

# PARSONS

100 Summer Street, 8th Floor • Boston, Massachusetts 02110 • (617) 457-7900 • Fax: (617) 457-7979 • www.parsons.com

July 26, 2004

Mr. Scott Bradley  
U.S. Army Corps of Engineers  
Engineering and Support Center, Huntsville  
Attn: CEHNC-FS-IS  
4820 University Square  
Huntsville, AL 35816-1822

**Subject: Seneca Army Depot Activity, Final Decision Document for the Inhibited Red-Fuming Nitric Acid (IRFNA) Disposal Site (SEAD-13)**


---

Dear Mr. Bradley:

Parsons Engineering Science, Inc. (Parsons) is pleased to submit the Final Decision Document for the SEAD-13 Inhibited Red-Fuming Nitric Acid (IRFNA) Disposal Site at the Seneca Army Depot Activity (SEDA) located in Romulus, New York. This work was performed in accordance with the Scope of Work (SOW) for Delivery Order 0023 under Contract DACA87-95-D-0031.

Parsons appreciates the opportunity to provide the Army with this document. Should you have any questions, please do not hesitate to call me at (617) 457-7905 to discuss them.

Sincerely,

*Todd Heino*  


Todd Heino, P.E.  
Program Manager

Enclosures

cc: Mr. S. Absolom, SEDA  
Mr. T. Enroth, CENAN  
Mr. K. Hoddinott, USACHPPM (PROV)  
Mr. C. Boes, USAEC



# PARSONS

100 Summer Street, 8th Floor • Boston, Massachusetts 02110 • (617) 457-7900 • Fax: (617) 457-7979 • www.parsons.com

July 26, 2004

Mr. Julio Vazquez  
USEPA Region II  
Superfund Federal Facilities Section  
290 Broadway, 18<sup>th</sup> Floor  
New York, NY 10007-1866

Mr. Joseph White  
New York State Department of Environmental Conservation (NYSDEC)  
Bureau of Eastern Remedial Action  
Division of Hazardous Waste Remediation  
625 Broadway 11<sup>th</sup> Floor  
Albany, NY 12233-7015

**Subject: Seneca Army Depot Activity, Final Decision Document for the Inhibited Red-Fuming Nitric Acid (IRFNA) Disposal Site (SEAD-13)**

---

Dear Mr. Vazquez/Mr. White:

Parsons Engineering Science, Inc. (Parsons) is pleased to submit the Final Decision Document for the SEAD-13 Inhibited Red-Fuming Nitric Acid (IRFNA) Disposal Site at the Seneca Army Depot Activity (SEDA) located in Romulus, New York.

Should you have any questions, please do not hesitate to call me at (617) 457-7905 to discuss them.

Sincerely,

*Todd Heino*  
*by J. P. Adams*

Todd Heino, P.E.  
Program Manager

Enclosures

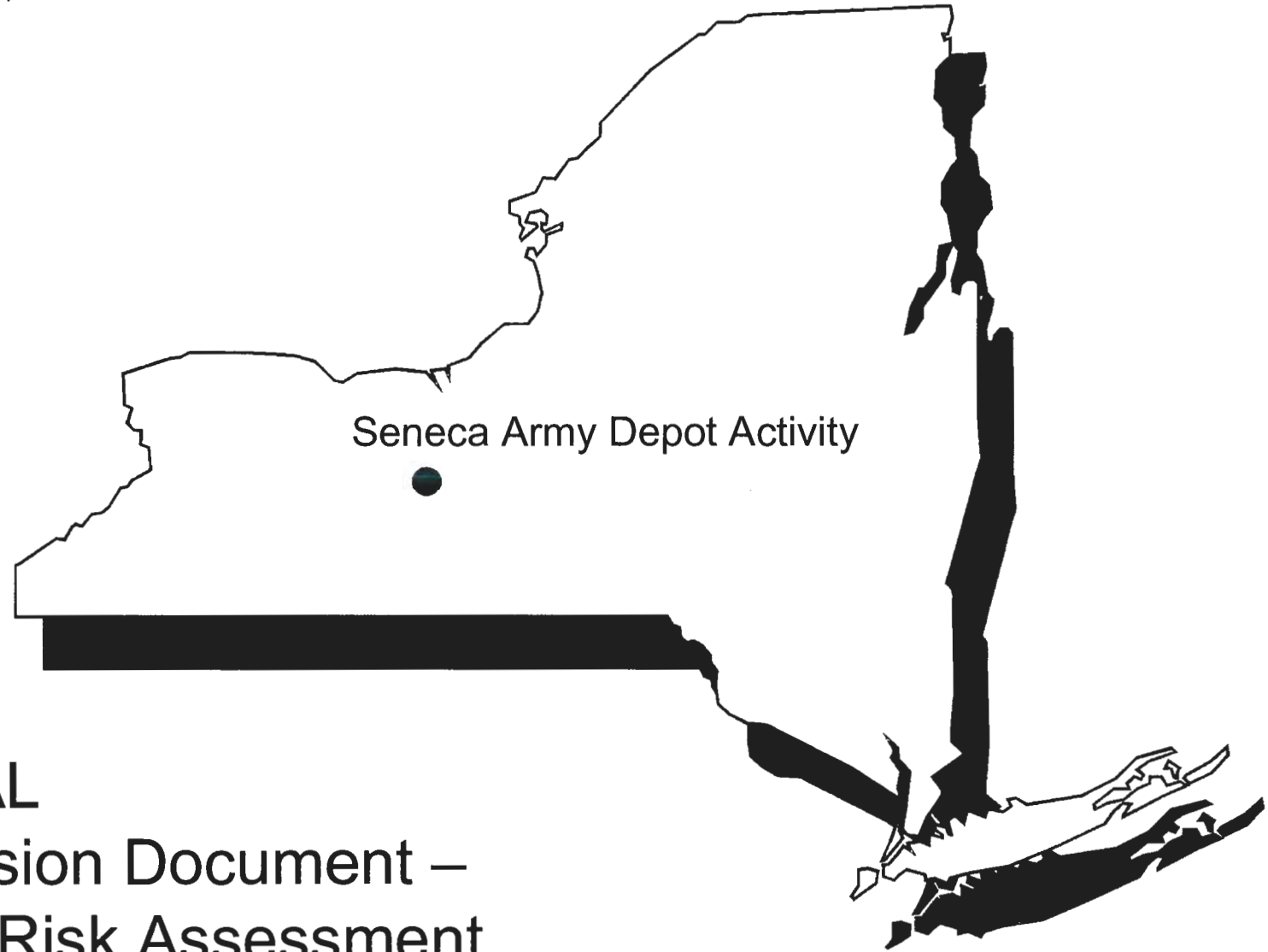
cc: S. Absolom, SEDA  
T. Enroth, USACE  
E. Kashdan  
C. Bethoney, NYSDOH  
C. Boes, AEC  
K. Hoddinott, USACHPPM  
S. Bradley, USACE





Seneca Army Depot Activity  
Romulus, NY

00813  
CD 80  
8/3, 4/26, 2/19



**FINAL DECISION DOCUMENT – MINI RISK ASSESSMENT**  
SEAD-13 – Inhibited Red Fuming Nitric Acid (IRFNA) Disposal Site

# FINAL Decision Document – Mini Risk Assessment

SEAD-13 – Inhibited Red Fuming Nitric Acid  
(IRFNA) Disposal Site

EPA Site ID# NY0213820830

NY Site ID# 8-50-006

CONTRACT NO. DACA87-95-D-0031

DELIVERY ORDER NO. 0023

JULY 2004

**FINAL DECISION DOCUMENT**  
**MINI RISK ASSESSMENT**  
**SEAD-13, INHIBITED RED FUMING NITRIC ACID (IRFNA)**  
**DISPOSAL AREA**

**Prepared For:**

**SENECA ARMY DEPOT ACTIVITY**  
**ROMULUS, NEW YORK 14541**  
**and**  
**US ARMY CORPS OF ENGINEERS**  
**HUNTSVILLE, ALABAMA 35816**

**Prepared By:**

**PARSONS**  
100 Summer St, 8<sup>th</sup> Fl.  
Boston, Massachusetts 02110

**Contract Number DACA87-95-D-0031**  
**Delivery Order # 0023**  
**736994-01002**

**July 2004**

## TABLE OF CONTENTS

<u>Section</u>	<u>Page</u>
<b>1.0 INTRODUCTION</b>	1-1
1.1 Objective of This Document	1-1
1.2 Historic Overview	1-2
1.3 Environmental Setting	1-2
1.3.1 Geology	1-2
1.3.2 Hydrogeology	1-3
<b>2.0 FIELD INVESTIGATIONS AT SEAD-13</b>	2-1
2.1 Introduction	2-1
2.2 Site Description	2-1
2.3 Historic Operations	2-2
2.4 Summary of Field Investigations	2-2
2.4.1 Geophysics	2-4
2.4.2 Soils	2-4
2.4.3 Groundwater	2-4
2.4.4 Surface Water and Sediment	2-5
2.5 Result of Field Investigation	2-6
2.5.1 Seismic Survey	2-6
2.5.2 Electromagnetic Survey	2-7
2.5.3 GPR Survey	2-8
2.5.4 Abandoned Pipes	2-8
2.5.5 Groundwater Flow and Elevation	2-9
2.6 Summary of Analytical Results	2-10
2.6.1 Surface Soils	2-10
2.6.1.1 Volatile Organic Compounds	2-10
2.6.1.2 Semivolatile Organic Compounds	2-10
2.6.1.3 Pesticides and PCBs	2-11
2.6.1.4 Herbicides	2-11
2.6.1.5 Metals	2-11
2.6.1.6 Nitroaromatics	2-11
2.6.1.7 Indicator Compound	2-12
2.6.2 Subsurface Soils	2-12
2.6.2.1 Volatile Organic Compounds	2-12
2.6.2.2 Semivolatile Organic Compounds	2-12
2.6.2.3 Pesticides and PCBs	2-12
2.6.2.4 Herbicides	2-12
2.6.2.5 Metals	2-13
2.6.2.6 Nitroaromatics	2-13

2.6.2.7	Indicator Compound	2-13
2.6.3	Groundwater Sampling Summary	2-14
2.6.3.1	Volatile Organic Compounds	2-14
2.6.3.2	Semivolatile Organic Compounds	2-14
2.6.3.3	Pesticides and PCBs	2-14
2.6.3.4	Herbicides	2-14
2.6.3.5	Metals	2-14
2.6.3.6	Indicator Compound	2-15
2.6.3.7	Turbidity and pH Results	2-15
2.6.4	Surface Water Sampling Summary	2-16
2.6.4.1	Volatile Organic Compounds	2-16
2.6.4.2	Semivolatile Organic Compounds	2-16
2.6.4.3	Pesticides and PCBs	2-17
2.6.4.4	Herbicides	2-17
2.6.4.5	Metals	2-17
2.6.4.6	Nitroaromatics	2-17
2.6.4.7	Indicator Compound	2-17
2.6.5	Sediment Sampling Summary	2-18
2.6.5.1	Volatile Organic Compounds	2-18
2.6.5.2	Semivolatile Organic Compounds	2-18
2.6.5.3	Pesticides and PCBs	2-18
2.6.5.4	Herbicides	2-18
2.6.5.5	Metals	2-18
2.6.5.6	Nitroaromatics	2-19
2.6.5.7	Indicator Compound	2-19
<b>3.0</b>	<b>HUMAN HEALTH MINI-RISK ASSESSMENTS</b>	3-1
3.1	Methodology and Organization of Document	3-2
3.2	Identification of Chemicals of Potential Concern	3-3
3.2.1	Site Specific Data Evaluation Considerations	3-4
3.2.1.1	QA/QC Methods	3-4
3.2.1.2	Analytical Methods	3-4
3.2.1.3	Data Validation	3-4
3.2.2	Identification of Chemicals of Potential Concern (COPCs)	3-5
3.3	Exposure Assessment	3-7
3.3.1	Overview and Characterization of Exposure Setting	3-7
3.3.2	Physical Setting and Characteristics	3-8
3.3.3	Land Use and Potentially Exposed Populations	3-8
3.3.3.1	Current Land Use	3-8
3.3.3.2	Potential Future Land Use	3-9
3.3.3.3	Potentially Exposed Populations	3-9
3.3.4	Identification of Exposure Pathways	3-10
3.3.4.1	Sources and Receiving Media	3-10
3.3.4.2	Fate and Transport	3-10

	3.3.4.3	Summary of Exposure Pathways to be Quantified	3-11
3.3.5		Quantification of Exposure	3-13
	3.3.5.1	Exposure Assumptions	3-14
	3.3.5.2	Exposure Scenarios	3-15
	3.3.5.3	Inhalation of Particulate Matter in Ambient Air	3-16
	3.3.5.4	Incidental Ingestion of Soil	3-20
	3.3.5.5	Dermal Contact with Soils	3-20
	3.3.5.6	Groundwater Ingestion	3-22
	3.3.5.7	Dermal Contact to Groundwater while Showering/Bathing	3-23
	3.3.5.8	Inhalation of Groundwater while Showering/Bathing	3-25
	3.3.5.9	Dermal Exposure to Surface Water	3-27
	3.3.5.10	Dermal Exposure to Sediment	3-27
3.4		Toxicity Assessment	3-28
	3.4.1	Non-carcinogenic Effects	3-28
	3.4.1.1	Reference Doses for Oral and Inhalation Exposure	3-29
	3.4.1.2	Reference Doses for Dermal Exposure	3-30
	3.4.1.3	Exposure Periods	3-30
	3.4.2	Carcinogenic Effects	3-30
	3.4.2.1	Cancer Slope Factors for Oral and Inhalation Exposure	3-33
	3.4.2.2	Cancer Slope Factors for Dermal Exposure	3-34
3.5		Risk Characterization	3-34
	3.5.1	Introduction	3-34
	3.5.1.1	Noncarcinogenic Effect	3-34
	3.5.1.2	Carcinogenic Effect	3-35
	3.5.2	Risk Summary	3-36
	3.5.3	Uncertainty Assessment	3-37
	3.5.3.1	Uncertainty in Data Collection and Evaluation	3-37
	3.5.3.2	Uncertainty in Exposure Assessment	3-38
	3.5.3.3	Uncertainty in Toxicity Assessment	3-39
	3.5.3.4	Uncertainty in Risk Characterization	3-40
	3.5.4	Risk Characterization For Residential Land Use	3-40
<b>4.0</b>		<b>ECOLOGICAL RISK ASSESSMENT (ERA)</b>	4-1
	4.1	Objectives and Overview	4-1
	4.2	Problem Formulation	4-2
	4.2.1	Environmental Setting and Contaminants at the Site	4-2
	4.2.2	Contaminant Fate and Transport	4-4
	4.2.3	Ecotoxicity and Potential Receptors	4-4
	4.2.4	Complete Exposure Pathways	4-5
	4.2.5	Assessment and Measurement Endpoints	4-7
	4.3	Exposure Assessment	4-9
	4.3.1	Constituent Distribution	4-9
	4.3.2	Receptor Distribution	4-9
	4.3.3	Quantification of Exposure	4-10

4.3.4	Effects Assessment	4-13
4.4	Risk Characterization	4-14
4.4.1	Surface Soil (0-2 ft)	4-15
4.4.2	Surface Water	4-15
4.4.3	Sediment	4-15
4.4.4	Uncertainty	4-15
4.4.4.1	Chemicals of Potential Concern	4-15
4.4.4.2	Exposure Assessment	4-16
4.4.4.3	Toxicity Assessment	4-16
4.4.4.4	Risk Characterization	4-17
4.5	Further Refinement of Contaminants of Concern	4-17
4.5.1	Overall Conservative Evaluation of Ecological Risks in Steps 1 and 2	4-17
4.5.2	Identification of Soil COCs	4-18
4.5.3	Identification of Surface Water COCs	4-20
4.5.4	Identification of Sediment COCs	4-20
4.6	Ecological Risk Summary	4-21
<b>5.0</b>	<b>RECOMMENDATIONS</b>	5-1
5.1	Expanded Site Investigation Results Supporting the Recommended Action	5-2
5.2	Mini Risk Assessment Results Supporting the Recommended Action	5-3



**LIST OF APPENDICES**

- Appendix A: SEAD-13: Laboratory Analyses Results  
Risk Calculation Tables for Conservation/Recreation Land Use
- Appendix B: Risk Calculation Tables for Residential Scenario  
Seneca Background Data
- Appendix C: Laboratory Analyses Results for All Compounds
- Appendix D: Results for NYSDEC Surface Soil Sampling – June 2004
- Appendix E: Toxicological Profiles for Selected COCs
- Appendix F: Response to Comments

**LIST OF TABLES**

Table 3.2-1	Summary of Samples Collected
Table 3.2-2	Chemicals of Potential Concern-SEAD-13
Table 3.3-1	Exposure Factor Assumptions for Conservation/Recreation Land
Table 3.3-2	Suspended Particulate Concentrations Measured at SEDA
Table 3.4-1	Toxicity Values
Table 3.5-1	Calculation of Total Noncarcinogenic and Carcinogenic Risks
Table 4.2-1	Policy Goals, Ecological Assessment and Measurement Endpoints, and Decision Rules
Table 4.3-1	Wildlife Intake Rates
Table 4.3-2	Environmental Fate and Transport Properties for Chemicals of Potential Concern
Table 4.3-3A	NOAEL Toxicity Reference Values – Mammals
Table 4.3-3B	NOAEL Toxicity Reference Values – Birds
Table 4.4-1	Hazard Quotient Summary – Terrestrial Receptors
Table 4.4-2	Hazard Quotient Summary – Aquatic Receptors

**LIST OF FIGURES**

Figure 1-1	Regional Geologic Cross Sections
Figure 1-2	Wind Rose, Syracuse, New York
Figure 2-1	Seneca Army Depot Map
Figure 2-2	SEAD-13 – IRFNA Disposal Site, Site Plan
Figure 2-3	SEAD-13 - IRFNA Disposal Site, Location of Sampling Points
Figure 2-4	SEAD-13 - IRFNA Disposal Site, Surface Water Samples
Figure 2-5	SEAD-13 – IRFNA Disposal Site, EM Survey, Apparent Conductivity
Figure 2-6	SEAD-13 - IRFNA Disposal Site, Approximate Location of Underground Piping
Figure 2-7	SEAD-13 - IRFNA Disposal Site, Groundwater Elevation Plan
Figure 2-8	SEAD-13 - IRFNA Disposal Site, Nitrates in Groundwater
Figure 2-9	SEAD-13 - IRFNA Disposal Site, Plume Delineation
Figure 2-10	SEAD-13 - IRFNA Disposal Site, pH Readings – April 2002
Figure 3-1	Exposure Assessment Process
Figure 3-2	Exposure Pathway Summary Conservation and Recreation Scenario
Figure 4-1	Ecological Conceptual Site Model

**LIST OF ACRONYMS**

AN	Army-Navy
AOC	Area of Concern
ARAR	Applicable or Relevant and Appropriate Requirements
AWQS	Ambient Water Quality Standards
BAF	Bioaccumulation Factor
BAP	Benzo(a)pyrene
BCF	Bioconcentration Factor
BGS	Below ground surface
BPAH	Benzo-polyaromatic hydrocarbons
BRA	Baseline Risk Assessment
BRAC	Base Realignment and Closure
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
CERFA	Community Environmental Response Facilitation Act
CLP	Contract Laboratory Program
COC	Constituent of Concern
COPC	Constituents of Potential Concern
CRAVE	Carcinogen Risk Assessment Verification Endeavor
CSF	Cancer Slope Factors
CSM	Conceptual Site Model
CT	Central Tendency
DoD	Department of Defense
EBS	Environmental Baseline Survey
EE/CA	Engineering Evaluation/Cost Analysis
EM-31	Electromagnetic-31 geophysical unit
EPA	Environmental Protection Agency
EPC	Exposure Point Concentration
ERA	Ecological Risk Assessment
ESI	Expanded Site Inspection
FFA	Federal Facility Agreement
FS	Feasibility Study
ft	Feet
GPR	Ground Penetrating Radar
HEAST	Health Effects Assessment Summary Tables
HF	hydrofluoric acid
HI	Hazard Index
HNO <sub>3</sub>	nitric acid
HQ	Hazard Quotient
HSWA	Hazardous and Solid Waste Amendments
IAG	Interagency Agreement
IEUBK	Integrated Exposure Uptake Biokinetic Model
IRFNA	Inhibited Red Fuming Nitric Acid

**LIST OF ACRONYMS (continued)**

IRIS	Integrated Risk Information System
IRM	Interim Remedial Measures
IRP	Installation Restoration Program
LOAEL	Lowest Observed Adverse Effect Level
LOT	Limit of Tolerance
LRA	Local Redevelopment Authority
mg/Kg	milligrams per kilogram
mg/L	milligrams per liter
MRD	Army Corps of Engineers Missouri River Division
MS/MSD	Matrix spike/matrix spike duplicate
MW	Monitoring Well
NA	Not analyzed or not available
NBS	National Bureau of Standards
NFA	No Further Action
NOAEL	No Observed Adverse Effect Level
NO <sub>2</sub>	nitrogen dioxide
NO <sub>3</sub> /NO <sub>2</sub> -N	Nitrate/nitrite-nitrogen
NPL	National Priority List
ns	nanosecond
NTU	Nephelometric Turbidity Units
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OB	Open Burning
OSWER	Office of Solid Waste and Emergency Response
OVM	Organic Vapor Meter
PCB	Polychlorinated Biphenyls
PAH	Polyaromatic Hydrocarbons
PM	Particulate Matter
ppm	parts per million
QA	Quality Assurance
QC	Quality Control
RAGS	<i>Risk Assessment Guidance for Superfund</i>
RBRG	Risk-Based Remediation Goals
RCRA	Resource Conservation Recovery Act
RD/RA	Remedial Design/Remedial Action
RfC	Reference Concentration
RfD	Reference Dose
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RME	Reasonable Maximum Exposure
ROD	Record of Decision

**LIST OF ACRONYMS (continued)**

SB	Soil Boring
SD	Sediment
SEAD	Seneca Army Depot
SEDA	Seneca Army Depot Activity
SFF	Site Foraging Factor
SGC	Standard, Guideline and Criteria
SLERA	Screening-Level Ecological Risk Assessment
SOW	Statement of Work
SS	Surface Soils
SVO	Semivolatile Organic
SW	Surface Water
SWMUs	Solid Waste Management Units
TAGM	Technical Administrative Guidance Memorandums
TAL	Target Analyte List
TCL	Target Compound List
TDS	Total Dissolved Solids
TEF	Toxicity Equivalency Factors
TOC	Total Organic Carbon
TPH	Total Petroleum Hydrocarbons
TP	Test Pit
TRV	Toxicity Reference Value
TSP	Total Suspended Particulate Matter
UCL	Upper 95 <sup>th</sup> Confidence Limit
µg/Kg	micrograms per kilogram
µg/L	micrograms per liter
URF	Unit Risk Factors
USACOE	US Army Corps of Engineers
USCS	Unified Soil Classification System
VOC	Volatile Organic Compound
yd	Yards

## REFERENCES

- Andelman, J.B., 1984. "Non-Ingestion Exposures to Chemicals in Potable Water," Working Paper No. 84-03, Graduate School of Public Health, University of Pittsburgh, Pittsburgh, PA, 15261.
- Andelman, J.B., 1985a. "Inhalation Exposure in the Home to Volatile Organic Contaminants of Drinking Water," *Science of the Total Environment*, 47, pp. 443-460.
- Andelman, J.B., 1985b. "Human Exposures to Volatile Halogenated Organic Chemicals in Indoor and Outdoor Air," *Environmental Health Perspectives*, 62, pp. 313-318.
- ATSDR (Agency for Toxic Substances and Disease Registry), 1989. Draft Toxicological Profile for Di-n-butyl Phthalate. Prepared by Life Systems, Inc. for U.S. Department of Health and Human Services.
- ATSDR (Agency for Toxic Substances and Disease Registry), 1990a. Draft Toxicological Profile for Antimony. Prepared by Syracuse Research Corporation for U.S. Department of Health and Human Services.
- ATSDR (Agency for Toxic Substances and Disease Registry), 1990b. Draft Toxicological Profile for Barium. Prepared by Clement Associates, Inc. for U.S. Department of Health and Human Services.
- ATSDR (Agency for Toxic Substances and Disease Registry), 1990c. Draft Toxicological for 2-Butanone. Prepared by Syracuse Research Corporation for U.S. Department of Health and Human Services.
- ATSDR (Agency for Toxic Substances and Disease Registry), 1990d. Toxicological Profile for Copper. Prepared by Syracuse Research Corporation for U.S. Department of Health and Human Services.
- ATSDR (Agency for Toxic Substances and Disease Registry), 1990e. Toxicological Profile for Silver. Prepared by Clement International Corporation for U.S. Department of Health and Human Services.
- ATSDR (Agency for Toxic Substances and Disease Registry), 1990f. Draft Toxicological Profile for Thallium. Prepared by Life Systems, Inc. and Clement Associates, Inc. for U.S. Department of Health and Human Services.
- ATSDR (Agency for Toxic Substances and Disease Registry), 1991a. Draft Toxicological Profile for Arsenic. Prepared by Clement International, Inc. for U.S. Department of Health and Human Services.
- ATSDR (Agency for Toxic Substances and Disease Registry), 1991b. Draft Toxicological Profile for Cadmium. Prepared by Life Systems, Inc. for U.S. Department of Health and Human Services.
- ATSDR (Agency for Toxic Substances and Disease Registry), 1991c. Draft Toxicological Profile for Methylene Chloride. Prepared by Life Systems, Inc. for U.S. Department of Health and Human Services.

ATSDR (Agency for Toxic Substances and Disease Registry), 1991d. Draft Toxicological Profile for N-nitrosodiphenylamine. Prepared by Syracuse Research Corporation for U.S. Department of Health and Human Services.

ATSDR (Agency for Toxic Substances and Disease Registry), 1992a. Toxicological Profile for Aluminum. Prepared by Clement International Corp. for U.S. Department of Health and Human Services.

ATSDR (Agency for Toxic Substances and Disease Registry), 1992b. Draft Toxicological Profile for Antimony. Prepared by Syracuse Research Corporation for U.S. Department of Health and Human Services.

ATSDR (Agency for Toxic Substances and Disease Registry), 1993a. Toxicological Profile for Di-2-Ethylhexyl Phthalate. Prepared by Life Systems, Inc. for U.S. Department of Health and Human Services.

ATSDR (Agency for Toxic Substances and Disease Registry), 1993b. Toxicological Profile for Endosulfan. Prepared by Clement International Corp. for U.S. Department of Health and Human Services.

ATSDR (Agency for Toxic Substances and Disease Registry), 1993c. Toxicological Profile for Heptachlor/Heptachlor Epoxide. Prepared by Clement International Corporation for U.S. Department of Health and Human Services.

ATSDR (Agency for Toxic Substances and Disease Registry), 1994a. Toxicological Profile for Acetone. Prepared by Syracuse Research Corporation and Clement International Corporation for U.S. Department of Health and Human Services.

ATSDR (Agency for Toxic Substances and Disease Registry), 1994b. Draft Toxicological Profile for Carbon Disulfide (Update). Prepared by Sciences International, Inc. for U.S. Department of Health and Human Services.

ATSDR (Agency for Toxic Substances and Disease Registry), 1994c. Toxicological Profile for Chlordane. Prepared by Syracuse Research Corporation and Clement International Corporation for U.S. Department of Health and Human Services.

ATSDR (Agency for Toxic Substances and Disease Registry), 1994d. Toxicological Profile for 4,4'-DDT, 4,4'-DDE, 4,4'-DDD. Prepared by Clement International Corporation for U.S. Department of Health and Human Services.

ATSDR (Agency for Toxic Substances and Disease Registry), 1994e. Draft Toxicological Profile for Endrin. Prepared by Research Triangle Institute for U.S. Department of Health and Human Services.

ATSDR (Agency for Toxic Substances and Disease Registry), 1994f. Toxicological Profile for Mercury. Prepared by Clement International Corporation for U.S. Department of Health and Human Services.



ATSDR (Agency for Toxic Substances and Disease Registry), 1994g. Draft Toxicological Profile for 1,1,2,2-Tetrachloroethane (Update). Prepared by Research Triangle Institute for U.S. Department of Health and Human Services.

ATSDR (Agency for Toxic Substances and Disease Registry), 1994h. Toxicological Profile for Toluene. Prepared by Life Systems, Inc. and Clement International Corporation for U.S. Department of Health and Human Services.

ATSDR (Agency for Toxic Substances and Disease Registry), 1995a. Draft Toxicological Profile for Benzene (Update). Prepared by Research Triangle Institute for U.S. Department of Health and Human Services.

ATSDR (Agency for Toxic Substances and Disease Registry), 1995b. Draft Toxicological Profile for Chloroform (Update). Prepared by Research Triangle Institute for U.S. Department of Health and Human Services.

ATSDR (Agency for Toxic Substances and Disease Registry), 1995c. Toxicological Profile for Polycyclic Aromatic Hydrocarbons (PAHs). Prepared by Research Triangle Institute for U.S. Department of Health and Human Services.

ATSDR (Agency for Toxic Substances and Disease Registry), 1995d. Draft Toxicological Profile for Naphthalene (Update). Prepared by Sciences International, Inc. for U.S. Department of Health and Human Services.

ATSDR (Agency for Toxic Substances and Disease Registry), 1995e. Toxicological Profile for Tetryl. Prepared by Research Triangle Institute for U.S. Department of Health and Human Services.

ATSDR (Agency for Toxic Substances and Disease Registry), 1995f. Toxicological Profile for Xylenes (Update). Prepared by Sciences International, Inc. for U.S. Department of Health and Human Services.

Beyer, W.N., 1990. Evaluating Soil Contamination. U.S. Fish and Wildlife Service, Biological Report 90 (2).

Beyer, W.N. and E.J. Cromartie, 1987. A Survey of Pb, Cu, Zn, Cd, Cr, As, and Se in earthworms and soil from diverse sites. Environmental Monitoring and Assessment 8: 27-36.

Beyer, W.N., E.E. Connor, and S. Gerould, 1994. Estimates of soil ingestion by wildlife. Journal of Wildlife Mgt. 58: 375-382.

Bouwer H. and Rice R.C., 1976, A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers with Completely or Partially Penetrating Wells, Water Resources Research, Vol. 12, No. 3 pp. 423-428.

Bouwer H. and Rice R.C., 1989, The Bouwer and Rice Slug Test - An Update, Groundwater

Vol. 27, No. 3 pp. 304-309.

Brett, C.E., Dick, V.B, Baird, G.C., 1991, "Comparative Taphonomy and Paleocology of Middle Devonian Dark Gray and Black Shale Facies from Western New York;" in eds., Landing, E.L. and Brett, C.E., Dynamic Stratigraphy and Depositional Environments of the Hamilton Group (Middle Devonian) in New York State, Part II, New York State Museum Bulletin Number 469. pp. 5-36.

Cornell University, 1967. Land Use Report.

Crain, L.J., "Groundwater Resources of the Western Oswego River Basin, New York". U.S. Geological Survey and State of New York Basin Planning Report ORB-5, 1974.

Department of Defense, 1997. Memorandum "Responsibility for Additional Environmental Cleanup after Transfer of Real Property". Office of the Under Secretary of Defense. July 25, 1997.

Dixon, K., T. LaPoint, R. Dickerson, K. Brooks, C. Bens, R. Mellot, S. Anderson, A. Edinger, L. Esman, M. Feken and S. Wall, 1993. Characterization of Waste Sites at Savannah River Site - Draft. Project 09268 Report. The Institute of Wildlife and Environmental Toxicology at Clemson University, Pendleton, SC.

EPA (U.S. Environmental Protection Agency), 1985. Rapid Assessment of Exposure to Particulate Emissions from Surface Contamination Sites.

EPA (U.S. Environmental Protection Agency), 1988. Superfund Exposure Assessment Manual. Office of Emergency and Remedial Response, Washington, DC. EPA/540/1-88/001.

EPA (U.S. Environmental Protection Agency), 1989a. Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual. EPA/540/1-89/001, USEPA, Washington, DC.

EPA (U.S. Environmental Protection Agency), 1991a. Human Health Evaluation Manual, Supplemental Guidance: "Standard Default Exposure Factors." Office of Solid Waste and Emergency Response, PB91-921314.

EPA (U.S. Environmental Protection Agency), 1992. "Dermal Exposure Assessment: Principles and Applications." Office of Research and Development. Washington, D.C. EPA/600/8-91/0 11B.

EPA (U.S. Environmental Protection Agency), 1992a. Framework for Ecological Risk Assessment. EPA/630/R-92/001. Risk Assessment Forum, Washington, D.C.

EPA (U.S. Environmental Protection Agency), 1993a. Superfund's Standard Default Exposure Factors for the Central Tendency and Reasonable Maximum Exposure. Preliminary Review Draft. Risk Assessment Council, Washington DC. November 4, 1993.

- EPA (U.S. Environmental Protection Agency), 1993b. Health Effects Assessment Summary Tables - Annual Update. March 1993.
- EPA (U.S. Environmental Protection Agency), 1993c. Wildlife Exposure Factors Handbook. Office of Research and Development, EPA/600/R-93/187a and b.
- EPA (U.S. Environmental Protection Agency), 1993d. "Seminar on Technologies for Remediating Sites Contaminated with Explosive and Radioactive Wastes." Office of Research and Development. Washington, D.C. EPA/625/K-93/011. June 1993.
- EPA (U.S. Environmental Protection Agency), 1993e. "Models for Estimation Air Emission Rates from Superfund Remedial Actions". Washington, D.C. EPA/451/R-93-001. March 8, 1993.
- EPA (U.S. Environmental Protection Agency), 1994. Guidance Manual for the Integrated Exposure Uptake Biokinetic Model for Lead in Children. February 1994.
- EPA (U.S. Environmental Protection Agency), 1994a. Memorandum from Dr. Gerry Henningsen, EPA Region VIII toxicologist, to EPA Region VIII. Hazardous Waste Management Site Remedial Program Managers and Contractors. September 28.
- EPA (U.S. Environmental Protection Agency), 1994b. "Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities". Office of Solid Waste and Emergency Response, Interim Directive #9355.4-12. February 1994.
- EPA (U.S. Environmental Protection Agency), 1994c. Application of the Trophic Level Concept to Analysis of Environmental Contaminant Transfer through Terrestrial Food Webs: Issues and Comparison with Aquatic Trophic Levels (Draft). Office of Science and Technology and Office of Water.
- EPA (U.S. Environmental Protection Agency), 1995. Region IV, Supplemental Guidance to RAGS: Region 4 Bulletins, Human Health and Ecological Risk Assessment. November 1995.
- EPA (U.S. Environmental Protection Agency), 1995a. Memorandum "Land Use in the CERCLA Remedy Selection Process". Office of Solid Waste and Emergency Response, Directive #9355.7-04. May 25, 1995.
- EPA (U.S. Environmental Protection Agency), 1996a. Proposed Guidelines for Ecological Risk Assessment. Federal Register 61(175):47552-47631.
- EPA (U.S. Environmental Protection Agency), 1996b. Integrated Risk Information System (IRIS), on-line May, 1996.
- EPA (U.S. Environmental Protection Agency), 1996c. "Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil." December 1996.

- EPA (U.S. Environmental Protection Agency), 1997, Exposure Factors Handbook.
- EPA (U.S. Environmental Protection Agency), 1997. Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments. June 1997.
- EPA (U.S. Environmental Protection Agency), 1997. Health Effects Assessment Summary Tables - Annual Update. July 1997.
- EPA (U.S. Environmental Protection Agency), 1999. Ecological Risk Assessment Bulletins – Supplemental to RAGS. August 1999.
- EPA (U.S. Environmental Protection Agency), 2001. Risk Assessment Guidance for Superfund Volume I: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment) Interim. September 2001.
- ERCE, 1991. SWMU Classification Report, 1991.
- Freeze, R.A. and Cherry, J.A., 1979. Groundwater, Prentice-Hall, Inc. Englewood Cliffs, New Jersey 07632, 604 pp.
- Gilbert, Richard O., 1987. Statistical Methods for Environmental Pollution Monitoring. Van Nostrand Reinhold, New York.
- Gray, L.M., 1991, "Paleoecology, Origin, and Significance of a Shell-Rich Bed in the Lowermost Part of the Ludlowville Formation (Middle Peronian, Central New York)," in eds. Landing, E.L. and Brett, C.E., Dynamic Stratigraphy and Depositional Environments of the Hamilton Group (Middle Devonian) in New York State, Part II, New York State Museum Bulletin 469, p.93-105.
- HSDB (Hazardous Substances Data Bank), 1994. National Library of Medicine (NLM) On-Line Toxicological Network (TOXNET). Bethesda, MD.
- Holzworth, George C., "Mixing Heights, Windspeed, and Potential for Urban Air Pollution throughout the Contiguous United States," January, 1972.
- Horslev, M.J., 1951, Time Lag and Soil Permeability in Ground-water Observations, Bulletin No. 36, Waterways Experiment Station, Corps of Engineers, U.S. Army.
- International Technology Corporation. "Final Report – Volume I, Building 360 Closure, Seneca Army Depot Activity, Romulus New York." July 1995.
- LaSala, A.M. Jr., 1968, Groundwater Resources of the Erie-Niagara Basin, New York: Basic Planning Report ENB-3, State of New York Conservation Department with Resources Commission.

- Ma, W., Th. Edelman, I. van Beersum and Th. Jans, 1983. Uptake of Cadmium, Zinc, Lead, and Copper by Earthworms near a Zinc-smelting Complex: Influence of Soil pH and Organic Matter. *Bull. Environ. Contam. Toxicol.* 30: 424-427.
- McKee, J.E. and H.W. Wolf, 1963. *Water Quality Criteria*. California State Water Resources Control Board. Publication No. 3-A. 548p.
- Merrin, Ira. S., 1992, "Conceptual Model of Ground Water Flow in Fractured Siltstone Based on Analysis of Rock Cores, Borehole Geophysics, and Thin Sections." *Ground Water Monitoring Review*, Fall, 1992.
- Metcalf & Eddy, 1989. *Criteria Development Report for the Closure of Nine Burning Pads Seneca Army Depot, Seneca, New York; Vol. I.*
- Menzie, C.A., D.E. Burmaster, F.S. Freshman and C.A. Callahan, 1992. Assessment of Methods for Estimating Ecological Risk in the Terrestrial Component: A Case Study at the Baird and McGuire Superfund Site in Holbrook, Massachusetts. *Environmental Toxicology and Chemistry* 11: 245-260.
- Menzie, C., J. Cura, J. Freshman and S. Svirsky, 1993. Evaluating Ecological Risks and Developing Remedial Objectives at Forested Wetland Systems in New England. pp. 89-100 in *Application of Ecological Risk Assessment to Hazardous Waste Site Remediation*. Workshop Proceedings. USEPA Science Advisory Board.
- Mozola, A.J., 1951, *The Groundwater Resources of Seneca County, New York*, Bulletin GW-26. Water, Power and Control Commission, Department of Conservation, State of New York, Albany, New York.
- NRC (Nuclear Regulatory Commission), 1992. *Residual Radioactive Contamination From Decommissioning, Technical Basis for Translating Contamination Levels to Annual Total Effective Dose Equivalent*. Final Report, NUREG/CR-5512, PNL-7994, Vol 1.
- NYSDEC (New York State Department of Environmental Conservation), 1993a. *Division of Water Technical and Operations Guidance Series (1.1.1), Ambient Water Quality Standards and Guidance Values*. October 1993.
- NYSDEC (New York State Department of Environmental Conservation), 1993b. *Technical Guidance for Screening of Contaminated Sediments*. November 1993.
- NYSDEC (New York State Department of Environmental Conservation), *Technical and Administrative Guidance Memorandum, Determination of Soil Cleanup Objectives and Cleanup Levels*, TAGM HWR-92-4046, January 1994.
- Owen, Bruce A., 1990 "Literature-Derived Absorption Coefficient for 39 Chemicals via Oral and Inhalation Routes of Exposure." *Regulatory Toxicology and Pharmacology*, Vol. II, pp 237-252.
- Parsons Engineering Science, Inc., 1994a. *SWMU Classification Report*, September 1994.

- Parsons Engineering Science, Inc., 1995a. Draft Final Report, Expanded Site Inspections of Eight Moderately Low Priority Solid Waste Management Units, December 1995.
- Parsons Engineering Science, Inc., 1995c. Draft Final Report, Expanded Site Inspections of Seven Low Priority Solid Waste Management Units, April 1995.
- Parsons Engineering Science, Inc., 1996. Draft Project Scoping Plan for Performing a CERCLA RI/FS at SEAD-52 and 60. January 1996.
- Parsons Engineering Science, Inc., 1998. Draft Report, Investigation of Moderate Non-Evaluated EBS Sites, May 1998.
- Sample, B.E., D.M. Opresko, and G.W. Suter II, 1996. Toxicological Benchmarks for Wildlife: 1996 Revision. Oak Ridge National Laboratory ES/ER/TM-86/R3.
- Scott, J.H., 1977. SIPT - A Seismic Refraction Inverse Modeling Program for Time Share Terminal Computer Systems, U.S. Geological Survey, Open File Report 77-366.
- SEDA (Seneca Army Depot), 1992c. Natural Resources Management Plan.
- Shacklette, H.T. at Boerngen, J.G., 1984, "Element Concentrations in Soils at other Surficial Materials of the Contiguous United States" U.S.G.S. Prof Paper 1270, Washington
- Suter, G.W., II, R.N. Hull and B.E. Sample, 1994. Ecological Risk Assessment for Comprehensive Environmental Response, Compensation, and Liability Act Sites on Federal Facilities: An Introductory Guide for Facility Managers. U.S. Dept of Energy, DOE/HWP-152.
- Travis, C.C. and A.D. Arms, 1988. Bioconcentration of Organics in Beef, Milk, and Vegetation. Environ. Sci. Technol. 22(3): 271-271.
- USDA (U.S. Department of Agriculture, Soil Conservation Service), 1972. Soil Survey, Seneca County, New York.
- U.S. Army Environmental Hygiene Agency, 1984. Phase 4 Evaluation of the Open Burning/Open Detonation Grounds. Investigation of Soil Contamination, Hazardous Waste Study No. 37-26-0479-85.
- U.S. Army Toxic and Hazardous Materials Agency (USATHMA), 1980, Installation Assessment of Seneca Army Depot, Report No. 157, AMXTH-IR-A-157, January 1980.
- U.S. Army Toxic and Hazardous Materials Agency (USATHAMA), 1989, Remedial Investigations Feasibility Studies, Seneca Army Depot Burning PA/Landfill.
- U.S. Geological Map of New York State, 1978.

Water Information Center, "Water Atlas of the United States," 1973.

## **1.0 INTRODUCTION**

### **1.1 OBJECTIVE OF THIS DOCUMENT**

On behalf of the United States Army (Army), Parsons is submitting this Decision Document for SEAD-13, located at the Seneca Army Depot Activity (SEDA or the Depot) in Romulus, New York. The goals of this decision document for the Inhibited Red Fuming Nitric Acid Disposal Site (IRFNA), SEAD-13, are to:

1. Assemble and summarize all of the currently known information about the site from the Expanded Site Investigation (ESI) in 1993/1994 and supplemental sampling conducted from 2000 to 2002;
2. Compare the available data and information with applicable guidance levels and standards and conduct a mini risk assessment in order to determine if there is an indication of potential threats to human health and the environment at the site;
3. Provide a recommendation that the area identified warrants no remedial action for soil, sediment, and surface water.

Additional information clarifying and substantiating recommendations pertinent to SEAD-13 is provided in the following sections of this Decision Document.

### **1.2 HISTORIC OVERVIEW**

The SEDA lies between Cayuga and Seneca Lakes in New York's Finger Lake Region, near the communities of Romulus and Varick, NY. SEDA encompasses approximately 10,600 acres of land and contains more than 900 buildings that provide more than 4.4 million square feet of space, including approximately 1.3 million square feet of storage space. Since its inception in 1941, the mission of the SEDA was the management of various military items, including munitions. Management of these items required areas and facilities for storage, quality assurance testing, range testing, munitions washout, deactivation furnaces and other support areas such as ordnance detonation. In addition, administrative and plant operational facilities were also established in support of the depot mission. Waste management was integrated with the SEDA management mission.

Management waste materials produced from these operations has been in accordance with the requirements of the Resource Conservation Recovery Act (RCRA). As part of the requirements of RCRA, the Depot identified a total of 72 Solid Waste Management Units (SWMUs). In 1990, the Depot was included in the federal section of the National Priority List (NPL). As a federal facility listed on the NPL, provisions of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA - 42 USC § 9620e) required that the US Army investigate the sites known to exist at SEDA and complete all necessary remedial investigations and actions at the facility. In accordance with this stipulation, the US Army, the US Environmental Protection Agency (EPA), and the New York State



Department of Environmental Conservation (NYSDEC) negotiated and finalized a Federal Facility Agreement (FFA) that outlines the administrative process and the procedures that will be followed to comply with CERCLA.

In 1995, the SEDA was designated for closure under the Department of Defense's (DoD's) Base Realignment and Closure (BRAC) process. In accordance with the requirements of the BRAC process, the Seneca County Board of Supervisors established, in October 1995, the Seneca Army Depot Local Redevelopment Authority (LRA). The primary responsibility assigned to the LRA is to plan and oversee the redevelopment of the Depot. The Reuse Plan and Implementation Strategy for Seneca Army Depot was adopted by the LRA and approved by the Seneca County Board of Supervisors on October 22, 1996. Under this plan and subsequent amendment, areas within the Depot were classified according to their most likely future use. These areas currently include:

- housing;
- institutional;
- industrial;
- warehousing;
- conservation/recreational land;
- an area designated for a future prison;
- an area for an airfield, special events, institutional, and training; and
- an area to be transferred from one federal entity to another (i.e., an area for the existing navigational LORAN transmitter).

The future land use currently recommended for SEAD-13 is conservation/recreation land.

## **1.3 ENVIRONMENTAL SETTING**

### **1.3.1 Geology**

SEDA is located within one distinct unit of glacial till that covers the entire area between the western shore of Lake Cayuga and the eastern shore of Lake Seneca. The till is consistent across the entire depot although it ranges in thickness from less than 2 feet to as much as 15 feet with the average being only a few feet thick. This till is generally characterized by brown to gray-brown silt, clay and fine sand with few fine to coarse gravel-sized inclusions of weathered shale. Larger diameter weathered shale clasts (as large as 6-inches in diameter) are more prevalent in basal portions of the till and are probably rip-up clasts removed by the active glacier during the late Pleistocene era. The general Unified Soil Classification System (USCS) description of the till on-site is as follows: Clay-silt, brown; slightly plastic, small percentage of fine to medium sand, small percentage of fine to coarse gravel-sized gray shale clasts, dense and mostly dry in place, till, (ML). Grain size analyses performed by Metcalf & Eddy (1989) on glacial till samples collected during the installation of monitoring wells at SEDA show a wide distribution of grain sizes. The glacial tills in this area have a high percentage of silt and clay with

trace amounts of fine gravel. A zone of gray weathered shale of variable thickness is present below the till in almost all locations at SEDA. This zone is characterized by fissile shale with a large amount of brown interstitial silt and clay.

This underlying bedrock below weathered shale is a member of the Ludlowville Formation of the Devonian age Hamilton Group. The Hamilton Group, 600 to 1,500 feet thick, is divided into four formations. They are, from oldest to youngest, the Marcellus, Skaneateles, Ludlowville, and Moscow formations. The western portion of SEDA is generally located in the Ludlowville Formation while the eastern portion is located in the younger Moscow Formation. The Ludlowville and Moscow formations are characterized by gray, calcareous shales, mudstones and thin limestones with numerous zones of abundant invertebrate fossils. The Ludlowville Formation is known to contain brachiopods, bivalves, trilobites, corals and bryozoans (Gray, 1991). In contrast, the lower two formations (Skaneateles and Marcellus) consist largely of black and dark gray sparsely fossiliferous shales (Brett *et al.*, 1991). Locally, the shale is soft, gray, and fissile. **Figure 1-1** displays the stratigraphic section of Paleozoic rocks of Central New York. Three known predominant joint directions, N60°E, N30°W, and N20°E are present within this unit (Mozola, 1952).

### **1.3.2            Hydrogeology**

Available geologic information reviewed indicates that the upper portions of the shale formation would be expected to yield small, yet adequate, supplies of water, for domestic use. Regionally, four distinct hydrologic water-bearing units have been identified (Mozola A.J., 1951). These include two distinct shale formations, a series of limestone units, and unconsolidated beds of Pleistocene glacial drift.

For mid-Devonian shales such as those of the Hamilton Group, the average yields (which are less than 15 gpm) are consistent with what would be expected for shales (LaSala, 1968). The deeper portions of the bedrock, (at depths greater than 235 feet) have provided yields of up to 150 gpm. At these depths, the high well yields may be attributed to the effect of solution on the Onondaga limestone that is at the base of the Hamilton Group. Based on well yield data, the degree of solution is affected by the type and thickness of overlying material (Mozola, 1951). Geologic cross-sections from Seneca Lake and Cayuga Lake have been constructed by the State of New York, (Mozola, 1951, and Crain, 1974). This information suggests that a groundwater divide trending north south exists approximately half way between the two Finger Lakes. SEDA is located on the western slope of this divide and therefore regional groundwater flow is expected to be primarily westward toward Seneca Lake.

Surface drainage from SEDA flows to four creeks. In the southern portion of the depot, the surface drainage flows through ditches and streams into Indian and Silver Creeks. These creeks then flow into Seneca Lake just south of the SEDA airfield. The central part and administration area of SEDA drain into Kendaia Creek. Kendaia Creek discharges into Seneca Lake near the Lake Housing Area. The majority of the northwestern and north-central portion of SEDA drains into Reeder Creek. The

northeastern portion of the depot, which includes a marshy area called the Duck Ponds, drains into Kendaia Creek and then flows north into the Cayuga-Seneca Canal and to Cayuga Lake

Data from site quarterly groundwater monitoring program indicate that the saturated thickness of the till/weathered shale overburden aquifer is variable, ranging between 1 and 8.5 feet. However, the aquifer's thickness appears to be influenced by the hydrologic cycle and some monitoring wells dry up completely during portions of the year. Based upon a review of two years of data, the variations of the water table elevations are likely a seasonal phenomenon. The overburden aquifer is thickest during the spring recharge months and thinnest during the summer and early fall. During late fall and early winter, the saturated thickness increases. Depth to groundwater, which varies by season and location, ranges from 1 foot to 10 feet. Although rainfall is fairly consistent at SEDA, averaging approximately 3 inches per month, evapotranspiration is a likely reason for the large fluctuations observed in the saturated thickness of the over-burden aquifer.

Regional precipitation is derived principally from cyclonic storms that pass from the interior of the country through the St. Lawrence Valley. With local influence derived from lakes Seneca, Cayuga, and Ontario providing some lake effect snows, leading to a significant amount of the winter precipitation and a moderate the local climate. Wind velocities are moderate, but during the winter months, there are numerous days with sufficient winds to cause blowing and drifting snow. The most frequently occurring wind directions are to the south and to the northwest (**Figure 1-2**).

## **2.0 SUMMARY OF SITE INFORMATION AND FIELD INVESTIGATIONS AT SEAD-13**

### **2.1 INTRODUCTION**

This section provides a brief description, operational history, and results of field investigations for SEAD-13. Information for this section was acquired through a review of site records and the implementation of field investigations associated with an Expanded Site Inspection (ESI) and supplemental sampling conducted from January 2000 to April 2002. This information is presented to support recommendations provided in this document.

### **2.2 SITE DESCRIPTION**

The Inhibited Red Fuming Nitric Acid (IRFNA) disposal site is located in the northeastern portion of SEDA (**Figure 2-1**). The site includes two IRFNA disposal areas, SEAD-13-East and SEAD-13-West, located on the eastern and western sides of the south end of the Duck Pond, respectively, near the entrance of its source tributary (**Figure 2-2**). The ground surface for both areas is less than two feet higher than the water level of the Duck Pond. SEAD-13-East is bound by mostly deciduous trees and East-West Baseline Road to the north, by deciduous trees and grassland to the east and south and by the Duck Pond to the west. SEAD-13-West is bound by grassland and low brush to the north, west and south and by the Duck Pond to the east. The extension of East-West Baseline Road is located approximately 100 feet north of the western area.

SEAD-13-East is comprised of six elongated disposal pits (possibly seven) that are visible on the ground surface immediately south of a dirt access road off of East-West Baseline Road. The pits, which are each generally 20 to 30 feet long, oriented east to west, are marked by sparse vegetation, crushed shale and 1-inch limestone pieces at the surface. Vertical water and shower pipes are located west of the pits. These pipes are discussed in greater detail in **Section 2.5.4**.

SEAD-13-West, which is located at the end of a dirt road off of East-West Baseline road, is comprised of a broad, low plain which extends to the shoreline of the Duck Pond. The area has no visible evidence of former IRFNA disposal pits at the surface, however, there is an area that is characterized by sparse vegetation and some crushed shale. The surface does not resemble the visible pits observed in SEAD-13-East. A vertical shower pipe and head is located in the eastern portion of this area, approximately 50 feet from the Duck Pond. These pipes are discussed in greater detail in **Section 2.5.4**.

Within SEDA, pedestrian and vehicular access to both of the disposal areas is not restricted, although it is more difficult to reach the western area.

## 2.3 HISTORIC OPERATIONS

The IRFNA Disposal Site (SEAD-13) was active during the early 1960s to dispose of quantities of unserviceable IRFNA. IRFNA is an oxidizer used in missile liquid propellant systems (Dept. of Sanitary Engineering Study No. 3642E4-60, 1960). Its composition is 81.3%-84.5% nitric acid (HNO<sub>3</sub>), 13%-15% nitrogen dioxide (NO<sub>2</sub>), 0.5%-0.7% hydrofluoric acid (HF) and 2.0%-3.0% water (H<sub>2</sub>O). The disposal areas at SEAD-13 involved shallow trenches partially filled with limestone or slaked lime. The SEAD-13 site consisted of six pits, which were 30 feet long, 8 feet wide and 4 feet deep, and they were suspected to be located in two separate areas, SEAD-13-East and SEAD-13-West. The pits were excavated to the native shale at a depth of approximately 4 feet below ground. Following excavation, limestone was placed in the bottom of the pits to a depth of approximately 2.5 feet below ground. The sides of the pits were also lined with limestone. Barrels of unserviceable IRFNA were stored on pallets near the west end of each of the pits. A stainless steel ejector, operated by water pressure, was fitted into a barrel with water flowing through the ejector. The ejector discharged a mixture of water and IRFNA through a long polyethylene hose under the water surface in the pit being used. During this period, the IRFNA was allowed to mix with the limestone in the pit to facilitate the neutralization of the acid. Five minutes were required to empty a barrel. Ten barrels were usually discharged into a single pit during a day's operation. At present, the site has been abandoned.

## 2.4 DESCRIPTION OF FIELD INVESTIGATIONS

An ESI was conducted from November 1993 to February 1994. The investigations included the following procedures:

- geophysical investigations;
- surface and subsurface soil sampling;
- monitoring well installation, development and sampling; and
- surface water and sediment sampling.

Additional sampling was conducted from September 2000 to April 2002 included sample collection from all media (i.e., surface and subsurface soil, groundwater, surface water, and sediment). The results of these investigations are provided in **Sections 2.4, 2.5, and 2.6**. Data from each media were compared to available New York State and Federal standards, guidelines, and criteria (SCG).

The soil criteria were obtained from the NYSDEC Technical and Administrative Guidance Memorandum (TAGM) titled "Determination of Soil Cleanup Objectives and Cleanup Levels" (HWR-92-4046) issued in November 1992 and revised in January 1994. This document provides criteria for soil clean-up levels. Although these criteria have not been promulgated, they are useful

guidelines for comparing on-site soil concentrations to determine if site conditions warrant further actions.

For the metals in soil, the TAGM criteria are the greater of either a value or the SEDA background concentration. The site background values for metals in soil are the 95th percentile of a background data set that has been compiled from 55 soil samples collected over several years of investigations. The TAGM guidelines were used for the following metals: barium, cobalt, mercury, selenium, and vanadium. The SEDA background soil concentrations were used for the following metals: aluminum, antimony, arsenic, beryllium, cadmium, calcium, chromium, copper, iron, lead, magnesium, manganese, nickel, potassium, silver, sodium, thallium, and zinc.

TAGM criteria provide specific standards for individual VOCs, SVOCs, and pesticides, as well as guidelines for total VOCs, SVOCs, and pesticides.

#### Maximum Concentration

Total VOCs	10 ppm
Total SVOCs	500 ppm
Individual SVOCs	50 ppm
Total Pesticides	10 ppm

The groundwater results are compared to the NYSDEC Ambient Water Quality Class GA Standards and Guidelines.

The surface water criteria are the NYSDEC Ambient Water Quality Class C Standards and Guidelines. The surface water criteria for several metals are based on the hardness of the surface water. The average surface water hardness for SEDA (217 mg/L) was calculated using data from two upstream surface water samples: 232 mg/L at SW-801 from the Ash Landfill remedial investigation and 201 mg/L at SW0196 from the OB Grounds remedial investigation. The average hardness was used to calculate the NYSDEC surface water criteria for the following analytes: chromium, copper, lead, nickel, zinc, and fluoride.

Sediment criteria were guidance values from NYSDEC, Division of Fish and Wildlife. The most stringent of the sediment criteria for wildlife, human health, or for aquatic life were used as the criteria. For metals, the criteria were the more stringent of the criteria for aquatic life or the Limit of Tolerance (LOT) values (listed in the same document as the criteria).

### 2.4.1 Geophysics

Ground penetrating radar (GPR) and Electromagnetic-31 geophysical unit (EM-31) surveys were conducted in 1993/1994 to locate the six abandoned disposal pits and to evaluate the potential presence of IRFNA barrels in the subsurface. GPR was used to identify areas of disturbed soils that could be associated with the IRFNA pits. The EM-31 data was collected on profiles spaced at 10-foot intervals throughout the two areas where the pits are presumed to be located. EM-31 measurements were made at 5-foot spacing along each profile. A total of 12,180 linear feet of EM-31 surveys were conducted at SEAD-13. The GPR data were collected along profiles spaced at 20-foot intervals. Additional GPR data were collected in order to delineate the extent of the pits for a total of 7,495 linear feet of GPR surveys were conducted at SEAD-13.

In addition to GPR and EM-31 surveys, four 115-foot seismic refraction surveys were performed as part of the geophysical investigations at SEAD-13. These surveys were performed along two lines laid out perpendicular to each other on each side of the Duck Pond. Data from the surveys were used to determine the direction of groundwater flow, and to adjust the location of the monitoring wells so that one would be located upgradient and one downgradient of the disposal pits.

### 2.4.2 Soils

As part of the ESI in 1993, ten borings were drilled at SEAD-13. Five soil borings were advanced within each of the two disposal areas. Three samples were collected from each boring, including one surface soil sample (0-2 feet) and two subsurface samples (2-13 feet). Samples were analyzed for Target Compound List volatile organic compounds (TCL VOCs), semivolatile organic compounds (SVOCs), pesticides/polychlorinated biphenyls (PCBs), Target Analyte List (TAL) metals, cyanide, explosives, herbicides, nitrates, and fluoride.

Supplemental data were collected in August 2001. Four new soil borings were drilled (SB13-11, SB13-12, SB13-13, and SB13-14), and one subsurface sample (6-8 feet or 8-10 feet) was collected in each new boring. Surface soil (0-2 feet or 0-2 inches) samples were collected at eleven locations, four of which corresponded to the locations of the new soil borings. All sampling locations are shown on **Figure 2-3**. Soil samples were analyzed for TCL VOCs, SVOCs, Pesticides/PCBs, TAL metals, cyanide, explosives, herbicides, nitrates, and fluoride.

### 2.4.3 Groundwater

As part of the ESI, a total of seven monitoring wells were installed at SEAD-13: Four wells were installed on the east side of the Duck Pond, and three wells were installed on the west side of the pond. The three wells installed on the west side were positioned to investigate rumors that a disposal area was located on the west side. The Army investigated the assumed west disposal area due to the presence of

the aboveground piping. It appears that the piping was installed in the event that it could be required at a later date.

On the east side of the Duck Pond, as part of the ESI, one monitoring well (MW13-1) was installed upgradient of the disposal area to obtain background water quality data; one well (MW13-2) was located within the disposal area; and two wells (MW13-3 and MW13-7) were installed near the downgradient edge of the east disposal area. The geophysical survey indicated that groundwater flows west on the east of the pond and east on the west side of the pond (i.e., groundwater discharges directly into the pond). As a result, the background wells were moved slightly to the north and the two downgradient wells were moved to the south of the proposed work plan locations. Additional discussion about groundwater flow directions is included in **Section 2.5.5**.

One monitoring well was constructed at each designated location and was screened over the entire thickness of the aquifer above competent bedrock. At MW13-3, an additional shallower well, MW13-7, was installed and screened between 5.0 and 7.0 feet below the ground surface. Both wells were dry. Following installation and development, one groundwater sample was collected from each of the five wells (two wells were dry), using a high-flow sampling method, and tested for VOCs, SVOCs, pesticides/PCBs, metals, cyanide, herbicides, nitrate/nitrite-nitrogen, and fluoride.

Additional groundwater sampling was conducted in 2001 and 2002 using a low-flow sampling method. Four additional monitoring wells were installed. MW13-11 was installed approximately 30-50 feet to the southwest of wells MW13-3 and MW13-7, at the downgradient edge of the high conductivity area, identified during the geophysical testing. MW13-11 was added to replace MW13-3 and MW13-7, which have been consistently dry. MW13-12 was installed in SEAD-13-West, and MW13-13 and MW13-14 were installed in the east disposal area. Since the new wells were installed, two rounds of groundwater sampling were conducted in 2001 and 2002. The recent sampling was conducted on the five existing wells (MW13-1, MW13-2, MW13-4, MW13-5, and MW13-6) and the four new wells (MW13-11, MW13-12, MW13-13, and MW13-14). Groundwater samples were analyzed for nitrates, metals, cyanide and SVOCs.

#### **2.4.4 Surface Water and Sediment**

To assess the potential impact of the IRFNA disposal pits on adjacent surface water bodies, three sediment and surface water sample sets were collected from within the Duck Pond in 1993. The surface water and sediment sampling locations are shown on **Figure 2-3**. One surface water and sediment sample set (SW13-3 and SD13-3) was used to obtain background surface water and sediment quality data. It was collected at a location near where a small stream enters the Duck Pond. The other two surface water samples were collected along the edges of the Duck Pond downgradient of SEAD-13-East and SEAD-13-West, at SW13-1 and SW13-2, respectively. The exact locations of the other two sample sets were determined based on an inspection of the site and our understanding of



groundwater discharge to the pond. The locations were also selected based on stressed vegetation and proximity to the pits. In 1993, the sediment and surface water sample sets were collected at these same locations and were tested for VOCs, SVOCs, explosives, pesticides/PCBs, herbicides, metals, cyanide, fluoride, and nitrate/nitrite-nitrogen.

Surface water samples collected in 1993 had unusually high aluminum concentrations. Consequently, confirmatory samples were collected in January 2000 at SW13-4, SW13-5, and SW13-6 to confirm the presence of aluminum. Three surface water samples were collected upgradient from SEAD-13 to find the possible source of aluminum. Two of these samples were collected from Kendig Creek: one downstream (SW13-7) and a sample and a duplicate upstream (SW13-8) of the location where a swale originating from the sewage treatment plant flows into Kendig Creek. One surface water sample was collected from the swale that originates from the sewage treatment plant (SW13-9). **Figure 2-4** presents the location of all of the surface water samples collected at or near SEAD-13. The samples collected in January 2000 were only analyzed for aluminum, pH, turbidity, and specific conductivity. No sediment samples were collected during this time.

In 2001, surface water samples were collected at five of the six surface sample locations adjacent to SEAD-13 (SW13-1, SW13-2, SW13-3, SW13-4, and SW13-5). Sediment samples were collocated with the surface water samples from all locations (SD13-1, SD13-2, SD13-3, SD13-4, SD13-5, and SD13-6). The surface water and sediment samples were analyzed for SVOCs, metals, cyanide, and nitrate/nitrite-nitrogen.

## **2.5 RESULTS OF FIELD INVESTIGATIONS**

### **2.5.1 Seismic Survey**

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

Although several of the seismic profiles were conducted on saturated ground, seismic velocities characteristic of saturated till were interpreted to be located at a depth of 3 to 6 feet along these profiles. It is common in swampy areas to encounter a low-velocity near-surface layer. This may be attributed to the effects of entrapped gas in swamp deposits and the inability of the seismic method to accurately resolve layers substantially thinner than the wavelength of the seismic energy. In spite of these limitations, results of seismic refraction survey suggest that groundwater flows to the west or

northwest at SEAD-13-East. The seismic survey conducted at SEAD-13-West shows groundwater at a uniform level; therefore, a flow direction could not be reliably determined.

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

### **2.5.2 Electromagnetic Survey**

**Figure 2-5** shows the EM-31 survey results for SEAD-13. SEAD-13-East shows a pronounced linear anomaly projecting from the western edge towards the center of the electromagnetic (EM) grid. This feature is attributed to a pipe, two inches in diameter that can be seen on the ground surface.

This pipe terminates at the vertical shower pipe located in the west-central portion of the grid. The other pronounced EM anomaly at SEAD-13-East is a zone of elevated conductivities in the central and northern portions of the grid. The high conductivities measured in the groundwater sample collected from MW13-2 suggest that this EM anomaly represents an area with impacted groundwater with a high concentration of dissolved ionic solids. It is likely that the groundwater contains dissolved salts, a by-product of the former activities at this site which involved the disposal and neutralization of acids. The suspected contaminated area originates in the vicinity of the former pits and extends towards the west-northwest presumably in the suspected direction of groundwater flow.

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

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

SEAD-13-East shows a generally featureless response. A weak signature from the pipe is evident on the western side of the grid. A small isolated anomaly is located directly south of the pipe. The

circular in-phase anomaly along the southern edge of the grid is the effect of metallic debris lying on the surface. The in-phase response from the grid at SEAD-13-West is dominated by the north to south trending pipe running through the surveyed area.

### **2.5.3 GPR Survey**

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

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

### **2.5.4 Abandoned Pipes**

A set of vertical piping was identified at SEAD-13. A vertical shower pipe and head, approximately 2 inches in diameter, are located in both the eastern and western side of the site. In the 1960 Report of sanitary engineering study No. 364214-60 "Disposal of Inhibited Red Fuming Nitric Acid by Soil Absorption, Seneca Ordnance Depot;" the vertical piping at SEAD-13-East was identified as vertical water and shower piping, likely used during the IRFNA disposal project as an emergency shower; however, the uses of the piping observed in SEAD-13-West, though similar in structure to that observed in SEAD-13-East, remains unknown (Final SWMU Classification Report, Parsons Engineering-Science Inc., 1994). An abandoned water hydrant was observed southwest of the Duck Pond. Possibly, this water hydrant was used to supply water pressure to the stainless steel ejector. Also, a set of the aboveground piping was identified southeast of the Duck Pond and two sets of vertical piping were visible in the water southwest of the Duck Pond.

Based on the EM survey (**Figure 2-5**), the approximate location of the underground piping at SEAD-13 is presented in **Figure 2-6**. It appears that the underground piping originates from a pumping station south of SEAD-13-West. The piping runs north through the western portion of the site to the fire hydrant and water valve at the northern edge of SEAD-13-West. The EM survey suggests that the piping turns eastward and runs from the water valve through the location of the vertical piping, visible on the west side of the pond, underneath the Duck Ponds, and then connects to the visible vertical piping on the east side of the pond. This east-west pipe terminates at the vertical shower pipe located in the center of SEAD-13-East. In addition, there is a segment of piping at SEAD-13-West that runs from the vertical pipe on the northeast corner of SEAD-13-West to the location of the vertical shower pipe, to the south. There is little information about the previous usage of the pipes; however, the Army reports that all existing water lines in the IRFNA disposal area were capped and abandoned during installation of a new water distribution line in the mid-1980s. The piping at SEAD-13 is not connected to any water distribution system currently in operation at SEDA.

### **2.5.5 Groundwater Flow and Elevation**

Based on groundwater elevations recorded during the April 2002 sampling event, groundwater flow direction is shown on **Figure 2-7**. The presumed direction of groundwater flow was to the west for SEAD-13-East. The geophysical survey indicated that groundwater flows west on the east of the pond and east on the west side of the pond (i.e., groundwater discharges directly into the pond).

At the presumed west disposal area, groundwater results show that the nitrate concentrations are not elevated in the assumed area of the west disposal area. The nitrate concentrations (up to 0.17 mg/L) are well below the Class GA standard of 10 mg/L. As a comparison, the nitrate concentrations are over 1,000 times higher in the east disposal area. Since there is no actual source material, upgradient and downgradient determinations cannot be made. As shown on **Figure 2-7**, based on the April 2002 sampling event, groundwater appears to flow in a northeasterly direction, towards the Duck Pond.

Depth to groundwater, which varies by season and location, ranges from 1 foot to 10 feet.

## **2.6 SUMMARY OF ANALYTICAL RESULTS**

Results of the chemical analyses are summarized in **Appendix A** (**Tables A-1** through **A-4** for soil, groundwater, surface water, and sediment, respectively); and complete analytical results are provided in **Appendix C** (**Tables C-1** through **C-4**).

### **2.6.1 Surface Soils**

#### **2.6.1.1 Volatile Organic Compounds**

No VOCs were detected in the surface soils at SEAD-13, with the exception of acetone, chloroform, methyl ethyl ketone, and toluene, which were detected in one sample at low concentrations well below their respective TAGM values. The maximum detected concentration of acetone was 86 µg/Kg in the surface soil sample SB13-6-1 at SEAD-13-West. The VOCs acetone, methyl ethyl ketone, and toluene are considered to be common laboratory contaminants. Based on the low frequency of detection and the low concentrations detected, these compounds can potentially be attributed to the laboratory and not site conditions.

### **2.6.1.2 Semivolatile Organic Compounds**

Semivolatile organic compounds were found at varying concentrations in the surface soil samples collected at SEAD-13. In general, the concentrations of SVOCs were low, with only concentrations of 4-methylphenol, benzo(a)pyrene, dibenz(a,h)anthracene, and phenol exceeding their TAGM values in one sample. The TAGM criteria for 4-methylphenol (500 µg/Kg) and phenol (30 µg/Kg) were exceeded in one surface soil sample, SB13-10-1, collected in SEAD-13-West. The duplicate collected at SB13-10 had trace amounts of these analytes that were below the detection limit. In the surface soil sample SS13-6 collected during the 2001 field investigation, the maximum concentration of dibenz(a,h)anthracene, 15 µg/Kg, barely exceeded the TAGM value of 14 µg/Kg. In the same surface soil sample, benzo(a)pyrene concentration (110 µg/Kg) exceeded the TAGM value of 61 µg/Kg. In the duplicate sample collected at SS13-6, the concentration of benzo(a)pyrene was significantly below the TAGM value, and dibenz(a,h)anthracene was not detected with a quantitation limit of 73 µg/Kg. A few samples contained phthalates: bis(2-ethylhexyl)phthalate was detected five times at concentrations ranging from 27 J µg/Kg to 1900 J µg/Kg; di-n-butylphthalate was detected twice at concentrations of 8.6 J µg/Kg and 140 µg/Kg; di-n-octylphthalate was detected twice at concentrations of 7.7 J µg/Kg and 210 J µg/Kg. All of the identified detections were less than their respective TAGM 4046 values. Phthalates are common laboratory contaminants, and their presence in these samples phthalates can potentially be attributed to the laboratory.

### **2.6.1.3 Pesticides and PCBs**

Only one pesticide compound was detected in the 13 surface soil samples analyzed for pesticides at SEAD-13. The pesticide, 4,4'-DDE, which was found in only one sample, SB13-2-1 (SEAD-13-East), at an estimated concentration of 3.6 µg/Kg was below the TAGM value of 2,100 µg/Kg.

### **2.6.1.4 Herbicides**

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

### **2.6.1.5 Metals**

Various surface soil samples were found to contain metals at concentrations that exceeded the associated TAGM values. Of the 23 metals reported, 13 were found in one or more samples at concentrations above the TAGM values. A few metals (copper, lead, and nickel) were identified in more than 5 out of 30 samples at levels above the TAGM value.

Copper was detected at concentrations exceeding the TAGM value (33 mg/Kg) in nine of the surface soil samples. Most were only slightly above the TAGM value with a maximum copper concentration of 84.2 mg/Kg detected in the soil sample SB13-1 (SEAD-13-West).

Lead was detected at concentrations that exceeded the TAGM value of 24.8 mg/Kg in 9 of the 30 surface soil samples. Six of the nine samples were only slightly above the TAGM value. Lead was detected in surface soil samples SS13-1 and SS13-9 at concentrations of 65.7 mg/Kg and 64.9 mg/Kg, respectively. The maximum concentration of lead, 75.6 mg/Kg, was detected in sample SS13-6. It is noted that a duplicate sample was collected at SS13-6 with a lead concentration of 35.1 mg/Kg.

Nickel concentrations exceeded the TAGM value (49 mg/Kg) in eight of the surface soil samples. Most slightly exceeded the criteria, with a maximum concentration of 71.1 mg/Kg detected in soil sample SB13-13 (SEAD-13-East).

### **2.6.1.6 Nitroaromatics**

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

### **2.6.1.7 Indicator Compounds**

The surface soil samples at the site were analyzed for nitrate/nitrite-nitrogen and fluoride, which were considered indicator compounds based on the types of materials disposed in the pits at SEAD-13. There are no TAGM values for either of these compounds. Nitrate/nitrite-nitrogen concentrations ranged from a low of 0.02 mg/Kg to a high of 27.9 mg/Kg, found in the surface soil sample SB13-13 (SEAD-13-East). Fluoride concentrations ranged from a low of 24 mg/Kg, to a high of 154 mg/Kg detected in surface soil sample SB13-7-1. Both of these borings are located in SEAD-13-East.

## **2.6.2 Subsurface Soils**

### **2.6.2.1 Volatile Organic Compounds**

Methylene chloride, carbon disulfide, and toluene were detected at low concentrations in at least one of the 20 subsurface soil samples analyzed; however, none of these concentrations exceeded their

respective TAGM values. Methylene chloride was found in three subsurface soil samples at an estimated concentration of 4 µg/Kg. Methylene chloride is considered to be a common laboratory contaminant, and given the number of samples in which it was detected, and the low concentrations, it can potentially be attributed to the laboratory and not to site conditions. Carbon disulfide was detected in one sample, SB13-1-4 (at SEAD-13-East), at an estimated concentration of 2 µg/Kg. Toluene was found at an estimated concentration of 2 µg/Kg in one sample, SB13-5-5.

#### **2.6.2.2 Semivolatile Organic Compounds**

Several SVOCs (benzo(b)fluoranthene, benzo(g,h,i)perylene, bis(2-Ethylhexyl)phthalate, chrysene, di-n-octylphthalate, di-n-butylphthalate, fluoranthene, phenanthene, and pyrene) were detected in the subsurface soil samples. However, none of the SVOC concentrations exceeded the TAGMs.

#### **2.6.2.3 Pesticides and PCBs**

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

#### **2.6.2.4 Herbicides**

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

#### **2.6.2.5 Metals**

Several samples were found to contain metals at concentrations that exceeded the associated TAGM values. Twelve metals were found in one or more samples at concentrations above the TAGM values. Six metals (chromium, iron, nickel, potassium, sodium, and thallium) were identified in at least 3 out of 25 samples at concentrations above their associated TAGM values.

Chromium was detected at concentrations slightly above the TAGM value (29.6 mg/Kg) in 3 of the subsurface soil samples collected. The highest concentration, 35.8 mg/Kg, was detected in the soil sample SB13-4-3 at SEAD-13-West. Other elevated concentrations were detected in samples SB13-8-2 (32.4 mg/Kg) and SB13-10-5 (30.8 mg/Kg), which are from SEAD-13-East and SEAD-13-West, respectively.

Iron was detected at concentrations slightly above the TAGM value (36,500 mg/Kg) in 4 of the subsurface soil samples collected. The maximum concentration, 42,500 mg/Kg, was detected in the soil sample SB13-4-3 at SEAD-13-West. Other elevated concentrations were detected in samples SB13-8-2 (41,100 mg/Kg) and SB13-10-5 (36,800 mg/Kg), which were from SEAD-13-East and SEAD-13-West, respectively.

Nickel concentrations slightly exceeded the TAGM value (49 mg/Kg) in 4 of the subsurface soil samples collected. A maximum concentration of 57.1 mg/Kg was detected in the soil sample SB13-10-4 (SEAD-13-West).

Thallium concentrations slightly exceeded the TAGM value of 0.7 mg/Kg in 4 subsurface soil samples. The highest was an estimated concentration of 0.78 mg/Kg in SB13-7-2 (SEAD-13-East).

#### **2.6.2.6 Nitroaromatics**

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

#### **2.6.2.7 Indicator Compounds**

The subsurface soil samples were analyzed for nitrate/nitrite nitrogen and fluoride, which were considered indicator compounds based on the types of materials disposed in the pits at SEAD-13. Nitrate/nitrite-nitrogen concentrations ranged from 0.02 mg/Kg to 176 mg/Kg, with the highest concentration found in subsurface soil sample SB13-2.5 located in the central portion of SEAD-13-East. Fluoride concentrations ranged from 11.7 mg/Kg to a high of 193 mg/Kg, found in subsurface soil sample SB13-5.5, located in the central portion of SEAD-13-West.

### **2.6.3 Groundwater Sampling Summary**

Groundwater concentrations of constituents were compared to the New York Ambient Water Quality Standards (NY AWQS) Class GA groundwater criteria. The summary of chemical analyses is presented in **Table A-2** in **Appendix A**. The following sections describe the nature and extent of groundwater contamination identified at SEAD-13.

#### **2.6.3.1 Volatile Organic Compounds**

No VOCs were detected in the 22 groundwater samples collected at SEAD-13.

#### **2.6.3.2 Semivolatile Organic Compounds**

Several SVOCs, 2-methylnaphthalene, bis(2-ethylhexyl)phthalate, butylbenzylphthalate, diethyl phthalate, and pyrene, were detected in four groundwater samples collected at SEAD-13; however, bis(2-ethylhexyl)phthalate was the only compound to exceed its criteria. A maximum concentration of bis(2-ethylhexyl)phthalate was 23 µg/L, which was found in the sample MW13-5. Bis(2-ethylhexyl)phthalate concentrations were above the criteria value of 5 µg/L, however, this phthalate is a common laboratory contaminant. Therefore, this compound can be potentially attributed to the laboratory and not to site conditions.



### 2.6.3.3 Pesticides and PCBs

No pesticides or PCBs were found in the six groundwater samples analyzed for pesticides and PCBs.

### 2.6.3.4 Herbicides

No herbicides were found in the six groundwater samples collected at SEAD-13 and analyzed for herbicides.

### 2.6.3.5 Metals

Eleven metals (aluminum, antimony, arsenic, chromium, iron, lead, magnesium, manganese, nickel, selenium, and sodium) were found in the groundwater samples at concentrations above the Class GA criteria. Magnesium was found in most of the monitoring wells at concentrations above the criteria value of 35,000 µg/L. The maximum concentration for magnesium, 314,000 µg/L, was found in the groundwater sample collected from monitoring well MW13-13 at SEAD-13-East during the 2002 sampling round. Iron exceeded the NYSDEC Class GA criteria in seven of the wells sampled (MW13-1, MW13-2, MW13-4, MW13-6, MW13-11, MW13-12, and MW13-13). The maximum concentration, 97,900 µg/L, was detected in the groundwater sample collected from monitoring well MW13-13, which is located in SEAD-13-East, during the sampling conducted in 2001.

Manganese was found in thirteen of the 22 samples at concentrations exceeding the NYSDEC Class GA groundwater standard of 300 µg/L, with a maximum concentration of 3210 µg/L found in the groundwater sample collected from monitoring well MW13-13 at SEAD-13-East in 2001. Chromium and lead were found in MW13-1 and MW13-13 at concentrations above their criteria values. The maximum concentrations of 109 µg/L for chromium and 34.8 µg/L for lead were found in MW13-13 in 2001 and in MW13-1 in 1994, respectively.

Antimony was found in five of the 22 samples at concentrations exceeding the NYSDEC Class GA groundwater standard of 3 µg/L. Detected concentrations of antimony ranged from 2.1 µg/L in MW13-13 to a maximum value of 52.7 µg/L at MW13-6, which were detected during high flow sampling in 1994.

### 2.6.3.6 Indicator Compounds

The groundwater samples were analyzed for nitrate/nitrite-nitrogen and fluoride, which were considered indicator compounds based on the types of materials disposed in the pits at SEAD-13. Five of the ten groundwater samples had nitrate (expressed as nitrogen) concentrations above the criteria value of 10 mg/L. The maximum nitrate value detected was 731 mg/L in sample MW13-13,

which is located downgradient from the former IRFNA pits in SEAD-13-East. **Figure 2-8** shows the nitrate and nitrite concentrations in the groundwater samples. **Figure 2-9** shows the delineation of the nitrate/nitrite plume. The nitrite (expressed as N) concentrations were all below the criteria value of 1 mg/L, except the concentrations at MW13-11 and MW13-14, which were detected at 2.1 mg/L and 1.1 mg/L, respectively. Fluoride was detected at concentrations ranging from 0.1 to 0.45 mg/L. All of the reported concentrations were below the Class GA Standard of 1.5 mg/L.

### 2.6.3.7 Turbidity and pH Results

Immediately prior to groundwater sampling, field parameters, including pH, were collected from each monitoring well sampled. As depicted on **Figure 2-10**, a review of groundwater sampling parameters shows that the pH of the groundwater at SEAD-13 is not lowered and is in the same range as the pH of groundwater at other background locations at SEDA. The pH levels measured at the site do not cause additional leaching of metals.

The elevated metals concentrations correlate with higher turbidity levels. The maximum concentrations of magnesium, iron, manganese, and chromium were all detected in the groundwater during the September 2001 sampling round at MW13-13, where the turbidity measurement was 999 NTUs as compared to a turbidity of 13.7 NTUs in April 2002. In general, the metals results were significantly lower where turbidity values were lower. For instance, the following table of results for MW13-13 demonstrates this.

Analyte	September 2001 (µg/L)	September 2001 Duplicate (µg/L)	April 2002 (µg/L)
Turbidity	999 NTUs	999 NTUs	13.7 NTUs
Aluminum	39,700	70,900	27.2
Chromium	62.5	109	<1.4
Copper	25.9	35	<1.4
Iron	57,300	97,900	59.2
Lead	27.1	32.5	0.8
Manganese	1,740	3,210	397
Nickel	80.2	134	9.5
Zinc	146	223	1.9

There are metals concentrations that exceed Class GA Standards, however, there is no defined plume of high metals concentrations. As demonstrated above, the highest concentrations of metals were due to a sampling event where high turbidity groundwater was analyzed.

## **2.6.4 Surface Water Sampling Summary**

The results of the surface water chemical analyses are presented in **Table A-3** in **Appendix A**. The following sections describe the nature and extent of surface water impacts identified at SEAD-13.

### **2.6.4.1 Volatile Organic Compounds**

No VOCs were found in the three surface water samples collected at SEAD-13 and analyzed for VOCs.

### **2.6.4.2 Semivolatile Organic Compounds**

The only SVOCs detected in the surface water samples at SEAD-13 were 4-methylphenol, isophorone, and phenol. 4-methylphenol and isophorone were detected below the Class C Standard. The one detection of phenol, 9.3 µg/L, was at a concentration slightly above the Class C Standard of 5 µg/L.

### **2.6.4.3 Pesticides and PCBs**

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

### **2.6.4.4 Herbicides**

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

### **2.6.4.5 Metals**

Several metals were detected; however, only aluminum and iron concentrations were detected above the NYSDEC AWQC criteria. The highest concentration of aluminum (3,830 µg/L) and the highest concentration of iron (5,870 µg/L) were found in the samples SW13-1 and SW13-3, respectively, which were collected on the east side of the pond. The elevated aluminum and iron concentrations were likely associated with the turbidity. Turbidity measurements of samples collected in January 2000 were low, ranging from 3 Nephelometric Turbidity Units (NTUs) to 5.7 NTUs; and, for the samples collected in 2000, the aluminum concentrations were generally low, as well. Samples collected in 1993 and 2001, which had higher concentrations of aluminum and iron than the samples collected in 2000, were noted in the field records to appear very turbid. Actual turbidity measurements are not available for the 1993 and 2001 surface water data. Nonetheless, all the available data were used in the risk assessment. Available turbidity data for surface water samples are included in **Table A-3**.

#### 2.6.4.6 Nitroaromatics

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

#### 2.6.4.7 Indicator Compounds

The surface water samples were analyzed for nitrate/nitrite-nitrogen and fluoride, which were considered indicator compounds based on the types of materials disposed in the pits at SEAD-13. Nitrate/nitrite-nitrogen was detected in six out of nine of the surface water samples at SEAD-13, with concentrations ranging from 0.02 mg/L to 0.11 mg/L. The maximum concentration, 0.11 mg/L, was found in sample SW13-5, near the point of groundwater discharge to the pond. Fluoride was also detected in the surface water samples. The reported concentrations ranged from 0.27 to 0.39 mg/L. There are no surface water standards for nitrate/nitrite-nitrogen or fluoride.

#### 2.6.5 Sediment Sampling Summary

A summary of the chemical analyses for sediment is presented in **Table A-4** in **Appendix A**. The sediment samples were collected in the same locations as the surface water samples described above. The following sections describe the nature and extent of contaminant concentrations in sediment identified at SEAD-13.

##### 2.6.5.1 Volatile Organic Compounds

Two VOCs were identified in the three sediment samples collected at SEAD-13. These compounds, acetone and methyl ethyl ketone, are common laboratory contaminants and therefore, they can be potentially attributed to the laboratory and not site conditions. The maximum concentrations for both compounds were identified in sample SD13-1, which was collected at the water's edge on the east side of the pond.

##### 2.6.5.2 Semivolatile Organic Compounds

Several SVOCs (2-methylnaphthalene, 4-methylphenol, acenaphthylene, anthracene, benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(ghi)perylene, chrysene, di-n-octylphthalate, dibenz(a,h)anthracene, dibenzofuran, fluoranthene, fluorene, indeno(1,2,3-cd)pyrene, naphthalene, phenanthrene, and pyrene) were identified in the sediment samples collected at SEAD-13. None of the SVOC concentrations exceeded the NYS Sediment Criteria for Benthic Aquatic Life Chronic Toxicity, with the exception of 4-methylphenol at SD13-4.

### **2.6.5.3 Pesticides and PCBs**

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

### **2.6.5.4 Herbicides**

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

### **2.6.5.5 Metals**

A number of metals were detected in the sediment samples collected at SEAD-13. Of these, cadmium, chromium, copper, iron, manganese, nickel, and sodium were detected in excess of the NYSDEC Sediment Lowest Effect Level guidance values. Cadmium exceeded the criteria (0.6 mg/Kg) in five samples, with a maximum detection estimated at 0.96 mg/Kg in SD13-4. Nickel was detected in all ten sediment samples at concentrations that exceeded the criteria level of 16 mg/Kg, with a maximum concentration of nickel of 35.4 mg/Kg in sample SD13-4. Sodium was detected at concentrations that exceeded the criteria (1 mg/Kg) in four samples. The maximum concentration estimated at 326 mg/Kg was found at sample SD13-4. The manganese criterion of 460 mg/Kg was exceeded in three samples. The maximum concentration of manganese, 778 mg/Kg, was detected in sample SD13-3. The chromium criteria, 26 mg/Kg, was slightly exceeded in three sediment samples. The maximum concentration of chromium, 27.7 mg/Kg, was detected in SD13-4. The copper criteria of 16 mg/Kg was exceeded in all ten samples, with the maximum concentration of 20.7 mg/Kg detected in SD13-4. The iron criteria of 20,000 mg/Kg was exceeded by nine of the ten sediment samples collected, with the maximum concentration of 29,400 mg/Kg detected in sample SD13-4.

### **2.6.5.6 Nitroaromatics**

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

### **2.6.5.7 Indicator Compounds**

The sediment samples were analyzed for nitrate/nitrite-nitrogen and fluoride, which were considered indicator compounds based on the types of materials disposed in the pits at SEAD-13. Nitrate/nitrite-nitrogen was detected in seven of the ten sediment samples analyzed. The maximum concentration detected was 6.4 mg/Kg in sample SD13-6. Fluoride was detected in all four of the sediment samples analyzed for fluoride. The reported concentrations ranged from 188 to 270 mg/Kg.

### 3.0 HUMAN HEALTH MINI RISK ASSESSMENTS

This section of the Decision Document presents the human health mini risk assessment for SEAD-13. This risk assessment provides an understanding of the potential risk that this site may pose to human health. The results of these evaluations are used to support decisions regarding site disposition. Procedures for conducting a mini risk assessment were presented to EPA and NYSDEC in the Decision Criteria Document dated March 1998.

The mini risk assessment is a conservative, screening level risk assessment tool. The intent of this mini risk assessment process is to expediently distinguish sites with a potential for human health or ecological risks from those that clearly pose no significant risk. Due to the conservative nature of the mini risk assessment, it is likely that the risks may be overestimated.

The methods used to conduct the mini risk assessment are the same as those used in the baseline risk assessments at several of the other sites at SEDA, with the exception that the maximum concentration of a component was used instead of the Upper 95<sup>th</sup> Confidence Limit (UCL) of the mean. The existing database is small; therefore using the maximum detected value will provide an added degree of conservatism. Biased sampling has been performed, and the data represent “worst case” conditions.

The objectives of the mini risk assessment are to:

- quantify the risk that a site may pose to human health;
- help determine whether a remedial investigation is necessary;
- provide a basis for determining if a removal action will eliminate the risk; and
- help support selection of the "No Action" remedial alternative, where appropriate.

To meet these objectives, the *Risk Assessment Guidance for Superfund* (RAGS) (EPA, 1989a) was followed when possible and applicable. Technical judgment, consultation with EPA staff, and recent publications were used in the development of the mini risk assessment.

The mini risk assessment was performed based on conservation/recreation as the future land use of SEAD-13.

The site is shown in **Figure 1-2**.

### **3.1 METHODOLOGY AND ORGANIZATION OF DOCUMENT**

The methodology used for this risk assessment follows EPA RAGS guidance. This section contains several major subsections, as follows:

- Identification of Chemicals of Concern
- Exposure Assessment
- Toxicity Assessment
- Risk Characterization

#### **Identification of Chemicals of Concern (Section 3.2)**

This section provides site-related data along with background chemical data. Detailed summaries and statistical analyses of these data are provided in this section. All chemicals with validated detections in the applicable environmental media were evaluated in the risk assessment. The relevant exposure pathway risks were calculated for each detected chemical. Relevant background data are presented and, where appropriate, statistical analyses were performed to compare on-site chemical concentrations with background concentrations. Based on these analyses, chemicals whose presence at a site is attributable to background were not further evaluated in the mini risk assessments.

#### **Exposure Assessment (Section 3.3)**

This section includes derivation and presentation of the applicable exposure point concentrations (EPCs) used in the human health risk assessment. EPCs for the baseline risk assessment are based on analytical data and modeling results. The EPCs provided are used for the future onsite land-use scenario, and correspond to the applicable exposure pathways for the baseline risk assessment.

The future land-use scenario for the site is Conservation and Recreation. Associated with the land use scenario is a specific set of plausible receptors and exposure pathways. In all scenarios, the calculated risk values apply to a hypothetical reasonable maximum exposure (RME) individual working on or visiting the site, and the risk values are dictated by the environmental sampling data used in the risk assessment as exposure point concentrations for the applicable media.

The three primary exposure routes considered in these risk assessments are ingestion, inhalation, and dermal contact. Chemical intake values for future land use are calculated based on exposure pathways, specific exposure values, and assumptions. Equations used to calculate intakes for all applicable exposure pathways are presented in this section.

### Toxicity Assessment (Section 3.4)

This section presents oral, inhalation, and dermal toxicity values used in the human health risk calculations. Appropriate data sources (i.e. IRIS, HEAST and EPA Risk Assessment Issue papers) are provided to support the toxicity values.

### Risk Characterization (Section 3.5)

This section presents the risk calculations for all human health exposure pathways for the expected future land use. Non-carcinogenic and carcinogenic risk estimates are summarized for each receptor and exposure pathway.

## 3.2 IDENTIFICATION OF CHEMICALS OF POTENTIAL CONCERN

The data used in the mini risk assessment were collected during the Expanded Site Investigations (ESIs) at the Three Moderate Priority Areas of Concern (AOC)s from November 1993 to April 1994 and during supplemental sampling performed in 2000, 2001, and 2002. The data for detected compounds are summarized in **Appendix A (Tables A-1 through A-4)** and all data are presented in **Appendix C (Tables C-1 through C-4)**. **Table 3.2-1** summarizes the total number of samples from each media collected at SEAD-13. The figures showing these sample locations are **Figure 2-3** and **Figure 2-4**.

**Table 3.2-1**  
**SUMMARY OF SAMPLES COLLECTED**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

Medium	Surface Soil	Subsurface Soil	Groundwater	Surface Water	Sediment
No. of Samples	25	24	20	14	9
No. of Duplicates	5	1	3	2	1
Total	30	25	23	16	10

The following sections describe the processes by which the data were analyzed, examined, and reduced to arrive at a list of analytes, for each exposure pathway, that were quantified for use in the human health mini risk assessment.



### **3.2.1 Site-Specific Data Evaluation Considerations**

The data usability criteria for documentation, analytical methods, data validation, precision, accuracy, representativeness, comparability, and completeness are discussed in *Final Expanded Site Inspection Three Moderate Priority SWMUs SEAD 11, 13, and 57* (Parsons, 1995).

The maximum detected concentration of a component in the database was used as the EPC in the mini risk assessment.

#### **3.2.1.1 QA/QC Methods**

QA/QC samples were analyzed for the purpose of assessing the quality of the sampling effort and the analytical data. The QA/QC samples included splits, replicates, field equipment blanks, trip blanks, and matrix spike/matrix spike duplicates (MS/MSD). Split samples were analyzed by an EPA contract laboratory and the Corps of Engineers Missouri River Division (MRD) to assess the quality of the analytical data. One replicate sample was collected per batch of 20 or fewer samples per matrix. One field equipment blank was collected per batch of 20 or fewer samples per matrix in order to detect possible sources of contamination introduced from field sampling equipment or from carry over from one sample to the next. One trip blank was collected per day of water sampling for VOCs and was analyzed for VOCs to determine if samples were contaminated during transit or sample collection. For each group of 20 or less samples per matrix, additional sample volume was collected (for water samples) or an individual sample was selected and was used for matrix spike and matrix spike duplicate analyses. The use of matrix spikes gives insight to the analytical proficiency and efficiency of the analytical methods and indicates if the sample matrix may be attenuating or augmenting the reported analytical results.

#### **3.2.1.2 Analytical Methods**

NYSDEC Contract Laboratory Program (CLP) Statement of Work methods was used for the analysis of organic and inorganic constituents in soil, sediment, groundwater, and surface water. These methods provide data suitable for the mini risk assessment.

#### **3.2.1.3 Data Validation**

The data validation was performed under the guidelines set forth in the “USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review”, 1999; “USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review”, 1994; “Region 2 RCRA and CERCLA Data Validation Standard Operating Procedures”, and NYSDEC Contract Laboratory Program Analytical Services Protocol. The data evaluation included performance of a completeness audit and a review of the following parameters, if applicable: holding times, sample

preservations, percentage of solids, quality control (QC) results of calibration, equipment/rinsate blanks, trip blanks, method blanks, matrix spike/matrix spike duplicate (MS/MSD) analyses, laboratory control sample performances, lab and field duplicates, ICP serial dilution, and surrogate recoveries.

### **3.2.2 Identification of Chemicals of Potential Concern (COPCs)**

**Table 3.2-2** presents the identified chemicals of potential concern (COPCs) for all the media. For inorganics, each site dataset was compared against the SEDA background dataset to determine if the site dataset is statistically different from the background dataset. This background comparison was performed for two media: soil and groundwater. The following method recommended by EPA Region 2 was used for these comparisons: For each inorganic constituent, the average concentration for the site was compared to 2 times the average background concentration. If the site average concentration for a constituent was less than 2 times the background average concentration, the constituent was considered to be present due to background conditions, and it was eliminated from further consideration in the risk assessment. Removing analytes from further consideration is consistent with RAGS (EPA 1989a). The background comparison was only conducted for soil and groundwater.

An average concentration was calculated based on the following protocols: (1) multiple rounds of samples (i.e., collected from the same location at different time periods) were considered as separate samples; (2) duplicate samples were considered as one sample and the average of the duplicate results was used as the concentration for this sample; (3) half the detection limit was used for samples with non-detected concentrations.

Only inorganic constituents were compared to background. Organic compounds were eliminated from further consideration only if they were detected infrequently (i.e. <5% of at least 20 samples) and the detected concentrations were relatively low (i.e., lower than the practical quantitation limit). This has produced a more conservative risk assessment since all organic constituents have been assumed to be present due to previous site activities. The COPC refining and identification is conducted in accordance with the EPA RAGS (EPA, 1989). Background data sets and the locations from which the data were collected are provided in **Appendix B**.

All detected compounds in surface water and sediment were conservatively retained for the risk assessment.

A detailed discussion of COPC identification for each medium is presented below.

#### Soil

As shown in **Table A-5**, the metal concentrations at the site are consistent with background. Therefore, no metals were identified as COPCs for surface soil or subsurface soil. Since no background data are available for nitrate/nitrite and fluoride, both were identified as COPCs for surface soil and subsurface soil.

Chloroform was detected in only 1 out of 13 surface soil samples, and the detected concentration (2 J  $\mu\text{g}/\text{Kg}$  at SB13-7) was lower than the practical quantitation limit for the VOCs (i.e., 12  $\mu\text{g}/\text{Kg}$  for other VOCs in the sample). Upon further review of the sample data and QA/QC data, it was determined that the detection of chloroform at a value of 2 J  $\mu\text{g}/\text{Kg}$  was the result of a lab error, and is not considered a reliable data value. This detection is below the quantitation level and is not considered part of the data set. Therefore, chloroform was not retained as a COPC for surface soil.

Similarly, although 1,4-dichlorobenzene, 2,4,5-trichlorophenol, 2,6-dinitrotoluene, 2-chloronaphthalene, 4-chlorophenyl phenyl ether, bis(2-chloroethoxy)methane, diethyl phthalate were detected, the frequency of detection is 3% (i.e., 1 out of 30 samples) for all the above compounds. In addition, the detected concentrations were lower than or close to the respective practical quantitation limits for the SVOCs. Therefore, none of the above chemicals were retained as a COPC for surface soil.

All the VOCs and SVOCs detected in subsurface soil were identified as COPCs. In addition, all the COPCs identified in surface soil were also regarded as COPCs for subsurface soil.

### Groundwater

As shown in **Table A-6**, aluminum, calcium, cyanide, magnesium, manganese, and potassium concentrations in groundwater were above the background groundwater concentrations. Calcium, magnesium, and potassium are considered nutrients and are only toxic at very high doses (i.e., concentrations that are much higher than those associated with contact at SEAD-13). Therefore, these compounds were not considered COPCs. As a result, aluminum, cyanide, and manganese were identified as COPCs for groundwater.

Although 2-methylnaphthalene and pyrene were detected in groundwater, the detection frequency is only 5% (i.e., 1 out of 22 samples) and the detected concentration was relatively low (lower than the practical quantitation limit for the SVOCs in the respective detected samples). Therefore, 2-methylnaphthalene and pyrene were not retained as COPCs for groundwater.

Inorganic compounds such as nitrate/nitrite-nitrogen and fluoride were identified as COPCs in groundwater.

### Sediment

All compounds detected in sediment were retained as COPCs for the risk assessment.

### Surface Water

All compounds detected in surface water were retained as COPCs for the risk assessment. It should be noted that the results of the surface water samples collected from Kendig Creek (SW13-7, SW13-8, and SW13-9) were not included in the risk assessment. The aluminum concentrations detected in the above samples were much lower than the maximum aluminum concentration detected at the site of SEAD-13.

After eliminating inorganic analytes present at background levels from the risk assessment, EPCs were selected as the maximum detected value for each constituent of concern. When the maximum value occurred in a sample that had a duplicate sample, the maximum value was used in the risk assessment: the samples were not averaged.

**Table 3.2-2** lists the COPCs for the mini risk assessment for SEAD-13 in soils, groundwater, surface water, and sediment.

## **3.3 EXPOSURE ASSESSMENT**

### **3.3.1 Overview and Characterization of Exposure Setting**

The objective of the exposure assessment was to estimate the type and magnitude of exposures to the Chemicals of Potential Concern (COPC) that are present at, or migrating from, the site. This component of the risk assessment can be performed either qualitatively or quantitatively. Quantitative assessment is preferred when toxicity factors necessary to characterize a compound of concern are available.

The exposure assessment consists of three steps (EPA, 1989a):

- Characterize Exposure Setting
- Identify Exposure Pathways
- Quantify Exposure

#### **Characterize Exposure Setting**

In this step, information on the physical characteristics of the site that may influence exposure is considered. The physical setting involves climate, vegetation, soil characteristics, and surface and groundwater hydrology. All potentially exposed populations and subpopulations therein (receptors)

are assessed relative to their potential for exposure. Additionally, locations relative to the site along with the current and potential future land use of the site are considered. This step is a qualitative one aimed at providing a general site perspective and offering insight on the surrounding population.

### **Identify Exposure Pathways**

All exposure pathways, ways in which receptors can be exposed to contaminants that originate from the source, are reviewed in this step. Chemical sources and mechanisms for release along with subsequent fate and transport are investigated. Exposure points of human contact and exposure routes are discussed before quantifying the exposure pathways in step 3.

### **Quantify Exposure**

In this final step, the exposure levels (COPC intakes or doses) are calculated for each exposure pathway and receptor. These calculations typically follow EPA guidance for assumptions of intake variables or exposure factors for each exposure pathway and EPA-recommended calculation methods.

**Figure 3-1** illustrates the exposure assessment process.

#### **3.3.2 Physical Setting and Characteristics**

The physical setting and characteristics of the site are described in **Section 2.0** of this document.

#### **3.3.3 Land Use and Potentially Exposed Populations**

##### **3.3.3.1 Current Land Use**

There is no current land use for the area under consideration; the site is abandoned. Perimeter chain link fencing restricts access to SEAD-13. The site has no actual site workers but is occasionally patrolled by site security personnel. There are no drinking water supply wells at SEAD-13; the closest well to the SEAD-13 site is 4000 ft away to the east.

##### **3.3.3.2 Potential Future Land Use**

EPA guidance for determining future land uses recommends, if available, master plans, which include future land uses, Bureau of Census projections and established land use trends in the general area should be utilized to establish future land use trends.

In July 1995, the Base Realignment and Closure Act (BRAC) Commission voted to recommend closure of SEDA. Congress approved the recommendation, which became public law on October 1, 1995. According to BRAC regulations, future uses of the site will be determined by the Army.

In accordance with BRAC regulations, the Army will notify all appropriate regulatory agencies and will perform any additional investigations and remedial actions to assure that any changes in the intended use of the site is protective of human health and the environment in accordance with CERCLA. Also, Army regulations (Regulation 200-1, paragraph 12-5, Real Property Transactions), require that the Army perform an Environmental Baseline Study (EBS) prior to a transfer of Army property. The EBS is an inventory and a comprehensive evaluation of the existing environmental conditions and consists of scope definition, survey, sampling, investigative and risk assessment.

As part of the 1995 BRAC process, a Land Redevelopment Authority (LRA) comprised of representatives of the local public was established. This group commissioned a study to recommend future uses of the Seneca Army Depot. The Land Reuse Plan produced by the LRA designated various uses for different parcels of SEDA. This Land Reuse Plan is the basis for future land use assumption—Conservation/Recreation Land—in this risk assessment.

### **3.3.3.3 Potentially Exposed Populations**

Potentially exposed populations that are relevant to each future land use are evaluated in this risk assessment. Since current exposure is infrequent and limited, only future receptors under the future land use scenarios are considered in this mini risk assessment. These receptors are:

- Park Worker
- Recreational Visitor (Child)
- Construction Worker

A resident adult and a resident child were evaluated, as well, in **Appendix B**.

### **3.3.4 Identification of Exposure Pathways**

Exposures are estimated only for plausible completed exposure pathways. A completed exposure pathway has the following four elements:

- a source and mechanism for chemical release,
- an environmental transport medium,
- an exposure point, and
- a human receptor and a feasible route of exposure at the exposure point.

A pathway cannot be completed unless each of these elements is present. **Figure 3-2** illustrates the completed exposure pathways for the SEAD-13 site.

#### **3.3.4.1 Sources and Receiving Media**

The suspected potential source(s) are soils within and adjacent to the IRFNA pits. These soils are contaminated with metals and nitrates/nitrites. The primary release mechanisms from the site are surface water runoff and infiltration of precipitation. If infiltration of precipitation occurs then groundwater would be a secondary source. At the SEAD-13 site, both surface water and groundwater drain into the Duck Pond. Soil, surface water, and sediment are also secondary sources. Wind is also a release mechanism, as dust from impacted soil may be introduced into the breathing zone, although this is not expected to be significant as the site is vegetated.

#### **3.3.4.2 Fate and Transport**

The environmental fate associated with the general classes of COPCs found at SEAD-13 is discussed briefly below.

##### **Volatile Organics**

A relatively small number of VOCs were detected in soil and sediment at SEAD-13. VOCs were detected infrequently and in low concentrations. Because of this low prevalence and concentrations, direct volatilization of VOCs was not considered significant in this assessment.

##### **Semivolatile Organics**

The principal SVOCs found in soil or sediment at SEAD-13 are PAHs, phenols, and phthalates. Generally, these constituents are relatively persistent and immobile in the environment. A pesticide, 4,4'-DDE, was also found in one soil sample and tetryl, a nitroaromatic, was detected in one sediment sample. Herbicides were not found in soil, groundwater, surface water, or sediment samples.

##### **Metals**

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 pollutant migration and was not considered. However, leaching and sorption are considered potential mechanisms for transport. Leaching of metals from soil is controlled by numerous factors. Most importantly is its chemical form (base metal or cation) in the soil. The leaching of metals from soils is substantial if the metal exists as a soluble salt. Upon contact with surface water or precipitation, the metals, either as metal oxides or metal salts, can be solubilized, eventually leaching to the groundwater. Although

metals were detected in the soils, the levels were consistent with background values, and, therefore, were not considered COPCs. Two metals (aluminum and manganese) and cyanide were considered COPCs in groundwater. Multiple metals were found in the sediment and surface water at SEAD-13.

### **3.3.4.3 Summary of Exposure Pathways to be Quantified**

The pathways presented reflect the projected future use of SEAD-13. This section presents the rationale for including these exposure pathways in this mini risk assessment:

- Inhalation of Particulate Matter in Ambient Air
- Incidental Ingestion and Dermal Contact to On-Site Surface Soils
- Incidental Ingestion and Dermal Contact to On-Site Surface and Subsurface Soils
- Ingestion of Groundwater
- Inhalation and Dermal Contact with Groundwater while Showering
- Incidental Dermal Contact with Surface Water and Sediment

#### **Inhalation of Particulate Matter in Ambient Air**

Surface soil particles may become airborne via wind erosion, which in turn may be inhaled by individuals at the site. Construction workers may also be exposed to subsurface soil particles. Therefore, inhalation exposure to soil particulates in ambient air was assessed for all future receptors.

#### **Incidental Ingestion and Dermal Contact to On-Site Surface Soils**

During the course of daily activities, workers and visitors (children) could come into contact with site surface soils (0-2 ft bgs) and involuntarily ingest and/or have their skin exposed to them. Therefore, exposure via dermal contact and soil ingestion was assessed for all future receptors.

#### **Incidental Ingestion and Dermal Contact to On-Site Surface and Subsurface Soils**

The laboratory analyses of all surface and subsurface soils show the presence of VOCs, SVOCs, pesticides, and metals. During the course of daily activities, an on-site construction worker will come into contact with these surface and subsurface soils during intrusive activities and may involuntarily ingest and have his/her skin exposed to them. Therefore, exposure via both dermal contact and soil ingestion was assessed for the future construction worker.

#### **Ingestion of Groundwater**

There is no current use of groundwater as a potable water source at the Depot. The future plan for all areas of SEDA is to obtain potable water from the existing water supply line. Potable water is



supplied to the Depot from a water supply line that passes through the Town of Varick. Varick's water is obtained from the water treatment plant at the Town of Waterloo. The source of this water is Lake Seneca. It is unlikely that a groundwater well would be installed for future drinking water use since a potable water pipeline exists. The shallow groundwater aquifer at the site is inadequate for both yield and quality. Nonetheless, since this use is not prevented via an institutional control such as a deed restriction, it was assumed that wells would be installed on-site for potable water at any site where COPCs were detected at levels exceeding background concentrations. Therefore, this is considered a complete pathway for the park worker and recreational visitor.

### **Inhalation and Dermal Contact with Groundwater while Showering**

Recreational visitors (campers at the conservation area) may come into contact with groundwater while taking daily showers. These receptors may be exposed to all chemicals contained in groundwater during showering by dermal contact and volatile chemicals that partition into the air via inhalation. Therefore, this is considered a complete pathway and data from the on-site wells are used to calculate exposure concentrations.

### **Incidental Dermal Contact with Surface Water and Sediment**

Park workers and recreational visitors may involuntarily contact and have their skin exposed to surface water or sediment. The permanent body of water in the future conservation area is the Duck Pond. This surface water and the associated wet soil, or sediment, may contain chemicals found in the surface soils, since it will collect runoff and soil eroded by the rainfall. While intentional adult contact with this surface water and sediment is unlikely, a park worker or child recreational visitor could potentially wade in the Duck Pond. Therefore, exposure via dermal contact was assessed for these receptors in the conservation area.

#### **3.3.5 Quantification of Exposure**

In this section, each receptor's potential exposures to chemical COPCs are quantified for each of the exposure pathways described above. In each case, the exposures are calculated following methods recommended in EPA guidance documents, such as the Risk Assessment Guidance for Superfund (EPA 1989) and the Supplemental Guidance for Dermal Risk Assessment (EPA 2001). These calculations generally involve two steps. First, representative chemical concentrations in the environment, or EPCs, are determined for each pathway and receptor. From these EPC values, the amount of chemical that an exposed person may take into his/her body is then calculated. This value is referred to as either the Human Intake or the Absorbed Dose, depending on the exposure route.

This section describes the exposure scenarios, exposure assumptions, and exposure calculation methods used in this risk assessment. All calculations are shown in the tables included in **Appendices A** and **B** for conservation/recreation use scenario and residential use scenario, respectively.

Risk assessment as a whole, and the exposure assessment step in particular, are designed to be health protective. The exposure calculations require estimates and assumptions about certain human exposure parameters, such as inhalation rates, ingestion rates, *etc.* Generally, values are selected which tend to be health protective. EPA (1993) recommends that two types of exposure estimates be used for Superfund risk assessments: a reasonable maximum exposure (RME) and central tendency exposure (CT). The RME is defined as the highest exposure that could reasonably be expected to occur for a given exposure pathway at a site, and it is intended to account for both uncertainty in the contaminant concentration and variability in the exposure parameters (such as exposure frequency or averaging time). The CT also may be evaluated for comparison purposes and is generally based on mean exposure parameters. Only RME scenarios have been evaluated in this mini risk assessment.

Superfund risk assessments consider chronic exposures unless specific conditions warrant a short-term or an acute assessment. In this evaluation, long-term exposure to relatively low chemical concentrations is the greatest concern.

EPCs were estimated for all pathways selected for quantitative evaluation. These concentrations are based on the highest measured values (for soil and groundwater) or on calculated estimates (for ambient air and showering). Steady-state conditions were assumed. Therefore, current and future chemical concentrations were assumed to be identical. This assumption may tend to overestimate long-term exposure concentrations because chemical concentrations are likely to decrease over time from natural processes such as dispersion, attenuation, degradation and dilution.

Estimates of pathway-specific human intakes or absorbed doses for each chemical involve assumptions about patterns of human exposure to contaminated media. These assumptions are integrated with EPCs to calculate intakes. Intakes or doses are normally expressed as the amount of chemical at the environment-human receptor exchange boundary in milligrams per kilogram of body weight per day (mg/Kg-day), which represents an exposure normalized for body weight over time. The total exposure is divided by the time period of interest to obtain an average exposure. The averaging time is a function of the toxic endpoint: for non-carcinogenic effects, it is the exposure time (specific to the scenario being assessed) and for carcinogenic effects, it is lifetime (70 years).

### **3.3.5.1 Exposure Assumptions**

An important aspect of exposure assessment is the determination of assumptions regarding how receptors may be exposed to contaminants. EPA guidance on exposure factors is extensive and was

followed throughout this exposure assessment. Standard scenarios and EPA-recommended default assumptions were used where appropriate.

The exposure scenarios in this assessment involve the following future receptors:

- park worker
- construction worker
- recreational visitor (child)

Residential exposure scenarios are assessed in **Appendix B**.

The exposure assumptions for these scenarios are intended to approximate the frequency, duration, and manner in which receptors are exposed to environmental media. For example, the worker scenarios are intended to approximate the exposure potential of individuals employed at the site.

Details of the exposure assumptions and parameters for each exposure scenario are shown in **Table 3.3-1**.

The primary sources for the RME exposure factors are as follows:

- EPA, 1988: Superfund Exposure Assessment Manual
- EPA, 1989a: Risk Assessment Guidance for Superfund, Volume I (RAGS)
- EPA, 1991a: Supplemental Guidance, Standard Default Exposure Factors
- EPA, 1992: Dermal Exposure Assessment, Principles and Applications
- EPA, 1993a: Superfund's Standard Default Exposure for the Central Tendency and Reasonable Maximum Exposure
- EPA, 1997: Exposure Factors Handbook
- EPA, 2001: Risk Assessment Guidance for Superfund Volume 1: Human Health Evaluation Manual (Part E, Supplemental Guidance for Dermal Risk Assessment)

In the following sections, the methods used to calculate exposures by each pathway are explained. Tables that show the human intake or absorbed dose values calculated for each exposure scenario are contained in **Appendix A**. These intakes and doses are used to assess overall carcinogenic and non-carcinogenic risk, as discussed later in the risk characterization section (**Section 3.5**).

### 3.3.5.2 Exposure Scenarios

For the conservation/recreation future use scenario, the following receptors are evaluated in this assessment, and their respective exposure scenarios are described in this section:

- Construction Worker
- Parker Worker
- Recreational Visitor (Child)

### **Construction Worker**

Future construction workers are assumed to spend one year working at the site, which is a typical duration for a significant construction project. These workers spend each working day at the site. During this time, this worker inhales the ambient air at the sites and may ingest or come in dermal contact with the soil there. Since the construction worker may be digging onsite, the soil ingestion or dermal contact with both surface and subsurface soils was assumed.

### **Park Worker**

The park worker's work schedule differs from the construction worker discussed above. The park worker is assumed to work onsite for only 8 months (35 weeks) per year from Spring through Autumn, when the conservation area would be used by recreational visitors. The workday is assumed to be 8 hours/day and the occupational exposure duration is 25 years. The park worker inhales the ambient air, ingests groundwater, and ingests and dermally contacts surface soil. In addition, the park worker may occasionally dermally contact surface water and sediment in the conservation area.

### **Recreational Visitor (Child)**

While both adults and children may visit the conservation area, potential risks would be expected to be higher for children, due to their higher soil ingestion rates and lower body weights. To be conservative, a child recreational visitor receptor is assessed. The recreational visitor is assumed to reside at the conservation area, such as in a campground, for a consecutive two-week period (24 hours/day, 14 days/year) each year for 5 years. During each visit, the child inhales the ambient air, ingests groundwater, inhales and dermally contacts groundwater during showering and ingests and dermally contacts surface soil. In addition, the child recreational visitor may occasionally dermally contact surface water and sediment in the conservation area.

Complete exposure assumptions (exposure factors) for all receptors and exposure scenarios are summarized in **Table 3.3-1**. This table corresponds with the conservation/recreation future land use for SEAD-13. Most exposure factors used in the exposure assessment were obtained from EPA guidance documents. Other exposure factors were based on conservative professional judgment where no data are available from EPA or other sources.

### 3.3.5.3 Inhalation of Particulate Matter in Ambient Air

This pathway consists of particulate matter (PM) being released from soils to the air and then being inhaled by future receptors. Ambient PM concentrations for a construction worker were estimated using an emission and dispersion model. PM concentrations for the park workers and recreational visitors were based on existing site air measurements shown in **Table 3.3-2**.

#### Construction Worker

During construction activities, construction workers may be exposed to chemicals in site soils via inhalation. Construction activities, such as excavation, have the potential to create dust, or suspended particulate matter (PM), originating from the soils being removed. This dust would contain the chemicals present in the soil. Construction workers in the construction area would breathe this PM in the ambient air.

Air concentrations of site chemicals of concern were estimated for this exposure pathway using excavation models recommended in the EPA's "Models for Estimating Air Emission Rates from Superfund Remedial Actions" (EPA 451/R-93-001). Particulate emissions from soil excavation and loading into trucks are estimated with the following equation:

$$E = \frac{k (0.0016) (M) [U/2.2]^{1.3}}{[X/2]^{1.4}}$$

where:

E	=	emissions (g)
k	=	particle size multiplier (unitless)
0.0016	=	empirical constant (g/Kg)
M	=	mass of soil handled (Kg)
U	=	mean wind speed (m/sec)
2.2	=	empirical constant (m/sec)
X	=	percent moisture content (%)

The construction worker receptor is assumed to work at the site for a one-year period. To conservatively estimate potential particulate emissions from construction activities during this period, it was assumed that the entire area of SEAD-13, 136,200 ft<sup>2</sup> (12, 800 m<sup>2</sup>), is excavated to a depth of two meters over the course of one year as part of the campground construction. This results in the following mass of soil removed:

$$\text{Mass} = \text{Area} \times \text{Depth} \times \text{Soil Bulk Density}$$

$$\begin{aligned}
 &= 12,800 \text{ square meters} \times 2 \text{ meters} \times 1.5 \text{ g/cm}^3 \times 10^6 \text{ cm}^3/\text{m}^3 \\
 &= 3.84 \times 10^{10} \text{ grams} \\
 &= 3.84 \times 10^7 \text{ Kg}
 \end{aligned}$$

Other parameter values for the model are as follows:

$$\begin{aligned}
 k &= 0.35 \text{ for PM}_{10} \text{ (EPA 1993)} \\
 U &= 4.4 \text{ m/sec, average wind speed for Syracuse, NY (EPA 1985)} \\
 X &= 10\%, \text{ recommended default (EPA 1993)}
 \end{aligned}$$

With these values for M, k, U and X, the emission rate (E) from excavation activities is calculated 5,500 grams of PM<sub>10</sub> over the course of a year. This emission rate would be representative if all soil excavated at SEAD-13 site was contaminated, and if local climatic factors did not suppress emissions. For example, precipitation, snow cover and frozen soil in the winter will minimize emissions. To account for these climatic/seasonal factors, it was assumed that emissions occur only half of the construction time. This results in a representative emission rate (E) of 2,750 grams/year. This is equivalent to an average emission rate of 11 g/day, 0.46 g/hr, or 0.13 mg/sec, assuming emission occur only during workdays: 250 days/yr, 8 hr/day.

Much greater short-term emissions are estimated for site grading with a bulldozer or tractor. This type of activity is assumed to occur for 90 workdays (8-hour day) over the course of a year. The model equation for grading emissions is:

$$E = \frac{0.094 (s)^{1.5}}{X^{1.4}}$$

where:

$$\begin{aligned}
 E &= \text{emission rate (g/sec)} \\
 0.094 &= \text{empirical constant (g/sec)} \\
 s &= \text{percent silt content (\%)} \\
 X &= \text{percent moisture content (\%)}
 \end{aligned}$$

Assuming the EPA-recommended default values of 8% for s, and 10% for X, the emission rate (E) from grading is calculated as 0.085 g/sec. Averaged over the course of a year with 90 8-hour days of grading emissions, this is 38.1 g/hr or 10.6 mg/sec of PM<sub>10</sub> emissions, assuming all emissions occur during working hours.

Total annual average emissions from excavation and grading are estimated as 0.13 mg/sec + 10.6 mg/sec = 10.7 mg/sec.

Localized exposure concentrations for construction workers are estimated with a simple box model. The model treats a defined surface area as a uniform emission source over the time period of interest. The box, or mixing volume, is defined by this surface area and an assumed mixing height. The emitted PM<sub>10</sub> is assumed to mix uniformly throughout the box, with dilution from surface winds.

The general model equation is:

$$C = \frac{E}{(U)(W)(H)}$$

where:

E	=	emission rate, mg/sec
U	=	wind speed, m/sec
W	=	crosswind width of the area source, m
H	=	mixing height, m

E and U are the same as defined or calculated above. The mixing area is based upon the assumption that the construction activity causing worker exposure is being performed within a 100 square meter area. This area is assumed to be square, and W is the square root of 100 m<sup>2</sup>, or 10 meters. H is assumed to be the height of the breathing zone, or 1.75 meters.

With these values, the PM<sub>10</sub> exposure concentration for a construction worker is calculated as 0.139 mg/m<sup>3</sup>. All of this PM<sub>10</sub> was assumed to be airborne soil released from each site as represented by total soils (surface and subsurface).

The concentration of particulate-associated chemicals in ambient air, then, is:

$$CA = CS \times PM_{10} \times CF$$

where:

CA	=	chemical concentration in air (mg/m <sup>3</sup> )
CS	=	chemical concentration in soil (mg/Kg soil)
PM <sub>10</sub>	=	PM <sub>10</sub> concentration (ug/m <sup>3</sup> )
CF	=	conversion factor (10 <sup>-9</sup> Kg/μg)

These calculated CA values are the inhalation EPCs for the dust inhalation scenarios. **Table A-8 in Appendix A** shows the inhalation EPCs for the future construction workers.

### Other Receptors (Park Workers and Child Receptors)

Ambient air normally contains particulate matter derived from various natural and anthropogenic sources, including soil erosion, fuel burning, automobiles, *etc.* The concentrations of airborne particulate matter were measured at SEDA over a four-month period (April-July) in 1995. A summary of the data collected in this air sampling program is shown in **Table 3.3-2**. Both Total Suspended Particulate Matter (TSP) and particulate matter less than 10 $\mu$ m aerodynamic diameter (PM<sub>10</sub>) were measured. TSP includes all particles that can remain suspended in air, while PM<sub>10</sub> includes only smaller particles that can be inhaled (particles larger than 10 $\mu$ m diameter typically cannot enter the narrow airways in the lung).

For this assessment, the highest 4-month average PM<sub>10</sub> concentration measured at any of the four monitoring stations was assumed to represent ambient air at SEAD-13. The entire particulate loading was assumed to be airborne soil released from the site as represented by the surface soil EPCs for each site.

The concentration of particulate-associated chemicals in ambient air (CA) was calculated with the same equation [CA = CS x PM<sub>10</sub> x CF] used for the construction worker, above.

The ambient air EPCs used in the intake calculations are shown in **Table A-8** in **Appendix A**.

The equation for intake is as follows (EPA, 1989a):

$$\text{Intake (mg/Kg/day)} = \frac{\text{CA} \times \text{IR} \times \text{EF} \times \text{ED}}{\text{BW} \times \text{AT}}$$

where:

CA	=	Chemical concentration in air (mg/m <sup>3</sup> )
IR	=	Inhalation Rate (m <sup>3</sup> /day)
EF	=	Exposure frequency (days/year)
ED	=	Exposure duration (years)
BW	=	Bodyweight (Kg)
AT	=	Averaging Time (days)

The results of these calculations are shown in **Table A-9** in **Appendix A**.



### 3.3.5.4 Incidental Ingestion of Soil

The soil data collected from each site were compiled and the EPCs were selected for each compound. For the park worker and recreational visitor receptors only surface soil data collected from the 0 to 2 foot interval were used in this analysis. For the construction worker exposure, all soil data were used as it is assumed that the construction worker will engage in intrusive activities.

The equation for intake is as follows (EPA 1989a):

$$\text{Intake (mg/Kg-day)} = \frac{\text{CS} \times \text{IR} \times \text{CF} \times \text{FI} \times \text{EF} \times \text{ED}}{\text{BW} \times \text{AT}}$$

Where:

CS	=	Chemical Concentration in Soil (mg/Kg soil)
IR	=	Ingestion Rate (mg soil/day)
CF	=	Conversion Factor (1 Kg/10 <sup>6</sup> mg)
FI	=	Fraction Ingested from Contaminated Source (unitless)
EF	=	Exposure Frequency (days/years)
ED	=	Exposure Duration (years)
BW	=	Body Weight (Kg)
AT	=	Averaging Time (period over which exposure is averaged -- days)

The results of these calculations are shown in **Table A-10** in **Appendix A**.

### 3.3.5.5 Dermal Contact with Soils

The same receptors considered to have the potential to ingest soil may also contact the same soils dermally.

As with the soil ingestion scenarios, the chemical concentrations in the soils taken from the 0 to 2 foot depth were used as the EPCs for the park worker and recreational visitor receptors. The chemical concentrations in all soils were used as the EPCs for the construction worker scenario.

The equation for the absorbed dose from dermal exposure is as follows, based on guidance in EPA 2001:

$$\text{Absorbed Dose (mg/Kg-day)} = \frac{\text{CS} \times \text{CF} \times \text{AF} \times \text{ABS} \times \text{SA} \times \text{EF} \times \text{ED} \times \text{EV}}{\text{BW} \times \text{AT}}$$

Where:

CS	=	Chemical Concentration in Soil (mg/Kg soil)
CF	=	Conversion Factor ( $10^{-6}$ Kg/mg)
AF	=	Soil to Skin Adherence Factor (mg/cm <sup>2</sup> -event)
ABS	=	Dermal Absorption Factor (unitless)
SA	=	Skin Surface Area Available for Contact (cm <sup>2</sup> )
EF	=	Exposure Frequency (days/year)
ED	=	Exposure Duration (years)
EV	=	Event Frequency (events/day)
BW	=	Body Weight (Kg)
AT	=	Averaging Time (period over which exposure is averaged -- days)

The product of the terms CS, AF, and ABS represents the dermal absorbed dose per event as defined in the EPA 2001 guidance.

The exposure calculations are summarized in **Tables A-11** in **Appendix A**.

Dermal exposure involves several unique exposure factors discussed briefly here. Specifically, the dermal exposure calculation considers the amount of exposed skin, the amount of soil that adheres to the skin and the degree to which a chemical may be adsorbed through the skin.

The surface area of exposed skin depends on the size of an individual (especially adult vs. child), clothing worn, and the specific parts of the body, which may directly contact the medium of concern (e.g., soil or groundwater during showering). EPA recommendations were followed to select exposed skin surface areas for each scenario in this assessment.

The following assumptions were made regarding skin surface areas for dermal exposure, according to EPA 1992 and EPA 2001:

**Park Worker (Soil)** The park worker was assumed to wear a short-sleeved shirt, long pants, and shoes. Therefore, the exposed skin surface was limited to the face, hands, and forearms. The EPA (2001) recommended RME value for the industrial scenario, 3300 cm<sup>2</sup>, was used in the risk assessment.

**Park Worker (Surface Water and Sediment)** The hands and forearms may be exposed. EPA (1992) recommends a surface area value of 1980 cm<sup>2</sup> for the RME as representative of these parts of the adult body.

**Recreational Visitor (Child) (Soil/Sediment/Surface Water)** The child recreational visitor was assumed to wear a short-sleeved shirt and shorts (no shoes); therefore, the exposed skin is limited to

the head, hands, forearms, lower legs, and feet. The EPA (2001) recommended RME value for a residential child, 2800 cm<sup>2</sup>, was used in the risk assessment.

**Recreational Visitor (Child) (Groundwater)** The entire body surface may be exposed during showering. EPA (2001) recommends a surface area value of 6600 cm<sup>2</sup> for the RME as representative of the entire child body.

The potential magnitude of exposure depends on the amount of soil that adheres to the exposed skin. Again, EPA (2001) recommended soil-to-skin adherence factors were used in this assessment.

Certain chemicals may be readily absorbed through the skin while others penetrate much more slowly or not at all. In the case of soil, some chemicals may be strongly bound to the matrix, which reduces their ability to absorb through the skin. Chemical-specific absorption factors, provided by EPA (2001), were used in this assessment.

### 3.3.5.6 Groundwater Ingestion

All future receptors may drink groundwater. The groundwater data collected from each site were compiled and the EPCs were selected for each compound.

The equation for intake is as follows (EPA, 1989a):

$$\text{Intake (mg/Kg-day)} = \frac{\text{CW} \times \text{IR} \times \text{EF} \times \text{ED}}{\text{BW} \times \text{AT}}$$

Where:

CW	=	Chemical Concentration in Water (mg/liter)
IR	=	Ingestion Rate (liters/day)
EF	=	Exposure Frequency (days/year)
ED	=	Exposure Duration (years)
BW	=	Bodyweight (Kg)
AT	=	Averaging time (days)

The results of these calculations are shown in **Table A-13** in **Appendix A**.

### 3.3.5.7 Dermal Contact to Groundwater while Showering/Bathing

The recreational visitor may be exposed to groundwater while showering. The EPCs developed for ingestion of groundwater are also used for this exposure route. The equation for the absorbed dose, according to EPA (2001) is as follows:

$$\text{Absorbed Dose (mg/Kg-day)} = \frac{\text{DA} \times \text{SA} \times \text{EF} \times \text{ED} \times \text{EV}}{\text{BW} \times \text{AT}}$$

Where:

DA	=	Absorbed Dose per event (mg/cm <sup>2</sup> - event)
SA	=	Skin Surface Area Available for Contact (cm <sup>2</sup> )
EF	=	Exposure Frequency (days/year)
ED	=	Exposure Duration (years)
EV	=	Event Frequency (events/day)
BW	=	Body Weight (Kg)
AT	=	Averaging Time (period over which exposure is averaged (days))

The absorbed dose per event (DA) was calculated as described in EPA's "Supplemental Guidance for Dermal Risk Assessment," (EPA, 2001).

For organics, a parameter, B was first calculated. This value attempts to characterize the relative contribution of each compound's specific permeability coefficient (K<sub>p</sub> value) in the stratum corneum and the viable epidermis.

$$B = K_p \frac{\sqrt{MW}}{2.6}$$

where: K <sub>p</sub>	=	Dermal permeability coefficient in water (cm/hr)
MW	=	Molecular weight (g/mole)

Once calculated, the B value is used to calculate time conditions associated with estimates of compound breakthrough time. In accordance with the work of Cleek and Bunge, if the exposure time per event (ET) is less than the breakthrough time (t\*) of steady-state conditions specific to each compound, then the absorbed dose is calculated as follows:

$$\text{DA} = \text{FA} \times 2 \text{K}_p \times \text{CW} \times \text{CF} \sqrt{\frac{6 \times \tau \times \text{ET}}{\pi}}$$

If the exposure time is longer than t\*, then the absorbed dose is calculated using:

$$\text{DA}_{\text{event}} = \text{FA} \times \text{K}_p \times \text{CW} \times \text{CF} \left[ \frac{\text{ET}}{1+B} + 2\tau \left( \frac{1+3B+3B^2}{(1+B)^2} \right) \right]$$

where for both equations:

FA	=	Fraction absorbed water (dimensionless), assumed as 1
K <sub>p</sub>	=	Dermal permeability coefficient (cm/hr)
CW	=	Chemical Concentration in Water (mg/L)
ET	=	Exposure Time (hours)
B	=	Bunge Model Value (unitless)
τ	=	Lag time (hours), listed in Exhibit B-3 of EPA (2001), or calculated per Equation A.4 in EPA (2001)
CF	=	Volume Conversion Factor = 0.001L/cm <sup>3</sup> , listed in Exhibit B-3 of EPA (2001) or calculated per Equations A.5 through A.8 in EPA (2001)
t*	=	Time to reach steady-state (hr)

The exposure times for showering are assumed to be 1 hr/event for the child recreational user, as recommended in the Supplemental Guidance for Dermal Risk Assessment, EPA, 2001. The entire body surface may be exposed during showering. EPA 2001 recommends a surface area value of 6600 cm<sup>2</sup> for the RME as representative of the entire body of a child. For the wading scenario, skin contact surface was assumed to be 2800 cm<sup>2</sup>.

The lag time (τ), is defined as the time it takes a chemical to penetrate to reach a steady-state condition during a dermal exposure in aqueous media. By properly defining the lag time, the permeability coefficient (K<sub>p</sub>) can be more properly used in the risk calculation further reducing uncertainty. Lag times and breakthrough times (t\*) for each organic compound were taken from a list in Exhibit B.2 of the Supplemental Guidance for Dermal Risk Assessment, EPA, 2001, or calculated per EPA guidance (2001). All chemicals not having lag times were derived using the following equation:

$$\tau = \frac{l_{sc}^2}{6D_{sc}}$$

where:

$l_{sc}$	=	thickness of the stratum corneum, assume (0.001) (cm)
$D_{sc}$	=	Stratum corneum diffusion coefficient (cm <sup>2</sup> /hr)

For inorganics, DA was calculated by:

$$DA = K_p \times CW \times ET \times CF$$

EPA, in the Supplemental Guidance for Dermal Risk Assessment (EPA 2001), recommends Dermal Permeability Coefficients (K<sub>p</sub>) for a number of organic and inorganic chemicals. These

recommended values were used in these exposure calculations. When no organic  $K_p$  value was available, a value was calculated using the following equation:

$$\text{Log } K_p = -2.80 + 0.66 (\text{log } K_{ow}) - 0.0056 (\text{MW})$$

Many inorganic compounds do not have specified recommended  $K_p$  values. In this case,  $K_p$  was assumed to be  $1 \times 10^{-3}$  as the default value recommended by EPA (EPA, 2001).

The dermal exposure calculations are summarized in **Table A-14** in **Appendix A**.

### 3.3.5.8 Inhalation of Groundwater while Showering/Bathing

The same groundwater concentrations that were used in the groundwater ingestion scenario were used in this scenario. These groundwater concentrations were converted to air concentrations inside the shower using a model developed by Andelman (Andelman, J.B. 1984, Andelman, J.B., 1985a, Andelman, J.B., 1985b). This model assumes that the concentration of the air inside the shower is in equilibrium between the rate of release from the shower water and the rate of air exchange between the shower and the bathroom. The empirical constants in the model were obtained from the observed efficiency of volatilization for TCE in model showers and from several homes with contaminated water where measurements have been made. The efficiency of release for chemicals other than TCE is obtained as the product of the ratio of the Henry's Law constant for that compound to the Henry's Law constant for TCE and the efficiency factor for TCE.

The average concentration of a volatile organic in the shower air over a period of  $t_s$  minutes is:

$$C_s = C_{inf} \left[ 1 + \left( \frac{1}{kt_s} \right) \times \left( e^{(-kt_s)^{-1}} \right) \right]$$

for  $t_s > 0$

where:

$C_s$	=	average concentration of a volatile compound in the shower air over a duration of $t_s$ minutes ( $\text{mg}/\text{m}^3$ )
$C_{inf}$	=	asymptotic concentration in air if shower ran for a long time (much longer than 15 minutes), calculated below ( $\text{mg}/\text{m}^3$ )
$T_s$	=	time in shower, RME value for an adult is 60 minutes (min), (EPA 2001)
$k$	=	rate constant for exponential function, defined below (1/min)
$C_{inf}$	=	$[(E)(F_w)(C_r)]/F_a$
$k$	=	$F_a/V_b$
$F_w$	=	flow rate of water in shower, RME value is 19 L/min

$EPC_{gw}$	=	concentration in shower water, determined case by case; $EPC_{gw}$ is the concentration of contaminant in groundwater where domestic water is provided by a well (mg/L or ppm)
$F_a$	=	flow rate of air in shower, typical value is 2.4 m <sup>3</sup> /min
$V_b$	=	volume of bathroom, typical value is 12 m <sup>3</sup> (m <sup>3</sup> )
$E$	=	$(E_{TCE})(H)/(H_{TCE})$
$E$	=	efficiency of release of a compound from water to air; $0 \leq E \leq 1$ ; if $E$ has a calculated value greater than 1, then $E$ must be set equal to 1 (unitless)
$E_{TCE}$	=	efficiency of release of TCE from water to air, $E_{TCE} = 0.6$ is a typical value (unitless)
$H$	=	Henry's law constant for an organic compound, (m <sup>3</sup> -atm/mol)
$H_{TCE}$	=	Henry's law constant for TCE, typical value is $H_{TCE} = 9.10E^{-3}$ (m <sup>3</sup> - atm/mol)

The calculated average concentrations in the air in the shower are presented in **Tables A-12a**.

The equation for the intake, taken from RAGS (EPA, 1989a) is as follows:

$$\text{Intake (mg/Kg-day)} = \frac{\text{CA} \times \text{IR} \times \text{EF} \times \text{ED}}{\text{BW} \times \text{AT}}$$

Where:

CA	=	Chemical Concentration in Air (mg/m <sup>3</sup> )
IR	=	Inhalation Rate (m <sup>3</sup> /hr)
EF	=	Exposure Frequency (hrs/yr)
ED	=	Exposure Duration (years)
BW	=	Body Weight (Kg)
AT	=	Averaging Time (period over which exposure is averaged -- days)

The exposure calculations are summarized in **Tables A-12**, and supporting calculations are presented in **Table A-12A**.

The chemical concentrations in the air were developed using the model described previously. The inhalation rate of 0.3 m<sup>3</sup>/hr was used as the RME value, recommended in the Exposure Factors Handbook (EPA 1997) as representative of sedentary children.

### 3.3.5.9 Dermal Exposure to Surface Water

The park worker and recreational visitor may occasionally come into contact with surface water or sediment at the Duck Pond. The park worker may occasionally put his hands and arms in water as part of his work. A child recreational visitor may be exposed to surface water during a wading event.

Therefore, surface water was analyzed at SEAD-13 and the site was assessed for dermal exposure to surface water.

The equations used to calculate dermally-absorbed doses from surface water are the same as those used for dermal contact with groundwater during showering. See **Section 3.3.5.7**, above, for a complete discussion of this methodology.

The exposure time for contact with surface water is assumed to be one hour per day for each receptor. The dermal exposure calculations for surface water at SEAD-13 are summarized in **Table A-15** in **Appendix A**.

