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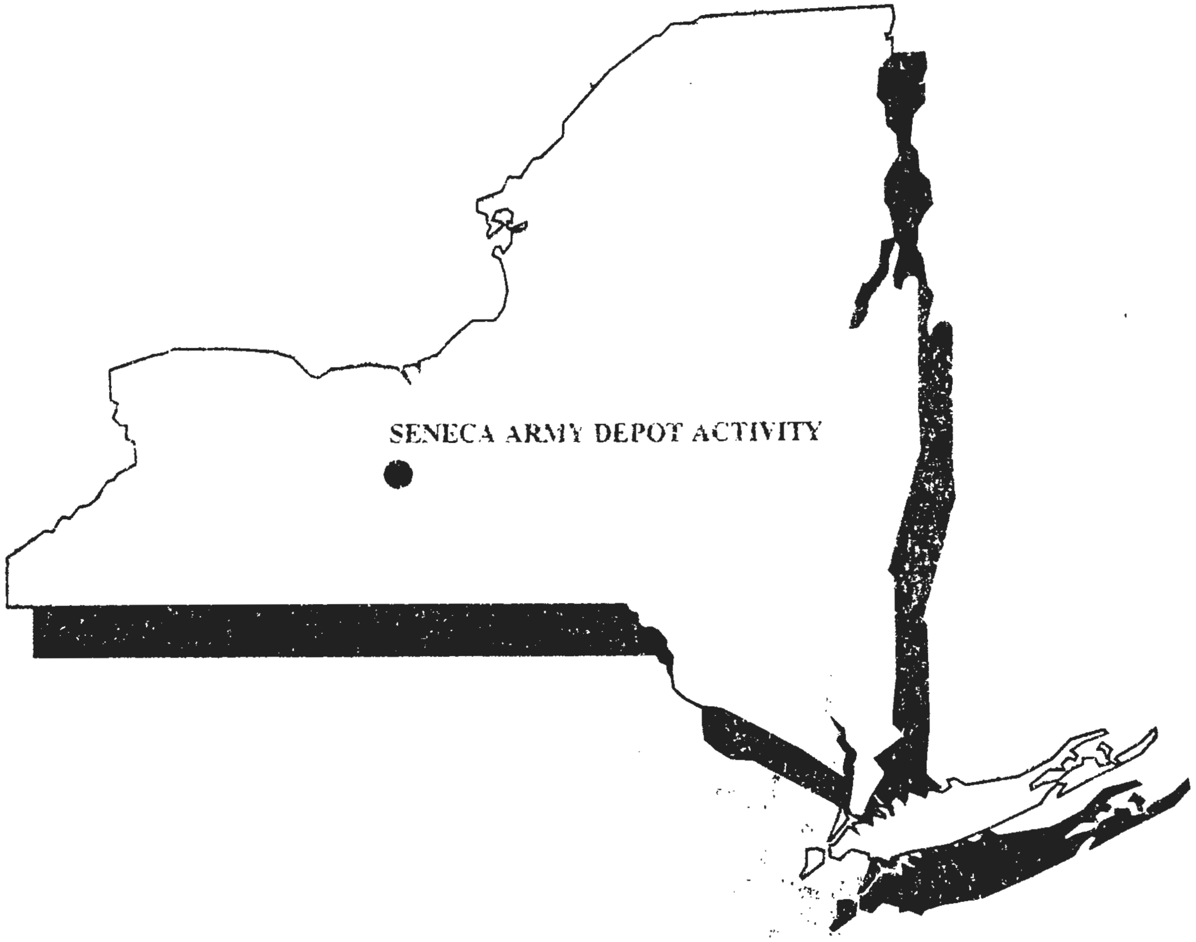

FINAL

REMEDIAL INVESTIGATION REPORT AT THE MUNITIONS WASHOUT FACILITY (SEAD -4)

CONTRACT NO. DACA87-95-D-0031
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FINAL
REMEDIAL INVESTIGATION
AT SEAD-4
SENECA ARMY DEPOT ACTIVITY
ROMULUS, NEW YORK

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ABS	Absorption Fraction
ACBM	Asbestos Containing Building Material
AET	Actual Evapotranspiration
AMC	U.S. Army Material Command
AOC	Area of Concern
AQCR	Genesee-Finger Lakes Air Quality Control Region
1,2-DCA	1,2-Dichloroethane
1,2,-DCE	1,2-Dichloroethylene (total)
2,4,5-TP	Silvex
ARAR	Applicable or Relevant and Appropriate Requirements
AST	Aboveground Storage Tank
ASTM	American Society for Testing and Materials
AW	Drilling Rod Size
ATSDR	Agency for Toxic Substances and Disease Registry
AWQC	Ambient Water Quality Criteria
B	Boring
BAF	Bioaccumulation Factor
BALAT	Benthic Aquatic Life Acute Toxicity Criteria
BALCT	Benthic Aquatic Life Chronic Toxicity Criteria
BAP	Benzo(a) Pyrene
BCF	Bioconcentration Factor
BDL	Below Detection Limit
bls	below land surface
BOD	Biological Oxygen Demand
BRA	Baseline Risk Assessment
BRAC	Base Realignment and Closure
BTEX	Benzene, Toluene, Ethylbenzene and Xylene
C	Carcinogenic Risk
CEC	Cation Exchange Capacity

CERCLA	Comprehensive Environmental Response, Compensation and Liability Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CI	Chloride
CLP	Contract Laboratory Program
cm	Centimeters
cm/sec	Centimeters per second
CME	Central Mine Equipment
COC	Chemical of Concern
COD	Chemical Oxygen Demand
COPC	Chemical of Potential Concern
CRAVE	USEPA Carcinogen Risk Assessment Verification Endeavor
CRT	Cathode Ray Tube
CSM	Conceptual Site Model
CT	Central Tendency
CV	Coefficient of Variance
DCE	Dichloroethylene
DDD	1.1-Dichloro - 2-(o-chlorophenyl) - 2-(p-chlorophenyl)
DDE	1.1-Dichloro - 2-(p-chlorophenyl) - 2-(o-chlorophenyl)
DDT	1.1.1-Trichloro - 2-(0-chlorophenyl) - 2-(p-chlorophenyl) ethane
DES	Diethyl Stilbestrol
DO	Disolved Oxygen
DOD	Department of Defense
DOE	Department of Energy
DOT	Department of Transportation
DWQS	Drinking Water Quality Standard
Eh	Oxidation Reduction Potential
EEC	Expected Exposure Point Concentration
EF	Exposure Factors
EIS	Environmental Impact Statement

EM	Electromagnetic
EMSOFT	Emission Model for Soil Organic Fate and Transport
EPA	Environmental Protection Agency
EPC	Explosive Point Concentration
EPM	Equivalent Porous Media
EPT	Ephemeroptera, Plecoptera and Tricoptera
EQ	Ecological Quotient
ERA	Ecological Risk Assessment
ERQ	Ecological Risk Quotient
ES	Engineering-Science, Inc.
ESE	Environmental Science and Engineering
ESF	Environmental Science and Forestry
ESI	Expanded Site Inspection
FDA	Food and Drug Administration
FI	Fraction Ingested
FMP	Forest Management Plan
FS	Feasibility Study
ft	Feet
ft/day	Feet per day
ft/ft	Feet per foot
ft/sec	Feet per second
ft/yr	Feet per year
FWMP	Fish and Wildlife Management Plan
FWIA	Fish and Wildlife Impact Analysis
g	gram
GAE	Geophysical anomaly excavations
GC	Gas chromatograph
GC/MS	Gas chromatograph/Mass spectrum
gpm	Gallons per minute
GPR	Ground penetrating radar

GSSI	Geophysical Survey Systems, Inc.
HEAST	Health Effects Assessment Summary Tables
HHB	Human Health Bioaccumulation Criteria
HI	Hazard Index
HMX	Octahydro-1,3,5,7-Tetranitro-1,3,5,7-Tetrazocine
HQ	Core Barrel Size
HSDB	Hazardous Substances Data Bank
I	Infiltration
ICF	ICF Technology, Incorporated
IR	Ingestion Rate
IRIS	Integrated Risk Information System
IRP	Installation Restoration Program
LEL	Lowest Effect Level
LOAEL	Lowest Observed Adverse Effect Level
LOT	Limit of Tolerance
L/min	Liters per minute
m	meter
MCPA	4-Chloro-2-Methylphenoxy acetic acid
MCRW	Microwell
MCPP	4-Chloro-2-Methylphenoxy-2-propionic acid
mg/kg	Milligrams per kilogram
mg/L	Micrograms per liter
mg/m3	milligrams/cubic meter
MHz	Megahertz
MIE	Monitoring Instruments for the Environment, Inc.
mi	mile
ml	milliliter
ML	Inorganic Silt
mL/g	milliliter per gram

mmhos/m	Millimhos per meter
mmHg	Millimeters Mercury
MRD	Missouri River Division
m/s	meter per second
MSL	Mean sea level
MW	Monitor Well
NAVA	North American Vertical Datum
NBS	National Bureau of Standards
Nc	Noncarcinogenic
NOAA	National Oceanic Atmospheric Administration
NOAEL	No Observed Adverse Effect Level
NO_2/N	Nitrite-Nitrogen
NO_3/N	Nitrate-Nitrogen
NPL	National Priority List
NRMP	National Resources Management Plan
NSF	National Sanitation Foundation
NTU	Nephelometric turbidity units
NW	Drilling Rod Designation
NWI	National Wildlife Institute
NYCRR	New York Codes, Rules and Regulations
NYS	New York State
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
OB	Open Burning
ODAST	One Dimensional Analytical Solute Transport
OU	Operational Unit
OV	Specific Ovid Quadrangle
OVM	Organic Vapor Meter
PAH	Polynuclear aromatic hydrocarbons

PCB	Plychlorinated Biphenyls
PDM	Miniature Real-time Aerosol Monitor Model
PERC	Percolation
PET	Potential Evapo Transpiration
PID	Photoionization detector
ppm	parts per million
ppmv	Part Per Million Per Volume
PR	Percent Recovery
PSCR	Preliminary Site Characterization Report
Psi	Pounds per square inch
PT	Monitoring Well
PVC	Polyvinyl Chloride
QA	Quality Assurance
QA/QC	Quality Assurance/Quality Control
QC	Quality Control
RAGS	Risk Assessment Guidance for Superfund
RCRA	Resource Conservation and Recovery Act
RF	Response Factor
RfC	Reference Concentration
RfD	Reference Dose
RI	Remedial Investigation
RME	Reasonable Maximum Exposure
RPD	Relative Percent Difference
RQD	Rock Quality Designation
SAF	Society of American Foresters
SARA	Superfund Amendments and Reauthorization Act
SB	Soil Boring
SCS	Soil Conservation Service
SD	Sediment
SDEF	Standard Default Exposure Factors

SDG	Sample Delivery Group
SEAD	Seneca Army Depot (old name)
SEDA	Seneca Army Depot
Sec	Seconds
SF	Slope Factor
SFF	Site Foraging Factor
SI	Site Investigation
SIPT	Seismic Interpretation Program Terminal
SIR	Subsurface Interface
SKC	Supplier of Air Sampling Equipment
SO_4	Sulfate
SOP	Standard Operating Procedures
SOW	Scope of Work
SQL	Sample Quantitator Limits
ST	Soil Moisture
STF	Soil Transport and Fate
SUNY-ESF	State University of NY College of Environmental Science and Forestry
SVOCs	Semi-Volatile Organic Compounds
SW	Sediment and surface water sample station
SWMU	Solid Waste Management Unit
TAGM	New York State Chemical And Administrative Guidance Memorandum
TAL	Target analyte list
TCL	Target compound list
TEC	Toxicological Endpoint Concentration
TEF	Toxicity Equivalency Factor
TES	Target Environmental Services, Inc.
TIC	Tentatively Identified Compound
TKN	Total Kjeldah/Nitrogen
TOC	Total Organic Carbon
TOX	Total Organic Halogens
TP	Test Pit
TPH	Total Petroleum Hydrocarbons

TRPH	Total Recovered Petroleum Hydrocarbons
TRV	Toxicity Reference Value
TS	Total Solids
ug/g	Micrograms per gram
ug/wp	Micrograms per wipe
ug/kg	Micrograms per kilogram
UCL	Upper Confidence Limit
URF	Unit Risk Factor
USACE	United States Army Corps of Engineers
USAEHA	United States Army Environmental Hygiene Agency
USATHAMA	United States Army Toxic and Hazardous Materials Agency
USCS	Unified Soil Classification System
USDA	United States Department of Agriculture
USEPA	United States Environmental Protection Agency
USFWS	United States Fish and Wildlife Service
USGS	United States Geological Survey
UST	Underground Storage Tank
UV/VIS	Ultraviolet/Visible
UXB	Unexploded Ordnance Clearance Subcontractor
UXO	Unexploded Ordnance
VLF-EM	Very Low Frequency Electromagnetic
VOA	Volatile organic analyte
VOC	Volatile Organic Compound
Vs	Volt Second
WB	Wildlife Bioaccumulation
WRS	Wilcoxon Rank Sum Test

DATA QUALIFIERS

EPA - defined qualifiers for Organic Analyses are as follows:

B - This flag is used when the analyte is found in the associated blank as well as in the sample. It indicates possible/probable blank contamination and warns the data user to take appropriate action.

C - This flag applies to pesticide results where the identification has been confirmed by GC/MS.

D - This flag identifies all compounds identified in an analysis at a secondary dilution factor. If a sample or extract is re-analyzed at a higher dilution factor, as in the "E" flag above, the "DL" suffix is appended to the sample number for the diluted sample, and all concentration values reported are flagged with the "D" flag.

E - This flag identifies compounds whose concentrations exceed the calibration range of the GC/MS instrument for that specific analysis.

J - Indicates an estimated value. This flag is used either when estimating a concentration for tentatively identified compounds where a 1:1 response is assumed, or when the mass spectral data identification criteria but the result is less than the sample quantitation limit but greater than zero.

L - The analyte is a suspected laboratory contaminant. It's presence in the sample is unlikely (applies to volatile and semi-volatile organic results).

S - The compound was detected above instrument saturation levels (applies to semi-volatile organic results).

U - Indicates compound was analyzed for but not detected.

X - The reported result was derived from instrument response outside the calibration range (applies to pesticide/PCB results).

Y - The reported result is below the specified reporting limit (applies to pesticide/PCB results).

EPA - qualifiers for Inorganic Analyses are as follows:

B - Concentration qualifier which indicates that the reported value was obtained from a reading that was less than the Contract Required Detection Limit (CRDL) but greater than or equal to the Instrument Detection Limit (IDL).

U - The analyte was analyzed for but not detected.

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1.0 INTRODUCTION

1.1 PURPOSE OF REPORT

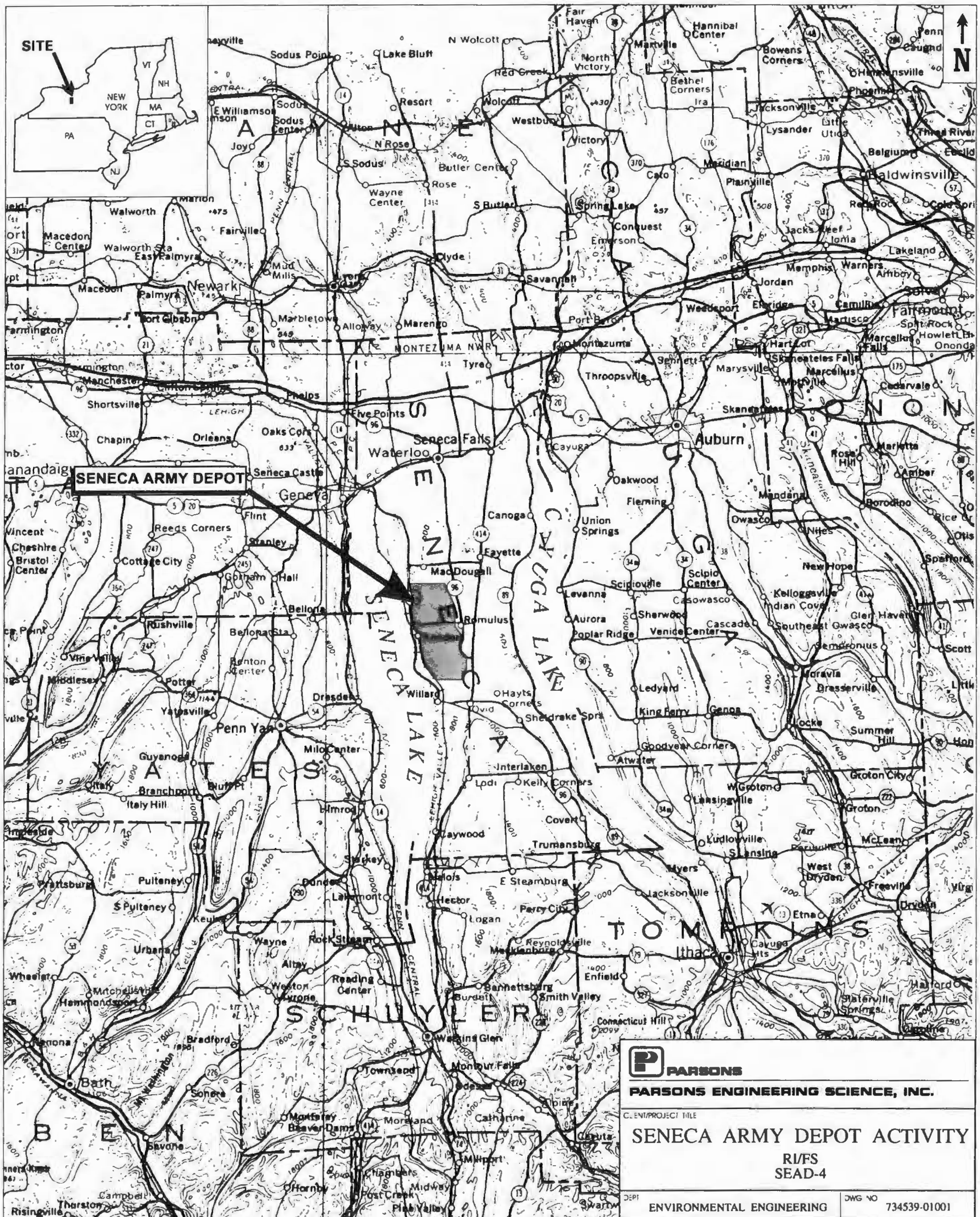
This report describes the Remedial Investigation (RI) activities at SEAD-4 at the Seneca Army Depot Activity (SEDA) in Romulus, New York. The purpose of this report is to discuss the physical characteristics of the site, present and interpret the analytical results from the investigation program, and identify sources of the potential impacts at the site. SEDA is included on the federal facilities National Priorities List (NPL) and has been listed since July 13, 1989.

Parsons Engineering Science, Inc. (Parsons ES) has been retained by the United States Army Corps of Engineers (USACE) as part of their remedial response activities under the Comprehensive Environmental Responsibility, Compensation and Liability Act (CERCLA) to perform these activities.

1.2 GENERAL DESCRIPTION OF SEDA

SEDA is an active military facility constructed in 1941. The site is located approximately 40 miles (mi) south of Lake Ontario, near Romulus, New York (**Figure 1-1**). The facility is located in an uplands area, at an elevation of approximately 600 feet Mean Sea Level (MSL), that forms a divide separating two of the New York Finger Lakes, Cayuga Lake on the east and Seneca Lake on the west. Sparsely populated farmland covers most of the surrounding area. New York State Highways 96 and 96A are roughly adjacent to SEDA's eastern and western boundaries, respectively. Since its inception in 1941, SEDA's primary mission has been the receipt, storage, maintenance, and supply of military items. SEAD-4 (The Munitions Washout Facility) comprises only a few acres within the 10,587 acres that make up the entire SEDA facility. **Figure 1-2** presents a plan view of SEDA and identifies the locations of SEAD-4.

The depot is divided into three areas. The main Post accounts for 9,832 acres and consists of an exclusion area containing partially buried, reinforced, concrete igloos, general storage magazines, and warehouses. The cantonment areas of the facility consist of the North and South Posts. The North Post, at the north end of the Main Post, includes former troop housing, troop support and community service facilities. The South Post is located in the southeastern portion of the facility near Rt. 96 and is a developed area containing warehouses, administration buildings, quarters, and community services.



![PARSONS]

PARSONS

PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY

RI/FS
SEAD-4

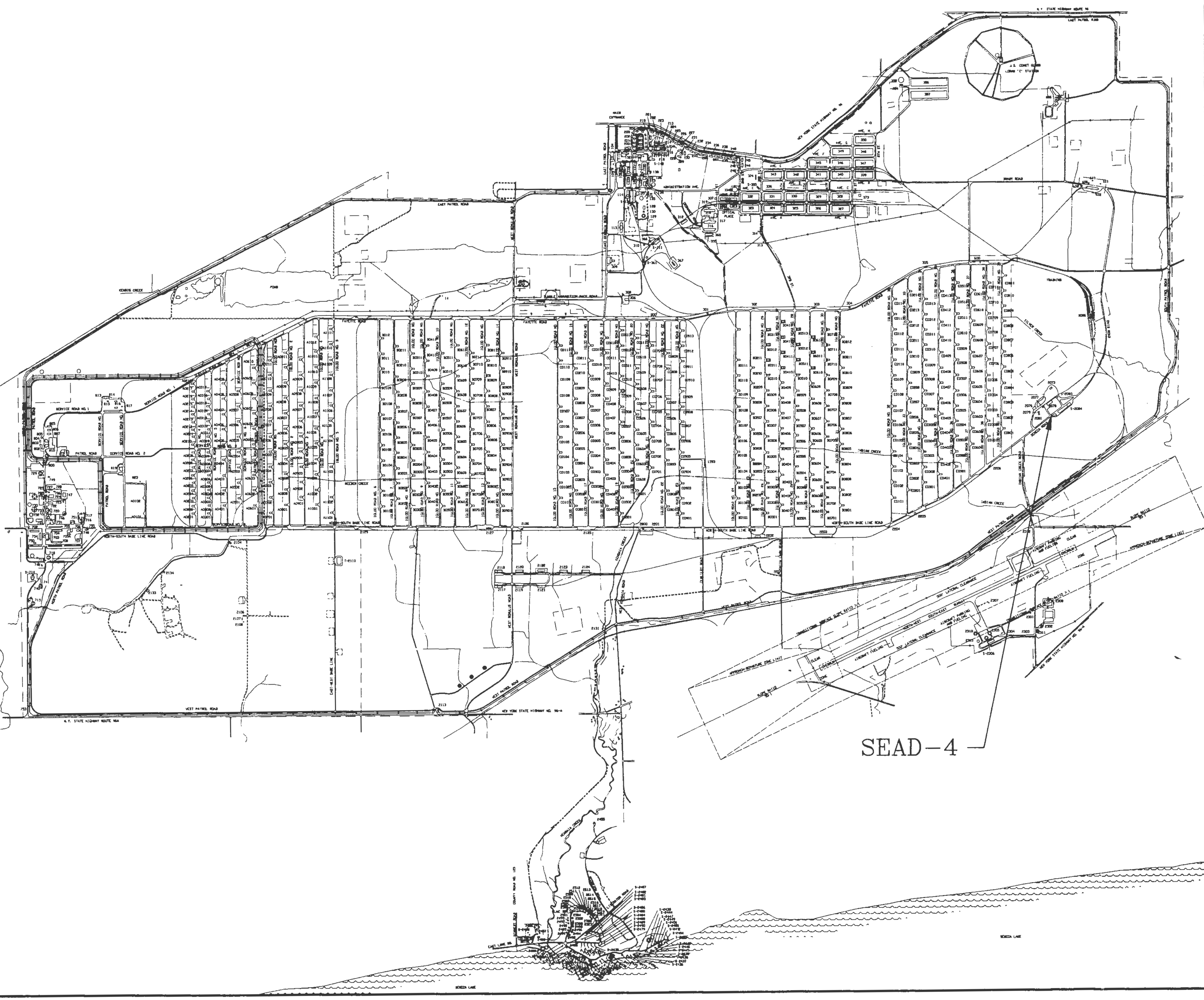
DEPT	DWG NO
ENVIRONMENTAL ENGINEERING	734539-01001

FIGURE 1-1

LOCATION MAP

SCALE	DATE
1"= 8 MILES APPROX	JUNE 1999

R:\GRAPHICS\SENECA\LOCMAP.CDR(CVM)



LEGEND:

S-2085 BUILDING NUMBER

-2800 0 2800

SCALE: 1" = 2800'

PARSONS

PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
REMEDIAL INVESTIGATION
SEAD-4, MUNITIONS WASHOUT FACILITY

DEPT.	Dwg. No.
ENVIRONMENTAL ENGINEERING	734539-01001

FIGURE 1-2
SENECA ARMY DEPOT ACTIVITY

SCALE	DATE	REV
1" = 2800'	JUNE 1999	A

R:\SENECA\RIFS\SD4\MWASH.DWG

1.3 SEAD-4

1.3.1 General Site Description

SEAD-4 is the Munitions Washout Facility located in the southwestern portion of SEDA. The Munitions Washout Facility was part of the Ammunition Workshop Facility. The workshop facility is approximately 30 acres in size and is characterized by developed and undeveloped areas (**Figure 1-3**). It is surrounded by open grassland and low, thick brush on all sides. North South Baseline Road is the main access road to the facility and bisects the site running from south-southeast to north-northwest. There is also a network of minor paved driveways in the eastern half of the site. The SEDA railroad tracks lead into the site from the southeast and terminate in the vicinity of Buildings 2078 and 2085.

The Ammunition Workshop Facility is almost entirely surrounded by two drainage ditches which are both approximately 3 feet deep. One of the ditches forms the eastern boundary of the site, originates in the southeastern part of the site, and circles around to the north where it joins the drainage ditch alongside North South Baseline Road. The second drainage ditch forms the southwestern boundary. It originates south of the site next to North South Baseline Road, circles to the northwest, and discharges into the man-made pond which lies on the western edge of the site.

Eleven buildings existed at the Ammunition Workshop Facility during the years that the Munitions Washout Building was operating. Building 2073 is the only building at the facility that is currently used. Four buildings were demolished. The buildings at the Ammunition Workshop Facility are listed below with their original designation:

1. Munitions Washout Building, which was used in the washout process (demolished);
2. "Decontamination building", which was used in the washout process (demolished);
3. Unnamed Building, which was used in the washout process (demolished);
4. Building T30, which was used to prepare the packing material (demolished);
5. Building 2073, Rocket Overhaul Shop, was used for testing of powder (this building is still active);
6. Building 2076, Lunch Room, was the employee break room and laundry facility;
7. Building 2077, General Purpose Storage, was a steam condensate return station (The washout process involved the use of steam or hot water to remove the solid explosives from munitions);

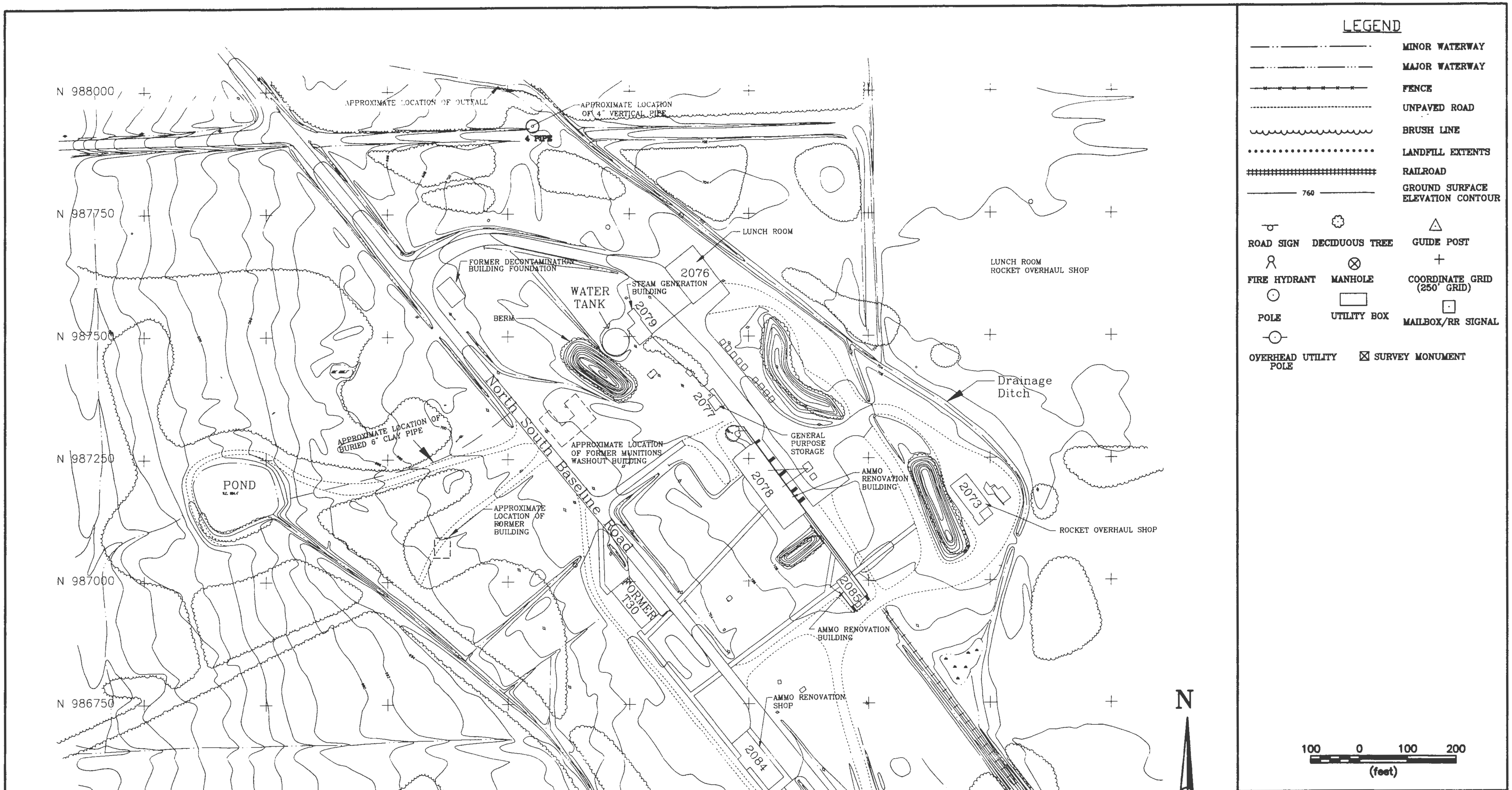
8. Building 2078, Ammo Renovation Shop, was a workshop used for munitions renovations;
9. Building 2079, Boiler House, was a steam generation building;
10. Building 2084, Ammo Renovation Shop, was used to prepare packing material for shipment of the renovated munitions (a paint booth and drying oven were also located in this building); and
11. Building 2085, Ammo Renovation Building, was a receiving building for munitions.

More descriptions of the buildings at the site are provided in Section 3.1, which presents the results of the building survey conducted during the RI field program.

Three buildings were associated with the washout process; the buildings include the former Munitions Washout Building, the "decontamination building", and a third unnamed building. The main building at the Munitions Washout Facility was the former Munitions Washout Building, which has been demolished. The Washout Building was located in the approximate center of the facility, adjacent to the North South Baseline Road. The "decontamination building," which might have been used as a cleaning or decontamination building, was located 300 feet to the northwest of the Washout Building, also adjacent to North South Baseline Road. The building foundation for the "decontamination building" has drains in the floor suggesting it was used for decontamination of equipment. Because this building was demolished not long after the washout process was stopped, it is assumed that it was used to support the washout process. The third building was located directly across North South Baseline Road and approximately 300 feet from the Munitions Washout Building.

The washout process involved the use of steam or hot water to remove the solid explosives from munitions ranging in size from 90-mm shells to 500-pound bombs. The heated water dissolved the solid explosives from the shells. The water was then passed over screens and agitated. As the water cooled while being agitated, the explosives would re-solidify into pellets. The pellets were dried, funneled into non-sparking containers, and were sent to weapons manufacturing plants to be re-used. The wastewater was then disposed of on-site. According to a former SEDA employee, the site workers referred to the wastewater as "red water", which suggests that the water that was discharged contained high concentrations of dissolved explosives.

The exact location where the wastewater from the washout operation was discharged is unknown. There are two areas suspected to have been used and there may be other unidentified areas where wastewater was discharged. It is unlikely that any explosive waste from the other ammunition



PARSONS

PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
REMEDIAL INVESTIGATION
SEAD-4 MUNITIONS WASHOUT FACILITY

DEPT.	Dwg. No.
ENVIRONMENTAL ENGINEERING	734539-01001

FIGURE 1-3
SEAD-4 MUNITIONS WASHOUT FACILITY
SITE MAP

SCALE	DATE	REV
1" = 200'	JUNE 1999	C

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renovation activities performed on-site was disposed of on-site. The areas where wastewater is suspected to have been discharged is the pond located west of the site and Indian Creek, which is located on the north side of Indian Creek Road. The man-made pond was constructed for the purpose of containing wastewater.

During the ESI, several underground piping structures were identified at the surface in the field where the leach field was suspected to be. The visible evidence of underground piping structures included 1) terra cotta pipe that passed through a concrete holding tank with a steel cover at two locations, 30 feet and 210 feet north of the road near the suspected leach field, 2) a vertical cylindrical steel pipe near the concrete tank farthest from the road, 3) an outfall that emptied into a drainage ditch that surrounds most of the northern portion of the site and 4) a manhole between the vertical steel pipe and the outfall pipe. The outfall was found to drain into the ditch to the north of the area. The chemical analyses performed on the sediment samples collected downstream of the outfall show that the sediment has been impacted by metals and semivolatile organic compounds (SVOCs). None of the piping structures seem to originate in the Munitions Washout Building, so the metals and the SVOCs released are not thought to be from the washout wastewater. According to site plans, the piping structures are connected to sewer and storm drain pipes that are connected to Buildings 2078 and 2079. The contamination in the ditch to the north of the facility, therefore, may be the result of activities associated with the washout process, but not from the washout wastewater itself.

The Groundwater Contamination Survey performed by the U.S. Army Environmental Hygiene Agency in 1988 states that the wastewater from the munitions washout operation was discharged near Building 2084. According to a current SEDA employee and a former SEDA employee, Building 2084 and T30 were used to paint, stencil, and otherwise prepare the packing material for the shipment of the renovated munitions. Another current SEDA employee reported seeing painting booths in Building 2084, so it seems unlikely that the wastewater from the washout operation was handled in these two buildings. A former SEDA employee has indicated that the washed out projectiles were painted in this building, so there may have been residual explosives in the projectiles that became part of the waste stream of these two buildings. The chemical analyses of the soil samples collected from soil borings near the two buildings show that the soil has been impacted by metals, SVOCs and one explosive compound. The chemical analyses of the sediment samples collected from the drainage ditch that originates immediately to the south of building 2084 show that the sediment in the ditch has been impacted by metals and SVOCs. While it is unlikely that washout wastewater was discharged near Building 2084, wastes of some kind may have been discharged in this area.

1.3.2 Site History

SEDA has been owned by the United States Government and operated by the Department of the Army since its construction in 1941. Prior to construction of the depot, the site was used for farming.

The Munitions Washout Facility was active between 1948 and 1963. Eleven buildings existed at the facility; four of the buildings have been demolished including the Munitions Washout Building, Building T30, the "decontamination building", and an unnamed building. At present, only the foundations of the Munitions Washout Building, "decontamination building", and Building T30 are visible as shown on the site map in **Figure 1-3**. A detailed description of all the buildings and their uses are presented later in Section 3.1.

Operations at this facility involved the dismantling of munitions and removing the explosives by steam cleaning. This produced recyclable and non-recyclable explosive solids and wastewater. The details of the operation are described in Section 1.3.1.

The Groundwater Contamination Survey Number 38-26-0868-88 (U.S. Army Environmental Hygiene Agency, 1988) states that the water from the washout operation at SEAD-4 was processed to concentrate the explosives. The concentrated explosives were then shipped to a munitions manufacturing facility and used in new munitions. Although the actual explosive compounds handled at the site are unknown, TNT was probably the primary explosive compound handled.

The Munitions Washout Facility Building was removed sometime between 1963 and 1968. This is known because operations at the building ceased in 1963 and the building does not appear on 1968 air photos taken of SEDA. An air photo taken in 1959 shows the former Washout Building, the "decontamination building", and the unnamed building. In the 1968 air photos, the three buildings no longer existed.

Building 2085 was a receiving building for munitions which were brought to the site by rail or trucks. Activities such as replacing the propellant in munitions or introducing tracers to 90 mm shells were performed in Buildings 2073 and 2078, the two main workshops.

The washout process involved the use of steam or hot water to remove the solid explosives from the munitions. Building 2079 was the steam generation building and Building 2077 was a steam condensate return station.

Packing material for shipping of the renovated munitions was prepared in Buildings T30 and 2084. Ammunition was spray painted in painting booths located in Building 2084. Building T30 was razed sometime between 1968 and 1993.

The employee break room and laundry facility was located in Building 2076.

The Groundwater Contamination Survey also stated that after processing, the wastewater was discharged near Building 2084 where it either leached into the ground or flowed into a nearby ditch. The wastewater was also possibly discharged into the pond that is located to the west of the facility or discharged into Indian Creek which is also to the west of the facility.

Within the past 8 years, the pond to the west of the facility was widened and deepened with a bulldozer. Pond sediment was pushed southwest of the pond to a 400-foot by 150-foot area adjacent to the pond. In 1990, soil samples were collected from the pond area and analyzed for explosives; none were detected (Appendix F).

1.3.3 Previous Investigations

SEAD-4 is described in three previous reports. The first report is a SWMU Classification Report (Parsons ES, 1994a) that describes and evaluates the Solid Waste Management Units at SEDA. This report was an initial step to provide a cursory evaluation of all of the SWMUs at SEDA. The second report is the Work Plan for CERCLA Expanded Site Inspection (ESI) of Ten Solid Waste Management Units (SWMUs) written by Parsons Main, Inc. in 1993. This report detailed the site work and sampling to be performed for the ESI. The third report is an Expanded Site Inspection Report (Parsons ES, 1995a) that presents the results of a more detailed investigation of SEAD-4.

SWMU Classification Report

The SWMU Classification Report (Parsons ES, 1994a) provides limited information about SEAD-4, as this report was designed to briefly describe and evaluate all 72 of the SWMUs at SEDA while also providing recommendations for future action at these sites. This report describes SEAD-4 (the Munitions Washout Facility), its physical make-up, the waste characteristics associated with it, as well as other information related to migration pathways and exposure potential. The report recommended that a CERCLA Site Inspection (SI) be performed at SEAD-4 as part of the investigation of 10 Solid Waste Management Units at SEDA. At the time of the preparation of the SWMU Classification Report, SEAD-4 was classified as a High Priority Area of Concern.

Expanded Site Inspection Report

The fieldwork for the ESI was conducted according to the Work Plan for CERCLA Expanded Site Inspection (ESI) of Ten Solid Waste Management Units (SWMUs) (Parsons Main, Inc., 1993). Based on this work, a report entitled Expanded Site Inspection, Seven High Priority SWMUs, SEAD-4, -16, -17, -24, -25, -26, and -45 was prepared by Parsons ES, (May 1995a), and submitted to both NYSDEC and the USEPA.

The ESI conducted at SEAD-4 consisted of geophysics, soil sampling, test pitting, monitoring well installation, groundwater sampling, surface water and sediment sampling. These investigations were used to initially characterize the physical setting of the site and determine whether soil and/or groundwater had been impacted by releases of chemicals from past site activities. Seismic profiles performed on the site were successful in determining that the bedrock surface slopes to the west or southwest, generally following the slope of the ground surface, and that groundwater flow was also likely to be in this direction.

The ESI conducted at SEAD-4 indicated that the subsurface soils have been impacted primarily by metals. Antimony, copper, chromium, and zinc were detected at significant concentrations above their respective TAGM values in the subsurface soil samples. The results of the chemical analysis show that surface soils at SEAD-4 have been impacted primarily by SVOCs and metals. The compounds benzo(a)anthracene, chrysene, benzo(a)pyrene, and dibenz(a,h)anthracene were reported in three surface soil samples at concentrations exceeding the associated TAGM values. Of the 22 metals reported in the surface soils, 17 were found in one or more samples at concentrations above the TAGM value. A large percentage of the samples contained the metals antimony, chromium, copper, and zinc at concentrations exceeding the TAGM values.