#### **3.3.5.10 Dermal Exposure to Sediment**

The same receptors in the Conservation/Recreation area considered to have the potential for dermal contact with surface water may also have dermal contact with sediment. These receptors are the park worker and child recreational visitor.

The absorbed chemical dose from dermal contact with sediment is calculated by the same method used for soils except that CS is the chemical concentration in sediment (mg/Kg-sediment), rather than soil, and the sediment to skin adherence factor (AF) was assumed to be 1 mg/cm<sup>2</sup>-event. See **Section 3.3.5.5**, above, for a complete discussion of this methodology.

Similar to soil, the sediment dermal exposure calculation considers the amount of exposed skin, the amount of soil that adheres to the skin and the degree to which a chemical may be adsorbed through the skin. As with soil, this assessment followed EPA guidance regarding the values assigned to each of these exposure parameters.

The dermal exposure calculations for sediment are summarized in **Tables A-16** in **Appendix A**.

### **3.4 TOXICITY ASSESSMENT**

The objective of the toxicity assessment is to weigh available evidence regarding the potential of the chemicals to cause adverse effects in exposed individuals, and to provide, where possible, an estimate of the relationship between the extent of exposure to a chemical and the increased likelihood and/or severity of adverse effects. The types of toxicity information considered in this assessment include the reference dose (RfD) and reference concentration (RfC) used to evaluate non-carcinogenic effects, and the slope factor and unit risk to evaluate carcinogenic potential. Most toxicity information used in this evaluation was obtained from the Integrated Risk Information System (IRIS). If values were not available from IRIS, the *Health Effects Assessment Summary Tables* (HEAST) (EPA, 1997) were consulted. Finally, the EPA Region II was consulted to provide any additional values not included in



these two sources. The toxicity factors used in this evaluation are summarized in **Table 3.4-1** for both non-carcinogenic and carcinogenic effects.

### **3.4.1 Non-carcinogenic Effects**

For chemicals that exhibit non-carcinogenic (i.e., systemic) effects, authorities consider organisms to have repair and detoxification capabilities that must be exceeded by some critical concentration (threshold) before the health effect is manifested. For example, an organ can have a large number of cells performing the same or similar functions that must be significantly depleted before the effect on the organ is seen. This threshold view holds that a range of exposures from just above zero to some finite value can be tolerated by the organism without an appreciable risk of adverse effects.

Health criteria for chemicals exhibiting non-carcinogenic effects for use in risk assessment are generally developed using EPA RfDs and RfCs developed by the RfD/RfC Work Group and included in the IRIS. In general, the RfD/RfC is an estimate of an average daily exposure to an individual (including sensitive individuals) below which there will not be an appreciable risk of adverse health effects. The RfD/RfC is derived using uncertainty factors (e.g., to adjust from animals to humans and to protect sensitive subpopulations) to ensure that it is unlikely to underestimate the potential for adverse non-carcinogenic effects to occur. The purpose of the RfD/RfC is to provide a benchmark against which an intake (or an absorbed dose in the case of dermal contact) from human exposure to various environmental conditions might be compared. Intakes of doses that are significantly higher than the RfD/RfC may indicate that an inadequate margin of safety could exist for exposure to that substance and that an adverse health effect could occur.

#### **3.4.1.1 References Doses for Oral and Inhalation Exposure**

The types of toxicity values used to evaluate the non-carcinogenic effects of chemicals include RfDs for oral exposure and RfCs for inhalation exposure. RfDs and RfCs represent thresholds for toxicity. They are derived such that human lifetime exposure to a given chemical via a given route at levels at or below the RfD or RfC, as appropriate, should not result in adverse health effects, even for the most sensitive members of the population. The chronic RfD or RfC for a chemical is ideally based on studies where either animal or human populations were exposed to a given chemical by a given route of exposure for the major portion of the life span (referred to as a chronic study). Various effect levels may be determined in a study; however, the preferred effect level for calculating non-carcinogenic toxicity values is the no-observed-adverse-effect level, or NOAEL. Second to the NOAEL is the lowest-observed-adverse-effect level, or LOAEL.

The oral RfD is derived by determining dose-specific effect levels from all the available quantitative studies, and applying uncertainty factors and/or a modifying factor to the most appropriate effect level. Uncertainty factors are intended to account for 1) the variation in sensitivity among members

of the human population, 2) the uncertainty in extrapolating animal data to humans, 3) the uncertainty in extrapolating from data obtained in a study that is less than lifetime exposure, 4) the uncertainty in using LOAEL data rather than NOAEL data, and 5) the uncertainty resulting from inadequacies in the data base. The modifying factor may be used to account for other uncertainties such as inadequacy of the number of animals in the critical study. Usually each of these uncertainty factors is set equal to 10, while the modifying factor varies between one and 10. RfDs are reported as doses in milligrams of chemical per kilogram body weight per day (mg/Kg-day).

The inhalation RfC is derived by determining concentration-specific effect levels from all of the available literature and transforming the most appropriate concentration to a human RfC. Transformation usually entails converting the concentration and exposure duration used in the study to an equivalent continuous 24-hour exposure, transforming the exposure-adjusted value to account for differences in animal and human inhalation, and then applying uncertainty factors and/or a modifying factor to the adjusted human exposure concentration to arrive at an RfC. The uncertainty factors potentially used are the same ones used to arrive at an RfD (see above). RfCs are reported as concentrations in milligrams of chemical per cubic meter of air (mg/m<sup>3</sup>). To use the RfCs in calculating risks, they were converted to inhalation reference doses in units of milligrams of chemical per kilogram of body weight per day (mg/Kg/day). This conversion was made by assuming an inhalation rate of 20 m<sup>3</sup>/day and an adult body weight of 70 Kg. Thus:

$$\text{Inhalation Reference Dose (mg/Kg/day)} = RfC \left( \frac{mg}{m^3} \right) \times \left( \frac{20m^3}{day} \right) \times \left( \frac{1}{70kg} \right)$$

#### 3.4.1.2 Reference Doses for Dermal Exposure

EPA has not derived toxicity values for all routes of exposure. Most of the available toxicity values are for oral exposure. Many inhalation values are also available. No values are currently available for dermal exposure. This is due to the lack of scientific studies available to quantify dermal toxicity and carcinogenic potential for the vast majority of priority pollutants. In addition, until recently, scientists have assumed that the hazards due to dermal exposures were minimal in comparison with those due to oral exposure. However, it appears that in many instances the hazards due to dermal exposure may be as great or greater.

At this time, chemical specific dermal toxicity factors are not available. This risk assessment evaluated risks from dermal contact with contaminants according to the most recent EPA guidance on dermal risk assessment (EPA, 2001). The guidance provides an approach which accounts for the fact that most oral RfDs are expressed as the amount of substance administered per unit time and body weight, whereas exposure estimates for the dermal pathway are expressed as absorbed dose. Primarily, a dermal RfD was estimated from the oral RfD by adjusting for the gastrointestinal absorption efficiency. For compounds recommended by Exhibit 4-1 of the guidance for adjustment

of toxicity factors, the GI absorption efficiency values in the table were used to calculate the dermal RfD. For all other compounds, oral RfDs were used to evaluate dermal exposure risks, i.e., a GI absorption efficiency value of 1 was used. Oral absorption factors and the calculated dermal RfDs are shown in **Table 3.4-1**.

### **3.4.1.3 Exposure Periods**

As mentioned earlier, chronic RfDs and RfCs are intended to be set at levels such that human lifetime exposure at or below these levels should not result in adverse health effects, even for the most sensitive members of the population. These values are ideally based on chronic exposure studies in humans or animals. Chronic exposure for humans is considered to be exposure of roughly seven years or more, based on exposure of rodents for one year or more in animal toxicity studies. For recreational visitors and construction workers, chronic RfDs and RfCs were used to conservatively assess risks for shorter exposure periods.

### **3.4.2 Carcinogenic Effects**

For chemicals that exhibit carcinogenic effects, most authorities recognize that one or more molecular events can evoke changes in a single cell or a small number of cells that can lead to tumor formation. This is the non-threshold theory of carcinogenesis, which purports that any level of exposure to a carcinogen can result in some finite possibility of generating the disease. Generally, regulatory agencies assume the non-threshold hypothesis for carcinogens in the absence of information concerning the mechanisms of action for the chemical of concern.

EPA's Carcinogen Risk Assessment Verification Endeavor (CRAVE) has developed slope factors and unit risks (i.e., dose-response values) for estimating excess lifetime cancer risks associated with various levels of lifetime exposure to potential human carcinogens. The carcinogenic slope factors can be used to estimate the lifetime excess cancer risk associated with exposure to a potential carcinogen. Risks estimated using slope factors are considered unlikely to underestimate actual risks, but they may overestimate actual risks. Excess lifetime cancer risks are generally expressed in scientific notation. An excess lifetime cancer risk of  $1 \times 10^{-6}$  (one in a million), for example, represents the probability of an individual developing cancer over a lifetime as a result of exposure to the specific carcinogenic chemical. EPA considers total excess lifetime cancer risks within the range of  $10^{-4}$  (one in ten thousand) to  $10^{-6}$  (EPA 1989a) to be acceptable when developing remedial alternatives for cleanup of Superfund Sites.

In practice, slope factors are derived from the results of human epidemiology studies or chronic animal bioassays. The data from the animals studies are fitted to the linearized, multistage model and a dose-response curve is obtained. The upper limit of the 95th percentile confidence-interval slope of the dose-response curve is subjected to various adjustments, and an interspecies scaling factor is

applied to conservatively derive the slope factor for humans. This linearized multistage procedure leads to a plausible upper limit of the risk that is consistent with some proposed mechanisms of carcinogenesis. Thus, the actual risks associated with exposure to a potential carcinogen are not likely to exceed the risks estimated using these slope factors, but they may be much lower. Dose-response data derived from human epidemiological studies are fitted to dose-time-response curves on an ad-hoc basis. These models provide rough but plausible estimates of the upper limits on lifetime risk. Slope factors based on human epidemiological data are also derived using very conservative assumptions and, as such, are considered unlikely to underestimate risks. In summary, while the actual risks associated with exposures to potential carcinogens are unlikely to be higher than the risks calculated using a slope factor, they could be considerably lower.

In addition, there are varying degrees of confidence in the weight of evidence for carcinogenicity of a given chemical. The EPA system involves characterizing the overall weight of evidence for a chemical's carcinogenicity based on availability of animal, human, and other supportive data. The weight-of-evidence classification is an attempt to determine the likelihood that the agent is a human carcinogen, and thus qualitatively affects the estimation of potential health risks. Three major factors are considered in characterizing the overall weight of evidence for carcinogenicity: (1) the quality of evidence from human studies, (2) the quality of evidence from animal studies, which are combined into a characterization of the overall weight of evidence for human carcinogenicity; and (3) other supportive information which is assessed to determine whether the overall weight of evidence should be modified. EPA's final classification of the overall weight of evidence includes the following five categories:

**Group A - Human Carcinogen** - There is sufficient evidence from epidemiological studies to support a causal association between an agent and cancer.

**Group B - Probable Human Carcinogen** - There is at least limited evidence from epidemiological studies of carcinogenicity to humans (Group B1) or that, in the absence of adequate data on humans, there is sufficient evidence of carcinogenicity in animals (Group B2).

**Group C - Possible Human Carcinogen** - There is limited evidence of carcinogenicity in animals in the absence of data on humans.

**Group D - Not Classified** - The evidence for carcinogenicity in animals is inadequate.

**Group E - No Evidence of Carcinogenicity to Humans** - There is no evidence for carcinogenicity in at least two adequate animal tests in different species, or in both epidemiological and animal studies.

Slope factors and unit risks are developed by the EPA based on epidemiological or animal bioassay data for a specific route of exposure, either oral or inhalation. For some chemicals, sufficient data are available to develop route-specific slope factors for inhalation and ingestion. For chemicals with only one route-specific slope factor but for which carcinogenic effects may also occur via another route, the available slope factor may be used by the EPA to evaluate risks associated with several potential routes of exposure (EPA, 1989b).

A number of the chemicals of potential concern have been classified as carcinogens or potential carcinogens by EPA, and each of these has also been assigned a carcinogenicity weight-of-evidence category, as shown in **Table 3.4-1**. These chemicals at SEAD-13 are:

#### **Group A - Human Carcinogens**

Arsenic  
Chromium VI

#### **Group B - Probable Human Carcinogens**

Methylene Chloride  
2,4-Dinitrotoluene  
2,4,6-trichlorophenol  
Benzo(a)anthracene  
Benzo(a)pyrene  
Benzo(b)fluoranthene  
Benzo(k)fluoranthene  
Bis(2-Ethylhexyl)phthalate  
Carbazole  
Chrysene  
Dibenz(a,h)anthracene  
Hexachlorobenzene  
Indeno(1,2,3-cd)pyrene  
DDE, 4,4'-  
Antimony  
Beryllium  
Cadmium  
Lead

#### **Group C - Possible Human Carcinogens**

4-Methylphenol

Butylbenzylphthalate  
Naphthalene

All remaining chemicals of concern are either not found to have weight of evidence rankings or are Group D or E. Group D classification means that the data are insufficient to make a determination regarding carcinogenic potential while Group E compounds have been conclusively found to be non-carcinogenic. Chemicals of potential concern found at SEAD-13 with potential carcinogenic effects are shown in **Table 3.4-1** along with their cancer slope factors.

### 3.4.2.1 Cancer Slope Factors for Oral and Inhalation Exposure

The types of toxicity values used to evaluate the carcinogenic effects of chemicals include slope factors (SFs) for oral exposure, and unit risk factors (URFs) for inhalation exposure. Oral slope factors are reported as risk per dose (mg/Kg-day)<sup>-1</sup>. Inhalation unit risk factors are reported in units of risk per concentration (mg/m<sup>3</sup>)<sup>-1</sup>. To make use of the unit risk factors in calculating risks they first had to be converted to inhalation slope factors in units of (mg/Kg-day)<sup>-1</sup>. This conversion was made by assuming an inhalation rate of 20 m<sup>3</sup>/day and an adult bodyweight of 70 Kg. Thus:

$$\text{Inhalation slope factor (mg/Kg-day)}^{-1} = \text{UnitRisk} \left( \frac{\text{ug}}{\text{m}^3} \right)^{-1} \times \frac{\text{day}}{20\text{m}^3} \times 70\text{kg} \times \frac{1000\text{ug}}{\text{mg}}$$

### 3.4.2.2 Cancer Slope Factors for Dermal Exposure

As discussed above, EPA has not derived toxicity values for the dermal route of exposure. In the absence of dermal reference toxicity values, EPA has suggested (EPA, 2001) that, in some cases, it is appropriate to modify an oral slope factor so it can be used to estimate the risk incurred by dermal exposure. The oral slope factors were converted to dermal slope factors by dividing by the oral absorption efficiency recommended by EPA. The same values presented in **Section 3.4.1.2** were used; however, if chemical specific modification factors were unavailable, oral values were used without adjustment. As discussed previously any valuation of the contribution of dermal exposure to the overall risk needs to be viewed as highly tentative at best. This is particularly true for PAHs which are carcinogens at the point of contact, i.e., to skin.

## 3.5 RISK CHARACTERIZATION

### 3.5.1 Introduction

To characterize risk, toxicity and exposure assessments were summarized and integrated into quantitative and qualitative expressions of risk. To characterize potential non-carcinogenic effects, comparisons were made between projected intakes of substances and toxicity values. To characterize

potential carcinogenic effects, probabilities that an individual will develop cancer over a lifetime of exposure are estimated from projected intakes and chemical-specific dose-response information. Major assumptions, scientific judgments, and, to the extent possible, estimates of the uncertainties embodied in the assessment are also presented.

### 3.5.1.1 Non-carcinogenic Effects

The potential for non-carcinogenic effects is evaluated by comparing an exposure level over a specified time period with an RfD derived for a similar exposure period. This ratio of exposure to toxicity is called a hazard quotient according to the following equation:

$$\text{Noncancer Hazard Quotient} = E/RfD$$

Where:

E = Exposure level or intake (mg/Kg-day), and  
RfD = Reference Dose (mg/Kg-day)

The noncancer hazard quotient assumes that there is a level of exposure (i.e., an RfD) below which it is unlikely for even sensitive populations to experience adverse health effects. If the exposure level (E) exceeds the threshold (i.e., if E/RfD exceeds unity) there may be concern for potential noncancer effects.

To assess the overall potential for non-carcinogenic effects posed by more than one chemical, a hazard index (HI) approach has been developed by the EPA. This approach assumes that simultaneous sub-threshold exposures to several chemicals could result in an adverse health effect. It also assumes that the magnitude of the adverse effect will be proportional to the sum of the ratios of the subthreshold exposures to respective acceptable exposures.

This is expressed as:

$$HI = E_1/RfD_1 + E_2/RfD_2 + \dots + E_i/RfD_i$$

Where:

$E_i$  = the exposure level or intake of the  $i$ th toxicant, and  
 $RfD_i$  = reference dose for the  $i$ th toxicant.

While any single chemical with an exposure level greater than the toxicity value will cause the HI to exceed unity, for multiple chemical exposures, the HI can also exceed unity even if no single chemical exposure exceeds its RfD. The assumption of dose additivity reflected in the HI is best applied to compounds that induce the same effects by the same mechanisms. Applying the HI to

cases where the known compounds do not induce the same effect may overestimate the potential for effects. To assess the overall potential for non-carcinogenic effects posed by several exposure pathways, the total HI for chronic exposure is the sum of the HI's for each pathway, for each receptor.

### 3.5.1.2 Carcinogenic Effects

For carcinogens, risks are estimated as the incremental probability of an individual developing cancer over a lifetime as a result of exposure to the potential carcinogen (i.e., excess individual lifetime cancer risk). The slope factor converts estimated daily intakes averaged over a lifetime of exposure directly to incremental risk of an individual developing cancer. It can generally be assumed that the dose-response relationship will be linear in the low-dose portion of the multistage model dose-response curve. Under this assumption, the slope factor is a constant, and risk will be directly related to intake. Thus, the following linear low-dose equation was used in this assessment:

$$\text{Risk} = \text{CDI} \times \text{SF}$$

Where:

- Risk = A unitless probability of an individual developing cancer,
- CDI = Chronic Daily Intake over 70 years (mg/Kg-day), and
- SF = Slope Factor (mg/Kg-day)<sup>-1</sup>

Because the slope factor is often an upper 95th-percentile confidence limit of the probability of a response and is based on animal data used in the multistage model, the carcinogenic risk will generally be an upper-bound estimate. This means that the "true risk" is not likely to exceed the risk estimate derived through this model and is likely to be less than predicted.

For simultaneous exposure to several carcinogens, the EPA assumes that the risks are additive. That is to say:

$$\text{Risk}_T = \text{Risk}_1 + \text{Risk}_2 + \dots + \text{Risk}_i$$

Where:

- Risk<sub>T</sub> = Total cancer risk, expressed as a unitless probability, and
- Risk<sub>i</sub> = Risk estimate for the *i*th substance.

Addition of the carcinogenic risks is valid when the following assumptions are met:

- doses are low,
- no synergistic or antagonistic interactions occur, and
- similar endpoints are evaluated.



According to guidance in the National Contingency Plan, the target overall lifetime carcinogenic risks from exposures for determining clean-up levels should range from  $10^{-4}$  to  $10^{-6}$ .

### **3.5.2 Risk Summary**

Human health risks were calculated for site-specific future exposure scenarios at SEAD-13. The receptors and exposure scenarios were based on the expected future land use of the site: Conservation\Recreation.

Cancer and non-cancer risks were calculated for all applicable exposure routes and are presented in **Table 3.5-1**. This table also serves as a summary of the tables in **Appendix A**, which show risk calculations for each exposure route.

Human health risks were calculated for the following three exposure scenarios at SEAD-13:

- Park worker
- Recreational visitor (child)
- Construction worker

The potential exposure pathways associated with each receptor are summarized in **Figure 3-2**.

**Table 3.5-1** summarizes the calculated cancer and non-cancer risks for all receptors and exposure routes considered in this risk assessment. The total cancer risk from all exposure routes is below the EPA target range for all three receptors. The total non-cancer hazard index (HI) from all exposure routes is less than one for the construction worker, but exceeds one for the park worker (HI=4) and the recreational visitor (child) (HI=2.) The elevated hazard index for both receptors is due solely to ingestion of groundwater, with nitrate/nitrite-nitrogen, aluminum, and manganese being the significant risk contributors.

### **3.5.3 Uncertainty Assessment**

All risk assessments involve the use of assumptions, judgments, and imperfect data to varying degrees. This results in uncertainty in the final estimates of risk. There are uncertainties associated with each component of the risk assessment from data collection through risk characterization. For example, there is uncertainty in the initial selection of substances used to characterize exposures and risk on the basis of the sampling data and available toxicity information. Other sources of uncertainty are inherent in the toxicity values for each substance and the exposure assessments used to characterize risk. Finally, additional uncertainties are incorporated into the risk assessment when exposures to several substances across multiple pathways are summed. Areas of uncertainty in each risk assessment step are discussed below.

### 3.5.3.1 Uncertainty in Data Collection and Evaluation

Uncertainties in the data collection/evaluation step of the risk assessment focus on determining whether enough samples were collected to adequately characterize the risk, and if sample analyses were conducted in a qualified manner to maximize the confidence in the results. Results of the sample analyses were used to develop a database that includes a complete list of the chemicals by media and their representative concentrations used in the risk assessment. The sampling and analysis addressed various objectives in addition to the risk assessment. Therefore, the samples were not collected randomly but were collected from areas of the site with the greatest likelihood to be contaminated. This type of non-random sampling biases the data collected toward overestimating chemical concentrations from the site.

All chemicals detected that were potentially site-related were retained in this assessment. Chemicals that were never detected were eliminated from the assessment. This practice may slightly underestimate risks due to low levels (i.e., below the sample quantitation limit) of eliminated chemicals. Since samples were collected at areas where concentrations were expected to be high and the maximum concentrations were used for the assessment, it is very unlikely that any chemicals were present at the site at health-significant levels and not detected in at least one sample. However, if this did occur, this assumption will underestimate risk. The maximum concentrations were used to calculate site-related risks. Since that assumption implies chronic exposure to the maximum concentration, this assumption is likely to result in an overestimation of site risk.

### 3.5.3.2 Uncertainty in Exposure Assessment

There are inherent uncertainties in predicting future land uses and future chemical concentrations. Future land use scenarios were based on the Land Reuse Plan developed by the LRA.

A large part of the risk assessment is the estimation of risks for a broad set of exposure scenarios and pathways. If exposure does not occur, no risks are present. This assessment does not factor in the probability of the exposure occurring. For certain pathways, exposure may be extremely unlikely. For example, the future receptors are assumed to drink groundwater. It is unlikely that this will occur, since there is a current acceptable water supply, and the aquifer beneath the site is not believed to be productive enough to supply the needs of the future land uses. This assumption yields an overestimation of risk for this scenario. Further, even in the unlikely event that groundwater were to be used as a source of drinking water, it would come from an aquifer below the unconfined aquifer where the contamination was detected (NYSDOH indicates that any private well should be developed from a water bearing formation at a depth greater than 20 feet below the ground surface. The approximate top of the bedrock unit is located at a depth of approximately 20 feet at SEDA. Water wells in the areas surrounding SEDA are screened in the bedrock at depths of 200 feet or more below

ground surface.). Based on the vertical connection tests performed in six wells at the Ash Landfill and in six wells at SEAD-25 (RI Draft Final Report at the Ash Landfill Site, 1994 and RI Final Report at SEAD-25 and SEAD-26, 1998), the till/weathered shale aquifer is not significantly connected to the underlying bedrock aquifer. Considering that SEAD-13 is located approximately 9,000 feet from SEAD-25 and 15,000 feet from the Ash Landfill, and that SEAD-13 has similar site geology as these two sites, it is reasonable to conclude that the till/weathered shale and bedrock aquifers are not significantly connected at SEAD-13. Therefore, the human health risks from ingestion of groundwater may be overestimated even though groundwater was used as a drinking water source.

Once pathways are identified, EPCs must be estimated. There is always some doubt as to how well an exposure model approximates the actual conditions receptors will be exposed to at a given site. Key assumptions in estimating EPCs and exposure assumptions and their potential impact on the assessment are described in the following paragraphs.

As summarized in **Tables 3.3-1**, there are many factors that determine the level of exposure for each exposure pathway. These factors include inhalation rates, ingestion rates, exposure frequencies, exposure durations, body weight, etc. The values for these exposure factors must be selected by the risk assessor to represent each receptor. For the scenarios in this risk assessment, upper bound values were selected for each exposure factor. In the calculations of exposure, these multiple upper-bound exposure factor estimates compound to yield intakes and absorbed doses that overestimate likely exposure levels.

Uncertainty associated with exposure estimation will result in potential underestimation or overestimation of risks for potential receptors. As an example, the recreational visitor is assumed to reside at the site during a camping event and the camping event is assumed to last two consecutive weeks (24 hours/day, 14 days/year) each year for 5 years. If the recreational visitor is exposed 24 hours/day for four weeks each year for 5 years, the cancer risk and the hazard index would double (i.e., cancer risk of  $6E-7$  and hazard index of 3.3 with groundwater exposure and cancer risk of  $4E-7$  and hazard index of 0.02 without groundwater exposure). With the exposure pathway to groundwater inaccessible, the risks are within the EPA risk limits. As presented in **Appendix B**, when exposure to groundwater is prevented, the total cancer risks and hazard indices for residential receptors, who are exposed to COCs at the site 350 days/year, are within the EPA risk limits. Therefore, although more conservative exposure scenarios (such as the example offered by EPA, exposure for more than two weeks a year for five years for a recreational visitor) are not evaluated for this mini risk assessment, they are not expected to result in unacceptable risk based on the risk evaluation for residential scenario.

Similarly, although youth recreational users and adult recreational users were not evaluated, risks for residential receptors can be used as conservative surrogates. Since risks for residential receptors are within the EPA limits with a restriction on groundwater use placed at the site, it is concluded that

risks for adult recreational users would be within the EPA limits with exposure to groundwater prevented.

The EPCs (i.e., maximum concentrations) derived from the measured chemical concentrations are assumed to persist without change for the entire duration of each exposure scenario. It is likely that some degradation would occur over time, particularly for some of the organic compounds, which would reduce the current concentrations. Therefore, this steady state assumption tends to overestimate exposure levels.

### **3.5.3.3 Uncertainty in Toxicity Assessment**

Of the chemicals of potential concern, a number had no reference dose or slope factors. The absence of toxicity values for these chemicals tends to underestimate risks.

There is considerable uncertainty inherent in the toxicity values for both carcinogens and non-carcinogens. Many of the studies are based on animals and extrapolated to humans, and, in some cases, subchronic studies must be used to assess chronic effects. Most cancer slope factors are calculated using a model that extrapolates low dose effects from high dose animal studies. Because toxicity constants are generally based on the upper limit of the 95th-percentile confidence interval or incorporate safety factors to compensate for uncertainty, chemical-specific risks may be overestimated.

Toxicity information was not available for dermal exposure; hence, several assumptions had to be made which may tend to over- or underestimate risk. Oral toxicity values were used without adjustment for chemicals with relatively high oral absorption to calculate risks from dermal exposure in accordance with the EPA recommendation (2001). However, values found in the literature (Owen, 1990) indicate that the uncertainty associated with using oral absorption to estimate dermal absorption is likely less than one order of magnitude.

The inhalation of groundwater during showering was quantitatively evaluated for the recreational visitor. However, risk from inhalation of chemicals without inhalation toxicity values was not quantitatively evaluated, which may cause underestimation of risks from this exposure route.

### **3.5.3.4 Uncertainty in Risk Characterization**

Uncertainties in the toxicity assessment are compounded under the assumption of dose additivity for multiple substance exposure. That assumption ignores possible synergisms and antagonisms among chemicals, and assumes similarity in mechanisms of action and metabolism. Overall, these assumptions would tend to overestimate risk. Similarly, risks summed for chemicals having various weight-of-evidence classifications as well as different target organs may also tend to overestimate risk.

As preceding sections of this report have indicated, the existing site-specific database of chemical and physical information was developed to characterize the types, locations, and concentrations of chemicals in soil, sediment, surface water, and groundwater. Calculations in this mini risk assessment are conservatively based on the maximum concentrations of each chemical detected in each medium of potential concern to human health (soil, groundwater, sediment, and surface water).

#### **3.5.4 Risk Characterization for Residential Land Use**

A residential scenario has been evaluated at SEAD-13 to provide a comprehensive and conservative baseline for the site even though residential development at this site is unlikely. Risk calculations for both an adult resident and a child resident for SEAD-13 can be found in **Appendix B**. A summary of the results is provided below.

**Table B-2.8** summarizes the calculated cancer and non-cancer risks for all exposure routes considered at SEAD-13. The total cancer risk from all exposure routes is within the EPA target range for both receptors. The total non-cancer hazard index (HI) from all exposure routes exceeds one for the adult resident (HI=20) and the child resident (HI=40). The elevated hazard index for both receptors is due mostly to ingestion of groundwater with nitrate/nitrite-nitrogen, aluminum, and manganese being the significant risk contributors.

Based on the current data, it would be necessary to place a restriction on groundwater use at this site. With exposure to groundwater prevented (via a land use restriction), the non-cancer Hazard Indices would be less than 1 for both child and adult residential receptors.

## **4.0 ECOLOGICAL RISK ASSESSMENT (ERA)**

### **4.1 OBJECTIVES AND OVERVIEW**

In addition to the evaluation of human health, this mini risk assessment considers the risk posed by the site to its ecological communities. The screening-level ecological risk assessment (SLERA) presented in this section is intended to evaluate the likelihood that adverse ecological effects are occurring or may occur as a result of exposure to chemicals associated with the site based on a weight-of-evidence approach. An ecological risk does not exist unless a given contaminant has the ability to cause one or more adverse effects, and it is contacted by an ecological receptor for a sufficient length of time, or at a sufficient intensity to elicit the identified adverse effect(s) (EPA, 1994b).

A screening-level ERA was performed according to EPA's Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments (1997). Ecological risk presented in terms of a hazard quotient (HQ), which is defined as the ratio of the estimated exposure point concentration (EPC) to an appropriate toxicity reference value (TRV). Separate HQs are calculated for each contaminant/receptor pair. Conservative (i.e., health protective) assumptions were used in this screening-level ERA in accordance with the EPA guidance.

Although an ecological field survey was not conducted at SEAD-13, other areas of SEDA have been studied to characterize the ecological communities at SEDA in general and at specific SEADs (e.g. SEADs-16, 17, 25, 26, and the Open Burning Grounds). Field surveys during the Remedial Investigations (RIs) of these SEADs produced an understanding of the habitat, vegetative communities and wildlife species present at the site. The ecological setting of SEAD-13 is similar to SEADs-16, 17, 25, 26, and the Open Burning Grounds. Therefore, the existing ecological characterizations for the other Seneca sites are considered to be applicable to SEAD-13. As a result, this mini ERA is based upon the findings of the prior field surveys at SEADs-16, 17, 25, 26, and the Open Burning Grounds.

The SLERA addresses potentially significant risks to the following biological groups and special-interest resources associated with the site: vascular vegetation, wildlife, aquatic life, endangered and threatened species, and wetlands. The focus of the SLERA lies in the evaluation of the potential toxicity of each constituent of potential concern (COPC) in soil and defines toxicity benchmark values that will be used to calculate the ecological risk quotient.

As preceding sections of this report have indicated, the existing site-specific database of chemical and physical information was developed to characterize the types, locations, and concentrations of chemicals in soil, sediment, surface water, and groundwater. Calculations in this mini ERA are conservatively based on the maximum concentrations of each chemical detected in each medium of potential concern to ecological receptors (soil, sediment, and surface water).

## 4.2 PROBLEM FORMULATION

The screening-level problem formulation establishes the goals, breadth, and focus of the ERA through addressing the following five issues:

- Environmental setting and contaminants known or suspected to exist at the site
- Contaminant fate and transport mechanisms that might exist at the site
- The mechanisms of ecotoxicity associated with contaminants and likely categories of receptors that could be affected
- What complete exposure pathways might exist at the site (a complete exposure pathway is one in which the chemical can be traced or expected to travel from the source to a receptor that can be affected by the chemical)
- Selection of endpoints to screen for ecological risk

Each of these steps is described in the following sections.

### 4.2.1 Environmental Setting and Contaminants at the Site

To begin the screening-level problem formulation, there must be at least a rudimentary knowledge of the potential environmental setting and chemical contamination at the site. In addition to the site information presented in the previous sections, the following key aspects of characterizations of environmental setting and contaminants at the site are presented here:

- Site habitat characterization
- Identification of ecological constituents of potential concern

#### **Site Habitat Characterization**

The ecological setting of SEAD-13 is similar to SEADs-16, 17, 25, 26, and the Open Burning Grounds based on the following factors:

- (1) SEAD-13 is located in Seneca Army Depot, within 3 miles of SEADs-16, 17, 25, 26, and the Open Burning Grounds. The Seneca sites share the same regional climate;
- (2) These sites are generally abandoned;
- (3) The vegetative cover at these sites consists of old fields, shrublands, and deciduous forest;
- (4) The shallow soil surface is similar to all sites, consisting mainly of crushed shales and limestone pieces;
- (5) Surface water, wetlands or drainage swales are present at these sites.

Therefore, characterizations of site habitat and ecological communities developed as part of the RIs for SEADs-16, 17, 25, 26, and the Open Burning (OB) Grounds were assumed to be representative of the sites included in this mini ERA. Key aspects of these characterizations relevant to this mini risk assessment are presented here.

Ecological site characterizations were based on compilation of existing ecological information and on-site reconnaissance activities. The methods used to characterize the ecological resources included site walkovers for the evaluation of existing wildlife and vegetative communities; interviews with local, state, and SEDA resource personnel; and review of environmental data obtained from previous Army reports. SEDA has a strong wildlife management program that is reviewed and approved by the New York State Bureau of Fish and Wildlife Management. The Depot manages an annual white-tailed deer (*Odocoileus virginiana*) harvest and has constructed a large wetland called the "Duck Pond" in the northeastern portion of the facility to provide a habitat for migrating waterfowl.

The NYSDEC Natural Heritage Program Biological and Conservation Data System identifies no known occurrences of federal- or state-designated threatened or endangered plant or animal species within a 2-mile radius of the site. No species of special concern are documented within the Depot property.

The only significant terrestrial resource known to occur at SEDA is the population of white-pelaged white-tailed deer (*Odocoileus virginiana*), which inhabits the fenced Depot area. Annual deer counting at the Depot indicate that the herd size is approximately 600 animals, approximately one-third (200) are white-pelaged. Since the Depot is totally enclosed, the white-pelaged deer is thought to occur as a result of inbreeding within the herd. To prevent overgrazing and starvation of the deer, the Depot maintains the herd through an annual hunting season on the Depot, and between 250-300 animals are harvested each fall. The management plan of the herd is conducted by the New York State DFW. The normal brown-pelaged deer are also common. White-tailed deer are not listed as a rare or endangered species.

In the vicinity of SEDA, agricultural crops and deciduous forests comprise the vegetative resources used by humans. Although no crops are grown on the Depot, farmland is the predominant land use in the surrounding private lands. Crops, including corn, wheat, oats, beans, and hay mixtures, are grown primarily for livestock feed. Deciduous forestland on the Depot and surrounding private lands is under active forest management. Timber and firewood are harvested from private woodlots.

In the vicinity of SEDA, there are several wildlife species that are hunted and trapped on private lands. Game species hunted include the eastern cottontail, white-tailed deer, ruffed grouse, ring-necked pheasant and various waterfowl. Gray squirrel and wild turkey are hunted to a lesser extent. Fur bearing species trapped in this study area include red and gray fox and raccoon. Muskrat and beaver are trapped to a lesser extent (Woodruff 1992). At the Depot, deer, waterfowl and small game



hunting is allowed, although the designated waterfowl hunting area is outside the site. Trapping is also permitted (SEDA 1992).

Animals that may inhabit areas of SEDA include squirrels, eastern cottontails, red foxes, and ring-necked pheasants (although pheasant populations on the Depot are low). Raccoon and deer mice can be found in various habitats at the site. Muskrats and beavers may occur in the wetlands and creek habitats. Although deer have an average home range of a square mile, the other species have more localized or smaller home ranges.

Both SEAD-13-West and SEAD-13-East are characterized by sparse vegetation. At SEAD-13-East, sparse vegetation marks the IRFNA disposal pits.

### **Identification of Ecological Constituents of Potential Concern**

All the COPCs identified in Section 3.2 for the human health risk assessment were considered as ecological COPCs. The highest concentration for each COPC measured at each of the sites was used as the exposure point concentration (EPC) in the calculations presented later in this section.

#### **4.2.2 Contaminant Fate and Transport**

The primary sources of contaminants at SEAD-13 are the residues that may be present in the soil and sediment from prior activities at the site. Contamination, if present, can migrate due to bioturbation or excavation. VOCs can move through the soils. Infiltrating rainwater can leach contaminants and transport them into groundwater, and surface water runoff can also carry contaminants onto adjacent soils, drainage ditches, or the Duck Pond.

Chemicals may migrate further in the environment by a variety of pathways following secondary release from surface soil and deeper soil. The following pathways result from these secondary release mechanisms:

- Suspension and dispersal by the wind of particulate contaminants or contaminants adsorbed to surface soil particles
- Direct volatilization of volatile organic compounds from surface soil to air
- Uptake of soil contaminants by terrestrial organisms
- Transport of chemicals to surface water and sediment by surface runoff of water and soil particles

#### **4.2.3 Ecotoxicity and Potential Receptors**

Understanding the toxic mechanism of a contaminant helps to evaluate the importance of potential exposure pathways and to focus the selection of assessment endpoints. For the constituents that are

present at the site (**Appendix A**), the extent and magnitude of contamination is presented in **Section 2.0**. The toxicological information for nitrate/nitrite is presented as follows. The toxicological information for all the other COPCs can be found in Toxicological Profile Information Sheet provided by Agency for Toxic Substances and Disease Registry (ATSDR).

The indicator compounds at the site is nitrate/nitrite nitrogen. Methemoglobinemia, which can lead to anoxia and death in extreme cases, is the primary acute toxic effect of oral exposure to inorganic nitrates in all animals tested. Ruminant animals are most susceptible. This effect is extremely variable since it depends on a number of factors including the conversion of nitrates to nitrites; the ability of the various animals to enzymatically reduce methemoglobin; the amount of vitamins A, C, D, and E in the diet; and the nutritional state of the animal. Since nitrate is soluble, the screening ecological risk assessment should include potential exposure pathways for receptors to nitrate in water.

#### **4.2.4 Complete Exposure Pathways**

Evaluating potential exposure pathways is one of the primary tasks of the screening-level ecological characterization of the site. A complete exposure pathway consists of the following four elements:

- A source and mechanism of contaminant release to the environment
- An environmental transport mechanism for the released contaminants
- A point of contact with the contaminated medium
- A route of contaminant entry into the receptor at the exposure point

If any of these elements is missing, the pathway is incomplete and is not considered further in the ERA. A pathway is complete when all four elements are present and permit potential exposure of a receptor to a source of contamination. Quantification of some potentially complete pathways may not be warranted because of minimal risk contribution relative to other major pathways. The dominant pathways from sources and exposure media through the food web to ecological receptors potentially exposed to ecological COPCs at the site are presented in **Figure 4-1**. **Figure 4-1** will serve as a conceptual hypothesis for the exposure characterization, the objective of which is to gather information from in order to determine the pathways and media through which ecological receptors may be exposed to COPCs.

As shown in **Figure 4-1**, there are five media through which ecological receptors could be exposed to site-related contaminants: air (dust and vapor), soil, surface water, sediment, and organisms in the food chain. An exposure point is a location where a receptor could potentially come into contact with a contaminated medium. An exposure route is the means by which a receptor comes into contact with a contaminated medium at an exposure point. Exposure to COPCs may occur through the routes of ingestion, inhalation, and dermal contact.

Probable exposure routes (i.e., potentially complete pathways) were identified for each medium based on the physical characteristics of the site and the potential ecological receptors that may occur there. Exposure routes were also identified for ecological receptors. Principal pathways for which analytical data were available for quantitative evaluation of soil COPCs include: ingestion of soil and ingestion of other animals and plants that have accumulated contaminants. Although ingestion is the principal soil exposure route, dermal contact also may be important, particularly for burrowing species. However, the limited dermal permeability database available for ecological receptors and surrogate species precluded quantitative evaluation of the dermal exposure pathway. For sediment and surface water, principal pathways include direct contact with surface water and sediment, ingestion of surface water and sediment, and ingestion of other organisms that have accumulated contaminants.

Ecological receptors could potentially be exposed to site-related contaminants via the air medium. Contaminants in air may be in the form of vapor from VOCs, or in particulate form (as dusts or adsorbed to soil particles) suspended by wind. In either form, ecological receptors could be exposed to contaminants through inhalation. However, the lack of applicable inhalation toxicity data for ecological receptors or similar species precluded quantitative evaluation of potential risks.

Terrestrial animals could potentially be directly exposed to soil contaminants through ingestion of, dermal contact with, and/or inhalation of site soils. For species such as deer, raccoon, opossum, rabbits, rodents, and birds, such exposures would likely be associated with foraging activities. Burrowing species, such as rabbits, mice, moles, and shrews, would probably receive the greatest exposures among vertebrates. Invertebrates living on and within the soil also may experience significant exposures.

Plants may be considered ecological receptors as well as a pathway or medium through which wildlife receptors can be exposed to contaminants. Plants may absorb site-related contaminants from soil through their roots. Contaminants absorbed by plants may then be transferred to wildlife when the plants are ingested for food. This exposure pathway was addressed by use of chemical-specific soil-to-plant uptake factors (obtained from the scientific literature) in the animal receptor exposure calculations. Plants on the site showed visible signs of stress during the field reconnaissance.

Under the future land use scenario for the SEAD-13 site, it is assumed that contaminated soils may be excavated during construction and distributed on the ground surface. As under current conditions, ecological receptors could potentially be exposed to chemicals in soil through ingestion and dermal contact. Other exposure pathways were also assumed to remain essentially the same as under current conditions, except that possible inhalation exposures are likely to be reduced by paving and vegetation (e.g., lawns). The abundance and diversity of some ecological receptors on the site may likely be reduced due to the development.

#### **4.2.5 Assessment and Measurement Endpoints**

To assess whether significant adverse ecological effects have occurred or may occur at the sites as a result of ecological receptors' exposure to COPCs, ecological endpoints were selected. EPA's Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments (EPA, 1997) states that assessment endpoints are any adverse effects on ecological receptors, where receptors are plant and animal populations and communities, habitats, and sensitive environments. Adverse effects on populations can be inferred from measures related to impaired reproduction, growth, and survival. Adverse effects on habitats can be inferred from changes in community structure or function. Adverse effects on habitats can be inferred from changes in composition and characteristics that reduce the habitats' ability to support plant and animal populations and communities. Unlike the human health risk assessment process, which focuses on individual receptors, the ERA focuses on populations or groups of interbreeding non-human, non-domesticated receptors. In the ERA process, risks to individuals are assessed only if they are protected under the Endangered Species Act, as well as species that are candidates for protection or are considered rare.

The Depot does not provide habitat for any threatened or endangered species; therefore, the assessment endpoint of no reduction in numbers of any threatened/endangered species is met. However, the available field surveys indicate that the site is likely to be used by avian and mammal populations. Accordingly, the assessment endpoint that has been selected to represent the policy goal of protection of terrestrial populations and ecosystems is "no substantial adverse effect on survival, growth, and reproduction of resident mouse, shrew, and American robin populations."

Receptors selected for ERA included: terrestrial receptors and aquatic receptors.

#### **Terrestrial Receptors**

Site-specific receptors were selected to represent assessment endpoints based principally on their importance in the community food web; their susceptibility (through exposure and sensitivity) to the site-related constituents, the amount of available data describing their potential for exposure and the toxicological effects that may result from exposure; and the extent to which they represent management goals. The native mouse species inhabiting areas of SEDA are the most appropriate receptor species for soil, and the relevant assessment endpoint was defined as "no substantial adverse effect on resident mouse populations." Given the predominately herbaceous nature of the site, the deer mouse (*Peromyscus maniculatus*) was selected as the species with the niche best met by conditions present at the site. These are the vertebrate receptors most likely to be maximally exposed to contaminants in soil at the site. They also represent a significant component of the food chain, feeding on seeds and berries and soil invertebrates and providing prey for predators. Therefore, the deer mouse was selected as the receptor species at this site and measures of effects (measurement endpoints) were selected that could be extrapolated to predict effects on the assessment endpoints.

Databases and available literature were searched for toxicity data for deer mice or other native rodent species. In the absence of site-specific data, laboratory-derived data on mortality or reproductive effects were used as measurement endpoints. In the absence of data on native species, data for laboratory rodents such as laboratory mice (*Mus musculus*) and laboratory rats (*Rattus norvegicus*) were used.

A second terrestrial receptor, the short-tail shrew, was also evaluated. The shrew was selected because more of its diet is derived from soil invertebrates than the deer mouse. Therefore, the shrew may be more susceptible than the mouse to the effects of COPCs that bioaccumulate in soil biota. The shrew is a more conservative receptor than the mouse for COPCs that may bioaccumulate. A raptor, such as a red-tailed hawk, was initially considered as a potential receptor for this ERA. However, the home range of a hawk, approximately 1800 acres or more (EPA 1993, Wildlife Exposure Factors Handbook), is much greater than the area of any of the sites considered in this assessment. Therefore, it is unlikely that a hawk would derive a significant portion of its diet from prey at any one of the sites evaluated. As a result, the raptor was not further evaluated in this ERA.

A foraging bird species, the American robin, was selected because, although the home ranges of birds are typically much greater than small mammals, birds can be much more sensitive to some chemicals than mammals.

### **Aquatic Receptors**

The assessment endpoint selected for evaluation of ecological risk associated with potential surface water contamination in the Duck Pond was the maintenance of benthic, aquatic, or amphibian populations that may occur in it. Aquatic organisms such as fish and macroinvertebrates and aquatic plants may be exposed to sediment through dermal contact and ingestion of sediments. Indirect exposure pathways for sediment include exposure to contaminants dissolved from sediment into interstitial pore water, and, consumption by other consumers in the food chain of plants or animals in which contaminants have bioaccumulated. Chemical bioavailability of many nonpolar organic compounds, including PCBs and pesticides, decreases with increasing concentration of total organic carbon (TOC) in the sediment. Surface water represents a potential transport medium for the constituents of concern (COCs). The potential source for contaminated surface water is contaminated soil with the release mechanism being surface runoff. Aquatic wildlife may be exposed to contaminants in surface water through contact with affected surface waters or through ingestion.

The measurement endpoints used for these assessment endpoints were NYS Benthic Aquatic Life Chronic Toxicity Levels, lowest effect levels, and NYS Wildlife bioaccumulation criteria for sediments and NYS Class C Surface Water Quality Standards in the Duck Pond surface waters.

The surface water RME concentrations and NYS Class C criteria AWQS comparisons are presented in **Table A-19**. The sediment RME concentrations and Benthic Aquatic Life Chronic Toxicity

Levels, lowest effect levels, and NYS Wildlife bioaccumulation criteria for sediments value comparisons are presented in **Table A-20**.

**Table 4.2-1** shows the policy goals, ecological assessment and measurement endpoints, and decision rules.

### **4.3 EXPOSURE ASSESSMENT**

The exposure assessment evaluates potential exposure of ecological receptors to site-related constituents through evaluation of the following:

- Description of the spatial distribution of COPCs
- Description of spatial and temporal distribution of ecological receptors
- Quantification of exposure that may result from overlap of these distributions

Each of these components is discussed below.

#### **4.3.1 Constituent Distribution**

The extent of measured chemical contamination at the site is restricted to the areas sampled within SEAD-13. The total combined area of the SEAD-13-East and SEAD-13-West is 3 acres, less than 1 percent of the 10,000 acre Depot property. Soil located outside the Depot is presumed to be relatively clean.

The magnitude of constituent exposures that may be experienced by ecological receptors is affected by the degree of their spatial and temporal associations with the site, as discussed in the following sections.

#### **4.3.2 Receptor Distribution**

A variety of factors may affect the extent and significance of potential exposures. Receptor exposures are affected by the degree of spatial and temporal association with the site. For example, the receptors' mobility may significantly affect their potential exposures to site-related contaminants. Many species may only inhabit the study area during seasonal periods (e.g., breeding season, non-migratory periods). Non-migratory species may remain in the vicinity throughout the year. These species, particularly those with longer life spans (and usually larger home ranges), have the greatest potential duration of exposure. However, species with small home range sizes have the greatest potential frequency of exposure. Other factors affecting exposures include habitat preference, behavior (e.g., burrowing, rooting, foraging), individual home range size (larger home ranges correspond to far less frequent use of study area), and diet. Diet is of particular importance in exposure as related to (1) food source availability (a larger amount of preferred food sources equals a

greater potential for receptor usage) and (2) bioaccumulative contaminants. Contaminants that bioaccumulate may also tend to biomagnify in the food chain. This is discussed in more detail in **Section 4.3.3**. As a result, predatory species at higher trophic levels may receive their most significant exposures through their prey. However, the possibility of a population of an upper trophic-level predator, or even an individual predator, utilizing SEAD-13 as a primary source of food is considered extremely remote.

The deer mouse and short-tailed shrew each have a typical home range of approximately 0.02~0.25 and 1 acres (Sample et al., 1994). The American robin has a typical home range of 1 acre (Sample et al., 1994). The area of SEAD-13 is larger than this (3 acres), hence this area could constitute 100 percent of the home range of a deer mouse, shrew, or American robin.

### **4.3.3 Quantification of Exposure**

**Table 4.3-1** presents a summary of exposure assumptions used for the terrestrial receptors.

Evaluation of the degree to which contaminant and receptor distributions (described in the previous two sections) coincide at the site indicated that the deer mouse, short-tailed shrew, or American robin are the receptors likely to have the greatest potential exposures to COPCs in soil.

To quantify exposures of terrestrial receptors to each COPC, a daily intake of each constituent was calculated. Conversion of the environmental concentration of each COPC to an estimated daily intake for a receptor at the site was necessary prior to evaluation of potentially toxic effects. For terrestrial animal receptors, calculation of exposure intake rates relied upon determination of an organism's exposure to COPCs found in soil. Exposure rates for the deer mouse, short-tailed-shrew, and American robin receptors were based upon ingestion of contaminants from this medium and also from consumption of other organisms. The SLERA did not attempt to measure potential risk from dermal and/or inhalation exposure pathways given the insignificance of these pathways relative to the major exposure pathways (e.g., ingestion) and due to the scarcity of data available for these pathways.

The first step in measuring exposure rates for terrestrial wildlife was the calculation of food ingestion rates for the deer mouse, short-tailed shrew, and American robin. The EPA's *Wildlife Exposure Factors Handbook* (EPA, 1993c) includes a variety of exposure information for a number of avian, reptile, and mammalian species, including the deer mouse. Data are directly available for body weight, ingestion rate, and dietary composition for the deer mouse. For short-tailed shrew and American robin, the EPA (1999; 2000) recommended values were adopted for the SLERA.

To provide conservative exposure rate calculations for the deer mouse, the mean body weight of 0.02 kg for the female deer mouse and the highest reported mean food ingestion rate of 0.22 g/g-day (0.0044 kg/day) for a non-lactating mouse were used (EPA, 1993c). The *Wildlife Exposure Factors Handbook* (EPA, 1993c) also presents average values for intake of animal matter and plant matter for

the deer mouse, as well as incidental soil ingestion. Soil ingestion has been measured at less than 2 percent of diet (Beyer *et al.*, 1994). As might be expected based on the opportunistic habits of mice, the proportion of animal to plant matter in the diet varies from around 65 percent animal: 35 percent plant to 25 percent animal: 75 percent plant, depending on season and region of the country. For this SLERA, an approximate average of 50 percent animal: 50 percent plant was used, after subtracting the 2 percent for incidental soil ingestion. The dietary intakes calculated for this assessment are as follows:

Total Dietary Intake	=	0.0044 kg food/day
Plant Matter Intake	=	0.00216 kg plant matter/day
Animal Matter Intake	=	0.00216 kg animal matter/day
Incidental Soil Intake	=	0.000088 kg soil/day

The short-tailed shrew is primarily carnivorous, with its diet consisting largely of insects and other invertebrates found in the soil. Based on information provided in EPA 1993, 5.3 percent of the shrew's diet is vegetative, with most of the remainder comprised of soil invertebrates. It was assumed that 100% percent of the shrew's intake is animal matter (small insects, *etc.*) in accordance with the EPA (2000) recommendation. The other exposure assumptions adopted by EPA (1999; 2000) were used for the short-tailed shrew. Accordingly, the shrew's dietary intakes calculated for this assessment are as follows:

Total Dietary Intake	=	0.0011 kg food/day
Plant Matter Intake	=	0 kg plant matter/day
Animal Matter Intake	=	0.0011 kg animal matter/day
Incidental Soil Intake	=	0.00011 kg soil/day

The American Robin's diet includes ground dwelling invertebrates, foliage dwelling insects and fruits. The robin's diet varies significantly throughout the year, exhibiting a high insect and invertebrate intake in the spring and a high plant material intake characteristic in the fall. Averaging the dietary characteristics over these three seasons results in an average invertebrate intake of 44% and an average plant material intake of 56%. For this ERA, a diet was assumed to consist of 50 percent invertebrate and 50 percent plant in accordance with the EPA recommendation (1999). The other exposure assumptions adopted by EPA (1999) were used for the American robin. The dietary intakes calculated for this assessment are as follows:

Total Dietary Intake	=	0.034 kg food/day
Plant Matter Intake	=	0.017 kg plant matter/day
Invertebrate Matter Intake	=	0.017 kg animal matter/day
Incidental Soil Intake	=	0.0011 kg soil/day



A site-specific exposure dose of each COPC was calculated using a food chain uptake model consistent with EPA Region IV guidance (EPA, 1995). This algorithm accounts for exposure via incidental ingestion of contaminated soil, ingestion of plants grown in contaminated soil, and ingestion of lower trophic level animals associated with contamination. The exposure equation for soil is as follows:

$$ED_{\text{soil}} = [(C_s \times SP \times CF \times I_p) + (C_s \times BAF \times I_a) + (C_s \times I_s)] \times SFF / BW$$

where:

$ED_{\text{soil}}$	=	Soil exposure dose for terrestrial receptor (mg/kg/day)
$C_s$	=	RME concentration in surface soil (0-2 ft) (mg/kg)
SP	=	Soil-to-plant uptake factor (unitless)
CF	=	Plant wet-weight-to-dry-weight conversion factor (unitless) = 0.2 (used for SP values based on plant dry weight)
$I_p$	=	Receptor-specific ingestion rate of plant material (kg/day)
BAF	=	Constituent-specific bioaccumulation factor (unitless)
$I_a$	=	Receptor-specific ingestion rate of animal material (kg/day)
$I_s$	=	Receptor-specific ingestion rate of soil (kg/day)
SFF	=	Site foraging factor (unitless)
BW	=	Body weight (kg)

In evaluating the potential for a contaminant to pose ecological risk, it is important to consider its propensity for bioaccumulation even though its concentration in an environmental medium may be below toxic levels. Therefore, all COPCs were evaluated with regard to their ecological persistence and tendency to bioaccumulate.

Bioaccumulation is the process of absorption and retention of a substance by an organism due to both uptake from water (or other surrounding media) and uptake from ingested residues in food, soil, and/or sediment. It is quantified by the calculation of a bioaccumulation factor (BAF). Bioconcentration is a component of bioaccumulation, accounting only for the process of uptake from the surrounding medium (usually water). It is quantified by the calculation of a bioconcentration factor (BCF). Both BAFs and BCFs are proportionality constants relating the concentration of a contaminant in the tissues of an organism to the concentration in the surrounding environment.

Bioaccumulation and bioconcentration may be a significant component of exposure to COPCs for the terrestrial receptors. For the deer mouse, short-tailed shrew, and American robin, bioaccumulation was evaluated by means of contaminant-specific soil-to-plant uptake factors and BAFs. The soil-to-plant uptake factors were obtained from NRC (1992) for metals and for organic compounds by using a regression equation from Travis and Arms (1988). The latter is based on the contaminant-specific octanol/water partition coefficient ( $\log K_{ow}$ ). BAFs were obtained from the

scientific literature. Factors reflecting accumulation of COPCs in earthworms were preferentially selected, based on the feeding habits of the deer mouse, shrew, and the American robin. **Table 4.3-2** shows values for soil-to-plant uptake factors and BAFs. A site foraging factor (SFF) of 1 was assumed for the mammals (i.e., deer mouse and short-tailed shrew) in accordance with the EPA guidance (1997). A site foraging factor of 0.5 was assumed for the American robin based on the fact that the American robin migrates south during winter.

**Table A-17** in **Appendix A** shows the calculation of daily intakes for the receptors.

#### **4.3.4 Effects Assessment**

The effects assessment defines and evaluates the potential ecological response to ecological COPCs in terms of the selected assessment and measurement endpoints. The effects assessment for soil exposure includes the derivation of toxicity reference values (TRVs) that are the basis of the comparison. **Section 4.4** uses the results of the toxicity assessment to identify ecological COCs and characterize ecological risk.

For soil, the methodology for assessing the potentially toxic effects of COPCs was based on the derivation of a TRV for each COPC. The TRVs were derived to represent reasonable estimates of the constituent concentrations that, if exceeded, may produce toxicity effects in ecological receptors exposed to soil. Ideally, TRV values would be based on site-specific toxicity data. However, in the absence of site-specific data, toxicity data from the literature were used by establishing data selection criteria such that TRVs would be as relevant as possible to assessment endpoints for this site. Furthermore, the conservativeness of the TRVs was reinforced by using the lowest available appropriate toxicity values and modifying them by uncertainty factors, when necessary. The derivation of TRVs for soil is shown in **Tables 4.3-3A** and **4.3-3B**.

The toxicity benchmarks used as effects thresholds for the evaluation of the assessment endpoint (maintenance of healthy populations of small mammals) are based on NOAELs for test organisms (Sample *et al.*, 1996). The NOAEL (no observed adverse effect level) is the highest exposure concentration at which no harmful effects were observed. Use of the NOAEL as the toxicity benchmark is more conservative than use of the LOAEL (lowest observed adverse effect level). Exposure of receptors to the LOAEL has been predicted to translate into less than 20 percent reduction in population size (Suter *et al.*, 1994) or Lowest Observed Effects Concentrations.

For the terrestrial receptor, the order of taxonomic preference when choosing TRVs was data from studies using (1) native small mammal species potentially present at the site, or (2) proxy species, such as commonly studied laboratory species. The preferred toxicity test endpoint was the NOAEL from an appropriate chronic study for non-lethal or reproductive effects. When NOAEL values were not available, LOAELs were used, as available. Values based on chronic studies were preferred. Studies were considered to provide chronic toxicity data if conducted for a minimum duration of

1 year in mammals. Studies longer than acute but shorter than chronic are considered subchronic. Studies shorter than 90 days in mammals were considered acute. Studies on developmental effects were considered chronic if conducted during a critical gestation period.

The toxicity values selected by this approach were modified through the application of uncertainty factors, as applicable, to derive a TRV for each COPC. The TRVs represent NOAELs with uncertainty factors incorporated for toxicity information derived from studies other than chronic studies and studies on species other than the receptors selected for this risk assessment. When only a LOAEL was available, an uncertainty factor of 10 was applied, as recommended by EPA Region II, to represent a surrogate NOAEL. In addition, when toxicity information for a surrogate contaminant was used, an uncertainty factor of 10 was applied. Uncertainty factors were applied by dividing the initial toxicity value by the product of the necessary uncertainty factors. Uncertainty factors are listed in **Tables 4.3-3A** and **4.3-3B** with the TRVs developed for soil COPCs.

#### **4.4 Risk Characterization**

Risk characterization integrates exposure(s) and effect(s) on receptors using hazard quotients (HQs) (ratios of exposure and effect concentrations). The resulting data are used to define the magnitude of risk from ecological COPCs at the site and to assess the risk to ecological receptors. Risk characterization uses the results of the exposure and effects assessments to calculate an HQ for each COPC. The HQs are based on relevant measurement endpoints and are indicative of the COPC's potential to pose ecological risk to receptors. Any COPCs for a given exposure group and medium that were identified as likely to pose significant risk to receptors based on their HQs were classified as ecological COCs. Risk assessment related uncertainties are also analyzed and discussed.

Estimation of a COPC's potential to pose significant risk to receptors is based on the magnitude of the HQ value calculated for each constituent, as well as other factors such as the bioaccumulation/biomagnification potential, mechanism of toxicity, physicochemical characteristics, environmental fate, and ecological relevance of each contaminant. The HQ is a ratio of the estimated exposure dose (for terrestrial receptors) of a constituent to the TRV. Generally, the greater this ratio or quotient, the greater the likelihood of an effect. Typically, a quotient of 1 is considered the threshold level at which effects may occur. The TRVs on which the HQs were based were derived to be conservative and representative of chronic exposures, as described previously in **Section 4.3.4**.

The calculated HQs were used to assess the potential that toxicological effects will occur among the site's receptors. The likelihood that a population of deer mice, short-tailed shrews, or American robins could be significantly impacted by the toxicological effect(s) produced by a given COPC was a major factor in the subsequent determination (in **Section 4.4.2**) of whether that contaminant should be classified as an ecological COC.

Ecological risk from COPCs was characterized for the potential future land use of SEAD-13. Risks from constituents found in soil available to terrestrial and aquatic receptors were assessed quantitatively. Complete exposure and hazard quotient calculations are included in **Appendix A**. The hazard quotients calculated are also summarized in **Table 4.4-1** and **Table 4.4-2**. Significant findings are summarized in the sections below.

#### **4.4.1 Surface Soil (0 - 2 ft)**

The HQs for all COPCs identified in soil were less than one, with the exception of 4-methylnaphthalene, bis(2-ethylhexyl)phthalate, di-n-butylphthalate, and hexachlorobenzene. Hazard quotients for the receptors exposed to hexachlorobenzene in soil were 24, 13, and 23 for the deer mouse, shrew, and American robin, respectively.

#### **4.4.2 Surface Water**

**Table 4.4-2** summarizes HQs for all COPCs in surface water at SEAD-13. The calculation was presented in **Table A-19** in **Appendix A**. The HQs for all COPCs identified in surface water were less than one with the exception of phenol, aluminum, and iron. HQs for aquatic receptors were 2, 38, and 20 for phenol, aluminum, and iron, respectively.

#### **4.4.3 Sediment**

**Table 4.4-2** summarizes HQs for all COPCs in sediment at SEAD-13. The calculation was presented in **Table A-20** in **Appendix A**. HQs for 4-methylphenol, cadmium, chromium, copper, iron, lead, manganese, nickel, and silver were greater than 1 (3.0, 1.6, 1.1, 1.3, 1.5, 1.1, 1.7, 2.2, and 3.2, respectively).

#### **4.4.4 Uncertainty**

Uncertainty is inherent in each step of the ecological risk assessment process. Major factors contributing to uncertainty in this risk assessment are discussed qualitatively in the following sections.

##### **4.4.4.1 Chemicals of Potential Concern**

The sampling data may not represent the actual overall distribution of contamination at the site, which could result in underestimation or overestimation of potential risk from identified chemicals. However, the use of maximum concentrations provided conservative exposure estimates and it is, therefore, unlikely that the potential for deleterious levels of contaminants has been underestimated.

#### 4.4.4.2 Exposure Assessment

While the potential receptor species selected for the site are inevitably a limited subset of the total list of species that may utilize the site, the potential exposure of the species evaluated in this assessment is considered likely to be representative of the nature and magnitude of the exposures experienced by those species not discussed.

Risk associated with intake of contaminants through the terrestrial food chain was addressed by modeling food chain transfer of chemical residues through plants and earthworms. The degree of uncertainty in the results of the analysis increases with the increasing distance of the receptor from the base of the food chain. Intakes from dermal contact with and inhalation of contaminants were not quantifiable for ecological receptors. However, this does not significantly increase the uncertainty of the estimated intakes because for most receptors, intakes via these routes are likely to be minimal relative to intakes via ingestion.

#### 4.4.4.3 Toxicity Assessment

There is uncertainty associated with the TRVs calculated for this risk characterization because the toxicity data were not site-specific. However, the TRVs used were conservative and were modified by uncertainty factors, when necessary, to increase the applicability of the data to the assessment. The HQs calculated from these conservative TRVs and maximum concentrations provide confidence that the risk assessment yielded reasonably conservative estimates of the potential risk of adverse ecological effects on the assessment endpoint.

Each COPC was assumed to be highly bioavailable. However, for most chemicals in most media, this is an overestimation (Dixon *et al.*, 1993) that may result in an overestimation of the potential for ecological risk. Empirical information on bioavailability of the COPCs was not available. No leachability tests in soil or sediment were conducted. No analysis for acid-volatile sulfide/simultaneously extracted metals was conducted as a measure of bioavailability in sediment. It is possible that some of the contaminants, particularly the metals, may be bound to soil or sediment particles and not available for uptake by receptors. This would tend to overestimate risk.

The soil-to-plant uptake equations and the BAFs include a bioavailability factor; however, these data, taken from the scientific literature, are not specific to this site and may under- or overestimate exposure. For several metals, no quantitative bioavailability data could be found, other than an indication from the literature that the constituent does not significantly bioaccumulate. For these metals, a bioaccumulation factor of 1.0 was used in the exposure equation. This is likely to overestimate the actual value.

The potential for toxic effects to be produced in receptor organisms as a result of exposure to multiple chemicals in a single medium or in multiple media was not evaluated. Therefore, the potential toxic

effects in a receptor as a result of exposure to a given medium could be higher or lower than estimated, depending on toxicological interactions. Exposure of a receptor to multiple contaminated media is likely to increase the risk of toxic effects.

#### **4.4.4.4 Risk Characterization**

The methodology, conservative assumptions, and toxicity benchmarks used in the risk estimation portion of the risk characterization are expected to overestimate, rather than underestimate, the potential for COPCs to pose risk to the ecological assessment endpoint. Maximum environmental concentrations were used, concentrations were assumed to remain constant over time, and the toxicity benchmarks used were the NOAEL values (levels where no toxic effects are expected) or conservative surrogates based on LOAEL values for non-lethal or reproductive effects appropriate for extrapolation to effects on the assessment endpoint.

### **4.5 FURTHER REFINEMENT OF CONTAMINANTS OF CONCERN**

For the screening level ERA, NOAEL toxicity values and default exposure assumptions were used to calculate screening level HQs. Due to the conservative nature of these assumptions, additional evaluation is required to refine the contaminants of concern. This streamlines the overall ERA process to determine if further evaluation is warranted. This section presents the results of further refinement of contaminants of concern conducted in accordance with EPA's ERAGS supplemental guidance (EPA, 2001).

Alternative toxicity values and maximum exposures based on maximum concentrations were considered for determining potential contaminants of concern (COCs). The use of maximum concentrations provided for conservative estimates so that risk would not be understated. The receptor is likely to range over the entire site and not be continuously exposed to the maximum concentration at all times. This additional risk characterization performed as part of the ERA Step 3 is discussed in **Sections 4.5.2 through 4.5.4** for each medium and can be used to refine the COCs and support a decision for either additional evaluation or no further evaluation of environmental risk.

#### **4.5.1 Overall Conservative Evaluation of Ecological Risks in Steps 1 and 2**

Using ERAGS, this SLERA was conducted using highly conservative assumptions. Therefore, the SLERA in general leads to an overestimation of the risks to the ecosystem. This section discusses three major parameters for which conservative estimations were used: the relative bioavailability, the foraging factor, and the NOAEL/LOAEL multiplier.

### ***Relative Bioavailability***

Although the relative bioavailability of contaminants at the site was assumed to be 100 percent for the SLERA, contaminants in environmental media are generally less available to biological organisms compared with the same contaminants in the experimental medium (i.e., diet, water, etc.). Extensive scientific data now exist to support the concepts that the longer the chemicals remain in soil, (1) the less readily they are removed by solvents, including water, (2) the less available they become to microorganisms, (3) the less toxic they become to organisms such as earthworms, and (4) the less they are ingested by organisms such as earthworms. This reduction in availability of the chemicals reduces the risk associated with their presence in the soil (GRI, 1997, as cited in Nakles et al., 2002). For example, the toxicity of DDT declined by 25~80% for animals (including fruit flies, houseflies, and cockroaches) after 90 days of aging (Nakles, et al., 2002). Based on the above discussion, the overall conservative assumptions (100% bioavailability) tend to overestimate the risks.

Chemical-specific bioavailability factors are discussed in the following sections, where appropriate, on a case-by-case basis.

### **NOAEL/LOAEL Multiplier**

A NOAEL is preferred to a LOAEL as a screening ecotoxicity value to ensure that risk is not underestimated (EPA, 1997a). However, currently NOAELs are not available for many groups of organisms and many chemicals. When a LOAEL value, but not a NOAEL value, is available from the literature, a standard practice is to multiply the LOAEL by a NOAEL/LOAEL multiplier, 0.1, and to use the product as the NOAEL for the screening evaluation. Although a NOAEL/LOAEL multiplier of 0.1 was used, the true NOAEL may be only slightly lower than the experimental LOAEL, particularly if the observed effect is of low severity (Sample et al., 1996). The data review referred to in the ERAGS that is used to support the use of 0.1 as the NOAEL/LOAEL multiplier indicates that 96% of chemicals included in the review had a NOAEL/LOAEL multiplier no less than 0.2. Therefore, using a default NOAEL/LOAEL multiplier of 0.1 may result in an overestimation of the HQs.

#### **4.5.2 Identification of Soil COCs**

This section presents further evaluation of the soil COPCs identified in the initial screening level ERA. Based on the calculated risk estimates for the initial screening level ERA, several SVOCs had HQs greater than 1: 4-methylphenol, bis(2-ethylhexyl)phthalate, di-n-butylphthalate, and hexachlorobenzene (see **Table 4.4-1**). Further evaluation presented in this section resulted in no COCs and the rationales are discussed below.

For 4-methylphenol, only the HQ associated with the maximum concentration for the American robin was above 1 (7.8). 4-methylphenol was detected in 6 out of 30 surface soil (0-2 ft bgs) samples and

the second highest concentration was 0.032 mg/kg, much lower than the maximum concentration used for the SLERA (9.2 mg/kg). The SVOC quantitation limit for the sample where the maximum concentration of 4-methylphenol was detected was elevated (more than ten times of the SVOC quantitation limits of the other soil samples) and the detected 4-methylphenol concentration was less than 3 times of the elevated quantitation limit (i.e., 9.2 mg/kg vs. 3.9 mg/kg). In addition, 4-methylphenol was not detected in another surface soil sample collected from the same location (i.e., SB13-10) and the quantitation limit was 0.37 mg/kg. Therefore, the maximum detected 4-methylphenol concentration is not representative of the concentrations in surface soil at SEAD-13. The alternative HQ based on the second highest concentration of 4-methylphenol for the American robin is  $7.8 \times 0.032 / 9.2 = 0.03$ , which is much lower than 1. Based upon the above discussion, 4-methylphenol is not expected to have any significant impacts on ecological receptors at this site and was not identified as a COC.

For bis(2-ethylhexyl)phthalate, only the HQ associated with the maximum concentration for the American robin was slightly above 1 (2.2). Bis(2-ethylhexyl)phthalate is a common laboratory contaminant. It was detected in 5 out of 30 surface soil (0-2 ft bgs) samples and the second highest concentration was 0.1 mg/kg, much lower than the maximum concentration used for the SLERA (1.9 mg/kg). Similar to 4-methylphenol, the SVOC quantitation limit for the sample where the maximum concentration of bis(2-ethylhexyl)phthalate was detected was elevated (more than ten times of the SVOC quantitation limits of the other soil samples) and the detected bis(2-ethylhexyl)phthalate concentration was less than the elevated quantitation limit (i.e., 1.9 mg/kg vs. 3.9 mg/kg). In addition, bis(2-ethylhexyl)phthalate was not detected in another surface soil sample collected from the same location (i.e., SB13-10) and the quantitation limit was 0.37 mg/kg. Therefore, the maximum detected bis(2-ethylhexyl)phthalate concentration is not representative of the concentrations in surface soil at SEAD-13. The alternative HQ based on the second highest concentration of bis(2-ethylhexyl)phthalate for the American robin is  $2.2 \times 0.1 / 1.9 = 0.4$ , which is lower than 1. Based upon the above discussion, bis(2-ethylhexyl)phthalate is not expected to have any significant impacts on ecological receptors at this site and was not identified as a COC.

For di-n-butylphthalate, only the HQ associated with the maximum concentration for the American robin was slightly above 1 (1.6). Di-n-butylphthalate is a common laboratory contaminant. Therefore, the detected concentration might not be related to the historical site activities. It was detected in only 2 out of 30 surface soil (0-2 ft bgs) samples and the second highest concentration was 0.0086 mg/kg, much lower than the maximum concentration used for the SLERA (0.14 mg/kg). Therefore, the maximum detected di-n-butylphthalate concentration is not representative of the concentrations in surface soil at SEAD-13. Based upon the above discussion, di-n-butylphthalate is not expected to have any significant impacts on ecological receptors at this site and was not identified as a COC.

For hexachlorobenzene, the HQs associated with the maximum concentration for all the evaluated receptors exceeded 1 (24, 13, and 23 respectively for deer mouse, short-tailed shrew, and American



robin). Hexachlorobenzene was detected in only 2 out of 30 surface soil (0-2 ft bgs) samples and the detected concentrations were lower than the EPA Contract Required Quantitation Limits for the Contract Laboratory Program (CLP) (39~210 ug/kg vs. 330 ug/kg). In addition, hexachlorobenzene was not detected in any of the other media at SEAD-13. Based upon the above discussion, hexachlorobenzene is not expected to have any significant impacts on ecological receptors at this site and was not identified as a COC.

#### **4.5.3 Identification of Surface Water COCs**

Although HQs for phenol, aluminum, and iron exceeded 1 for aquatic receptors using the NYSDEC AWQS (Class C) as the screening values, no COCs were identified for surface water.

The HQ for phenol only slightly exceeded 1 (1.86) based on the maximum detected phenol concentration at the site. Phenol was detected in 2 out of 9 surface water samples. Multiple rounds of sampling were conducted at the locations where phenol was detected and all the other rounds indicated that phenol was not detected. In addition, phenol was not found in any soil, groundwater, or sediment samples. Therefore, there is no evidence that the site has been impacted by phenol. Based on the above discussion, phenol was not considered a COC in surface water.

Aluminum and iron occur naturally and the elevated concentrations in the surface water samples might be caused by the high turbidity during the sampling process. For example, the turbidity values were low for all the surface water samples collected in 2000 (1.7~5.7 NTU). The aluminum concentrations in all the 2000 samples had aluminum levels below the NYSDEC AWQS (Class C). That is, the HQs were below 1 using the 2000 concentrations to represent the surface water concentrations at the site. In addition, aluminum and iron concentrations in soil are consistent with background. Iron concentrations in groundwater are consistent with background and aluminum concentrations in groundwater only slightly exceeded 2 times of the average background level. Based on the above information, aluminum and iron were not considered COCs for surface water.

#### **4.5.4 Identification of Sediment COCs**

The maximum 4-methylphenol concentration detected at SD13-4 was lower than the sample quantitation limit for SVOCs (58 µg/kg vs. 130 µg/kg). All the other sample concentrations were below the sediment screening value identified for this SLERA. Therefore, 4-methylphenol was not considered a COC for sediment.

Although several metals (cadmium, chromium, copper, iron, lead, manganese, nickel, and silver) have HQs slightly exceed 1, none was identified as a COC. Metals in sediment are frequently bound to particles or complexed with other elements, making them less available to biological organisms. These tendencies would tend to limit the bioavailability of metal to ecological receptors.

- Metal toxicity is generally associated with the soluble fraction.
- Soluble metal and not total metal is associated with the uptake and bioaccumulation of metal from soil into plants.
- The oral toxicity of metal compounds in soil is dependant upon the chemical form. Insoluble compounds are considerably less toxic compared to the soluble forms. The sediment pH at the site favors formation of insoluble fractions.
- Although bioaccumulation has been observed for some metals (e.g., Cd, Pb, etc.), biomagnification is not reported for these metals.

Based on the slight exceedances of 1 for HQs and the conservative estimate of the bioavailability, the above metals are not considered to present a significant potential for adverse aquatic effects and are not considered as COCs at this site.

#### **4.6 ECOLOGICAL RISK SUMMARY**

COPCs in soil, sediment, and surface water were quantitatively assessed for ecological risk for future conditions. Exposure to these COPCs in soil by representative terrestrial receptors (deer mouse, short-tailed shrew, and American robin) was further evaluated to determine if any COPCs have a high likelihood of being a significant risk to the receptor population analyzed for this risk assessment or the ecological community that encompasses the site. COPCs in surface water and sediment were compared to NYS surface water and sediment criteria.

A hierarchy of assessment endpoints was selected to assess both proximate and ultimate risks that might be associated with site-related chemicals. The proximate assessment endpoint was chosen to provide protection of the population levels of vertebrate species that utilize the sites to a significant extent and that are important as indicators of potential effects on the health of the community. Deer mice, short-tailed shrews, and American robins represent terrestrial vertebrate populations at the sites. Although toxic effects that reduce this assessment endpoint population or the populations they represent in the immediate vicinity of the site are significant to the populations themselves, they are not necessarily significant to the ultimate, more important, assessment endpoint: the community of species that occupies the area surrounding and including the site.

It is this ultimate assessment endpoint, maintenance of the health and diversity of the natural community in the area, that is the most important ecological component to be protected with regard to this site. Therefore, any COCs estimated to pose a potential for adverse effects to proximate assessment endpoints would subsequently be evaluated with regard to the risk they may pose to the ultimate assessment endpoint.

The ecological setting of SEAD-13 is not unique or significant, as described in **Section 4.2.2**. There are no endangered, threatened, or special concern species in the vicinity that are likely to be dependent on or affected by the habitat at the site. The species that inhabit the sites are not rare in the region and are not generally considered to be of special societal value.

In soils available to terrestrial receptors (0-2-ft bgs) representative of future conditions at the site, the HQs calculated for all COPCs were less than 1 with the exception of 4-methylphenol, bis(2-ethylhexyl)phthalate, and di-n-butylphthalate for the American robin, and hexachlorobenzene for all terrestrial receptors. However, biased soil sampling and the use of maximum values and NOAELs in the risk calculations result in highly conservative numerical hazard quotient estimates. Therefore, none of these SVOCs are considered COCs for terrestrial receptors.

In surface water available to aquatic receptors that are representative of future conditions at the site, the HQs calculated for all COPCs were less than 1 with the exception of phenol, aluminum, and iron; however, none of these compounds are considered COCs. Considering the results of multiple rounds of sampling, there is no evidence that the site has been impacted by phenol. The high hazard quotients for aluminum and iron, which are naturally occurring metals, are likely a result of high turbidity in the surface water samples. Therefore, there are no COCs for aquatic receptors in the surface water.

For sediment available to aquatic receptors, the HQs for 4-methylphenol and eight metals slightly exceeded 1. None of these constituents are considered COCs since the HQs are based on conservative assumptions of the bioavailability of the metals to aquatic receptors. Therefore, the results of the SLERA demonstrate that there are no COCs at SEAD-13 that pose a threat to terrestrial or aquatic receptors in the surface soil, surface water, or sediment.

## 5.0 RECOMMENDATIONS

This section presents the recommendations of the Army and supporting data for the Inhibited Red-Fuming Nitric Acid Disposal Site (SEAD-13). The Army recommends the following:

- Remedial action for soil, sediment, and surface water is not required;
- Groundwater use restriction to prevent the ingestion of groundwater is required until contaminant concentrations meet NYSDEC Class GA groundwater standards and EPA MCLs;
- An annual groundwater program will be developed and implemented; and
- Five-year reviews will be performed, in accordance with Section 121(c) of the CERCLA, until data shows that they are no longer required.

The groundwater use restriction would eliminate contact with groundwater as an exposure pathway for human health risk, thereby reducing risk to within acceptable levels for potential human receptors. With the exception of groundwater ingestion, there are no other unacceptable risks at SEAD-13. The land use restriction could involve a restriction on the deed, local building code modification, etc., to prohibit the use of the groundwater for drinking purposes. A restriction on the use of groundwater for drinking purposes together with a groundwater monitoring program is recommended due to the presence of elevated levels of nitrate/nitrite-nitrogen in the groundwater at SEAD-13-East. In accordance with Section 121(c) of the CERCLA, the monitoring program will be reviewed after five years.

The Army's decision to place a land use restriction on SEAD-13 and no further action for the other media is based on the results of the Expanded Site Investigation (ESI) in 1993/1994 and supplemental sampling, conducted from 2000 to 2002, summarized in **Section 2.0**, and the mini risk assessment conducted in **Sections 3.0** and **4.0** of this report. Conclusions of the field investigation and risk assessment supporting the Army's recommendation are as follows:

- Results of field investigations associated with the ESI and supplemental sampling identified four wells at SEAD-13-East with nitrate/nitrite-nitrogen concentrations above the NYS Ambient Water Quality Standard (AWQS) for groundwater classified as GA. The Army recommends annual groundwater monitoring, which would include five-year reviews (see **Section 5.1** below).
- The results of the surface water investigation indicated that nitrate/nitrite-nitrogen is below criteria established for nitrate in drinking water sources in New York State (10 mg/L) (see **Section 5.1** below).
- Total carcinogenic risk from all exposure routes is within the EPA target range for all receptors at SEAD-13 (see **Section 5.2** below).
- If groundwater use is prevented, total non-carcinogenic risks to receptors due to the SEAD-13 site are reduced to within acceptable limits. (see **Section 5.2** below).

- Assumptions used for the estimation of risks for SEAD-13 were conservative due to the use of maximum concentration of a constituent as the exposure point concentration (EPC) instead of the Upper 95<sup>th</sup> Confidence Limit (UCL) of the mean; therefore, the risk is likely overstated (see **Section 5.2** below).
- Ecological risk assessment results showed that there are no COCs in surface soil, surface water, or sediment that could pose a risk to receptors at SEAD-13 (see **Section 5.2** below).

## **5.1 EXPANDED SITE INVESTIGATION RESULTS SUPPORTING THE RECOMMENDED ACTION**

Results from the Expanded Site Investigation and supplemental investigation that support the Army's recommendation outlined above are provided in this section.

*Results of field investigations associated with the ESI and supplemental sampling identified four wells at SEAD-13-East with Nitrate/Nitrite concentrations above the NYS GA standard*

During the field investigations at SEAD-13, samples from four groundwater wells (MW13-2, MW13-11, MW13-13, and MW13-14) had nitrate/nitrite-nitrogen concentrations above the NYS AWQS Class GA Standard of 10 mg/L. During the ESI, the concentration of nitrate/nitrite-nitrogen in the groundwater sample collected from MW13-2 on the east side of the Duck Pond (SEAD-13-East) was 460 mg/L. Nitrate/nitrite-nitrogen was not detected in the well upgradient of this location (MW13-1), and levels of nitrate/nitrite-nitrogen in wells downgradient of MW13-2 (MW13-3 and MW13-7 located between MW13-2 and the Duck Pond), could not be measured since they were dry. Monitoring wells on the west side of the Duck Pond had nitrate/nitrite concentrations meeting the NYS AWQS Class GA Standards (10 mg/L).

During the supplemental groundwater sampling in 2001 and 2002, three additional wells (MW13-11, MW13-13, and MW13-14) were installed at SEAD-13-East. In the most recent sampling round, April 2002, the groundwater samples collected from each well (except MW13-1) at SEAD-13-East had nitrate levels that exceeded the NYS criteria (445 mg/L, 119 mg/L, 731 mg/L, and 139 mg/L from MW13-2, MW13-11, MW13-13, and MW13-14, respectively). Therefore, the Army recommends annual groundwater monitoring and five-year reviews. The details of the groundwater monitoring program will be provided in a Remedial Design Plan.

*The results of the surface water investigation indicated that nitrate/nitrite-nitrogen is below the NYS AWQS Standard of 10 mg/L for nitrate in drinking water.*

Water level measurements and EM-31 results indicated that groundwater flows west on the east of the pond and east on the west side of the pond; i.e., groundwater discharges directly into the pond. Although groundwater flows towards the pond, nitrate/nitrite-nitrogen concentrations in samples

collected from the Duck Pond were very low (0.02-0.11 mg/L). The only NYS AWQS standard that exists for surface waters is 10 mg/L for drinking water sources. As the Duck Pond is not a drinking water source, this standard does not apply. However, levels measured within the pond were well below this standard. This indicates that if any discharge into the pond occurs, it is not significantly impacting the nitrate/nitrite-nitrogen levels within the pond.

*The potential for impacts to existing drinking water sources is remote.*

The potential for the nitrate/nitrite-nitrogen levels observed in four wells (MW13-2, MW13-11, MW13-13, and MW13-14) at SEAD-13-East to affect existing drinking water sources was evaluated, and the following is concluded. Drinking water wells on the east of the site will not be affected since they are 4,000 feet upgradient of MW 13-2. Drinking water wells located downgradient of the site will most likely not be affected as well, since the closest well is 7,000 feet away from the site and the Duck Pond lies between SEAD-13 and this downgradient drinking water well. As stated above, the pond appears to be unaffected by the presence of nitrate/nitrite-nitrogen levels detected in the groundwater wells in SEAD-13-East. Therefore, it is unlikely a well downgradient of the pond would be affected.

## **5.2 MINI RISK ASSESSMENT RESULTS SUPPORTING THE RECOMMENDED ACTION**

Results from the mini risk assessment that support the Army's recommendation outlined above are provided in this section.

*Total carcinogenic risk from all exposure routes is within the EPA target range for all receptors at SEAD-13.*

The mini risk assessment conducted at SEAD-13 concluded that the total carcinogenic risk from all exposure routes is within the EPA target range of  $10^{-4}$  and  $10^{-6}$  for all receptors of both future land use scenarios considered, and, therefore, the site does not pose a cancer risk to any receptor. These future land uses were conservation/recreation and residential.

*If groundwater use is prevented, total non-carcinogenic risks to receptors due to constituents present at the SEAD-13 site are reduced to within acceptable limits.*

The mini risk assessment conducted at SEAD-13 concluded that the total non-cancer hazard index (HI) from all exposure routes is less than 1 for the construction worker, but exceeds 1 for the park worker (HI=4) and the recreational visitor (HI=2). The elevated HI for both receptors is due to ingestion of groundwater, with nitrate/nitrite-nitrogen, aluminum, and manganese in groundwater as the largest contributors of risk for both land uses. When the groundwater pathway is eliminated, the total hazard indices for these receptors are 0.008 and 0.006, meeting the EPA hazard index criteria of less than 1.

*Assumptions used for the estimation of risks for SEAD-13 were conservative.*

Two possible land uses were considered for the mini risk assessment at SEAD-13: conservation/recreation land use and residential development land use. Conservation/recreation land use is the land use recommended by the Local Redevelopment Authority (LRA) for the SEAD-13 site. Residential land use, which resulted in higher non-carcinogenic risks, was considered to provide a conservative baseline for the site even though residential development at this site is unlikely. Therefore, it is unlikely that the risk calculated under the residential scenario would be exhibited, since such land use is improbable.

Another example of conservative assumptions used in the mini risk assessment was the use of maximum concentration of a constituent as the EPC instead of the Upper 95<sup>th</sup> Confidence Limit (UCL) of the mean. The maximum value was used due to the limited number of samples collected during the field investigations. The use of the maximum concentrations implies chronic exposure to the maximum concentration, which would likely overestimate the level of risk at the site.

*Ecological risk assessment results showed negligible risks to receptors at SEAD-13.*

Ecological risk assessment results showed negligible ecological risk to receptors in surface soil, surface water, and sediment. The only constituents exhibiting a hazard quotient greater than 1 in the soil were 4-methylphenol, bis(2-ethylhexyl)phthalate, di-n-butylphthalate, and hexachlorobenzene. However, biased soil sampling and the use of maximum values and NOAELs in the risk calculations result in highly conservative numerical hazard quotient estimates. Therefore, none of these SVOCs are considered to pose a risk to terrestrial receptors. For surface water, the SLERA calculated HQs greater than 1 for phenol, aluminum, and iron. None of these COPCs are considered to pose a threat to aquatic receptors, since there is no evidence that the site is impacted by phenol, and since the samples of aluminum and iron, which occur naturally at SEDA, were characterized as turbid. In sediment, HQs calculated for 4-methylphenol and eight metals were greater than 1; however, this risk is overstated since conservative assumptions were used regarding the bioavailability of the metals to aquatic receptors. For these reasons, there is no ecological risk posed by constituents at SEAD-13.

**TABLE 3.2-2**  
**CHEMICALS OF POTENTIAL CONCERN - SEAD-13**  
 Decision Document- Mini Risk Assessment  
 Seneca Army Depot Activity

COMPOUNDS	Total Soil mg/kg	Surface Soil mg/kg	Groundwater <sup>1</sup> mg/L	Surface Water <sup>1</sup> mg/L	Sediment <sup>1</sup> mg/kg
<b>Volatile Organics</b>					
Acetone	X	X			X
Carbon Disulfide	X				
Methylene Chloride	X				
Methyl ethyl ketone	X	X			X
Toluene	X	X			
<b>Semivolatile Organics</b>					
2,4,6-Trichlorophenol	X	X			
2,4-Dinitrotoluene		X			
2-Methylnaphthalene	X				X
4-Methylphenol	X	X		X	X
Acenaphthene	X	X			
Acenaphthylene	X	X			X
Anthracene	X	X			X
Benzo(a)anthracene	X	X			X
Benzo(a)pyrene	X	X			X
Benzo(b)fluoranthene	X	X			X
Benzo(ghi)perylene	X	X			X
Benzo(k)fluoranthene	X	X			X
bis(2-Ethylhexyl)phthalate	X	X	X		
Butylbenzylphthalate			X		
Carbazole	X	X			
Chrysene	X	X			X
Di-n-butylphthalate	X	X			
Di-n-octylphthalate	X	X			X
Dibenz(a,h)anthracene	X	X			X
Dibenzofuran	X	X			X
Diethyl phthalate			X		
Fluoranthene	X	X			X
Fluorene	X	X			X
Hexachlorobenzene	X	X			
Indeno(1,2,3-cd)pyrene	X	X			X
Isophorone				X	
Naphthalene	X	X			X
Phenanthrene	X	X			X
Phenol	X	X		X	
Pyrene	X	X			X
<b>Nitroaromatics</b>					
Tetryl					X
<b>Pesticides/PCB</b>					
4,4'-DDE	X	X			
<b>Metals</b>					
Aluminum			X	X	X
Antimony				X	X
Arsenic				X	X
Barium				X	X
Beryllium					X
Cadmium					X
Calcium					
Chromium				X	X
Cobalt				X	X
Copper				X	X
Cyanide			X		
Iron				X	X
Lead				X	X
Magnesium					
Manganese			X	X	X
Mercury				X	X
Nickel				X	X
Potassium					
Selenium					X
Silver					X
Sodium					
Vanadium				X	X
Zinc				X	X
<b>Other Analyses</b>					
Nitrate/Nitrite Nitrogen	X	X	X	X	X
Fluoride	X	X	X	X	X

NOTES:

1. Although site concentrations exceeded background, calcium, magnesium, potassium, and sodium are considered nutrients and are only toxic at very high doses (i.e., concentrations that are much higher than those associated with contact at SEAD-13). As a result, these compounds were not considered COCs.



**TABLE 3.3-1**  
**EXPOSURE FACTOR ASSUMPTIONS FOR CONSERVATION/RECREATIONAL LAND - SEAD-13**  
 Decision Document - Mini Risk Assessment  
 Seneca Army Depot Activity

RECEPTOR	EXPOSURE ROUTE	PARAMETER	RME		BASIS	SOURCE
			VALUE	UNITS		
PARK WORKER	Inhalation of Dust in Ambient Air  (Air EPC Calculated from Surface Soil Only)	Body Weight	70	kg	Standard reference weight for adults males. Average inhalation rate for light activity is 1.0 m <sup>3</sup> /hr, 8 hr work day. Works on-site 5 days/wk, 8 months/yr (35 weeks). Upper bound time for employment at a job. 25 years. 70 years, conventional human life span.	USEPA, 1991. USEPA, 1997. BPJ. USEPA, 1991, 1993. USEPA, 1989. USEPA, 1989.
		Inhalation Rate	8	m <sup>3</sup> /day		
		Exposure Frequency	175	days/yr		
		Exposure Duration	25	years		
		Averaging Time - Nc	9,125	days		
		Averaging Time - Car	25,550	days		
	Ingestion of Soil  (Soil EPC Calculated from Surface Soil Only)	Body Weight	70	kg	Standard reference weight for adults males. Upper bound worker exposure to dirt and dust. 100% ingestion, conservative assumption. Works on-site 5 days/wk, 8 months/yr (35 weeks). Upper bound time for employment at a job. 25 years. 70 years, conventional human life span.	USEPA, 1991. USEPA, 1993. BPJ. BPJ. USEPA, 1991, 1993. USEPA, 1989. USEPA, 1989.
Ingestion Rate		100	mg soil/day			
Fraction Ingested		1	(unitless)			
Exposure Frequency		175	days/yr			
Exposure Duration		25	years			
Averaging Time - Nc		9,125	days			
Dermal Contact of Soil  (Soil EPC Calculated from Surface Soil Only)	Body Weight	70	kg	Standard reference weight for adults males. Face, hands, and forearms. RME for industrial scenario RME for industrial scenario Works on-site 5 days/wk, 8 months/yr (35 weeks). Upper bound time for employment at a job. RME for industrial scenario 25 years. 70 years, conventional human life span	USEPA, 1991. USEPA, 2001. USEPA, 2001. BPJ. USEPA, 1991, 1993. USEPA, 2001. USEPA, 1989. USEPA, 1989.	
	Absorption Factor	Compound	Specific			
	Skin Contact Surface Area	3,300	cm <sup>2</sup>			
	Soil to Skin Adherence Factor	0.2	mg/cm <sup>2</sup> -event			
	Exposure Frequency	175	days/yr			
	Exposure Duration	25	years			
Ingestion of Groundwater	Body Weight	70	kg	Standard reference weight for adults males. Standard occupational ingestion rate. Works on-site 5 days/wk, 8 months/yr (35 weeks). Upper bound time for employment at a job. 25 years. 70 years, conventional human life span.	USEPA, 1991. USEPA, 1991. BPJ. USEPA, 1991, 1993. USEPA, 1989. USEPA, 1989.	
	Ingestion Rate	1	liter/day			
	Exposure Frequency	175	days/yr			
	Exposure Duration	25	years			
	Averaging Time - Nc	9,125	days			
	Averaging Time - Car	25,550	days			
Dermal Contact of Surface Water	Body Weight	70	kg	Standard reference weight for adults males. Adult male hands and forearms. Contact time during occasional site maintenance work. Assumes activity occurs 10% of work days. Upper bound time for employment at a job. RME for showering scenario. 25 years. 70 years, conventional human life span.	USEPA, 1991. USEPA, 1992. BPJ. BPJ. USEPA, 1991, 1993. USEPA, 2001. USEPA, 1989. USEPA, 1989.	
	Skin Contact Surface Area	1,980	cm <sup>2</sup>			
	Event Duration	1	hour/event			
	Exposure Frequency	18	days/yr			
	Exposure Duration	25	years			
	Event Frequency	1	event/day			
Dermal Contact of Sediment	Body Weight	70	kg	Standard reference weight for adults males. Adult male hands and forearms. Upper bound soil to skin adherence factor. Assumes activity occurs 10% of work days. Upper bound time for employment at a job. RME for industrial scenario. 25 years. 70 years, conventional human life span	USEPA, 1991. USEPA, 1992. USEPA, 1992. BPJ. USEPA, 1991, 1993. USEPA, 2001. USEPA, 1989. USEPA, 1989.	
	Absorption Factor	Compound	Specific			
	Skin Contact Surface Area	1,980	cm <sup>2</sup>			
	Soil to Skin Adherence Factor	1	mg/cm <sup>2</sup> -event			
	Exposure Frequency	18	days/yr			
	Exposure Duration	25	years			

**TABLE 3.3-1**  
**EXPOSURE FACTOR ASSUMPTIONS FOR CONSERVATION/RECREATIONAL LAND - SEAD-13**  
 Decision Document - Mini Risk Assessment  
 Seneca Army Depot Activity

RECEPTOR	EXPOSURE ROUTE	PARAMETER	RME		BASIS	SOURCE
			VALUE	UNITS		
RECREATIONAL VISITOR (CHILD)	Inhalation of Dust in Ambient Air  (Air EPC Calculated from Surface Soil Only)	Body Weight	15	kg	Standard reference weight for children less than 6 years old. Average inhalation rate for a child 1-12 years old. Assumes 2 weeks. Assumed. 5 years. 70 years, conventional human life span.	USEPA, 1991, 1993. USEPA, 1997. BPJ. BPJ. USEPA, 1989. USEPA, 1989.
		Inhalation Rate	8.7	m3/day		
		Exposure Frequency	14	days/yr		
		Exposure Duration	5	years		
		Averaging Time - Nc	1,825	days		
		Averaging Time - Car	25,550	days		
	Ingestion of Soil  (Soil EPC Calculated from Surface Soil Only)	Body Weight	15	kg	Standard reference weight for children less than 6 years old. Maximum IR for a child. 100% ingestion, conservative assumption. Assumes 2 weeks. Assumed. 5 years. 70 years, conventional human life span.	USEPA, 1991, 1993. USEPA, 1993. BPJ. BPJ. BPJ. USEPA, 1989. USEPA, 1989.
Ingestion Rate		200	mg soil/day			
Fraction Ingested		1	(unitless)			
Exposure Frequency		14	days/yr			
Exposure Duration		5	years			
Averaging Time - Nc		1,825	days			
Dermal Contact of Soil  (Soil EPC Calculated from Surface Soil Only)	Body Weight	15	kg	Standard reference weight for children less than 6 years old. Head, hands, forearms, lower legs, and feet. RME for residential scenario. RME for residential scenario. Assumes 2 weeks. Assumed. RME for residential scenario. 5 years. 70 years, conventional human life span.	USEPA, 1991, 1993. USEPA, 2001. USEPA, 2001. BPJ. BPJ. USEPA, 2001. USEPA, 1989. USEPA, 1989.	
	Absorption Factor	Compound Specific				
	Skin Contact Surface Area	2,800	cm2			
	Soil to Skin Adherence Factor	0.2	mg/cm2-event			
	Exposure Frequency	14	days/yr			
	Exposure Duration	5	years			
Inhalation of Groundwater	Body Weight	15	kg	Standard reference weight for children less than 6 years old. Inhalation rate for sedentary children ages 3-10, 0.3 m3/hr for 1 hour. Assumes 2 weeks. Assumed. 5 years. 70 years, conventional human life span.	USEPA, 1991, 1993. USEPA, 1997. BPJ. BPJ. USEPA, 1989. USEPA, 1989.	
	Inhalation Rate	0.3	m3/day			
	Exposure Frequency	14	days/yr			
	Exposure Duration	5	years			
	Averaging Time - Nc	1,825	days			
	Averaging Time - Car	25,550	days			
Ingestion of Groundwater	Body Weight	15	kg	Standard reference weight for children less than 6 years old. Approximate 90th percentile value for children 1-11 years old. Assumes 2 weeks. Assumed. 5 years. 70 years, conventional human life span.	USEPA, 1991, 1993. USEPA, 1997. BPJ. BPJ. USEPA, 1989. USEPA, 1989.	
	Ingestion Rate	1	liter/day			
	Exposure Frequency	14	days/yr			
	Exposure Duration	5	years			
	Averaging Time - Nc	1,825	days			
	Averaging Time - Car	25,550	days			
Dermal Contact of Groundwater	Body Weight	15	kg	Standard reference weight for children less than 6 years old. RME for showering scenario. RME for showering scenario. Assumes 2 weeks. Assumed. RME for showering scenario. 5 years. 70 years, conventional human life span.	USEPA, 1991, 1993. USEPA, 2001. USEPA, 2001. BPJ. BPJ. USEPA, 2001. USEPA, 1989. USEPA, 1989.	
	Skin Contact Surface Area	6,600	cm2			
	Event Duration	1	hours/event			
	Exposure Frequency	14	days/yr			
	Exposure Duration	5	years			
	Event Frequency	1	event/day			

**TABLE 3.3-1**  
**EXPOSURE FACTOR ASSUMPTIONS FOR CONSERVATION/RECREATIONAL LAND - SEAD-13**  
 Decision Document - Mini Risk Assessment  
 Seneca Army Depot Activity

RECEPTOR	EXPOSURE ROUTE	PARAMETER	RME		BASIS	SOURCE
			VALUE	UNITS		
RECREATIONAL VISITOR (CHILD - CONTINUED)	Dermal Contact of Surface Water	Body Weight	15	kg	Standard reference weight for children less than 6 years old.	USEPA, 1991.
		Skin Contact Surface Area	2,800	cm <sup>2</sup>	Head, hands, forearms, lower legs, and feet. RME for residential scenario.	USEPA, 2001.
		Event Duration	1	hour/event	Upper bound water contact period.	USEPA, 1992.
		Exposure Frequency	7	days/yr	Assumes contact occurs every other day.	BPJ.
		Exposure Duration	5	years	Assumed.	BPJ.
		Event Frequency	1	event/day	RME for showering scenario.	USEPA, 2001.
		Averaging Time - Nc	1,825	days	5 years.	USEPA, 1989.
	Averaging Time - Car	25,550	days	70 years, conventional human life span	USEPA, 1989.	
	Dermal Contact of Sediment	Body Weight	15	kg	Standard reference weight for children less than 6 years old.	USEPA, 1991.
		Absorption Factor	Compound	Specific		
		Skin Contact Surface Area	2,800	cm <sup>2</sup>	Head, hands, forearms, lower legs, and feet. RME for residential scenario.	USEPA, 2001.
		Soil to Skin Adherence Factor	1	mg/cm <sup>2</sup> -event	Upper bound water contact period.	USEPA, 1992.
		Exposure Frequency	7	days/yr	Assumes contact occurs every second day.	BPJ.
		Exposure Duration	5	years	Assumed.	BPJ.
Event Frequency		1	event/day	RME for residential scenario.	USEPA, 2001.	
Averaging Time - Nc	1,825	days	5 years.	USEPA, 1989.		
Averaging Time - Car	25,550	days	70 years, conventional human life span	USEPA, 1989.		

**TABLE 3.3-1**  
**EXPOSURE FACTOR ASSUMPTIONS FOR CONSERVATION/RECREATIONAL LAND - SEAD-13**  
 Decision Document - Mini Risk Assessment  
 Seneca Army Depot Activity

RECEPTOR	EXPOSURE ROUTE	PARAMETER	RME		BASIS	SOURCE
			VALUE	UNITS		
<b>CONSTRUCTION WORKER</b>	<b>Inhalation of Dust in Ambient Air</b>  (Air EPC Calculated from Surface and Subsurface Soils)	Body Weight	70	kg	Standard reference weight for adults males.	USEPA, 1991.
		Inhalation Rate	10.4	m3/day	Average inhalation rate for outdoor worker is 1.3 m3/hr, 8 hr work day.	USEPA, 1997.
		Exposure Frequency	250	days/yr	Site specific based on land area.	USEPA, 1991.
		Exposure Duration	1	year	Upper bound time of employment for construction worker.	USEPA, 1991.
		Averaging Time - Nc	365	days	1 year.	USEPA, 1989.
	<b>Ingestion of Soil</b>  (Soil EPC Calculated from Surface and Subsurface Soils)	Averaging Time - Car	25,550	days	70 years, conventional human life span.	USEPA, 1989.
		Body Weight	70	kg	Standard reference weight for adults males.	USEPA, 1991.
		Ingestion Rate	480	mg soil/day	Assumed IR for intensive construction work.	USEPA, 1991, 1993.
		Fraction Ingested	1	(unitless)	100% ingestion, conservative assumption.	BPJ.
<b>Dermal Contact of Soil</b>  (Soil EPC Calculated from Surface and Subsurface Soils)	Exposure Frequency	250	days/yr	Site specific based on land area.	USEPA, 1991.	
	Exposure Duration	1	year	Upper bound time of employment for construction worker.	USEPA, 1991.	
	Averaging Time - Nc	365	days	1 year.	USEPA, 1989.	
	Averaging Time - Car	25,550	days	70 years, conventional human life span.	USEPA, 1989.	
	Body Weight	70	kg	Standard reference weight for adults males.	USEPA, 1991.	
	Absorption Factor	Compound Specific				
	Skin Contact Surface Area	3,300	cm2	Face, hands, and forearms. RME for industrial scenario.	USEPA, 2001.	
Soil to Skin Adherence Factor	0.2	mg/cm2-event	RME for industrial scenario.	USEPA, 2001.		
Exposure Frequency	250	days/yr	Site specific based on land area.	USEPA, 1991.		
Exposure Duration	1	year	Upper bound time of employment for construction worker.	USEPA, 1991.		
Event Frequency	1	event/day	RME for industrial scenario.	USEPA, 2001.		
Averaging Time - Nc	365	days	1 year.	USEPA, 1989.		
Averaging Time - Car	25,550	days	70 years, conventional human life span.	USEPA, 1989.		
Notes: RME = Reasonable Maximum Exposure Car = Carcinogenic Nc = Non-carcinogenic		Source References: - BPJ: Best Professional Judgment. - USEPA, 1988: Superfund Exposure Assessment Manual - USEPA, 1989: Risk Assessment Guidance for Superfund, Volume I (RAGS) - USEPA, 1991: Supplemental Guidance, Standard Default Exposure Factors - USEPA, 1992: Dermal Exposure Assessment, Principles and Applications - USEPA, 1993: Superfund's Standard Default Exposure for the Central Tendency and Reasonable Maximum Exposure - USEPA, 1997: Exposure Factors Handbook, Update to 1990 handbook - USEPA, 2001: Supplemental Guidance for Dermal Risk Assessment				

**TABLE 3.3-2**  
**SUSPENDED PARTICULATE CONCENTRATIONS MEASURED AT SEDA**  
**Decision Document - Mini Risk Assessment**  
**Seneca Army Depot Activity**

<b>PARTICULATE DATA</b>	<b>SITE #1 PM 10</b>	<b>SITE #2 PM 10</b>	<b>SITE #3 PM 10</b>	<b>SITE #4 PM 10</b>
<b>Peak Concentration (ug/m3)</b>	37 on 23 July 95	37 on 23 July 95	37 on 5 July 95	37 on 5 July 95
<b>Arithmetic Mean (ug/m3)</b>	16.9	16.6	16.4	15.8
<b>Standard Deviation</b>	21.4	21.1	23.0	23.0
<b>Geometric Mean (ug/m3)</b>	15.1	14.8	14.8	14.2
<b>No. of 24-hr. Avgs. Above 150 ug/m3</b>	0	0	0	0
<b>Number of Valid Samples</b>	29	32	29	31
<b>Percent Data Recovery</b>	90.6	100.0	90.6	96.9

tive Summary for April 1, 1995 through July 31, 1995

**TABLE 3.4-1  
TOXICITY VALUES  
Decision Document - Mini Risk Assessment  
Seneca Army Depot Activity**

Analyte	Oral RfD (mg/kg-day)	Inhalation RfD (mg/kg-day)	Carc. Slope Oral (mg/kg-day) <sup>-1</sup>	Rank Wt. of Evidence	Carc. Slope Inhalation (mg/kg-day) <sup>-1</sup>	Dermal RfD (mg/kg-day)	Carc. Slope Dermal (mg/kg-day) <sup>-1</sup>	GI Absorption Factor
<b>Volatile Organics</b>								
Acetone	1.00E-01	a NA	a NA	a D	NA	a 1.00E-01	f NA	1 j
Carbon Disulfide	1.00E-01	a 2.00E-01	a NA	a NA	NA	a 1.00E-01	f NA	1 j
Methylene Chloride	6.00E-02	a 8.57E-01	b 7.50E-03	a B2	1.65E-03	a 6.00E-02	f 7.50E-03	g 1 j
Methyl ethyl ketone	6.00E-01	a 2.86E-01	a NA	a D	NA	a 6.00E-01	f NA	1 j
Toluene	2.00E-01	a 1.14E-01	a NA	a D	NA	a 2.00E-01	f NA	1 j
<b>Semivolatiles*</b>								
2,4-Dinitrotoluene	2.00E-03	a NA	a 6.80E-01	h B2	NA	a 2.00E-03	f 6.80E-01	g 1 j
2-Methylnaphthalene	4.00E-02	i NA	a NA	a NA	NA	a 4.00E-02	f NA	1 j
2,4,6-Trichlorophenol	NA	a NA	a 1.1E-02	a B2	1.085E-02	a NA	f 1.1E-02	g 1 j
4-Methylphenol	5.00E-03	b NA	a NA	a C	NA	a 5.00E-03	f NA	1 j
Acenaphthene	6.00E-02	a NA	a NA	a NA	NA	a 6.00E-02	f NA	1 j
Acenaphthylene	NA	e NA	a NA	a D	NA	a NA	f NA	1 j
Anthracene	3.00E-01	a NA	a NA	a D	NA	a 3.00E-01	f NA	1 j
Benzo(a)anthracene	NA	a NA	a 7.30E-01	c B2	NA	a NA	f 7.30E-01	g 1 j
Benzo(a)pyrene	NA	a NA	a 7.30E+00	a B2	NA	a NA	f 7.30E+00	g 1 j
Benzo(b)fluoranthene	NA	a NA	a 7.30E-01	c B2	NA	a NA	f 7.30E-01	g 1 j
Benzo(ghi)perylene	NA	a NA	a NA	a D	NA	a NA	f NA	1 j
Benzo(k)fluoranthene	NA	a NA	a 7.30E-02	c B2	NA	a NA	f 7.30E-02	g 1 j
Butylbenzylphthalate	2.00E-01	b NA	a NA	a C	NA	a 2.00E-01	f NA	1 j
Carbazole	NA	a NA	a 2.00E-02	b B2	NA	a NA	f 2.00E-02	g 1 j
Chrysene	NA	a NA	a 7.30E-03	c B2	NA	a NA	f 7.30E-03	g 1 j
Dibenz(a,h)anthracene	NA	a NA	a 7.30E+00	c B2	NA	a NA	f 7.30E+00	g 1 j
Dibenzofuran	NA	a NA	a NA	a D	NA	a NA	f NA	1 j
Diethyl phthalate	8.00E-01	b NA	a NA	a D	NA	a 8.00E-01	f NA	1 j
Di-n-butylphthalate	1.00E-01	a NA	a NA	a D	NA	a 1.00E-01	f NA	1 j
Di-n-octylphthalate	2.00E-02	b NA	a NA	a NA	NA	a 2.00E-02	f NA	1 j
Fluoranthene	4.00E-02	a NA	a NA	a D	NA	a 4.00E-02	f NA	1 j
Fluorene	4.00E-02	a NA	a NA	a D	NA	a 4.00E-02	f NA	1 j
Hexachlorobenzene	8.00E-04	a NA	a 1.60E+00	a B2	1.61E+00	a 8.00E-04	f 1.60E+00	g 1 j
Indeno(1,2,3-cd)pyrene	NA	a NA	a 7.30E-01	c B2	NA	a NA	f 7.30E-01	g 1 j
Isophorone	2.00E-01	a NA	a 9.5E-04	a C	NA	a 2.00E-01	f 9.50E-04	g 1 j
Naphthalene	2.00E-02	a 8.60E-04	a NA	a C	NA	a 2.00E-02	f NA	1 j
Phenanthrene	NA	a NA	a NA	a D	NA	a NA	f NA	1 j
Phenol	6.00E-01	a NA	a NA	a D	NA	a 6.00E-01	f NA	1 j
Pyrene	3.00E-02	a NA	a NA	a D	NA	a 3.00E-02	f NA	1 j
bis(2-Ethylhexyl)phthalate	2.00E-02	a NA	a 1.40E-02	a B2	NA	a 2.00E-02	f 1.40E-02	g 1 j
<b>Pesticides/PCBs</b>								
4,4'-DDE	NA	a NA	a 3.40E-01	a B2	NA	a NA	f 3.40E-01	g 1 j
<b>Nitroaromatics*</b>								
Tetryl	1.00E-02	b NA	a NA	a NA	NA	a 1.00E-02	f NA	1 j
<b>Metals</b>								
Aluminum	1.00E+00	i 1.00E-03	i NA	a D	NA	a 1.00E+00	f NA	1 j
Antimony	4.00E-04	a NA	e NA	a B1	NA	a 4.00E-04	f NA	1 j
Arsenic	3.00E-04	a NA	e 1.50E+00	d A	1.51E+01	a 3.00E-04	f 1.50E+00	g 1 j
Barium	7.00E-02	a 1.43E-04	b NA	a D	NA	a 4.90E-03	f NA	0.07 k
Beryllium	2.00E-03	a 6.00E-06	a NA	a B2	8.40E+00	a 1.40E-05	f NA	0.007 k
Cadmium	5.00E-04	p NA	a NA	a B1	6.30E+00	a 5.00E-04	f NA	1 j
Chromium	3.00E-03	q 2.80E-05	q NA	a A	4.20E+01	q 3.90E-05	f NA	0.013 k
Cobalt	6.00E-02	m NA	a NA	a NA	NA	a 6.00E-02	f NA	1 j
Copper	4.00E-02	b NA	a NA	a D	NA	a 4.00E-02	f NA	1 j
Cyanide	2.00E-02	a NA	a NA	a D	NA	a 2.00E-02	f NA	1 j
Iron	3.00E-01	e NA	a NA	a NR	NA	a 3.00E-01	f NA	1 j
Lead	NA	a NA	a NA	a B2	NA	a NA	f NA	1 j
Manganese	5.00E-02	r 1.43E-05	a NA	a D	NA	a 2.00E-03	f NA	0.04 k
Mercury	3.00E-04	s 8.57E-05	a NA	a D	NA	a 3.00E-04	f NA	1 j
Nickel	2.00E-02	a NA	a NA	a NR	NA	a 8.00E-04	f NA	0.04 k
Selenium	5.00E-03	a NA	a NA	a D	NA	a 5.00E-03	f NA	1 j
Silver	5.00E-03	a NA	a NA	a D	NA	a 2.00E-04	f NA	0.04 k
Thallium	8.00E-05	t NA	a NA	a D	NA	a 8.00E-05	f NA	1 j
Vanadium	7.00E-03	b NA	a NA	a D	NA	a 1.82E-04	f NA	0.026 k
Zinc	3.00E-01	a NA	a NA	a D	NA	a 3.00E-01	f NA	1 j
<b>Other Analyses</b>								
Nitrate/Nitrite Nitrogen	1.60E+00	au NA	a NA	a NA	NA	a 1.60E+00	f NA	1 j
Nitrite-Nitrogen	1.00E-01	a NA	a NA	a NA	NA	a 1.00E-01	f NA	1 j
Fluoride	6.00E-02	a NA	a NA	a NA	NA	a 6.00E-02	f NA	1 j

a = Taken from the Integrated Risk Information System (IRIS)  
b = Taken from HEAST 1995  
c = Calculated using TEF  
d = Calculated from proposed oral unit risk value  
e = Provisional health guideline from EPA Risk Assessment Issue Papers provided by EPA Technical Support Center.  
(Inhalation RfD's were derived from EPA RfC's based on the assumption of 20 m<sup>3</sup>/day inhalation rate and 70 kg body weight.)  
f = Calculated from oral RfD value. (Dermal RfD = Oral RfD \* GI Absorption Factor)  
g = Calculated from oral slope factor (Dermal Slope Factor = Oral Slope Factor/GI Absorption Efficiency)  
h = Slope factor is for the mixture of 2,4,6-dinitrotoluene.  
i = Provisional health guideline from EPA Risk Assessment Issue Papers (1996-1997) provided by EPA Technical Support Center.  
(Inhalation RfD's were derived from EPA RfC's based on the assumption of 20 m<sup>3</sup>/day inhalation rate and 70 kg body weight.)  
j = No adjustment was made on oral toxicity factors to derive dermal toxicity factors.  
k = Taken from USEPA, 2001.  
l = EPA Region 2 accepted oral absorption factor for cadmium (personal communication between A. Schatz of Parsons and M. Maddaloni of EPA)  
m = RfD is for aroclor-1254.  
n = Value for Endosulfan.  
o = Value for Chlordane.  
p = Two RfDs are available for cadmium and the most conservative is presented.  
q = Values for Chromium VI.  
r = For manganese, for dietary intake, a RfD of 0.14 mg/kg/day is presented in IRIS. For non-dietary intake (groundwater/soil), IRIS recommends applying a modifying factor of 3, resulting in an RfD of 0.05 mg/kg/day.  
s = Value for mercuric chloride.  
t = Value for thallium chloride.  
u = Value for nitrate  
NA = Not Available  
\* Dinitrotoluene, 2,4- and dinitrotoluene, 2,6- were analyzed as both nitroaromatics and semivolatiles.

TABLE 3.5-1  
 CALCULATION OF TOTAL NONCARCINOGENIC AND CARCINOGENIC RISKS  
 REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-13  
 Decision Document - Mini Risk Assessment  
 Seneca Army Depot Activity

RECEPTOR	EXPOSURE ROUTE	EXPOSURE/RISK CALCULATIONS Table Number	HAZARD INDEX	CANCER RISK
<u>PARK WORKER</u>	Inhalation of Dust in Ambient Air	Table A-9	6E-07	1E-10
	Ingestion of Soil	Table A-10	4E-03	6E-07
	Dermal Contact to Soil	Table A-11	1E-03	5E-07
	Ingestion of Groundwater	Table A-13	4E+00	8E-07
	Dermal Contact to Surface Water	Table A-15	2E-03	5E-09
	Dermal Contact to Sediment	Table A-16	7E-04	2E-07
	<i>TOTAL RECEPTOR RISK (Nc &amp; Car)</i>			<u>4E+00</u>
<u>RECREATIONAL VISITOR (CHILD)</u>	Inhalation of Dust Ambient Air	Table A-9	2E-07	9E-12
	Ingestion of Soil	Table A-10	3E-03	9E-08
	Dermal Contact to Soil	Table A-11	4E-04	3E-08
	Inhalation of Groundwater	Table A-12	NQ	9E-13
	Ingestion of Groundwater	Table A-13	2E+00	6E-08
	Dermal Contact to Groundwater	Table A-14	5E-02	2E-08
	Dermal Contact to Surface Water	Table A-15	5E-03	3E-09
	Dermal Contact to Sediment	Table A-16	2E-03	9E-08
<i>TOTAL RECEPTOR RISK (Nc &amp; Car)</i>			<u>2E+00</u>	<u>3E-07</u>
<u>CONSTRUCTION WORKER</u>	Inhalation of Dust in Ambient Air	Table A-9	8E-06	7E-11
	Ingestion of Soil	Table A-10	3E-02	2E-07
	Dermal Contact to Soil	Table A-11	2E-03	3E-08
	<i>TOTAL RECEPTOR RISK (Nc &amp; Car)</i>			<u>3E-02</u>

NQ= Not Quantified due to lack of toxicity data.

**TABLE 4.2-1**  
**POLICY GOALS, ECOLOGICAL ASSESSMENT AND MEASUREMENT ENDPOINTS,**  
**AND DECISION RULES**  
 Decision Document - Mini Risk Assessment  
 Seneca Army Depot Activity

Policy Goals	Assessment Endpoint	Measurement Endpoint	Decision Rule
<b>Policy Goal 1:</b> The conservation of threatened and endangered species (TES) and their critical habitats	<b>Assessment Endpoint 1:</b> No reduction in numbers of any state- or federally-designated TES	<b>Measurement Endpoint 1:</b> Biosurveys for TES plants and animals; COPC concentration in physical media and predicted concentration in prey species	<b>Decision Rule for Assessment Endpoint 1:</b> If TES are not present, or COPC Maximum concentrations in the media do not exceed toxicity screening thresholds or dietary NOAELS ( <i>i.e.</i> , HQ<1), the assessment endpoint is met and TES are not at risk
<b>Policy Goal 2:</b> The protection of terrestrial populations and ecosystems	<b>Assessment Endpoint 2:</b> No substantial adverse effect on populations of small mammals ( <i>i.e.</i> , deer mouse, short-tail shrew) and birds ( <i>i.e.</i> , American robin)	<b>Measurement Endpoint 2:</b> Lowest chronic, dietary, non-lethal effect level of COPCs on mice	<b>Decision Rule for Assessment Endpoint 2:</b> If ratios of estimated exposure concentrations predicted from COPC Maximum concentrations in soil to dietary limits corresponding to LOAEL toxicity reference values for adverse effects on terrestrial receptors (HQs) are < 1, then Assessment endpoint 2 is met and indigenous receptor species populations are not at risk.

COPC = constituent of potential concern.  
 TES = threatened and endangered species.  
 NOAEL = no observed adverse effect level.  
 LOAEL = lowest observed adverse effect level.  
 HQ = hazard quotient.



**TABLE 4.3-1**  
**WILDLIFE INTAKE RATES**  
**Decision Document - Mini Risk Assessment - Other Sites**  
**Seneca Army Depot Activity**

Receptor	Body Weight (kg) <sup>(1)</sup>	Trophic Level <sup>(2)</sup>	Foraging Factor <sup>(3)</sup>	Home Range (Hectares)	Dietary Breakdown <sup>(4)</sup>		
					Plant (wet-kg/day)	Animal (wet-kg/day)	Soil (dry-kg/day)
Deer Mouse	0.020	3	1	0.01-0.1	0.00216	0.00216	0.000088
Short-tailed Shrew	0.018	3	1	0.39	0.00000	0.0011	0.00011
American Robin	0.080	3	0.5	0.42	0.017	0.017	0.0011

**Notes:**

- (1) Body weight of deer mouse based on mean body weight for female deer mouse.  
 Body weight of short-tailed shrew from USEPA Ecological Soil Screening Level Guidance (Draft, 2000).
- (2) Trophic level: organisms are assigned to trophic levels of 1 (producer), 2 (herbivore), 3 (1st order carnivore), and 4 (top carnivore) within the food web.
- (3) Foraging factor: adjustment factor (from 0 to 1) based upon an organism's total time of exposure to unit-based contaminants.  
 For this risk assessment, foraging factors were assumed to be 1 for the deer mouse and short-tailed shrew. A foraging factor of 0.5 was used for the American Robin, since they migrate south for the winter.
- (4) Source: Deer Mouse: Wildlife Exposure Factors Handbook, USEPA 1993 and USEPA 1997. Assumes 50% plant and 50% invertibrates.  
 Short-tailed Shrew: USEPA Ecological Soil Screening Level Guidance (Draft, 2000). Animal intake rate (0.62 kg wet/kg BW-day) from USEPA, 1999. Home Range from Sample et al., 1994.  
 American Robin: USEPA, 1999. Home range from Sample et al., 1994.

**TABLE 4.3-2  
ENVIRONMENTAL FATE AND TRANSPORT PROPERTIES  
FOR CHEMICALS OF POTENTIAL CONCERN  
Decision Document - Mini Risk Assessment  
Seneca Army Depot Activity**

Constituent	Soil to Plant Transfer Factors (STP)			Trophic Level 2 BAF (invertebrates)		
	logKow <sup>(1)</sup>		Source	BAF	Organism	Source
<b>Volatile Organics</b>						
Acetone	-2.40E-01	5.33E+01	Travis & Arms 1988	3.90E-01		EPA 1995e in Sample et al., 1996
Methyl ethyl ketone	2.60E-01	2.74E+01	Travis & Arms 1988	1.20E-01		USEPA 1999
Toluene	2.50E+00	1.39E+00	Travis & Arms 1988	5.07E+00		USEPA 1999
<b>Semivolatile Organics</b>						
2,4,6-Trichlorophenol	3.06E+00	6.60E-01	Travis & Arms 1988	7.52E+01		USEPA 1999
2,4-Dinitrotoluene	1.53E+00	5.05E+00	Travis & Arms 1988	1.00E+00		Default
2-Methylnaphthalene	4.11E+00	1.63E-01	Travis & Arms 1988	3.42E+00	Invertebrate	Beyer 1990 (BAP as surrogate)
4-Methylphenol	1.94E+00	2.93E+00	Travis & Arms 1988	1.00E+00		Default
Acenaphthene	3.92E+00	2.10E-01	Travis & Arms 1988	3.42E-01	Invertebrate	Beyer 1990
Acenaphthylene	4.07E+00	1.72E-01	Travis & Arms 1988	3.42E-01		Beyer 1990 (BAP as surrogate)
Anthracene	4.45E+00	1.04E-01	Travis & Arms 1988	5.10E-02		Beyer 1990
Benzo(a)anthracene	5.90E+00	1.51E-02	Travis & Arms 1988	1.25E-01		Beyer 1990
Benzo(a)pyrene	6.04E+00	1.02E+00	USEPA 1994	3.42E-01		Beyer 1990
Benzo(b)fluoranthene	6.57E+00	6.17E-03	Travis & Arms 1988	3.20E-01		Beyer 1990
Benzo(ghi)perylene	7.10E+00	3.05E-03	Travis & Arms 1988	2.40E-01	Earthworm	Beyer 1990
Benzo(k)fluoranthene	6.85E+00	4.25E-03	Travis & Arms 1988	2.53E-01		Beyer 1990
bis(2-Ethylhexyl)phthalate	4.20E+00	5.10E-03	USEPA 1994	1.20E+01	Earthworm	USEPA 1994
Carbazole		3.30E-01	USEPA	6.23E+01		USEPA 1999
Chrysene	5.61E+00	2.22E-02	Travis & Arms 1988	1.75E-01		Beyer 1990
Dibenz(a,h)anthracene	6.36E+00	8.16E-03	Travis & Arms 1988	3.68E-01		Beyer 1990
Dibenzofuran	4.17E+00	1.51E-01	Travis & Arms 1988	1.00E+00		Default
Di-n-butylphthalate	4.57E+00	8.84E-02	Travis & Arms 1988	1.20E+01	Earthworm	USEPA 1994 (BEHP as surrogate)
Di-n-octylphthalate	9.20E+00	1.60E-04	USEPA 1994	4.90E+03	Earthworm	USEPA 1994
Fluoranthene	5.22E+00	3.72E-02	Travis & Arms 1988	7.92E-01	Earthworm	Beyer 1990
Fluorene	4.18E+00	1.49E-01	Travis & Arms 1988	3.42E-01		Beyer 1990
Hexachlorobenzene	5.15E+00	4.09E-02	Travis & Arms 1988	2.30E+03		USEPA 1999
Indeno(1,2,3-cd)pyrene	7.70E+00	1.37E-03	Travis & Arms 1988	4.19E-01		Beyer 1990
Naphthalene	3.40E+00	4.20E-01	Travis & Arms 1988	3.42E-01	Earthworm	Beyer 1990 (BAP as surrogate)
Phenanthrene	4.46E+00	1.02E-01	Travis & Arms 1988	1.22E-01	Earthworm	Beyer 1990
Phenol	1.48E+00	5.40E+00	Travis & Arms 1988	8.30E-02	Earthworm	USEPA 1994 (PCP surrogate)
Pyrene	5.09E+00	4.43E-02	Travis & Arms 1988	9.20E-02	Earthworm	Beyer 1990
<b>Pesticides/PCBs</b>						
4,4'-DDE	5.77E+00	1.80E-02	Travis & Arms 1988	2.50E-02	Invertebrates	Menzie et al., 1992
<b>Other Analyses</b>						
Nitrate/Nitrite Nitrogen		nd	No data available	7.00E-01		USEPA 1999
Fluoride		nd	No data available	7.00E-01		USEPA 1999

Notes:

(1) Logarithmic value of octanol-water partition coefficient. LogKow source: Montgomery, J.H. and L.M. Welkom, *Groundwater Chemicals Desk Reference*, 1989.

(2) Soil to plant uptake factor. For organic chemicals without reported SP values, the SP was estimated from the Kow as follows:

$$\log SP = 1.588 - 0.578 \times \log Kow \quad (\text{Travis and Arms 1988})$$

(3) This table includes SP and BAF factor information available from Parsons ES-Tampa current database (9/00).

(4) BAF = Bioaccumulation factor.

(5) For chemicals without reported SP or BAF values, surrogate or default values were assigned based on best professional judgement.

**TABLE 4.3-3A**  
**NOAEL TOXICITY REFERENCE VALUES - MAMMALS**  
**Decision Document - Mini Risk Assessment**  
**Seneca Army Depot Activity**

Constituent	Test Organism	Endpoint/Duration/Effect	Source	Effect Dose (mg/kg/day)	Endpoint CF <sup>(1)</sup>	Study Duration CF <sup>(1)</sup>	Total CF <sup>(1)</sup>	TRV <sup>(2)</sup> (mg/kg/day)
<b>Volatile Organics</b>								
Acetone	rat	NOAEL, gavage, 90-day, liver and kidney damage	Sample et al. 1996	100.00	1	10	10	10.00
Methyl ethyl ketone	rat	NOAEL, water, 2 generations, reproduction	Sample et al. 1996	1771.000	10	1	10	177.100
Toluene	mouse	LOAEL, gavage, day 6-12 gestation crit. lifestage, reproduction	Sample et al. 1996	260.00	10	1	10	26.00
<b>Semivolatile Organics</b>								
2,4,6-Trichlorophenol	mouse	NOAEL, gavage, oil, 14 day, body weight	ATSDR, 1999	35	1	100	100	0.35
2,4-Dinitrotoluene	mouse	NOAEL	ATSDR, 1998	47	1	1	1	47
2-Methylnaphthalene	mouse	LOAEL, diet, 81 wks., respiratory (naphthalene used as surrogate)	ATSDR 1995	71.60	10	1	10	7.16
4-Methylphenol	mink	NOAEL, diet, 6 mos. crit. lifestage, reproduction (Methylphenol, 2- (o-cresol) as surrogate)	Sample et al. 1996	219.20	1	1	1	219.20
Acenaphthene	mouse	LOAEL, oral gavage, 13wk, hepatic effects	ATSDR 1995	175.00	10	10	100	1.75
Acenaphthylene	mouse	LOAEL, oral intubation, gestation days 7-16 (crit. lifestage), reproduction (benzo(a)pyrene used as surrogate)	Sample et al. 1996	10.00	10	1	10	1.00
Anthracene	mouse	NOAEL, oral gavage, 13 wks., hepatic effects	ATSDR 1995	1000.00	1	10	10	100.00
Benzo(a)anthracene	mouse	LOAEL, oral intubation, gestation days 7-16 crit. lifestage, reproduction (benzo(a)pyrene used as surrogate)	Sample et al. 1996	10.00	10	1	10	1.00
Benzo(a)pyrene	mouse	LOAEL, oral intubation, gestation days 7-16 crit. lifestage, reproduction	Sample et al. 1996	10.00	10	1	10	1.00
Benzo(b)fluoranthene	mouse	LOAEL, oral intubation, gestation days 7-16 crit. lifestage, reproduction (benzo(a)pyrene used as surrogate)	Sample et al. 1996	10.00	10	1	10	1.00
Benzo(ghi)perylene	mouse	LOAEL, oral intubation, gestation days 7-16 crit. lifestage, reproduction (benzo(a)pyrene used as surrogate)	Sample et al. 1996	10.00	10	1	10	1.00
Benzo(k)fluoranthene	mouse	LOAEL, oral intubation, gestation days 7-16 crit. lifestage, reproduction (benzo(a)pyrene used as surrogate)	Sample et al. 1996	10.00	10	1	10	1.00
bis(2-ethylhexyl)phthalate	rat	NOAEL, chronic (2 years)	Carpenter et al. 1953 as cited in USEPA, 1999	60.00	1	1	1	60.00
Carbazole	rat	LD50, oral		500	10	10	100	5
Chrysene	mouse	LOAEL, oral intubation, gestation days 7-16 crit. lifestage, reproduction (benzo(a)pyrene used as surrogate)	Sample et al. 1996	10.00	10	1	10	1.00

**TABLE 4.3-3A**  
**NOAEL TOXICITY REFERENCE VALUES - MAMMALS**  
**Decision Document - Mini Risk Assessment**  
**Seneca Army Depot Activity**

Constituent	Test Organism	Endpoint/Duration/Effect	Source	Effect Dose (mg/kg/day)	Endpoint CF <sup>(1)</sup>	Study Duration CF <sup>(1)</sup>	Total CF <sup>(1)</sup>	TRV <sup>(2)</sup> (mg/kg/day)
Dibenz(a,h)anthracene	mouse	LOAEL, oral intubation, gestation days 7-16 crit. lifestage, reproduction (benzo(a)pyrene used as surrogate)	Sample et al. 1996	10.00	10	1	10	1.00
Dibenzofuran	mammal	No data available					--	none available
Di-n-butylphthalate	mouse	NOAEL, diet, 105 days crit. lifestage, reproduction	Sample et al. 1996	550.00	1	1	1	550.00
Di-n-octylphthalate	mouse	NOAEL, chronic (105 days)	Heindel et al., 1989, as cited in USEPA, 1999	7500	1	1	1	7500
Fluoranthene	mouse	LOAEL, oral gavage, 13 wks., hepatic effects	ATSDR 1995	125.00	10	10	100	1.25
Fluorene	mouse	LOAEL, oral gavage, 13 wks., hepatic effects	ATSDR 1995	125.00	10	10	100	1.25
hexachlorobenzene	mouse	NOAEL, feed, 6 week, respiratory	ATSDR, 2000	22	1	10	10	2.2
Indeno(1,2,3-cd)pyrene	mouse	LOAEL, oral intubation, gestation days 7-16 crit. lifestage, reproduction (benzo(a)pyrene used as surrogate)	Sample et al. 1996	10.00	10	1	10	1.00
Naphthalene	mouse	LOAEL, diet, 81 wks., respiratory	ATSDR 1995	71.60	10	1	10	7.16
Pentachlorophenol	rat	NOAEL, diet, 75 days and through gestation and lactation crit. lifestage, reproduction	Sample et al. 1996	0.24	1	1	1	0.24
Phenanthrene	mouse	LOAEL, oral intubation, gestation days 7-16 crit. lifestage, reproduction (benzo(a)pyrene used as surrogate)	Sample et al. 1996	10.00	10	1	10	1.00
Phenol	short-tailed shrew	NOAEL, oral ad libitum, immunological	ATSDR 1998	4.00E+00	1	1	1	4.00E+00
Pyrene	mouse	LOAEL, oral intubation, gestation days 7-16 crit. lifestage, reproduction (benzo(a)pyrene used as surrogate)	Sample et al. 1996	10.00	10	1	10	1.00
<b>Pesticides/PCBs</b>								
4,4'-DDE	rat	NOAEL, diet, 2 year crit. lifestage, reproduction (DDT used as surrogate)	Sample et al. 1996	0.800	1	1	1	0.800
<b>Other Analyses</b>								
Nitrate/Nitrite Nitrogen	guinea pig	NOAEL, oral in water, 143-204 days during a critical lifestage	Sample et al. 1996	507	1	1	1	507

Notes:

- (1) CF = conversion factor. Conversion factors - endpoint (non-NOAEL = 10) and study duration (non-chronic = 10)
- (2) The toxicity reference value was derived by dividing the effect dose by the total conversion factor.
- (3) This table includes TRV factor information available from Parsons ES-Tampa current database (8/99).
- (4) V = Volatile (MW<200, H>1E-05); SV = Semi-Volatile; PAH = Polynuclear Aromatic Hydrocarbon; PES = Pesticide; PCB = Polychlorinated Biphenyl; ING = Inorganic
- (5) Mammals: acute = <90days, subchronic = 90days - 1yr, chronic = >1yr. Birds: acute = <18days, subchronic = 18days - 10wks, chronic = >10wks. Source: Sample et al. 1996  
If the study is during a critical life stage (gestation or development), the study may be considered a chronic exposure.
- (6) The product of the appropriate uncertainty factors from each uncertainty category becomes the total uncertainty factor applied to develop the constituent-specific TRV.
- (7) Value for Nitrate is used.

**TABLE 4.3-3B**  
**NOAEL TOXICITY REFERENCE VALUES - BIRDS**  
**Decision Document - Mini Risk Assessment**  
**Seneca Army Depot Activity**

Constituent	Test Organism	Endpoint/Duration/Effect	Source	Effect Dose (mg/kg/day)	Endpoint CF <sup>1</sup>	Study Duration CF <sup>1</sup>	Total CF <sup>1</sup>	TRV <sup>2</sup> (mg/kg/day)
<b>Volatile Organic Compounds</b>								
Acetone	Japanese quail	NOAEL, 14-day old, diet, 5 days, survival	Hill and Camardese	6.10E+03	1	10	10	6.10E+02
Methyl ethyl ketone								none available
Toluene								none available
<b>Semivolatile Organic Compounds</b>								
2,4,6-Trichlorophenol								none available
2,4-Dinitrotoluene								none available
2-Methylnaphthalene	mallard	LOAEL, diet, 7 months, physiological (mixed PAHs used as surrogate)	Eisler 1987	2.85E+02	10	1	10	2.85E+01
4-Methylphenol	red-winged blackbird	LD50, single gavage, survival	Schafer et al. 1983.	2.06E+01	10	10	100	2.06E-01
Acenaphthene	mallard	NOAEL, diet, 7 months, physiological (mixed PAHs used as surrogate)	Eisler 1987	1.00E+03	1	1	1	1.00E+03
Acenaphthylene	mallard	NOAEL, diet, 7 months, physiological (mixed PAHs used as surrogate)	Eisler 1987	1.00E+03	1	1	1	1.00E+03
Anthracene	mallard	NOAEL, diet, 7 months, physiological (mixed PAHs used as surrogate)	Eisler 1987	1.00E+03	1	1	1	1.00E+03
Benzo(a)anthracene	chicken	Subchronic NOAEL, Fertility and malformations (benzo(a)pyrene used as surrogate)	Rigdon and Neal 1963	4.00E+01	1	1	1	4.00E+01
Benzo(a)pyrene	chicken	Subchronic NOAEL, fertility and malformations	Rigdon and Neal 1963	4.00E+01	1	1	1	4.00E+01
Benzo(b)fluoranthene	chicken	Subchronic NOAEL, Fertility and malformations (benzo(a)pyrene used as surrogate)	Rigdon and Neal 1963	4.00E+01	1	1	1	4.00E+01
Benzo(ghi)perylene	chicken	Subchronic NOAEL, Fertility and malformations (benzo(a)pyrene used as surrogate)	Rigdon and Neal 1963	4.00E+01	1	1	1	4.00E+01
Benzo(k)fluoranthene	chicken	Subchronic NOAEL, Fertility and malformations (benzo(a)pyrene used as surrogate)	Rigdon and Neal 1963	4.00E+01	1	1	1	4.00E+01
Bis(2-ethylhexyl)phthalate	ringed dove	NOAEL, diet, 4 wks. crit. lifestage, reproduction	Sample et al. 1996	1.11E+00	1	1	1	1.11E+00
Carbazole								none available
Chrysene	chicken	Subchronic NOAEL, Fertility and malformations (benzo(a)pyrene used as surrogate)	Rigdon and Neal 1963	4.00E+01	1	1	1	4.00E+01
Dibenz(a,h)anthracene	chicken	Subchronic NOAEL, Fertility and malformations (benzo(a)pyrene used as surrogate)	Rigdon and Neal 1963	4.00E+01	1	1	1	4.00E+01
Dibenzofuran	red-winged blackbird	LC50, diet, 18 hours, survival	Schafer et al. 1983.	2.18E+01	10	10	100	2.18E-01
Di-n-butylphthalate	ringed dove	NOAEL, diet, 4 wks. crit. lifestage, reproduction	Sample et al. 1996	1.11E+00	1	10	10	1.11E-01
Di-n-octylphthalate								none available

**TABLE 4.3-3B**  
**NOEL TOXICITY REFERENCE VALUES - BIRDS**  
**Decision Document - Mini Risk Assessment**  
**Seneca Army Depot Activity**

Constituent	Test Organism	Endpoint/Duration/Effect	Source	Effect Dose (mg/kg/day)	Endpoint CF <sup>1</sup>	Study Duration CF <sup>1</sup>	Total CF <sup>1</sup>	TRV <sup>2</sup> (mg/kg/day)
Fluoranthene	chicken	Subchronic NOAEL, Fertility and malformations (benzo(a)pyrene used as surrogate)	Rigdon and Neal 1963	4.00E+01	1	1	1	4.00E+01
Fluorene	mallard	LOAEL, diet, 7 months, physiological (mixed PAHs used as surrogate)	Eisler 1987	2.85E+02	10	1	10	2.85E+01
Hexachlorobenzene	coturnix quail	NOAEL, acute, 5 days	Hill and Camardese 1986 as cited in USEPA, 1999	2.25E+01	1	10	10	2.25E+00
Indeno(1,2,3-cd)pyrene	chicken	Subchronic NOAEL, Fertility and malformations (benzo(a)pyrene used as surrogate)	Rigdon and Neal 1963	4.00E+01	1	1	1	4.00E+01
Naphthalene	mallard	LOAEL, diet, 7 months, physiological (mixed PAHs used as surrogate)	Eisler 1987	2.85E+02	10	1	10	2.85E+01
Phenanthrene	mallard	LOAEL, diet, 7 months, physiological (mixed PAHs used as surrogate)	Eisler 1987	2.85E+02	10	1	10	2.85E+01
Pentachlorophenol	Japanese quail	NOAEL, diet, 8 day, survival	Eisler 1989	3.49E+02	1	10	10	3.49E+01
Phenol								none available
Pyrene	chicken	Subchronic NOAEL, Fertility and malformations (benzo(a)pyrene used as surrogate)	Rigdon and Neal 1963	4.00E+01	1	1	1	4.00E+01
<b>Pesticides</b>								
4,4'-DDE	Japanese quail	NOAEL, diet, 12 wks, reproduction, liver effects	Sample et al. 1996	5.60E-01	1	10	10	5.60E-02
<b>Other Analyses</b>								
Nitrate/Nitrite Nitrogen								none available
Fluoride								none available

1 CF = conversion factor.

2 The toxicity reference value was derived by dividing the effect dose by the total conversion factor.

**TABLE 4.4-1**  
**HAZARD QUOTIENT SUMMARY - TERRESTRIAL RECEPTORS**  
 Decision Document - Mini Risk Assessment  
 Seneca Army Depot Activity

Constituent	Deer Mouse Hazard Quotient	Short-tailed Shrew Hazard Quotient	American Robin Hazard Quotient
<b>Volatile Organics</b>			
Acetone	0.0	0.0	0.0
Methyl ethyl ketone	0.0	0.0	--
Toluene	0.0	0.0	--
<b>Semivolatile Organics</b>			
2,4,6-Trichlorophenol	0.2	0.1	--
2,4-Dinitrotoluene	0.0	0.0	--
2-Methylnaphthalene	0.0	0.0	0.0
4-Methylphenol	0.0	0.0	<b>7.8</b>
Acenaphthene	0.0	0.0	0.0
Acenaphthylene	0.0	0.0	0.0
Anthracene	0.0	0.0	0.0
Benzo(a)anthracene	0.0	0.0	0.0
Benzo(a)pyrene	0.0	0.0	0.0
Benzo(b)fluoranthene	0.0	0.0	0.0
Benzo(ghi)perylene	0.0	0.0	0.0
Benzo(k)fluoranthene	0.0	0.0	0.0
bis(2-Ethylhexyl)phthalate	0.0	0.0	<b>2.2</b>
Chrysene	0.0	0.0	0.0
Di-n-butylphthalate	0.0	0.0	<b>1.6</b>
Di-n-octylphthalate	0.0	0.0	--
Dibenz(a,h)anthracene	0.0	0.0	0.0
Dibenzofuran	--	--	0.2
Fluoranthene	0.1	0.0	0.0
Fluorene	0.0	0.0	0.0
Hexachlorobenzene	<b>23.7</b>	<b>13.4</b>	<b>22.8</b>
Indeno(1,2,3-cd)pyrene	0.0	0.0	0.0
Naphthalene	0.0	0.0	0.0
Phenanthrene	0.0	0.0	0.0
Phenol	0.5	0.0	--
Pyrene	0.0	0.0	0.0
<b>Pesticides/PCB</b>			
4,4'-DDE	0.0	0.0	0.0
<b>Other Analyses</b>			
Nitrate/Nitrite Nitrogen	0.0	0.0	--
Fluoride	--	--	--

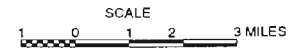
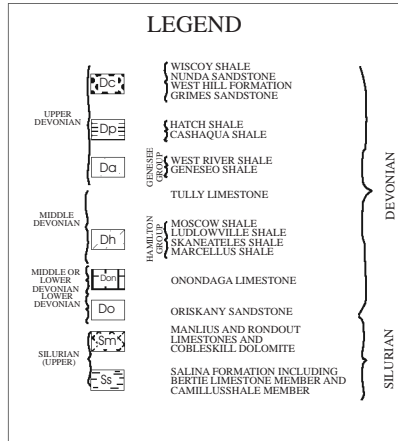
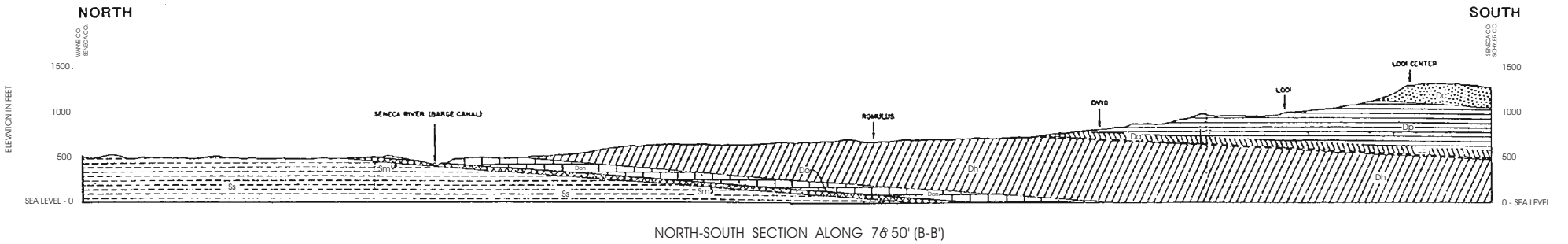
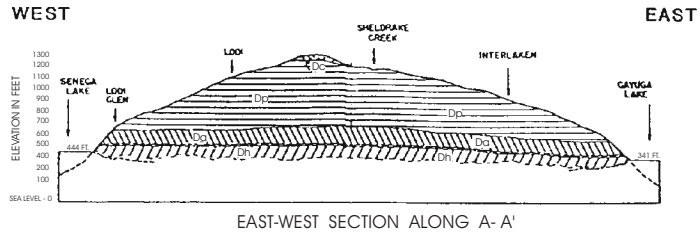
1. Bold Hazard Quotients indicate that the HQ is greater than 1.

**TABLE 4.4-2**  
**HAZARD QUOTIENT SUMMARY - AQUATIC RECEPTORS**  
**Decision Document - Mini Risk Assessment**  
**Seneca Army Depot Activity**

CONSTITUENT	HAZARD QUOTIENT	
	SEDIMENT	SURFACE WATER
<b>VOLATILE ORGANICS</b>		
Acetone	--	--
Methyl ethyl ketone	--	--
<b>SEMIVOLATILE ORGANICS</b>		
2-Methylnaphthalene	0.0	--
4-Methylphenol	<b>3.0</b>	--
Acenaphthylene	--	--
Anthracene	0.0	--
Benzo(a)anthracene	0.2	--
Benzo(a)pyrene	--	--
Benzo(b)fluoranthene	--	--
Benzo(ghi)perylene	--	--
Benzo(k)fluoranthene	--	--
Chrysene	--	--
Dibenz(a,h)anthracene	--	--
Dibenzofuran	--	--
Di-n-octylphthalate	--	--
Fluoranthene	0.0	--
Fluorene	0.0	--
Indeno(1,2,3-cd)pyrene	--	--
Isophorone	--	--
Naphthalene	0.0	--
Phenanthrene	0.0	--
Phenol	--	<b>1.9</b>
Pyrene	0.0	--
<b>NITROAROMATICS</b>		
Tetryl	--	--
<b>METALS</b>		
Aluminum	--	<b>38</b>
Antimony	0.3	--
Arsenic	0.8	0.0
Barium	--	--
Beryllium	--	--
Cadmium	<b>1.6</b>	--
Calcium	--	--
Chromium	<b>1.1</b>	0.0
Cobalt	--	0.3
Copper	<b>1.3</b>	0.4
Iron	<b>1.5</b>	<b>20</b>
Lead	<b>1.1</b>	0.0
Magnesium	--	--
Manganese	<b>1.7</b>	--
Mercury	0.6	0.1
Nickel	<b>2.2</b>	0.1
Potassium	--	--
Selenium	--	--
Silver	<b>3.2</b>	--
Sodium	--	--
Vanadium	--	0.4
Zinc	0.95	0.2
<b>OTHER ANALYSES</b>		
Nitrate/Nitrite Nitrogen	--	--
Fluoride	--	--

1) Bold hazard quotients indicate that HQ is greater than 1.





SOURCE: MODIFIED FROM THE GROUND WATER RESOURCES OF SENECA COUNTY, NEW YORK; MOZOLA, A.J., BULLETIN GW-26, ALBANY, NY, 1951

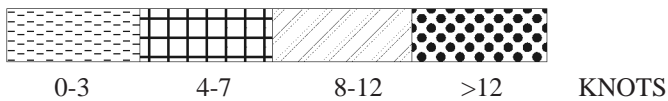
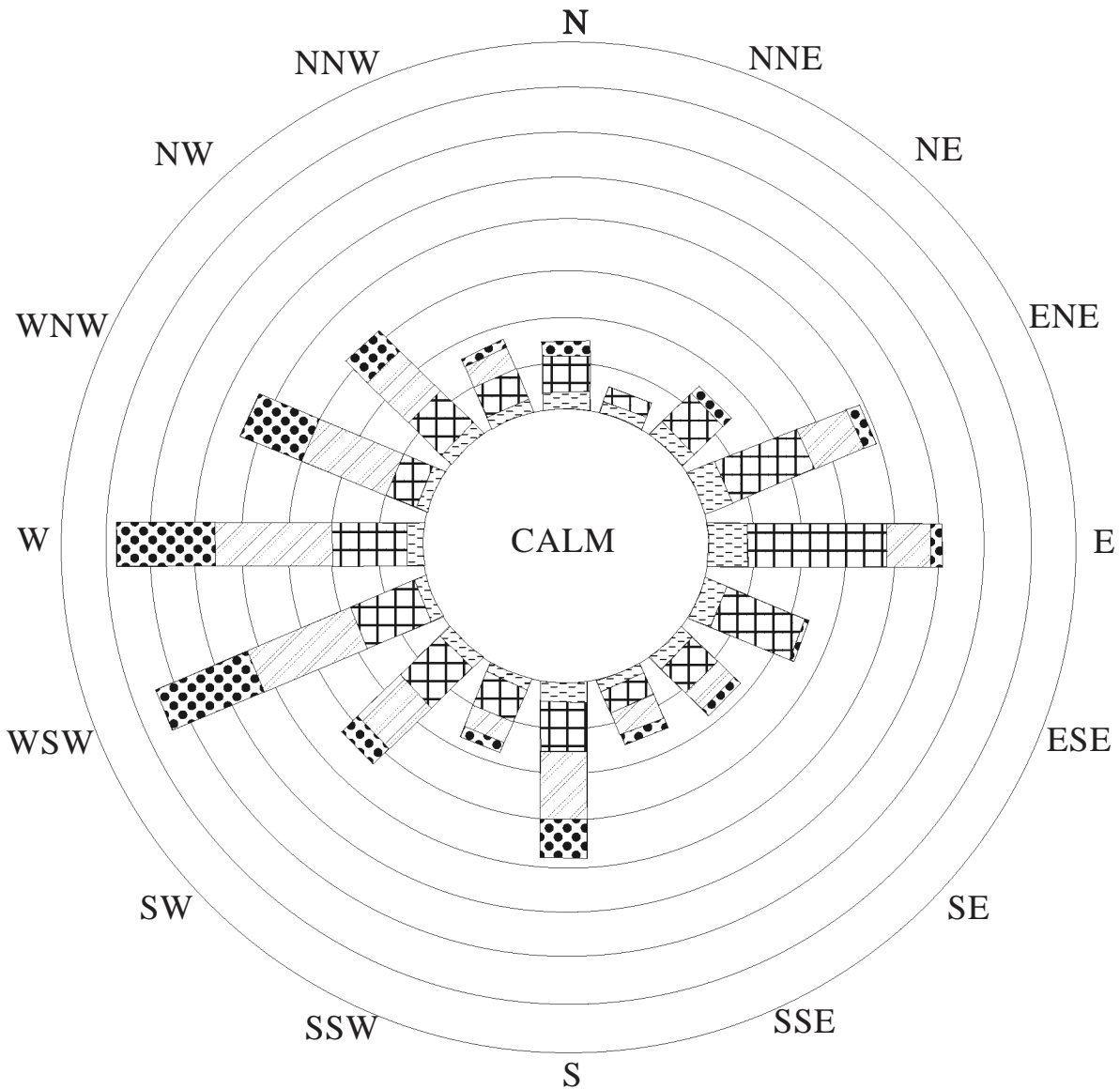
**PARSONS**

CLIENT/PROJECT TITLE  
**SENECA ARMY DEPOT ACTIVITY**  
 DECISION DOCUMENT  
 MINI RISK ASSESSMENT

DEPT. ENVIRONMENTAL ENGINEERING DWG. NO. 736026-01002

FIGURE 1-1  
 REGIONAL GEOLOGIC  
 CROSS SECTIONS

SCALE AS NOTED DATE JULY 2004



NOTE: EACH DIVISION IS 2% OF TOTAL TIME

INSTALLATION: SENECA ARMY DEPOT  
 LOCATION OF DATA: SYRACUSE, NEW YORK  
 SOURCE: MODIFIED FROM:  
 US ARMY ENVIRONMENTAL  
 HYGIENE AGENCY

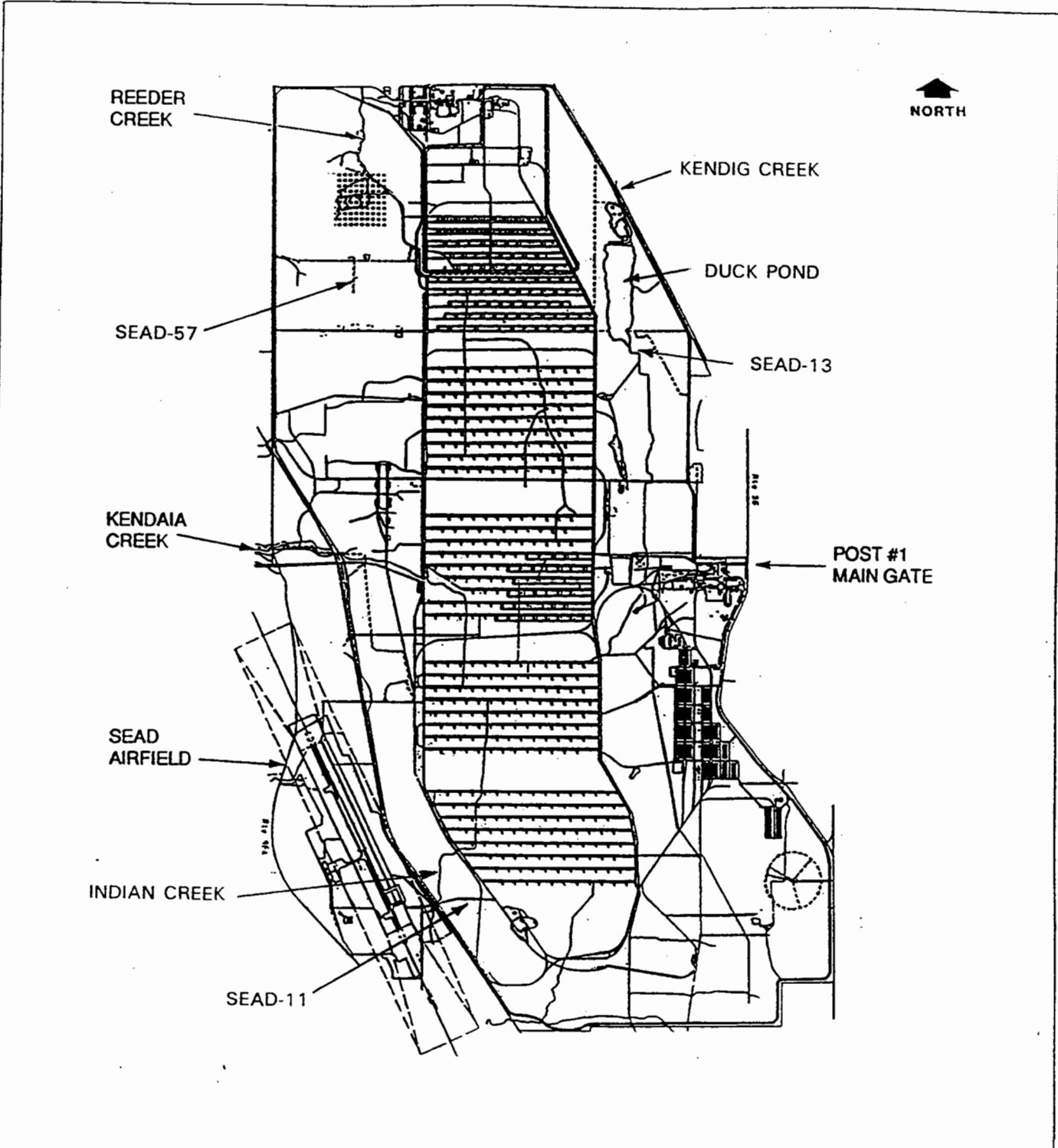
**PARSONS**

CLIENT/PROJECT TITLE  
**SENECA ARMY DEPOT ACTIVITY**  
 DECISION DOCUMENT  
 MINI RISK ASSESSMENT


DEPT: ENVIRONMENTAL ENGINEERING DWG NO. 736026-01002

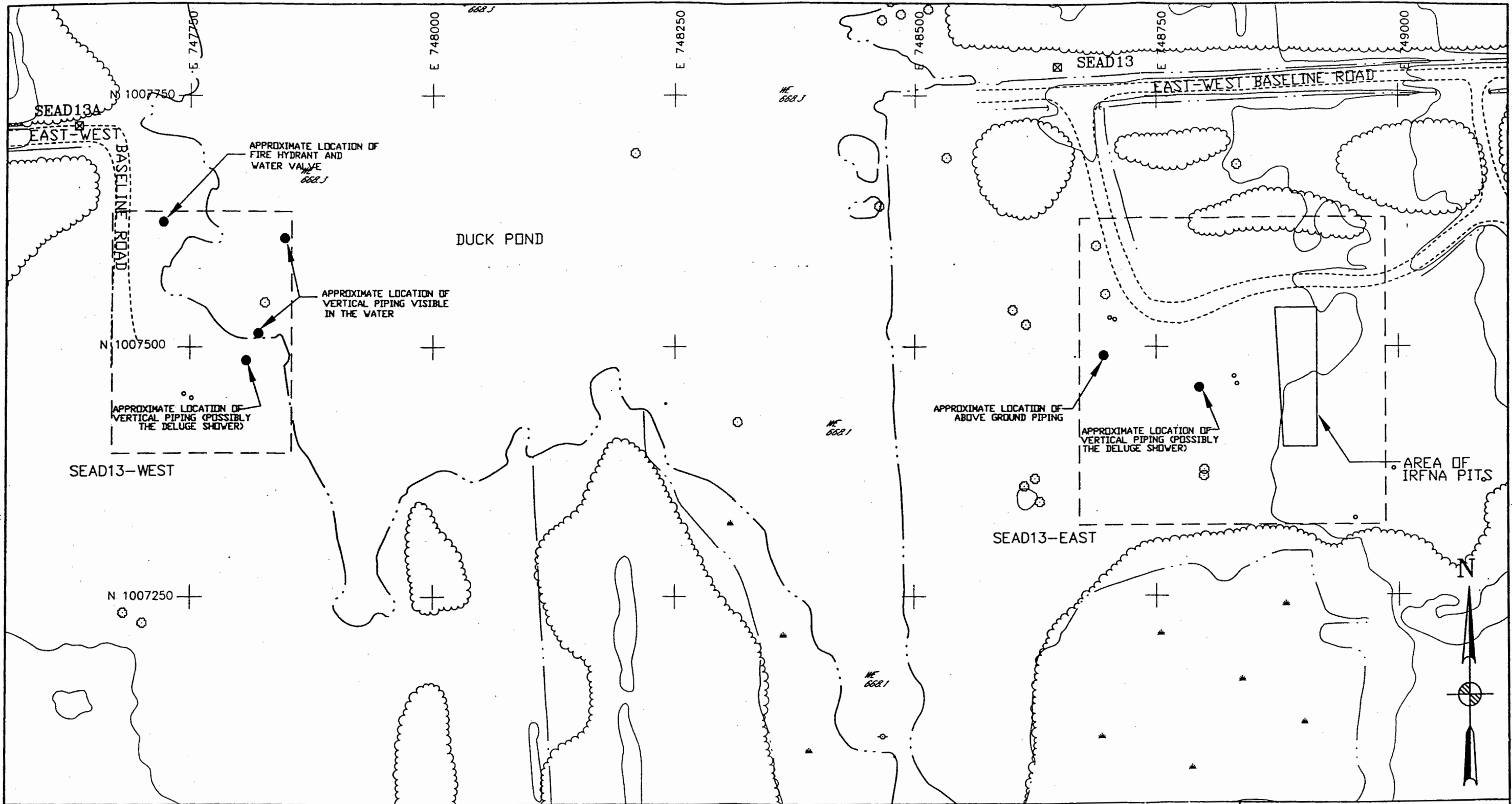
FIGURE 1-2  
**WIND ROSE,  
 SYRACUSE, NEW YORK**

SCALE NA DATE JULY 2004



SOURCE: Seneca Army Depot

 <b>PARSONS</b> <b>ENGINEERING-SCIENCE, INC.</b>	
<small>CLIENT/PROJECT TITLE</small> <b>SENECA ARMY DEPOT</b> DECISION DOCUMENT MINI RISK ASSESSMENT	
<small>DEPT.</small> ENVIRONMENTAL ENGINEERING	<small>No.</small> 720477-02000
<b>FIGURE 2-1</b> <b>Seneca Army Depot Map</b>	
<small>SCALE</small> 1" = 5000' approx.	
<small>REV</small> A	



**LEGEND**

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



**PARSONS**  
**PARSONS ENGINEERING SCIENCE, INC.**

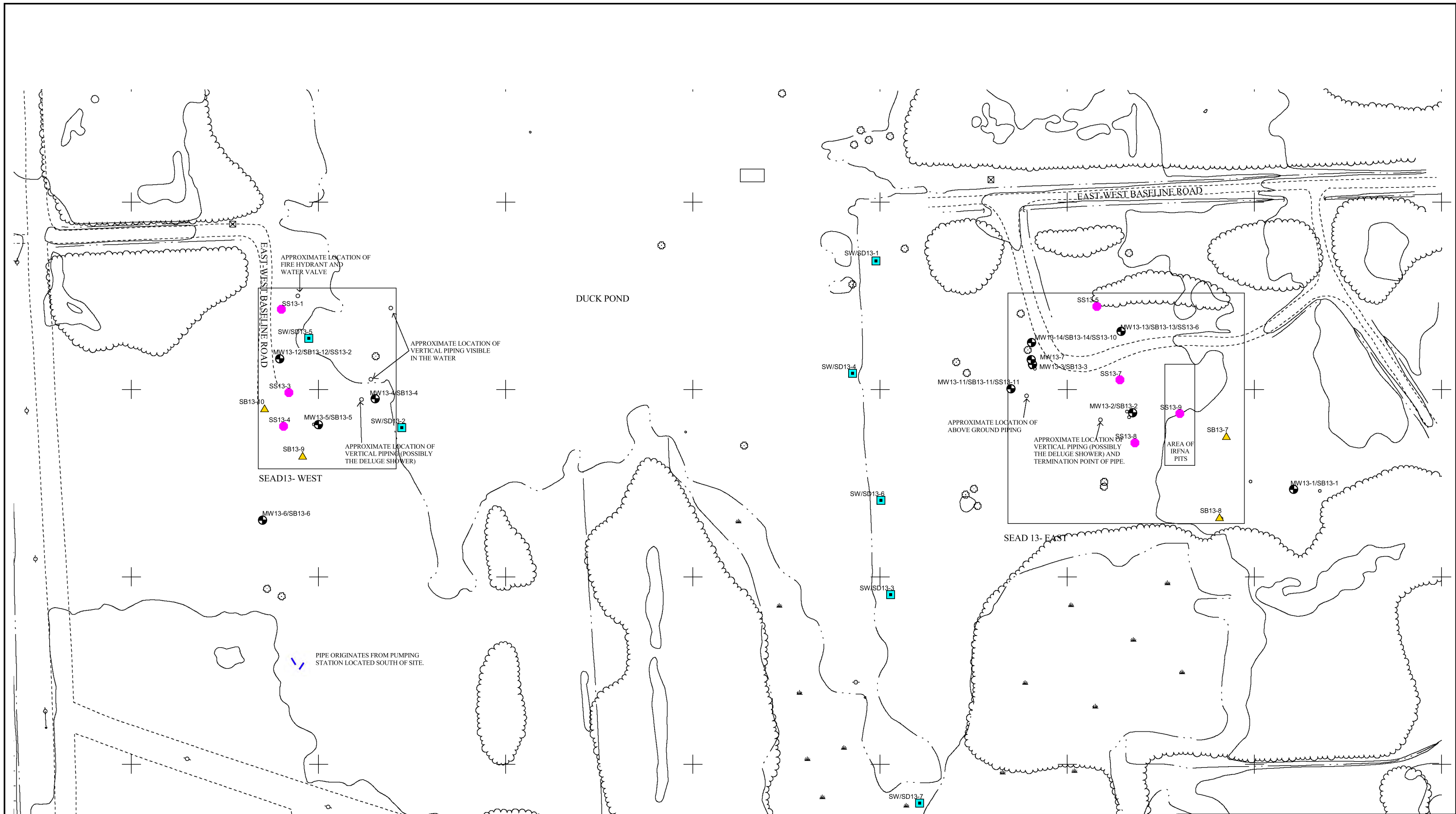
CLIENT/PROJECT TITLE  
**SENECA ARMY DEPOT ACTIVITY**

DEPT. ENVIRONMENTAL ENGINEERING      Proj. No. 720476-02000

**FIGURE 2-2**  
**SEAD-13 IRFNA DISPOSAL SITE**  
**SITE PLAN**

SCALE 1" = 100'      DATE JUNE 1995      REV A

ACAD\SENECA\35\WHA\SD13S1.DWG



**LEGEND**

- Monitoring Well Location
- ▲ Soil Boring Location
- Surface Water/Sediment Location
- Surface Soil Location



**PARSONS**

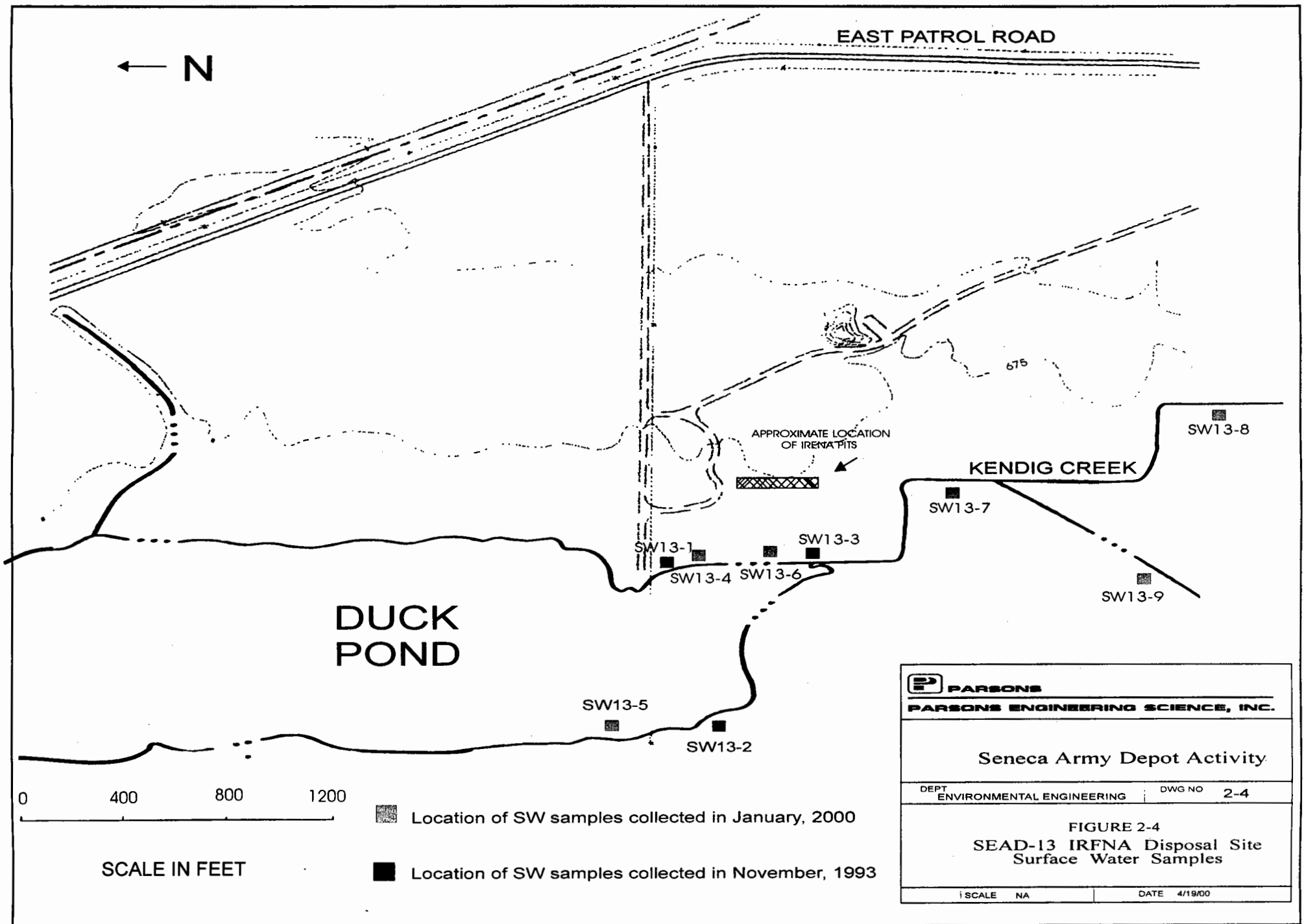
SENECA ARMY DEPOT ACTIVITY  
SEAD-13


FIGURE 2-3

SEAD-13 IRFNA Disposal Site  
Sampling Locations

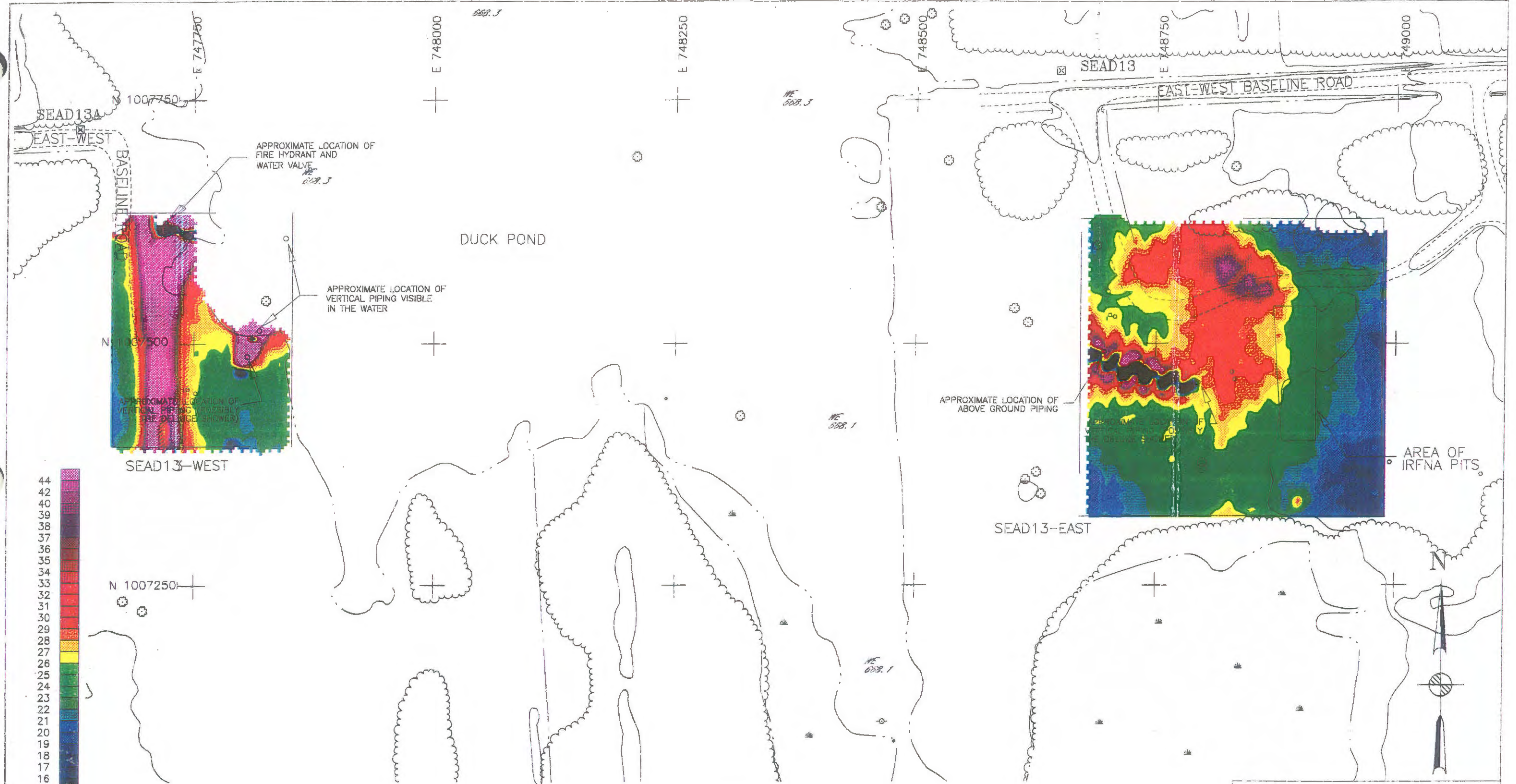
SCALE 1:130	DATE OCTOBER 2002	Sheet 1 of 1
----------------	----------------------	--------------

O:\SENECA\SEAD13\PROP\_SA.APR



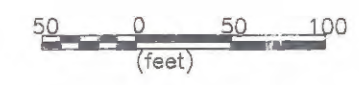
 <b>PARSONS</b> <b>PARSONS ENGINEERING SCIENCE, INC.</b>	
<b>Seneca Army Depot Activity</b>	
DEPT ENVIRONMENTAL ENGINEERING	DWG NO 2-4
<b>FIGURE 2-4</b> <b>SEAD-13 IRFNA Disposal Site</b> <b>Surface Water Samples</b>	
SCALE NA	DATE 4/19/00





**LEGEND**

- |           |                                  |   |                             |
|-----------|----------------------------------|---|-----------------------------|
| —         | MINOR WATERWAY                   | □ | SURVEY MONUMENT             |
| —         | MAJOR WATERWAY                   | ⊕ | DECIDUOUS TREE              |
| —x—x—x—x— | FENCE                            | ⊙ | MANHOLE                     |
| —         | UNPAVED ROAD                     | ⊗ | GUIDE POST                  |
| ~         | BRUSH LINE                       | ⊘ | FIRE HYDRANT                |
| .....     | LANDFILL EXTENT                  | + | UTILITY BOX                 |
| #####     | RAILROAD                         | ⊕ | COORDINATE GRID (250' GRID) |
| —760—     | GROUND SURFACE ELEVATION CONTOUR | ⊖ | POLE                        |
|           |                                  | ⊖ | OVERHEAD UTILITY POLE       |
|           |                                  | ⊖ | MAILBOX/RR SIGNAL           |



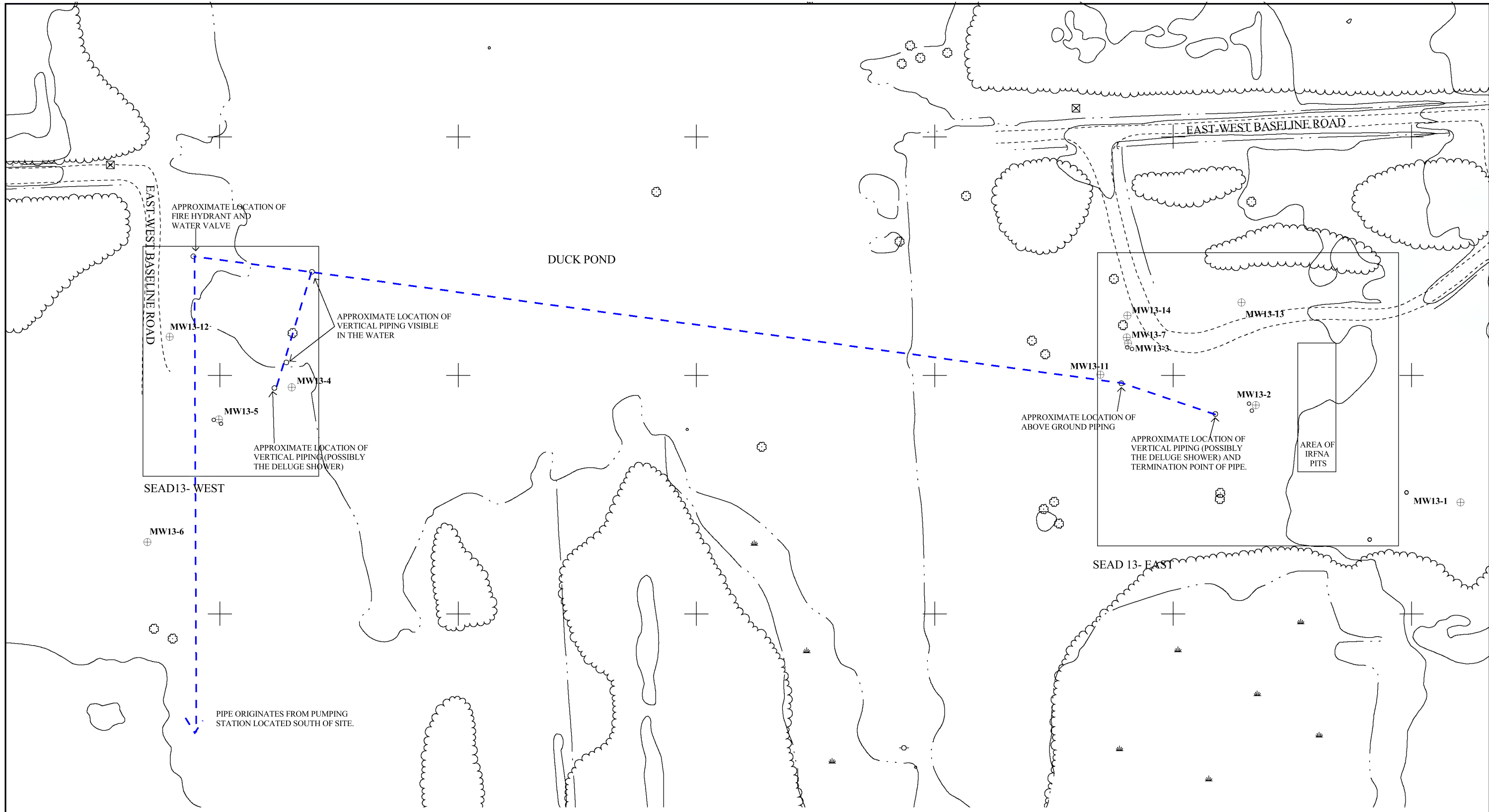
**PARSONS**  
**PARSONS ENGINEERING SCIENCE, INC.**

CLIENT/PROJECT TITLE  
**SENECA ARMY DEPOT ACTIVITY**



DEPT. ENVIRONMENTAL ENGINEERING      Des. No. 720478-02000

**FIGURE 2-5**  
 SEAD-13 IRFNA DISPOSAL SITE  
 EM SURVEY, APPARENT CONDUCTIVITY

SCALE 1" = 100'      DATE MARCH 2000      REV A



**LEGEND**

- MW-13  
 Monitoring Well Location
-  Approximate location of underground piping based on EM survey



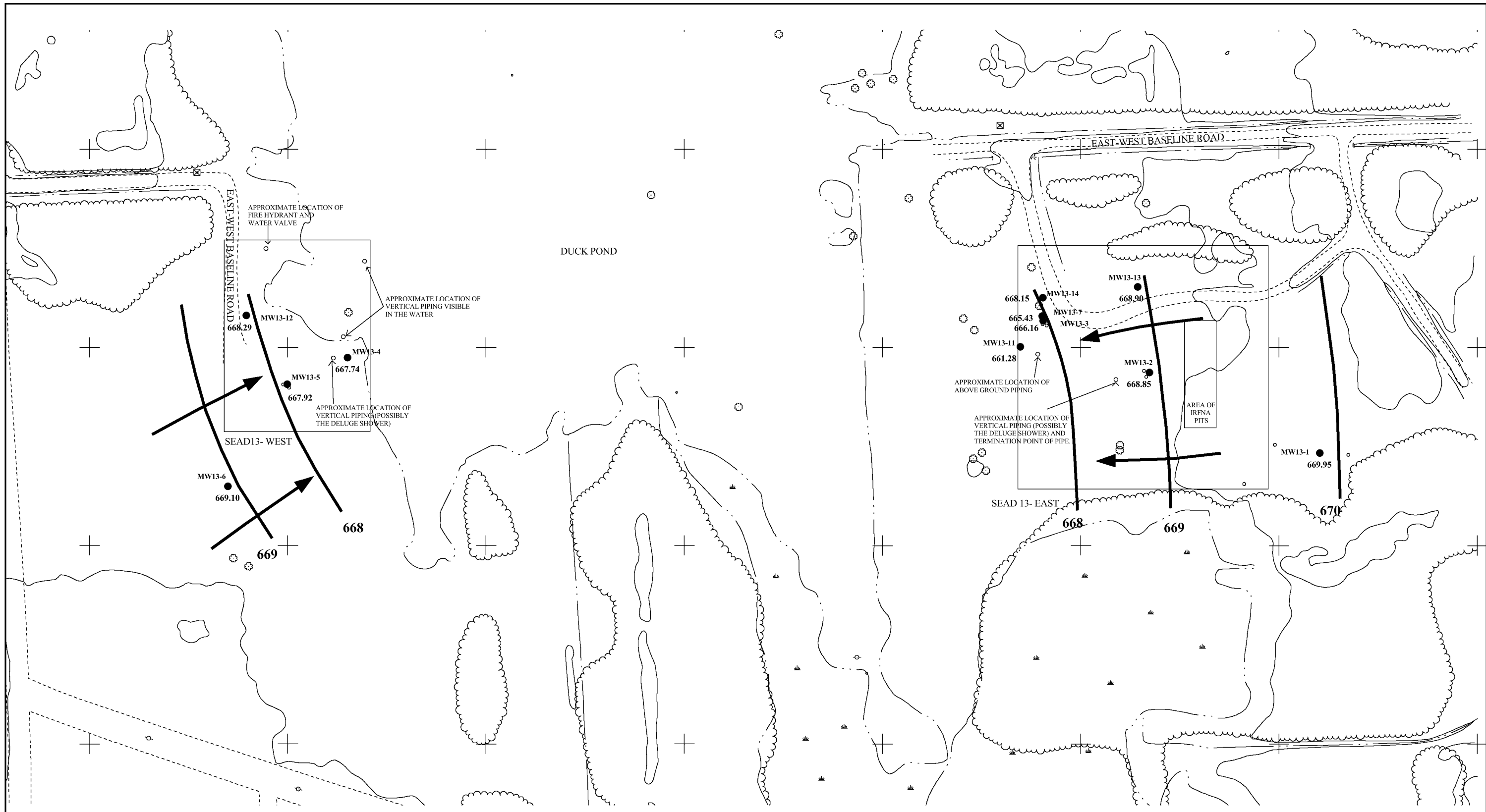
**PARSONS**

SENECA ARMY DEPOT ACTIVITY  
SEAD-13

FIGURE 2-6  
SEAD-13 IRFNA Disposal Site  
Approximate Location of Underground Piping

SCALE	DATE	Sheet 1 of 1
1:120	OCTOBER 2002	





**LEGEND**

MW-13  
 670.00 ● Monitoring Well Location with  
 Water Table Elevation

670 ———> Groundwater elevation contour  
 Arrow indicates direction of flow



**PARSONS**

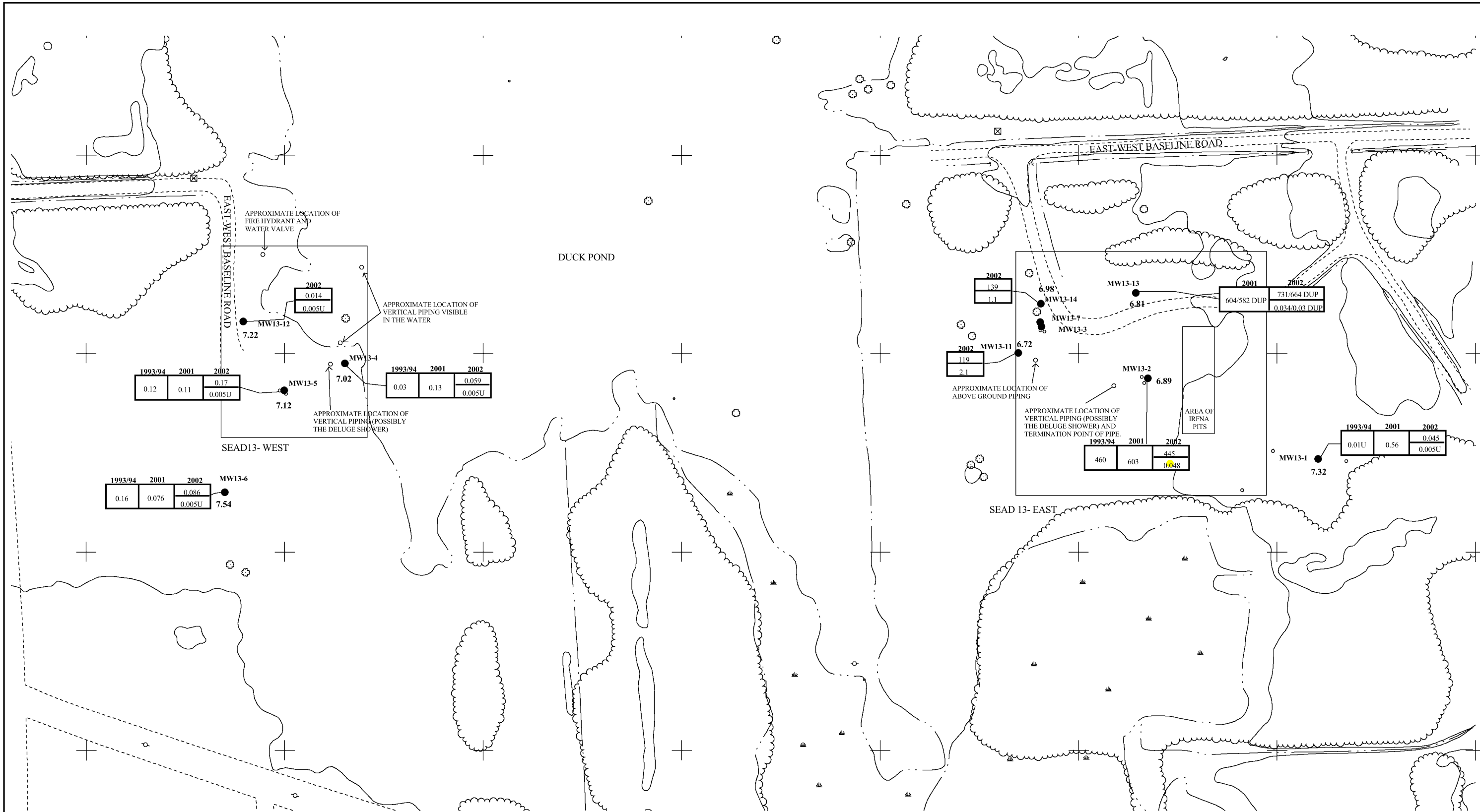
SENECA ARMY DEPOT ACTIVITY  
 SEAD-13

FIGURE 2-7  
 SEAD-13 IRFNA Disposal Site  
 Groundwater Elevation Plan  
 April 2002

SCALE 1:120

DATE JULY 2004

Sheet 1 of 1



**LEGEND**

- Monitoring Well Location
- U Not detected
- DUP Duplicate Sample

Sampling Year

0.076 Nitrate/Nitrite - Nitrogen Concentration (mg/L)

Sampling Year

0.17 Nitrate Concentration (mg/L)

0.005U Nitrite Concentration (mg/L)

Note:

MW13-11, MW13-12, MW13-13 and MW13-14 were installed in 2001.



**PARSONS**

SENECA ARMY DEPOT ACTIVITY  
SEAD-13

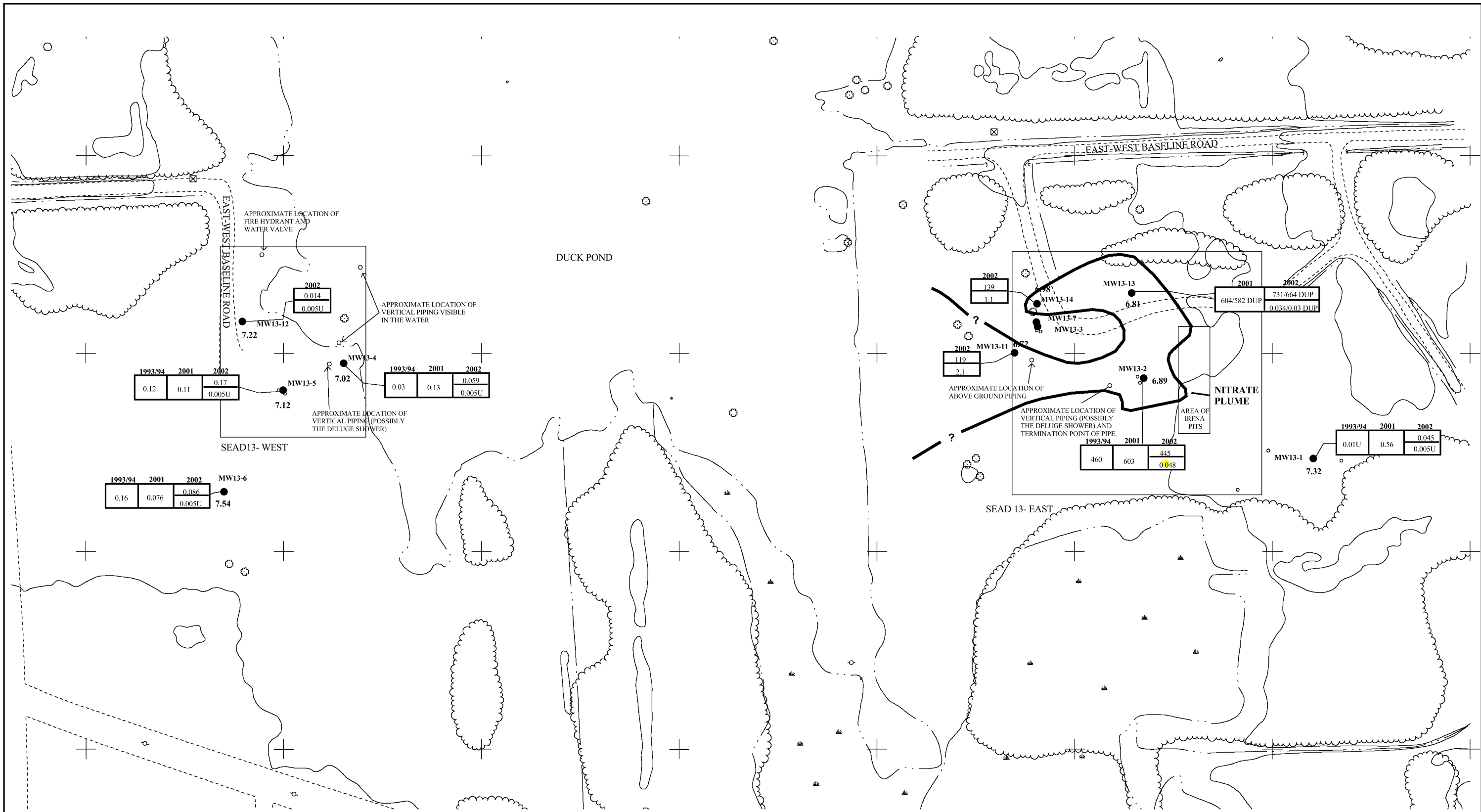
FIGURE 2-8

SEAD-13 IRFNA Disposal Site  
Nitrates/Nitrites in Groundwater

SCALE 1:120

DATE JULY 2004

Sheet 1 of 1



**LEGEND**

- Monitoring Well Location
- U Not detected
- DUP Duplicate Sample

**Sampling Year**

0.076	Nitrate/Nitrite - Nitrogen Concentration (mg/L)
-------	---

**Sampling Year**

0.17	Nitrate Concentration (mg/L)
0.005U	Nitrite Concentration (mg/L)

- Boundary of Nitrate Plume
- Delineation based on groundwater test results and geophysical survey

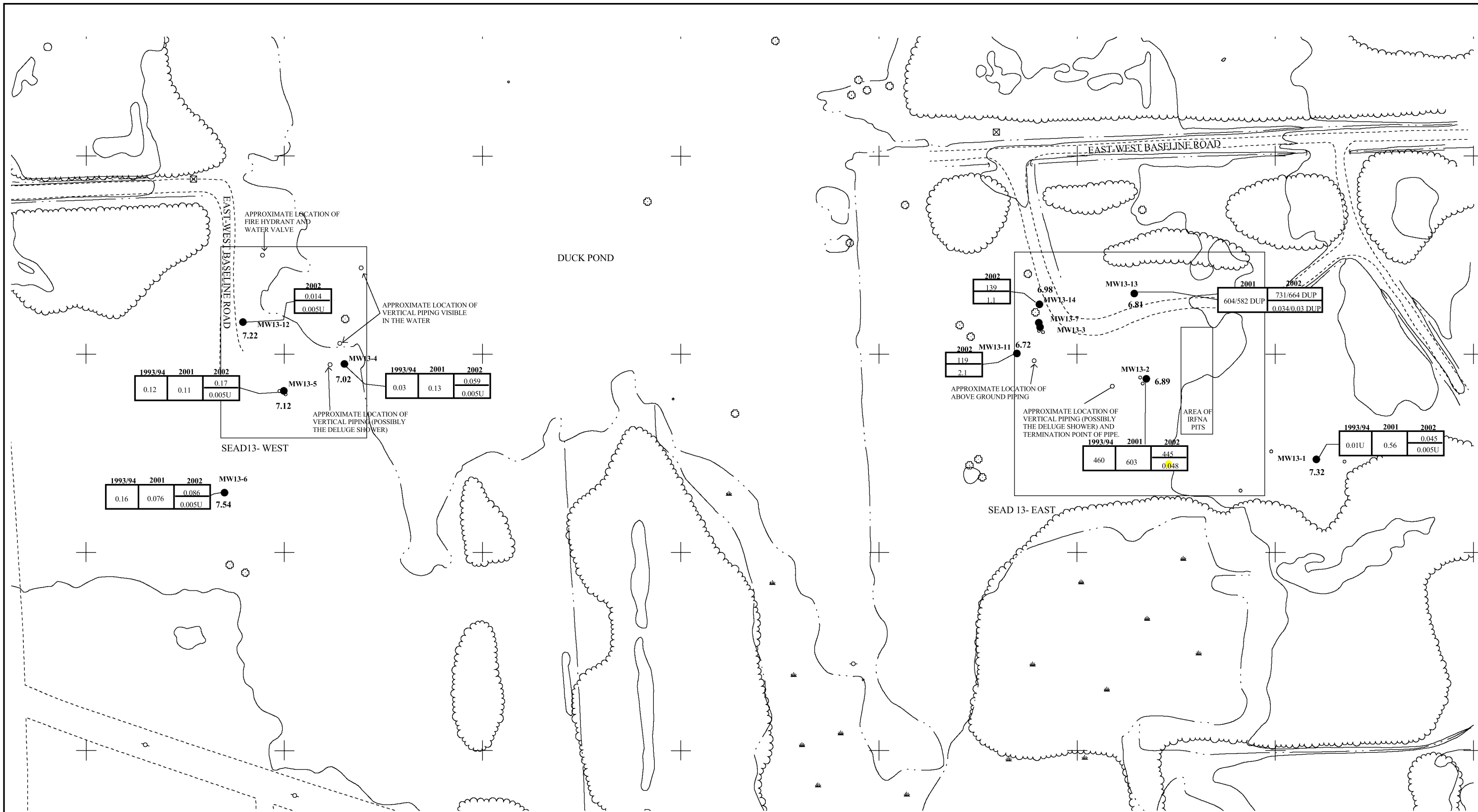
Note:  
MW13-11, MW13-12, MW13-13 and MW13-14 were installed in 2001.



**PARSONS**

SENECA ARMY DEPOT ACTIVITY  
SEAD-13

FIGURE 2-9  
SEAD-13 IRFNA Disposal Site  
Plume Delineation



**LEGEND**

● Monitoring Well Location with pH reading taken during sampling activities

7.54

Sampling Year

0.076	Nitrate/Nitrite - Nitrogen Concentration (mg/L)
-------	---

Sampling Year

0.17	Nitrate Concentration (mg/L)
0.005U	Nitrite Concentration (mg/L)

Data Qualifiers:

U Not detected

DUP Duplicate Sample

Note: MW13-11, MW13-12, MW13-13 and MW13-14 were installed in 2001.



**PARSONS**

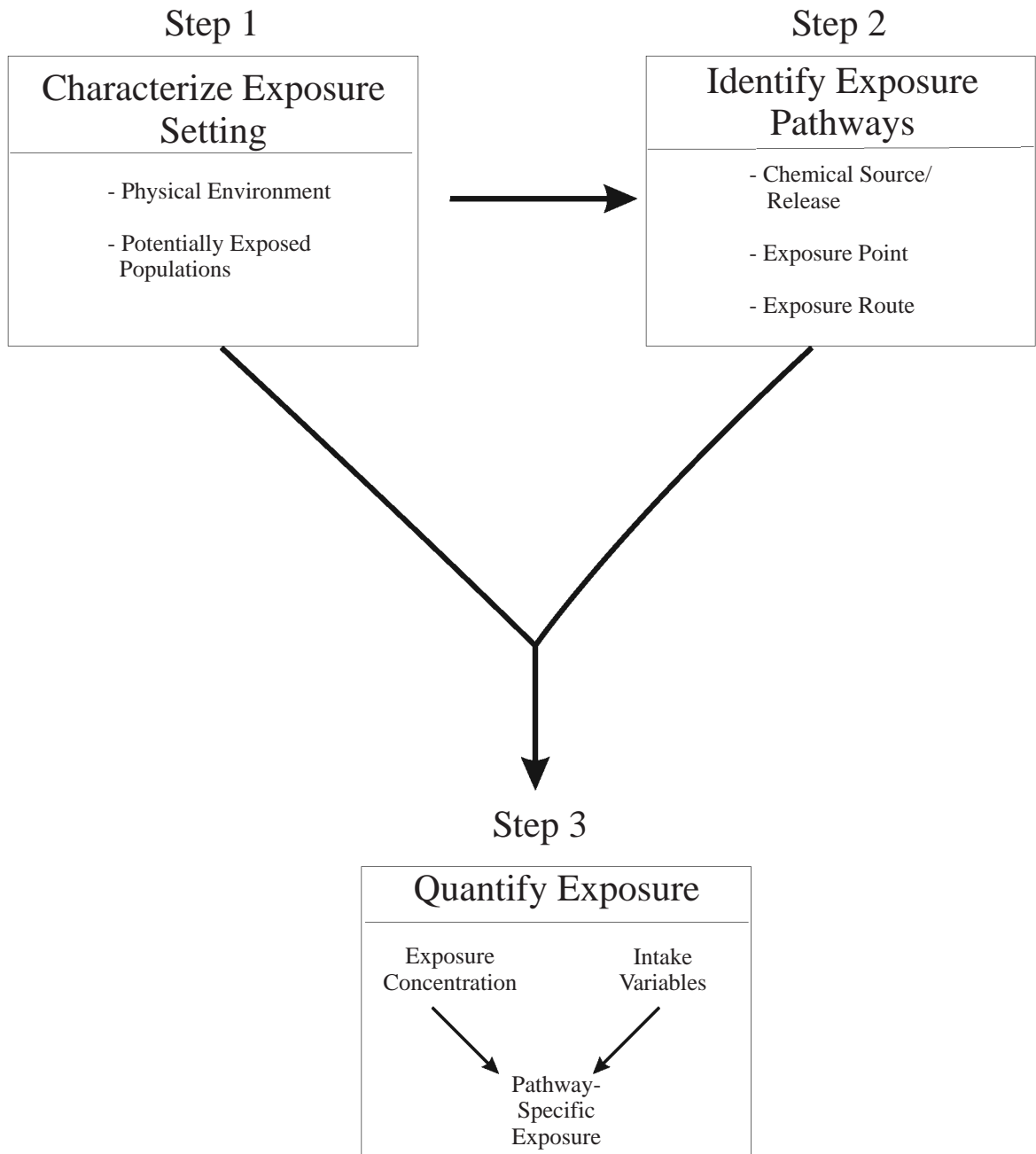
SENECA ARMY DEPOT ACTIVITY  
SEAD-13

FIGURE 2-10

SEAD-13 IRFNA Disposal Site  
pH Readings - April 2002

SCALE	DATE	Sheet 1 of 1
1:120	MARCH 2003	

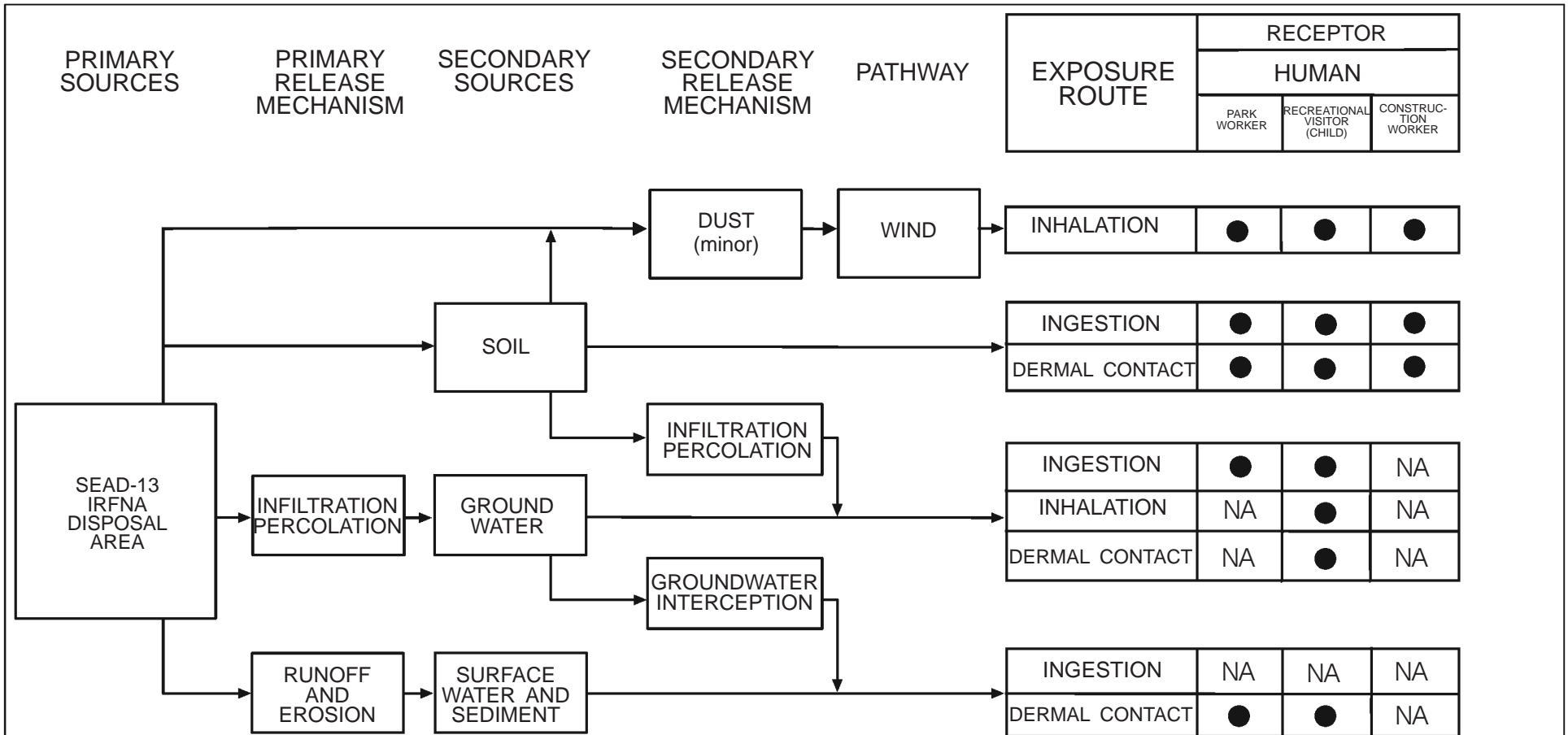
O:\SENECA\SEAD13\PROP\_SA.APR



P:\PIT\Projects\SENECA\SEAD\_13\S13-nia\Final\_July2004\Figures\Fig3-1.cdr

Source: US EPA 1989a

<b>PARSONS</b>	
CLIENT/PROJECT TITLE <b>SENECA ARMY DEPOT</b> DECISION DOCUMENT MINI RISK ASSESSMENT	
ENVIRONMENTAL ENGINEERING	763026-01001
FIGURE 3-1 <b>EXPOSURE ASSESSMENT PROCESS</b>	
SCALE NA	JULY 2004



# PARSONS

CLIENT/PROJECT TITLE

**SENECA ARMY DEPOT**  
 DECISION DOCUMENT  
 MINI-RISK ASSESSMENT

DEPT.

ENVIRONMENTAL ENGINEERING

DWG NO.

FIGURE 3-2  
 EXPOSURE PATHWAY SUMMARY  
 FOR CONSERVATION AND  
 RECREATION SCENARIO

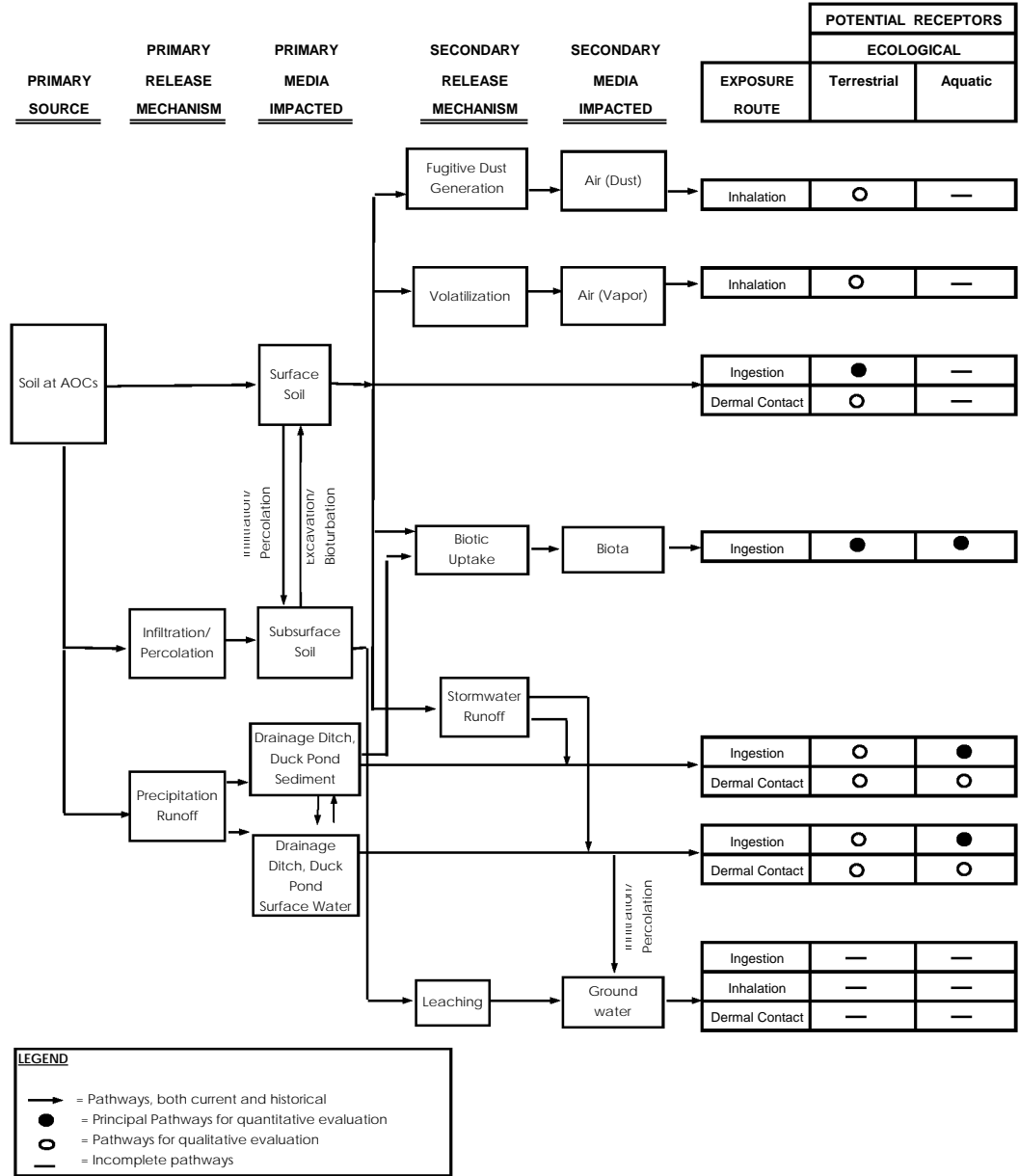
SCALE

NA

DATE

JULY 2004

**Figure 4-1 Ecological Conceptual Site Model  
SENECA ARMY DEPOT ACTIVITY**



**APPENDIX A**  
**Laboratory Analyses Results – SEAD-13**  
**Risk Calculation Tables for Conservation/Recreational Land Use**

Table A-1a:	Surface Soil Analysis Results
Table A-1b:	Subsurface Soil Analysis Results
Table A-2:	Groundwater Analysis Results
Table A-3:	Surface Water Analysis Results
Table A-4:	Sediment Analysis Results
Table A-5:	Inorganics Analysis of Soil
Table A-6:	Inorganics Analysis of Groundwater
Table A-7:	Exposure Point Concentrations for Chemicals of Potential Concern
Table A-8:	Ambient Air Exposure Point Concentrations
Table A-9:	Calculation of Intake and Risk from the Inhalation of Dust in Ambient Air
Table A-10:	Calculation of Intake and Risk from the Ingestion of Soil
Table A-11:	Calculation of Absorbed Dose and Risk from Dermal Contact to Soil
Table A-12:	Calculation of Intake and Risk from Inhalation of Groundwater (While Showering)
Table A-12a:	Calculation of Air Concentration in Shower from Volatilization of Groundwater (Daily)
Table A-13:	Calculation of Intake and Risk from the Ingestion of Groundwater
Table A-14:	Calculation of Intake and Risk from Dermal Contact to Groundwater (While Showering)
Table A-15:	Calculation of Adsorbed Dose and Risk from Dermal Contact to Surface Water
Table A-16:	Calculation of Adsorbed Dose and Risk from Dermal Contact to Sediment
Table A-17:	Calculated Soil Receptor Exposure
Table A-18a:	Calculation of Soil Hazard Quotients - Mammals
Table A-18b:	Calculation of Soil Hazard Quotients - Birds
Table A-19:	Calculated Hazard Quotients, Current Aquatic Receptors, Surface Water
Table A-20:	Calculated Hazard Quotients, Current Aquatic Receptors, Sediment



**TABLE A-1a**  
**SURFACE SOIL ANALYSES RESULTS-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER <sup>(1)</sup>	FACILITY LOCATION MATRIX SAMPLE_ID DEPTH_TOP DEPTH_BOTTOM SAMPLE_DATE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046 <sup>(2)</sup>	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13
									MW13-1 SOIL SB13-1-1	MW13-2 SOIL SB13-2-1	MW13-3 SOIL SB13-3-1	MW13-4 SOIL SB13-4-1	MW13-5 SOIL SB13-5-1	MW13-6 SOIL SB13-6-1
								Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)	
<b>VOLATILE ORGANICS</b>														
Acetone	UG/KG	86	8%	200	0	1	13	12 U	11 UR	12 U	12 U	11 U	86	
Methyl ethyl ketone	UG/KG	26	8%	300	0	1	13	12 U	11 UR	12 U	12 U	11 U	26	
Toluene	UG/KG	6	8%	1500	0	1	13	12 U	6 J	12 U	12 U	11 U	13 U	
<b>SEMIVOLATILE ORGANICS</b>														
1,4-Dichlorobenzene	UG/KG	3300	3%	8500	0	1	30	400 U	360 U	400 U	410 U	370 U	410 U	
2,4,5-Trichlorophenol	UG/KG	9.5	3%	100	0	1	30	980 U	880 U	960 U	1000 U	900 U	990 U	
2,4,6-Trichlorophenol	UG/KG	10	7%		0	2	30	400 U	360 U	400 U	410 U	370 U	410 U	
2,4-Dinitrotoluene	UG/KG	1600	3%		0	1	30	400 U	360 U	400 U	410 U	370 U	410 U	
2,6-Dinitrotoluene	UG/KG	120	3%	1000	0	1	30	400 U	360 U	400 U	410 U	370 U	410 U	
2-Chloronaphthalene	UG/KG	5.4	3%		0	1	30	400 U	360 U	400 U	410 U	370 U	410 U	
2-Methylnaphthalene	UG/KG	42	13%	36400	0	4	30	400 U	360 U	400 U	410 U	370 U	410 U	
4-Chlorophenyl phenyl ether	UG/KG	5.9	3%		0	1	30	400 U	360 U	400 U	410 U	370 U	410 U	
4-Methylphenol	UG/KG	9200	20%	900	1	6	30	400 U	360 U	400 U	410 U	370 U	410 U	
Acenaphthene	UG/KG	650	10%	50000	0	3	30	400 U	360 U	400 U	410 U	370 U	410 U	
Acenaphthylene	UG/KG	16	7%	41000	0	2	30	400 U	360 U	400 U	410 U	370 U	410 U	
Anthracene	UG/KG	16	7%	50000	0	2	30	400 U	360 U	400 U	410 U	370 U	410 U	
Benzo(a)anthracene	UG/KG	100	27%	224	0	8	30	400 U	360 U	400 U	410 U	370 U	410 U	
Benzo(a)pyrene	UG/KG	110	30%	61	1	9	30	400 U	360 U	400 U	410 U	370 U	410 U	
Benzo(b)fluoranthene	UG/KG	89	30%	1100	0	9	30	400 U	360 U	400 U	410 U	370 U	410 U	
Benzo(ghi)perylene	UG/KG	86	27%	50000	0	8	30	400 U	360 U	400 U	410 U	370 U	410 U	
Benzo(k)fluoranthene	UG/KG	74	27%	1100	0	8	30	400 U	360 U	400 U	410 U	370 U	410 U	
Bis(2-Chloroethoxy)methane	UG/KG	5.6	3%		0	1	30	400 U	360 U	400 U	410 U	370 U	410 U	
Bis(2-Ethylhexyl)phthalate	UG/KG	1900	17%	50000	0	5	30	400 U	360 U	400 U	410 U	370 U	56 J	
Carbazole	UG/KG	180	17%		0	5	30	400 U	360 U	400 U	410 U	370 U	410 U	
Chrysene	UG/KG	190	40%	400	0	12	30	400 U	360 U	400 U	410 U	370 U	410 U	
Di-n-butylphthalate	UG/KG	140	7%	8100	0	2	30	400 U	360 U	400 U	410 U	370 U	410 U	
Di-n-octylphthalate	UG/KG	210	7%	50000	0	2	30	210 J	360 U	400 U	410 U	370 U	410 U	
Dibenz(a,h)anthracene	UG/KG	15	7%	14	1	2	30	400 U	360 U	400 U	410 U	370 U	410 U	
Dibenzofuran	UG/KG	340	20%	6200	0	6	30	400 U	360 U	400 U	410 U	370 U	410 U	
Diethyl phthalate	UG/KG	7	3%	7100	0	1	30	400 U	360 U	400 U	410 U	370 U	410 U	
Fluoranthene	UG/KG	800	47%	50000	0	14	30	400 U	360 U	400 U	410 U	370 U	410 U	
Fluorene	UG/KG	18	7%	50000	0	2	30	400 U	360 U	400 U	410 U	370 U	410 U	
Hexachlorobenzene	UG/KG	210	7%	410	0	2	30	400 U	360 U	400 U	410 U	370 U	410 U	
Indeno(1,2,3-cd)pyrene	UG/KG	53	20%	3200	0	6	30	400 U	360 U	400 U	410 U	370 U	410 U	
N-Nitrosodiphenylamine	UG/KG	99	3%		0	1	30	400 U	360 U	400 U	410 U	370 U	410 U	
Naphthalene	UG/KG	510	17%	13000	0	5	30	400 U	360 U	400 U	410 U	370 U	410 U	
Nitrobenzene	UG/KG	5.7	3%	200	0	1	30	400 U	360 U	400 U	410 U	370 U	410 U	
Phenanthrene	UG/KG	1400	40%	50000	0	12	30	400 U	360 U	400 U	410 U	370 U	410 U	
Phenol	UG/KG	14000	7%	30	1	2	30	400 U	360 U	400 U	410 U	370 U	410 U	
Pyrene	UG/KG	540	47%	50000	0	14	30	400 U	360 U	400 U	410 U	370 U	410 U	
<b>PESTICIDES/PCBS</b>														
4,4'-DDE	UG/KG	3.6	8%	2100	0	1	13	4 U	3.6 J	4 U	4.1 U	3.7 U	4.1 U	

**TABLE A-1a**  
**SURFACE SOIL ANALYSES RESULTS-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER <sup>(1)</sup>	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046 <sup>(2)</sup>	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13
								12/8/1993	11/9/1993	12/8/1993	12/15/1993	11/8/1993	12/15/1993
FACILITY LOCATION MATRIX SAMPLE_ID DEPTH_TOP DEPTH_BOTTOM SAMPLE_DATE SEAD-13 MW13-1 SOIL SB13-1-1 0 2 SEAD-13 MW13-2 SOIL SB13-2-1 0 2 SEAD-13 MW13-3 SOIL SB13-3-1 0 2 SEAD-13 MW13-4 SOIL SB13-4-1 0 2 SEAD-13 MW13-5 SOIL SB13-5-1 0 1 SEAD-13 MW13-6 SOIL SB13-6-1 0 2													
METALS Aluminum MG/KG 21200 100% 19300 2 30 30 18300 10700 10800 21200 13000 16000 Antimony MG/KG 5.1 37% 5.9 0 11 30 5.1 J 6.3 UJ 4.5 UJ 4 UJ 7.8 UJ 3.2 UJ Arsenic MG/KG 10 100% 8.2 2 30 30 7 5.6 5.5 8.1 4.6 4.6 Barium MG/KG 157 100% 300 0 30 30 106 58.8 54.3 129 56.7 103 Beryllium MG/KG 1.2 100% 1.1 1 30 30 0.92 J 0.52 J 0.52 J 1.1 0.63 J 0.92 Cadmium MG/KG 1 57% 2.3 0 17 30 0.45 U 0.4 U 0.44 U 0.38 U 0.49 U 0.31 U Calcium MG/KG 83900 100% 121000 0 30 30 3570 28800 83900 28800 21600 5140 Chromium MG/KG 30.5 100% 29.6 2 30 30 29.4 21.2 17.1 30.2 25.4 21.5 Cobalt MG/KG 19.3 100% 30 0 30 30 12 11.3 10.2 J 10.6 13.1 10.6 Copper MG/KG 84.2 100% 33 9 30 30 11.6 45.2 26.9 21.6 31.2 16 Iron MG/KG 33700 100% 36500 0 30 30 32500 25000 23100 31600 28600 25300 Lead MG/KG 75.6 83% 24.8 9 25 30 15 UR 25.6 10.6 UR 13.6 21.3 13.8 Magnesium MG/KG 25600 100% 21500 1 30 30 5890 5380 25600 8780 6740 3750 Manganese MG/KG 1150 100% 1060 1 30 30 451 336 443 363 335 934 Mercury MG/KG 0.09 47% 0.1 0 14 30 0.03 J 0.04 J 0.02 U 0.05 J 0.04 J 0.03 J Nickel MG/KG 71.1 100% 49 8 30 30 34.9 46.6 31.4 38.1 46.1 22.7 Potassium MG/KG 2800 100% 2380 1 30 30 2190 1120 1150 2130 1350 1330 Selenium MG/KG 1.4 70% 2 0 21 30 0.26 J 0.83 J 0.14 U 0.53 J 0.58 J 1.2 Silver MG/KG 0.35 7% 0.75 0 2 30 0.9 U 0.75 U 0.8 UJ 0.88 U 0.77 U 0.99 UJ 0.62 U Sodium MG/KG 186 63% 172 2 19 30 80.6 J 90.2 J 163 J 81.5 J 94.7 J 61.9 J Thallium MG/KG 0.91 20% 0.7 1 6 30 0.43 J 0.35 J 0.91 J 0.22 U 0.2 U 0.18 U Vanadium MG/KG 35.8 100% 150 0 30 30 32.7 19.3 17.1 35.8 29.9 Zinc MG/KG 152 100% 110 3 30 30 81.9 63.6 62.4 89.4 53.2 62.5 OTHER ANALYSES Nitrate/Nitrite Nitrogen MG/KG 27.9 94% 0 16 17 0.1 0.31 0.04 0.09 0.04 0.55 Percent Solids % 96.7 100% 0 17 17 82.3 90.3 83.5 80.3 89 80.5 Fluoride MG/KG 154 0 17 17 68 80 125 64 56 78													

NOTES:  
 U = compound was not detected  
 J = reported value is an estimated concentration  
 R = data was rejected during the data validation process  
 UJ = compound was not detected, the associated reporting limit is approximate  
 (1) Only compounds that were detected were included in this list of parameters.  
 (2) NYSDEC Technical and Administrative Guidance Memorandum (TAGM) HWR-94-4046, Revised January 24, 1994.

**TABLE A-1a**  
**SURFACE SOIL ANALYSES RESULTS-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER <sup>(1)</sup>	FACILITY LOCATION MATRIX SAMPLE_ID DEPTH_TOP DEPTH_BOTTOM SAMPLE_DATE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046 <sup>(2)</sup>	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-13 SB13-10 SOIL SB13-10-10	SEAD-13 SB13-10 SOIL SB13-10-1	SEAD-13 SB13-11 SOIL 134016	SEAD-13 SB13-12 SOIL 134018	SEAD-13 SB13-13 SOIL 134012	SEAD-13 SB13-13 SOIL 134020
									12/17/1993	12/17/1993	8/16/2001	8/15/2001	8/15/2001	8/16/2001
									Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)
<b>VOLATILE ORGANICS</b>														
Acetone	UG/KG	86	8%	200	0	1	13	12 U	12 U					
Methyl ethyl ketone	UG/KG	26	8%	300	0	1	13	12 U	12 U					
Toluene	UG/KG	6	8%	1500	0	1	13	12 U	12 U					
<b>SEMIVOLATILE ORGANICS</b>														
1,4-Dichlorobenzene	UG/KG	3300	3%	8500	0	1	30	370 UJ	3300 J	77 U	89 U	73 U	75 U	
2,4,5-Trichlorophenol	UG/KG	9.5	3%	100	0	1	30	890 UJ	9400 UJ	190 U	9.5 J	180 U	190 U	
2,4,6-Trichlorophenol	UG/KG	10	7%		0	2	30	370 UJ	3900 UJ	77 U	10 J	73 U	75 U	
2,4-Dinitrotoluene	UG/KG	1600	3%		0	1	30	370 UJ	3900 UJ	77 U	89 U	73 U	75 U	
2,6-Dinitrotoluene	UG/KG	120	3%	1000	0	1	30	370 UJ	3900 UJ	77 UJ	89 UJ	73 UJ	75 UJ	
2-Chloronaphthalene	UG/KG	5.4	3%		0	1	30	370 UJ	3900 UJ	77 U	5.4 J	73 U	75 U	
2-Methylnaphthalene	UG/KG	42	13%	36400	0	4	30	370 UJ	3900 UJ	77 U	6.2 J	73 U	75 U	
4-Chlorophenyl phenyl ether	UG/KG	5.9	3%		0	1	30	370 UJ	3900 UJ	77 U	5.9 J	73 U	75 U	
4-Methylphenol	UG/KG	9200	20%	900	1	6	30	370 UJ	9200 J	77 U	12 J	73 U	75 U	
Acenaphthene	UG/KG	650	10%	50000	0	3	30	370 UJ	650 J	77 U	5.4 J	73 U	75 U	
Acenaphthylene	UG/KG	16	7%	41000	0	2	30	370 UJ	3900 UJ	77 U	6 J	73 U	75 U	
Anthracene	UG/KG	16	7%	50000	0	2	30	370 UJ	3900 UJ	77 U	5.3 J	73 U	75 U	
Benzo(a)anthracene	UG/KG	100	27%	224	0	8	30	370 UJ	3900 UJ	77 U	8.9 J	73 U	75 U	
Benzo(a)pyrene	UG/KG	110	30%	61	1	9	30	370 UJ	3900 UJ	77 U	9.7 J	73 U	75 U	
Benzo(b)fluoranthene	UG/KG	89	30%	1100	0	9	30	370 UJ	3900 UJ	77 U	8 J	73 U	75 U	
Benzo(ghi)perylene	UG/KG	86	27%	50000	0	8	30	370 UJ	3900 UJ	77 U	8.3 J	73 U	75 U	
Benzo(k)fluoranthene	UG/KG	74	27%	1100	0	8	30	370 UJ	3900 UJ	77 U	9.9 J	73 U	75 U	
Bis(2-Chloroethoxy)methane	UG/KG	5.6	3%		0	1	30	370 UJ	3900 UJ	77 U	5.6 J	73 U	75 U	
Bis(2-Ethylhexyl)phthalate	UG/KG	1900	17%	50000	0	5	30	370 UJ	1900 J	77 U	89 U	73 U	75 U	
Carbazole	UG/KG	180	17%		0	5	30	370 UJ	180 J	77 U	5.9 J	73 U	75 U	
Chrysene	UG/KG	190	40%	400	0	12	30	370 UJ	3900 UJ	77 U	9.3 J	73 U	75 U	
Di-n-butylphthalate	UG/KG	140	7%	8100	0	2	30	370 UJ	3900 UJ	77 U	8.6 J	73 U	75 U	
Di-n-octylphthalate	UG/KG	210	7%	50000	0	2	30	370 UJ	3900 UJ	77 UJ	7.7 J	73 U	75 UJ	
Dibenz(a,h)anthracene	UG/KG	15	7%	14	1	2	30	370 UJ	3900 UJ	77 U	6.7 J	73 U	75 U	
Dibenzofuran	UG/KG	340	20%	6200	0	6	30	370 UJ	340 J	77 UJ	5.4 J	73 UJ	75 UJ	
Diethyl phthalate	UG/KG	7	3%	7100	0	1	30	370 UJ	3900 UJ	77 U	7 J	73 U	75 U	
Fluoranthene	UG/KG	800	47%	50000	0	14	30	370 UJ	800 J	77 U	10 J	73 U	75 U	
Fluorene	UG/KG	18	7%	50000	0	2	30	370 UJ	3900 UJ	77 U	5.7 J	73 U	75 U	
Hexachlorobenzene	UG/KG	210	7%	410	0	2	30	370 UJ	3900 UJ	77 U	89 U	73 U	75 U	
Indeno(1,2,3-cd)pyrene	UG/KG	53	20%	3200	0	6	30	370 UJ	3900 UJ	77 U	8.7 J	73 U	75 U	
N-Nitrosodiphenylamine	UG/KG	99	3%		0	1	30	370 UJ	3900 UJ	77 U	89 U	73 U	75 U	
Naphthalene	UG/KG	510	17%	13000	0	5	30	370 UJ	510 J	77 U	5.8 J	73 U	75 U	
Nitrobenzene	UG/KG	5.7	3%	200	0	1	30	370 UJ	3900 UJ	77 U	5.7 J	73 U	75 U	
Phenanthrene	UG/KG	1400	40%	50000	0	12	30	370 UJ	1400 J	77 U	8.2 J	73 U	75 U	
Phenol	UG/KG	14000	7%	30	1	2	30	370 UJ	14000 J	77 U	11 J	73 U	75 U	
Pyrene	UG/KG	540	47%	50000	0	14	30	370 UJ	540 J	77 U	11 J	73 U	75 U	
<b>PESTICIDES/PCBS</b>														
4,4'-DDE	UG/KG	3.6	8%	2100	0	1	13	3.9 U	3.8 U					

**TABLE A-1a**  
**SURFACE SOIL ANALYSES RESULTS-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER <sup>(1)</sup>	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM <sup>(2)</sup>	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-13 SB13-10 SOIL SB13-10-10	SEAD-13 SB13-10 SOIL SB13-10-1	SEAD-13 SB13-11 SOIL 134016	SEAD-13 SB13-12 SOIL 134018	SEAD-13 SB13-13 SOIL 134012	SEAD-13 SB13-13 SOIL 134020
								12/17/1993	12/17/1993	8/16/2001	8/15/2001	8/15/2001	8/16/2001
								Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)
<b>METALS</b>													
Aluminum	MG/KG	21200	100%	19300	2	30	30	18500	12000	14400	12400	13800	21000
Antimony	MG/KG	5.1	37%	5.9	0	11	30	5 J	4.4 UJ	0.58 J	0.45 UJ	0.39 UJ	0.36 J
Arsenic	MG/KG	10	100%	8.2	2	30	30	5.7	3.8	6.5	3.6	5.2	6.1
Barium	MG/KG	157	100%	300	0	30	30	157	72.2	110	79.3	133	108
Beryllium	MG/KG	1.2	100%	1.1	1	30	30	0.91 J	0.63 J	0.79 J	0.65 J	0.72 J	1.2
Cadmium	MG/KG	1	57%	2.3	0	17	30	0.48 U	0.42 U	0.82 J	0.58 J	0.6 J	0.81 J
Calcium	MG/KG	83900	100%	121000	0	30	30	4220	2070	23000	3260	4860	20400
Chromium	MG/KG	30.5	100%	29.6	2	30	30	27.2	16.2	22.4	17.6	22.2	28.1
Cobalt	MG/KG	19.3	100%	30	0	30	30	8.2 J	4.3 J	12.2	7.1 J	11.7	19.3
Copper	MG/KG	84.2	100%	33	9	30	30	26.6 J	7.5 J	26.1	9.5	21.6	36.2
Iron	MG/KG	33700	100%	36500	0	30	30	29000	16500	28800 J	19700 J	23600 J	30800
Lead	MG/KG	75.6	83%	24.8	9	25	30	11	9	17.8	10.6	12.9	21.1
Magnesium	MG/KG	25600	100%	21500	1	30	30	6210	2840	8050	3440	4350	8000
Manganese	MG/KG	1150	100%	1060	1	30	30	204	104	778	483	1150	531
Mercury	MG/KG	0.09	47%	0.1	0	14	30	0.03 J	0.03 J	0.04 U	0.05 U	0.05 U	0.06 U
Nickel	MG/KG	71.1	100%	49	8	30	30	32.6	14.1	37.1	18.4	31.4	71.1
Potassium	MG/KG	2800	100%	2380	1	30	30	1500	974 J	1700	1580	1860	2800
Selenium	MG/KG	1.4	70%	2	0	21	30	0.32 J	0.29 J	0.63 J	0.58 U	0.61 J	1.2 J
Silver	MG/KG	0.35	7%	0.75	0	2	30	0.95 U	0.85 U	0.38 U	0.4 U	0.35 U	0.29 U
Sodium	MG/KG	186	63%	172	2	19	30	57 J	40 J	151 J	163 J	135 J	176 J
Thallium	MG/KG	0.91	20%	0.7	1	6	30	0.27 U	0.27 U	0.54 R	0.58 R	0.5 R	0.42 R
Vanadium	MG/KG	35.8	100%	150	0	30	30	31.7	21.6	25.7	21.9	23	33.3
Zinc	MG/KG	152	100%	110	3	30	30	68.7	40.7	71.2	52.1	51.9	136
<b>OTHER ANALYSES</b>													
Nitrate/Nitrite Nitrogen	MG/KG	27.9	94%		0	16	17	0.5	0.33	1.1	0.22	19.8	27.9
Percent Solids	%	96.7	100%		0	17	17	84.7	84.6	84.8	74	90.3	88.5
Fluoride	MG/KG	154						34	75				

**NOTES:**

U = compound was not detected

J = reported value is an estimated concentration

R = data was rejected during the data validation process

UJ = compound was not detected, the associated reporting limit is approximate

(1) Only compounds that were detected were included in this list of parameters.

(2) NYSDEC Technical and Administrative Guidance Memorandum (TAGM) HWR-94-4046, Revised January 24, 1994.

**TABLE A-1a**  
**SURFACE SOIL ANALYSES RESULTS-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER <sup>(1)</sup>	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046 <sup>(2)</sup>	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-13 SB13-14 SOIL	SEAD-13 SB13-14 SOIL	SEAD-13 SB13-7 SOIL	SEAD-13 SB13-7 SOIL	SEAD-13 SB13-8 SOIL	SEAD-13 SB13-9 SOIL
								134009	134014	SB13-7-10	SB13-7-1	SB13-8-1	SB13-9-7
								0	0	0	0	0	0
								0.2	2	2	2	2	2
								7/30/2001	8/16/2001	12/7/1993	12/7/1993	12/7/1993	12/16/1993
								1	1				
								Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)
<b>VOLATILE ORGANICS</b>													
Acetone	UG/KG	86	8%	200	0	1	13			12 UJ	12 U	13 U	12 U
Methyl ethyl ketone	UG/KG	26	8%	300	0	1	13			12 UJ	12 U	13 U	12 U
Toluene	UG/KG	6	8%	1500	0	1	13			12 UJ	12 U	13 U	12 U
<b>SEMIVOLATILE ORGANICS</b>													
1,4-Dichlorobenzene	UG/KG	3300	3%	8500	0	1	30	69 U	69 U	390 U	390 U	440 U	400 U
2,4,5-Trichlorophenol	UG/KG	9.5	3%	100	0	1	30	170 U	170 U	940 U	950 U	1100 U	980 U
2,4,6-Trichlorophenol	UG/KG	10	7%		0	2	30	69 U	69 U	390 U	390 U	440 U	400 U
2,4-Dinitrotoluene	UG/KG	1600	3%		0	1	30	69 U	69 U	390 U	390 U	440 U	400 U
2,6-Dinitrotoluene	UG/KG	120	3%	1000	0	1	30	69 U	69 UJ	390 U	390 U	440 U	400 U
2-Chloronaphthalene	UG/KG	5.4	3%		0	1	30	69 U	69 U	390 U	390 U	440 U	400 U
2-Methylnaphthalene	UG/KG	42	13%	36400	0	4	30	69 U	69 U	390 U	390 U	440 U	400 U
4-Chlorophenyl phenyl ether	UG/KG	5.9	3%		0	1	30	69 U	69 U	390 U	390 U	440 U	400 U
4-Methylphenol	UG/KG	9200	20%	900	1	6	30	69 U	69 U	390 U	390 U	440 U	400 U
Acenaphthene	UG/KG	650	10%	50000	0	3	30	69 U	69 U	390 U	390 U	440 U	400 U
Acenaphthylene	UG/KG	16	7%	41000	0	2	30	69 U	69 U	390 U	390 U	440 U	400 U
Anthracene	UG/KG	16	7%	50000	0	2	30	69 U	69 U	390 U	390 U	440 U	400 U
Benzo(a)anthracene	UG/KG	100	27%	224	0	8	30	69 U	69 U	390 U	390 U	440 U	400 U
Benzo(a)pyrene	UG/KG	110	30%	61	1	9	30	69 U	69 U	390 U	390 U	440 U	400 U
Benzo(b)fluoranthene	UG/KG	89	30%	1100	0	9	30	69 U	69 U	390 U	390 U	440 U	400 U
Benzo(ghi)perylene	UG/KG	86	27%	50000	0	8	30	69 U	69 U	390 U	390 U	440 U	400 U
Benzo(k)fluoranthene	UG/KG	74	27%	1100	0	8	30	69 U	69 U	390 U	390 U	440 U	400 U
Bis(2-Chloroethoxy)methane	UG/KG	5.6	3%		0	1	30	69 U	69 U	390 U	390 U	440 U	400 U
Bis(2-Ethylhexyl)phthalate	UG/KG	1900	17%	50000	0	5	30	69 U	69 U	390 U	390 U	440 U	27 J
Carbazole	UG/KG	180	17%		0	5	30	69 U	69 U	390 U	390 U	440 U	400 U
Chrysene	UG/KG	190	40%	400	0	12	30	4.2 J	69 U	390 U	390 U	440 U	400 U
Di-n-butylphthalate	UG/KG	140	7%	8100	0	2	30	69 U	69 U	390 U	390 U	440 U	400 U
Di-n-octylphthalate	UG/KG	210	7%	50000	0	2	30	69 U	69 UJ	390 U	390 U	440 U	400 U
Dibenz(a,h)anthracene	UG/KG	15	7%	14	1	2	30	69 U	69 U	390 U	390 U	440 U	400 U
Dibenzofuran	UG/KG	340	20%	6200	0	6	30	69 U	69 UJ	390 U	390 U	440 U	400 U
Diethyl phthalate	UG/KG	7	3%	7100	0	1	30	69 U	69 U	390 U	390 U	440 U	400 U
Fluoranthene	UG/KG	800	47%	50000	0	14	30	4 J	69 U	390 U	390 U	440 U	400 U
Fluorene	UG/KG	18	7%	50000	0	2	30	69 U	69 U	390 U	390 U	440 U	400 U
Hexachlorobenzene	UG/KG	210	7%	410	0	2	30	69 U	69 U	390 U	390 U	440 U	400 U
Indeno(1,2,3-cd)pyrene	UG/KG	53	20%	3200	0	6	30	69 U	69 U	390 U	390 U	440 U	400 U
N-Nitrosodiphenylamine	UG/KG	99	3%		0	1	30	69 U	69 U	390 U	390 U	440 U	400 U
Naphthalene	UG/KG	510	17%	13000	0	5	30	69 U	69 U	390 U	390 U	440 U	400 U
Nitrobenzene	UG/KG	5.7	3%	200	0	1	30	69 U	69 U	390 U	390 U	440 U	400 U
Phenanthrene	UG/KG	1400	40%	50000	0	12	30	5.3 J	69 U	390 U	390 U	440 U	400 U
Phenol	UG/KG	14000	7%	30	1	2	30	69 U	69 U	390 U	390 U	440 U	400 U
Pyrene	UG/KG	540	47%	50000	0	14	30	3.6 J	69 U	390 U	390 U	440 U	400 U
<b>PESTICIDES/PCBS</b>													
4,4'-DDE	UG/KG	3.6	8%	2100	0	1	13			3.9 U	3.9 U	4.4 U	4 U

**TABLE A-1a**  
**SURFACE SOIL ANALYSES RESULTS-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER <sup>(1)</sup>	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046 <sup>(2)</sup>	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-13 SB13-14 SOIL	SEAD-13 SB13-14 SOIL	SEAD-13 SB13-7 SOIL	SEAD-13 SB13-7 SOIL	SEAD-13 SB13-8 SOIL	SEAD-13 SB13-9 SOIL
								7/30/2001	8/16/2001	12/7/1993	12/7/1993	12/7/1993	12/16/1993
								1	1	Value (Q)	Value (Q)	Value (Q)	Value (Q)
<b>METALS</b>													
Aluminum	MG/KG	21200	100%	19300	2	30	30	10200	12700	14900	9810	15500	14200
Antimony	MG/KG	5.1	37%	5.9	0	11	30	0.56 J	0.31 UJ	4.5 UJ	4.4 UJ	5.4 UJ	4 UJ
Arsenic	MG/KG	10	100%	8.2	2	30	30	3.3	4.4	8.5	10	8.2	5.3
Barium	MG/KG	157	100%	300	0	30	30	46.6	35.9	89.5	37.3 J	125	105
Beryllium	MG/KG	1.2	100%	1.1	1	30	30	0.52 J	0.58 J	0.79 J	0.43 J	0.95 J	0.79 J
Cadmium	MG/KG	1	57%	2.3	0	17	30	0.64 J	0.74 J	0.43 U	0.43 U	0.53 U	0.39 U
Calcium	MG/KG	83900	100%	121000	0	30	30	15400	24900	11000	25400	6540	7980
Chromium	MG/KG	30.5	100%	29.6	2	30	30	17.8	22.9	21.7	17.6	22	20.2
Cobalt	MG/KG	19.3	100%	30	0	30	30	10.4	13.2	8.8 J	9.9 J	8.1 J	7.9 J
Copper	MG/KG	84.2	100%	33	9	30	30	29.2	34.8	26.9	31.8	19.4	24.2
Iron	MG/KG	33700	100%	36500	0	30	30	21900	28700 J	24800	23000	25500	24300
Lead	MG/KG	75.6	83%	24.8	9	25	30	23	24.1 J	31.6 UR	26.8 UR	19 UR	14.4
Magnesium	MG/KG	25600	100%	21500	1	30	30	4820	6580	4850	4800	4130	4350
Manganese	MG/KG	1150	100%	1060	1	30	30	268	342	266	313	358	352
Mercury	MG/KG	0.09	47%	0.1	0	14	30	0.04 U	0.05 U	0.08 J	0.05 J	0.06 J	0.03 J
Nickel	MG/KG	71.1	100%	49	8	30	30	36.6	45.5	31.9	38.7	24.7	28.5
Potassium	MG/KG	2800	100%	2380	1	30	30	1420	1790	1950	1080	1660	975
Selenium	MG/KG	1.4	70%	2	0	21	30	0.75 J	0.53 J	0.65 J	0.72 J	0.98 J	0.69 J
Silver	MG/KG	0.35	7%	0.75	0	2	30	0.29 U	0.34 J	0.87 U	0.86 U	1.1 U	0.78 U
Sodium	MG/KG	186	63%	172	2	19	30	54.3 U	186 J	77.2 J	86.3 J	63.9 J	42.6 J
Thallium	MG/KG	0.91	20%	0.7	1	6	30	0.52 U	0.39 R	0.47 J	0.55 J	0.3 J	0.2 U
Vanadium	MG/KG	35.8	100%	150	0	30	30	16.6	18.6	24.2	16.1	26.7	25.6
Zinc	MG/KG	152	100%	110	3	30	30	69.4	67.1 J	84.3	47.1	91.2	48.5
<b>OTHER ANALYSES</b>													
Nitrate/Nitrite Nitrogen	MG/KG	27.9	94%		0	16	17	0.041	0.01 U	0.02	0.11	3.1	0.19
Percent Solids	%	96.7	100%		0	17	17	95.9	95	85.1	83.8	74.6	82.2
Fluoride	MG/KG	154								72	154	24	97

**NOTES:**

U = compound was not detected

J = reported value is an estimated concentration

R = data was rejected during the data validation process

UJ = compound was not detected, the associated reporting limit is approximate

(1) Only compounds that were detected were included in this list of parameters.

(2) NYSDEC Technical and Administrative Guidance Memorandum (TAGM) HWR-94-4046, Revised January 24, 1994.

**TABLE A-1a**  
**SURFACE SOIL ANALYSES RESULTS-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

FACILITY LOCATION MATRIX			SEAD-13		SEAD-13		SEAD-13		SEAD-13		SEAD-13		SEAD-13	
SAMPLE_ID			SB13-9-1		134000		134010		134001		134002		134003	
DEPTH_TOP			0		0		0		0		0		0	
DEPTH_BOTTOM			2		0.2		0.2		0.2		0.2		0.2	
SAMPLE_DATE			12/16/1993		7/30/2001		7/31/2001		7/30/2001		7/30/2001		7/30/2001	
PARAMETER <sup>(1)</sup>	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046 <sup>(2)</sup>	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	Value (Q)	1 Value (Q)	1 Value (Q)	1 Value (Q)	1 Value (Q)	1 Value (Q)	1 Value (Q)
<b>VOLATILE ORGANICS</b>														
Acetone	UG/KG	86	8%	200	0	1	13	12 U						
Methyl ethyl ketone	UG/KG	26	8%	300	0	1	13	12 U						
Toluene	UG/KG	6	8%	1500	0	1	13	12 U						
<b>SEMIVOLATILE ORGANICS</b>														
1,4-Dichlorobenzene	UG/KG	3300	3%	8500	0	1	30	430 U	100 UJ	84 U	110 UJ	76 UJ	77 UJ	
2,4,5-Trichlorophenol	UG/KG	9.5	3%	100	0	1	30	1000 U	250 U	210 U	280 U	190 U	190 U	
2,4,6-Trichlorophenol	UG/KG	10	7%		0	2	30	430 U	100 U	84 U	7.2 J	76 U	77 U	
2,4-Dinitrotoluene	UG/KG	1600	3%		0	1	30	430 U	100 UJ	84 U	110 UJ	76 UJ	77 UJ	
2,6-Dinitrotoluene	UG/KG	120	3%	1000	0	1	30	430 U	100 UJ	84 U	110 UJ	76 UJ	77 UJ	
2-Chloronaphthalene	UG/KG	5.4	3%		0	1	30	430 U	100 UJ	84 U	110 UJ	76 UJ	77 UJ	
2-Methylnaphthalene	UG/KG	42	13%	36400	0	4	30	430 U	100 U	84 U	110 U	4.8 J	77 U	
4-Chlorophenyl phenyl ether	UG/KG	5.9	3%		0	1	30	430 U	100 UJ	84 U	110 UJ	76 UJ	77 UJ	
4-Methylphenol	UG/KG	9200	20%	900	1	6	30	430 U	16 J	84 U	32 J	25 J	77 U	
Acenaphthene	UG/KG	650	10%	50000	0	3	30	430 U	100 U	84 U	110 U	76 U	77 U	
Acenaphthylene	UG/KG	16	7%	41000	0	2	30	430 U	100 U	84 U	110 U	76 U	77 U	
Anthracene	UG/KG	16	7%	50000	0	2	30	430 U	100 U	84 U	110 U	76 U	77 U	
Benzo(a)anthracene	UG/KG	100	27%	224	0	8	30	430 U	9.2 J	5.3 J	110 U	5.6 J	77 U	
Benzo(a)pyrene	UG/KG	110	30%	61	1	9	30	430 U	8.4 J	8.3 J	110 U	5.2 J	77 U	
Benzo(b)fluoranthene	UG/KG	89	30%	1100	0	9	30	430 U	11 J	8.5 J	110 U	12 J	77 U	
Benzo(ghi)perylene	UG/KG	86	27%	50000	0	8	30	430 U	5.8 J	7.2 J	110 U	6.4 J	77 U	
Benzo(k)fluoranthene	UG/KG	74	27%	1100	0	8	30	430 U	7.5 J	5.6 J	110 U	7.5 J	77 U	
Bis(2-Chloroethoxy)methane	UG/KG	5.6	3%		0	1	30	430 U	100 U	84 U	110 U	76 U	77 U	
Bis(2-Ethylhexyl)phthalate	UG/KG	1900	17%	50000	0	5	30	62 J	100 U	84 U	110 U	76 U	77 U	
Carbazole	UG/KG	180	17%		0	5	30	430 U	100 U	84 U	110 U	76 U	77 U	
Chrysene	UG/KG	190	40%	400	0	12	30	430 U	14 J	9.4 J	110 U	14 J	7.5 J	
Di-n-butylphthalate	UG/KG	140	7%	8100	0	2	30	430 U	100 U	84 U	110 U	76 U	77 U	
Di-n-octylphthalate	UG/KG	210	7%	50000	0	2	30	430 U	100 U	84 U	110 U	76 U	77 U	
Dibenz(a,h)anthracene	UG/KG	15	7%	14	1	2	30	430 U	100 U	84 U	110 U	76 U	77 U	
Dibenzofuran	UG/KG	340	20%	6200	0	6	30	430 U	100 UJ	84 U	110 UJ	4.4 J	77 UJ	
Diethyl phthalate	UG/KG	7	3%	7100	0	1	30	430 U	100 U	84 U	110 U	76 U	77 U	
Fluoranthene	UG/KG	800	47%	50000	0	14	30	430 U	29 J	12 J	8.8 J	19 J	9.6 J	
Fluorene	UG/KG	18	7%	50000	0	2	30	430 U	100 UJ	84 U	110 UJ	76 UJ	77 UJ	
Hexachlorobenzene	UG/KG	210	7%	410	0	2	30	430 U	100 U	84 U	110 U	76 U	77 U	
Indeno(1,2,3-cd)pyrene	UG/KG	53	20%	3200	0	6	30	430 U	5.4 J	6 J	110 U	5 J	77 U	
N-Nitrosodiphenylamine	UG/KG	99	3%		0	1	30	430 U	100 U	84 U	110 U	76 U	77 U	
Naphthalene	UG/KG	510	17%	13000	0	5	30	430 U	100 UJ	84 U	110 UJ	4.3 J	77 UJ	
Nitrobenzene	UG/KG	5.7	3%	200	0	1	30	430 U	100 UJ	84 U	110 UJ	76 UJ	77 UJ	
Phenanthrene	UG/KG	1400	40%	50000	0	12	30	430 U	16 J	7.8 J	110 UJ	14 J	9.1 J	
Phenol	UG/KG	14000	7%	30	1	2	30	430 U	100 U	84 U	110 U	76 U	77 U	
Pyrene	UG/KG	540	47%	50000	0	14	30	430 U	21 J	12 J	7.4 J	14 J	8.7 J	
<b>PESTICIDES/PCBS</b>														
4,4'-DDE	UG/KG	3.6	8%	2100	0	1	13	4.3 U						

**TABLE A-1a**  
**SURFACE SOIL ANALYSES RESULTS-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER <sup>(1)</sup>	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046 <sup>(2)</sup>	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-13 SB13-9 SOIL SB13-9-1	SEAD-13 SS13-1 SOIL 134000	SEAD-13 SS13-11 SOIL 134010	SEAD-13 SS13-2 SOIL 134001	SEAD-13 SS13-3 SOIL 134002	SEAD-13 SS13-4 SOIL 134003
								12/16/1993	7/30/2001	7/31/2001	7/30/2001	7/30/2001	7/30/2001
								1	1	1	1	1	1
							Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)
<b>METALS</b>													
Aluminum	MG/KG	21200	100%	19300	2	30	30	18300	14700	12700	12400	14300	13900
Antimony	MG/KG	5.1	37%	5.9	0	11	30	5.6 UJ	0.48 UJ	0.52 J	0.64 J	0.37 UJ	0.69 J
Arsenic	MG/KG	10	100%	8.2	2	30	30	7.8	4.7	3.1	2.7 J	3.8	4.9
Barium	MG/KG	157	100%	300	0	30	30	124	50.9 J	101	88.7	31.6 J	52.5
Beryllium	MG/KG	1.2	100%	1.1	1	30	30	1.1 J	0.71 J	0.71 J	0.81 J	0.66 J	0.69 J
Cadmium	MG/KG	1	57%	2.3	0	17	30	0.54 U	0.78 J	0.47 J	0.6 J	0.73 J	0.77 J
Calcium	MG/KG	83900	100%	121000	0	30	30	4800	30500	4890	6520	18700	18200
Chromium	MG/KG	30.5	100%	29.6	2	30	30	26.2	28	18.3	17.4	27.4	26.8
Cobalt	MG/KG	19.3	100%	30	0	30	30	10.3 J	14.2	8.2 J	8 J	13.3	14.8
Copper	MG/KG	84.2	100%	33	9	30	30	27.8	84.2	19.5	19	41.3	32.7
Iron	MG/KG	33700	100%	36500	0	30	30	31700	33200	21700	18300	31100	32800
Lead	MG/KG	75.6	83%	24.8	9	25	30	13.3	65.7	21	18.7	34.6	33.9
Magnesium	MG/KG	25600	100%	21500	1	30	30	5250	7880	3580	3800	7440	7420
Manganese	MG/KG	1150	100%	1060	1	30	30	473	427	341	413	340	595
Mercury	MG/KG	0.09	47%	0.1	0	14	30	0.04 J	0.09 J	0.06 U	0.09 U	0.05 U	0.06 U
Nickel	MG/KG	71.1	100%	49	8	30	30	35.4	49.2	24.9	22.5	50.7	51.5
Potassium	MG/KG	2800	100%	2380	1	30	30	1650	1820	1640	1670	1750	1500
Selenium	MG/KG	1.4	70%	2	0	21	30	1.4	0.62 U	0.82 J	0.69 U	0.47 U	0.48 U
Silver	MG/KG	0.35	7%	0.75	0	2	30	1.1 U	0.43 U	0.36 U	0.48 U	0.33 U	0.34 U
Sodium	MG/KG	186	63%	172	2	19	30	56 J	95.7 U	67.5 U	107 U	133 J	74.9 U
Thallium	MG/KG	0.91	20%	0.7	1	6	30	0.27 U	0.62 UJ	0.65 U	0.69 UJ	0.47 UJ	0.48 UJ
Vanadium	MG/KG	35.8	100%	150	0	30	30	34.8	20.3	23.3	25	19.9	20.4
Zinc	MG/KG	152	100%	110	3	30	30	56.9	72.1	71.8	69.9	78.3	85.2
<b>OTHER ANALYSES</b>													
Nitrate/Nitrite Nitrogen	MG/KG	27.9	94%		0	16	17	0.03	0.02 J	0.15	0.046 J	0.14 J	0.39 J
Percent Solids	%	96.7	100%		0	17	17	75.8	65.2	78.6	58.2	87.4	86.3
Fluoride	MG/KG	154						78					

**NOTES:**

U = compound was not detected

J = reported value is an estimated concentration

R = data was rejected during the data validation process

UJ = compound was not detected, the associated reporting limit is approximate

(1) Only compounds that were detected were included in this list of parameters.

(2) NYSDEC Technical and Administrative Guidance Memorandum (TAGM) HWR-94-4046, Revised January 24, 1994.



**TABLE A-1a**  
**SURFACE SOIL ANALYSES RESULTS-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER <sup>(1)</sup>	FACILITY LOCATION MATRIX SAMPLE_ID DEPTH_TOP DEPTH_BOTTOM SAMPLE_DATE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046 <sup>(2)</sup>	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-13 SS13-5 SOIL	SEAD-13 SS13-6 SOIL	SEAD-13 SS13-6 SOIL	SEAD-13 SS13-7 SOIL	SEAD-13 SS13-8 SOIL	SEAD-13 SS13-9 SOIL
									134004	134011	134005	134006	134007	134008
								7/30/2001	7/31/2001	7/31/2001	7/30/2001	7/31/2001	7/31/2001	7/30/2001
								0	0	0	0	0	0	0
								0.2	0.2	0.2	0.2	0.2	0.2	0.2
								1	1	1	1	1	1	1
								Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)
<b>VOLATILE ORGANICS</b>														
Acetone	UG/KG	86	8%	200	0	1	13							
Methyl ethyl ketone	UG/KG	26	8%	300	0	1	13							
Toluene	UG/KG	6	8%	1500	0	1	13							
<b>SEMIVOLATILE ORGANICS</b>														
1,4-Dichlorobenzene	UG/KG	3300	3%	8500	0	1	30	81 UJ	73 UJ	73 UJ	72 UJ	74 UJ	68 UJ	68 UJ
2,4,5-Trichlorophenol	UG/KG	9.5	3%	100	0	1	30	200 U	180 U	180 U	180 U	180 U	170 U	170 U
2,4,6-Trichlorophenol	UG/KG	10	7%		0	2	30	81 U	73 U	73 U	72 U	74 U	68 U	68 U
2,4-Dinitrotoluene	UG/KG	1600	3%		0	1	30	81 UJ	73 UJ	73 UJ	72 UJ	74 UJ	1600	1600
2,6-Dinitrotoluene	UG/KG	120	3%	1000	0	1	30	81 UJ	73 UJ	73 UJ	72 UJ	74 UJ	120	120
2-Chloronaphthalene	UG/KG	5.4	3%		0	1	30	81 UJ	73 UJ	73 UJ	72 UJ	74 UJ	68 UJ	68 UJ
2-Methylnaphthalene	UG/KG	42	13%	36400	0	4	30	81 U	15 J	73 U	72 U	74 U	42 J	42 J
4-Chlorophenyl phenyl ether	UG/KG	5.9	3%		0	1	30	81 UJ	73 UJ	73 UJ	72 UJ	74 UJ	68 U	68 U
4-Methylphenol	UG/KG	9200	20%	900	1	6	30	81 U	6.6 J	73 U	72 U	74 U	68 U	68 U
Acenaphthene	UG/KG	650	10%	50000	0	3	30	81 U	5.8 J	73 U	72 U	74 U	68 U	68 U
Acenaphthylene	UG/KG	16	7%	41000	0	2	30	81 U	16 J	73 U	72 U	74 U	68 U	68 U
Anthracene	UG/KG	16	7%	50000	0	2	30	81 U	16 J	73 U	72 U	74 U	68 U	68 U
Benzo(a)anthracene	UG/KG	100	27%	224	0	8	30	81 U	100	4.6 J	4.4 J	74 U	3.7 J	3.7 J
Benzo(a)pyrene	UG/KG	110	30%	61	1	9	30	81 U	110	4.8 J	3.8 J	3.8 J	4 J	4 J
Benzo(b)fluoranthene	UG/KG	89	30%	1100	0	9	30	81 U	89	10 J	7.9 J	7 J	13 J	13 J
Benzo(ghi)perylene	UG/KG	86	27%	50000	0	8	30	81 U	86	7.4 J	9.8 J	74 U	13 J	13 J
Benzo(k)fluoranthene	UG/KG	74	27%	1100	0	8	30	81 U	74	7.9 J	5 J	4.2 J	68 U	68 U
Bis(2-Chloroethoxy)methane	UG/KG	5.6	3%		0	1	30	81 U	73 U	73 U	72 U	74 U	68 U	68 U
Bis(2-Ethylhexyl)phthalate	UG/KG	1900	17%	50000	0	5	30	81 U	73 UJ	73 U	72 U	100	80 U	80 U
Carbazole	UG/KG	180	17%		0	5	30	81 U	4.2 J	4.6 J	72 U	74 U	5 J	5 J
Chrysene	UG/KG	190	40%	400	0	12	30	4.3 J	190	18 J	16 J	8.9 J	12 J	12 J
Di-n-butylphthalate	UG/KG	140	7%	8100	0	2	30	81 U	73 U	73 U	72 U	74 U	140	140
Di-n-octylphthalate	UG/KG	210	7%	50000	0	2	30	81 U	73 U	73 U	72 U	74 U	68 U	68 U
Dibenz(a,h)anthracene	UG/KG	15	7%	14	1	2	30	81 U	15 J	73 U	72 U	74 U	68 U	68 U
Dibenzofuran	UG/KG	340	20%	6200	0	6	30	81 UJ	5 J	73 UJ	4.7 J	74 UJ	14 J	14 J
Diethyl phthalate	UG/KG	7	3%	7100	0	1	30	81 U	73 U	73 U	72 UJ	74 U	68 U	68 U
Fluoranthene	UG/KG	800	47%	50000	0	14	30	5.2 J	110	21 J	15 J	6.6 J	9.9 J	9.9 J
Fluorene	UG/KG	18	7%	50000	0	2	30	81 UJ	18 J	73 UJ	72 UJ	74 UJ	68 U	68 U
Hexachlorobenzene	UG/KG	210	7%	410	0	2	30	81 U	73 U	73 U	72 U	39 J	210	210
Indeno(1,2,3-cd)pyrene	UG/KG	53	20%	3200	0	6	30	81 U	53 J	5.3 J	72 U	74 U	68 U	68 U
N-Nitrosodiphenylamine	UG/KG	99	3%		0	1	30	81 U	73 U	73 U	72 U	74 U	99	99
Naphthalene	UG/KG	510	17%	13000	0	5	30	81 UJ	9.8 J	73 UJ	72 UJ	74 UJ	12 J	12 J
Nitrobenzene	UG/KG	5.7	3%	200	0	1	30	81 UJ	73 UJ	73 UJ	72 UJ	74 UJ	68 U	68 U
Phenanthrene	UG/KG	1400	40%	50000	0	12	30	81 UJ	180 J	20 J	34 J	9.2 J	44 J	44 J
Phenol	UG/KG	14000	7%	30	1	2	30	81 U	73 U	73 U	72 U	74 U	68 U	68 U
Pyrene	UG/KG	540	47%	50000	0	14	30	5.2 J	310	15 J	15 J	7.3 J	13 J	13 J
<b>PESTICIDES/PCBS</b>														
4,4'-DDE	UG/KG	3.6	8%	2100	0	1	13							

**TABLE A-1a**  
**SURFACE SOIL ANALYSES RESULTS-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER <sup>(1)</sup>	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046 <sup>(2)</sup>	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-13 SS13-5 SOIL	SEAD-13 SS13-6 SOIL	SEAD-13 SS13-6 SOIL	SEAD-13 SS13-7 SOIL	SEAD-13 SS13-8 SOIL	SEAD-13 SS13-9 SOIL
								134004	134011	134005	134006	134007	134008
								0	0	0	0	0	0
								0.2	0.2	0.2	0.2	0.2	0.2
								7/30/2001	7/31/2001	7/31/2001	7/30/2001	7/31/2001	7/30/2001
								1	1	1	1	1	1
								Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)
<b>METALS</b>													
Aluminum	MG/KG	21200	100%	19300	2	30	30	14600	9570	13900	12800	13100	13900
Antimony	MG/KG	5.1	37%	5.9	0	11	30	0.41 UJ	0.37 UJ	0.36 UJ	0.63 J	0.59 J	0.93 J
Arsenic	MG/KG	10	100%	8.2	2	30	30	5.2	3.8	5.2	4.7	5.3	5.7
Barium	MG/KG	157	100%	300	0	30	30	110	54.6	45.9	50.7	62.3	55.8
Beryllium	MG/KG	1.2	100%	1.1	1	30	30	0.82 J	0.47 J	0.71 J	0.59 J	0.63 J	0.64 J
Cadmium	MG/KG	1	57%	2.3	0	17	30	0.74 J	0.72 J	0.87 J	0.74 J	0.94 J	1
Calcium	MG/KG	83900	100%	121000	0	30	30	4160	23600	32400	28600	25900	23600
Chromium	MG/KG	30.5	100%	29.6	2	30	30	20.6	17.1	23.9	24.7	25.1	30.5
Cobalt	MG/KG	19.3	100%	30	0	30	30	9.8 J	7.7 J	14.8	13.4	13.5	14.1
Copper	MG/KG	84.2	100%	33	9	30	30	27.2	21.2	41.6	47.5	51.1	57.4
Iron	MG/KG	33700	100%	36500	0	30	30	28100	21100	27800	30100	30000	33700
Lead	MG/KG	75.6	83%	24.8	9	25	30	16.1	75.6	35.1	35.2	32.6	64.9
Magnesium	MG/KG	25600	100%	21500	1	30	30	4310	8600	8230	6620	9050	7450
Manganese	MG/KG	1150	100%	1060	1	30	30	298	399	377	377	387	370
Mercury	MG/KG	0.09	47%	0.1	0	14	30	0.06 U	0.06 U	0.06 U	0.05 U	0.05 U	0.06 J
Nickel	MG/KG	71.1	100%	49	8	30	30	28.9	24.9	57.9	57.5	55.6	55.3
Potassium	MG/KG	2800	100%	2380	1	30	30	2260	1150	1740	1560	1650	1810
Selenium	MG/KG	1.4	70%	2	0	21	30	0.52 U	0.47 U	0.5 J	0.46 U	0.51 J	1.2
Silver	MG/KG	0.35	7%	0.75	0	2	30	0.36 U	0.33 U	0.32 U	0.32 U	0.32 U	0.35 J
Sodium	MG/KG	186	63%	172	2	19	30	80.3 U	72.2 U	71.7 U	71.1 U	70.3 U	52.5 U
Thallium	MG/KG	0.91	20%	0.7	1	6	30	0.52 UJ	0.47 UJ	0.46 UJ	0.46 UJ	0.45 UJ	0.5 U
Vanadium	MG/KG	35.8	100%	150	0	30	30	25.9	15.3	22.7	20.1	21.2	21.8
Zinc	MG/KG	152	100%	110	3	30	30	75	107	152	94.6	130	106
<b>OTHER ANALYSES</b>													
Nitrate/Nitrite Nitrogen	MG/KG	27.9	94%		0	16	17	1.6 J	15.1 J	3.4 J	0.45 J	0.07 J	0.93
Percent Solids	%	96.7	100%		0	17	17	81.2	89.5	90.2	90.9	88.7	96.7
Fluoride	MG/KG	154											

**NOTES:**

U = compound was not detected

J = reported value is an estimated concentration

R = data was rejected during the data validation process

UJ = compound was not detected, the associated reporting limit is approximate

(1) Only compounds that were detected were included in this list of parameters.

(2) NYSDEC Technical and Administrative Guidance Memorandum (TAGM) HWR-94-4046, Revised January 24, 1994.

**TABLE A-1b**  
**SUBSURFACE SOIL ANALYSES RESULTS-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER <sup>(1)</sup>	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046 <sup>(2)</sup>	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	
								MW13-1	MW13-1	MW13-2	MW13-2	MW13-3	MW13-3	
								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	
								SB13-1-3	SB13-1-4	SB13-2-3	SB13-2-5	SB13-3-3	SB13-3-5	
								6	8	4	8	4	8	
								8	10	6	10	6	10	
								12/8/1993	12/8/1993	11/9/1993	11/9/1993	12/8/1993	12/8/1993	
								Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)	
<b>VOLATILE ORGANICS</b>														
Carbon disulfide	UG/KG	2	5%	2700	0	1	20	11 UJ	2 J	11 U	12 UJ	11 U	11 U	11 U
Methylene chloride	UG/KG	4	15%	100	0	3	20	3 J	4 J	11 U	12 UJ	11 U	11 U	11 U
Toluene	UG/KG	2	5%	1500	0	1	20	11 UJ	11 UR	11 U	12 UJ	11 U	11 U	11 U
<b>SEMIVOLATILE ORGANICS</b>														
Benzo(b)fluoranthene	UG/KG	4.9	4%	1100	0	1	25	360 U	350 U	380 U	370 U	370 U	360 U	360 U
Benzo(ghi)perylene	UG/KG	20	4%	50000	0	1	25	360 U	350 U	380 U	370 U	370 U	360 U	360 U
Bis(2-Ethylhexyl)phthalate	UG/KG	24	12%	50000	0	3	25	360 U	350 U	380 U	370 U	370 U	360 U	360 U
Chrysene	UG/KG	6.6	16%	400	0	4	25	360 U	350 U	380 U	370 U	370 U	360 U	360 U
Di-n-butylphthalate	UG/KG	20	8%	8100	0	2	25	360 U	20 J	380 U	370 U	370 U	360 U	360 U
Di-n-octylphthalate	UG/KG	110	8%	50000	0	2	25	360 U	110 J	380 U	370 U	370 U	53 J	53 J
Fluoranthene	UG/KG	7.5	4%	50000	0	1	25	360 U	350 U	380 U	370 U	370 U	360 U	360 U
Phenanthrene	UG/KG	5.1	12%	50000	0	3	25	360 U	350 U	380 U	370 U	370 U	360 U	360 U
Pyrene	UG/KG	4.6	4%	50000	0	1	25	360 U	350 U	380 U	370 U	370 U	360 U	360 U
<b>METALS</b>														
Aluminum	MG/KG	20400	100%	19300	2	25	25	8250	11700	12700	5700	8720	13100	13100
Antimony	MG/KG	5.8	32%	5.9	0	8	25	3.7 UJ	2.8 UJ	12.2 UJ	8.7 UJ	4.1 J	4.1 UJ	4.1 UJ
Arsenic	MG/KG	10.2	100%	8.2	2	25	25	6.2	5.7	5.4	5.3	6.7	6.5	6.5
Barium	MG/KG	584	100%	300	1	25	25	88.1	33.9	94.9	71.7	97.8	137	137
Beryllium	MG/KG	1	100%	1.1	0	25	25	0.42 J	0.54 J	0.62 J	0.27 J	0.43 J	0.65 J	0.65 J
Cadmium	MG/KG	0.9	20%	2.3	0	5	25	0.36 U	0.27 U	0.76 U	0.54 U	0.32 U	0.39 U	0.39 U
Calcium	MG/KG	98100	100%	121000	0	25	25	87700	50300	61700	76100	86900	64400	64400
Chromium	MG/KG	35.8	100%	29.6	3	25	25	13.3	19.6	22.9	10.7	14.1	20.7	20.7
Cobalt	MG/KG	18.9	100%	30	0	25	25	7.2 J	11.1	12	7.4 J	8.8	12.8	12.8
Copper	MG/KG	44	100%	33	2	25	25	18.4	17.6	23.5	18.9	23.4	23.7	23.7
Iron	MG/KG	42500	100%	36500	4	25	25	17400	24700	27700	13600	18500	26400	26400
Lead	MG/KG	18.6	68%	24.8	0	17	25	9 UR	11.7 UR	9.3	7.7	11.9 UR	14.1 UR	14.1 UR
Magnesium	MG/KG	21700	100%	21500	1	25	25	20800	12600	13300	21200	21700	14300	14300
Manganese	MG/KG	708	100%	1060	0	25	25	517	404	445	411	390	446	446
Mercury	MG/KG	0.07	32%	0.1	0	8	25	0.07 J	0.02 U	0.02 U	0.03 U	0.03 U	0.02 U	0.02 U
Nickel	MG/KG	57.1	100%	49	4	25	25	24	33.1	40.8	20	27.1	34.4	34.4
Potassium	MG/KG	2790	100%	2380	3	25	25	1390	1270	1410	1040	1230	1980	1980
Selenium	MG/KG	0.66	80%	2	0	20	25	0.56 J	0.51 J	0.53 J	0.32 J	0.14 U	0.64 J	0.64 J
Silver	MG/KG	1	12%	0.75	1	3	25	0.71 U	0.54 U	1.5 UJ	1.1 UJ	0.65 U	0.79 U	0.79 U
Sodium	MG/KG	252	100%	172	9	25	25	155 J	134 J	131 J	145 J	152 J	163 J	163 J
Thallium	MG/KG	0.78	32%	0.7	4	8	25	0.43 J	0.64 J	0.27 U	0.25 U	0.71 J	0.75 J	0.75 J
Vanadium	MG/KG	30.7	100%	150	0	25	25	13.3	16.3	21.4	12.2	14.1	19.3	19.3
Zinc	MG/KG	108	100%	110	0	25	25	56.2	45.8	78.6	45	46.9	62.3	62.3
<b>OTHER ANALYSES</b>														
Nitrate/Nitrite Nitrogen	MG/KG	176	100%		0	5	5	0.02	0.02	129	176	5.6	4.8	4.8
Percent Solids	%	96.8	100%		0	5	5	92.4	93.4	86.9	88.8	90	91.8	91.8
Fluoride		193						55	99	138	135	170	142	142

**NOTES:**

U = compound was not detected

J = reported value is an estimated concentration

R = data was rejected during the data validation process

UJ = compound was not detected, the associated reporting limit is approximate

Blank cells indicate that the sample was not analyzed for that specific parameter.

(1) Only compounds that were detected were included in this list of parameters.

(2) NYSDEC Technical and Administrative Guidance Memorandum (TAGM) HWR-94-4046, Revised January 24, 1994.

**TABLE A-1b**  
**SUBSURFACE SOIL ANALYSES RESULTS-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER <sup>(1)</sup>	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046 <sup>(2)</sup>	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-13 MW13-4 SOIL SB13-4-2	SEAD-13 MW13-4 SOIL SB13-4-3	SEAD-13 MW13-5 SOIL SB13-5-3	SEAD-13 MW13-5 SOIL SB13-5-5	SEAD-13 MW13-6 SOIL SB13-6-3	SEAD-13 MW13-6 SOIL SB13-6-4
								12/15/1993	12/15/1993	11/8/1993	11/8/1993	12/15/1993	12/15/1993
							Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)
<b>VOLATILE ORGANICS</b>													
Carbon disulfide	UG/KG	2	5%	2700	0	1	20	11 U	11 U	11 U	11 U	11 U	11 U
Methylene chloride	UG/KG	4	15%	100	0	3	20	11 U	11 U	11 U	11 UR	11 U	11 U
Toluene	UG/KG	2	5%	1500	0	1	20	11 U	11 U	11 U	2 J	11 U	11 U
<b>SEMIVOLATILE ORGANICS</b>													
Benzo(b)fluoranthene	UG/KG	4.9	4%	1100	0	1	25	380 U	360 U	380 U	370 U	370 U	350 U
Benzo(ghi)perylene	UG/KG	20	4%	50000	0	1	25	20 J	360 U	380 U	370 U	370 U	350 U
Bis(2-Ethylhexyl)phthalate	UG/KG	24	12%	50000	0	3	25	24 J	16 J	380 U	370 U	370 U	24 J
Chrysene	UG/KG	6.6	16%	400	0	4	25	380 U	360 U	380 U	370 U	370 U	350 U
Di-n-butylphthalate	UG/KG	20	8%	8100	0	2	25	380 U	360 U	380 U	370 U	370 U	350 U
Di-n-octylphthalate	UG/KG	110	8%	50000	0	2	25	380 U	360 U	380 U	370 U	370 U	350 U
Fluoranthene	UG/KG	7.5	4%	50000	0	1	25	380 U	360 U	380 U	370 U	370 U	350 U
Phenanthrene	UG/KG	5.1	12%	50000	0	3	25	380 U	360 U	380 U	370 U	370 U	350 U
Pyrene	UG/KG	4.6	4%	50000	0	1	25	380 U	360 U	380 U	370 U	370 U	350 U
<b>METALS</b>													
Aluminum	MG/KG	20400	100%	19300	2	25	25	15500	20400	14000	8230	13500	10200
Antimony	MG/KG	5.8	32%	5.9	0	8	25	4.5 J	3.2 UJ	9 UJ	8.3 UJ	2.5 UJ	2.9 UJ
Arsenic	MG/KG	10.2	100%	8.2	2	25	25	6.8	9.6	6.3	4.7	2.7	2.3
Barium	MG/KG	584	100%	300	1	25	25	96.9	79.1	98.6	132	60.4	56.8
Beryllium	MG/KG	1	100%	1.1	0	25	25	0.78 J	1	0.63 J	0.4 J	0.71	0.58 J
Cadmium	MG/KG	0.9	20%	2.3	0	5	25	0.34 U	0.31 U	0.56 U	0.52 U	0.25 U	0.28 U
Calcium	MG/KG	98100	100%	121000	0	25	25	68000	10200	25700	88000	31800	45200
Chromium	MG/KG	35.8	100%	29.6	3	25	25	25.8	35.8	23.3	14.8	23.5	17.8
Cobalt	MG/KG	18.9	100%	30	0	25	25	12.4	12.1	8.8	9.9	15	11.3
Copper	MG/KG	44	100%	33	2	25	25	21.1	26.5	26.4	26.5	27.4	14.5
Iron	MG/KG	42500	100%	36500	4	25	25	30100	42500	24300	19600	26900	20700
Lead	MG/KG	18.6	68%	24.8	0	17	25	13.6	7.1	12.8	8.3	11.6	11.7
Magnesium	MG/KG	21700	100%	21500	1	25	25	10600	9660	8990	20700	6640	5220
Manganese	MG/KG	708	100%	1060	0	25	25	607	398	273	461	508	556
Mercury	MG/KG	0.07	32%	0.1	0	8	25	0.01 J	0.02 J	0.02 U	0.02 U	0.01 U	0.01 U
Nickel	MG/KG	57.1	100%	49	4	25	25	43.2	53	36.8	29	41.9	33
Potassium	MG/KG	2790	100%	2380	3	25	25	1570	1810	1630	1260	1120	1000
Selenium	MG/KG	0.66	80%	2	0	20	25	0.2 J	0.28 J	0.26 J	0.59 J	0.11 J	0.24 J
Silver	MG/KG	1	12%	0.75	1	3	25	0.69 U	0.63 U	1.1 UJ	1 UJ	0.49 U	0.56 U
Sodium	MG/KG	252	100%	172	9	25	25	183	87.8 J	87 J	187	116 J	141 J
Thallium	MG/KG	0.78	32%	0.7	4	8	25	0.2 U	0.18 U	0.27 U	0.19 U	0.14 U	0.23 U
Vanadium	MG/KG	30.7	100%	150	0	25	25	23.1	30.7	23.7	15.1	18.5	13.8
Zinc	MG/KG	108	100%	110	0	25	25	65.8	93	64.4	51.4	64.7	39.3
<b>OTHER ANALYSES</b>													
Nitrate/Nitrite Nitrogen	MG/KG	176	100%		0	5	5	0.2	0.09	0.07	0.06	0.9	0.09
Percent Solids	%	96.8	100%		0	5	5	87	91.6	87.1	88.1	90.5	93.4
Fluoride		193						91	2.2 U	124	193	50	62

NOTES:  
U = compound was not detected  
J = reported value is an estimated concentration  
R = data was rejected during the data validation process  
UJ = compound was not detected, the associated reporting limit is approximate  
Blank cells indicate that the sample was not analyzed for that specific parameter.  
(1) Only compounds that were detected were included in this list of parameters.  
(2) NYSDEC Technical and Administrative Guidance Memorandum (TAGM) HWR-94-4046, Revised January 24, 1994.