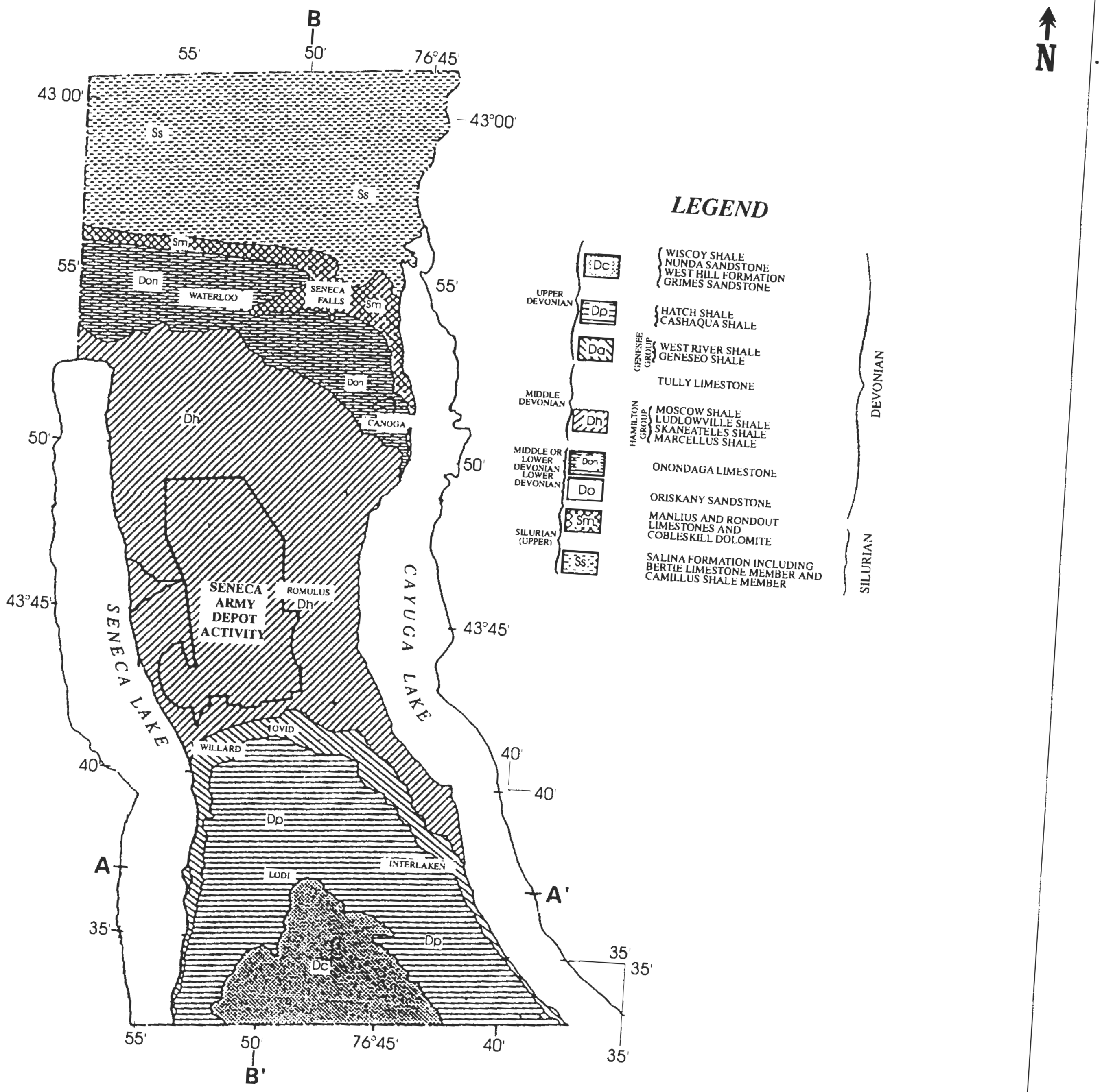
The results of the groundwater investigation at SEAD-4 identified levels of antimony, beryllium, cadmium, iron, magnesium, manganese, and sodium in one or more of the groundwater samples at concentrations above the standard values. It should be noted that comparisons of the concentrations of metals in the background well with those in downgradient wells show that in most instances where the NY AWQS Class GA values were exceeded, one or more downgradient wells exceeded the concentration measured in the background well. This is true for antimony, beryllium, cadmium, iron, magnesium, and sodium.

In the surface water samples, three metals, aluminum, copper, and iron, were found at concentrations above the most stringent state or federal criteria value. The nitroaromatic compound 1,3-dinitrotoluene was detected in the sample from the vertical pipe associated with the concrete tank adjacent to the leaching field on the northern section of the site. Sediment at the site has been impacted by SVOCs, pesticides, PCBs, and metals.

1.4 BACKGROUND INFORMATION

1.4.1 Regional Geologic Setting

The Finger Lakes uplands area is underlain by a broad north-to-south trending series of rock terraces mantled by till. As part of the Appalachian Plateau, the region is underlain by a technically undisturbed sequence of Paleozoic rocks consisting of shales, sandstones, conglomerates, limestones and dolostones. **Figure 1-4** shows the regional geology of Seneca County. In the vicinity of SEDA, Devonian age (385 million years bp) rocks of the Hamilton group are monoclinally folded and dip gently to the south (**Figure 1-5**). No evidence of faulting or folding is present. The Hamilton Group is a sequence of limestones, calcareous shales, siltstones, and sandstones. These rocks were deposited in a shallow inland sea at the north end of the Appalachian Basin (Gray, 1991). Terrigenous sediments from topographic highs associated with the Acadian landmass of Western New England, eastern New York and Pennsylvania were transported to the west across a marine shelf (Gray, 1991). These sediments were deposited in a northeast-southwest trending trough whose central axis was near what is now the Finger Lakes (Gray, 1991).



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

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PARSONS
PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
RI/FS
SEAD-4

DEPT
ENVIRONMENTAL ENGINEERING

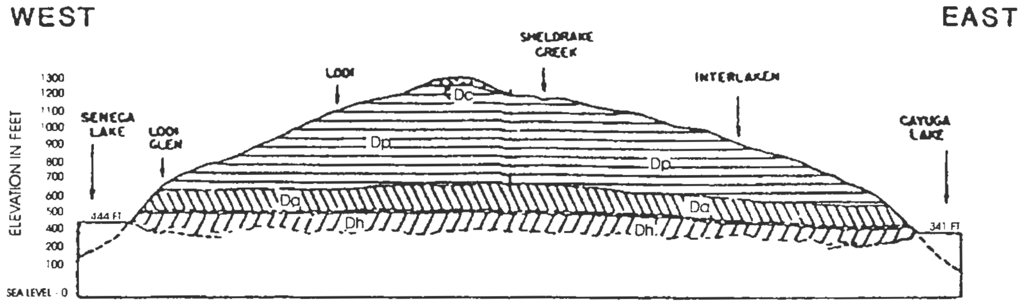
DWG NO
734539-01001

FIGURE 1-4

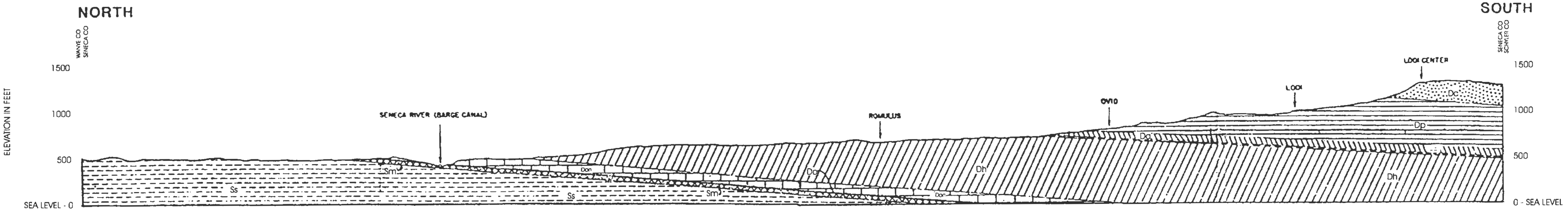
GEOLOGIC MAP OF SENECA COUNTY

SCALE 1" = 5 MILES

DATE JUNE 1999



EAST-WEST SECTION ALONG A- A'



NORTH-SOUTH SECTION ALONG 76°50' (B-B')

LEGEND

UPPER DEVONIAN	Dc	WISCOY SHALE NUNDA SANDSTONE WEST HILL FORMATION GRIMES SANDSTONE	DEVONIAN
	Dp	HATCH SHALE CASHAQUA SHALE	
	Da	GENESEE GROUP: WEST RIVER SHALE GENESEO SHALE	
MIDDLE DEVONIAN		TULLY LIMESTONE	
	Dh	HAMILTON GROUP: MOSCOW SHALE LUDLOWVILLE SHALE SKANEATELES SHALE MARCELLUS SHALE	
MIDDLE OR LOWER DEVONIAN	Don	ONONDAGA LIMESTONE	
LOWER DEVONIAN	Do	ORISKANY SANDSTONE	
SILURIAN (UPPER)	Sm	MANLIUS AND RONDOUT LIMESTONES AND COBLESKILL DOLOMITE	SILURIAN
	Ss	SALINA FORMATION INCLUDING BERTIE LIMESTONE MEMBER AND CAMILLUSSHALE MEMBER	

SCALE

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

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CLIENT/PROJECT TITLE
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RI/FS
SEAD-4

DEPT ENVIRONMENTAL ENGINEERING
DWG NO 734539-01001

FIGURE 1-5

REGIONAL GEOLOGIC
CROSS SECTIONS

SCALE AS NOTED
DATE JUNE 1999

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The Hamilton Group, 600 to 1500 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 and mudstones and thin limestones with numerous zones of abundant invertebrate fossils that form geographically widespread encrinites, coral-rich layers, and complex shell beds. 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). **Figure 1-6** displays the stratigraphic section of Paleozoic rocks of Central New York.

The physiography of Seneca County is shown on **Figure 1-7**. The majority of the area between Seneca and Cayuga Lakes is characterized by a till plain, which encompasses the entire SEDA facility. The Appalachian Plateau encroaches on the southern portion of this area. To the north of SEDA, the till plain gives way to glacial lake sediments in and near the towns of Waterloo and Seneca Falls. Farther north still is an area of drumlin and drumlinoid hills, which is flanked on the east by the marsh areas of the Montezuma National Wildlife Refuge and on the west by outwash plains and gravel hills (**Figure 1-7**).

Regional background elemental concentrations for soils from the Finger Lakes region of New York State are not available. However, background elemental concentrations for soils from the eastern United States, and in particular New York State, are available in the literature. **Table 1-1** presents data for soils in the eastern United States from a United States Geological Survey (USGS) professional paper (Shacklette and Boerngen, 1984) and data for the New York State soils from a New York State Department of Environmental Conservation (NYSDEC) report by McGovern (undated).

According to the General Soils Map, Seneca County, New York (Hutton, 1972), the soils in the vicinity of SEDA are from the Darien-Anglo association, which is characterized by deep and moderately deep, somewhat poorly-drained soils that have a silty clay loam and clay loam subsoil (**Figure 1-8**).

MESOZOIC

Lower Cretaceous

MESOZOIC INTRUSIVES

Kimberlite and alnoite dikes and diatremes

PALEOZOIC

Upper Devonian

CONNEAUT GROUP
600-1000 ft. (180-300 m.)

Germania Formation-shale, sandstone; Whiteville Formation-shale, sandstone; Hinsdale Sandstone; Wellsville Formation-shale, sandstone; Cuba Sandstone.

CANADAWAY GROUP
800-1200 FT(240-370) m.)

Machias Formation-shale, siltstone; Rushford Sandstone; Caneadea, Canisteo, and Hume Shales; Canaseraga Sandstone; Stone Wales and Dunkirk Shales; in Pennsylvania: Towanda Foramtion-shale, sandstone,

JAVA GROUP
300-700 FT (90-210 m.)

Wiscoy Formation-sandstone, shale; Hanover and pipe creek shales.

WEST FALLS GROUP
1100-1600 ft. (340-490 m.)

Nunda Formation-sandstone, shale.
West Hill and fardeau Formations-shale, siltstone; Roricks Glen Shale; upper Beers Hill Shale; Grimes Siltstone.
lower Beers Hill Shale; Dunn Hill, Millport, and Moreland Shales.
Nunda Formation-sandstone, shale; West Hill Formation-shale, siltstone; Corning Shale.
"New Milford" Formation-sandstone, shale.
Gardeau formation-shale, siltstone; Roricks Gain Shale.
Slide Mountain Formation-sandstone, shale, conglomerate.
Beers Hill Shale; Grimes Siltstone; Dunn Hill, Millport, and Moreland Shales

SONYEA GROUP
200-1000 ft. (60-300 m.)

In west: Cashaqua and Middlesex Shales.
In east: Rye Point shale; Rock Stream ("Enfield") Siltstone; Pulteney, Sawmill Creek, John Creek, and Montour Shales.

GENESEE GROUP AND TULLY LIMESTONE
200-1000 ft. (60-300 m.)

West River Shale; Genundewa Limestone; Penn Yan and Geneseo Shales; all except Geneseo replaced eastwardly by Ithaca Formation-shale, siltstone and Sherburne Siltstone.

Middle Devonian

Oneonta Formation-shale, sandstone.
Unadilla Formation-shale, siltstone.
Tully Limestone.

HAMILTON GROUP
600-1500 ft. (180-460 m.)

Moscow Foramtion-In west: Windom and Kashong Shales, Menteth Limestone Members; In east: Cooperstown Shale Member, Portland Point Limstone Member.
Ludlowville Formation-In west: Deep Run Shale Tichenor Limestone, Wanakah and Ledyard Shale Members, Centerfield Limestone Member. In east: King Ferry Shale and other members, Stone Mill Sandstone Member.
Skaneateles Formation-In west: Levanna shale and Stafford Limestone Members; In east: Butternut, Pompey, and Delphi Station Shale Members, Mottville Sandstone Member.
Marcellus Fornation-In west: Oakta Creek Shale Member; In east: Cardiff and Chittenango Shale Members, Cherry Valley Linestone and Union Springs Shale Members.
Panther Mountain Formation-shale, siltstone, sandstone.

ONONDAGA LIMESTONE AND ORISKANY SANDSTONE
75-150 ft. (23-45 m.)

Lower Devonian

Onondaga Limestone-Seneca, Morehouse (cherty) and Nedrow Limestone Members, Edgecliff cherty Limestone Member, local bioherms.
Oriskany Sandstone.

HELDERBERG GROUP
0-200 ft. (0-60 m.)

Coeymans and Manlius Limestones; Rondout Dolostone.

Upper Silurian

AKRON DOLOSTONE, COBLESKILL LIMESTONE, AND SALINA GROUP
700-1000 FT. (210-200 M.)

Akron Dolostone; Bertie Formation-dolostone , shale. Camillus and Syracuse Formatons-shale, dolostone, gypsum, salt.
Cobleskill Limestone; Bertie and camillus Formations-dolostone, shale.

LOCKPORT GROUP
80-175 FT (25-55 m.)

Oak Orchard and Penfield Dolostones, both replaced eastwardly by Sconondoa Formation-limestone, dolostone.

Lower Silurian

CLINTON GROUP
150-325 FT (40-100 m.)

Decew Dolostone; Rochester Shale.
Irondequoit Limestone; Williamson Shale; Wolcott Furnace Hematite; Wolcott Limestone; Sodus Shale; Bear Creek Shale; Wallington Limestone; Furnaceville Hematite; Maplewood shale; Kodak Sandstone. Herkimer Sandstone; Kirkland Hematite; Willowvale Shale; Westmoreland Hematite; Sauquoir Formation-sandstone shale; Oneida Conglomerate.

MEDINA GROUP AND QUEENSTON FORMATION
0-900 FT. (0-270 m.)

Upper Ordovician

Medina Group: Grimb
sy Formation-sandstone, shale.

LORRAINE GROUP
700-900 ft. (210-270 m.)

Oswega Sandstone.
Pulaski and Whetstone Gulf Formations-siltstoen, shale.

Middle Ordovician

TRENTON GROUP
100-300 ft. (30-90 m.)

Utica Shale.

Hamilton group	MOSCOW SHALE	140±	Lower two-thirds of section is a fossiliferous, soft gray calcareous shale; upper third highly friable but less calcareous and fossiliferous. Staining by iron oxide very common. Concretions present ! greater abundance in lower beds, but irregular calcareous masses occur throughout section. Joints
	LUDLOWVILLE SHALE	140±	Lower beds are thinly laminated, light-colored, fossiliferous, shaly passage beds; overlain by hard calcareous black shales 5 to 12 inches thick and rich in corals and brachiopods; hard layers responsible for falls and cascades. Middle beds are less fossiliferous, soft gray arenaceous shales, rich in concretions, calcareous lenses, and occasional thin sandstone layers. Upper beds (Tichenor limestone member) are thin, irregularly bedded ray shales becoming light blue gray upon exposure, calcareous, coarsely ~~textured, and fossiliferous. Joint~~
	SKANEATELES SHALE	185±	Basal beds composed of dark fissile shale. Upper shale more calcareous, grayish to bluish impure limestone layers. joint pattern N. 75L E. and N. 30L W.; diagonal joints N. 50ı E. Joints sealed, parallel and spaced 6 inches to 4 feet apart.
	MARCELLUS SHALE	50	Black, slatelike, bituminous shale with occasional limestone layers in sequence, containing zones rich in iron sulfides or calcareous conretions, often with septarian structures; very fissile, iron-stained and gray when weathered. Joint pattern N. 25ı W., N. 65L E., 1

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

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CLIENT/PROJECT TITLE
SENECA ARMY DEPOT ACTIVITY
RI/FS
SEAD-4

DEPT. ENVIRONMENTAL ENGINEERING
DWG NO. 734539-01001

FIGURE 1-6
BEDROCK STRATIGRAPHIC COLUMN

SCALE
DATE JUNE 1999

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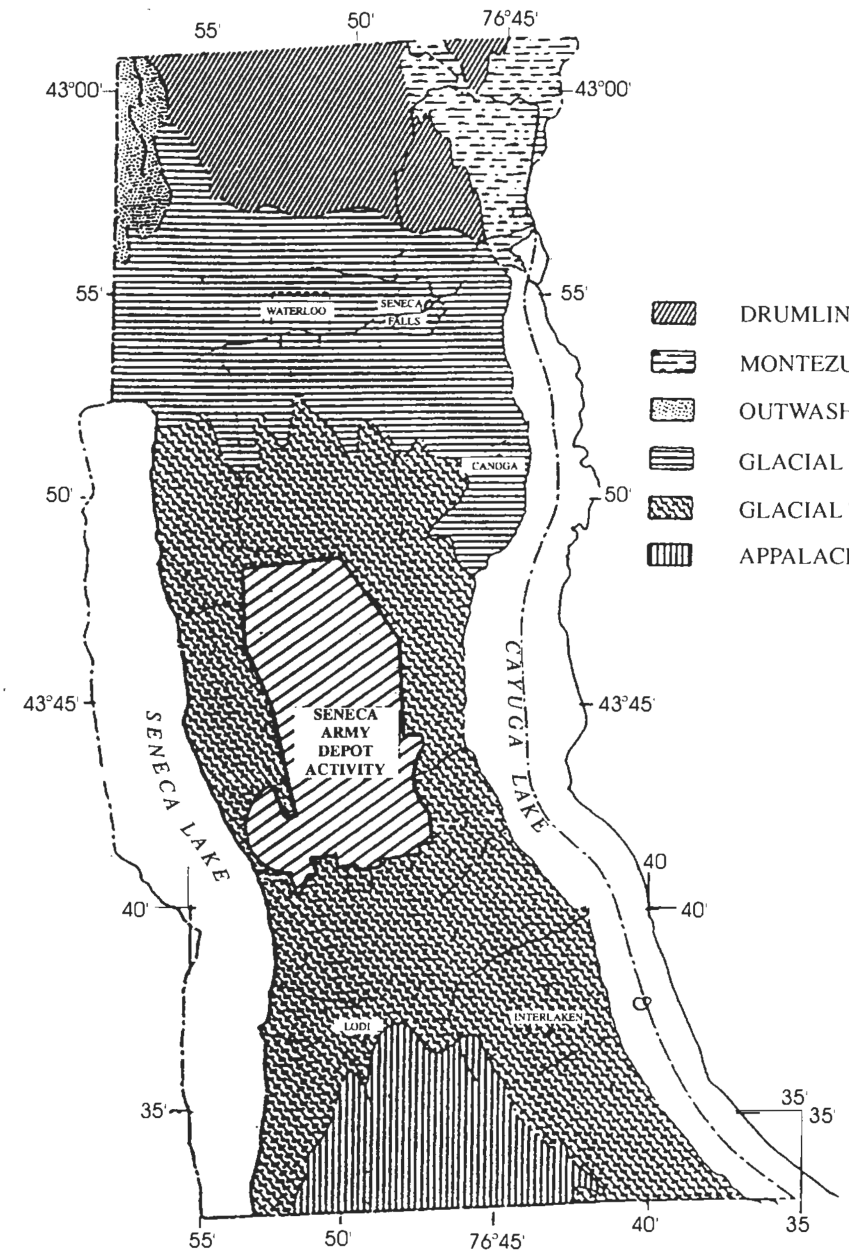

LEGEND

▨ DRUMLINS AND DRUMLINOID HILLS

▤ MONTEZUMA MARSH AREA

▒ OUTWASH PLAINS AND GRAVEL HILLS

▤ GLACIAL LAKE PLAIN

▨ GLACIAL TILL PLAIN

▥ APPALACHIAN PLATEAU

SOURCE: MODIFIED FROM-THE GROUND WATER RESOURCES
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SEAD-4

DEPT	DWG NO
ENVIRONMENTAL ENGINEERING	734539-01001

FIGURE 1-7

PHYSIOGRAPHIC MAP OF
SENECA COUNTY

SCALE	DATE
1" = 5 MILES	JUNE 1999

GRAPHICS\SENECA\PHYSIO.CDR(CVM)

Table 1-1

Background Concentrations of Elements in Soils of the Eastern United States with Specific Data for New York State

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Element	Concentration Range (mg/kg)	Geographic Location
Aluminum	7,000 - 100,000	Eastern U.S. (2)
	1,000 - 25,000	Albany Area (1)
Arsenic	< 0.1 - 73	Eastern U.S. (2)
	3 - 12	New York State (1)
	< 0.1 - 6.5	Albany Area (1)
Barium	10 - 1,500	Eastern U.S. (2)
	15 - 600	New York State (1)
	250 -350	Albany Area (1)
Beryllium	1 - 7	Eastern U.S. (2)
	0 - 1.75	New York State (1)
	0 - 0.9	Albany Area (1)
Cadmium	Not Available	Eastern U.S. (2)
	0.0001 - 1.0	No Region Specified (1)
Calcium	100 - 280,000	Eastern U.S. (2)
	130 - 35,000	New York State (1)
	150 - 5,000	Albany Area (1)
	2,900 - 6,500	Albany Area (1)
Chromium	1 - 1,000	Eastern U.S. (2)
	1.5 - 40	New York State (1)
	1.5 - 25	Albany Area (1)
Cobalt	< 0.3 - 70	Eastern U.S. (2)
	2.5 - 60	New York State (1)
	2.5 - 6	Albany Area (1)
Copper	< 1 - 700	Eastern U.S. (2)
	< 1 - 15	Albany Area (1)
Iron	100 - 100,000	Eastern U.S. (2)
	17,000 - 25,000	Albany Area (1)
Lead	> 10 - 300	Eastern U.S. (2)
	1 - 12.5	Albany Area (1)

Table 1-1

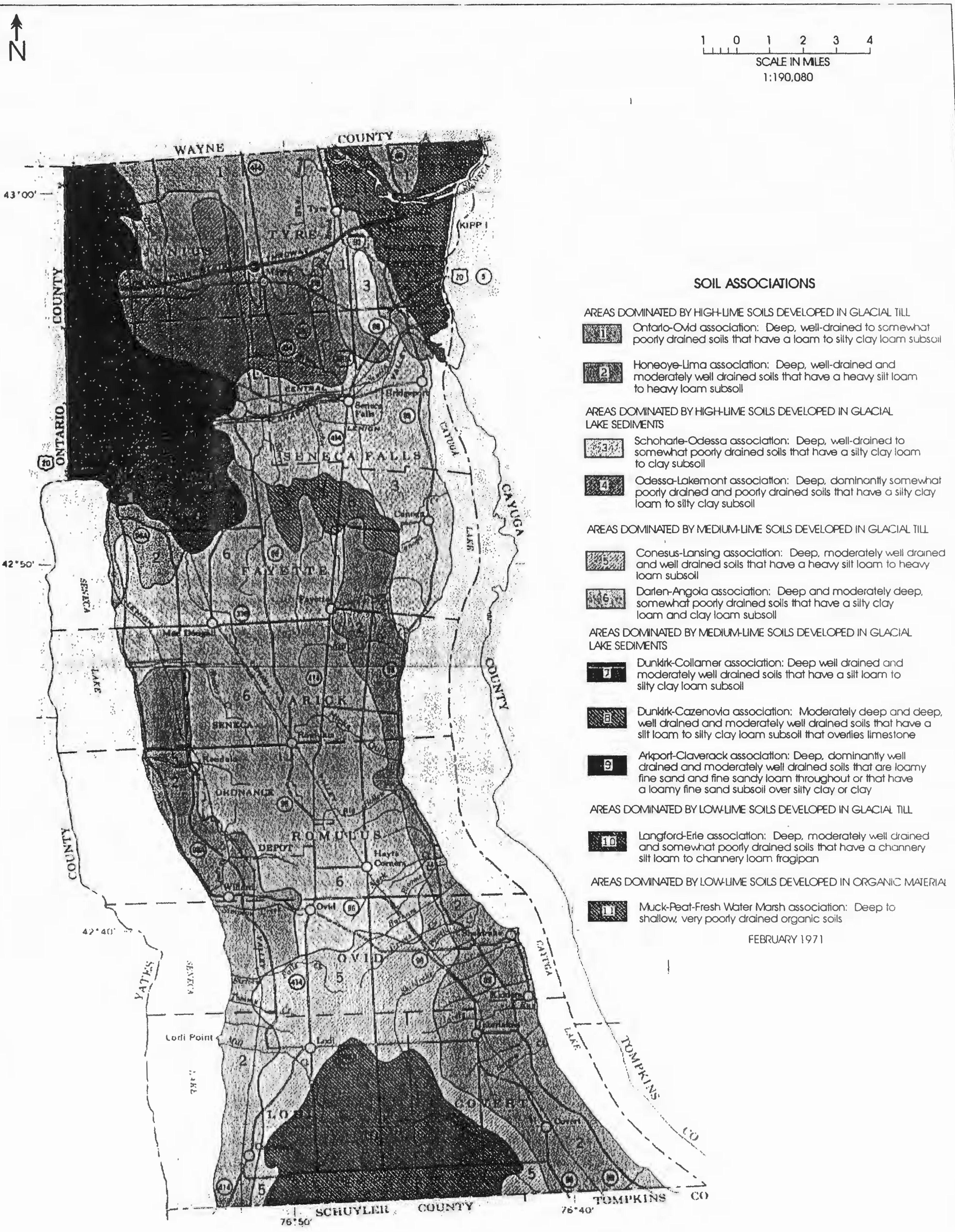
Background Concentrations of Elements in Soils of the Eastern United States with Specific Data for New York State

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Element	Concentration Range (mg/kg)	Geographic Location
Magnesium	50 - 50,000 2,500 - 6,000 1,700 - 4,000	Eastern U.S. (2) New York State (1) Albany Area (1)
Manganese	> 2 - 7,000 50 - 5,000 400 - 600	Eastern U.S. (2) New York State (1) Albany Area (1)
Mercury	0.01 - 3.4 0.042 - 0.066	Eastern U.S. (2) Albany Area (1)
Nickel	< 5 - 700 19.5 (mean)	Eastern U.S. (2) New York State (1) (no range available)
Potassium	50 - 37,000 47.5 - 117.5	Eastern U.S. (2) New York State (1)
Selenium	> 0.1 - 3.9 Not Available	Eastern U.S. (2)
Sodium	500 - 50,000 Not Available	Eastern U.S. (2)
Vanadium	> 7 - 300 Not Available	Eastern U.S. (2)
Zinc	> 5 - 2,900 37 - 60	Eastern U.S. (2) Albany Area (1)

Notes:

1. (1) Source: McGovern, Carol E., Background Concentrations of 20 Elements in Soils with Special Regard for New York State, Wildlife Resources Center, New York Department of Environmental Conservation, Delmar, New York 12054, No Date.
2. (2) Source: Shacklette, H.T. and Boerngen, J.G., 1984, Element Concentrations in Soils and Other Surficial Materials of the Conterminous United States, U.S.G.S. Prof Paper 1270, Washington.
3. The data are for areas where surficial materials are thought to be uncontaminated, undisturbed, or areas far from pollution sources.



SOIL ASSOCIATIONS

AREAS DOMINATED BY HIGH-LIME SOILS DEVELOPED IN GLACIAL TILL

1 Ontario-Ovid association: Deep, well-drained to somewhat poorly drained soils that have a loam to silty clay loam subsoil

2 Honeoye-Lima association: Deep, well-drained and moderately well drained soils that have a heavy silt loam to heavy loam subsoil

AREAS DOMINATED BY HIGH-LIME SOILS DEVELOPED IN GLACIAL LAKE SEDIMENTS

3 Schoharie-Odessa association: Deep, well-drained to somewhat poorly drained soils that have a silty clay loam to clay subsoil

4 Odessa-Lakemont association: Deep, dominantly somewhat poorly drained and poorly drained soils that have a silty clay loam to silty clay subsoil

AREAS DOMINATED BY MEDIUM-LIME SOILS DEVELOPED IN GLACIAL TILL

5 Conesus-Lansing association: Deep, moderately well drained and well drained soils that have a heavy silt loam to heavy loam subsoil

6 Darien-Angola association: Deep and moderately deep, somewhat poorly drained soils that have a silty clay loam and clay loam subsoil

AREAS DOMINATED BY MEDIUM-LIME SOILS DEVELOPED IN GLACIAL LAKE SEDIMENTS

7 Dunkirk-Collamer association: Deep well drained and moderately well drained soils that have a silt loam to silty clay loam subsoil

8 Dunkirk-Cazenovia association: Moderately deep and deep, well drained and moderately well drained soils that have a silt loam to silty clay loam subsoil that overlies limestone

9 Arkport-Claverack association: Deep, dominantly well drained and moderately well drained soils that are loamy fine sand and fine sandy loam throughout or that have a loamy fine sand subsoil over silty clay or clay

AREAS DOMINATED BY LOW-LIME SOILS DEVELOPED IN GLACIAL TILL

10 Langford-Erie association: Deep, moderately well drained and somewhat poorly drained soils that have a channery silt loam to channery loam fragipan

AREAS DOMINATED BY LOW-LIME SOILS DEVELOPED IN ORGANIC MATERIAL

11 Muck-Peat-Fresh Water Marsh association: Deep to shallow, very poorly drained organic soils

FEBRUARY 1971

SOURCE: U.S. DEPARTMENT OF ARGRICULTURE
SOIL CONSERVATION SERVICE
CORNELL UNIVERSITY AGRICULTURAL EXPERIMENT STATION

PARSONS
PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE
SENECA ARMY DEPOT ACTIVITY
REMEDIAL INVESTIGATION
SEAD-4 MUNITIONS WASHOUT FACILITY

DEPT ENVIRONMENTAL ENGINEERING
Dwg No 734539-01001

FIGURE 1-8
GENERAL SOIL MAP
SENECA COUNTY, NEW YORK

SCALE 1" = 2000'
DATE MAY 1999
REV A

R:\GRAPHICS\SENECA\COLRSOIL.CDR(CVM)

1.4.2 Geology at SEDA

Previous subsurface investigations conducted at 27 separate sites at SEDA have provided important information used to develop more detailed descriptions of the till and shale at SEDA. Generally, the geology at SEDA is characterized by a thin mantle of till overlying gray Devonian shale, with a thin weathered shale zone at the contact between these two units. This stratigraphy is consistent over the entire SEDA facility.

The predominant surficial geologic unit present at the site is dense till. The till is distributed across the entire Depot and generally ranges in thickness from 3 feet to approximately 15 feet, although it is generally between 6 and 10 feet thick; at a few locations the thickness of the till is greater than 30 feet. The till is generally characterized as brown to olive-gray silt and clay, with little fine sand and variable amounts of fine to coarse gravel-sized fragments of dark gray shale. Larger diameter clasts of shale (as large as 6 inches in diameter) are sometimes present in the basal portion of the till and are probably rip-up clasts removed from the weathered shale zone and incorporated into the till by the once-active glacier. Grain size analyses of the till show a wide distribution of particle sizes within the till (Hutton, 1972 and Metcalf & Eddy, 1989), however, there is a high percentage of silt and clay with the balance comprised of coarser particles. The porosities of 5 gray-brown silt clay (i.e., till) samples ranged from 34.0 percent to 44.2 percent with an average of 37.3 percent (USAEHA, 1985).

Darien silt-loam soils, less than a foot thick, have developed over the Wisconsin age till at SEAD-4. These soils are poorly drained and have a silt clay loam and a clay subsoil. In general, the topographic relief associated with these soils is 3 to 8 percent.

As part of the CERCLA investigations being conducted at SEDA, a total of 57 background soil samples have been collected from the till to provide a background data set for inorganic constituents in SEDA soils. The 57 samples were collected from 14 separate sites and are presented in **Table 1-2**. The minimum, maximum, average, standard deviation and the 95th upperconfidence level (UCL) of the mean for background concentrations of inorganic constituents in the soil at SEDA are also shown in **Table 1-1**. In addition to the statistical summary information, the actual data from the individual sample points are also presented. For the statistical calculations, non-detect values have been adjusted to one-half the detection limit.

Table 1-2
Statistical Comparison of Site Background Concentrations of Metals (mg/kg) in Soils at SEDA

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

LOC_ID:	B-8-91	B-8-91	B-8-91	B-8-91	B-9-91
QC CODE:	SA	SA	SA	SA	SA
STUDY ID:	RI PHASE1	RI PHASE1	RI PHASE1	RI PHASE1	RI PHASE1
TOP:	0	2	2	6	0
BOTTOM:	2	4	4	8	2
MATRIX:	SOIL	SOIL	SOIL	SOIL	SOIL
SAMPLE DATE:	11/5/1991	11/5/1991	11/5/1991	11/5/1991	11/5/1991
SAMP ID:	S1105-24SOIL1	S1105-25SOIL1	S1105-26(1)SOIL1	S1105-27SOIL1	S1105-28SOIL1

Units are mg/kg
Total Samples. 57

Compound	Minimum Soils	Maximum Soils	Average Soils	95 th Percentile	Standard Deviation	95th Upper Confidence Limit	Median	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q
Aluminum	5560	21000	13341	19480	4166	14422	13500	19200		20500		17700		12700		14800	
Antimony	0.08	6.80	3.56	5.97	2.18	3.31	2.85	10.3	UJ	8.8	UJ	8.2	UJ	8.4	UJ	9.9	UJ
Arsenic	2.30	21.50	5.08	8.23	2.69	5.92	4.60	5.1	J	6.1	J	6	J	4.2	J	4.3	J
Barium	33.90	159.00	78.43	117.60	26.46	85.30	73.20	136	J	98.9	J	86.7	J	56.2	J	101	J
Beryllium	0.34	1.40	0.67	1.10	0.24	0.73	0.64	1.4		1.2		1		0.78	J	1.1	
Cadmium	0.01	2.90	0.97	2.32	0.72	0.71	0.23	2.6		2.9		2.4		1.9		2.3	
Calcium	1370	293000	45450	120400	49976	58424	31800	5390		4870		3560		85900		45600	
Chromium	10.30	32.70	20.32	29.52	5.85	21.84	19.80	27.4	J	30.1	J	26.9	J	19.8	J	22.5	J
Cobalt	5.50	29.10	11.39	18.96	4.44	12.55	10.60	13.8		18.4		14		14.2		13.7	
Copper	9.70	62.80	20.99	32.86	8.30	23.14	19.70	22.3		27.6		26		16.2		22.6	
Cyanide	0.22	0.41	0.27	0.35	0.04	0.30	0.29	0.6	U	0.63	U	0.67	U	0.58	U	0.7	U
Iron	8770	38600	24705	36320	6824	26476	25100	37200		36100		32500		27400		31000	
Lead	5.40	266.00	16.47	23.81	35.07	26.49	11.35	14.5		11.4		13.6		10.1		10.8	
Magnesium	2830	29100	10290	21500	6357	11940	7910	5850		7300		6490		6720		8860	
Manganese	207	2380	576	1054	326	693	523	1130		956		832		926		903	
Mercury	0.01	0.13	0.04	0.09	0.03	0.05	0.03	0.09		0.06	J	0.06	J	0.05	J	0.08	J
Nickel	12.30	62.30	30.39	48.85	10.66	33.71	28.25	42.3		48.7		44.4		30.4		38.4	
Potassium	628	3160	1487	2510	507	1619	1350	1910		2110		1760		1430		1320	
Selenium	0.05	1.70	0.63	0.99	0.35	0.44	0.18	0.17	UJ	0.21	UJ	0.2	UJ	0.61	UJ	0.21	UJ
Silver	0.01	0.87	0.46	0.75	0.25	0.45	0.39	1.6	U	1.3	U	1.2	U	1.3	U	1.5	U
Sodium	12.55	269.00	99.42	169.20	52.31	100.62	80.60	79.2	U	67.5	U	62.6	U	75.3	J	84.2	J
Thallium	0.07	1.20	0.43	0.87	0.26	0.34	0.18	0.47	U	0.58	U	0.57	U	0.34	U	0.59	U
Vanadium	12.00	32.70	21.41	31.88	6.30	23.05	21.00	32.2		25.4		26.4		15.7		19.7	
Zinc	34.70	126.00	67.80	107.85	20.55	76.90	65.00	85.1	J	94.2	J	85	J	75	J	126	J

Notes:
1) This table presents chemical analysis results from soil samples collected across SEDA
2) For statistical calculations, all detects (no qualifier or J qualifier) were taken at full value, and all non-detects (U or UJ qualifier) were taken at half value.