**TABLE A-1b**  
**SUBSURFACE SOIL ANALYSES RESULTS-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER <sup>(1)</sup>	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046 <sup>(2)</sup>	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-13 SB13-10	SEAD-13 SB13-10	SEAD-13 SB13-11	SEAD-13 SB13-11	SEAD-13 SB13-12	SEAD-13 SB13-13
								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
								12/17/1993	12/18/1993	8/16/2001	8/16/2001	8/15/2001	8/15/2001
								Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)
<b>VOLATILE ORGANICS</b>													
Carbon disulfide	UG/KG	2	5%	2700	0	1	20	11 U	10 UR				
Methylene chloride	UG/KG	4	15%	100	0	3	20	11 U	2 J				
Toluene	UG/KG	2	5%	1500	0	1	20	11 U	10 UR				
<b>SEMIVOLATILE ORGANICS</b>													
Benzo(b)fluoranthene	UG/KG	4.9	4%	1100	0	1	25	340 U	320 U	68 U	4.9 J	71 U	75 U
Benzo(ghi)perylene	UG/KG	20	4%	50000	0	1	25	340 U	320 U	68 U	68 U	71 U	75 U
Bis(2-Ethylhexyl)phthalate	UG/KG	24	12%	50000	0	3	25	340 U	320 U	68 U	68 U	71 U	75 U
Chrysene	UG/KG	6.6	16%	400	0	4	25	340 U	320 U	4.4 J	6.6 J	4.9 J	4.1 J
Di-n-butylphthalate	UG/KG	20	8%	8100	0	2	25	340 U	320 U	68 U	4.3 J	71 U	75 U
Di-n-octylphthalate	UG/KG	110	8%	50000	0	2	25	340 U	320 U	68 UJ	68 UJ	71 UJ	75 U
Fluoranthene	UG/KG	7.5	4%	50000	0	1	25	340 U	320 U	68 U	7.5 J	71 U	75 U
Phenanthrene	UG/KG	5.1	12%	50000	0	3	25	340 U	320 U	4.3 J	68 U	3.7 J	5.1 J
Pyrene	UG/KG	4.6	4%	50000	0	1	25	340 U	320 U	68 U	68 U	71 U	4.6 J
<b>METALS</b>													
Aluminum	MG/KG	20400	100%	19300	2	25	25	12100	17100	14500	16200	12300	7690
Antimony	MG/KG	5.8	32%	5.9	0	8	25	3.7 UJ	4.1 UJ	0.66 J	0.41 J	0.33 UJ	0.4 UJ
Arsenic	MG/KG	10.2	100%	8.2	2	25	25	6.6	4.5	4.2	5.9	5.5	4.2
Barium	MG/KG	584	100%	300	1	25	25	174	584	22.8 J	38.8	152	83.3
Beryllium	MG/KG	1	100%	1.1	0	25	25	0.72 J	0.88 J	0.66 J	0.77 J	0.63 J	0.4 J
Cadmium	MG/KG	0.9	20%	2.3	0	5	25	0.36 U	0.39 U	0.79 J	0.9 J	0.73 J	0.53 J
Calcium	MG/KG	98100	100%	121000	0	25	25	78900	32500	35300	35200	69000	80200
Chromium	MG/KG	35.8	100%	29.6	3	25	25	20.1	30.8	25.5	28.3	20.3	13.2
Cobalt	MG/KG	18.9	100%	30	0	25	25	17.8	18.6	14.8	16.5	13.4	8.1 J
Copper	MG/KG	44	100%	33	2	25	25	33.7	17.1	11.4	14.4	30	19.3
Iron	MG/KG	42500	100%	36500	4	25	25	25800	36800	33600 J	38400	26200 J	17600 J
Lead	MG/KG	18.6	68%	24.8	0	17	25	14.8	12.5	15.6	18.6 J	12	10.5
Magnesium	MG/KG	21700	100%	21500	1	25	25	16100	8700	15800	9320	17100	20000
Manganese	MG/KG	708	100%	1060	0	25	25	708	546	566	652	400	449
Mercury	MG/KG	0.07	32%	0.1	0	8	25	0.02 J	0.02 U	0.05 U	0.04 U	0.05 U	0.05 U
Nickel	MG/KG	57.1	100%	49	4	25	25	57.1	53	41.4	46.8	36.5	23.5
Potassium	MG/KG	2790	100%	2380	3	25	25	1880	1580	1830	2140	2500	1820
Selenium	MG/KG	0.66	80%	2	0	20	25	0.45 J	0.42 J	0.6 J	0.64 J	0.66 J	0.51 U
Silver	MG/KG	1	12%	0.75	1	3	25	0.72 U	1 J	0.33 U	0.3 U	0.34 J	0.36 U
Sodium	MG/KG	252	100%	172	9	25	25	166 J	125 J	194 J	248 J	224 J	223 J
Thallium	MG/KG	0.76	32%	0.7	4	8	25	0.13 U	0.19 U	0.48 R	0.43 R	0.43 R	0.51 R
Vanadium	MG/KG	30.7	100%	150	0	25	25	21.6	24.3	19.2	22.6	21.2	14.2
Zinc	MG/KG	108	100%	110	0	25	25	92.8	82.2	45.2	53.7 J	108	46.6
<b>OTHER ANALYSES</b>													
Nitrate/Nitrite Nitrogen	MG/KG	176	100%		0	5	5	0.17	0.05	9.6	5.5	0.11	83.4
Percent Solids	%	96.8	100%		0	5	5	91.7	95.8	96.5	96.8	91.5	87.8
Fluoride		193						28	27				

**NOTES:**

U = compound was not detected

J = reported value is an estimated concentration

R = data was rejected during the data validation process

UJ = compound was not detected, the associated reporting limit is approximate

Blank cells indicate that the sample was not analyzed for that specific parameter.

(1) Only compounds that were detected were included in this list of parameters.

(2) NYSDEC Technical and Administrative Guidance Memorandum (TAGM) HWR-94-4046, Revised January 24, 1994.

**TABLE A-1b**  
**SUBSURFACE SOIL ANALYSES RESULTS-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER <sup>(1)</sup>	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046 <sup>(2)</sup>	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-13 SB13-14 SOIL	SEAD-13 SB13-7 SOIL	SEAD-13 SB13-7-4 SOIL	SEAD-13 SB13-8 SOIL	SEAD-13 SB13-8-3 SOIL	SEAD-13 SB13-9 SOIL	SEAD-13 SB13-8 SOIL	SEAD-13 SB13-9-6 SOIL
								8/16/2001	12/7/1993	12/7/1993	12/7/1993	12/7/1993	12/16/1993	12/16/1993	
								Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)	
<b>VOLATILE ORGANICS</b>															
Carbon disulfide	UG/KG	2	5%	2700	0	1	20		12 U	11 U	11 U	11 U	11 U	11 U	11 U
Methylene chloride	UG/KG	4	15%	100	0	3	20		12 U	11 U	11 U	11 U	11 U	11 U	11 U
Toluene	UG/KG	2	5%	1500	0	1	20		12 U	11 U	11 U	11 U	11 U	11 U	11 U
<b>SEMIVOLATILE ORGANICS</b>															
Benzo(b)fluoranthene	UG/KG	4.9	4%	1100	0	1	25	70 U	400 U	370 U	400 U	360 U	360 U	360 U	350 U
Benzo(ghi)perylene	UG/KG	20	4%	50000	0	1	25	70 U	400 U	370 U	400 U	360 U	360 U	360 U	350 U
Bis(2-Ethylhexyl)phthalate	UG/KG	24	12%	50000	0	3	25	70 U	400 U	370 U	400 U	360 U	360 U	360 U	350 U
Chrysene	UG/KG	6.6	16%	400	0	4	25	70 U	400 U	370 U	400 U	360 U	360 U	360 U	350 U
Di-n-butylphthalate	UG/KG	20	8%	8100	0	2	25	70 U	400 U	370 U	400 U	360 U	360 U	360 U	350 U
Di-n-octylphthalate	UG/KG	110	8%	50000	0	2	25	70 U	400 U	370 U	400 U	360 U	360 U	360 U	350 U
Fluoranthene	UG/KG	7.5	4%	50000	0	1	25	70 U	400 U	370 U	400 U	360 U	360 U	360 U	350 U
Phenanthrene	UG/KG	5.1	12%	50000	0	3	25	70 U	400 U	370 U	400 U	360 U	360 U	360 U	350 U
Pyrene	UG/KG	4.6	4%	50000	0	1	25	70 U	400 U	370 U	400 U	360 U	360 U	360 U	350 U
<b>METALS</b>															
Aluminum	MG/KG	20400	100%	19300	2	25	25	15100	14200	8490	19600	9710	12000	14200	13800
Antimony	MG/KG	5.8	32%	5.9	0	8	25	0.37 UJ	4.7 J	3.6 UJ	3.1 UJ	5.7 J	5.8 J	4.6 J	
Arsenic	MG/KG	10.2	100%	8.2	2	25	25	4.9	6.2	5.9	10.2	6	8	5.5	
Barium	MG/KG	584	100%	300	1	25	25	102	79.1	62.7	96	119	18	173	
Beryllium	MG/KG	1	100%	1.1	0	25	25	0.72 J	0.7 J	0.42 J	0.97	0.48 J	0.69 J	0.73 J	
Cadmium	MG/KG	0.9	20%	2.3	0	5	25	0.74 J	0.44 U	0.35 U	0.3 U	0.42 U	0.47 U	0.42 U	
Calcium	MG/KG	98100	100%	121000	0	25	25	56000	33100	74800	4010	76600	98100	78900	
Chromium	MG/KG	35.8	100%	29.6	3	25	25	24.8	23	14.4	32.4	15.3	21.2	24.6	
Cobalt	MG/KG	18.9	100%	30	0	25	25	14.5	13.1	11.5	18.9	10.6	13.8	10.4	
Copper	MG/KG	44	100%	33	2	25	25	22.9	27.6	21.6	31.5	22.2	44	32.7	
Iron	MG/KG	42500	100%	36500	4	25	25	30600 J	29500	18400	41100	19600	25200	26800	
Lead	MG/KG	18.6	68%	24.8	0	17	25	13.8 J	17.9 UR	10.5 UR	10 UR	11.2 UR	14.4	10.4	
Magnesium	MG/KG	21700	100%	21500	1	25	25	13200	18400	17200	7940	19500	17700	19800	
Manganese	MG/KG	708	100%	1060	0	25	25	523	518	466	687	380	532	396	
Mercury	MG/KG	0.07	32%	0.1	0	8	25	0.05 U	0.03 J	0.02 U	0.02 J	0.02 U	0.02 J	0.02 J	
Nickel	MG/KG	57.1	100%	49	4	25	25	41.4	38.1	34	55.6	31.4	45.9	40.9	
Potassium	MG/KG	2790	100%	2380	3	25	25	2790	1840	1150	1420	1590	2150	2590	
Selenium	MG/KG	0.66	80%	2	0	20	25	0.47 U	0.14 U	0.26 J	0.29 J	0.14 U	0.52 J	0.47 J	
Silver	MG/KG	1	12%	0.75	1	3	25	0.4 J	0.89 U	0.7 U	0.6 U	0.84 U	0.93 U	0.84 U	
Sodium	MG/KG	252	100%	172	9	25	25	252 J	108 J	148 J	62 J	144 J	196 J	175 J	
Thallium	MG/KG	0.78	32%	0.7	4	8	25	0.47 R	0.78 J	0.62 J	0.5 J	0.75 J	0.24 U	0.24 U	
Vanadium	MG/KG	30.7	100%	150	0	25	25	22.7	22.9	13.3	27.1	15.8	25.8	24.5	
Zinc	MG/KG	108	100%	110	0	25	25	54.6 J	75.4	47.4	103	68.5	73.5	98	
<b>OTHER ANALYSES</b>															
Nitrate/Nitrite Nitrogen	MG/KG	176	100%		0	5	5	0.46	0.15	0.03	0.31	0.03	0.04	0.04	
Percent Solids	%	96.8	100%		0	5	5	94.5	82.5	90.5	82.8	90.7	89.3	92.1	
Fluoride		193							158	171	47	11.7	89	72	

**NOTES:**

U = compound was not detected

J = reported value is an estimated concentration

R = data was rejected during the data validation process

UJ = compound was not detected, the associated reporting limit is approximate

Blank cells indicate that the sample was not analyzed for that specific parameter.

(1) Only compounds that were detected were included in this list of parameters.

(2) NYSDEC Technical and Administrative Guidance Memorandum (TAGM) HWR-94-4046, Revised January 24, 1994.

**TABLE A-2  
GROUNDWATER ANALYSES RESULTS-SEAD-13  
Decision Document-Mini Risk Assessment  
Seneca Army Depot Activity**

FACILITY LOCATION MATRIX		SEAD-13		SEAD-13		SEAD-13		SEAD-13		SEAD-13		SEAD-13		SEAD-13	
SAMPLE_ID		MW13-1		MW13-1		MW13-1		MW13-11		MW13-12		MW13-13		MW13-13	
SAMPLE_DATE		2/3/1994		9/6/2001		4/4/2002		4/4/2002		4/5/2002		9/5/2001		9/5/2001	
PARAMETER (1)	UNIT	MAXIMUM	FREQUENCY OF DETECTION	CRITERIA VALUE (2)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	Value (Q)	1 Value (Q)	2 Value (Q)	2 Value (Q)	2 Value (Q)	1 Value (Q)	1 Value (Q)	2 Value (Q)
<b>SEMIVOLATILE ORGANICS</b>															
2-Methylnaphthalene	UG/L	0.069	5%	NA	0	1	22	11 U	1 U	1 U	1 U	1 U	1 U	1 U	1 U
Bis(2-Ethylhexyl)phthalate	UG/L	23	18%	5	2	4	22	11 U	1 U	1 U	1 U	2.6	1 U	1 U	1 U
Butylbenzylphthalate	UG/L	0.1	18%	NA	0	4	22	11 U	1 U	1 U	0.069 J	1 U	1 U	1 U	0.059 J
Diethyl phthalate	UG/L	0.16	41%	NA	0	9	22	11 U	1 U	0.084 J	0.16 J	0.057 J	1 U	1 U	0.054 J
Pyrene	UG/L	0.06	5%	NA	0	1	22	11 U	1 U	1 U	1 U	1 U	1 U	0.06 J	1 U
<b>METALS</b>															
Aluminum	UG/L	70900	82%	50 (a)	16	18	22	42400	170 J	18.9 J	50.4 J	138 J	39700 J	70900 J	27.2 J
Antimony	UG/L	52.7	32%	3	5	7	22	33.9 J	4.7 U	3.1 J	1.8 U	1.8 U	4.7 U	4.7 U	2.1 J
Arsenic	UG/L	15.1	32%	10 (b)	1	7	22	9.3 J	2.8 U	2.2 U	2.2 U	2.2 U	8.7 J	15.1	2.2 U
Barium	UG/L	459	100%	1000	0	22	22	337	60.9 J	59.8 J	18.5 J	25.7 J	268	459	30.8 J
Beryllium	UG/L	3.6	23%	4 (c)	0	5	22	2.2 J	0.2 U	0.1 U	0.1 U	0.1 U	2.1 J	3.6 J	0.1 U
Cadmium	UG/L	0.57	5%	5	0	1	22	2.1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Calcium	UG/L	1140000	100%	NA	0	22	22	181000	91600	93900	614000	182000	957000	1140000	900000
Chromium	UG/L	109	41%	50	3	9	22	69.4	1.2 U	1.4 U	1.4 U	1.4 U	62.5	109	1.4 U
Cobalt	UG/L	47.7	50%	NA	0	11	22	34.6 J	2.5 U	2.9 U	14.1 J	2.9 U	29.2 J	47.7 J	4.1 J
Copper	UG/L	35	50%	200	0	11	22	23.3 J	2.5 J	1.4 U	1.4 U	1.4 U	25.9	35	1.4 U
Cyanide	UG/L	124	27%	NA	0	6	22	5 U	10 U	10 U	20.2 J	10 U	72.8	124	74 J
Iron	UG/L	97900	86%	300	13	19	22	69400	460 J	17 U	441	891	57300 J	97900 J	59.2 J
Lead	UG/L	34.8	45%	15 (c)	3	10	22	34.8	2.1 J	0.8 R	0.8 R	0.8 R	27.1	34.8	0.8 R
Magnesium	UG/L	314000	100%	35000	19	22	22	50300	21700	22600	301000	72000	295000	304000	314000
Manganese	UG/L	3210	100%	300	13	22	22	1120	258	130	2810	618	1740	3210	397
Mercury	UG/L	0.05	5%	0.7	0	1	22	0.05 J	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Nickel	UG/L	134	77%	100	1	17	22	99.8	2 U	2.4 U	34.3 J	2.4 U	80.2	134	9.5 J
Potassium	UG/L	42000	100%	NA	0	22	22	10100	1680 J	1200 J	42000 J	14800 J	21600	28800	6380
Selenium	UG/L	17.8	41%	10	1	9	22	3.6 J	1.2 U	2 U	17.8 J	2 U	1.2 U	1.2 U	2 U
Silver	UG/L	1.6	5%	50	0	1	22	4.2 U	1.6 J	1.2 U	1.2 U	1.2 U	1.5 U	1.5 U	1.2 U
Sodium	UG/L	52700	100%	20000	8	22	22	9350	8620	7930	52700	17200	23600	24800	18100
Vanadium	UG/L	115	32%	NA	0	7	22	70.8	2.1 U	2 U	2 U	2 U	64.7	115	2 U
Zinc	UG/L	223	86%	5000 (a)	0	19	22	143	2.7 J	1.4 J	0.9 U	0.9 U	146	223	1.9 J
<b>OTHER ANALYSES</b>															
NITRATE	MG/L	731	100%	10	5	10	10			0.045	119	0.014			664
NITRITE	MG/L	2.1	50%	1	2	5	10			0.005 U	2.1	0.005 U			0.03
Nitrate/Nitrite Nitrogen	MG/L	731	100%	NA	0	21	22	0.01 U	0.56	0.045	121	0.014	604	582	664
Fluoride	MG/L	0.45	100%	1.5	0	6	6	0.45							
Turbidity	NTU	999	100%		0	21	21	18.2	127	1.74	8.0	8.7	999	999	13.7

**NOTES:**

U = compound was not detected

J = reported value is an estimated concentration

R = data was rejected during the data validation process

UJ = compound was not detected, the associated reporting limit is approximate

Blank cells indicate that the sample was not analyzed for that specific parameter.

(1) Only compounds that were detected were included in this list of parameters.

(2) NY State Class GA Groundwater Standard (TOGS 1.1.1, June 1998), except as noted below.

a) US EPA Secondary Drinking Water Regulation, non-enforceable (EPA 822-B-00-001, Summer 2000)

b) US EPA Maximum Contaminant Limit announced 10/31/01. Source <http://www.epa.gov/safewater/arsenic.html>

c) US EPA National Primary Drinking Water Standards, EPA 816-F-01-007 March 2001

**TABLE A-2**  
**GROUNDWATER ANALYSES RESULTS-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER <sup>(1)</sup>	FACILITY LOCATION MATRIX SAMPLE_ID SAMPLE_DATE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	CRITERIA VALUE <sup>(2)</sup>	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-13 MW13-13 WATER 132021 4/4/2002	SEAD-13 MW13-14 WATER 132022 4/4/2002	SEAD-13 MW13-2 WATER 132002 11/18/1993	SEAD-13 MW13-2 WATER 132002 9/6/2001	SEAD-13 MW13-2 WATER 132015 4/4/2002	SEAD-13 MW13-4 WATER 132002 2/4/1994	SEAD-13 MW13-4 WATER 132004 2/4/1994	SEAD-13 MW13-4 WATER 132004 9/6/2001
									2 Value (Q)	2 Value (Q)	1 Value (Q)	2 Value (Q)	Value (Q)	Value (Q)	1 Value (Q)	
<b>SEMIVOLATILE ORGANICS</b>																
2-Methylnaphthalene	UG/L	0.069	5%	NA	0	1	22	1 U	1 U	11 U	1.1 U	1 U	10 U	1 U	1 U	1 U
Bis(2-Ethylhexyl)phthalate	UG/L	23	18%	5	2	4	22	1 U	1 U	11 U	1.1 U	1 U	17	1 U	1 U	1 U
Butylbenzylphthalate	UG/L	0.1	18%	NA	0	4	22	1 U	1 U	11 U	0.1 J	1 U	10 U	1 U	1 U	1 U
Diethyl phthalate	UG/L	0.16	41%	NA	0	9	22	0.067 J	0.16 J	11 U	1.1 U	0.059 J	10 U	1 U	1 U	1 U
Pyrene	UG/L	0.06	5%	NA	0	1	22	1 U	1 U	11 U	1.1 U	1 U	10 U	1 U	1 U	1 U
<b>METALS</b>																
Aluminum	UG/L	70900	82%	50	(a)	16	18	22	97.2 J	105 J	89.6 J	3880 J	18.3 U	5540	177 J	4.7 U
Antimony	UG/L	52.7	32%	3		5	7	22	2.1 J	1.8 U	52.5 U	4.7 U	1.8 U	31.5 J	4.7 U	4.7 U
Arsenic	UG/L	15.1	32%	10	(b)	1	7	22	2.2 U	2.2 U	1.4 J	3.1 J	2.2 U	1.4 U	3.2 J	3.2 J
Barium	UG/L	459	100%	1000		0	22	22	31.2 J	25.2 J	28.7 J	51 J	20 J	71.2 J	164 J	164 J
Beryllium	UG/L	3.6	23%	4	(c)	0	5	22	0.1 U	0.1 U	0.3 U	0.26 J	0.1 U	0.4 U	0.2 U	0.2 U
Cadmium	UG/L	0.57	5%	5		0	1	22	0.5 U	0.5 U	3.3 U	0.5 U	0.5 U	2.1 U	0.57 J	0.57 J
Calcium	UG/L	1140000	100%	NA		0	22	22	945000	408000	592000	761000	594000	182000	163000	163000
Chromium	UG/L	109	41%	50		3	9	22	1.4 U	2.3 J	2.5 U	5.2 J	1.4 U	9.9 J	1.2 U	1.2 U
Cobalt	UG/L	47.7	50%	NA		0	11	22	4 J	5.5 J	4.9 U	11.6 J	2.9 U	6.7 J	7.9 J	7.9 J
Copper	UG/L	35	50%	200		0	11	22	1.4 U	1.4 U	3.7 U	3.7 J	3.1 J	3.3 J	3.3 J	3.3 J
Cyanide	UG/L	124	27%	NA		0	6	22	10 UJ	11 J	5.1 U	49.7	10 UJ	5 U	10 U	10 U
Iron	UG/L	97900	86%	300		13	19	22	179 J	220	562	4830 J	17.6 J	8010	1140 J	1140 J
Lead	UG/L	34.8	45%	15	(c)	3	10	22	0.8 R	0.8 R	0.6 U	14.3	0.8 U	3.1	4.2	4.2
Magnesium	UG/L	314000	100%	35000		19	22	22	314000	278000	188000	289000	231000	44900	35600	35600
Manganese	UG/L	3210	100%	300		13	22	22	391	1580	342	529	192	299	1570	1570
Mercury	UG/L	0.05	5%	0.7		0	1	22	0.1 U	0.1 U	0.07 UJ	0.1 U	0.1 U	0.04 U	0.1 U	0.1 U
Nickel	UG/L	134	77%	100		1	17	22	9.9 J	12.6 J	5 J	12.7 J	4.8 J	17.5 J	6.1 J	6.1 J
Potassium	UG/L	42000	100%	NA		0	22	22	6870	25700 J	8690	5350	3460 J	4460 J	2360 J	2360 J
Selenium	UG/L	17.8	41%	10		1	9	22	2 U	7.4 J	2.9 J	1.2 UJ	2 U	1.2 J	1.2 UJ	1.2 UJ
Silver	UG/L	1.6	5%	50		0	1	22	1.2 U	1.2 U	6.7 U	1.5 U	1.2 U	4.2 U	1.5 U	1.5 U
Sodium	UG/L	52700	100%	20000		8	22	22	18500	28700	17000	21000	15300	9340	29100	29100
Vanadium	UG/L	115	32%	NA		0	7	22	2 U	2 U	3.3 U	6.2 J	2 U	8.8 J	2.1 U	2.1 U
Zinc	UG/L	223	86%	5000	(a)	0	19	22	1.5 J	0.9 U	3.8 J	24.3	0.94 J	138	12.3 J	12.3 J
<b>OTHER ANALYSES</b>																
NITRATE	MG/L	731	100%	10		5	10	10	731	139			445			
NITRITE	MG/L	2.1	50%	1		2	5	10	0.034	1.1			0.048			
Nitrate/Nitrite Nitrogen	MG/L	731	100%	NA		0	21	22	731	140	460	603	445	0.03		0.13
Fluoride	MG/L	0.45	100%	1.5		0	6	6			0.1			0.3	0.23	
Turbidity	NTU	999	100%			0	21	21	13.7	10.0	4.2	500	1.25	8.1		15.2

**NOTES:**

U = compound was not detected

J = reported value is an estimated concentration

R = data was rejected during the data validation process

UJ = compound was not detected, the associated reporting limit is approximate

Blank cells indicate that the sample was not analyzed for that specific parameter.

(1) Only compounds that were detected were included in this list of parameters.

(2) NY State Class GA Groundwater Standard (TOGS 1.1.1, June 1998), except as noted below.

a) US EPA Secondary Drinking Water Regulation, non-enforceable (EPA 822-B-00-001, Summer 2000)

b) US EPA Maximum Contaminant Limit announced 10/31/01. Source <http://www.epa.gov/safewater/arsenic.html>

c) US EPA National Primary Drinking Water Standards, EPA 816-F-01-007 March 2001



**TABLE A-2  
GROUNDWATER ANALYSES RESULTS-SEAD-13  
Decision Document-Mini Risk Assessment  
Seneca Army Depot Activity**

PARAMETER <sup>(1)</sup>	UNIT	MAXIMUM	FREQUENCY OF DETECTION	CRITERIA VALUE <sup>(2)</sup>		NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	
									MW13-4 WATER 132017 4/5/2002	MW13-5 WATER 132005 2/5/1994	MW13-5 WATER 132005 9/6/2001	MW13-5 WATER 132018 4/5/2002	MW13-6 WATER 132006 2/4/1994	MW13-6 WATER 132006 9/6/2001	MW13-6 WATER 132019 4/5/2002	
									2	1	2	1	2	1	2	
									Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)	
<b>SEMIVOLATILE ORGANICS</b>																
2-Methylnaphthalene	UG/L	0.069	5%	NA		0	1	22	1 U	10 U	0.069 J	1 U	10 U	1.2 U	1 U	
Bis(2-Ethylhexyl)phthalate	UG/L	23	18%	5		2	4	22	1 U	23	1 U	1.3	10 U	1.2 U	1 U	
Butylbenzylphthalate	UG/L	0.1	18%	NA		0	4	22	1 U	10 U	0.073 J	1 U	10 U	1.2 U	1 U	
Diethyl phthalate	UG/L	0.16	41%	NA		0	9	22	0.14 J	10 U	1 U	0.085 J	10 U	1.2 U	1 U	
Pyrene	UG/L	0.06	5%	NA		0	1	22	1 U	10 U	1 U	1 U	10 U	1.2 U	1 U	
<b>METALS</b>																
Aluminum	UG/L	70900	82%	50	(a)	16	18	22	18.3 U	53.1 J	23.5 U	18.3 U	2810	7990 J	126 J	
Antimony	UG/L	52.7	32%	3		5	7	22	1.8 U	43 J	4.7 U	1.8 U	52.7 J	4.7 U	1.8 U	
Arsenic	UG/L	15.1	32%	10	(b)	1	7	22	2.2 U	1.4 U	3 J	2.2 U	1.4 U	2.8 U	2.2 U	
Barium	UG/L	459	100%	1000		0	22	22	64.3 J	33.5 J	86.2 J	53.4 J	34.3 J	81.8 J	38.8 J	
Beryllium	UG/L	3.6	23%	4	(c)	0	5	22	0.1 U	0.4 U	0.2 U	0.1 U	0.4 U	0.29 J	0.1 U	
Cadmium	UG/L	0.57	5%	5		0	1	22	0.5 U	2.1 U	0.5 U	0.5 U	2.1 U	0.5 U	0.5 U	
Calcium	UG/L	1140000	100%	NA		0	22	22	102000	105000	113000	111000	81500	75900	71500	
Chromium	UG/L	109	41%	50		3	9	22	2.2 J	2.6 U	1.2 U	1.4 U	6.1 J	10.4	1.4 U	
Cobalt	UG/L	47.7	50%	NA		0	11	22	2.9 U	4.4 U	2.5 U	2.9 U	4.4 U	4.6 J	2.9 U	
Copper	UG/L	35	50%	200		0	11	22	2.3 J	3.1 U	3.8 J	1.4 U	3.1 U	7.3 J	1.4 U	
Cyanide	UG/L	124	27%	NA		0	6	22	10 UJ	5 U	10 U	10 UJ	5 U	10 U	10 UJ	
Iron	UG/L	97900	86%	300		13	19	22	1370	75.8 J	18 U	17 U	4550	8350 J	88.9 J	
Lead	UG/L	34.8	45%	15	(c)	3	10	22	0.8 R	0.5 U	1.8 J	0.8 R	1.5 J	7.4	0.8 R	
Magnesium	UG/L	314000	100%	35000		19	22	22	18900	55300	55400	57200	51500	47800	46800	
Manganese	UG/L	3210	100%	300		13	22	22	1390	143	47.6	37.1	376	131	2.3 J	
Mercury	UG/L	0.05	5%	0.7		0	1	22	0.1 U	0.04 U	0.1 U	0.1 U	0.04 U	0.1 U	0.1 U	
Nickel	UG/L	134	77%	100		1	17	22	3.6 J	4.6 J	3.5 J	2.4 U	8.6 J	13 J	2.4 U	
Potassium	UG/L	42000	100%	NA		0	22	22	1190 J	5460	2860 J	2970 J	6780	4960 J	2560 J	
Selenium	UG/L	17.8	41%	10		1	9	22	2.4 J	0.7 U	1.2 UJ	2.5 J	2.3 J	1.2 UJ	3 J	
Silver	UG/L	1.6	5%	50		0	1	22	1.2 U	4.2 U	1.5 U	1.2 U	4.2 U	1.5 U	1.2 U	
Sodium	UG/L	52700	100%	20000		8	22	22	14000	14000	26500	23400	7880	14400	12700	
Vanadium	UG/L	115	32%	NA		0	7	22	2 U	3.7 U	2.1 U	2 U	5.9 J	12.7 J	2 U	
Zinc	UG/L	223	86%	5000	(a)	0	19	22	2.6 J	101	4.3 J	2.5 J	50.6	37.3	4.3 J	
<b>OTHER ANALYSES</b>																
NITRATE	MG/L	731	100%	10		5	10	10	0.059			0.17			0.086	
NITRITE	MG/L	2.1	50%	1		2	5	10	0.005 U			0.005 U			0.005 U	
Nitrate/Nitrite Nitrogen	MG/L	731	100%	NA		0	21	22	0.059	0.12	0.11	0.17	0.16	0.076	0.086	
Fluoride	MG/L	0.45	100%	1.5		0	6	6		0.22			0.28			
Turbidity	NTU	999	100%			0	21	21	3.9	195	8.6	8.0	12.3		10.4	

**NOTES:**

U = compound was not detected

J = reported value is an estimated concentration

R = data was rejected during the data validation process

UJ = compound was not detected, the associated reporting limit is approximate

Blank cells indicate that the sample was not analyzed for that specific parameter.

(1) Only compounds that were detected were included in this list of parameters.

(2) NY State Class GA Groundwater Standard (TOGS 1.1.1, June 1998), except as noted below.

a) US EPA Secondary Drinking Water Regulation, non-enforceable (EPA 822-B-00-001, Summer 2000)

b) US EPA Maximum Contaminant Limit announced 10/31/01. Source <http://www.epa.gov/safewater/arsenic.html>

c) US EPA National Primary Drinking Water Standards, EPA 816-F-01-007 March 2001

**TABLE A-3**  
**SURFACE WATER ANALYSES RESULTS-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER <sup>(1)</sup>	FACILITY LOCATION MATRIX SAMPLE_ID SAMPLE_DATE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYS AWQS CLASS C (AQUATIC) <sup>(2)</sup>	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-13 SW/SD13-1 WATER SW13-1 11/3/1993	SEAD-13 SW/SD13-2 WATER SW13-2 11/3/1993	SEAD-13 SW/SD13-3 WATER SW13-3 11/4/1993	SEAD-13 SW13-1 WATER 131010 7/31/2001	SEAD-13 SW13-2 WATER 131011 7/31/2001
									Value (Q)	Value (Q)	Value (Q)	2 Value (Q)	2 Value (Q)
<b>SEMIVOLATILE ORGANICS</b>													
4-Methylphenol	UG/L	23	33%	NA	0	3	9	10 U	10 U	10 U	17 J	1 U	
Isophorone	UG/L	0.057	11%	NA	0	1	9	10 U	10 U	10 U	1 U	1 U	
Phenol	UG/L	9.3	22%	5	1	2	9	10 U	10 U	10 U	0.82 J	1 U	
<b>METALS</b>													
Aluminum	UG/L	3830	88%	100	8	14	16	3830	2410	162 J	505	435	
Antimony	UG/L	3	11%	NA	0	1	9	52.8 U	52.8 U	52.6 U	1.8 U	1.8 U	
Arsenic	UG/L	6.7	56%	150	0	5	9	1.2 U	1.2 U	1.2 U	3.5 J	3.9 J	
Barium	UG/L	91.6	100%	NA	0	9	9	91.6 J	50.4 J	31.8 J	45.8 J	42.9 J	
Calcium	UG/L	75300	100%	NA	0	9	9	75300	61400	73200	46600	42300	
Chromium	UG/L	5.4	11%	139	0	1	9	5.4 J	2.5 U	2.5 U	2.1 U	2.1 U	
Cobalt	UG/L	1.6	11%	5	0	1	9	4.9 U	4.9 U	4.9 U	1.5 U	1.5 U	
Copper	UG/L	6.6	78%	17	0	7	9	6.6 J	3.7 U	3.7 U	2.4 J	2.1 J	
Iron	UG/L	5870	100%	300	9	9	9	5790 J	4310 J	458 J	2300	1740	
Lead	UG/L	7.5	56%	223	0	5	9	4.4	7.5	0.8 U	1.5 U	1.5 U	
Magnesium	UG/L	14200	100%	NA	0	9	9	14200	12800	13200	11800	11200	
Manganese	UG/L	1850	100%	NA	0	9	9	268	296	85.3	314	210	
Mercury	UG/L	0.11	11%	1.4	0	1	9	0.07 U	0.07 U	0.07 U	0.1 U	0.1 U	
Nickel	UG/L	7.1	56%	100	0	5	9	7.1 J	5.5 J	4.1 U	1.4 U	1.4 U	
Potassium	UG/L	7200	89%	NA	0	8	9	7200	4740 J	5240	2730 J	3010 J	
Sodium	UG/L	70000	100%	NA	0	9	9	62100	53400	70000	37600	33600	
Vanadium	UG/L	6.2	33%	14	0	3	9	6.2 J	3.3 U	3.3 U	5.6 U	5.6 U	
Zinc	UG/L	27.7	89%	159	0	8	9	27.7	15.9 J	3.1 U	14.8 J	3.3 J	
<b>OTHER ANALYSES</b>													
Nitrate/Nitrite Nitrogen	MG/L	0.11	67%	NA	0	6	9	0.1	0.02	0.04	0.01 U	0.01 U	
Fluoride	MG/KG	0.39	100%		0	3	3	0.37	0.39	0.27			
Turbidity	NTU	5.7	100%		0	6	6						

NOTES:

U = compound was not detected

J = reported value is an estimated concentration

R = data was rejected during the data validation process

UJ = compound was not detected, the associated reporting limit is approximate

Blank cells indicate that the sample was not analyzed for that specific parameter.

(1) Only compounds that were detected were included in this list of parameters.

**TABLE A-3**  
**SURFACE WATER ANALYSES RESULTS-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER <sup>(1)</sup>	FACILITY LOCATION MATRIX SAMPLE_ID SAMPLE_DATE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYS AWQS CLASS C (AQUATIC) <sup>(2)</sup>	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-13 SW13-3 WATER 131012 7/31/2001	SEAD-13 SW13-4 WATER 131001 1/4/2000	SEAD-13 SW13-4 WATER 131013 7/31/2001	SEAD-13 SW13-5 WATER 131002 1/4/2000	SEAD-13 SW13-5 WATER 131016 7/31/2001	SEAD-13 SW13-5 WATER 131014 7/31/2001
									2 Value (Q)	1 Value (Q)	1 Value (Q)	1 Value (Q)	1 Value (Q)	1 Value (Q)
<b>SEMIVOLATILE ORGANICS</b>														
4-Methylphenol	UG/L	23	33%	NA	0	3	9	23 J		0.054 J		1.1 U		1 U
Isophorone	UG/L	0.057	11%	NA	0	1	9	1 U		1 U		1.1 U		0.057 J
Phenol	UG/L	9.3	22%	5	1	2	9	9.3 J		1 U		1.1 U		1 U
<b>METALS</b>														
Aluminum	UG/L	3830	88%	100	8	14	16	1560	34.4 U	19.8 J	36.7 J	933		1040
Antimony	UG/L	3	11%	NA	0	1	9	1.8 U		1.8 U		3 J		1.8 UJ
Arsenic	UG/L	6.7	56%	150	0	5	9	3.6 J		2.5 U		4.7 J		6.7 J
Barium	UG/L	91.6	100%	NA	0	9	9	70.2 J		64.4 J		44.2 J		46.7 J
Calcium	UG/L	75300	100%	NA	0	9	9	55900		61600		45700		47600
Chromium	UG/L	5.4	11%	139	0	1	9	2.1 U		2.1 U		2.1 U		2.1 U
Cobalt	UG/L	1.6	11%	5	0	1	9	1.6 J		1.5 U		1.5 U		1.5 U
Copper	UG/L	6.6	78%	17	0	7	9	6.3 J		2.4 J		2 J		3.7 J
Iron	UG/L	5870	100%	300	9	9	9	5870		4110		2360		2520
Lead	UG/L	7.5	56%	223	0	5	9	3.1		1.5 U		2.6 J		2.3 J
Magnesium	UG/L	14200	100%	NA	0	9	9	13800		10200		10900		11600
Manganese	UG/L	1850	100%	NA	0	9	9	896		1850		291		312
Mercury	UG/L	0.11	11%	1.4	0	1	9	0.1 U		0.1 U		0.1 U		0.11 J
Nickel	UG/L	7.1	56%	100	0	5	9	1.7 J		1.4 U		2.2 J		2.8 J
Potassium	UG/L	7200	89%	NA	0	8	9	3740 J		173 U		3490 J		3670 J
Sodium	UG/L	70000	100%	NA	0	9	9	53600		24200		31200		32700
Vanadium	UG/L	6.2	33%	14	0	3	9	5.6 U		5.6 U		1.5 J		1.7 J
Zinc	UG/L	27.7	89%	159	0	8	9	25.3		9.5 J		14.7 J		15.3 J
<b>OTHER ANALYSES</b>														
Nitrate/Nitrite Nitrogen	MG/L	0.11	67%	NA	0	6	9	0.021		0.03		0.11 J		0.01 UJ
Fluoride	MG/KG	0.39	100%		0	3	3							
Turbidity	NTU	5.7	100%		0	6	6		1.7		4.5			

NOTES:

U = compound was not detected

J = reported value is an estimated concentration

R = data was rejected during the data validation process

UJ = compound was not detected, the associated reporting limit is approximate

Blank cells indicate that the sample was not analyzed for that specific parameter.

(1) Only compounds that were detected were included in this list of parameters.

**TABLE A-3**  
**SURFACE WATER ANALYSES RESULTS-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER <sup>(1)</sup>	FACILITY LOCATION MATRIX SAMPLE_ID SAMPLE_DATE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYS AWQS CLASS C (AQUATIC) <sup>(2)</sup>	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-13 SW13-6 WATER 131000 1/4/2000	SEAD-13 SW13-7 WATER 131004 1/4/2000	SEAD-13 SW13-8 WATER 131005 1/4/2000	SEAD-13 SW13-8 WATER 131006 1/4/2000	SEAD-13 SW13-9 WATER 131003 1/4/2000
									1 Value (Q)	1 Value (Q)	1 Value (Q)	1 Value (Q)	1 Value (Q)
<b>SEMIVOLATILE ORGANICS</b>													
4-Methylphenol	UG/L	23	33%	NA	0	3	9						
Isophorone	UG/L	0.057	11%	NA	0	1	9						
Phenol	UG/L	9.3	22%	5	1	2	9						
<b>METALS</b>													
Aluminum	UG/L	3830	88%	100	8	14	16	35.7 J	86.2 J	87.8 J	74 J	34.4 U	
Antimony	UG/L	3	11%	NA	0	1	9						
Arsenic	UG/L	6.7	56%	150	0	5	9						
Barium	UG/L	91.6	100%	NA	0	9	9						
Calcium	UG/L	75300	100%	NA	0	9	9						
Chromium	UG/L	5.4	11%	139	0	1	9						
Cobalt	UG/L	1.6	11%	5	0	1	9						
Copper	UG/L	6.6	78%	17	0	7	9						
Iron	UG/L	5870	100%	300	9	9	9						
Lead	UG/L	7.5	56%	223	0	5	9						
Magnesium	UG/L	14200	100%	NA	0	9	9						
Manganese	UG/L	1850	100%	NA	0	9	9						
Mercury	UG/L	0.11	11%	1.4	0	1	9						
Nickel	UG/L	7.1	56%	100	0	5	9						
Potassium	UG/L	7200	89%	NA	0	8	9						
Sodium	UG/L	70000	100%	NA	0	9	9						
Vanadium	UG/L	6.2	33%	14	0	3	9						
Zinc	UG/L	27.7	89%	159	0	8	9						
<b>OTHER ANALYSES</b>													
Nitrate/Nitrite Nitrogen	MG/L	0.11	67%	NA	0	6	9						
Fluoride	MG/KG	0.39	100%		0	3	3						
Turbidity	NTU	5.7	100%		0	6	6	3	5.7	4.4			3.1

NOTES:

U = compound was not detected

J = reported value is an estimated concentration

R = data was rejected during the data validation process

UJ = compound was not detected, the associated reporting limit is approximate

Blank cells indicate that the sample was not analyzed for that specific parameter.

(1) Only compounds that were detected were included in this list of parameters.

TABLE A-4  
 SEDIMENT ANALYSES RESULTS-SEAD-13  
 Decision Document-Mini Risk Assessment  
 Seneca Army Depot Activity

FACILITY LOCATION MATRIX SAMPLE_ID SAMPLE_DATE	SEAD-13 SD13-1 SEDIMENT 133000 7/31/2001	SEAD-13 SD13-2 SEDIMENT 133001 7/31/2001	SEAD-13 SD13-3 SEDIMENT 133002 7/31/2001	SEAD-13 SD13-4 SEDIMENT 133003 7/31/2001	SEAD-13 SD13-5 SEDIMENT 133004 7/31/2001	SEAD-13 SD13-6 SEDIMENT 133005 7/31/2001	SEAD-13 SW/SD13-1 SEDIMENT SD13-1 11/3/1993	SEAD-13 SW/SD13-2 SEDIMENT SD13-2 11/3/1993	SEAD-13 SW/SD13-3 SEDIMENT SD13-3 11/3/1993	SEAD-13 SW/SD13-4 SEDIMENT SD13-4 11/3/1993
PARAMETER <sup>(1)</sup> UNIT MAXIMUM FREQUENCY OF DETECTION NYS Benthic Aquatic Life Chronic Toxicity NYS Lowest Effect Level <sup>(2)</sup> NUMBER ABOVE CRITERIA NUMBER OF DETECTS NUMBER OF ANALYSES Value (Q) Value (Q) Value (Q) Value (Q) Value (Q) Value (Q) Value (Q) Value (Q) Value (Q) Value (Q)										
VOLATILE ORGANICS										
Acetone UG/KG 380 100% NA							380 J	150 J	110 J	110 J
Methyl ethyl ketone UG/KG 140 25% NA							140 J	43 UJ	28 UJ	28 UJ
SEMIVOLATILE ORGANICS										
2-Methylnaphthalene UG/KG 10 10% 1330										
4-Methylphenol UG/KG 58 50% 19.6										
Acenaphthylene UG/KG 8.8 10% NA										
Anthracene UG/KG 8.3 20% 4184										
Benzo(a)anthracene UG/KG 90 20% 469										
Benzo(a)pyrene UG/KG 88 20% NA										
Benzo(b)fluoranthene UG/KG 86 20% NA										
Benzo(ghi)perylene UG/KG 57 20% NA										
Benzo(k)fluoranthene UG/KG 55 20% NA										
Chrysene UG/KG 190 20% NA										
Di-n-octylphthalate UG/KG 9.9 10% NA										
Dibenz(a,h)anthracene UG/KG 16 20% NA										
Dibenzofuran UG/KG 4.3 10% NA										
Fluoranthene UG/KG 120 40% 39887										
Fluorene UG/KG 6.4 10% 313										
Indeno(1,2,3-cd)pyrene UG/KG 44 20% NA										
Naphthalene UG/KG 6.8 10% 1173										
Phenanthrene UG/KG 160 30% 4693										
Pyrene UG/KG 270 40% 37580										
NITROAROMATICS										
Tetryl UG/KG 200 25% NA										
METALS										
Aluminum MG/KG 18400 100% NA										
Antimony MG/KG 0.65 10% NA										
Arsenic MG/KG 4.8 60% NA										
Barium MG/KG 164 100% NA										
Beryllium MG/KG 1 100% NA										
Cadmium MG/KG 0.96 60% NA										
Calcium MG/KG 42200 100% NA										
Chromium MG/KG 27.7 100% NA										
Cobalt MG/KG 13.5 100% NA										
Copper MG/KG 20.7 100% NA										
Iron MG/KG 29400 100% NA										
Lead MG/KG 33.3 100% NA										
Magnesium MG/KG 7110 100% NA										
Manganese MG/KG 778 100% NA										
Mercury MG/KG 0.09 40% NA										
Nickel MG/KG 35.4 100% NA										
Potassium MG/KG 2830 100% NA										
Selenium MG/KG 0.49 30% NA										
Silver MG/KG 3.2 10% NA										
Sodium MG/KG 326 40% NA										
Vanadium MG/KG 33.6 100% NA										
Zinc MG/KG 114 60% NA										
OTHER ANALYSES										
Nitrate/Nitrite Nitrogen MG/KG 6.4 70% NA										
Percent Solids % 90.3 100% NA										
Fluoride MG/KG 270 100% NA										

NOTES:

U = compound was not detected

J = reported value is an estimated concentration

R = data was rejected during the data validation process

UJ = compound was not detected, the associated reporting limit is approximate

Blank cells indicate that the sample was not analyzed for that specific parameter.

(1) Only compounds that were detected were included in this list of parameters.

(2) Note that for the COPCs, there are no values for NYSDEC Sediment Criteria for Human Health and Sediment Criteria for Wildlife.

**TABLE A-5**  
**INORGANICS ANALYSIS OF SOIL - SEAD-13**  
 Decision Document - Mini Risk Assessment  
 Seneca Army Depot Activity

	Average of Background Soils <sup>1</sup> (mg/kg)	2 x Average of Background Soils (mg/kg)	Average of SEAD-13 Soils <sup>2</sup> (mg/kg)	Is Average of Site data > than 2 x Average of Background data? <sup>3</sup>
Aluminum	13340.53	26681.05	13266	No
Antimony	3.56	7.12	2.08	No
Arsenic	5.08	10.15	5.57	No
Barium	78.43	156.86	99.3	No
Beryllium	0.67	1.33	0.68	No
Cadmium	0.52	1.04	0.41	No
Calcium	45449.65	90899.30	38525	No
Chromium	20.32	40.64	22.2	No
Cobalt	11.39	22.79	11.7	No
Copper	20.99	41.97	27.9	No
Iron	24704.74	49409.47	26571	No
Lead	16.47	32.95	19.9	No
Magnesium	10290.18	20580.35	10681	No
Manganese	576.14	1152.28	456	No
Mercury	0.04	0.09	0.027	No
Nickel	30.39	60.79	38.4	No
Potassium	1487.25	2974.49	1652	No
Selenium	0.63	1.26	0.46	No
Silver	0.46	0.91	0.35	No
Sodium	99.42	198.85	116	No
Thallium	0.43	0.86	0.29	No
Vanadium	21.41	42.82	21.7	No
Zinc	67.80	135.60	72.6	No

Notes:

1. Seneca site soil background data is presented in Table B-3.1
2. The average value is calculated for all soil from the data presented in Tables A-1a and A-1b. In order to calculate the average, duplicates are averaged, rejected data are not included, and half the detection limit is used for the samples with non-detected values.
3. A "Yes" value indicates that site metal levels are higher than background levels and metal will be retained for risk assessment.  
 A "No" value indicates that levels are considered to be similar to background levels and metal will not be retained for risk assessment.

**TABLE A-6**  
**INORGANICS ANALYSIS OF GROUNDWATER - SEAD-13**  
 Decision Document - Mini Risk Assessment  
 Seneca Army Depot Activity

	Average of Background Groundwater <sup>1</sup> (ug/L)	2 x Average of Background Groundwater (ug/L)	Average of SEAD-13 Groundwater <sup>2</sup> (ug/L)	Is Average of Site data > than 2 x Average of Background data? <sup>4</sup>
Aluminum	2923	5846	5947	Yes
Antimony	33.2	66.4	10.6	No
Arsenic	5.63	11.3	2.3	No
Barium	81.2	162	82.4	No
Beryllium	0.90	1.79	0.4	No
Cadmium <sup>3</sup>	0.46	0.92	0.5	No
Calcium <sup>5</sup>	115619	231239	324670	Yes
Chromium	8.67	17.3	10.0	No
Cobalt	6.84	13.7	7.3	No
Copper	5.39	10.8	4.6	No
Cyanide <sup>3</sup>	2.68	5.4	14.1	Yes
Iron	4476	8953	8908	No
Lead	6.59	13.2	7.7	No
Magnesium <sup>5</sup>	28568	57135	124025	Yes
Manganese	231	462.8	722	Yes
Mercury	0.05	0.10	0.04	No
Nickel	10.6	21.1	17.4	No
Potassium <sup>5</sup>	4066	8131	8920	Yes
Selenium	1.49	2.99	2.6	No
Silver	0.83	1.66	1.1	No
Sodium	15021	30041	18581	No
Vanadium	8.23	16.5	11.3	No
Zinc	25.4	50.7	35.8	No

Notes:

1. Seneca site groundwater background data is presented in Table B-3.2
2. The average value is calculated for all soil from the data presented in Tables A-1a and A-1b. In order to calculate the average, duplicates are averaged, rejected data is not included, and half the detection limit is used for non-detected values.
3. The background average concentration for this compound was calculated using the data presented in Table B-3.2, even though all samples were non-detect.
4. A "Yes" value indicates that site metal levels are higher than background levels and metal will be retained for risk assessment. A "No" value indicates that levels are considered to be similar to background levels and metal will not be retained for risk
5. Although site concentrations exceeded background, these compounds are considered nutrients and are only toxic at very high doses (i.e., concentrations that are much higher than those associated with contact at SEAD-13). As a result, these compounds were not considered COCs.

**TABLE A-7**  
**EXPOSURE POINT CONCENTRATIONS FOR CHEMICALS OF POTENTIAL CONCERN - SEAD-13**  
 Decision Document- Mini Risk Assessment  
 Seneca Army Depot Activity

COMPOUNDS	Total Soil mg/kg	Surface Soil mg/kg	Groundwater mg/L	Surface Water mg/L	Sediment mg/kg
<b>Volatile Organics</b>					
Acetone	8.60E-02	8.60E-02			3.80E-01
Carbon Disulfide	2.00E-03				
Methylene Chloride	4.00E-03				
Methyl ethyl ketone	2.60E-02	2.60E-02			1.40E-01
Toluene	6.00E-03	6.00E-03			
<b>Semivolatile Organics</b>					
2,4,6-Trichlorophenol	1.00E-02	1.00E-02			
2,4-Dinitrotoluene	1.60E+00	1.60E+00			
2-Methylnaphthalene	4.20E-02	4.20E-02			1.00E-02
4-Methylphenol	9.20E+00	9.20E+00		2.30E-02	5.80E-02
Acenaphthene	6.50E-01	6.50E-01			
Acenaphthylene	1.60E-02	1.60E-02			8.80E-03
Anthracene	1.60E-02	1.60E-02			8.30E-03
Benzo(a)anthracene	1.00E-01	1.00E-01			9.00E-02
Benzo(a)pyrene	1.10E-01	1.10E-01			8.80E-02
Benzo(b)fluoranthene	8.90E-02	8.90E-02			8.60E-02
Benzo(ghi)perylene	8.60E-02	8.60E-02			5.70E-02
Benzo(k)fluoranthene	7.40E-02	7.40E-02			5.50E-02
bis(2-Ethylhexyl)phthalate	1.90E+00	1.90E+00	2.30E-02		
Butylbenzylphthalate			1.00E-04		
Carbazole	1.80E-01	1.80E-01			
Chrysene	1.90E-01	1.90E-01			1.90E-01
Di-n-butylphthalate	1.40E-01	1.40E-01			
Di-n-octylphthalate	2.10E-01	2.10E-01			9.90E-03
Dibenz(a,h)anthracene	1.50E-02	1.50E-02			1.60E-02
Dibenzofuran	3.40E-01	3.40E-01			4.30E-03
Diethyl phthalate			1.60E-04		
Fluoranthene	8.00E-01	8.00E-01			1.20E-01
Fluorene	1.80E-02	1.80E-02			6.40E-03
Hexachlorobenzene	2.10E-01	2.10E-01			
Indeno(1,2,3-cd)pyrene	5.30E-02	5.30E-02			4.40E-02
Isophorone				5.70E-05	
Naphthalene	5.10E-01	5.10E-01			6.80E-03
Phenanthrene	1.40E+00	1.40E+00			1.60E-01
Phenol	1.40E+01	1.40E+01		9.30E-03	
Pyrene	5.40E-01	5.40E-01			2.70E-01
<b>Nitroaromatics</b>					
Tetryl					2.00E-01
<b>Pesticides/PCB</b>					
4,4'-DDE	3.60E-03	3.60E-03			
<b>Metals</b>					
Aluminum			7.09E+01	3.83E+00	1.84E+04
Antimony				3.00E-03	6.50E-01
Arsenic				6.70E-03	4.80E+00
Barium				9.16E-02	1.64E+02
Beryllium					1.00E+00
Cadmium					9.60E-01
Chromium				5.40E-03	2.77E+01
Cobalt				1.60E-03	1.35E+01
Copper				6.60E-03	2.07E+01
Cyanide			1.24E-01		
Iron				5.87E+00	2.94E+04
Lead				7.50E-03	3.33E+01
Manganese			3.21E+00	1.85E+00	7.78E+02
Mercury				1.10E-04	9.00E-02
Nickel				7.10E-03	3.54E+01
Selenium					4.90E-01
Silver					3.20E+00
Vanadium				6.20E-03	3.36E+01
Zinc				2.77E-02	1.14E+02
<b>Other Analyses</b>					
NITRATE			7.31E+02		
NITRITE			2.10E+00		
Nitrate/Nitrite Nitrogen	1.76E+02	2.79E+01	7.31E+02	1.10E-01	6.40E+00
Fluoride	1.93E+02	1.54E+02	4.50E-01	3.90E-01	2.70E+02

NOTES:

1. All EPCs are the maximum value detected for that compound in that media.
2. For groundwater, EPCs for nitrate and nitrite were used to characterize risk. For all other mediums, nitrate/nitrite-nitrogen concentrations were used to characterize risk.



**TABLE A-8**  
**AMBIENT AIR EXPOSURE POINT CONCENTRATIONS - SEAD-13**  
**Decision Document - Mini Risk Assessment**  
**Seneca Army Depot Activity**

Equation for Air EPC from Surface Soil (mg/m <sup>3</sup> ) = CS <sub>surf</sub> x PM10 x CF	Equation for Air EPC from Total Soils (mg/m <sup>3</sup> ) = C <sub>Stot</sub> x PM10 x CF
<u>Variables:</u> CS <sub>surf</sub> = Chemical Concentration in Surface Soil, from EPC data (mg/kg) PM10 = Average Measured PM10 Concentration = 17 ug/m <sup>3</sup> CF = Conversion Factor = 1E-9 kg/ug	<u>Variables:</u> C <sub>Stot</sub> = Chemical Concentration in Total Soils, from EPC data (mg/kg) PM10 = PM10 Concentration Calculated for Construction Worker= 139 ug/m <sup>3</sup> CF = Conversion Factor = 1E-9 kg/ug

Analyte	EPC Data for Surface Soil	EPC Data for Total Soils	Calculated Air EPC Surface Soil	Calculated Air EPC Total Soils
	(mg/kg)	(mg/kg)	(mg/m <sup>3</sup> )	(mg/m <sup>3</sup> )
<b>Volatile Organics</b>			0.00E+00	0.00E+00
Acetone	8.60E-02	8.60E-02	1.46E-09	1.20E-08
Carbon Disulfide	ND	2.00E-03	ND	2.78E-10
Methylene Chloride	ND	4.00E-03	ND	5.56E-10
Methyl ethyl ketone	2.60E-02	2.60E-02	4.42E-10	3.61E-09
Toluene	6.00E-03	6.00E-03	1.02E-10	8.34E-10
				0.00E+00
<b>Semivolatile Organics</b>			0.00E+00	0.00E+00
2,4,6-Trichlorophenol	1.00E-02	1.00E-02	1.70E-10	1.39E-09
2,4-Dinitrotoluene	1.60E+00	1.60E+00	2.72E-08	2.22E-07
2-Methylnaphthalene	4.20E-02	4.20E-02	7.14E-10	5.84E-09
4-Methylphenol	9.20E+00	9.20E+00	1.56E-07	1.28E-06
Acenaphthene	6.50E-01	6.50E-01	1.11E-08	9.04E-08
Acenaphthylene	1.60E-02	1.60E-02	2.72E-10	2.22E-09
Anthracene	1.60E-02	1.60E-02	2.72E-10	2.22E-09
Benzo(a)anthracene	1.00E-01	1.00E-01	1.70E-09	1.39E-08
Benzo(a)pyrene	1.10E-01	1.10E-01	1.87E-09	1.53E-08
Benzo(b)fluoranthene	8.90E-02	8.90E-02	1.51E-09	1.24E-08
Benzo(ghi)perylene	8.60E-02	8.60E-02	1.46E-09	1.20E-08
Benzo(k)fluoranthene	7.40E-02	7.40E-02	1.26E-09	1.03E-08
bis(2-Ethylhexyl)phthalate	1.90E+00	1.90E+00	3.23E-08	2.64E-07
Carbazole	1.80E-01	1.80E-01	3.06E-09	2.50E-08
Chrysene	1.90E-01	1.90E-01	3.23E-09	2.64E-08
Di-n-butylphthalate	1.40E-01	1.40E-01	2.38E-09	1.95E-08
Di-n-octylphthalate	2.10E-01	2.10E-01	3.57E-09	2.92E-08
Dibenz(a,h)anthracene	1.50E-02	1.50E-02	2.55E-10	2.09E-09
Dibenzofuran	3.40E-01	3.40E-01	5.78E-09	4.73E-08
Fluoranthene	8.00E-01	8.00E-01	1.36E-08	1.11E-07
Fluorene	1.80E-02	1.80E-02	3.06E-10	2.50E-09
Hexachlorobenzene	2.10E-01	2.10E-01	3.57E-09	2.92E-08
Indeno(1,2,3-cd)pyrene	5.30E-02	5.30E-02	9.01E-10	7.37E-09
Naphthalene	5.10E-01	5.10E-01	8.67E-09	7.09E-08
Phenanthrene	1.40E+00	1.40E+00	2.38E-08	1.95E-07
Phenol	1.40E+01	1.40E+01	2.38E-07	1.95E-06
Pyrene	5.40E-01	5.40E-01	9.18E-09	7.51E-08
<b>Pesticides/PCB</b>				
4,4'-DDE	3.60E-03	3.60E-03	6.12E-11	5.00E-10
<b>Other Analytes</b>				
Nitrate/Nitrite Nitrogen	2.79E+01	1.76E+02	4.74E-07	2.45E-05
Fluoride	1.54E+02	1.93E+02	2.62E-06	2.68E-05

ND = Compound was not detected.

**TABLE A-9  
CALCULATION OF INTAKE AND RISK FROM INHALATION OF DUST IN AMBIENT AIR  
REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-13  
Decision Document - Mini Risk Assessment  
Seneca Army Depot Activity**

Equation for Intake (mg/kg-day) = $\frac{CA \times IR \times EF \times ED}{BW \times AT}$	Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose
Variables (Assumptions for Each Receptor are Listed at the Bottom): CA = Chemical Concentration in Air, Calculated from Air EPC Data IR = Inhalation Rate EF = Exposure Frequency	Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor
ED = Exposure Duration BW = Bodyweight AT = Averaging Time	

Analyte	Inhalation RfD (mg/kg-day)	Carc. Slope Inhalation (mg/kg-day) <sup>-1</sup>	Air EPC* from Surface Soil (mg/m3)	Air EPC* from Total Soils (mg/m3)	Park Worker			Recreational Visitor (Child)			Construction Worker					
					Intake (mg/kg-day)		Hazard Quotient	Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Cancer Risk
					(Nc)	(Car)			(Nc)	(Car)			(Nc)	(Car)		
<b>Volatile Organics</b>																
Acetone	NA	NA	1.46E-09	1.20E-08												
Carbon Disulfide	2.00E-01	NA	ND	2.78E-10								2.83E-11	1E-10	1E-15		
Methylene Chloride	8.57E-01	1.65E-03	ND	5.56E-10								5.66E-11	7E-11	1E-09		
Methyl ethyl ketone	2.86E-01	NA	4.42E-10	3.61E-09	2.42E-11	8E-11		9.83E-12	3E-11			3.68E-10	1E-09	7E-10		
Toluene	1.14E-01	NA	1.02E-10	8.34E-10	5.59E-12	5E-11		2.27E-12	2E-11			8.49E-11	7E-10			
<b>Semivolatile Organics</b>																
2,4,6-Trichlorophenol	NA	1.09E-02	1.70E-10	1.39E-09		3.33E-12	4E-14		2.70E-13		3E-15		2.02E-12	2E-14		
2,4-Dinitrotoluene	NA	NA	2.72E-08	2.22E-07												
2-Methylnaphthalene	NA	NA	7.14E-10	5.84E-09												
4-Methylphenol	NA	NA	1.56E-07	1.28E-06												
Acenaphthene	NA	NA	1.11E-08	9.04E-08												
Acenaphthylene	NA	NA	2.72E-10	2.22E-09												
Anthracene	NA	NA	2.72E-10	2.22E-09												
Benzo(a)anthracene	NA	NA	1.70E-09	1.39E-08												
Benzo(a)pyrene	NA	NA	1.87E-09	1.53E-08												
Benzo(b)fluoranthene	NA	NA	1.51E-09	1.24E-08												
Benzo(ghi)perylene	NA	NA	1.46E-09	1.20E-08												
Benzo(k)fluoranthene	NA	NA	1.26E-09	1.03E-08												
bis(2-Ethylhexyl)phthalate	NA	NA	3.23E-08	2.64E-07												
Carbazole	NA	NA	3.06E-09	2.50E-08												
Chrysene	NA	NA	3.23E-09	2.64E-08												
Di-n-butylphthalate	NA	NA	2.38E-09	1.95E-08												
Di-n-octylphthalate	NA	NA	3.57E-09	2.92E-08												
Dibenz(a,h)anthracene	NA	NA	2.55E-10	2.09E-09												
Dibenzofuran	NA	NA	5.78E-09	4.73E-08												
Fluoranthene	NA	NA	1.36E-08	1.11E-07												
Fluorene	NA	NA	3.06E-10	2.50E-09												
Hexachlorobenzene	NA	1.61E+00	3.57E-09	2.92E-08	6.99E-11	1E-10		5.67E-12		9E-12		4.24E-11		7E-11		
Indeno(1,2,3-cd)pyrene	NA	NA	9.01E-10	7.37E-09												
Naphthalene	8.60E-04	NA	8.67E-09	7.09E-08	4.75E-10	6E-07		1.93E-10	2E-07		7.21E-09		8E-06			
Phenanthrene	NA	NA	2.38E-08	1.95E-07												
Phenol	NA	NA	2.38E-07	1.95E-06												
Pyrene	NA	NA	9.18E-09	7.51E-08												
<b>Pesticides/PCB</b>																
4,4'-DDE	NA	NA	6.12E-11	5.00E-10												
<b>Other Analytes</b>																
Nitrate/Nitrite Nitrogen	NA	NA	4.74E-07	2.45E-05												
Fluoride	NA	NA	2.62E-06	2.68E-05												
<b>Total Hazard Quotient and Cancer Risk:</b>						<b>6E-07</b>	<b>1E-10</b>			<b>2E-07</b>	<b>9E-12</b>			<b>8E-06</b>	<b>7E-11</b>	
					<b>Assumptions for Park Worker</b>			<b>Assumptions for Recreational Visitor (Child)</b>			<b>Assumptions for Construction Worker</b>					
					CA =	EPC Surface Only		CA =	EPC Surface Only		CA =	EPC Surface and Subsurface				
					BW =	70 kg		BW =	15 kg		BW =	70 kg				
					IR =	8 m3/day		IR =	8.7 m3/day		IR =	10.4 m3/day				
					EF =	175 days/year		EF =	14 days/year		EF =	250 days/year				
					ED =	25 years		ED =	5 years		ED =	1 years				
					AT (Nc) =	9,125 days		AT (Nc) =	1,825 days		AT (Nc) =	365 days				
					AT (Car) =	25,550 days		AT (Car) =	25,550 days		AT (Car) =	25,550 days				

Note: Cells in this table were intentionally left blank due to a lack of toxicity data.

\* See Table A-8 for calculation of Air EPC.

NA= Information not available.

**TABLE A-10  
CALCULATION OF INTAKE AND RISK FROM THE INGESTION OF SOIL  
REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-13  
Decision Document - Mini Risk Assessment  
Seneca Army Depot Activity**

Equation for Intake (mg/kg-day) = $\frac{CS \times IR \times CF \times FI \times EF \times ED}{BW \times AT}$	Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose
Variables (Assumptions for Each Receptor are Listed at the Bottom): CS = Chemical Concentration in Soil, Calculated from Soil EPC Data IR = Ingestion Rate CF = Conversion Factor FI = Fraction Ingested	Equation for Cancer Risk = Chronic Daily Intake (Cnr) x Slope Factor
EF = Exposure Frequency ED = Exposure Duration BW = Bodyweight AT = Averaging Time	

Analyte	Oral RfD (mg/kg-day)	Carc. Slope Oral (mg/kg-day) <sup>-1</sup>	EPC Surface Soil (mg/kg)	EPC from Total Soils (mg/kg)	Park Worker			Recreational Visitor (Child)			Construction Worker					
					Intake (mg/kg-day)		Hazard Quotient	Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Cancer Risk
					(Nc)	(Car)			(Nc)	(Car)			(Nc)	(Car)		
<b>Volatile Organics</b>																
Acetone	1.00E+001	NA	8.60E+002	8.60E+002	5.89E+008		6E-007	4.40E+008		4E-007		4.04E+007		4E-006		9E-008
Carbon Disulfide	1.00E+001	NA	ND	2.00E+003								9.39E+009		9E-008		
Methylene Chloride	6.00E+002	7.50E+003	ND	4.00E+003								1.88E+008	2.68E+010	3E-007		2E-012
Methyl ethyl ketone	6.00E+001	NA	2.60E+002	2.60E+002	1.78E+008		3E-008	1.33E+008		2E-008		1.22E+007		2E-007		
Toluene	2.00E+001	NA	6.00E+003	6.00E+003	4.11E+009		2E-008	3.07E+009		2E-008		2.82E+008		1E-007		
<b>Semivolatile Organics</b>																
2,4,6-Trichlorophenol	NA	1.10E+002	1.00E+002	1.00E+002		2.45E+009		3E-011		3.65E+010		4E-012		6.71E+010		7E-012
2,4-Dinitrotoluene	2.00E+003	6.80E+001	1.60E+000	1.60E+000	1.10E+006	3.91E+007	5E-004	3E-007	8.18E+007	5.84E+008	4E-004	4E-008	7.51E+006	1.07E+007	4E-003	7E-008
2-Methylnaphthalene	4.00E+002	NA	4.20E+002	4.20E+002	2.88E+008		7E-007	7E-007	2.15E+008	5E-007	5E-007	1.97E+007		5E-006		
4-Methylphenol	5.00E+003	NA	9.20E+000	9.20E+000	6.30E+006		1E-003	1E-003	4.71E+006	9E-004	9E-004	4.32E+005		9E-003		
Acenaphthene	6.00E+002	NA	6.50E+001	6.50E+001	4.45E+007		7E-006	7E-006	3.32E+007	6E-006	6E-006	3.05E+006		5E-005		
Acenaphthylene	NA	NA	1.60E+002	1.60E+002												
Anthracene	3.00E+001	NA	1.60E+002	1.60E+002	1.10E+008		4E-008	4E-008	8.18E+009	3E-008	3E-008	7.51E+008		3E-007		
Benzo(a)anthracene	NA	7.30E+001	1.00E+001	1.00E+001		2.45E+008		2E-008		3.65E+009		3E-009		6.71E+009		5E-009
Benzo(a)pyrene	NA	7.30E+001	1.10E+001	1.10E+001		2.69E+008		2E-007		4.02E+009		3E-008		7.38E+009		5E-008
Benzo(b)fluoranthene	NA	7.30E+001	8.90E+002	8.90E+002		2.18E+008		2E-008		3.25E+009		2E-009		5.97E+009		4E-009
Benzo(g)hperylene	NA	NA	8.60E+002	8.60E+002												
Benzo(k)fluoranthene	NA	7.30E+002	7.40E+002	7.40E+002		1.81E+008		1E-009		2.70E+009		2E-010		4.97E+009		4E-010
bis(2-Ethylhexyl)phthalate	2.00E+002	1.40E+002	1.90E+000	1.90E+000	1.30E+006		7E-005	7E-005	9.72E+007	6.94E+008	5E-005	1E-009	8.92E+006	1.27E+007	4E-004	2E-009
Carbazole	NA	2.00E+002	1.80E+001	1.80E+001		4.40E+008		9E-010		6.58E+009		1E-010		1.21E+008		2E-010
Chrysene	NA	7.30E+003	1.90E+001	1.90E+001		4.65E+008		3E-010		6.94E+009		5E-011		1.27E+008		9E-011
Di-n-butylphthalate	1.00E+001	NA	1.40E+001	1.40E+001	9.59E+008		1E-006	1E-006	7.16E+008	7E-007	7E-007	6.58E+007		7E-006		
Di-n-octylphthalate	2.00E+002	NA	2.10E+001	2.10E+001	1.44E+007		7E-006	7E-006	1.07E+007	5E-006	5E-006	9.86E+007		5E-005		
Dibenz(a,h)anthracene	NA	7.30E+000	1.50E+002	1.50E+002		3.67E+009		3E-008		5.48E+010		4E-009		1.01E+009		7E-009
Dibenzofuran	NA	NA	3.40E+001	3.40E+001												
Fluoranthene	4.00E+002	NA	8.00E+001	8.00E+001	5.48E+007		1E-005	1E-005	4.09E+007	1E-005	1E-005	3.76E+006		9E-005		
Fluorene	4.00E+002	NA	1.80E+002	1.80E+002	1.23E+008		3E-007	3E-007	9.21E+009	2E-007	2E-007	8.45E+008		2E-006		
Hexachlorobenzene	8.00E+004	1.60E+000	2.10E+001	2.10E+001	1.44E+007		2E-004	2E-004	1.07E+007	7.67E+009	1E-004	1E-008	9.86E+007	1.41E+008	1E-003	2E-008
Indeno(1,2,3-cd)pyrene	NA	7.30E+001	5.30E+002	5.30E+002		1.30E+008		9E-009		1.94E+009		1E-009		3.56E+009		3E-009
Naphthalene	2.00E+002	NA	5.10E+001	5.10E+001	3.49E+007		2E-005	2E-005	2.61E+007	1E-005	1E-005	2.40E+006		1E-004		
Phenanthrene	NA	NA	1.40E+000	1.40E+000												
Phenol	6.00E+001	NA	1.40E+001	1.40E+001	9.59E+006		2E-005	2E-005	7.16E+006	1E-005	1E-005	6.58E+005		1E-004		
Pyrene	3.00E+002	NA	5.40E+001	5.40E+001	3.70E+007		1E-005	1E-005	2.76E+007	9E-006	9E-006	2.54E+006		8E-005		
<b>Pesticides/PCB</b>																
4,4'-DDE	NA	3.40E+001	3.60E+003	3.60E+003		8.81E+010		3E-010		1.32E+010		4E-011		2.42E+010		8E-011
<b>Other Analyses</b>																
Nitrate/Nitrite Nitrogen	1.60E+000	NA	2.79E+001	1.76E+002	1.91E+005		1E-005	1E-005	1.43E+005	9E-006	9E-006	8.27E+004		5E-004		
Fluoride	6.00E+002	NA	1.54E+002	1.93E+002	1.05E+004		2E-003	2E-003	7.88E+005	1E-003	1E-003	9.06E+004		2E-002		
<b>Total Hazard Quotient and Cancer Risk:</b>							<b>4E-003</b>	<b>6E-007</b>			<b>3E-003</b>	<b>9E-008</b>		<b>3E-002</b>	<b>2E-007</b>	
<b>Assumptions for Park Worker</b>					<b>Assumptions for Recreational Visitor (Child)</b>					<b>Assumptions for Construction Worker</b>						
CF = 1E-006 kg/mg					CF = 1E-006 kg/mg					CF = 1E-006 kg/mg						
CS = EPC Surface Only					CS = EPC Surface Only					CS = EPC Surface and Subsurface						
BW = 70 kg					BW = 15 kg					BW = 70 kg						
IR = 100 mg soil/day					IR = 200 mg soil/day					IR = 480 mg soil/day						
FI = 1 unitless					FI = 1 unitless					FI = 1 unitless						
EF = 175 days/year					EF = 14 days/year					EF = 250 days/year						
ED = 25 years					ED = 5 years					ED = 1 years						
AT (Nc) = 9125 days					AT (Nc) = 1825 days					AT (Nc) = 365 days						
AT (Car) = 25550 days					AT (Car) = 25550 days					AT (Car) = 25550 days						

Note: Cells in this table were intentionally left blank due to a lack of toxicity data.  
NA= Information not available.  
ND=Compound not detected

**TABLE A-1**  
**CALCULATION OF ABSORBED DOSE AND RISK FROM DERMAL CONTACT TO SOIL**  
**REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-13**  
**Decision Document - Mini Risk Assessment**  
**Seneca Army Depot Activity**

Equation for Intake (mg/kg-day) = $\frac{CS \times CF \times SA \times AF \times ABS \times EF \times ED \times EV}{BW \times AT}$						Equation for Hazard Quotient = Chronic Daily Intake (CDI) / Reference Dose											
Variables (Assumptions for Each Receptor are Listed at the Bottom):						Equation for Cancer Risk = Chronic Daily Intake (CDI) x Slope Factor											
CS = Chemical Concentration in Soil, from Soil EPC Data			EF = Exposure Frequency			CDI = Chronic Daily Intake			Slope Factor								
CF = Conversion Factor			ED = Exposure Duration			CDI = Chronic Daily Intake			Slope Factor								
SA = Surface Area Contact			EV = Event Frequency			CDI = Chronic Daily Intake			Slope Factor								
AF = Adherence Factor			BW = Bodyweight			CDI = Chronic Daily Intake			Slope Factor								
ABS = Absorption Factor			AT = Averaging Time			CDI = Chronic Daily Intake			Slope Factor								
Analyte	Dermal RfD (mg/kg-day)	Carc. Slope Dermal (mg/kg-day) <sup>-1</sup>	Absorption Factor* (unitless)	EPC Surface Soil (mg/kg)	EPC from Total Soils (mg/kg)	Park Worker			Recreational Visitor (Child)			Construction Worker					
						Absorbed Dose (mg/kg-day) (Ne)	Absorbed Dose (mg/kg-day) (Car)	Hazard Quotient	Cancer Risk	Absorbed Dose (mg/kg-day) (Ne)	Absorbed Dose (mg/kg-day) (Car)	Hazard Quotient	Cancer Risk	Absorbed Dose (mg/kg-day) (Ne)	Absorbed Dose (mg/kg-day) (Car)	Hazard Quotient	Cancer Risk
<b>Volatiles Organics</b>																	
Acetone	1.00E-001	NA	NA	8.60E-002	8.60E-002												
Carbon Disulfide	1.00E-001	NA	NA	ND	2.00E-003												
Methylene Chloride	6.00E-002	7.50E-003	NA	ND	4.00E-003												
Methyl ethyl ketone	6.00E-001	NA	NA	2.60E-002	2.60E-002												
Toluene	2.00E-001	NA	NA	6.00E-003	6.00E-003												
<b>Semivolatiles Organics</b>																	
2,4,6-Trichlorophenol	NA	1.10E-002	0.1	1.00E-002	1.00E-002		1.61E-009		1.8E-011		1.02E-010		1.1E-012		9.23E-011		1.0E-012
2,4-Dinitrotoluene	2.00E-003	6.80E-001	0.1	1.60E+000	1.60E+000	7.23E-007	2.58E-007	3.6E-004	1.8E-007	2.29E-007	1.64E-008	1.1E-004	1.1E-008	1.03E-006	1.48E-008	5.2E-004	1.0E-008
2-Methylnaphthalene	4.00E-002	NA	0.1	4.20E-002	4.20E-002	1.90E-008		4.7E-007		6.01E-009	1.5E-007		2.71E-008		6.8E-007		6.8E-007
4-Methylphenol	5.00E-003	NA	0.1	9.20E+000	9.20E+000	4.16E-006		8.3E-004		1.32E-006	2.6E-004		5.94E-006		1.2E-003		1.2E-003
Acenaphthene	6.00E-002	NA	0.1	6.50E-001	6.50E-001	2.94E-007		4.9E-006		9.31E-008	1.6E-006		4.20E-007		7.0E-006		7.0E-006
Acenaphthylene	NA	NA	0.1	1.60E-002	1.60E-002												
Anthracene	3.00E-001	NA	0.13	1.60E-002	1.60E-002	9.40E-009		3.1E-008		2.98E-009	9.9E-009		1.34E-008		4.5E-008		4.5E-008
Benzo(a)anthracene	NA	7.30E-001	0.13	1.00E-001	1.00E-001		2.10E-008		1.5E-008		1.33E-009		9.7E-010		1.20E-009		8.8E-010
Benzo(a)pyrene	NA	7.30E+000	0.13	1.10E-001	1.10E-001		2.31E-008		1.7E-007		1.46E-009		1.1E-008		1.32E-009		9.6E-009
Benzo(b)fluoranthene	NA	7.30E-001	0.13	8.90E-002	8.90E-002		1.87E-008		1.4E-008		1.18E-009		8.6E-010		1.07E-009		7.8E-010
Benzo(ghi)perylene	NA	NA	0.13	8.60E-002	8.60E-002												
Benzo(k)fluoranthene	NA	7.30E-002	0.13	7.40E-002	7.40E-002												
bis(2-Ethylhexyl)phthalate	2.00E-002	1.40E-002	0.1	1.90E+000	1.90E+000	8.59E-007	3.07E-007	4.3E-005	4.3E-009	2.72E-007	1.94E-008	1.4E-005	2.7E-010	1.23E-006	1.75E-008	6.1E-005	2.5E-010
Carbazole	NA	2.00E-002	0.1	1.80E-001	1.80E-001		2.91E-008		5.8E-010		1.84E-009		3.7E-011		1.66E-009		3.3E-011
Chrysene	NA	7.30E-003	0.13	1.90E-001	1.90E-001		3.99E-008		2.9E-010		2.53E-009		1.8E-011		2.28E-009		1.7E-011
Di-n-butylphthalate	1.00E-001	NA	0.1	1.40E-001	1.40E-001												
Di-n-octylphthalate	2.00E-002	NA	0.1	2.10E-001	2.10E-001	9.49E-008		4.7E-006		3.01E-008	1.99E-010	1.5E-006	1.5E-009	1.36E-007	1.80E-010	6.8E-006	1.3E-009
Dibenz(a,h)anthracene	NA	7.30E+000	0.13	1.50E-002	1.50E-002		3.15E-009		2.3E-008		1.99E-010		1.5E-009		1.80E-010		1.3E-009
Dibenzofuran	NA	NA	0.1	3.40E-001	3.40E-001												
Fluoranthene	4.00E-002	NA	0.13	8.00E-001	8.00E-001	4.70E-007		1.2E-005		1.49E-007	3.7E-006		6.72E-007		1.7E-005		1.7E-005
Fluorene	4.00E-002	NA	0.13	1.80E-002	1.80E-002	1.04E-008		2.6E-007		3.35E-009	8.4E-008		1.51E-008		3.8E-007		3.8E-007
Hexachlorobenzene	8.00E-004	1.60E+000	0.1	2.10E-001	2.10E-001	9.49E-008	3.39E-008	1.2E-004	5.4E-008	3.01E-008	2.15E-009	3.8E-005	3.4E-009	1.36E-007	1.94E-009	1.7E-004	3.1E-009
Indeno(1,2,3-cd)pyrene	NA	7.30E-001	0.13	5.30E-002	5.30E-002		1.11E-008		8.1E-009		7.05E-010		5.1E-010		6.36E-010		4.6E-010
Naphthalene	2.00E-002	NA	0.13	5.10E-001	5.10E-001	3.00E-007		1.5E-005		9.49E-008	4.7E-006		4.28E-007		2.1E-005		2.1E-005
Phenanthrene	NA	NA	0.13	1.40E+000	1.40E+000												
Phenol	6.00E-001	NA	0.1	1.40E+001	1.40E+001	6.33E-006		1.1E-005		2.00E-006	3.3E-006		9.04E-006		1.5E-005		1.5E-005
Pyrene	3.00E-002	NA	0.1	5.40E-001	5.40E-001	2.44E-007		8.1E-006		7.73E-008	2.6E-006		3.49E-007		1.2E-005		1.2E-005
<b>Pesticides/PCB</b>																	
4,4'-DDE	NA	3.40E-001	0.03	3.60E-003	3.60E-003		1.74E-010		5.9E-011		1.10E-011		3.8E-012		9.96E-012		3.4E-012
<b>Other Analyses</b>																	
Nitrate/Nitrite Nitrogen	1.60E+000	NA	NA	2.79E+001	1.76E+002												
Fluoride	6.00E-002	NA	NA	1.54E+002	1.93E+002												
<b>Total Hazard Quotient and Cancer Risk:</b>							<b>1E-003</b>	<b>5E-007</b>		<b>4E-004</b>	<b>3E-008</b>		<b>2E-003</b>	<b>3E-008</b>			
						<b>Assumptions for Park Worker</b>			<b>Assumptions for Recreational Visitor (Child)</b>			<b>Assumptions for Construction Worker</b>					
						CS =	EPC Surface Only			CS =			EPC Surface and Subsurface				
						CF =	1.00E-006 kg/mg			CF =			1.00E-006 kg/mg				
						SA =	3.00 cm <sup>2</sup>			SA =			3.00 cm <sup>2</sup>				
						AF =	0.2 mg/cm <sup>2</sup> -event			AF =			0.2 mg/cm <sup>2</sup> -event				
						EF =	175 days/year			EF =			14 days/year				
						ED =	25 years			ED =			5 years				
						EV =	1 event/day			EV =			1 event/day				
						BW =	70 kg			BW =			15 kg				
						AT (Ne) =	9,125 days			AT (Ne) =			1,825 days				
						AT (Car) =	25,550 days			AT (Car) =			25,550 days				

Note: Cells in this table were intentionally left blank due to a lack of toxicity data.

NA - Information not available.

\* Recommended dermal absorption factor by EPA Dermal Risk Assessment Guidance (1999).

**TABLE A-12  
CALCULATION OF INTAKE AND RISK FROM INHALATION OF GROUNDWATER (WHILE SHOWERING)  
REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-13  
Decision Document - Mini Risk Assessment  
Seneca Army Depot Activity**

Equation for Intake (mg/kg-day) =	$\frac{CA \times IR \times EF \times ED}{BW \times AT}$	Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose
<u>Variables (Assumptions for Each Receptor are Listed at the Bottom):</u>		Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor
CA = Chemical Concentration in Air	ED = Exposure Duration	
IR = Inhalation Rate	BW = Bodyweight	
EF = Exposure Frequency	AT = Averaging Time	

Analyte	Inhalation RfD (mg/kg-day)	Carc. Slope Inhalation (mg/kg-day)-1	EPC* Air (mg/m <sup>3</sup> )	Park Worker			Recreational Visitor (Child)			Construction Worker					
				Intake (mg/kg-day)		Hazard Quotient	Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Cancer Risk
				(Nc)	(Car)			(Nc)	(Car)			(Nc)	(Car)		
<b>Semivolatile Organics</b>															
bis(2-Ethylhexyl)phthalate	NA	1.40E-002	1.12E-006	Inhalation of Groundwater Not Applicable for Park Worker			6.15E-011		9E-013		Inhalation of Groundwater Not Applicable for Construction Worker				
Butylbenzylphthalate	NA	NA	6.03E-008												
Diethyl phthalate	NA	NA	3.45E-008												
<b>Metals</b>															
Aluminum	1.00E-003	NA	NA												
Cyanide	NA	NA	NA												
Manganese	1.43E-005	NA	NA												
<b>Other Analyses</b>															
NITRATE	NA	NA	NA												
NITRITE	NA	NA	NA												
Fluoride	NA	NA	NA												
<b>Total Hazard Quotient and Cancer Risk:</b>										<b>9E-013</b>					
							<b>Assumptions for Recreational Visitor (Child)</b>								
							BW = 15 kg								
							IR = 0.30 m <sup>3</sup> /day								
							EF = 14 days/year								
							ED = 5 years								
							AT (Nc) = 1,825 days								
							AT (Car) = 25,550 days								

Note: Cells in this table were intentionally left blank due to a lack of toxicity data.

NA= Information not available.

\* EPC air is the concentration of chemical available for inhalation after accounting for partitioning between the air and water in the shower. The calculation of the EPC air is shown in Table A-12A.

**TABLE A-12A**  
**CALCULATION OF AIR CONCENTRATION IN SHOWER**  
**FROM VOLATILIZATION OF GROUNDWATER (DAILY)**  
**REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-13**  
**Decision Document - Mini Risk Assessment**  
**Seneca Army Depot Activity**

Analyte	EPC Air All-Site Wells (mg/m <sup>3</sup> )	Time of Shower - Ts (min)	Flow Rate of Shower - Fw (L/min)	EPC Groundwater (mg/l)	Flow Rate of Air in Shower - Fa (m <sup>3</sup> /min)	Volume of Bathroom - Vb (m <sup>3</sup> )	Henry Laws Constant - H (m <sup>3</sup> -atm/mol)	Asymptotic Air Conc. - Cinf (mg/m <sup>3</sup> )	Rate Constant - K (1/min)	Efficiency of Release - E (unitless)	Efficiency of Release for TCE - E-TCE	Henry Laws Constant - H-TCE (m <sup>3</sup> -atm/mol)
<b>Semivolatile Organics</b>												
bis(2-Ethylhexyl)phthalate	1.12E-006	60	19	2.30E-002	2.4	12	1.02E-007	1.22E-006	0.20	6.73E-006	0.6	0.0091
Butylbenzylphthalate	6.03E-008	60	19	1.00E-004	2.4	12	1.26E-006	6.58E-008	0.20	8.31E-005	0.6	0.0091
Diethyl phthalate	3.45E-008	60	19	1.60E-004	2.4	12	4.5E-007	3.76E-008	0.20	2.97E-005	0.6	0.0091
<b>Metals</b>												
Aluminum	NA	60	19	7.09E+001	2.4	12	NA	0.00E+000	0.20	0.00E+000	0.6	0.0091
Cyanide	NA	60	19	1.24E-001	2.4	12	NA	0.00E+000	0.20	0.00E+000	0.6	0.0091
Manganese	NA	60	19	3.21E+000	2.4	12	NA	0.00E+000	0.20	0.00E+000	0.6	0.0091
<b>Other Analyses</b>												
NITRATE	NA	60	19	7.31E+002	2.4	12	NA	0.00E+000	0.20	0.00E+000	0.6	0.0091
NITRITE	NA	60	19	2.10E+000	2.4	12	NA	0.00E+000	0.20	0.00E+000	0.6	0.0091
Fluoride	NA	60	19	4.50E-001	2.4	12	NA	0.00E+000	0.20	0.00E+000	0.6	0.0091
Concentration in Air (mg/m <sup>3</sup> ) = Cinf[1+(1/(kTs)(exp(-kTs)-1)] Asymptotic Air Conc. - Cinf (mg/m <sup>3</sup> ) = (E)(Fw)(EPCgw)/Fa Rate Constant - k (1/min) = Fa/Vb Efficiency of Release - E (unitless) = (E-tce)(H)/(H-tce)						<b>Variables:</b> CA = Chemical Concentration in Air (mg/m <sup>3</sup> ) Ts = Time of Shower (minutes) Fw = Flow Rate of Shower (L/min) Fa = Flow Rate of Air in Shower (m <sup>3</sup> /min) Vb = Volume of Bathroom (m <sup>3</sup> )			<b>Assumptions:</b> EPC - Groundwater Data - RME 60 (RME default) 19 (Estimated RME) 2.4 (Average Air Flow) 12 (Average Bathroom Volume)			

Henry's Constant source: Soil Screening Guidance, EPA, 1996.

**TABLE A-13  
CALCULATION OF INTAKE AND RISK FROM THE INGESTION OF GROUNDWATER  
REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-13  
Decision Document - Mini Risk Assessment  
Seneca Army Depot Activity**

Equation for Intake (mg/kg-day) = $\frac{CW \times IR \times EF \times ED}{BW \times AT}$	Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose
Variables (Assumptions for Each Receptor are Listed at the Bottom): CW = Chemical Concentration in Groundwater, from Groundwater EPC Data IR = Ingestion Rate EF = Exposure Frequency	Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor
ED=Exposure Duration BW=Bodyweight AT=Averaging Time	

Analyte	Oral RFD (mg/kg-day)	Carc. Slope Oral (mg/kg-day)-1	EPC Groundwater (mg/liter)	Park Worker				Recreational Visitor (Child)				Construction Worker							
				Intake (mg/kg-day)		Hazard Quotient	Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Cancer Risk				
				(Nc)	(Car)			(Nc)	(Car)			(Nc)	(Car)						
<b>Semivolatile Organics</b>																			
bis(2-Ethylhexyl)phthalate	2.00E-002	1.40E-002	2.30E-002	1.58E-004	5.63E-005	8E-003	8E-007	5.88E-005	4.20E-006	3E-003	6E-008	Ingestion of Groundwater Not Applicable for Construction Worker							
Butylbenzylphthalate	2.00E-001	NA	1.00E-004	6.85E-007		3E-006		2.56E-007		1E-006									
Diethyl phthalate	8.00E-001	NA	1.60E-004	1.10E-006		1E-006		4.09E-007		5E-007									
<b>Metals</b>																			
Aluminum	1.00E+000	NA	7.09E+001	4.86E-001		5E-001		1.81E-001		2E-001									
Cyanide	2.00E-002	NA	1.24E-001	8.49E-004		4E-002		3.17E-004		2E-002									
Manganese	5.00E-002	NA	3.21E+000	2.20E-002		4E-001		8.21E-003		2E-001									
<b>Other Analyses</b>																			
NITRATE	1.60E+000	NA	7.31E+002	5.01E+000		3E+000		1.87E+000		1E+000									
NITRITE	1.00E-001	NA	2.10E+000	1.44E-002		1E-001		5.37E-003		5E-002									
Fluoride	6.00E-002	NA	4.50E-001	3.08E-003		5E-002		1.15E-003		2E-002									
<b>Total Hazard Quotient and Cancer Risk:</b>						<b>4E+000</b>	<b>8E-007</b>			<b>2E+000</b>	<b>6E-008</b>								
				<b>Assumptions for Park Worker</b>				<b>Assumptions for Recreational Visitor (Child)</b>											
				BW =	70 kg	BW =	15 kg												
				IR =	1 liter/day	IR =	1 liter/day												
				EF =	175 days/year	EF =	14 days/year												
				ED =	25 years	ED =	5 years												
				AT (Nc) =	9,125 days	AT (Nc) =	1,825 days												
				AT (Car) =	25,550 days	AT (Car) =	25,550 days												

Note: Cells in this table were intentionally left blank due to a lack of toxicity data.  
NA= Information not available.

**TABLE A-14**  
**CALCULATION OF INTAKE AND RISK FROM DERMAL CONTACT TO GROUNDWATER (WHILE SHOWERING)**  
**REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-13**  
**Decision Document - Mini Risk Assessment**  
**Seneca Army Depot Activity**

Equation for Intake (mg/kg-day) = $\frac{DA \times SA \times EF \times ED \times EV}{BW \times AT}$	Equation for Absorbed Dose per Event (DA): For organics: $DA = 2Kp \times CW \sqrt{\frac{6 \times \tau \times ET}{\pi}} \times CF$ For inorganics: $DA = Kp \times CW \times ET \times CF$ $\tau = \text{Lag Time}$ $CF = \text{Conversion Factor}$	Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor
Variables (Assumptions for Each Receptor are Listed at the Bottom): DA = Absorbed Dose per Event SA = Surface Area Contact EF = Exposure Frequency ED = Exposure Duration EV = Event Frequency BW = Bodyweight AT = Averaging Time	Kp = Permeability Coefficient CW = EPC Cdem ET = Exposure Time	

Analyte	Dermal RfD (mg/kg-day)	Carc. Slope Dermal (mg/kg-day) <sup>-1</sup>	Permeability Coefficient Kp (cm/hr)	τ (hours)	EPC Groundwater (mg/liter)	Absorbed Dose/Event (mg-cm <sup>2</sup> /event)	Park Worker			Recreational Visitor (Child)			Construction Worker					
							Intake (mg/kg-day)		Hazard Quotient	Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Cancer Risk
							(Nc)	(Car)			(Nc)	(Car)			(Nc)	(Car)		
<b>Semivolatile Organics</b>							<b>Dermal Contact to Groundwater Not Applicable for Park Worker</b>						<b>Dermal Contact to Groundwater Not Applicable for Construction Worker</b>					
bis(2-Ethylhexyl)phthalate	2.00E-002	1.40E-002	5.27E-003	1.62E+001	2.30E-002	1.35E-006				2.28E-005	1.63E-006	1E-003	2E-008					
Butylbenzylphthalate	2.00E-001	NA	4.94E-002	5.87E+000	1.00E-004	3.30E-008												
Diethyl phthalate	8.00E-001	NA	3.9E-003	1.87E+000	1.60E-004	2.36E-009												
<b>Metals</b>																		
Aluminum	1.00E+000	NA	1.00E-003		7.09E+001	7.09E-005				1.20E-003		1E-003						
Cyanide	2.00E-002	NA	1.00E-003		1.24E-001	1.24E-007				2.09E-006		1E-004						
Manganese	2.00E-003	NA	1.00E-003		3.21E+000	3.21E-006				5.42E-005		3E-002						
<b>Other Analyses</b>																		
NITRATE	1.60E+000	NA	1.00E-003		7.31E+002	7.31E-004				1.23E-002		8E-003						
NITRITE	1.00E-001	NA	1.00E-003		2.10E+000	2.10E-006				3.54E-005		4E-004						
Nitrate/Nitrite Nitrogen	1.60E+000	NA	1.00E-003		7.31E+002	7.31E-004				1.23E-002		8E-003						
Fluoride	6.00E-002	NA	1.00E-003		4.50E-001	4.50E-007												
<b>Total Hazard Quotient and Cancer Risk:</b>												<b>5E-002</b>	<b>2E-008</b>					
										<b>Assumptions for Recreational Visitor (Child)</b>								
										CF =	0.001 l/cm <sup>3</sup>							
										BW =	15 kg							
										SA =	6,600 cm <sup>2</sup>							
										ET =	1.00 hours/event							
										EF =	14 days/year							
										ED =	5 years							
										EV =	1 event/day							
										AT (Nc) =	1,825 days							
										AT (Car) =	25,550 days							

Note: Cells in this table were intentionally left blank due to a lack of toxicity data.  
 NA= Information not available.



**TABLE A-15  
CALCULATION OF ABSORBED DOSE AND RISK FROM DERMAL CONTACT TO SURFACE WATER  
REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-13  
Decision Document - Mini Risk Assessment  
Seneca Army Depot Activity**

Equation for Intake (mg/kg-day) =  $\frac{DA \times SA \times EF \times ED \times EV}{BW \times AT}$

Equation for Absorbed Dose per Event (DA):

For organics:  $DA = K_p \times CW \times CF \left[ \frac{ET}{1+B} + 2\tau \times \frac{1+3B+3B^2}{(1+B)^2} \right]$

where  $B = K_p \frac{\sqrt{MW}}{2.6}$

For inorganics:  $DA = K_p \times CW \times ET \times CF$

DA = Absorbed Dose per Event  
SA = Surface Area Contact  
EF = Exposure Frequency  
EV = Event Frequency

ED = Exposure Duration  
BW = Bodyweight  
AT = Averaging Time

Kp = Permeability Coefficient  
CW = EPC Surface Water  
ET = Event Duration

$\tau$  = Lag Time  
CF = Conversion Factor  
MW = Molecular Weight

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Dermal RfD (mg/kg-day)	Carc. Slope Dermal (mg/kg-day) <sup>-1</sup>	Permeability Coefficient Kp (cm/hr)	$\tau$ (hours)	EPC Surface Water (mg/L)	Absorbed Dose/Event (mg-cm <sup>2</sup> /event)	Park Worker			Recreational Visitor (Child)			Construction Worker					
							Intake (mg/kg-day)		Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Cancer Risk	
							(Nc)	(Car)		(Nc)	(Car)			(Nc)	(Car)			
<b>Semivolatile Organics</b>																		
4-Methylphenol	5.00E-003	NA	7.7E-003	4.30E-001	2.30E-002	3.29E-007	4.59E-007	1.64E-007	9.17E-005	2.08E-013	1.18E-006	8.41E-008	2.35E-004				<b>Dermal Contact to Surface Water for Construction Worker not Applicable</b>	
Isophorone	2.00E-001	9.50E-004	3.40E-003	6.30E-001	5.70E-005	4.39E-010	6.12E-010	2.19E-010	3.06E-009		1.57E-009	1.12E-010	7.85E-009					
Phenol	6.00E-001	NA	4.30E-003	3.60E-001	9.30E-003	6.86E-008	9.57E-008	3.42E-008	1.60E-007		2.46E-007	1.75E-008	4.09E-007					
<b>Metals</b>																		
Aluminum	1.00E+000	NA	1.00E-003	NA	3.83E+000	3.83E-006	5.34E-006	1.91E-006	5.34E-006	5.01E-009	1.37E-005	9.79E-007	1.37E-005				3E-009	
Antimony	4.00E-004	NA	1.00E-003	NA	3.00E-003	3.00E-009	4.18E-009	1.49E-009	1.05E-005		1.07E-008	7.67E-010	2.68E-005					
Arsenic	3.00E-004	1.50E+000	1.00E-003	NA	6.70E-003	6.70E-009	9.35E-009	3.34E-009	3.12E-005		2.40E-008	1.71E-009	8.00E-005					
Barium	4.90E-003	NA	1.00E-003	NA	9.16E-002	9.16E-008	1.28E-007	4.56E-008	2.61E-005		3.28E-007	2.34E-008	6.69E-005					
Chromium	3.90E-005	NA	2.00E-003	NA	5.40E-003	1.08E-008	1.51E-008	5.38E-009	3.86E-004		3.87E-008	2.76E-009	9.91E-004					
Cobalt	6.00E-002	NA	1.00E-003	NA	1.60E-003	1.60E-009	2.23E-009	7.97E-010	3.72E-008		5.73E-009	4.09E-010	9.55E-008					
Copper	4.00E-002	NA	1.00E-003	NA	6.60E-003	6.60E-009	9.21E-009	3.29E-009	2.30E-007		2.36E-008	1.69E-009	5.91E-007					
Iron	3.00E-001	NA	1.00E-003	NA	5.87E+000	5.87E-006	8.19E-006	2.92E-006	2.73E-005		2.10E-005	1.50E-006	7.00E-005					
Lead	NA	NA	4.00E-006	NA	7.50E-003	3.00E-011												
Manganese	2.00E-003	NA	1.00E-003	NA	1.85E+000	1.85E-006	2.58E-006	9.22E-007	1.29E-003		6.62E-006	4.73E-007	3.31E-003					
Mercury	3.00E-004	NA	1.00E-003	NA	1.10E-004	1.10E-010	1.53E-010	5.48E-011	5.11E-007		3.94E-010	2.81E-011	1.31E-006					
Nickel	8.00E-004	NA	2.00E-004	NA	7.10E-003	1.42E-009	1.98E-009	7.07E-010	2.48E-006		5.08E-009	3.63E-010	6.35E-006					
Vanadium	1.82E-004	NA	1.00E-003	NA	6.20E-003	6.20E-009	8.65E-009	3.09E-009	4.75E-005		2.22E-008	1.59E-009	1.22E-004					
Zinc	3.00E-001	NA	6.00E-004	NA	2.77E-002	1.66E-008	2.32E-008	8.28E-009	7.73E-008		5.95E-008	4.25E-009	1.98E-007					
<b>Other Analyses</b>																		
Nitrate/Nitrite Nitrogen	1.60E+000	NA	6.00E-004		1.10E-001	6.60E-008	9.21E-008	3.29E-008	5.75E-008		2.36E-007	1.69E-008	1.48E-007					
Fluoride	6.00E-002	NA	6.00E-004		3.90E-001	2.34E-007	3.26E-007	1.17E-007	5.44E-006		8.38E-007	5.98E-008	1.40E-005					
<b>Total Hazard Quotient and Cancer Risk:</b>										2E-003				SE-003			3E-009	
							<b>Assumptions for Park Worker</b>				<b>Assumptions for Recreational Visitor (Child)</b>							
							CF =	1E-003	liter/cm3		CF =	1E-003	liter/cm3					
							BW =	70	kg		BW =	15	kg					
							SA =	1,980	cm2		SA =	2,800	cm2					
							ET =	1	hour/event		ET =	1	hour/event					
							EF =	18	days/year		EF =	7	days/year					
							ED =	25	years		ED =	5	years					
							EV =	1	event/day		EV =	1	event/day					
							AT (Nc) =	9,125	days		AT (Nc) =	1,825	days					
							AT (Car) =	25,550	days		AT (Car) =	25,550	days					

Note: Cells in this table were intentionally left blank due to a lack of toxicity data.  
NA= Information not available.

TABLE A-16  
 CALCULATION OF ABSORBED DOSE AND RISK FROM DERMAL CONTACT TO SEDIMENT  
 REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-13  
 Decision Document - Mini Risk Assessment  
 Seneca Army Depot Activity

Equation for Intake (mg/kg-day) = $CS \times CF \times SA \times AF \times ABS \times EF \times ED \times EV$	Variables (Assumptions for Each Parameter are Listed at the Bottom): CS = Chemical Concentration in Sediment, from Sediment EPC Data CF = Conversion Factor SA = Surface Area Contact AF = Adherence Factor ABS = Absorption Factor	Equation for Hazard Quotient = Chronic Daily Intake (No)/Reference Dose Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor
	BW x AT EF = Exposure Frequency ED = Exposure Duration BW = Bodyweight AT = Averaging Time EV = Event Frequency	

Analyte	Dermal RD (mg/kg-day)	Carc. Slope Dermal (mg/kg-day) <sup>-1</sup>	Absorption Factor* (unitless)	EPC Sediment (mg/kg)	Park Worker			Recreational Visitor (Child)			Construction Worker					
					Absorbed Dose (mg/kg-day)		Hazard Quotient	Cancer Risk	Absorbed Dose (mg/kg-day)		Hazard Quotient	Cancer Risk	Absorbed Dose (mg/kg-day)		Hazard Quotient	Cancer Risk
					(No)	(Car)			(No)	(Car)			(No)	(Car)		
Dermal Contact to Sediment for Construction Worker Not Applicable																
<b>Volatile Organics</b>																
Acetone	1.00E-001	NA	NA	3.00E-001												
Methyl ethyl ketone	6.00E-001	NA	NA	1.40E-001												
<b>Semivolatile Organics</b>																
2-Methylnaphthalene	4.00E-002	NA	1.00E-001	1.00E-002	1.30E-009		3E-008		3.50E-009		9E-008		2E-009			
3-Methylphenol	5.00E-003	NA	1.00E-001	5.00E-002	8.00E-009		2E-006		2.00E-008		4E-006		2E-008			
Acenaphthylene	NA	NA	1.00E-001	8.00E-003												
Anthracene	3.00E-001	NA	1.30E-001	8.30E-003	1.51E-009		5E-009		3.80E-009		1E-008		2E-009			
Benzo(a)anthracene	NA	7.30E-001	1.30E-001	9.00E-002	5.83E-009		4E-009		2.99E-009		2E-009		2E-009			
Benzo(a)pyrene	NA	7.30E+000	1.30E-001	8.80E-002	5.70E-009		4E-008		2.93E-009		2E-008		2E-008			
Benzo(b)fluoranthene	NA	7.30E+001	1.30E-001	8.60E-002	5.57E-009		4E-009		2.86E-009		2E-009		2E-009			
Benzo(k)fluoranthene	NA	NA	1.30E-001	5.70E-002												
Benzo(k)fluoranthene	NA	7.30E+002	1.30E-001	5.50E-002	3.56E-009		3E-010		1.83E-009		1E-010		1E-010			
Chrysene	NA	7.30E+003	1.30E-001	1.90E-001	1.23E-008		9E-011		6.32E-009		5E-011		5E-011			
Dibenz(a,h)anthracene	2.00E-002	NA	1.00E-001	9.90E-003	1.30E-009		7E-008		3.54E-009		2E-007		4E-009			
Dibenz(a,h)anthracene	NA	7.30E+000	1.30E-001	1.60E-002	1.04E-009		8E-009		5.32E-010		4E-009		4E-009			
Dibenzofuran	NA	NA	1.00E-001	4.30E-003												
Fluoranthene	4.00E-002	NA	1.30E-001	1.20E-001	2.18E-008		5E-007		5.58E-008		1E-006		7E-008			
Fluorene	4.00E-002	NA	1.30E-001	6.40E-003	1.16E-009		3E-008		2.98E-009		1E-009		1E-009			
Indeno(1,2,3-cd)pyrene	NA	7.30E+001	1.30E-001	4.40E-002	2.85E-009		2E-009		1.46E-009		2E-007		1E-009			
Naphthalene	2.00E-002	NA	1.30E-001	6.00E-003	1.23E-009		6E-008		3.16E-009		2E-007		1E-009			
Phenanthrene	NA	NA	1.30E-001	1.60E-001												
Pyrene	3.00E-002	NA	1.00E-001	2.70E-001	3.77E-008		1E-006		9.67E-008		3E-006		3E-006			
<b>Metals</b>																
Aluminum	1.00E+000	NA	NA	1.84E+004												
Antimony	4.00E-004	NA	NA	6.50E-001												
Arsenic	3.00E-004	1.50E+000	3.00E-002	4.80E+000	2.01E-007	7.17E-008	7E-004	1E-007	5.16E-007	3.68E-008	2E-003	6E-008	6E-008			
Barium	4.00E-003	NA	NA	1.64E+002												
Beryllium	1.40E-005	NA	NA	1.00E+000												
Cadmium	5.00E-004	NA	1.00E-003	9.60E-001	1.34E-009		3E-006		3.44E-009		7E-006		7E-006			
Chromium	3.90E-005	NA	NA	2.77E+001												
Cobalt	6.00E-002	NA	NA	1.35E+001												
Copper	4.00E-002	NA	NA	2.07E+001												
Iron	3.00E-001	NA	NA	2.94E+004												
Lead	NA	NA	NA	3.33E+001												
Manganese	2.00E-003	NA	NA	7.78E+002												
Mercury	3.00E-004	NA	NA	9.00E-002												
Nickel	8.00E-004	NA	NA	3.54E+001												
Nickelium	5.00E-003	NA	NA	4.90E-001												
Silver	2.00E-004	NA	NA	3.20E+000												
Vanadium	1.82E-004	NA	NA	3.36E+001												
Zinc	3.00E-001	NA	NA	1.14E+002												
<b>Other Analyses</b>																
Nitrate/Nitrite Nitrogen	1.60E+000	NA	NA	6.40E+000												
Fluoride	6.00E-002	NA	NA	2.70E+002												
<b>Total Hazard Quotient and Cancer Risk:</b>							7E-004	2E-007	2E-003	9E-008						
					<b>Assumptions for Park Worker</b>			<b>Assumptions for Recreational Visitor (Child)</b>								
					CF =	1E-006	kg/mg	CF =	1E-006	kg/mg						
					BW =	70	kg	BW =	15	kg						
					SA =	1,900	cm <sup>2</sup>	SA =	2,800	cm <sup>2</sup>						
					AF =	1	mg/cm <sup>2</sup> -event	AF =	1	mg/cm <sup>2</sup> -event						
					EF =	18	days/year	EF =	7	days/year						
					ED =	25	years	ED =	5	years						
					EV =	1	event/day	EV =	1	event/day						
					AT (No) =	9,125	days	AT (No) =	1,825	days						
					AT (Car) =	25,550	days	AT (Car) =	25,550	days						

Note: Cells in this table were intentionally left blank due to a lack of toxicity data.

NA = Information not available.

\* USEPA Region 2 recommends quantifying dermal exposure only for cadmium, arsenic, PCBs, dioxins/furans and pentachlorophenol, since absorption factors are not available for other chemicals of concern.

**TABLE A-17**  
**CALCULATED SOIL RECEPTOR EXPOSURE - SEAD-13**  
 Decision Document - Mini Risk Assessment  
 Seneca Army Depot Activity

Constituent	RME Concentration (mg/kg)	SP <sup>1</sup> (mg/kg dry tissue)/(mg/kg dry soil)	BAF <sup>2</sup> (mg/kg wet tissue)/(mg/kg dry soil)	Deer Mouse Exposure (mg/kg/day) <sup>3</sup>	Short-tailed Shrew Exposure (mg/kg/day) <sup>3</sup>	American Robin Exposure (mg/kg/day) <sup>3</sup>
<b>Volatile Organics</b>						
Acetone	8.60E-02	5.33E+01	3.90E-01	1.03E-01	2.58E-03	1.02E-01
Methyl ethyl ketone	2.60E-02	2.74E+01	1.20E-01	1.58E-02	3.50E-04	1.56E-02
Toluene	6.00E-03	1.39E+00	5.07E+00	3.49E-03	1.90E-03	3.45E-03
<b>Semivolatile Organics</b>						
2,4,6-Trichlorophenol	1.00E-02	6.60E-01	7.52E+01	8.14E-02	4.60E-02	8.01E-02
2,4-Dinitrotoluene	1.60E+00	5.05E+00	1.00E+00	3.55E-01	1.08E-01	3.53E-01
2-Methylnaphthalene	4.20E-02	1.63E-01	3.42E+00	1.58E-02	9.03E-03	1.57E-02
4-Methylphenol	9.20E+00	2.93E+00	1.00E+00	1.62E+00	6.18E-01	1.61E+00
Acenaphthene	6.50E-01	2.10E-01	3.42E-01	2.98E-02	1.76E-02	3.10E-02
Acenaphthylene	1.60E-02	1.72E-01	3.42E-01	7.21E-04	4.32E-04	7.50E-04
Anthracene	1.60E-02	1.04E-01	5.10E-02	1.94E-04	1.48E-04	2.32E-04
Benzo(a)anthracene	1.00E-01	1.51E-02	1.25E-01	1.82E-03	1.38E-03	2.05E-03
Benzo(a)pyrene	1.10E-01	1.02E+00	3.42E-01	6.97E-03	2.97E-03	7.14E-03
Benzo(b)fluoranthene	8.90E-02	6.17E-03	3.20E-01	3.48E-03	2.28E-03	3.65E-03
Benzo(ghi)perylene	8.60E-02	3.05E-03	2.40E-01	2.61E-03	1.79E-03	2.79E-03
Benzo(k)fluoranthene	7.40E-02	4.25E-03	2.53E-01	2.35E-03	1.60E-03	2.50E-03
bis(2-Ethylhexyl)phthalate	1.90E+00	5.10E-03	1.20E+01	2.47E+00	1.40E+00	2.44E+00
Carbazole	1.80E-01	3.30E-01	6.23E+01	1.21E+00	6.86E-01	1.19E+00
Chrysene	1.90E-01	2.22E-02	1.75E-01	4.52E-03	3.19E-03	4.93E-03
Di-n-butylphthalate	1.40E-01	8.84E-02	1.20E+01	1.82E-01	1.04E-01	1.80E-01
Di-n-octylphthalate	2.10E-01	1.60E-04	4.90E+03	1.11E+02	6.29E+01	1.09E+02
Dibenz(a,h)anthracene	1.50E-02	8.16E-03	3.68E-01	6.65E-04	4.29E-04	6.92E-04
Dibenzofuran	3.40E-01	1.51E-01	1.00E+00	3.93E-02	2.29E-02	3.96E-02
Fluoranthene	8.00E-01	3.72E-02	7.92E-01	7.26E-02	4.36E-02	7.35E-02
Fluorene	1.80E-02	1.49E-01	3.42E-01	8.02E-04	4.86E-04	8.35E-04
Hexachlorobenzene	2.10E-01	4.09E-02	2.30E+03	5.21E+01	2.95E+01	5.12E+01
Indeno(1,2,3-cd)pyrene	5.30E-02	1.37E-03	4.19E-01	2.63E-03	1.68E-03	2.73E-03
Naphthalene	5.10E-01	4.20E-01	3.42E-01	2.57E-02	1.38E-02	2.66E-02
Phenanthrene	1.40E+00	1.02E-01	1.22E-01	2.77E-02	1.90E-02	3.08E-02
Phenol	1.40E+01	5.40E+00	8.30E-02	1.82E+00	1.57E-01	1.83E+00
Pyrene	5.40E-01	4.43E-02	9.20E-02	8.26E-03	6.34E-03	9.50E-03
<b>Pesticides/PCB</b>						
4,4'-DDE	3.60E-03	1.80E-02	2.50E-02	2.70E-05	2.75E-05	3.57E-05
<b>Other Analyses<sup>5</sup></b>						
Nitrate/Nitrite Nitrogen	2.79E+01	nd	7.00E-01	2.23E+00	1.36E+00	2.27E+00
Fluoride	1.54E+02	nd	7.00E-01	1.23E+01	7.53E+00	1.25E+01

(1) SP: soil-to-plant uptake factor.

(2) BAF: bioaccumulation factor.

(3) Receptor exposure calculated as

$$ED = [(Cs * SP * CF * Ip) + (Cs * BAF * Ia) + (Cs * Is)] * SFF / BW$$

Where, ED = exposure dose

Cs = RME conc in soil (mg/kg)

CF = plant dry-to-wet-weight conversion factor  
(0.2 for all)

SP = soil-to-plant uptake factor

Ip = plant-matter intake rate (0.00216 kg/day for mouse, 0.0 kg/day for shrew, 0.017 kg/day for robin)

BAF = bioaccumulation factor (unitless)

Ia = animal-matter intake rate (0.00216 kg/day for mouse, 0.011 kg/day for shrew, 0.017 kg/day for robin)

Is = incidental soil intake rate (0.000088 kg/day for mouse, 0.00011 for shrew, 0.0011 for robin)

SFF = Site foraging factor (1 for mouse, shrew, and 0.5 for robin)

BW = body weight (0.02 kg for mouse, 0.018 kg for shrew, 0.077 kg for robin)

(4) Source: Travis and Arms, 1988; USEPA, 1999.

(5) Since there is no SP value available for this compound, the exposure value was calculated not including the soil-to-plant uptake term.

NOTE: Soil samples used in ecological risk assessment were taken from a depth of 0-2 ft below ground surface

**TABLE A-18a**  
**CALCULATION OF SOIL HAZARD QUOTIENTS - SEAD-13 - MAMMALS**  
 Decision Document - Mini Risk Assessment  
 Seneca Army Depot Activity

Constituent	Deer Mouse Exposure (mg/kg/day) <sup>1</sup>	Short-tailed Shrew Exposure (mg/kg/day) <sup>1</sup>	Toxicity Reference Value (mg/kg/day) <sup>2</sup>	Deer Mouse Hazard Quotient <sup>3</sup>	Short-tailed Shrew Hazard Quotient <sup>3</sup>
<b>Volatile Organics</b>					
Acetone	1.03E-01	2.58E-03	1.00E+01	1.0E-02	2.6E-04
Methyl ethyl ketone	1.58E-02	3.50E-04	1.77E+02	8.9E-05	2.0E-06
Toluene	3.49E-03	1.90E-03	2.60E+01	1.3E-04	7.3E-05
<b>Semivolatile Organics</b>					
2,4,6-Trichlorophenol	8.14E-02	4.60E-02	3.50E-01	2.3E-01	1.3E-01
2,4-Dinitrotoluene	3.55E-01	1.08E-01	4.70E+01	7.5E-03	2.3E-03
2-Methylnaphthalene	1.58E-02	9.03E-03	7.16E+00	2.2E-03	1.3E-03
4-Methylphenol	1.62E+00	6.18E-01	2.19E+02	7.4E-03	2.8E-03
Acenaphthene	2.98E-02	1.76E-02	1.75E+00	1.7E-02	1.0E-02
Acenaphthylene	7.21E-04	4.32E-04	1.00E+00	7.2E-04	4.3E-04
Anthracene	1.94E-04	1.48E-04	1.00E+02	1.9E-06	1.5E-06
Benzo(a)anthracene	1.82E-03	1.38E-03	1.00E+00	1.8E-03	1.4E-03
Benzo(a)pyrene	6.97E-03	2.97E-03	1.00E+00	7.0E-03	3.0E-03
Benzo(b)fluoranthene	3.48E-03	2.28E-03	1.00E+00	3.5E-03	2.3E-03
Benzo(ghi)perylene	2.61E-03	1.79E-03	1.00E+00	2.6E-03	1.8E-03
Benzo(k)fluoranthene	2.35E-03	1.60E-03	1.00E+00	2.4E-03	1.6E-03
bis(2-Ethylhexyl)phthalate	2.47E+00	1.40E+00	6.00E+01	4.1E-02	2.3E-02
Carbazole	1.21E+00	6.86E-01	5.00E+00	2.4E-01	1.4E-01
Chrysene	4.52E-03	3.19E-03	1.00E+00	4.5E-03	3.2E-03
Di-n-butylphthalate	1.82E-01	1.04E-01	5.50E+02	3.3E-04	1.9E-04
Di-n-octylphthalate	1.11E+02	6.29E+01	7.50E+03	1.5E-02	8.4E-03
Dibenz(a,h)anthracene	6.65E-04	4.29E-04	1.00E+00	6.6E-04	4.3E-04
Dibenzofuran	3.93E-02	2.29E-02	none available	--	--
Fluoranthene	7.26E-02	4.36E-02	1.25E+00	5.8E-02	3.5E-02
Fluorene	8.02E-04	4.86E-04	1.25E+00	6.4E-04	3.9E-04
Hexachlorobenzene	5.21E+01	2.95E+01	2.20E+00	2.4E+01	1.3E+01
Indeno(1,2,3-cd)pyrene	2.63E-03	1.68E-03	1.00E+00	2.6E-03	1.7E-03
Naphthalene	2.57E-02	1.38E-02	7.16E+00	3.6E-03	1.9E-03
Phenanthrene	2.77E-02	1.90E-02	1.00E+00	2.8E-02	1.9E-02
Phenol	1.82E+00	1.57E-01	4.00E+00	4.6E-01	3.9E-02
Pyrene	8.26E-03	6.34E-03	1.00E+00	8.3E-03	6.3E-03
<b>Pesticides/PCB</b>					
4,4'-DDE	2.70E-05	2.75E-05	8.00E-01	3.4E-05	3.4E-05
<b>Other Analyses</b>					
Nitrate/Nitrite Nitrogen	2.23E+00	1.36E+00	5.07E+02	4.4E-03	2.7E-03
Fluoride	1.23E+01	7.53E+00	none available	--	--

(1) Receptor exposure from Table A-17.  
 (2) Toxicity reference value from Table 3.6-4.  
 (3) Hazard quotient calculated as  $HQ = \text{exposure rate} / \text{toxicity reference value}$   
 with  $HQ < 1$ , no effects expected  
      $1 < HQ \leq 10$ , small potential for effects  
      $10 < HQ \leq 100$ , potential for greater exposure to result in effects, and  
      $HQ > 100$ , highest potential for effects.

**TABLE A-18b**  
**CALCULATION OF SOIL HAZARD QUOTIENTS - SEAD-13 - BIRDS**  
Decision Document - Mini Risk Assessment  
Seneca Army Depot Activity

Constituent	American Robin Exposure (mg/kg/day) 1	Toxicity Reference Value (mg/kg/day) <sup>2</sup>	American Robin Hazard Quotient <sup>3</sup>
<b>Volatile Organics</b>			
Acetone	1.02E-01	6.10E+02	1.7E-04
Methyl ethyl ketone	1.56E-02	none available	--
Toluene	3.45E-03	none available	--
<b>Semivolatile Organics</b>			
2,4,6-Trichlorophenol	8.01E-02	none available	--
2,4-Dinitrotoluene	3.53E-01	none available	--
2-Methylnaphthalene	1.57E-02	2.85E+01	5.5E-04
4-Methylphenol	1.61E+00	2.06E-01	7.8E+00
Acenaphthene	3.10E-02	1.00E+03	3.1E-05
Acenaphthylene	7.50E-04	1.00E+03	7.5E-07
Anthracene	2.32E-04	1.00E+03	2.3E-07
Benzo(a)anthracene	2.05E-03	4.00E+01	5.1E-05
Benzo(a)pyrene	7.14E-03	4.00E+01	1.8E-04
Benzo(b)fluoranthene	3.65E-03	4.00E+01	9.1E-05
Benzo(ghi)perylene	2.79E-03	4.00E+01	7.0E-05
Benzo(k)fluoranthene	2.50E-03	4.00E+01	6.3E-05
bis(2-Ethylhexyl)phthalate	2.44E+00	1.11E+00	2.2E+00
Carbazole	1.19E+00	none available	--
Chrysene	4.93E-03	4.00E+01	1.2E-04
Di-n-butylphthalate	1.80E-01	1.11E-01	1.6E+00
Di-n-octylphthalate	1.09E+02	none available	--
Dibenz(a,h)anthracene	6.92E-04	4.00E+01	1.7E-05
Dibenzofuran	3.96E-02	2.18E-01	1.8E-01
Fluoranthene	7.35E-02	4.00E+01	1.8E-03
Fluorene	8.35E-04	2.85E+01	2.9E-05
Hexachlorobenzene	5.12E+01	2.25E+00	2.3E+01
Indeno(1,2,3-cd)pyrene	2.73E-03	4.00E+01	6.8E-05
Naphthalene	2.66E-02	2.85E+01	9.3E-04
Phenanthrene	3.08E-02	2.85E+01	1.1E-03
Phenol	1.83E+00	none available	--
Pyrene	9.50E-03	4.00E+01	2.4E-04
<b>Pesticides/PCB</b>			
4,4'-DDE	3.57E-05	5.60E-02	6.4E-04
<b>Other Analyses</b>			
Nitrate/Nitrite Nitrogen	2.27E+00	none available	--
Fluoride	1.25E+01	none available	--

(1) Receptor exposure from Table A-17.  
(2) Toxicity reference value from Table 3.6-4.  
(3) Hazard quotient calculated as  $HQ = \text{exposure rate} / \text{toxicity reference value}$   
with  $HQ < 1$ , no effects expected  
 $1 < HQ \leq 10$ , small potential for effects  
 $10 < HQ \leq 100$ , potential for greater exposure to result in effects, and  
 $HQ > 100$ , highest potential for effects.

**Table A-19**  
**CALCULATED ECOLOGICAL QUOTIENTS**  
**CURRENT AQUATIC RECEPTORS**  
**SURFACE WATER - SEAD-13**  
**Decision Document - Mini Risk Assessment**  
**Seneca Army Depot Activity**

COMPOUND	RME CONCENTRATION	NYSDEC AWQC	HAZARD QUOTIENT
	(1)	CLASS C (2)	
	mg/L	mg/L	
<b>SEMIVOLATILE ORGANICS</b>			
4-Methylphenol	0.0	NA	--
Isophorone	0.0	NA	--
Phenol	0.0	0.0	<b>1.9</b>
<b>METALS</b>			
Aluminum	3.8	0.1	<b>38</b>
Antimony	0.0	NA	--
Arsenic	0.0	0.2	0.0
Barium	0.1	NA	--
Calcium	75	NA	--
Chromium	0.0	0.1	0.0
Cobalt	0.0	0.0	0.3
Copper	0.0	0.0	0.4
Iron	5.9	0.3	<b>20</b>
Lead	0.0	0.2	0.0
Magnesium	14	NA	--
Manganese	1.9	NA	--
Mercury	0.0	0.0	0.1
Nickel	0.0	0.1	0.1
Potassium	7.2	NA	--
Sodium	70.0	NA	--
Vanadium	0.0	0.0	0.4
Zinc	0.0	0.2	0.2
<b>OTHER ANALYSES</b>			
Nitrate/Nitrite Nitrogen	0.1	NA	--
Fluoride	0.4	NA	--

Notes:

- 1) RME concentrations are the maximum concentrations detected for each analyte
- 2) New York State Water Quality Criteria Standard for Class C Stream (October 1998). Hardness depends on a hardness of 217 mg/l.

NA = Not Available

**Table A-20**  
**CALCULATED ECOLOGICAL QUOTIENTS**  
**CURRENT AQUATIC RECEPTORS**  
**SEDIMENT - SEAD-13**  
**Decision Document - Mini Risk Assessment**  
**Seneca Army Depot Activity**

COMPOUND	RME CONCENTRATION <sup>(1)</sup>	CRITERIA VALUE <sup>(2)</sup>	HAZARD QUOTIENT
	mg/kg	mg/kg	
<b>VOLATILE ORGANICS</b>			
Acetone	0.38	NA	--
Methyl ethyl ketone	0.14	NA	--
<b>SEMIVOLATILE ORGANICS</b>			
2-Methylnaphthalene	0.01	1.3	0.0
4-Methylphenol	0.058	0.0	<b>3.0</b>
Acenaphthylene	0.0088	NA	--
Anthracene	0.0083	4.2	0.0
Benzo(a)anthracene	0.09	0.5	0.2
Benzo(a)pyrene	0.088	NA	--
Benzo(b)fluoranthene	0.086	NA	--
Benzo(ghi)perylene	0.057	NA	--
Benzo(k)fluoranthene	0.055	NA	--
Chrysene	0.19	NA	--
Di-n-octylphthalate	0.0099	NA	--
Dibenz(a,h)anthracene	0.016	NA	--
Dibenzofuran	0.0043	NA	--
Fluoranthene	0.12	39.9	0.0
Fluorene	0.0064	0.3	0.0
Indeno(1,2,3-cd)pyrene	0.044	NA	--
Naphthalene	0.0068	1.2	0.0
Phenanthrene	0.16	4.7	0.0
Pyrene	0.27	37.6	0.0
<b>NITROAROMATICS</b>			
Tetryl	0.2	NA	--
<b>METALS</b>			
Aluminum	18400	NA	--
Antimony	0.65	2.0	0.3
Arsenic	4.8	6.0	0.8
Barium	164	NA	--
Beryllium	1	NA	--
Cadmium	0.96	0.6	<b>1.6</b>
Calcium	42200	NA	--
Chromium	27.7	26.0	<b>1.1</b>
Cobalt	13.5	NA	--
Copper	20.7	16.0	<b>1.3</b>
Iron	29400	20000.0	<b>1.5</b>
Lead	33.3	31.0	<b>1.1</b>
Magnesium	7110	NA	--
Manganese	778	460.0	<b>1.7</b>
Mercury	0.09	0.2	0.6
Nickel	35.4	16.0	<b>2.2</b>
Potassium	2830	NA	--
Selenium	0.49	NA	--
Silver	3.2	1.0	<b>3.2</b>
Sodium	326	NA	--
Vanadium	33.6	NA	--
Zinc	114	120.0	0.95
<b>OTHER ANALYSES</b>			
Nitrate/Nitrite Nitrogen	6.4	NA	--
Fluoride	270	NA	--

NOTES:

- 1) RME concentrations are the maximum concentrations detected for each analyte
- 2) From Technical Guidance for Screening Contaminated Sediments, NYSDEC Division of Fish, Wildlife and Marine Resources, January, 1999, Table 1 used for SVOC's: Benthic Aquatic Life Chronic Toxicity (BALCT). For metals, the lowest value from Table 2 was used.
- 3) NA = Not Applicable

**APPENDIX B**  
**Risk Calculation Tables For Residential Scenario**  
**Background Data**

Table B-1.1:	Exposure Factor Assumptions for Residential Scenario
Table B-2.1:	Ambient Air Exposure Point Concentrations – SEAD-13
Table B-2.2:	Calculation of Intake from Inhalation of Dust in Ambient Air
Table B-2.3:	Calculation of Intake and Risk from the Ingestion of Soil
Table B-2.4:	Calculation of Absorbed Dose and Risk form Dermal Contact to Soil
Table B-2.5:	Calculation of Intake and Risk from Inhalation of Groundwater (While Showering)
Table B-2.6:	Calculation of Intake and Risk from the Ingestion of Groundwater
Table B-2.7:	Calculation of Intake and Risk from Dermal Contact to Groundwater (While Showering)
Table B-2.8:	Calculation of Total Noncarcinogenic and Carcinogenic Risks
Table B-3.1:	Background Soil Data
Table B-3.2:	Background Groundwater Data



**TABLE B-1.1**  
**EXPOSURE FACTOR ASSUMPTIONS FOR RESIDENTIAL SCENARIO**  
 Decision Document - Mini Risk Assessment  
 Seneca Army Depot Activity

RECEPTOR	EXPOSURE ROUTE	PARAMETER	RME		BASIS	SOURCE
			VALUE	UNITS		
RESIDENT (ADULT)	Inhalation of Dust in Ambient Air  (Air EPC Calculated from Surface Soil Only)	Body Weight	70	kg	Standard reference weight for adult males.	USEPA, 1991.
		Inhalation Rate	20	m <sup>3</sup> /day	Assumed inhalation rate for adult receptors.	USEPA, 1991, 1993.
		Exposure Frequency	350	days/yr	Assumes year round exposure to soil and vacation from home for 2 wks/yr.	USEPA, 1991.
		Exposure Duration	24	years	Upper bound time in 1 residence: 6 years as a child, 24 years as an adult.	USEPA, 1991, 1993.
		Averaging Time - Nc	8,760	days	24 years.	USEPA, 1989.
		Averaging Time - Car	25,550	days	70 years, conventional human life span.	USEPA, 1989.
	Ingestion of Soil  (Soil EPC Calculated from Surface Soil Only)	Body Weight	70	kg	Standard reference weight for adult males.	USEPA, 1991.
Ingestion Rate		100	mg soil/day	Average residential adult exposure to indoor and outdoor dirt and dust.	USEPA, 1991, 1993.	
Fraction Ingested		1	(unitless)	100% ingestion, conservative assumption.	BPJ.	
Exposure Frequency		350	days/yr	Assumes year round exposure to soil and vacation from home for 2 wks/yr.	USEPA, 1991.	
Exposure Duration		24	years	Upper bound time in 1 residence: 6 years as a child, 24 years as an adult.	USEPA, 1991, 1993.	
Averaging Time - Nc		8,760	days	24 years.	USEPA, 1989.	
Dermal Contact of Soil  (Soil EPC Calculated from Surface Soil Only)	Averaging Time - Car	25,550	days	70 years, conventional human life span.	USEPA, 1989.	
	Body Weight	70	kg	Standard reference weight for adult males.	USEPA, 1991.	
	Absorption Factor	Compound	Specific			
	Skin Contact Surface Area	5,700	cm <sup>2</sup>	RME for residential scenario.	USEPA, 2001.	
	Soil to Skin Adherence Factor	0.07	mg/cm <sup>2</sup> -event	RME for residential scenario.	USEPA, 2001.	
	Exposure Frequency	350	days/yr	Assumes year round exposure to soil and vacation from home for 2 wks/yr.	USEPA, 1991.	
	Exposure Duration	24	years	Upper bound time in 1 residence: 6 years as a child, 24 years as an adult.	USEPA, 1991, 1993.	
Event Frequency	1	event/day	RME for residential scenario.	USEPA, 2001.		
Averaging Time - Nc	8,760	days	24 years.	USEPA, 1989.		
Averaging Time - Car	25,550	days	70 years, conventional human life span.	USEPA, 1989.		
Inhalation of Groundwater	Body Weight	70	kg	Standard reference weight for adult males.	USEPA, 1991.	
	Inhalation Rate	0.29	m <sup>3</sup> /day	Inhalation rate for sedentary adults, 0.5m <sup>3</sup> /hr for 0.58 hr.	USEPA, 1997.	
	Exposure Frequency	3.65	days/yr	Showers 15 min/day, 350 days/yr.	BPJ.	
	Exposure Duration	24	years	Upper bound time in 1 residence: 6 years as a child, 24 years as an adult.	USEPA, 1991, 1993.	
	Averaging Time - Nc	8,760	days	24 years.	USEPA, 1989.	
Averaging Time - Car	25,550	days	70 years, conventional human life span.	USEPA, 1989.		
Ingestion of Groundwater	Body Weight	70	kg	Standard reference weight for adult males.	USEPA, 1991.	
	Ingestion Rate	2	liter/day	90th percentile for adult residents.	USEPA, 1989.	
	Exposure Frequency	350	days/yr	Assumes year round exposure to gw and vacation from home for 2 wks/yr.	BPJ.	
	Exposure Duration	24	years	Upper bound time in 1 residence: 6 years as a child, 24 years as an adult.	USEPA, 1991, 1993.	
	Averaging Time - Nc	8,760	days	24 years.	USEPA, 1989.	
Averaging Time - Car	25,550	days	70 years, conventional human life span.	USEPA, 1989.		
Dermal Contact of Groundwater	Body Weight	70	kg	Standard reference weight for adult males.	USEPA, 1991.	
	Skin Contact Surface Area	18,000	cm <sup>2</sup>	RME for showering scenario.	USEPA, 2001.	
	Event Duration	0.58	hours/day	RME for showering scenario.	USEPA, 2001.	
	Exposure Frequency	350	days/yr	Assumes year round exposure to gw and vacation from home for 2 wks/yr.	USEPA, 1991.	
	Exposure Duration	24	years	Upper bound time in 1 residence: 6 years as a child, 24 years as an adult.	USEPA, 1991, 1993.	
	Event Frequency	1	event/day	RME for showering scenario.	USEPA, 2001.	
Averaging Time - Nc	8,760	days	24 years.	USEPA, 1989.		
Averaging Time - Car	25,550	days	70 years, conventional human life span.	USEPA, 1989.		

**TABLE B-1.1**  
**EXPOSURE FACTOR ASSUMPTIONS FOR RESIDENTIAL SCENARIO**  
 Decision Document - Mini Risk Assessment  
 Seneca Army Depot Activity

RECEPTOR	EXPOSURE ROUTE	PARAMETER	RME		BASIS	SOURCE
			VALUE	UNITS		
RESIDENT (CHILD)	Inhalation of Dust in Ambient Air  (Air EPC Calculated from Surface Soil Only)	Body Weight	15	kg	Standard reference weight for children less than 6 years old.	USEPA, 1991 1993.
		Inhalation Rate	8.7	m <sup>3</sup> /day	Average inhalation rate for a child 1-12 years old.	USEPA, 1997.
		Exposure Frequency	350	days/yr	Assumes year round exposure to soil and vacation from home for 2 wks/yr.	USEPA, 1991.
		Exposure Duration	6	years	Upper bound time in 1 residence: 6 years as a child, 24 years as an adult.	USEPA, 1991, 1993.
		Averaging Time - Nc	2,190	days	6 years.	USEPA, 1989.
		Averaging Time - Car	25,550	days	70 years, conventional human life span.	USEPA, 1989.
	Ingestion of Soil  (Soil EPC Calculated from Surface Soil Only)	Body Weight	15	kg	Standard reference weight for children less than 6 years old.	USEPA, 1991, 1993.
Ingestion Rate		200	mg soil/day	Maximum IR for a child.	USEPA, 1993.	
Fraction Ingested		1	(unitless)	100% ingestion, conservative assumption.	BPJ.	
Exposure Frequency		350	days/yr	Assumes year round exposure to soil and vacation from home for 2 wks/yr.	USEPA, 1991.	
Exposure Duration		6	years	Upper bound time in 1 residence: 6 years as a child, 24 years as an adult.	USEPA, 1991, 1993.	
Averaging Time - Nc		2,190	days	6 years.	USEPA, 1989.	
Dermal Contact of Soil  (Soil EPC Calculated from Surface Soil Only)	Body Weight	15	kg	Standard reference weight for children less than 6 years old.	USEPA, 1991, 1993.	
	Absorption Factor	Compound	Specific			
	Skin Contact Surface Area	2,800	cm <sup>2</sup>	Head, hands, forearms, lower legs, and feet. RME for residential scenario.	USEPA, 2001.	
	Soil to Skin Adherence Factor	0.2	mg/cm <sup>2</sup> -event	RME for residential scenario.	USEPA, 2001.	
	Exposure Frequency	350	days/yr	Assumes year round exposure to soil and vacation from home for 2 wks/yr.	USEPA, 1991.	
	Exposure Duration	6	years	Upper bound time in 1 residence: 6 years as a child, 24 years as an adult.	USEPA, 1991, 1993.	
Inhalation of Groundwater	Body Weight	15	kg	Standard reference weight for children less than 6 years old.	USEPA, 1991, 1993.	
	Inhalation Rate	0.3	m <sup>3</sup> /day	Inhalation rate for sedentary children ages 3-10, 0.3 m <sup>3</sup> /hr for 1hr.	USEPA, 1997.	
	Exposure Frequency	3.65	days/yr	Showers 15 min/day, 350 days/yr.	BPJ.	
	Exposure Duration	6	years	Upper bound time in 1 residence: 6 years as a child, 24 years as an adult.	USEPA, 1991, 1993.	
	Averaging Time - Nc	2,190	days	6 years.	USEPA, 1989.	
	Averaging Time - Car	25,550	days	70 years, conventional human life span.	USEPA, 1989.	
Ingestion of Groundwater	Body Weight	15	kg	Standard reference weight for children less than 6 years old.	USEPA, 1991, 1993.	
	Ingestion Rate	1	liter/day	Approximate 90th percentile value for children 1-11 years old.	USEPA, 1997.	
	Exposure Frequency	350	days/yr	Assumes year round exposure to gw and vacation from home for 2 wks/yr.	USEPA, 1991.	
	Exposure Duration	6	years	Upper bound time in 1 residence: 6 years as a child, 24 years as an adult.	USEPA, 1991, 1993.	
	Averaging Time - Nc	2,190	days	6 years.	USEPA, 1989.	
	Averaging Time - Car	25,550	days	70 years, conventional human life span.	USEPA, 1989.	
Dermal Contact of Groundwater	Body Weight	15	kg	Standard reference weight for children less than 6 years old.	USEPA, 1991, 1993.	
	Skin Contact Surface Area	6,600	cm <sup>2</sup>	RME for showering scenario.	USEPA, 2001.	
	Event Duration	1	hours/day	RME for showering scenario.	USEPA, 2001.	
	Exposure Frequency	350	days/yr	Assumes year round exposure to gw and vacation from home for 2 wks/yr.	USEPA, 1991.	
	Exposure Duration	6	years	Upper bound time in 1 residence: 6 years as a child, 24 years as an adult.	USEPA, 1991, 1993.	
	Event Frequency	1	event/day	RME for showering scenario.	USEPA, 2001.	
Notes:	RME = Reasonable Maximum Exposure	Source References:				
	Car = Carcinogenic	<ul style="list-style-type: none"> <li>- BPJ: Best Professional Judgment.</li> <li>- USEPA, 1988: Superfund Exposure Assessment Manual</li> <li>- USEPA, 1989: Risk Assessment Guidance for Superfund, Volume I (RAGS)</li> <li>- USEPA, 1991: Supplemental Guidance, Standard Default Exposure Factors</li> <li>- USEPA, 1992: Dermal Exposure Assessment, Principles and Applications</li> <li>- USEPA, 1993: Superfund's Standard Default Exposure for the Central Tendency and Reasonable Maximum Exposure</li> <li>- USEPA, 1997: Exposure Factors Handbook, Update to 1990 handbook</li> <li>- USEPA, 2001: Supplemental Guidance for Dermal Risk Assessment</li> </ul>				
Nc = Non-carcinogenic						

**TABLE B-2.1**  
**AMBIENT AIR EXPOSURE POINT CONCENTRATIONS - SEAD-13**  
**Decision Document - Mini Risk Assessment**  
**Seneca Army Depot Activity**

Equation for Air EPC from Surface Soil (mg/m <sup>3</sup> ) CS <sub>surf</sub> x PM10 x CF		
Variables:		
CS <sub>surf</sub> = Chemical Concentration in Surface Soil, from EPC data (mg/kg)		
PM10 = Average Measured PM10 Concentration = 17 ug/m <sup>3</sup>		
CF = Conversion Factor = 1E-9 kg/ug		
Analyte	EPC Data for Surface Soil (mg/kg)	Calculated Air EPC Surface Soil (mg/m <sup>3</sup> )
<b>Volatile Organics</b>		0.00E+00
Acetone	8.60E-02	1.46E-09
Methyl ethyl ketone	2.60E-02	4.42E-10
Toluene	6.00E-03	1.02E-10
<b>Semivolatile Organics</b>		0.00E+00
2,4,6-Trichlorophenol	1.00E-02	1.70E-10
2,4-Dinitrotoluene	1.60E+00	2.72E-08
2-Methylnaphthalene	4.20E-02	7.14E-10
4-Methylphenol	9.20E+00	1.56E-07
Acenaphthene	6.50E-01	1.11E-08
Acenaphthylene	1.60E-02	2.72E-10
Anthracene	1.60E-02	2.72E-10
Benzo(a)anthracene	1.00E-01	1.70E-09
Benzo(a)pyrene	1.10E-01	1.87E-09
Benzo(b)fluoranthene	8.90E-02	1.51E-09
Benzo(ghi)perylene	8.60E-02	1.46E-09
Benzo(k)fluoranthene	7.40E-02	1.26E-09
bis(2-Ethylhexyl)phthalate	1.90E+00	3.23E-08
Carbazole	1.80E-01	3.06E-09
Chrysene	1.90E-01	3.23E-09
Di-n-butylphthalate	1.40E-01	2.38E-09
Di-n-octylphthalate	2.10E-01	3.57E-09
Dibenz(a,h)anthracene	1.50E-02	2.55E-10
Dibenzofuran	3.40E-01	5.78E-09
Fluoranthene	8.00E-01	1.36E-08
Fluorene	1.80E-02	3.06E-10
Hexachlorobenzene	2.10E-01	3.57E-09
Indeno(1,2,3-cd)pyrene	5.30E-02	9.01E-10
Naphthalene	5.10E-01	8.67E-09
Phenanthrene	1.40E+00	2.38E-08
Phenol	1.40E+01	2.38E-07
Pyrene	5.40E-01	9.18E-09
<b>Pesticides/PCB</b>		
4,4'-DDE	3.60E-03	6.12E-11
<b>Other Analytes</b>		
Nitrate/Nitrite Nitrogen	2.79E+01	4.74E-07
Fluoride	1.54E+02	2.62E-06

ND = Compound was not detected.

**TABLE B-2.2**  
**CALCULATION OF INTAKE AND RISK FROM INHALATION OF DUST IN AMBIENT AIR**  
**REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-13**  
**Decision Document - Mini Risk Assessment**  
**Seneca Army Depot Activity**

Equation for Intake (mg/kg-day) = $\frac{CA \times IR \times EF \times ED}{BW \times AT}$	Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose
Variables (Assumptions for Each Receptor are Listed at the Bottom): CA = Chemical Concentration in Air, Calculated from Air EPC Data IR = Inhalation Rate EF = Exposure Frequency	ED = Exposure Duration BW = Bodyweight AT = Averaging Time
Equation for Contribution to Lifetime Cancer Risk = Chronic Daily Intake (Car) x Slope Factor Equation for Total Lifetime Cancer Risk = Adult Contribution + Child Contribution	

Analyte	Inhalation RfD (mg/kg-day)	Carc. Slope Inhalation (mg/kg-day) <sup>-1</sup>	Air EPC* from Surface Soil (mg/m3)	Resident (Adult)			Resident (Child)		Resident Total Lifetime Cancer Risk			
				Intake (mg/kg-day)		Hazard Quotient	Contribution to Lifetime Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Contribution to Lifetime Cancer Risk	
				(Nc)	(Car)			(Nc)				(Car)
<b>Volatile Organics</b>												
Acetone	NA	NA	1.46E-009									
Carbon Disulfide	2.00E-001	NA	ND									
Methylene Chloride	8.57E-001	1.65E-003	ND									
Methyl ethyl ketone	2.86E-001	NA	4.42E-010	1.21E-010		4E-010	2.46E-010	9E-010				
Toluene	1.14E-001	NA	1.02E-010	2.79E-011		2E-010	5.67E-011	5E-010				
<b>Semivolatile Organics</b>												
2,4,6-Trichlorophenol	NA	1.09E-002	1.70E-010		1.60E-011							
2,4-Dinitrotoluene	NA	NA	2.72E-008									
2-Methylnaphthalene	NA	NA	7.14E-010									
4-Methylphenol	NA	NA	1.56E-007									
Acenaphthene	NA	NA	1.11E-008									
Acenaphthylene	NA	NA	2.72E-010									
Anthracene	NA	NA	2.72E-010									
Benzo(a)anthracene	NA	NA	1.70E-009									
Benzo(a)pyrene	NA	NA	1.87E-009									
Benzo(b)fluoranthene	NA	NA	1.51E-009									
Benzo(ghi)perylene	NA	NA	1.46E-009									
Benzo(k)fluoranthene	NA	NA	1.26E-009									
bis(2-Ethylhexyl)phthalate	NA	NA	3.23E-008									
Carbazole	NA	NA	3.06E-009									
Chrysene	NA	NA	3.23E-009									
Di-n-butylphthalate	NA	NA	2.38E-009									
Di-n-octylphthalate	NA	NA	3.57E-009									
Dibenz(a,h)anthracene	NA	NA	2.55E-010									
Dibenzofuran	NA	NA	5.78E-009									
Fluoranthene	NA	NA	1.36E-008									
Fluorene	NA	NA	3.06E-010									
Hexachlorobenzene	NA	1.61E+000	3.57E-009									
Indeno(1,2,3-cd)pyrene	NA	NA	9.01E-010									
Naphthalene	8.60E-004	NA	8.67E-009	2.38E-009		3E-006	4.82E-009	6E-006				
Phenanthrene	NA	NA	2.38E-008									
Phenol	NA	NA	2.38E-007									
Pyrene	NA	NA	9.18E-009									
<b>Pesticides/PCB</b>												
4,4'-DDE	NA	NA	6.12E-011									
<b>Other Analytes</b>												
Nitrate/Nitrite Nitrogen	NA	NA	4.74E-007									
Fluoride	NA	NA	2.62E-006									
<b>Total Hazard Quotient and Cancer Risk:</b>						<b>3E-006</b>	<b>5E-010</b>		<b>6E-006</b>	<b>3E-010</b>	<b>8E-010</b>	
				<b>Assumptions for Resident (Adult)</b>				<b>Assumptions for Resident (Child)</b>				
				CA = EPC Surface Only				CA = EPC Surface Only				
				BW = 70 kg				BW = 15 kg				
				IR = 20 m3/day				IR = 8.7 m3/day				
				EF = 350 days/year				EF = 350 days/year				
				ED = 24 years				ED = 6 years				
				AT (Nc) = 8,760 days				AT (Nc) = 2,190 days				
				AT (Car) = 25,550 days				AT (Car) = 25,550 days				

Note: Cells in this table were intentionally left blank due to a lack of toxicity data.  
 \* See Table B-1 for calculation of Air EPC.  
 NA= Information not available.  
 ND=Compound not detected

**TABLE B-2.3  
CALCULATION OF INTAKE AND RISK FROM THE INGESTION OF SOIL  
REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-13  
Decision Document - Mini Risk Assessment  
Seneca Army Depot Activity**

Equation for Intake (mg/kg-day) =	$\frac{CS \times IR \times CF \times FI \times EF \times ED}{BW \times AT}$	Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose
Variables (Assumptions for Each Receptor are Listed at the Bottom):		Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor
CS = Chemical Concentration in Soil, Calculated from Soil EPC Data	EF = Exposure Frequency	Equation for Total Lifetime Cancer Risk = Adult Contribution + Child Contribution
IR = Ingestion Rate	ED = Exposure Duration	
CF = Conversion Factor	BW = Bodyweight	
FI = Fraction Ingested	AT = Averaging Time	

Analyte	Oral RFD (mg/kg-day)	Carc. Slope Oral (mg/kg-day)-1	EPC Surface Soil (mg/kg)	Resident (Adult)			Resident (Child)			Resident Total Lifetime Cancer Risk		
				Intake (mg/kg-day)		Hazard Quotient	Intake (mg/kg-day)		Hazard Quotient			
				(Nc)	(Car)		(Nc)	(Car)				
<b>Volatile Organics</b>												
Acetone	1.00E-001	NA	8.60E-002	1.18E-007		1E-006		1.10E-006	1E-005			
Carbon Disulfide	1.00E-001	NA	ND									
Methylene Chloride	6.00E-002	7.50E-003	ND									
Methyl ethyl ketone	6.00E-001	NA	2.60E-002	3.56E-008		6E-008		3.32E-007	6E-007			
Toluene	2.00E-001	NA	6.00E-003	8.22E-009		4E-008		7.67E-008	4E-007			
<b>Semivolatile Organics</b>												
2,4,6-Trichlorophenol	NA	1.10E-002	1.00E-002		4.70E-009					5E-011		
2,4-Dinitrotoluene	2.00E-003	6.80E-001	1.60E+000	2.19E-006	7.51E-007	1E-003	5E-007	2.05E-005	1.75E-006	1E-002		
2-Methylnaphthalene	4.00E-002	NA	4.20E-002	5.75E-008		1E-006		5.37E-007		1E-005		
4-Methylphenol	5.00E-003	NA	9.20E+000	1.26E-005		3E-003		1.18E-004		2E-002		
Acenaphthene	6.00E-002	NA	6.50E-001	8.90E-007		1E-005		8.31E-006		1E-004		
Acenaphthylene	NA	NA	1.60E-002									
Anthracene	3.00E-001	NA	1.60E-002	2.19E-008		7E-008		2.05E-007		7E-007		
Benzo(a)anthracene	NA	7.30E-001	1.00E-001		4.70E-008		3E-008	1.10E-007		8E-008		
Benzo(a)pyrene	NA	7.30E+000	1.10E-001		5.17E-008		4E-007	1.21E-007		9E-007		
Benzo(b)fluoranthene	NA	7.30E-001	8.90E-002		4.18E-008		3E-008	9.75E-008		7E-008		
Benzo(ghi)perylene	NA	NA	8.60E-002									
Benzo(k)fluoranthene	NA	7.30E-002	7.40E-002		3.48E-008		3E-009	8.11E-008		6E-009		
bis(2-Ethylhexyl)phthalate	2.00E-002	1.40E-002	1.90E+000	2.60E-006	8.92E-007	1E-004	1E-008	2.43E-005	2.08E-006	1E-003		
Carbazole	NA	2.00E-002	1.80E-001		8.45E-008		2E-009	1.97E-007		4E-009		
Chrysene	NA	7.30E-003	1.90E-001		8.92E-008		7E-010	2.08E-007		2E-009		
Di-n-butylphthalate	1.00E-001	NA	1.40E-001	1.92E-007		2E-006		1.79E-006		2E-005		
Di-n-octylphthalate	2.00E-002	NA	2.10E-001	2.88E-007		1E-005		2.68E-006		1E-004		
Dibenz(a,h)anthracene	NA	7.30E+000	1.50E-002		7.05E-009		5E-008	1.64E-008		1E-007		
Dibenzofuran	NA	NA	3.40E-001									
Fluoranthene	4.00E-002	NA	8.00E-001	1.10E-006		3E-005		1.02E-005		3E-004		
Fluorene	4.00E-002	NA	1.80E-002	2.47E-008		6E-007		2.30E-007		6E-006		
Hexachlorobenzene	8.00E-004	1.60E+000	2.10E-001	2.88E-007	9.86E-008	4E-004	2E-007	2.68E-006	2.30E-007	3E-003		
Indeno(1,2,3-cd)pyrene	NA	7.30E-001	5.30E-002		2.49E-008		2E-008	5.81E-008		4E-008		
Naphthalene	2.00E-002	NA	5.10E-001	6.99E-007		3E-005		6.52E-006		3E-004		
Phenanthrene	NA	NA	1.40E+000									
Phenol	6.00E-001	NA	1.40E+001	1.92E-005		3E-005		1.79E-004		3E-004		
Pyrene	3.00E-002	NA	5.40E-001	7.40E-007		2E-005		6.90E-006		2E-004		
<b>Pesticides/PCB</b>												
4,4'-DDE	NA	3.40E-001	3.60E-003		1.69E-009			3.95E-009		1E-009		
<b>Other Analyses</b>												
Nitrate/Nitric Nitrogen	1.60E+000	NA	2.79E+001	3.82E-005		2E-005		3.57E-004		2E-004		
Fluoride	6.00E-002	NA	1.54E+002	2.11E-004		4E-003		1.97E-003		3E-002		
<b>Total Hazard Quotient and Cancer Risk:</b>						<b>8E-003</b>	<b>1E-006</b>			<b>7E-002</b>	<b>3E-006</b>	<b>4E-006</b>
				Assumptions for Resident (Adult)			Assumptions for Resident (Child)					
				CF =	1E-006 kg/mg	CF =	1E-006 kg/mg					
				CS =	EPC Surface Only	CS =	EPC Surface Only					
				BW =	70 kg	BW =	15 kg					
				IR =	100 mg soil/day	IR =	200 mg soil/day					
				FI =	1 unitless	FI =	1 unitless					
				EF =	350 days/year	EF =	350 days/year					
				ED =	24 years	ED =	6 years					
				AT (Nc) =	8760 days	AT (Nc) =	2190 days					
				AT (Car) =	25550 days	AT (Car) =	25550 days					

Note: Cells in this table were intentionally left blank due to a lack of toxicity data.  
NA= Information not available.  
ND=Compound not detected

TABLE B-2.4  
 CALCULATION OF ABSORBED DOSE AND RISK FROM DERMAL CONTACT TO SOIL  
 REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-13  
 Decision Document - Mini Risk Assessment  
 Seneca Army Depot Activity

Equation for Intake (mg/kg-day) =	$CS \times CF \times SA \times AF \times ABS \times EF \times ED \times EV$ BW x AT	
Variables (Assumptions for Each Receptor are Listed at the Bottom):		Equation for Hazard Quotient = Chronic Daily Intake (No)/Reference Dose
CS = Chemical Concentration in Soil, from Soil EPC Data	BF = Exposure Frequency	Equation for Contribution to Lifetime Cancer Risk = Chronic Daily Intake (Car) x Slope Factor
CF = Conversion Factor	ED = Exposure Duration	Equation for Total Lifetime Cancer Risk = Adult Contribution + Child Contribution
SA = Surface Area Contact	EV = Event Frequency	
AF = Adherence Factor	BW = Bodyweight	
ABS = Absorption Factor	AT = Averaging Time	

Analyte	Dermal RfD (mg/kg-day)	Carc. Slope Dermal (mg/kg-day) <sup>-1</sup>	Absorption Factor*	EPC Surface Soil (mg/kg)	Resident (Adult)			Resident (Child)			Resident Total Lifetime Cancer Risk		
					Intake (mg/kg-day)		Hazard Quotient	Contribution to Lifetime Cancer Risk	Intake (mg/kg-day)			Hazard Quotient	Contribution to Lifetime Cancer Risk
					(No)	(Car)			(No)	(Car)			
<b>Volatile Organics</b>													
Acetone	1.00E-001	NA	NA	8.60E-002									
Carbon Disulfide	1.00E-001	NA	NA	ND									
Methylene Chloride	6.00E-002	7.50E-003	NA	ND									
Methyl ethyl ketone	6.00E-001	NA	NA	2.60E-002									
Toluene	2.00E-001	NA	NA	6.00E-003									
<b>Semivolatile Organics</b>													
2,4,6-Trichlorophenol	NA	1.10E-002	0.10	1.00E-002		1.87E-009	2.06E-011		3.07E-009		5E-011		
2,4-Dinitrotoluene	2.00E-003	6.80E-001	0.10	1.60E+000	8.75E-007	3.00E-007	2.04E-007	5.73E-006	4.91E-007	2.86E-003	3.38E-007		
2-Methylnaphthalene	4.00E-002	NA	0.10	4.20E-002	2.30E-008		5.74E-007	1.50E-007		3.76E-006			
4-Methylphenol	5.00E-003	NA	0.10	9.20E+000	5.03E-006		1.01E-003	3.29E-005		6.59E-003			
Acenaphthene	6.00E-002	NA	0.10	6.50E-001	3.55E-007		5.92E-006	2.33E-006		3.88E-005			
Acenaphthylene	NA	NA	0.10	1.60E-002									
Anthracene	3.00E-001	NA	0.13	1.60E-002	1.14E-008		3.79E-008	7.45E-008		2.48E-007			
Benzo(a)anthracene	NA	7.30E-001	0.13	1.00E-001	2.44E-008		1.78E-008	3.99E-008		2.91E-008	5E-008		
Benzo(a)pyrene	NA	7.30E+000	0.13	1.10E-001	2.68E-008		1.96E-007	4.39E-008		3.20E-007	5E-007		
Benzo(b)fluoranthene	NA	7.30E-001	0.13	8.90E-002	2.17E-008		1.58E-008	3.55E-008		2.59E-008	4E-008		
Benzo(ghi)perylene	NA	NA	0.13	8.60E-002									
Benzo(k)fluoranthene	NA	7.30E-002	0.13	7.40E-002	1.80E-008		1.32E-009	2.95E-008		2.15E-009	3E-009		
bis(2-Ethylhexyl)phthalate	2.00E-002	1.40E-002	0.10	1.90E+000	1.04E-006	3.56E-007	5.19E-003	4.98E-009	6.80E-006	5.83E-007	8.16E-009		
Carbazole	NA	2.00E-002	0.10	1.80E-001	3.37E-008		6.75E-010	5.52E-008		1.10E-009	2E-009		
Chrysene	NA	7.30E-003	0.13	1.90E-001	4.63E-008		3.38E-010	7.58E-008		5.53E-010	9E-010		
Di-n-butylphthalate	1.00E-001	NA	0.10	1.40E-001	7.65E-008		7.65E-007	5.01E-007		5.01E-006			
Di-n-octylphthalate	2.00E-002	NA	0.10	2.10E-001	1.15E-007		5.74E-006	7.52E-007		3.76E-005			
Dibenz(a,h)anthracene	NA	7.30E+000	0.13	1.50E-002	3.65E-009		2.67E-008	5.98E-009		4.37E-008	7E-008		
Dibenzofuran	NA	NA	0.10	3.40E-001									
Fluoranthene	4.00E-002	NA	0.13	8.00E-001	5.68E-007		1.42E-003	3.72E-006		9.31E-005			
Fluorene	4.00E-002	NA	0.13	1.80E-002	1.28E-008		3.20E-007	8.38E-008		2.09E-006			
Hexachlorobenzene	8.00E-004	1.60E+000	0.10	2.10E-001	1.15E-007	3.94E-008	1.43E-004	6.30E-008	7.52E-007	6.44E-008	1.03E-007		
Indeno(1,2,3-cd)pyrene	NA	7.30E-001	0.13	5.30E-002	1.29E-008		9.43E-009	2.11E-008		1.54E-008	2E-008		
Naphthalene	2.00E-002	NA	0.13	5.10E-001	3.62E-007		1.81E-003	2.37E-006		1.19E-004			
Phenanthrene	NA	NA	0.13	1.40E+000									
Phenol	6.00E-001	NA	0.10	1.40E+001	7.65E-006		1.28E-005	5.01E-005		8.35E-005			
Pyrene	3.00E-002	NA	0.10	5.40E-001	2.95E-007		9.84E-006	1.93E-006		6.44E-005			
<b>Pesticides/PCB</b>													
4,4'-DDE	NA	3.40E-001	0.03	3.60E-003		2.02E-010	6.88E-011		3.31E-010		1.13E-010		
<b>Other Analyses</b>													
Nitrate/Nitrite Nitrogen	1.60E+000	NA	NA	2.79E+001									
Fluoride	6.00E-002	NA	NA	1.54E+002									
<b>Total Hazard Quotient and Cancer Risk:</b>							<b>3E-004</b>	<b>3E-007</b>		<b>2E-003</b>	<b>5E-007</b>	<b>9E-007</b>	
					<b>Assumptions for Resident (Adult)</b>			<b>Assumptions for Resident (Child)</b>					
					CS =	EPC Surface Only	CS =	EPC Surface Only					
					CF =	1E-006 kg/mg	CF =	1E-006 kg/mg					
					SA =	5,700 cm <sup>2</sup>	SA =	2,800 cm <sup>2</sup>					
					AF =	0.07 mg/cm <sup>2</sup> -event	AF =	0.2 mg/cm <sup>2</sup> -event					
					EF =	350 days/year	EF =	350 days/year					
					ED =	24 years	ED =	6 years					
					EV =	1 event/day	EV =	1 event/day					
					BW =	70 kg	BW =	15 kg					
					AT (No) =	8,760 days	AT (No) =	2,190 days					
					AT (Car) =	25,550 days	AT (Car) =	25,550 days					

Note: Cells in this table were intentionally left blank due to a lack of toxicity data.

NA= Information not available.

\* Recommended dermal absorption factor by EPA Dermal Risk Assessment Guidance (1999).

**TABLE B-2.5**  
**CALCULATION OF INTAKE AND RISK FROM INHALATION OF GROUNDWATER (WHILE SHOWERING)**  
**REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-13**  
**Decision Document - Mini Risk Assessment**  
**Seneca Army Depot Activity**

Equation for Intake (mg/kg-day) = $\frac{CA \times IR \times EF \times ED}{BW \times AT}$	Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose
Variables (Assumptions for Each Receptor are Listed at the Bottom): CA =Chemical Concentration in Air IR = Inhalation Rate EF = Exposure Frequency	Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor
ED=Exposure Duration BW=Bodyweight AT = Averaging Time	

Analyte	Inhalation RfD (mg/kg-day)	Carc. Slope Inhalation (mg/kg-day)-1	EPC* Air (mg/m <sup>3</sup> )	Future Resident (Adult)			Future Resident (Child)			Resident Total Lifetime Cancer Risk		
				Intake (mg/kg-day)		Hazard Quotient	Contribution to Lifetime Cancer Risk	Intake (mg/kg-day)			Hazard Quotient	Contribution to Lifetime Cancer Risk
				(Nc)	(Car)			(Nc)	(Car)			
<b>Semivolatile Organics</b>												
bis(2-Ethylhexyl)phthalate	NA	1.40E-002	1.12E-006		1.53E-009		2E-011		1.85E-009	3E-011	5E-011	
Butylbenzylphthalate	NA	NA	6.03E-008									
Diethyl phthalate	NA	NA	3.45E-008									
<b>Metals</b>												
Aluminum	1.00E-003	NA	NA									
Cyanide	NA	NA	NA									
Manganese	1.43E-005	NA	NA									
<b>Other Analyses</b>												
NITRATE	NA	NA	NA									
NITRITE	NA	NA	NA									
Fluoride	NA	NA	NA									
<b>Total Hazard Quotient and Cancer Risk:</b>							<b>2E-011</b>			<b>3E-011</b>	<b>5E-011</b>	
				<b>Assumptions for Future Resident (Adult)</b>			<b>Assumptions for Future Resident (Child)</b>					
				BW =	70 kg	BW =		15 kg				
				IR =	0.29 m3/day	IR =		0.30 m3/day				
				EF =	350 days/year	EF =		350 days/year				
				ED =	24 years	ED =		6 years				
				AT (Nc) =	8,760 days	AT (Nc) =		2,190 days				
				AT (Car) =	25,550 days	AT (Car) =		25,550 days				

Note: Cells in this table were intentionally left blank due to a lack of toxicity data.

NA= Information not available.

\* EPC air is the concentration of chemical available for inhalation after accounting for partitioning between the air and water in the shower. The calculation of the EPC air is shown in Table A-12A.

**TABLE B-2.6**  
**CALCULATION OF INTAKE AND RISK FROM THE INGESTION OF GROUNDWATER**  
**REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-13**  
**Decision Document - Mini Risk Assessment**  
**Seneca Army Depot Activity**

Equation for Intake (mg/kg-day) = $\frac{CW \times IR \times EF \times ED}{BW \times AT}$	Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose
Variables (Assumptions for Each Receptor are Listed at the Bottom): CW = Chemical Concentration in Groundwater, from Groundwater EPC Data IR = Ingestion Rate EF = Exposure Frequency	ED=Exposure Duration BW=Bodyweight AT=Averaging Time
	Equation for Contribution to Cancer Risk = Chronic Daily Intake (Car) x Slope Factor Equation for Total Lifetime Cancer Risk = Adult Contribution + Child Contribution

Analyte	Oral RfD (mg/kg-day)	Carc. Slope Oral (mg/kg-day) <sup>-1</sup>	EPC Groundwater (mg/liter)	Resident (Adult)				Resident (Child)			Resident Total Lifetime Cancer Risk	
				Intake (mg/kg-day)		Hazard Quotient	Contribution to Lifetime Cancer Risk	Intake (mg/kg-day)		Hazard Quotient		Contribution to Lifetime Cancer Risk
				(Nc)	(Car)			(Nc)	(Car)			
<b>Semivolatile Organics</b>												
bis(2-Ethylhexyl)phthalate	2.00E-002	1.40E-002	2.30E-002	6.30E-004	2.16E-004	3E-002	3E-006	1.47E-003	1.26E-004	7E-002	2E-006	5E-006
Butylbenzylphthalate	2.00E-001	NA	1.00E-004	2.74E-006		1E-005		6.39E-006		3E-005		
Diethyl phthalate	8.00E-001	NA	1.60E-004	4.38E-006		5E-006		1.02E-005		1E-005		
<b>Metals</b>												
Aluminum	1.00E+000	NA	7.09E+001	1.94E+000		2E+000		4.53E+000		5E+000		
Cyanide	2.00E-002	NA	1.24E-001	3.40E-003		2E-001		7.93E-003		4E-001		
Manganese	5.00E-002	NA	3.21E+000	8.79E-002		2E+000		2.05E-001		4E+000		
<b>Other Analyses</b>												
NITRATE	1.60E+000	NA	7.31E+002	2.00E+001		1E+001		4.67E+001		3E+001		
NITRITE	1.00E-001	NA	2.10E+000	5.75E-002		6E-001		1.34E-001		1E+000		
Fluoride	6.00E-002	NA	4.50E-001	1.23E-002		2E-001		2.88E-002		5E-001		
<b>Total Hazard Quotient and Cancer Risk:</b>						<b>2E+001</b>	<b>3E-006</b>			<b>4E+001</b>	<b>2E-006</b>	<b>5E-006</b>
				<b>Assumptions for Resident (Adult)</b>				<b>Assumptions for Resident (Child)</b>				
				BW =	70 kg	BW =	15 kg					
				IR =	2 liters/day	IR =	1 liters/day					
				EF =	350 days/year	EF =	350 days/year					
				ED =	24 years	ED =	6 years					
				AT (Nc) =	8,760 days	AT (Nc) =	2,190 days					
				AT (Car) =	25,550 days	AT (Car) =	25,550 days					

Note: Cells in this table were intentionally left blank due to a lack of toxicity data.  
 NA= Information not available.



**TABLE B-2.7**  
**CALCULATION OF INTAKE AND RISK FROM DERMAL CONTACT TO GROUNDWATER (WHILE SHOWERING)**  
**REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-13**  
**Decision Document - Mini Risk Assessment**  
**Seneca Army Depot Activity**

Equation for Intake (mg/kg-day) = $\frac{DA \times SA \times EF \times ED \times EV}{BW \times AT}$	Equation for Absorbed Dose per Event (DA): $DA = 2K_p \times CW \sqrt{\frac{6 \times r \times ET}{\pi}} \times CF$ For organics: $r = \text{Lag Time}$ For inorganics: $DA = K_p \times CW \times ET \times CF$ Kp = Permeability Coefficient CW = EPC Cderm ET = Exposure Time CF = Conversion Factor	Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose  Equation for Contribution to Cancer Risk = Chronic Daily Intake (Car) x Slope Factor Equation for Total Lifetime Cancer Risk = Adult Contribution + Child Contribution
<b>Variables (Assumptions for Each Receptor are Listed at the Bottom):</b> DA = Absorbed Dose per Event SA = Surface Area Contact EF = Exposure Frequency ED = Exposure Duration EV = Event Frequency BW = Bodyweight AT = Averaging Time		

Analyte	Dermal RfD (mg/kg-day)	Carc. Slope Dermal (mg/kg-day) <sup>-1</sup>	Permeability Coefficient Kp (cm/hr)	τ (hours)	EPC Groundwater (mg/liter)	Absorbed Dose/Event (mg-cm <sup>2</sup> /event)	Resident (Adult)			Resident (Child)			Resident Total Lifetime Cancer Risk		
							Intake (mg/kg-day)		Hazard Quotient	Contribution to Lifetime Cancer Risk	Intake (mg/kg-day)			Hazard Quotient	Contribution to Lifetime Cancer Risk
							(Nc)	(Car)			(Nc)	(Car)			
<b>Semivolatile Organics</b>															
bis(2-Ethylhexyl)phthalate	2.00E-002	1.40E-002	5.27E-003	1.62E+001	2.30E-002	1.35E-006	3.33E-004	1.14E-004	2E-002	2E-006	5.69E-004	4.88E-005	3E-002	7E-007	2E-006
Butylbenzylphthalate	2.00E-001	NA	4.94E-002	5.87E+000	1.00E-004	3.30E-008									
Diethyl phthalate	8.00E-001	NA	3.90E-003	1.87E+000	1.60E-004	2.36E-009									
<b>Metals</b>															
Aluminum	1.00E+000	NA	1.00E-003		7.09E+001	7.09E-005	1.75E-002		2E-002		2.99E-002		3E-002		
Cyanide	2.00E-002	NA	1.00E-003		1.24E-001	1.24E-007	3.06E-005		2E-003		5.23E-005		3E-003		
Manganese	2.00E-003	NA	1.00E-003		3.21E+000	3.21E-006	7.92E-004		4E-001		1.35E-003		7E-001		
<b>Other Analyses</b>															
NITRATE	1.60E+000	NA	1.00E-003		7.31E+002	7.31E-004	1.80E-001		1E-001		3.08E-001		2E-001		
NITRITE	1.00E-001	NA	1.00E-003		2.10E+000	2.10E-006	5.18E-004		5E-003		8.86E-004		9E-003		
Nitrate/Nitrite Nitrogen Fluoride	1.60E+000	NA	1.00E-003		7.31E+002	7.31E-004	1.80E-001		1E-001		3.08E-001		2E-001		
<b>Total Hazard Quotient and Cancer Risk:</b>									<b>7E-001</b>	<b>2E-006</b>			<b>1E+000</b>	<b>7E-007</b>	<b>2E-006</b>
							<b>Assumptions for Resident (Adult)</b>			<b>Assumptions for Resident (Child)</b>					
							CF =	0.001	l/cm3	CF =	0.001	l/cm3			
							BW =	70	kg	BW =	15	kg			
							SA =	18,000	cm2	SA =	6,600	cm2			
							ET =	0.58	hours/day	ET =	1.00	hours/day			
							EF =	350	days/year	EF =	350	days/year			
							ED =	24	years	ED =	6	years			
							EV =	1	event/day	EV =	1	event/day			
							AT (Nc) =	8,760	days	AT (Nc) =	2,190	days			
							AT (Car) =	25,550	days	AT (Car) =	25,550	days			

Note: Cells in this table were intentionally left blank due to a lack of toxicity data.  
 NA= Information not available.

**TABLE B-2.8**  
**CALCULATION OF TOTAL NONCARCINOGENIC AND CARCINOGENIC RISKS -RESIDENTIAL SCENARIO**  
**REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-13**  
**Decision Document - Mini Risk Assessment**  
**Seneca Army Depot Activity**

<b>RECEPTOR</b>	<b>EXPOSURE ROUTE</b>	<b>EXPOSURE/RISK CALCULATIONS Table Number</b>	<b>HAZARD INDEX</b>	<b>CANCER RISK</b>
<b><u>RESIDENT (ADULT)</u></b>	<b>Inhalation of Dust in Ambient Air</b>	Table B-2.2	<b>3E-06</b>	<b>5E-10</b>
	<b>Ingestion of Soil</b>	Table B-2.3	<b>8E-03</b>	<b>1E-06</b>
	<b>Dermal Contact to Soil</b>	Table B-2.4	<b>3E-04</b>	<b>3E-07</b>
	<b>Inhalation of Groundwater</b>	Table B-2.5	<b>NQ</b>	<b>2E-11</b>
	<b>Ingestion of Groundwater</b>	Table B-2.6	<b>2E+01</b>	<b>3E-06</b>
	<b>Dermal Contact to Groundwater</b>	Table B-2.7	<b>7E-01</b>	<b>2E-06</b>
	<b><i>TOTAL RECEPTOR RISK (Nc &amp; Car)</i></b>		<b><i>2E+01</i></b>	<b><i>6E-06</i></b>
<b><u>RESIDENT (CHILD)</u></b>	<b>Inhalation of Dust Ambient Air</b>	Table B-2.2	<b>6E-06</b>	<b>3E-10</b>
	<b>Ingestion of Soil</b>	Table B-2.3	<b>7E-02</b>	<b>3E-06</b>
	<b>Dermal Contact to Soil</b>	Table B-2.4	<b>2E-03</b>	<b>5E-07</b>
	<b>Inhalation of Groundwater</b>	Table B-2.5	<b>NQ</b>	<b>3E-11</b>
	<b>Ingestion of Groundwater</b>	Table B-2.6	<b>4E+01</b>	<b>2E-06</b>
	<b>Dermal Contact to Groundwater</b>	Table B-2.7	<b>1E+00</b>	<b>7E-07</b>
	<b><i>TOTAL RECEPTOR RISK (Nc &amp; Car)</i></b>		<b><i>4E+01</i></b>	<b><i>6E-06</i></b>
<b><u>TOTAL LIFETIME CANCER RISK</u></b>	<b>Inhalation of Dust in Ambient Air</b>	Table B-2		<b>8E-10</b>
	<b>Ingestion of Soil</b>	Table B-3		<b>4E-06</b>
	<b>Dermal Contact to Soil</b>	Table B-4		<b>9E-07</b>
	<b>Inhalation of Ground Water</b>	Table B-5		<b>5E-11</b>
	<b>Ingestion of Ground Water</b>	Table B-6		<b>5E-06</b>
	<b>Dermal Contact to Ground Water</b>	Table B-7		<b>2E-06</b>
	<b><i>TOTAL RECEPTOR RISK (Nc &amp; Car)</i></b>			<b><i>1E-05</i></b>

NQ= Not Quantified due to lack of toxicity data.

**TABLE B-3.1  
BACKGROUND SOIL DATA  
SEAD-13  
Decision Document - Mini Risk Assessment  
Seneca Army Depot Activity**

LOC_ID:			B-8-91		B-8-91		B-8-91		B-8-91		B-9-91		B-9-91						
QC CODE:			SA		SA		SA		SA		SA		SA						
STUDY ID:			RI PHASE1		RI PHASE1		RI PHASE1		RI PHASE1		RI PHASE1		RI PHASE1						
TOP:																			
BOTTOM:																			
MATRIX:																			
SAMPLE DATE:	FREQUENCY			NUMBER		NUMBER		NUMBER		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMP ID:	OF			ABOVE		OF		OF		11/5/1991		11/5/1991		11/5/1991		11/5/1991		11/5/1991	
COMPOUND	UNIT	MAXIMUM	DETECTION	TAGM	TAGM	DETECTS	ANALYSES	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q
<b>METALS</b>																			
Aluminum	MG/KG	21000	100%	19520	3	57	57	19200		20500		17700		12700		14800		8880	
Antimony	MG/KG	6.8	18%	6	2	10	57	10.3 UJ		8.8 UJ		8.2 UJ		8.4 UJ		9.9 UJ		9.9 UJ	
Arsenic	MG/KG	21.5	95%	8.9	2	54	57	5.1 J		6.1 J		6 J		4.2 J		4.3 J		3.8 J	
Barium	MG/KG	159	100%	300	0	57	57	136 J		98.9 J		86.7 J		56.2 J		101 J		110 J	
Beryllium	MG/KG	1.4	100%	1.13	2	57	57	1.4		1.2		1		0.78 J		1.1		0.76	
Cadmium	MG/KG	2.9	35%	2.46	2	20	57	2.6		2.9		2.4		1.9		2.3		1.7	
Calcium	MG/KG	293000	100%	125300	2	57	57	5390		4870		3560		85900		45600		104000	
Chromium	MG/KG	32.7	100%	30	2	57	57	27.4 J		30.1 J		26.9 J		19.8 J		22.5 J		13.8 J	
Cobalt	MG/KG	29.1	100%	30	0	57	57	13.8		18.4		14		14.2		13.7		10.7	
Copper	MG/KG	62.8	100%	33	3	57	57	22.3		27.6		26		16.2		22.6		21.6	
Cyanide	MG/KG	0	0%	0.35	0	0	51	0.6 U		0.63 U		0.67 U		0.58 U		0.7 U		0.63 U	
Iron	MG/KG	38600	100%	37410	2	57	57	37200		36100		32500		27400		31000		19600	
Lead	MG/KG	266	95%	24.4	3	54	57	14.5		11.4		13.6		10.1		10.8		10.1	
Magnesium	MG/KG	29100	100%	21700	2	54	54	5850		7300		6490		6720		8860		17000	
Manganese	MG/KG	2380	95%	1100	2	54	57	1130		956		832		926		903		532	
Mercury	MG/KG	0.13	72%	0.1	2	41	57	0.09		0.06 J		0.06 J		0.05 J		0.08 J		0.04 J	
Nickel	MG/KG	62.3	98%	50	2	56	57	42.3		48.7		44.4		30.4		38.4		23.8	
Potassium	MG/KG	3160	100%	2623	2	57	57	1910		2110		1760		1430		1320		1080	
Selenium	MG/KG	1.7	40%	2	0	23	57	0.17 UJ		0.21 UJ		0.2 UJ		0.61 UJ		0.21 UJ		0.65 UJ	
Silver	MG/KG	0.87	4%	0.8	1	2	54	1.6 U		1.3 U		1.2 U		1.3 U		1.5 U		1.5 U	
Sodium	MG/KG	269	82%	188	2	47	57	79.2 U		67.5 U		62.6 U		75.3 J		84.2 J		112 J	
Thallium	MG/KG	1.2	17%	0.855	3	9	54	0.47 U		0.58 U		0.57 U		0.34 U		0.59 U		0.36 U	
Vanadium	MG/KG	32.7	100%	150	0	57	57	32.2		25.4		26.4		15.7		19.7		19.5	
Zinc	MG/KG	126	95%	115	2	54	57	85.1 J		94.2 J		85 J		75 J		126 J		84.3 J	

**TABLE B-3.1  
BACKGROUND SOIL DATA  
SEAD-13  
Decision Document - Mini Risk Assessment  
Seneca Army Depot Activity**

LOC_ID:		B-9-91	BK-1	BK-2	GB35	GB35	GB35						
QC CODE:		SA	SA	SA	SA	SA	DU						
STUDY ID:		RI PHASE1	RI PHASE1	RI PHASE1	RI PHASE1	RI PHASE1	RI PHASE1						
TOP:													
BOTTOM:													
MATRIX:													
SAMPLE DATE:	FREQUENCY	NUMBER	NUMBER	NUMBER	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	
SAMP ID:	OF	ABOVE	OF	OF	11/5/1991	12/16/1992	12/16/1992	1/20/1993	1/20/1993	1/20/1993	1/20/1993	1/20/1993	
COMPOUND	UNIT	MAXIMUM	DETECTION	TAGM	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	
METALS					S1105-30RESOIL1	BK-1SOIL3	BK-2RESOIL3	GB35-1GRID	GB35-2GRID	GB35-6DUGRID			
					VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	
Aluminum	MG/KG	21000	100%	19520	3	57	57	7160	19400	14400	18000	17600	16200
Antimony	MG/KG	6.8	18%	6	2	10	57	7 UJ	7.9 U	7.2 U	5.8 UJ	6.8 J	6.3 J
Arsenic	MG/KG	21.5	95%	8.9	2	54	57	4.4 J	3	2.7	6.2	7.7	5.3
Barium	MG/KG	159	100%	300	0	57	57	39.9 J	159	106	93.6	61.7	61.7
Beryllium	MG/KG	1.4	100%	1.13	2	57	57	0.52 J	1.1	0.81	0.85	0.74	0.77
Cadmium	MG/KG	2.9	35%	2.46	2	20	57	1.5	0.45 U	0.41 U	0.33 U	0.31 U	0.35 U
Calcium	MG/KG	293000	100%	125300	2	57	57	101000	4590	22500	1590	17700	1370
Chromium	MG/KG	32.7	100%	30	2	57	57	11.2 J	30	22.3	23.5	29.3	25.1
Cobalt	MG/KG	29.1	100%	30	0	57	57	8.1	14.4	12.3	9.4	16.3	10.3
Copper	MG/KG	62.8	100%	33	3	57	57	19.3	26.9	18.8	17.5	24.5	17.2
Cyanide	MG/KG	0	0%	0.35	0	0	51	0.62 U	0.57 U	0.61 U	0.78 U	0.71 U	0.82 U
Iron	MG/KG	38600	100%	37410	2	57	57	17300	38600	26600	25200	34200	30800
Lead	MG/KG	266	95%	24.4	3	54	57	7.8	15.8	18.9	14.4	5.4	19.1
Magnesium	MG/KG	29100	100%	21700	2	54	54	12600	5980	7910	3850	7790	4490
Manganese	MG/KG	2380	95%	1100	2	54	57	514	2380	800	701	646	775
Mercury	MG/KG	0.13	72%	0.1	2	41	57	0.05 J	0.13 J	0.11	0.06 J	0.03 U	0.07 J
Nickel	MG/KG	62.3	98%	50	2	56	57	19	47.7	31	26.3	48.7	28.3
Potassium	MG/KG	3160	100%	2623	2	57	57	1050	1720	1210	1110	1110	975
Selenium	MG/KG	1.7	40%	2	0	23	57	0.21 UJ	0.73 J	0.94	0.23 UJ	0.23 UJ	0.21 UJ
Silver	MG/KG	0.87	4%	0.8	1	2	54	1.1 U	0.47 U	0.43 U	0.34 U	0.32 U	0.36 U
Sodium	MG/KG	269	82%	188	2	47	57	116 J	49.1 J	61.1 J	35.6 J	77.5 J	34.6 J
Thallium	MG/KG	1.2	17%	0.855	3	9	54	0.6 U	0.42 U	0.38 U	0.55 U	0.54 U	0.5 U
Vanadium	MG/KG	32.7	100%	150	0	57	57	12.9	28	22.4	27.1	22.3	26.1
Zinc	MG/KG	126	95%	115	2	54	57	74.8 J	98.6	63.7	55	83.4	53.1

**TABLE B-3.1  
BACKGROUND SOIL DATA  
SEAD-13  
Decision Document - Mini Risk Assessment  
Seneca Army Depot Activity**

LOC_ID:									GB36	GB36	MW-36	MW-34	SB24-5	SB24-5				
QC CODE:									SA	SA	SA	SA	SA	SA				
STUDY ID:									RI PHASE1	RI PHASE1	RI Phase 1 Step 1	RI PHASE1	ESI	ESI				
TOP:											-1		-1	-1				
BOTTOM:											-1		-1	-1				
MATRIX:									SOIL	SOIL	SOIL	SOIL	SOIL	SOIL				
SAMPLE DATE:			FREQUENCY		NUMBER	NUMBER	NUMBER	1/20/1993	1/20/1993	11-Jan-93	11/20/1991	12/02/93	12/02/93					
SAMP ID:			OF		ABOVE	OF	OF	GB36-1GRID	GB36-2GRID	MW36-3GRID	S2011121MW34GRID	SB24-5-1	SB24-5-3					
COMPOUND	UNIT	MAXIMUM	DETECTION	TAGM	TAGM	DETECTS	ANALYSES	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q			
<b>METALS</b>																		
Aluminum	MG/KG	21000	100%	19520	3	57	57	18100		16200		12700		16100		16200		10100
Antimony	MG/KG	6.8	18%	6	2	10	57	5.9 J		5.8 UJ		5.7 UJ		5.7 J		12.5 UJ		5.8 UJ
Arsenic	MG/KG	21.5	95%	8.9	2	54	57	4.6		9.7		2.9 J		6.3 U		4.2		3.3
Barium	MG/KG	159	100%	300	0	57	57	74.8		50.8		46.9 J		67.5		117		58.3
Beryllium	MG/KG	1.4	100%	1.13	2	57	57	0.77		0.65		0.59		0.86		0.98 J		0.48 J
Cadmium	MG/KG	2.9	35%	2.46	2	20	57	0.3 U		0.33 U		0.33 U		2.3		0.78 U		0.36 U
Calcium	MG/KG	293000	100%	125300	2	57	57	1660		22900		4170		28600		4540		74200
Chromium	MG/KG	32.7	100%	30	2	57	57	24.8		27.4		23.3 J		26.6		24.5		16.9
Cobalt	MG/KG	29.1	100%	30	0	57	57	20.4		13.2		18.6		17		16		8.2
Copper	MG/KG	62.8	100%	33	3	57	57	17.7		17.5		19.2 J		32.7		28.4		20.9
Cyanide	MG/KG	0	0%	0.35	0	0	51	0.7 U		0.68 U		0.56 U		0.54 U		0.6 U		0.51 U
Iron	MG/KG	38600	100%	37410	2	57	57	26100		30700		27500		35000		33600		21300
Lead	MG/KG	266	95%	24.4	3	54	57	12.7		6.2		20.2		11.9		45.5 J		8.7 J
Magnesium	MG/KG	29100	100%	21700	2	54	54	4490		7150		5750		6850		5150		12100
Manganese	MG/KG	2380	95%	1100	2	54	57	426		507		540		803		1080		400
Mercury	MG/KG	0.13	72%	0.1	2	41	57	0.02 J		0.02 J		0.02 J		0.07 R		0.07 JR		0.06 JR
Nickel	MG/KG	62.3	98%	50	2	56	57	28.3		42.8		43.3 J		49.3 J		37.3		26.4
Potassium	MG/KG	3160	100%	2623	2	57	57	1400		1100		754		1290		1170 J		993
Selenium	MG/KG	1.7	40%	2	0	23	57	0.2 UJ		0.18 UJ		0.19 UJ		0.18 UJ		0.15 UJ		0.23 UJ
Silver	MG/KG	0.87	4%	0.8	1	2	54	0.31 U		0.34 U		0.34 U		0.87 J		1.6 U		0.73 U
Sodium	MG/KG	269	82%	188	2	47	57	46.6 J		97.6 J		31.6 U		55.2 J		50.9 J		153 J
Thallium	MG/KG	1.2	17%	0.855	3	9	54	0.46 U		0.43 U		0.45 U		0.51 U		0.16 U		0.25 U
Vanadium	MG/KG	32.7	100%	150	0	57	57	27.8		19.7		16.2 J		22.3		29.9		14.4
Zinc	MG/KG	126	95%	115	2	54	57	59.2		74.1		34.7 J		95.7		85.7		62.8

**TABLE B-3.1**  
**BACKGROUND SOIL DATA**  
**SEAD-13**  
**Decision Document - Mini Risk Assessment**  
**Seneca Army Depot Activity**

LOC_ID:					SB24-5	MW25-1	MW25-1	MW25-6
QC CODE:					SA	SA	SA	SA
STUDY ID:					ESI	ESI	ESI	RI ROUND1
TOP:					-1	0	2	0
BOTTOM:					-1	2	4	0.17
MATRIX:					SOIL	SOIL	SOIL	SOIL
SAMPLE DATE:		FREQUENCY		NUMBER	12/02/93	12/3/1993	12/3/1993	9/25/1995
SAMP ID:		OF		ABOVE	SB24-5-5	SB25-6-01	SB25-6-02	SB25-7-00
COMPOUND	UNIT	MAXIMUM	DETECTION	TAGM	DETECTS	ANALYSES	VALUE	Q
METALS							VALUE	Q
Aluminum	MG/KG	21000	100%	19520	3	57	13700	10600
Antimony	MG/KG	6.8	18%	6	2	10	11.3 UJ	4.2 U
Arsenic	MG/KG	21.5	95%	8.9	2	54	5	8.3
Barium	MG/KG	159	100%	300	0	57	67.2	59.1
Beryllium	MG/KG	1.4	100%	1.13	2	57	0.62 J	0.48 J
Cadmium	MG/KG	2.9	35%	2.46	2	20	0.7 U	0.41 U
Calcium	MG/KG	293000	100%	125300	2	57	49000	82500
Chromium	MG/KG	32.7	100%	30	2	57	23.1	16.9
Cobalt	MG/KG	29.1	100%	30	0	57	12	11.2
Copper	MG/KG	62.8	100%	33	3	57	22.2	20.2 J
Cyanide	MG/KG	0	0%	0.35	0	0	0.57 U	0.58 U
Iron	MG/KG	38600	100%	37410	2	57	26700	21400
Lead	MG/KG	266	95%	24.4	3	54	7.9 J	9.5
Magnesium	MG/KG	29100	100%	21700	2	54	11400	19600
Manganese	MG/KG	2380	95%	1100	2	54	450	722 J
Mercury	MG/KG	0.13	72%	0.1	2	41	0.04 JR	0.03 J
Nickel	MG/KG	62.3	98%	50	2	56	35.2	26.8
Potassium	MG/KG	3160	100%	2623	2	57	1660	1480
Selenium	MG/KG	1.7	40%	2	0	23	0.22 UJ	0.97 J
Silver	MG/KG	0.87	4%	0.8	1	2	1.4 U	0.82 U
Sodium	MG/KG	269	82%	188	2	47	139 J	269 J
Thallium	MG/KG	1.2	17%	0.855	3	9	0.24 U	0.24 UJ
Vanadium	MG/KG	32.7	100%	150	0	57	19.5	18.5
Zinc	MG/KG	126	95%	115	2	54	63.2	71.6 J

**TABLE B-3.1  
BACKGROUND SOIL DATA  
SEAD-13  
Decision Document - Mini Risk Assessment  
Seneca Army Depot Activity**

LOC_ID:								MW25-6	MW25-6	MW25-6	MW64A-1	MW64A-1	MW64A-1
QC CODE:								SA	SA	DU	SA	SA	SA
STUDY ID:								RI ROUND1	RI ROUND1	RI ROUND1	ESI	ESI	ESI
TOP:								4	6	0	0	2	4
BOTTOM:								6	8	0.17	0.2	4	6
MATRIX:								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
SAMPLE DATE:		FREQUENCY			NUMBER	NUMBER	NUMBER	9/25/1995	9/25/1995	9/25/1995	4/2/1994	4/2/1994	4/2/1994
SAMP ID:		OF			ABOVE	OF	OF	SB25-7-03	SB25-7-04	SB25-7-10	MW64A-1-1	MW64A-1-2	MW64A-1-3
COMPOUND	UNIT	MAXIMUM	DETECTION	TAGM	TAGM	DETECTS	ANALYSES	VALUE	Q	VALUE	Q	VALUE	Q
METALS								VALUE	Q	VALUE	Q	VALUE	Q
Aluminum	MG/KG	21000	100%	19520	3	57	57	8020	7550	12500	16100	19800	12600
Antimony	MG/KG	6.8	18%	6	2	10	57	0.42 UJ	0.44 U	0.4 UJ	0.23 J	0.2 UJ	0.2 UJ
Arsenic	MG/KG	21.5	95%	8.9	2	54	57	4.1	3.4	4.3	7.1	8.2	5
Barium	MG/KG	159	100%	300	0	57	57	58	52	71.3	83.7	91.2	62.3
Beryllium	MG/KG	1.4	100%	1.13	2	57	57	0.43	0.39	0.56	0.68 J	0.74 J	0.53 J
Cadmium	MG/KG	2.9	35%	2.46	2	20	57	0.06 U	0.06 U	0.05 U	0.11 J	0.02 U	0.12 J
Calcium	MG/KG	293000	100%	125300	2	57	57	120000 J	133000 J	47400 J	7210	4300	72400
Chromium	MG/KG	32.7	100%	30	2	57	57	13.7 J	12.4 J	16.9 J	23	25	19
Cobalt	MG/KG	29.1	100%	30	0	57	57	8.2	6.9	8	11.8	11.3	9.1 J
Copper	MG/KG	62.8	100%	33	3	57	57	17.7	16.4	15.7	25.5	21	23.7
Cyanide	MG/KG	0	0%	0.35	0	0	51	0.57 U	0.51 U	0.444 U	0.66 U	0.56 U	0.55 U
Iron	MG/KG	38600	100%	37410	2	57	57	18900	15400	20500	28500	28000	22600
Lead	MG/KG	266	95%	24.4	3	54	57	7	6.5	11.1	21.6	13.6	15.4
Magnesium	MG/KG	29100	100%	21700	2	54	54	17400	20700	11700	5480	5010	14800
Manganese	MG/KG	2380	95%	1100	2	54	57	735	402	452	558	604	402
Mercury	MG/KG	0.13	72%	0.1	2	41	57	0.02	0.01	0.03	0.05 J	0.03 J	0.02 J
Nickel	MG/KG	62.3	98%	50	2	56	57	26.4	22.4	22.3	32.2	28.6	26.7
Potassium	MG/KG	3160	100%	2623	2	57	57	1280	1430	1110	2590 J	2260 J	2700 J
Selenium	MG/KG	1.7	40%	2	0	23	57	0.7 U	0.74 U	0.66 U	0.96	1.7	0.34 U
Silver	MG/KG	0.87	4%	0.8	1	2	54	0.98 U	1 U	0.92 U	0.12 U	0.14 U	0.14 U
Sodium	MG/KG	269	82%	188	2	47	57	89.1	110	57.5	27.5 U	31.8 U	92.1 J
Thallium	MG/KG	1.2	17%	0.855	3	9	54	1.1	0.6 U	1.2	0.42 J	0.32 U	0.32 U
Vanadium	MG/KG	32.7	100%	150	0	57	57	13.4	13.7	21	27.6	32.2	22.8
Zinc	MG/KG	126	95%	115	2	54	57	64.9	65.1	54.1	104	87.1	64.9

**TABLE B-3.1  
BACKGROUND SOIL DATA  
SEAD-13  
Decision Document - Mini Risk Assessment  
Seneca Army Depot Activity**

LOC_ID:								MW64B-1	MW64B-1	MW64B-1	MW64B-1	MW67-2	MW67-2					
QC CODE:								SA	SA	SA	SA	SA	SA					
STUDY ID:								ESI	ESI	ESI	ESI	ESI	ESI					
TOP:								0	4	6	6	0	2					
BOTTOM:								0.2	6	8	8	0.2	4					
MATRIX:								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL					
SAMPLE DATE:			FREQUENCY		NUMBER	NUMBER	NUMBER	5/13/1994	5/13/1994	5/13/1994	13-May-94	3/30/1994	3/30/1994					
SAMP ID:			OF		ABOVE	OF	OF	MW64B-1-1	MW64B-1-2	MW64B-1-3	MW64B-1-04	MW67-2-1	MW67-2-2					
COMPOUND	UNIT	MAXIMUM	DETECTION	TAGM	TAGM	DETECTS	ANALYSES	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q			
<b>METALS</b>																		
Aluminum	MG/KG	21000	100%	19520	3	57	57	13400		8870		7620		7620		16700		14900
Antimony	MG/KG	6.8	18%	6	2	10	57	0.3 J		0.15 UJ		0.15 UJ		0.15 UJ		0.27 J		0.22 J
Arsenic	MG/KG	21.5	95%	8.9	2	54	57	5.5		4.3		5.5		5.5		4.4		4.5
Barium	MG/KG	159	100%	300	0	57	57	75.5		70.8		76.7		76.7		114		105
Beryllium	MG/KG	1.4	100%	1.13	2	57	57	0.56 J		0.43 J		0.37 J		0.37 J		0.67 J		0.61 J
Cadmium	MG/KG	2.9	35%	2.46	2	20	57	0.63 J		0.64 J		0.54 J		0.54 J		0.2 J		0.11 J
Calcium	MG/KG	293000	100%	125300	2	57	57	5530		70000		75900		75900		3580		79000
Chromium	MG/KG	32.7	100%	30	2	57	57	17.5		14.1		13.5		13.5		19.5		22.5
Cobalt	MG/KG	29.1	100%	30	0	57	57	7.2 J		10		7.4 J		7.4 J		7.5 J		10.4 J
Copper	MG/KG	62.8	100%	33	3	57	57	18.9		20.2		17.6		17.6		16.5		20.3
Cyanide	MG/KG	0	0%	0.35	0	0	51	0.6 U		0.5 U		0.48 U		0.48 U		0.64 U		0.5 U
Iron	MG/KG	38600	100%	37410	2	57	57	20900		18400		17100		17100		20500		24400
Lead	MG/KG	266	95%	24.4	3	54	57	21.4		8.8		8.3		8.3		17.5		9.3
Magnesium	MG/KG	29100	100%	21700	2	54	54	3720		18900		21500		21500				
Manganese	MG/KG	2380	95%	1100	2	54	57	207		434		389		389		438		528
Mercury	MG/KG	0.13	72%	0.1	2	41	57	0.05 J		0.02 J		0.01 U		0.01 U		0.04		0.01 J
Nickel	MG/KG	62.3	98%	50	2	56	57	19.8		28.2		22.6		22.6		18.7		32.3
Potassium	MG/KG	3160	100%	2623	2	57	57	1700		1630		1650		1650		1780 J		3160 J
Selenium	MG/KG	1.7	40%	2	0	23	57	0.99 J		0.26 U		0.57 J		0.57 J		0.81		0.36 U
Silver	MG/KG	0.87	4%	0.8	1	2	54	0.16 UJ		0.11 UJ		0.11 UJ		0.11 UJ		0.11 U		0.15 U
Sodium	MG/KG	269	82%	188	2	47	57	35.9 U		96.8 J		79.6 J		79.6 J		25.1 U		112 J
Thallium	MG/KG	1.2	17%	0.855	3	9	54	0.41 J		0.24 U		0.24 U		0.24 U		0.48 J		0.34 U
Vanadium	MG/KG	32.7	100%	150	0	57	57	23.3		14.8		14.2		14.2		28.2		24.8
Zinc	MG/KG	126	95%	115	2	54	57	72.2		59		45.6		45.600		64.8		62



**TABLE B-3.1**  
**BACKGROUND SOIL DATA**  
**SEAD-13**  
**Decision Document - Mini Risk Assessment**  
**Seneca Army Depot Activity**

LOC_ID:					MW67-2	MW70-1	MW70-1	MW70-1	MW70-1	SB11-3	SB11-3					
QC CODE:					SA	SA	SA	SA	SA	SA	SA					
STUDY ID:					ESI	ESI	ESI	ESI	ESI	ESI	ESI					
TOP:					4	0	2	4	0	2						
BOTTOM:					5	0.2	4	6	2	4						
MATRIX:					SOIL	SOIL	SOIL	SOIL	SOIL	SOIL						
SAMPLE DATE:		FREQUENCY		NUMBER	NUMBER	NUMBER	3/30/1994	5/11/1994	5/11/1994	11/2/1993	11/2/1993					
SAMP ID:		OF		ABOVE	OF	OF	MW67-2-3	MW70-1-1	MW70-1-2	MW70-1-3	SB11-3-1	SB11-3-2				
COMPOUND	UNIT	MAXIMUM	DETECTION	TAGM	TAGM	DETECTS	ANALYSES	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	
<b>METALS</b>																
Aluminum	MG/KG	21000	100%	19520	3	57	57	9460		12200		9480		11000		6330
Antimony	MG/KG	6.8	18%	6	2	10	57	0.2 UJ		0.23 UJ		0.21 UJ		0.19 UJ		8 UJ
Arsenic	MG/KG	21.5	95%	8.9	2	54	57	4.2		5.4		4.1		5.7		0
Barium	MG/KG	159	100%	300	0	57	57	80.8		67.5		56.6		79.9		57.4
Beryllium	MG/KG	1.4	100%	1.13	2	57	57	0.4 J		0.44 J		0.41 J		0.54 J		0.34 J
Cadmium	MG/KG	2.9	35%	2.46	2	20	57	0.12 J		0.57 J		0.43 J		0.8 J		0.5 U
Calcium	MG/KG	293000	100%	125300	2	57	57	77800		3600		51600		48600		91300
Chromium	MG/KG	32.7	100%	30	2	57	57	14.8		13.7		14.7		17.8		11.1
Cobalt	MG/KG	29.1	100%	30	0	57	57	9.7 J		5.5 J		7.1 J		21		6.5 J
Copper	MG/KG	62.8	100%	33	3	57	57	20.5		12.4		19.7		33.5		12.2
Cyanide	MG/KG	0	0%	0.35	0	0	51	0.54 U								0.47 U
Iron	MG/KG	38600	100%	37410	2	57	57	18700		17700		16000		26400		13200
Lead	MG/KG	266	95%	24.4	3	54	57	8.5		20.7		9.1		13.6		11.4
Magnesium	MG/KG	29100	100%	21700	2	54	54			2830		13600		7980		12900
Manganese	MG/KG	2380	95%	1100	2	54	57	411		233		470		1040		356
Mercury	MG/KG	0.13	72%	0.1	2	41	57	0.02 J		0.1 J		0.03 J		0.02 J		0.04 U
Nickel	MG/KG	62.3	98%	50	2	56	57	25.9		12.3		17.6		52.4		16.7
Potassium	MG/KG	3160	100%	2623	2	57	57	1970 J		982 J		1590		1350		1110
Selenium	MG/KG	1.7	40%	2	0	23	57	0.34 U		1 J		0.64 J		0.32 U		0.13 UJ
Silver	MG/KG	0.87	4%	0.8	1	2	54	0.14 U								1 UJ
Sodium	MG/KG	269	82%	188	2	47	57	107 J		36.4 U		126 J		165 J		136 J
Thallium	MG/KG	1.2	17%	0.855	3	9	54	0.32 U								1.5 U
Vanadium	MG/KG	32.7	100%	150	0	57	57	16.5		23.3		17.2		17.6		13.3
Zinc	MG/KG	126	95%	115	2	54	57	60.1		55.4		42.4		116		0

**TABLE B-3.1  
BACKGROUND SOIL DATA  
SEAD-13  
Decision Document - Mini Risk Assessment  
Seneca Army Depot Activity**

LOC_ID:					SB11-3	SB13-1	SB13-1	SB13-1	SB13-1	MW13-6	MW13-6				
QC CODE:					SA	SA	SA	SA	SA	SA	SA				
STUDY ID:					ESI	ESI	ESI	ESI	ESI	ESI	ESI				
TOP:					10	0			6	0	4				
BOTTOM:					12	2			8	2	6				
MATRIX:					SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL				
SAMPLE DATE:		FREQUENCY		NUMBER	NUMBER	NUMBER	NUMBER	NUMBER	NUMBER	NUMBER	NUMBER				
SAMP ID:		OF		ABOVE	OF	OF	OF	OF	OF	OF	OF				
COMPOUND	UNIT	MAXIMUM	DETECTION	TAGM	TAGM	DETECTS	ANALYSES	VALUE	Q	VALUE	Q				
METALS															
Aluminum	MG/KG	21000	100%	19520	3	57	57	10900		18300		8250	11700	16000	13500
Antimony	MG/KG	6.8	18%	6	2	10	57	7.6 UJ		5.1 J		3.7 UJ	2.8 UJ	3.2 UJ	2.5 UJ
Arsenic	MG/KG	21.5	95%	8.9	2	54	57	0		7		6.2	5.7	4.6	2.7
Barium	MG/KG	159	100%	300	0	57	57	62.7		106		88.1	33.9	103	60.4
Beryllium	MG/KG	1.4	100%	1.13	2	57	57	0.47 J		0.92 J		0.42 J	0.54 J	0.92	0.71
Cadmium	MG/KG	2.9	35%	2.46	2	20	57	0.48 U		0.45 U		0.36 U	0.27 U	0.31 U	0.25 U
Calcium	MG/KG	293000	100%	125300	2	57	57	48600		3570		87700	50300	5140	31800
Chromium	MG/KG	32.7	100%	30	2	57	57	18.6		29.4		13.3	19.6	21.5	23.5
Cobalt	MG/KG	29.1	100%	30	0	57	57	10.1		12		7.2 J	11.1	10.6	15
Copper	MG/KG	62.8	100%	33	3	57	57	21.7		11.6		18.4	17.6	16	27.4
Cyanide	MG/KG	0	0%	0.35	0	0	51	0.53 U		0.61 U		0.5 U	0.53 U	0.6 U	0.53 U
Iron	MG/KG	38600	100%	37410	2	57	57	28300		32500		17400	24700	25300	26900
Lead	MG/KG	266	95%	24.4	3	54	57	10.1		15		0	0	13.8	11.6
Magnesium	MG/KG	29100	100%	21700	2	54	54	10100		5890		20800	12600	3750	6640
Manganese	MG/KG	2380	95%	1100	2	54	57	434		451		517	404	934	508
Mercury	MG/KG	0.13	72%	0.1	2	41	57	0.03 U		0.03 J		0.07 J	0.02 U	0.03 J	0.01 U
Nickel	MG/KG	62.3	98%	50	2	56	57	29.5		34.9		24	33.1	22.7	41.9
Potassium	MG/KG	3160	100%	2623	2	57	57	1230		2190		1390	1270	1330	1120
Selenium	MG/KG	1.7	40%	2	0	23	57	0.21 UJ		0.26 J		0.56 J	0.51 J	1.2	0.11 J
Silver	MG/KG	0.87	4%	0.8	1	2	54	0.97 UJ		0.9 U		0.71 U	0.54 U	0.62 U	0.49 U
Sodium	MG/KG	269	82%	188	2	47	57	146 J		80.6 J		155 J	134 J	61.9 J	116 J
Thallium	MG/KG	1.2	17%	0.855	3	9	54	0.23 U		0.43 J		0.43 J	0.64 J	0.18 U	0.14 U
Vanadium	MG/KG	32.7	100%	150	0	57	57	17		32.7		13.3	16.3	29.9	18.5
Zinc	MG/KG	126	95%	115	2	54	57	0		81.9		56.2	45.8	62.5	64.7

**TABLE B-3.1  
BACKGROUND SOIL DATA  
SEAD-13  
Decision Document - Mini Risk Assessment  
Seneca Army Depot Activity**

LOC_ID:								MW13-6	SB17-1	SB17-1	SB17-1	SB17-1	SB26-1	SB26-1	
QC CODE:								SA	SA	SA	SA	SA	SA	SA	
STUDY ID:								ESI	ESI	ESI	ESI	ESI	ESI	ESI	
TOP:								6	0	2	4	0	2		
BOTTOM:								8	2	4	6	2	4		
MATRIX:								SOIL	SOIL	SOIL	SOIL	SOIL	SOIL		
SAMPLE DATE:			FREQUENCY		NUMBER	NUMBER	NUMBER	15-Dec-93	12/1/1993	12/1/1993	12/1/1993	11/17/1993	11/17/1993		
SAMP ID:			OF		ABOVE	OF	OF	SB13-6-4	SB17-1-1	SB17-1-2	SB17-1-3	SB26-1-1	SB26-1-2		
COMPOUND	UNIT	MAXIMUM	DETECTION	TAGM	TAGM	DETECTS	ANALYSES	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q
<b>METALS</b>															
Aluminum	MG/KG	21000	100%	19520	3	57	57	10200	13700	18100	8700	5560	9040		
Antimony	MG/KG	6.8	18%	6	2	10	57	2.9 UJ	11.7 UJ	11.8 UJ	9 UJ	7.3 UJ	6.7 UJ		
Arsenic	MG/KG	21.5	95%	8.9	2	54	57	2.3	4.3	5.2	3.4	3.2	5.3		
Barium	MG/KG	159	100%	300	0	57	57	56.8	107	114	59.4	73.2	43.7		
Beryllium	MG/KG	1.4	100%	1.13	2	57	57	0.58 J	0.7 J	0.9 J	0.42 J	0.35 J	0.41 J		
Cadmium	MG/KG	2.9	35%	2.46	2	20	57	0.28 U	0.73 U	0.74 U	0.56 U	0.46 U	0.42 U		
Calcium	MG/KG	293000	100%	125300	2	57	57	45200	2870	20900	72800	293000	47300		
Chromium	MG/KG	32.7	100%	30	2	57	57	17.8	17.6	25.1	13.9	10.3	15.7		
Cobalt	MG/KG	29.1	100%	30	0	57	57	11.3	9.9 J	13.3	8.8	5.9 J	9.5		
Copper	MG/KG	62.8	100%	33	3	57	57	14.5	46.4	26.9	20	9.7	14.3		
Cyanide	MG/KG	0	0%	0.35	0	0	51	0.51 U	0 NA	0 NA	0 NA	0.48 U	0.57 U		
Iron	MG/KG	38600	100%	37410	2	57	57	20700	25100	29900	18800	8770	19100		
Lead	MG/KG	266	95%	24.4	3	54	57	11.7	266	11.4 J	7.5 J	6.33	8.5		
Magnesium	MG/KG	29100	100%	21700	2	54	54	5220	3330	8490	18100	29100	9160		
Manganese	MG/KG	2380	95%	1100	2	54	57	556	547	487	391	309	551		
Mercury	MG/KG	0.13	72%	0.1	2	41	57	0.01 U	0.05 J	0.06 J	0.03 UJ	0.02 U	0.02 U		
Nickel	MG/KG	62.3	98%	50	2	56	57	33	19.1	42	25.2	31.6 R	23.9		
Potassium	MG/KG	3160	100%	2623	2	57	57	1000	628 J	1560	1090	1710	901		
Selenium	MG/KG	1.7	40%	2	0	23	57	0.24 J	0.25 UJ	0.24 UJ	0.14 UJ	0.13 UJ	0.26 J		
Silver	MG/KG	0.87	4%	0.8	1	2	54	0.56 U	1.5 U	1.5 U	1.1 U	0.92 UJ	0.85 UJ		
Sodium	MG/KG	269	82%	188	2	47	57	141 J	46.2 J	74.6 J	137 J	192 J	108 J		
Thallium	MG/KG	1.2	17%	0.855	3	9	54	0.23 U	0.28 UJ	0.26 UJ	0.15 UJ	0.73 U	0.17 U		
Vanadium	MG/KG	32.7	100%	150	0	57	57	13.8	23.1	27	13.9	12.7	14.4		
Zinc	MG/KG	126	95%	115	2	54	57	39.3	93.4	80.2	57.1	283 R	90.6		

**TABLE B-3.1  
BACKGROUND SOIL DATA  
SEAD-13  
Decision Document - Mini Risk Assessment  
Seneca Army Depot Activity**

LOC_ID:			SB4-1		SB4-1		SB4-1		SB4-1		TP57-11					
QC CODE:			SA		DU		SA		SA		SA					
STUDY ID:			ESI		ESI		ESI		ESI		ESI					
TOP:			0		0		4		8		3					
BOTTOM:			2		2		6		10		3					
MATRIX:			SOIL		SOIL		SOIL		SOIL		SOIL					
SAMPLE DATE:	FREQUENCY		NUMBER		NUMBER		NUMBER		NUMBER		NUMBER					
SAMP ID:	OF		ABOVE		OF		OF		OF		OF					
COMPOUND	UNIT	MAXIMUM	DETECTION	TAGM	TAGM	DETECTS	ANALYSES	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	
METALS																
Aluminum	MG/KG	21000	100%	19520	3	57	57	14800		21000		15300		19200		14600
Antimony	MG/KG	6.8	18%	6	2	10	57	4.8 UJ		3.8 UJ		5 UJ		2.8 UJ		11.3 UJ
Arsenic	MG/KG	21.5	95%	8.9	2	54	57	6.2		4.2		3.9		21.5		5.9
Barium	MG/KG	159	100%	300	0	57	57	72		97.7		40.4 J		81.2		120
Beryllium	MG/KG	1.4	100%	1.13	2	57	57	0.73 J		0.64 J		0.74 J		1		0.81 J
Cadmium	MG/KG	2.9	35%	2.46	2	20	57	0.47 U		0.37 U		0.49 U		0.27 U		0.71 U
Calcium	MG/KG	293000	100%	125300	2	57	57	4280		2460		30900		14400		22300
Chromium	MG/KG	32.7	100%	30	2	57	57	23.2		27.9		27.6		32.7		20.1
Cobalt	MG/KG	29.1	100%	30	0	57	57	11.3		5.9 J		16.5		29.1		8.8 J
Copper	MG/KG	62.8	100%	33	3	57	57	14.1		15.1		62.8		21.6		21.7
Cyanide	MG/KG	0	0%	0.35	0	0	51	0.52 U		0.53 U		0.53 U		0.47 U		0.54 U
Iron	MG/KG	38600	100%	37410	2	57	57	27500		19500		34300		37900		24900
Lead	MG/KG	266	95%	24.4	3	54	57	0 J		9.8 J		7.5 J		9.1 J		11.3
Magnesium	MG/KG	29100	100%	21700	2	54	54	4270		4460		7130		8040		5360
Manganese	MG/KG	2380	95%	1100	2	54	57	615 J		0 J		0		0		329
Mercury	MG/KG	0.13	72%	0.1	2	41	57	0.05 J		0.04 J		0.04 J		0.04 J		0.04 J
Nickel	MG/KG	62.3	98%	50	2	56	57	27.8		25.1		47.6		62.3		25.7
Potassium	MG/KG	3160	100%	2623	2	57	57	1250		2490		1300		2030		1430
Selenium	MG/KG	1.7	40%	2	0	23	57	0.4 J		0.23 J		0.09 U		0.14 U		0.46 J
Silver	MG/KG	0.87	4%	0.8	1	2	54	0.93 U		0.74 U		0.98 U		0.64 J		1.4 UJ
Sodium	MG/KG	269	82%	188	2	47	57	43.8 U		39.2 J		105 J		91.6 J		93 J
Thallium	MG/KG	1.2	17%	0.855	3	9	54	0.23 U		0.23 U		0.16 U		0.24 U		0.17 U
Vanadium	MG/KG	32.7	100%	150	0	57	57	28.6		31		22.2		29.3		27.8
Zinc	MG/KG	126	95%	115	2	54	57	79.6		72.1		102		115		57.9

**TABLE B-3.2  
BACKGROUND GROUND WATER DATA  
SEAD-13  
Decision Document - Mini Risk Assessment  
Seneca Army Depot Activity**

STUDY ID:  
LOC ID:  
QC CODE:  
SAMP. DETH TOP:  
SAMP. DEPTH BOT:  
MATRIX:  
SAMP ID:

PARAMETER	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NY AWQS CLASS GA	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	3Q93 MW-35 SA NONE NONE GROUNDW MW35OB3		RI PHASE1 MW-35 SA NONE NONE GROUNDW MW-35GW		ESI MW11-1 SA NONE NONE GROUNDW MW11-1-1		ESI MW13-1 SA NONE NONE GROUNDW MW13-1-1		ESI MW13-6 SA NONE NONE GROUNDW MW13-6-1		RI ROUND MW16-1 SA 3.3 5.3 GROUNDW 16101		RI ROUND MW16-1 SA 731.5 728.4 GROUNDW 16152		RI ROUND MW17-1 SA 3.4 7.4 GROUNDW 16108	
								VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q
METALS																							
Aluminum	UG/L	42400	87%		0	27	31	207		7550 J		53.7 J		42400		2810		1850		143 U		90.4	
Antimony	UG/L	52.7	13%		0	4	31	16.8 U		55.5 U		21.4 U		33.9 J		52.7 J		2 U		3 U		2 U	
Arsenic	UG/L	10	13%	25	0	4	31	1 B		3.5 U		0.8 U		9.3 J		1.4 U		2.7 U		4.4 U		2.7 U	
Barium	UG/L	337	94%	1000	0	29	31	97.3 B		103 J		25.2 J		337		34.3 J		74.2		48.2 U		85	
Beryllium	UG/L	2.2	13%		0	4	31	0.3 U		1.8 R		0.4 U		2.2 J		0.4 U		0.23		0.2 U		0.26	
Cadmium	UG/L	0	0%	10	0	0	31	2.4 U		2.9 U		2.1 U		2.1 U		2.1 U		0.3 U		0.6 U		0.3 U	
Calcium	UG/L	181000	100%		0	31	31	108000		94700		97500		181000		81500		157000		116000		108000	
Chromium	UG/L	69.4	48%	50	1	15	31	3.3 U		15.3 R		2.6 U		69.4		6.1 J		2.7		1 U		1 U	
Cobalt	UG/L	34.6	45%		0	14	31	2.7 U		19.9 J		4.4 U		34.6 J		4.4 U		2.1		1.3 U		1.2 U	
Copper	UG/L	32.5	48%	200	0	15	31	2.1 U		14.4 U		3.1 U		23.3 J		3.1 U		4.9		1.9 U		3.1	
Cyanide	UG/L	2.8	3%	100	0	1	31	2.8 B		10 UJ		5 U		5 U		5 U		5 U		5 UJ		5 U	
Iron	UG/L	69400	100%	300	22	31	31	321		10500		41.4 J		69400		4550		2400 J		296		119	
Lead	UG/L	34.8	32%	25	1	10	31	2.8 B		3.3		1.1 J		34.8		1.5 J		1.7 U		1.5 U		1.7 U	
Magnesium	UG/L	58200	100%		0	31	31	15600		14600		29700		50300		51500		23300		17600		22600	
Manganese	UG/L	1120	97%	300	8	30	31	23.4		557 J		278		1120		376		210		64.2		21.3	
Mercury	UG/L	0.06	23%	0.7	0	7	31	0.1 U		0.18 R		0.04 U		0.05 J		0.04 U		0.1 U		0.1 U		0.1 U	
Nickel	UG/L	99.8	61%	100	0	19	31	8.3 U		15.9 U		4 U		99.8		8.6 J		4.7		2.5 U		1.8	
Potassium	UG/L	10200	94%		0	29	31	1400 B		4180 J		7100		10100		6780 J		1670		998 U		472	
Selenium	UG/L	3.6	19%	10	0	6	31	1.2 B		1.1 J		0.7 U		3.6 J		2.3 J		2.4 U		4.7 UJ		2.4 U	
Silver	UG/L	0.98	6%	50	0	2	31	2.6 U		9 U		4.2 U		4.2 U		4.2 U		1.3 U		1.5 U		1.3 U	
Sodium	UG/L	59400	97%	20000	7	30	31	13400		44100		4860 J		9350		7880		8750		3870 U		9290	
Thallium	UG/L	4.7	13%		0	4	31	1.2 U		3.2 U		1.2 U		1.2 U		1.2 U		4.2 U		5.9 U		4.4	
Vanadium	UG/L	70.8	52%		0	16	31	3 U		30.3 U		3.7 U		70.8		5.9 J		3.3		1.6 U		1.2 U	
Zinc	UG/L	143	84%	300	0	26	31	72.7		58.2		21.4		143		50.6		15.6 R		5.8 U		2.5 R	

**TABLE B-3.2**  
**BACKGROUND GROUND WATER DATA**  
**SEAD-13**  
**Decision Document - Mini Risk Assessment**  
**Seneca Army Depot Activity**

STUDY ID:  
 LOC ID:  
 QC CODE:  
 SAMP. DETH TOP:  
 SAMP. DEPTH BOT:  
 MATRIX:  
 SAMP ID:

RI ROUND:  
 MW17-1  
 SA  
 731.1  
 727.1  
 GROUNDW  
 16171

RI ROUND:  
 MW25-6  
 SA  
 NONE  
 NONE  
 GROUNDW  
 MW25-6

RI ROUND:  
 MW25-6  
 SA  
 NONE  
 NONE  
 GROUNDW  
 25008

ESI  
 MW26-1  
 SA  
 NONE  
 NONE  
 GROUNDW  
 MW26-1-1

RI ROUND:  
 MW26-1  
 SA  
 NONE  
 NONE  
 GROUNDW  
 MW26-1

RI ROUND:  
 MW26-1  
 SA  
 NONE  
 NONE  
 GROUNDW  
 26001

ESI  
 MW4-1  
 SA  
 NONE  
 NONE  
 GROUNDW  
 MW4-1-1

ESI  
 MW44A-1  
 SA  
 NONE  
 NONE  
 GROUNDW  
 MW44A-1-1

PARAMETER	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NY AWQS CLASS GA	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	RI ROUND: MW17-1		RI ROUND: MW25-6		RI ROUND: MW25-6		ESI MW26-1		RI ROUND: MW26-1		RI ROUND: MW26-1		ESI MW4-1		ESI MW44A-1	
								VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q
METALS																							
Aluminum	UG/L	42400	87%		0	27	31	386		162		529		188 J		457		38.7		41.9 U		69 J	
Antimony	UG/L	52.7	13%		0	4	31	3 U		2.2 U		2.3 U		21.5 U		2.2 U		1.4		21.6 U		1.3 U	
Arsenic	UG/L	10	13%	25	0	4	31	4.4 U		2.1 U		3.5 U		0.8 U		2.1 U		4 U		2.2 J		2 U	
Barium	UG/L	337	94%	1000	0	29	31	90.4 U		85.6		72.3		31.9 J		33.2		29.9		19.6 J		102 J	
Beryllium	UG/L	2.2	13%		0	4	31	0.2 U		0.27 U		0.13 U		0.4 U		0.27 U		0.1 U		0.4 U		0.1 U	
Cadmium	UG/L	0	0%	10	0	0	31	0.6 U		0.3 U		0.32 U		2.1 U		0.3 U		2.1 U		2.1 U		0.2 U	
Calcium	UG/L	181000	100%		0	31	31	104000		133000		118000		115000		121000		110000		137000		92200	
Chromium	UG/L	69.4	48%	50	1	15	31	1 U		2.2		1.3 U		2.6 U		4.7		0.73		2.6 U		0.4 U	
Cobalt	UG/L	34.6	45%		0	14	31	2 U		1.3		1.1		4.4 U		1.1		0.9 U		4.6 J		0.5 U	
Copper	UG/L	32.5	48%	200	0	15	31	1.1 U		0.99		1.1		3.1 U		5.7		1 U		3.1 U		0.5 U	
Cyanide	UG/L	2.8	3%	100	0	1	31	5 UJ		5 U		5 UJ		5 U		5 U		5 U		5 U		5 U	
Iron	UG/L	69400	100%	300	22	31	31	572 J		308		623		286		867		58.4 J		332		114 J	
Lead	UG/L	34.8	32%	25	1	10	31	1.5 U		4.4		1.1 U		0.5 U		7.8		1.9 U		0.5 U		0.9 U	
Magnesium	UG/L	58200	100%		0	31	31	22900		35900		32900		16700		16600		15500		57600		19000	
Manganese	UG/L	1120	97%	300	8	30	31	9.7 U		56		22		529		27.5		2.5		346		18.2	
Mercury	UG/L	0.06	23%	0.7	0	7	31	0.1 U		0.02 U		0.1 U		0.05 J		0.02 U		0.2 U		0.04 U		0.04 U	
Nickel	UG/L	99.8	61%	100	0	19	31	2.5 U		2.6		1.7 U		4 U		6.2		1.6 U		4 U		0.7 U	
Potassium	UG/L	10200	94%		0	29	31	843 U		1840 J		1420		10200		3620		3860 J		7380		1050 J	
Selenium	UG/L	3.6	19%	10	0	6	31	4.7 UJ		3.7 U		3.4 U		0.7 U		3.7 U		3.4 U		2.1 J		2.7 U	
Silver	UG/L	0.98	6%	50	0	2	31	1.5 U		0.8 U		1.1 U		4.2 U		0.8 U		1.3 U		4.2 U		0.5 U	
Sodium	UG/L	59400	97%	20000	7	30	31	8190		20400 J		16500		30300		24600		34800		11700		2310 J	
Thallium	UG/L	4.7	13%		0	4	31	4.1 U		3 U		3.5 U		1.2 U		4.3		4.7 U		1.2 U		1.9 U	
Vanadium	UG/L	70.8	52%		0	16	31	1.6 U		1.4		1.2 U		3.7 U		1.3 J		1.1 U		3.7 U		0.5 U	
Zinc	UG/L	143	84%	300	0	26	31	14.4 U		7.5		2.2		26.7		20.5		3.1 J		19.1 J		3.8 J	

**TABLE B-3.2**  
**BACKGROUND GROUND WATER DATA**  
**SEAD-13**  
**Decision Document - Mini Risk Assessment**  
**Seneca Army Depot Activity**

STUDY ID:	LOC ID:	QC CODE:	SAMP. DEPTH TOP:	SAMP. DEPTH BOT:	MATRIX:	SAMP ID:	FREQUENCY OF DETECTION	NY AWQS CLASS GA	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	ESI MW44B-1 SA NONE NONE GROUNDW MW44B-1-1	ESI MW57-1 SA NONE NONE GROUNDW MW57-1-1	ESI MW58-1 SA NONE NONE GROUNDW MW58-1-1	ESI MW64A-1 SA NONE NONE GROUNDW MW64A-1-1	ESI MW64B-1 SA NONE NONE GROUNDW MW64B-1-1	ESI MW64C-9 SA NONE NONE GROUNDW MW64C-9-1	ESI MW64D-1 SA NONE NONE GROUNDW MW64D-1-1	RI PHASE2 PT-10 SA NONE NONE GROUNDW PT10GW1	
PARAMETER	UNIT	MAXIMUM										VALUE Q	VALUE Q	VALUE Q	VALUE Q	VALUE Q	VALUE Q	VALUE Q	VALUE Q	VALUE Q
METALS																				
Aluminum	UG/L	42400	87%		0	27	31	288 J				4200	440	398	198 J	38.2 J	177 J	72 U		
Antimony	UG/L	52.7	13%		0	4	31	1.3 U	44.7 J	1.3 U	2 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U	49.5 UJ	1.4 UJ
Arsenic	UG/L	10	13%	25	0	4	31	2 U	1.4 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U	2 U
Barium	UG/L	337	94%	1000	0	29	31	72.6 J	36.5 J	71.9 J	42 J	104 J	20.4 J	88.6 J	193 J					
Beryllium	UG/L	2.2	13%		0	4	31	0.1 U	0.4 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.89 U
Cadmium	UG/L	0	0%	10	0	0	31	0.2 U	2.1 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	0.2 U	2.8 U
Calcium	UG/L	181000	100%		0	31	31	120000	82000	113000	109000	138000	121000	142000	79100					
Chromium	UG/L	69.4	48%	50	1	15	31	0.4 U	7.7 J	0.82 J	0.49 J	0.41 J	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	0.4 U	2.7 UJ	
Cobalt	UG/L	34.6	45%		0	14	31	0.91 J	4.4 U	0.64 J	0.5 U	1.1 J	0.5 U	0.69 J	5.4 U					
Copper	UG/L	32.5	48%	200	0	15	31	0.5 U	3.1 U	1.5 J	0.61 J	1 J	0.55 J	0.5 U	4.7 U					
Cyanide	UG/L	2.8	3%	100	0	1	31	5 U	5 U	5 U	5 U	5 U	5 U	5 U	10 UJ					
Iron	UG/L	69400	100%	300	22	31	31	666	6360	678	773 J	400	681	440	85.6 J					
Lead	UG/L	34.8	32%	25	1	10	31	0.9 U	2.1 J	0.89 U	0.89 U	0.89 U	0.9 U	0.9 U	0.79 U					
Magnesium	UG/L	58200	100%		0	31	31	31800	11400	17300	16800	45600	49400	14800	34200					
Manganese	UG/L	1120	97%	300	8	30	31	219	245	84	28.3	98.9	96	223	124					
Mercury	UG/L	0.06	23%	0.7	0	7	31	0.04 U	0.04 U	0.04 U	0.04 J	0.04 U	0.04 U	0.04 U	0.09 UJ					
Nickel	UG/L	99.8	61%	100	0	19	31	0.73 J	8.2 J	1.6 J	1 J	1.4 J	1.2 J	7.4 UJ						
Potassium	UG/L	10200	94%		0	29	31	2150 J	3860 J	1460 J	1790 J	4780 J	1670 J	3340 J	2870 J					
Selenium	UG/L	3.6	19%	10	0	6	31	2.7 U	0.69 U	2.7 U	2.7 U	2.7 U	2.7 U	2.7 U	0.99 UJ					
Silver	UG/L	0.98	6%	50	0	2	31	0.68 J	4.2 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	5.4 U					
Sodium	UG/L	59400	97%	20000	7	30	31	7190	4080 J	4180 J	2180 J	8140	6420	12300	41100					
Thallium	UG/L	4.7	13%		0	4	31	4.7 J	1.2 U	1.9 U	1.9 U	1.9 U	1.9 U	2.2 J						
Vanadium	UG/L	70.8	52%		0	16	31	0.5 U	7.6 J	0.81 J	1.3 J	0.73 J	0.61 J	0.69 J	6.7 UJ					
Zinc	UG/L	143	84%	300	0	26	31	2.2 U	57.4	7.1 J	3.9 J	3.9 J	3.9 J	3.8 J	8.8 J					

**TABLE B-3.2**  
**BACKGROUND GROUND WATER DATA**  
**SEAD-13**  
**Decision Document - Mini Risk Assessment**  
**Seneca Army Depot Activity**

STUDY ID:	LOC ID:	QC CODE:	SAMP. DEPTH TOP:	SAMP. DEPTH BOT:	MATRIX:	SAMP ID:	FREQUENCY OF DETECTION	NY AWQS CLASS GA	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	ESI MW24-1	QUARTER1 MW45-4	ESI MW60-1	ESI MW62-1	ESI MW63-1	ESI MW67-1	ESI MW70-1			
PARAMETER	UNIT	MAXIMUM	DETECTION	NY AWQS CLASS GA	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	ESI MW24-1	QUARTER1 MW45-4	ESI MW60-1	ESI MW62-1	ESI MW63-1	ESI MW67-1	ESI MW70-1							
								GROUNDW	GROUNDW	GROUNDW	GROUNDW	GROUNDW	GROUNDW	GROUNDW	GROUNDW	GROUNDW	GROUNDW	GROUNDW			
								OB108	OB108	MW60-1	MW62-1	MW63-1	MW67-2	MW70-1							
								VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q		
<b>METALS</b>																					
Aluminum	UG/L	42400	87%		0	27	31	19100		36.8	U	348		499		747		1240	88.2	J	
Antimony	UG/L	52.7	13%		0	4	31	21.5	U	2.8	U	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U
Arsenic	UG/L	10	13%	25	0	4	31	10		3.6	U	2	U	2	U	2	U	2	U	2	U
Barium	UG/L	337	94%	1000	0	29	31	156	J	23.4		88.7	J	68.1	J	72.6	J	100	J	86.5	J
Beryllium	UG/L	2.2	13%		0	4	31	0.89	J	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Cadmium	UG/L	0	0%	10	0	0	31	2.1	U	0.4	U	0.2	U	0.2	U	0.2	U	0.2	U	0.2	U
Calcium	UG/L	181000	100%		0	31	31	180000		112000		95100		91700		89400		119000		119000	
Chromium	UG/L	69.4	48%	50	1	15	31	29.8		1.3	U	0.56	J	1.4	J	1.1	J	2	J	0.4	U
Cobalt	UG/L	34.6	45%		0	14	31	18.7	J	1.4	U	0.5	U	2.5	J	6.2	J	1.4	J	0.5	U
Copper	UG/L	32.5	48%	200	0	15	31	32.5		1.5		0.5	U	0.54	J	2.1	J	1.5	J	0.5	U
Cyanide	UG/L	2.8	3%	100	0	1	31	5	U		5	U		5	UJ	5	U	5	U	5	U
Iron	UG/L	69400	100%	300	22	31	31	32000		62.8		1290		797	J	1260		2270		213	
Lead	UG/L	34.8	32%	25	1	10	31	7		2	U	0.9	U	0.89	U	1.1	J	0.9	U	0.9	U
Magnesium	UG/L	58200	100%		0	31	31	39800		24200		31100		58200		16400		24200		28100	
Manganese	UG/L	1120	97%	300	8	30	31	712		5	J	377		271		548		153		107	
Mercury	UG/L	0.06	23%	0.7	0	7	31	0.06	J	0.2	U	0.05	J	0.05	J	0.04	U	0.04	U	0.06	J
Nickel	UG/L	99.8	61%	100	0	19	31	41.4		2.2		0.7	U	3.9	J	9.7	J	2.9	J	1.5	J
Potassium	UG/L	10200	94%		0	29	31	9220		2180		8760		7470	J	3870	J	1870	J	1540	J
Selenium	UG/L	3.6	19%	10	0	6	31	2.5	J	3.1	U	2.7	U	2.7	U	2.7	U	2.7	U	2.7	U
Silver	UG/L	0.98	6%	50	0	2	31	4.2	U	0.98		0.5	U	0.5	U	0.5	U	0.5	U	0.5	U
Sodium	UG/L	59400	97%	20000	7	30	31	5950		10600		59400		18100		5710		13700		5220	
Thallium	UG/L	4.7	13%		0	4	31	1.2	U	4	U	1.9	U	1.9	U	1.9	U	1.9	U	1.9	U
Vanadium	UG/L	70.8	52%		0	16	31	30.9	J	1.2	U	1	J	1.8	J	1.5	J	2.1	J	0.5	U
Zinc	UG/L	143	84%	300	0	26	31	107		6.8		6.9	J	4.2	J	7.1	J	6.5	J	3.5	J



**APPENDIX C**  
**Laboratory Analyses Results for All Compounds – SEAD-13**

Table C-1a: Surface Soil Analysis Results  
Table C-1b: Subsurface Soil Analysis Results  
Table C-2: Groundwater Analysis Results  
Table C-3: Surface Water Analysis Results  
Table C-4: Sediment Analysis Results

**TABLE C-1a**  
**SURFACE SOIL ANALYSES RAW DATA-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

		SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	
		MW13-1	MW13-2	MW13-3	MW13-4	MW13-5	MW13-6	MW13-6	MW13-6	
		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	
		SB13-1-1	SB13-2-1	SB13-3-1	SB13-4-1	SB13-5-1	SB13-6-1	SB13-6-1	SB13-10-10	
		0	0	0	0	0	0	0	0	
		2	2	2	2	1	2	2	2	
		12/8/1993	11/9/1993	12/8/1993	12/15/1993	11/8/1993	12/15/1993	12/15/1993	12/17/1993	
		SA	SA	SA	SA	SA	SA	SA	DU	
		ESI	ESI	ESI	ESI	ESI	ESI	ESI	ESI	
PARAMETER	UNIT	N	N	N	N	N	N	N	N	
1,1,1-Trichloroethane	UG/KG VOA	NYSDEC TAGM 4046	800	12 U	11 UR	12 U	12 U	11 U	13 U	12 U
1,1,2,2-Tetrachloroethane	UG/KG VOA	NYSDEC TAGM 4046	600	12 U	11 UR	12 U	12 U	11 U	13 U	12 U
1,1,2-Trichloroethane	UG/KG VOA			12 U	11 UR	12 U	12 U	11 U	13 U	12 U
1,1-Dichloroethane	UG/KG VOA	NYSDEC TAGM 4046	200	12 U	11 UR	12 U	12 U	11 U	13 U	12 U
1,1-Dichloroethene	UG/KG VOA	NYSDEC TAGM 4046	400	12 U	11 UR	12 U	12 U	11 U	13 U	12 U
1,2-Dichloroethane	UG/KG VOA	NYSDEC TAGM 4046	100	12 U	11 UR	12 U	12 U	11 U	13 U	12 U
1,2-Dichloroethene (total)	UG/KG VOA			12 U	11 UR	12 U	12 U	11 U	13 U	12 U
1,2-Dichloropropane	UG/KG VOA			12 U	11 UR	12 U	12 U	11 U	13 U	12 U
Acetone	UG/KG VOA	NYSDEC TAGM 4046	200	12 U	11 UR	12 U	12 U	11 U	86	12 U
Benzene	UG/KG VOA	NYSDEC TAGM 4046	60	12 U	11 UR	12 U	12 U	11 U	13 U	12 U
Bromodichloromethane	UG/KG VOA			12 U	11 UR	12 U	12 U	11 U	13 U	12 U
Bromoform	UG/KG VOA			12 U	11 UR	12 U	12 U	11 U	13 U	12 U
Carbon disulfide	UG/KG VOA	NYSDEC TAGM 4046	2700	12 U	11 UR	12 U	12 U	11 U	13 U	12 U
Carbon tetrachloride	UG/KG VOA	NYSDEC TAGM 4046	600	12 U	11 UR	12 U	12 U	11 U	13 U	12 U
Chlorobenzene	UG/KG VOA	NYSDEC TAGM 4046	1700	12 U	11 UR	12 U	12 U	11 U	13 U	12 U
Chlorodibromomethane	UG/KG VOA			12 U	11 UR	12 U	12 U	11 U	13 U	12 U
Chloroethane	UG/KG VOA	NYSDEC TAGM 4046	1900	12 U	11 UR	12 U	12 U	11 U	13 U	12 U
Chloroform	UG/KG VOA	NYSDEC TAGM 4046	300	12 U	11 UR	12 U	12 U	11 U	13 U	12 U
Cis-1,3-Dichloropropene	UG/KG VOA			12 U	11 UR	12 U	12 U	11 U	13 U	12 U
Ethyl benzene	UG/KG VOA	NYSDEC TAGM 4046	5500	12 U	11 UR	12 U	12 U	11 U	13 U	12 U
Methyl bromide	UG/KG VOA			12 U	11 UR	12 U	12 U	11 U	13 U	12 U
Methyl butyl ketone	UG/KG VOA			12 U	11 UR	12 U	12 U	11 U	13 U	12 U
Methyl chloride	UG/KG VOA			12 U	11 UR	12 U	12 U	11 U	13 U	12 U
Methyl ethyl ketone	UG/KG VOA	NYSDEC TAGM 4046	300	12 U	11 UR	12 U	12 U	11 U	26	12 U
Methyl isobutyl ketone	UG/KG VOA	NYSDEC TAGM 4046	1000	12 U	11 UR	12 U	12 U	11 U	13 U	12 U
Methylene chloride	UG/KG VOA	NYSDEC TAGM 4046	100	12 U	11 UR	12 U	12 U	11 U	13 U	12 U
Styrene	UG/KG VOA			12 U	11 UR	12 U	12 U	11 U	13 U	12 U
Tetrachloroethene	UG/KG VOA	NYSDEC TAGM 4046	1400	12 U	11 UR	12 U	12 U	11 U	13 U	12 U
Toluene	UG/KG VOA	NYSDEC TAGM 4046	1500	12 U	6 J	12 U	12 U	11 U	13 U	12 U
Total Xylenes	UG/KG VOA	NYSDEC TAGM 4046	1200	12 U	11 UR	12 U	12 U	11 U	13 U	12 U
Trans-1,3-Dichloropropene	UG/KG VOA			12 U	11 UR	12 U	12 U	11 U	13 U	12 U
Trichloroethene	UG/KG VOA	NYSDEC TAGM 4046	700	12 U	11 UR	12 U	12 U	11 U	13 U	12 U
Vinyl chloride	UG/KG VOA	NYSDEC TAGM 4046	200	12 U	11 UR	12 U	12 U	11 U	13 U	12 U
1,2,4-Trichlorobenzene	UG/KG SV	NYSDEC TAGM 4046	3400	400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
1,2-Dichlorobenzene	UG/KG SV	NYSDEC TAGM 4046	7900	400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
1,3-Dichlorobenzene	UG/KG SV	NYSDEC TAGM 4046	1600	400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
1,4-Dichlorobenzene	UG/KG SV	NYSDEC TAGM 4046	8500	400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
2,2'-oxybis(1-Chloropropane)	UG/KG SV			400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
2,4,5-Trichlorophenol	UG/KG SV	NYSDEC TAGM 4046	100	980 U	880 U	960 U	1000 U	900 U	990 U	890 UJ
2,4,6-Trichlorophenol	UG/KG SV			400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
2,4-Dichlorophenol	UG/KG SV	NYSDEC TAGM 4046	400	400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
2,4-Dimethylphenol	UG/KG SV			400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
2,4-Dinitrophenol	UG/KG SV	NYSDEC TAGM 4046	200	980 U	880 U	960 U	1000 U	900 U	990 U	890 UJ
2,4-Dinitrotoluene	UG/KG SV			400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
2,6-Dinitrotoluene	UG/KG SV	NYSDEC TAGM 4046	1000	400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
2-Chloronaphthalene	UG/KG SV			400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
2-Chlorophenol	UG/KG SV	NYSDEC TAGM 4046	800	400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
2-Methylnaphthalene	UG/KG SV	NYSDEC TAGM 4046	36400	400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
2-Methylphenol	UG/KG SV	NYSDEC TAGM 4046	100	400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
2-Nitroaniline	UG/KG SV	NYSDEC TAGM 4046	430	980 U	880 U	960 U	1000 U	900 U	990 U	890 UJ
2-Nitrophenol	UG/KG SV	NYSDEC TAGM 4046	330	400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
3,3'-Dichlorobenzidine	UG/KG SV			400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
3-Nitroaniline	UG/KG SV	NYSDEC TAGM 4046	500	980 U	880 U	960 U	1000 U	900 U	990 U	890 UJ
4,6-Dinitro-2-methylphenol	UG/KG SV			980 U	880 U	960 U	1000 U	900 U	990 U	890 UJ
4-Bromophenyl phenyl ether	UG/KG SV			400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
4-Chloro-3-methylphenol	UG/KG SV	NYSDEC TAGM 4046	240	400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
4-Chloroaniline	UG/KG SV	NYSDEC TAGM 4046	220	400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
4-Chlorophenyl phenyl ether	UG/KG SV			400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
4-Methylphenol	UG/KG SV	NYSDEC TAGM 4046	900	400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
4-Nitroaniline	UG/KG SV			980 U	880 U	960 U	1000 U	900 U	990 U	890 UJ
4-Nitrophenol	UG/KG SV	NYSDEC TAGM 4046	100	980 U	880 U	960 U	1000 U	900 U	990 U	890 UJ

**TABLE C-1a**  
**SURFACE SOIL ANALYSES RAW DATA-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	NYSDEC TAGM	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13
			MW13-1	MW13-2	MW13-3	MW13-4	MW13-5	MW13-6	MW13-10	
SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
SB13-1-1	SB13-2-1	SB13-3-1	SB13-4-1	SB13-5-1	SB13-6-1	SB13-10-10				
	0	0	0	0	0	0	0	0	0	0
	2	2	2	2	1	2	2	1	2	2
	12/8/1993	11/9/1993	12/8/1993	12/15/1993	11/8/1993	12/15/1993			12/17/1993	
SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
ESI	ESI	ESI	ESI	ESI	ESI	ESI	ESI	ESI	ESI	ESI
N	N	N	N	N	N	N	N	N	N	N
Acenaphthene	UG/KG SV	NYSDEC TAGM 4046	50000	400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
Acenaphthylene	UG/KG SV	NYSDEC TAGM 4046	41000	400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
Anthracene	UG/KG SV	NYSDEC TAGM 4046	50000	400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
Benzo(a)anthracene	UG/KG SV	NYSDEC TAGM 4046	224	400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
Benzo(a)pyrene	UG/KG SV	NYSDEC TAGM 4046	61	400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
Benzo(b)fluoranthene	UG/KG SV	NYSDEC TAGM 4046	1100	400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
Benzo(ghi)perylene	UG/KG SV	NYSDEC TAGM 4046	50000	400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
Benzo(k)fluoranthene	UG/KG SV	NYSDEC TAGM 4046	1100	400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
Bis(2-Chloroethoxy)methane	UG/KG SV			400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
Bis(2-Chloroethyl)ether	UG/KG SV			400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
Bis(2-Chloroisopropyl)ether	UG/KG SV									
Bis(2-Ethylhexyl)phthalate	UG/KG SV	NYSDEC TAGM 4046	50000	400 U	360 U	400 U	410 U	370 U	56 J	370 UJ
Butylbenzylphthalate	UG/KG SV	NYSDEC TAGM 4046	50000	400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
Carbazole	UG/KG SV			400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
Chrysene	UG/KG SV	NYSDEC TAGM 4046	400	400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
Di-n-butylphthalate	UG/KG SV	NYSDEC TAGM 4046	8100	400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
Di-n-octylphthalate	UG/KG SV	NYSDEC TAGM 4046	50000	210 J	360 U	400 U	410 U	370 U	410 U	370 UJ
Dibenz(a,h)anthracene	UG/KG SV	NYSDEC TAGM 4046	14	400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
Dibenzofuran	UG/KG SV	NYSDEC TAGM 4046	6200	400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
Diethyl phthalate	UG/KG SV	NYSDEC TAGM 4046	7100	400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
Dimethylphthalate	UG/KG SV	NYSDEC TAGM 4046	2000	400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
Fluoranthene	UG/KG SV	NYSDEC TAGM 4046	50000	400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
Fluorene	UG/KG SV	NYSDEC TAGM 4046	50000	400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
Hexachlorobenzene	UG/KG SV	NYSDEC TAGM 4046	410	400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
Hexachlorobutadiene	UG/KG SV			400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
Hexachlorocyclopentadiene	UG/KG SV			400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
Hexachloroethane	UG/KG SV			400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
Indeno(1,2,3-cd)pyrene	UG/KG SV	NYSDEC TAGM 4046	3200	400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
Isophorone	UG/KG SV	NYSDEC TAGM 4046	4400	400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
N-Nitrosodiphenylamine	UG/KG SV			400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
N-Nitrosodipropylamine	UG/KG SV			400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
Naphthalene	UG/KG SV	NYSDEC TAGM 4046	13000	400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
Nitrobenzene	UG/KG SV	NYSDEC TAGM 4046	200	400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
Pentachlorophenol	UG/KG SV	NYSDEC TAGM 4046	1000	980 U	880 U	960 U	1000 U	900 U	990 U	890 UJ
Phenanthrene	UG/KG SV	NYSDEC TAGM 4046	50000	400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
Phenol	UG/KG SV	NYSDEC TAGM 4046	30	400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
Pyrene	UG/KG SV	NYSDEC TAGM 4046	50000	400 U	360 U	400 U	410 U	370 U	410 U	370 UJ
1,3,5-Trinitrobenzene	UG/KG EXP							130 U		
1,3-Dinitrobenzene	UG/KG EXP							130 U		
2,4,6-Trinitrotoluene	UG/KG EXP							130 U		
2,4-Dinitrotoluene	UG/KG EXP							130 U		
2,6-Dinitrotoluene	UG/KG EXP	NYSDEC TAGM 4046	1000					130 U		
2-amino-4,6-Dinitrotoluene	UG/KG EXP							130 U		
4-amino-2,6-Dinitrotoluene	UG/KG EXP							130 U		
HMX	UG/KG EXP							130 U		
RDX	UG/KG EXP							130 U		
Tetryl	UG/KG EXP							130 U		
4,4'-DDD	UG/KG OCP	NYSDEC TAGM 4046	2900	4 U	3.7 U	4 U	4.1 U	3.7 U	4.1 U	3.9 U
4,4'-DDE	UG/KG OCP	NYSDEC TAGM 4046	2100	4 U	3.6 J	4 U	4.1 U	3.7 U	4.1 U	3.9 U
4,4'-DDT	UG/KG OCP	NYSDEC TAGM 4046	2100	4 U	3.7 U	4 U	4.1 U	3.7 U	4.1 U	3.9 U
Aldrin	UG/KG OCP	NYSDEC TAGM 4046	41	2.1 U	1.9 U	2 U	2.1 U	1.9 U	2.1 U	2 U
Alpha-BHC	UG/KG OCP	NYSDEC TAGM 4046	110	2.1 U	1.9 U	2 U	2.1 U	1.9 U	2.1 U	2 U
Alpha-Chlordane	UG/KG OCP			2.1 U	1.9 U	2 U	2.1 U	1.9 U	2.1 U	2 U
Aroclor-1016	UG/KG OCP			40 U	37 U	40 U	41 U	37 U	41 U	39 U
Aroclor-1221	UG/KG OCP			82 U	74 U	81 U	84 U	75 U	84 U	79 U
Aroclor-1232	UG/KG OCP			40 U	37 U	40 U	41 U	37 U	41 U	39 U
Aroclor-1242	UG/KG OCP			40 U	37 U	40 U	41 U	37 U	41 U	39 U
Aroclor-1248	UG/KG OCP			40 U	37 U	40 U	41 U	37 U	41 U	39 U
Aroclor-1254	UG/KG OCP	NYSDEC TAGM 4046	10000	40 U	37 U	40 U	41 U	37 U	41 U	39 U
Aroclor-1260	UG/KG OCP	NYSDEC TAGM 4046	10000	40 U	37 U	40 U	41 U	37 U	41 U	39 U
Beta-BHC	UG/KG OCP	NYSDEC TAGM 4046	200	2.1 U	1.9 U	2 U	2.1 U	1.9 U	2.1 U	2 U

**TABLE C-1a**  
**SURFACE SOIL ANALYSES RAW DATA-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	NYSDEC TAGM 4046	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13
			MW13-1	MW13-2	MW13-3	MW13-4	MW13-5	MW13-6	SB13-10	
			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			SB13-1-1	SB13-2-1	SB13-3-1	SB13-4-1	SB13-5-1	SB13-6-1	SB13-6-1	SB13-10-10
			0	0	0	0	0	0	0	0
			2	2	2	2	1	2	2	2
			12/8/1993	11/9/1993	12/8/1993	12/15/1993	11/8/1993	12/15/1993		12/17/1993
			SA	SA	SA	SA	SA	SA	SA	DU
			ESI	ESI	ESI	ESI	ESI	ESI	ESI	ESI
			N	N	N	N	N	N	N	N
Delta-BHC	UG/KG OCP	NYSDEC TAGM 4046	300	2.1 U	1.9 U	2 U	2.1 U	1.9 U	2.1 U	2 U
Dieldrin	UG/KG OCP	NYSDEC TAGM 4046	44	4 U	3.7 U	4 U	4.1 U	3.7 U	4.1 U	3.9 U
Endosulfan I	UG/KG OCP	NYSDEC TAGM 4046	900	2.1 U	1.9 U	2 U	2.1 U	1.9 U	2.1 U	2 U
Endosulfan II	UG/KG OCP	NYSDEC TAGM 4046	900	4 U	3.7 U	4 U	4.1 U	3.7 U	4.1 U	3.9 U
Endosulfan sulfate	UG/KG OCP	NYSDEC TAGM 4046	1000	4 U	3.7 U	4 U	4.1 U	3.7 U	4.1 U	3.9 U
Endrin	UG/KG OCP	NYSDEC TAGM 4046	100	4 U	3.7 U	4 U	4.1 U	3.7 U	4.1 U	3.9 U
Endrin aldehyde	UG/KG OCP			4 U	3.7 U	4 U	4.1 U	3.7 U	4.1 U	3.9 U
Endrin ketone	UG/KG OCP			4 U	3.7 U	4 U	4.1 U	3.7 U	4.1 U	3.9 U
Gamma-BHC/Lindane	UG/KG OCP	NYSDEC TAGM 4046	60	2.1 U	1.9 U	2 U	2.1 U	1.9 U	2.1 U	2 U
Gamma-Chlordane	UG/KG OCP	NYSDEC TAGM 4046	540	2.1 U	1.9 U	2 U	2.1 U	1.9 U	2.1 U	2 U
Heptachlor	UG/KG OCP	NYSDEC TAGM 4046	100	2.1 U	1.9 U	2 U	2.1 U	1.9 U	2.1 U	2 U
Heptachlor epoxide	UG/KG OCP	NYSDEC TAGM 4046	20	2.1 U	1.9 U	2 U	2.1 U	1.9 U	2.1 U	2 U
Methoxychlor	UG/KG OCP			21 U	19 U	20 U	21 U	19 U	21 U	20 U
Toxaphene	UG/KG OCP			210 U	190 U	200 U	210 U	190 U	210 U	200 U
2,4,5-T	UG/KG H	NYSDEC TAGM 4046	1900	6.1 U	5.6 UR	6 U	6.3 U	5.6 U	6.3 U	5.9 U
2,4,5-TP/Silvex	UG/KG H	NYSDEC TAGM 4046	700	6.1 U	5.6 UR	6 U	6.3 U	5.6 U	6.3 U	5.9 U
2,4-D	UG/KG H	NYSDEC TAGM 4046	500	61 U	56 UR	60 U	63 U	56 U	63 U	59 U
2,4-DB	UG/KG H			61 U	56 UR	60 U	63 U	56 U	63 U	59 U
Dalapon	UG/KG H			150 U	140 UR	150 U	150 U	140 U	150 U	150 U
Dicamba	UG/KG H			6.1 U	5.6 UR	6 U	6.3 U	5.6 U	6.3 U	5.9 U
Dichloroprop	UG/KG H			61 U	56 UR	60 U	63 U	56 U	63 U	59 U
Dinoseb	UG/KG H			31 U	28 UR	30 U	32 U	28 U	32 U	30 U
MCPA	UG/KG H			6100 U	5600 UR	6000 U	6300 U	5600 U	6300 U	5900 U
MCPP	UG/KG H			6100 U	5600 UR	6000 U	6300 U	5600 U	6300 U	5900 U
Aluminum	MG/KG M	NYSDEC TAGM 4046	19300	18300	10700	10800	21200	13000	16000	18500
Antimony	MG/KG M	NYSDEC TAGM 4046	5.9	5.1 J	6.3 UJ	4.5 UJ	4 UJ	7.8 UJ	3.2 UJ	5 J
Arsenic	MG/KG M	NYSDEC TAGM 4046	8.2	7	5.6	5.5	8.1	4.6	4.6	5.7
Barium	MG/KG M	NYSDEC TAGM 4046	300	106	58.8	54.3	129	56.7	103	157
Beryllium	MG/KG M	NYSDEC TAGM 4046	1.1	0.92 J	0.52 J	0.52 J	1.1	0.63 J	0.92	0.91 J
Cadmium	MG/KG M	NYSDEC TAGM 4046	2.3	0.45 U	0.4 U	0.44 U	0.38 U	0.49 U	0.31 U	0.48 U
Calcium	MG/KG M	NYSDEC TAGM 4046	121000	3570	28800	83900	28800	21600	5140	4220
Chromium	MG/KG M	NYSDEC TAGM 4046	29.6	29.4	21.2	17.1	30.2	25.4	21.5	27.2
Cobalt	MG/KG M	NYSDEC TAGM 4046	30	12	11.3	10.2 J	10.6	13.1	10.6	8.2 J
Copper	MG/KG M	NYSDEC TAGM 4046	33	11.6	45.2	26.9	21.6	31.2	16	26.6 J
Cyanide	MG/KG M	NYSDEC TAGM 4046	0.35	0.61 U	0.52 U	0.59 U	0.54 U	0.54 U	0.6 U	0.59 U
Iron	MG/KG M	NYSDEC TAGM 4046	36500	32500	25000	23100	31600	28600	25300	29000
Lead	MG/KG M	NYSDEC TAGM 4046	24.8	15 UR	25.6	10.6 UR	13.6	21.3	13.8	11
Magnesium	MG/KG M	NYSDEC TAGM 4046	21500	5890	5380	25600	8780	6740	3750	6210
Manganese	MG/KG M	NYSDEC TAGM 4046	1060	451	336	443	363	335	934	204
Mercury	MG/KG M	NYSDEC TAGM 4046	0.1	0.03 J	0.04 J	0.02 U	0.05 J	0.04 J	0.03 J	0.03 J
Nickel	MG/KG M	NYSDEC TAGM 4046	49	34.9	46.6	31.4	38.1	46.1	22.7	32.6
Potassium	MG/KG M	NYSDEC TAGM 4046	2380	2190	1120	1150	2130	1350	1330	1500
Selenium	MG/KG M	NYSDEC TAGM 4046	2	0.26 J	0.83 J	0.14 U	0.53 J	0.58 J	1.2	0.32 J
Silver	MG/KG M	NYSDEC TAGM 4046	0.75	0.9 U	0.8 UJ	0.88 U	0.77 U	0.99 UJ	0.62 U	0.95 U
Sodium	MG/KG M	NYSDEC TAGM 4046	172	80.6 J	90.2 J	163 J	81.5 J	94.7 J	61.9 J	57 J
Thallium	MG/KG M	NYSDEC TAGM 4046	0.7	0.43 J	0.35 J	0.91 J	0.22 U	0.2 U	0.18 U	0.27 U
Vanadium	MG/KG M	NYSDEC TAGM 4046	150	32.7	19.3	17.1	35.8	20	29.9	31.7
Zinc	MG/KG M	NYSDEC TAGM 4046	110	81.9	63.6	62.4	89.4	53.2	62.5	68.7
Nitrate/Nitrite Nitrogen	MG/KG WC									
Percent Solids	% WC									

**TABLE C-1a**  
**SURFACE SOIL ANALYSES RAW DATA-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	N	N	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	
				SB13-10	SB13-11	SB13-12	SB13-13	SB13-14	SB13-14	SB13-7	SB13-7	SB13-8-1				
SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	
SB13-10-1	134016	134018	134012	134020	134009	134014	SB13-7-10	SB13-7-1	SB13-8-1							
	0	0	0	0	0	0	0	0	0							
	2	2	2	2	2	0.2	2	2	2							
12/17/1993	8/16/2001	8/15/2001	8/15/2001	8/16/2001	7/30/2001	8/16/2001	12/7/1993	12/7/1993	12/7/1993							
SA	SA	SA	SA	SA	SA	SA	DU	SA	SA							
ESI	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	ESI	ESI	ESI							
	1	1	1	1	1	1	1	1	1							
1,1,1-Trichloroethane	UG/KG VOA	NYSDEC TAGM 4046	800	12 U												
1,1,2,2-Tetrachloroethane	UG/KG VOA	NYSDEC TAGM 4046	600	12 U												
1,1,2-Trichloroethane	UG/KG VOA			12 U												
1,1-Dichloroethane	UG/KG VOA	NYSDEC TAGM 4046	200	12 U												
1,1-Dichloroethene	UG/KG VOA	NYSDEC TAGM 4046	400	12 U												
1,2-Dichloroethane	UG/KG VOA	NYSDEC TAGM 4046	100	12 U												
1,2-Dichloroethene (total)	UG/KG VOA			12 U												
1,2-Dichloropropane	UG/KG VOA			12 U												
Acetone	UG/KG VOA	NYSDEC TAGM 4046	200	12 U												
Benzene	UG/KG VOA	NYSDEC TAGM 4046	60	12 U												
Bromodichloromethane	UG/KG VOA			12 U												
Bromoform	UG/KG VOA			12 U												
Carbon disulfide	UG/KG VOA	NYSDEC TAGM 4046	2700	12 U												
Carbon tetrachloride	UG/KG VOA	NYSDEC TAGM 4046	600	12 U												
Chlorobenzene	UG/KG VOA	NYSDEC TAGM 4046	1700	12 U												
Chlorodibromomethane	UG/KG VOA			12 U												
Chloroethane	UG/KG VOA	NYSDEC TAGM 4046	1900	12 U												
Chloroform	UG/KG VOA	NYSDEC TAGM 4046	300	12 U												
Cis-1,3-Dichloropropene	UG/KG VOA			12 U												
Ethyl benzene	UG/KG VOA	NYSDEC TAGM 4046	5500	12 U												
Methyl bromide	UG/KG VOA			12 U												
Methyl butyl ketone	UG/KG VOA			12 U												
Methyl chloride	UG/KG VOA			12 U												
Methyl ethyl ketone	UG/KG VOA	NYSDEC TAGM 4046	300	12 U												
Methyl isobutyl ketone	UG/KG VOA	NYSDEC TAGM 4046	1000	12 U												
Methylene chloride	UG/KG VOA	NYSDEC TAGM 4046	100	12 U												
Styrene	UG/KG VOA			12 U												
Tetrachloroethene	UG/KG VOA	NYSDEC TAGM 4046	1400	12 U												
Toluene	UG/KG VOA	NYSDEC TAGM 4046	1500	12 U												
Total Xylenes	UG/KG VOA	NYSDEC TAGM 4046	1200	12 U												
Trans-1,3-Dichloropropene	UG/KG VOA			12 U												
Trichloroethene	UG/KG VOA	NYSDEC TAGM 4046	700	12 U												
Vinyl chloride	UG/KG VOA	NYSDEC TAGM 4046	200	12 U												
1,2,4-Trichlorobenzene	UG/KG SV	NYSDEC TAGM 4046	3400	3900 UJ												
1,2-Dichlorobenzene	UG/KG SV	NYSDEC TAGM 4046	7900	3900 UJ												
1,3-Dichlorobenzene	UG/KG SV	NYSDEC TAGM 4046	1600	3900 UJ												
1,4-Dichlorobenzene	UG/KG SV	NYSDEC TAGM 4046	8500	3300 J												
2,2'-oxybis(1-Chloropropane)	UG/KG SV			3900 UJ												
2,4,5-Trichlorophenol	UG/KG SV	NYSDEC TAGM 4046	100	9400 UJ												
2,4,6-Trichlorophenol	UG/KG SV			3900 UJ												
2,4-Dichlorophenol	UG/KG SV	NYSDEC TAGM 4046	400	3900 UJ												
2,4-Dimethylphenol	UG/KG SV			3900 UJ												
2,4-Dinitrophenol	UG/KG SV	NYSDEC TAGM 4046	200	9400 UJ												
2,4-Dinitrotoluene	UG/KG SV			3900 UJ												
2,6-Dinitrotoluene	UG/KG SV	NYSDEC TAGM 4046	1000	3900 UJ												
2-Chloronaphthalene	UG/KG SV			3900 UJ												
2-Chlorophenol	UG/KG SV	NYSDEC TAGM 4046	800	3900 UJ												
2-Methylnaphthalene	UG/KG SV	NYSDEC TAGM 4046	36400	3900 UJ												
2-Methylphenol	UG/KG SV	NYSDEC TAGM 4046	100	3900 UJ												
2-Nitroaniline	UG/KG SV	NYSDEC TAGM 4046	430	3900 UJ												
2-Nitrophenol	UG/KG SV	NYSDEC TAGM 4046	330	3900 UJ												
3,3'-Dichlorobenzidine	UG/KG SV			3900 UJ												
3-Nitroaniline	UG/KG SV	NYSDEC TAGM 4046	500	9400 UJ												
4,6-Dinitro-2-methylphenol	UG/KG SV			9400 UJ												
4-Bromophenyl phenyl ether	UG/KG SV			3900 UJ												
4-Chloro-3-methylphenol	UG/KG SV	NYSDEC TAGM 4046	240	3900 UJ												
4-Chloroaniline	UG/KG SV	NYSDEC TAGM 4046	220	3900 UJ												
4-Chlorophenyl phenyl ether	UG/KG SV			3900 UJ												
4-Methylphenol	UG/KG SV	NYSDEC TAGM 4046	900	9200 J												
4-Nitroaniline	UG/KG SV			9400 UJ												
4-Nitrophenol	UG/KG SV	NYSDEC TAGM 4046	100	9400 UJ												



**TABLE C-1a**  
**SURFACE SOIL ANALYSES RAW DATA-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	NYSDEC TAGM 4046	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13
			SB13-10	SB13-11	SB13-12	SB13-13	SB13-13	SB13-14	SB13-14	SB13-7	SB13-7	SB13-8-1		
			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			SB13-10-1	134016	134018	134012	134020	134009	134014	SB13-7-10	SB13-7-1	SB13-8-1		
			0	0	0	0	0	0	0	0	0	0	0	0
			2	2	2	2	2	0.2	2	2	2	2	2	2
			12/17/1993	8/16/2001	8/15/2001	8/15/2001	8/16/2001	7/30/2001	8/16/2001	12/7/1993	12/7/1993	12/7/1993		
			SA	SA	SA	SA	SA	SA	SA	DU	SA	SA	SA	SA
			ESI	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	ESI	ESI	ESI	ESI	ESI
			N	N	N	N	N	N	N	N	N	N	N	N
Delta-BHC	UG/KG OCP	NYSDEC TAGM 4046	300	2 U						2 U	2 U	2.3 U		
Dieldrin	UG/KG OCP	NYSDEC TAGM 4046	44	3.8 U						3.9 U	3.9 U	4.4 U		
Endosulfan I	UG/KG OCP	NYSDEC TAGM 4046	900	2 U						2 U	2 U	2.3 U		
Endosulfan II	UG/KG OCP	NYSDEC TAGM 4046	900	3.8 U						3.9 U	3.9 U	4.4 U		
Endosulfan sulfate	UG/KG OCP	NYSDEC TAGM 4046	1000	3.8 U						3.9 U	3.9 U	4.4 U		
Endrin	UG/KG OCP	NYSDEC TAGM 4046	100	3.8 U						3.9 U	3.9 U	4.4 U		
Endrin aldehyde	UG/KG OCP			3.8 U						3.9 U	3.9 U	4.4 U		
Endrin ketone	UG/KG OCP			3.8 U						3.9 U	3.9 U	4.4 U		
Gamma-BHC/Lindane	UG/KG OCP	NYSDEC TAGM 4046	60	2 U						2 U	2 U	2.3 U		
Gamma-Chlordane	UG/KG OCP	NYSDEC TAGM 4046	540	2 U						2 U	2 U	2.3 U		
Heptachlor	UG/KG OCP	NYSDEC TAGM 4046	100	2 U						2 U	2 U	2.3 U		
Heptachlor epoxide	UG/KG OCP	NYSDEC TAGM 4046	20	2 U						2 U	2 U	2.3 U		
Methoxychlor	UG/KG OCP			20 U						20 U	20 U	23 U		
Toxaphene	UG/KG OCP			200 U						200 U	200 U	230 U		
2,4,5-T	UG/KG H	NYSDEC TAGM 4046	1900	5.9 U						5.9 U	5.9 U	6.7 U		
2,4,5-TP/Silvex	UG/KG H	NYSDEC TAGM 4046	700	5.9 U						5.9 U	5.9 U	6.7 U		
2,4-D	UG/KG H	NYSDEC TAGM 4046	500	5.9 U						5.9 U	5.9 U	6.7 U		
2,4-DB	UG/KG H			5.9 U						5.9 U	5.9 U	6.7 U		
Dalapon	UG/KG H			150 U						150 U	150 U	160 U		
Dicamba	UG/KG H			5.9 U						5.9 U	5.9 U	6.7 U		
Dichloroprop	UG/KG H			5.9 U						5.9 U	5.9 U	6.7 U		
Dinoseb	UG/KG H			30 U						30 U	30 U	34 U		
MCPA	UG/KG H			5900 U						5900 U	5900 U	6700 U		
MCPP	UG/KG H			5900 U						5900 U	5900 U	6700 U		
Aluminum	MG/KG M	NYSDEC TAGM 4046	19300	12000	14400	12400	13800	21000	10200	12700	14900	9810	15500	
Antimony	MG/KG M	NYSDEC TAGM 4046	5.9	4.4 UJ	0.58 J	0.45 UJ	0.39 UJ	0.36 J	0.56 J	0.31 UJ	4.5 UJ	4.4 UJ	5.4 UJ	
Arsenic	MG/KG M	NYSDEC TAGM 4046	8.2	3.8	6.5	3.6	5.2	6.1	3.3	4.4	8.5	10	8.2	
Barium	MG/KG M	NYSDEC TAGM 4046	300	72.2	110	79.3	133	108	46.6	35.9	89.5	37.3 J	125	
Beryllium	MG/KG M	NYSDEC TAGM 4046	1.1	0.63 J	0.79 J	0.65 J	0.72 J	1.2	0.52 J	0.58 J	0.79 J	0.43 J	0.95 J	
Cadmium	MG/KG M	NYSDEC TAGM 4046	2.3	0.42 U	0.82 J	0.58 J	0.6 J	0.81 J	0.64 J	0.74 J	0.43 U	0.43 U	0.53 U	
Calcium	MG/KG M	NYSDEC TAGM 4046	121000	2070	23000	3260	4860	20400	15400	24900	11000	25400	6540	
Chromium	MG/KG M	NYSDEC TAGM 4046	29.6	16.2	22.4	17.6	22.2	28.1	17.8	22.9	21.7	17.6	22	
Cobalt	MG/KG M	NYSDEC TAGM 4046	30	4.3 J	12.2	7.1 J	11.7	19.3	10.4	13.2	8.8 J	9.9 J	8.1 J	
Copper	MG/KG M	NYSDEC TAGM 4046	33	7.5 J	26.1	9.5	21.6	36.2	29.2	34.8	26.9	31.8	19.4	
Cyanide	MG/KG M	NYSDEC TAGM 4046	0.35	0.49 U	0.5 U	0.52 U	0.42 U	0.44 U	0.38 U	0.48 U	0.57 U	0.58 U	0.58 U	
Iron	MG/KG M	NYSDEC TAGM 4046	36500	16500	28800 J	19700 J	23600 J	30800	21900	28700 J	24800	23000	25500	
Lead	MG/KG M	NYSDEC TAGM 4046	24.8	9	17.8	10.6	12.9	21.1	23	24.1 J	31.6 UR	26.8 UR	19 UR	
Magnesium	MG/KG M	NYSDEC TAGM 4046	21500	2840	8050	3440	4350	8000	4820	6580	4850	4800	4130	
Manganese	MG/KG M	NYSDEC TAGM 4046	1060	104	778	483	1150	531	268	342	266	313	358	
Mercury	MG/KG M	NYSDEC TAGM 4046	0.1	0.03 J	0.04 U	0.05 U	0.05 U	0.06 U	0.04 U	0.05 U	0.08 J	0.05 J	0.06 J	
Nickel	MG/KG M	NYSDEC TAGM 4046	49	14.1	37.1	18.4	31.4	36.6	31.9	45.5	31.9	38.7	24.7	
Potassium	MG/KG M	NYSDEC TAGM 4046	2380	974 J	1700	1580	1860	2800	1420	1790	1950	1080	1660	
Selenium	MG/KG M	NYSDEC TAGM 4046	2	0.29 J	0.63 J	0.58 U	0.61 J	1.2 J	0.75 J	0.53 J	0.65 J	0.72 J	0.98 J	
Silver	MG/KG M	NYSDEC TAGM 4046	0.75	0.85 U	0.38 U	0.4 U	0.35 U	0.29 U	0.29 U	0.34 J	0.87 U	0.86 U	1.1 U	
Sodium	MG/KG M	NYSDEC TAGM 4046	172	40 J	151 J	163 J	135 J	176 J	54.3 U	186 J	77.2 J	86.3 J	63.9 J	
Thallium	MG/KG M	NYSDEC TAGM 4046	0.7	0.27 U	0.54 R	0.58 R	0.5 R	0.42 R	0.52 U	0.39 R	0.47 J	0.55 J	0.3 J	
Vanadium	MG/KG M	NYSDEC TAGM 4046	150	21.6	25.7	21.9	23	33.3	16.6	18.6	24.2	16.1	26.7	
Zinc	MG/KG M	NYSDEC TAGM 4046	110	40.7	71.2	52.1	51.9	136	69.4	67.1 J	84.3	47.1	91.2	
Nitrate/Nitrite Nitrogen	MG/KG WC			1.1	0.22	19.8	27.9	0.041	0.01 U					
Percent Solids	% WC			84.8	74	90.3	88.5	95.9	95					