Table 1-2
Statistical Comparison of Site Background Concentrations
of Metals (mg/kg) in Soils at SEDA

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

LOC_ID:	B-9-91	B-9-91	BK-1	BK-2	GB35
QC CODE:	SA	SA	SA	SA	SA
STUDY ID:	RI PHASE1	RI PHASE1	RI PHASE1	RI PHASE1	RI PHASE1
TOP:	2	6	0	0	0
BOTTOM:	4	8	2	2	2
MATRIX:	SOIL	SOIL	SOIL	SOIL	SOIL
SAMPLE DATE:	11/5/1991	11/5/1991	12/16/1992	12/16/1992	1/20/1993
SAMP ID:	S1105-29SOIL1	S1105-30RESOIL1	BK-1SOIL3	BK-2RESOIL3	GB35-1GRID

Units are mg/kg
Total Samples: 57

Compound	Minimum Soils	Maximum Soils	Average Soils	95 th Percentile	Standard Deviation	95th Upper Confidence Limit	Median	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q
Aluminum	5560	21000	13341	19480	4166	14422	13500	8880		7160		19400		14400		18000	
Antimony	0.08	6.80	3.56	5.97	2.18	3.31	2.85	9.9	UJ	7	UJ	7.9	U	7.2	U	5.8	UJ
Arsenic	2.30	21.50	5.08	8.23	2.69	5.92	4.60	3.8	J	4.4	J	3		2.7		6.2	
Barium	33.90	159.00	78.43	117.60	26.46	85.30	73.20	110	J	39.9	J	159		106		93.6	
Beryllium	0.34	1.40	0.67	1.10	0.24	0.73	0.64	0.76		0.52	J	1.1		0.81		0.85	
Cadmium	0.01	2.90	0.97	2.32	0.72	0.71	0.23	1.7		1.5		0.45	U	0.41	U	0.33	U
Calcium	1370	293000	45450	120400	49976	58424	31800	104000		101000		4590		22500		1590	
Chromium	10.30	32.70	20.32	29.52	5.85	21.84	19.80	13.8	J	11.2	J	30		22.3		23.5	
Cobalt	5.50	29.10	11.39	18.96	4.44	12.55	10.60	10.7		8.1		14.4		12.3		9.4	
Copper	9.70	62.80	20.99	32.86	8.30	23.14	19.70	21.6		19.3		26.9		18.8		17.5	
Cyanide	0.22	0.41	0.27	0.35	0.04	0.30	0.29	0.63	U	0.62	U	0.57	U	0.61	U	0.78	U
Iron	8770	38600	24705	36320	6824	26476	25100	19600		17300		38600		26600		25200	
Lead	5.40	266.00	16.47	23.81	35.07	26.49	11.35	10.1		7.8		15.8		18.9		14.4	
Magnesium	2830	29100	10290	21500	6357	11940	7910	17000		12600		5980		7910		3850	
Manganese	207	2380	576	1054	326	693	523	532		514		2380		800		701	
Mercury	0.01	0.13	0.04	0.09	0.03	0.05	0.03	0.04	J	0.05	J	0.13	J	0.11		0.06	J
Nickel	12.30	62.30	30.39	48.85	10.66	33.71	28.25	23.8		19		47.7		31		26.3	
Potassium	628	3160	1487	2510	507	1619	1350	1080		1050		1720		1210		1110	
Selenium	0.05	1.70	0.63	0.99	0.35	0.44	0.18	0.65	UJ	0.21	UJ	0.73	J	0.94		0.23	UJ
Silver	0.01	0.87	0.46	0.75	0.25	0.45	0.39	1.5	U	1.1	U	0.47	U	0.43	U	0.34	U
Sodium	12.55	269.00	99.42	169.20	52.31	100.62	80.60	112	J	116	J	49.1	J	61.1	J	35.6	J
Thallium	0.07	1.20	0.43	0.87	0.26	0.34	0.18	0.36	U	0.6	U	0.42	U	0.38	U	0.55	U
Vanadium	12.00	32.70	21.41	31.88	6.30	23.05	21.00	19.5		12.9		28		22.4		27.1	
Zinc	34.70	126.00	67.80	107.85	20.55	76.90	65.00	84.3	J	74.8	J	98.6		63.7		55	

Notes:
1) This table presents chemical analysis results from soil samples collected across SEDA
2) For statistical calculations, all detects (no qualifier or J qualifier) were taken at full value, and all non-detects (U or UJ qualifier) were taken at half value

Table 1-2

Statistical Comparison of Site Background Concentrations
of Metals (mg/kg) in Soils at SEDA

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

LOC_ID:	GB35	GB35	GB36	GB36	MW-36
QC CODE:	SA	DU	SA	SA	SA
STUDY ID:	RI PHASE1	RI PHASE1	RI PHASE1	RI PHASE1	RI Phase 1 Step 1
TOP:	2	0	0	2	4.000
BOTTOM:	4	2	2	4	5.500
MATRIX:	SOIL	SOIL	SOIL	SOIL	SOIL
SAMPLE DATE:	1/20/1993	1/20/1993	1/20/1993	1/20/1993	11-Jan-93
SAMP ID:	GB35-2GRID	GB35-6DUGRID	GB36-1GRID	GB36-2GRID	MW36-3GRID

Units are mg/kg
Total Samples 57

Compound	Minimum Soils	Maximum Soils	Average Soils	95 th Percentile	Standard Deviation	95th Upper Confidence Limit	Median	GB35-2GRID VALUE	Q	GB35-6DUGRID VALUE	Q	GB36-1GRID VALUE	Q	GB36-2GRID VALUE	Q	MW36-3GRID VALUE	Q
Aluminum	5560	21000	13341	19480	4166	14422	13500	17600		16200		18100		16200		12700	
Antimony	0.08	6.80	3.56	5.97	2.18	3.31	2.85	6.8	J	6.3	J	5.9	J	5.8	UJ	5.7	UJ
Arsenic	2.30	21.50	5.08	8.23	2.69	5.92	4.60	7.7		5.3		4.6		9.7		2.9	J
Barium	33.90	159.00	78.43	117.60	26.46	85.30	73.20	61.7		61.7		74.8		50.8		46.9	J
Beryllium	0.34	1.40	0.67	1.10	0.24	0.73	0.64	0.74		0.77		0.77		0.65		0.59	
Cadmium	0.01	2.90	0.97	2.32	0.72	0.71	0.23	0.31	U	0.35	U	0.3	U	0.33	U	0.33	U
Calcium	1370	293000	45450	120400	49976	58424	31800	17700		1370		1660		22900		4170	
Chromium	10.30	32.70	20.32	29.52	5.85	21.84	19.80	29.3		25.1		24.8		27.4		23.3	J
Cobalt	5.50	29.10	11.39	18.96	4.44	12.55	10.60	16.3		10.3		20.4		13.2		18.6	
Copper	9.70	62.80	20.99	32.86	8.30	23.14	19.70	24.5		17.2		17.7		17.5		19.2	J
Cyanide	0.22	0.41	0.27	0.35	0.04	0.30	0.29	0.71	U	0.82	U	0.7	U	0.68	U	0.56	U
Iron	8770	38600	24705	36320	6824	26476	25100	34200		30800		26100		30700		27500	
Lead	5.40	266.00	16.47	23.81	35.07	26.49	11.35	5.4		19.1		12.7		6.2		20.2	
Magnesium	2830	29100	10290	21500	6357	11940	7910	7790		4490		4490		7150		5750	
Manganese	207	2380	576	1054	326	693	523	646		775		426		507		540	
Mercury	0.01	0.13	0.04	0.09	0.03	0.05	0.03	0.03	U	0.07	J	0.02	J	0.02	J	0.02	J
Nickel	12.30	62.30	30.39	48.85	10.66	33.71	28.25	48.7		28.3		28.3		42.8		43.3	J
Potassium	628	3160	1487	2510	507	1619	1350	1110		975		1400		1100		754	
Selenium	0.05	1.70	0.63	0.99	0.35	0.44	0.18	0.23	UJ	0.21	UJ	0.2	UJ	0.18	UJ	0.19	UJ
Silver	0.01	0.87	0.46	0.75	0.25	0.45	0.39	0.32	U	0.36	U	0.31	U	0.34	U	0.34	U
Sodium	12.55	269.00	99.42	169.20	52.31	100.62	80.60	77.5	J	34.6	J	46.6	J	97.6	J	31.6	U
Thallium	0.07	1.20	0.43	0.87	0.26	0.34	0.18	0.54	U	0.5	U	0.46	U	0.43	U	0.45	U
Vanadium	12.00	32.70	21.41	31.88	6.30	23.05	21.00	22.3		26.1		27.8		19.7		16.2	J
Zinc	34.70	126.00	67.80	107.85	20.55	76.90	65.00	83.4		53.1		59.2		74.1		34.7	J

Notes
1) This table presents chemical analysis results from soil samples collected across SEDA
2) For statistical calculations, all detects (no qualifier or J qualifier) were taken at full value,
and all non-detects (U or UJ qualifier) were taken at half value

Table 1-2

Statistical Comparison of Site Background Concentrations
of Metals (mg/kg) in Soils at SEDA

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

LOC_ID:	MW-34	SB24-5	SB24-5	SB24-5	MW25-1
QC CODE:	SA	SA	SA	SA	SA
STUDY ID:	RI PHASE1	ESI	ESI	ESI	ESI
TOP:	0	0.000	4.000	8.000	0
BOTTOM:	2	2.000	6.000	10.000	2
MATRIX:	SOIL	SOIL	SOIL	SOIL	SOIL
SAMPLE DATE:	11/20/1991	12/02/93	12/02/93	12/02/93	12/3/1993
SAMP ID:	S2011121MW34GRID	SB24-5-1	SB24-5-3	SB24-5-5	SB25-6-01

Units are mg/kg

Total Samples 57

Compound	Minimum Soils	Maximum Soils	Average Soils	95 th Percentile	Standard Deviation	95th Upper Confidence Limit	Median	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q
Aluminum	5560	21000	13341	19480	4166	14422	13500	16100		16200		10100		13700		10600	
Antimony	0 08	6 80	3 56	5.97	2 18	3 31	2 85	5 7	J	12 5	UJ	5 8	UJ	11 3	UJ	4 2	U
Arsenic	2 30	21.50	5.08	8.23	2 69	5 92	4 60	6 3	U	4.2		3 3		5		8 3	
Barium	33 90	159 00	78 43	117 60	26 46	85 30	73 20	67 5		117		58.3		67.2		59 1	
Beryllium	0 34	1 40	0 67	1 10	0 24	0 73	0 64	0 86		0 98	J	0 48	J	0 62	J	0 48	J
Cadmium	0 01	2 90	0 97	2 32	0 72	0 71	0 23	2 3		0 78	U	0.36	U	0.7	U	0 41	U
Calcium	1370	293000	45450	120400	49976	58424	31800	28600		4540		74200		49000		82500	
Chromium	10 30	32 70	20 32	29 52	5.85	21 84	19 80	26 6		24.5		16 9		23.1		16 9	
Cobalt	5 50	29 10	11 39	18.96	4 44	12 55	10 60	17		16		8 2		12		11 2	
Copper	9 70	62 80	20 99	32.86	8 30	23 14	19.70	32 7		28 4		20 9		22 2		20 2	J
Cyanide	0 22	0 41	0 27	0.35	0 04	0 30	0.29	0 54	U	0.6	U	0 51	U	0 57	U	0 58	U
Iron	8770	38600	24705	36320	6824	26476	25100	35000		33600		21300		26700		21400	
Lead	5 40	266 00	16.47	23.81	35 07	26 49	11 35	11 9		45 5	J	8 7	J	7 9	J	9 5	
Magnesium	2830	29100	10290	21500	6357	11940	7910	6850		5150		12100		11400		19600	
Manganese	207	2380	576	1054	326	693	523	803		1080		400		450		722	J
Mercury	0 01	0 13	0 04	0 09	0 03	0 05	0 03	0 07	R	0.07	JR	0 06	JR	0 04	JR	0 03	J
Nickel	12 30	62 30	30 39	48 85	10 66	33 71	28.25	49 3	J	37.3		26 4		35 2		26 8	
Potassium	628	3160	1487	2510	507	1619	1350	1290		1170	J	993		1660		1480	
Selenium	0 05	1 70	0 63	0 99	0.35	0 44	0 18	0 18	UJ	0.15	UJ	0 23	UJ	0 22	UJ	0 97	J
Silver	0 01	0 87	0 46	0 75	0 25	0 45	0 39	0 87	J	1.6	U	0 73	U	1 4	U	0 82	U
Sodium	12 55	269 00	99 42	169 20	52.31	100 62	80 60	55 2	J	50 9	J	153	J	139	J	269	J
Thallium	0 07	1 20	0 43	0 87	0 26	0 34	0 18	0 51	U	0 16	U	0 25	U	0 24	U	0 24	UJ
Vanadium	12 00	32 70	21 41	31 88	6 30	23 05	21 00	22 3		29 9		14 4		19 5		18 5	
Zinc	34 70	126 00	67 80	107 85	20 55	76 90	65 00	95 7		85 7		62 8		63 2		71 6	J

Notes

1) This table presents chemical analysis results from soil samples collected across SEDA

2) For statistical calculations, all detects (no qualifier or J qualifier) were taken at full value, and all non-detects (U or UJ qualifier) were taken at half value

Table 1-2
Statistical Comparison of Site Background Concentrations of Metals (mg/kg) in Soils at SEDA

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

LOC_ID:	MW25-1	MW25-6	MW25-6	MW25-6	MW25-6
QC CODE:	SA	SA	SA	SA	DU
STUDY ID:	ESI	RI ROUND1	RI ROUND1	RI ROUND1	RI ROUND1
TOP:	2	0	4	6	0
BOTTOM:	4	0.17	6	8	0.17
MATRIX:	SOIL	SOIL	SOIL	SOIL	SOIL
SAMPLE DATE:	12/3/1993	9/25/1995	9/25/1995	9/25/1995	9/25/1995
SAMP ID:	SB25-6-02	SB25-7-00	SB25-7-03	SB25-7-04	SB25-7-10

Units are mg/kg
Total Samples: 57

Compound	Minimum Soils	Maximum Soils	Average Soils	95 th Percentile	Standard Deviation	95th Upper Confidence Limit	Median	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q
Aluminum	5560	21000	13341	19480	4166	14422	13500	7070		12500		8020		7550		12500	
Antimony	0.08	6.80	3.56	5.97	2.18	3.31	2.85	3	U	0.4		0.42	UJ	0.44	U	0.4	UJ
Arsenic	2.30	21.50	5.08	8.23	2.69	5.92	4.60	4.8		4.3		4.1		3.4		4.3	
Barium	33.90	159.00	78.43	117.60	26.46	85.30	73.20	35		71.3		58		52		71.3	
Beryllium	0.34	1.40	0.67	1.10	0.24	0.73	0.64	0.35	J	0.56		0.43		0.39		0.56	
Cadmium	0.01	2.90	0.97	2.32	0.72	0.71	0.23	0.29	U	0.05	U	0.06	U	0.06	U	0.05	U
Calcium	1370	293000	45450	120400	49976	58424	31800	122000		47400	J	120000	J	133000	J	47400	J
Chromium	10.30	32.70	20.32	29.52	5.85	21.84	19.80	11.3		16.9	J	13.7	J	12.4	J	16.9	J
Cobalt	5.50	29.10	11.39	18.96	4.44	12.55	10.60	6.6	J	8		8.2		6.9		8	
Copper	9.70	62.80	20.99	32.86	8.30	23.14	19.70	12	J	15.7		17.7		16.4		15.7	
Cyanide	0.22	0.41	0.27	0.35	0.04	0.30	0.29	0.64	U	0.44	U	0.57	U	0.51	U	0.444	U
Iron	8770	38600	24705	36320	6824	26476	25100	15800		20500		18900		15400		20500	
Lead	5.40	266.00	16.47	23.81	35.07	26.49	11.35	13.8		11.1		7		6.5		11.1	
Magnesium	2830	29100	10290	21500	6357	11940	7910	22800		11700		17400		20700		11700	
Manganese	207	2380	576	1054	326	693	523	610	J	452		735		402		452	
Mercury	0.01	0.13	0.04	0.09	0.03	0.05	0.03	0.04	U	0.03		0.02		0.01		0.03	
Nickel	12.30	62.30	30.39	48.85	10.66	33.71	28.25	18		22.3		26.4		22.4		22.3	
Potassium	628	3160	1487	2510	507	1619	1350	1060		1110		1280		1430		1110	
Selenium	0.05	1.70	0.63	0.99	0.35	0.44	0.18	0.63	J	0.63	U	0.7	U	0.74	U	0.66	U
Silver	0.01	0.87	0.46	0.75	0.25	0.45	0.39	0.59	U	0.89	U	0.98	U	1	U	0.92	U
Sodium	12.55	269.00	99.42	169.20	52.31	100.62	80.60	186	J	59.9		89.1		110		57.5	
Thallium	0.07	1.20	0.43	0.87	0.26	0.34	0.18	0.21	UJ	1.2		1.1		0.6	U	1.2	
Vanadium	12.00	32.70	21.41	31.88	6.30	23.05	21.00	12		21		13.4		13.7		21	
Zinc	34.70	126.00	67.80	107.85	20.55	76.90	65.00	40.6	J	54.1		64.9		65.1		54.1	

Notes:
1) This table presents chemical analysis results from soil samples collected across SEDA.
2) For statistical calculations, all detects (no qualifier or J qualifier) were taken at full value, and all non-detects (U or UJ qualifier) were taken at half value

Table 1-2
Statistical Comparison of Site Background Concentrations of Metals (mg/kg) in Soils at SEDA

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

LOC_ID:	MW64A-1	MW64A-1	MW64A-1	MW64B-1	MW64B-1
QC CODE:	SA	SA	SA	SA	SA
STUDY ID:	ESI	ESI	ESI	ESI	ESI
TOP:	0	2	4	0	4
BOTTOM:	0.2	4	6	0.2	6
MATRIX:	SOIL	SOIL	SOIL	SOIL	SOIL
SAMPLE DATE:	4/2/1994	4/2/1994	4/2/1994	5/13/1994	5/13/1994
SAMP ID:	MW64A-1-1	MW64A-1-2	MW64A-1-3	MW64B-1-1	MW64B-1-2

Units are mg/kg
Total Samples: 57

Compound	Minimum Soils	Maximum Soils	Average Soils	95 th Percentile	Standard Deviation	95th Upper Confidence Limit	Median	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q
Aluminum	5560	21000	13341	19480	4166	14422	13500	16100		19800		12600		13400		8870	
Antimony	0.08	6.80	3.56	5.97	2.18	3.31	2.85	0.23	J	0.2	UJ	0.2	UJ	0.3	J	0.15	UJ
Arsenic	2.30	21.50	5.08	8.23	2.69	5.92	4.60	7.1		8.2		5		5.5		4.3	
Barium	33.90	159.00	78.43	117.60	26.46	85.30	73.20	83.7		91.2		62.3		75.5		70.8	
Beryllium	0.34	1.40	0.67	1.10	0.24	0.73	0.64	0.68	J	0.74	J	0.53	J	0.56	J	0.43	J
Cadmium	0.01	2.90	0.97	2.32	0.72	0.71	0.23	0.11	J	0.02	U	0.12	J	0.63	J	0.64	J
Calcium	1370	293000	45450	120400	49976	58424	31800	7210		4300		72400		5530		70000	
Chromium	10.30	32.70	20.32	29.52	5.85	21.84	19.80	23		25		19		17.5		14.1	
Cobalt	5.50	29.10	11.39	18.96	4.44	12.55	10.60	11.8		11.3		9.1	J	7.2	J	10	
Copper	9.70	62.80	20.99	32.86	8.30	23.14	19.70	25.5		21		23.7		18.9		20.2	
Cyanide	0.22	0.41	0.27	0.35	0.04	0.30	0.29	0.66	U	0.56	U	0.55	U	0.6	U	0.5	U
Iron	8770	38600	24705	36320	6824	26476	25100	28500		28000		22600		20900		18400	
Lead	5.40	266.00	16.47	23.81	35.07	26.49	11.35	21.6		13.6		15.4		21.4		8.8	
Magnesium	2830	29100	10290	21500	6357	11940	7910	5480		5010		14800		3720		18900	
Manganese	207	2380	576	1054	326	693	523	558		604		402		207		434	
Mercury	0.01	0.13	0.04	0.09	0.03	0.05	0.03	0.05	J	0.03	J	0.02	J	0.05	J	0.02	J
Nickel	12.30	62.30	30.39	48.85	10.66	33.71	28.25	32.2		28.6		26.7		19.8		28.2	
Potassium	628	3160	1487	2510	507	1619	1350	2590	J	2260	J	2700	J	1700		1630	
Selenium	0.05	1.70	0.63	0.99	0.35	0.44	0.18	0.96		1.7		0.34	U	0.99	J	0.26	U
Silver	0.01	0.87	0.46	0.75	0.25	0.45	0.39	0.12	U	0.14	U	0.14	U	0.16	UJ	0.11	UJ
Sodium	12.55	269.00	99.42	169.20	52.31	100.62	80.60	27.5	U	31.8	U	92.1	J	35.9	U	96.8	J
Thallium	0.07	1.20	0.43	0.87	0.26	0.34	0.18	0.42	J	0.32	U	0.32	U	0.41	J	0.24	U
Vanadium	12.00	32.70	21.41	31.88	6.30	23.05	21.00	27.6		32.2		22.8		23.3		14.8	
Zinc	34.70	126.00	67.80	107.85	20.55	76.90	65.00	104		87.1		64.9		72.2		59	

Notes:
1) This table presents chemical analysis results from soil samples collected across SEDA.
2) For statistical calculations, all detects (no qualifier or J qualifier) were taken at full value, and all non-detects (U or UJ qualifier) were taken at half value.

Table 1-2
Statistical Comparison of Site Background Concentrations of Metals (mg/kg) in Soils at SEDA

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Units are mg/kg
Total Samples: 57

Compound	Minimum Soils	Maximum Soils	Average Soils	95 th Percentile	Standard Deviation	95th Upper Confidence Limit	Median	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q
							LOC_ID:	MW64B-1		MW64B-1		MW67-2		MW67-2		MW67-2	
							QC CODE:	SA		SA		SA		SA		SA	
							STUDY ID:	ESI		ESI		ESI		ESI		ESI	
							TOP:	6		6		0		2		4	
							BOTTOM:	8		8		0.2		4		5	
							MATRIX:	SOIL		SOIL		SOIL		SOIL		SOIL	
							SAMPLE DATE:	5/13/1994		13-May-94		3/30/1994		3/30/1994		3/30/1994	
							SAMP ID:	MW64B-1-3		MW64B-1-04		MW67-2-1		MW67-2-2		MW67-2-3	
Aluminum	5560	21000	13341	19480	4166	14422	13500	7620		7620		16700		14900		9460	
Antimony	0.08	6.80	3.56	5.97	2.18	3.31	2.85	0.15	UJ	0.15	UJ	0.27	J	0.22	J	0.2	UJ
Arsenic	2.30	21.50	5.08	8.23	2.69	5.92	4.60	5.5		5.5		4.4		4.5		4.2	
Barium	33.90	159.00	78.43	117.60	26.46	85.30	73.20	76.7		76.7		114		105		80.8	
Beryllium	0.34	1.40	0.67	1.10	0.24	0.73	0.64	0.37	J	0.37	J	0.67	J	0.61	J	0.4	J
Cadmium	0.01	2.90	0.97	2.32	0.72	0.71	0.23	0.54	J	0.54	J	0.2	J	0.11	J	0.12	J
Calcium	1370	293000	45450	120400	49976	58424	31800	75900		75900		3580		79000		77800	
Chromium	10.30	32.70	20.32	29.52	5.85	21.84	19.80	13.5		13.5		19.5		22.5		14.8	
Cobalt	5.50	29.10	11.39	18.96	4.44	12.55	10.60	7.4	J	7.4	J	7.5	J	10.4	J	9.7	J
Copper	9.70	62.80	20.99	32.86	8.30	23.14	19.70	17.6		17.6		16.5		20.3		20.5	
Cyanide	0.22	0.41	0.27	0.35	0.04	0.30	0.29	0.48	U	0.48	U	0.64	U	0.5	U	0.54	U
Iron	8770	38600	24705	36320	6824	26476	25100	17100		17100		20500		24400		18700	
Lead	5.40	266.00	16.47	23.81	35.07	26.49	11.35	8.3		8.3		17.5		9.3		8.5	
Magnesium	2830	29100	10290	21500	6357	11940	7910	21500		21500							
Manganese	207	2380	576	1054	326	693	523	389		389		438		528		411	
Mercury	0.01	0.13	0.04	0.09	0.03	0.05	0.03	0.01	U	0.01	U	0.04		0.01	J	0.02	J
Nickel	12.30	62.30	30.39	48.85	10.66	33.71	28.25	22.6		22.6		18.7		32.3		25.9	
Potassium	628	3160	1487	2510	507	1619	1350	1650		1650		1780	J	3160	J	1970	J
Selenium	0.05	1.70	0.63	0.99	0.35	0.44	0.18	0.57	J	0.57	J	0.81		0.36	U	0.34	U
Silver	0.01	0.87	0.46	0.75	0.25	0.45	0.39	0.11	UJ	0.11	UJ	0.11	U	0.15	U	0.14	U
Sodium	12.55	269.00	99.42	169.20	52.31	100.62	80.60	79.6	J	79.6	J	25.1	U	112	J	107	J
Thallium	0.07	1.20	0.43	0.87	0.26	0.34	0.18	0.24	U	0.24	U	0.48	J	0.34	U	0.32	U
Vanadium	12.00	32.70	21.41	31.88	6.30	23.05	21.00	14.2		14.2		28.2		24.8		16.5	
Zinc	34.70	126.00	67.80	107.85	20.55	76.90	65.00	45.6		45.600		64.8		62		60.1	

Notes

1) This table presents chemical analysis results from soil samples collected across SEDA

2) For statistical calculations, all detects (no qualifier or J qualifier) were taken at full value, and all non-detects (U or UJ qualifier) were taken at half value

Table 1-2
Statistical Comparison of Site Background Concentrations
of Metals (mg/kg) in Soils at SEDA

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Units are mg/kg
Total Samples 57

							LOC_ID:	MW70-1		MW70-1		MW70-1		SB11-3		SB11-3		SB11-3	
							QC CODE:	SA		SA		SA		SA		SA		SA	
							STUDY ID:	ESI		ESI		ESI		ESI		ESI		ESI	
							TOP:	0		2		4		0		2		10	
							BOTTOM:	0.2		4		6		2		4		12	
							MATRIX:	SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
							SAMPLE DATE:	5/11/1994		5/11/1994		5/11/1994		11/2/1993		11/2/1993		11/3/1993	
							SAMP ID:	MW70-1-1		MW70-1-2		MW70-1-3		SB11-3-1		SB11-3-2		SB11-3-6	
							COMPOUND	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q
Compound	Minimum Soils	Maximum Soils	Average Soils	95 th Percentile	Standard Deviation	95th Upper Confidence Limit	Median												
Aluminum	5560	21000	13341	19480	4166	14422	13500	12200		9480		11000		17600		6330		10900	
Antimony	0.08	6.80	3.56	5.97	2.18	3.31	2.85	0.23	UJ	0.21	UJ	0.19	UJ	10.8	UJ	8	UJ	7.6	UJ
Arsenic	2.30	21.50	5.08	8.23	2.69	5.92	4.60	5.4		4.1		5.7		5.6		0		0	
Barium	33.90	159.00	78.43	117.60	26.46	85.30	73.20	67.5		56.6		79.9		113		57.4		62.7	
Beryllium	0.34	1.40	0.67	1.10	0.24	0.73	0.64	0.44	J	0.41	J	0.54	J	0.85	J	0.34	J	0.47	J
Cadmium	0.01	2.90	0.97	2.32	0.72	0.71	0.23	0.57	J	0.43	J	0.8	J	0.67	U	0.5	U	0.48	U
Calcium	1370	293000	45450	120400	49976	58424	31800	3600		51600		48600		4950		91300		48600	
Chromium	10.30	32.70	20.32	29.52	5.85	21.84	19.80	13.7		14.7		17.8		24		11.1		18.6	
Cobalt	5.50	29.10	11.39	18.96	4.44	12.55	10.60	5.5	J	7.1	J	21		11.3		6.5	J	10.1	
Copper	9.70	62.80	20.99	32.86	8.30	23.14	19.70	12.4		19.7		33.5		20		12.2		21.7	
Cyanide	0.22	0.41	0.27	0.35	0.04	0.30	0.29							0.57	U	0.47	U	0.53	U
Iron	8770	38600	24705	36320	6824	26476	25100	17700		16000		26400		27200		13200		28300	
Lead	5.40	266.00	16.47	23.81	35.07	26.49	11.35	20.7		9.1		13.6		27.9		11.4		10.1	
Magnesium	2830	29100	10290	21500	6357	11940	7910	2830		13600		7980		4160		12900		10100	
Manganese	207	2380	576	1054	326	693	523	233		470		1040		674		356		434	
Mercury	0.01	0.13	0.04	0.09	0.03	0.05	0.03	0.1	J	0.03	J	0.02	J	0.05	J	0.04	U	0.03	U
Nickel	12.30	62.30	30.39	48.85	10.66	33.71	28.25	12.3		17.6		52.4		28.3		16.7		29.5	
Potassium	628	3160	1487	2510	507	1619	1350	982	J	1590		1350		2110		1110		1230	
Selenium	0.05	1.70	0.63	0.99	0.35	0.44	0.18	1	J	0.64	J	0.32	U	0.24	J	0.13	UJ	0.21	UJ
Silver	0.01	0.87	0.46	0.75	0.25	0.45	0.39							1.4	UJ	1	UJ	0.97	UJ
Sodium	12.55	269.00	99.42	169.20	52.31	100.62	80.60	36.4	U	126	J	165	J	66.3	J	136	J	146	J
Thallium	0.07	1.20	0.43	0.87	0.26	0.34	0.18							0.19	U	1.5	U	0.23	U
Vanadium	12.00	32.70	21.41	31.88	6.30	23.05	21.00	23.3		17.2		17.6		31.8		13.3		17	
Zinc	34.70	126.00	67.80	107.85	20.55	76.90	65.00	55.4		42.4		116		83.2		0		0	

Notes
1) This table presents chemical analysis results from soil samples collected across SEDA
2) For statistical calculations, all detects (no qualifier or J qualifier) were taken at full value, and all non-detects (U or UJ qualifier) were taken at half value.

Table 1-2
Statistical Comparison of Site Background Concentrations of Metals (mg/kg) in Soils at SEDA

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

LOC_ID:	SB13-1	SB13-1	SB13-1	MW13-6	MW13-6	MW13-6
QC CODE:	SA	SA	SA	SA	SA	SA
STUDY ID:	ESI	ESI	ESI	ESI	ESI	ESI
TOP:	0	6	6	0	4	6
BOTTOM:	2	8	8	2	6	8
MATRIX:	SOIL	SOIL	SOIL	SOIL	SOIL	SOIL
SAMPLE DATE:	12/8/1993		12/8/1993	15-Dec-93	15-Dec-93	15-Dec-93
SAMP ID:	SB13-1-1	SB13-1-2	SB13-1-3	SB13-6-1	SB13-6-3	SB13-6-4

Units are mg/kg
Total Samples 57

Compound	Minimum Soils	Maximum Soils	Average Soils	95 th Percentile	Standard Deviation	95th Upper Confidence Limit	Median	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q
Aluminum	5560	21000	13341	19480	4166	14422	13500	18300		8250		11700		16000		13500		10200	
Antimony	0.08	6 80	3.56	5.97	2.18	3.31	2.85	5.1	J	3.7	UJ	2.8	UJ	3.2	UJ	2.5	UJ	2 9	UJ
Arsenic	2.30	21.50	5.08	8.23	2.69	5.92	4.60	7		6 2		5.7		4.6		2.7		2.3	
Barium	33.90	159.00	78.43	117.60	26.46	85.30	73 20	106		88.1		33.9		103		60.4		56.8	
Beryllium	0.34	1.40	0.67	1.10	0.24	0.73	0.64	0.92	J	0 42	J	0.54	J	0.92		0.71		0 58	J
Cadmium	0.01	2.90	0.97	2.32	0.72	0.71	0 23	0 45	U	0.36	U	0.27	U	0.31	U	0.25	U	0.28	U
Calcium	1370	293000	45450	120400	49976	58424	31800	3570		87700		50300		5140		31800		45200	
Chromium	10.30	32.70	20.32	29.52	5.85	21.84	19.80	29 4		13.3		19.6		21.5		23.5		17.8	
Cobalt	5.50	29.10	11.39	18.96	4.44	12.55	10.60	12		7.2	J	11.1		10.6		15		11.3	
Copper	9.70	62.80	20.99	32.86	8.30	23.14	19.70	11.6		18.4		17.6		16		27.4		14.5	
Cyanide	0.22	0.41	0.27	0.35	0.04	0.30	0.29	0 61	U	0.5	U	0.53	U	0.6	U	0.53	U	0.51	U
Iron	8770	38600	24705	36320	6824	26476	25100	32500		17400		24700		25300		26900		20700	
Lead	5.40	266.00	16.47	23.81	35 07	26.49	11.35	15		0		0		13.8		11.6		11.7	
Magnesium	2830	29100	10290	21500	6357	11940	7910	5890		20800		12600		3750		6640		5220	
Manganese	207	2380	576	1054	326	693	523	451		517		404		934		508		556	
Mercury	0.01	0.13	0.04	0.09	0.03	0.05	0.03	0.03	J	0 07	J	0.02	U	0.03	J	0.01	U	0.01	U
Nickel	12.30	62.30	30.39	48.85	10.66	33.71	28.25	34.9		24		33.1		22.7		41.9		33	
Potassium	628	3160	1487	2510	507	1619	1350	2190		1390		1270		1330		1120		1000	
Selenium	0.05	1.70	0.63	0.99	0.35	0 44	0.18	0.26	J	0.56	J	0.51	J	1.2		0 11	J	0 24	J
Silver	0.01	0.87	0.46	0.75	0.25	0.45	0.39	0.9	U	0.71	U	0.54	U	0.62	U	0.49	U	0 56	U
Sodium	12 55	269.00	99.42	169.20	52.31	100.62	80.60	80.6	J	155	J	134	J	61.9	J	116	J	141	J
Thallium	0.07	1.20	0.43	0.87	0 26	0.34	0.18	0.43	J	0.43	J	0.64	J	0.18	U	0 14	U	0 23	U
Vanadium	12.00	32.70	21.41	31.88	6.30	23.05	21.00	32.7		13.3		16.3		29.9		18.5		13.8	
Zinc	34.70	126 00	67.80	107.85	20.55	76.90	65.00	81.9		56.2		45.8		62.5		64.7		39 3	

Notes.
1) This table presents chemical analysis results from soil samples collected across SEDA.
2) For statistical calculations, all detects (no qualifier or J qualifier) were taken at full value, and all non-detects (U or UJ qualifier) were taken at half value.

Table 1-2
Statistical Comparison of Site Background Concentrations of Metals (mg/kg) in Soils at SEDA

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

LOC_ID:	SB17-1	SB17-1	SB17-1	SB26-1	SB26-1
QC CODE:	SA	SA	SA	SA	SA
STUDY ID:	ESI	ESI	ESI	ESI	ESI
TOP:	0	2	4	0	2
BOTTOM:	2	4	6	2	4
MATRIX:	SOIL	SOIL	SOIL	SOIL	SOIL
SAMPLE DATE:	12/1/1993	12/1/1993	12/1/1993	11/17/1993	11/17/1993
SAMP ID:	SB17-1-1	SB17-1-2	SB17-1-3	SB26-1-1	SB26-1-2

Units are mg/kg
Total Samples: 57

Compound	Minimum Soils	Maximum Soils	Average Soils	95 th Percentile	Standard Deviation	95th Upper Confidence Limit	Median	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q
Aluminum	5560	21000	13341	19480	4166	14422	13500	13700		18100		8700		5560		9040	
Antimony	0.08	6.80	3.56	5.97	2.18	3.31	2.85	11.7	UJ	11.8	UJ	9	UJ	7.3	UJ	6.7	UJ
Arsenic	2.30	21.50	5.08	8.23	2.69	5.92	4.60	4.3		5.2		3.4		3.2		5.3	
Barium	33.90	159.00	78.43	117.60	26.46	85.30	73.20	107		114		59.4		73.2		43.7	
Beryllium	0.34	1.40	0.67	1.10	0.24	0.73	0.64	0.7	J	0.9	J	0.42	J	0.35	J	0.41	J
Cadmium	0.01	2.90	0.97	2.32	0.72	0.71	0.23	0.73	U	0.74	U	0.56	U	0.46	U	0.42	U
Calcium	1370	293000	45450	120400	49976	58424	31800	2870		20900		72800		293000		47300	
Chromium	10.30	32.70	20.32	29.52	5.85	21.84	19.80	17.6		25.1		13.9		10.3		15.7	
Cobalt	5.50	29.10	11.39	18.96	4.44	12.55	10.60	9.9	J	13.3		8.8		5.9	J	9.5	
Copper	9.70	62.80	20.99	32.86	8.30	23.14	19.70	46.4		26.9		20		9.7		14.3	
Cyanide	0.22	0.41	0.27	0.35	0.04	0.30	0.29	0	NA	0	NA	0	NA	0.48	U	0.57	U
Iron	8770	38600	24705	36320	6824	26476	25100	25100		29900		18800		8770		19100	
Lead	5.40	266.00	16.47	23.81	35.07	26.49	11.35	266		11.4	J	7.5	J	6.33		8.5	
Magnesium	2830	29100	10290	21500	6357	11940	7910	3330		8490		18100		29100		9160	
Manganese	207	2380	576	1054	326	693	523	547		487		391		309		551	
Mercury	0.01	0.13	0.04	0.09	0.03	0.05	0.03	0.05	J	0.06	J	0.03	UJ	0.02	U	0.02	U
Nickel	12.30	62.30	30.39	48.85	10.66	33.71	28.25	19.1		42		25.2		31.6	R	23.9	
Potassium	628	3160	1487	2510	507	1619	1350	628	J	1560		1090		1710		901	
Selenium	0.05	1.70	0.63	0.99	0.35	0.44	0.18	0.25	UJ	0.24	UJ	0.14	UJ	0.13	UJ	0.26	J
Silver	0.01	0.87	0.46	0.75	0.25	0.45	0.39	1.5	U	1.5	U	1.1	U	0.92	UJ	0.85	UJ
Sodium	12.55	269.00	99.42	169.20	52.31	100.62	80.60	46.2	J	74.6	J	137	J	192	J	108	J
Thallium	0.07	1.20	0.43	0.87	0.26	0.34	0.18	0.28	UJ	0.26	UJ	0.15	UJ	0.73	U	0.17	U
Vanadium	12.00	32.70	21.41	31.88	6.30	23.05	21.00	23.1		27		13.9		12.7		14.4	
Zinc	34.70	126.00	67.80	107.85	20.55	76.90	65.00	93.4		80.2		57.1		283	R	90.6	

Notes:
1) This table presents chemical analysis results from soil samples collected across SEDA.
2) For statistical calculations, all detects (no qualifier or J qualifier) were taken at full value, and all non-detects (U or UJ qualifier) were taken at half value.

Table 1-2
Statistical Comparison of Site Background Concentrations of Metals (mg/kg) in Soils at SEDA

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Units are mg/kg

Total Samples 57

							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:	12/6/1993		12/6/1993		12/6/1993		12/6/1993		11/8/1993	
							SAMP ID:	SB4-1-1		SB4-1-10		SB4-1-2		SB4-1-3		TP57-11	
							COMPOUND	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q
Compound	Minimum Soils	Maximum Soils	Average Soils	95 th Percentile	Standard Deviation	95th Upper Confidence Limit	Median										
Aluminum	5560	21000	13341	19480	4166	14422	13500	14800		21000		15300		19200		14600	
Antimony	0.08	6.80	3.56	5.97	2.18	3.31	2.85	4.8	UJ	3.8	UJ	5	UJ	2.8	UJ	11.3	UJ
Arsenic	2.30	21.50	5.08	8.23	2.69	5.92	4.60	6.2		4.2		3.9		21.5		5.9	
Barium	33.90	159.00	78.43	117.60	26.46	85.30	73.20	72		97.7		40.4	J	81.2		120	
Beryllium	0.34	1.40	0.67	1.10	0.24	0.73	0.64	0.73	J	0.64	J	0.74	J	1		0.81	J
Cadmium	0.01	2.90	0.97	2.32	0.72	0.71	0.23	0.47	U	0.37	U	0.49	U	0.27	U	0.71	U
Calcium	1370	293000	45450	120400	49976	58424	31800	4280		2460		30900		14400		22300	
Chromium	10.30	32.70	20.32	29.52	5.85	21.84	19.80	23.2		27.9		27.6		32.7		20.1	
Cobalt	5.50	29.10	11.39	18.96	4.44	12.55	10.60	11.3		5.9	J	16.5		29.1		8.8	J
Copper	9.70	62.80	20.99	32.86	8.30	23.14	19.70	14.1		15.1		62.8		21.6		21.7	
Cyanide	0.22	0.41	0.27	0.35	0.04	0.30	0.29	0.52	U	0.53	U	0.53	U	0.47	U	0.54	U
Iron	8770	38600	24705	36320	6824	26476	25100	27500		19500		34300		37900		24900	
Lead	5.40	266.00	16.47	23.81	35.07	26.49	11.35	0	J	9.8	J	7.5	J	9.1	J	11.3	
Magnesium	2830	29100	10290	21500	6357	11940	7910	4270		4460		7130		8040		5360	
Manganese	207	2380	576	1054	326	693	523	615	J	0	J	0		0		329	
Mercury	0.01	0.13	0.04	0.09	0.03	0.05	0.03	0.05	J	0.04	J	0.04	J	0.04	J	0.04	J
Nickel	12.30	62.30	30.39	48.85	10.66	33.71	28.25	27.8		25.1		47.6		62.3		25.7	
Potassium	628	3160	1487	2510	507	1619	1350	1250		2490		1300		2030		1430	
Selenium	0.05	1.70	0.63	0.99	0.35	0.44	0.18	0.4	J	0.23	J	0.09	U	0.14	U	0.46	J
Silver	0.01	0.87	0.46	0.75	0.25	0.45	0.39	0.93	U	0.74	U	0.98	U	0.64	J	1.4	UJ
Sodium	12.55	269.00	99.42	169.20	52.31	100.62	80.60	43.8	U	39.2	J	105	J	91.6	J	93	J
Thallium	0.07	1.20	0.43	0.87	0.26	0.34	0.18	0.23	U	0.23	U	0.16	U	0.24	U	0.17	U
Vanadium	12.00	32.70	21.41	31.88	6.30	23.05	21.00	28.6		31		22.2		29.3		27.8	
Zinc	34.70	126.00	67.80	107.85	20.55	76.90	65.00	79.6		72.1		102		115		57.9	

Notes

1) This table presents chemical analysis results from soil samples collected across SEDA

2) For statistical calculations, all detects (no qualifier or J qualifier) were taken at full value, and all non-detects (U or UJ qualifier) were taken at half value

The Moscow shale (a member of the Hamilton group) is soft, gray, and fissile. This shale is extensively jointed and weathered at the contact with the overlying till. Joint spacings are from 1 inch to 4 feet based upon surface exposures. Three prominent joint directions are evident in the shale (N 60° E, N 30° W, and N 20° E) with the joint dips being primarily vertical (Mozola, 1951). Merrin (1992) also cites three prominent vertical joint directions of northeast, north-northwest, and east-northeast in outcrops of the Genesse Formation 15 miles southeast of SEDA near Ithaca, New York. Cores performed in the upper 5 to 8 feet of the bedrock at SEDA revealed low Rock Quality Designations (RQDs), i.e., less than 5 percent with almost 100 percent recovery suggesting a high degree of weathering in this upper zone (Parsons ES, 1994b; Metcalf & Eddy, 1989). The shale is significantly less fractured below this depth.

1.4.3 Regional Hydrogeologic Setting

Regionally, four distinct hydrologic units have been identified within Seneca County (Mozola, 1951). These include two distinct shale formations, a series of limestone units, and unconsolidated beds of Pleistocene glacial drift. Overall, the groundwater in the county is very hard, and therefore, the quality is minimally acceptable for use as potable water. Approximately 95 percent of the wells in the county are used for domestic or farm supply and the average daily withdrawal is approximately 500 gallons, or 0.35 gallons per minute (gpm). About five percent of the wells in the county are used for commercial, industrial, or municipal purposes. Seneca Falls and Waterloo, the two largest communities in the county, are in the hydrogeologic region which is most favorable for the development of a groundwater supply. However, because the hardness of the groundwater is objectionable to the industrial and commercial establishments operating within the villages, both villages utilize surface water (Cayuga Lake and Seneca River, respectively) as their municipal supplies. The villages of Ovid and Interlaken, both of which are without substantial industrial establishments, utilize groundwater as their public water supplies. Ovid obtains its supply from two shallow gravel-packed wells, and Interlaken is served by a developed seepage-spring area.

Regionally, the water table aquifer of the unconsolidated surficial glacial deposits of the region would be expected to flow in a direction consistent with the dropping ground surface elevations. Geologic cross-sections from Seneca Lake and Cayuga Lake have been constructed by the State of New York, (Mozola, 1951). This cross-section information, along with groundwater flow directions established at numerous sites on SEDA and stream drainage patterns in the area, suggests that a groundwater divide exists approximately half way between the two finger lakes; the divide is believed to run approximately parallel to Route 96 near the eastern boundary of SEDA. Further evidence for the divide is provided in Parsons ES (1995). SEDA is located on the western slope of this divide and, therefore, regional groundwater flow on the depot is expected to be west toward Seneca Lake.

A substantial amount of information concerning the hydrogeology in the area has also been compiled by Mozola (1951). This report has been reviewed in order to better understand the hydrogeology of the area surrounding SEDA. The report indicates that within a four (4) mile radius of SEDA there are a number of wells from which geologic and hydrogeologic information is available. This information includes: 1) the depth; 2) the yield; and 3) the geological strata through which the wells were drilled. Although the information was compiled in the 1950s, these data are useful in providing an understanding and characterization of the aquifers present within the area surrounding SEDA.

A review of this information suggests that three geologic units have been used to produce water for both domestic and agricultural purposes. These units, in stratigraphic order from the ground surface, include: 1) an unconfined overburden aquifer consisting of Pleistocene deposits of till and weathered shale, 2) a confined bedrock aquifer consisting of competent shale, and 3) a deep confined aquifer within beds of limestone underlying the competent shale. As of 1957, six wells tapped the overburden aquifer, twenty-five wells utilized water from the competent shale aquifer, and one used the deep limestone as a source of water.

For the six wells that utilized groundwater extracted from the overburden, the average yield was approximately 7.5 gpm. The average depth of these wells was thirty-six feet. The geologic material which comprises this aquifer is generally Plesitocene till, with the exception of one well located northeast of the site. This well penetrates a localized outwash sand and gravel deposit. The yields from the five wells in the overburden range from 4 to 15 gpm. The one well located in the outwash sand and gravel deposit, drilled to 60 feet, yields only 5 gpm. A 20-foot hand dug well, located to the southeast of the outwash well, yields 10 gpm.

The 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. 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). Accordingly, the majority of the wells in the area tap the competent shale aquifer.

The limestone aquifer is between 100 and 700 feet deep. The deeper portions of this bedrock (i.e. at depths greater than 235 feet) have provided yields up to 150 gpm. Although the occurrence of water derived from limestone is considered to be unusual for this area and is more commonplace to the north, these high well yields may be attributable to the effects of solutioning on the Onondaga limestone, which is at the base of the Hamilton Group. Solution effects on limestones (and shales that contain gypsum) in the Erie-Niagara have been reported by LaSala (1968). Based on well yield data, the degree of solutioning is affected by the type and thickness of the overlying material (Mozola, 1951). The limestone aquifer is considered to comprise a separate source of water for the area compared to water derived from the upper aquifers. Despite the high yields, however, very few wells in the region adjacent to SEDA utilize the limestone as a source of water, which may be due to the drilling depths required to intercept this water.

The geologic study of the area by Mozola (1951) determined three reasons for the lack of hydrologic interconnection between the groundwater near the surface and the deeper aquifers. First, the shales in this region are relatively impermeable, i.e., absorbing, transmitting, and yielding water very slowly. Joints and other openings in the shales are generally very narrow or are filled with fine silt and clay. This impermeability tends to inhibit downward seepage of water from the surficial deposits. Second, the slope of the bedrock and the land surfaces toward the Finger Lakes favors rapid drainage of surface water. Third, the overlying glacial drift (i.e., till) is considered too thin to hold large quantities of water for gradual recharge of the bedrock.

1.4.4 Hydrogeology at SEDA

Physical characterization studies at 27 sites at SEDA provide some important information on the behavior of the till/weathered shale and competent shale aquifers. The areas addressed below include groundwater flow directions, hydraulic conductivity results, groundwater velocities, and a general conceptual model for groundwater flow at SEDA.

Groundwater flow directions at SEDA are generally to the west based on water table maps prepared for 27 sites on the Depot. However, there are occasions where local topography and/or water bodies cause groundwater to flow in other directions. Water table maps from several of these 27 sites provide additional evidence for a groundwater divide near and approximately parallel to Route 96 near Romulus, New York (i.e., on the eastern flank of SEDA) (Parsons ES, 1995a and 1996). East of the divide groundwater flows into Cayuga Lake and west of the divide it flows into Seneca Lake.

Hydraulic conductivity data are available from numerous sites at SEDA. Generally, the hydraulic conductivity values for the till/weathered shale aquifer range between 10^{-4} cm/sec and 10^{-3} cm/sec. The typical range for tills described by Freeze and Cherry (1979) is between 10^{-4} cm/sec and 10^{-10} cm/sec. Hydraulic conductivities for the competent shale generally range from 10^{-4} cm/sec to 10^{-6} cm/sec, based on data obtained from the Ash Landfill. The average hydraulic conductivities for approximately 0- to 20- foot and 20- to 40- foot zones in the competent shale were 7.1×10^{-5} cm/sec and 1.4×10^{-5} cm/sec, respectively, based hydraulic conductivity testing performed on a total of 10 wells installed in bedrock (Parsons ES, 1994b).

Three years of historical water table data collected at the Ash Landfill site provide information for a conceptual model of the overall behavior of the till/weathered shale aquifer at SEDA (Parsons ES, 1994b). For the relatively thin till/weathered shale aquifer, historical data sampled as part of the Ash Landfill RI indicates fluctuations in the water table of as great as 8.7 feet occur in the monitoring wells. It is noteworthy that at certain times of the year, the saturated interval becomes quite thin (approximately 1 to 3 feet thick) and even dries up at some locations. Based on these historical data, these wells exhibit rhythmic, seasonal water table and saturated thickness fluctuations (Parsons ES, 1995). The saturated interval is at its thinnest (generally between 1 and 3 feet thick) in the month of September and its thickest (generally between 6 and 8.5 feet thick) between the months of December and March.

Mozola (1951) states that groundwater in Seneca County is derived almost entirely from precipitation within the County. To investigate historical precipitation events and the likely relationship between fluctuations in the water table and these precipitation events, monthly precipitation data for the years 1990 through most of 1993 were obtained from the Aurora Research Farm located approximately 10 miles east of the site. Although no definitive trend is depicted by the data, they generally show higher amounts of precipitation in the spring (March and April) and fall (September) and relatively lower amounts in the summer (with the exception of the month of July 1992) and winter (January and February). These data alone do not explain the observed water table fluctuations.

The rhythmic behavior of the aquifer is not solely controlled by precipitation events, rather it is more likely affected by a combination of precipitation amounts and evapotranspiration rates. This later phenomenon is affected by temperature, exposure to the intensity of the sun, velocity of the wind, and the amount of vegetation. Horizontal flow is not believed to play a major role in discharging water from the till/weathered shale unit, which has a relatively low hydraulic conductivity. Based on results from vertical connection tests conducted at the Ash Landfill and SEAD-25 and 26, low degrees of downward movement may be possible from the till/weathered shale aquifer to the competent shale aquifer. However, no strong downward vertical gradients are believed to occur on-site. Therefore, downward flow is also believed to be minimal compared to evaporative losses.

Therefore, based on the hydrographs for the wells at the Ash Landfill, a conceptual model for the till/weathered shale flow system is that the high water table in the late fall and winter is sustained through the spring by generally high precipitation amounts, snow melting events (predominantly in March and April) and low evapotranspiration rates. Decreasing precipitation accompanied by an increase in evapotranspiration (due to an increase in temperature and more vegetation uptake) in the summer results in little recharge to the aquifer and thus a fall in the water table. In the summer, evapotranspiration at the surface causes water to move up from the water table to the surface by capillary action, a phenomenon noted by deMarsily (1986). In the fall (September and October) there is generally an increase in precipitation and a decrease in evapotranspiration, which accounts for the increasing water table elevations that are sustained through the winter months and into the spring. Supporting evidence for the concept of evapotranspiration losses from groundwater and water table fluctuations is provided in Parsons ES (1995 and 1996).

The nature of fractures observed in the competent shale at the Ash Landfill suggests that groundwater flow in the shale aquifer may approach equivalent porous media (EPM) flow conditions (Parsons ES, 1996). Additionally, Merrin (1992) suggests that groundwater flow through fractured siltstones approximately 15 miles south of SEDA near Ithaca, NY might approximate EPM conditions.

1.4.5 Regional Topography

SEDA lies on the western side of a series of north-to south-trending rock terraces that separate Cayuga Lake on the east and Seneca Lake on the west. The rock terraces range in elevation from 490 feet above MSL in northern Seneca County to as much as 1,600 feet above MSL at the southern end of the lakes. Elevations on SEDA range from 450 feet above MSL on the western boundary to 760 feet above MSL in the southeast corner. The Depot's land surface generally slopes downward to the west and upward to the north.

1.4.6 Regional Climate

Table 1-3 summarizes climatological data for the SEDA area. The nearest source of climatological data is the Aurora Research Farm in Aurora, New York, which is approximately ten miles east of SEDA on the east side of Cayuga Lake. This research Farm is administered by the Northeast Regional Climate Center located at Cornell University in Ithaca, New York. Only precipitation and temperature measurements are available from this location. The other data reported in **Table 1-3** were taken either from isopleth drawings from a climatic atlas, or from data collected at Syracuse, New York, which is 40 miles northeast of SEDA. Meteorological data collected at Seneca Army Depot Activity and Ithaca, NY were used to prepare the wind roses presented in **Figure 1-9**. A cool climate exists at SEDA with temperatures ranging from an average of 23°F in January to 69°F in July. Marked temperature differences are found between daytime highs and nighttime lows during the summer and portions of spring and autumn. Precipitation is unusually well-distributed throughout the year, averaging approximately 3 inches per month. This precipitation is derived principally from cyclonic storms that pass from the interior of the country through the St. Lawrence Valley. Lakes Seneca, Cayuga, and Ontario provide a significant amount of the winter precipitation and moderate the local climate. The annual average snowfall is approximately 100 inches. 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 due south.

Daily precipitation data measured at the Aurora Research Farm in Aurora, New York for the period (1957-1991) were obtained from the Northeast Regional Climate Center at Cornell University. The average monthly precipitation during this 35-year period of record is summarized in **Figure 1-10**. The maximum 24-hour precipitation measured at this station during this period was 3.9 inches on

Table 1-3

Climatological Data for Seneca Army Depot Activity

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

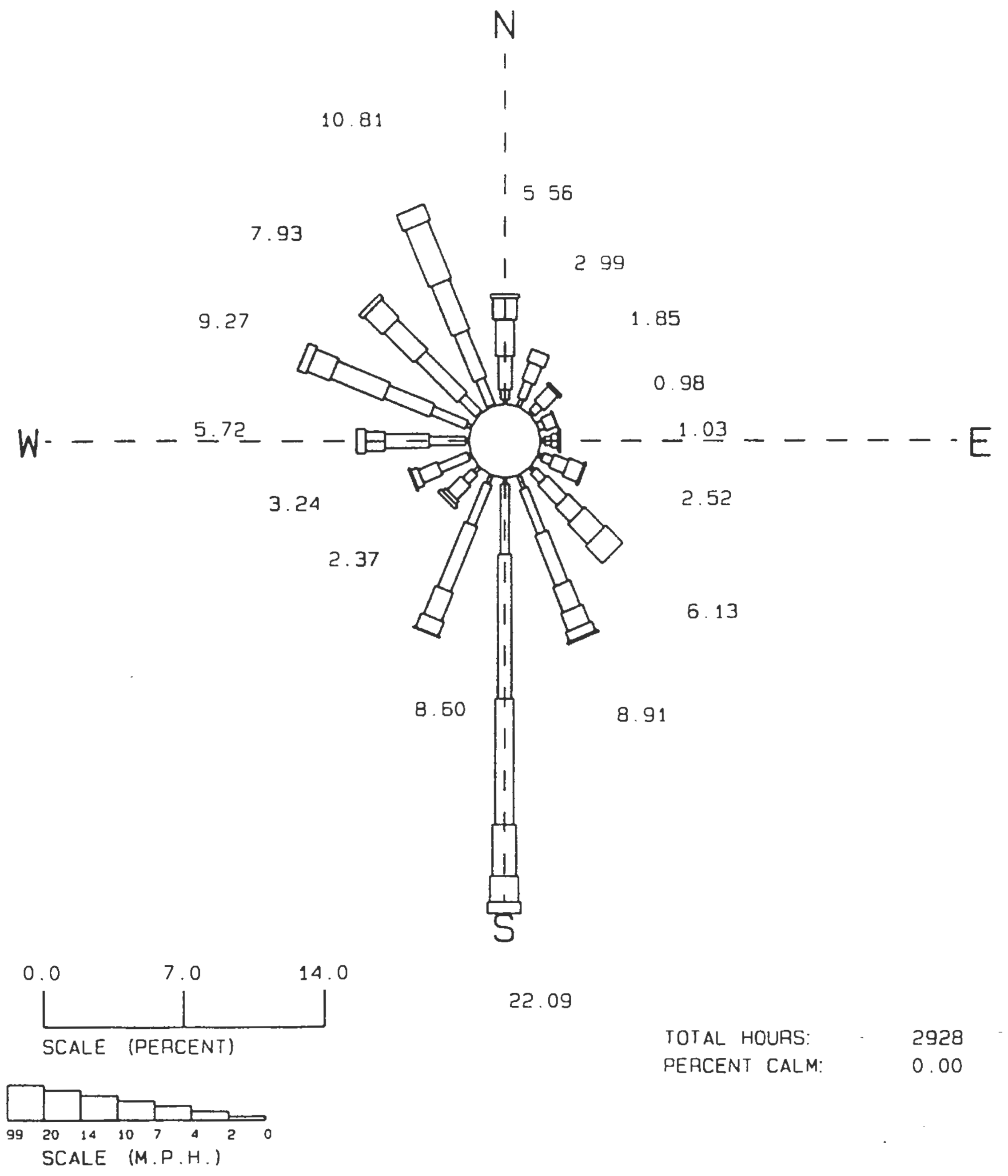
Month	Temperature (1),°F			Mean Precipitation (1), in.	Mean Relative Humidity (%)	Percent Sunshine	Mean Number of Days (4)		
	Maximum	Minimum	Mean				Clear	Partly Cloudy	Cloudy
January	30.9	14.0	22.5	1.88	70	35	3	7	21
February	32.4	14.1	23.3	2.16	70	50	3	6	19
March	40.6	23.4	32.0	2.45	70	50	4	7	20
April	54.9	34.7	44.8	2.86	70	50	6	7	17
May	66.1	42.9	54.5	3.17	70	50	6	10	15
June	76.1	53.1	64.6	3.70	70	60	8	10	12
July	80.7	57.2	69.0	3.46	70	60	8	13	10
August	78.8	55.2	67.0	3.18	70	60	8	11	12
September	72.1	49.1	60.7	2.95	70	60	7	11	12
October	61.2	39.5	50.3	2.80	70	50	7	8	16
November	47.1	31.4	39.3	3.15	70	30	2	6	22
December	35.1	20.4	27.8	2.57	70	30	2	5	24
Annual	56.3	36.3	46.3	34.33	70	50	64	101	200

Period	Mixing Height (2), m	Wind Speed (2), m/s
Morning (Winter)	900	8
Morning (Spring)	700	6
Morning (Summer)	500	5
Morning (Autumn)	600	5
Morning (Annual)	650	6
Afternoon (Winter)	900	8
Afternoon (Spring)	1600	8
Afternoon (Summer)	1800	7
Afternoon (Autumn)	1300	7
Afternoon (Annual)	1400	7

Mean Annual Pan Evaporation (3), inches : 35
Mean Annual Lake Evaporation (3), inches : 28

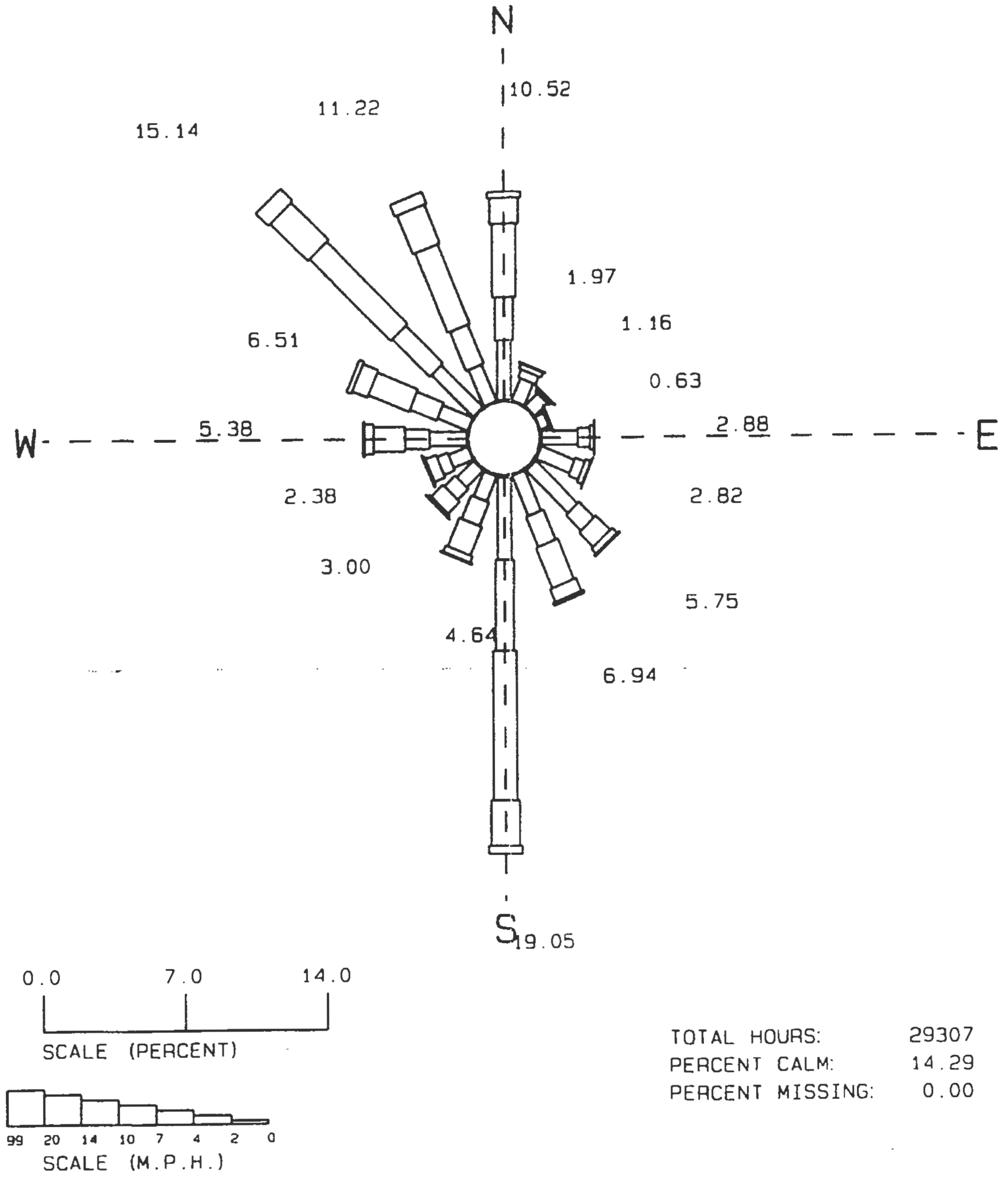
Number of episodes lasting more than 2 days (2), (No. of episode-days) :
Mixing Height < 500 m, wind speed < 2 m/s : 0 (0)
Mixing Height < 1000 m, wind speed < 2 m/s : 0 (0)
Number of episodes lasting more than 5 days (2), (No. of episode-days) :
Mixing Height < 500 m, wind speed < 4 m/s : 0 (0)

Notes:
1) Climate of New York Climatography of the United States No. 60. National Oceanic and Atmospheric Administration, June 1982. Data for Ithaca Cornell University, NY.
2) Mixing Heights, Wind Speeds, and Potential for Urban Air Pollution throughout the Contiguous United States. George C. Holzworth, Jan. 1972.
3) Climate Atlas of the United States. U.S. Department of Commerce, 1983.
4) Climate of New York Climatography of the United States No. 60. National Oceanic and Atmospheric Administration, June 1982. Data for Syracuse, NY.



TOTAL HOURS: 2928
PERCENT CALM: 0.00

SENECA ARMY DEPOT
SENECA 10-M MET. TOWER
SEASONAL WIND ROSE
10 METER LEVEL APRIL 24 - JULY 14 1995



TOTAL HOURS: 29307
PERCENT CALM: 14.29
PERCENT MISSING: 0.00

SENECA ARMY DEPOT
ITHACA AIRPORT
ANNUAL WIND ROSE
20 FOOT LEVEL POR: 1989-1993

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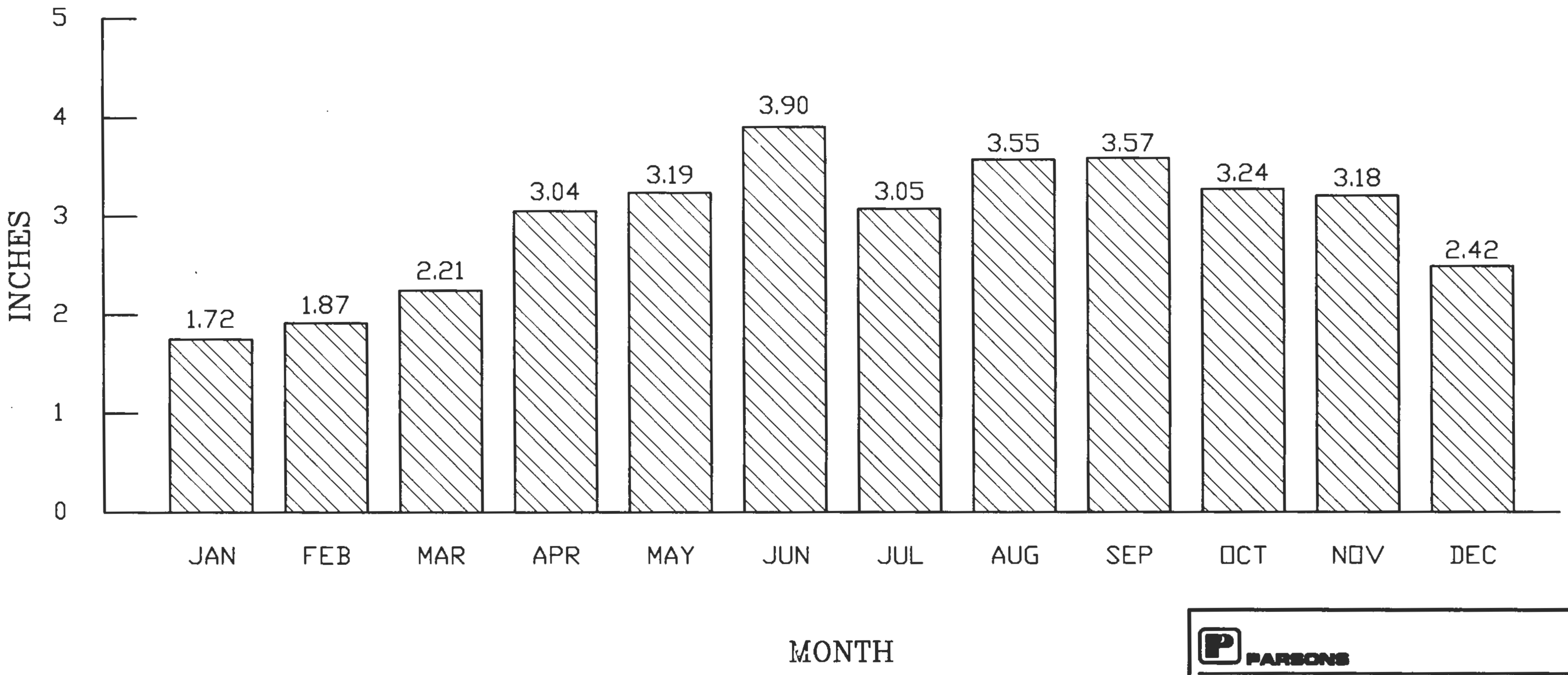
CLIENT/PROJECT TITLE
SENECA ARMY DEPOT ACTIVITY
RI/FS
SEAD-4

DEPT ENVIRONMENTAL ENGINEERING
DWG NO 734539-01001

FIGURE 1-9
WIND ROSES

SCALE NA
DATE MAY 1999

GRAPHICS\SENECA\2WROSES.CDR



DATA IS FROM THE NORTHEAST REGIONAL CLIMATE CENTER, CORNELL UNIVERSITY, ITHACA, NY AND IS GIVEN A MONTHLY AVERAGE PRECIPITATION AVERAGED OVER THE YEARS 1957 THROUGH 1991.

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CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
RI/FS
SEAD-4

DEPT.	Dwg. No.
ENVIRONMENTAL ENGINEERING	**734639-01001**

FIGURE 1-10

AVERAGE MONTHLY PRECIPITATION IN PROXIMITY OF SENECA ARMY DEPOT ACTIVITY

SCALE	DATE	REV
NA	**JUNE 1999**	**A**

R:\SENECA\RIFS\SD59\AVG-MNTH.DWG

September 26, 1975. Values of 35 inches mean annual pan evaporation and 28 inches for annual lake evaporation were already reported in **Table 1-3**. An independent value of 27 inches for mean annual evaporation from open water surfaces was estimated from an isoplethed figure in "Water Atlas of the United States" (Water Information Center, 1973).

In general, climatological conditions that tend to promote good dispersions are high ambient temperatures, high wind speeds, low precipitation amounts, and a preponderance of clear skies. As **Table 1-3** shows, temperatures tend to be highest from June through September. Precipitation and relative humidity tend to be rather high throughout the year. The months with the maximum amount of sunshine are June through September. Mixing heights tend to be lowest in the summer and during the morning hours. Wind speeds also tend to be lower during the morning, which suggests that dispersion will often be reduced at those times, particularly during the summer. However, no episode-days are expected to occur with low mixing heights (less than 500 m) and light wind speeds (less than or equal to 2 m/s). Information on the frequency of inversion episodes for a number of National Weather Service stations is summarized in "Mixing Heights, Wind Speeds, and Potential for Urban Air Pollution Throughout the Contiguous United States" (George C. Holzworth, US EPA, 1972). The closest stations at which inversion information is available are Albany, New York and Buffalo, New York. The Buffalo station is nearer to SEDA but almost certainly exhibits influences from Lake Erie. These influences would not be expected to be as noticeable at SEDA. SEDA is located in the Genesee-Finger Lakes Air Quality Control Region (AQCR). The AQCR is designated as "non-attainment" for ozone and "attainment" or "unclassified" for all other criteria pollutants. Data for existing air quality in the immediate area surrounding the SEAD, however, cannot be obtained since the nearest state air quality stations are 40 to 50 miles away from the depot (Rochester of Monroe County or Syracuse of Onondaga County). A review of the data for Rochester, which is in the same AQCR as SEDA, indicates that all monitored pollutants (sulfur dioxide, particulates, carbon monoxide, lead, ozone) are below state and federal limits, with the exception of ozone. In 1987, the maximum ozone concentration observed in Rochester was 0.127 ppm. However, this value may not be representative of the SEDA area which is in a more rural area.

1.4.7 Regional/Local Land Use

Historically, Varick and Romulus Townships within Seneca County developed as agricultural centers supporting a rural population, however, there was a significant increase in the populations of these two centers in 1941 when SEDA was opened.

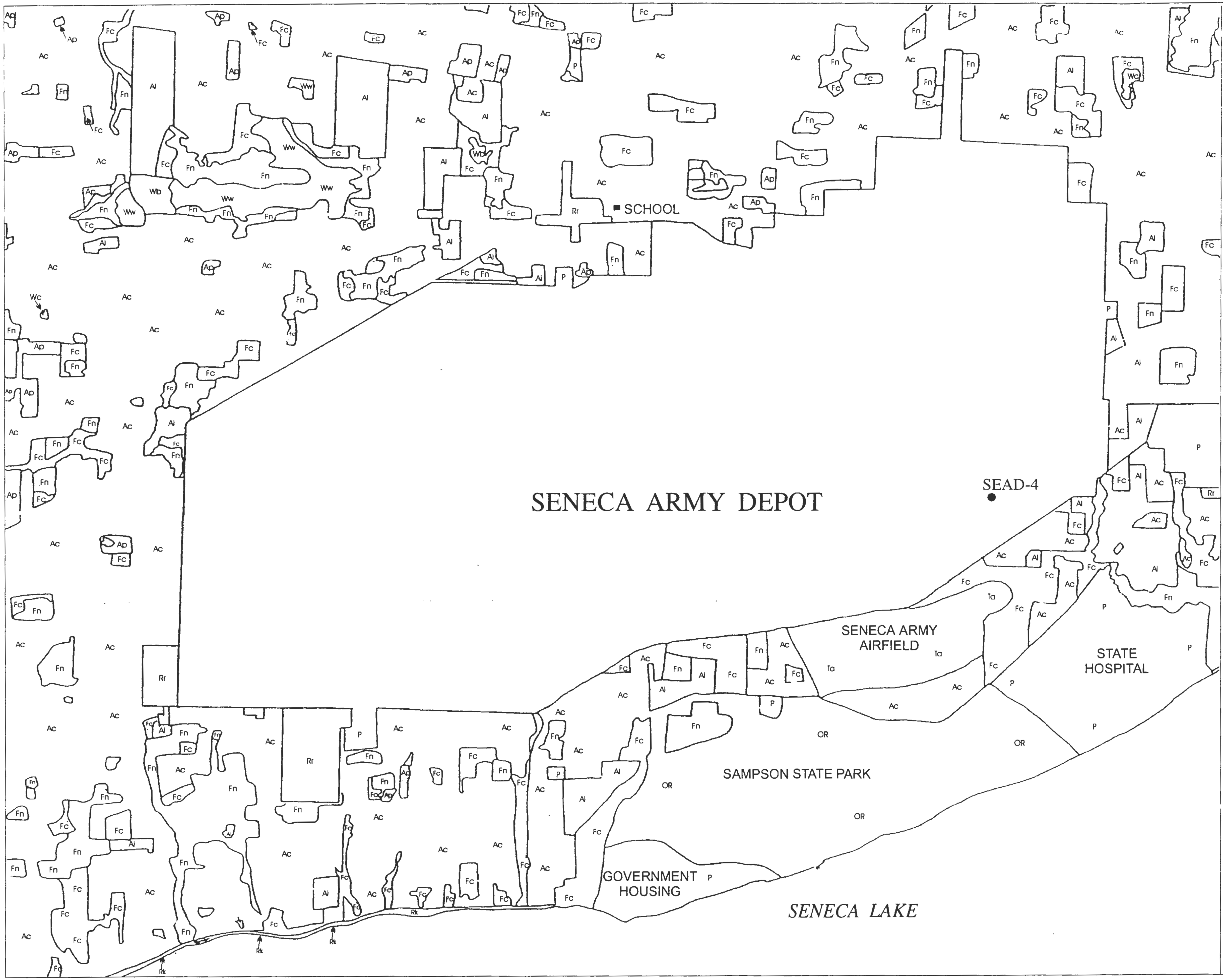
Land use in the region surrounding SEDA is largely agricultural, with some forestry and public land uses (i.e., school, recreation, and state parks) (**Figure 1-11**). Agricultural land uses are categorized as inactive or active use. Inactive agricultural land consists of land committed to eventual forest regeneration, land waiting to be developed, or land presently under construction. Active agricultural land surrounding SEDA consists largely of cropland and cropland pasture. The USGS quadrangle maps for the Towns of Ovid and Dresden, New York (1970), New York State Department of Transportation (DOT) quadrangles for Romulus, New York (1978) and Geneva South, New York (1978) do not indicate land designated for dairy production in the vicinity of SEDA. Forested land adjacent to SEDA is primarily under regeneration although there are sporadic occurrences of mature forest. Public and semi-public land use surrounding and within the vicinity of SEDA includes Sampson State Park, Willard Psychiatric Center, and Central School (at the Town of Romulus, New York). Sampson State Park encompasses approximately 1,853 acres of land and includes a boat ramp on Seneca Lake.

1.5 OFF-SITE WELL INVENTORY

The section identifies private drinking water wells near SEAD-4. Knowledge of off-site wells is required when assessing any potential threats to drinking water supplies from releases at the site being investigated. Five drinking water wells were identified within a one-mile radius of SEAD-4 (**Figure 1-12**). Three of the wells are located at the Seneca Army Airfield and two wells are private private drinking water wells. There are no public water supply wells within a one-mile radius of the site.

1.6 REPORT ORGANIZATION

The remaining sections of this report describe the investigation programs, the results of the data collected during the RI and identify the magnitude and extent of impacts at the site. The first part of Section 2.0 (Study Area Investigation) presents the methodologies used during the field



N

LEGEND

Active

Ac Cropland/cropland pasture
Ap Permanent pasture

Inactive

Ai Agriculture inactive

Forestland

Fc Brush cover up to fully stocked poles less than 30 feet
Fn Forest over 30 feet

Water

Wn Natural, any size
Wc Artificial, one acre

Wetlands

Wb Bogs, shrub wetlands
Ww Wooded wetlands

Public

P All Categories

Residential

Rr Rural hamlet

Shoreline

Rk Shoreline developed

Outdoor Recreation

OR All categories

Transportation

Ta Airport

Source: New York Land Use and Natural Resource Inventory

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SENECA ARMY DEPOT ACTIVITY

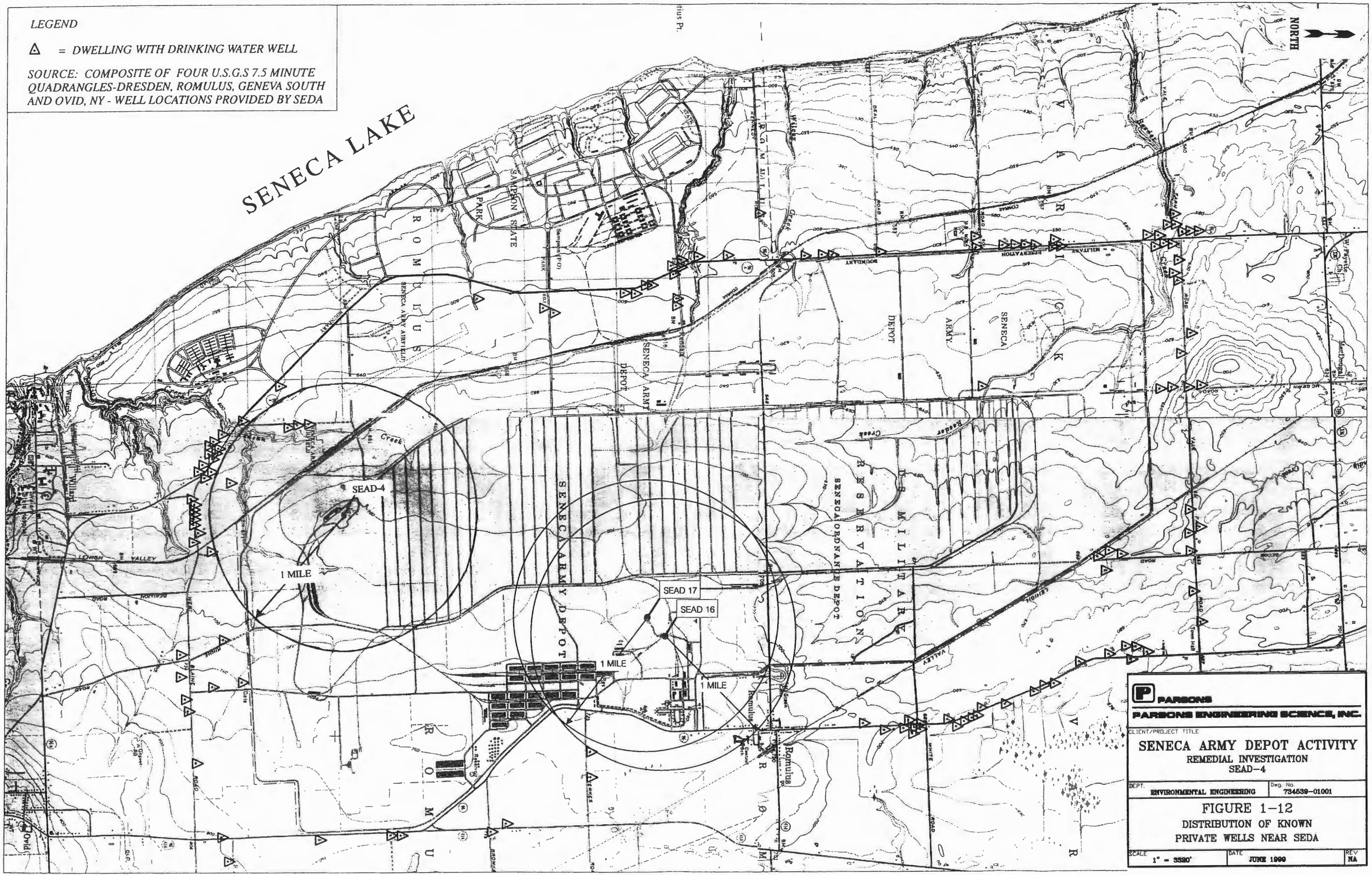
RI/FS
SEAD-4

DEPT. ENVIRONMENTAL ENGINEERING
DWG NO. 734539-01001

FIGURE 1-11
REGIONAL/LOCAL
LAND USE MAP

SCALE 1" = 2000'
DATE JUNE 1999

\graphics\seneca\lanuse.cdr(cvm)



LEGEND

△ = *DWELLING WITH DRINKING WATER WELL*

SOURCE: COMPOSITE OF FOUR U.S.G.S 7.5 MINUTE QUADRANGLES-DRESDEN, ROMULUS, GENEVA SOUTH AND OVID, NY - WELL LOCATIONS PROVIDED BY SEDA

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CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
REMEDIAL INVESTIGATION
SEAD-4

DEPT.	Dwg. No.
ENVIRONMENTAL ENGINEERING	734639-01001

FIGURE 1-12
DISTRIBUTION OF KNOWN
PRIVATE WELLS NEAR SEDA

SCALE	DATE	REV
1" = 3320'	JUNE 1999	NA

R:\GRAPHICS\SENECA\WELLOC.CDR AND WELS1617.CDR investigations. This is followed by a discussion of the technical approach of the RI and the rationale for choosing the locations investigated during the field program. This section relates the investigation programs (i.e., geophysical, surface water and sediment, soils, groundwater, and ecological) to the important site features and characteristics, and sources of contamination. Section 3.0 discusses the results of the investigation programs, specifically, surface features, ecology, surface water hydrology and sediments, geology and hydrogeology. The nature and extent of contamination on and off-site is discussed in Section 4.0. Section 5.0 (Contaminant Fate and Transport) provides a discussion of the mechanisms involved in the weathering and transport of constituents found at the site. Section 6 (Baseline Risk Assessment) evaluates the risk to human health and the environment. Appendices contain the supporting data for this report.