**TABLE C-1a**  
**SURFACE SOIL ANALYSES RAW DATA-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	NYSDEC TAGM 4046	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13
			SB13-9	SB13-9	SS13-1	SS13-11	SS13-2	SS13-3	SS13-4	SS13-5	SS13-6	SS13-6	
			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			SB13-9-7	SB13-9-1	134000	134010	134001	134002	134003	134004	134011	134005	
			0	0	0	0	0	0	0	0	0	0	0
			2	2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
			12/16/1993	12/16/1993	7/30/2001	7/31/2001	7/30/2001	7/30/2001	7/30/2001	7/30/2001	7/31/2001	7/31/2001	7/31/2001
			DU	SA	SA	SA	SA	SA	SA	SA	DU	SA	
			ESI	ESI	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	
			N	N	N	N	N	N	N	N	N	N	
1,1,1-Trichloroethane	UG/KG VOA		800	12 U	12 U								
1,1,2,2-Tetrachloroethane	UG/KG VOA		600	12 U	12 U								
1,1,2-Trichloroethane	UG/KG VOA			12 U	12 U								
1,1-Dichloroethane	UG/KG VOA		200	12 U	12 U								
1,1-Dichloroethene	UG/KG VOA		400	12 U	12 U								
1,2-Dichloroethane	UG/KG VOA		100	12 U	12 U								
1,2-Dichloroethene (total)	UG/KG VOA			12 U	12 U								
1,2-Dichloropropane	UG/KG VOA			12 U	12 U								
Acetone	UG/KG VOA		200	12 U	12 U								
Benzene	UG/KG VOA		60	12 U	12 U								
Bromodichloromethane	UG/KG VOA			12 U	12 U								
Bromoform	UG/KG VOA			12 U	12 U								
Carbon disulfide	UG/KG VOA		2700	12 U	12 U								
Carbon tetrachloride	UG/KG VOA		600	12 U	12 U								
Chlorobenzene	UG/KG VOA		1700	12 U	12 U								
Chlorodibromomethane	UG/KG VOA			12 U	12 U								
Chloroethane	UG/KG VOA		1900	12 U	12 U								
Chloroform	UG/KG VOA		300	12 U	12 U								
Cis-1,3-Dichloropropene	UG/KG VOA			12 U	12 U								
Ethyl benzene	UG/KG VOA		5500	12 U	12 U								
Methyl bromide	UG/KG VOA			12 U	12 U								
Methyl butyl ketone	UG/KG VOA			12 U	12 U								
Methyl chloride	UG/KG VOA			12 U	12 U								
Methyl ethyl ketone	UG/KG VOA		300	12 U	12 U								
Methyl isobutyl ketone	UG/KG VOA		1000	12 U	12 U								
Methylene chloride	UG/KG VOA		100	12 U	12 U								
Styrene	UG/KG VOA			12 U	12 U								
Tetrachloroethene	UG/KG VOA		1400	12 U	12 U								
Toluene	UG/KG VOA		1500	12 U	12 U								
Total Xylenes	UG/KG VOA		1200	12 U	12 U								
Trans-1,3-Dichloropropene	UG/KG VOA			12 U	12 U								
Trichloroethene	UG/KG VOA		700	12 U	12 U								
Vinyl chloride	UG/KG VOA		200	12 U	12 U								
1,2,4-Trichlorobenzene	UG/KG SV		3400	400 U	430 U	100 UJ	84 U	110 UJ	76 UJ	77 UJ	81 UJ	73 UJ	73 UJ
1,2-Dichlorobenzene	UG/KG SV		7900	400 U	430 U	100 UJ	84 U	110 UJ	76 UJ	77 UJ	81 UJ	73 UJ	73 UJ
1,3-Dichlorobenzene	UG/KG SV		1600	400 U	430 U	100 UJ	84 U	110 UJ	76 UJ	77 UJ	81 UJ	73 UJ	73 UJ
1,4-Dichlorobenzene	UG/KG SV		8500	400 U	430 U	100 UJ	84 U	110 UJ	76 UJ	77 UJ	81 UJ	73 UJ	73 UJ
2,2'-oxybis(1-Chloropropane)	UG/KG SV			400 U	430 U								
2,4,5-Trichlorophenol	UG/KG SV		100	980 U	1000 U	250 U	210 U	280 U	190 U	190 U	200 U	180 U	180 U
2,4,6-Trichlorophenol	UG/KG SV			400 U	430 U	100 U	84 U	7.2 J	76 U	77 U	81 U	73 U	73 U
2,4-Dichlorophenol	UG/KG SV		400	400 U	430 U	100 U	84 U	110 U	76 U	77 U	81 U	73 U	73 U
2,4-Dimethylphenol	UG/KG SV			400 U	430 U	100 U	84 U	110 U	76 U	77 U	81 U	73 U	73 U
2,4-Dinitrophenol	UG/KG SV		200	980 U	1000 U	250 UJ	210 UJ	280 UJ	190 UJ	190 UJ	200 UJ	180 UJ	180 UJ
2,4-Dinitrotoluene	UG/KG SV			400 U	430 U	100 UJ	84 U	110 UJ	76 UJ	77 UJ	81 UJ	73 UJ	73 UJ
2,6-Dinitrotoluene	UG/KG SV		1000	400 U	430 U	100 UJ	84 U	110 UJ	76 UJ	77 UJ	81 UJ	73 UJ	73 UJ
2-Chloronaphthalene	UG/KG SV			400 U	430 U	100 UJ	84 U	110 UJ	76 UJ	77 UJ	81 UJ	73 UJ	73 UJ
2-Chlorophenol	UG/KG SV		800	400 U	430 U	100 UJ	84 U	110 UJ	76 UJ	77 UJ	81 UJ	73 UJ	73 UJ
2-Methylnaphthalene	UG/KG SV		36400	400 U	430 U	100 U	84 U	110 U	4.8 J	77 U	81 U	15 J	73 U
2-Methylphenol	UG/KG SV		100	400 U	430 U	100 UJ	84 U	110 UJ	76 UJ	77 UJ	81 UJ	73 UJ	73 UJ
2-Nitroaniline	UG/KG SV		430	980 U	1000 U	250 U	210 U	280 U	190 U	190 U	200 U	180 U	180 U
2-Nitrophenol	UG/KG SV		330	400 U	430 U	100 UJ	84 U	110 UJ	76 UJ	77 UJ	81 UJ	73 UJ	73 UJ
3,3'-Dichlorobenzidine	UG/KG SV			400 U	430 U	100 U	84 U	110 U	76 U	77 U	81 U	73 U	73 U
3-Nitroaniline	UG/KG SV		500	980 U	1000 U	250 U	210 U	280 U	190 U	190 U	200 U	180 U	180 U
4,6-Dinitro-2-methylphenol	UG/KG SV			980 U	1000 U	250 U	210 U	280 U	190 UJ	190 U	200 U	180 U	180 U
4-Bromophenyl phenyl ether	UG/KG SV			400 U	430 U	100 UJ	84 U	110 UJ	76 UJ	77 UJ	81 UJ	73 UJ	73 UJ
4-Chloro-3-methylphenol	UG/KG SV		240	400 U	430 U	100 U	84 U	110 U	76 U	77 U	81 U	73 U	73 U
4-Chloroaniline	UG/KG SV		220	400 U	430 U	100 U	84 U	110 U	76 U	77 U	81 U	73 U	73 U
4-Chlorophenyl phenyl ether	UG/KG SV			400 U	430 U	100 UJ	84 U	110 UJ	76 UJ	77 UJ	81 UJ	73 UJ	73 UJ
4-Methylphenol	UG/KG SV		900	400 U	430 U	16 J	84 U	32 J	25 J	77 UJ	81 UJ	73 UJ	73 UJ
4-Nitroaniline	UG/KG SV			980 U	1000 U	250 U	210 U	280 U	190 U	190 U	200 U	180 U	180 U
4-Nitrophenol	UG/KG SV		100	980 U	1000 U	250 UJ	210 U	280 UJ	190 UJ	190 U	200 U	180 U	180 U



**TABLE C-1a**  
**SURFACE SOIL ANALYSES RAW DATA-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	NYSDEC TAGM 4046	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13
			SB13-9	SB13-9	SS13-1	SS13-1	SS13-2	SS13-3	SS13-4	SS13-5	SS13-6	SS13-6			
SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
SB13-9-7	SB13-9-1	134000	134010	134001	134002	134003	134004	134011	134005						
0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0
2	2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
12/16/1993	12/16/1993	7/30/2001	7/31/2001	7/30/2001	7/30/2001	7/30/2001	7/30/2001	7/30/2001	7/30/2001	7/30/2001	7/30/2001	7/30/2001	7/30/2001	7/30/2001	7/30/2001
DU	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
ESI	ESI	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13
N	N	N	N	N	N	N	N	N	N	N	N	N	N	N	N
Acenaphthene	UG/KG SV	NYSDEC TAGM 4046	50000	400 U	430 U	100 U	84 U	110 U	76 U	77 U	81 U	5.8 J	73 U		
Acenaphthylene	UG/KG SV	NYSDEC TAGM 4046	41000	400 U	430 U	100 U	84 U	110 U	76 U	77 U	81 U	16 J	73 U		
Anthracene	UG/KG SV	NYSDEC TAGM 4046	50000	400 U	430 U	100 U	84 U	110 U	76 U	77 U	81 U	16 J	73 U		
Benzo(a)anthracene	UG/KG SV	NYSDEC TAGM 4046	224	400 U	430 U	9.2 J	5.3 J	110 U	5.6 J	77 U	81 U	100	4.6 J		
Benzo(a)pyrene	UG/KG SV	NYSDEC TAGM 4046	61	400 U	430 U	8.4 J	8.3 J	110 U	5.2 J	77 U	81 U	110	4.8 J		
Benzo(b)fluoranthene	UG/KG SV	NYSDEC TAGM 4046	1100	400 U	430 U	11 J	8.5 J	110 U	12 J	77 U	81 U	89	10 J		
Benzo(ghi)perylene	UG/KG SV	NYSDEC TAGM 4046	50000	400 U	430 U	5.8 J	7.2 J	110 U	6.4 J	77 U	81 U	86	7.4 J		
Benzo(k)fluoranthene	UG/KG SV	NYSDEC TAGM 4046	1100	400 U	430 U	7.5 J	5.6 J	110 U	7.5 J	77 U	81 U	74	7.9 J		
Bis(2-Chloroethoxy)methane	UG/KG SV		400 U	400 U	430 U	100 U	84 U	110 U	76 U	77 U	81 U	73 U	73 U		
Bis(2-Chloroethyl)ether	UG/KG SV		400 U	400 U	430 U	100 UJ	84 U	110 UJ	76 UJ	77 UJ	81 UJ	73 UJ	73 UJ		
Bis(2-Chloroisopropyl)ether	UG/KG SV		400 U	400 U	430 U	100 UJ	84 U	110 UJ	76 UJ	77 UJ	81 UJ	73 UJ	73 UJ		
Bis(2-Ethylhexyl)phthalate	UG/KG SV	NYSDEC TAGM 4046	50000	27 J	62 J	100 U	84 U	110 U	76 U	77 U	81 U	73 UJ	73 U		
Butylbenzylphthalate	UG/KG SV	NYSDEC TAGM 4046	50000	400 U	430 U	100 U	84 U	110 U	76 U	77 U	81 U	73 U	73 U		
Carbazole	UG/KG SV		400 U	400 U	430 U	100 U	84 U	110 U	76 U	77 U	81 U	4.2 J	4.6 J		
Chrysene	UG/KG SV	NYSDEC TAGM 4046	400	400 U	430 U	14 J	9.4 J	110 U	14 J	7.5 J	4.3 J	190	18 J		
Di-n-butylphthalate	UG/KG SV	NYSDEC TAGM 4046	8100	400 U	430 U	100 U	84 U	110 U	76 U	77 U	81 U	73 U	73 U		
Di-n-octylphthalate	UG/KG SV	NYSDEC TAGM 4046	50000	400 U	430 U	100 U	84 U	110 U	76 U	77 U	81 U	73 U	73 U		
Dibenz(a,h)anthracene	UG/KG SV	NYSDEC TAGM 4046	14	400 U	430 U	100 U	84 U	110 U	76 U	77 U	81 U	15 J	73 U		
Dibenzofuran	UG/KG SV	NYSDEC TAGM 4046	6200	400 U	430 U	100 UJ	84 U	110 UJ	4.4 J	77 UJ	81 UJ	5 J	73 UJ		
Diethyl phthalate	UG/KG SV	NYSDEC TAGM 4046	7100	400 U	430 U	100 U	84 U	110 U	76 U	77 U	81 U	73 U	73 U		
Dimethylphthalate	UG/KG SV	NYSDEC TAGM 4046	2000	400 U	430 U	100 UJ	84 U	110 UJ	76 UJ	77 UJ	81 UJ	73 UJ	73 UJ		
Fluoranthene	UG/KG SV	NYSDEC TAGM 4046	50000	400 U	430 U	29 J	12 J	110 U	19 J	9.6 J	5.2 J	110	21 J		
Fluorene	UG/KG SV	NYSDEC TAGM 4046	50000	400 U	430 U	100 UJ	84 U	110 UJ	76 UJ	77 UJ	81 UJ	18 J	73 UJ		
Hexachlorobenzene	UG/KG SV	NYSDEC TAGM 4046	410	400 U	430 U	100 U	84 U	110 U	76 U	77 U	81 U	73 U	73 U		
Hexachlorobutadiene	UG/KG SV		400 U	400 U	430 U	100 U	84 U	110 U	76 U	77 U	81 U	73 U	73 U		
Hexachlorocyclopentadiene	UG/KG SV		400 U	400 U	430 U	100 UJ	84 U	110 UJ	76 UJ	77 UJ	81 UJ	73 UJ	73 UJ		
Hexachloroethane	UG/KG SV		400 U	400 U	430 U	100 U	84 U	110 U	76 U	77 U	81 U	73 U	73 U		
Indeno(1,2,3-cd)pyrene	UG/KG SV	NYSDEC TAGM 4046	3200	400 U	430 U	5.4 J	6 J	110 U	5 J	77 U	81 U	53 J	5.3 J		
Isophorone	UG/KG SV	NYSDEC TAGM 4046	4400	400 U	430 U	100 U	84 U	110 U	76 U	77 U	81 U	73 U	73 U		
N-Nitrosodiphenylamine	UG/KG SV		400 U	400 U	430 U	100 U	84 U	110 U	76 U	77 U	81 U	73 U	73 U		
N-Nitrosodipropylamine	UG/KG SV		400 U	400 U	430 U	100 U	84 U	110 U	76 U	77 U	81 U	73 U	73 U		
Naphthalene	UG/KG SV	NYSDEC TAGM 4046	13000	400 U	430 U	100 UJ	84 U	110 UJ	4.3 J	77 UJ	81 UJ	9.8 J	73 UJ		
Nitrobenzene	UG/KG SV	NYSDEC TAGM 4046	200	400 U	430 U	100 UJ	84 U	110 UJ	76 UJ	77 UJ	81 UJ	73 UJ	73 UJ		
Pentachlorophenol	UG/KG SV	NYSDEC TAGM 4046	1000	980 U	1000 U	250 U	210 U	280 U	190 U	190 U	200 U	180 U	180 U		
Phenanthrene	UG/KG SV	NYSDEC TAGM 4046	50000	400 U	430 U	16 J	7.8 J	110 UJ	14 J	9.1 J	81 UJ	180 J	20 J		
Phenol	UG/KG SV	NYSDEC TAGM 4046	30	400 U	430 U	100 U	84 U	110 U	76 U	77 U	81 U	73 U	73 U		
Pyrene	UG/KG SV	NYSDEC TAGM 4046	50000	400 U	430 U	21 J	12 J	7.4 J	14 J	8.7 J	5.2 J	310	15 J		
1,3,5-Trinitrobenzene	UG/KG EXP														
1,3-Dinitrobenzene	UG/KG EXP														
2,4,6-Trinitrotoluene	UG/KG EXP														
2,4-Dinitrotoluene	UG/KG EXP														
2,6-Dinitrotoluene	UG/KG EXP	NYSDEC TAGM 4046	1000												
2-amino-4,6-Dinitrotoluene	UG/KG EXP														
4-amino-2,6-Dinitrotoluene	UG/KG EXP														
HMX	UG/KG EXP														
RDX	UG/KG EXP														
Tetryl	UG/KG EXP														
4,4'-DDD	UG/KG OCP	NYSDEC TAGM 4046	2900	4 U	4.3 U										
4,4'-DDE	UG/KG OCP	NYSDEC TAGM 4046	2100	4 U	4.3 U										
4,4'-DDT	UG/KG OCP	NYSDEC TAGM 4046	2100	4 U	4.3 U										
Aldrin	UG/KG OCP	NYSDEC TAGM 4046	41	2.1 U	2.2 U										
Alpha-BHC	UG/KG OCP	NYSDEC TAGM 4046	110	2.1 U	2.2 U										
Alpha-Chlordane	UG/KG OCP			2.1 U	2.2 U										
Aroclor-1016	UG/KG OCP			40 U	43 U										
Aroclor-1221	UG/KG OCP			82 U	88 U										
Aroclor-1232	UG/KG OCP			40 U	43 U										
Aroclor-1242	UG/KG OCP			40 U	43 U										
Aroclor-1248	UG/KG OCP			40 U	43 U										
Aroclor-1254	UG/KG OCP	NYSDEC TAGM 4046	10000	40 U	43 U										
Aroclor-1260	UG/KG OCP	NYSDEC TAGM 4046	10000	40 U	43 U										
Beta-BHC	UG/KG OCP	NYSDEC TAGM 4046	200	2.1 U	2.2 U										

**TABLE C-1a**  
**SURFACE SOIL ANALYSES RAW DATA-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	NYSDEC TAGM 4046	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13
			SB13-9	SB13-9	SS13-1	SS13-11	SS13-2	SS13-3	SS13-4	SS13-5	SS13-6	SS13-6		
			SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
			SB13-9-7	SB13-9-1	134000	134010	134001	134002	134003	134004	134011	134005		
			0	0	0	0	0	0	0	0	0	0	0	0
			2	2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2	0.2
			12/16/1993	12/16/1993	7/30/2001	7/31/2001	7/30/2001	7/30/2001	7/30/2001	7/30/2001	7/31/2001	7/31/2001	7/31/2001	7/31/2001
			DU	SA	SA	SA	SA	SA	SA	SA	DU	SA	SA	
			ESI	ESI	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	
			N	N	N	N	N	N	N	N	N	N	N	
Delta-BHC	UG/KG OCP	NYSDEC TAGM 4046	300	2.1 U	2.2 U									
Dieldrin	UG/KG OCP	NYSDEC TAGM 4046	44	4 U	4.3 U									
Endosulfan I	UG/KG OCP	NYSDEC TAGM 4046	900	2.1 U	2.2 U									
Endosulfan II	UG/KG OCP	NYSDEC TAGM 4046	900	4 U	4.3 U									
Endosulfan sulfate	UG/KG OCP	NYSDEC TAGM 4046	1000	4 U	4.3 U									
Endrin	UG/KG OCP	NYSDEC TAGM 4046	100	4 U	4.3 U									
Endrin aldehyde	UG/KG OCP			4 U	4.3 U									
Endrin ketone	UG/KG OCP			4 U	4.3 U									
Gamma-BHC/Lindane	UG/KG OCP	NYSDEC TAGM 4046	60	2.1 U	2.2 U									
Gamma-Chlordane	UG/KG OCP	NYSDEC TAGM 4046	540	2.1 U	2.2 U									
Heptachlor	UG/KG OCP	NYSDEC TAGM 4046	100	2.1 U	2.2 U									
Heptachlor epoxide	UG/KG OCP	NYSDEC TAGM 4046	20	2.1 U	2.2 U									
Methoxychlor	UG/KG OCP			21 U	22 U									
Toxaphene	UG/KG OCP			210 U	220 U									
2,4,5-T	UG/KG H	NYSDEC TAGM 4046	1900	6.1 U	6.6 U									
2,4,5-TP/Silvex	UG/KG H	NYSDEC TAGM 4046	700	6.1 U	6.6 U									
2,4-D	UG/KG H	NYSDEC TAGM 4046	500	61 U	66 U									
2,4-DB	UG/KG H			61 U	66 U									
Dalapon	UG/KG H			150 U	160 U									
Dicamba	UG/KG H			6.1 U	6.6 U									
Dichloroprop	UG/KG H			61 U	66 U									
Dinoseb	UG/KG H			31 U	33 U									
MCPA	UG/KG H			6100 U	6600 U									
MCPP	UG/KG H			6100 U	6600 U									
Aluminum	MG/KG M	NYSDEC TAGM 4046	19300	14200	18300	14700	12700	12400	14300	13900	14600	9570	13900	
Antimony	MG/KG M	NYSDEC TAGM 4046	5.9	4 UJ	5.6 UJ	0.48 UJ	0.52 J	0.64 J	0.37 UJ	0.69 J	0.41 UJ	0.37 UJ	0.36 UJ	
Arsenic	MG/KG M	NYSDEC TAGM 4046	8.2	5.3	7.8	4.7	3.1	2.7 J	3.8	4.9	5.2	3.8	5.2	
Barium	MG/KG M	NYSDEC TAGM 4046	300	105	124	50.9 J	101	88.7	31.6 J	52.5	110	54.6	45.9	
Beryllium	MG/KG M	NYSDEC TAGM 4046	1.1	0.79 J	1.1 J	0.71 J	0.71 J	0.81 J	0.66 J	0.69 J	0.82 J	0.47 J	0.71 J	
Cadmium	MG/KG M	NYSDEC TAGM 4046	2.3	0.39 U	0.54 U	0.78 J	0.47 J	0.6 J	0.73 J	0.77 J	0.74 J	0.72 J	0.87 J	
Calcium	MG/KG M	NYSDEC TAGM 4046	121000	7980	4800	30500	4890	6520	18700	18200	4160	23600	32400	
Chromium	MG/KG M	NYSDEC TAGM 4046	29.6	20.2	26.2	28	18.3	17.4	27.4	26.8	20.6	17.1	23.9	
Cobalt	MG/KG M	NYSDEC TAGM 4046	30	7.9 J	10.3 J	14.2	8.2 J	8 J	13.3	14.8	9.8 J	7.7 J	14.8	
Copper	MG/KG M	NYSDEC TAGM 4046	33	24.2	27.8	84.2	19.5	19	41.3	32.7	27.2	21.2	41.6	
Cyanide	MG/KG M	NYSDEC TAGM 4046	0.35	0.58 U	0.63 U	0.7 U	0.59 U	0.8 U	0.51 U	0.45 U	0.6 U	0.54 U	0.49 U	
Iron	MG/KG M	NYSDEC TAGM 4046	36500	24300	31700	33200	21700	18300	31100	32800	28100	21100	27800	
Lead	MG/KG M	NYSDEC TAGM 4046	24.8	14.4	13.3	65.7	21	18.7	34.6	33.9	16.1	75.6	35.1	
Magnesium	MG/KG M	NYSDEC TAGM 4046	21500	4350	5250	7880	3580	3800	7440	7420	4310	8600	8230	
Manganese	MG/KG M	NYSDEC TAGM 4046	1060	352	473	427	341	413	340	595	298	399	377	
Mercury	MG/KG M	NYSDEC TAGM 4046	0.1	0.03 J	0.04 J	0.09 J	0.06 U	0.09 U	0.05 U	0.06 U	0.06 U	0.06 U	0.06 U	
Nickel	MG/KG M	NYSDEC TAGM 4046	49	28.5	35.4	49.2	24.9	50.7	51.5	28.9	50.3	33.0	57.9	
Potassium	MG/KG M	NYSDEC TAGM 4046	2380	975	1650	1820	1640	1670	1750	1500	2260	1150	1740	
Selenium	MG/KG M	NYSDEC TAGM 4046	2	0.69 J	1.4	0.62 U	0.82 J	0.69 U	0.47 U	0.48 U	0.52 U	0.47 U	0.5 J	
Silver	MG/KG M	NYSDEC TAGM 4046	0.75	0.78 U	1.1 U	0.43 U	0.36 U	0.48 U	0.33 U	0.34 U	0.36 U	0.33 U	0.32 U	
Sodium	MG/KG M	NYSDEC TAGM 4046	172	42.6 J	56 J	95.7 U	67.5 U	107 U	133 J	74.9 U	80.3 U	72.2 U	71.7 U	
Thallium	MG/KG M	NYSDEC TAGM 4046	0.7	0.2 U	0.27 U	0.62 UJ	0.65 U	0.69 UJ	0.47 UJ	0.48 UJ	0.52 UJ	0.47 UJ	0.46 UJ	
Vanadium	MG/KG M	NYSDEC TAGM 4046	150	25.6	34.8	20.3	23.3	25	19.9	20.4	25.9	15.3	22.7	
Zinc	MG/KG M	NYSDEC TAGM 4046	110	48.5	56.9	72.1	71.8	69.9	78.3	85.2	75	107	152	
Nitrate/Nitrite Nitrogen	MG/KG WC					0.02 J	0.15	0.046 J	0.14 J	0.39 J	1.6 J	15.1 J	3.4 J	
Percent Solids	% WC					65.2	78.6	58.2	87.4	86.3	81.2	89.5	90.2	

**TABLE C-1a**  
**SURFACE SOIL ANALYSES RAW DATA-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	NYSDEC TAGM 4046	SEAD-13	SEAD-13	SEAD-13
			SS13-7	SS13-8	SS13-9
			SOIL	SOIL	SOIL
			134006	134007	134008
			0	0	0
			0.2	0.2	0.2
			7/30/2001	7/31/2001	7/30/2001
			SA	SA	SA
			SEAD-13	SEAD-13	SEAD-13
			1	1	1
			N	N	N
1,1,1-Trichloroethane	UG/KG VOA	NYSDEC TAGM 4046	800		
1,1,2,2-Tetrachloroethane	UG/KG VOA	NYSDEC TAGM 4046	600		
1,1,2-Trichloroethane	UG/KG VOA				
1,1-Dichloroethane	UG/KG VOA	NYSDEC TAGM 4046	200		
1,1-Dichloroethene	UG/KG VOA	NYSDEC TAGM 4046	400		
1,2-Dichloroethane	UG/KG VOA	NYSDEC TAGM 4046	100		
1,2-Dichloroethene (total)	UG/KG VOA				
1,2-Dichloropropane	UG/KG VOA				
Acetone	UG/KG VOA	NYSDEC TAGM 4046	200		
Benzene	UG/KG VOA	NYSDEC TAGM 4046	60		
Bromodichloromethane	UG/KG VOA				
Bromoform	UG/KG VOA				
Carbon disulfide	UG/KG VOA	NYSDEC TAGM 4046	2700		
Carbon tetrachloride	UG/KG VOA	NYSDEC TAGM 4046	600		
Chlorobenzene	UG/KG VOA	NYSDEC TAGM 4046	1700		
Chlorodibromomethane	UG/KG VOA				
Chloroethane	UG/KG VOA	NYSDEC TAGM 4046	1900		
Chloroform	UG/KG VOA	NYSDEC TAGM 4046	300		
Cis-1,3-Dichloropropene	UG/KG VOA				
Ethyl benzene	UG/KG VOA	NYSDEC TAGM 4046	5500		
Methyl bromide	UG/KG VOA				
Methyl butyl ketone	UG/KG VOA				
Methyl chloride	UG/KG VOA				
Methyl ethyl ketone	UG/KG VOA	NYSDEC TAGM 4046	300		
Methyl isobutyl ketone	UG/KG VOA	NYSDEC TAGM 4046	1000		
Methylene chloride	UG/KG VOA	NYSDEC TAGM 4046	100		
Styrene	UG/KG VOA				
Tetrachloroethene	UG/KG VOA	NYSDEC TAGM 4046	1400		
Toluene	UG/KG VOA	NYSDEC TAGM 4046	1500		
Total Xylenes	UG/KG VOA	NYSDEC TAGM 4046	1200		
Trans-1,3-Dichloropropene	UG/KG VOA				
Trichloroethene	UG/KG VOA	NYSDEC TAGM 4046	700		
Vinyl chloride	UG/KG VOA	NYSDEC TAGM 4046	200		
1,2,4-Trichlorobenzene	UG/KG SV	NYSDEC TAGM 4046	3400	72 UJ	74 UJ
1,2-Dichlorobenzene	UG/KG SV	NYSDEC TAGM 4046	7900	72 UJ	74 UJ
1,3-Dichlorobenzene	UG/KG SV	NYSDEC TAGM 4046	1600	72 UJ	74 UJ
1,4-Dichlorobenzene	UG/KG SV	NYSDEC TAGM 4046	8500	72 UJ	74 UJ
2,2'-oxybis(1-Chloropropane)	UG/KG SV				
2,4,5-Trichlorophenol	UG/KG SV	NYSDEC TAGM 4046	100	180 U	180 U
2,4,6-Trichlorophenol	UG/KG SV			72 U	74 U
2,4-Dichlorophenol	UG/KG SV	NYSDEC TAGM 4046	400	72 U	74 U
2,4-Dimethylphenol	UG/KG SV			72 U	74 U
2,4-Dinitrophenol	UG/KG SV	NYSDEC TAGM 4046	200	180 UJ	180 UJ
2,4-Dinitrotoluene	UG/KG SV			72 UJ	74 UJ
2,6-Dinitrotoluene	UG/KG SV	NYSDEC TAGM 4046	1000	72 UJ	74 UJ
2-Chloronaphthalene	UG/KG SV			72 UJ	74 UJ
2-Chlorophenol	UG/KG SV	NYSDEC TAGM 4046	800	72 UJ	74 UJ
2-Methylnaphthalene	UG/KG SV	NYSDEC TAGM 4046	36400	72 U	74 U
2-Methylphenol	UG/KG SV	NYSDEC TAGM 4046	100	72 UJ	74 UJ
2-Nitroaniline	UG/KG SV	NYSDEC TAGM 4046	430	180 U	180 U
2-Nitrophenol	UG/KG SV	NYSDEC TAGM 4046	330	72 UJ	74 UJ
3,3'-Dichlorobenzidine	UG/KG SV			72 U	74 U
3-Nitroaniline	UG/KG SV	NYSDEC TAGM 4046	500	180 U	180 U
4,6-Dinitro-2-methylphenol	UG/KG SV			180 U	180 U
4-Bromophenyl phenyl ether	UG/KG SV			72 UJ	74 UJ
4-Chloro-3-methylphenol	UG/KG SV	NYSDEC TAGM 4046	240	72 U	74 U
4-Chloroaniline	UG/KG SV	NYSDEC TAGM 4046	220	72 U	74 U
4-Chlorophenyl phenyl ether	UG/KG SV			72 UJ	74 UJ
4-Methylphenol	UG/KG SV	NYSDEC TAGM 4046	900	72 U	74 U
4-Nitroaniline	UG/KG SV			180 U	180 U
4-Nitrophenol	UG/KG SV	NYSDEC TAGM 4046	100	180 U	180 U

**TABLE C-1a**  
**SURFACE SOIL ANALYSES RAW DATA-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT		SEAD-13		SEAD-13		SEAD-13	
			SS13-7	SOIL	SS13-8	SOIL	SS13-9	SOIL
			134006	134007	134007	134008		
			0	0	0	0		
			0.2	0.2	0.2	0.2		
			7/30/2001	7/31/2001	7/31/2001	7/30/2001		
			SA	SA	SA	SA		
			SEAD-13	SEAD-13	SEAD-13	SEAD-13		
			1	1	1	1		
			N	N	N	N		
Acenaphthene	UG/KG SV	NYSDEC TAGM 4046	50000	72 U	74 U	68 U		
Acenaphthylene	UG/KG SV	NYSDEC TAGM 4046	41000	72 U	74 U	68 U		
Anthracene	UG/KG SV	NYSDEC TAGM 4046	50000	72 U	74 U	68 U		
Benzo(a)anthracene	UG/KG SV	NYSDEC TAGM 4046	224	4.4 J	74 U	3.7 J		
Benzo(a)pyrene	UG/KG SV	NYSDEC TAGM 4046	61	3.8 J	3.8 J	4 J		
Benzo(b)fluoranthene	UG/KG SV	NYSDEC TAGM 4046	1100	7.9 J	7 J	13 J		
Benzo(ghi)perylene	UG/KG SV	NYSDEC TAGM 4046	50000	9.8 J	74 U	13 J		
Benzo(k)fluoranthene	UG/KG SV	NYSDEC TAGM 4046	1100	5 J	4.2 J	68 U		
Bis(2-Chloroethoxy)methane	UG/KG SV			72 U	74 U	68 U		
Bis(2-Chloroethyl)ether	UG/KG SV			72 UJ	74 UJ	68 U		
Bis(2-Chloroisopropyl)ether	UG/KG SV			72 UJ	74 UJ	68 U		
Bis(2-Ethylhexyl)phthalate	UG/KG SV	NYSDEC TAGM 4046	50000	72 U	100	80 U		
Butylbenzylphthalate	UG/KG SV	NYSDEC TAGM 4046	50000	72 U	74 U	68 U		
Carbazole	UG/KG SV			72 U	74 U	5 J		
Chrysene	UG/KG SV	NYSDEC TAGM 4046	400	16 J	8.9 J	12 J		
Di-n-butylphthalate	UG/KG SV	NYSDEC TAGM 4046	8100	72 U	74 U	140		
Di-n-octylphthalate	UG/KG SV	NYSDEC TAGM 4046	50000	72 U	74 U	68 U		
Dibenz(a,h)anthracene	UG/KG SV	NYSDEC TAGM 4046	14	72 U	74 U	68 U		
Dibenzofuran	UG/KG SV	NYSDEC TAGM 4046	6200	4.7 J	74 UJ	14 J		
Diethyl phthalate	UG/KG SV	NYSDEC TAGM 4046	7100	72 UJ	74 U	68 U		
Dimethylphthalate	UG/KG SV	NYSDEC TAGM 4046	2000	72 U	74 UJ	68 U		
Fluoranthene	UG/KG SV	NYSDEC TAGM 4046	50000	15 J	6.6 J	9.9 J		
Fluorene	UG/KG SV	NYSDEC TAGM 4046	50000	72 UJ	74 UJ	68 U		
Hexachlorobenzene	UG/KG SV	NYSDEC TAGM 4046	410	72 U	39 J	210		
Hexachlorobutadiene	UG/KG SV			72 U	74 U	68 U		
Hexachlorocyclopentadiene	UG/KG SV			72 UJ	74 UJ	68 U		
Hexachloroethane	UG/KG SV			72 U	74 U	68 U		
Indeno(1,2,3-cd)pyrene	UG/KG SV	NYSDEC TAGM 4046	3200	72 U	74 U	68 U		
Isophorone	UG/KG SV	NYSDEC TAGM 4046	4400	72 U	74 U	68 U		
N-Nitrosodiphenylamine	UG/KG SV			72 U	74 U	99		
N-Nitrosodipropylamine	UG/KG SV			72 U	74 U	68 U		
Naphthalene	UG/KG SV	NYSDEC TAGM 4046	13000	72 UJ	74 UJ	12 J		
Nitrobenzene	UG/KG SV	NYSDEC TAGM 4046	200	72 UJ	74 UJ	68 U		
Pentachlorophenol	UG/KG SV	NYSDEC TAGM 4046	1000	180 U	180 U	170 U		
Phenanthrene	UG/KG SV	NYSDEC TAGM 4046	50000	34 J	9.2 J	44 J		
Phenol	UG/KG SV	NYSDEC TAGM 4046	30	72 U	74 U	68 U		
Pyrene	UG/KG SV	NYSDEC TAGM 4046	50000	15 J	7.3 J	13 J		
1,3,5-Trinitrobenzene	UG/KG EXP							
1,3-Dinitrobenzene	UG/KG EXP							
2,4,6-Trinitrotoluene	UG/KG EXP							
2,4-Dinitrotoluene	UG/KG EXP							
2,6-Dinitrotoluene	UG/KG EXP	NYSDEC TAGM 4046	1000					
2-amino-4,6-Dinitrotoluene	UG/KG EXP							
4-amino-2,6-Dinitrotoluene	UG/KG EXP							
HMX	UG/KG EXP							
RDX	UG/KG EXP							
Tetryl	UG/KG EXP							
4,4'-DDD	UG/KG OCP	NYSDEC TAGM 4046	2900					
4,4'-DDE	UG/KG OCP	NYSDEC TAGM 4046	2100					
4,4'-DDT	UG/KG OCP	NYSDEC TAGM 4046	2100					
Aldrin	UG/KG OCP	NYSDEC TAGM 4046	41					
Alpha-BHC	UG/KG OCP	NYSDEC TAGM 4046	110					
Alpha-Chlordane	UG/KG OCP							
Aroclor-1016	UG/KG OCP							
Aroclor-1221	UG/KG OCP							
Aroclor-1232	UG/KG OCP							
Aroclor-1242	UG/KG OCP							
Aroclor-1248	UG/KG OCP							
Aroclor-1254	UG/KG OCP	NYSDEC TAGM 4046	10000					
Aroclor-1260	UG/KG OCP	NYSDEC TAGM 4046	10000					
Beta-BHC	UG/KG OCP	NYSDEC TAGM 4046	200					

**TABLE C-1a**  
**SURFACE SOIL ANALYSES RAW DATA-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT		SEAD-13	SEAD-13	SEAD-13
			SS13-7	SS13-8	SS13-9
			SOIL	SOIL	SOIL
			134006	134007	134008
			0	0	0
			0.2	0.2	0.2
			7/30/2001	7/31/2001	7/30/2001
			SA	SA	SA
			SEAD-13	SEAD-13	SEAD-13
			1	1	1
			N	N	N
Delta-BHC	UG/KG OCP	NYSDEC TAGM 4046	300		
Dieldrin	UG/KG OCP	NYSDEC TAGM 4046	44		
Endosulfan I	UG/KG OCP	NYSDEC TAGM 4046	900		
Endosulfan II	UG/KG OCP	NYSDEC TAGM 4046	900		
Endosulfan sulfate	UG/KG OCP	NYSDEC TAGM 4046	1000		
Endrin	UG/KG OCP	NYSDEC TAGM 4046	100		
Endrin aldehyde	UG/KG OCP				
Endrin ketone	UG/KG OCP				
Gamma-BHC/Lindane	UG/KG OCP	NYSDEC TAGM 4046	60		
Gamma-Chlordane	UG/KG OCP	NYSDEC TAGM 4046	540		
Heptachlor	UG/KG OCP	NYSDEC TAGM 4046	100		
Heptachlor epoxide	UG/KG OCP	NYSDEC TAGM 4046	20		
Methoxychlor	UG/KG OCP				
Toxaphene	UG/KG OCP				
2,4,5-T	UG/KG H	NYSDEC TAGM 4046	1900		
2,4,5-TP/Silvex	UG/KG H	NYSDEC TAGM 4046	700		
2,4-D	UG/KG H	NYSDEC TAGM 4046	500		
2,4-DB	UG/KG H				
Dalapon	UG/KG H				
Dicamba	UG/KG H				
Dichloroprop	UG/KG H				
Dinoseb	UG/KG H				
MCPA	UG/KG H				
MCPP	UG/KG H				
Aluminum	MG/KG M	NYSDEC TAGM 4046	19300	12800	13100
Antimony	MG/KG M	NYSDEC TAGM 4046	5.9	0.63 J	0.59 J
Arsenic	MG/KG M	NYSDEC TAGM 4046	8.2	4.7	5.3
Barium	MG/KG M	NYSDEC TAGM 4046	300	50.7	62.3
Beryllium	MG/KG M	NYSDEC TAGM 4046	1.1	0.59 J	0.63 J
Cadmium	MG/KG M	NYSDEC TAGM 4046	2.3	0.74 J	0.94 J
Calcium	MG/KG M	NYSDEC TAGM 4046	121000	28600	25900
Chromium	MG/KG M	NYSDEC TAGM 4046	29.6	24.7	25.1
Cobalt	MG/KG M	NYSDEC TAGM 4046	30	13.4	13.5
Copper	MG/KG M	NYSDEC TAGM 4046	33	47.5	51.1
Cyanide	MG/KG M	NYSDEC TAGM 4046	0.35	0.53 U	0.56 U
Iron	MG/KG M	NYSDEC TAGM 4046	36500	30100	30000
Lead	MG/KG M	NYSDEC TAGM 4046	24.8	35.2	32.6
Magnesium	MG/KG M	NYSDEC TAGM 4046	21500	6620	9050
Manganese	MG/KG M	NYSDEC TAGM 4046	1060	377	387
Mercury	MG/KG M	NYSDEC TAGM 4046	0.1	0.05 U	0.05 U
Nickel	MG/KG M	NYSDEC TAGM 4046	49	57.5	55.6
Potassium	MG/KG M	NYSDEC TAGM 4046	2380	1560	1650
Selenium	MG/KG M	NYSDEC TAGM 4046	2	0.46 U	0.51 J
Silver	MG/KG M	NYSDEC TAGM 4046	0.75	0.32 U	0.32 U
Sodium	MG/KG M	NYSDEC TAGM 4046	172	71.1 U	70.3 U
Thallium	MG/KG M	NYSDEC TAGM 4046	0.7	0.46 UJ	0.45 UJ
Vanadium	MG/KG M	NYSDEC TAGM 4046	150	20.1	21.2
Zinc	MG/KG M	NYSDEC TAGM 4046	110	94.6	130
Nitrate/Nitrite Nitrogen	MG/KG WC		0.45 J		0.07 J
Percent Solids	% WC		90.9		88.7

**TABLE C-1b**  
**SUBSURFACE SOIL ANALYSES RAW DATA-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	N	SEAD-13		SEAD-13		SEAD-13		SEAD-13		SEAD-13	
			MW13-1	SOIL	MW13-1	SOIL	MW13-2	SOIL	MW13-2	SOIL	MW13-3	SOIL
			SB13-1-3	6	8	8	4	8	4	4	8	
			12/8/1993	8	10	11/9/1993	6	10	6	12/8/1993	10	
			SA	SA	SA	SA	SA	SA	SA	SA		
			ESI	ESI	ESI	ESI	ESI	ESI	ESI	ESI		
			N	N	N	N	N	N	N	N		
1,1,1-Trichloroethane	UG/KG	VOA NYSDEC TAGM 4046	800	11 UJ	11 UR	11 U	11 U	12 UJ	11 U	11 U	11 U	
1,1,1,2,2-Tetrachloroethane	UG/KG	VOA NYSDEC TAGM 4046	600	11 UJ	11 UR	11 U	11 U	12 UJ	11 U	11 U	11 U	
1,1,2-Trichloroethane	UG/KG	VOA		11 UJ	11 UR	11 U	11 U	12 UJ	11 U	11 U	11 U	
1,1-Dichloroethane	UG/KG	VOA NYSDEC TAGM 4046	200	11 UJ	11 UR	11 U	11 U	12 UJ	11 U	11 U	11 U	
1,1-Dichloroethene	UG/KG	VOA NYSDEC TAGM 4046	400	11 UJ	11 UR	11 U	11 U	12 UJ	11 U	11 U	11 U	
1,2-Dichloroethane	UG/KG	VOA NYSDEC TAGM 4046	100	11 UJ	11 UR	11 U	11 U	12 UJ	11 U	11 U	11 U	
1,2-Dichloroethene (total)	UG/KG	VOA		11 UJ	11 UR	11 U	11 U	12 UJ	11 U	11 U	11 U	
1,2-Dichloropropane	UG/KG	VOA		11 UJ	11 UR	11 U	11 U	12 UJ	11 U	11 U	11 U	
Acetone	UG/KG	VOA NYSDEC TAGM 4046	200	13 UJ	15 UR	11 U	11 U	12 UJ	11 U	11 U	11 U	
Benzene	UG/KG	VOA NYSDEC TAGM 4046	60	11 UJ	11 UR	11 U	11 U	12 UJ	11 U	11 U	11 U	
Bromodichloromethane	UG/KG	VOA		11 UJ	11 UR	11 U	11 U	12 UJ	11 U	11 U	11 U	
Bromoform	UG/KG	VOA		11 UJ	11 UR	11 U	11 U	12 UJ	11 U	11 U	11 U	
Carbon disulfide	UG/KG	VOA NYSDEC TAGM 4046	2700	11 UJ	2 J	11 U	11 U	12 UJ	11 U	11 U	11 U	
Carbon tetrachloride	UG/KG	VOA NYSDEC TAGM 4046	600	11 UJ	11 UR	11 U	11 U	12 UJ	11 U	11 U	11 U	
Chlorobenzene	UG/KG	VOA NYSDEC TAGM 4046	1700	11 UJ	11 UR	11 U	11 U	12 UJ	11 U	11 U	11 U	
Chlorodibromomethane	UG/KG	VOA		11 UJ	11 UR	11 U	11 U	12 UJ	11 U	11 U	11 U	
Chloroethane	UG/KG	VOA NYSDEC TAGM 4046	1900	11 UJ	11 UR	11 U	11 U	12 UJ	11 U	11 U	11 U	
Chloroform	UG/KG	VOA NYSDEC TAGM 4046	300	11 UJ	11 UR	11 U	11 U	12 UJ	11 U	11 U	11 U	
Cis-1,3-Dichloropropene	UG/KG	VOA		11 UJ	11 UR	11 U	11 U	12 UJ	11 U	11 U	11 U	
Ethyl benzene	UG/KG	VOA NYSDEC TAGM 4046	5500	11 UJ	11 UR	11 U	11 U	12 UJ	11 U	11 U	11 U	
Methyl bromide	UG/KG	VOA		11 UJ	11 UR	11 U	11 U	12 UJ	11 U	11 U	11 U	
Methyl butyl ketone	UG/KG	VOA		11 UJ	11 UR	11 U	11 U	12 UJ	11 U	11 U	11 U	
Methyl chloride	UG/KG	VOA		11 UJ	11 UR	11 U	11 U	12 UJ	11 U	11 U	11 U	
Methyl ethyl ketone	UG/KG	VOA NYSDEC TAGM 4046	300	11 UJ	11 UR	11 U	11 U	12 UJ	11 U	11 U	11 U	
Methyl isobutyl ketone	UG/KG	VOA NYSDEC TAGM 4046	1000	11 UJ	11 UR	11 U	11 U	12 UJ	11 U	11 U	11 U	
Methylene chloride	UG/KG	VOA NYSDEC TAGM 4046	100	3 J	4 J	11 U	11 U	12 UJ	11 U	11 U	11 U	
Styrene	UG/KG	VOA		11 UJ	11 UR	11 U	11 U	12 UJ	11 U	11 U	11 U	
Tetrachloroethene	UG/KG	VOA NYSDEC TAGM 4046	1400	11 UJ	11 UR	11 U	11 U	12 UJ	11 U	11 U	11 U	
Toluene	UG/KG	VOA NYSDEC TAGM 4046	1500	11 UJ	11 UR	11 U	11 U	12 UJ	11 U	11 U	11 U	
Total Xylenes	UG/KG	VOA NYSDEC TAGM 4046	1200	11 UJ	11 UR	11 U	11 U	12 UJ	11 U	11 U	11 U	
Trans-1,3-Dichloropropene	UG/KG	VOA		11 UJ	11 UR	11 U	11 U	12 UJ	11 U	11 U	11 U	
Trichloroethene	UG/KG	VOA NYSDEC TAGM 4046	700	11 UJ	11 UR	11 U	11 U	12 UJ	11 U	11 U	11 U	
Vinyl chloride	UG/KG	VOA NYSDEC TAGM 4046	200	11 UJ	11 UR	11 U	11 U	12 UJ	11 U	11 U	11 U	
1,2,4-Trichlorobenzene	UG/KG	SV NYSDEC TAGM 4046	3400	360 U	350 U	380 U	370 U	370 U	370 U	360 U	360 U	
1,2-Dichlorobenzene	UG/KG	SV NYSDEC TAGM 4046	7900	360 U	350 U	380 U	370 U	370 U	370 U	360 U	360 U	
1,3-Dichlorobenzene	UG/KG	SV NYSDEC TAGM 4046	1600	360 U	350 U	380 U	370 U	370 U	370 U	360 U	360 U	
1,4-Dichlorobenzene	UG/KG	SV NYSDEC TAGM 4046	8500	360 U	350 U	380 U	370 U	370 U	370 U	360 U	360 U	
2,2'-oxybis(1-Chloropropane)	UG/KG	SV		360 U	350 U	380 U	370 U	370 U	370 U	360 U	360 U	
2,4,5-Trichlorophenol	UG/KG	SV NYSDEC TAGM 4046	100	870 U	860 U	920 U	890 U	890 U	890 U	870 U	870 U	
2,4,6-Trichlorophenol	UG/KG	SV		360 U	350 U	380 U	370 U	370 U	370 U	360 U	360 U	
2,4-Dichlorophenol	UG/KG	SV NYSDEC TAGM 4046	400	360 U	350 U	380 U	370 U	370 U	370 U	360 U	360 U	
2,4-Dimethylphenol	UG/KG	SV		360 U	350 U	380 U	370 U	370 U	370 U	360 U	360 U	
2,4-Dinitrophenol	UG/KG	SV NYSDEC TAGM 4046	200	870 U	860 U	920 U	890 U	890 U	890 U	870 U	870 U	
2,4-Dinitrotoluene	UG/KG	SV		360 U	350 U	380 U	370 U	370 U	370 U	360 U	360 U	
2,6-Dinitrotoluene	UG/KG	SV NYSDEC TAGM 4046	1000	360 U	350 U	380 U	370 U	370 U	370 U	360 U	360 U	
2-Chloronaphthalene	UG/KG	SV		360 U	350 U	380 U	370 U	370 U	370 U	360 U	360 U	
2-Chlorophenol	UG/KG	SV NYSDEC TAGM 4046	800	360 U	350 U	380 U	370 U	370 U	370 U	360 U	360 U	
2-Methylnaphthalene	UG/KG	SV NYSDEC TAGM 4046	36400	360 U	350 U	380 U	370 U	370 U	370 U	360 U	360 U	
2-Methylphenol	UG/KG	SV NYSDEC TAGM 4046	100	360 U	350 U	380 U	370 U	370 U	370 U	360 U	360 U	

**TABLE C-1b**  
**SUBSURFACE SOIL ANALYSES RAW DATA-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	N	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13
			MW13-1 SOIL SB13-1-3	MW13-1 SOIL SB13-1-4	MW13-2 SOIL SB13-2-3	MW13-2 SOIL SB13-2-5	MW13-3 SOIL SB13-3-3	MW13-3 SOIL SB13-3-5
			6 8 12/8/1993	8 10 12/8/1993	4 6 11/9/1993	8 10 11/9/1993	4 6 12/8/1993	8 10 12/8/1993
			SA ESI	SA ESI	SA ESI	SA ESI	SA ESI	SA ESI
			N	N	N	N	N	N
2-Nitroaniline	UG/KG SV	NYSDEC TAGM 4046	430	870 U	860 U	920 U	890 U	870 U
2-Nitrophenol	UG/KG SV	NYSDEC TAGM 4046	330	360 U	350 U	380 U	370 U	360 U
3,3'-Dichlorobenzidine	UG/KG SV			360 U	350 U	380 U	370 U	360 U
3-Nitroaniline	UG/KG SV	NYSDEC TAGM 4046	500	870 U	860 U	920 U	890 U	870 U
4,6-Dinitro-2-methylphenol	UG/KG SV			870 U	860 U	920 U	890 U	870 U
4-Bromophenyl phenyl ether	UG/KG SV			360 U	350 U	380 U	370 U	360 U
4-Chloro-3-methylphenol	UG/KG SV	NYSDEC TAGM 4046	240	360 U	350 U	380 U	370 U	360 U
4-Chloroaniline	UG/KG SV	NYSDEC TAGM 4046	220	360 U	350 U	380 U	370 U	360 U
4-Chlorophenyl phenyl ether	UG/KG SV			360 U	350 U	380 U	370 U	360 U
4-Methylphenol	UG/KG SV	NYSDEC TAGM 4046	900	360 U	350 U	380 U	370 U	360 U
4-Nitroaniline	UG/KG SV			870 U	860 U	920 U	890 U	870 U
4-Nitrophenol	UG/KG SV	NYSDEC TAGM 4046	100	870 U	860 U	920 U	890 U	870 U
Acenaphthene	UG/KG SV	NYSDEC TAGM 4046	50000	360 U	350 U	380 U	370 U	360 U
Acenaphthylene	UG/KG SV	NYSDEC TAGM 4046	41000	360 U	350 U	380 U	370 U	360 U
Anthracene	UG/KG SV	NYSDEC TAGM 4046	50000	360 U	350 U	380 U	370 U	360 U
Benzo(a)anthracene	UG/KG SV	NYSDEC TAGM 4046	224	360 U	350 U	380 U	370 U	360 U
Benzo(a)pyrene	UG/KG SV	NYSDEC TAGM 4046	61	360 U	350 U	380 U	370 U	360 U
Benzo(b)fluoranthene	UG/KG SV	NYSDEC TAGM 4046	1100	360 U	350 U	380 U	370 U	360 U
Benzo(ghi)perylene	UG/KG SV	NYSDEC TAGM 4046	50000	360 U	350 U	380 U	370 U	360 U
Benzo(k)fluoranthene	UG/KG SV	NYSDEC TAGM 4046	1100	360 U	350 U	380 U	370 U	360 U
Bis(2-Chloroethoxy)methane	UG/KG SV			360 U	350 U	380 U	370 U	360 U
Bis(2-Chloroethyl)ether	UG/KG SV			360 U	350 U	380 U	370 U	360 U
Bis(2-Chloroisopropyl)ether	UG/KG SV							
Bis(2-Ethylhexyl)phthalate	UG/KG SV	NYSDEC TAGM 4046	50000	360 U	350 U	380 U	370 U	360 U
Butylbenzylphthalate	UG/KG SV	NYSDEC TAGM 4046	50000	360 U	350 U	380 U	370 U	360 U
Carbazole	UG/KG SV			360 U	350 U	380 U	370 U	360 U
Chrysene	UG/KG SV	NYSDEC TAGM 4046	400	360 U	350 U	380 U	370 U	360 U
Di-n-butylphthalate	UG/KG SV	NYSDEC TAGM 4046	8100	360 U	20 J	380 U	370 U	360 U
Di-n-octylphthalate	UG/KG SV	NYSDEC TAGM 4046	50000	360 U	110 J	380 U	370 U	53 J
Dibenz(a,h)anthracene	UG/KG SV	NYSDEC TAGM 4046	14	360 U	350 U	380 U	370 U	360 U
Dibenzofuran	UG/KG SV	NYSDEC TAGM 4046	6200	360 U	350 U	380 U	370 U	360 U
Diethyl phthalate	UG/KG SV	NYSDEC TAGM 4046	7100	360 U	350 U	380 U	370 U	360 U
Dimethylphthalate	UG/KG SV	NYSDEC TAGM 4046	2000	360 U	350 U	380 U	370 U	360 U
Fluoranthene	UG/KG SV	NYSDEC TAGM 4046	50000	360 U	350 U	380 U	370 U	360 U
Fluorene	UG/KG SV	NYSDEC TAGM 4046	50000	360 U	350 U	380 U	370 U	360 U
Hexachlorobenzene	UG/KG SV	NYSDEC TAGM 4046	410	360 U	350 U	380 U	370 U	360 U
Hexachlorobutadiene	UG/KG SV			360 U	350 U	380 U	370 U	360 U
Hexachlorocyclopentadiene	UG/KG SV			360 U	350 U	380 U	370 U	360 U
Hexachloroethane	UG/KG SV			360 U	350 U	380 U	370 U	360 U
Indeno(1,2,3-cd)pyrene	UG/KG SV	NYSDEC TAGM 4046	3200	360 U	350 U	380 U	370 U	360 U
Isophorone	UG/KG SV	NYSDEC TAGM 4046	4400	360 U	350 U	380 U	370 U	360 U
N-Nitrosodiphenylamine	UG/KG SV			360 U	350 U	380 U	370 U	360 U
N-Nitrosodipropylamine	UG/KG SV			360 U	350 U	380 U	370 U	360 U
Naphthalene	UG/KG SV	NYSDEC TAGM 4046	13000	360 U	350 U	380 U	370 U	360 U
Nitrobenzene	UG/KG SV	NYSDEC TAGM 4046	200	360 U	350 U	380 U	370 U	360 U
Pentachlorophenol	UG/KG SV	NYSDEC TAGM 4046	1000	870 U	860 U	920 U	890 U	870 U
Phenanthrene	UG/KG SV	NYSDEC TAGM 4046	50000	360 U	350 U	380 U	370 U	360 U
Phenol	UG/KG SV	NYSDEC TAGM 4046	30	360 U	350 U	380 U	370 U	360 U
Pyrene	UG/KG SV	NYSDEC TAGM 4046	50000	360 U	350 U	380 U	370 U	360 U

**TABLE C-1b**  
**SUBSURFACE SOIL ANALYSES RAW DATA-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	SEAD-13		SEAD-13		SEAD-13		SEAD-13		SEAD-13		SEAD-13	
		MW13-1	SOIL	MW13-1	SOIL	MW13-2	SOIL	MW13-2	SOIL	MW13-3	SOIL	MW13-3	SOIL
		SB13-1-3	SB13-1-4	SB13-1-3	SB13-1-4	SB13-2-3	SB13-2-5	SB13-2-3	SB13-2-5	SB13-3-3	SB13-3-5	SB13-3-3	SB13-3-5
		6	8	8	10	4	8	6	10	4	6	8	10
		12/8/1993	12/8/1993	11/9/1993	11/9/1993	11/9/1993	11/9/1993	11/9/1993	11/9/1993	12/8/1993	12/8/1993	12/8/1993	12/8/1993
		SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
		ESI	ESI	ESI	ESI	ESI	ESI	ESI	ESI	ESI	ESI	ESI	ESI
		N	N	N	N	N	N	N	N	N	N	N	N
1,3,5-Trinitrobenzene	UG/KG EXP					130 U		130 U					
1,3-Dinitrobenzene	UG/KG EXP					130 U		130 U					
2,4,6-Trinitrotoluene	UG/KG EXP					130 U		130 U					
2,4-Dinitrotoluene	UG/KG EXP					130 U		130 U					
2,6-Dinitrotoluene	UG/KG EXP	NYSDEC TAGM 4046	1000			130 U		130 U					
2-amino-4,6-Dinitrotoluene	UG/KG EXP					130 U		130 U					
4-amino-2,6-Dinitrotoluene	UG/KG EXP					130 U		130 U					
HMX	UG/KG EXP					130 U		130 U					
RDX	UG/KG EXP					130 U		130 U					
Tetryl	UG/KG EXP					130 U		130 U					
4,4'-DDD	UG/KG OCP	NYSDEC TAGM 4046	2900	3.6 U	3.5 U	3.8 U		3.7 U		3.7 U		3.6 U	3.6 U
4,4'-DDE	UG/KG OCP	NYSDEC TAGM 4046	2100	3.6 U	3.5 U	3.8 U		3.7 U		3.7 U		3.6 U	3.6 U
4,4'-DDT	UG/KG OCP	NYSDEC TAGM 4046	2100	3.6 U	3.5 U	3.8 U		3.7 U		3.7 U		3.6 U	3.6 U
Aldrin	UG/KG OCP	NYSDEC TAGM 4046	41	1.8 U	1.8 U	2 U		1.9 U		1.9 U		1.8 U	1.8 U
Alpha-BHC	UG/KG OCP	NYSDEC TAGM 4046	110	1.8 U	1.8 U	2 U		1.9 U		1.9 U		1.8 U	1.8 U
Alpha-Chlordane	UG/KG OCP			1.8 U	1.8 U	2 U		1.9 U		1.9 U		1.8 U	1.8 U
Aroclor-1016	UG/KG OCP			36 U	35 U	38 U		37 U		37 U		36 U	36 U
Aroclor-1221	UG/KG OCP			73 U	72 U	77 U		75 U		74 U		73 U	73 U
Aroclor-1232	UG/KG OCP			36 U	35 U	38 U		37 U		37 U		36 U	36 U
Aroclor-1242	UG/KG OCP			36 U	35 U	38 U		37 U		37 U		36 U	36 U
Aroclor-1248	UG/KG OCP			36 U	35 U	38 U		37 U		37 U		36 U	36 U
Aroclor-1254	UG/KG OCP	NYSDEC TAGM 4046	10000	36 U	35 U	38 U		37 U		37 U		36 U	36 U
Aroclor-1260	UG/KG OCP	NYSDEC TAGM 4046	10000	36 U	35 U	38 U		37 U		37 U		36 U	36 U
Beta-BHC	UG/KG OCP	NYSDEC TAGM 4046	200	1.8 U	1.8 U	2 U		1.9 U		1.9 U		1.8 U	1.8 U
Delta-BHC	UG/KG OCP	NYSDEC TAGM 4046	300	1.8 U	1.8 U	2 U		1.9 U		1.9 U		1.8 U	1.8 U
Dieldrin	UG/KG OCP	NYSDEC TAGM 4046	44	3.6 U	3.5 U	3.8 U		3.7 U		3.7 U		3.6 U	3.6 U
Endosulfan I	UG/KG OCP	NYSDEC TAGM 4046	900	1.8 U	1.8 U	2 U		1.9 U		1.9 U		1.8 U	1.8 U
Endosulfan II	UG/KG OCP	NYSDEC TAGM 4046	900	3.6 U	3.5 U	3.8 U		3.7 U		3.7 U		3.6 U	3.6 U
Endosulfan sulfate	UG/KG OCP	NYSDEC TAGM 4046	1000	3.6 U	3.5 U	3.8 U		3.7 U		3.7 U		3.6 U	3.6 U
Endrin	UG/KG OCP	NYSDEC TAGM 4046	100	3.6 U	3.5 U	3.8 U		3.7 U		3.7 U		3.6 U	3.6 U
Endrin aldehyde	UG/KG OCP			3.6 U	3.5 U	3.8 U		3.7 U		3.7 U		3.6 U	3.6 U
Endrin ketone	UG/KG OCP			3.6 U	3.5 U	3.8 U		3.7 U		3.7 U		3.6 U	3.6 U
Gamma-BHC/Lindane	UG/KG OCP	NYSDEC TAGM 4046	60	1.8 U	1.8 U	2 U		1.9 U		1.9 U		1.8 U	1.8 U
Gamma-Chlordane	UG/KG OCP	NYSDEC TAGM 4046	540	1.8 U	1.8 U	2 U		1.9 U		1.9 U		1.8 U	1.8 U
Heptachlor	UG/KG OCP	NYSDEC TAGM 4046	100	1.8 U	1.8 U	2 U		1.9 U		1.9 U		1.8 U	1.8 U
Heptachlor epoxide	UG/KG OCP	NYSDEC TAGM 4046	20	1.8 U	1.8 U	2 U		1.9 U		1.9 U		1.8 U	1.8 U
Methoxychlor	UG/KG OCP			18 U	18 U	20 U		19 U		19 U		18 U	18 U
Toxaphene	UG/KG OCP			180 U	180 U	200 U		190 U		190 U		180 U	180 U
2,4,5-T	UG/KG H	NYSDEC TAGM 4046	1900	5.5 U	5.4 U	5.8 UR		5.6 UR		5.5 U		5.4 U	5.4 U
2,4,5-TP/Silvex	UG/KG H	NYSDEC TAGM 4046	700	5.5 U	5.4 U	5.8 UR		5.6 UR		5.5 U		5.4 U	5.4 U
2,4-D	UG/KG H	NYSDEC TAGM 4046	500	55 U	54 U	58 UR		56 UR		55 U		54 U	54 U
2,4-DB	UG/KG H			55 U	54 U	58 UR		56 UR		55 U		54 U	54 U
Dalapon	UG/KG H			130 U	130 U	140 UR		140 UR		140 U		130 U	130 U
Dicamba	UG/KG H			5.5 U	5.4 U	5.8 UR		5.6 UR		5.5 U		5.4 U	5.4 U
Dichloroprop	UG/KG H			55 U	54 U	58 UR		56 UR		55 U		54 U	54 U
Dinoseb	UG/KG H			28 U	27 U	29 UR		28 UR		28 U		27 U	27 U
MCPA	UG/KG H			5500 U	5400 U	5800 UR		5600 UR		5500 U		5400 U	5400 U
MCPP	UG/KG H			5500 U	5400 U	5800 UR		5600 UR		5500 U		5400 U	5400 U
Aluminum	MG/KG M	NYSDEC TAGM 4046	19300	8250	11700	12700		5700		8720		13100	13100



**TABLE C-1b**  
**SUBSURFACE SOIL ANALYSES RAW DATA-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	N	SEAD-13		SEAD-13		SEAD-13		SEAD-13		SEAD-13			
			MW13-1	SOIL	MW13-1	SOIL	MW13-2	SOIL	MW13-2	SOIL	MW13-3	SOIL	MW13-3	SOIL
			SB13-1-3	SB13-1-3	SB13-1-4	SB13-1-4	SB13-2-3	SB13-2-3	SB13-2-5	SB13-2-5	SB13-3-3	SB13-3-3	SB13-3-5	SB13-3-5
			6	8	8	10	4	6	8	10	4	6	8	10
			12/8/1993	12/8/1993	12/8/1993	12/8/1993	11/9/1993	11/9/1993	11/9/1993	11/9/1993	12/8/1993	12/8/1993	12/8/1993	12/8/1993
			SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
			ESI	ESI	ESI	ESI	ESI	ESI	ESI	ESI	ESI	ESI	ESI	ESI
			N	N	N	N	N	N	N	N	N	N	N	N
Antimony	MG/KG M	NYSDEC TAGM 4046	5.9	3.7 UJ	2.8 UJ	12.2 UJ	8.7 UJ	4.1 J	4.1 UJ					
Arsenic	MG/KG M	NYSDEC TAGM 4046	8.2	6.2	5.7	5.4	5.3	6.7	6.5					
Barium	MG/KG M	NYSDEC TAGM 4046	300	88.1	33.9	94.9	71.7	97.8	137					
Beryllium	MG/KG M	NYSDEC TAGM 4046	1.1	0.42 J	0.54 J	0.62 J	0.27 J	0.43 J	0.65 J					
Cadmium	MG/KG M	NYSDEC TAGM 4046	2.3	0.36 U	0.27 U	0.76 U	0.54 U	0.32 U	0.39 U					
Calcium	MG/KG M	NYSDEC TAGM 4046	121000	87700	50300	61700	76100	86900	64400					
Chromium	MG/KG M	NYSDEC TAGM 4046	29.6	13.3	19.6	22.9	10.7	14.1	20.7					
Cobalt	MG/KG M	NYSDEC TAGM 4046	30	7.2 J	11.1	12	7.4 J	8.8	12.8					
Copper	MG/KG M	NYSDEC TAGM 4046	33	18.4	17.6	23.5	18.9	23.4	23.7					
Cyanide	MG/KG M	NYSDEC TAGM 4046	0.35	0.5 U	0.53 U	0.53 U	0.5 U	0.55 U	0.53 U					
Iron	MG/KG M	NYSDEC TAGM 4046	36500	17400	24700	27700	13600	18500	26400					
Lead	MG/KG M	NYSDEC TAGM 4046	24.8	9 UR	11.7 UR	9.3	7.7	11.9 UR	14.1 UR					
Magnesium	MG/KG M	NYSDEC TAGM 4046	21500	20800	12600	13300	21200	21700	14300					
Manganese	MG/KG M	NYSDEC TAGM 4046	1060	517	404	445	411	390	446					
Mercury	MG/KG M	NYSDEC TAGM 4046	0.1	0.07 J	0.02 U	0.02 U	0.03 U	0.03 U	0.02 U					
Nickel	MG/KG M	NYSDEC TAGM 4046	49	24	33.1	40.8	20	27.1	34.4					
Potassium	MG/KG M	NYSDEC TAGM 4046	2380	1390	1270	1410	1040	1230	1980					
Selenium	MG/KG M	NYSDEC TAGM 4046	2	0.56 J	0.51 J	0.53 J	0.32 J	0.14 U	0.64 J					
Silver	MG/KG M	NYSDEC TAGM 4046	0.75	0.71 U	0.54 U	1.5 UJ	1.1 UJ	0.65 U	0.79 U					
Sodium	MG/KG M	NYSDEC TAGM 4046	172	155 J	134 J	131 J	145 J	152 J	163 J					
Thallium	MG/KG M	NYSDEC TAGM 4046	0.7	0.43 J	0.64 J	0.27 U	0.25 U	0.71 J	0.75 J					
Vanadium	MG/KG M	NYSDEC TAGM 4046	150	13.3	16.3	21.4	12.2	14.1	19.3					
Zinc	MG/KG M	NYSDEC TAGM 4046	110	56.2	45.8	78.6	45	46.9	62.3					
Nitrate/Nitrite Nitrogen	MG/KG	WC												
Percent Solids	%	WC												

**TABLE C-1b**  
**SUBSURFACE SOIL ANALYSES RAW DATA-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	N	SEAD-13		SEAD-13		SEAD-13		SEAD-13		SEAD-13		SEAD-13		SEAD-13	
			MW13-4	SOIL	MW13-4	SOIL	MW13-5	SOIL	MW13-6	SOIL	MW13-6	SOIL	SB13-10	SOIL	SB13-10-4	SOIL
		SB13-4-2	SB13-4-3	SB13-5-3	SB13-5-5	SB13-6-3	SB13-6-4	SB13-10-4	SB13-10-5							
		2	4	2	12	4	6	6	8							
		4	6	4	13	6	8	8	10							
		12/15/1993	12/15/1993	11/8/1993	11/8/1993	12/15/1993	12/15/1993	12/17/1993	12/18/1993							
		SA	SA	SA	SA	SA	SA	SA	SA							
		ESI	ESI	ESI	ESI	ESI	ESI	ESI	ESI							
		N	N	N	N	N	N	N	N							
1,1,1-Trichloroethane	UG/KG	VOA	NYSDEC TAGM 4046	800	11 U	11 U	11 U	11 U	11 UR	11 U	11 U	11 U	11 U	11 U	10	
1,1,2,2-Tetrachloroethane	UG/KG	VOA	NYSDEC TAGM 4046	600	11 U	11 U	11 U	11 U	11 UR	11 U	11 U	11 U	11 U	11 U	10	
1,1,2-Trichloroethane	UG/KG	VOA			11 U	11 U	11 U	11 U	11 UR	11 U	11 U	11 U	11 U	11 U	10	
1,1-Dichloroethane	UG/KG	VOA	NYSDEC TAGM 4046	200	11 U	11 U	11 U	11 U	11 UR	11 U	11 U	11 U	11 U	11 U	10	
1,1-Dichloroethene	UG/KG	VOA	NYSDEC TAGM 4046	400	11 U	11 U	11 U	11 U	11 UR	11 U	11 U	11 U	11 U	11 U	10	
1,2-Dichloroethane	UG/KG	VOA	NYSDEC TAGM 4046	100	11 U	11 U	11 U	11 U	11 UR	11 U	11 U	11 U	11 U	11 U	10	
1,2-Dichloroethene (total)	UG/KG	VOA			11 U	11 U	11 U	11 U	11 UR	11 U	11 U	11 U	11 U	11 U	10	
1,2-Dichloropropane	UG/KG	VOA			11 U	11 U	11 U	11 U	11 UR	11 U	11 U	11 U	11 U	11 U	10	
Acetone	UG/KG	VOA	NYSDEC TAGM 4046	200	11 U	11 U	11 U	11 U	11 UR	11 U	11 U	11 U	11 U	11 U	11	
Benzene	UG/KG	VOA	NYSDEC TAGM 4046	60	11 U	11 U	11 U	11 U	11 UR	11 U	11 U	11 U	11 U	11 U	10	
Bromodichloromethane	UG/KG	VOA			11 U	11 U	11 U	11 U	11 UR	11 U	11 U	11 U	11 U	11 U	10	
Bromoform	UG/KG	VOA			11 U	11 U	11 U	11 U	11 UR	11 U	11 U	11 U	11 U	11 U	10	
Carbon disulfide	UG/KG	VOA	NYSDEC TAGM 4046	2700	11 U	11 U	11 U	11 U	11 UR	11 U	11 U	11 U	11 U	11 U	10	
Carbon tetrachloride	UG/KG	VOA	NYSDEC TAGM 4046	600	11 U	11 U	11 U	11 U	11 UR	11 U	11 U	11 U	11 U	11 U	10	
Chlorobenzene	UG/KG	VOA	NYSDEC TAGM 4046	1700	11 U	11 U	11 U	11 U	11 UR	11 U	11 U	11 U	11 U	11 U	10	
Chlorodibromomethane	UG/KG	VOA			11 U	11 U	11 U	11 U	11 UR	11 U	11 U	11 U	11 U	11 U	10	
Chloroethane	UG/KG	VOA	NYSDEC TAGM 4046	1900	11 U	11 U	11 U	11 U	11 UR	11 U	11 U	11 U	11 U	11 U	10	
Chloroform	UG/KG	VOA	NYSDEC TAGM 4046	300	11 U	11 U	11 U	11 U	11 UR	11 U	11 U	11 U	11 U	11 U	10	
Cis-1,3-Dichloropropene	UG/KG	VOA			11 U	11 U	11 U	11 U	11 UR	11 U	11 U	11 U	11 U	11 U	10	
Ethyl benzene	UG/KG	VOA	NYSDEC TAGM 4046	5500	11 U	11 U	11 U	11 U	11 UR	11 U	11 U	11 U	11 U	11 U	10	
Methyl bromide	UG/KG	VOA			11 U	11 U	11 U	11 U	11 UR	11 U	11 U	11 U	11 U	11 U	10	
Methyl butyl ketone	UG/KG	VOA			11 U	11 U	11 U	11 U	11 UR	11 U	11 U	11 U	11 U	11 U	10	
Methyl chloride	UG/KG	VOA			11 U	11 U	11 U	11 U	11 UR	11 U	11 U	11 U	11 U	11 U	10	
Methyl ethyl ketone	UG/KG	VOA	NYSDEC TAGM 4046	300	11 U	11 U	11 U	11 U	11 UR	11 U	11 U	11 U	11 U	11 U	10	
Methyl isobutyl ketone	UG/KG	VOA	NYSDEC TAGM 4046	1000	11 U	11 U	11 U	11 U	11 UR	11 U	11 U	11 U	11 U	11 U	10	
Methylene chloride	UG/KG	VOA	NYSDEC TAGM 4046	100	11 U	11 U	11 U	11 U	11 UR	11 U	11 U	11 U	11 U	11 U	2	
Styrene	UG/KG	VOA			11 U	11 U	11 U	11 U	11 UR	11 U	11 U	11 U	11 U	11 U	10	
Tetrachloroethene	UG/KG	VOA	NYSDEC TAGM 4046	1400	11 U	11 U	11 U	11 U	11 UR	11 U	11 U	11 U	11 U	11 U	10	
Toluene	UG/KG	VOA	NYSDEC TAGM 4046	1500	11 U	11 U	11 U	2 J	11 U	11 U	11 U	11 U	11 U	11 U	10	
Total Xylenes	UG/KG	VOA	NYSDEC TAGM 4046	1200	11 U	11 U	11 U	11 U	11 UR	11 U	11 U	11 U	11 U	11 U	10	
Trans-1,3-Dichloropropene	UG/KG	VOA			11 U	11 U	11 U	11 U	11 UR	11 U	11 U	11 U	11 U	11 U	10	
Trichloroethene	UG/KG	VOA	NYSDEC TAGM 4046	700	11 U	11 U	11 U	11 U	11 UR	11 U	11 U	11 U	11 U	11 U	10	
Vinyl chloride	UG/KG	VOA	NYSDEC TAGM 4046	200	11 U	11 U	11 U	11 U	11 UR	11 U	11 U	11 U	11 U	11 U	10	
1,2,4-Trichlorobenzene	UG/KG	SV	NYSDEC TAGM 4046	3400	380 U	360 U	380 U	370 U	370 U	370 U	350 U	340 U	340 U	320		
1,2-Dichlorobenzene	UG/KG	SV	NYSDEC TAGM 4046	7900	380 U	360 U	380 U	370 U	370 U	370 U	350 U	340 U	340 U	320		
1,3-Dichlorobenzene	UG/KG	SV	NYSDEC TAGM 4046	1600	380 U	360 U	380 U	370 U	370 U	370 U	350 U	340 U	340 U	320		
1,4-Dichlorobenzene	UG/KG	SV	NYSDEC TAGM 4046	8500	380 U	360 U	380 U	370 U	370 U	370 U	350 U	340 U	340 U	320		
2,2-oxybis(1-Chloropropane)	UG/KG	SV			380 U	360 U	380 U	370 U	370 U	370 U	350 U	340 U	340 U	320		
2,4,5-Trichlorophenol	UG/KG	SV	NYSDEC TAGM 4046	100	920 U	870 U	920 U	910 U	890 U	890 U	860 U	830 U	830 U	790		
2,4,6-Trichlorophenol	UG/KG	SV			380 U	360 U	380 U	370 U	370 U	370 U	350 U	340 U	340 U	320		
2,4-Dichlorophenol	UG/KG	SV	NYSDEC TAGM 4046	400	380 U	360 U	380 U	370 U	370 U	370 U	350 U	340 U	340 U	320		
2,4-Dimethylphenol	UG/KG	SV			380 U	360 U	380 U	370 U	370 U	370 U	350 U	340 U	340 U	320		
2,4-Dinitrophenol	UG/KG	SV	NYSDEC TAGM 4046	200	920 U	870 U	920 U	910 U	890 U	890 U	860 U	830 U	830 U	790		
2,4-Dinitrotoluene	UG/KG	SV			380 U	360 U	380 U	370 U	370 U	370 U	350 U	340 U	340 U	320		
2,6-Dinitrotoluene	UG/KG	SV	NYSDEC TAGM 4046	1000	380 U	360 U	380 U	370 U	370 U	370 U	350 U	340 U	340 U	320		
2-Chloronaphthalene	UG/KG	SV			380 U	360 U	380 U	370 U	370 U	370 U	350 U	340 U	340 U	320		
2-Chlorophenol	UG/KG	SV	NYSDEC TAGM 4046	800	380 U	360 U	380 U	370 U	370 U	370 U	350 U	340 U	340 U	320		
2-Methylnaphthalene	UG/KG	SV	NYSDEC TAGM 4046	36400	380 U	360 U	380 U	370 U	370 U	370 U	350 U	340 U	340 U	320		
2-Methylphenol	UG/KG	SV	NYSDEC TAGM 4046	100	380 U	360 U	380 U	370 U	370 U	370 U	350 U	340 U	340 U	320		

**TABLE C-1b**  
**SUBSURFACE SOIL ANALYSES RAW DATA-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	N	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13
			MW13-4 SOIL SB13-4-2	MW13-4 SOIL SB13-4-3	MW13-5 SOIL SB13-5-3	MW13-5 SOIL SB13-5-5	MW13-6 SOIL SB13-6-3	MW13-6 SOIL SB13-6-4	SB13-10 SOIL SB13-10-4	SB13-10 SOIL SB13-10-5	
			2 4 12/15/1993	4 6 12/15/1993	2 4 11/8/1993	12 13 11/8/1993	4 6 12/15/1993	6 8 12/15/1993	6 8 12/17/1993	6 8 12/18/1993	8 10 12/18/1993
			SA ESI	SA ESI	SA ESI	SA ESI	SA ESI	SA ESI	SA ESI	SA ESI	SA ESI
PARAMETER	UNIT	N	N	N	N	N	N	N	N	N	N
2-Nitroaniline	UG/KG SV	NYSDEC TAGM 4046 430	920 U	870 U	920 U	910 U	890 U	860 U	830 U	790	
2-Nitrophenol	UG/KG SV	NYSDEC TAGM 4046 330	380 U	360 U	380 U	370 U	370 U	350 U	340 U	320	
3,3'-Dichlorobenzidine	UG/KG SV		380 U	360 U	380 U	370 U	370 U	350 U	340 U	320	
3-Nitroaniline	UG/KG SV	NYSDEC TAGM 4046 500	920 U	870 U	920 U	910 U	890 U	860 U	830 U	790	
4,6-Dinitro-2-methylphenol	UG/KG SV		920 U	870 U	920 U	910 U	890 U	860 U	830 U	790	
4-Bromophenyl phenyl ether	UG/KG SV		380 U	360 U	380 U	370 U	370 U	350 U	340 U	320	
4-Chloro-3-methylphenol	UG/KG SV	NYSDEC TAGM 4046 240	380 U	360 U	380 U	370 U	370 U	350 U	340 U	320	
4-Chloroaniline	UG/KG SV	NYSDEC TAGM 4046 220	380 U	360 U	380 U	370 U	370 U	350 U	340 U	320	
4-Chlorophenyl phenyl ether	UG/KG SV		380 U	360 U	380 U	370 U	370 U	350 U	340 U	320	
4-Methylphenol	UG/KG SV	NYSDEC TAGM 4046 900	380 U	360 U	380 U	370 U	370 U	350 U	340 U	320	
4-Nitroaniline	UG/KG SV		920 U	870 U	920 U	910 U	890 U	860 U	830 U	790	
4-Nitrophenol	UG/KG SV	NYSDEC TAGM 4046 100	920 U	870 U	920 U	910 U	890 U	860 U	830 U	790	
Acenaphthene	UG/KG SV	NYSDEC TAGM 4046 50000	380 U	360 U	380 U	370 U	370 U	350 U	340 U	320	
Acenaphthylene	UG/KG SV	NYSDEC TAGM 4046 41000	380 U	360 U	380 U	370 U	370 U	350 U	340 U	320	
Anthracene	UG/KG SV	NYSDEC TAGM 4046 50000	380 U	360 U	380 U	370 U	370 U	350 U	340 U	320	
Benzo(a)anthracene	UG/KG SV	NYSDEC TAGM 4046 224	380 U	360 U	380 U	370 U	370 U	350 U	340 U	320	
Benzo(a)pyrene	UG/KG SV	NYSDEC TAGM 4046 61	380 U	360 U	380 U	370 U	370 U	350 U	340 U	320	
Benzo(b)fluoranthene	UG/KG SV	NYSDEC TAGM 4046 1100	380 U	360 U	380 U	370 U	370 U	350 U	340 U	320	
Benzo(ghi)perylene	UG/KG SV	NYSDEC TAGM 4046 50000	20 J	360 U	380 U	370 U	370 U	350 U	340 U	320	
Benzo(k)fluoranthene	UG/KG SV	NYSDEC TAGM 4046 1100	380 U	360 U	380 U	370 U	370 U	350 U	340 U	320	
Bis(2-Chloroethoxy)methane	UG/KG SV		380 U	360 U	380 U	370 U	370 U	350 U	340 U	320	
Bis(2-Chloroethyl)ether	UG/KG SV		380 U	360 U	380 U	370 U	370 U	350 U	340 U	320	
Bis(2-Chloroisopropyl)ether	UG/KG SV										
Bis(2-Ethylhexyl)phthalate	UG/KG SV	NYSDEC TAGM 4046 50000	24 J	16 J	380 U	370 U	370 U	24 J	340 U	320	
Butylbenzylphthalate	UG/KG SV	NYSDEC TAGM 4046 50000	380 U	360 U	380 U	370 U	370 U	350 U	340 U	320	
Carbazole	UG/KG SV		380 U	360 U	380 U	370 U	370 U	350 U	340 U	320	
Chrysene	UG/KG SV	NYSDEC TAGM 4046 400	380 U	360 U	380 U	370 U	370 U	350 U	340 U	320	
Di-n-butylphthalate	UG/KG SV	NYSDEC TAGM 4046 8100	380 U	360 U	380 U	370 U	370 U	350 U	340 U	320	
Di-n-octylphthalate	UG/KG SV	NYSDEC TAGM 4046 50000	380 U	360 U	380 U	370 U	370 U	350 U	340 U	320	
Dibenz(a,h)anthracene	UG/KG SV	NYSDEC TAGM 4046 14	380 U	360 U	380 U	370 U	370 U	350 U	340 U	320	
Dibenzofuran	UG/KG SV	NYSDEC TAGM 4046 6200	380 U	360 U	380 U	370 U	370 U	350 U	340 U	320	
Diethyl phthalate	UG/KG SV	NYSDEC TAGM 4046 7100	380 U	360 U	380 U	370 U	370 U	350 U	340 U	320	
Dimethylphthalate	UG/KG SV	NYSDEC TAGM 4046 2000	380 U	360 U	380 U	370 U	370 U	350 U	340 U	320	
Fluoranthene	UG/KG SV	NYSDEC TAGM 4046 50000	380 U	360 U	380 U	370 U	370 U	350 U	340 U	320	
Fluorene	UG/KG SV	NYSDEC TAGM 4046 50000	380 U	360 U	380 U	370 U	370 U	350 U	340 U	320	
Hexachlorobenzene	UG/KG SV	NYSDEC TAGM 4046 410	380 U	360 U	380 U	370 U	370 U	350 U	340 U	320	
Hexachlorobutadiene	UG/KG SV		380 U	360 U	380 U	370 U	370 U	350 U	340 U	320	
Hexachlorocyclopentadiene	UG/KG SV		380 U	360 U	380 U	370 U	370 U	350 U	340 U	320	
Hexachloroethane	UG/KG SV		380 U	360 U	380 U	370 U	370 U	350 U	340 U	320	
Indeno(1,2,3-cd)pyrene	UG/KG SV	NYSDEC TAGM 4046 3200	380 U	360 U	380 U	370 U	370 U	350 U	340 U	320	
Isophorone	UG/KG SV	NYSDEC TAGM 4046 4400	380 U	360 U	380 U	370 U	370 U	350 U	340 U	320	
N-Nitrosodiphenylamine	UG/KG SV		380 U	360 U	380 U	370 U	370 U	350 U	340 U	320	
N-Nitrosodipropylamine	UG/KG SV		380 U	360 U	380 U	370 U	370 U	350 U	340 U	320	
Naphthalene	UG/KG SV	NYSDEC TAGM 4046 13000	380 U	360 U	380 U	370 U	370 U	350 U	340 U	320	
Nitrobenzene	UG/KG SV	NYSDEC TAGM 4046 200	380 U	360 U	380 U	370 U	370 U	350 U	340 U	320	
Pentachlorophenol	UG/KG SV	NYSDEC TAGM 4046 1000	920 U	870 U	920 U	910 U	890 U	860 U	830 U	790	
Phenanthrene	UG/KG SV	NYSDEC TAGM 4046 50000	380 U	360 U	380 U	370 U	370 U	350 U	340 U	320	
Phenol	UG/KG SV	NYSDEC TAGM 4046 30	380 U	360 U	380 U	370 U	370 U	350 U	340 U	320	
Pyrene	UG/KG SV	NYSDEC TAGM 4046 50000	380 U	360 U	380 U	370 U	370 U	350 U	340 U	320	

**TABLE C-1b**  
**SUBSURFACE SOIL ANALYSES RAW DATA-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	SEAD-13		SEAD-13		SEAD-13		SEAD-13		SEAD-13		SEAD-13		SEAD-13	
		MW13-4	SOIL	MW13-4	SOIL	MW13-5	SOIL	MW13-6	SOIL	MW13-6	SOIL	SB13-10	SOIL	SB13-10-4	SOIL
		SB13-4-2	SB13-4-3	SB13-4-3	SB13-5-3	SB13-5-3	SB13-6-3	SB13-6-4	SB13-6-4	SB13-6-4	SB13-10-4	SB13-10-4	SB13-10-5	SB13-10-5	SB13-10-5
		2	4	4	2	12	4	6	6	8	6	8	8	10	8
		4	6	6	4	13	6	8	8	8	8	8	10	10	10
		12/15/1993	12/15/1993	12/15/1993	11/8/1993	11/8/1993	12/15/1993	12/15/1993	12/15/1993	12/15/1993	12/17/1993	12/17/1993	12/18/1993	12/18/1993	12/18/1993
		SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
		ESI	ESI	ESI	ESI	ESI	ESI	ESI	ESI	ESI	ESI	ESI	ESI	ESI	ESI
		N	N	N	N	N	N	N	N	N	N	N	N	N	N
1,3,5-Trinitrobenzene	UG/KG EXP				130 U	130 U									
1,3-Dinitrobenzene	UG/KG EXP				130 U	130 U									
2,4,6-Trinitrotoluene	UG/KG EXP				130 U	130 U									
2,4-Dinitrotoluene	UG/KG EXP				130 U	130 U									
2,6-Dinitrotoluene	UG/KG EXP	NYSDEC TAGM 4046	1000		130 U	130 U									
2-amino-4,6-Dinitrotoluene	UG/KG EXP				130 U	130 U									
4-amino-2,6-Dinitrotoluene	UG/KG EXP				130 U	130 U									
HMX	UG/KG EXP				130 U	130 U									
RDX	UG/KG EXP				130 U	130 U									
Tetryl	UG/KG EXP				130 U	130 U									
4,4'-DDD	UG/KG OCP	NYSDEC TAGM 4046	2900	3.8 U	3.6 U	3.8 U	3.7 U	3.7 U	3.7 U	3.5 U	3.6 U	3.4	3.4	3.4	3.4
4,4'-DDE	UG/KG OCP	NYSDEC TAGM 4046	2100	3.8 U	3.6 U	3.8 U	3.7 U	3.7 U	3.7 U	3.5 U	3.6 U	3.4	3.4	3.4	3.4
4,4'-DDT	UG/KG OCP	NYSDEC TAGM 4046	2100	3.8 U	3.6 U	3.8 U	3.7 U	3.7 U	3.7 U	3.5 U	3.6 U	3.4	3.4	3.4	3.4
Aldrin	UG/KG OCP	NYSDEC TAGM 4046	41	2 U	1.8 U	2 U	1.9 U	1.9 U	1.9 U	1.8 U	1.8 U	1.8	1.8	1.8	1.8
Alpha-BHC	UG/KG OCP	NYSDEC TAGM 4046	110	2 U	1.8 U	2 U	1.9 U	1.9 U	1.9 U	1.8 U	1.8 U	1.8	1.8	1.8	1.8
Alpha-Chlordane	UG/KG OCP			2 U	1.8 U	2 U	1.9 U	1.9 U	1.9 U	1.8 U	1.8 U	1.8	1.8	1.8	1.8
Aroclor-1016	UG/KG OCP			38 U	36 U	38 U	37 U	37 U	37 U	35 U	36 U	34	34	34	34
Aroclor-1221	UG/KG OCP			77 U	73 U	77 U	76 U	74 U	74 U	72 U	72 U	69	69	69	69
Aroclor-1232	UG/KG OCP			38 U	36 U	38 U	37 U	37 U	37 U	35 U	36 U	34	34	34	34
Aroclor-1242	UG/KG OCP			38 U	36 U	38 U	37 U	37 U	37 U	35 U	36 U	34	34	34	34
Aroclor-1248	UG/KG OCP			38 U	36 U	38 U	37 U	37 U	37 U	35 U	36 U	34	34	34	34
Aroclor-1254	UG/KG OCP	NYSDEC TAGM 4046	10000	38 U	36 U	38 U	37 U	37 U	37 U	35 U	36 U	34	34	34	34
Aroclor-1260	UG/KG OCP	NYSDEC TAGM 4046	10000	38 U	36 U	38 U	37 U	37 U	37 U	35 U	36 U	34	34	34	34
Beta-BHC	UG/KG OCP	NYSDEC TAGM 4046	200	2 U	1.8 U	2 U	1.9 U	1.9 U	1.9 U	1.8 U	1.8 U	1.8	1.8	1.8	1.8
Delta-BHC	UG/KG OCP	NYSDEC TAGM 4046	300	2 U	1.8 U	2 U	1.9 U	1.9 U	1.9 U	1.8 U	1.8 U	1.8	1.8	1.8	1.8
Dieldrin	UG/KG OCP	NYSDEC TAGM 4046	44	3.8 U	3.6 U	3.8 U	3.7 U	3.7 U	3.7 U	3.5 U	3.6 U	3.4	3.4	3.4	3.4
Endosulfan I	UG/KG OCP	NYSDEC TAGM 4046	900	2 U	1.8 U	2 U	1.9 U	1.9 U	1.9 U	1.8 U	1.8 U	1.8	1.8	1.8	1.8
Endosulfan II	UG/KG OCP	NYSDEC TAGM 4046	900	3.8 U	3.6 U	3.8 U	3.7 U	3.7 U	3.7 U	3.5 U	3.6 U	3.4	3.4	3.4	3.4
Endosulfan sulfate	UG/KG OCP	NYSDEC TAGM 4046	1000	3.8 U	3.6 U	3.8 U	3.7 U	3.7 U	3.7 U	3.5 U	3.6 U	3.4	3.4	3.4	3.4
Endrin	UG/KG OCP	NYSDEC TAGM 4046	100	3.8 U	3.6 U	3.8 U	3.7 U	3.7 U	3.7 U	3.5 U	3.6 U	3.4	3.4	3.4	3.4
Endrin aldehyde	UG/KG OCP			3.8 U	3.6 U	3.8 U	3.7 U	3.7 U	3.7 U	3.5 U	3.6 U	3.4	3.4	3.4	3.4
Endrin ketone	UG/KG OCP			3.8 U	3.6 U	3.8 U	3.7 U	3.7 U	3.7 U	3.5 U	3.6 U	3.4	3.4	3.4	3.4
Gamma-BHC/Lindane	UG/KG OCP	NYSDEC TAGM 4046	60	2 U	1.8 U	2 U	1.9 U	1.9 U	1.9 U	1.8 U	1.8 U	1.8	1.8	1.8	1.8
Gamma-Chlordane	UG/KG OCP	NYSDEC TAGM 4046	540	2 U	1.8 U	2 U	1.9 U	1.9 U	1.9 U	1.8 U	1.8 U	1.8	1.8	1.8	1.8
Heptachlor	UG/KG OCP	NYSDEC TAGM 4046	100	2 U	1.8 U	2 U	1.9 U	1.9 U	1.9 U	1.8 U	1.8 U	1.8	1.8	1.8	1.8
Heptachlor epoxide	UG/KG OCP	NYSDEC TAGM 4046	20	2 U	1.8 U	2 U	1.9 U	1.9 U	1.9 U	1.8 U	1.8 U	1.8	1.8	1.8	1.8
Methoxychlor	UG/KG OCP			20 U	18 U	20 U	19 U	19 U	19 U	18 U	18 U	18	18	18	18
Toxaphene	UG/KG OCP			200 U	180 U	200 U	190 U	190 U	190 U	180 U	180 U	180	180	180	180
2,4,5-T	UG/KG H	NYSDEC TAGM 4046	1900	5.8 U	5.5 U	5.8 U	5.7 U	5.6 U	5.6 U	5.4 U	5.4 U	5.2	5.2	5.2	5.2
2,4,5-TP/Silvex	UG/KG H	NYSDEC TAGM 4046	700	5.8 U	5.5 U	5.8 U	5.7 U	5.6 U	5.6 U	5.4 U	5.4 U	5.2	5.2	5.2	5.2
2,4-D	UG/KG H	NYSDEC TAGM 4046	500	58 U	55 U	58 U	57 U	56 U	56 U	54 U	54 U	52	52	52	52
2,4-DB	UG/KG H			58 U	55 U	58 U	57 U	56 U	56 U	54 U	54 U	52	52	52	52
Dalapon	UG/KG H			140 U	130 U	140 U	140 U	140 U	140 U	130 U	130 U	130	130	130	130
Dicamba	UG/KG H			5.8 U	5.5 U	5.8 U	5.7 U	5.6 U	5.6 U	5.4 U	5.4 U	5.2	5.2	5.2	5.2
Dichloroprop	UG/KG H			58 U	55 U	58 U	57 U	56 U	56 U	54 U	54 U	52	52	52	52
Dinoseb	UG/KG H			29 U	28 U	29 U	28 U	28 U	28 U	27 U	27 U	26	26	26	26
MCPA	UG/KG H			5800 U	5500 U	5800 U	5700 U	5600 U	5600 U	5400 U	5400 U	5200	5200	5200	5200
MCPP	UG/KG H			5800 U	5500 U	5800 U	5700 U	5600 U	5600 U	5400 U	5400 U	520	520	520	520
Aluminum	MG/KG M	NYSDEC TAGM 4046	19300	15500	20400	14000	8230	13500	10200	12100	12100	17100	17100	17100	17100

**TABLE C-1b**  
**SUBSURFACE SOIL ANALYSES RAW DATA-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	N	SEAD-13		SEAD-13		SEAD-13		SEAD-13		SEAD-13		SEAD-13	
			MW13-4 SOIL SB13-4-2	MW13-4 SOIL SB13-4-3	MW13-5 SOIL SB13-5-3	MW13-5 SOIL SB13-5-5	MW13-6 SOIL SB13-6-3	MW13-6 SOIL SB13-6-4	SB13-10 SOIL SB13-10-4	SB13-10 SOIL SB13-10-5				
			2	4	2	12	4	6	6	8	6	8	8	8
			4	6	4	13	6	8	8	8	8	8	10	10
			12/15/1993	12/15/1993	11/8/1993	11/8/1993	12/15/1993	12/15/1993	12/17/1993	12/17/1993	12/17/1993	12/17/1993	12/18/1993	12/18/1993
			SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
			ESI	ESI	ESI	ESI	ESI	ESI	ESI	ESI	ESI	ESI	ESI	ESI
			N	N	N	N	N	N	N	N	N	N	N	N
Antimony	MG/KG M	NYSDEC TAGM 4046	5.9	4.5 J	3.2 UJ	9 UJ	8.3 UJ	2.5 UJ	2.9 UJ	3.7 UJ	4.1			
Arsenic	MG/KG M	NYSDEC TAGM 4046	8.2	6.8	9.6	6.3	4.7	2.7	2.3	6.6	4.5			
Barium	MG/KG M	NYSDEC TAGM 4046	300	96.9	79.1	98.6	132	60.4	56.8	174	584			
Beryllium	MG/KG M	NYSDEC TAGM 4046	1.1	0.78 J	1	0.63 J	0.4 J	0.71	0.58 J	0.72 J	0.88			
Cadmium	MG/KG M	NYSDEC TAGM 4046	2.3	0.34 U	0.31 U	0.56 U	0.52 U	0.25 U	0.28 U	0.36 U	0.39			
Calcium	MG/KG M	NYSDEC TAGM 4046	121000	68000	10200	25700	88000	31800	45200	78900	32500			
Chromium	MG/KG M	NYSDEC TAGM 4046	29.6	25.8	35.8	23.3	14.8	23.5	17.8	20.1	30.8			
Cobalt	MG/KG M	NYSDEC TAGM 4046	30	12.4	12.1	8.8	9.9	15	11.3	17.8	18.6			
Copper	MG/KG M	NYSDEC TAGM 4046	33	21.1	26.5	26.4	26.5	27.4	14.5	33.7	17.1			
Cyanide	MG/KG M	NYSDEC TAGM 4046	0.35	0.51 U	0.54 U	0.52 U	0.53 U	0.53 U	0.51 U	0.48 U	0.51			
Iron	MG/KG M	NYSDEC TAGM 4046	36500	30100	42500	24300	19600	26900	20700	25800	36800			
Lead	MG/KG M	NYSDEC TAGM 4046	24.8	13.6	7.1	12.8	8.3	11.6	11.7	14.8	12.5			
Magnesium	MG/KG M	NYSDEC TAGM 4046	21500	10600	9660	8990	20700	6640	5220	16100	8700			
Manganese	MG/KG M	NYSDEC TAGM 4046	1060	607	398	273	461	508	556	708	546			
Mercury	MG/KG M	NYSDEC TAGM 4046	0.1	0.01 J	0.02 J	0.02 U	0.02 U	0.01 U	0.01 U	0.02 J	0.02			
Nickel	MG/KG M	NYSDEC TAGM 4046	49	43.2	53	36.8	29	41.9	33	57.1	53			
Potassium	MG/KG M	NYSDEC TAGM 4046	2380	1570	1810	1630	1260	1120	1000	1880	1580			
Selenium	MG/KG M	NYSDEC TAGM 4046	2	0.2 J	0.28 J	0.26 J	0.59 J	0.11 J	0.24 J	0.45 J	0.42			
Silver	MG/KG M	NYSDEC TAGM 4046	0.75	0.69 U	0.63 U	1.1 UJ	1 UJ	0.49 U	0.56 U	0.72 U	1			
Sodium	MG/KG M	NYSDEC TAGM 4046	172	183 J	87.8 J	87 J	187 J	116 J	141 J	166 J	125			
Thallium	MG/KG M	NYSDEC TAGM 4046	0.7	0.2 U	0.18 U	0.27 U	0.19 U	0.14 U	0.23 U	0.13 U	0.19			
Vanadium	MG/KG M	NYSDEC TAGM 4046	150	23.1	30.7	23.7	15.1	18.5	13.8	21.6	24.3			
Zinc	MG/KG M	NYSDEC TAGM 4046	110	65.8	93	64.4	51.4	64.7	39.3	92.8	82.2			
Nitrate/Nitrite Nitrogen	MG/KG	WC												
Percent Solids	%	WC												

**TABLE C-1b**  
**SUBSURFACE SOIL ANALYSES RAW DATA-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	SEAD-13 SOIL	SEAD-13 SB13-11 SOIL	SEAD-13 SB13-12 SOIL	SEAD-13 SB13-13 SOIL	SEAD-13 SB13-14 SOIL	SEAD-13 SB13-7 SOIL	SEAD-13 SB13-7-2 SOIL	SEAD-13 SB13-7-4 SOIL	SEAD-13 SB13-8 SOIL	SEAD-13 SB13-8-2 SOIL	
												134017
		6	6	6	8	8	2	6	6	2	2	
		8	8	8	10	10	4	8	8	4	4	
		8/16/2001	8/16/2001	8/15/2001	8/15/2001	8/16/2001	12/7/1993	12/7/1993	12/7/1993	12/7/1993	12/7/1993	
		SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	
		SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	ESI	ESI	ESI	ESI	ESI	
		1	1	1	1	1						
		N	N	N	N	N	N	N	N	N	N	
1,1,1-Trichloroethane	UG/KG	VOA	NYSDEC TAGM 4046	800 UR			12 U		11 U		11	
1,1,2,2-Tetrachloroethane	UG/KG	VOA	NYSDEC TAGM 4046	600 UR			12 U		11 U		11	
1,1,2-Trichloroethane	UG/KG	VOA		UR			12 U		11 U		11	
1,1-Dichloroethane	UG/KG	VOA	NYSDEC TAGM 4046	200 UR			12 U		11 U		11	
1,1-Dichloroethene	UG/KG	VOA	NYSDEC TAGM 4046	400 UR			12 U		11 U		11	
1,2-Dichloroethane	UG/KG	VOA	NYSDEC TAGM 4046	100 UR			12 U		11 U		11	
1,2-Dichloroethene (total)	UG/KG	VOA		UR			12 U		11 U		11	
1,2-Dichloropropane	UG/KG	VOA		UR			12 U		11 U		11	
Acetone	UG/KG	VOA	NYSDEC TAGM 4046	200 UR			14 U		11 U		11	
Benzene	UG/KG	VOA	NYSDEC TAGM 4046	60 UR			12 U		11 U		11	
Bromodichloromethane	UG/KG	VOA		UR			12 U		11 U		11	
Bromoform	UG/KG	VOA		UR			12 U		11 U		11	
Carbon disulfide	UG/KG	VOA	NYSDEC TAGM 4046	2700 UR			12 U		11 U		11	
Carbon tetrachloride	UG/KG	VOA	NYSDEC TAGM 4046	600 UR			12 U		11 U		11	
Chlorobenzene	UG/KG	VOA	NYSDEC TAGM 4046	1700 UR			12 U		11 U		11	
Chlorodibromomethane	UG/KG	VOA		UR			12 U		11 U		11	
Chloroethane	UG/KG	VOA	NYSDEC TAGM 4046	1900 UR			12 U		11 U		11	
Chloroform	UG/KG	VOA	NYSDEC TAGM 4046	300 UR			12 U		11 U		11	
Cis-1,3-Dichloropropene	UG/KG	VOA		UR			12 U		11 U		11	
Ethyl benzene	UG/KG	VOA	NYSDEC TAGM 4046	5500 UR			12 U		11 U		11	
Methyl bromide	UG/KG	VOA		UR			12 U		11 U		11	
Methyl butyl ketone	UG/KG	VOA		UR			12 U		11 U		11	
Methyl chloride	UG/KG	VOA		UR			12 U		11 U		11	
Methyl ethyl ketone	UG/KG	VOA	NYSDEC TAGM 4046	300 UR			12 U		11 U		11	
Methyl isobutyl ketone	UG/KG	VOA	NYSDEC TAGM 4046	1000 UR			12 U		11 U		11	
Methylene chloride	UG/KG	VOA	NYSDEC TAGM 4046	100 J			12 U		11 U		11	
Styrene	UG/KG	VOA		UR			12 U		11 U		11	
Tetrachloroethene	UG/KG	VOA	NYSDEC TAGM 4046	1400 UR			12 U		11 U		11	
Toluene	UG/KG	VOA	NYSDEC TAGM 4046	1500 UR			12 U		11 U		11	
Total Xylenes	UG/KG	VOA	NYSDEC TAGM 4046	1200 UR			12 U		11 U		11	
Trans-1,3-Dichloropropene	UG/KG	VOA		UR			12 U		11 U		11	
Trichloroethene	UG/KG	VOA	NYSDEC TAGM 4046	700 UR			12 U		11 U		11	
Vinyl chloride	UG/KG	VOA	NYSDEC TAGM 4046	200 UR			12 U		11 U		11	
1,2,4-Trichlorobenzene	UG/KG	SV	NYSDEC TAGM 4046	3400 U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400
1,2-Dichlorobenzene	UG/KG	SV	NYSDEC TAGM 4046	7900 U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400
1,3-Dichlorobenzene	UG/KG	SV	NYSDEC TAGM 4046	1600 U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400
1,4-Dichlorobenzene	UG/KG	SV	NYSDEC TAGM 4046	8500 U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400
2,2'-oxybis(1-Chloropropane)	UG/KG	SV		U						400 U	370 U	400
2,4,5-Trichlorophenol	UG/KG	SV	NYSDEC TAGM 4046	100 U	170 U	170 U	180 U	190 U	170 U	960 U	890 U	960
2,4,6-Trichlorophenol	UG/KG	SV		U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400
2,4-Dichlorophenol	UG/KG	SV	NYSDEC TAGM 4046	400 U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400
2,4-Dimethylphenol	UG/KG	SV		U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400
2,4-Dinitrophenol	UG/KG	SV	NYSDEC TAGM 4046	200 U	170 UJ	170 UJ	180 UJ	190 UJ	170 UJ	960 U	890 U	960
2,4-Dinitrotoluene	UG/KG	SV		U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400
2,6-Dinitrotoluene	UG/KG	SV	NYSDEC TAGM 4046	1000 U	68 UJ	68 UJ	71 UJ	75 UJ	70 UJ	400 U	370 U	400
2-Chloronaphthalene	UG/KG	SV		U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400
2-Chlorophenol	UG/KG	SV	NYSDEC TAGM 4046	800 U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400
2-Methylnaphthalene	UG/KG	SV	NYSDEC TAGM 4046	36400 U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400
2-Methylphenol	UG/KG	SV	NYSDEC TAGM 4046	100 U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400

**TABLE C-1b**  
**SUBSURFACE SOIL ANALYSES RAW DATA-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	SEAD-13 SB13-11 SOIL	SEAD-13 SB13-11 SOIL	SEAD-13 SB13-12 SOIL	SEAD-13 SB13-13 SOIL	SEAD-13 SB13-14 SOIL	SEAD-13 SB13-7 SOIL	SEAD-13 SB13-7-2 SOIL	SEAD-13 SB13-7-4 SOIL	SEAD-13 SB13-8 SOIL	SEAD-13 SB13-8-2 SOIL
		6	6	6	8	8	2	6	6	2	2
		8	8	8	10	10	4	8	8	4	4
		8/16/2001	8/16/2001	8/15/2001	8/15/2001	8/16/2001	12/7/1993	12/7/1993	12/7/1993	12/7/1993	12/7/1993
		SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
		SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	ESI	ESI	ESI	ESI	ESI
		1	1	1	1	1	1	1	1	1	1
		N	N	N	N	N	N	N	N	N	N
2-Nitroaniline	UG/KG SV	NYSDEC TAGM 4046	430 U	170 U	170 U	180 U	190 U	170 U	960 U	890 U	960 U
2-Nitrophenol	UG/KG SV	NYSDEC TAGM 4046	330 U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400 U
3,3'-Dichlorobenzidine	UG/KG SV		U	68 U	68 U	71 U	75 U	70 UJ	400 U	370 U	400 U
3-Nitroaniline	UG/KG SV	NYSDEC TAGM 4046	500 U	170 U	170 U	180 U	190 U	170 U	960 U	890 U	960 U
4,6-Dinitro-2-methylphenol	UG/KG SV		U	170 UJ	170 UJ	180 UJ	190 U	170 UJ	960 U	890 U	960 U
4-Bromophenyl phenyl ether	UG/KG SV		U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400 U
4-Chloro-3-methylphenol	UG/KG SV	NYSDEC TAGM 4046	240 U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400 U
4-Chloroaniline	UG/KG SV	NYSDEC TAGM 4046	220 U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400 U
4-Chlorophenyl phenyl ether	UG/KG SV		U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400 U
4-Methylphenol	UG/KG SV	NYSDEC TAGM 4046	900 U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400 U
4-Nitroaniline	UG/KG SV		U	170 U	170 U	180 U	190 U	170 U	960 U	890 U	960 U
4-Nitrophenol	UG/KG SV	NYSDEC TAGM 4046	100 U	170 U	170 U	180 U	190 U	170 U	960 U	890 U	960 U
Acenaphthene	UG/KG SV	NYSDEC TAGM 4046	50000 U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400 U
Acenaphthylene	UG/KG SV	NYSDEC TAGM 4046	41000 U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400 U
Anthracene	UG/KG SV	NYSDEC TAGM 4046	50000 U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400 U
Benzo(a)anthracene	UG/KG SV	NYSDEC TAGM 4046	224 U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400 U
Benzo(a)pyrene	UG/KG SV	NYSDEC TAGM 4046	61 U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400 U
Benzo(b)fluoranthene	UG/KG SV	NYSDEC TAGM 4046	1100 U	68 U	4.9 J	71 U	75 U	70 U	400 U	370 U	400 U
Benzo(ghi)perylene	UG/KG SV	NYSDEC TAGM 4046	50000 U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400 U
Benzo(k)fluoranthene	UG/KG SV	NYSDEC TAGM 4046	1100 U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400 U
Bis(2-Chloroethoxy)methane	UG/KG SV		U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400 U
Bis(2-Chloroethyl)ether	UG/KG SV		U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400 U
Bis(2-Chloroisopropyl)ether	UG/KG SV		U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400 U
Bis(2-Ethylhexyl)phthalate	UG/KG SV	NYSDEC TAGM 4046	50000 U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400 U
Butylbenzylphthalate	UG/KG SV	NYSDEC TAGM 4046	50000 U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400 U
Carbazole	UG/KG SV		U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400 U
Chrysene	UG/KG SV	NYSDEC TAGM 4046	400 U	4.4 J	6.6 J	4.9 J	4.1 J	70 U	400 U	370 U	400 U
Di-n-butylphthalate	UG/KG SV	NYSDEC TAGM 4046	8100 U	68 U	4.3 J	71 U	75 U	70 U	400 U	370 U	400 U
Di-n-octylphthalate	UG/KG SV	NYSDEC TAGM 4046	50000 U	68 UJ	68 UJ	71 UJ	75 U	70 U	400 U	370 U	400 U
Dibenz(a,h)anthracene	UG/KG SV	NYSDEC TAGM 4046	14 U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400 U
Dibenzofuran	UG/KG SV	NYSDEC TAGM 4046	6200 U	68 UJ	68 UJ	71 UJ	75 UJ	70 UJ	400 U	370 U	400 U
Diethyl phthalate	UG/KG SV	NYSDEC TAGM 4046	7100 U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400 U
Dimethylphthalate	UG/KG SV	NYSDEC TAGM 4046	2000 U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400 U
Fluoranthene	UG/KG SV	NYSDEC TAGM 4046	50000 U	68 U	7.5 J	71 U	75 U	70 U	400 U	370 U	400 U
Fluorene	UG/KG SV	NYSDEC TAGM 4046	50000 U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400 U
Hexachlorobenzene	UG/KG SV	NYSDEC TAGM 4046	410 U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400 U
Hexachlorobutadiene	UG/KG SV		U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400 U
Hexachlorocyclopentadiene	UG/KG SV		U	68 UJ	68 UJ	71 UJ	75 UJ	70 UJ	400 U	370 U	400 U
Hexachloroethane	UG/KG SV		U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400 U
Indeno(1,2,3-cd)pyrene	UG/KG SV	NYSDEC TAGM 4046	3200 U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400 U
Isophorone	UG/KG SV	NYSDEC TAGM 4046	4400 U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400 U
N-Nitrosodiphenylamine	UG/KG SV		U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400 U
N-Nitrosodipropylamine	UG/KG SV		U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400 U
Naphthalene	UG/KG SV	NYSDEC TAGM 4046	13000 U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400 U
Nitrobenzene	UG/KG SV	NYSDEC TAGM 4046	200 U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400 U
Pentachlorophenol	UG/KG SV	NYSDEC TAGM 4046	1000 U	170 U	170 U	180 U	190 U	170 UJ	960 U	890 U	960 U
Phenanthrene	UG/KG SV	NYSDEC TAGM 4046	50000 U	4.3 J	68 U	3.7 J	5.1 J	70 U	400 U	370 U	400 U
Phenol	UG/KG SV	NYSDEC TAGM 4046	30 U	68 U	68 U	71 U	75 U	70 U	400 U	370 U	400 U
Pyrene	UG/KG SV	NYSDEC TAGM 4046	50000 U	68 U	68 U	71 U	4.6 J	70 U	400 U	370 U	400 U

**TABLE C-1b**  
**SUBSURFACE SOIL ANALYSES RAW DATA-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

		SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13					
		SB13-11	SB13-11	SB13-12	SB13-13	SB13-14	SB13-7	SB13-7	SB13-8					
		SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL					
		134017	134021	134019	134013	134015	SB13-7-2	SB13-7-4	SB13-8-2					
		6	6	6	8	8	2	6	2					
		8	8	8	10	10	4	8	4					
		8/16/2001	8/16/2001	8/15/2001	8/15/2001	8/16/2001	12/7/1993	12/7/1993	12/7/1993					
		SA	SA	SA	SA	SA	SA	SA	SA					
		SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	ESI	ESI	ESI					
		1	1	1	1	1								
PARAMETER	UNIT	N	N	N	N	N	N	N	N					
1,3,5-Trinitrobenzene	UG/KG EXP													
1,3-Dinitrobenzene	UG/KG EXP													
2,4,6-Trinitrotoluene	UG/KG EXP													
2,4-Dinitrotoluene	UG/KG EXP													
2,6-Dinitrotoluene	UG/KG EXP NYSDEC TAGM 4046		1000											
2-amino-4,6-Dinitrotoluene	UG/KG EXP													
4-amino-2,6-Dinitrotoluene	UG/KG EXP													
HMX	UG/KG EXP													
RDX	UG/KG EXP													
Tetryl	UG/KG EXP													
4,4'-DDD	UG/KG OCP NYSDEC TAGM 4046		2900 U				4 U	3.7 U	4					
4,4'-DDE	UG/KG OCP NYSDEC TAGM 4046		2100 U				4 U	3.7 U	4					
4,4'-DDT	UG/KG OCP NYSDEC TAGM 4046		2100 U				4 U	3.7 U	4					
Aldrin	UG/KG OCP NYSDEC TAGM 4046		41 U				2 U	1.9 U	2					
Alpha-BHC	UG/KG OCP NYSDEC TAGM 4046		110 U				2 U	1.9 U	2					
Alpha-Chlordane	UG/KG OCP		U				2 U	1.9 U	2					
Aroclor-1016	UG/KG OCP		U				40 U	37 U	40					
Aroclor-1221	UG/KG OCP		U				81 U	74 U	81					
Aroclor-1232	UG/KG OCP		U				40 U	37 U	40					
Aroclor-1242	UG/KG OCP		U				40 U	37 U	40					
Aroclor-1248	UG/KG OCP		U				40 U	37 U	40					
Aroclor-1254	UG/KG OCP NYSDEC TAGM 4046		10000 U				40 U	37 U	40					
Aroclor-1260	UG/KG OCP NYSDEC TAGM 4046		10000 U				40 U	37 U	40					
Beta-BHC	UG/KG OCP NYSDEC TAGM 4046		200 U				2 U	1.9 U	2					
Delta-BHC	UG/KG OCP NYSDEC TAGM 4046		300 U				2 U	1.9 U	2					
Dieldrin	UG/KG OCP NYSDEC TAGM 4046		44 U				4 U	3.7 U	4					
Endosulfan I	UG/KG OCP NYSDEC TAGM 4046		900 U				2 U	1.9 U	2					
Endosulfan II	UG/KG OCP NYSDEC TAGM 4046		900 U				4 U	3.7 U	4					
Endosulfan sulfate	UG/KG OCP NYSDEC TAGM 4046		1000 U				4 U	3.7 U	4					
Endrin	UG/KG OCP NYSDEC TAGM 4046		100 U				4 U	3.7 U	4					
Endrin aldehyde	UG/KG OCP		U				4 U	3.7 U	4					
Endrin ketone	UG/KG OCP		U				4 U	3.7 U	4					
Gamma-BHC/Lindane	UG/KG OCP NYSDEC TAGM 4046		60 U				2 U	1.9 U	2					
Gamma-Chlordane	UG/KG OCP NYSDEC TAGM 4046		540 U				2 U	1.9 U	2					
Heptachlor	UG/KG OCP NYSDEC TAGM 4046		100 U				2 U	1.9 U	2					
Heptachlor epoxide	UG/KG OCP NYSDEC TAGM 4046		20 U				2 U	1.9 U	2					
Methoxychlor	UG/KG OCP		U				20 U	19 U	20					
Toxaphene	UG/KG OCP		U				200 U	190 U	200					
2,4,5-T	UG/KG H NYSDEC TAGM 4046		1900 U				6.1 U	5.6 U	6					
2,4,5-TP/Silvex	UG/KG H NYSDEC TAGM 4046		700 U				6.1 U	5.6 U	6					
2,4-D	UG/KG H NYSDEC TAGM 4046		500 U				61 U	56 U	60					
2,4-DB	UG/KG H		U				61 U	56 U	60					
Dalapon	UG/KG H		U				150 U	140 U	150					
Dicamba	UG/KG H		U				6.1 U	5.6 U	6					
Dichloroprop	UG/KG H		U				61 U	56 U	60					
Dinoseb	UG/KG H		U				31 U	28 U	30					
MCPA	UG/KG H		U				6100 U	5600 U	6000					
MCPP	UG/KG H		U				6100 U	5600 U	6000					
Aluminum	MG/KG M NYSDEC TAGM 4046	19300					14500	16200	12300	7690	15100	14200	8490	19600



**TABLE C-1b**  
**SUBSURFACE SOIL ANALYSES RAW DATA-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT				SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13
					SB13-11	SB13-11	SB13-12	SB13-13	SB13-14	SB13-7	SB13-7	SB13-8	
					SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
					134017	134021	134019	134013	134015	SB13-7-2	SB13-7-4	SB13-8-2	
					6	6	6	8	8	2	6	2	
					8	8	8	10	10	4	8	4	
					8/16/2001	8/16/2001	8/15/2001	8/15/2001	8/16/2001	12/7/1993	12/7/1993	12/7/1993	
					SA	SA	SA	SA	SA	SA	SA	SA	
					SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	ESI	ESI	ESI	
					1	1	1	1	1				
					N	N	N	N	N	N	N	N	N
Antimony	MG/KG	M	NYSDEC TAGM 4046	5.9 UJ	0.66 J	0.41 J	0.33 UJ	0.4 UJ	0.37 UJ	4.7 J	3.6 UJ	3.1	
Arsenic	MG/KG	M	NYSDEC TAGM 4046	8.2	4.2	5.9	5.5	4.2	4.9	6.2	5.9	10.2	
Barium	MG/KG	M	NYSDEC TAGM 4046	300	22.8 J	38.8	152	83.3	102	79.1	62.7	96	
Beryllium	MG/KG	M	NYSDEC TAGM 4046	1.1 J	0.66 J	0.77 J	0.63 J	0.4 J	0.72 J	0.7 J	0.42 J	0.97	
Cadmium	MG/KG	M	NYSDEC TAGM 4046	2.3 U	0.79 J	0.9 J	0.73 J	0.53 J	0.74 J	0.44 U	0.35 U	0.3	
Calcium	MG/KG	M	NYSDEC TAGM 4046	121000	35300	35200	69000	80200	56000	33100	74800	4010	
Chromium	MG/KG	M	NYSDEC TAGM 4046	29.6	25.5	28.3	20.3	13.2	24.8	23	14.4	32.4	
Cobalt	MG/KG	M	NYSDEC TAGM 4046	30	14.8	16.5	13.4	8.1 J	14.5	13.1	11.5	18.9	
Copper	MG/KG	M	NYSDEC TAGM 4046	33	11.4	14.4	30	19.3	22.9	27.6	21.6	31.5	
Cyanide	MG/KG	M	NYSDEC TAGM 4046	0.35 U	0.49 U	0.5 U	0.4 U	0.5 U	0.49 U	0.59 U	0.54 U	0.57	
Iron	MG/KG	M	NYSDEC TAGM 4046	36500	33600 J	38400	26200 J	17600 J	30600 J	29500	18400	41100	
Lead	MG/KG	M	NYSDEC TAGM 4046	24.8	15.6	18.6 J	12	10.5	13.8 J	17.9 UR	10.5 UR	10	
Magnesium	MG/KG	M	NYSDEC TAGM 4046	21500	15800	9320	17100	20000	13200	18400	17200	7940	
Manganese	MG/KG	M	NYSDEC TAGM 4046	1060	566	652	400	449	523	518	466	687	
Mercury	MG/KG	M	NYSDEC TAGM 4046	0.1 U	0.05 U	0.04 U	0.05 U	0.05 U	0.05 U	0.03 J	0.02 U	0.02	
Nickel	MG/KG	M	NYSDEC TAGM 4046	49	41.4	46.8	36.5	23.5	41.4	38.1	34	55.6	
Potassium	MG/KG	M	NYSDEC TAGM 4046	2380	1830	2140	2500	1820	2790	1840	1150	1420	
Selenium	MG/KG	M	NYSDEC TAGM 4046	2 J	0.6 J	0.64 J	0.66 J	0.51 U	0.47 U	0.14 U	0.26 J	0.29	
Silver	MG/KG	M	NYSDEC TAGM 4046	0.75 J	0.33 U	0.3 U	0.34 J	0.36 U	0.4 J	0.89 U	0.7 U	0.6	
Sodium	MG/KG	M	NYSDEC TAGM 4046	172 J	194 J	248 J	224 J	223 J	252 J	108 J	148 J	62	
Thallium	MG/KG	M	NYSDEC TAGM 4046	0.7 U	0.48 R	0.43 R	0.43 R	0.51 R	0.47 R	0.78 J	0.62 J	0.5	
Vanadium	MG/KG	M	NYSDEC TAGM 4046	150	19.2	22.6	21.2	14.2	22.7	22.9	13.3	27.1	
Zinc	MG/KG	M	NYSDEC TAGM 4046	110	45.2	53.7 J	108	46.6	54.6 J	75.4	47.4	103	
Nitrate/Nitrite Nitrogen	MG/KG	WC			9.6	5.5	0.11	83.4	0.46				
Percent Solids	%	WC			96.5	96.8	91.5	87.8	94.5				

**TABLE C-1b**  
**SUBSURFACE SOIL ANALYSES RAW DATA-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	N	SEAD-13		SEAD-13		SEAD-13	
			SB13-8	SOIL	SB13-9	SOIL	SB13-9	SOIL
			SB13-8-3	SB13-9-4	SB13-9-6	SB13-8-3	SB13-9-4	SB13-9-6
			4	6	10			
			6	8	12			
			12/7/1993	12/16/1993	12/16/1993			
			SA	SA	SA			
			ESI	ESI	ESI			
			N	N	N			
1,1,1-Trichloroethane	UG/KG	VOA NYSDEC TAGM 4046	800 U	11 U	11 U	11 U	11 U	11 U
1,1,2,2-Tetrachloroethane	UG/KG	VOA NYSDEC TAGM 4046	600 U	11 U	11 U	11 U	11 U	11 U
1,1,2-Trichloroethane	UG/KG	VOA	U	11 U	11 U	11 U	11 U	11 U
1,1-Dichloroethane	UG/KG	VOA NYSDEC TAGM 4046	200 U	11 U	11 U	11 U	11 U	11 U
1,1-Dichloroethene	UG/KG	VOA NYSDEC TAGM 4046	400 U	11 U	11 U	11 U	11 U	11 U
1,2-Dichloroethane	UG/KG	VOA NYSDEC TAGM 4046	100 U	11 U	11 U	11 U	11 U	11 U
1,2-Dichloroethene (total)	UG/KG	VOA	U	11 U	11 U	11 U	11 U	11 U
1,2-Dichloropropane	UG/KG	VOA	U	11 U	11 U	11 U	11 U	11 U
Acetone	UG/KG	VOA NYSDEC TAGM 4046	200 U	11 U	11 U	11 U	11 U	11 U
Benzene	UG/KG	VOA NYSDEC TAGM 4046	60 U	11 U	11 U	11 U	11 U	11 U
Bromodichloromethane	UG/KG	VOA	U	11 U	11 U	11 U	11 U	11 U
Bromoform	UG/KG	VOA	U	11 U	11 U	11 U	11 U	11 U
Carbon disulfide	UG/KG	VOA NYSDEC TAGM 4046	2700 U	11 U	11 U	11 U	11 U	11 U
Carbon tetrachloride	UG/KG	VOA NYSDEC TAGM 4046	600 U	11 U	11 U	11 U	11 U	11 U
Chlorobenzene	UG/KG	VOA NYSDEC TAGM 4046	1700 U	11 U	11 U	11 U	11 U	11 U
Chlorodibromomethane	UG/KG	VOA	U	11 U	11 U	11 U	11 U	11 U
Chloroethane	UG/KG	VOA NYSDEC TAGM 4046	1900 U	11 U	11 U	11 U	11 U	11 U
Chloroform	UG/KG	VOA NYSDEC TAGM 4046	300 U	11 U	11 U	11 U	11 U	11 U
Cis-1,3-Dichloropropene	UG/KG	VOA	U	11 U	11 U	11 U	11 U	11 U
Ethyl benzene	UG/KG	VOA NYSDEC TAGM 4046	5500 U	11 U	11 U	11 U	11 U	11 U
Methyl bromide	UG/KG	VOA	U	11 U	11 U	11 U	11 U	11 U
Methyl butyl ketone	UG/KG	VOA	U	11 U	11 U	11 U	11 U	11 U
Methyl chloride	UG/KG	VOA	U	11 U	11 U	11 U	11 U	11 U
Methyl ethyl ketone	UG/KG	VOA NYSDEC TAGM 4046	300 U	11 U	11 U	11 U	11 U	11 U
Methyl isobutyl ketone	UG/KG	VOA NYSDEC TAGM 4046	1000 U	11 U	11 U	11 U	11 U	11 U
Methylene chloride	UG/KG	VOA NYSDEC TAGM 4046	100 U	11 U	11 U	11 U	11 U	11 U
Styrene	UG/KG	VOA	U	11 U	11 U	11 U	11 U	11 U
Tetrachloroethene	UG/KG	VOA NYSDEC TAGM 4046	1400 U	11 U	11 U	11 U	11 U	11 U
Toluene	UG/KG	VOA NYSDEC TAGM 4046	1500 U	11 U	11 U	11 U	11 U	11 U
Total Xylenes	UG/KG	VOA NYSDEC TAGM 4046	1200 U	11 U	11 U	11 U	11 U	11 U
Trans-1,3-Dichloropropene	UG/KG	VOA	U	11 U	11 U	11 U	11 U	11 U
Trichloroethene	UG/KG	VOA NYSDEC TAGM 4046	700 U	11 U	11 U	11 U	11 U	11 U
Vinyl chloride	UG/KG	VOA NYSDEC TAGM 4046	200 U	11 U	11 U	11 U	11 U	11 U
1,2,4-Trichlorobenzene	UG/KG	SV NYSDEC TAGM 4046	3400 U	360 U	360 U	350 U	350 U	350 U
1,2-Dichlorobenzene	UG/KG	SV NYSDEC TAGM 4046	7900 U	360 U	360 U	350 U	350 U	350 U
1,3-Dichlorobenzene	UG/KG	SV NYSDEC TAGM 4046	1600 U	360 U	360 U	350 U	350 U	350 U
1,4-Dichlorobenzene	UG/KG	SV NYSDEC TAGM 4046	8500 U	360 U	360 U	350 U	350 U	350 U
2,2'-oxybis(1-Chloropropane)	UG/KG	SV	U	360 U	360 U	350 U	350 U	350 U
2,4,5-Trichlorophenol	UG/KG	SV NYSDEC TAGM 4046	100 U	880 U	860 U	850 U	850 U	850 U
2,4,6-Trichlorophenol	UG/KG	SV	U	360 U	360 U	350 U	350 U	350 U
2,4-Dichlorophenol	UG/KG	SV NYSDEC TAGM 4046	400 U	360 U	360 U	350 U	350 U	350 U
2,4-Dimethylphenol	UG/KG	SV	U	360 U	360 U	350 U	350 U	350 U
2,4-Dinitrophenol	UG/KG	SV NYSDEC TAGM 4046	200 U	880 U	860 U	850 U	850 U	850 U
2,4-Dinitrotoluene	UG/KG	SV	U	360 U	360 U	350 U	350 U	350 U
2,6-Dinitrotoluene	UG/KG	SV NYSDEC TAGM 4046	1000 U	360 U	360 U	350 U	350 U	350 U
2-Chloronaphthalene	UG/KG	SV	U	360 U	360 U	350 U	350 U	350 U
2-Chlorophenol	UG/KG	SV NYSDEC TAGM 4046	800 U	360 U	360 U	350 U	350 U	350 U
2-Methylnaphthalene	UG/KG	SV NYSDEC TAGM 4046	36400 U	360 U	360 U	350 U	350 U	350 U
2-Methylphenol	UG/KG	SV NYSDEC TAGM 4046	100 U	360 U	360 U	350 U	350 U	350 U

**TABLE C-1b**  
**SUBSURFACE SOIL ANALYSES RAW DATA-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	N	SEAD-13 SB13-8 SOIL SB13-8-3	SEAD-13 SB13-9 SOIL SB13-9-4	SEAD-13 SB13-9 SOIL SB13-9-6
2-Nitroaniline	UG/KG SV	NYSDEC TAGM 4046	430 U	880 U	850 U
2-Nitrophenol	UG/KG SV	NYSDEC TAGM 4046	330 U	360 U	350 U
2,3'-Dichlorobenzidine	UG/KG SV		U	360 U	350 U
3-Nitroaniline	UG/KG SV	NYSDEC TAGM 4046	500 U	880 U	850 U
4,6-Dinitro-2-methylphenol	UG/KG SV		U	880 U	850 U
4-Bromophenyl phenyl ether	UG/KG SV		U	360 U	350 U
4-Chloro-3-methylphenol	UG/KG SV	NYSDEC TAGM 4046	240 U	360 U	350 U
4-Chloroaniline	UG/KG SV	NYSDEC TAGM 4046	220 U	360 U	350 U
4-Chlorophenyl phenyl ether	UG/KG SV		U	360 U	350 U
4-Methylphenol	UG/KG SV	NYSDEC TAGM 4046	900 U	360 U	350 U
4-Nitroaniline	UG/KG SV		U	880 U	850 U
4-Nitrophenol	UG/KG SV	NYSDEC TAGM 4046	100 U	880 U	850 U
Acenaphthene	UG/KG SV	NYSDEC TAGM 4046	50000 U	360 U	350 U
Acenaphthylene	UG/KG SV	NYSDEC TAGM 4046	41000 U	360 U	350 U
Anthracene	UG/KG SV	NYSDEC TAGM 4046	50000 U	360 U	350 U
Benzo(a)anthracene	UG/KG SV	NYSDEC TAGM 4046	224 U	360 U	350 U
Benzo(a)pyrene	UG/KG SV	NYSDEC TAGM 4046	61 U	360 U	350 U
Benzo(b)fluoranthene	UG/KG SV	NYSDEC TAGM 4046	1100 U	360 U	350 U
Benzo(ghi)perylene	UG/KG SV	NYSDEC TAGM 4046	50000 U	360 U	350 U
Benzo(k)fluoranthene	UG/KG SV	NYSDEC TAGM 4046	1100 U	360 U	350 U
Bis(2-Chloroethoxy)methane	UG/KG SV		U	360 U	350 U
Bis(2-Chloroethyl)ether	UG/KG SV		U	360 U	350 U
Bis(2-Chloroisopropyl)ether	UG/KG SV				
Bis(2-Ethylhexyl)phthalate	UG/KG SV	NYSDEC TAGM 4046	50000 U	360 U	350 U
Butylbenzylphthalate	UG/KG SV	NYSDEC TAGM 4046	50000 U	360 U	350 U
Carbazole	UG/KG SV		U	360 U	350 U
Chrysene	UG/KG SV	NYSDEC TAGM 4046	400 U	360 U	350 U
Di-n-butylphthalate	UG/KG SV	NYSDEC TAGM 4046	8100 U	360 U	350 U
Di-n-octylphthalate	UG/KG SV	NYSDEC TAGM 4046	50000 U	360 U	350 U
Dibenz(a,h)anthracene	UG/KG SV	NYSDEC TAGM 4046	14 U	360 U	350 U
Dibenzofuran	UG/KG SV	NYSDEC TAGM 4046	6200 U	360 U	350 U
Diethyl phthalate	UG/KG SV	NYSDEC TAGM 4046	7100 U	360 U	350 U
Dimethylphthalate	UG/KG SV	NYSDEC TAGM 4046	2000 U	360 U	350 U
Fluoranthene	UG/KG SV	NYSDEC TAGM 4046	50000 U	360 U	350 U
Fluorene	UG/KG SV	NYSDEC TAGM 4046	50000 U	360 U	350 U
Hexachlorobenzene	UG/KG SV	NYSDEC TAGM 4046	410 U	360 U	350 U
Hexachlorobutadiene	UG/KG SV		U	360 U	350 U
Hexachlorocyclopentadiene	UG/KG SV		U	360 U	350 U
Hexachloroethane	UG/KG SV		U	360 U	350 U
Indeno(1,2,3-cd)pyrene	UG/KG SV	NYSDEC TAGM 4046	3200 U	360 U	350 U
Isophorone	UG/KG SV	NYSDEC TAGM 4046	4400 U	360 U	350 U
N-Nitrosodiphenylamine	UG/KG SV		U	360 U	350 U
N-Nitrosodipropylamine	UG/KG SV		U	360 U	350 U
Naphthalene	UG/KG SV	NYSDEC TAGM 4046	13000 U	360 U	350 U
Nitrobenzene	UG/KG SV	NYSDEC TAGM 4046	200 U	360 U	350 U
Pentachlorophenol	UG/KG SV	NYSDEC TAGM 4046	1000 U	880 U	850 U
Phenanthrene	UG/KG SV	NYSDEC TAGM 4046	50000 U	360 U	350 U
Phenol	UG/KG SV	NYSDEC TAGM 4046	30 U	360 U	350 U
Pyrene	UG/KG SV	NYSDEC TAGM 4046	50000 U	360 U	350 U

**TABLE C-1b**  
**SUBSURFACE SOIL ANALYSES RAW DATA-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

		SEAD-13	SEAD-13	SEAD-13
		SB13-8	SB13-9	SB13-9
		SOIL	SOIL	SOIL
		SB13-8-3	SB13-9-4	SB13-9-6
		4	6	10
		6	8	12
		12/7/1993	12/16/1993	12/16/1993
		SA	SA	SA
		ESI	ESI	ESI
PARAMETER	UNIT	N	N	N
1,3,5-Trinitrobenzene	UG/KG EXP			
1,3-Dinitrobenzene	UG/KG EXP			
2,4,6-Trinitrotoluene	UG/KG EXP			
2,4-Dinitrotoluene	UG/KG EXP			
2,6-Dinitrotoluene	UG/KG EXP NYSDEC TAGM 4046	1000		
2-amino-4,6-Dinitrotoluene	UG/KG EXP			
4-amino-2,6-Dinitrotoluene	UG/KG EXP			
HMX	UG/KG EXP			
RDX	UG/KG EXP			
Tetryl	UG/KG EXP			
4,4'-DDD	UG/KG OCP NYSDEC TAGM 4046	2900 U	3.6 U	3.7 U
4,4'-DDE	UG/KG OCP NYSDEC TAGM 4046	2100 U	3.6 U	3.7 U
4,4'-DDT	UG/KG OCP NYSDEC TAGM 4046	2100 U	3.6 U	3.7 U
Aldrin	UG/KG OCP NYSDEC TAGM 4046	41 U	1.9 U	1.9 U
Alpha-BHC	UG/KG OCP NYSDEC TAGM 4046	110 U	1.9 U	1.9 U
Alpha-Chlordane	UG/KG OCP	U	1.9 U	1.9 U
Aroclor-1016	UG/KG OCP	U	36 U	37 U
Aroclor-1221	UG/KG OCP	U	74 U	75 U
Aroclor-1232	UG/KG OCP	U	36 U	37 U
Aroclor-1242	UG/KG OCP	U	36 U	37 U
Aroclor-1248	UG/KG OCP	U	36 U	37 U
Aroclor-1254	UG/KG OCP NYSDEC TAGM 4046	10000 U	36 U	37 U
Aroclor-1260	UG/KG OCP NYSDEC TAGM 4046	10000 U	36 U	37 U
Beta-BHC	UG/KG OCP NYSDEC TAGM 4046	200 U	1.9 U	1.9 U
Delta-BHC	UG/KG OCP NYSDEC TAGM 4046	300 U	1.9 U	1.9 U
Dieldrin	UG/KG OCP NYSDEC TAGM 4046	44 U	3.6 U	3.7 U
Endosulfan I	UG/KG OCP NYSDEC TAGM 4046	900 U	1.9 U	1.9 U
Endosulfan II	UG/KG OCP NYSDEC TAGM 4046	900 U	3.6 U	3.7 U
Endosulfan sulfate	UG/KG OCP NYSDEC TAGM 4046	1000 U	3.6 U	3.7 U
Endrin	UG/KG OCP NYSDEC TAGM 4046	100 U	3.6 U	3.7 U
Endrin aldehyde	UG/KG OCP	U	3.6 U	3.7 U
Endrin ketone	UG/KG OCP	U	3.6 U	3.7 U
Gamma-BHC/Lindane	UG/KG OCP NYSDEC TAGM 4046	60 U	1.9 U	1.9 U
Gamma-Chlordane	UG/KG OCP NYSDEC TAGM 4046	540 U	1.9 U	1.9 U
Heptachlor	UG/KG OCP NYSDEC TAGM 4046	100 U	1.9 U	1.9 U
Heptachlor epoxide	UG/KG OCP NYSDEC TAGM 4046	20 U	1.9 U	1.9 U
Methoxychlor	UG/KG OCP	U	19 U	19 U
Toxaphene	UG/KG OCP	U	190 U	190 U
2,4,5-T	UG/KG H NYSDEC TAGM 4046	1900 U	5.5 U	5.6 U
2,4,5-TP/Silvex	UG/KG H NYSDEC TAGM 4046	700 U	5.5 U	5.6 U
2,4-D	UG/KG H NYSDEC TAGM 4046	500 U	5.5 U	5.6 U
2,4-DB	UG/KG H	U	5.5 U	5.6 U
Dalapon	UG/KG H	U	140 U	140 U
Dicamba	UG/KG H	U	5.5 U	5.6 U
Dichloroprop	UG/KG H	U	5.5 U	5.6 U
Dinoseb	UG/KG H	U	28 U	28 U
MCPA	UG/KG H	U	5500 U	5600 U
MCPP	UG/KG H	U	5500 U	5600 U
Aluminum	MG/KG M NYSDEC TAGM 4046	19300	9710	12000
				13800