2.0 STUDY AREA INVESTIGATION

2.1 INTRODUCTION

A conceptual understanding of the site conditions at SEAD-4 was developed as part of this CERCLA investigation. This investigation combined the present data with additional hydrologic, geologic, ecological, and chemical information that was obtained from the previously completed ESI to provide a comprehensive CERCLA Remedial Investigation report.

This CERCLA investigation was conducted in two phases. The first phase of the investigation was the ESI, which began in the fall of 1993. A detailed description of the tasks associated with each phase of this program is presented in the Workplan for CERCLA Expanded Site Investigation (ESI) of Ten Solid Waste Management Units (Parsons ES, January 1993), hereafter referred to as the Ten SWMU ESI Workplan. The Expanded Site Inspection of Seven High Priority SWMUs Report (Parsons ES, 1995), which included SEAD-4, was prepared after the completion of the ESI fieldwork and provided the basis for the work required to complete the remedial investigation.

The second phase of the CERCLA investigation was the RI, which began with the field program in the fall of 1998. The description of the tasks involved with each phase of this program were presented in two documents. The first document was the Generic Installation Remedial Investigation/Feasibility Study (RI/FS) Workplan (Parsons ES, 1995b), hereafter referred to as the Generic RI/FS Workplan. The second document was the SEAD-4 Project Scoping Plan for Performing a CERCLA RI/FS (Parsons ES,1996). The following sections describe, in detail, the ESI and RI work completed by Parsons ES to further characterize the environmental setting and chemical impacts at the site.

The Ten SWMU ESI workplan was approved by the U.S. Environmental Protection Agency (EPA), Region II, and NYSDEC, prior to initiation of fieldwork in November 1993. The Generic RI/FS workplan was approved by the EPA Region II and NYSDEC in September 1995. Subsequent to this approval, revisions were made to the Generic RI/FS workplan in May 1996 in response to further comments made by the EPA. The SEAD-4 Project Scoping Plan was finalized in October 1996. Together, the workplans described the following field tasks:

- Surveying (ESI and RI),
- Geophysical Investigation (ESI and RI),

- Soil Sampling (ESI and RI),
- Groundwater Investigation (ESI and RI),
- Surface Water/Sediment Investigations (ESI and RI), and
- Building Investigation (RI).

The general methods used for the ESI and RI as well as information specific to the field investigations at SEAD-4 are presented in the following sections.

2.2 SITE SURVEY PROGRAM

Two site survey programs were conducted at SEAD-4, one for the ESI field program and one for the RI field program.

The initial site survey program, which was conducted for the ESI, consisted of field reconnaissance, ground control, aerial photogrammetry, and a field survey of the location, identification, and elevation of monitoring wells, soil borings, geophysical lines, and any other sampling points associated with the ESI field program. A reconnaissance of the sites was performed to locate general site features and confirm the presence of significant features (i.e., buildings, utilities access to roads, sample locations, etc.) identified in the Ten SWMU ESI Workplan. All sample locations were identified and marked during this initial survey. SEDA was photographed from the air on December 14, 1993 for the purpose of constructing a photogrammetric site plan with 2-foot contour intervals. This photogrammetric map was used as the basis for individual site base maps. Ground control was performed during the period from November of 1993 through February of 1994.

For the RI field program, the site survey consisted of field reconnaissance and a field survey. Again, the site reconnaissance was performed to locate general site features and confirm the presence of significant features identified in the SEAD-4 Project Scoping Plan. All sample locations were identified and marked with stakes and flagging during this initial survey. Consideration was also given to the accessibility of the site with regard to drilling rigs and heavy machinery.

Monitoring wells were located and surveyed upon completion of the ESI field program and the RI field program. All sample locations and monitoring well locations were surveyed after the surface completion and installation of the locking cap guard pipe. At each monitoring well location, three elevations were measured: the top of the outer protective casing at the point opposite the lock or bolt on the guard pipe, the top of the inner PVC riser pipe, and at the finished concrete pad adjacent to the outer well casing. All of the surveyed locations were referenced to the New York State Plane Coordinate System.

The site surveys for the ESI and RI at SEAD-4 were combined to form the basis for complete survey for the RI, and they provide accurate site base maps that were used for the following purposes:

1. Locating the environmental sampling points associated with the RI field program;
2. Providing accurate and current information regarding the topography and site conditions;
3. Estimating the volume of impacted soils and sediments which may require a remedial action;
4. Mapping the direction of groundwater flow and computing the velocity of groundwater; and
5. Mapping the extent of any impacted groundwater above established ARAR limits.

The location, identification, coordinates, and elevations of all control points and all of the environmental sampling points were plotted on the site base maps to show their location with respect to surface features within the project area. The SEAD-4 site plan is presented in **Figure 1-3.**

2.3 GEOPHYSICAL INVESTIGATION

A geophysical investigation was carried out for both the ESI and the RI. The geophysical investigation for the ESI was tailored to track groundwater flow so that the direction of possible contaminant flow could be followed and to determine the location of a suspected leach field. For the RI, the investigation was geared toward verifying whether or not specific pits or concrete tanks existed in certain areas of the site.

ESI Program

As part of the ESI geophysical investigation, four 115-foot seismic refraction profiles were performed along two lines laid out perpendicular to each other. Data from the surveys were used to determine the direction of groundwater flow, then, when necessary, the location of the monitoring wells was adjusted to locate a well upgradient and a well downgradient of the possibly contaminated area.

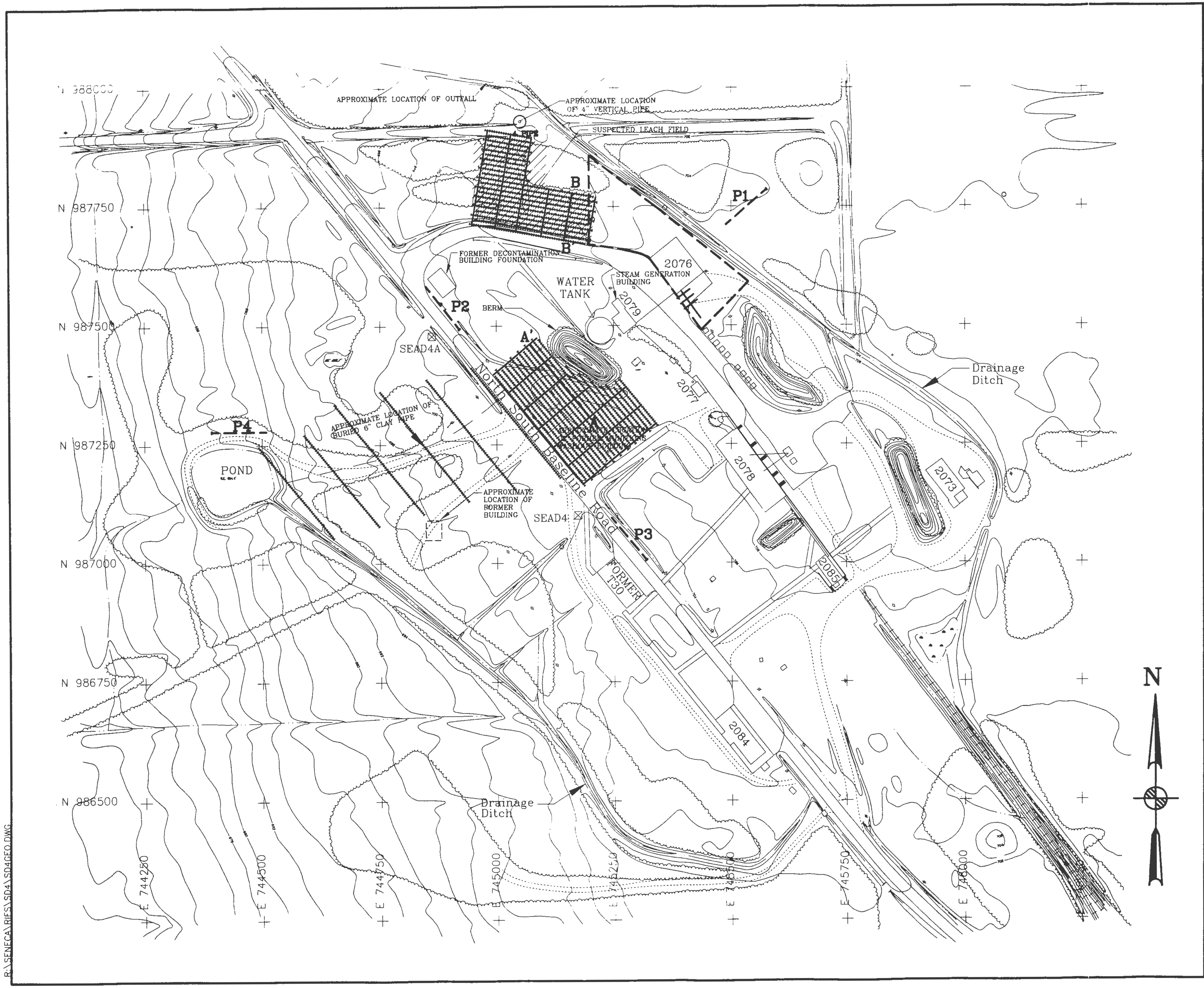
The exact location of the suspected leach field, west of the Munitions Washout Facility, was unknown. To determine the location of the leachfield, ground penetrating radar (GPR) and electromagnetic (EM-31) surveys were performed. GPR was the primary geophysical method with the EM-31 providing backup geophysical data. The objective of these surveys was to delineate the suspected leach field and subsurface pipes and structures that may have serviced the suspected leach field (**Figure 2-1**). A grid of GPR and EM-31 data was collected over the area of the suspected leachfield location. The GPR data was collected continuously along the lines spaced at 10-foot intervals and along selected cross-lines (**Figure 2-1**). Electromagnetic measurements were made on the same lines and cross-lines with measurements taken at 5-foot intervals. Approximately 5,000 linear feet of GPR profiles were acquired and approximately 4,100 linear feet of EM data was collected in the area.

In addition, GPR and EM-31 profiles were performed in the area between the pond and the former Munitions Washout Facility to identify the location of the former 6" clay pipe through which wastewater was discharged. Six profiles, spaced at 100-foot intervals, were surveyed to locate the former ditch. These profiles were approximately 300 feet in length.

RI Program

As part of the geophysical investigation for the RI, EM-31 and GPR surveys were performed around the north, south, and east sides of Building 2076 to determine the existence of an underground concrete tank or pit used for laundry wash water that was suspected to be contaminated with explosives. The EM-31 survey was performed on two 10- by 10-foot grids. The survey lines were delineated using a hand held compass. Any anomalies found with the EM-31 were followed up with GPR. NAEVA Geophysics, Inc. conducted the survey on January 5, 1999. Their report is presented in Appendix A of this report.

Contour maps were generated of the in-phase and quadrature components of the electromagnetic field. The in-phase data showed no anomalous features in the subsurface; however, the quadrature map showed a north-south trending conductivity anomaly south of the building.



LEGEND

- MINOR WATERWAY
- MAJOR WATERWAY
- FENCE
- UNPAVED ROAD
- BRUSH LINE
- LANDFILL EXTENTS
- RAILROAD
- 760 GROUND SURFACE ELEVATION CONTOUR
- ROAD SIGN
- DECIDUOUS TREE
- GUIDE POST
- FIRE HYDRANT
- MANHOLE
- COORDINATE GRID (250' GRID)
- POLE
- UTILITY BOX
- MAILBOX/RR SIGNAL
- OVERHEAD UTILITY POLE
- ☒ SURVEY MONUMENT
- SEISMIC PROFILE
- EM/GPR TRANSECT
- GPR CROSS-TRANSECT
- A——A' GPR RECORD (SHOWN IN REPORT)

100 0 100 200
(feet)

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PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE
SENECA ARMY DEPOT ACTIVITY
REMEDIAL INVESTIGATION
SEAD-4 MUNITIONS WASHOUT FACILITY

DEPT.	Dwg. No.
ENVIRONMENTAL ENGINEERING	734539-01001

FIGURE 2-1
LOCATION OF GEOPHYSICAL SURVEYS

SCALE	DATE	REV
1" = 200'	JUNE 1999	C

R:\SENECA\RIFS\SD4\SD4GEO.DWG

As part of the RI field program, bi-directional GPR profiles were collected over the EM-31 quadrature anomaly south of Building 2076. Three profiles crossed the anomaly transverse to its long axis, and one profile followed the long axis over the center of the anomaly. All four profiles showed a large, hyperbolic reflector in each record. The GPR data suggests that there is a large object in the subsurface south of Building 2076.

2.3.1 Seismic Refraction Methodology

Seismic refraction surveys were performed at SEAD-4 to determine the direction of groundwater flow by measuring either the depth to the water table or the depth to bedrock. These data, along with topographic information, were used to more accurately locate the up- and downgradient monitoring wells.

Four 115-foot seismic refraction transects were laid out at SEAD-4. They were approximately equidistant from the center of SEAD-4 and each other with each transect pointing toward the center of the site. The shot point locations were located along each profile and were used to define each individual seismic spread. The seismic data were collected using an industry standard 12- or 24-channel seismograph. When the geophones were placed on asphalt or concrete, small metal base plates replaced the metal spike on each geophone. The geophones placed on asphalt or concrete were weighted down using small 2 to 3 pound sand bags to improve overall coupling with the ground and to help minimize background noise levels. Geophone spacings were held at 5- foot intervals throughout the survey.

Once the seismograph setup was complete and data collection was ready to commence, the background noise level at each geophone location was monitored. The background noise was displayed on the seismograph CRT as a series of moving bars, the amplitude of which is proportional to the background noise level. This review provided information on ambient noise levels, while also highlighting malfunctioning geophones. Geophones that displayed a high level of noise were moved or had their placement adjusted.

An impact or dropped weight was used as the seismic energy source. Due to the shallow nature of the water table (i.e., generally less than 10 feet in depth) a low energy source was sufficient to accurately image the water table surface. Three shots were fired for each geophysical spread located at the spread ends and spread center. A paper copy of each seismic record was made in the field. Each record was reviewed for quality to insure that adequate signal to noise levels were present for the shot. Upon initial acceptance, a preliminary velocity analysis was performed in the field to define the subsurface structure along each spread. This preliminary review focused on determining if the water table surface had been properly resolved. Upon final acceptance of each shot, the seismic record was annotated to identify the transect number, the spread number, the shot point number, and the shot point location. After each record was reviewed, accepted, and annotated, the data collection procedure was repeated for the remainder of the shot points for each spread.

Subsequent to the seismic data collection, a survey was performed to provide X,Y,Z station information for the seismic shot point locations to ± 1.0 feet horizontally and ± 0.1 feet vertically. These data were used during seismic data reduction and seismic modeling.

The seismic refraction method relies upon the analysis of the arrival times of the first seismic energy at each geophone location to provide details about the subsurface geology. The time when the seismic energy arrives at each geophone location is referred to as the first break. Each seismic record was reviewed, both using the seismograph CRT and the paper records, to determine the first breaks at each geophone. This analysis was preliminarily performed in the field with the data checked after the completion of the field program. These first break data values were tabulated and used to create time-distance plots as described below.

For each seismic spread, a graph was made of the first break determinations for all of the spread shot points. These graphs display, in an X-Y plot, the first breaks (time) versus the geophone locations (distance). These time-distance plots form the basis of the geophysical interpretation. The time-distance plots were individually analyzed to assign each first break arrival to an assumed layer within the subsurface. It is estimated that up to four distinct seismic layers exist at the site. These include the unsaturated and saturated surficial deposits, the weathered bedrock, and the competent bedrock. In general, these various layers can be grouped into broad ranges of seismic velocities. As an example, unsaturated deposits will generally have a seismic velocity of less than 2,500 feet per second. By comparison, the saturated deposits should have seismic velocities in the range of 4,500 to 5,500 feet per second. The time-distance plots were interpreted to yield the velocity distribution within the subsurface. Each first break arrival was assigned to one of the above mentioned layers. This velocity analysis and layer assignment formed the basis for the data files to be used during the seismic modeling.

Once the first break analysis and layer assignments were complete, input seismic data files were created for use in the seismic modeling software. The input files included all of the information pertaining to the spread geometry, shot point locations and depths, first break arrivals, and layer assignments. The elevation data was also inputted into the computer files. The computer program, SIPT (Scott, 1977) was used to model the seismic data. SIPT is an interactive computer program developed by the United States Geological Survey for the inverse modeling of seismic refraction data. This program uses input seismic refraction data to create two-dimensional cross-sectional models of velocity layering within the subsurface. The program uses the delay-time method to produce a first approximation of the subsurface velocity layering. This approximation is then refined through the use of iterative ray tracing and model adjustment to minimize the differences between field-measured first arrival times and the forward modeled raypath times. The program also provides various levels of velocity analyses that will be reviewed to provide diagnostic information on the model solutions.

The results of the computer modeling were reviewed with the known geology of the site. The subsurface velocity layering was attributed to known or expected geologic units. A detailed analysis was made of the velocity distribution of the upper, unsaturated materials to ensure that, near surface low velocity materials are not adversely affecting the data quality and interpretation. The velocity distribution within the bedrock was also reviewed to provide information on the presence and degree of weathering and to identify any lithologic or fracture related changes within the bedrock.

Based upon the seismic refraction data and the logs from the various monitoring wells, two seismic cross-sections were generated. These cross-sections show the land surface elevation and the elevation of the water table and bedrock surfaces. The locations of bedrock piezometers, along with the stratigraphic information derived from them, are shown on these cross-sections.

2.3.2 EM-31 Methodology

An EM-31 survey was conducted during both the ESI and the RI field programs at SEAD-4. The survey performed for the ESI generated information about locations of subsurface pipes, pits, metal objects, and former ditches. The EM-31 survey was performed for the RI to determine the existence of an underground concrete tank which was thought to be near Building 2076.

This EM-31 survey produced electromagnetic data that was collected using grid-based surveys. In general, the grid-based surveys used 10- foot by 10- foot grid spacing. The individual EM-31 survey lines and station locations were established by using both hip chains and hand held compasses.

A data logger was used to record the individual electromagnetic readings. Both the in-phase and quadrature components of the electromagnetic field were measured and recorded. These data were in turn stored on a computer and printed out at the end of each field day. A calibration area, free of cultural interference, was established. The EM-31 response was measured at this area at the start of each day. This check was made to insure that no significant meter drift occurred during each survey.

Upon completion of each electromagnetic survey, the data was presented in both profile and contour form. Both the in-phase and quadrature components were plotted. This multiple presentation format aids in the interpretation of the data. All of these presentation aids were interpreted to identify the locations of buried metallic objects, disposal pits, waste boundaries, and areas of elevated subsurface soil apparent conductivities. These data were compared to the results of the GPR surveys to provide as complete and accurate interpretation of the subsurface conditions as possible.

The EM-31 instrument was calibrated by the manufacturer. This calibration can be rechecked in the field but this requires that access to highly resistive rock outcrops is available. A secondary field calibration was performed on a daily basis to insure repeatability of measurements and to check against daily meter drift. This field calibration is the only performance evaluation that is performed on these instruments. The EM-31 data was collected to evaluate only relative variations in subsurface conductivities. The absolute terrain conductivity was required since the SEAD-4 objectives were to identify relative variations in subsurface conditions associated with waste boundaries, buried metallic objects, etc.

2.3.3 GPR Methodology

GPR surveys were performed during both the ESI and RI field programs. As part of the ESI, a GPR survey of selected areas within SEAD-4 was conducted to locate buried structures including buried or filled-in pits, trenches, and disposal areas, to identify the original ground surface beneath the berms, and to obtain more information about anomalies detected during the EM-31 surveys. For the RI, a GPR survey was performed to locate an underground tank near Building 2076.

The GPR instrument was hand operated. As the equipment was pulled across the site, the reflected radar pulses were transmitted to the receiver unit where they were converted to analog signals. The analog signal was transmitted to the control unit where the signal was electronically processed and sent to the graphic recorder. The graphic recorder produced a continuous chart display on electrosensitive paper. This real-time display enabled the operator to interpret the data on site.

2.4 BUILDING INVESTIGATIONS

Building investigations were only performed during the RI. The buildings were inspected to evaluate the potential for source areas of contamination. Where possible, material handling processes were identified and inventories were made of the equipment present in buildings. The potential release mechanisms of floor drains and subterranean piping structures were documented. Photographs of each building were taken and information pertaining to the photographs were documented in a photo log.

Building samples were collected in order to determine the function of each building and its potential contamination. A total of six soil/debris samples were collected from inside the buildings; one from each of the six buildings (see **Table 2-1** for sample material descriptions). **Figures 2-2 through** 7 show the sample locations. The location of the samples was selected based on an evaluation of the most likely area to be impacted by activities within the building.

All samples were analyzed for volatile organic compounds, semivolatile compounds, pesticides, PCBs, explosives, metals, cyanide, and nitrates.

TABLE 2-1

SEAD-4 - Solid Materials Sampling Summary

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

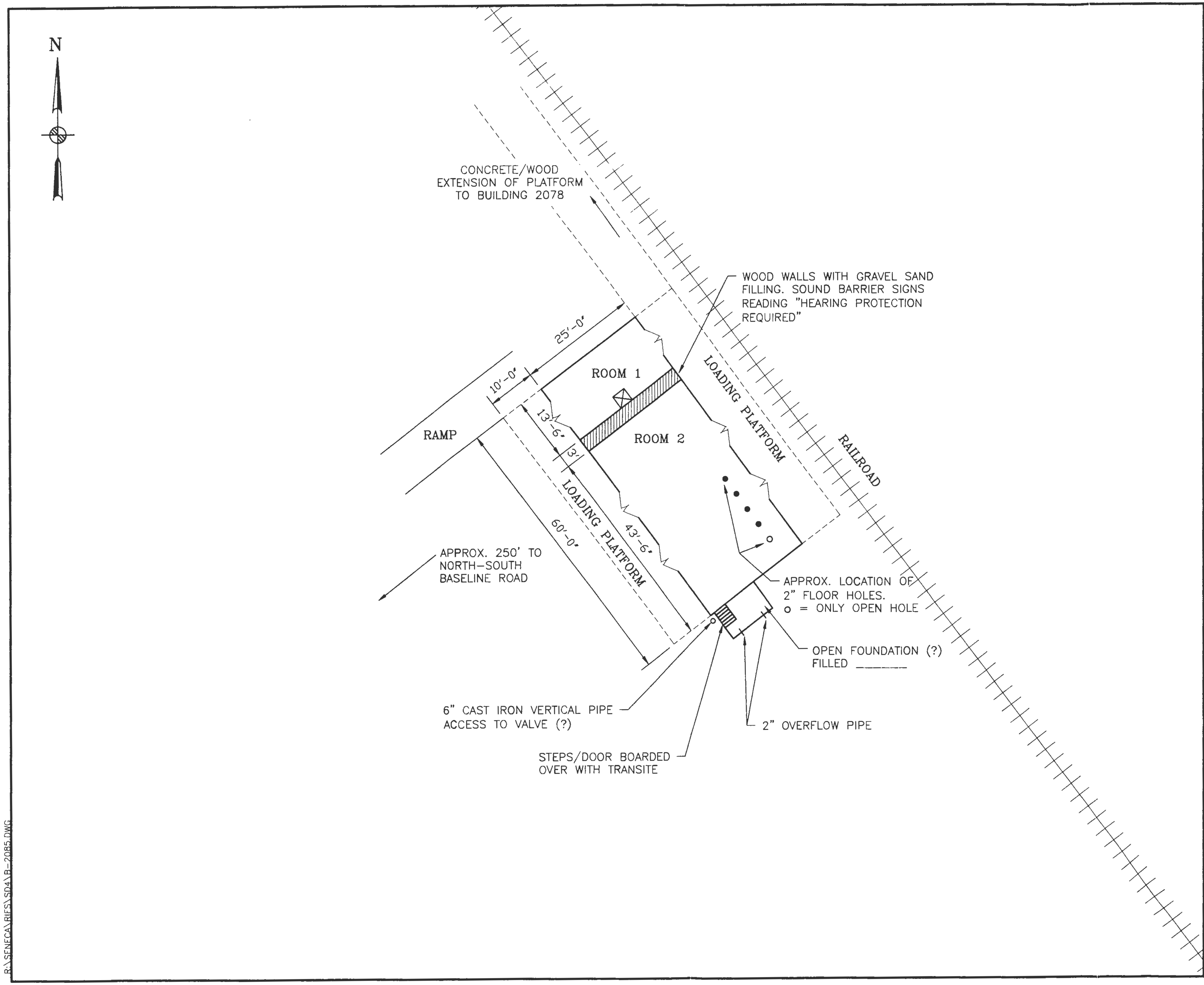
BUILDING NUMBER	SAMPLE NUMBER	STUDY (2)	ROOM LOCATION	MATERIAL DESCRIPTION
2084	044001	RI	Floor trench behind paint booth and drying assembly	Dirt/paint debris
2085	044002	RI	Each corner of building floor	Floor debris
2073	044003	RI	Composite of six floor drains in older part of building	Drain debris
2078	044004	RI	Encrusted material from all corners of the building	Floor debris
2076	044005	RI	Composite of sediments from along a drain in the building	Sediment from drains
2079	044006	RI	Floor trench drain right behind the boiler	Floor debris

Notes:

All samples were analyzed for volatile organic compounds, semi-volatile organic compounds, pesticides, PCBs, nitroaromatics, metals, cyanide, and nitrates.

(1) See figures 2-2 through 7 for sample locations.

(2) ESI - Samples collected during Environmental Site Inspection conducted in 1993.
RI - Samples collected during Remedial Investigation conducted in 1998.



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NOTE(S):

BUILDING APPEARS TO HAVE BEEN USED FOR TRANSFER OF MATERIALS

LEGEND:

☒ 1 COMPOSITE SAMPLE COLLECTED FROM DEBRIS NEAR THE WALL AND THE CORNERS OF ROOM 1.

PARSONS

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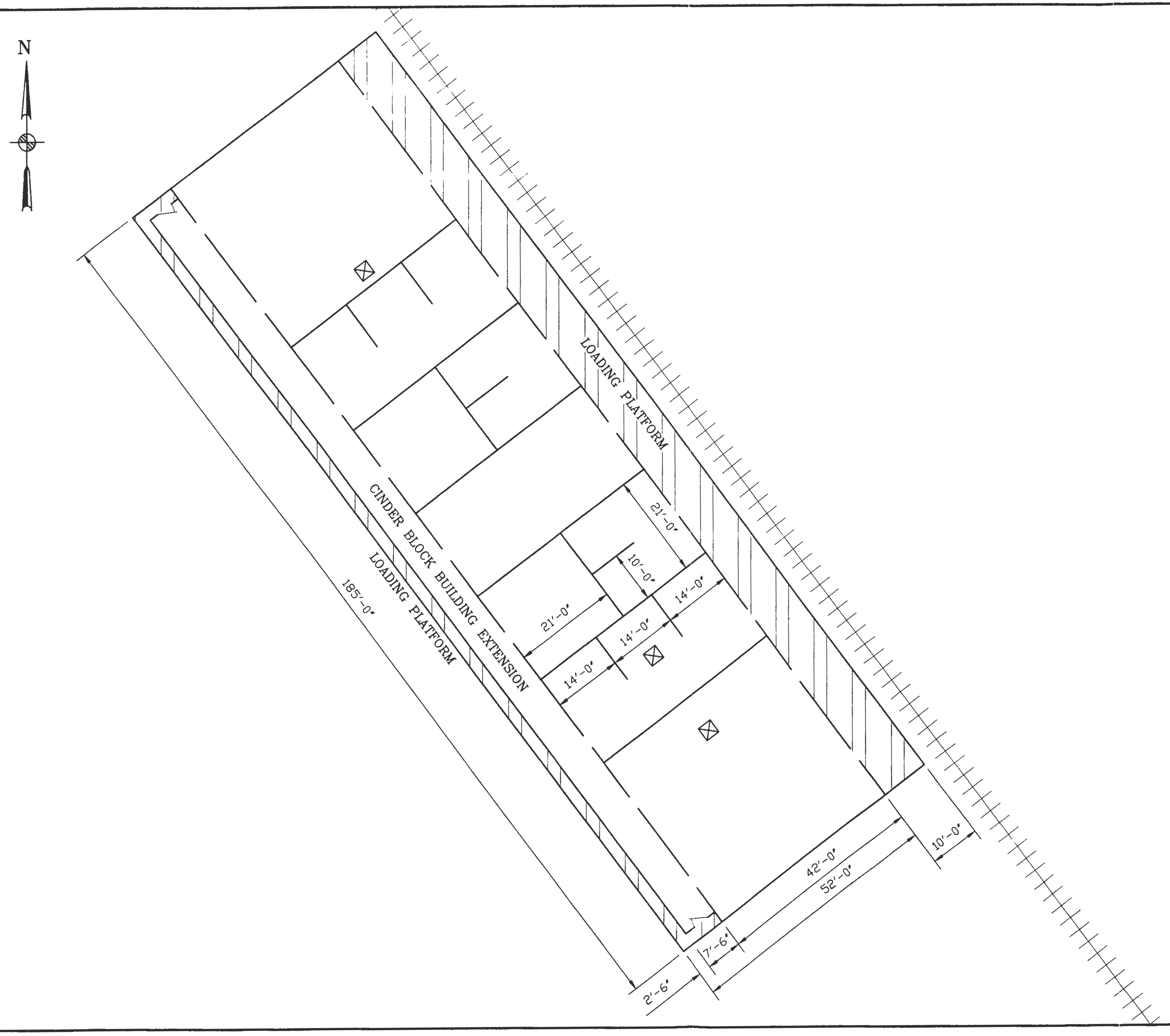
CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
REMEDIAL INVESTIGATION
SEAD-4 MUNITIONS WASHOUT FACILITY

DEPT. ENVIRONMENTAL ENGINEERING
Dwg. No. 734539-01000

FIGURE 2-2
BUILDING 2085
SAMPLE LOCATIONS

SCALE 1" = 20'-0"
DATE JUNE 1999
REV A



R:\SENECA\RIFS\SD4\B-2078.DWG

NOTE(S):

BUILDING APPEARS TO HAVE BEEN USED FOR RE-PACKAGING EXPLOSIVES. WALLS THROUGHOUT THE BUILDING ARE 1' THICK WITH STEEL DOOR, HOLES FOR A CONVEYOR SYSTEM.

LEGEND:

☒ 1 COMPOSITE SAMPLE COLLECTED FROM THESE LOCATIONS.

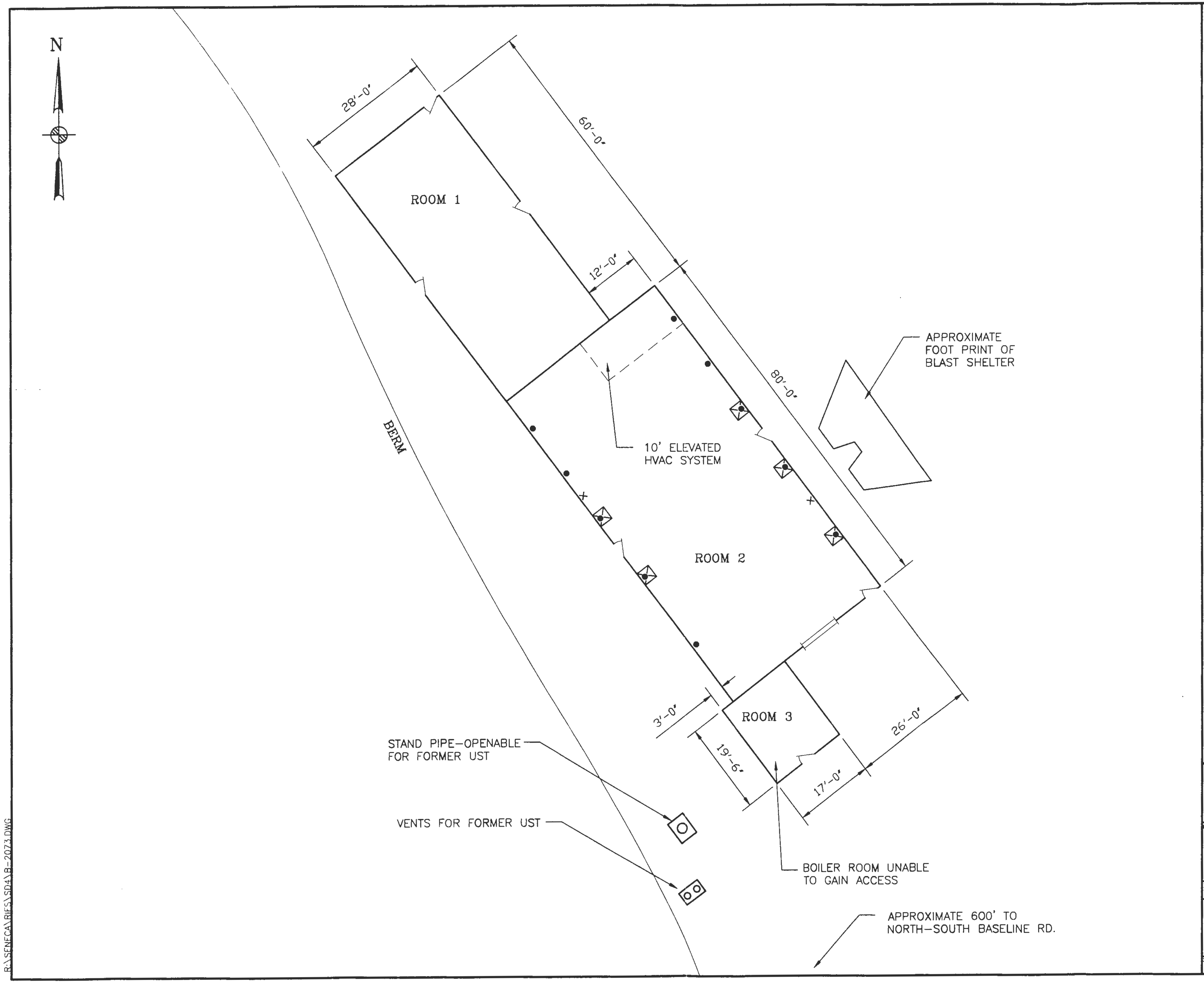
PARSONS
PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE
SENECA ARMY DEPOT ACTIVITY
REMEDIAL INVESTIGATION
SEAD-4 MUNITIONS WASHOUT FACILITY

DEPT.	Dwg. No.
ENVIRONMENTAL ENGINEERING	734539-01000

FIGURE 2-3
BUILDING 2078
SAMPLE LOCATIONS

SCALE	DATE	REV
1" = 20'-0"	JUNE 1999	A



LEGEND:

- ● FLOOR DRAIN LOCATIONS
- × FLAMABLE STORAGE LOCKERS (CURRENTLY CONTAINING PAINTS AND SOLVENTS)
- ☒ 1 COMPOSITE SAMPLE COLLECTED FROM THE FLOOR DRAINS.

NOTE(S):

APPROXIMATELY 90% OF ROOM 1 FLOOR SPACE IS COVERED BY PALLETS.

APPROXIMATELY 70% OF ROOM 2 FLOOR SPACE IS COVERED BY PALLETS.

APPARENT USE IS FOR STORAGE OF CONTAINERS (CURRENTLY ~200 PALLETS STORED) AND SUPPLIES.

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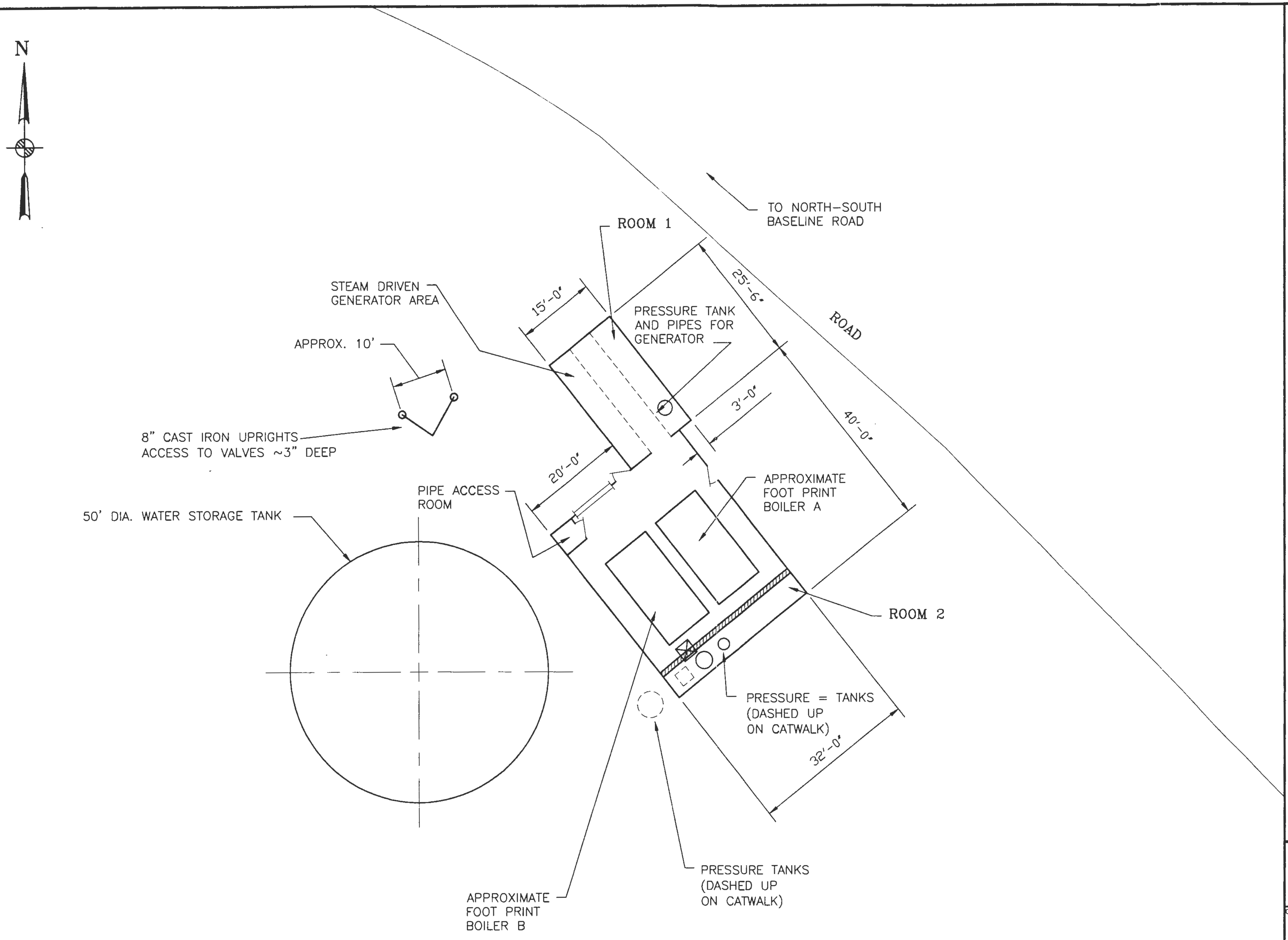
CLIENT/PROJECT TITLE
SENECA ARMY DEPOT ACTIVITY
REMEDIAL INVESTIGATION
SEAD-4 MUNITIONS WASHOUT FACILITY

DEPT. ENVIRONMENTAL ENGINEERING
Dwg. No. 734539-01000

FIGURE 2-4
BUILDING 2073
SAMPLE LOCATIONS

SCALE 1" = 20'-0"
DATE JUNE 1999
REV A



LEGEND:

☒ 1 COMPOSITE SAMPLE COLLECTED FROM THE BOTTOM OF TRENCH.