**TABLE C-1b**  
**SUBSURFACE SOIL ANALYSES RAW DATA-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

				SEAD-13	SEAD-13	SEAD-13
				SB13-8	SB13-9	SB13-9
				SOIL	SOIL	SOIL
				SB13-8-3	SB13-9-4	SB13-9-6
				4	6	10
				6	8	12
				12/7/1993	12/16/1993	12/16/1993
				SA	SA	SA
				ESI	ESI	ESI
PARAMETER	UNIT			N	N	N
Antimony	MG/KG M	NYSDEC TAGM 4046	5.9 UJ	5.7 J	5.8 J	4.6 J
Arsenic	MG/KG M	NYSDEC TAGM 4046	8.2	6	8	5.5
Barium	MG/KG M	NYSDEC TAGM 4046	300	119	191	173
Beryllium	MG/KG M	NYSDEC TAGM 4046	1.1	0.48 J	0.69 J	0.73 J
Cadmium	MG/KG M	NYSDEC TAGM 4046	2.3 U	0.42 U	0.47 U	0.42 U
Calcium	MG/KG M	NYSDEC TAGM 4046	121000	76600	98100	78900
Chromium	MG/KG M	NYSDEC TAGM 4046	29.6	15.3	21.2	24.6
Cobalt	MG/KG M	NYSDEC TAGM 4046	30	10.6	13.8	10.4
Copper	MG/KG M	NYSDEC TAGM 4046	33	22.2	44	32.7
Cyanide	MG/KG M	NYSDEC TAGM 4046	0.35 U	0.54 U	0.54 U	0.51 U
Iron	MG/KG M	NYSDEC TAGM 4046	36500	19600	25200	26800
Lead	MG/KG M	NYSDEC TAGM 4046	24.8 UR	11.2 UR	14.4	10.4
Magnesium	MG/KG M	NYSDEC TAGM 4046	21500	19500	17700	19800
Manganese	MG/KG M	NYSDEC TAGM 4046	1060	380	532	396
Mercury	MG/KG M	NYSDEC TAGM 4046	0.1 J	0.02 U	0.02 J	0.02 J
Nickel	MG/KG M	NYSDEC TAGM 4046	49	31.4	45.9	40.9
Potassium	MG/KG M	NYSDEC TAGM 4046	2380	1590	2150	2590
Selenium	MG/KG M	NYSDEC TAGM 4046	2 J	0.14 U	0.52 J	0.47 J
Silver	MG/KG M	NYSDEC TAGM 4046	0.75 U	0.84 U	0.93 U	0.84 U
Sodium	MG/KG M	NYSDEC TAGM 4046	172 J	144 J	196 J	175 J
Thallium	MG/KG M	NYSDEC TAGM 4046	0.7 J	0.75 J	0.24 U	0.24 U
Vanadium	MG/KG M	NYSDEC TAGM 4046	150	15.8	25.8	24.5
Zinc	MG/KG M	NYSDEC TAGM 4046	110	68.5	73.5	98
Nitrate/Nitrite Nitrogen	MG/KG WC					
Percent Solids	% WC					

**TABLE C-2  
GROUNDWATER ANALYSES RAW DATA SEAD-13  
Decision Document-Mini Risk Assessment  
Seneca Army Depot Activity**

PARAMETER	UNIT	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13
		MW13-1 GROUNDWATER MW13-1	MW13-1 GROUNDWATER 132001	MW13-1 GROUNDWATER 132014	MW13-11 GROUNDWATER 132023	MW13-12 GROUNDWATER 132024	MW13-13 GROUNDWATER 132008	MW13-13 GROUNDWATER 132012	MW13-13 GROUNDWATER 132025
		4.3 11.1 2/3/1994	13.92 13.92 9/6/2001	14 14 4/4/2002	15 15 4/4/2002	9 9 4/5/2002	15 15 9/5/2001	15 15 9/5/2001	14 14 4/4/2002
		SA ESI	SA SEAD-13	SA SEAD-13	SA SEAD-13	SA SEAD-13	SA SEAD-13	SA SEAD-13	DU SEAD-13
		N	1	2	2	2	1	1	2
1,1,1-Trichloroethane	UG/L VOA GA	5							
1,1,2,2-Tetrachloroethane	UG/L VOA								
1,1,2-Trichloroethane	UG/L VOA GA	1							
1,1-Dichloroethane	UG/L VOA GA	5							
1,1-Dichloroethene	UG/L VOA GA	5							
1,2-Dichloroethane	UG/L VOA GA	0.6							
1,2-Dichloroethene (total)	UG/L VOA MCL	70							
1,2-Dichloropropane	UG/L VOA GA	1							
Acetone	UG/L VOA								
Benzene	UG/L VOA GA	1							
Bromodichloromethane	UG/L VOA MCL	80							
Bromoform	UG/L VOA MCL	80							
Carbon disulfide	UG/L VOA								
Carbon tetrachloride	UG/L VOA GA	5							
Chlorobenzene	UG/L VOA GA	5							
Chlorodibromomethane	UG/L VOA MCL	80							
Chloroethane	UG/L VOA GA	5							
Chloroform	UG/L VOA GA	7							
Cis-1,3-Dichloropropene	UG/L VOA GA	0.4							
Ethyl benzene	UG/L VOA GA	5							
Methyl bromide	UG/L VOA GA	5							
Methyl butyl ketone	UG/L VOA								
Methyl chloride	UG/L VOA GA	5							
Methyl ethyl ketone	UG/L VOA								
Methyl isobutyl ketone	UG/L VOA								
Methylene chloride	UG/L VOA GA	5							
Styrene	UG/L VOA GA	5							
Tetrachloroethene	UG/L VOA GA	5							
Toluene	UG/L VOA GA	5							
Total Xylenes	UG/L VOA GA	5							
Trans-1,3-Dichloropropene	UG/L VOA GA	0.4							
Trichloroethene	UG/L VOA GA	5							
Vinyl chloride	UG/L VOA GA	2							
1,2,4-Trichlorobenzene	UG/L SV GA	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,2-Dichlorobenzene	UG/L SV GA	3	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,3-Dichlorobenzene	UG/L SV GA	3	1 U	1 U	1 U	1 U	1 U	1 U	1 U
1,4-Dichlorobenzene	UG/L SV GA	3	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2,2'-oxybis(1-Chloropropane)	UG/L SV								
2,4,5-Trichlorophenol	UG/L SV	27 U	2.6 U	2.6 U	2.5 U	2.6 U	2.6 U	2.5 U	2.5 U
2,4,6-Trichlorophenol	UG/L SV		1 U	1 U	1 U	1 U	1 U	1 U	1 U
2,4-Dichlorophenol	UG/L SV GA	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2,4-Dimethylphenol	UG/L SV		1 UJ	1 U	1 U	1 U	1 UJ	1 UJ	1 U
2,4-Dinitrophenol	UG/L SV	27 U	2.6 UJ	2.6 R	2.5 R	2.6 UJ	2.6 UJ	2.5 UJ	2.5 R
2,4-Dinitrotoluene	UG/L SV GA	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2,6-Dinitrotoluene	UG/L SV GA	5	1 U	1 U	1 U	1 U	1 U	1 U	1 U
2-Chloronaphthalene	UG/L SV		1 U	1 U	1 U	1 U	1 U	1 U	1 U
2-Chlorophenol	UG/L SV		1 U	1 U	1 U	1 U	1 U	1 U	1 U
2-Methylnaphthalene	UG/L SV		1 U	1 U	1 U	1 U	1 U	1 U	1 U
2-Methylphenol	UG/L SV		1 U	1 U	1 U	1 U	1 U	1 U	1 U

**TABLE C-2  
GROUNDWATER ANALYSES RAW DATA SEAD-13  
Decision Document-Mini Risk Assessment  
Seneca Army Depot Activity**

PARAMETER	UNIT	SEAD-13 MW13-1 GROUNDWATER MW13-1		SEAD-13 MW13-1 GROUNDWATER 132001		SEAD-13 MW13-1 GROUNDWATER 132014		SEAD-13 MW13-11 GROUNDWATER 132023		SEAD-13 MW13-12 GROUNDWATER 132024		SEAD-13 MW13-13 GROUNDWATER 132008		SEAD-13 MW13-13 GROUNDWATER 132012		SEAD-13 MW13-13 GROUNDWATER 132025	
		N		N	1	N	2	N	2	N	2	N	1	N	1	N	2
2-Nitroaniline	UG/L SV GA	5	27 U		2.6 U		2.6 U		2.5 U		2.6 U		2.6 U		2.5 U		2.5 U
2-Nitrophenol	UG/L SV		11 U		1 U		1 U		1 U		1 U		1 U		1 U		1 U
3,3'-Dichlorobenzidine	UG/L SV GA	5	11 U		1 U		1 U		1 U		1 U		1 U		1 U		1 U
3-Nitroaniline	UG/L SV GA	5	27 U		2.6 U		2.6 U		2.5 U		2.6 U		2.6 U		2.5 U		2.5 U
4,6-Dinitro-2-methylphenol	UG/L SV		27 U		2.6 UJ		2.6 UJ		2.5 UJ		2.6 UJ		2.6 UJ		2.5 UJ		2.5 UJ
4-Bromophenyl phenyl ether	UG/L SV		11 U		1 U		1 U		1 U		1 U		1 U		1 U		1 U
4-Chloro-3-methylphenol	UG/L SV		11 U		1 U		1 U		1 U		1 U		1 U		1 U		1 U
4-Chloroaniline	UG/L SV GA	5	11 U		1 UJ		1 U		1 U		1 U		1 UJ		1 UJ		1 U
4-Chlorophenyl phenyl ether	UG/L SV		11 U		1 U		1 U		1 U		1 U		1 U		1 U		1 U
4-Methylphenol	UG/L SV		11 U		1 U		1 U		1 U		1 U		1 U		1 U		1 U
4-Nitroaniline	UG/L SV GA	5	27 U		2.6 UJ		2.6 U		2.5 U		2.6 U		2.6 UJ		2.5 UJ		2.5 U
4-Nitrophenol	UG/L SV		27 U		2.6 U		2.6 U		2.5 U		2.6 U		2.6 U		2.5 U		2.5 U
Acenaphthene	UG/L SV		11 U		1 U		1 U		1 U		1 U		1 U		1 U		1 U
Acenaphthylene	UG/L SV		11 U		1 U		1 U		1 U		1 U		1 U		1 U		1 U
Anthracene	UG/L SV		11 U		1 U		1 U		1 U		1 U		1 U		1 U		1 U
Benzo(a)anthracene	UG/L SV		11 U		1 U		1 U		1 U		1 U		1 U		1 U		1 U
Benzo(a)pyrene	UG/L SV GA	0	11 U		1 U		1 U		1 U		1 U		1 U		1 U		1 U
Benzo(b)fluoranthene	UG/L SV		11 U		1 U		1 U		1 U		1 U		1 U		1 U		1 U
Benzo(ghi)perylene	UG/L SV		11 U		1 U		1 U		1 U		1 U		1 U		1 U		1 U
Benzo(k)fluoranthene	UG/L SV		11 U		1 U		1 U		1 U		1 U		1 U		1 U		1 U
Bis(2-Chloroethoxy)methane	UG/L SV GA	5	11 U		1 U		1 U		1 U		1 U		1 U		1 U		1 U
Bis(2-Chloroethyl)ether	UG/L SV GA	1	11 U		1 U		1 U		1 U		1 U		1 U		1 U		1 U
Bis(2-Chloroisopropyl)ether	UG/L SV GA	5			1 U		1 U		1 U		1 U		1 U		1 U		1 U
Bis(2-Ethylhexyl)phthalate	UG/L SV GA	5	11 U		1 U		1 U		1 U		2.6		1 U		1 U		1 U
Butylbenzylphthalate	UG/L SV		11 U		1 U		1 U		0.069 J		1 U		1 U		1 U		0.059 J
Carbazole	UG/L SV		11 U		1 U		1 U		1 U		1 U		1 U		1 U		1 U
Chrysene	UG/L SV		11 U		1 U		1 U		1 U		1 U		1 U		1 U		1 U
Di-n-butylphthalate	UG/L SV GA	50	11 U		1 U		1 U		1 U		1 U		1 U		1 U		1 U
Di-n-octylphthalate	UG/L SV		11 U		1 U		1 U		1 U		1 UJ		1 U		1 U		1 U
Dibenz(a,h)anthracene	UG/L SV		11 U		1 U		1 U		1 U		1 U		1 U		1 U		1 U
Dibenzofuran	UG/L SV		11 U		1 U		1 U		1 U		1 U		1 U		1 U		1 U
Diethyl phthalate	UG/L SV		11 U		1 U		0.084 J		0.16 J		0.057 J		1 U		1 U		0.054 J
Dimethylphthalate	UG/L SV		11 U		1 U		1 U		1 U		1 U		1 U		1 U		1 U
Fluoranthene	UG/L SV		11 U		1 U		1 U		1 U		1 U		1 U		1 U		1 U
Fluorene	UG/L SV		11 U		1 U		1 U		1 U		1 U		1 U		1 U		1 U
Hexachlorobenzene	UG/L SV GA	0.04	11 U		1 U		1 U		1 U		1 U		1 U		1 U		1 U
Hexachlorobutadiene	UG/L SV GA	0.5	11 U		1 U		1 U		1 U		1 U		1 U		1 U		1 U
Hexachlorocyclopentadiene	UG/L SV GA	5	11 U		1 U		1 U		1 U		1 U		1 U		1 U		1 U
Hexachloroethane	UG/L SV GA	5	11 U		1 U		1 U		1 U		1 U		1 U		1 U		1 U
Indeno(1,2,3-cd)pyrene	UG/L SV		11 U		1 U		1 U		1 U		1 U		1 U		1 U		1 U
Isophorone	UG/L SV		11 U		1 U		1 U		1 U		1 U		1 U		1 U		1 U
N-Nitrosodiphenylamine	UG/L SV		11 U		1 U		1 U		1 U		1 U		1 U		1 U		1 U
N-Nitrosodipropylamine	UG/L SV		11 U		1 U		1 U		1 U		1 U		1 U		1 U		1 U
Naphthalene	UG/L SV		11 U		1 U		1 U		1 U		1 U		1 U		1 U		1 U
Nitrobenzene	UG/L SV GA	0.4	11 U		1 U		1 U		1 U		1 U		1 U		1 U		1 U
Pentachlorophenol	UG/L SV GA	1	27 U		2.6 U		2.6 UJ		2.5 UJ		2.6 U		2.6 U		2.5 U		2.5 UJ
Phenanthrene	UG/L SV		11 U		1 U		1 U		1 U		1 U		1 U		1 U		1 U
Phenol	UG/L SV GA	1	11 U		1 U		1 U		1 U		1 U		1 U		1 U		1 U
Pyrene	UG/L SV		11 U		1 U		1 U		1 U		1 U		1 U		0.06 J		1 U

**TABLE C-2**  
**GROUNDWATER ANALYSES RAW DATA SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	
		MW13-1 GROUNDWATER MW13-1	MW13-1 GROUNDWATER 132001	MW13-1 GROUNDWATER 132014	MW13-11 GROUNDWATER 132023	MW13-12 GROUNDWATER 132024	MW13-13 GROUNDWATER 132008	MW13-13 GROUNDWATER 132012	MW13-13 GROUNDWATER 132025	
		4.3	13.92	14	15	9	15	14		
		11.1	13.92	14	15	9	15	14		
		2/3/1994	9/6/2001	4/4/2002	4/4/2002	4/5/2002	9/5/2001	4/4/2002		
		SA	SA	SA	SA	SA	SA	DU		
		ESI	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13		
		N	1	2	2	2	1	2		
4,4'-DDD	UG/L OCP GA	0.3	0.11 UJ							
4,4'-DDE	UG/L OCP GA	0.2	0.11 UJ							
4,4'-DDT	UG/L OCP GA	0.2	0.11 UJ							
Aldrin	UG/L OCP GA	0	0.054 UJ							
Alpha-BHC	UG/L OCP GA	0.01	0.054 UJ							
Alpha-Chlordane	UG/L OCP		0.054 UJ							
Aroclor-1016	UG/L OCP GA	0.09	1.1 UJ							
Aroclor-1221	UG/L OCP GA	0.09	2.2 UJ							
Aroclor-1232	UG/L OCP GA	0.09	1.1 UJ							
Aroclor-1242	UG/L OCP GA	0.09	1.1 UJ							
Aroclor-1248	UG/L OCP GA	0.09	1.1 UJ							
Aroclor-1254	UG/L OCP GA	0.09	1.1 UJ							
Aroclor-1260	UG/L OCP GA	0.09	1.1 UJ							
Beta-BHC	UG/L OCP GA	0.04	0.054 UJ							
Delta-BHC	UG/L OCP GA	0.04	0.054 UJ							
Dieldrin	UG/L OCP GA	0.004	0.11 UJ							
Endosulfan I	UG/L OCP		0.054 UJ							
Endosulfan II	UG/L OCP		0.11 UJ							
Endosulfan sulfate	UG/L OCP		0.11 UJ							
Endrin	UG/L OCP GA	0	0.11 UJ							
Endrin aldehyde	UG/L OCP GA	5	0.11 UJ							
Endrin ketone	UG/L OCP GA	5	0.11 UJ							
Gamma-BHC/Lindane	UG/L OCP GA	0.05	0.054 UJ							
Gamma-Chlordane	UG/L OCP		0.054 UJ							
Heptachlor	UG/L OCP GA	0.04	0.054 UJ							
Heptachlor epoxide	UG/L OCP GA	0.03	0.054 UJ							
Methoxychlor	UG/L OCP GA	35	0.54 UJ							
Toxaphene	UG/L OCP GA	0.06	5.4 UJ							
2,4,5-T	UG/L H GA	35	0.11 U							
2,4,5-TP/Silvex	UG/L H GA	0.26	0.11 U							
2,4-D	UG/L H GA	50	1.1 U							
2,4-DB	UG/L H		1.1 U							
Dalapon	UG/L H GA	50	2.5 U							
Dicamba	UG/L H GA	0.44	0.11 U							
Dichloroprop	UG/L H		1.1 U							
Dinoseb	UG/L H GA	1	0.54 U							
MCPA	UG/L H GA	0.44	110 U							
MCPP	UG/L H		110 U							
Aluminum	UG/L M SEC	50	42400	170 J	18.9 J	50.4 J	138 J	39700 J	70900 J	27.2 J
Antimony	UG/L M GA	3	33.9 J	4.7 U	3.1 J	1.8 U	1.8 U	4.7 U	4.7 U	2.1 J
Arsenic	UG/L M MCL	10	9.3 J	2.8 U	2.2 U	2.2 U	2.2 U	8.7 J	15.1	2.2 U
Barium	UG/L M GA	1000	337	60.9 J	59.8 J	18.5 J	25.7 J	268	459	30.8 J
Beryllium	UG/L M MCL	4	2.2 J	0.2 U	0.1 U	0.1 U	0.1 U	2.1 J	3.6 J	0.1 U
Cadmium	UG/L M GA	5	2.1 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U	0.5 U
Calcium	UG/L M		181000	91600	93900	614000	182000	957000	1140000	900000
Chromium	UG/L M GA	50	69.4	1.2 U	1.4 U	1.4 U	1.4 U	62.5	109	1.4 U
Cobalt	UG/L M		34.6 J	2.5 U	2.9 U	14.1 J	2.9 U	29.2 J	47.7 J	4.1 J
Copper	UG/L M GA	200	23.3 J	2.5 J	1.4 U	1.4 U	1.4 U	25.9	35	1.4 U
Cyanide	UG/L M		5 U	10 U	10 UJ	20.2 J	10 UJ	72.8	124	74 J



**TABLE C-2**  
**GROUNDWATER ANALYSES RAW DATA SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	SEAD-13		SEAD-13		SEAD-13		SEAD-13		SEAD-13		SEAD-13		SEAD-13		
		MW13-1	GROUNDWATER	MW13-1	GROUNDWATER	MW13-1	GROUNDWATER	MW13-11	GROUNDWATER	MW13-12	GROUNDWATER	MW13-13	GROUNDWATER	MW13-13	GROUNDWATER	MW13-13
		MW13-1		132001		132014		132023		132024		132008		132012		132025
		4.3		13.92		14		15		9		15		15		14
		11.1		13.92		14		15		9		15		15		14
		2/3/1994		9/6/2001		4/4/2002		4/4/2002		4/5/2002		9/5/2001		9/5/2001		4/4/2002
		SA		SA		SA		SA		SA		SA		SA		DU
		ESI		SEAD-13		SEAD-13		SEAD-13		SEAD-13		SEAD-13		SEAD-13		SEAD-13
		N		1		2		2		2		1		1		2
Iron	UG/L M GA	300	69400	460 J		17 U		441		891		57300 J		97900 J		59.2 J
Lead	UG/L M MCL	15	34.8	2.1 J		0.8 R		0.8 R		0.8 R		27.1		32.5		0.8 R
Magnesium	UG/L M	3500	50300	21700		22600		301000		72000		295000		304000		314000
Manganese	UG/L M SEC	300	1120	258		130		2810		618		1740		3210		397
Mercury	UG/L M GA	0.7	0.05 J	0.1 U		0.1 U		0.1 U		0.1 U		0.1 U		0.1 U		0.1 U
Nickel	UG/L M GA	100	99.8	2 U		2.4 U		34.3 J		2.4 U		80.2		134		9.5 J
Potassium	UG/L M		10100	1680 J		1200 J		42000 J		14800 J		21600		28800		6380
Selenium	UG/L M GA	10	3.6 J	1.2 UJ		2 U		17.8 J		2 U		1.2 UJ		1.2 UJ		2 U
Silver	UG/L M GA	50	4.2 U	1.6 J		1.2 U		1.2 U		1.2 U		1.5 U		1.5 U		1.2 U
Sodium	UG/L M GA	20000	9350	8620		7930		52700		17200		23600		24800		18100
Thallium	UG/L M MCL	2	1.2 U	4.8 U		5.8 U		5.8 U		5.8 U		4.8 U		4.8 U		5.8 U
Vanadium	UG/L M		70.8	2.1 U		2 U		2 U		2 U		64.7		115		2 U
Zinc	UG/L M SEC	5000	143	2.7 J		1.4 J		0.9 U		0.9 U		146		223		1.9 J
NITRATE	MG/L WC		10			0.045		119		0.014						664
NITRITE	MG/L WC		1			0.005 U		2.1		0.005 U						0.03
Nitrate/Nitrite	MG/L WC					0.045		121		0.014						664
Nitrate/Nitrite Nitrogen	MG/L WC GA	10000		0.56								604		582		

**TABLE C-2**  
**GROUNDWATER ANALYSES RAW DATA SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13
		MW13-13 GROUNDWATER 132021 15 15 4/4/2002 SA SEAD-13	MW13-14 GROUNDWATER 132022 15 15 4/4/2002 SA SEAD-13	MW13-2 GROUNDWATER MW13-2 6.3 15.3 11/18/1993 SA ESI	MW13-2 GROUNDWATER 132002 17.5 17.5 9/6/2001 SA SEAD-13	MW13-2 GROUNDWATER 132015 17 17 4/4/2002 SA SEAD-13	MW13-4 <sup>(1)</sup> GROUNDWATER MW13-4 3.5 7.5 2/4/1994 SA ESI	MW13-4 GROUNDWATER 132004 11.6 11.6 9/6/2001 SA SEAD-13	MW13-4 GROUNDWATER 132017 11 11 4/5/2002 SA SEAD-13	MW13-5 GROUNDWATER MW13-5 6.3 15.3 2/5/1994 SA ESI
		N	N	N	N	N	N	N	N	N
1,1,1-Trichloroethane	UG/L VOA GA	5		10 U		10 U		10 U		10 U
1,1,2,2-Tetrachloroethane	UG/L VOA			10 U		10 U		10 U		10 U
1,1,2-Trichloroethane	UG/L VOA GA	1		10 U		10 U		10 U		10 U
1,1-Dichloroethane	UG/L VOA GA	5		10 U		10 U		10 U		10 U
1,1-Dichloroethene	UG/L VOA GA	5		10 U		10 U		10 U		10 U
1,2-Dichloroethane	UG/L VOA GA	0.6		10 U		10 U		10 U		10 U
1,2-Dichloroethene (total)	UG/L VOA MCL	70		10 U		10 U		10 U		10 U
1,2-Dichloropropane	UG/L VOA GA	1		10 U		10 U		10 U		10 U
Acetone	UG/L VOA			10 U		10 U		10 U		10 U
Benzene	UG/L VOA GA	1		10 U		10 U		10 U		10 U
Bromodichloromethane	UG/L VOA MCL	80		10 U		10 U		10 U		10 U
Bromoform	UG/L VOA MCL	80		10 U		10 U		10 U		10 U
Carbon disulfide	UG/L VOA			10 U		10 U		10 U		10 U
Carbon tetrachloride	UG/L VOA GA	5		10 U		10 U		10 U		10 U
Chlorobenzene	UG/L VOA GA	5		10 U		10 U		10 U		10 U
Chlorodibromomethane	UG/L VOA MCL	80		10 U		10 U		10 U		10 U
Chloroethane	UG/L VOA GA	5		10 U		10 U		10 U		10 U
Chloroform	UG/L VOA GA	7		10 U		10 U		10 U		10 U
Cis-1,3-Dichloropropene	UG/L VOA GA	0.4		10 U		10 U		10 U		10 U
Ethyl benzene	UG/L VOA GA	5		10 U		10 U		10 U		10 U
Methyl bromide	UG/L VOA GA	5		10 U		10 U		10 U		10 U
Methyl butyl ketone	UG/L VOA			10 U		10 U		10 U		10 U
Methyl chloride	UG/L VOA GA	5		10 U		10 U		10 U		10 U
Methyl ethyl ketone	UG/L VOA			10 U		10 U		10 U		10 U
Methyl isobutyl ketone	UG/L VOA			10 U		10 U		10 U		10 U
Methylene chloride	UG/L VOA GA	5		10 U		10 U		10 U		10 U
Styrene	UG/L VOA GA	5		10 U		10 U		10 U		10 U
Tetrachloroethene	UG/L VOA GA	5		10 U		10 U		10 U		10 U
Toluene	UG/L VOA GA	5		10 U		10 U		10 U		10 U
Total Xylenes	UG/L VOA GA	5		10 U		10 U		10 U		10 U
Trans-1,3-Dichloropropene	UG/L VOA GA	0.4		10 U		10 U		10 U		10 U
Trichloroethene	UG/L VOA GA	5		10 U		10 U		10 U		10 U
Vinyl chloride	UG/L VOA GA	2		10 U		10 U		10 U		10 U
1,2,4-Trichlorobenzene	UG/L SV GA	5	1 U	11 U	1.1 U	11 U	1 U	10 U	1 U	10 U
1,2-Dichlorobenzene	UG/L SV GA	3	1 U	11 U	1.1 U	11 U	1 U	10 U	1 U	10 U
1,3-Dichlorobenzene	UG/L SV GA	3	1 U	11 U	1.1 U	11 U	1 U	10 U	1 U	10 U
1,4-Dichlorobenzene	UG/L SV GA	3	1 U	11 U	1.1 U	11 U	1 U	10 U	1 U	10 U
2,2'-oxybis(1-Chloropropane)	UG/L SV			11 U		10 U		10 U		10 U
2,4,5-Trichlorophenol	UG/L SV	2.5 U	2.5 U	26 U	2.6 U	25 U	2.5 U	26 U	2.6 U	25 U
2,4,6-Trichlorophenol	UG/L SV	1 U	1 U	11 U	1.1 U	11 U	1 U	10 U	1 U	10 U
2,4-Dichlorophenol	UG/L SV GA	5	1 U	11 U	1.1 U	11 U	1 U	10 U	1 U	10 U
2,4-Dimethylphenol	UG/L SV	1 U	1 U	11 U	1.1 UJ	11 U	1 U	10 U	1 UJ	10 U
2,4-Dinitrophenol	UG/L SV	2.5 R	2.5 R	26 U	2.6 UJ	25 U	2.5 R	26 U	2.6 UJ	25 U
2,4-Dinitrotoluene	UG/L SV GA	5	1 U	11 U	1.1 U	11 U	1 U	10 U	1 U	10 U
2,6-Dinitrotoluene	UG/L SV GA	5	1 U	11 U	1.1 U	11 U	1 U	10 U	1 U	10 U
2-Chloronaphthalene	UG/L SV	1 U	1 U	11 U	1.1 U	11 U	1 U	10 U	1 U	10 U
2-Chlorophenol	UG/L SV	1 U	1 U	11 U	1.1 U	11 U	1 U	10 U	1 U	10 U
2-Methylnaphthalene	UG/L SV	1 U	1 U	11 U	1.1 U	11 U	1 U	10 U	1 U	10 U
2-Methylphenol	UG/L SV	1 U	1 U	11 U	1.1 U	11 U	1 U	10 U	1 U	10 U

**TABLE C-2**  
**GROUNDWATER ANALYSES RAW DATA SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	SEAD-13 MW13-13 GROUNDWATER 132021		SEAD-13 MW13-14 GROUNDWATER 132022		SEAD-13 MW13-2 GROUNDWATER MW13-2		SEAD-13 MW13-2 GROUNDWATER 132002		SEAD-13 MW13-2 GROUNDWATER 132015		SEAD-13 MW13-4 <sup>(1)</sup> GROUNDWATER MW13-4		SEAD-13 MW13-4 GROUNDWATER 132004		SEAD-13 MW13-4 GROUNDWATER 132017		SEAD-13 MW13-5 GROUNDWATER MW13-5	
		N	2	N	2	N	1	N	2	N	1	N	2	N	2	N	2		
2-Nitroaniline	UG/L SV GA	5	2.5 U		2.5 U		26 U		2.6 U		2.5 U		25 U		2.6 U		2.6 U		25 U
2-Nitrophenol	UG/L SV		1 U		1 U		11 U		1.1 U		1 U		10 U		1 U		1 U		10 U
3,3'-Dichlorobenzidine	UG/L SV GA	5	1 U		1 U		11 U		1.1 U		1 U		10 U		1 U		1 U		10 U
3-Nitroaniline	UG/L SV GA	5	2.5 U		2.5 U		26 U		2.6 U		2.5 U		25 U		2.6 U		2.6 U		25 U
4,6-Dinitro-2-methylphenol	UG/L SV		2.5 UJ		2.5 UJ		26 U		2.6 UJ		2.5 UJ		25 U		2.6 UJ		2.6 UJ		25 U
4-Bromophenyl phenyl ether	UG/L SV		1 U		1 U		11 U		1.1 U		1 U		10 U		1 U		1 U		10 U
4-Chloro-3-methylphenol	UG/L SV		1 U		1 U		11 U		1.1 U		1 U		10 U		1 U		1 U		10 U
4-Chloroaniline	UG/L SV GA	5	1 U		1 U		11 U		1.1 UJ		1 U		10 U		1 UJ		1 U		10 U
4-Chlorophenyl phenyl ether	UG/L SV		1 U		1 U		11 U		1.1 U		1 U		10 U		1 U		1 U		10 U
4-Methylphenol	UG/L SV		1 U		1 U		11 U		1.1 U		1 U		10 U		1 U		1 U		10 U
4-Nitroaniline	UG/L SV GA	5	2.5 U		2.5 U		26 U		2.6 UJ		2.5 U		25 U		2.6 UJ		2.6 U		25 U
4-Nitrophenol	UG/L SV		2.5 U		2.5 U		26 U		2.6 U		2.5 U		25 U		2.6 U		2.6 U		25 U
Acenaphthene	UG/L SV		1 U		1 U		11 U		1.1 U		1 U		10 U		1 U		1 U		10 U
Acenaphthylene	UG/L SV		1 U		1 U		11 U		1.1 U		1 U		10 U		1 U		1 U		10 U
Anthracene	UG/L SV		1 U		1 U		11 U		1.1 U		1 U		10 U		1 U		1 U		10 U
Benzo(a)anthracene	UG/L SV		1 U		1 U		11 U		1.1 U		1 U		10 U		1 U		1 U		10 U
Benzo(a)pyrene	UG/L SV GA	0	1 U		1 U		11 U		1.1 U		1 U		10 U		1 U		1 U		10 U
Benzo(b)fluoranthene	UG/L SV		1 U		1 U		11 U		1.1 U		1 U		10 U		1 U		1 U		10 U
Benzo(ghi)perylene	UG/L SV		1 U		1 U		11 U		1.1 U		1 U		10 U		1 U		1 U		10 U
Benzo(k)fluoranthene	UG/L SV		1 U		1 U		11 U		1.1 U		1 U		10 U		1 U		1 U		10 U
Bis(2-Chloroethoxy)methane	UG/L SV GA	5	1 U		1 U		11 U		1.1 U		1 U		10 U		1 U		1 U		10 U
Bis(2-Chloroethyl)ether	UG/L SV GA	1	1 U		1 U		11 U		1.1 U		1 U		10 U		1 U		1 U		10 U
Bis(2-Chloroisopropyl)ether	UG/L SV GA	5	1 U		1 U		11 U		1.1 U		1 U		10 U		1 U		1 U		10 U
Bis(2-Ethylhexyl)phthalate	UG/L SV GA	5	1 U		1 U		11 U		1.1 U		1 U		17		1 U		1 U		23
Butylbenzylphthalate	UG/L SV		1 U		1 U		11 U		0.1 J		1 U		10 U		1 U		1 U		10 U
Carbazole	UG/L SV		1 U		1 U		11 U		1.1 U		1 U		10 U		1 U		1 U		10 U
Chrysene	UG/L SV		1 U		1 U		11 U		1.1 U		1 U		10 U		1 U		1 U		10 U
Di-n-butylphthalate	UG/L SV GA	50	1 U		1 U		11 U		1.1 U		1 U		10 U		1 U		1 U		10 U
Di-n-octylphthalate	UG/L SV		1 U		1 U		11 U		1.1 U		1 U		10 U		1 U		1 UJ		10 U
Dibenz(a,h)anthracene	UG/L SV		1 U		1 U		11 U		1.1 U		1 U		10 U		1 U		1 U		10 U
Dibenzofuran	UG/L SV		1 U		1 U		11 U		1.1 U		1 U		10 U		1 U		1 U		10 U
Diethyl phthalate	UG/L SV		0.067 J		0.16 J		11 U		1.1 U		0.059 J		10 U		1 U		0.14 J		10 U
Dimethylphthalate	UG/L SV		1 U		1 U		11 U		1.1 U		1 U		10 U		1 U		1 U		10 U
Fluoranthene	UG/L SV		1 U		1 U		11 U		1.1 U		1 U		10 U		1 U		1 U		10 U
Fluorene	UG/L SV		1 U		1 U		11 U		1.1 U		1 U		10 U		1 U		1 U		10 U
Hexachlorobenzene	UG/L SV GA	0.04	1 U		1 U		11 U		1.1 U		1 U		10 U		1 U		1 U		10 U
Hexachlorobutadiene	UG/L SV GA	0.5	1 U		1 U		11 U		1.1 U		1 U		10 U		1 U		1 U		10 U
Hexachlorocyclopentadiene	UG/L SV GA	5	1 U		1 U		11 U		1.1 U		1 U		10 U		1 U		1 U		10 U
Hexachloroethane	UG/L SV GA	5	1 U		1 U		11 U		1.1 U		1 U		10 U		1 U		1 U		10 U
Indeno(1,2,3-cd)pyrene	UG/L SV		1 U		1 U		11 U		1.1 U		1 U		10 U		1 U		1 U		10 U
Isophorone	UG/L SV		1 U		1 U		11 U		1.1 U		1 U		10 U		1 U		1 U		10 U
N-Nitrosodiphenylamine	UG/L SV		1 U		1 U		11 U		1.1 U		1 U		10 U		1 U		1 U		10 U
N-Nitrosodipropylamine	UG/L SV		1 U		1 U		11 U		1.1 U		1 U		10 U		1 U		1 U		10 U
Naphthalene	UG/L SV		1 U		1 U		11 U		1.1 U		1 U		10 U		1 U		1 U		10 U
Nitrobenzene	UG/L SV GA	0.4	1 U		1 U		11 U		1.1 U		1 U		10 U		1 U		1 U		10 U
Pentachlorophenol	UG/L SV GA	1	2.5 UJ		2.5 UJ		26 U		2.6 U		2.5 UJ		25 U		2.6 U		2.6 U		25 U
Phenanthrene	UG/L SV		1 U		1 U		11 U		1.1 U		1 U		10 U		1 U		1 U		10 U
Phenol	UG/L SV GA	1	1 U		1 U		11 U		1.1 U		1 U		10 U		1 U		1 U		10 U
Pyrene	UG/L SV		1 U		1 U		11 U		1.1 U		1 U		10 U		1 U		1 U		10 U

**TABLE C-2  
GROUNDWATER ANALYSES RAW DATA SEAD-13  
Decision Document-Mini Risk Assessment  
Seneca Army Depot Activity**

PARAMETER	UNIT	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13
		MW13-13 GROUNDWATER 132021 15 15 4/4/2002 SA SEAD-13	MW13-14 GROUNDWATER 132022 15 15 4/4/2002 SA SEAD-13	MW13-2 GROUNDWATER MW13-2 6.3 15.3 11/18/1993 SA ESI	MW13-2 GROUNDWATER 132002 17.5 17.5 9/6/2001 SA SEAD-13	MW13-2 GROUNDWATER 132015 17 17 4/4/2002 SA SEAD-13	MW13-4 <sup>(1)</sup> GROUNDWATER MW13-4 3.5 7.5 2/4/1994 SA ESI	MW13-4 GROUNDWATER 132004 11.6 11.6 9/6/2001 SA SEAD-13	MW13-4 GROUNDWATER 132017 11 11 4/5/2002 SA SEAD-13	MW13-5 GROUNDWATER MW13-5 6.3 15.3 2/5/1994 SA ESI
		N	N	N	N	N	N	N	N	N
4,4'-DDD	UG/L OCP GA	0.3		0.1 U		0.12 UJ		0.12 U		0.12 U
4,4'-DDE	UG/L OCP GA	0.2		0.1 U		0.12 UJ		0.12 U		0.12 U
4,4'-DDT	UG/L OCP GA	0.2		0.1 U		0.12 UJ		0.12 U		0.12 U
Aldrin	UG/L OCP GA	0		0.052 U		0.06 UJ		0.058 U		0.058 U
Alpha-BHC	UG/L OCP GA	0.01		0.052 U		0.06 UJ		0.058 U		0.058 U
Alpha-Chlordane	UG/L OCP			0.052 U		0.06 UJ		0.058 U		0.058 U
Aroclor-1016	UG/L OCP GA	0.09		1 U		1.2 UJ		1.2 U		1.2 U
Aroclor-1221	UG/L OCP GA	0.09		2.1 U		2.4 UJ		2.3 U		2.3 U
Aroclor-1232	UG/L OCP GA	0.09		1 U		1.2 UJ		1.2 U		1.2 U
Aroclor-1242	UG/L OCP GA	0.09		1 U		1.2 UJ		1.2 U		1.2 U
Aroclor-1248	UG/L OCP GA	0.09		1 U		1.2 UJ		1.2 U		1.2 U
Aroclor-1254	UG/L OCP GA	0.09		1 U		1.2 UJ		1.2 U		1.2 U
Aroclor-1260	UG/L OCP GA	0.09		1 U		1.2 UJ		1.2 U		1.2 U
Beta-BHC	UG/L OCP GA	0.04		0.052 U		0.06 UJ		0.058 U		0.058 U
Delta-BHC	UG/L OCP GA	0.04		0.052 U		0.06 UJ		0.058 U		0.058 U
Dieldrin	UG/L OCP GA	0.004		0.1 U		0.12 UJ		0.12 U		0.12 U
Endosulfan I	UG/L OCP			0.052 U		0.06 UJ		0.058 U		0.058 U
Endosulfan II	UG/L OCP			0.1 U		0.12 UJ		0.12 U		0.12 U
Endosulfan sulfate	UG/L OCP			0.1 U		0.12 UJ		0.12 U		0.12 U
Endrin	UG/L OCP GA	0		0.1 U		0.12 UJ		0.12 U		0.12 U
Endrin aldehyde	UG/L OCP GA	5		0.1 U		0.12 UJ		0.12 U		0.12 U
Endrin ketone	UG/L OCP GA	5		0.1 U		0.12 UJ		0.12 U		0.12 U
Gamma-BHC/Lindane	UG/L OCP GA	0.05		0.052 U		0.06 UJ		0.058 U		0.058 U
Gamma-Chlordane	UG/L OCP			0.052 U		0.06 UJ		0.058 U		0.058 U
Heptachlor	UG/L OCP GA	0.04		0.052 U		0.06 UJ		0.058 U		0.058 U
Heptachlor epoxide	UG/L OCP GA	0.03		0.052 U		0.06 UJ		0.058 U		0.058 U
Methoxychlor	UG/L OCP GA	35		0.52 U		0.6 UJ		0.58 U		0.58 U
Toxaphene	UG/L OCP GA	0.06		5.2 U		6 UJ		5.8 U		5.8 U
2,4,5-T	UG/L H GA	35		0.11 U		0.11 U		0.11 U		0.11 U
2,4,5-TP/Silvex	UG/L H GA	0.26		0.11 U		0.11 U		0.11 U		0.11 U
2,4-D	UG/L H GA	50		1.1 U		1.1 U		1.1 U		1.1 U
2,4-DB	UG/L H			1.1 U		1.1 U		1.1 U		1.1 U
Dalapon	UG/L H GA	50		2.5 U		2.4 U		2.5 U		2.5 U
Dicamba	UG/L H GA	0.44		0.11 U		0.11 U		0.11 U		0.11 U
Dichloroprop	UG/L H			1.1 U		1.1 U		1.1 U		1.1 U
Dinoseb	UG/L H GA	1		0.54 U		0.52 U		0.55 U		0.55 U
MCPA	UG/L H GA	0.44		110 U		110 U		110 U		110 U
MCPP	UG/L H			110 U		110 U		110 U		110 U
Aluminum	UG/L M SEC	50	97.2 J	89.6 J	3880 J	18.3 U	5540	177 J	18.3 U	53.1 J
Antimony	UG/L M GA	3	2.1 J	1.8 U	52.5 U	4.7 U	1.8 U	31.5 J	4.7 U	1.8 U
Arsenic	UG/L M MCL	10	2.2 U	2.2 U	1.4 J	3.1 J	2.2 U	1.4 U	3.2 J	2.2 U
Barium	UG/L M GA	1000	31.2 J	25.2 J	28.7 J	51 J	20 J	71.2 J	164 J	64.3 J
Beryllium	UG/L M MCL	4	0.1 U	0.1 U	0.3 U	0.26 J	0.1 U	0.4 U	0.2 U	0.1 U
Cadmium	UG/L M GA	5	0.5 U	0.5 U	3.3 U	0.5 U	0.5 U	2.1 U	0.57 J	0.5 U
Calcium	UG/L M		945000	408000	592000	761000	594000	182000	163000	102000
Chromium	UG/L M GA	50	1.4 U	2.3 J	2.5 U	5.2 J	1.4 U	9.9 J	1.2 U	2.2 J
Cobalt	UG/L M		4 J	5.5 J	4.9 U	11.6 J	2.9 U	6.7 J	7.9 J	2.9 U
Copper	UG/L M GA	200	1.4 U	1.4 U	3.7 U	3.7 J	3.1 J	3.3 J	3.3 J	2.3 J
Cyanide	UG/L M		10 UJ	11 J	5.1 U	49.7	10 UJ	5 U	10 U	10 UJ

**TABLE C-2**  
**GROUNDWATER ANALYSES RAW DATA SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	SEAD-13		SEAD-13		SEAD-13		SEAD-13		SEAD-13		SEAD-13		SEAD-13					
		MW13-13	GROUNDWATER	MW13-14	GROUNDWATER	MW13-2	GROUNDWATER	MW13-2	GROUNDWATER	MW13-2	GROUNDWATER	MW13-4 <sup>(1)</sup>	GROUNDWATER	MW13-4	GROUNDWATER	MW13-5	GROUNDWATER		
		132021		132022		MW13-2		132002		132015		MW13-4		132004		132017		MW13-5	
		15		15		6.3		17.5		17		3.5		11.6		11		6.3	
		15		15		15.3		17.5		17		7.5		11.6		11		15.3	
		4/4/2002		4/4/2002		11/18/1993		9/6/2001		4/4/2002		2/4/1994		9/6/2001		4/5/2002		2/5/1994	
		SA		SA		SA		SA		SA		SA		SA		SA		SA	
		SEAD-13		SEAD-13		ESI		SEAD-13		SEAD-13		ESI		SEAD-13		SEAD-13		ESI	
		2		2				1		2				1		2			
Iron	UG/L M GA	300	179 J	220		562		4830 J		17.6 J		8010		1140 J		1370		75.8 J	
Lead	UG/L M MCL	15	0.8 R	0.8 R		0.6 U		14.3		0.8 U		3.1		4.2		0.8 R		0.5 U	
Magnesium	UG/L M	3500	314000	278000		188000		289000		231000		44900		35600		18900		55300	
Manganese	UG/L M SEC	300	391	1580		342		529		192		299		1570		1390		143	
Mercury	UG/L M GA	0.7	0.1 U	0.1 U		0.07 UJ		0.1 U		0.1 U		0.04 U		0.1 U		0.1 U		0.04 U	
Nickel	UG/L M GA	100	9.9 J	12.6 J		5 J		12.7 J		4.8 J		17.5 J		6.1 J		3.6 J		4.6 J	
Potassium	UG/L M		6870	25700 J		8690		5350		3460 J		4460 J		2360 J		1190 J		5460	
Selenium	UG/L M GA	10	2 U	7.4 J		2.9 J		1.2 UJ		2 U		1.2 J		1.2 UJ		2.4 J		0.7 U	
Silver	UG/L M GA	50	1.2 U	1.2 U		6.7 U		1.5 U		1.2 U		4.2 U		1.5 U		1.2 U		4.2 U	
Sodium	UG/L M GA	20000	18500	28700		17000		21000		15300		9340		29100		14000		14000	
Thallium	UG/L M MCL	2	5.8 U	5.8 U		9 U		4.8 U		5.8 U		1.2 U		4.8 U		5.8 U		1.2 U	
Vanadium	UG/L M		2 U	2 U		3.3 U		6.2 J		2 U		8.8 J		2.1 U		2 U		3.7 U	
Zinc	UG/L M SEC	5000	1.5 J	0.9 U		3.8 J		24.3		0.94 J		138		12.3 J		2.6 J		101	
NITRATE	MG/L WC	10	731	139				445								0.059			
NITRITE	MG/L WC	1	0.034	1.1				0.048								0.005 U			
Nitrate/Nitrite	MG/L WC		731	140				445								0.059			
Nitrate/Nitrite Nitrogen	MG/L WC GA	10000						603						0.13					

Note:

(1) This table was generated solely from data contained in the Seneca database. It is noted that a duplicate was collected at MW13-4 (Sample ID MW13-8) on 2/04/94, however it is not included in this table since only fluoride data was reported, which is not stored in the database. The data from sample MW13-8 is included in Table A-2.

**TABLE C-2  
GROUNDWATER ANALYSES RAW DATA SEAD-13  
Decision Document-Mini Risk Assessment  
Seneca Army Depot Activity**

PARAMETER	UNIT	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13
		MW13-5	MW13-5	MW13-6	MW13-6	MW13-6
		GROUNDWATER	GROUNDWATER	GROUNDWATER	GROUNDWATER	GROUNDWATER
		132005	132018	MW13-6	132006	132019
		17.86	15	5	11.33	10
17.86	15	9	11.33	10		
9/6/2001	4/5/2002	2/4/1994	9/6/2001	4/5/2002		
SA	SA	SA	SA	SA		
SEAD-13	SEAD-13	ESI	SEAD-13	SEAD-13		
1	2		1	2		
N	N	N	N	N		
1,1,1-Trichloroethane	UG/L VOA GA	5		10 U		
1,1,2,2-Tetrachloroethane	UG/L VOA			10 U		
1,1,2-Trichloroethane	UG/L VOA GA	1		10 U		
1,1-Dichloroethane	UG/L VOA GA	5		10 U		
1,1-Dichloroethene	UG/L VOA GA	5		10 U		
1,2-Dichloroethane	UG/L VOA GA	0.6		10 U		
1,2-Dichloroethene (total)	UG/L VOA MCL	70		10 U		
1,2-Dichloropropane	UG/L VOA GA	1		10 U		
Acetone	UG/L VOA			10 U		
Benzene	UG/L VOA GA	1		10 U		
Bromodichloromethane	UG/L VOA MCL	80		10 U		
Bromoform	UG/L VOA MCL	80		10 U		
Carbon disulfide	UG/L VOA			10 U		
Carbon tetrachloride	UG/L VOA GA	5		10 U		
Chlorobenzene	UG/L VOA GA	5		10 U		
Chlorodibromomethane	UG/L VOA MCL	80		10 U		
Chloroethane	UG/L VOA GA	5		10 U		
Chloroform	UG/L VOA GA	7		10 U		
Cis-1,3-Dichloropropene	UG/L VOA GA	0.4		10 U		
Ethyl benzene	UG/L VOA GA	5		10 U		
Methyl bromide	UG/L VOA GA	5		10 U		
Methyl butyl ketone	UG/L VOA			10 U		
Methyl chloride	UG/L VOA GA	5		10 U		
Methyl ethyl ketone	UG/L VOA			10 U		
Methyl isobutyl ketone	UG/L VOA			10 U		
Methylene chloride	UG/L VOA GA	5		10 U		
Styrene	UG/L VOA GA	5		10 U		
Tetrachloroethene	UG/L VOA GA	5		10 U		
Toluene	UG/L VOA GA	5		10 U		
Total Xylenes	UG/L VOA GA	5		10 U		
Trans-1,3-Dichloropropene	UG/L VOA GA	0.4		10 U		
Trichloroethene	UG/L VOA GA	5		10 U		
Vinyl chloride	UG/L VOA GA	2		10 U		
1,2,4-Trichlorobenzene	UG/L SV GA	5	1 U	10 U	1.2 U	1 U
1,2-Dichlorobenzene	UG/L SV GA	3	1 U	10 U	1.2 U	1 U
1,3-Dichlorobenzene	UG/L SV GA	3	1 U	10 U	1.2 U	1 U
1,4-Dichlorobenzene	UG/L SV GA	3	1 U	10 U	1.2 U	1 U
2,2'-oxybis(1-Chloropropane)	UG/L SV			10 U		
2,4,5-Trichlorophenol	UG/L SV	2.6 U	2.6 U	25 U	2.9 U	2.6 U
2,4,6-Trichlorophenol	UG/L SV	1 U	1 U	10 U	1.2 U	1 U
2,4-Dichlorophenol	UG/L SV GA	5	1 U	10 U	1.2 U	1 U
2,4-Dimethylphenol	UG/L SV		1 UJ	10 U	1.2 UJ	1 U
2,4-Dinitrophenol	UG/L SV	2.6 UJ	2.6 UJ	25 U	2.9 UJ	2.6 UJ
2,4-Dinitrotoluene	UG/L SV GA	5	1 U	10 U	1.2 U	1 U
2,6-Dinitrotoluene	UG/L SV GA	5	1 U	10 U	1.2 U	1 U
2-Chloronaphthalene	UG/L SV		1 U	10 U	1.2 U	1 U
2-Chlorophenol	UG/L SV		1 U	10 U	1.2 U	1 U
2-Methylnaphthalene	UG/L SV	0.069 J	1 U	10 U	1.2 U	1 U
2-Methylphenol	UG/L SV		1 U	10 U	1.2 U	1 U

**TABLE C-2**  
**GROUNDWATER ANALYSES RAW DATA SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	N	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13
			MW13-5	MW13-5	MW13-6	MW13-6	MW13-6
			GROUNDWATER	GROUNDWATER	GROUNDWATER	GROUNDWATER	GROUNDWATER
			132005	132018	MW13-6	132006	132019
			17.86	15	5	11.33	10
			17.86	15	9	11.33	10
			9/6/2001	4/5/2002	2/4/1994	9/6/2001	4/5/2002
			SA	SA	SA	SA	SA
			SEAD-13	SEAD-13	ESI	SEAD-13	SEAD-13
			1	2		1	2
2-Nitroaniline	UG/L SV GA	5	2.6 U	2.6 U	25 U	2.9 U	2.6 U
2-Nitrophenol	UG/L SV		1 U	1 U	10 U	1.2 U	1 U
3,3'-Dichlorobenzidine	UG/L SV GA	5	1 U	1 U	10 U	1.2 U	1 U
3-Nitroaniline	UG/L SV GA	5	2.6 U	2.6 U	25 U	2.9 U	2.6 U
4,6-Dinitro-2-methylphenol	UG/L SV		2.6 UJ	2.6 UJ	25 U	2.9 UJ	2.6 UJ
4-Bromophenyl phenyl ether	UG/L SV		1 U	1 U	10 U	1.2 U	1 U
4-Chloro-3-methylphenol	UG/L SV		1 U	1 U	10 U	1.2 U	1 U
4-Chloroaniline	UG/L SV GA	5	1 UJ	1 U	10 U	1.2 UJ	1 U
4-Chlorophenyl phenyl ether	UG/L SV		1 U	1 U	10 U	1.2 U	1 U
4-Methylphenol	UG/L SV		1 U	1 U	10 U	1.2 U	1 U
4-Nitroaniline	UG/L SV GA	5	2.6 UJ	2.6 U	25 U	2.9 UJ	2.6 U
4-Nitrophenol	UG/L SV		2.6 U	2.6 U	25 U	2.9 U	2.6 U
Acenaphthene	UG/L SV		1 U	1 U	10 U	1.2 U	1 U
Acenaphthylene	UG/L SV		1 U	1 U	10 U	1.2 U	1 U
Anthracene	UG/L SV		1 U	1 U	10 U	1.2 U	1 U
Benzo(a)anthracene	UG/L SV		1 U	1 U	10 U	1.2 U	1 U
Benzo(a)pyrene	UG/L SV GA	0	1 U	1 U	10 U	1.2 U	1 U
Benzo(b)fluoranthene	UG/L SV		1 U	1 U	10 U	1.2 U	1 U
Benzo(ghi)perylene	UG/L SV		1 U	1 U	10 U	1.2 U	1 U
Benzo(k)fluoranthene	UG/L SV		1 U	1 U	10 U	1.2 U	1 U
Bis(2-Chloroethoxy)methane	UG/L SV GA	5	1 U	1 U	10 U	1.2 U	1 U
Bis(2-Chloroethyl)ether	UG/L SV GA	1	1 U	1 U	10 U	1.2 U	1 U
Bis(2-Chloroisopropyl)ether	UG/L SV GA	5	1 U	1 U		1.2 U	1 U
Bis(2-Ethylhexyl)phthalate	UG/L SV GA	5	1 U	1.3	10 U	1.2 U	1 U
Butylbenzylphthalate	UG/L SV		0.073 J	1 U	10 U	1.2 U	1 U
Carbazole	UG/L SV		1 U	1 U	10 U	1.2 U	1 U
Chrysene	UG/L SV		1 U	1 U	10 U	1.2 U	1 U
Di-n-butylphthalate	UG/L SV GA	50	1 U	1 U	10 U	1.2 U	1 U
Di-n-octylphthalate	UG/L SV		1 U	1 UJ	10 U	1.2 U	1 UJ
Dibenz(a,h)anthracene	UG/L SV		1 U	1 U	10 U	1.2 U	1 U
Dibenzofuran	UG/L SV		1 U	1 U	10 U	1.2 U	1 U
Diethyl phthalate	UG/L SV		1 U	0.085 J	10 U	1.2 U	1 U
Dimethylphthalate	UG/L SV		1 U	1 U	10 U	1.2 U	1 U
Fluoranthene	UG/L SV		1 U	1 U	10 U	1.2 U	1 U
Fluorene	UG/L SV		1 U	1 U	10 U	1.2 U	1 U
Hexachlorobenzene	UG/L SV GA	0.04	1 U	1 U	10 U	1.2 U	1 U
Hexachlorobutadiene	UG/L SV GA	0.5	1 U	1 U	10 U	1.2 U	1 U
Hexachlorocyclopentadiene	UG/L SV GA	5	1 U	1 U	10 U	1.2 U	1 U
Hexachloroethane	UG/L SV GA	5	1 U	1 U	10 U	1.2 U	1 U
Indeno(1,2,3-cd)pyrene	UG/L SV		1 U	1 U	10 U	1.2 U	1 U
Isophorone	UG/L SV		1 U	1 U	10 U	1.2 U	1 U
N-Nitrosodiphenylamine	UG/L SV		1 U	1 U	10 U	1.2 U	1 U
N-Nitrosodipropylamine	UG/L SV		1 U	1 U	10 U	1.2 U	1 U
Naphthalene	UG/L SV		1 U	1 U	10 U	1.2 U	1 U
Nitrobenzene	UG/L SV GA	0.4	1 U	1 U	10 U	1.2 U	1 U
Pentachlorophenol	UG/L SV GA	1	2.6 U	2.6 U	25 U	2.9 U	2.6 U
Phenanthrene	UG/L SV		1 U	1 U	10 U	1.2 U	1 U
Phenol	UG/L SV GA	1	1 U	1 U	10 U	1.2 U	1 U
Pyrene	UG/L SV		1 U	1 U	10 U	1.2 U	1 U

**TABLE C-2  
GROUNDWATER ANALYSES RAW DATA SEAD-13  
Decision Document-Mini Risk Assessment  
Seneca Army Depot Activity**

PARAMETER	UNIT	SEAD-13		SEAD-13		SEAD-13		SEAD-13		SEAD-13	
		MW13-5		MW13-5		MW13-6		MW13-6		MW13-6	
		GROUNDWATER	GROUNDWATER	GROUNDWATER	GROUNDWATER	GROUNDWATER	GROUNDWATER	GROUNDWATER	GROUNDWATER	GROUNDWATER	GROUNDWATER
		132005	132018	MW13-6	132006	132019					
		17.86	15	5	11.33	10					
		17.86	15	9	11.33	10					
		9/6/2001	4/5/2002	2/4/1994	9/6/2001	4/5/2002					
		SA	SA	SA	SA	SA					
		SEAD-13	SEAD-13	ESI	SEAD-13	SEAD-13					
		1	2		1	2					
		N	N	N	N	N					
4,4'-DDD	UG/L OCP GA	0.3		0.11 U							
4,4'-DDE	UG/L OCP GA	0.2		0.11 U							
4,4'-DDT	UG/L OCP GA	0.2		0.11 U							
Aldrin	UG/L OCP GA	0		0.054 U							
Alpha-BHC	UG/L OCP GA	0.01		0.054 U							
Alpha-Chlordane	UG/L OCP			0.054 U							
Aroclor-1016	UG/L OCP GA	0.09		1.1 U							
Aroclor-1221	UG/L OCP GA	0.09		2.2 U							
Aroclor-1232	UG/L OCP GA	0.09		1.1 U							
Aroclor-1242	UG/L OCP GA	0.09		1.1 U							
Aroclor-1248	UG/L OCP GA	0.09		1.1 U							
Aroclor-1254	UG/L OCP GA	0.09		1.1 U							
Aroclor-1260	UG/L OCP GA	0.09		1.1 U							
Beta-BHC	UG/L OCP GA	0.04		0.054 U							
Delta-BHC	UG/L OCP GA	0.04		0.054 U							
Dieldrin	UG/L OCP GA	0.004		0.11 U							
Endosulfan I	UG/L OCP			0.054 U							
Endosulfan II	UG/L OCP			0.11 U							
Endosulfan sulfate	UG/L OCP			0.11 U							
Endrin	UG/L OCP GA	0		0.11 U							
Endrin aldehyde	UG/L OCP GA	5		0.11 U							
Endrin ketone	UG/L OCP GA	5		0.11 U							
Gamma-BHC/Lindane	UG/L OCP GA	0.05		0.054 U							
Gamma-Chlordane	UG/L OCP			0.054 U							
Heptachlor	UG/L OCP GA	0.04		0.054 U							
Heptachlor epoxide	UG/L OCP GA	0.03		0.054 U							
Methoxychlor	UG/L OCP GA	35		0.54 U							
Toxaphene	UG/L OCP GA	0.06		5.4 U							
2,4,5-T	UG/L H GA	35		0.12 U							
2,4,5-TP/Silvex	UG/L H GA	0.26		0.12 U							
2,4-D	UG/L H GA	50		1.2 U							
2,4-DB	UG/L H			1.2 U							
Dalapon	UG/L H GA	50		2.6 U							
Dicamba	UG/L H GA	0.44		0.12 U							
Dichloroprop	UG/L H			1.2 U							
Dinoseb	UG/L H GA	1		0.57 U							
MCPA	UG/L H GA	0.44		120 U							
MCPP	UG/L H			120 U							
Aluminum	UG/L M SEC	50	23.5 U	18.3 U	2810	7990 J	126 J				
Antimony	UG/L M GA	3	4.7 U	1.8 U	52.7 J	4.7 U	1.8 U				
Arsenic	UG/L M MCL	10	3 J	2.2 U	1.4 U	2.8 U	2.2 U				
Barium	UG/L M GA	1000	86.2 J	53.4 J	34.3 J	81.8 J	38.8 J				
Beryllium	UG/L M MCL	4	0.2 U	0.1 U	0.4 U	0.29 J	0.1 U				
Cadmium	UG/L M GA	5	0.5 U	0.5 U	2.1 U	0.5 U	0.5 U				
Calcium	UG/L M		113000	111000	81500	75900	71500				
Chromium	UG/L M GA	50	1.2 U	1.4 U	6.1 J	10.4	1.4 U				
Cobalt	UG/L M		2.5 U	2.9 U	4.4 U	4.6 J	2.9 U				
Copper	UG/L M GA	200	3.8 J	1.4 U	3.1 U	7.3 J	1.4 U				
Cyanide	UG/L M		10 U	10 UJ	5 U	10 U	10 UJ				



**TABLE C-2**  
**GROUNDWATER ANALYSES RAW DATA SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	SEAD-13 MW13-5 GROUNDWATER 132005		SEAD-13 MW13-5 GROUNDWATER 132018		SEAD-13 MW13-6 GROUNDWATER MW13-6		SEAD-13 MW13-6 GROUNDWATER 132006		SEAD-13 MW13-6 GROUNDWATER 132019	
		17.86	17.86	15	15	5	9	11.33	11.33	10	10
		9/6/2001		4/5/2002		2/4/1994		9/6/2001		4/5/2002	
		SA		SA		SA		SA		SA	
		SEAD-13		SEAD-13		ESI		SEAD-13		SEAD-13	
		1		2		N		1		2	
		N		N		N		N		N	
Iron	UG/L M GA	300	18 U		17 U		4550		8350 J		88.9 J
Lead	UG/L M MCL	15	1.8 J		0.8 R		1.5 J		7.4		0.8 R
Magnesium	UG/L M	3500	55400		57200		51500		47800		46800
Manganese	UG/L M SEC	300	47.6		37.1		376		131		2.3 J
Mercury	UG/L M GA	0.7	0.1 U		0.1 U		0.04 U		0.1 U		0.1 U
Nickel	UG/L M GA	100	3.5 J		2.4 U		8.6 J		13 J		2.4 U
Potassium	UG/L M		2860 J		2970 J		6780		4960 J		2560 J
Selenium	UG/L M GA	10	1.2 UJ		2.5 J		2.3 J		1.2 UJ		3 J
Silver	UG/L M GA	50	1.5 U		1.2 U		4.2 U		1.5 U		1.2 U
Sodium	UG/L M GA	20000	26500		23400		7880		14400		12700
Thallium	UG/L M MCL	2	4.8 U		5.8 U		1.2 U		4.8 U		5.8 U
Vanadium	UG/L M		2.1 U		2 U		5.9 J		12.7 J		2 U
Zinc	UG/L M SEC	5000	4.3 J		2.5 J		50.6		37.3		4.3 J
NITRATE	MG/L WC		10		0.17						0.086
NITRITE	MG/L WC		1		0.005 U						0.005 U
Nitrate/Nitrite	MG/L WC				0.17						0.086
Nitrate/Nitrite Nitrogen	MG/L WC GA	10000	0.11						0.076		

**TABLE C-3**  
**SURFACE WATER ANALYSES RESULTS-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	SEAD-13 SW/SD13-1 SURFACE WATER SW13-1		SEAD-13 SW/SD13-2 SURFACE WATER SW13-2		SEAD-13 SW/SD13-3 SURFACE WATER SW13-3		SEAD-13 SW13-1 SURFACE WATER 131010		SEAD-13 SW13-2 SURFACE WATER 131011		SEAD-13 SW13-3 SURFACE WATER 131012	
		N	0	N	0	N	0	N	0	N	0	N	0
			11/3/1993		11/3/1993		11/4/1993		7/31/2001		7/31/2001		7/31/2001
		SA		SA		SA		SA		SA		SA	
		ESI		ESI		ESI		SEAD-13		SEAD-13		SEAD-13	
								2		2		2	
1,1,1-Trichloroethane	UG/L VOA		10 U		10 U		10 U						
1,1,2,2-Tetrachloroethane	UG/L VOA		10 U		10 U		10 U						
1,1,2-Trichloroethane	UG/L VOA		10 U		10 U		10 U						
1,1-Dichloroethane	UG/L VOA		10 U		10 U		10 U						
1,1-Dichloroethene	UG/L VOA		10 U		10 U		10 U						
1,2-Dichloroethane	UG/L VOA		10 U		10 U		10 U						
1,2-Dichloroethene (total)	UG/L VOA		10 U		10 U		10 U						
1,2-Dichloropropane	UG/L VOA		10 U		10 U		10 U						
Acetone	UG/L VOA		10 U		10 U		10 U						
Benzene	UG/L VOA		10 U		10 U		10 U						
Bromodichloromethane	UG/L VOA		10 U		10 U		10 U						
Bromoform	UG/L VOA		10 U		10 U		10 U						
Carbon disulfide	UG/L VOA		10 U		10 U		10 U						
Carbon tetrachloride	UG/L VOA		10 U		10 U		10 U						
Chlorobenzene	UG/L VOA	NYS AWQS CLASS C (AQUATIC)	5	10 U	10 U	10 U	10 U						
Chlorodibromomethane	UG/L VOA		10 U		10 U		10 U						
Chloroethane	UG/L VOA		10 U		10 U		10 U						
Chloroform	UG/L VOA		10 U		10 U		10 U						
Cis-1,3-Dichloropropene	UG/L VOA		10 U		10 U		10 U						
Ethyl benzene	UG/L VOA		10 U		10 U		10 U						
Methyl bromide	UG/L VOA		10 U		10 U		10 U						
Methyl butyl ketone	UG/L VOA		10 U		10 U		10 U						
Methyl chloride	UG/L VOA		10 U		10 U		10 U						
Methyl ethyl ketone	UG/L VOA		10 U		10 U		10 U						
Methyl isobutyl ketone	UG/L VOA		10 U		10 U		10 U						
Methylene chloride	UG/L VOA		10 U		10 U		10 U						
Styrene	UG/L VOA		10 U		10 U		10 U						
Tetrachloroethene	UG/L VOA		10 U		10 U		10 U						
Toluene	UG/L VOA	NYS AWQS CLASS C (AQUATIC)	6000	10 U	10 U	10 U	10 U						
Total Xylenes	UG/L VOA		10 U		10 U		10 U						
Trans-1,3-Dichloropropene	UG/L VOA		10 U		10 U		10 U						
Trichloroethene	UG/L VOA	NYS AWQS CLASS C (AQUATIC)	40	10 U	10 U	10 U	10 U						
Vinyl chloride	UG/L VOA		10 U		10 U		10 U						
1,2,4-Trichlorobenzene	UG/L SV	NYS AWQS CLASS C (AQUATIC)	5	10 U	10 U	10 U	10 U	1 U		1 U		1 U	
1,2-Dichlorobenzene	UG/L SV	NYS AWQS CLASS C (AQUATIC)	5	10 U	10 U	10 U	10 U	1 U		1 U		1 U	
1,3-Dichlorobenzene	UG/L SV	NYS AWQS CLASS C (AQUATIC)	5	10 U	10 U	10 U	10 U	1 U		1 U		1 U	
1,4-Dichlorobenzene	UG/L SV	NYS AWQS CLASS C (AQUATIC)	5	10 U	10 U	10 U	10 U	1 U		1 U		1 U	
2,2'-oxybis(1-Chloropropane)	UG/L SV			10 U	10 U	10 U	10 U						
2,4,5-Trichlorophenol	UG/L SV			26 U	26 U	25 U	25 U	2.6 U		2.6 U		2.5 U	
2,4,6-Trichlorophenol	UG/L SV			10 U	10 U	10 U	10 U	1 U		1 U		1 U	
2,4-Dichlorophenol	UG/L SV	NYS AWQS CLASS C (AQUATIC)	1	10 U	10 U	10 U	10 U	1 U		1 U		1 U	
2,4-Dimethylphenol	UG/L SV	NYS AWQS CLASS C (AQUATIC)	1000	10 U	10 U	10 U	10 U	1 U		1 U		1 U	
2,4-Dinitrophenol	UG/L SV	NYS AWQS CLASS C (AQUATIC)	400	26 U	26 U	25 U	25 U	2.6 UJ		2.6 UJ		2.5 UJ	
2,4-Dinitrotoluene	UG/L SV			10 U	10 U	10 U	10 U	1 U		1 U		1 U	
2,6-Dinitrotoluene	UG/L SV			10 U	10 U	10 U	10 U	1 U		1 U		1 U	
2-Chloronaphthalene	UG/L SV			10 U	10 U	10 U	10 U	1 U		1 U		1 U	
2-Chlorophenol	UG/L SV			10 U	10 U	10 U	10 U	1 U		1 U		1 U	
2-Methylnaphthalene	UG/L SV	NYS AWQS CLASS C (AQUATIC)	4.7	10 U	10 U	10 U	10 U	1 U		1 U		1 U	
2-Methylphenol	UG/L SV			10 U	10 U	10 U	10 U	1 U		1 U		1 U	

**TABLE C-3**  
**SURFACE WATER ANALYSES RESULTS-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	SEAD-13 SW/SD13-1 SURFACE WATER SW13-1		SEAD-13 SW/SD13-2 SURFACE WATER SW13-2		SEAD-13 SW/SD13-3 SURFACE WATER SW13-3		SEAD-13 SW13-1 SURFACE WATER 131010		SEAD-13 SW13-2 SURFACE WATER 131011		SEAD-13 SW13-3 SURFACE WATER 131012	
		0	0	0	0	0	0	0	0	0	0		
		N/A	11/3/1993	N/A	11/3/1993	N/A	11/4/1993	N/A	7/31/2001	N/A	7/31/2001	N/A	7/31/2001
		SA		SA		SA		SA		SA		SA	
		ESI		ESI		ESI		SEAD-13		SEAD-13		SEAD-13	
		N		N		N		N	2	N	2	N	2
2-Nitroaniline	UG/L SV	26 U		26 U		25 U		2.6 U		2.6 U		2.5 U	
2-Nitrophenol	UG/L SV	10 U		10 U		10 U		1 U		1 U		1 U	
3,3'-Dichlorobenzidine	UG/L SV	10 U		10 U		10 U		1 U		1 U		1 U	
3-Nitroaniline	UG/L SV	26 U		26 U		25 U		2.6 U		2.6 U		2.5 U	
4,6-Dinitro-2-methylphenol	UG/L SV	26 U		26 U		25 U		2.6 U		2.6 U		2.5 U	
4-Bromophenyl phenyl ether	UG/L SV	10 U		10 U		10 U		1 U		1 U		1 U	
4-Chloro-3-methylphenol	UG/L SV	10 U		10 U		10 U		1 U		1 U		1 U	
4-Chloroaniline	UG/L SV	10 U		10 U		10 U		1 U		1 U		1 U	
4-Chlorophenyl phenyl ether	UG/L SV	10 U		10 U		10 U		1 U		1 U		1 U	
4-Methylphenol	UG/L SV	10 U		10 U		10 U		17 J		1 U		23 J	
4-Nitroaniline	UG/L SV	26 U		26 U		25 U		2.6 U		2.6 U		2.5 U	
4-Nitrophenol	UG/L SV	26 U		26 U		25 U		2.6 U		2.6 U		2.5 U	
Acenaphthene	UG/L SV	10 U		10 U		10 U		1 U		1 U		1 U	
Acenaphthylene	UG/L SV	10 U		10 U		10 U		1 U		1 U		1 U	
Anthracene	UG/L SV	10 U		10 U		10 U		1 U		1 U		1 U	
Benzo(a)anthracene	UG/L SV	10 U		10 U		10 U		1 U		1 U		1 U	
Benzo(a)pyrene	UG/L SV	10 U		10 U		10 U		1 U		1 U		1 U	
Benzo(b)fluoranthene	UG/L SV	10 U		10 U		10 U		1 U		1 U		1 U	
Benzo(ghi)perylene	UG/L SV	10 U		10 U		10 U		1 U		1 U		1 U	
Benzo(k)fluoranthene	UG/L SV	10 U		10 U		10 U		1 U		1 U		1 U	
Bis(2-Chloroethoxy)methane	UG/L SV	10 U		10 U		10 U		1 U		1 U		1 U	
Bis(2-Chloroethyl)ether	UG/L SV	10 U		10 U		10 U		1 U		1 U		1 U	
Bis(2-Chloroisopropyl)ether	UG/L SV	10 U		10 U		10 U		1 U		1 U		1 U	
Bis(2-Ethylhexyl)phthalate	UG/L SV	NYS AWQS CLASS C (AQUATIC)	0.6	10 U		10 U		1 UJ		1 UJ		2.1 UJ	
Butylbenzylphthalate	UG/L SV	10 U		10 U		10 U		1 U		1 U		1 U	
Carbazole	UG/L SV	10 U		10 U		10 U		1 U		1 U		1 U	
Chrysene	UG/L SV	10 U		10 U		10 U		1 U		1 U		1 U	
Di-n-butylphthalate	UG/L SV	10 U		10 U		10 U		1 U		1 U		1 U	
Di-n-octylphthalate	UG/L SV	10 U		10 U		10 U		1 U		1 U		1 U	
Dibenz(a,h)anthracene	UG/L SV	10 U		10 U		10 U		1 U		1 U		1 U	
Dibenzofuran	UG/L SV	10 U		10 U		10 U		1 U		1 U		1 U	
Diethyl phthalate	UG/L SV	10 U		10 U		10 U		1 U		1 U		1 U	
Dimethylphthalate	UG/L SV	10 U		10 U		10 U		1 U		1 U		1 U	
Fluoranthene	UG/L SV	10 U		10 U		10 U		1 U		1 U		1 U	
Fluorene	UG/L SV	10 U		10 U		10 U		1 U		1 U		1 U	
Hexachlorobenzene	UG/L SV	NYS AWQS CLASS C (AQUATIC)	0.00003	10 U		10 U		1 U		1 U		1 U	
Hexachlorobutadiene	UG/L SV	NYS AWQS CLASS C (AQUATIC)	0.01	10 U		10 U		1 U		1 U		1 U	
Hexachlorocyclopentadiene	UG/L SV	NYS AWQS CLASS C (AQUATIC)	0.45	10 U		10 U		1 U		1 U		1 U	
Hexachloroethane	UG/L SV	NYS AWQS CLASS C (AQUATIC)	0.6	10 U		10 U		1 U		1 U		1 U	
Indeno(1,2,3-cd)pyrene	UG/L SV	10 U		10 U		10 U		1 U		1 U		1 U	
Isophorone	UG/L SV	10 U		10 U		10 U		1 U		1 U		1 U	
N-Nitrosodiphenylamine	UG/L SV	10 U		10 U		10 U		1 U		1 U		1 U	
N-Nitrosodipropylamine	UG/L SV	10 U		10 U		10 U		1 U		1 U		1 U	
Naphthalene	UG/L SV	10 U		10 U		10 U		1 U		1 U		1 U	
Nitrobenzene	UG/L SV	10 U		10 U		10 U		1 U		1 U		1 U	
Pentachlorophenol	UG/L SV	NYS AWQS CLASS C (AQUATIC)	1	26 U		25 U		2.6 U		2.6 U		2.5 U	
Phenanthrene	UG/L SV	10 U		10 U		10 U		1 U		1 U		1 U	
Phenol	UG/L SV	NYS AWQS CLASS C (AQUATIC)	5	10 U		10 U		0.82 J		1 U		9.3 J	
Pyrene	UG/L SV	10 U		10 U		10 U		1 U		1 U		1 U	

**TABLE C-3**  
**SURFACE WATER ANALYSES RESULTS-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	SEAD-13 SW/SD13-1 SURFACE WATER SW13-1		SEAD-13 SW/SD13-2 SURFACE WATER SW13-2		SEAD-13 SW/SD13-3 SURFACE WATER SW13-3		SEAD-13 SW13-1 SURFACE WATER 131010		SEAD-13 SW13-2 SURFACE WATER 131011		SEAD-13 SW13-3 SURFACE WATER 131012	
			0		0		0		0		0		0
		N/A	11/3/1993	N/A	11/3/1993	N/A	11/4/1993	N/A	7/31/2001	N/A	7/31/2001	N/A	7/31/2001
		SA		SA		SA		SA		SA		SA	
		ESI		ESI		ESI		SEAD-13		SEAD-13		SEAD-13	
		N		N		N		N	2	N	2	N	2
1,3,5-Trinitrobenzene	UG/L EXP		0.13 U		0.13 UJ		0.13 UJ						
1,3-Dinitrobenzene	UG/L EXP		0.13 U		0.13 UJ		0.13 UJ						
2,4,6-Trinitrotoluene	UG/L EXP		0.13 U		0.13 UJ		0.13 UJ						
2,4-Dinitrotoluene	UG/L EXP		0.13 U		0.13 UJ		0.13 UJ						
2,6-Dinitrotoluene	UG/L EXP		0.13 U		0.13 UJ		0.13 UJ						
2-amino-4,6-Dinitrotoluene	UG/L EXP		0.13 U		0.13 UJ		0.13 UJ						
4-amino-2,6-Dinitrotoluene	UG/L EXP		0.13 U		0.13 UJ		0.13 UJ						
HMX	UG/L EXP		0.13 U		0.13 UJ		0.13 UJ						
RDX	UG/L EXP		0.13 U		0.13 UJ		0.13 UJ						
Tetryl	UG/L EXP		0.13 U		0.13 UJ		0.13 UJ						
4,4'-DDD	UG/L OCP	NYS AWQS CLASS C (AQUATIC)	0.00008		0.1 U		0.1 U						
4,4'-DDE	UG/L OCP	NYS AWQS CLASS C (AQUATIC)	0.000007		0.1 U		0.1 U						
4,4'-DDT	UG/L OCP	NYS AWQS CLASS C (AQUATIC)	0.00001		0.1 U		0.1 U						
Aldrin	UG/L OCP	NYS AWQS CLASS C (AQUATIC)	0.001		0.051 U		0.051 U						
Alpha-BHC	UG/L OCP				0.051 U		0.051 U						
Alpha-Chlordane	UG/L OCP				0.051 U		0.051 U						
Aroclor-1016	UG/L OCP	NYS AWQS CLASS C (AQUATIC)	0.000001		1 U		1 U						
Aroclor-1221	UG/L OCP	NYS AWQS CLASS C (AQUATIC)	0.000001		2 U		2 U						
Aroclor-1232	UG/L OCP	NYS AWQS CLASS C (AQUATIC)	0.000001		1 U		1 U						
Aroclor-1242	UG/L OCP				1 U		1 U						
Aroclor-1248	UG/L OCP	NYS AWQS CLASS C (AQUATIC)	0.000001		1 U		1 U						
Aroclor-1254	UG/L OCP	NYS AWQS CLASS C (AQUATIC)	0.000001		1 U		1 U						
Aroclor-1260	UG/L OCP	NYS AWQS CLASS C (AQUATIC)	0.000001		1 U		1 U						
Beta-BHC	UG/L OCP				0.051 U		0.051 U						
Delta-BHC	UG/L OCP				0.051 U		0.051 U						
Dieldrin	UG/L OCP	NYS AWQS CLASS C (AQUATIC)	0.0000006		0.1 U		0.1 U						
Endosulfan I	UG/L OCP	NYS AWQS CLASS C (AQUATIC)	0.009		0.051 U		0.051 U						
Endosulfan II	UG/L OCP	NYS AWQS CLASS C (AQUATIC)	0.009		0.1 U		0.1 U						
Endosulfan sulfate	UG/L OCP				0.1 U		0.1 U						
Endrin	UG/L OCP	NYS AWQS CLASS C (AQUATIC)	0.002		0.1 U		0.1 U						
Endrin aldehyde	UG/L OCP				0.1 U		0.1 U						
Endrin ketone	UG/L OCP				0.1 U		0.1 U						
Gamma-BHC/Lindane	UG/L OCP				0.051 U		0.051 U						
Gamma-Chlordane	UG/L OCP				0.051 U		0.051 U						
Heptachlor	UG/L OCP	NYS AWQS CLASS C (AQUATIC)	0.0002		0.051 U		0.051 U						
Heptachlor epoxide	UG/L OCP	NYS AWQS CLASS C (AQUATIC)	0.0003		0.051 U		0.051 U						
Methoxychlor	UG/L OCP	NYS AWQS CLASS C (AQUATIC)	0.03		0.51 U		0.51 U						
Toxaphene	UG/L OCP	NYS AWQS CLASS C (AQUATIC)	0.000006		5.1 U		5.1 U						
2,4,5-T	UG/L H				0.11 U		0.11 U						
2,4,5-TP/Silvex	UG/L H				0.11 U		0.11 U						
2,4-D	UG/L H				1.1 U		1.1 U						
2,4-DB	UG/L H				1.1 U		1.1 U						
Dalapon	UG/L H				2.4 U		2.4 U						
Dicamba	UG/L H				0.11 U		0.11 U						
Dichloroprop	UG/L H				1.1 U		1.1 U						
Dinoseb	UG/L H				0.51 U		0.52 U						
MCPA	UG/L H				110 U		110 U						
MCPP	UG/L H				110 U		110 U						
Aluminum	UG/L M	NYS AWQS CLASS C (AQUATIC)	100	3830		2410		162 J	505		435		1560

**TABLE C-3**  
**SURFACE WATER ANALYSES RESULTS-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT		SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13
			SW/SD13-1	SW/SD13-2	SW/SD13-3	SW13-1	SW13-2	SW13-3
			SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER
			SW13-1	SW13-2	SW13-3	131010	131011	131012
			0	0	0	0	0	0
			N/A	N/A	N/A	N/A	N/A	N/A
			11/3/1993	11/3/1993	11/4/1993	7/31/2001	7/31/2001	7/31/2001
			SA	SA	SA	SA	SA	SA
			ESI	ESI	ESI	SEAD-13	SEAD-13	SEAD-13
			N	N	N	2	2	2
Antimony	UG/L M		52.8 U	52.8 U	52.6 U	1.8 U	1.8 U	1.8 U
Arsenic	UG/L M	NYS AWQS CLASS C (AQUATIC)	150	1.2 U	1.2 U	3.5 J	3.9 J	3.6 J
Barium	UG/L M		91.6 J	50.4 J	31.8 J	45.8 J	42.9 J	70.2 J
Beryllium	UG/L M	NYS AWQS CLASS C (AQUATIC)	1100	0.3 U	0.3 U	0.3 U	0.3 U	0.3 U
Cadmium	UG/L M	NYS AWQS CLASS C (AQUATIC)	3.84	3.3 U	3.3 U	3.3 U	0.3 U	0.3 U
Calcium	UG/L M		75300	61400	73200	46600	42300	55900
Chromium	UG/L M	NYS AWQS CLASS C (AQUATIC)	139.45	5.4 J	2.5 U	2.5 U	2.1 U	2.1 U
Cobalt	UG/L M	NYS AWQS CLASS C (AQUATIC)	5	4.9 U	4.9 U	4.9 U	1.5 U	1.5 U
Copper	UG/L M	NYS AWQS CLASS C (AQUATIC)	17.32	6.6 J	3.7 U	3.7 U	2.4 J	2.1 J
Cyanide	UG/L M	NYS AWQS CLASS C (AQUATIC)	5.2	5 U	5 U	5 U	10 U	10 U
Iron	UG/L M	NYS AWQS CLASS C (AQUATIC)	300	5790 J	4310 J	458 J	2300	1740
Lead	UG/L M	NYS AWQS CLASS C (AQUATIC)	1.4624632	4.4	7.5	0.8 U	1.5 U	1.5 U
Magnesium	UG/L M		14200	12800	13200	11800	11200	13800
Manganese	UG/L M		268	296	85.3	314	210	896
Mercury	UG/L M	NYS AWQS CLASS C (AQUATIC)	0.0007	0.07 U	0.07 U	0.07 U	0.1 U	0.1 U
Nickel	UG/L M	NYS AWQS CLASS C (AQUATIC)	99.92	7.1 J	5.5 J	4.1 U	1.4 U	1.7 J
Potassium	UG/L M		7200	4740 J	5240	2730 J	3010 J	3740 J
Selenium	UG/L M	NYS AWQS CLASS C (AQUATIC)	4.6	1.1 U	1.1 U	1.1 U	2.3 U	2.3 U
Silver	UG/L M	NYS AWQS CLASS C (AQUATIC)	0.1	6.7 UJ	6.7 UJ	6.7 UJ	1.6 U	1.6 U
Sodium	UG/L M		62100	53400	70000	37600	33600	53600
Thallium	UG/L M	NYS AWQS CLASS C (AQUATIC)	8	1.2 U	1.2 U	1.2 U	2.3 U	2.3 U
Vanadium	UG/L M	NYS AWQS CLASS C (AQUATIC)	14	6.2 J	3.3 U	3.3 U	5.6 U	5.6 U
Zinc	UG/L M	NYS AWQS CLASS C (AQUATIC)	159.25	27.7	15.9 J	3.1 U	14.8 J	3.3 J
Nitrate/Nitrite Nitrogen	MG/L WC					0.01 U	0.01 U	0.021

**TABLE C-3**  
**SURFACE WATER ANALYSES RESULTS-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13
		SW13-4	SW13-4	SW13-5	SW13-5	SW13-5	SW13-6	SW13-7
		SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER
		131001	131013	131002	131016	131014	131000	131004
		0	0	0	0	0	0	0
		N/A	N/A	N/A	N/A	N/A	N/A	N/A
		1/4/2000	7/31/2001	1/4/2000	7/31/2001	7/31/2001	1/4/2000	1/4/2000
		SA	SA	SA	DU	SA	SA	SA
		SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13
		1	1	1	1	1	1	1
		N	N	N	N	N	N	N
1,1,1-Trichloroethane	UG/L VOA							
1,1,2,2-Tetrachloroethane	UG/L VOA							
1,1,2-Trichloroethane	UG/L VOA							
1,1-Dichloroethane	UG/L VOA							
1,1-Dichloroethene	UG/L VOA							
1,2-Dichloroethane	UG/L VOA							
1,2-Dichloroethene (total)	UG/L VOA							
1,2-Dichloropropane	UG/L VOA							
Acetone	UG/L VOA							
Benzene	UG/L VOA							
Bromodichloromethane	UG/L VOA							
Bromoform	UG/L VOA							
Carbon disulfide	UG/L VOA							
Carbon tetrachloride	UG/L VOA							
Chlorobenzene	UG/L VOA NYS AWQS CLASS C (AQUATIC)	5						
Chlorodibromomethane	UG/L VOA							
Chloroethane	UG/L VOA							
Chloroform	UG/L VOA							
Cis-1,3-Dichloropropene	UG/L VOA							
Ethyl benzene	UG/L VOA							
Methyl bromide	UG/L VOA							
Methyl butyl ketone	UG/L VOA							
Methyl chloride	UG/L VOA							
Methyl ethyl ketone	UG/L VOA							
Methyl isobutyl ketone	UG/L VOA							
Methylene chloride	UG/L VOA							
Styrene	UG/L VOA							
Tetrachloroethene	UG/L VOA							
Toluene	UG/L VOA NYS AWQS CLASS C (AQUATIC)	6000						
Total Xylenes	UG/L VOA							
Trans-1,3-Dichloropropene	UG/L VOA							
Trichloroethene	UG/L VOA NYS AWQS CLASS C (AQUATIC)	40						
Vinyl chloride	UG/L VOA							
1,2,4-Trichlorobenzene	UG/L SV NYS AWQS CLASS C (AQUATIC)	5	1 U		1.1 U	1 U		
1,2-Dichlorobenzene	UG/L SV NYS AWQS CLASS C (AQUATIC)	5	1 U		1.1 U	1 U		
1,3-Dichlorobenzene	UG/L SV NYS AWQS CLASS C (AQUATIC)	5	1 U		1.1 U	1 U		
1,4-Dichlorobenzene	UG/L SV NYS AWQS CLASS C (AQUATIC)	5	1 U		1.1 U	1 U		
2,2'-oxybis(1-Chloropropane)	UG/L SV							
2,4,5-Trichlorophenol	UG/L SV		2.6 U		2.7 U	2.6 U		
2,4,6-Trichlorophenol	UG/L SV		1 U		1.1 U	1 U		
2,4-Dichlorophenol	UG/L SV NYS AWQS CLASS C (AQUATIC)	1	1 U		1.1 U	1 U		
2,4-Dimethylphenol	UG/L SV NYS AWQS CLASS C (AQUATIC)	1000	1 U		1.1 U	1 U		
2,4-Dinitrophenol	UG/L SV NYS AWQS CLASS C (AQUATIC)	400	2.6 UJ		2.7 U	2.6 U		
2,4-Dinitrotoluene	UG/L SV		1 U		1.1 U	1 U		
2,6-Dinitrotoluene	UG/L SV		1 U		1.1 U	1 U		
2-Chloronaphthalene	UG/L SV		1 U		1.1 U	1 U		
2-Chlorophenol	UG/L SV		1 U		1.1 U	1 U		
2-Methylnaphthalene	UG/L SV NYS AWQS CLASS C (AQUATIC)	4.7	1 U		1.1 U	1 U		
2-Methylphenol	UG/L SV		1 U		1.1 U	1 U		

**TABLE C-3**  
**SURFACE WATER ANALYSES RESULTS-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13
		SW13-4	SW13-4	SW13-5	SW13-5	SW13-5	SW13-6	SW13-7
		SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER
		131001	131013	131002	131016	131014	131000	131004
		0	0	0	0	0	0	0
		N/A	N/A	N/A	N/A	N/A	N/A	N/A
		1/4/2000	7/31/2001	1/4/2000	7/31/2001	7/31/2001	1/4/2000	1/4/2000
		SA	SA	SA	DU	SA	SA	SA
		SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13
		1	1	1	1	1	1	1
		N	N	N	N	N	N	N
2-Nitroaniline	UG/L SV		2.6 U		2.7 U	2.6 U		
2-Nitrophenol	UG/L SV		1 U		1.1 U	1 U		
3,3'-Dichlorobenzidine	UG/L SV		1 U		1.1 U	1 U		
3-Nitroaniline	UG/L SV		2.6 U		2.7 U	2.6 U		
4,6-Dinitro-2-methylphenol	UG/L SV		2.6 U		2.7 U	2.6 U		
4-Bromophenyl phenyl ether	UG/L SV		1 U		1.1 U	1 U		
4-Chloro-3-methylphenol	UG/L SV		1 U		1.1 U	1 U		
4-Chloroaniline	UG/L SV		1 U		1.1 U	1 U		
4-Chlorophenyl phenyl ether	UG/L SV		1 U		1.1 U	1 U		
4-Methylphenol	UG/L SV		0.054 J		1.1 U	1 U		
4-Nitroaniline	UG/L SV		2.6 U		2.7 U	2.6 U		
4-Nitrophenol	UG/L SV		2.6 U		2.7 U	2.6 U		
Acenaphthene	UG/L SV		1 U		1.1 U	1 U		
Acenaphthylene	UG/L SV		1 U		1.1 U	1 U		
Anthracene	UG/L SV		1 U		1.1 U	1 U		
Benzo(a)anthracene	UG/L SV		1 U		1.1 U	1 U		
Benzo(a)pyrene	UG/L SV		1 U		1.1 U	1 U		
Benzo(b)fluoranthene	UG/L SV		1 U		1.1 U	1 U		
Benzo(ghi)perylene	UG/L SV		1 U		1.1 U	1 U		
Benzo(k)fluoranthene	UG/L SV		1 U		1.1 U	1 U		
Bis(2-Chloroethoxy)methane	UG/L SV		1 U		1.1 U	1 U		
Bis(2-Chloroethyl)ether	UG/L SV		1 U		1.1 U	1 U		
Bis(2-Chloroisopropyl)ether	UG/L SV		1 U		1.1 U	1 U		
Bis(2-Ethylhexyl)phthalate	UG/L SV	NYS AWQS CLASS C (AQUATIC)	0.6	1 UJ	1.1 U	1 U		
Butylbenzylphthalate	UG/L SV		1 U		1.1 U	1 U		
Carbazole	UG/L SV		1 U		1.1 U	1 U		
Chrysene	UG/L SV		1 U		1.1 U	1 U		
Di-n-butylphthalate	UG/L SV		1 U		1.1 U	1 U		
Di-n-octylphthalate	UG/L SV		1 U		1.1 U	1 U		
Dibenz(a,h)anthracene	UG/L SV		1 U		1.1 U	1 U		
Dibenzofuran	UG/L SV		1 U		1.1 U	1 U		
Diethyl phthalate	UG/L SV		1 U		1.1 U	1 U		
Dimethylphthalate	UG/L SV		1 U		1.1 U	1 U		
Fluoranthene	UG/L SV		1 U		1.1 U	1 U		
Fluorene	UG/L SV		1 U		1.1 U	1 U		
Hexachlorobenzene	UG/L SV	NYS AWQS CLASS C (AQUATIC)	0.00003	1 U	1.1 U	1 U		
Hexachlorobutadiene	UG/L SV	NYS AWQS CLASS C (AQUATIC)	0.01	1 U	1.1 U	1 U		
Hexachlorocyclopentadiene	UG/L SV	NYS AWQS CLASS C (AQUATIC)	0.45	1 U	1.1 U	1 U		
Hexachloroethane	UG/L SV	NYS AWQS CLASS C (AQUATIC)	0.6	1 U	1.1 U	1 U		
Indeno(1,2,3-cd)pyrene	UG/L SV		1 U		1.1 U	1 U		
Isophorone	UG/L SV		1 U		1.1 U	0.057 J		
N-Nitrosodiphenylamine	UG/L SV		1 U		1.1 U	1 U		
N-Nitrosodipropylamine	UG/L SV		1 U		1.1 U	1 U		
Naphthalene	UG/L SV		1 U		1.1 U	1 U		
Nitrobenzene	UG/L SV		1 U		1.1 U	1 U		
Pentachlorophenol	UG/L SV	NYS AWQS CLASS C (AQUATIC)	1	2.6 U	2.7 U	2.6 U		
Phenanthrene	UG/L SV		1 U		1.1 U	1 U		
Phenol	UG/L SV	NYS AWQS CLASS C (AQUATIC)	5	1 U	1.1 U	1 U		
Pyrene	UG/L SV		1 U		1.1 U	1 U		

**TABLE C-3**  
**SURFACE WATER ANALYSES RESULTS-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13		
		SW13-4	SW13-4	SW13-5	SW13-5	SW13-5	SW13-6	SW13-7		
		SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER		
		131001	131013	131002	131016	131014	131000	131004		
		0	0	0	0	0	0	0		
		N/A	N/A	N/A	N/A	N/A	N/A	N/A		
		1/4/2000	7/31/2001	1/4/2000	7/31/2001	7/31/2001	1/4/2000	1/4/2000		
		SA	SA	SA	DU	SA	SA	SA		
		SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13		
		1	1	1	1	1	1	1		
		N	N	N	N	N	N	N		
1,3,5-Trinitrobenzene	UG/L EXP									
1,3-Dinitrobenzene	UG/L EXP									
2,4,6-Trinitrotoluene	UG/L EXP									
2,4-Dinitrotoluene	UG/L EXP									
2,6-Dinitrotoluene	UG/L EXP									
2-amino-4,6-Dinitrotoluene	UG/L EXP									
4-amino-2,6-Dinitrotoluene	UG/L EXP									
HMX	UG/L EXP									
RDX	UG/L EXP									
Tetryl	UG/L EXP									
4,4'-DDD	UG/L OCP	NYS AWQS CLASS C (AQUATIC)		0.00008						
4,4'-DDE	UG/L OCP	NYS AWQS CLASS C (AQUATIC)		0.000007						
4,4'-DDT	UG/L OCP	NYS AWQS CLASS C (AQUATIC)		0.00001						
Aldrin	UG/L OCP	NYS AWQS CLASS C (AQUATIC)		0.001						
Alpha-BHC	UG/L OCP									
Alpha-Chlordane	UG/L OCP									
Aroclor-1016	UG/L OCP	NYS AWQS CLASS C (AQUATIC)		0.000001						
Aroclor-1221	UG/L OCP	NYS AWQS CLASS C (AQUATIC)		0.000001						
Aroclor-1232	UG/L OCP	NYS AWQS CLASS C (AQUATIC)		0.000001						
Aroclor-1242	UG/L OCP									
Aroclor-1248	UG/L OCP	NYS AWQS CLASS C (AQUATIC)		0.000001						
Aroclor-1254	UG/L OCP	NYS AWQS CLASS C (AQUATIC)		0.000001						
Aroclor-1260	UG/L OCP	NYS AWQS CLASS C (AQUATIC)		0.000001						
Beta-BHC	UG/L OCP									
Delta-BHC	UG/L OCP									
Dieldrin	UG/L OCP	NYS AWQS CLASS C (AQUATIC)		0.0000006						
Endosulfan I	UG/L OCP	NYS AWQS CLASS C (AQUATIC)		0.009						
Endosulfan II	UG/L OCP	NYS AWQS CLASS C (AQUATIC)		0.009						
Endosulfan sulfate	UG/L OCP									
Endrin	UG/L OCP	NYS AWQS CLASS C (AQUATIC)		0.002						
Endrin aldehyde	UG/L OCP									
Endrin ketone	UG/L OCP									
Gamma-BHC/Lindane	UG/L OCP									
Gamma-Chlordane	UG/L OCP									
Heptachlor	UG/L OCP	NYS AWQS CLASS C (AQUATIC)		0.0002						
Heptachlor epoxide	UG/L OCP	NYS AWQS CLASS C (AQUATIC)		0.0003						
Methoxychlor	UG/L OCP	NYS AWQS CLASS C (AQUATIC)		0.03						
Toxaphene	UG/L OCP	NYS AWQS CLASS C (AQUATIC)		0.000006						
2,4,5-T	UG/L H									
2,4,5-TP/Silvex	UG/L H									
2,4-D	UG/L H									
2,4-DB	UG/L H									
Dalapon	UG/L H									
Dicamba	UG/L H									
Dichloroprop	UG/L H									
Dinoseb	UG/L H									
MCPA	UG/L H									
MCPP	UG/L H									
Aluminum	UG/L M	NYS AWQS CLASS C (AQUATIC)	100	34.4 U	19.8 J	36.7 J	933	1040	35.7 J	86.2 J



**TABLE C-3**  
**SURFACE WATER ANALYSES RESULTS-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13
		SW13-4	SW13-4	SW13-5	SW13-5	SW13-5	SW13-6	SW13-7
		SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER
		131001	131013	131002	131016	131014	131000	131004
		0	0	0	0	0	0	0
		N/A	N/A	N/A	N/A	N/A	N/A	N/A
		1/4/2000	7/31/2001	1/4/2000	7/31/2001	7/31/2001	1/4/2000	1/4/2000
		SA	SA	SA	DU	SA	SA	SA
		SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13
		1	1	1	1	1	1	1
		N	N	N	N	N	N	N
Antimony	UG/L M		1.8 U		3 J		1.8 UJ	
Arsenic	UG/L M	NYS AWQS CLASS C (AQUATIC)	2.5 U		4.7 J		6.7 J	
Barium	UG/L M		64.4 J		44.2 J		46.7 J	
Beryllium	UG/L M	NYS AWQS CLASS C (AQUATIC)	0.3 U		0.1 U		0.1 U	
Cadmium	UG/L M	NYS AWQS CLASS C (AQUATIC)	0.3 U		0.3 U		0.3 U	
Calcium	UG/L M		61600		45700		47600	
Chromium	UG/L M	NYS AWQS CLASS C (AQUATIC)	2.1 U		2.1 U		2.1 U	
Cobalt	UG/L M	NYS AWQS CLASS C (AQUATIC)	1.5 U		1.5 U		1.5 U	
Copper	UG/L M	NYS AWQS CLASS C (AQUATIC)	17.32		2.4 J		3.7 J	
Cyanide	UG/L M	NYS AWQS CLASS C (AQUATIC)	5.2		10 U		10 U	
Iron	UG/L M	NYS AWQS CLASS C (AQUATIC)	300		4110		2360	
Lead	UG/L M	NYS AWQS CLASS C (AQUATIC)	1.4624632		1.5 U		2.6 J	
Magnesium	UG/L M		10200		10900		11600	
Manganese	UG/L M		1850		291		312	
Mercury	UG/L M	NYS AWQS CLASS C (AQUATIC)	0.0007		0.1 U		0.11 J	
Nickel	UG/L M	NYS AWQS CLASS C (AQUATIC)	99.92		1.4 U		2.2 J	
Potassium	UG/L M		173 U		3490 J		3670 J	
Selenium	UG/L M	NYS AWQS CLASS C (AQUATIC)	4.6		2.3 U		2.3 U	
Silver	UG/L M	NYS AWQS CLASS C (AQUATIC)	0.1		1.6 U		1.6 U	
Sodium	UG/L M		24200		31200		32700	
Thallium	UG/L M	NYS AWQS CLASS C (AQUATIC)	8		2.3 U		2.9 U	
Vanadium	UG/L M	NYS AWQS CLASS C (AQUATIC)	14		5.6 U		1.7 J	
Zinc	UG/L M	NYS AWQS CLASS C (AQUATIC)	159.25		9.5 J		14.7 J	
Nitrate/Nitrite Nitrogen	MG/L WC		0.03		0.11 J		0.01 UJ	

**TABLE C-3**  
**SURFACE WATER ANALYSES RESULTS-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	SEAD-13	SEAD-13	SEAD-13
		SW13-8	SW13-8	SW13-9
		SURFACE WATER	SURFACE WATER	SURFACE WATER
		131005	131006	131003
		0	0	0
		N/A	N/A	N/A
		1/4/2000	1/4/2000	1/4/2000
		SA	SA	SA
		SEAD-13	SEAD-13	SEAD-13
		1	1	1
		N	N	N
1,1,1-Trichloroethane	UG/L VOA			
1,1,2,2-Tetrachloroethane	UG/L VOA			
1,1,2-Trichloroethane	UG/L VOA			
1,1-Dichloroethane	UG/L VOA			
1,1-Dichloroethene	UG/L VOA			
1,2-Dichloroethane	UG/L VOA			
1,2-Dichloroethene (total)	UG/L VOA			
1,2-Dichloropropane	UG/L VOA			
Acetone	UG/L VOA			
Benzene	UG/L VOA			
Bromodichloromethane	UG/L VOA			
Bromoform	UG/L VOA			
Carbon disulfide	UG/L VOA			
Carbon tetrachloride	UG/L VOA			
Chlorobenzene	UG/L VOA NYS AWQS CLASS C (AQUATIC)	5		
Chlorodibromomethane	UG/L VOA			
Chloroethane	UG/L VOA			
Chloroform	UG/L VOA			
Cis-1,3-Dichloropropene	UG/L VOA			
Ethyl benzene	UG/L VOA			
Methyl bromide	UG/L VOA			
Methyl butyl ketone	UG/L VOA			
Methyl chloride	UG/L VOA			
Methyl ethyl ketone	UG/L VOA			
Methyl isobutyl ketone	UG/L VOA			
Methylene chloride	UG/L VOA			
Styrene	UG/L VOA			
Tetrachloroethene	UG/L VOA			
Toluene	UG/L VOA NYS AWQS CLASS C (AQUATIC)	6000		
Total Xylenes	UG/L VOA			
Trans-1,3-Dichloropropene	UG/L VOA			
Trichloroethene	UG/L VOA NYS AWQS CLASS C (AQUATIC)	40		
Vinyl chloride	UG/L VOA			
1,2,4-Trichlorobenzene	UG/L SV NYS AWQS CLASS C (AQUATIC)	5		
1,2-Dichlorobenzene	UG/L SV NYS AWQS CLASS C (AQUATIC)	5		
1,3-Dichlorobenzene	UG/L SV NYS AWQS CLASS C (AQUATIC)	5		
1,4-Dichlorobenzene	UG/L SV NYS AWQS CLASS C (AQUATIC)	5		
2,2'-oxybis(1-Chloropropane)	UG/L SV			
2,4,5-Trichlorophenol	UG/L SV			
2,4,6-Trichlorophenol	UG/L SV			
2,4-Dichlorophenol	UG/L SV NYS AWQS CLASS C (AQUATIC)	1		
2,4-Dimethylphenol	UG/L SV NYS AWQS CLASS C (AQUATIC)	1000		
2,4-Dinitrophenol	UG/L SV NYS AWQS CLASS C (AQUATIC)	400		
2,4-Dinitrotoluene	UG/L SV			
2,6-Dinitrotoluene	UG/L SV			
2-Chloronaphthalene	UG/L SV			
2-Chlorophenol	UG/L SV			
2-Methylnaphthalene	UG/L SV NYS AWQS CLASS C (AQUATIC)	4.7		
2-Methylphenol	UG/L SV			

**TABLE C-3**  
**SURFACE WATER ANALYSES RESULTS-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	SEAD-13	SEAD-13	SEAD-13
		SW13-8	SW13-8	SW13-9
		SURFACE WATER	SURFACE WATER	SURFACE WATER
		131005	131006	131003
		0	0	0
		N/A	N/A	N/A
		1/4/2000	1/4/2000	1/4/2000
		SA	SA	SA
		SEAD-13	SEAD-13	SEAD-13
		1	1	1
		N	N	N
2-Nitroaniline	UG/L SV			
2-Nitrophenol	UG/L SV			
3,3'-Dichlorobenzidine	UG/L SV			
3-Nitroaniline	UG/L SV			
4,6-Dinitro-2-methylphenol	UG/L SV			
4-Bromophenyl phenyl ether	UG/L SV			
4-Chloro-3-methylphenol	UG/L SV			
4-Chloroaniline	UG/L SV			
4-Chlorophenyl phenyl ether	UG/L SV			
4-Methylphenol	UG/L SV			
4-Nitroaniline	UG/L SV			
4-Nitrophenol	UG/L SV			
Acenaphthene	UG/L SV			
Acenaphthylene	UG/L SV			
Anthracene	UG/L SV			
Benzo(a)anthracene	UG/L SV			
Benzo(a)pyrene	UG/L SV			
Benzo(b)fluoranthene	UG/L SV			
Benzo(ghi)perylene	UG/L SV			
Benzo(k)fluoranthene	UG/L SV			
Bis(2-Chloroethoxy)methane	UG/L SV			
Bis(2-Chloroethyl)ether	UG/L SV			
Bis(2-Chloroisopropyl)ether	UG/L SV			
Bis(2-Ethylhexyl)phthalate	UG/L SV	NYS AWQS CLASS C (AQUATIC)	0.6	
Butylbenzylphthalate	UG/L SV			
Carbazole	UG/L SV			
Chrysene	UG/L SV			
Di-n-butylphthalate	UG/L SV			
Di-n-octylphthalate	UG/L SV			
Dibenz(a,h)anthracene	UG/L SV			
Dibenzofuran	UG/L SV			
Diethyl phthalate	UG/L SV			
Dimethylphthalate	UG/L SV			
Fluoranthene	UG/L SV			
Fluorene	UG/L SV			
Hexachlorobenzene	UG/L SV	NYS AWQS CLASS C (AQUATIC)	0.00003	
Hexachlorobutadiene	UG/L SV	NYS AWQS CLASS C (AQUATIC)	0.01	
Hexachlorocyclopentadiene	UG/L SV	NYS AWQS CLASS C (AQUATIC)	0.45	
Hexachloroethane	UG/L SV	NYS AWQS CLASS C (AQUATIC)	0.6	
Indeno(1,2,3-cd)pyrene	UG/L SV			
Isophorone	UG/L SV			
N-Nitrosodiphenylamine	UG/L SV			
N-Nitrosodipropylamine	UG/L SV			
Naphthalene	UG/L SV			
Nitrobenzene	UG/L SV			
Pentachlorophenol	UG/L SV	NYS AWQS CLASS C (AQUATIC)	1	
Phenanthrene	UG/L SV			
Phenol	UG/L SV	NYS AWQS CLASS C (AQUATIC)	5	
Pyrene	UG/L SV			

**TABLE C-3**  
**SURFACE WATER ANALYSES RESULTS-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	SEAD-13		SEAD-13		SEAD-13	
		SW13-8	SW13-8	SW13-8	SW13-9	SW13-9	SW13-9
		SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER
		131005	131006	131006	131003	131003	131003
		0	0	0	0	0	0
		N/A	N/A	N/A	N/A	N/A	N/A
		1/4/2000	1/4/2000	1/4/2000	1/4/2000	1/4/2000	1/4/2000
		SA	SA	SA	SA	SA	SA
		SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13
		1	1	1	1	1	1
		N	N	N	N	N	N
1,3,5-Trinitrobenzene	UG/L EXP						
1,3-Dinitrobenzene	UG/L EXP						
2,4,6-Trinitrotoluene	UG/L EXP						
2,4-Dinitrotoluene	UG/L EXP						
2,6-Dinitrotoluene	UG/L EXP						
2-amino-4,6-Dinitrotoluene	UG/L EXP						
4-amino-2,6-Dinitrotoluene	UG/L EXP						
HMX	UG/L EXP						
RDX	UG/L EXP						
Tetryl	UG/L EXP						
4,4'-DDD	UG/L OCP	NYS AWQS CLASS C (AQUATIC)	0.00008				
4,4'-DDE	UG/L OCP	NYS AWQS CLASS C (AQUATIC)	0.000007				
4,4'-DDT	UG/L OCP	NYS AWQS CLASS C (AQUATIC)	0.00001				
Aldrin	UG/L OCP	NYS AWQS CLASS C (AQUATIC)	0.001				
Alpha-BHC	UG/L OCP						
Alpha-Chlordane	UG/L OCP						
Aroclor-1016	UG/L OCP	NYS AWQS CLASS C (AQUATIC)	0.000001				
Aroclor-1221	UG/L OCP	NYS AWQS CLASS C (AQUATIC)	0.000001				
Aroclor-1232	UG/L OCP	NYS AWQS CLASS C (AQUATIC)	0.000001				
Aroclor-1242	UG/L OCP						
Aroclor-1248	UG/L OCP	NYS AWQS CLASS C (AQUATIC)	0.000001				
Aroclor-1254	UG/L OCP	NYS AWQS CLASS C (AQUATIC)	0.000001				
Aroclor-1260	UG/L OCP	NYS AWQS CLASS C (AQUATIC)	0.000001				
Beta-BHC	UG/L OCP						
Delta-BHC	UG/L OCP						
Dieldrin	UG/L OCP	NYS AWQS CLASS C (AQUATIC)	0.0000006				
Endosulfan I	UG/L OCP	NYS AWQS CLASS C (AQUATIC)	0.009				
Endosulfan II	UG/L OCP	NYS AWQS CLASS C (AQUATIC)	0.009				
Endosulfan sulfate	UG/L OCP						
Endrin	UG/L OCP	NYS AWQS CLASS C (AQUATIC)	0.002				
Endrin aldehyde	UG/L OCP						
Endrin ketone	UG/L OCP						
Gamma-BHC/Lindane	UG/L OCP						
Gamma-Chlordane	UG/L OCP						
Heptachlor	UG/L OCP	NYS AWQS CLASS C (AQUATIC)	0.0002				
Heptachlor epoxide	UG/L OCP	NYS AWQS CLASS C (AQUATIC)	0.0003				
Methoxychlor	UG/L OCP	NYS AWQS CLASS C (AQUATIC)	0.03				
Toxaphene	UG/L OCP	NYS AWQS CLASS C (AQUATIC)	0.000006				
2,4,5-T	UG/L H						
2,4,5-TP/Silvex	UG/L H						
2,4-D	UG/L H						
2,4-DB	UG/L H						
Dalapon	UG/L H						
Dicamba	UG/L H						
Dichloroprop	UG/L H						
Dinoseb	UG/L H						
MCPA	UG/L H						
MCPP	UG/L H						
Aluminum	UG/L M	NYS AWQS CLASS C (AQUATIC)	100	87.8 J	74 J		34.4 U

**TABLE C-3**  
**SURFACE WATER ANALYSES RESULTS-SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT		SEAD-13	SEAD-13	SEAD-13
			SW13-8	SW13-8	SW13-9
			SURFACE WATER	SURFACE WATER	SURFACE WATER
			131005	131006	131003
			0	0	0
			N/A	N/A	N/A
			1/4/2000	1/4/2000	1/4/2000
			SA	SA	SA
			SEAD-13	SEAD-13	SEAD-13
			1	1	1
			N	N	N
Antimony	UG/L M				
Arsenic	UG/L M	NYS AWQS CLASS C (AQUATIC)	150		
Barium	UG/L M				
Beryllium	UG/L M	NYS AWQS CLASS C (AQUATIC)	1100		
Cadmium	UG/L M	NYS AWQS CLASS C (AQUATIC)	3.84		
Calcium	UG/L M				
Chromium	UG/L M	NYS AWQS CLASS C (AQUATIC)	139.45		
Cobalt	UG/L M	NYS AWQS CLASS C (AQUATIC)	5		
Copper	UG/L M	NYS AWQS CLASS C (AQUATIC)	17.32		
Cyanide	UG/L M	NYS AWQS CLASS C (AQUATIC)	5.2		
Iron	UG/L M	NYS AWQS CLASS C (AQUATIC)	300		
Lead	UG/L M	NYS AWQS CLASS C (AQUATIC)	1.4624632		
Magnesium	UG/L M				
Manganese	UG/L M				
Mercury	UG/L M	NYS AWQS CLASS C (AQUATIC)	0.0007		
Nickel	UG/L M	NYS AWQS CLASS C (AQUATIC)	99.92		
Potassium	UG/L M				
Selenium	UG/L M	NYS AWQS CLASS C (AQUATIC)	4.6		
Silver	UG/L M	NYS AWQS CLASS C (AQUATIC)	0.1		
Sodium	UG/L M				
Thallium	UG/L M	NYS AWQS CLASS C (AQUATIC)	8		
Vanadium	UG/L M	NYS AWQS CLASS C (AQUATIC)	14		
Zinc	UG/L M	NYS AWQS CLASS C (AQUATIC)	159.25		
Nitrate/Nitrite Nitrogen	MG/L WC				

**TABLE C-4**  
**SEDIMENT ANALYSES RAW DATA -SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	SEAD-13 SD13-1 SEDIMENT	SEAD-13 SD13-2 SEDIMENT	SEAD-13 SD13-3 SEDIMENT	SEAD-13 SD13-4 SEDIMENT	SEAD-13 SD13-5 SEDIMENT	SEAD-13	
							133000	133004
		0	0	0	0	0	0	0
		0.2	0.2	0.2	0.2	0.2	0.2	0.2
		7/31/2001	7/31/2001	7/31/2001	7/31/2001	7/31/2001	7/31/2001	7/31/2001
		SA	SA	SA	SA	SA	SA	SA
		SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13
		N	N	N	N	N	N	N
		2	2	2	1	1		
1,1,1-Trichloroethane	UG/KG VOA							
1,1,2,2-Tetrachloroethane	UG/KG VOA	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	11.7315					
1,1,2-Trichloroethane	UG/KG VOA							
1,1-Dichloroethane	UG/KG VOA							
1,1-Dichloroethene	UG/KG VOA	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	0.7821					
1,2-Dichloroethane	UG/KG VOA	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	27.3735					
1,2-Dichloroethene (total)	UG/KG VOA							
1,2-Dichloropropane	UG/KG VOA							
Acetone	UG/KG VOA							
Benzene	UG/KG VOA	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	23.463					
Bromodichloromethane	UG/KG VOA							
Bromoform	UG/KG VOA							
Carbon disulfide	UG/KG VOA							
Carbon tetrachloride	UG/KG VOA	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	23.463					
Chlorobenzene	UG/KG VOA	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER	136.8675					
Chlorodibromomethane	UG/KG VOA							
Chloroethane	UG/KG VOA							
Chloroform	UG/KG VOA							
Cis-1,3-Dichloropropene	UG/KG VOA							
Ethyl benzene	UG/KG VOA	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER	938.52					
Methyl bromide	UG/KG VOA							
Methyl butyl ketone	UG/KG VOA							
Methyl chloride	UG/KG VOA							
Methyl ethyl ketone	UG/KG VOA							
Methyl isobutyl ketone	UG/KG VOA							
Methylene chloride	UG/KG VOA							
Styrene	UG/KG VOA							
Tetrachloroethene	UG/KG VOA	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	31.284					
Toluene	UG/KG VOA	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER	1916.145					
Total Xylenes	UG/KG VOA	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER	3597.66					
Trans-1,3-Dichloropropene	UG/KG VOA							
Trichloroethene	UG/KG VOA	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	78.21					
Vinyl chloride	UG/KG VOA	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	2.73735					
1,2,4-Trichlorobenzene	UG/KG SV		130 UJ	95 UJ	120 UJ	130 UJ	98 UJ	98 UJ
1,2-Dichlorobenzene	UG/KG SV	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER	469.26	130 UJ	95 UJ	120 UJ	130 UJ	98 UJ
1,3-Dichlorobenzene	UG/KG SV	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER	469.26	130 UJ	95 UJ	120 UJ	130 UJ	98 UJ
1,4-Dichlorobenzene	UG/KG SV	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER	469.26	130 UJ	95 UJ	120 UJ	130 UJ	98 UJ
2,2'-oxybis(1-Chloropropane)	UG/KG SV							
2,4,5-Trichlorophenol	UG/KG SV		320 U	240 U	290 U	320 U	240 U	240 U
2,4,6-Trichlorophenol	UG/KG SV		130 U	95 U	120 U	130 U	98 U	98 U
2,4-Dichlorophenol	UG/KG SV		130 U	95 U	120 U	130 U	98 U	98 U
2,4-Dimethylphenol	UG/KG SV	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER	19.5525	130 U	95 U	120 U	130 U	98 U
2,4-Dinitrophenol	UG/KG SV		320 UJ	240 UJ	290 UJ	320 UJ	240 UJ	240 UJ
2,4-Dinitrotoluene	UG/KG SV		130 UJ	95 UJ	120 UJ	130 UJ	98 UJ	98 UJ
2,6-Dinitrotoluene	UG/KG SV		130 UJ	95 UJ	120 UJ	130 UJ	98 UJ	98 UJ
2-Chloronaphthalene	UG/KG SV		130 UJ	95 UJ	120 UJ	130 UJ	98 UJ	98 UJ
2-Chlorophenol	UG/KG SV		130 UJ	95 UJ	120 UJ	130 UJ	98 UJ	98 UJ
2-Methylnaphthalene	UG/KG SV	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER	1329.57	130 U	95 U	120 U	130 U	98 U
2-Methylphenol	UG/KG SV		130 UJ	95 UJ	120 UJ	130 UJ	98 UJ	98 UJ

**TABLE C-4**  
**SEDIMENT ANALYSES RAW DATA -SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT			SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13
				SD13-1	SD13-2	SD13-3	SD13-4	SD13-5
				SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT
				133000	133001	133002	133003	133004
				0	0	0	0	0
				0.2	0.2	0.2	0.2	0.2
				7/31/2001	7/31/2001	7/31/2001	7/31/2001	7/31/2001
				SA	SA	SA	SA	SA
				SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13
				N	N	N	N	N
				2	2	2	1	1
2-Nitroaniline	UG/KG SV			320 U	240 U	290 U	320 U	240 U
2-Nitrophenol	UG/KG SV	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER	19.5525	130 UJ	95 UJ	120 UJ	130 UJ	98 UJ
3,3'-Dichlorobenzidine	UG/KG SV			130 U	130 U	120 U	130 U	98 U
3-Nitroaniline	UG/KG SV			320 U	240 U	290 U	320 U	240 U
4,6-Dinitro-2-methylphenol	UG/KG SV			320 U	240 U	290 U	320 U	240 U
4-Bromophenyl phenyl ether	UG/KG SV			130 UJ	95 UJ	120 UJ	130 UJ	98 UJ
4-Chloro-3-methylphenol	UG/KG SV			130 U	95 U	120 U	130 U	98 U
4-Chloroaniline	UG/KG SV			130 U	95 U	120 U	130 U	98 U
4-Chlorophenyl phenyl ether	UG/KG SV			130 UJ	95 UJ	120 UJ	130 UJ	98 UJ
4-Methylphenol	UG/KG SV	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER	19.5525	15 J	6.9 J	120 U	58 J	10 J
4-Nitroaniline	UG/KG SV			320 U	240 U	290 U	320 U	240 U
4-Nitrophenol	UG/KG SV			320 UJ	240 UJ	290 UJ	320 UJ	240 UJ
Acenaphthene	UG/KG SV	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER	5474.7	130 U	95 U	120 U	130 U	98 U
Acenaphthylene	UG/KG SV			130 U	95 U	120 U	130 U	98 U
Anthracene	UG/KG SV	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER	4184.235	130 U	95 U	120 U	130 U	5.1 J
Benzo(a)anthracene	UG/KG SV	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	50.8365	130 U	95 U	120 U	130 U	9.4 J
Benzo(a)pyrene	UG/KG SV	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	50.8365	130 U	95 U	120 U	130 U	8.8 J
Benzo(b)fluoranthene	UG/KG SV	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	50.8365	130 U	95 U	120 U	130 U	9.8 J
Benzo(ghi)perylene	UG/KG SV			130 U	95 U	120 U	130 U	8.3 J
Benzo(k)fluoranthene	UG/KG SV	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	50.8365	130 U	95 U	120 U	130 U	8.6 J
Bis(2-Chloroethoxy)methane	UG/KG SV			130 U	95 U	120 U	130 U	98 U
Bis(2-Chloroethyl)ether	UG/KG SV			130 UJ	95 UJ	120 UJ	130 UJ	98 UJ
Bis(2-Chloroisopropyl)ether	UG/KG SV			130 UJ	95 UJ	120 UJ	130 UJ	98 UJ
Bis(2-Ethylhexyl)phthalate	UG/KG SV	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER	7801.4475	130 U	95 U	120 U	130 U	98 U
Butylbenzylphthalate	UG/KG SV			130 U	95 U	120 U	130 U	98 U
Carbazole	UG/KG SV			130 U	95 U	120 U	130 U	98 U
Chrysene	UG/KG SV	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	50.8365	130 U	95 U	120 U	130 U	11 J
Di-n-butylphthalate	UG/KG SV			130 U	95 U	120 U	130 U	98 U
Di-n-octylphthalate	UG/KG SV			130 U	95 U	120 U	130 U	9.9 J
Dibenz(a,h)anthracene	UG/KG SV			130 U	95 U	120 U	130 U	6 J
Dibenzofuran	UG/KG SV			130 UJ	95 UJ	120 UJ	130 UJ	98 UJ
Diethyl phthalate	UG/KG SV			130 U	95 U	120 U	130 U	98 U
Dimethylphthalate	UG/KG SV			130 UJ	95 UJ	120 UJ	130 UJ	98 UJ
Fluoranthene	UG/KG SV	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER	39887.1	130 U	95 U	120 U	130 U	13 J
Fluorene	UG/KG SV	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER	312.84	130 UJ	95 UJ	120 UJ	130 UJ	98 UJ
Hexachlorobenzene	UG/KG SV	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	5.86575	130 U	95 U	120 U	130 U	98 U
Hexachlorobutadiene	UG/KG SV			130 U	95 U	120 U	130 U	98 U
Hexachlorocyclopentadiene	UG/KG SV			130 UJ	95 UJ	120 UJ	130 UJ	98 UJ
Hexachloroethane	UG/KG SV			130 U	95 U	120 U	130 U	98 U
Indeno(1,2,3-cd)pyrene	UG/KG SV	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	50.8365	130 U	95 U	120 U	130 U	7.8 J
Isophorone	UG/KG SV			130 U	95 U	120 U	130 U	98 U
N-Nitrosodiphenylamine	UG/KG SV			130 U	95 U	120 U	130 U	98 U
N-Nitrosodipropylamine	UG/KG SV			130 U	95 U	120 U	130 U	98 U
Naphthalene	UG/KG SV	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER	1173.15	130 UJ	95 UJ	120 UJ	130 UJ	98 UJ
Nitrobenzene	UG/KG SV			130 UJ	95 UJ	120 UJ	130 UJ	98 UJ
Pentachlorophenol	UG/KG SV	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER	1564.2	320 U	240 U	290 U	320 U	240 U
Phenanthrene	UG/KG SV	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER	4692.6	130 UJ	95 UJ	120 UJ	130 UJ	8.6 J
Phenol	UG/KG SV	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER	19.5525	130 U	95 U	120 U	130 U	98 U
Pyrene	UG/KG SV	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER	37579.905	130 U	95 U	120 U	130 U	13 J

**TABLE C-4**  
**SEDIMENT ANALYSES RAW DATA -SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13
		SD13-1	SD13-2	SD13-3	SD13-4	SD13-5
		SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT
		133000	133001	133002	133003	133004
		0	0	0	0	0
		0.2	0.2	0.2	0.2	0.2
		7/31/2001	7/31/2001	7/31/2001	7/31/2001	7/31/2001
		SA	SA	SA	SA	SA
		SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13
		2	2	2	1	1
		N	N	N	N	N
1,3,5-Trinitrobenzene	UG/KG EXP					
1,3-Dinitrobenzene	UG/KG EXP					
2,4,6-Trinitrotoluene	UG/KG EXP					
2,4-Dinitrotoluene	UG/KG EXP					
2,6-Dinitrotoluene	UG/KG EXP					
2-amino-4,6-Dinitrotoluene	UG/KG EXP					
4-amino-2,6-Dinitrotoluene	UG/KG EXP					
HMX	UG/KG EXP					
RDX	UG/KG EXP					
Tetryl	UG/KG EXP					
4,4'-DDD	UG/KG OCP	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	0.39105			
4,4'-DDE	UG/KG OCP	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	0.39105			
4,4'-DDT	UG/KG OCP	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	0.39105			
Aldrin	UG/KG OCP	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	3.9105			
Alpha-BHC	UG/KG OCP					
Alpha-Chlordane	UG/KG OCP	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	0.039105			
Aroclor-1016	UG/KG OCP	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	0.031284			
Aroclor-1221	UG/KG OCP	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	0.031284			
Aroclor-1232	UG/KG OCP	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	0.031284			
Aroclor-1242	UG/KG OCP	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	0.031284			
Aroclor-1248	UG/KG OCP	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	0.031284			
Aroclor-1254	UG/KG OCP	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	0.031284			
Aroclor-1260	UG/KG OCP	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	0.031284			
Beta-BHC	UG/KG OCP					
Delta-BHC	UG/KG OCP					
Dieldrin	UG/KG OCP	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	3.9105			
Endosulfan I	UG/KG OCP	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER	1.17315			
Endosulfan II	UG/KG OCP	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER	1.17315			
Endosulfan sulfate	UG/KG OCP					
Endrin	UG/KG OCP	NYS WILD/HUMAN BIOACCUM CRITERIA	31.284			
Endrin aldehyde	UG/KG OCP					
Endrin ketone	UG/KG OCP					
Gamma-BHC/Lindane	UG/KG OCP					
Gamma-Chlordane	UG/KG OCP	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	0.039105			
Heptachlor	UG/KG OCP	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	0.031284			
Heptachlor epoxide	UG/KG OCP	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	0.031284			
Methoxychlor	UG/KG OCP					
Toxaphene	UG/KG OCP					
2,4,5-T	UG/KG H					
2,4,5-TP/Silvex	UG/KG H					
2,4-D	UG/KG H					
2,4-DB	UG/KG H					
Dalapon	UG/KG H					
Dicamba	UG/KG H					
Dichloroprop	UG/KG H					
Dinoseb	UG/KG H					
MCPA	UG/KG H					
MCPP	UG/KG H					
Aluminum	MG/KG M	14100	11900	18400	17900	14600



**TABLE C-4**  
**SEDIMENT ANALYSES RAW DATA -SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT		SEAD-13 SD13-1 SEDIMENT		SEAD-13 SD13-2 SEDIMENT		SEAD-13 SD13-3 SEDIMENT		SEAD-13 SD13-4 SEDIMENT		SEAD-13 SD13-5 SEDIMENT	
			133000	0	133001	0	133002	0	133003	0	133004	0
			7/31/2001		7/31/2001		7/31/2001		7/31/2001		7/31/2001	
			SA		SA		SA		SA		SA	
			SEAD-13		SEAD-13		SEAD-13		SEAD-13		SEAD-13	
			2		2		2		1		1	
			N		N		N		N		N	
Antimony	MG/KG M	NYS LOWEST EFFECT LEVEL	2	0.69 UJ		0.44 UJ		0.58 UJ		0.64 UJ		0.65 J
Arsenic	MG/KG M	NYS LOWEST EFFECT LEVEL	6	4		3.6		4.8		3.9		4.6
Barium	MG/KG M			98.5		58.8		164		119		98.3
Beryllium	MG/KG M			0.59 J		0.54 J		0.98 J		1 J		0.74 J
Cadmium	MG/KG M	NYS LOWEST EFFECT LEVEL	0.6	0.7 J		0.55 J		0.86 J		0.96 J		0.75 J
Calcium	MG/KG M			4260		4370		4800		5510		11000
Chromium	MG/KG M	NYS LOWEST EFFECT LEVEL	26	20.1		18.4		24.9		27.7		20.9
Cobalt	MG/KG M			9.1 J		8.9 J		11.1 J		13.5 J		10.8 J
Copper	MG/KG M	NYS LOWEST EFFECT LEVEL	16	20		18.1		18.2		20.7		18.2
Cyanide	MG/KG M			0.83 U		0.59 U		0.78 U		0.82 U		0.58 U
Iron	MG/KG M	NYS LOWEST EFFECT LEVEL	20000	20900		20700		28900		29400		24600
Lead	MG/KG M	NYS LOWEST EFFECT LEVEL	31	20.9		16		17.2		24.9		19.1
Magnesium	MG/KG M			3890		4030		4070		5120		5780
Manganese	MG/KG M	NYS LOWEST EFFECT LEVEL	460	306		258		778		399		546
Mercury	MG/KG M	NYS LOWEST EFFECT LEVEL	0.15	0.1 U		0.06 U		0.09 U		0.09 U		0.07 U
Nickel	MG/KG M	NYS LOWEST EFFECT LEVEL	16	25.7		25.5		26.5		35.4		26
Potassium	MG/KG M			1820 J		1370		1500 J		2830		1620
Selenium	MG/KG M			0.88 U		0.56 U		0.74 U		0.82 U		0.58 U
Silver	MG/KG M	NYS LOWEST EFFECT LEVEL	1	0.61 U		0.39 U		0.52 U		0.57 U		0.41 U
Sodium	MG/KG M			136 U		86.2 U		115 U		127 U		90.1 U
Thallium	MG/KG M			0.88 UJ		0.56 UJ		0.74 UJ		0.82 UJ		0.58 UJ
Vanadium	MG/KG M			18.7 J		18.3		28.5		29.7		23.2
Zinc	MG/KG M	NYS LOWEST EFFECT LEVEL	120	85.9		58.3		81.5		114		66.9
Nitrate/Nitrite Nitrogen	MG/KG WC			0.019 U		0.014 U		0.044 J		0.019 U		0.057 J
Percent Solids	% WC			51.3		69.3		56.2		51.7		66.9

**TABLE C-4**  
**SEDIMENT ANALYSES RAW DATA -SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	SEAD-13 SD13-6 SEDIMENT 133005 0 0.2 7/31/2001 SA SEAD-13	SEAD-13 SW/SD13-1 SEDIMENT SD13-1 0 0.5 11/3/1993 SA ESI	SEAD-13 SW/SD13-2 SEDIMENT SD13-2 0 0.5 11/3/1993 SA ESI	SEAD-13 SW/SD13-3 SEDIMENT SD13-3 0 0.5 11/3/1993 SA ESI	SEAD-13 SW/SD13-1 SEDIMENT SD13-4 0 0.5 11/3/1993 SA ESI
1,1,1-Trichloroethane	UG/KG VOA			36 UJ	43 UJ	28 UJ
1,1,2,2-Tetrachloroethane	UG/KG VOA	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA 11.7315		36 UJ	43 UJ	28 UJ
1,1,2-Trichloroethane	UG/KG VOA			36 UJ	43 UJ	28 UJ
1,1-Dichloroethane	UG/KG VOA			36 UJ	43 UJ	28 UJ
1,1-Dichloroethene	UG/KG VOA	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA 0.7821		36 UJ	43 UJ	28 UJ
1,2-Dichloroethane	UG/KG VOA	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA 27.3735		36 UJ	43 UJ	28 UJ
1,2-Dichloroethene (total)	UG/KG VOA			36 UJ	43 UJ	28 UJ
1,2-Dichloropropane	UG/KG VOA			36 UJ	43 UJ	28 UJ
Acetone	UG/KG VOA			380 J	150 J	110 J
Benzene	UG/KG VOA	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA 23.463		36 UJ	43 UJ	28 UJ
Bromodichloromethane	UG/KG VOA			36 UJ	43 UJ	28 UJ
Bromoform	UG/KG VOA			36 UJ	43 UJ	28 UJ
Carbon disulfide	UG/KG VOA			36 UJ	43 UJ	28 UJ
Carbon tetrachloride	UG/KG VOA	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA 23.463		36 UJ	43 UJ	28 UJ
Chlorobenzene	UG/KG VOA	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER 136.8675		36 UJ	43 UJ	28 UJ
Chlorodibromomethane	UG/KG VOA			36 UJ	43 UJ	28 UJ
Chloroethane	UG/KG VOA			36 UJ	43 UJ	28 UJ
Chloroform	UG/KG VOA			36 UJ	43 UJ	28 UJ
Cis-1,3-Dichloropropene	UG/KG VOA			36 UJ	43 UJ	28 UJ
Ethyl benzene	UG/KG VOA	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER 938.52		36 UJ	43 UJ	28 UJ
Methyl bromide	UG/KG VOA			36 UJ	43 UJ	28 UJ
Methyl butyl ketone	UG/KG VOA			36 UJ	43 UJ	28 UJ
Methyl chloride	UG/KG VOA			36 UJ	43 UJ	28 UJ
Methyl ethyl ketone	UG/KG VOA			140 J	43 UJ	28 UJ
Methyl isobutyl ketone	UG/KG VOA			36 UJ	43 UJ	28 UJ
Methylene chloride	UG/KG VOA			36 UJ	43 UJ	28 UJ
Styrene	UG/KG VOA			36 UJ	43 UJ	28 UJ
Tetrachloroethene	UG/KG VOA	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA 31.284		36 UJ	43 UJ	28 UJ
Toluene	UG/KG VOA	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER 1916.145		36 UJ	43 UJ	28 UJ
Total Xylenes	UG/KG VOA	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER 3597.66		36 UJ	43 UJ	28 UJ
Trans-1,3-Dichloropropene	UG/KG VOA			36 UJ	43 UJ	28 UJ
Trichloroethene	UG/KG VOA	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA 78.21		36 UJ	43 UJ	28 UJ
Vinyl chloride	UG/KG VOA	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA 2.73735		36 UJ	43 UJ	28 UJ
1,2,4-Trichlorobenzene	UG/KG SV		73 UJ	970 UJ	990 UJ	2700 UJ
1,2-Dichlorobenzene	UG/KG SV	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER 469.26	73 UJ	970 UJ	990 UJ	2700 UJ
1,3-Dichlorobenzene	UG/KG SV	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER 469.26	73 UJ	970 UJ	990 UJ	2700 UJ
1,4-Dichlorobenzene	UG/KG SV	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER 469.26	73 UJ	970 UJ	990 UJ	2700 UJ
2,2'-oxybis(1-Chloropropane)	UG/KG SV			970 UJ	990 UJ	2700 UJ
2,4,5-Trichlorophenol	UG/KG SV		180 U	2400 UJ	2400 UJ	6600 UJ
2,4,6-Trichlorophenol	UG/KG SV		73 U	970 UJ	990 UJ	2700 UJ
2,4-Dichlorophenol	UG/KG SV		73 U	970 UJ	990 UJ	2700 UJ
2,4-Dimethylphenol	UG/KG SV	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER 19.5525	73 U	970 UJ	990 UJ	2700 UJ
2,4-Dinitrophenol	UG/KG SV		180 UJ	2400 UJ	2400 UJ	6600 UJ
2,4-Dinitrotoluene	UG/KG SV		73 UJ	970 UJ	990 UJ	2700 UJ
2,6-Dinitrotoluene	UG/KG SV		73 UJ	970 UJ	990 UJ	2700 UJ
2-Chloronaphthalene	UG/KG SV		73 UJ	970 UJ	990 UJ	2700 UJ
2-Chlorophenol	UG/KG SV		73 UJ	970 UJ	990 UJ	2700 UJ
2-Methylnaphthalene	UG/KG SV	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER 1329.57	10 J	970 UJ	990 UJ	2700 UJ
2-Methylphenol	UG/KG SV		73 UJ	970 UJ	990 UJ	2700 UJ

**TABLE C-4**  
**SEDIMENT ANALYSES RAW DATA -SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	N	SEAD-13 SD13-6 SEDIMENT 133005 0 0.2 7/31/2001 SA SEAD-13	1	N	SEAD-13	SEAD-13	SEAD-13	SEAD-13	SEAD-13
						SW/SD13-1 SEDIMENT SD13-1 0 0.5 11/3/1993 SA ESI	SW/SD13-2 SEDIMENT SD13-2 0 0.5 11/3/1993 SA ESI	SW/SD13-3 SEDIMENT SD13-3 0 0.5 11/3/1993 SA ESI	SW/SD13-1 SEDIMENT SD13-4 0 0.5 11/3/1993 SA ESI	
2-Nitroaniline	UG/KG SV			180 U		2400 UJ	2400 UJ	6600 UJ	1800 UJ	
2-Nitrophenol	UG/KG SV	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER	19.5525	73 UJ		970 UJ	990 UJ	2700 UJ	760 UJ	
3,3'-Dichlorobenzidine	UG/KG SV			73 U		970 UJ	990 UJ	2700 UJ	760 UJ	
3-Nitroaniline	UG/KG SV			180 U		2400 UJ	2400 UJ	6600 UJ	1800 UJ	
4,6-Dinitro-2-methylphenol	UG/KG SV			180 U		2400 UJ	2400 UJ	6600 UJ	1800 UJ	
4-Bromophenyl phenyl ether	UG/KG SV			73 UJ		970 UJ	990 UJ	2700 UJ	760 UJ	
4-Chloro-3-methylphenol	UG/KG SV			73 U		970 UJ	990 UJ	2700 UJ	760 UJ	
4-Chloroaniline	UG/KG SV			73 U		970 UJ	990 UJ	2700 UJ	760 UJ	
4-Chlorophenyl phenyl ether	UG/KG SV			73 UJ		970 UJ	990 UJ	2700 UJ	760 UJ	
4-Methylphenol	UG/KG SV	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER	19.5525	6.4 J		970 UJ	990 UJ	2700 UJ	760 UJ	
4-Nitroaniline	UG/KG SV			180 U		2400 UJ	2400 UJ	6600 UJ	1800 UJ	
4-Nitrophenol	UG/KG SV			180 UJ		2400 UJ	2400 UJ	6600 UJ	1800 UJ	
Acenaphthene	UG/KG SV	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER	5474.7	73 U		970 UJ	990 UJ	2700 UJ	760 UJ	
Acenaphthylene	UG/KG SV			8.8 J		970 UJ	990 UJ	2700 UJ	760 UJ	
Anthracene	UG/KG SV	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER	4184.235	8.3 J		970 UJ	990 UJ	2700 UJ	760 UJ	
Benzo(a)anthracene	UG/KG SV	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	50.8365	90		970 UJ	990 UJ	2700 UJ	760 UJ	
Benzo(a)pyrene	UG/KG SV	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	50.8365	88		970 UJ	990 UJ	2700 UJ	760 UJ	
Benzo(b)fluoranthene	UG/KG SV	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	50.8365	86		970 UJ	990 UJ	2700 UJ	760 UJ	
Benzo(ghi)perylene	UG/KG SV			57 J		970 UJ	990 UJ	2700 UJ	760 UJ	
Benzo(k)fluoranthene	UG/KG SV	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	50.8365	55 J		970 UJ	990 UJ	2700 UJ	760 UJ	
Bis(2-Chloroethoxy)methane	UG/KG SV			73 U		970 UJ	990 UJ	2700 UJ	760 UJ	
Bis(2-Chloroethyl)ether	UG/KG SV			73 UJ		970 UJ	990 UJ	2700 UJ	760 UJ	
Bis(2-Chloroisopropyl)ether	UG/KG SV			73 UJ		970 UJ	990 UJ	2700 UJ	760 UJ	
Bis(2-Ethylhexyl)phthalate	UG/KG SV	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER	7801.4475	73 U		970 UJ	990 UJ	2700 UJ	760 UJ	
Butylbenzylphthalate	UG/KG SV			73 U		970 UJ	990 UJ	2700 UJ	760 UJ	
Carbazole	UG/KG SV			73 U		970 UJ	990 UJ	2700 UJ	760 UJ	
Chrysene	UG/KG SV	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	50.8365	190		970 UJ	990 UJ	2700 UJ	760 UJ	
Di-n-butylphthalate	UG/KG SV			73 U		970 UJ	990 UJ	2700 UJ	760 UJ	
Di-n-octylphthalate	UG/KG SV			73 U		970 UJ	990 UJ	2700 UJ	760 UJ	
Dibenz(a,h)anthracene	UG/KG SV			16 J		970 UJ	990 UJ	2700 UJ	760 UJ	
Dibenzofuran	UG/KG SV			4.3 J		970 UJ	990 UJ	2700 UJ	760 UJ	
Diethyl phthalate	UG/KG SV			73 U		970 UJ	990 UJ	2700 UJ	760 UJ	
Dimethylphthalate	UG/KG SV			73 UJ		970 UJ	990 UJ	2700 UJ	760 UJ	
Fluoranthene	UG/KG SV	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER	39887.1	120		69 J	990 UJ	2700 UJ	63 J	
Fluorene	UG/KG SV	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER	312.84	6.4 J		970 UJ	990 UJ	2700 UJ	760 UJ	
Hexachlorobenzene	UG/KG SV	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	5.86575	73 U		970 UJ	990 UJ	2700 UJ	760 UJ	
Hexachlorobutadiene	UG/KG SV			73 U		970 UJ	990 UJ	2700 UJ	760 UJ	
Hexachlorocyclopentadiene	UG/KG SV			73 UJ		970 UJ	990 UJ	2700 UJ	760 UJ	
Hexachloroethane	UG/KG SV			73 U		970 UJ	990 UJ	2700 UJ	760 UJ	
Indeno(1,2,3-cd)pyrene	UG/KG SV	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	50.8365	44 J		970 UJ	990 UJ	2700 UJ	760 UJ	
Isophorone	UG/KG SV			73 U		970 UJ	990 UJ	2700 UJ	760 UJ	
N-Nitrosodiphenylamine	UG/KG SV			73 U		970 UJ	990 UJ	2700 UJ	760 UJ	
N-Nitrosodipropylamine	UG/KG SV			73 U		970 UJ	990 UJ	2700 UJ	760 UJ	
Naphthalene	UG/KG SV	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER	1173.15	6.8 J		970 UJ	990 UJ	2700 UJ	760 UJ	
Nitrobenzene	UG/KG SV			73 UJ		970 UJ	990 UJ	2700 UJ	760 UJ	
Pentachlorophenol	UG/KG SV	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER	1564.2	180 U		2400 UJ	2400 UJ	6600 UJ	1800 UJ	
Phenanthrene	UG/KG SV	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER	4692.6	160 J		970 UJ	990 UJ	2700 UJ	35 J	
Phenol	UG/KG SV	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER	19.5525	73 U		970 UJ	990 UJ	2700 UJ	760 UJ	
Pyrene	UG/KG SV	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER	37579.905	270		60 J	990 UJ	2700 UJ	54 J	

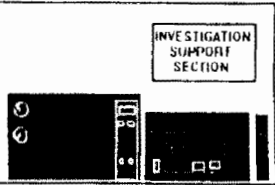
**TABLE C-4**  
**SEDIMENT ANALYSES RAW DATA -SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT	SEAD-13		SEAD-13		SEAD-13		SEAD-13		SEAD-13	
		SD13-6	SD13-1	SW/SD13-1	SW/SD13-2	SW/SD13-3	SW/SD13-3	SW/SD13-3	SW/SD13-3	SW/SD13-1	SW/SD13-1
		SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT
		133005	SD13-1	SD13-1	SD13-2	SD13-2	SD13-3	SD13-3	SD13-3	SD13-4	SD13-4
		0	0	0	0	0	0	0	0	0	0
		0.2	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
		7/31/2001	11/3/1993	11/3/1993	11/3/1993	11/3/1993	11/3/1993	11/3/1993	11/3/1993	11/3/1993	11/3/1993
		SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
		SEAD-13	ESI	ESI	ESI	ESI	ESI	ESI	ESI	ESI	ESI
		1									
		N	N	N	N	N	N	N	N	N	N
1,3,5-Trinitrobenzene	UG/KG EXP			130 UJ	130 UJ	130 UJ	130 UJ	130 UJ	130 UJ	130 UJ	130 UJ
1,3-Dinitrobenzene	UG/KG EXP			130 UJ	130 UJ	130 UJ	130 UJ	130 UJ	130 UJ	130 UJ	130 UJ
2,4,6-Trinitrotoluene	UG/KG EXP			130 UJ	130 UJ	130 UJ	130 UJ	130 UJ	130 UJ	130 UJ	130 UJ
2,4-Dinitrotoluene	UG/KG EXP			130 UJ	130 UJ	130 UJ	130 UJ	130 UJ	130 UJ	130 UJ	130 UJ
2,6-Dinitrotoluene	UG/KG EXP			130 UJ	130 UJ	130 UJ	130 UJ	130 UJ	130 UJ	130 UJ	130 UJ
2-amino-4,6-Dinitrotoluene	UG/KG EXP			130 UJ	130 UJ	130 UJ	130 UJ	130 UJ	130 UJ	130 UJ	130 UJ
4-amino-2,6-Dinitrotoluene	UG/KG EXP			130 UJ	130 UJ	130 UJ	130 UJ	130 UJ	130 UJ	130 UJ	130 UJ
HMX	UG/KG EXP			130 UJ	130 UJ	130 UJ	130 UJ	130 UJ	130 UJ	130 UJ	130 UJ
RDX	UG/KG EXP			130 UJ	130 UJ	130 UJ	130 UJ	130 UJ	130 UJ	130 UJ	130 UJ
Tetryl	UG/KG EXP			130 UJ	200 J	130 UJ	130 UJ	130 UJ	130 UJ	130 UJ	130 UJ
4,4'-DDD	UG/KG OCP	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	0.39105	9.6 UJ	10 UJ	10 UJ	8.2 UJ	8.2 UJ	7.6 UJ	7.6 UJ	7.6 UJ
4,4'-DDE	UG/KG OCP	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	0.39105	9.6 UJ	10 UJ	10 UJ	8.2 UJ	8.2 UJ	7.6 UJ	7.6 UJ	7.6 UJ
4,4'-DDT	UG/KG OCP	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	0.39105	9.6 UJ	10 UJ	10 UJ	8.2 UJ	8.2 UJ	7.6 UJ	7.6 UJ	7.6 UJ
Aldrin	UG/KG OCP	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	3.9105	5 UJ	5.2 UJ	5.2 UJ	4.2 UJ	4.2 UJ	3.9 UJ	3.9 UJ	3.9 UJ
Alpha-BHC	UG/KG OCP			5 UJ	5.2 UJ	5.2 UJ	4.2 UJ	4.2 UJ	3.9 UJ	3.9 UJ	3.9 UJ
Alpha-Chlordane	UG/KG OCP	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	0.039105	5 UJ	5.2 UJ	5.2 UJ	4.2 UJ	4.2 UJ	3.9 UJ	3.9 UJ	3.9 UJ
Aroclor-1016	UG/KG OCP	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	0.031284	96 UJ	100 UJ	100 UJ	82 UJ	82 UJ	76 UJ	76 UJ	76 UJ
Aroclor-1221	UG/KG OCP	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	0.031284	200 UJ	200 UJ	200 UJ	170 UJ	170 UJ	150 UJ	150 UJ	150 UJ
Aroclor-1232	UG/KG OCP	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	0.031284	96 UJ	100 UJ	100 UJ	82 UJ	82 UJ	76 UJ	76 UJ	76 UJ
Aroclor-1242	UG/KG OCP	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	0.031284	96 UJ	100 UJ	100 UJ	82 UJ	82 UJ	76 UJ	76 UJ	76 UJ
Aroclor-1248	UG/KG OCP	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	0.031284	96 UJ	100 UJ	100 UJ	82 UJ	82 UJ	76 UJ	76 UJ	76 UJ
Aroclor-1254	UG/KG OCP	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	0.031284	96 UJ	100 UJ	100 UJ	82 UJ	82 UJ	76 UJ	76 UJ	76 UJ
Aroclor-1260	UG/KG OCP	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	0.031284	96 UJ	100 UJ	100 UJ	82 UJ	82 UJ	76 UJ	76 UJ	76 UJ
Beta-BHC	UG/KG OCP			5 UJ	5.2 UJ	5.2 UJ	4.2 UJ	4.2 UJ	3.9 UJ	3.9 UJ	3.9 UJ
Delta-BHC	UG/KG OCP			5 UJ	5.2 UJ	5.2 UJ	4.2 UJ	4.2 UJ	3.9 UJ	3.9 UJ	3.9 UJ
Dieldrin	UG/KG OCP	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	3.9105	9.6 UJ	10 UJ	10 UJ	8.2 UJ	8.2 UJ	7.6 UJ	7.6 UJ	7.6 UJ
Endosulfan I	UG/KG OCP	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER	1.17315	5 UJ	5.2 UJ	5.2 UJ	4.2 UJ	4.2 UJ	3.9 UJ	3.9 UJ	3.9 UJ
Endosulfan II	UG/KG OCP	NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITER	1.17315	9.6 UJ	10 UJ	10 UJ	8.2 UJ	8.2 UJ	7.6 UJ	7.6 UJ	7.6 UJ
Endosulfan sulfate	UG/KG OCP			9.6 UJ	10 UJ	10 UJ	8.2 UJ	8.2 UJ	7.6 UJ	7.6 UJ	7.6 UJ
Endrin	UG/KG OCP	NYS WILD/HUMAN BIOACCUM CRITERIA	31.284	9.6 UJ	10 UJ	10 UJ	8.2 UJ	8.2 UJ	7.6 UJ	7.6 UJ	7.6 UJ
Endrin aldehyde	UG/KG OCP			9.6 UJ	10 UJ	10 UJ	8.2 UJ	8.2 UJ	7.6 UJ	7.6 UJ	7.6 UJ
Endrin ketone	UG/KG OCP			9.6 UJ	10 UJ	10 UJ	8.2 UJ	8.2 UJ	7.6 UJ	7.6 UJ	7.6 UJ
Gamma-BHC/Lindane	UG/KG OCP			5 UJ	5.2 UJ	5.2 UJ	4.2 UJ	4.2 UJ	3.9 UJ	3.9 UJ	3.9 UJ
Gamma-Chlordane	UG/KG OCP	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	0.039105	5 UJ	5.2 UJ	5.2 UJ	4.2 UJ	4.2 UJ	3.9 UJ	3.9 UJ	3.9 UJ
Heptachlor	UG/KG OCP	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	0.031284	5 UJ	5.2 UJ	5.2 UJ	4.2 UJ	4.2 UJ	3.9 UJ	3.9 UJ	3.9 UJ
Heptachlor epoxide	UG/KG OCP	NYS HUMAN HEALTH BIOACCUMULATION CRITERIA	0.031284	5 UJ	5.2 UJ	5.2 UJ	4.2 UJ	4.2 UJ	3.9 UJ	3.9 UJ	3.9 UJ
Methoxychlor	UG/KG OCP			50 UJ	52 UJ	52 UJ	42 UJ	42 UJ	39 UJ	39 UJ	39 UJ
Toxaphene	UG/KG OCP			500 UJ	520 UJ	520 UJ	420 UJ	420 UJ	390 UJ	390 UJ	390 UJ
2,4,5-T	UG/KG H			15 UJ	16 UJ	16 UJ	13 UJ	13 UJ	12 UJ	12 UJ	12 UJ
2,4,5-TP/Silvex	UG/KG H			15 UJ	16 UJ	16 UJ	13 UJ	13 UJ	12 UJ	12 UJ	12 UJ
2,4-D	UG/KG H			150 UJ	160 UJ	160 UJ	130 UJ	130 UJ	120 UJ	120 UJ	120 UJ
2,4-DB	UG/KG H			150 UJ	160 UJ	160 UJ	130 UJ	130 UJ	120 UJ	120 UJ	120 UJ
Dalapon	UG/KG H			350 UJ	370 UJ	370 UJ	300 UJ	300 UJ	280 UJ	280 UJ	280 UJ
Dicamba	UG/KG H			15 UJ	16 UJ	16 UJ	13 UJ	13 UJ	12 UJ	12 UJ	12 UJ
Dichloroprop	UG/KG H			150 UJ	160 UJ	160 UJ	130 UJ	130 UJ	120 UJ	120 UJ	120 UJ
Dinoseb	UG/KG H			73 UJ	76 UJ	76 UJ	62 UJ	62 UJ	58 UJ	58 UJ	58 UJ
MCPA	UG/KG H			15000 UJ	16000 UJ	16000 UJ	13000 UJ	13000 UJ	12000 UJ	12000 UJ	12000 UJ
MCPP	UG/KG H			15000 UJ	16000 UJ	16000 UJ	13000 UJ	13000 UJ	12000 UJ	12000 UJ	12000 UJ
Aluminum	MG/KG M		9330	14500 J	16900 J	16900 J	17800 J	17800 J	18200 J	18200 J	18200 J

**TABLE C-4**  
**SEDIMENT ANALYSES RAW DATA -SEAD-13**  
**Decision Document-Mini Risk Assessment**  
**Seneca Army Depot Activity**

PARAMETER	UNIT		SEAD-13		SEAD-13		SEAD-13		SEAD-13		SEAD-13	
			SD13-6	SD13-6	SW/SD13-1	SW/SD13-1	SW/SD13-2	SW/SD13-2	SW/SD13-3	SW/SD13-3	SW/SD13-1	SW/SD13-1
			SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT
			133005	SD13-1	SD13-2	SD13-2	SD13-3	SD13-3	SD13-3	SD13-3	SD13-4	SD13-4
			0	0	0	0	0	0	0	0	0	0
			0.2	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5	0.5
			7/31/2001	11/3/1993	11/3/1993	11/3/1993	11/3/1993	11/3/1993	11/3/1993	11/3/1993	11/3/1993	11/3/1993
			SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
			SEAD-13	ESI	ESI	ESI	ESI	ESI	ESI	ESI	ESI	ESI
			1									
			N	N	N	N	N	N	N	N	N	N
Antimony	MG/KG M	NYS LOWEST EFFECT LEVEL	2	0.34 UJ	27.2 UJ	31.5 UJ	21.2 UJ	20.6 UJ				
Arsenic	MG/KG M	NYS LOWEST EFFECT LEVEL	6	4	4.2 UR	2.2 UR	3.7 UR	4.3 UR				
Barium	MG/KG M			53.9	97.2 J	112 J	162 J	134 J				
Beryllium	MG/KG M			0.47 J	0.67 J	0.77 J	1 J	0.95 J				
Cadmium	MG/KG M	NYS LOWEST EFFECT LEVEL	0.6	0.66 J	1.7 UJ	2 UJ	1.3 UJ	1.3 UJ				
Calcium	MG/KG M			42200	7000 J	5780 J	7200 J	5750 J				
Chromium	MG/KG M	NYS LOWEST EFFECT LEVEL	26	16.6	21.7 J	23.3 J	26.1 J	26.9 J				
Cobalt	MG/KG M			7.9 J	6.7 J	9.1 J	11.3 J	10.8 J				
Copper	MG/KG M	NYS LOWEST EFFECT LEVEL	16	18.6	16.5 J	18.3 J	20.6 J	20.7 J				
Cyanide	MG/KG M			0.52 U	1.4 UJ	1.4 UJ	1.1 UJ	1.1 UJ				
Iron	MG/KG M	NYS LOWEST EFFECT LEVEL	20000	20400	19400 J	21100 J	27200 J	28100 J				
Lead	MG/KG M	NYS LOWEST EFFECT LEVEL	31	33.3	18.1 J	25.4 J	8.5 J	25.7 J				
Magnesium	MG/KG M			7110	4100 J	3980 J	4680 J	4610 J				
Manganese	MG/KG M	NYS LOWEST EFFECT LEVEL	460	543	235 J	361 J	424 J	428 J				
Mercury	MG/KG M	NYS LOWEST EFFECT LEVEL	0.15	0.07 J	0.03 J	0.09 J	0.02 UJ	0.06 J				
Nickel	MG/KG M	NYS LOWEST EFFECT LEVEL	16	23.5	24.6 J	25.7 J	31.1 J	30.8 J				
Potassium	MG/KG M			1130	2350 J	2210 J	2040 J	2210 J				
Selenium	MG/KG M			0.44 U	0.49 J	0.54 UJ	0.42 J	0.37 J				
Silver	MG/KG M	NYS LOWEST EFFECT LEVEL	1	0.3 U	3.4 UJ	4 UJ	2.7 UJ	3.2 J				
Sodium	MG/KG M			67.3 U	299 J	292 J	244 J	326 J				
Thallium	MG/KG M			0.44 UJ	0.5 UJ	0.59 UJ	0.3 UJ	0.35 UJ				
Vanadium	MG/KG M			15.1	26.3 J	31.5 J	31.8 J	33.6 J				
Zinc	MG/KG M	NYS LOWEST EFFECT LEVEL	120	86.8	91 UR	105 UR	93.2 UR	111 UR				
Nitrate/Nitrite Nitrogen	MG/KG WC			6.4 J								
Percent Solids	% WC			90.3								

**APPENDIX D**  
**Results for NYSDEC Surface Soil Sampling – June 2004**



NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION  
 DIVISION OF ENVIRONMENTAL REMEDIATION  
 CHAIN OF CUSTODY RECORD

Please Print legibly in ink:

Site Name: Seneca Army Depot Proj Manager: WHITE  
 Site Code: 850006 Region: B Bureau / Region:  
 T A Code: A475 Phone Number: 402-9620

VOA (40 ML)

BNA; PEST, PCBs (1 LITER) METALS (preserved 500 ML/ 1 LITER)

SOIL JARS

Bottles Released by: (Signature, Date/Time)

Sets

BNAs P/PCBs

Metals

VOAs

P/PCBs

Plus Trip Blank

BNAs 7

Metals

Received by: (Signature, Date/Time)

Benton 6/15/04

Sampler completes items 1 thru 8, one sample per line. Check analyses requested.