PARSONS

PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE

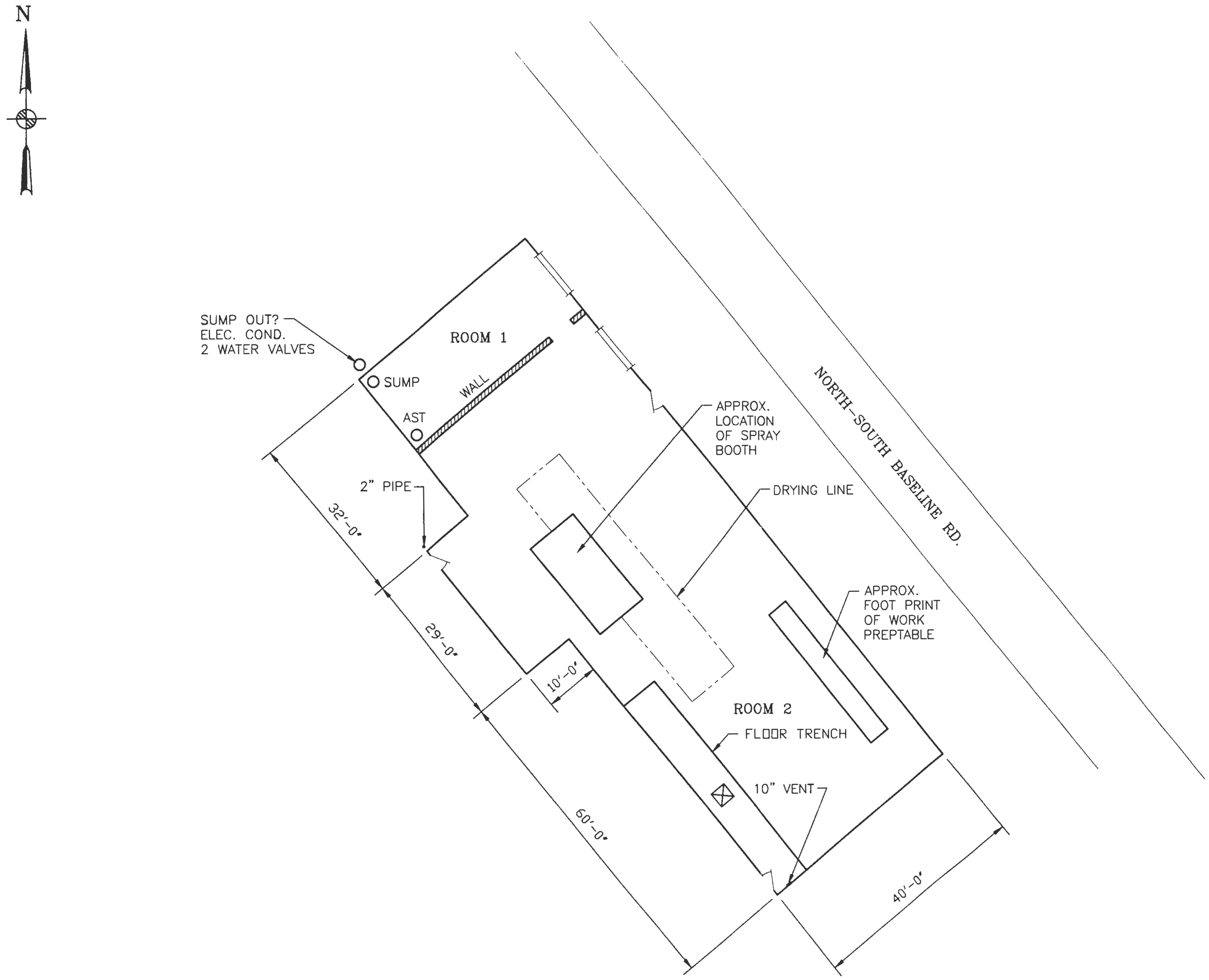
SENECA ARMY DEPOT ACTVITY
REMEDIAL INVESTIGATION
SEAD-4 MUNITIONS WASHOUT FACILITY

DEPT.	Dwg. No.
ENVIRONMENTAL ENGINEERING	734539-01000

FIGURE 2-5
BUILDING 2079
SAMPLE LOCATIONS

SCALE	DATE	REV
1" = 20'-0"	JUNE 1999	A

R:\SENECA\RIFS\SD4B-2079.DWG



NOTE(S):

BUILDING APPEARS TO HAVE BEEN USED FOR RE-PAINTING ORDINACE SHELLS

LEGEND:

☒ 1 COMPOSITE SAMPLE COLLECTED FROM FLOOR TRENCH.

PARSONS
PARSONS ENGINEERING SCIENCE, INC.

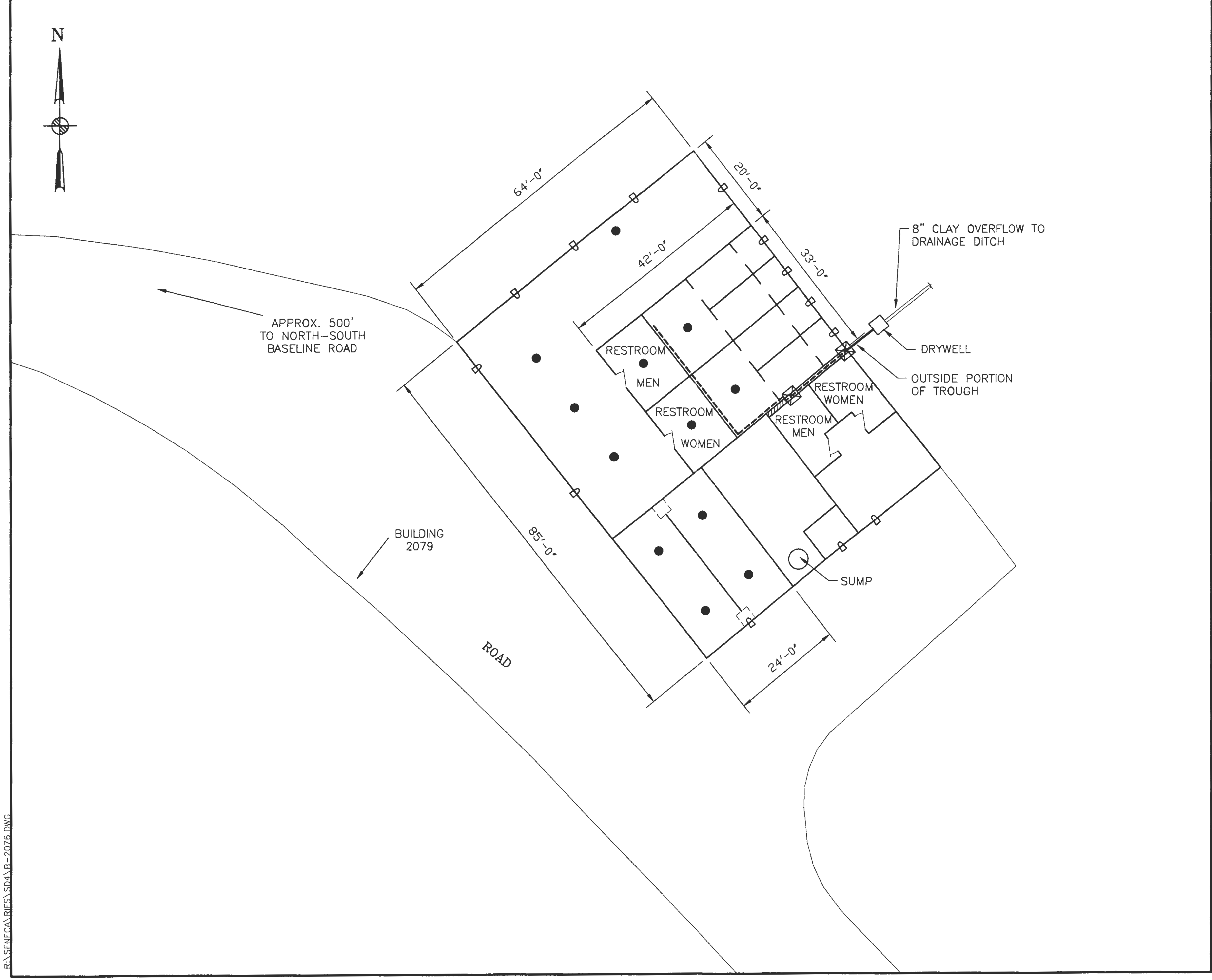
CLIENT/PROJECT TITLE
SENECA ARMY DEPOT ACTIVITY
REMEDIAL INVESTIGATION
SEAD-4 MUNITIONS WASHOUT FACILITY

DEPT.	Dwg. No.
ENVIRONMENTAL ENGINEERING	734539-01000

FIGURE 2-6
BUILDING 2084
SAMPLE LOCATIONS

SCALE	DATE	REV
1" = 20'-0"	JUNE 1999	A

R:\SENECA\RIFS\SD4\B-2084.DWG



LEGEND:

- ● APPROXIMATE FLOOR DRAIN LOCATIONS
- ⌂ OUTSIDE DOORS (SOME ARE BOARDED)
- ----- LOCATION OF FLOOR TROUGH/DRAINS
- ☒ 1 COMPOSITE SAMPLE COLLECTED FROM THESE LOCATIONS.

NOTE(S):

ROOF OVERHANGS ~6' AROUND ENTIRE BUILDING

APPARENT USE – LUNCHROOM AND LAUNDRY FACILITIES

PARSONS

PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
REMEDIAL INVESTIGATION
SEAD-4 MUNITIONS WASHOUT FACILITY

DEPT. ENVIRONMENTAL ENGINEERING
Dwg. No. 734539-01000

FIGURE 2-7
BUILDING 2076
SAMPLE LOCATIONS

SCALE 1" = 20'-0"
DATE JUNE 1999
REV A

R:\SENECA\RIFS\SD4\B-2076.DWG

2.5 SOILS INVESTIGATION

The objectives of the soils investigation program were to determine the nature and extent of chemical impacts within and around the site, to locate areas for potential removal action, and to provide data on the background soil quality.

The soils investigation program was completed in accordance with the pre-approved Ten SWMU ESI Workplan (Parsons Main, Inc. January, 1993), the Generic Installation RI/FS Workplan (Parsons ES, 1995b), and the SEAD-4 Project Scoping Plan, (Parsons ES, 1996). Sample locations were placed in source areas and at upgradient locations to establish background conditions. Occasionally the locations of borings were adjusted slightly from those locations presented in the Ten SWMU ESI workplan, based on the results of the geophysical investigations, which better defined the groundwater flow direction. The individual boring logs are included in Appendix B. Empire Soils Investigation, Inc. of Groton, New York performed the drilling for the ESI and the RI field programs. Parsons ES provided direction and oversight at all times for this subcontractor.

ESI Program

On November 15, 1993, the field sampling program of the workplan was updated because of the discovery of previously unknown 1959 and 1968 air photos that provided information on the layout of the former munitions washout facility. The information provided about SEAD-4 included:

- The former munitions washout facility location,
- Information regarding piping and other structures,
- The presence and extent of 2 drainage ditches,
- A discharge pipe leading from the pond.

The soil investigation program for the ESI consisted of ten soil borings, eight test pits, and seven surface soil samples. Nine soil borings were located in areas where releases may have occurred and one background soil boring was located in an area considered free of influences of the site activities. The groundwater flow directions were estimated for the workplan based on topography and to some extent the proximity of surface water. The locations of borings, monitoring wells and test pits were adjusted from those locations in the workplan based on the results of the geophysical investigations, which better defined the groundwater flow directions and detected anomalies. The individual boring logs and test pit logs are included in Appendix B. Empire Soils Investigation, Inc. of Groton, New York performed the drilling. For the ESI field work, the samples were tested according to the analyses specified in Section 2.8.

RI Program

The purpose of the RI soil investigation program at SEAD-4 was to:

- determine the extent of metals and semivolatile organic compound (SVOC) impacts in three areas of concern based on the results of the ESI,
- determine whether the soil has been impacted in four areas newly identified as potential release areas for metals, SVOCs, or explosives,
- locate areas for potential removal actions, and
- provide a database for a feasibility study and the scope of remedial actions.

The soil investigation for the RI consisted of soil borings and surface soil sampling. All surface soil and subsurface soil samples were submitted to the laboratory for chemical analysis discussed in Section 2.8. The boring logs are included in Appendix B.

2.5.1 Surface Soils

ESI Program

Seven surface soil samples were obtained for the ESI field program (**Table 2-2**, which lists the ESI and RI samples). The locations of the surface soil samples are shown in **Figure 2-8**. Two samples (SS4-1 and SS4-2) were collected from the original bed of the ditch that leads west to the pond. Samples SS4-3 to SS4-6 were obtained from the material that was bulldozed from the pond. Sample SS4-7 was obtained from the original bed of the ditch that leads north from the former facility.

RI Program

The RI surface soil investigation at SEAD-4 was conducted between November 30, 1998 and December 17, 1998. A total of 91 surface soil samples were collected (**Table 2-2**). Seventy-three of those samples were collected from grids designated as Areas 1, 2, and 3; 18 samples were collected at other locations at SEAD-4 (**Figure 2-8**). In Areas 1, 2, and 3, surface soil samples were

TABLE 2-2

SEAD-4 - Surface Soil Sampling Summary

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

LOCATION ID	STUDY (2)	SAMPLE NUMBER	DEPTH (1)	AREA	CHROMIUM (3) SCREENING (Y/N)
SS4-1	ESI	206836	0-6"	NA	N
SS4-2	ESI	206837	0-6"	NA	N
SS4-3	ESI	206838/043201 **	0-6"	NA	N
SS4-4	ESI	206839/043181**	0-6"	NA	N
SS4-5	ESI	206840/043188 **	0-6"	NA	N
SS4-6	ESI	206841	0-6"	NA	N
SS4-7	ESI	206842	0-6"	NA	N
SS4-8	RI	043001/043183 **	0-2"	1	Y
SS4-8 *	RI	043002	0-2"	1	Y (only)
SS4-9	RI	043003/043180 **	0-2"	1	Y
SS4-10	RI	043004/043197 **	0-2"	1	Y
SS4-11	RI	043005	0-2"	1	Y
SS4-12	RI	043006/043190 **	0-2"	1	Y
SS4-13	RI	043007/043200 **	0-2"	1	Y
SS4-13	RI	043185 ***	0-2"	1	Y
SS4-14	RI	043008	0-2"	1	Y
SS4-15	RI	043009	0-2"	1	Y (only)
SS4-16	RI	043010	0-2"	1	Y (only)
SS4-17	RI	043011	0-2"	1	Y (only)
SS4-18	RI	043012/043186 **	0-2"	1	Y
SS4-19	RI	043013	0-2"	1	Y
SS4-20	RI	043014	0-2"	1	Y (only)

Note:

NA = Not Applicable

* This is a duplicate sample.

** Sample also analyzed for hexavalent chromium.

*** Duplicate sample for hexavalent chromium only.

All samples were analyzed for volatile organic compounds, semi-volatile organic compounds, pesticides, PCBs, nitroaromatics, metals, cyanide, nitrates and grain size.

(1) Depth in inches below ground surface.

(2) ESI - Samples collected during Expanded Site Inspection conducted in 1993.
RI - Samples collected during Remedial Investigation conducted in 1998.

(3) Chromium screening was used to determine the sample points with the highest chromium. The samples were sent to the laboratory with a 24 hour turn around so that decisions could be made for further sampling.

TABLE 2-2

SEAD-4 - Surface Soil Sampling Summary

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

LOCATION ID	STUDY (2)	SAMPLE NUMBER	DEPTH (1)	AREA	CHROMIUM (3) SCREENING (Y/N)
SS4-21	RI	043015	0-2"	1	Y (only)
SS4-22	RI	043016	0-2"	1	Y (only)
SS4-23	RI	043017	0-2"	1	Y (only)
SS4-24	RI	043018	0-2"	1	Y (only)
SS4-25	RI	043019	0-2"	1	Y (only)
SS4-26	RI	043020	0-2"	1	Y (only)
SS4-27	RI	043021	0-2"	1	Y (only)
SS4-28	RI	043022	0-2"	1	Y (only)
SS4-29	RI	043023	0-2"	1	Y
SS4-30	RI	043024	0-2"	1	Y (only)
SS4-31	RI	043025	0-2"	1	Y (only)
SS4-32	RI	043026	0-2"	1	Y (only)
SS4-33	RI	043027	0-2"	2	Y (only)
SS4-34	RI	043028	0-2"	2	Y (only)
SS4-35	RI	043029	0-2"	2	Y
SS4-36	RI	043030	0-2"	2	Y
SS4-37	RI	043031	0-2"	2	Y (only)
SS4-38	RI	043032	0-2"	2	Y
SS4-39	RI	043033	0-2"	2	Y (only)
SS4-40	RI	043034	0-2"	2	Y (only)
SS4-41	RI	043035	0-2"	2	Y (only)

Note:

NA = Not Applicable

* This is a duplicate sample.

** Sample also analyzed for hexavalent chromium.

All samples were analyzed for volatile organic compounds, semi-volatile organic compounds, pesticides, PCBs, nitroaromatics, metals, cyanide, nitrates and grain size.

(1) Depth in inches below ground surface.

(2) ESI - Samples collected during Expanded Site Inspection conducted in 1993.
RI - Samples collected during Remedial Investigation conducted in 1998.

(3) Chromium screening was used to determine the sample points with the highest chromium. The samples were sent to the laboratory with a 24 hour turn around so that decisions could be made for further sampling.

TABLE 2-2

SEAD-4 - Surface Soil Sampling Summary

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

LOCATION ID	STUDY (2)	SAMPLE NUMBER	DEPTH (1)	AREA	CHROMIUM (3) SCREENING (Y/N)
SS4-42	RI	043036/043198 **	0-2"	2	Y
SS4-43	RI	043037	0-2"	2	Y
SS4-43 *	RI	043038	0-2"	2	Y
SS4-44	RI	043039	0-2"	2	Y (only)
SS4-45	RI	043040	0-2"	2	Y (only)
SS4-46	RI	043041	0-2"	2	Y
SS4-47	RI	043042	0-2"	2	Y (only)
SS4-48	RI	043043/043193 **	0-2"	2	Y
SS4-49	RI	043044	0-2"	2	Y (only)
SS4-50	RI	043045	0-2"	2	Y (only)
SS4-51	RI	043046	0-2"	2	Y (only)
SS4-52	RI	043047	0-2"	2	Y (only)
SS4-53	RI	043048	0-2"	3	N
SS4-54	RI	043049	0-2"	3	N
SS4-55	RI	043050	0-2"	3	N
SS4-55 *	RI	043051	0-2"	3	N
SS4-56	RI	043052	0-2"	3	N
SS4-57	RI	043053	0-2"	3	N
SS4-58	RI	043054	0-2"	3	N
SS4-59	RI	043055	0-2"	3	N
SS4-60	RI	043056	0-2"	3	N

Note:

NA = Not Applicable

* This is a duplicate sample.

** Sample also analyzed for hexavalent chromium.

All samples were analyzed for volatile organic compounds, semi-volatile organic compounds, pesticides, PCBs, nitroaromatics, metals, cyanide, nitrates and grain size.

(1) Depth in inches below ground surface.

(2) ESI - Samples collected during Expanded Site Inspection conducted in 1993.
RI - Samples collected during Remedial Investigation conducted in 1998.

(3) Chromium screening was used to determine the sample points with the highest chromium. The samples were sent to the laboratory with a 24 hour turn around so that decisions could be made for further sampling.

TABLE 2-2

SEAD-4 - Surface Soil Sampling Summary

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

LOCATION ID	STUDY (2)	SAMPLE NUMBER	DEPTH (1)	AREA	CHROMIUM (3) SCREENING (Y/N)
SS4-61	RI	043057	0-2"	3	N
SS4-62	RI	043058	0-2"	3	N
SS4-63	RI	043059	0-2"	3	N
SS4-64	RI	043060	0-2"	3	N
SS4-65	RI	043065	0-2"	Site Wide	N
SS4-66	RI	043066	0-2"	Site Wide	N
SS4-67	RI	043067	0-2"	Site Wide	N
SS4-68	RI	043061	0-2"	Site Wide	N
SS4-69	RI	043062	0-2"	Site Wide	N
SS4-70	RI	043063	0-2"	Site Wide	N
SS4-71	RI	043064	0-2"	Site Wide	N
SS4-72	RI	043068	0-2"	Site Wide	N
SS4-73	RI	043069	0-2"	Site Wide	N
SS4-73 *	RI	43070	0-2"	Site Wide	N
SS4-74	RI	043071	0-2"	Site Wide	N
SS4-75	RI	043072	0-2"	Site Wide	N
SS4-76	RI	043073	0-2"	Site Wide	N
SS4-77	RI	043074	0-2"	Site Wide	N
SS4-78	RI	043075	0-2"	Site Wide	N
SS4-79	RI	043076	0-2"	Site Wide	N
SS4-80	RI	043077	0-2"	Site Wide	N
SS4-81	RI	043078	0-2"	Site Wide	N

Note:

NA = Not Applicable

* This is a duplicate sample.

** Sample also analyzed for hexavalent chromium.

All samples were analyzed for volatile organic compounds, semi-volatile organic compounds, pesticides, PCBs, nitroaromatics, metals, cyanide, nitrates and grain size.

(1) Depth in inches below ground surface.

(2) ESI - Samples collected during Expanded Site Inspection conducted in 1993.

RI - Samples collected during Remedial Investigation conducted in 1998.

(3) Chromium screening was used to determine the sample points with the highest chromium. The samples were sent to the laboratory with a 24 hour turn around so that decisions could be made for further sampling.

TABLE 2-2

SEAD-4 - Surface Soil Sampling Summary

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

LOCATION ID	STUDY (2)	SAMPLE NUMBER	DEPTH (1)	AREA	CHROMIUM (3) SCREENING (Y/N)
SS4-82	RI	043079	0-2"	Site Wide	N
SS4-83	RI	043093	0-2"	1	N
SS4-83 *	RI	043102	0-2"	1	N
SS4-84	RI	043094	0-2"	1	Y (only)
SS4-85	RI	043095	0-2"	1	Y
SS4-86	RI	043096	0-2"	1	Y
SS4-87	RI	043097	0-2"	1	Y (only)
SS4-88	RI	043098	0-2"	1	Y (only)
SS4-89	RI	043099	0-2"	1	Y (only)
SS4-90	RI	043100/043199 **	0-2"	2	Y
SS4-91	RI	043101	0-2"	2	Y (only)
SS4-93	RI	043103	0-2"	1	Y (only)
SS4-94	RI	043104 **	0-2"	1	Y
SS4-95	RI	043105 **	0-2"	1	Y
SS4-96	RI	043106	0-2"	1	Y (only)
SS4-97	RI	043107	0-2"	1	Y (only)
SS4-98	RI	043108	0-2"	1	Y (only)
SS4-99	RI	043147	0-2"	1	Y (only)
SB4-14	RI	43109/43191 **	0-2"	Bldg 2084	N
SB4-25	RI	43174/43196 **	0-2"	SW Pond	N
MW4-6	RI	43153/43195 **	0-2"	NW Pond	N

Note:

NA = Not Applicable

* This is a duplicate sample.

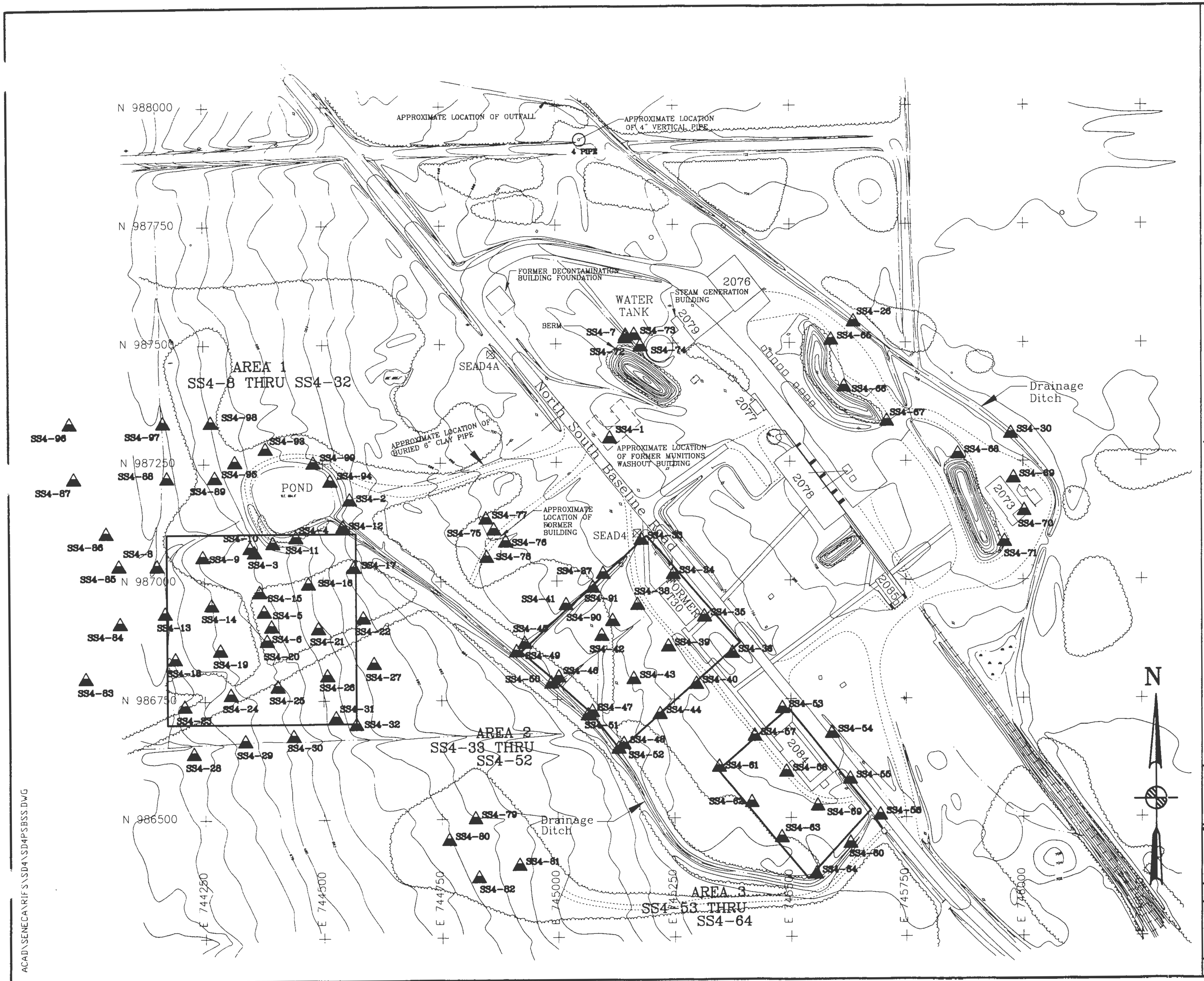
All samples were analyzed for volatile organic compounds, semi-volatile organic compounds, pesticides, PCBs, nitroaromatics, metals, cyanide, nitrates and grain size.

(1) Depth in inches below ground surface.

** Sample also analyzed for hexavalent chromium.

(2) ESI - Samples collected during Expanded Site Inspection conducted in 1993.
RI - Samples collected during Remedial Investigation conducted in 1998.

(3) Chromium screening was used to determine the sample points with the highest chromium. The samples were sent to the laboratory with a 24 hour turn around so that decisions could be made for further sampling.



LEGEND

━━━	MINOR WATERWAY
━━━	MAJOR WATERWAY
━━━	FENCE
───	UNPAVED ROAD
⌒⌒⌒	BRUSH LINE
······	LANDFILL EXTENT
┿┿┿	RAILROAD
─760─	GROUND SURFACE ELEVATION CONTOUR

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

▲ SURFACE SOIL

– – – – EXTENT OF GEOPHYSICAL SURVEY

PARSONS

PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
RI/FS PROJECT SCOPING PLAN
SEAD-4, MUNITIONS WASHOUT FACILITY LEACH FIELD

DEPT ENVIRONMENTAL ENGINEERING
Dwg. No. 734539-01001

FIGURE 2-8
LOCATION OF SURFACE SOIL
SAMPLES

SCALE 1" = 200'
DATE JUNE 1999
REV C

collected in grids where samples were spaced 100-feet apart from each other. Since the soil samples collected in Areas 1 and 2 for the ESI contained high levels of total chromium, surface soil samples collected in Areas 1 and 2 during the RI were screened for chromium at the lab. The chromium screening analyses were considered to be Level II quality data. The chromium screening results were returned to the field within 24 hours of the lab receiving each sample. This chromium screening data was used to locate additional surface soil samples and soil borings in Areas 1 and 2. In addition, the eight surface soil samples from Area 1 and four surface soil samples from Area 2 that contained the highest concentrations of total chromium underwent full Level IV analysis.

To address the possibility of false negative chromium screening results in Areas 1 and 2, four of the "clean" (lowest or non-detectable levels of chromium) samples from the Level II analyses (two in Area 1 and two in Area 2) were submitted for Level IV analysis. The results of the chromium screening are presented in Section 4.

A total of 39 surface soil samples were collected in and around Area 1. Area 1 is a 400-foot by 400-foot area to the south and southwest of the pond where sediment dredged from the pond was placed. Twenty-five surface soil samples (SS4-8 through SS4-32) were initially submitted for Level II screening. Ten of these samples, which either contained high concentrations of chromium or were used to check false negatives, were then submitted for Level IV analysis.

In Area 1, the chromium screening results showed high chromium levels in surface soil samples collected from the area around the pond where the sediment from the pond had been dumped, on the banks of the pond, along the outfall pipe near the pond, and in the depression/ditch. Based on the results of the chromium screening, 14 additional surface soil samples were collected in an area to the north and west of Area 1 and were submitted for Level II chromium screening. These additional soil samples were located to outline the contamination in more detail. Four of the surface soil samples (SS4-83 through SS4-86) were located west of the Area 1 grid; six surface soil samples (SS4-87 through SS4-89 and SS4-96 through SS4-98) were located in a grid pattern west of the pond; and three soil samples SS4-93 through SS4-95) were located on the northern edge of the pond.

A total of 22 surface soil samples were collected from Area 2. Area 2 is a 350-foot by 300-foot area between former Building T30 and the western drainage ditch. Twenty surface soil samples (SS4-33 through SS4-52) were initially submitted for Level II screening and six of these soil samples were later submitted for Level IV analysis. The chromium screening results indicated that only one area contained significantly higher chromium levels. The area of concern was near a barren spot of earth that may have been used as a dumping site. Based on the results of the chromium screening, two additional soil samples (SS4-90 through SS4-91) were collected in Area 2 and screened.

A total of 12 surface soil samples were collected from Area 3. Area 3 is a 200-foot by 300-foot area between Building 2084 and the western drainage ditch. All of the samples (SS4-53 through SS4-64) were submitted for Level IV analysis only.

In addition to the surface soil samples collected in Areas 1, 2, and 3, 18 surface soil samples were collected at other locations in SEAD-4. The location of these samples was in areas which had been identified as possible sources of contamination, such as around buildings, berms, or reported dumping sites. Four surface soil samples (SS4-68 through SS4-71) were collected around Building 2073. Three soil samples (SS4-65 through SS4-67) were collected from the berm located northwest of Building 2073. Three surface soil samples (SS4-72 through SS4-74) were collected around the ESI sample location SS4-7, where several SVOCs were detected. Four soil samples (SS4-75 through SS4-78) were collected from around the former building located approximately 350 feet east-southeast of the pond. Four soil samples (SS4-79 through SS4-82) were collected from the cleared area at the end of the unpaved road in the southern portion of the site.

Methodology

During the ESI phase of the work, surface soil samples were collected with a stainless steel trowel or scoop, then placed in a stainless steel bowl. Grab samples of surface soils were obtained by removing representative sections of soil from 0 to 2 inches below ground surface. Vegetation was removed prior to sample collection. Soil samples destined for VOC analysis were placed in VOA vials before mixing the soil. The remaining sample soil was then homogenized and placed in the remaining sample containers. During the RI phase of the work, volatile organic samples of surface soils were collected by driving split spoons in order to collect core samples from a depth of 0 to 2 inches below ground surface. This change in the surface soil sampling procedure for the RI phase of the work was required due to regulatory comments provided to Parsons ES subsequent to the ESI phase of the work. The samples were tested according to the analyses specified in Section 2.8.

2.5.2 Soil Borings

ESI Program

During the ESI ten soil borings were advanced to evaluate the vertical extent of impacts. Boring SB4-1 was located in an area considered free of influences of the site activities and provided data on the background soil quality **(Figure 2-9)**. The remaining borings were at locations where releases to the environment may have occurred. Five borings were completed as monitoring wells (**Table 2-3**). The soils borings were located as follows:

-
- SB4-2, downgradient of the leachfield,
- SB4-3, SB-46, downgradient of the former Munitions Washout Building,
- SB4-4, downgradient of the pond,
- SB4-5, in the area of the former Munitions Washout Building,
- SB4-7, near Building B-20,
- SB4-8, near the former Munition Washout Building,
- SB4-9, near Building 2084, and
- SB4-10, near Building T-30.

The three samples from each boring were submitted for chemical analyses identified in Section 2.8.

RI Program

The soil boring investigation for the RI was conducted at SEAD-4 from December 14, 1998 through December 23, 1998. A total of 18 soil borings were performed throughout SEAD-4 (**Table 2-3**). **Figure 2-9** shows the locations of the soil borings. Five soil borings were located in Area 1 and one soil boring was located in Area 2. These six soil borings were located at each surface soil sample with the highest chromium-screen result. Additional surface samples for these borings were not collected. For each of the remaining 12 soil borings, three samples were collected: a surface soil sample (0-2"), a "mid" sample, and a "deep" sample that consisted of material on top of competent bedrock. For several borings, bedrock was encountered at a shallow depth, and only one subsurface sample was collected. All soil borings were advanced to split spoon refusal, which represents depth to competent bedrock. Soil boring SB4-14, which was located behind Building 2084, was drilled further into bedrock, and monitoring well MW4-10 was installed.

TABLE 2-3

SEAD-4 - Soil Sampling Summary

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

LOCATION ID	WELL NUMBER	STUDY (2)	SAMPLE NUMBER	SAMPLE INTERVAL (1)
SB4-1	MW4-1	ESI	SB4-1.1	0-2'
		ESI	SB4-1.2*	4-6'
		ESI	SB4-1.3	4-6'
		ESI	SB4-1.5*	0-2'
		ESI	SB4-1.10*	0-2'
		ESI	SB4-1.6	10-12'
SB4-2	MW4-2	ESI	SB4-2.1	0-2'
		ESI	SB4-2.2	2-4'
SB4-3	MW4-3	ESI	SB4-3.1	0-2'
		ESI	SB4-3.3	4-6'
		ESI	SB4-3.4	6-8'
SB4-4	MW4-4	ESI	SB4-4.1	0-2'
		ESI	SB4-4.2	2-4'
		ESI	SB4-4.3	4-6'
		ESI	Sb4-4.5*	0-2'
SB4-5	MW4-5	ESI	SB4-5.1	0-2'
		ESI	SB4-5.2	2-4'
SB4-6	NA	ESI	SB4-6.1	0-2'
		ESI	SB4-6.2	2-4'
SB4-7	NA	ESI	SB4-7.1	0-2'
		ESI	SB4-7.3	4-6'
		ESI	SB4-7.4	6-8'
SB4-8	NA	ESI	SB4-8.1	0-2'
		ESI	SB4-8.2	2-4'
		ESI	SB4-8.3	4-6'

Notes:

NA = Not Applicable

All soil boring samples were analyzed for volatile organic compounds, semi-volatile organic compounds, pesticides, PCBs, nitroaromatics, metals, cyanide and nitrates.

All monitoring wells were analyzed for volatile organic compounds, semi-volatile organic compounds, nitrates, explosives, metals, cyanide, pesticides and PCB's.

@ Shelby tube: only grain size, density, pH, cation exchange capacity and total organic compounds were analyzed for these samples.

* Duplicate samples taken at the sample site.

(1) Interval represents depth in feet below ground surface.

(2) ESI - Samples collected during Expanded Site Inspection conducted in 1993.
RI - Samples collected during Remedial Investigation conducted in 1998.

TABLE 2-3

SEAD-4 - Soil Sampling Summary

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

LOCATION ID	WELL NUMBER	STUDY (2)	SAMPLE NUMBER	SAMPLE INTERVAL (1)
SB4-9	NA	ESI	SB4-9.1	0-2'
		ESI	SB4-9.2	2-4'
		ESI	SB4-9.3	4-6'
SB4-10	NA	ESI	SB4-10.1	0-2'
		ESI	SB4-10.2	2-4'
		ESI	SB4-10.3	4-6'
SB4-11	NA	RI	043132	0-2"
		RI	043133 @	2-2.9'
SB4-12	NA	RI	043113	0-2"
		RI	043114	4-4.6'
		RI	043115	6-6.4'
SB4-13	NA	RI	043116	0-2"
		RI	043117 @	2-4'
SB4-14	MW4-10	RI	043109	0-2"
		RI	043110 *	0-2"
		RI	043112	2-3'
SB4-15	NA	RI	043145	0-2"
		RI	043146 @	2-4'
		RI	043148	4-6'
SB4-16	NA	RI	043122	0-2"
		RI	043124	2-3'
SB4-17	NA	RI	043119	0-2"
		RI	043121	2-3.2'
SB4-18	NA	RI	043080	0-2"
		RI	043081	2-3.5'
		RI	043082	4-5.8'

Notes:

NA = Not Applicable

All soil boring samples were analyzed for volatile organic compounds, semi-volatile organic compounds, pesticides, PCBs, nitroaromatics, metals, cyanide and nitrates.

All monitoring wells were analyzed for volatile organic compounds, semi-volatile organic compounds, nitrates, explosives, metals, cyanide, pesticides and PCB's.

@ Shelby tube: only grain size, density, pH, cation exchange capacity and total organic compounds were analyzed for these samples. Sample #043117 was not sampled for grain size.

* Duplicate samples taken at the sample site.

(1) Interval represents depth in feet below ground surface.

(2) ESI - Samples collected during Expanded Site Inspection conducted in 1993.
RI - Samples collected during Remedial Investigation conducted in 1998.

TABLE 2-3

SEAD-4 - Soil Sampling Summary

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

LOCATION ID	WELL NUMBER	STUDY (2)	SAMPLE NUMBER	SAMPLE INTERVAL (1)
SB4-19	NA	RI	043083	0-2"
		RI	043084	2-3.2'
		RI	043085	4-5.2'
SB4-20	NA	RI	043135	0-1.2'
		RI	043136	2-3.5'
		RI	043149	6-6.8'
SB4-21	NA	RI	043137	2-3.4'
		RI	043138	8-8.7'
SB4-22	NA	RI	043139	4-5.7'
		RI	043140	6-7.6'
SB4-23	NA	RI	043086 @	0-1'
		RI	043087	2-3'
		RI	043088	4-5.6'
SB4-24	NA	RI	043141	3-4'
		RI	043173 *	3-4'
		RI	043142	8-8.6'
SB4-25	NA	RI	043174	0-2"
		RI	043143	2-3.5'
		RI	043144	6-7.2'
SB4-26	NA	RI	043090	0-2"
		RI	043091	2-3.5'
		RI	043092	4-5'

Notes:

NA = Not Applicable

All soil boring samples were analyzed for volatile organic compounds, semi-volatile organic compounds, pesticides, PCBs, nitroaromatics, metals, cyanide and nitrates.

All monitoring wells were analyzed for volatile organic compounds, semi-volatile organic compounds, nitrates, explosives, metals, cyanide, pesticides and PCB's.

@ Shelby tube: only grain size, density, pH, cation exchange capacity and total organic compounds were analyzed for these samples.

* Duplicate samples taken at the sample site.

(1) Interval represents depth in feet below ground surface.

(2) ESI - Samples collected during Expanded Site Inspection conducted in 1993.
RI - Samples collected during Remedial Investigation conducted in 1998.

TABLE 2-3

SEAD-4 - Soil Sampling Summary

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

LOCATION ID	WELL NUMBER	STUDY (2)	SAMPLE NUMBER	SAMPLE INTERVAL (1)
SB4-27	NA	RI	043125	0-2"
		RI	043127	2-2.5'
SB4-28	NA	RI	043128	0-2"
		RI	043129 @	2-4'
MW4-6	NA	RI	043153	0-2"
		RI	043154	2-3.5'
		RI	043155	6-6.5'
MW4-7	NA	RI	043157	0-2"
		RI	043159	0.5-1.5'
MW4-8	NA	RI	043150	0-2"
		RI	043151	2-3.5'
		RI	043152	6-6.5'
MW4-9	NA	RI	043164	0-2"
		RI	043166	0.6-1.6'
MW4-11	NA	RI	043170	0-2"
		RI	043171	2-3.3'
		RI	043172	4-5.5'
MW4-12	NA	RI	043167	0-2"
		RI	043168	2-3.4'
		RI	043169	8-8.8'
MW4-13	NA	RI	043160	0-2"
		RI	043161 *	0-2"
		RI	043163	2-2.6'

Notes:

NA = Not Applicable

All soil boring samples were analyzed for volatile organic compounds, semi-volatile organic compounds, pesticides, PCBs, nitroaromatics, metals, cyanide and nitrates.

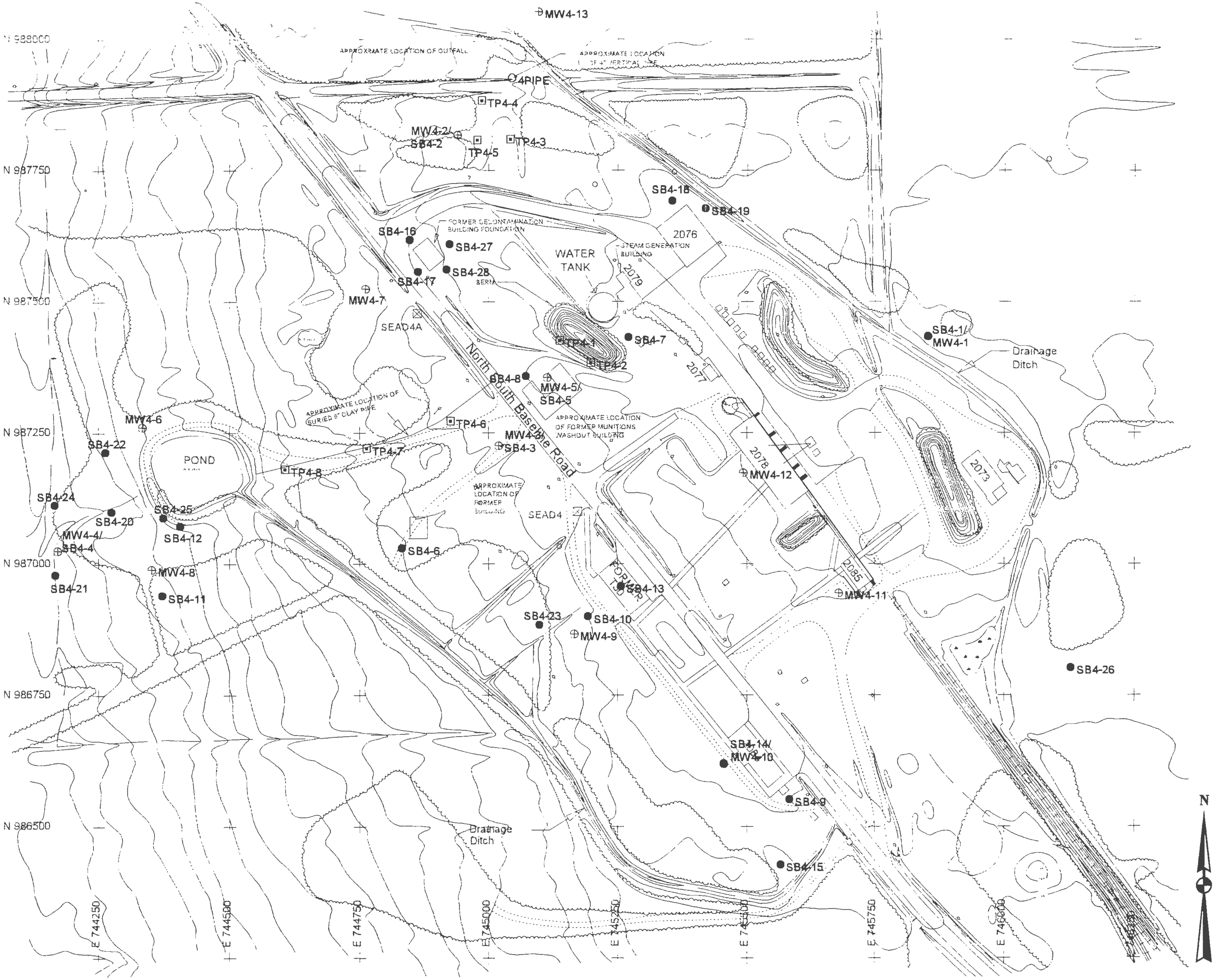
All monitoring wells were analyzed for volatile organic compounds, semi-volatile organic compounds, nitrates, explosives, metals, cyanide, pesticides and PCB's.

@ Shelby tube: only grain size, density, pH, cation exchange capacity and total organic compounds were analyzed for these samples.

* Duplicate samples taken at the sample site.

(1) Interval represents depth in feet below ground surface.

(2) ESI - Samples collected during Expanded Site Inspection conducted in 1993.
RI - Samples collected during Remedial Investigation conducted in 1998.



O:\Seneca\Sead-4\Sead4-ri2.apr

LEGEND

⊕ MW4-12	Monitoring Well Sample Location with LOC_ID
● SB4-24	Soil Boring Sample Location with LOC_ID
⊡ TP4-27	Test Pit Sample Location with LOC_ID
○ 4 PIPE	Vertical Pipe Sample Location with LOC_ID

200 0 200
(feet)

PARSONS

PARSONS ENGINEERING SCIENCE, INC.

SENECA ARMY DEPOT ACTIVITY
REMEDIAL INVESTIGATION
SEAD-4 MUNITIONS WASHOUT FACILITY

FIGURE 2-9
SOIL BORING, TEST PIT, AND
MONITORING WELL SAMPLING POINTS

SCALE	DATE	REV
1:200		SHEET 1 OF 1

Shelby tubes were collected at four soil borings, one from each soil boring. The soil from the Shelby tubes was analyzed for density, grain size, total organic carbon, cation exchange capacity, and pH.

The soil borings which were performed during the RI are as follows:

- SB4-11, south of the pond in the middle of the Area 1 grid (near SS4-4 from ESI);
- SB4-12, southern edge of the pond (near SS4-5 from ESI);
- SB4-13, middle of the former Building T30 foundation (Area 2);
- SB4-14, directly southwest of Building 2084 (also where MW4-10 was located);
- SB4-15, south of Building 2084 in small drainage swale;
- SB4-16, 17, 27 and 28, around former "decontamination" building;
- SB4-18, directly northwest of Building 2076;
- SB4-19, directly northeast of Building 2076, near the north ditch;
- SB4-20, at SS4-9 in Area 1;
- SB4-21, at SS4-13 in Area 1;
- SB4-22, at SS4-89 in Area 1;
- SB4-23, at SS4-42 in Area 2;
- SB4-24, at SS4-8 in Area 1;
- SB4-25, at SS4-10 in Area 1;
- SB4-26, east of the railroad, south of Building 2073 (background sample).

The soil samples from each boring were submitted for chemical analyses identified in Section 2.8.

Methodology

Soil borings were performed during both the ESI and the RI. Soil borings were performed using an Acker F-800 drilling rig for the ESI and a CME-550 drilling rig for the RI. Both rigs were equipped with 4.25-inch I.D. hollow stem augers. All borings were advanced to refusal on competent bedrock. The determination of auger "refusal" in competent shale is somewhat subjective as the hollow stem augers can generally penetrate through the shale at a very slow rate. For the purposes of these studies, auger "refusal" in "competent" shale was defined as the depth (after penetrating the weathered shale) when augering became significantly more difficult and auger advancement was slow.

During drilling, soil samples were collected continuously at 2-foot intervals using a decontaminated 2 foot split spoon sampler according to the method described in ASTM D-1586-84. This technique involved driving a decontaminated split spoon sampler 2 feet into undisturbed soil with a rig-mounted 140 lb hammer. Once the sample was collected, the augers were advanced to the top of the next sample interval. Samples were collected until spoon refusal on competent shale was encountered.

Soil samples were screened for volatile organic compounds using an Organic Vapor Meter (OVM) 580B and for radioactivity with a Victoreen Model 190 Radiation Monitor for the ESI but not the RI. Three of the samples from each boring were selected for chemical analysis: 1) 0 to 2 feet below grade; 2) immediately above the water table; and 3) midway between samples (1) and (2). The intermediate sample was collected at a depth where one of the following site specific items occurred: (1) a stratigraphic change such as the base of the fill, (2) evidence of perched water table, (3) elevated photoionization detection (PID) readings, or (4) visibly affected soil (e.g., oil stains). If none of these occurred, then the intermediate sample was collected at the halfway point between the samples collected at the surface and at the water table. If intermediate split spoon samples exhibited elevated PID readings, the one with the highest concentration was the one intermediate sample to be analyzed.

For the ESI, additional monitoring included establishing a designated downwind monitoring station where monitoring for volatile organics with an OVM and dust particulates using a MIE Model PDM-3 Miniature Real-Time Aerosol Meter (Miniram) was performed. A Miniram was also positioned on or near the drilling rig. The OVM was programmed to register real time and maximum readings of volatile organics. These meters were checked before drilling and approximately every 15 minutes during drilling.

Samples to be analyzed for volatile organic compounds were not homogenized during the sampling process. The remaining soil from the spoon was homogenized in a decontaminated stainless steel bowl with a decontaminated stainless steel utensil and placed in the appropriate sample containers.

All soil borings were logged using the standardized boring log form. Soil samples were classified according to the Unified Soil Classification System (USCS). In addition , a lithologic description was provided according to the Burmeister system.

Upon completion of sampling, all borings were grouted to the surface or a monitoring well was installed. The soil brought to the surface by the augers was containerized in DOT-approved 55-gallon drums, which were labeled with the date, location, and description of wastes. The drilling rigs, augers and split spoons were steam cleaned between borings at the decontamination pad using potable water from the Depot.

2.5.3 Test Pits (Geophysical Anomaly Excavations)

The test pit excavations were only carried out in the ESI program. The objective of the test pitting program was to investigate anomalies discovered during the geophysical surveys.

Test pits were excavated up to 7 feet deep using a backhoe. Upon completion, all excavated material was returned to the pit and covered. Unexploded ordnance (UXO) personnel performed the excavation and obtained the soil samples and Parsons personnel monitored for VOCs with an OVM 580 and for radiation with a Dosimeter Mini Con Rad. All personnel were outfitted in Level B equipment to avoid possible exposure. Test pit logs are included in Appendix B.

Eight test pits were excavated at SEAD-4 (**Table 2-4**). Two excavations (TP4-1 and TP4-2) were located in the former munitions washout facility. Three excavations (TP4-3 to 4-5) were located within the suspected leach field, north of the munitions facility and three excavations (TP4-6 to 4-8) were located along the clay pipe running west to the pond (**Figure 2-9**). Four soil samples were composited into one sample for each test pit. The samples from each test pit were submitted for chemical analyses identified in Section 2.8.

2.6 GROUNDWATER INVESTIGATION

A groundwater investigation was performed in both the ESI and RI programs. The purpose of the groundwater monitoring program at SEAD-4 was to define the horizontal and vertical extent of impacted groundwater, determine the directions of groundwater flow on the site, determine the hydrogeologic properties of the aquifer to assess contaminant migration and potential remedial actions, and determine the background groundwater quality.

TABLE 2-4

SEAD-4 - Test Pit Sampling Summary

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

LOCATION ID	STUDY (2)	SAMPLING COMMENTS	SAMPLING DEPTH (1)
TP4-1	ESI	Composite of 4 locations in pit	0-3'
TP4-2	ESI	Composite of 4 locations in pit	0-3'
TP4-3	ESI	Composite of 4 locations in pit	0-4'
TP4-4	ESI	Composite of 4 locations in pit	0-4'
TP4-5	ESI	Composite of 4 locations in pit	0-3.5'
TP4-6	ESI	Composite of 4 locations in pit	0-5'
TP4-7	ESI	Composite of 4 locations in pit	0-5'
TP4-8	ESI	Composite of 4 locations in pit	0-3'

Notes:

All samples were analyzed for the following: volatile organics. semi-volatile organics. pesticides/PCBs. metals. cyanide. herbicides. explosives. and nitrates.

(1) Depth in feet below ground surface.

(2) ESI - Samples collected during Expanded Site Inspection conducted in 1993.
RI - Samples collected during Remedial Investigation conducted in 1998.

ESI Program

The ESI groundwater investigation program was designed to obtain background water quality data, to determine groundwater flow direction, and to determine if hazardous constituents are migrating to the groundwater from SEAD-4. When required, the locations of monitoring wells were changed from the locations shown in the workplan based on the depth to groundwater and bedrock data obtained from the geophysical surveys.

Five monitoring wells were installed as part of ESI field program for SEAD-4 (**Figure 2-9**). The monitoring wells and their locations are listed below:

- MW4-1, upgradient side of the drainage ditch on the east side of the site;
- MW4-2, downgradient of the suspected leachfield location;
- MW4-3, directly downgradient of the former Munitions Washout Facility building;
- MW4-4, downgradient of the pond; and
- MW4-5, within the former munitions washout facility.

The monitoring well installation diagrams are presented in Appendix C.

RI Program

A total of eight monitoring wells were installed (**Figure 2-9**). The goals of the groundwater investigation during the RI were to determine the extent of groundwater contamination, to characterize the aquifer, and to determine the direction and rate of groundwater flow. To accomplish this, eight monitoring wells were installed in addition to the five existing monitoring wells at the Munitions Washout Facility. Monitoring well installation for the RI study was conducted at SEAD-4 from December 17, 1998 through January 7, 1999. All of the monitoring wells were screened in the till/weathered shale aquifer. Monitoring well diagrams are presented in Appendix C.

The pond water has been demonstrated to contain metals concentrations exceeding the respective TAGM values, and the ESI monitoring wells located downgradient of the pond contained two metals at concentrations higher than their respective TAGM values. To further monitor the infiltration and percolation of the impacted surface water from the pond to the groundwater, two additional till/weathered shale monitoring wells (MW4-6 and MW4-8) were installed to supplement the monitoring well that already exists downgradient of the pond. The monitoring wells were located so that radial flow away from the area of the pond could be monitored.

Surface and subsurface samples collected during the ESI from the soil boring that was located immediately to the west of former Building T30 contained metals that exceed the respective TAGM values. To monitor the groundwater in this area, a till/weathered shale monitoring well (MW4-9) was installed at the location where soil boring SB4-10 was performed.

Because Building 2084 appears to be a source of the metals and SVOC impacts identified in the western drainage ditch, a till/weathered shale monitoring well (MW4-10) was installed directly downgradient of Building 2084.

Building 2085 was the main receiving building for munitions that came to the site for renovation or washout, and Building 2078 was one of the main ammunition renovation workshops. Either of these buildings may be a source of metals, SVOCs or explosive compounds, and a till/weathered shale monitoring well (MW4-11 and MW4-12) was installed immediately downgradient of each.

An additional background till/weathered shale monitoring well (MW4-13) was installed on the northeast edge of the site to supplement the existing background monitoring well at the eastern edge of the site.

2.6.1 Monitoring Well Installation

Proper design, construction, and installation of the monitoring wells were essential for accurate interpretation of the groundwater data. The installation procedures were consistent with the USEPA Region II CERCLA QA Manual and the NYSDEC Technical and Administrative Guidance Manuals (TAGMS) regarding design, installation, development and collection of groundwater samples. Further, the programs were in compliance with all requirements described in the NYSDEC, 6 NYCRR Part 360, Solid Waste Management Facilities Regulations, Section 360-2.11, which details groundwater monitoring well requirements. The exception to compliance was that monitoring wells installed during the ESI field program were constructed of factory slotted PVC screens. For the RI program, monitoring wells were constructed of non-solvent welded/bonded continuous-slot, wire-wrap screens as required in 6NYCRR Part 360.

The overburden monitoring wells were installed using a hollow stem auger rig equipped with 4.25-inch hollow stem augers. The borings were advanced to auger refusal, which for the purposes of this investigation defined the contact between weathered shale and competent shale. During drilling, split-spoon samples were collected continuously until spoon refusal, using the method outlined in ASTM D-1580-84, to observe and characterize the soil conditions and geology at the well location. During the ESI, monitoring wells were constructed of 2-inch I.D. Schedule 40 polyvinyl chloride (PVC) with a well screen slot size of 0.010 inches. During the RI, the monitoring wells were constructed of 2-inch National Sanitation Foundation (NSF) or ASTM-approved schedule 40 PVC wire-wrapped screens as required by NYSDEC with threaded, flush joints that contain a rubber gasket. No solvents or other adhesives were used to connect the PVC casing. A silt sump "point" was placed at the bottom of each well. **Table 2-5** presents the monitoring well installation details.

All soil samples were screened for VOCs while in the split-spoon with an OVM 580B. During the ESI, the soil samples were also screened with a Dosimeter Min Con Rad for radioactivity. An MIE Model PDM-3 Miniram was also positioned on or near the drilling rig to detect dust. These meters were calibrated before drilling and checked approximately every 15 minutes during drilling.

During the ESI, a downwind monitoring station was also established during well installation. Each well location was monitored for VOCs with an OVM 580B and for particulates using a MIE Model PDM-3 Miniram. The OVM 580B was programmed to provide real time and maximum readings of volatile organics.

During the ESI, wells were screened from 3 feet above the water table (if space allowed) to the top of competent bedrock. Water table variations, site stratigraphy, and expected contaminant flow and behavior were also considered in determining the screen length and position. During the RI, the overburden monitoring wells had a maximum screen length of 10 feet and were screened across the water table and through the entire till/weathered shale aquifer, if possible. Several methods for sizing sand pack materials and well screen openings are available in the literature. The methods are cited in Aller et al., (1989), Handbook of Suggested Practices for the Design and Installation of Groundwater Monitoring Wells, Environmental Monitoring Systems Laboratory Office of Research and Development, U.S. Environmental Protection Agency, Las Vegas, Nevada, EPA 600/4-89/034, and Driscoll, F.G. (1988), Groundwater and Wells. Most methods are similar in concept and do not differ appreciably in their results. The first step in designing the filter pack is to obtain sieve

TABLE 2-5

SEAD-4 - Monitoring Well Construction Details

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Well Number		Study (2)	Depth of Well Relative to Ground Surface (ft)	Depth of Well Relative to Top of PVC (ft)	Well Screen Length (ft)	Screened Interval Relative to Ground Surface (ft)	Elevation of Top of PVC Well (MSL) (ft)
1	MW4-1	ESI	10.5	12.97	4.0	5.4-9.4	700.12
2	MW4-2	ESI	4.0	6.64	1.0	2.2-3.2	702.44
3	MW4-3	ESI	9.0	11.46	4.0	3.9-7.9	699.90
4	MW4-4	ESI	10.0	12.51	4.0	4.9-8.9	680.37
5	MW4-5	ESI	6.0	8.46	2.0	3.1-5.1	700.46
6	MW4-6	RI	9.8	12.03	4.9	4.5-9.4	686.12
7	MW4-7	RI	6.0	8.65	2.0	3.2-5.2	699.46
8	MW4-8	RI	10.0	12.39	4.9	4.6-9.5	684.08
9	MW4-9	RI	6.2	8.64	2.0	3.4-5.4	703.66
10	MW4-10	RI	8.0	10.43	4.9	2.6-7.5	706.72
11	MW4-11	RI	9.0	11.53	4.6	3.6-8.2	708.2
12	MW4-12	RI	11.0	13.54	4.6	5.6-10.2	710.11
13	MW4-13	RI	6.7	9.02	2.0	3.9-5.9	700.92

Notes:

All samples were analyzed for volatile organic compounds, semi-volatile organic compounds, pesticides, PCBs, nitroaromatics, metals, cyanide, nitrates.

All wells were installed in Till/Weathered Shale.

All wells were constructed of 2-inch PVC well casing with 0.010 inch PVC well screen.

(1) ESI - Samples collected during Expanded Site Inspection conducted in 1993.
RI - Samples collected during Remedial Investigation conducted in 1998.

analyses on the sample of the formation intended to be monitored. The filter pack material size is selected on the basis of the finest formation materials present.

The slot size for the monitoring wells had been determined and approved as part of an earlier RI at the Ash Landfill at SEDA. NYSDEC, USEPA, and the Army have reviewed the grain size curves for till and weathered shale from the OB Grounds at the SEDA as well as the documentation determining the proper screen size based on these curves. Given the types of formation materials (which were confirmed from visual soil classification at the OB Grounds, Ash Landfill, and 25 ESI sites in various locations at SEDA) the nature of their deposition, and their widespread distribution in the area, the till and weathered shale do not vary significantly across the base to preclude the use of these curves from the OB Grounds for slot size selection at SEAD-4. A 0.010-inch slot size used with a #3Q-ROC filter pack was determined to be appropriate for the monitoring wells on-site.

A sand pack was placed by pouring sand from the surface into the annular space between the well screen and the hollow stem auger. If the well was greater than 15 feet deep, a tremie pipe was used to place the sand pack. The sand pack was not extended more than 2 feet (but at least 6 inches) above the top, or 6 inches below the bottom of the screen. A finer grained sand pack material, 6 inches thick, was placed at the top of the sand pack, between the sand pack and the bentonite seal to prevent infiltration of the bentonite into the sand pack around the well screen.

A layer of bentonite pellets, between 1 and 2 feet thick, was used to seal the well and was poured within the annular space. During the RI phase of the work, potable water was poured on the pellets in a continuous stream for a period of one hour. Then, the remaining annular space was completely filled with a lean cement grout containing at least 3% by weight bentonite to cement. The grout mixture was placed in the annular space by pouring or pumping it from the surface. In some instances, the bentonite extended to the surface if there was no vertical space available for a cement/bentonite grout.

In all instances, wells were protected with a steel casing, at least 4 inches in diameter. This protective steel casing extended 3 1/2 feet below the ground surface to prevent heaving by frost. In some cases, the depth of the protective casing was reduced to allow for better well construction in shallow bedrock situations. However, in this instance the casing was shortened so that no more than 2.5 feet stick up above the ground surface. The protective casing had a locking cap and a brass, weather resistant padlock. A cement collar was placed around each well. A weep hole was drilled at the base of the protective steel casing above the cement collar to allow drainage of water.

A locking expandable cap was also placed in the top of the PVC well casing. To allow the water in the well to equilibrate when the expandable cap is tightened, a small slot was cut in the PVC well pipe 1-inch below the base of the expandable well cap. A permanent well identification number was stamped into the steel protective casing.

2.6.2 Monitoring Well Development

Subsequent to the monitoring well installations, each monitoring well was developed to ensure the collection of representative groundwater samples. The well development details are summarized in **Table 2-6**. The criteria for determining if the well had been properly developed was based upon the guidance provided by the NYSDEC, TAGM #HWR-88-4015. This guidance document specifies a maximum allowable turbidity level in groundwater samples collected from monitoring wells.

The development procedure consisted of light surging for 2 to 5 minutes, with periodic removal of water using a bailer. During the RI phase, surging was performed with a surge block that had a diameter slightly smaller than the well diameter. During the ESI, surging was performed with a bailer. The light surging was performed to remove any silt and clay "skin" that may have formed on the borehole wall during drilling. After surging, the water in the well was removed using a peristaltic pump at a rate of between 1.5 and 3 liters per minute. At the end of the development process, the water was removed at a minimum rate of 0.1 liter per minute. This low flow allowed the well and the surrounding formation to be developed while not creating a large influx of silt and clay.

During well development, temperature, specific conductivity, and pH were measured in the field. For the ESI, a Hach portable field turbidmeter with full scale ranges of 1.0, 10, and 100 NTUs was used to measure turbidity. For the RI, turbidity was measured with a Engineered Systems Model 800 portable field analyzer with full scale ranges of 20 and 200 NTUs. Readings were conducted for each well volume. Development operations were performed until the following primary conditions were met:

1. Water samples had the lowest possible turbidity measurement (preferably < 50 NTUs); and
2. The temperature, specific conductivity and pH of the water varied by no more than 10 percent over 2 consecutive readings.

TABLE 2 - 6

SEAD-4 - Monitoring Well Development Information

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

WELL NUMBER	STUDY (1)	WELL INSTALLATION DATE	DEV. START DATE	TEMPERATURE (°C)	pH (standard units)	CONDUCTIVITY (µmhos/cm)	TURBIDITY (NTUs)	GALLONS REMOVED	WELL VOLUMES REMOVED
MW4-1(2)	ESI	12/6/1993	12/16/1993	7.00	7.24	700	1.95	18.5	3
MW4-2(2)	ESI	11/10/1993	11/20/1993	5.00	7.68	455	3.31	5.3	2.5
MW4-3	ESI	11/10/93	11/20/1993	9:00	7.21	650	2.27	8	4
MW4-4	ESI	12/5/93	12/18/1993	8.20	7.28	462	3.25	13.8	2
MW4-5(2)	ESI	12/5/93	12/18/1993	6.80	7.30	570	7.72	9	3.3
MW4-1(2)	RI	12/6/1993	3/17/1999	4.90	6.80	1009	>100	13.2	2.0
MW4-2(3)	RI	11/10/1993	3/18/1999	2.20	6.41	176	147	16.0	3.5
MW4-3	RI	11/10/93	3/17/1999	7.33	7.00	703	3.9	8.0	2.6
MW4-4(4)	RI	12/5/93	3/16/1999	6.72	7.02	619	3.15	10.0	1.6
MW4-5(2)	RI	12/5/93	3/17/1999	4.50	6.70	800	3.67	6.0	1.5
MW4-6(4)	RI	12/19/1998	3/16/1999	7.21	6.32	290	21.3	23.0	4.2
MW4-7	RI	12/20/1998	3/17/1999	5.88	7.35	265	17.6	12.0	3.1
MW4-8(4)	RI	12/19/1998	3/16/1999	4.44	6.20	425	3.95	16.0	2.6
MW4-9(2)	RI	12/20/1998	3/17/1999	4.77	6.36	206	125.5	23.0	5.7
MW4-10(2)	RI	12/17/1998	3/18/1999	4.77	7.23	605	13.4	11.3	1.8
MW4-11(2)	RI	12/20/1998	3/18/1999	7.38	6.06	802	>100	20.0	3.2
MW4-12(2)	RI	12/21/1998	3/18/1999	5.30	6.48	992	4.49	14.5	2.1
MW4-13	RI	12/20/1998	3/17/1999	5.49	6.70	324	12.8	13.8	3.2

Note:

All wells were developed by the surge and pump method.

(1) ESI - Well development conducted during Expanded Site Inspection conducted in 1993.
RI - Well development conducted during Remedial Investigation conducted in 1999.

(2) These wells are very slow to recover and required multiple attempts to develop. In some cases recovery was so slow that volume and/or turbidity targets were not achieved.

(3) Surface water from snow melt was pooled around and entering the aquifer effecting what is normally a slow to recover well.

(4) Well was very fast to recover. Parameter equilibration and low turbidities favored an abbreviated development.

In addition to meeting the above primary conditions, at least three borehole volumes of water were removed from the well, if the well allowed. If not, as much water as was necessary to meet the primary conditions was removed. In all instances at least one well volume was removed.

2.6.3 Groundwater Sampling

During the ESI, one groundwater sample was collected from each of the five monitoring wells following installation and development. The samples were analyzed for the parameters listed in Section 2.8.

For the RI, groundwater samples were proposed to be collected from all 13 monitoring wells at SEAD-4 over two distinct times of the year, and analyzed for the parameters listed in Section 2.8. The first round of sampling was completed in March 1999 and all 13 monitoring wells were sampled (**Table 2-7**). The second round of groundwater sampling was conducted in the July 1999. The second set of samples was analyzed using the same methods as the first set. The wells were sampled using the latest version of the EPA groundwater sampling procedure as described in the following section The field sampling data are presented in **Table 2-8.**

ESI Program Methodology

During the ESI phase of the work, the monitoring wells were purged prior to sampling using a peristaltic pump and dedicated Teflon tubing that extended to the bottom of the well. A low-flow purging method was implemented to collect groundwater samples with the lowest possible turbidity.

Prior to purging, the thickness of the silt layer at the bottom of the well was determined by measuring the depth to the top of the silt and subtracting that from the depth of the well. If the thickness of the silt was greater than 1 inch, then the silt was removed using the peristaltic pump and dedicated Teflon tubing. Silt removal was complete when the water was no longer silt-laden and dark brown-gray in color.

The purging process began with the open-end of the tube at the bottom of the well screen, or at least 6 inches from the bottom of the well. The purging flow rate was between 0.01 and 2 liters per minute (L/min), and the water was collected at the surface with a graduated 5-gallon bucket.

TABLE 2-7

SEAD-4 - Groundwater Sampling Summary

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

LOCATION ID	STUDY (2)	SAMPLE NUMBER	SAMPLE DEPTH (1)
MW4-1	ESI	MW4-1	NA
MW4-2	ESI	MW4-2	NA
MW4-3	ESI	MW4-3	NA
MW4-4	ESI	MW4-4	NA
MW4-5	ESI	MW4-5	NA
MW4-1	RI - Round 1	042017	11.00
MW4-2	RI - Round 1	042018	5.30
MW4-3	RI - Round 1	042019	8.50
MW4-4	RI - Round 1	042020	10.00
MW4-5	RI - Round 1	042021	7.00
MW4-6	RI - Round 1	042022	9.00
▨	RI - Round 1	042030 *	9.00
MW4-7	RI - Round 1	042023	6.10
MW4-8	RI - Round 1	042024	8.80
MW4-9	RI - Round 1	042025	6.50
MW4-10	RI - Round 1	042026	8.40
MW4-11	RI - Round 1	042027	9.00
MW4-12	RI - Round 1	042028	8.50
MW4-13	RI - Round 1	042029	7.90
MW4-1	RI - Round 2	042031	12.50
MW4-2	RI - Round 2	dry	N/A
MW4-3	RI - Round 2	042033	10.95
MW4-4	RI - Round 2	042036	10.00
MW4-5	RI - Round 2	dry	N/A
MW4-6	RI - Round 2	042039	11.00
▨	RI - Round 2	042040 *	11.00
MW4-7	RI - Round 2	042042	8.10
MW4-8	RI - Round 2	042037	10.80
MW4-9	RI - Round 2	042038	8.00
MW4-10	RI - Round 2	042032	10.00
MW4-11	RI - Round 2	042035	10.00
MW4-12	RI - Round 2	042034	12.90
MW4-13	RI - Round 2	042041	9.00

* Duplicate samples taken at the sample site.

(1) Interval represents depth in feet below the top of the PVC.

(2) ESI - Samples collected during Expanded Site Inspection conducted in 1993.
RI - Samples collected during Remedial Investigation conducted in 1999.

TABLE 2 - 8

SEAD-4 - Monitoring Well Groundwater Field Sampling Information

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Monitoring Well	Date Sampled	Study (1)	INDICATORS (2)						Gallons of Purge Water Removed	Standing Water Vol. (gal)	Well Volumes Removed
			Temperature (°C)	pH	Conductivity (µmhos/cm)	Turbidity (NTUs)	ORP (millivolts)	Dissolved Oxygen (mg/L)			
MW4-1	01/21/94	ESI	5.5	7.20	600	3.10	NA	NA	1.90	1.25	1.52
MW4-2	02/4/94	ESI	2.0	7.50	228	72.7	NA	NA	0.90	0.30	3.00
MW4-3	01/20/94	ESI	5.5	7.50	550	12.4	NA	NA	2.10	0.70	3.00
MW4-4	01/31/94	ESI	4.0	7.80	400	6.2	NA	NA	4.80	1.60	3.00
MW4-5	01/20/94	ESI	3.0	7.60	480	1.10	NA	NA	0.4	0.20	2.00
MW4-1	4/1/99	RI	8.3	7.00	902	28.00	50	12.30	0.7	8.74	0.08
MW4-2	4/1/99	RI	5.3	6.99	260	16.40	27.3	11.40	1.8	0.40	4.50
MW4-3	3/29/99	RI	6.9	7.15	1232	0.70	75	42.00	4.0	1.00	4.00
MW4-4	4/24/99	RI	7.2	7.19	635	3.50	281.6	33.90	1.8	1.62	1.11
MW4-5	4/24/99	RI	8.2	7.14	806	12.00	285.6	36.90	0.6	0.78	0.77
MW4-6	4/1/99	RI	5.3	6.25	248	18.20	100.4	12.40	3.6	n/a	n/a
MW4-7	3/17/99	RI	5.4	7.48	513	7.30	43.9	4.40	3.1	0.82	3.78
MW4-8	3/30/99	RI	5.9	7.20	365	10.00	61.1	23.50	2.2	1.43	1.54
MW4-9	3/30/99	RI	5.8	6.98	239	31.00	51.6	27.70	2	0.88	2.27
MW4-10	3/30/99	RI	8.0	7.17	560	8.90	56.4	28.80	1.8	1.11	1.62
MW4-11	3/31/99	RI	10.8	7.15	1003	30.00	50.1	23.70	0.6	1.02	0.59
MW4-12	3/30/99	RI	7.7	7.00	964	31.00	68.1	25.70	2.3	0.9	2.56
MW4-13	3/31/99	RI	7.5	7.12	410	4.80	38.5	18.60	1	0.94	1.06
MW4-1 (4)	7/7/99	RI	13.3	6.94	889	9.67	127	5.81	1.50	0.58	2.59
MW4-2	dry	RI	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW4-3	7/7/99	RI	15.2	7.01	708	3.81	108.9	3.25	0.60	0.37	1.62
MW4-4	7/8/99	RI	15.1	7.06	560	4.49	94.8	2.01	1.50	0.92	1.63
MW4-5	dry	RI	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a	n/a
MW4-6	7/10/99	RI	15.0	7.10	423	1.34	58	1.06	1.75	0.42	4.17
MW4-7 (4)	7/10/99	RI	18.6	7.41	649	>100 (3)	86.6	5.20	0.9	0.3	3.00
MW4-8 (4)	7/8/99	RI	14.7	7.13	551	>100 (3)	-6.4	1.07	1	0.6	1.67
MW4-9 (4)	7/9/99	RI	15.7	7.26	525	>100 (3)	53.4	2.13	0.24	0.24	1.00
MW4-10 (4)	7/7/99	RI	16.6	6.98	661	>100 (3)	-14.9	2.64	0.5	0.48	1.04
MW4-11 (4)	7/8/99	RI	17.1	6.99	869	>100 (3)	-27.1	4.47	1.5	0.5	3.00
MW4-12 (4)	7/8/99	RI	12.4	6.81	874	>100 (3)	112.5	1.90	1.3	0.53	2.45
MW4-13 (4)	7/9/99	RI	20.0	7.00	300	20.00	-4.2	7.00	0.48	0.25	1.92

Note:

All samples were analyzed for volatile organic compounds, semi-volatile organic compounds, pesticides, PCBs, nitroaromatics, metals, cyanide, nitrates

(1) ESI - Samples collected during Expanded Site Inspection conducted in 1993.
RI - Samples collected during Remedial Investigation conducted in March 1999 and July 1999

(2) Final indicator measurements taken after well purging was completed.

(3) Metals sample <50 NTU

(4) These wells were purged and sampled to dryness due to very poor recharge rates. Stability parameters may not be representitive of the groundwater.

During the purging process, the water level in the well was monitored with an electronic water level meter. The water was not pumped below one half of the pre-purge static water column height. During removal of the first volume of water, it was determined if the well was a slow or fast recharging well. A fast recharging well supplies water to the well such that the water level is not drawn below the depth of one half of the static height of the water column using flow rates between 0.01 and 2 L/min. A slow recharging well does not supply water to the well to maintain a water level at or above one half of the static height of the water in the well using a minimum purge rate of 0.01 L/min.

For wells that were slow to recharge, purging continued until approximately one-half the well volume had been removed or the water level in the well reached the depth of one half the static height of the water column. At this time, the indicator parameters (temperature, specific conductivity, and pH) were measured and the time, flow rate, depth to the bottom of the opening of the Teflon tube, and total volume of water removed were recorded on the sampling data sheet. The Teflon tube was slowly raised to a point between the top of the well screen and the water surface. If this was not feasible, the open end of the tube was raised to the highest point possible to allow water to be pumped.

If during purging, the water level was lowered to below one half of the static water column height then the pump was shut off and the well was allowed to recharge before continuing. After one well volume had been removed, the indicator parameters were measured and the time, flow rate, depths, and volume of water removed were recorded. If at least one well volume had been removed and the measurements of temperature, specific conductance, and pH had stabilized (i.e., two successive measurements varied be less than 10 percent), then purging stopped. If they had not stabilized, then purging continued until they stabilized. At this time, the well was considered to have been purged enough to ensure that the subsequent water samples collected from the well would be representative of water from the aquifer. After stabilization, the water level in the well was monitored periodically, for a period of 3 hours. During this time, if the well had recovered to 95 percent of the original static level, then the well was sampled. If the 95 percent recovery was not achieved after 3 hours, the recovery requirement for the well was reduced to 85 percent prior to sampling. If the well had not recharged to 85 percent after 6 hours, sampling of the well began.

The following procedure was used for purging a fast recharging well. After approximately one well volume was removed, the time, flow rate, depth to the bottom of the opening of the Teflon tube and the total volume of water removed was recorded on the sampling data sheet. Measurements of indicator parameters (temperature, specific conductance and pH) were also made this time. The Teflon tube was slowly raised to a point between the top of the well screen and the water surface. After each well volume was removed the indicator parameters were measured and recorded. Purging of the well continued until three well volumes were removed. After purging the third well volume, the indicator parameters were recorded for the last time. If required, additional temperature, specific conductance, and pH measurements were made until they stabilized (two successive measurements varied by less than 10 percent). Moving the location of the tube from the screened interval to a point near the top of the water surface during purging ensured the removal of any stagnant water from the well prior to sampling. After removal of three well volumes the water level in the well was periodically measured. During this time, if the well had recovered to 95 percent of the original static level, then the well was sampled. If the 95 percent recovery was not achieved after 3 hours, then the recovery requirement for the well was reduced to 85 percent prior to sampling.

Before collecting the sample, the Teflon purging tube was removed from the well and placed into a clean plastic bag. To sample, a bailer was lowered into the well at a rate of approximately 1/2-inch per second to minimize the disturbance of water and silt in the well. When the bailer was filled with water it was removed at a rate of approximately 1/2-inch per second and the appropriate sample containers were filled. If the well was bailed to near dryness during the sampling process (i.e., the bailer reaches the bottom of the well), sampling was stopped until the well recharged to 85 percent of the original static level. If it did not recharge to 85 percent after 6 hours, sampling continued as water was available for each parameter. When sampling was complete, the dedicated Teflon tubing was returned to the well.

The sampling order was as follows:

- volatile organic compounds,
- semivolatile organic compounds,
- metals,
- cyanide,
- pesticides and PCBs,
- explosives,
- herbicides, and
- nitrates.

The sampling order allowed that metals were collected early in the sequence. Obtaining low turbidity water samples for metals that are truly representative of the aquifer was a primary goal of the sampling procedure. Therefore, water for metals analysis was collected early in the sequence, because water collected late in the sequence using a bailer tends to be more turbid.

RI Program Methodology

During the RI phase of the work, the groundwater sampling procedures for monitoring wells and microwells were conducted according to the Draft SOP titled Groundwater Sampling Procedure, Low Flow Pump Purging and Sampling (EPA, May 15, 1995). This method produced groundwater samples with significantly lower turbidities than those for the ESI.

A Marschalk bladder pump, which is a low-flow pump constructed of stainless steel, and Teflon tubing were used to purge and sample the monitoring wells.

Both the static water level and the water level after the pump was submerged were measured before purging commenced at a well.. Pumping of the well was started at 200 to 500 milliliters per minute. Following the Draft SOP the pumping rate was set to cause little or no water level drawdown in the well (less than 0.3 ft. with the water level stabilized). The water level was monitored every three to five minutes (or as appropriate) during pumping. Care was taken not to cause pump suction to be broken, or entrainment of air in the sample. Any pumping rate adjustments and the depth to the water were recorded throughout the process.

Pumping rates were, as needed, reduced to the minimum capabilities of the pump to avoid pumping the well dry. If the recharge rate of the well was very low, purging was interrupted so that the water level within the well did not drop below the pump. A steady flow rate was maintained to the extent practicable. Sampling commenced as soon as the volume in the well had recovered sufficiently to permit collection of samples. In some very low-yielding formations it was not possible to sample with minimal drawdown even using the lowest pumping rates.

During purging of the well, field indicator parameters (turbidity, temperature, specific conductance, pH, DO, and Eh) were monitored every three to five minutes. The well was considered stabilized and ready for sampling once all the field indicator parameter values reached stabilization. Stabilization is considered to be achieved when three consecutive readings, taken at three to five minute intervals, are within the following limits:

- turbidity (10% for values greater than 1 NTU)
- DO (10%)
- specific conductance (3%)
- temperature (3%)
- pH (± 0.1 unit)
- ORP/Eh (± 10 millvolts)
-

The variability within each water quality indicator parameter is based on the current recommendations of the EPA Office of Research and Development, which have been adopted by EPA Region II. If the parameters had stabilized, but the turbidity was not below the 50 NTU goal, the pump flow rate was decreased to no more than 100 ml/min. Measurement of the indicator parameters for DO, Eh specific conductance, temperature, and pH were obtained using a flow through cell (Hydrolab H20 water quality meter), which kept the sample from being exposed to the air prior to measurement. Turbidity was measured in a clean container using a portable turbidity meter, such as a glass beaker. The order of equilibration for each water quality indicator parameter should be pH, temperature, and specific conductance, followed by oxidation-reduction potential, dissolved oxygen and turbidity. However, it should be noted that temperature and pH, while often used as equilibration indicators are actually quite insensitive in terms of distinguishing between formation water and stagnant casing water.