(1)FIELD ID	(2)MATRIX *	(3)DATE COLLECTED	(4)VOA	(5)BNA	(6)PEST PCB	(7)METALS	(8)COMMENTS (or SPECIAL ANALYSIS)	LAB SAMPLE ID Lab use only
C13 #1	SOIL	6-17-04		✓				
↓ #2	↓	↓		↓				
#3								
#4								
#5								
#6								
↓ #7	↓	↓		↓				

\*Please categorize the sample matrix as one of the following:

- GW - Groundwater
- SW - Surface water
- SOIL - Soil
- SED - Sediment
- LEACH - Leachate
- WASTE - Specify
- OTHER - Specify
- TB - Trip Blank

Shipping Address:

DER LAB, Room D201  
 1 University Place  
 Rensselaer, NY 12144  
 ATT: Brian Policastro  
 Phone: 518-525-2766

COLLECTED BY: (Signature, date/time) Sylvester 6-17-04

RELINQUISHED BY: (Signature, date/time) Benton 6-18-04

If you have any questions please call Fred Woodward at 518-457-9280 (office) or 518-525-2766 (lab).

LABORATORY ACCESSION BY: (Signature, date/time) Paul A. Diller 6/18/04  
 0938

# Case Narrative

Site Name: Seneca Army Depot

Date received: 06/18/04

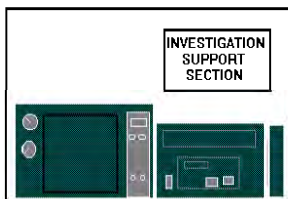
For sample delivery group(s): 170-02

The calibration verification that these samples were run under had several of the target analytes exceeding the calibration verification criteria that is associated with this method. However, since the initial calibration that these samples were quantitated against was valid, any reported values for these analytes should be considered valid. None of the analytes that exceeded the calibration verification criteria were found in the samples.

For samples Lab ID 804-170-005, 006, and 007 there were low recoveries for the Base/Neutral Surrogates. This was probably due to a matrix interference. If Base/Neutral analytes were detected in any of these three samples the reported value may be lower than the actual value and should be qualified with an 'E'.

All other QA/QC associated with this sample delivery group were within acceptable method criteria.





NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION  
 DIVISION OF ENVIRONMENTAL REMEDIATION  
 LABORATORY ANALYTICAL REPORT

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

FIELD SAMPLE ID

Site Name: Seneca Army Depot

Site Code: 850006

Matrix: (soil/water) SOIL

Sample wt/vol: 30.02 (g/ml) G

Level: (low/med) LOW

Extraction: (SepF/Cont/Sonc/SPE/ASE) \_\_\_\_\_

% Moisture: 16.9 decanted:(Y/N) N

Concentrated Extract Volume: 2000 (uL)

Injection Volume: 2.0 (uL) pH: \_\_\_\_\_

GPC Cleanup: (Y/N) Y

**C13-#1**

SDG No.: 170-02

Lab Sample ID: 804-170-005

Lab File ID: 04F0183A.D

Date Received: 06/18/04

Date Extracted: 06/24/04

Date Analyzed: 06/29/04

Dilution Factor: 1.0

CONCENTRATION UNITS:

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg)	UG/KG	Q
108-95-2	Phenol		800	U
95-57-8	2-Chlorophenol		800	U
111-44-4	bis(2-Chloroethyl)ether		800	U
541-73-1	1,3-Dichlorobenzene		800	U
106-46-7	1,4-Dichlorobenzene		800	U
95-50-1	1,2-Dichlorobenzene		800	U
100-51-6	Benzyl alcohol		800	U
108-60-1	2,2'-Oxybis(1-chloropropane)		800	U
95-48-7	2-Methylphenol		800	U
67-72-1	Hexachloroethane		800	U
621-64-7	N-Nitroso-di-n-propylamine		800	U
106-44-5	4-Methylphenol		800	U
98-95-3	Nitrobenzene		800	U
78-59-1	Isophorone		800	U
88-75-5	2-Nitrophenol		800	U
105-67-9	2,4-Dimethylphenol		800	U
111-91-1	bis(2-Chloroethoxy)methane		800	U
120-83-2	2,4-Dichlorophenol		800	U
120-82-1	1,2,4-Trichlorobenzene		800	U
91-20-3	Naphthalene		800	U
106-47-8	4-Chloroaniline		800	U
87-68-3	Hexachlorobutadiene		800	U
59-50-7	4-Chloro-3-methylphenol		800	U
91-57-6	2-Methylnaphthalene		800	U
77-47-4	Hexachlorocyclopentadiene		800	U
88-06-2	2,4,6-Trichlorophenol		800	U
95-95-4	2,4,5-Trichlorophenol		800	U
91-58-7	2-Chloronaphthalene		800	U
88-74-4	2-Nitroaniline		1600	U
208-96-8	Acenaphthylene		800	U
131-11-3	Dimethylphthalate		800	U
606-20-2	2,6-Dinitrotoluene		800	U
83-32-9	Acenaphthene		800	U
99-09-2	3-Nitroaniline		1600	U

CAS NO.	COMPOUND	(ug/L or ug/Kg)	UG/KG	Q
51-28-5	2,4-Dinitrophenol		1600	U
132-64-9	Dibenzofuran		800	U
100-02-7	4-Nitrophenol		1600	U
121-14-2	2,4-Dinitrotoluene		800	U
86-73-7	Fluorene		800	U
7005-72-3	4-Chlorophenyl-phenylether		800	U
84-66-2	Diethylphthalate		800	U
100-01-6	4-Nitroaniline		1600	U
534-52-1	4,6-Dinitro-2-methylphenol		1600	U
86-30-6	n-Nitrosodiphenylamine		800	U
101-55-3	4-Bromophenyl-phenylether		800	U
118-74-1	Hexachlorobenzene		800	U
87-86-5	Pentachlorophenol		1600	U
85-01-8	Phenanthrene		800	U
120-12-7	Anthracene		800	U
86-74-8	Carbazole		800	U
84-74-2	Di-n-butylphthalate		800	U
206-44-0	Fluoranthene		800	U
129-00-0	Pyrene		800	U
85-68-7	Butylbenzylphthalate		800	U
56-55-3	Benzo[a]anthracene		800	U
218-01-9	Chrysene		800	U
91-94-1	3,3'-Dichlorobenzidine		800	U
117-81-7	bis(2-Ethylhexyl)phthalate		800	U
117-84-0	Di-n-octylphthalate		800	U
205-99-2	Benzo[b]fluoranthene		800	U
207-08-9	Benzo[k]fluoranthene		800	U
50-32-8	Benzo[a]pyrene		800	U
193-39-5	Indeno[1,2,3-cd]pyrene		800	U
53-70-3	Dibenz[a,h]anthracene		800	U
191-24-2	Benzo[g,h,i]perylene		800	U

1F  
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET  
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

**C13-#1**

Lab Name: Seneca Army Depot Contract: \_\_\_\_\_

Lab Code: 850006 Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 170-02

Matrix: (soil/water) SOIL Lab Sample ID: 804-170-005

Sample wt/vol: 30.02 (g/ml) G Lab File ID: 04F0183A.D

Level: (low/med) LOW Date Received: 06/18/04

% Moisture: 16.9 decanted: (Y/N) N Date Extracted: 06/24/04

Concentrated Extract Volume: 2000 (uL) Date Analyzed: 06/29/04

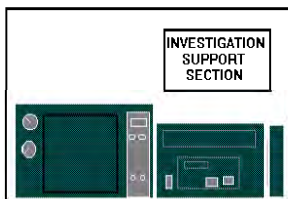
Injection Volume: 2.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: \_\_\_\_\_

CONCENTRATION UNITS:

Number TICs found: 0 (ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q



NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION  
 DIVISION OF ENVIRONMENTAL REMEDIATION  
 LABORATORY ANALYTICAL REPORT

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

FIELD SAMPLE ID

Site Name: Seneca Army Depot

Site Code: 850006

Matrix: (soil/water) SOIL

Sample wt/vol: 30.06 (g/ml) G

Level: (low/med) LOW

Extraction: (SepF/Cont/Sonc/SPE/ASE) \_\_\_\_\_

% Moisture: 16.4 decanted:(Y/N) N

Concentrated Extract Volume: 2000 (uL)

Injection Volume: 2.0 (uL) pH: \_\_\_\_\_

GPC Cleanup: (Y/N) Y

**C13-#2**

SDG No.: 170-02

Lab Sample ID: 804-170-006

Lab File ID: 04F0184A.D

Date Received: 06/18/04

Date Extracted: 06/24/04

Date Analyzed: 06/29/04

Dilution Factor: 1.0

CONCENTRATION UNITS:

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg)	UG/KG	Q
108-95-2	Phenol		800	U
95-57-8	2-Chlorophenol		800	U
111-44-4	bis(2-Chloroethyl)ether		800	U
541-73-1	1,3-Dichlorobenzene		800	U
106-46-7	1,4-Dichlorobenzene		800	U
95-50-1	1,2-Dichlorobenzene		800	U
100-51-6	Benzyl alcohol		800	U
108-60-1	2,2'-Oxybis(1-chloropropane)		800	U
95-48-7	2-Methylphenol		800	U
67-72-1	Hexachloroethane		800	U
621-64-7	N-Nitroso-di-n-propylamine		800	U
106-44-5	4-Methylphenol		800	U
98-95-3	Nitrobenzene		800	U
78-59-1	Isophorone		800	U
88-75-5	2-Nitrophenol		800	U
105-67-9	2,4-Dimethylphenol		800	U
111-91-1	bis(2-Chloroethoxy)methane		800	U
120-83-2	2,4-Dichlorophenol		800	U
120-82-1	1,2,4-Trichlorobenzene		800	U
91-20-3	Naphthalene		800	U
106-47-8	4-Chloroaniline		800	U
87-68-3	Hexachlorobutadiene		800	U
59-50-7	4-Chloro-3-methylphenol		800	U
91-57-6	2-Methylnaphthalene		800	U
77-47-4	Hexachlorocyclopentadiene		800	U
88-06-2	2,4,6-Trichlorophenol		800	U
95-95-4	2,4,5-Trichlorophenol		800	U
91-58-7	2-Chloronaphthalene		800	U
88-74-4	2-Nitroaniline		1600	U
208-96-8	Acenaphthylene		800	U
131-11-3	Dimethylphthalate		800	U
606-20-2	2,6-Dinitrotoluene		800	U
83-32-9	Acenaphthene		800	U
99-09-2	3-Nitroaniline		1600	U

CAS NO.	COMPOUND	(ug/L or ug/Kg)	UG/KG	Q
51-28-5	2,4-Dinitrophenol		1600	U
132-64-9	Dibenzofuran		800	U
100-02-7	4-Nitrophenol		1600	U
121-14-2	2,4-Dinitrotoluene		800	U
86-73-7	Fluorene		800	U
7005-72-3	4-Chlorophenyl-phenylether		800	U
84-66-2	Diethylphthalate		800	U
100-01-6	4-Nitroaniline		1600	U
534-52-1	4,6-Dinitro-2-methylphenol		1600	U
86-30-6	n-Nitrosodiphenylamine		800	U
101-55-3	4-Bromophenyl-phenylether		800	U
118-74-1	Hexachlorobenzene		800	U
87-86-5	Pentachlorophenol		1600	U
85-01-8	Phenanthrene		800	U
120-12-7	Anthracene		800	U
86-74-8	Carbazole		800	U
84-74-2	Di-n-butylphthalate		800	U
206-44-0	Fluoranthene		800	U
129-00-0	Pyrene		800	U
85-68-7	Butylbenzylphthalate		800	U
56-55-3	Benzo[a]anthracene		800	U
218-01-9	Chrysene		800	U
91-94-1	3,3'-Dichlorobenzidine		800	U
117-81-7	bis(2-Ethylhexyl)phthalate		800	U
117-84-0	Di-n-octylphthalate		800	U
205-99-2	Benzo[b]fluoranthene		800	U
207-08-9	Benzo[k]fluoranthene		800	U
50-32-8	Benzo[a]pyrene		800	U
193-39-5	Indeno[1,2,3-cd]pyrene		800	U
53-70-3	Dibenz[a,h]anthracene		800	U
191-24-2	Benzo[g,h,i]perylene		800	U

1F  
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET  
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

**C13-#2**

Lab Name: Seneca Army Depot Contract: \_\_\_\_\_

Lab Code: 850006 Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 170-02

Matrix: (soil/water) SOIL Lab Sample ID: 804-170-006

Sample wt/vol: 30.06 (g/ml) G Lab File ID: 04F0184A.D

Level: (low/med) LOW Date Received: 06/18/04

% Moisture: 16.4 decanted: (Y/N) N Date Extracted: 06/24/04

Concentrated Extract Volume: 2000 (uL) Date Analyzed: 06/29/04

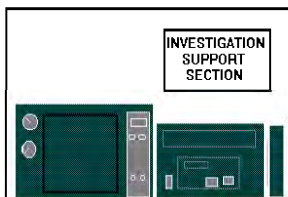
Injection Volume: 2.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: \_\_\_\_\_

CONCENTRATION UNITS:

Number TICs found: 4 (ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 054833-23-7	Eicosane, 10-methyl-	35.52	240	JN
2. 013287-24-6	Nonadecane, 9-methyl-	37.05	200	JN
3. 000083-47-6	.gamma.-Sitosterol	37.41	570	JN
4. 000544-85-4	Dotriacontane	38.49	220	JN



NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION  
 DIVISION OF ENVIRONMENTAL REMEDIATION  
 LABORATORY ANALYTICAL REPORT

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

FIELD SAMPLE ID

Site Name: Seneca Army Depot

Site Code: 850006

Matrix: (soil/water) SOIL

Sample wt/vol: 30.1 (g/ml) G

Level: (low/med) LOW

Extraction: (SepF/Cont/Sonc/SPE/ASE) \_\_\_\_\_

% Moisture: 14.9 decanted:(Y/N) N

Concentrated Extract Volume: 2000 (uL)

Injection Volume: 2.0 (uL) pH: \_\_\_\_\_

GPC Cleanup: (Y/N) Y

**C13-#3**

SDG No.: 170-02

Lab Sample ID: 804-170-007

Lab File ID: 04F0189A.D

Date Received: 06/18/04

Date Extracted: 06/24/04

Date Analyzed: 06/30/04

Dilution Factor: 1.0

CONCENTRATION UNITS:

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg)	UG/KG	Q
108-95-2	Phenol		780	U
95-57-8	2-Chlorophenol		780	U
111-44-4	bis(2-Chloroethyl)ether		780	U
541-73-1	1,3-Dichlorobenzene		780	U
106-46-7	1,4-Dichlorobenzene		780	U
95-50-1	1,2-Dichlorobenzene		780	U
100-51-6	Benzyl alcohol		780	U
108-60-1	2,2'-Oxybis(1-chloropropane)		780	U
95-48-7	2-Methylphenol		780	U
67-72-1	Hexachloroethane		780	U
621-64-7	N-Nitroso-di-n-propylamine		780	U
106-44-5	4-Methylphenol		780	U
98-95-3	Nitrobenzene		780	U
78-59-1	Isophorone		780	U
88-75-5	2-Nitrophenol		780	U
105-67-9	2,4-Dimethylphenol		780	U
111-91-1	bis(2-Chloroethoxy)methane		780	U
120-83-2	2,4-Dichlorophenol		780	U
120-82-1	1,2,4-Trichlorobenzene		780	U
91-20-3	Naphthalene		780	U
106-47-8	4-Chloroaniline		780	U
87-68-3	Hexachlorobutadiene		780	U
59-50-7	4-Chloro-3-methylphenol		780	U
91-57-6	2-Methylnaphthalene		780	U
77-47-4	Hexachlorocyclopentadiene		780	U
88-06-2	2,4,6-Trichlorophenol		780	U
95-95-4	2,4,5-Trichlorophenol		780	U
91-58-7	2-Chloronaphthalene		780	U
88-74-4	2-Nitroaniline		1600	U
208-96-8	Acenaphthylene		780	U
131-11-3	Dimethylphthalate		780	U
606-20-2	2,6-Dinitrotoluene		780	U
83-32-9	Acenaphthene		780	U
99-09-2	3-Nitroaniline		1600	U

CAS NO.	COMPOUND	(ug/L or ug/Kg)	UG/KG	Q
51-28-5	2,4-Dinitrophenol		1600	U
132-64-9	Dibenzofuran		780	U
100-02-7	4-Nitrophenol		1600	U
121-14-2	2,4-Dinitrotoluene		750	J
86-73-7	Fluorene		780	U
7005-72-3	4-Chlorophenyl-phenylether		780	U
84-66-2	Diethylphthalate		780	U
100-01-6	4-Nitroaniline		1600	U
534-52-1	4,6-Dinitro-2-methylphenol		1600	U
86-30-6	n-Nitrosodiphenylamine		780	U
101-55-3	4-Bromophenyl-phenylether		780	U
118-74-1	Hexachlorobenzene		780	U
87-86-5	Pentachlorophenol		1600	U
85-01-8	Phenanthrene		780	U
120-12-7	Anthracene		780	U
86-74-8	Carbazole		780	U
84-74-2	Di-n-butylphthalate		780	U
206-44-0	Fluoranthene		780	U
129-00-0	Pyrene		780	U
85-68-7	Butylbenzylphthalate		780	U
56-55-3	Benzo[a]anthracene		780	U
218-01-9	Chrysene		780	U
91-94-1	3,3'-Dichlorobenzidine		780	U
117-81-7	bis(2-Ethylhexyl)phthalate		780	U
117-84-0	Di-n-octylphthalate		780	U
205-99-2	Benzo[b]fluoranthene		780	U
207-08-9	Benzo[k]fluoranthene		780	U
50-32-8	Benzo[a]pyrene		780	U
193-39-5	Indeno[1,2,3-cd]pyrene		780	U
53-70-3	Dibenz[a,h]anthracene		780	U
191-24-2	Benzo[g,h,i]perylene		780	U

1F  
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET  
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

**C13-#3**

Lab Name: Seneca Army Depot Contract: \_\_\_\_\_

Lab Code: 850006 Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 170-02

Matrix: (soil/water) SOIL Lab Sample ID: 804-170-007

Sample wt/vol: 30.1 (g/ml) G Lab File ID: 04F0189A.D

Level: (low/med) LOW Date Received: 06/18/04

% Moisture: 14.9 decanted: (Y/N) N Date Extracted: 06/24/04

Concentrated Extract Volume: 2000 (uL) Date Analyzed: 06/30/04

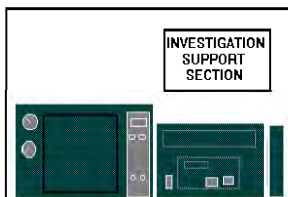
Injection Volume: 2.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: \_\_\_\_\_

CONCENTRATION UNITS:

Number TICs found: 1 (ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 000630-06-8	Hexatriacontane	38.49	170	JN



NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION  
 DIVISION OF ENVIRONMENTAL REMEDIATION  
 LABORATORY ANALYTICAL REPORT

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

FIELD SAMPLE ID

Site Name: Seneca Army Depot

Site Code: 850006

Matrix: (soil/water) SOIL

Sample wt/vol: 30.08 (g/ml) G

Level: (low/med) LOW

Extraction: (SepF/Cont/Sonc/SPE/ASE) \_\_\_\_\_

% Moisture: 15.4 decanted:(Y/N) N

Concentrated Extract Volume: 2000 (uL)

Injection Volume: 2.0 (uL) pH: \_\_\_\_\_

GPC Cleanup: (Y/N) Y

**C13-#4**

SDG No.: 170-02

Lab Sample ID: 804-170-008

Lab File ID: 04F0190A.D

Date Received: 06/18/04

Date Extracted: 06/24/04

Date Analyzed: 06/30/04

Dilution Factor: 1.0

CONCENTRATION UNITS:

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg)	UG/KG	Q
108-95-2	Phenol		790	U
95-57-8	2-Chlorophenol		790	U
111-44-4	bis(2-Chloroethyl)ether		790	U
541-73-1	1,3-Dichlorobenzene		790	U
106-46-7	1,4-Dichlorobenzene		790	U
95-50-1	1,2-Dichlorobenzene		790	U
100-51-6	Benzyl alcohol		790	U
108-60-1	2,2'-Oxybis(1-chloropropane)		790	U
95-48-7	2-Methylphenol		790	U
67-72-1	Hexachloroethane		790	U
621-64-7	N-Nitroso-di-n-propylamine		790	U
106-44-5	4-Methylphenol		790	U
98-95-3	Nitrobenzene		790	U
78-59-1	Isophorone		790	U
88-75-5	2-Nitrophenol		790	U
105-67-9	2,4-Dimethylphenol		790	U
111-91-1	bis(2-Chloroethoxy)methane		790	U
120-83-2	2,4-Dichlorophenol		790	U
120-82-1	1,2,4-Trichlorobenzene		790	U
91-20-3	Naphthalene		790	U
106-47-8	4-Chloroaniline		790	U
87-68-3	Hexachlorobutadiene		790	U
59-50-7	4-Chloro-3-methylphenol		790	U
91-57-6	2-Methylnaphthalene		790	U
77-47-4	Hexachlorocyclopentadiene		790	U
88-06-2	2,4,6-Trichlorophenol		790	U
95-95-4	2,4,5-Trichlorophenol		790	U
91-58-7	2-Chloronaphthalene		790	U
88-74-4	2-Nitroaniline		1600	U
208-96-8	Acenaphthylene		790	U
131-11-3	Dimethylphthalate		790	U
606-20-2	2,6-Dinitrotoluene		790	U
83-32-9	Acenaphthene		790	U
99-09-2	3-Nitroaniline		1600	U

CAS NO.	COMPOUND	(ug/L or ug/Kg)	UG/KG	Q
51-28-5	2,4-Dinitrophenol		1600	U
132-64-9	Dibenzofuran		790	U
100-02-7	4-Nitrophenol		1600	U
121-14-2	2,4-Dinitrotoluene		790	U
86-73-7	Fluorene		790	U
7005-72-3	4-Chlorophenyl-phenylether		790	U
84-66-2	Diethylphthalate		790	U
100-01-6	4-Nitroaniline		1600	U
534-52-1	4,6-Dinitro-2-methylphenol		1600	U
86-30-6	n-Nitrosodiphenylamine		790	U
101-55-3	4-Bromophenyl-phenylether		790	U
118-74-1	Hexachlorobenzene		790	U
87-86-5	Pentachlorophenol		1600	U
85-01-8	Phenanthrene		790	U
120-12-7	Anthracene		790	U
86-74-8	Carbazole		790	U
84-74-2	Di-n-butylphthalate		790	U
206-44-0	Fluoranthene		790	U
129-00-0	Pyrene		790	U
85-68-7	Butylbenzylphthalate		790	U
56-55-3	Benzo[a]anthracene		790	U
218-01-9	Chrysene		790	U
91-94-1	3,3'-Dichlorobenzidine		790	U
117-81-7	bis(2-Ethylhexyl)phthalate		790	U
117-84-0	Di-n-octylphthalate		790	U
205-99-2	Benzo[b]fluoranthene		790	U
207-08-9	Benzo[k]fluoranthene		790	U
50-32-8	Benzo[a]pyrene		790	U
193-39-5	Indeno[1,2,3-cd]pyrene		790	U
53-70-3	Dibenz[a,h]anthracene		790	U
191-24-2	Benzo[g,h,i]perylene		790	U

1F  
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET  
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

**C13-#4**

Lab Name: Seneca Army Depot Contract: \_\_\_\_\_

Lab Code: 850006 Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 170-02

Matrix: (soil/water) SOIL Lab Sample ID: 804-170-008

Sample wt/vol: 30.08 (g/ml) G Lab File ID: 04F0190A.D

Level: (low/med) LOW Date Received: 06/18/04

% Moisture: 15.4 decanted: (Y/N) N Date Extracted: 06/24/04

Concentrated Extract Volume: 2000 (uL) Date Analyzed: 06/30/04

Injection Volume: 2.0 (uL) Dilution Factor: 1.0

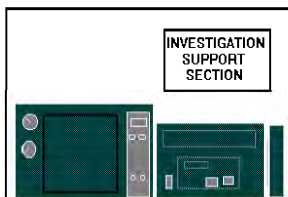
GPC Cleanup: (Y/N) Y pH: \_\_\_\_\_

CONCENTRATION UNITS:

Number TICs found: 1 (ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 000083-47-6	.gamma.-Sitosterol	37.41	410	JN





NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION  
 DIVISION OF ENVIRONMENTAL REMEDIATION  
 LABORATORY ANALYTICAL REPORT

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

FIELD SAMPLE ID

Site Name: Seneca Army Depot

Site Code: 850006

Matrix: (soil/water) SOIL

Sample wt/vol: 30.07 (g/ml) G

Level: (low/med) LOW

Extraction: (SepF/Cont/Sonc/SPE/ASE) \_\_\_\_\_

% Moisture: 21.2 decanted:(Y/N) N

Concentrated Extract Volume: 2000 (uL)

Injection Volume: 2.0 (uL) pH: \_\_\_\_\_

GPC Cleanup: (Y/N) Y

**C13-#5**

SDG No.: 170-02

Lab Sample ID: 804-170-009

Lab File ID: 04F0193A.D

Date Received: 06/18/04

Date Extracted: 06/24/04

Date Analyzed: 06/30/04

Dilution Factor: 1.0

CONCENTRATION UNITS:

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg)	UG/KG	Q
108-95-2	Phenol		840	U
95-57-8	2-Chlorophenol		840	U
111-44-4	bis(2-Chloroethyl)ether		840	U
541-73-1	1,3-Dichlorobenzene		840	U
106-46-7	1,4-Dichlorobenzene		840	U
95-50-1	1,2-Dichlorobenzene		840	U
100-51-6	Benzyl alcohol		840	U
108-60-1	2,2'-Oxybis(1-chloropropane)		840	U
95-48-7	2-Methylphenol		840	U
67-72-1	Hexachloroethane		840	U
621-64-7	N-Nitroso-di-n-propylamine		840	U
106-44-5	4-Methylphenol		840	U
98-95-3	Nitrobenzene		840	U
78-59-1	Isophorone		840	U
88-75-5	2-Nitrophenol		840	U
105-67-9	2,4-Dimethylphenol		840	U
111-91-1	bis(2-Chloroethoxy)methane		840	U
120-83-2	2,4-Dichlorophenol		840	U
120-82-1	1,2,4-Trichlorobenzene		840	U
91-20-3	Naphthalene		840	U
106-47-8	4-Chloroaniline		840	U
87-68-3	Hexachlorobutadiene		840	U
59-50-7	4-Chloro-3-methylphenol		840	U
91-57-6	2-Methylnaphthalene		840	U
77-47-4	Hexachlorocyclopentadiene		840	U
88-06-2	2,4,6-Trichlorophenol		840	U
95-95-4	2,4,5-Trichlorophenol		840	U
91-58-7	2-Chloronaphthalene		840	U
88-74-4	2-Nitroaniline		1700	U
208-96-8	Acenaphthylene		840	U
131-11-3	Dimethylphthalate		840	U
606-20-2	2,6-Dinitrotoluene		840	U
83-32-9	Acenaphthene		840	U
99-09-2	3-Nitroaniline		1700	U

CAS NO.	COMPOUND	(ug/L or ug/Kg)	UG/KG	Q
51-28-5	2,4-Dinitrophenol		1700	U
132-64-9	Dibenzofuran		840	U
100-02-7	4-Nitrophenol		1700	U
121-14-2	2,4-Dinitrotoluene		840	U
86-73-7	Fluorene		840	U
7005-72-3	4-Chlorophenyl-phenylether		840	U
84-66-2	Diethylphthalate		840	U
100-01-6	4-Nitroaniline		1700	U
534-52-1	4,6-Dinitro-2-methylphenol		1700	U
86-30-6	n-Nitrosodiphenylamine		840	U
101-55-3	4-Bromophenyl-phenylether		840	U
118-74-1	Hexachlorobenzene		840	U
87-86-5	Pentachlorophenol		1700	U
85-01-8	Phenanthrene		840	U
120-12-7	Anthracene		840	U
86-74-8	Carbazole		840	U
84-74-2	Di-n-butylphthalate		840	U
206-44-0	Fluoranthene		840	U
129-00-0	Pyrene		840	U
85-68-7	Butylbenzylphthalate		840	U
56-55-3	Benzo[a]anthracene		840	U
218-01-9	Chrysene		840	U
91-94-1	3,3'-Dichlorobenzidine		840	U
117-81-7	bis(2-Ethylhexyl)phthalate		840	U
117-84-0	Di-n-octylphthalate		840	U
205-99-2	Benzo[b]fluoranthene		840	U
207-08-9	Benzo[k]fluoranthene		840	U
50-32-8	Benzo[a]pyrene		840	U
193-39-5	Indeno[1,2,3-cd]pyrene		840	U
53-70-3	Dibenz[a,h]anthracene		840	U
191-24-2	Benzo[g,h,i]perylene		840	U

1F  
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET  
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

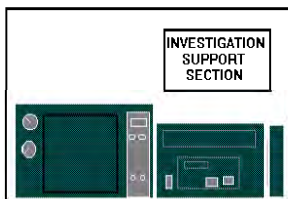
**C13-#5**

Lab Name: Seneca Army Depot Contract: \_\_\_\_\_  
 Lab Code: 850006 Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 170-02  
 Matrix: (soil/water) SOIL Lab Sample ID: 804-170-009  
 Sample wt/vol: 30.07 (g/ml) G Lab File ID: 04F0193A.D  
 Level: (low/med) LOW Date Received: 06/18/04  
 % Moisture: 21.2 decanted: (Y/N) N Date Extracted: 06/24/04  
 Concentrated Extract Volume: 2000 (uL) Date Analyzed: 06/30/04  
 Injection Volume: 2.0 (uL) Dilution Factor: 1.0  
 GPC Cleanup: (Y/N) Y pH: \_\_\_\_\_

CONCENTRATION UNITS:

Number TICs found: 3 (ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 000629-96-9	1-Eicosanol	37.15	420	JN
2. 000083-47-6	.gamma.-Sitosterol	37.46	2200	JN
3. 000638-95-9	.alpha.-Amyrin	37.74	660	JN



NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION  
 DIVISION OF ENVIRONMENTAL REMEDIATION  
 LABORATORY ANALYTICAL REPORT

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

FIELD SAMPLE ID

Site Name: Seneca Army Depot

Site Code: 850006

Matrix: (soil/water) SOIL

Sample wt/vol: 30.07 (g/ml) G

Level: (low/med) LOW

Extraction: (SepF/Cont/Sonc/SPE/ASE) \_\_\_\_\_

% Moisture: 13 decanted:(Y/N) N

Concentrated Extract Volume: 2000 (uL)

Injection Volume: 2.0 (uL) pH: \_\_\_\_\_

GPC Cleanup: (Y/N) Y

**C13-#6**

SDG No.: 170-02

Lab Sample ID: 804-170-010

Lab File ID: 04F0194A.D

Date Received: 06/18/04

Date Extracted: 06/24/04

Date Analyzed: 06/30/04

Dilution Factor: 1.0

CONCENTRATION UNITS:

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg)	UG/KG	Q
108-95-2	Phenol	760	U	
95-57-8	2-Chlorophenol	760	U	
111-44-4	bis(2-Chloroethyl)ether	760	U	
541-73-1	1,3-Dichlorobenzene	760	U	
106-46-7	1,4-Dichlorobenzene	760	U	
95-50-1	1,2-Dichlorobenzene	760	U	
100-51-6	Benzyl alcohol	760	U	
108-60-1	2,2'-Oxybis(1-chloropropane)	760	U	
95-48-7	2-Methylphenol	760	U	
67-72-1	Hexachloroethane	760	U	
621-64-7	N-Nitroso-di-n-propylamine	760	U	
106-44-5	4-Methylphenol	760	U	
98-95-3	Nitrobenzene	760	U	
78-59-1	Isophorone	760	U	
88-75-5	2-Nitrophenol	760	U	
105-67-9	2,4-Dimethylphenol	760	U	
111-91-1	bis(2-Chloroethoxy)methane	760	U	
120-83-2	2,4-Dichlorophenol	760	U	
120-82-1	1,2,4-Trichlorobenzene	760	U	
91-20-3	Naphthalene	760	U	
106-47-8	4-Chloroaniline	760	U	
87-68-3	Hexachlorobutadiene	760	U	
59-50-7	4-Chloro-3-methylphenol	760	U	
91-57-6	2-Methylnaphthalene	760	U	
77-47-4	Hexachlorocyclopentadiene	760	U	
88-06-2	2,4,6-Trichlorophenol	760	U	
95-95-4	2,4,5-Trichlorophenol	760	U	
91-58-7	2-Chloronaphthalene	760	U	
88-74-4	2-Nitroaniline	1500	U	
208-96-8	Acenaphthylene	760	U	
131-11-3	Dimethylphthalate	760	U	
606-20-2	2,6-Dinitrotoluene	760	U	
83-32-9	Acenaphthene	760	U	
99-09-2	3-Nitroaniline	1500	U	

CAS NO.	COMPOUND	(ug/L or ug/Kg)	UG/KG	Q
51-28-5	2,4-Dinitrophenol	1500	U	
132-64-9	Dibenzofuran	760	U	
100-02-7	4-Nitrophenol	1500	U	
121-14-2	2,4-Dinitrotoluene	760	U	
86-73-7	Fluorene	760	U	
7005-72-3	4-Chlorophenyl-phenylether	760	U	
84-66-2	Diethylphthalate	760	U	
100-01-6	4-Nitroaniline	1500	U	
534-52-1	4,6-Dinitro-2-methylphenol	1500	U	
86-30-6	n-Nitrosodiphenylamine	760	U	
101-55-3	4-Bromophenyl-phenylether	760	U	
118-74-1	Hexachlorobenzene	760	U	
87-86-5	Pentachlorophenol	1500	U	
85-01-8	Phenanthrene	760	U	
120-12-7	Anthracene	760	U	
86-74-8	Carbazole	760	U	
84-74-2	Di-n-butylphthalate	760	U	
206-44-0	Fluoranthene	760	U	
129-00-0	Pyrene	760	U	
85-68-7	Butylbenzylphthalate	760	U	
56-55-3	Benzo[a]anthracene	760	U	
218-01-9	Chrysene	760	U	
91-94-1	3,3'-Dichlorobenzidine	760	U	
117-81-7	bis(2-Ethylhexyl)phthalate	760	U	
117-84-0	Di-n-octylphthalate	760	U	
205-99-2	Benzo[b]fluoranthene	760	U	
207-08-9	Benzo[k]fluoranthene	760	U	
50-32-8	Benzo[a]pyrene	760	U	
193-39-5	Indeno[1,2,3-cd]pyrene	760	U	
53-70-3	Dibenz[a,h]anthracene	760	U	
191-24-2	Benzo[g,h,i]perylene	760	U	

1F  
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET  
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

**C13-#6**

Lab Name: Seneca Army Depot Contract: \_\_\_\_\_

Lab Code: 850006 Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 170-02

Matrix: (soil/water) SOIL Lab Sample ID: 804-170-010

Sample wt/vol: 30.07 (g/ml) G Lab File ID: 04F0194A.D

Level: (low/med) LOW Date Received: 06/18/04

% Moisture: 13 decanted: (Y/N) N Date Extracted: 06/24/04

Concentrated Extract Volume: 2000 (uL) Date Analyzed: 06/30/04

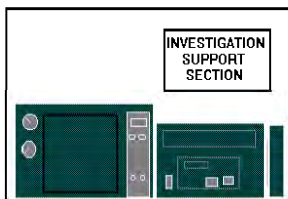
Injection Volume: 2.0 (uL) Dilution Factor: 1.0

GPC Cleanup: (Y/N) Y pH: \_\_\_\_\_

CONCENTRATION UNITS:

Number TICs found: 3 (ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 004651-51-8	Ergost-5-en-3-ol, (3.beta.)-	36.71	210	JN
2. 000083-47-6	.gamma.-Sitosterol	37.41	420	JN
3. 000638-68-6	Triacontane	37.78	190	JN



NYS DEPARTMENT OF ENVIRONMENTAL CONSERVATION  
 DIVISION OF ENVIRONMENTAL REMEDIATION  
 LABORATORY ANALYTICAL REPORT

SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET

FIELD SAMPLE ID

Site Name: Seneca Army Depot

Site Code: 850006

Matrix: (soil/water) SOIL

Sample wt/vol: 30.02 (g/ml) G

Level: (low/med) LOW

Extraction: (SepF/Cont/Sonc/SPE/ASE) \_\_\_\_\_

% Moisture: 41.8 decanted:(Y/N) N

Concentrated Extract Volume: 2000 (uL)

Injection Volume: 2.0 (uL) pH: \_\_\_\_\_

GPC Cleanup: (Y/N) Y

**C13-#7**

SDG No.: 170-02

Lab Sample ID: 804-170-011

Lab File ID: 04F0195A.D

Date Received: 06/18/04

Date Extracted: 06/24/04

Date Analyzed: 06/30/04

Dilution Factor: 1.0

CONCENTRATION UNITS:

CONCENTRATION UNITS:

CAS NO.	COMPOUND	(ug/L or ug/Kg)	UG/KG	Q
108-95-2	Phenol		1100	U
95-57-8	2-Chlorophenol		1100	U
111-44-4	bis(2-Chloroethyl)ether		1100	U
541-73-1	1,3-Dichlorobenzene		1100	U
106-46-7	1,4-Dichlorobenzene		1100	U
95-50-1	1,2-Dichlorobenzene		1100	U
100-51-6	Benzyl alcohol		1100	U
108-60-1	2,2'-Oxybis(1-chloropropane)		1100	U
95-48-7	2-Methylphenol		1100	U
67-72-1	Hexachloroethane		1100	U
621-64-7	N-Nitroso-di-n-propylamine		1100	U
106-44-5	4-Methylphenol		1100	U
98-95-3	Nitrobenzene		1100	U
78-59-1	Isophorone		1100	U
88-75-5	2-Nitrophenol		1100	U
105-67-9	2,4-Dimethylphenol		1100	U
111-91-1	bis(2-Chloroethoxy)methane		1100	U
120-83-2	2,4-Dichlorophenol		1100	U
120-82-1	1,2,4-Trichlorobenzene		1100	U
91-20-3	Naphthalene		1100	U
106-47-8	4-Chloroaniline		1100	U
87-68-3	Hexachlorobutadiene		1100	U
59-50-7	4-Chloro-3-methylphenol		1100	U
91-57-6	2-Methylnaphthalene		1100	U
77-47-4	Hexachlorocyclopentadiene		1100	U
88-06-2	2,4,6-Trichlorophenol		1100	U
95-95-4	2,4,5-Trichlorophenol		1100	U
91-58-7	2-Chloronaphthalene		1100	U
88-74-4	2-Nitroaniline		2300	U
208-96-8	Acenaphthylene		1100	U
131-11-3	Dimethylphthalate		1100	U
606-20-2	2,6-Dinitrotoluene		1100	U
83-32-9	Acenaphthene		1100	U
99-09-2	3-Nitroaniline		2300	U

CAS NO.	COMPOUND	(ug/L or ug/Kg)	UG/KG	Q
51-28-5	2,4-Dinitrophenol		2300	U
132-64-9	Dibenzofuran		1100	U
100-02-7	4-Nitrophenol		2300	U
121-14-2	2,4-Dinitrotoluene		1100	U
86-73-7	Fluorene		1100	U
7005-72-3	4-Chlorophenyl-phenylether		1100	U
84-66-2	Diethylphthalate		1100	U
100-01-6	4-Nitroaniline		2300	U
534-52-1	4,6-Dinitro-2-methylphenol		2300	U
86-30-6	n-Nitrosodiphenylamine		1100	U
101-55-3	4-Bromophenyl-phenylether		1100	U
118-74-1	Hexachlorobenzene		1100	U
87-86-5	Pentachlorophenol		2300	U
85-01-8	Phenanthrene		1100	U
120-12-7	Anthracene		1100	U
86-74-8	Carbazole		1100	U
84-74-2	Di-n-butylphthalate		1100	U
206-44-0	Fluoranthene		1100	U
129-00-0	Pyrene		1100	U
85-68-7	Butylbenzylphthalate		1100	U
56-55-3	Benzo[a]anthracene		1100	U
218-01-9	Chrysene		1100	U
91-94-1	3,3'-Dichlorobenzidine		1100	U
117-81-7	bis(2-Ethylhexyl)phthalate		1100	U
117-84-0	Di-n-octylphthalate		1100	U
205-99-2	Benzo[b]fluoranthene		1100	U
207-08-9	Benzo[k]fluoranthene		1100	U
50-32-8	Benzo[a]pyrene		1100	U
193-39-5	Indeno[1,2,3-cd]pyrene		1100	U
53-70-3	Dibenz[a,h]anthracene		1100	U
191-24-2	Benzo[g,h,i]perylene		1100	U

1F  
SEMIVOLATILE ORGANICS ANALYSIS DATA SHEET  
TENTATIVELY IDENTIFIED COMPOUNDS

EPA SAMPLE NO.

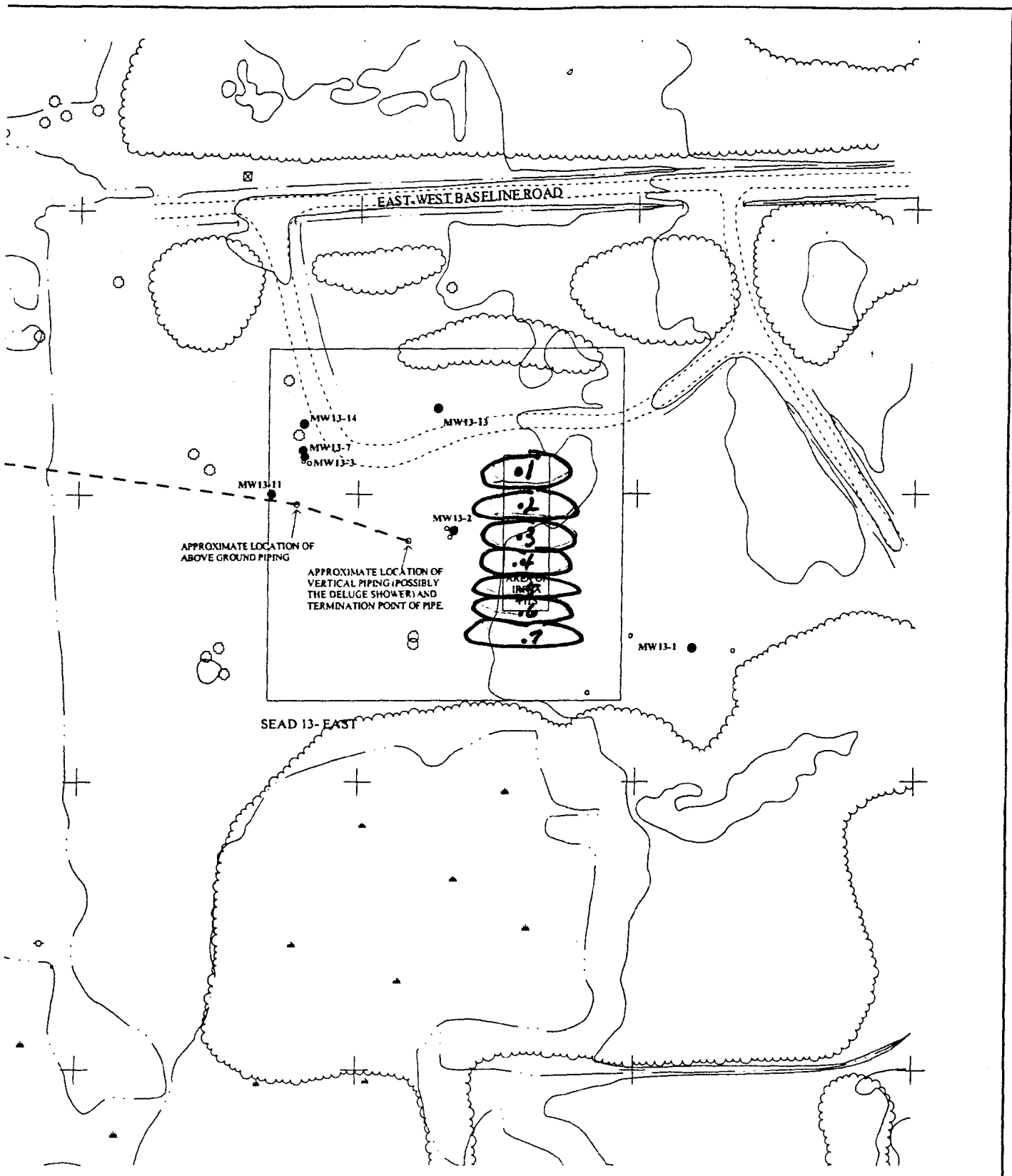
**C13-#7**

Lab Name: Seneca Army Depot Contract: \_\_\_\_\_  
 Lab Code: 850006 Case No.: \_\_\_\_\_ SAS No.: \_\_\_\_\_ SDG No.: 170-02  
 Matrix: (soil/water) SOIL Lab Sample ID: 804-170-011  
 Sample wt/vol: 30.02 (g/ml) G Lab File ID: 04F0195A.D  
 Level: (low/med) LOW Date Received: 06/18/04  
 % Moisture: 41.8 decanted: (Y/N) N Date Extracted: 06/24/04  
 Concentrated Extract Volume: 2000 (uL) Date Analyzed: 06/30/04  
 Injection Volume: 2.0 (uL) Dilution Factor: 1.0  
 GPC Cleanup: (Y/N) Y pH: \_\_\_\_\_

CONCENTRATION UNITS:

Number TICs found: 6 (ug/L or ug/Kg) UG/KG

CAS NUMBER	COMPOUND NAME	RT	EST. CONC.	Q
1. 000630-06-8	Hexatriacontane	35.52	280	JN
2. 000629-99-2	Pentacosane	36.29	290	JN
3. 000629-97-0	Docosane	37.04	340	JN
4. 000112-95-8	Eicosane	37.78	390	JN
5. 014167-59-0	Tetratriacontane	38.49	620	JN
6. 000629-94-7	Heneicosane	39.29	310	JN



# PARSONS

SENECA ARMY DEPOT ACTIVITY  
SEAD-13

FIGURE 2-6

SEAD-13 IRFNA Disposal Site  
Approximate Location of Underground Piping

SCALE

1:120

DATE

OCTOBER 2002

Sheet 1 of 1

**APPENDIX E**  
**Toxicological Profiles for Selected COCs**



## ALUMINUM

## CAS NUMBER

7429-90-5

## COMMON SYNONYMS

None.

## ANALYTICAL CLASSIFICATION

Inorganic.

## PHYSICAL AND CHEMICAL DATA

Water Solubility: insoluble [1]

Vapor Pressure: insignificant at 25°C [1]

Henry's Law Constant: Not Applicable

Specific Gravity: 2.70 [1]

Organic Carbon Partition Coefficient: NR

## BACKGROUND CONCENTRATIONS

Aluminum is a naturally-occurring element. The concentration of aluminum in minimally disturbed soils varies. A collection of 1,247 soil samples from across the conterminous U.S. determined that 79 percent were less than 70,000 ppm, with a geometric mean of 47,000 ppm and a maximum value of 100,000 ppm [2]. In water, aluminum concentrations are dependent upon the pH of the water: significant concentrations occur only when the pH is less than 5. In waters with a high humic-derived acid content, aluminum may be present even at a more neutral pH [1]. In surface water, aluminum was detected at concentrations ranging from 0.001 to 2.760 mg/L with a mean concentration of 0.074 mg/L in 456/1577 samples [1].

## FATE AND TRANSPORT

The mobility of aluminum in the environment will be dependent upon the solubility of the aluminum compound and upon the pH of the environmental medium. Soluble compounds will tend to be more mobile in the environment and a lowering of the pH of the soil generally results in an increase in mobility for monomeric forms of aluminum. Consequently, acid rain may

mobilize aluminum in the environment. Terrestrial plants take up aluminum, but it is not likely to bioconcentrate [1].

#### HUMAN TOXICITY

General. Aluminum is a major component of the earth's crust. People may be exposed to aluminum through its use in cooking utensils, antacids and antiperspirants. Aluminum in these forms has not been reported to be harmful, although excess exposure to aluminum is not beneficial and may be harmful to some people. Excess aluminum has been associated with neurodegenerative diseases, although the link between the two is tenuous. The primary targets of aluminum toxicity are the central nervous system, skeletal system, respiratory system and the developing fetus [1]. Aluminum is not known to cause cancer in humans or animals, and has not been placed in a USEPA weight-of-evidence cancer group [3].

Oral Exposure. A chronic oral RfD is not available for aluminum [3,4]. Oral LD<sub>50</sub> values of 261 mg Al/mg body weight in rats (nitrate form) and 770 mg Al/kg in mice (chloride form) have been reported. In humans, aluminum has been associated with neurodegenerative diseases, such as Alzheimer's disease. A causal relationship, however, has not been shown between aluminum exposure and the progression of neurodegenerative disease. Neurodegenerative diseases have also developed in individuals who have been on renal dialysis for a number of years. Aluminum is present in the dialysis fluid and is given to control hyperphosphatemia. A softening of the bones, resulting in increased spontaneous fractures and pain, has been reported in dialysis patients. In infants given renal dialysis containing aluminum, aluminum accumulation and encephalopathy has been noted. The effects of aluminum on the developing fetus of animals have been controversial: a decrease in pup growth and neurological development have been observed in some studies, but not others [1].

Inhalation Exposure. An inhalation RfC is not available for aluminum [3,4]. Inhalation of aluminum results in irritive effects on the respiratory system, including asthma, cough, lung fibrosis and decreased pulmonary function [1].

Dermal Exposure. Dermal exposure to aluminum is primarily the result of the use of aluminum-containing antiperspirants. In sensitive individuals, aluminum may cause a skin rash [1].

#### REFERENCES

1. ATSDR, 1990. Toxicological Profile for Aluminum. Draft. Agency for Toxic Substances and Disease Registry. October, 1990.
2. USGS, 1984. Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States. United States Geological Survey Professional Paper 1270.
3. USEPA. 1995. Integrated Risk Information System (IRIS). Online. March, 1995.

4. USEPA, 1994. Health Effects Assessment Summary Tables (HEAST). Office of Emergency and Remedial Response. March 1994.

## MANGANESE

## CAS NUMBER

7439-96-5

## COMMON SYNONYMS

None.

## ANALYTICAL CLASSIFICATION

Inorganic.

## PHYSICAL AND CHEMICAL DATA

Water Solubility: decomposes [1]

Vapor Pressure: insignificant at 25°C [1]

Henry's Law Constant: Not Applicable [1]

Specific Gravity: 7.20 at 20/4°C [1]

Organic Carbon Partition Coefficient: Not Applicable [1]

## BACKGROUND CONCENTRATIONS

Manganese is a naturally-occurring element. The concentration of manganese in minimally disturbed soils varies tremendously. A collection of 1,317 soil samples from across the conterminous U.S. determined that 89 percent were less than or equal to 700 ppm, with a geometric mean of 330 ppm, but with a maximum value as high as 7,000 ppm. Of fifteen samples collected around Ohio, 80 percent were found to contain manganese at concentrations less than or equal to 700 ppm, with a maximum value between 1,000 and 7,000 ppm [2].

## FATE AND TRANSPORT

Environmental fate processes may transform one manganese compound to another; however, manganese itself is not degraded. Elemental manganese and inorganic manganese compounds may exist in air as suspended particulate matter. Such particles are removed from the atmosphere primarily by dry deposition, and, to a lesser extent, by washout. In water, the metal may exist in any of four oxidation states (2+, 3+, 4+, or 7+). Mn(+2) predominates in most waters, and usually combines with carbonate to form a compound of low solubility. In extremely reduced water, poorly soluble sulfides are formed. Manganese is often transported in rivers as suspended sediments. Manganese in water may be significantly bioconcentrated at lower trophic levels.

Bioconcentration may not be significant in predatory fish; thus biomagnification may not be significant [1].

Adsorption of manganese to soils may be highly variable, increasing with higher organic content and anion-exchange capacity. At low concentrations, manganese may be "fixed" by clays, and will not be readily released into solution. At higher concentrations, it may be desorbed by ion exchange. For example, the discharge of waste water into estuarine environments resulted in the mobilization of manganese from the bottom sediments. Also, microorganisms may increase the mobility of manganese under some circumstances [1].

#### HUMAN TOXICITY

General. The only adverse health effect identified following exposure to high levels of manganese is a condition known as "manganism," which results in psychomotor disturbances. Manganese in small amounts is believed to be an essential nutrient for humans [1]. The USEPA has placed manganese in weight-of-evidence Group D; that is, it is not classifiable as to human carcinogenicity [3].

Oral Exposure. The chronic RfD for the manganese ranges from 0.005 mg/kg/day for the ingestion of manganese in water to 0.14 mg/kg/day for the ingestion of manganese in food [3]. Both RfDs are based on a NOAEL for central nervous system effects determined from human chronic ingestion data [3]. The amount of manganese absorbed from the gastrointestinal tract typically averages 3 to 5%. Most animal studies indicate that manganese compounds have low acute oral toxicity. A NOAEL of 2,300 mg/kg/day in food for 6 months was determined for mice. On the other hand, single doses of highly concentrated solutions of various manganese compounds delivered to rats by gavage produced LD<sub>50</sub> values ranging from 410 to 820 mg manganese/kg/day. Thus it was concluded that high doses delivered by gavage did not yield a model relevant for normal environmental exposure. Evidence for the onset of manganism in humans following oral exposure is inconclusive. In animals, changes in the brain have been observed following very high oral exposure [1].

Inhalation Exposure. An RfC of 0.00005 mg/m<sup>3</sup> is based on a LOAEL of 0.15 mg/m<sup>3</sup> for impairment of neurobehavioral function in occupationally exposed workers [3]. The rate and extent of absorption of manganese following inhalation is unknown. A significant fraction of inhaled manganese-containing particles are carried via mucociliary transport to the gastrointestinal tract. Exposure of humans to high levels of manganese dust in air for a prolonged period of time (1 month to several years) may cause mental and emotional disturbances, and the impairment of locomotion and dexterity, a condition known as manganism. However, this condition has only been documented for workers in mines and foundries. Manganism occurs because excessive manganese injures a part of the brain that helps control body movements. Some of the symptoms of manganism can be reduced by medical treatment, but the brain injury is permanent [1].

Dermal Exposure. No information was located on the dermal absorption of manganese or adverse health effects resulting therefrom. It is reasonable to assume that intake via this pathway under normal circumstances is minimal.

#### ECOLOGICAL TOXICITY

General. Manganese is an essential trace element or micronutrient for plants and animals. Manganese does not occur naturally as a metal, but is found in various salts and minerals, frequently in association with iron compounds [4]. Manganese readily bioaccumulates in plants and animals, but does not biomagnify in food chains.

Vegetation. At pH values of 5.0 or less, manganese is rendered very soluble and excessive accumulation in plants can result. At pH values of 8.0 or above, precipitation results in the removal of bioavailable manganese from the soil [5].

Wetland plants, such as cattails, tend to maintain higher tissue concentrations of manganese than upland plants, probably because of greater availability of soluble manganese in wet soils or sediments [6]. Cattails can take up 779 mg/kg dry weight without injury [4]. Plants having more than 400 to 3,000 mg/kg of manganese (dry weight) in their tissues may exhibit toxic symptoms depending on the plant species [6]. Manganese toxicity in young plants is indicated by brown spotting on leaves [5]. Vegetation phytotoxic concentrations in soils and sediments are species specific and range widely.

Aquatic Life. Manganese ions are rarely found at concentrations above 1 mg/L, so manganese is not considered to be a problem in freshwater [7]. Manganese is toxic to fish in concentrations ranging from 1.5 to 1000 mg/L. Most toxic thresholds for fish are probably less than 50 mg/L [4]. Toxicity of manganese increases with decreasing pH [8]. Manganese has been shown to bioaccumulate in freshwater invertebrates [4]. There are no USEPA or OEPA aquatic life water quality standards [9,10].

Wildlife. The divalent form of manganese has a low order of toxicity to biota, especially to vertebrate animals. The hexavalent form is highly toxic, but does not occur in nature. Toxic concentrations of divalent manganese is reported in the diets of the following species: birds, 4,800 ppm; rats greater than 2,000 ppm; and rabbits 1,250 to 6,000 ppm. Toxic levels of manganese in mammals can cause decreased feed intake, decrease growth, reduced hemoglobin, and even death [11]. Growing rats have had dietary intake as high as 1,000 to 2,000 mg/kg with no apparent ill effects [6]. Maximum tolerable levels of manganese recommended by the National Academy of Sciences was 15 mg/kg body weight for sheep and cattle, 16 mg/kg body weight for swine, and 250 mg/kg body weight for poultry [11].

#### REFERENCES

1. ATSDR, 1990. Toxicological Profile for Manganese. Draft. Agency for Toxic Substances and Disease Registry. USPHS/USEPA. October 1990.
2. USGS, 1984. Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States. United States Geological Survey Professional Paper 1270.
3. USEPA, 1995. Integrated Risk Information System (IRIS). On-line data base. March, 1995.
4. Snyder, B.D. and J.L. Snyder, 1984. Feasibility of Using Oil Shale wastewater for Waterfowl Wetlands. U.S. Fish and Wildlife Service. FWS/OBS-84/01.
5. USEPA, 1983. Hazardous Waste Land Treatment (revised edition). Office of Solid Waste and Emergency Response. SW-874. Washington, D.C.
6. Engineering-Science, Inc., 1991. Waste Site Investigation for Alcoa Massena Operation, Comprehensive Biota Sampling Program Report. Volume XII. Liverpool, N.Y.
7. USEPA, 1976. Quality Criteria for Water. Office of Water and Hazardous Materials. Washington, D.C.
8. Golder Associates, Inc., 1991. Final Remedial Investigation for Mosley Road Sanitary Landfill. Denver, Colorado.
9. USEPA, 1991. Water Quality Criteria Summary. Washington, D.C.
10. OEPA, 1991. Ohio Water Quality Standards. Ohio Administrative Code, Title 3745-Chapter 1. Ohio Environmental Protection Agency.
11. CH2M Hill, Inc., 1989. Preliminary Endangerment Assessment for Lowry Landfill. Denver, Colorado.

## Nitrate (NO<sub>3</sub><sup>-</sup>)

### CAS NUMBER

014797-55-8

### COMMON SYNONYMS

None.

### ANALYTICAL CLASSIFICATION

Inorganic.

### PHYSICAL AND CHEMICAL DATA

Water Solubility: soluble [1].

### NATURAL SOURCES

Nitrates are produced by natural biological and physical oxidations and therefore are ubiquitous in the Environment [2].

### ARTIFICIAL SOURCES

Most of the excess nitrates in the environment originate from inorganic chemicals manufactured for agriculture.

### FATE AND TRANSPORT

Plants may absorb excessive amounts of nitrate nitrogen from soil. Under the reducing conditions of fermentation, nitrate in ensilage may be reduced to toxic NO<sub>2</sub> gas, which can accumulate to high levels in enclosed soils. Nitrite can be formed under aerobic conditions from ammonia by autotrophic nitrifying bacteria. The nitrites are oxidized by the *Nitrobacter* group of nitrifying bacteria. Under anaerobic conditions nitrates are reduced to nitrites by a process called denitrification, and then reduction of nitrites occurs [3].

### HUMAN TOXICITY



---

**Non-Carcinogenic Health Effects**

General. The primary toxic effect of inorganic nitrates is the oxidation of the iron in hemoglobin by excess nitrites forming methemoglobin. Infants less than 6 months old comprise the most sensitive population [4,5]. A secondary target for inorganic nitrate toxicity is the cardiovascular system. Nitrate intake can also result in a vasodilatory effect, which can complicate the anoxia resulting from methemoglobinemia [2]. The chronic administration of organic nitrates results in the development of tolerance to the cardiovascular effects of these compounds. This effect is independent of entry route and creates limitations in the treatment of angina symptoms and potentially serious problems for workers in munitions and dynamite industries [6,7,8].

Oral Exposure. A Reference Dose (RfD) of 1.60 mg/kg/day (nitrate nitrogen) for chronic oral exposure was calculated from a NOAEL of 10 mg/L and a LOAEL of 11-20 mg/L in drinking water, based on clinical signs of methemoglobinemia in 0-3-month-old infants [9,10]. It is important to note, however, that the effect was documented in the most sensitive human population so no uncertainty or modifying factors were used [11]. Toxic health hazards in humans, except for methemoglobinemia, as a result of chronic high inorganic nitrate exposure are undocumented [12].

Inhalation Exposure. Information on developmental and reproductive toxicity in humans resulting from inhalation exposure to nitrates was not available.

**Carcinogenic Health Effects**

General. The possibility of inorganic or organic nitrate functioning as a carcinogen depends on its conversion to nitrite and the subsequent reaction of nitrite with other molecules, specifically secondary amines, amides, and carbamates, to form carcinogenic N-nitroso compounds [5, 13]. Human population studies have yielded conflicting results.

Oral Exposure. Human population studies have yielded conflicting results. It is currently under review [11] for classification of carcinogenicity.

**ECOLOGICAL TOXICITY**

General. Methemoglobinemia, which can lead to anoxia and death in extreme cases, is the primary acute toxic effect of oral exposure to inorganic nitrates in all animals tested. Ruminant animals are most susceptible. This effect is extremely variable since it depends on a number of factors including the conversion of nitrates to nitrites; the ability of the various animals to enzymatically reduce methemoglobin; the amount of vitamins A, C, D, and E in the diet; and the nutritional state of the animal.

Animals. Acute nitrate toxicity in cattle has been reported following the ingestion of water containing 500 ppm or more nitrate or feed containing 5000 ppm or more nitrate. Methemoglobinemia is caused by the conversion of the nitrates to nitrites [2]. Dogs have sustained a plasma level of 24 mEq nitrate/L (336 mg nitrate-nitrogen/L) following gavage with sodium nitrate in water with no evidence of methemoglobinemia. Slight increases in glomerular filtration rates and renal plasma flow were observed, and hyperexcretion of chloride leading to hypochloremia, alkalosis, and digestive disturbances were reported. Dogs have also been given 20,000 ppm nitrate in their diet without any apparent adverse effects [2]. Rats have shown no effects after a dietary nitrate concentration of 10,000 ppm [14]. Pigs are even more resistant to nitrate poisoning but have developed methemoglobinemia after ingesting food or drinking water containing nitrites converted from nitrates by microflora in the food or water before ingestion (toxic dose listed as 88 mg nitrite/kg body weight) [2]. Potassium nitrate oral LD50 values of 3750 mg/kg for rats and 1901 mg/kg for rabbits and sodium nitrate oral LD50 values of 2680 mg/kg for rabbits have been reported [15].

Male rats given 3000 mg sodium nitrite/L in drinking water for 2 years had no significant differences in mortality, growth, or development. Rats given 100 mg sodium nitrite/kg/day (20 mg nitrite-nitrogen/kg/day) in a lifetime drinking water study had elevated methemoglobin, but no other treatment-related hematologic or histologic effects were observed [16].

Rats given both nitrite and heptamethyleneimine in drinking water, which can react in vivo to form a nitrosamine, were shown to have an increased incidence of tumors when compared to controls missing either component [17].

#### REFERENCES

1. Weast, R.C., Astle, M.J. 1983. CRC Handbook of Chemistry and Physics, 62<sup>nd</sup> ed. CRC Press, Inc., Boca Raton, Florida. p. B-125.
2. Ridder, W. E. and F. W. Oehme. 1974. Nitrates as an environmental, animal, and human hazard. Clin. Toxicol. 7(2):145–159.
3. Sawyer, C.N., McCarty, P.L., Parkin, G.F. 1994. Chemistry for Environmental Engineering, 2<sup>nd</sup> ed. McGraw-Hill, Inc., New York. p.552.
4. Hartman, P. E. 1982. Nitrates and nitrites: Ingestion, pharmacodynamics and toxicology. In: Chemical Mutagens, Vol. 7, F.J. De Serres and A. Hollaender eds. Plenum Publishing Corp., New York. pp. 211–293.

5. Bouchard, D. C., M. K. Williams, and R. Y. Surampalli. 1992. Nitrate contamination of groundwater: Sources and potential health effects. *Am Water Works Assoc. J.* 84(9):85–90.
6. Stokinger, H. E. 1982. Aliphatic nitro compounds, nitrates, nitrites. In: *Patty's Industrial Hygiene and Toxicology, Vol. 2A*, eds. G.D. Clayton and F.E. Clayton, John Wiley & Sons, New York. pp. 4169-4201.
7. Elkayam, U., A. Mehra, A. Shotan, and E. Ostrzega. 1992. Nitrate resistance and tolerance: potential limitations in the treatment of congestive heart failure. *Am. J. Cardiol.* 70:98B-104B.
8. Colucci, W. S., G. H. Williams, R. W. Alexander, and E. Braunwald. 1981. Mechanisms and implications of vasodilator tolerance in the treatment of congestive heart failure. *Am J. Med.* 71:89-99.
9. Bosch, H. M., A. B. Rosenfield, R. Huston, H. R. Shipman, and F. L. Woodward. 1950. Methemoglobinemia and Minnesota well supplies. *Am. Water Works Assoc. J.* 42:161–170.
10. Walton, G. 1951. Survey of literature relating to infant methemoglobinemia due to nitrate-contaminated water. *Am. J. Public Health.* 41:986–996.
11. EPA. 1994. Integrated Risk Information System (IRIS). Health Risk Assessment for Nitrate. OnLine. Office of Health and Environmental Assessment, Environmental Criteria and Assessment Office, Cincinnati, OH.
12. Moller, H., J. Landt, P. Jensen, E. Pedersen, H. Autrup, and O. M. Jensen. 1989. Nitrate exposure from drinking water and diet in a Danish rural population. *Int. J. Epidemiol.* 18(1):206-212.
13. Taylor, H. W. and W. Lijinsky. 1975. Tumor induction in rats by feeding heptamethyleneimine and nitrite in water. *Cancer Res.* 35:505-812.
14. PHS (Public Health Service). 1962. *Drinking Water Standards*. H.E.W., Environmental Control Administration; Rockville, Maryland.
15. Sax, N. I. and R. J. Lewis. 1989. *Dangerous Properties of Industrial Materials*. 7th ed. Vol. II. Van Nostrand Reinhold, New York. p. 2494.
16. Druckrey, H., D. Steinhoff, H. Beuthner, H. Schneider and P. Klarner. 1963. Screening of nitrite for chronic toxicity in rats. *Arzneim. Forsch.* 13:320-323.
17. Taylor, H. W. and W. Lijinsky. 1975. Tumor induction in rats by feeding heptamethyleneimine and nitrite in water. *Cancer Res.* 35:505-812.

**APPENDIX F**  
**Response to Comments**

**Response to (Emailed) Comments from the United States Environmental Protection Agency**

**Subject:** Response to Comments on Draft Final Decision Document for the Inhibited Red-Fuming Nitric Acid (IRFNA) Disposal Sites (SEAD-13)  
Seneca Army Depot  
Romulus, New York

**Comments Dated:** July 3, 2003

**Date of Comment Response:** July 23, 2004

**General Comments:**

**Comment 1:** Response to Comment #2: Comment 2 originally questioned the method of background comparison used to eliminate inorganic chemicals as COPCs. The response quoted a 1997 letter from EPA recommending the method of comparing a site average concentration to twice the average background concentration. EPA, however, has now issued final guidance regarding background comparison methodology (EPA, 2002b.) This final guidance supercedes previous and outdated guidance including the method of comparison to twice the average background concentration. The final guidance provides specific protocols for background comparison using statistical tools that are now readily available and user-friendly.

Current guidance for background comparison must be used for future risk assessment. A listing of some of this guidance is noted above.

**Response 2:** The Army acknowledges that the 2002 EPA document is the most current guidance, and it will be used for future risk assessments. Since the beginning of the SEAD-13 project predates this 2002 EPA guidance, the EPA guidance provided at that time (i.e., the EPA letter dated 1997) is used as the basis of the risk assessment.

**Specific Comments:**

**Comment 1:** Response to Comment #2: This is regarding your response to our Comment 2: Page 3-16.

The Army's response should be expanded, and included in the uncertainty section of the risk characterization as a potential underestimation or overestimation of risk. For example, the response may be expanded to say that a recreational visitor might have exposure for 2 weeks per year for 10 years, which would double the risk/hazard estimated." This result could then be compared to the risk range to see how it would fall within that range.

**Response 2:** Acknowledged. The response to Comment #2 has been added to Section 3.5.3.2. In addition, risk uncertainty associated with exposure assumptions will be addressed in the uncertainty section. The additional text is included below:

Uncertainty associated with exposure estimation will result in potential underestimation or overestimation of risks for potential receptors. As an example, the recreational visitor is assumed to reside at the site during a camping event and the camping event is assumed to last two consecutive weeks (24 hours/day, 14 days/year) each year for 5 years. If the recreational visitor is exposed 24 hours/day for four weeks each year for 5 years, the cancer risk and the hazard index would double (i.e., cancer risk of  $6E-7$  and hazard index of 3.3 with groundwater exposure and cancer risk of  $4E-7$  and hazard index of 0.02 without groundwater exposure). With the exposure pathway to groundwater inaccessible, the risks are within the EPA risk limits. As presented in **Appendix B**, when exposure to groundwater is prevented, the total cancer risks and hazard indices for residential receptors, who are exposed to COCs at the site 350 days/year, are within the EPA risk limits. Therefore, although more conservative exposure scenarios (such as the example offered by EPA, exposure for more than two weeks a year for five years for a recreational visitor) are not evaluated for this mini risk assessment, they are not expected to result in unacceptable risk based on the risk evaluation for residential scenario.

Similarly, although youth recreational users and adult recreational users were not evaluated, risks for residential receptors can be used as conservative surrogates. Since risks for residential receptors are within the EPA limits with a restriction on groundwater use placed at the site, it is concluded that risks for adult recreational users would be within the EPA limits with exposure to groundwater prevented.

## **Response to the Comments from the United States Environmental Protection Agency**

**Subject:** Draft Final Decision Document for SEAD-13  
Seneca Army Depot  
Romulus, New York

**Comments Dated:** January 30, 2003

**Date of Comment Response:** March 28, 2003

*7/19/04: Post submittal note: Since these responses were submitted, minor revisions have been made to the responses in order to accurately reflect corrections made to the text of the Decision Document.*

### **General Comments - Human Health:**

All general comments relating to the human health risk assessment were adequately addressed.

#### **New Comments:**

**Comment 1:** Residential receptors are assessed in Appendix B. These receptors are also briefly discussed in Section 3.6. While it is clear that the Army considers these receptors to represent an unlikely scenario, they should be integrated into the overall risk assessment. In some instances, the risk assessment is misleading in that the evaluation of the residential receptors is not even identified (e.g., see the bulleted lists in Section 3.3.5.1 and Section 3.3.5.2).

**Response 1:** Agreed. Discussion on the residential receptor has been integrated throughout Section 3.0. The tables of risk calculations remain in Appendix B.

**Comment 2:** The method of background comparison is not very conservative. Comparing the site average to twice the average background value for inorganics allows potential hotspots to be overlooked. Please reference the specific guidance that was used in establishing this comparison technique. At a minimum, Tables A-5 and A-6 should list maximum detected values.

**Response 2:** In a letter dated November 25, 1997, EPA recommended that the Army compare the site average to twice the average background value for inorganics. EPA proposed this method as a more practical and sufficient method of assessing the data, instead of using Wilcoxon Rank Sum, or other more complex statistics. The comment from EPA is quoted below:

USEPA Region II typically recommends using a much simpler technique for comparing site data to background data than the Wilcoxon Rank Sum test: selecting as chemicals of potential concern those inorganic chemicals detected in site samples with an average concentration (of the detected values) greater than two times the average concentration (of the detected values) in the background samples. It appears that using this technique would have achieved essentially the same results as the statistical treatments conducted here, without the uncertainty of the validity of the statistical treatments used.

The Army followed this recommendation.

Agreed. The maximum detected values have been added to Tables A-5 and A-6.

**Specific Comments - Human Health:**

All specific comments relating to the human health risk assessment were adequately addressed.

**New Comments:**

**Comment 1:** Page 3-6, Section 3.2.2, Identification of Chemicals of Potential Concern (COPCs):

The second paragraph under the heading "Soil" indicates that chloroform was not retained as a COPC for surface soil because it was detected at levels below the PQL in 1 out of 13 samples. The frequency of detection (FOD) is greater than 5% and, as such, eliminating this chemical is in conflict with the last paragraph on Page 3-5 which indicates that organics will be eliminated only if the FOD is less than 5%. Revise to address this apparent inconsistency.

**Response 1:** Upon review of the data, it was determined that the detection of chloroform at a value of 2 J was the result of a lab error, and is not considered a reliable data value. The table has been revised to reflect that the concentration of chloroform in sample SB13-7-1 is 12 U  $\mu\text{g}/\text{kg}$ . This detection is below the quantitation level and is not considered part of the data set. Therefore, chloroform will not be added as a COPC. This explanation has been added to the text for clarification.

**Comment 2:** Page 3-16, Section 3.3.5.2, Exposure Scenarios: The paragraph under the "Recreational Visitor" scenario indicates that the assumed exposure for this receptor is two weeks a year for five years. This exposure scenario is not conservative enough. If the area potentially will be used as a recreational facility, it is possible that a nearby resident could visit on a regular basis. Additionally, it would be appropriate and more conservative to evaluate the youth recreational users and adult recreational users in addition to child recreational users. Not only would these analyses result in risk estimates for these receptors, but it would also allow for the calculation of the lifetime cancer risk for the recreational user.

**Response 2:** The recreational visitor is assumed to reside at the site during a camping event and the camping event is assumed to last two consecutive weeks (24 hours/day, 14 days/year) each year for 5 years. As presented in Appendix B, with exposure to groundwater prevented, the total cancer risks and hazard indices for residential receptors, who are exposed to COCs at the site 350 days/year, are within the EPA risk limits. Therefore, although more conservative exposure scenarios (i.e., exposure more than two weeks a year for five years) are not evaluated for this mini risk assessment, they are not expected to result in unacceptable risk based on the risk evaluation for residential scenario.



Similarly, although youth recreational users and adult recreational users were not evaluated, risks for residential receptors can be used as conservative surrogates. Since risks for residential receptors are within the EPA limits with a restriction on groundwater use placed at the site, it is concluded that risks for adult recreational users would be within the EPA limits with exposure to groundwater prevented.

**General Comments – Ecological Risk Assessment:**

**Comment 1:** The response provided adequately addresses the concerns presented in the comment. As the response states, the Process Document was followed correctly during the compilation of the SLERA, and the conclusions of the ERA portion of the mini risk assessment correspond with the Process Document requirements for the conclusion of a SLERA. However, common practice is to compare maximum concentrations of detected contaminants in each media to predetermined screening values as a way of determining those contaminants that should be considered COPCs in the ERA.

**Response 1:** Comment noted. A screening-level ecological effects evaluation (i.e., Step 1.3) was not performed for this mini-ERA to reduce the list of COPCs. This is a conservative approach as all compounds detected were retained as COPCs, and, therefore, this approach will not affect the risk assessment results.

**Specific Comments – Ecological Risk Assessment:**

All specific comments relating to the ecological risk assessment were adequately addressed.

**Specific Comments – Nonrisk Related:**

**New Comments:**

**Comment 1:** Figure 1-2, Wind Rose Syracuse, New York: The predominant wind directions differ substantially between the wind rose charts presented in the April 2000 Draft Decision Document and the October 2002 Draft Final Decision Document. Revise accordingly.

**Response 1:** Acknowledged. The Wind Rose Figure included in the October 2002 Draft Final Decision Document reflects the most current conditions at SEDA. The figure provided in the April 2000 document is outdated.

**Comment 2:** Page 2-5, Section 2.4.3, Groundwater: This paragraph indicates that for SEAD-13-West, monitoring well 13-(1)2 is upgradient and monitoring well 13-6 is a downgradient well. The paragraph also indicates that the presumed direction of groundwater flow

was to the northeast for SEAD-13-West. Based on Figure 2-3, the presumed groundwater flow is in conflict with the upgradient and downgradient designations for the wells. Revise accordingly.

**Response 2:** The Army believes that based on historic knowledge and groundwater monitoring results that the west disposal pits do not exist. A 1960s report on the disposal of IRFNA discussed the “disposal site” and the construction of 6 pits (east disposal area). The location marked on an old map appears to be in an area that was east of the future Duck Pond. It should be noted that the Army investigated the assumed west disposal area due to the presence of the aboveground piping. It appears that the piping was installed in the event that it was required at a later date. Groundwater results show that the nitrate concentrations are not elevated in the assumed area of the west disposal area. The nitrate concentrations (up to 0.17 ppm) are well below the Class GA standard of 10 mg/l. As a comparison, the nitrate concentrations are over 1,000 times higher in the east disposal area.

Since there is no actual source material, upgradient and downgradient determinations cannot be made. The text will be revised accordingly.

The presumed groundwater flow is now discussed in new Section 2.5.5 and shown on Figure 2-6.

**Comment 3:** Page 3-4, Section 3.2.1.1, QA/QC Methods: The fifth sentence in this section uses the phrase “field equipment decontamination event.” Revise text for clarity.

**Response 3:** Agreed. One field equipment blank was collected per batch of 20 or fewer samples per matrix in order to detect possible sources of contamination introduced from field sampling equipment or from carry over from one sample to the next. The text has been revised.

**Comment 4:** Page 3-5, Section 3.2.1.3, Data Validation: The second sentence of this section uses the term “sample reservations.” Please correct this text.

**Response 4:** Agreed. The text should read “sample preservations”. The text has been revised.

**Comment 5:** Page 3-11, Section 3.3.4.2, Fate and Transport: The second to last sentence under the “Metals” heading refers to cyanide as a metal. Revise text for clarity.

**Response 5:** Agreed. The sentence has been rephrased as follows: “Two metals, aluminum and manganese, and cyanide were considered COPCs in groundwater.”

**Response to the Comments from New York State Department of Environmental Conservation**

**Subject:** Draft Final Decision Document – Mini Risk Assessment for the Inhibited Red Fuming Nitric Acid (IRFNA) Disposal Site (SEAD-13)  
Seneca Army Depot  
Romulus, New York

**Comments Dated:** December 12, 2002

**Date of Comment Response:** March 28, 2003

*7/19/04: Post submittal note: Since these responses were submitted, minor revisions have been made to the responses in order to accurately reflect corrections made to the text of the Decision Document.*

**Army's Response to NYSDEC Comments:**

**Comment 1:** In NYSDEC's Specific Comment #1, the Department requested that "(S)urface and subsurface soil samples should be taken from within the IRFNA pits themselves (0-2 inches, plus others)." However, the Army only took one additional surface soil sample from within the IRFNA pits as indicated in Figure 2-3. One surface soil sample appears inadequate to characterize the extent of surface and subsurface contamination of IRFNA pits that are described in this report as "six elongated disposal pits (possibly seven)" that are "30 feet long, 8 feet wide and 4 feet deep." Also, for the one soil sample that was collected from the disposal pits, what type of surface soil was tested? The site description states that the pits are covered with crushed gravel and limestone fragments. Please explain the surface soil sampling methodology used.

**Response 1:** Disagreed. The Army submitted an initial work plan to NYSDEC and EPA for the supplemental fieldwork on January 11, 2001. A revised work plan was submitted on July 31, 2001 and this plan modified well locations slightly from the January 11, 2001 work plan. No locations were moved from the pits themselves. Both plans proposed one surface soil sampling point and no subsurface sampling points within the pits. The Army did not receive agency comments regarding the soil sample locations or the notice to proceed with sampling. The Army believed that NYSDEC considered the Army's proposed scope and sampling locations to be acceptable prior to beginning the work.

The surface soil sample collected in the disposal pit (SS13-9) was composed of shale fragments and limestone gravel. This description confirms that the sample was collected from the IRFNA pit contents. The sample was a grab sample and was collected using a spade.

The Army does not intend on performing additional surface or subsurface sampling within the disposal pits or in any other location at SEAD 13.

**Comment 2:** In the Army's response to NYSDEC's Specific Comment #2, the Army states that the "nitrate/nitrite concentrations in the groundwater in the IRFNA pit area have been generally

consistent over time.” However, the Army has not adequately defined the source of this contamination. If there is no source, then why haven’t the groundwater concentrations decreased with time? The consistent levels of nitrate/nitrite contamination may be indicative of a continuing source of groundwater contamination that may require further investigation. Please address.

**Response 2:** Disagreed. The source of the groundwater plume is the east disposal pit area. The plume extends in the directions of groundwater flow away from the east disposal pit area towards the Duck Pond. The Army contends that the nitrate plume has been adequately characterized by a combination of the nitrate groundwater results (Figure 2-9) and the geophysical survey results (Figure 2-5). The highest areas of conductivity as identified by the geophysical survey correspond well to the areas of high nitrate concentrations. Further, the two wells (MW13-3 and MW13-7) where the wells are consistently dry show as areas of low conductivity. Therefore, although the wells do not necessarily bracket the outside edge of the plume, the geophysical results show that the high conductivity dissipates outside of monitoring wells MW13-11, MW13-13 and MW-13-14.

The Army recognizes that the disposal pits were the source of groundwater contamination. However, further investigation of the source is not necessary as discussed above. The Army understands that a groundwater use restriction will be required to prevent ingestion of groundwater. Ingestion of groundwater was the only risk identified for SEAD 13.

### **General Comments:**

**Comment 3:** This document recommends institutional controls in the form of “a restriction on the use of groundwater for drinking water purposes together with a groundwater monitoring program is recommended due to the presence of elevated levels of nitrate/nitrite-nitrogen in the groundwater at SEAD-13 East.” However, the Army does not present how this remedial action would achieve ARARs. The document simply recommends “five-year reviews will be performed until data shows that they are no longer required.” The Army needs to thoroughly demonstrate how institutional controls would be protective of human health and the environment, in addition to compliance with ARARs.

**Response 3:** Agreed. Groundwater monitoring and land use restriction for groundwater will be implemented at the site until contaminant concentrations meet Class GA groundwater standards and EPA MCLs. The restriction on groundwater use at the site would eliminate contact with groundwater as an exposure pathway for human health risk, thereby reducing risk to within acceptable levels for potential human receptors. With the exception of groundwater use, there are no other unacceptable risks at this site. This clarification has been added to the text.

**Comment 4:** Although one of the Army’s goal for this decision document is to provide a recommendation that the area warrants no remedial action for soil, sediment, and surface water by

providing, in the Army's opinion, adequate site information to warrant this recommendation, the State believes that the Army has overlooked the actual source area, i.e., the disposal pits. Since the proposed future use of SEAD-13 is conservation/recreation, there is the potential for human contact, either by a construction worker, park worker or recreational visitor. Because the source was not addressed, and this exposure scenario was not addressed in the mini-risk assessment, the NYSDOH considers the risk assessment incomplete. At a minimum, a source area management plan is needed until the requested disposal pit information, as described below, is evaluated.

**Response 4:** Disagreed. The Army believes that the source of contamination has been sufficiently delineated. See Response No. 1. The Army disagrees that the source area was not evaluated in the mini-risk assessment. There was one surface soil sample (SS13-9) that was collected from the source materials. The risk assessment did not show unacceptable risk for contact with surface soil.

**Comment 5:** Clarification is sought as to why soil boring samples were not collected within the disposal pits. It is unclear how much soil, if any, is actually in the pits or if the disposal pits are even considered soil. The analysis of the waste for contaminants of concern (i.e., degradation products of IRFNA) and the physical parameter of pH would allow for a more complete evaluation of the potential for future exposures and additional migration of contaminants to surrounding soil and groundwater. In addition, the pH of the soil and groundwater adjacent to the pit area was not examined. As stated above, this information is necessary to evaluate the potential of (disposal pit related) decreased pH of soil or groundwater to leach "site background" inorganics not related to the disposal of IRFNA from surrounding soils into groundwater and subsequently the Duck Pond. In the document discussion of groundwater contamination, the Army states that some of the elevated inorganics, decreased pH and background leaching may also be the cause. Without turbidity data or dissolved inorganic/pH data, these two scenarios cannot be separated as to which may be the cause of the elevated inorganics.

**Response 5:** See Response No. 1 for rationale behind the subsurface exploration program. As stated above, the Army believes that the source has been sufficiently delineated, based on geophysical and groundwater data.

As shown on Figure 2-10, a review of groundwater sampling parameters shows that the pH of the groundwater at SEAD-13 is not lowered and is in the same range as the pH of groundwater at other background locations at SEDA. The pH levels measured at the site does not cause additional leaching of metals.

The elevated metals concentrations correlate with higher turbidity levels. The maximum concentrations of magnesium, iron, manganese and chromium were all detected in the September 2001 sampling round in MW13-13 where the turbidity measurement was 999 NTUs as compared to a turbidity of 13.7 NTUs in April 2002. In general, the metals results were significantly lower

where turbidity values were lower. For instance, the following table of results for MW13-13 demonstrates this.

Analyte	September 2001 (ug/l)	September 2001 Duplicate (ug/l)	April 2002 (ug/l)
Turbidity	999 NTUs	999 NTUs	13.7 NTUs
Aluminum	39,700	70,900	27.2
Chromium	62.5	109	<1.4
Copper	25.9	35	<1.4
Iron	57,300	97,900	59.2
Lead	27.1	32.5	0.8
Manganese	1,740	3,210	397
Nickel	80.2	134	9.5
Zinc	146	223	1.9

The Army does not dispute that there are metals concentrations that are exceeding Class GA Standards, however, there is no defined plume of high metals concentrations. As demonstrated above, the highest concentrations of metals were due to a sampling event where high turbidity groundwater was analyzed.

A new Section 2.6.3.7 has been added to summarize the turbidity and pH data.

**Comment 6:** Has the groundwater contamination been sufficiently delineated? If so, please provide a plume sketch, depicting both nitrate/nitrite and metals contamination.

**Response 6:** The groundwater contamination has been sufficiently delineated. Figure 2-9 provides a plume sketch, as well as nitrate/nitrite data.

As discussed in Response No. 5, there is no metals plume map to present.

**Comment 7:** There should be a conclusions section, preceding the Army's recommendations. In this conclusions section, the Army should indicate that SEAD-13 failed a residential risk assessment.

**Response 7:** The conclusions are presented in Section 3 and 4 and reiterated in Section 5. An additional section is not required. The results of the residential risk assessment are presented in Section 3.5.4 (formerly numbered Section 3.6). In the same manner that risk is not an issue for a recreation/conservation land use scenario, risk is not a threat to human health under a residential scenario. The risk assessment showed that the cancer risk to a future resident (child and/or adult) is within EPA's acceptable range. The non-cancer risks for the resident adult and resident child are elevated (HI=20 and HI=40, respectively). These high HIs are solely due to ingestion and

dermal contact to groundwater. If the groundwater pathway is eliminated, the total hazard indices for all residents become less than 1. The Army acknowledges that a land use restriction will be implemented to prevent the use of groundwater by future site users.

**Comment 8:** Although discussed in the text, there should be a figure denoting the direction of groundwater flow.

**Response 8:** Agreed. The direction of groundwater flow has been added to Figure 2-7.

**Specific Comments:**

**Comment 9:** Page 1-4, Section 1.3.2. Hydrology: The depth to groundwater should be indicated in this section.

**Response 9:** Agreed. Depth to groundwater, which varies by season and location, ranges from 1 foot to 10 feet. A new section 2.5.5 has been added to present groundwater elevation and groundwater flow information.

**Comment 10:** Page 2-10, Section 2.6.1.2 Semivolatile Organic Compounds: If the Army is attributing phthalates as laboratory contaminants, then the detection levels and frequency of detection should be discussed more thoroughly. This should be applied to other areas of the document where laboratory contamination is suspected as well.

**Response 10:** Agreed. The statement has been rephrased. "A few samples contained phthalates: bis(2-ethylhexyl)phthalate was detected five times at concentrations ranging from 27 J µg/kg to 1900 J µg/kg; di-n-butylphthalate was detected twice at concentrations of 8.6 J µg/kg and 140 µg/kg; di-n-octylphthalate was detected twice at concentrations of 7.7 J µg/kg and 210 J µg/kg. All of the identified detections were less than their respective TAGM 4046 values.

**Comment 11:** Page 2-14, Section 2.6.3.5, Metals: As stated in this section, eleven metals were found in the groundwater to exceed ARARs. Given that nitric acid was disposed at this site, there should be a discussion on pH levels detected and whether there is any correlation between pH and metals concentrations in the groundwater. If applicable, turbidity levels should be discussed as well.

**Response 11:** See Response No. 5.

**Comment 12:** Page 2-16, Section 2.6.4.5, Metals: If the Army is attributing higher levels of aluminum and iron to turbidity, then the actual turbidity levels should be presented in the text.

**Response 12:** Agreed. See Response No. 5. The turbidity data is included in the tables in Appendix A (Table A-3). The text has been revised to add turbidity data.

**Comment 13:** Page 5-2, Section 5.1, Expanded Investigation Results Supporting the Recommended Action: The Army should denote which document “the details of the groundwater monitoring program will be provided in.”

**Response 13:** Agreed. The details will be provided in a Remedial Design Plan.

**Comment 14:** Figures 2-1 through 2-7: On these figures it is unclear where the suspected IRFNA pits are on the west side of the site. Therefore it is difficult to support the Army’s location of monitoring wells and sampling points on the west portion of the site. Also, groundwater direction should be indicated where appropriate.

**Response 14:** The Army believes that based on historic knowledge and groundwater monitoring results that the west disposal pits do not exist. A 1960s Army report on the disposal of IRFNA discussed the “disposal site” and the construction of 6 pits (east disposal area). The location marked on an old map appears to be in an area that was east of the future Duck Pond. It should be noted that the Army investigated the assumed west disposal area due to the presence of the aboveground piping. It appears that the piping was installed in the event that it was required at a later date. Groundwater results show that the nitrate concentrations are not elevated in the assumed area of the west disposal area. The nitrate concentrations (up to 0.17 ppm) are well below the Class GA standard of 10 mg/l. As a comparison, the nitrate concentrations are over 1,000 times higher in the east disposal area.

The direction of groundwater flow has been added to a new Figure 2-7. In general, groundwater flows toward the Duck Pond.

**Comment 15:** Page 3-42, Section 3.6, Risk Characterization for Residential Land Use: The risk assessment section should be made more consistent by including this section as a sub-section under Section 3.5, Risk Characterization.

**Response 15:** Agreed. The section *Risk Characterization for Residential Land Use* has been renumbered Section 3.5.4.



## **Response to the Comments from United States Environmental Protection Agency Region 2**

**Subject:** Draft Decision Document-Mini Risk Assessment for SEAD-13,  
Inhibited Red-Fuming Nitric Acid Disposal (IRFNA) Site  
Seneca Army Depot  
Romulus, New York

**Comments Dated:** July 14, 2000

**Date of Comment Response:** October 30, 2002

### **General Comments – Human Health:**

**Comment 1:** Section 3.2.1 indicates that the data were generated using NYSDEC CLP Statement of Work methods and that these methods provide data suitable for a risk assessment. However, there is no indication that the data were validated according to EPA guidelines. Please include information regarding the data validation procedures and levels that were done for this data.

**Response 1:** Agreed. The samples were collected by Parsons, analyzed by NYSDEC CLP-approved laboratory, and validated by Parsons data validation personnel. The QA/QC measures during the data collection period and the data evaluation for suitability of use in the risk assessment complied with the RAGS (EPA, 1989). The data usability criteria for documentation, analytical methods, data validation, precision, accuracy, representativeness, comparability, and completeness are discussed in *Final Expanded Site Inspection Three Moderate Priority SWMU's SEAD 11, 13, and 57* (Parsons, 1995).

Specifically, the data validation was performed under the guidelines set forth in the "USEPA Contract Laboratory Program National Functional Guidelines for Organic Data Review", 1999, "USEPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review", 1994; "Region 2 RCRA and CERCLA Data Validation Standard Operating Procedures"; and NYSDEC Contract Laboratory Program Analytical Services Protocol. The data validation included a completeness audit and a review of the following parameters, if applicable: holding times, sample reservations, percentage of solids, quality control (QC) results of calibration, equipment/rinsate blanks, trip blanks, method blanks, matrix spike/matrix spike duplicate (MS/MSD) analyses, laboratory control sample performances, lab and field duplicates, ICP serial dilution, and surrogate recoveries.

The above information regarding the data validation has been included in Section 3.2.

**Comment 2:** The soil to skin adherence factor (AF) is listed as 1.0 for all chemicals in all scenarios. However, more recent guidance suggests an AF of 0.08 mg/cm<sup>2</sup> for adults and 0.3 mg/cm<sup>2</sup> for children. (Kissel, et al.) While an AF of 1 is more conservative, using this value has the potential to overestimate risks from the dermal pathway. This potential overestimation of risk should be discussed in the Uncertainty Section of the risk assessment.

**Response 2:** Acknowledged. The dermal risk assessment (including assessment of risks associated with soil, sediment, groundwater, and surface water dermal exposures) has been updated according to the USEPA *Supplemental Guidance for Dermal Risk Assessment* (2001), which represents the current knowledge of dermal risk assessment. The major changes are summarized as follows:

- (1) A quantitative evaluation of risks associated with soil and sediment dermal exposure has been added to the risk assessment.
- (2) The evaluation of dermal exposure to COCs in water has been updated according to the USEPA 2001 guidance. The relevant tables and text (Section 3.3.5.7 and 3.3.5.9) have been updated to reflect the change.
- (3) The exposure parameters associated with the dermal exposure pathways, such as soil adherence factor, exposed skin surface area, permeability coefficient, lag time per event ( $\tau$ ), dermal RfD and cancer slope factor, and dermal absorption factor have been updated according to the USEPA 2001 guidance. The relevant tables and text have been updated to reflect the changes.

It should be noted that the sediment to skin adherence factor was retained as 1 mg/cm<sup>2</sup>, the upper bound soil to skin adherence factor. As stated in the USEPA 2001 guidance: "*The adherence factor is perhaps, the most uncertain parameter to estimate for sediment exposures*". As a conservative approach, the sediment to skin adherence factor of 1 mg/cm<sup>2</sup> was retained and used for risk characterization. The uncertainty associated with the soil/sediment adherence factor has been discussed in Section 3.5.3.

**Comment 3:** Section 3.5.3.2 discusses the Uncertainties in the Exposure Assessment portion of the risk assessment. Two exposure pathways were not quantitatively evaluated due to lack of absorption factor information (ABS values). Dermal contact with soil was not quantitatively evaluated for any receptor and dermal contact with sediment was not quantitatively evaluated due to lack of exposure factor (the ABS values), potential underestimation of risks should be discussed in this section.

**Response 3:** Acknowledged. As discussed in the response to the preceding comment, the assessment of risks via soil, sediment, groundwater, and surface water dermal exposure has been updated according to the USEPA *Supplemental Guidance for Dermal Risk Assessment* (2001), which represents the current knowledge of dermal risk assessment. A quantitative evaluation of risks associated with soil and sediment dermal exposure has been added to the risk assessment. ABS values are not available for several COCs (including VOCs and several metals). The associated potential underestimation of risks has been discussed in Section 3.5.3.

**Comment 4:** Section 3.5.3.3 discusses the Uncertainties in the Toxicity Assessment. The inhalation of groundwater during showering was not quantitatively evaluated for the recreational

visitor due to lack of inhalation toxicity information. Potential underestimations of risk from not quantitatively evaluating this pathway should be included in this section.

**Response 4:** Acknowledged. A quantitative evaluation of risk via inhalation of groundwater during showering has been included in the report. Discussion of potential underestimation of risk due to the lack of inhalation toxicity information for some COCs has been included in Section 3.5.3.3.

**Comment 5:** There were no toxicological profiles provided for the COCs selected. Although references for the toxicological profiles were provided, the document would be more complete if toxicological profiles were included as an appendix to the document.

**Response 5:** Acknowledged. Although no toxicological profiles were provided for the identified COCs, profiles for most of the COCs can be found at the USEPA Integrated Risk Information System (<http://www.epa.gov/iris/>) and/or Toxicological Profile web page published by Agency for Toxic Substances and Disease Registry (<http://www.atsdr.cdc.gov/toxpro2.html>). Toxicological profiles for the selected compounds with significant contributions to the risks posed to human health or the environment have been included in Appendix D in the Decision Document – Mini Risk Assessment.

**Comment 6:** During the field investigations a set of pipes was identified at both SEAD-13 East and West. Please provide historical information about the pipes, their use, their abandonment and whether they have been plugged to prevent possible backflows into some other areas within the Depot. Please explain the significance of the pipes relative to possible exposures and risks.

**Response 6:** A set of vertical pipes was identified at SEAD-13. A vertical shower pipe and head is located in both the eastern and western side of the site. In the 1960 Report of sanitary engineering study No. 364214-60 "Disposal of Inhibited Red Fuming Nitric Acid by Soil Absorption, Seneca Ordnance Depot;" the vertical piping at SEAD-13-East was identified as vertical water and shower piping, likely used during the IRFNA disposal project as an emergency shower; however, the uses of the piping observed in SEAD-13-West, though similar in structure to that observed in SEAD-13-East, remains unknown (Final SWMU Classification Report, Parsons Engineering-Science Inc., 1994). An abandoned water hydrant was observed southwest of the Duck Pond. Possibly, this water hydrant was used to supply water pressure to the stainless steel ejector. Also, a set of the aboveground pipes was identified southeast of the Duck Pond and two sets of vertical piping were visible in the water southwest of the Duck Pond. The above information about the pipes has been included in Section 2.5.4, and Figure 2-6 has been added, which displays the approximate alignment of the underground piping at SEAD-13, based on the electromagnetic (EM) survey (Figure 2-5). There is little information about the previous usage of the piping.

According to the mini risk assessment, ingestion of groundwater with nitrate, aluminum, and manganese is the only exposure route that may cause significant risk. Since there is no exposure to the groundwater through the pipes, the risk related to the piping is negligible. In addition, the Army reports that all existing water line in the IRFNA disposal area were capped and abandoned during installation of a new water distribution line in the mid-1980s. The piping at SEAD-13 is not connected to any water distribution system currently in operation at SEDA.

#### **Specific Comments – Human Health:**

**Comment 1:** The Risk Characterization for Residential Land Use section is numbered as Section 3.6. However, Section 3.6 is the Ecological Risk Assessment section. The Residential Land Use section should be renumbered as 3.7 in the document and Table of Contents.

**Response 1:** Acknowledged. The Risk Characterization for Residential Land Use remains labeled as Section 3.6, and the Ecological Risk Assessment section has been renumbered as 4.0 in the document and Table of Contents.

**Comment 2:** Table A-14 in Appendix A. The Assumptions block lists the receptor as a "Recreational Worker." This should be changed to read "Recreational Visitor."

**Response 2:** Agreed. The "Recreational Worker" in Table A-14 has been changed to "Recreational Visitor".

#### **General Comments– Ecological Risk Assessment:**

**Comment 1:** It is unclear why a screening level ecological risk assessment (SLERA) was not performed as part of this ecological risk assessment (ERA). Performing a SLERA (Steps 1 and 2 as presented in *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments, USEPA 1997* [Process Document]) could help to reduce the number of COPCs therefore potentially reducing the amount of effort needed for further analysis.

**Response 1:** It should be noted that the ecological risk assessment conducted for SEAD-13 in this mini risk assessment is the SLERA (Steps 1 and 2 as presented in USEPA *Ecological Risk Assessment Guidance for Superfund: Process for Designing and Conducting Ecological Risk Assessments, 1997*). According to the guidance, the following information should have been compiled at the conclusion of SLERA (Steps 1 and 2): (1) Exposure estimates based on conservative assumptions and maximum concentrations; (2) Hazard quotients indicating which, if any, contaminants and exposure pathways might pose ecological threats. All the above information has been compiled in the mini risk assessment report. The results of the SLERA indicate that no pathways would pose ecological risk at SEAD-13 and therefore the ecological

risk assessment is complete at this step (i.e., SLERA) with a finding of negligible ecological risks. It should be noted that a screening-level ecological effects evaluation (i.e., Step 1.3) was not performed for this mini-ERA to reduce the list of COPCs. The ecological risk assessment Section (Section 4) has been revised to reflect the above discussion.

**Comment 2:** Assessment Endpoint 2 is stated in Table 3.6-1 as "No substantial adverse effect on populations of small mammals." It is unclear why foraging birds are not included in this assessment endpoint. Although the home ranges of birds are typically much larger than small mammals, birds can be much more sensitive to some chemicals (such as pesticides) than mammals. As a result, some toxicity reference values (TRVs) may be much lower for birds than for mammals resulting in potentially higher hazard quotients (HQs). It is recommended that Assessment Endpoint 2 be revised to include "no substantial adverse effect on populations of foraging birds." It is also recommended that a foraging bird species, such as the American robin, be included in the food chain modeling performed in the ERA.

**Response 2:** Agreed. A foraging bird species, the American robin, has been included in the food chain modeling performed in the ERA. Assessment Endpoint 2 in Table 4-1 has been revised to include "no substantial adverse effect on populations of small mammals (i.e., deer mouse, short-tailed shrew) and foraging birds (i.e., American robin)."

**Comment 3:** The food chain modeling was performed using only the most conservative parameters available such as maximum concentrations, NOAELs, and a site foraging factor (SFF) of one for both species being modeled. If HQs of greater than one were calculated, the uncertainties involved in using only the most conservative parameters in the food chain model were discussed along with how the use of less conservative, more realistic parameters would most likely result in lower HQ values. It would be much more useful if additional food chain modeling was performed to quantitatively show if the use of less conservative parameters would result in lower HQs. Simply speculating that HQ values would be below one if less conservative food chain modeling parameters were used does not provide adequate justification for excluding constituents from consideration as COCs. It is recommended that Section 3.6.4.1 be revised to include calculated HQ values using average concentrations, NOAELs, and more realistic species specific SFFs where appropriate.

**Response 3:** Acknowledged. Additional food chain modeling was performed to quantitatively show that the use of less conservative parameters would result in HQs lower than 1. This section has been revised to include more realistic species specific SFFs. The Army concurs that average concentrations would be more conservative; however, maximum concentrations have been used in the calculation of HQs in order to ensure that the ecological risk is not understated. It should be noted that Section 3.6 has been renamed as Section 4.0 and all the subsections have been renamed accordingly.

**Comment 4:** The analysis performed in the ERA for aquatic receptors should be considered only a screening analysis (Steps 1 and 2 of the ERA process). Since the aquatic receptors analysis consists of a comparison of maximum detected concentrations in surface water and sediment to screening criteria, any reference to Step 3 activities should be removed. For example, activities such as determining assessment and measurement endpoints for aquatic receptors and including aquatic receptors in the conceptual site model (CSM) are not necessary. The only Step 3 activity that is recommended for aquatic media is that surface water and sediment preliminary COPCs (constituents with preliminary HQs great than one) be refined (e.g. comparison to background frequency of detection, discussing bio-availability, etc.) so that the lack of food chain modeling for aquatic receptors can be justified.

**Response 4:** Agreed. The analysis performed in the ERA for aquatic receptors is a screening analysis (Steps 1 and 2 of the ERA process). Reference to Step 3 activities (*i.e.*, determining assessment and measurement endpoints) has been removed.

Discussion of why no chemicals are considered as COCs at this site in surface water and sediment has been included in Sections 4.4.2 and 4.4.3.

#### **Specific Comments– Ecological Risk Assessment:**

**Comment 1:** *Section 3.6.2, Page 3-49* – This section discusses the problem formulation step of the ERA process. Five bulleted items are presented as the key elements of the problem formulation process. According to the Process Document, fate and transport and the ecological effects of contaminants are also part of the problem formulation process. These two additional items should be discussed in Section 3.6.2.

**Response 1:** Agreed. Five bulleted items and the section have been revised according to the Process Document. Fate and transport and the ecological effects of contaminants have been included in the problem formulation process. It should be noted that Section 3.6 has been renamed as Section 4.0 and all the subsections have been renamed accordingly.

**Comment 2:** *Section 3.6.2.2, Page 3-49.* This section provides a characterization of the habitat at the site. The first sentence of this section states that characterizations of site habitat and ecological communities developed as part of the RIs for SEADs-16, 17, 25, and 26 and the Open Burning Grounds were assumed to be representative of SEAD-13. This assumption is not explained further. More detail should be provided discussing the way that SEAD-13 is ecologically similar enough to SEADs-16, 17, 25, and 26 and the Open Burning Grounds to justify this assumption.

**Response 2:** Agreed. The ecological setting of SEAD-13 is similar to SEADs-16, 17, 25, 26, and the Open Burning Grounds according to the following information:

- (1) SEAD-13 is located in Seneca Army Depot, within 3 miles of SEADs-16, 17, 25, 26, and the Open Burning Grounds. The Seneca sites share the same regional climate;
- (2) These sites are generally abandoned;
- (3) The vegetative cover at these sites consists of old fields, shrublands, and deciduous forest;
- (4) The shallow soil surface is similar to all sites, consisting mainly of crushed shales and limestone pieces;
- (5) Surface water, wetlands or drainage swales are present at these sites.

The above discussion has been included in the section. It should be noted that Section 3.6 has been renamed as Section 4.0 and all the subsections have been renamed accordingly.

**Comment 3:** *Section 3.6.2.3, Page 3-51-* This section discusses ecological assessment endpoints. The 1994 version of the Process Document is cited in the first sentence of this section. It is unclear why the most recent version (June 1997) of the Process Document was not used in developing this ERA. An effort should be made to use the most recent version of all documents used in the development of this ERA.

**Response 3:** Agreed. The ERA has been revised to use the June 1997 version of the Process Document as guidance. It should be noted that Section 3.6 has been renamed as Section 4.0 and all the subsections have been renamed accordingly.

**Comment 4:** *Section 3.6.2.3, Page 3-52.* Three criteria are presented on page 3-52 to be considered in the selection of assessment endpoints. The criteria are, ecological relevance, susceptibility to the contaminant(s), and representation of management goals. According to the Process Document, mechanisms of toxicity and potential for complete exposure pathways should also be considered when selecting assessment endpoints. A brief discussion of these two additional topics should be presented in this section.

**Response 4:** The above criteria are involved in selection of assessment endpoints in Step 3. As discussed in response to General Comment 1, the ecological assessment presented in this report has completed the SLERA (Steps 1 and 2 – screening level ecological risk assessment). Discussion of assessment and measurement endpoints has been revised to comply with the Process Document. It should be noted that Section 3.6 has been renamed as Section 4.0 and all the subsections have been renamed accordingly.

**Comment 5:** *Table 3.6-1* – Table 3.6-1 presents the policy goals, ecological assessment and measurement endpoints and decision rules developed for this ERA. It appears that the end of the sentence in the “Decision rule for Assessment Endpoint 2” cell is cut off. This editorial error should be corrected.

**Response 5:** Agreed. The editorial error has been corrected. It should be noted that Section 3.6 has been renamed as Section 4.0 and all the subsections (including the tables) have been renamed accordingly.

**Comment 6:** *Figure 3-3* – Figure 3-3 presents the ecological conceptual site model (CSM) for the Seneca Army Depot Activity. Ingestion of surface soil is the only terrestrial pathway marked for quantitative evaluation. Since ingestion of biota is included in the food chain model as a potential route of exposure, it should also be marked in the CSM as a principal pathway for quantitative evaluation. Figure 3-7 should be revised accordingly.

**Response 6:** Agreed. Ingestion of biota was included in the food chain model to evaluate exposure. The figure has been revised to include ingestion of biota by terrestrial receptors as a principal pathway for quantitative evaluation. It should be noted that Figure 3-3 has been renamed as Figure 4-1.

The reference to Figure 3-7 was unclear. Please provide additional information on this comment.

**Comment 7:** *Section 3.6.2.4, Page 3-59* - This section discusses the analysis plan for the ERA. The first sentence of this section states that the analysis plan is the final state of problem formulation. According to the Process Document, the analysis plan is not part of problem formulation (Step 3) but is part of Step 4, Study Design and Data Quality Objectives Process. Section 3.6.2.4 should be revised to state that the analysis plan is part of the study design process, not problem formulation.

**Response 7:** Agreed. Since the ecological assessment presented in this report was completed at the screening-level (Steps 1 and 2), the report has been revised to only include information for Steps 1 and 2. It should be noted that Section 3.6 has been renamed as Section 4.0 and all the subsections have been renamed accordingly.

**Comment 8:** *Table 3.6-2* – Table 3.6-2 presents the wildlife intake rates used in the food chain modeling. Two problems were noted with this table:

- a. It is unclear why a surface water ingestion rate is provided for the short-tailed shrew if surface water ingestion is not part of the food chain model. The surface water column should be removed from Table 3.6-2.
- b. It is unclear why a soil ingestion rate is not provided for the short-tailed shrew. Since incidental soil ingestion is part of the food chain model, a soil ingestion rate should be provided for the short-tailed shrew.

**Response 8:** Agreed. The surface water column has been removed from the table.



Agreed. A soil ingestion rate of 0.00011 kg dw/day was assumed for the short-tailed shrew. The selected soil ingestion rate is from USEPA *Ecological Soil Screening Level Guidance* (2000) and is based upon the assumption that the soil ingestion rate is 3% of the food ingestion rate (i.e., 0.20 kg dw/kg BW day for the short-tailed shrew) and that the body weight of the short-tailed shrew is 0.018 kg. It should be noted that both the body weight and dietary breakdown have been revised in accordance with the USEPA guidance (2000) and USEPA Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities (1999).

It should be noted that Section 3.6 has been renamed as Section 4.0 and all the subsections (including the tables) have been renamed accordingly.

**Comment 9:** *Section 3.6.4.2, Page 3-72* – This section discusses the results of the surface water screening. It is stated in the second sentence of this section that the HQ for nitrate/nitrite-nitrogen is greater than one (5.0). However, according to Tables 3.6-6 and A-19, the HQ for nitrate/nitrogen is 5.0E-03, which is below one. This discrepancy should be addressed.

**Response 9:** Agreed. The section has been revised to be consistent with the tables. It should be noted that Section 3.6 has been renamed as Section 4.0 and all the subsections (including the tables) have been renamed accordingly. The results of the surface water screening are presented in Table 4.4-2. There is no HQ for nitrate/nitrite-nitrogen, since, according to NYS TOGS 1.1.1 (1998), a chemical specific screening value for aquatic life for nitrate/nitrite-nitrogen is not available.

#### **SECTION 4 – Recommendations**

**Comment 1:** *Section 4.0, Page 4-1* – Please include the groundwater monitoring program as mentioned on Section 1.1, page 1-2 and the five-year review requirements within your recommendations. A map showing approximate plume contours and recommended monitoring wells should also be included within this section.

**Response 1:** Agreed. The proposed groundwater monitoring program and the five-year review requirements has been included in the section presenting recommendations for the site, Section 5.0. In general, the groundwater monitoring program will consist of annual sampling of the existing groundwater monitoring network. The details of the monitoring program will be specified in a future document. The monitoring program will continue until the applicable standards have been achieved.

A figure (Figure 2–7) showing the nitrate/nitrite groundwater concentrations has been included in Section 2.0. It should be noted that Section 4.0 has been renamed as Section 5.0.

**Comment 2:** *Section 4.0, 4<sup>th</sup> bullet, Page 4-1* – What is the Army's plan to address the high concentration of iron at MW13-1? Please provide recommendations.

**Response 2:** The iron concentrations in groundwater are consistent with background. In addition, iron in groundwater is not expected to pose any significant risk to human health and the environment. The above recommendation is based on the following factors:

- (1) Although the concentration detected at MW13-1 in 1994 was elevated (i.e., at 69.4 mg/L), the concentrations detected in 2001 and 2002 were much lower (i.e., 0.46 mg/L and undetected with the detection limit of 0.017 mg/L, respectively). Although iron concentrations detected at 1994 and 2001 exceeded the NY State Class GA Groundwater Standard, the concentration detected at 2002 was below the standard (i.e., 300 mg/L). The elevated concentrations detected in the previous sampling events might be associated with the high turbidity of the samples. In addition, the sum of the iron and manganese concentrations detected at MW13-1 in 2001 and 2002 were lower than the NY State Class GA Groundwater Standard for the sum of iron and manganese.
- (2) Iron concentrations detected in groundwater were consistent with background. As a result, iron was not considered a COC for the mini risk assessment of this draft final decision document.
- (3) Iron occurs naturally and is an essential human nutrient. The mini risk assessment conducted for the draft decision document indicates that even if iron were considered a COC for groundwater, there would be no unacceptable human health risk or ecological risk related to iron in groundwater at the site.

It should be noted that elevated iron concentrations (57.3 mg/L and 97.9 mg/L) were detected at MW13-13 in 2001. However, the elevated concentrations might be related to the elevated turbidity in the samples (i.e., turbidity of 999 NTU). In addition, the iron concentration detected in 2002 in a sample collected from the same well but with much lower turbidity (13.7 NTU) was 0.0592 mg/L, which was below the NY State Groundwater Standard for iron (i.e., 0.3 mg/L). The high iron levels are proportional to high turbidity, and they are not associated with dissolved contaminants.

Based on the above discussion, it is concluded that iron concentrations in groundwater are not expected to pose any significant risk to human health and the environment. Therefore, the section has been updated to reflect that iron is not a COC. It should be noted that Section 4.0 has been renamed Section 5.0 and all the subsections have been renamed accordingly.

## **Response to the Comments from New York State Department of Environmental Conservation**

**Subject:** Draft Decision Document-Mini Risk Assessment for SEAD-13,  
Inhibited Red-Fuming Nitric Acid Disposal (IRFNA) Site  
Seneca Army Depot  
Romulus, New York

**Comments Dated:** July 26, 2000

**Date of Comment Response:** October 30, 2002

### **General Comments:**

The result of a project review by the New York State Department of Environmental Conservation, is that this agency cannot concur with a no further action designation for SEAD-13 at this time. Most of the data submitted in the document is outdated (1993-1994), and not characteristic of present site condition. It is certain, had this agency received a sampling plan for the most recent round of surface water sampling (2000), it would have requested that all matrices (groundwater, surface soil, subsurface soil, surface water and sediment) be included. SEAD should be aware that although a complete Remedial Investigation (RI) is not requested at this time, in an effort to adequately categorize present site conditions, a sampling should be conducted at SEAD-13.

**Response:** Agreed. Additional soil, groundwater, sediment, and surface water sampling was conducted from January 2000 to April 2002 to further categorize present site conditions. The mini risk assessment report has been revised to include the results of the additional sampling efforts.

### **Specific Comments:**

**Comment 1:** Surface and subsurface soil samples should be taken from within the IRFNA pits themselves (0-2 inches, plus others).

**Response 1:** Agreed. An additional surface (0-2 inches) soil sample was collected from within the IRFNA pits at SEAD-13-East (SS13-9) in 2001. Although no subsurface soil samples were directly collected within the IRFNA pits, subsurface soil samples have been collected adjacent to the IRFNA pits (e.g., SB13-1, SB13-7, SB13-8, SB13-2, SB13-13, etc.)

**Comment 2:** Groundwater sampling should indicate if the nitrate/nitrite nitrogen concentrations in the groundwater are decreasing to support that no further action is appropriate.

**Response 2:** Acknowledged. The additional groundwater sampling results have been added to the decision document. The multiple rounds of groundwater samples collected from MW13-2 and the adjacent area (MW13-13 and MW13-14) indicate that the nitrate/nitrite (expressed as N) concentrations in the IRFNA pits area were elevated. The nitrate/nitrite concentrations detected at MW13-2 were 460 mg/L, 603 mg/L, and 445 mg/L for 1993, 2001, and 2002, respectively.

Therefore, it appears that nitrate/nitrite concentrations in the groundwater in the IRFNA pits area have been generally consistent over time.

The elevated nitrate/nitrite concentrations (i.e., exceeding the NY State Class GA Groundwater Standard of 10 mg/L) are limited to the SEAD-13-east disposal area. The nitrate/nitrite concentrations detected at MW13-1 and at MW13-4 (in the west disposal area) were below the NYS Groundwater Standard. Nitrate/nitrite concentrations detected in surface water adjacent to the east disposal area were relatively low (i.e., all concentrations were lower than 1.5 mg/L). There is no evidence that sediment and surface water at SEAD-13 are impacted. In addition, it is expected that a restriction on groundwater use will be required at the site. There is no significant risk to human health posed by the site once the restriction is in place. Based on the consistent levels of nitrate/nitrite over ten years, the conclusions are not expected to change in the short-term.

**Comment 3:** The EM survey indicates a ground water plume with high concentration of ionic solids north of MW13-2. This could be an indication that the 460 ppm found in MW13-2 is an underestimation of the impact to groundwater at the site. A groundwater well to the north of MW13-2 may be needed to completely categorize the full impact to groundwater in this area.

**Response 3:** Acknowledged. In 2001, two monitoring wells (MW13-13 and MW13-14) were installed north of MW13-2 where the EM survey indicates a high concentration of ionic solids. Groundwater samples were collected in 2001 and 2002 from these two monitoring wells. Additional groundwater samples were also collected from MW13-2 in 2001 and 2002. The analytical results indicate that the nitrate/nitrite concentrations at MW13-2 and MW13-13 were higher than the concentration at MW13-14 (i.e., the concentrations at MW13-2 and MW13-13 ranged from 445-731 mg/L and the concentration at MW13-14 was 140 mg/L). The additional sample results have been included in the draft final decision document.

**Comment 4:** The surface soil samples taken at 0-2 feet are not characteristic of surface soil conditions. Surface soil samples (0-2 inches) and subsurface soil samples (0-2 feet, at the one and two foot level) are requested to characterize surface and subsurface soils.

**Response 4:** Agreed. Additional surface soil samples were collected in 2001 at 0-2 inches (SB13-14, SS13-1 through SS13-9, and SS13-11). All soil samples have been collected at 0-2 inches, 0-1 ft, 0-2 ft, and other levels from 4-12 ft bgs. The data are adequate to characterize surface and subsurface soil and have been included in the draft final decision document.

**Comment 5:** Surface water samples analyzed only for aluminum are not acceptable. Surface water should be analyzed for the complete range of heavy metals.

**Response 5:** Acknowledged. Three surface water samples collected in 1993 (SW13-1, SW13-2, and SW-3) were analyzed for the complete range of heavy metals. In responding to the comment, additional surface water samples were collected in 2000 and 2001. Six of the collected samples were submitted for the analysis of the complete range of heavy metals (aluminum, antimony, arsenic, barium, beryllium, cadmium, calcium, chromium, cobalt, copper, iron, lead, magnesium, manganese, mercury, nickel, potassium, selenium, silver, sodium, thallium, vanadium, and zinc) and cyanide. These additional data have been included in the draft final decision document.

**Comment 6:** Sediment and surface water samples from within the Duck Pond area are required as this would be an area most impacted by the IRFNA pits.

**Response 6:** Acknowledged. Sediment samples (SD13-1, SD13-2, SD13-3, SD13-4, SD13-5 and SD13-6) and surface water samples (SW13-1, SW13-2, SW13-3, SW13-4, SW13-5, and SW13-6) were collected within the Duck Pond. The results are included in the draft final decision document.