Groundwater samples were collected for volatile analyses first. The actual sampling flow rate for volatiles was accomplished with a gradual reduction in the flow rate down to 100 milliliters per minute and sustained hydraulic head pressure within the sampling tube. A gradual reduction in association with sustained hydraulic head pressure minimized aeration, bubble formation, turbulent filling of sample bottles, and loss of volatiles due to extended residence time in the tubing. This method coincides with the USEPA Region II Quality Assurance Manual (October 1989) and the RCRA Groundwater Monitoring Technical Enforcement Guidance Document (OSWER Directive #9950.1, September 1986), which state that when collecting samples where volatile constituents are of concern using a bladder pump, pumping rates should not exceed 100 milliliters per minute.

The sample discharge for all other analytical parameters was a continuous flow of up to 500 milliliters per minute.

The groundwater sampling order was as follows:

- volatile organic compounds,
- semivolatile organic compounds,
- metals,
- cyanide,
- pesticides and PCBs,
- Explosives, and
- Nitrate-nitrogen.

As each sample was collected, the sample was labeled. All samples requiring cooling were placed into an ice-filled cooler maintained at 4°C for delivery to the laboratory.

All sample containers were filled by allowing the pump discharge to flow slowly down the inside of the container with minimal turbulence.

Purging and sampling equipment, which consisted of the bladder pump, was decontaminated prior to being used at each well. The pump was partially disassembled and flushed with the decontaminating solutions. The procedure was as follows:

1. Flush with potable water.
2. Flush with non-phosphate detergent solution.
3. Flush with tap water to remove the detergent.
4. Flush with distilled/dionized water.
5. Flush with isopropyl alcohol.
6. Flush with distilled/dionized water.

2.6.4 Aquifer Testing

During the ESI, groundwater levels were measured at the five monitoring wells on April 4, 1994.

During the RI, three rounds of water level measurements were performed at all 13 monitoring wells. One round of measurements was taken before well development and this data was used only for well development calculations. The second round of water levels was performed before the first round of groundwater sampling in March 1999. The final round of measurements will be performed before the second round of groundwater sampling, which will be completed in the summer. The second and third rounds will be used to create groundwater topography maps.

Slug tests were performed during the RI field program at the eight monitoring wells installed during the RI program to determine hydraulic conductivities. A transducer and data logger were used to record the slug test data. Although a slug test was performed at monitoring well MW4-7, the slug test did not provide adequate results because there was only two feet of water in the monitoring well. The slug test parameters and related information are shown in **Table 2-9**. The procedures for slug testing are provided in following section. Slug test data are presented in Appendix D.

Groundwater Level Measurements

During the ESI at SEAD-4, one round of water level measurements was completed on April 4, 1994. For the RI, three rounds of water level measurements were completed for all monitoring wells at SEAD-4. Two of these RI rounds (March 1999 and July 1999) were used to determine groundwater flow directions at the sites.

Each round of water level measurements was conducted within a 10-hour period so that they represented a "snap-shot" of groundwater conditions at the sites. The water levels were measured to the nearest one hundredth of a foot using a battery-operated water level indicator. All groundwater depth measurements were referenced to a notch on the top of the well casing (PVC).

Water level measurement equipment, including the water level indicator, was decontaminated before it was used at any monitoring wells.

Rising Head Slug Testing

During the RI phase of the work, the hydraulic conductivity of the overburden aquifer was determined using the rising head slug test method at SEAD-4. The rising head test requires the instantaneous removal of a specific volume of water from the well resulting in a lowering of the water table in the well. Subsequent to the removal of the volume, rising water levels were recorded over time for later data reduction and hydraulic conductivity calculations.

TABLE 2-9

SEAD-4 - Data for Slug Test Hydraulic Conductivity Determinations

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Well Number	Study (1)	Test Name (2)	Well Type (3)	Depth to Bottom of Screen Relative to Ground Surface (feet) (4)	Well Point Relative to Top of PVC (feet) (5)	Static Water Level Relative to Top of PVC (feet) (4)	Internal Radius of Well Casing (inches) (4)	Effective Radius of Well Boring (inches) (4)	Screened Length (feet) (4)
MW4-6	RI	9	T/WS	9.4	12.03	4.04	2	8	4.9
MW4-7	RI	5	T/WS	5.2	8.65	5.05	2	8	2.0
MW4-8	RI	8	T/WS	9.5	12.39	4.9	2	8	4.9
MW4-9	RI	6	T/WS	5.4	8.69	4.39	2	8	2.0
MW4-10	RI	07	T/WS	7.5	10.43	4.86	2	8	4.9
MW4-11	RI	05	T/WS	8.2	11.53	6.17	2	8	4.6
MW4-12	RI	06	T/WS	10.2	13.54	8.36	2	8	4.6
MW4-13	RI	7	T/WS	5.9	9.02	3.61	2	8	2.0

Notes:

(1) RI = Remedial Investigation
ESI = Expanded Site Investigation

(2) Slug tests run with In-Situ Hermit 2-Channel Data Logger and pressure transducer.

(3) T/WS = Till Wethered Shale Aquifer

(4) Input data to determine hydraulic conductivity using a procedure described by Bouwer and Rice (1976 and 1989).

(4) Well point depths may vary from those measured during well construction because sediments in the bottom of the well are removed during well development.

Prior to the beginning the test, the water level in the well was measured using an electronic water level meter. Then an In-Situ, Inc. model PTX-161 pressure transducer rated to 10 pounds per square inch (psi) was lowered into the well to an appropriate depth so that when the slug was lowered into the well it would not come in contact with the transducer. At least one foot was allowed between the bottom of the well and the transducer. Next, either a 3-foot or 5-foot long stainless steel slug with a 1.66-inch diameter was lowered into the well using clean nylon rope so that the top of the slug was just below the static water level previously measured in the well. The hollow stainless steel slug contained machined ends onto which stainless screw caps with o-ring gaskets fit. The slug was filled with potable water for the test. After the slug was lowered into the well, the water level in the well was allowed to equilibrate. Water levels were measured until they stabilized to within 0.01 feet for 5 minutes by monitoring the transducer via the data logger. The stabilized water level at the end of the test was nearly equal to the original static water level.

After stabilization of the water level, the slug was quickly removed and data logger started simultaneously thereby beginning the slug test. A 2-channel Hermit model 1000C data logger was used to record the slug test data. The data logger was configured for logarithmic data collection so that early time water level changes could be adequately recorded. After 10 minutes of data collection the water level was monitored with the data logger to determine if it had stabilized. When the water level reached 80 percent of the original static water level and stabilized to 0.02 feet over a 5-minute time period, the test was stopped. The test data was downloaded to a portable computer in the field and reviewed to evaluate whether the data was acceptable.

In instances where the saturated thickness of the aquifer was small enough such that it did not allow significant displacement of water with a transducer/slug configuration, a stop watch and water level meter were used to measure and record the depth to water data. In these instances, the slug was placed at the bottom of the well to maximize the volume of water displaced during the test.

The slug test information for each monitoring well was reduced using the procedure described by Bouwer and Rice (1976 and 1989). Normalized recovery rates were plotted against time on a semi-logarithmic plot and the hydraulic conductivity was determined. The time and water level field data were used to calculate the hydraulic conductivity. Other input data consisted of the following: 1) initial drawdown in test well; 2) internal radius of the test well casing; 3) effective radius of the test well; 4) saturated aquifer thickness under static conditions; 5) length of the test well screen; and 6) height of water column in test well under static conditions. Once the data were plotted, the hydraulic conductivity was determined on-screen by matching the straight line portion of the drawdown (displacement) curve.

Recent refinements have been developed in the interpretation of slug test data in unconfined formations using the Bouwer and Rice (1976 and 1989) Method (i.e., Zlotnik, V., 1994, Groundwater, V.32, No. 5, and more recently, Hyder, Z. and Butler, J.J. Jr., 1995, Groundwater V. 33 No. 1). In response to this, the method for interpreting slug test data using the Bouwer and Rice (1976 and 1989) technique was modified to include, where appropriate, the recommendations of Zlotnik (1994). In instances where there was no significant vertical flow affecting the test according to the geometric criteria stated by Zlotnik (i.e., $L/D \approx 1$) this method was not used. Because all of the overburden wells installed in the till were screened across all or most of the aquifer saturated thickness, the criteria for test geometry ($L/D \approx 1$) held true in most instances.

2.7 SURFACE WATER AND SEDIMENT INVESTIGATION

The objectives of the surface water and sediment investigation at SEAD-4 were to determine the nature and extent of chemical impacts, to define the fullest extent of impacts, and to obtain background surface water and sediment samples to allow comparison to SEAD-4 data. The sample program for surface water and sediment is summarized in **Table 2-10**. Sample locations are shown in **Figures 2-10 and 2-11.** The sampling procedures are described in the following sections. Surface water and sediment samples were collected during the ESI and the RI field programs.

ESI Program

A total of nine sediment samples and two surface water samples (SW) were collected at SEAD-4 (**Figure 2-10**). Two sediment samples (SD4-1 and SD4-2) and two surface water samples (SW4-1 and SW4-2) were collected near the edge of the pond, and, using a boat, one sediment sample (SD4-3) was collected from the deepest part of the pond.

Modifications to the Field Sampling Program, previously mentioned, (November 15, 1993) included the addition of six sediment samples to replace soil boring samples. Three of the six additional sediment samples (SD4-4, 5, and 6) were collected from the drainage ditch located on the southwest side of the site. The remaining three samples (SD4-7, 8 and 9) were collected from the drainage ditch on the northeast side of the site.

TABLE 2-10

SEAD-4 - Surface Water and Sediment Sampling Summary

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

LOCATION ID	STUDY (1)	SAMPLE NUMBER	MATRIX
SD4-1	ESI	203271	Sediment
SD4-2	ESI	203272	Sediment
SD4-3	ESI	203273	Sediment
SD4-4	ESI	206905	Sediment
SD4-5	ESI	206906	Sediment
SD4-6	ESI	206907	Sediment
SD4-7	ESI	206908	Sediment
SD4-8	ESI	206909	Sediment
SD4-9	ESI	206910	Sediment
SD4-2	RI	043189 **	Sediment
SD4-6	RI	043187 **	Sediment
SD4-10	RI	041001	Sediment
SD4-11	RI	041002	Sediment
SD4-12	RI	041003	Sediment
SD4-12 *	RI	041004	Sediment
SD4-13	RI	041005	Sediment
SD4-14	RI	041006	Sediment
SD4-15	RI	041007	Sediment
SD4-16	RI	041008	Sediment
SD4-17	RI	041009	Sediment
SD4-18	RI	041010	Sediment
SD4-19	RI	041011	Sediment
SD4-20	RI	041012	Sediment

Note:

All sediment samples were analyzed for volatile organic compounds, semi-volatile organic compounds, pesticides, PCBs, nitroaromatics, metals, cyanide, nitrates, grain size, pH, cation exchange capacity and total organic compounds.

All surface water samples were analyzed for volatile organic compounds, semi-volatile compounds, pesticides, PCBs, nitroaromatics, metals, cyanide, nitrates, pH, total organic compounds, ammonia, hardness, phosphate, alkalinity, total dissolved solids and total suspended solids.

* Duplicate samples taken at the sample site.

** Hexavalent chromium analysis only.

(1) ESI - Samples collected during Expanded Site Inspection conducted in 1993.
RI - Samples collected during Remedial Investigation conducted in 1998.

TABLE 2-10

SEAD-4 - Surface Water and Sediment Sampling Summary

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

LOCATION ID	STUDY (1)	SAMPLE NUMBER	MATRIX
SD4-21	RI	041013	Sediment
SD4-22	RI	041014	Sediment
SD4-23	RI	041015	Sediment
SD4-24	RI	041016	Sediment
SD4-25	RI	041017	Sediment
SD4-26	RI	041018	Sediment
SD4-27	RI	041019	Sediment
SD4-28	RI	041020	Sediment
SD4-29	RI	041021	Sediment
SD4-30	RI	041022	Sediment
SD4-31	RI	041023	Sediment
SD4-32	RI	041024	Sediment
SD4-33	RI	041026	Sediment
SD4-34	RI	041027	Sediment
SD4-35	RI	041028	Sediment
SD4-36	RI	041029	Sediment
SD4-37	RI	041025	Sediment
SD4-38	RI	041030	Sediment
SD4-39	RI	041039	Sediment
SD4-40	RI	041040	Sediment
SD4-41	RI	041041	Sediment

Note:

All sediment samples were analyzed for volatile organic compounds, semi-volatile organic compounds. pesticides. PCBs, nitroaromatics. metals, cyanide. nitrates, grain size, pH, cation exchange capacity and total organic compounds.

All surface water samples were analyzed for volatile organic compounds. semi-volatile compounds, pesticides. PCBs, nitroaromatics, metals, cyanide, nitrates, pH, total organic compounds, ammonia, hardness, phosphate, alkalinity, total dissolved solids and total suspended solids.

* Duplicate samples taken at the sample site.

(1) ESI - Samples collected during Expanded Site Inspection conducted in 1993.
RI - Samples collected during Remedial Investigation conducted in 1998.

SEAD-4 - Surface Water and Sediment Sampling Summary

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

LOCATION ID	STUDY (1)	SAMPLE NUMBER	MATRIX
SD4-42	RI	041042/043194 ***	Sediment
SD4-43	RI	041043/043184 ***	Sediment
SD4-44	RI	041044	Sediment
SD4-45	RI	041045	Sediment
SD4-46	RI	041046	Sediment
SD4-47	RI	041038	Sediment
SD4-48	RI	041031	Sediment
SD4-49	RI	041034	Sediment
SD4-50	RI	041032	Sediment
SD4-50 *	RI	041033	Sediment
SD4-51	RI	041035	Sediment
SD4-52	RI	041036	Sediment
SD4-53	RI	041037	Sediment
SD4-54	RI	041047	Sediment
SD4-55	RI	041048	Sediment
SD4-55 *	RI	041049	Sediment
SW4-1	ESI	203210	Water
SW4-2	ESI	203212	Water
SW4-3 *	ESI	203213	Water
4PIPE	ESI	206099	Water

Note:

All sediment samples were analyzed for volatile organic compounds, semi-volatile organic compounds, pesticides, PCBs, nitroaromatics, metals, cyanide, nitrates, grain size, pH, cation exchange capacity and total organic compounds.

All surface water samples were analyzed for volatile organic compounds, semi-volatile compounds, pesticides, PCBs, nitroaromatics, metals, cyanide, nitrates, pH, total organic compounds, ammonia, hardness, phosphate, alkalinity, total dissolved solids and total suspended solids.

* Duplicate samples taken at the sample site.

** Hexavalent chromium analysis only.

*** Sample also analyzed for hexavalent chromium.

(1) ESI - Samples collected during Expanded Site Inspection conducted in 1993.
RI - Samples collected during Remedial Investigation conducted in 1998.

2-10

SEAD-4 - Surface Water and Sediment Sampling Summary

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

LOCATION ID	STUDY (1)	SAMPLE NUMBER	MATRIX
SW4-12	RI	042003	Water
SW4-12 *	RI	042004	Water
SW4-13	RI	042005	Water
SW4-19	RI	042011	Water
SW4-49	RI	042014	Water
SW4-50	RI	042012	Water
SW4-50 *	RI	042013	Water
SW4-51	RI	042015	Water
SW4-52	RI	042016	Water

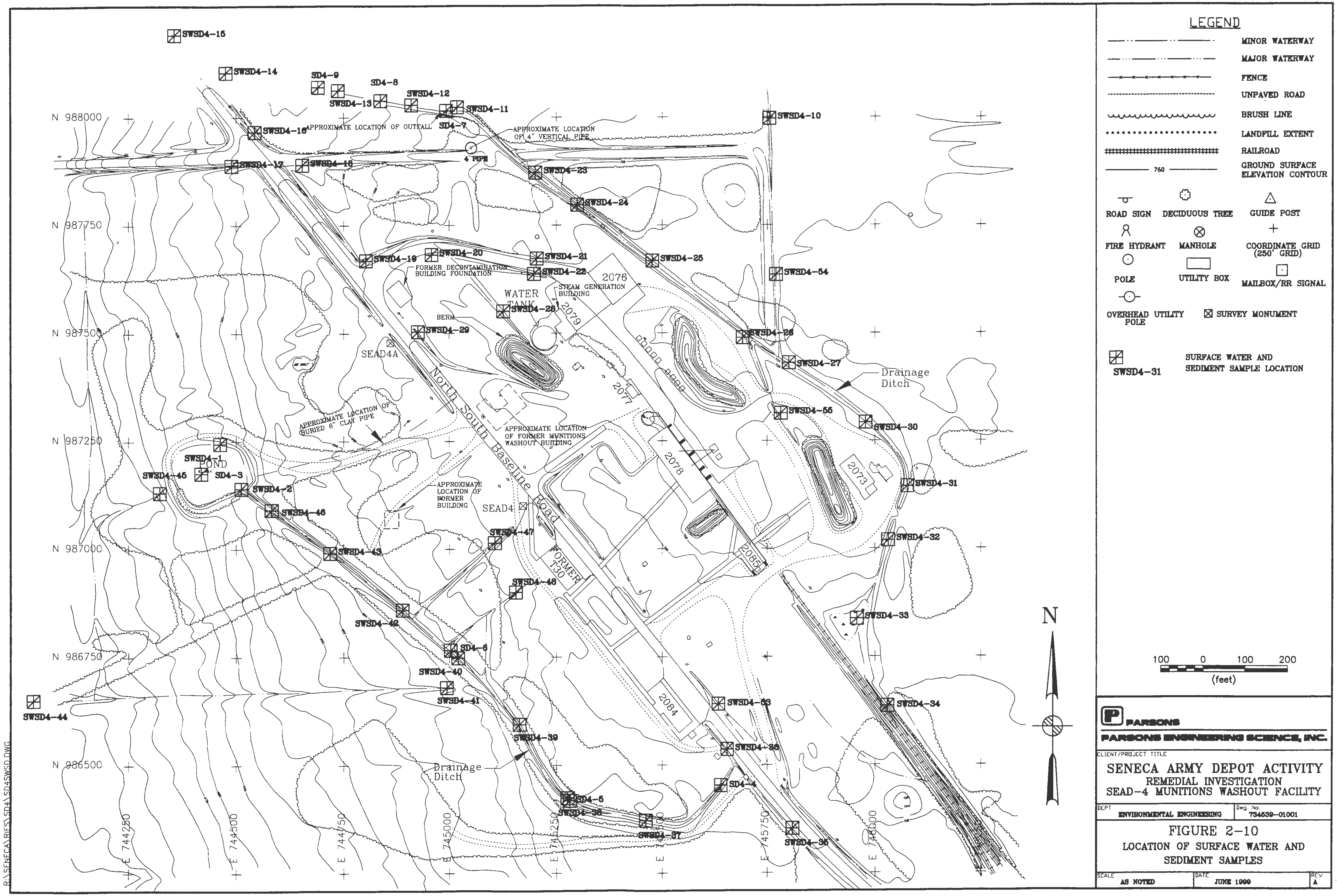
Note:

All sediment samples were analyzed for volatile organic compounds, semi-volatile organic compounds, pesticides, PCBs, nitroaromatics, metals, cyanide, nitrates, grain size, pH, cation exchange capacity and total organic compounds.

All surface water samples were analyzed for volatile organic compounds, semi-volatile compounds, pesticides, PCBs, nitroaromatics, metals, cyanide, nitrates, pH, total organic compounds, ammonia, hardness, phosphate, alkalinity, total dissolved solids and total suspended solids.

* Duplicate samples taken at the sample site.

(1) ESI - Samples collected during Expanded Site Inspection conducted in 1993.
RI - Samples collected during Remedial Investigation conducted in 1998.



PARSONS

PARSONS ENGINEERING SCIENCE, INC.

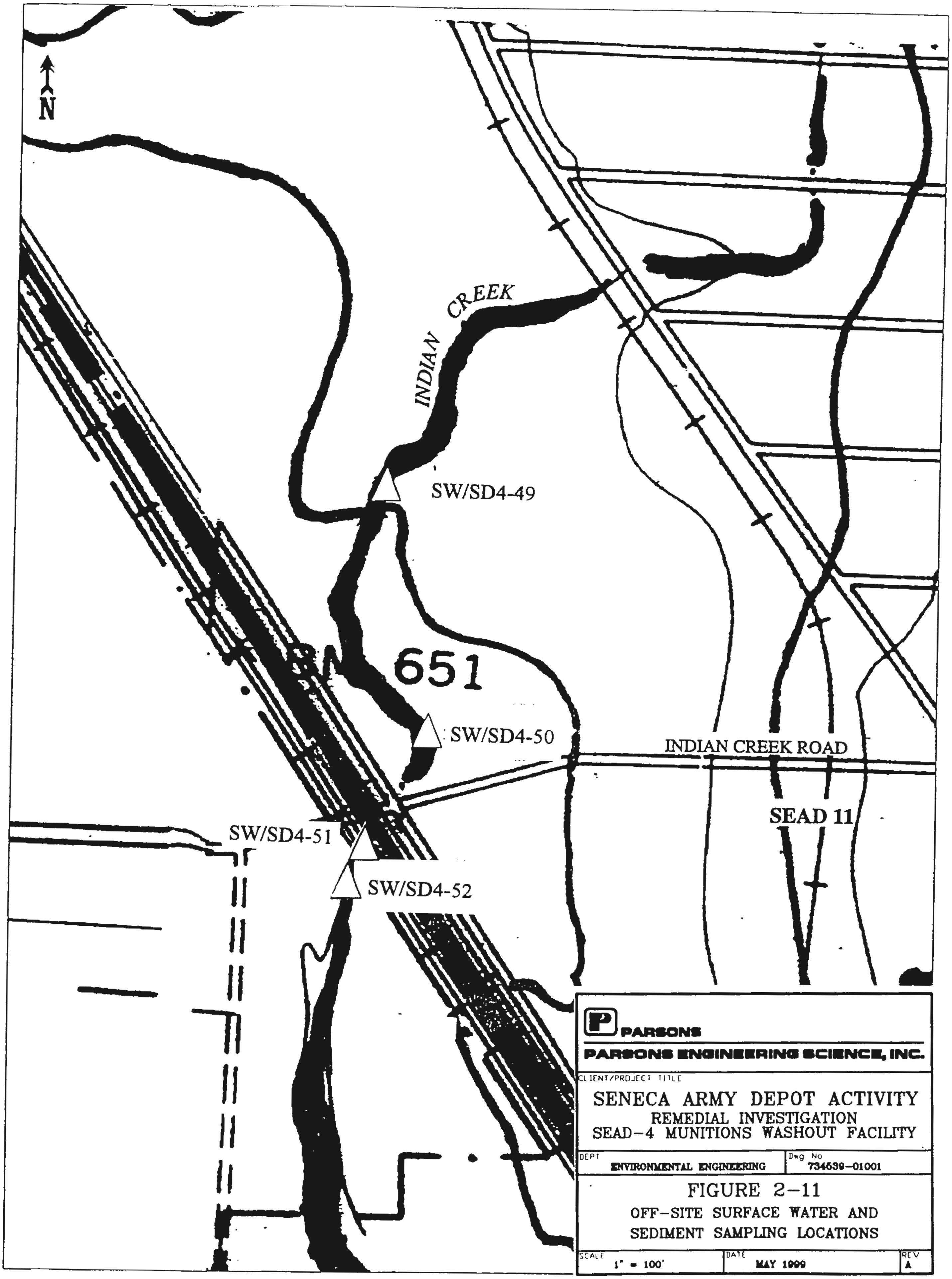
CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
REMEDIAL INVESTIGATION
SEAD-4 MUNITIONS WASHOUT FACILITY

DEPT	Dwg. No.
ENVIRONMENTAL ENGINEERING	734539-01001

FIGURE 2-10
LOCATION OF SURFACE WATER AND SEDIMENT SAMPLES

SCALE	DATE	REV
AS NOTED	JUNE 1999	A



PARSONS

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SENECA ARMY DEPOT ACTIVITY
REMEDIAL INVESTIGATION
SEAD-4 MUNITIONS WASHOUT FACILITY

DEPT ENVIRONMENTAL ENGINEERING

Dwg No 734639-01001

FIGURE 2-11

OFF-SITE SURFACE WATER AND SEDIMENT SAMPLING LOCATIONS

SCALE 1" = 100'

DATE MAY 1999

REV A

RI Program

The purpose of the RI surface water and sediment investigation was to refine the locations of potential contaminant source areas, and to define the fullest extent of impacts. Surface water and sediment sampling was conducted in areas of SEAD-4 that have the potential for acting as an exposure pathway, transporting contaminants off-site or infiltrating into the soil and percolating to groundwater.

The RI surface water and sediment sampling in SEAD-4 was conducted from December 4, 1998 through December 19, 1998. A total of 46 sediment samples and seven surface water samples were collected from on-site and off-site locations at SEAD-4 during the RI program. **Figures 2-10 and 2-11** presents the sampling locations. Forty-two sediment samples were collected in drainage ditches throughout SEAD-4. Due to dry conditions, surface water was not available at 39 of the 42 sites in on-site locations at SEAD-4. SW4-12 and SW4-13 were collected from the drainage ditch east of the site and SW4-19 was collected from the drainage ditch east of the former building foundation.

It was reported by a former SEDA employee that wastewater from the washout process may have been released into Indian Creek, from the north side of Indian Creek Road. Based on this information, it was assumed that a point discharge occurred to the north of the road before it crosses over Indian Creek. A total of four surface water and sediment samples (SW/SD4-49 through 52) were collected from Indian Creek in this area in order to evaluate the point discharge. The area is located at the SEDA boundary where both Indian Creek Road and Indian Creek cross the boundary. Two of the samples were collected upstream of Indian Creek Road and two sample were collected downstream of Indian Creek Road. The surface water and sediment samples from Indian Creek were also used to assess the presence and extent of impacts from SEAD-11. The locations of the surface water and sediment samples collected in Indian Creek for the SEAD-4 RI/FS are shown in **Figure 2-11**. SEAD-4, which could not be shown on this figure because of the scale of the map, is located approximately 600 feet east of sample location SW/SD4-51.

Methodology

Surface water and sediment samples for the ESI and the RI were collected in the following manner. Surface water samples were collected on the site by immersing a clean glass beaker or a sample bottle without preservatives. The sample was then transferred to a pre-preserved sample bottle, if required. Temperature, conductivity, and pH of surface water were measured directly in the field with calibrated meters. pH was measured with an Orion pH meter, Model SA230 or SA230A. Conductivity and temperature were measured with a YSI Model 33 conductivity meter.

Sediment samples were collected by scooping sediment into a decontaminated stainless steel bowl with a decontaminated trowel. Volatile Organic Analytes (VOA) samples were taken first, prior to any mixing of the sediments. Then, the bowl was refilled with additional sediment, if required, thoroughly mixed and the appropriate sample containers filled with sediment. Samples were then placed in coolers containing refrigerants.

During the ESI phase of the program, surface water and sediment samples were analyzed for the parameters listed in Section 2-8.

2.8 ANALYTICAL PROGRAM

For the ESI study, a total of 42 soil samples, nine sediment samples, five groundwater samples, and three surface water samples were collected from SEAD-4 for chemical testing. All the samples were analyzed for the following:

- TCL Volatile Organic Compounds,
- TCL Semivolatile Organic Compounds,
- TCL Pesticides/PCBs,
- Herbicides by EPA Method 8150,
- Explosives by EPA Method 8330,
- Nitrates by EPA Method 352.2, and
- TAL metals and cyanide according to NYSDEC CLP SOW.

A summary of the analytical program for SEAD-4 is presented in **Table 2-11**

For the RI study, a total of 141 soil samples including building debris samples (plus six duplicate samples), 46 sediment samples (plus three duplicate samples), 13 groundwater samples (plus one duplicate sample), and seven surface water samples (plus two duplicate samples) were collected from SEAD-4 for chemical testing. All the samples were analyzed for the following:

- TCL Volatile Organic Compounds,

- TCL Semivolatile Organic Compounds,
- TCL Pesticides/PCBs,
- Explosives compounds by EPA Method 8330,
- Nitrate-Nitrogen by EPA Method 352.1, and
- TAL metals and cyanide according to the NYSDEC CLP SOW.

A total of 60 surface soil samples were collected for Level II total chromium screening.

For the RI, four subsurface soil samples were tested for TOC, cation exchange capacity, pH, and density. Three subsurface soil samples were tested for grain size distribution. Twenty-one surface soil and sediment locations were analyzed for hexavalent Chromium. The groundwater samples were analyzed for volatile organic compounds by EPA Method 524.2. The surface water samples were also analyzed for pH, hardness, TOC, total suspended solids, total dissolved solids, alkalinity, ammonia, nitrate/nitrite-nitrogen, and phosphate. The sediment samples were also analyzed for TOC, grain size distribution, cation exchange capacity and pH..

TABLE 2-11

SEAD-4 - Summary of Sampling and Analyses

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Media (RI)	TCL VOC (1)	TCL SVOC	TCL Pest/PCB	Nitrate/Nitrogen EPA Method 353.2	Explosives EPA Method 8330	NYSDEC TAL Metals	Grain Size ASTM D:422-63	pH EPA Method 150.1	Hardness EPA Method 130.2	TSS EPA 160.2	TDS EPA 160.1
Surface soil	X	X	X	X	X	X	X				
Soil boring	X	X	X	X	X	X					
Shelby tubes							X	X			
Soil/Debris	X	X	X	X	X	X					
Sediment	X	X	X	X	X	X	X	X			
Surface water	X	X	X	X	X	X		X	X	X	X
Groundwater *	X	X	X	X	X	X					

Media (RI)	Ammonia EPA Method 350	Phosphate EPA Method 365.2	Cat Ex. Cap. EPA Method 9081	TOC EPA 415.1	Alkalinity EPA Method 310	Density COE Method 1110
Surface soil						
Soil boring				X		X
Shelby tubes			X	X		X
Soil/Debris						
Sediment			X	X		
Surface water	X	X		X	X	
Groundwater *						

Notes: (1) Groundwater analyzed by EPA Method 524.2

* Temperature, pH, conductivity, and turbidity were measured in the field.

TABLE 2-11

SEAD-4 - Summary of Sampling and Analyses

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Media (ESI)	Herbicides EPA Method 8150	TCL VOC	TCL SVOC	TCL Pest/PCB	Nitrate-Nitrogen EPA Method 353.2	Explosives EPA Method 8330	TAL Metals
Surface soil	X	X	X	X	X	X	X
Soil boring	X	X	X	X	X	X	X
Test Pits	X	X	X	X	X	X	X
Sediment	X	X	X	X	X	X	X
Surface water	X	X	X	X	X	X	X
Groundwater	X	X	X	X	X	X	X

3.0 DETAILED SITE DESCRIPTION

3.1 SITE FEATURES

SEAD-4, the Munitions Washout Facility, is located in the southwestern portion of the SEDA and was part of the Ammunition Workshop Facility that is approximately 30 acres in size. The Munitions Washout Facility was active between 1948 and 1963. The main building at the Munitions Washout Facility was the Munitions Washout Building, which has since been demolished.

The Ammunition Workshop Facility is now characterized by developed and undeveloped areas. It is surrounded by open grassland and low, thick brush on all sides. North South Baseline Road is the main access road to the facility and bisects the site running from south-southeast to north-northwest. There is also a network of minor paved driveways in the eastern half of the site. The SEDA railroad tracks lead into the site from the southeast and terminate in the vicinity of Buildings 2078 and 2085. Another set of SEDA railroad tracks run in the same direction as the North South Baseline Road on the southwestern boundary of the site.

The Ammunition Workshop Facility is almost entirely surrounded by two drainage ditches which are both approximately 3 feet deep. One of the ditches originates in the southeastern part of the site and helps to form its eastern boundary. This ditch runs northwest and then circles around to the west where it joins the drainage ditch alongside North South Baseline Road. The second drainage ditch forms the southwestern boundary. It originates south of the site next to North South Baseline Road, circles to the northwest, and discharges into the man-made pond which lies on the western edge of the site.

The man-made pond is approximately 150 feet in diameter and was created for the purpose of containing wastewater. Within the past 8 years, the pond was widened and deepened with a bulldozer. Pond sediment was pushed southwest of the pond to a 400-foot by 150-foot area adjacent to the pond. There are no known records of its full excavation beyond this dredging and it is assumed not to have a liner.

A 6-inch diameter clay pipe discharges into the southeast corner of the man-made pond. The pipe appeared to originate in the area of the Munitions Washout Building. Three test pits were excavated to determine the orientation and origin of the clay pipe. At 75 feet and 200 feet away from the pond, the pipe was found to be oriented such that it appeared to originate in the area of the Munitions Washout Building. The pipe was not found in the test pit located 400 feet from the pond. In order to locate the pipe, a 48-foot long trench was excavated to bedrock (approximately 6 feet deep) 400 feet from the pond and perpendicular to the suspected trend of the clay pipe. The failure to locate the pipe 400 feet from the pond suggests that the pipe either makes a bend to the north or south and does not originate at the Munitions Washout Building, or the eastern end of the pipe was removed or destroyed with the rest of the Munitions Washout Building.

Eleven buildings existed at the Ammunition Workshop Facility during the years that the Munitions Washout Building was operating. Three of the buildings are believed to have been used in the washout process. None of these three buildings currently exist. An air photo taken in 1959 shows the former Washout Building; the "decontamination building", which was possibly used as a cleaning or decontamination building for equipment; and a third unnamed building. The Washout Building was located in the approximate center of the facility, adjacent to North South Baseline Road; the "decontamination building" was located 350 feet to the northwest of the Washout Building, also adjacent to North South Baseline Road; and the unnamed building was located directly across North South Baseline Road and approximately 300 feet from the Washout Building. It is assumed that the buildings were razed sometime between 1963 and 1968 because 1963 was the year that washout operations ceased at the site. In addition, the buildings no longer existed in the 1968 air photos. The foundation of the "decontamination building" still exists and drains in the floor of the building also exist, but nothing remains of the other two buildings. A crushed shale road leads from the road to where the third building once stood.

The Munitions Washout Building was approximately 100 feet by 30 feet in size. The foundation of the “decontamination building” was found to be 40 feet by 55 feet, and the third building measured approximately 30 feet by 30 feet. To the northeast of the Munitions Washout Building is a berm approximately 25 feet high and 150 feet long. Directly behind the berm is a water tank approximately 50 feet in diameter.

The remainder of the buildings at the Ammunition Workshop Facility (all but one of which are still standing) were used for ammunition renovation. Building 2085 was a receiving building for munitions which were brought to the site by rail or lift trucks. It was used for the unloading, storage and transfer of projectiles. During the building surveys it was found that Building 2085 was adjacent to the railroad and contained loading platforms which could be used for the convenience of unloading munitions from the railroad to the building and then from the building to either the road (via a ramp) or Building 2078 as shown in **Figure 2-2**.

Activities such as replacing the propellant in munitions or introducing tracers to 90 mm shells were performed in Buildings 2073 and 2078, the two main workshops. Building 2078 contains a conveyor belt system that could have been used in the munitions renovation. The building has been used to tear down munitions including 75s, 90s, and 106s and other obsolete weapons. Weapons would be off loaded on the southeast loading dock from a fork truck, railroad car or truck trailer. The munitions were then sorted and started down the conveyor system. The conveyor carried individual munitions from south to north. Fuses and projectiles would be separated in different bays and the ammunition powder would be opened up and vacuumed out of its casing (see **Figure 2-3** for building details). The vacuum system would carry the ammunition powder to the powder house. The powder was collected in a metal hopper (still visible in the powder house) and subsequently dispensed to canisters for further testing or disposal. A scale was positioned below the hopper in the powder house and approximately 112 pounds of powder were transferred to each canister. Testing of the powder occurred at a different building, possibly 2073.

The small building south of the Building 2073 held the motors and more of the dust collection system. This included a filter bag dust collection tank and a floor mounted motor. A second tank presumably collected dust or helped to create a reserve vacuum pressure.

Building 2073 contains several pallets, two flammable storage lockers, and an elevated HVAC system. The building has been used to inspect munitions. A blast shield located outside the southeast corner of the building was used to test the ammunition. Projectiles could be mounted and fired within the confines of the blast shield. The explosion would be directed away from the building to the East. See **Figure 2-4** for more details.

Building 2079 was a steam generation building and Building 2077 was a steam condensate return station. The washout process involved the use of steam or hot water to remove the solid explosives from munitions ranging in size from 90 mm shells to 500-pound bombs. The heated water dissolved the solid explosives from the shells. The water was then passed over screens and agitated. As the water cooled while being agitated the explosives would re-solidify into pellets and be funneled into non-sparking containers, which were then sent to weapons manufacturing plants to be re-used. The wastewater was then disposed of on-site. During the building surveys 2 boilers were found in Building 2079 along with a steam driven generator and pipes leading to the 50-foot diameter water tank outside of the building. The boiler house also provided steam heat to the adjacent facilities at this end of the ammunition grounds. The two boilers operated on fuel oil. The fuel oil tanks had previously been located east of the boiler house. Water from the adjacent AST would have been pumped in and further conditioned before entering each boiler's steam drum. Resulting steam was then piped above ground to the adjacent buildings as a heating supply. Electricity was also generated from a steam generator located in the north room of the boiler house. This was an Allis-Chalmers® and Worthington® brand steam generator and motor as shown in **Figure 2-5**.

Two pipe risers and a triangular opening into what could be an underground pipe chase were noted outside the southwest corner of the building. Due to overgrowth and poor lighting, the contents of this space could not be ascertained. Two 8-inch diameter cast iron upright pipes were found twenty feet northwest of the generator room. Each contained an apparent valve at a depth of 3 feet below the top of the upright.

Building T30 and 2084 were used to prepare the packing material for the shipment of the renovated munitions. According to a current SEDA employee and a former SEDA employee, Building 2084 and T30 were used to paint, stencil, and otherwise prepare the packing material for the shipment of the renovated munitions. During the building surveys painting booths were found in Building 2084, along with drying lines. According to a former employee of the post, the building formerly covered a larger area of ground to the North. Ammunition was trucked in and unloaded under a large staging shelter. The shelter no longer exists at the site. Ammunition was then brought into the building, unpacked, disassembled to some extent, hung on the overhead rack assembly and rotated around the overhead assembly, into the paint booth. There the ammunition was spray painted, and then moved along the assembly to a point above the steam-heated drying racks. Once dry, the ammunition was probably re-stenciled with identifying codes, repacked in wood crates, and moved to another portion of the site. The drying racks were heated by steam piping running below the overhead assembly system. See **Figure 2-6** for details. Building T30 was the only building used for the ammunition renovation that was demolished. It was razed sometime between 1968 and 1993, but the foundation still exists.

Building 2076 was the employee break room and laundry facility. The building has been used to launder white uniforms used in Building 2078 where munitions were torn down and explosive powders removed or handled. Wash water likely contained residual explosive powder. A former employee of the post stated that this water was simply released to the floor drain and then allowed to drain to the dry well (in the form of a concrete tank or pit) directly east of the building. The dry well does have an 8-inch diameter clay overflow pipe that leads to a drainage ditch to the East. See **Figure 2-7** for more details.

All but two of the buildings at the site are located to the east of North South Baseline Road. The area to the west of North South Baseline Road is mostly undeveloped. During the years of operation, the area was covered in grass but currently it is mostly covered with thick, low brush.

Two underground storage tanks (USTs) formerly existed at Building 2079. Both tanks stored #6 fuel oil; one had a 15,000-gallon capacity and the second had a 20,000-gallon capacity. Both of the tanks were removed.

Two above ground storage tanks (ASTs) formerly existed at Building 2079 and Building 2076. Both tanks had a 275-gallon capacity and have been removed.

Several underground piping structures associated with the leach field were identified at the surface in the field north of the "decontamination building" during the ESI. The visible evidence of underground piping structures included 1) terra-cotta pipe that passed through a concrete holding tank with a steel cover at two locations, 30 feet and 210 feet north of the road near the suspected leach field, 2) a vertical cylindrical steel pipe near the concrete tank, 3) an outfall that emptied into a drainage ditch that surrounds most of the northern portion of the site and 4) a manhole between the vertical steel pipe and the outfall pipe.

Another site of concern that was probably affected by SEAD-4 activities is not actually located within SEAD-4. Indian Creek is a small water body that forms within the SEDA and flows south under some railroad tracks, continues to flow south until tributaries join it, and eventually feeds into Seneca Lake. Indian Creek Road, which is near Indian Creek, runs west from the northern part of SEAD-4 and continues off the SEDA. A public railroad track runs near the edge of the SEDA at this point and is fenced off on the SEDA side and on the outer side of the tracks. Based on this information, the discharge is assumed to have occurred at a single point north of Indian Creek Road before the fence, still on SEDA property.

Reeds and other plants surround Indian Creek. On the SEDA side of the fence there is a flood plain surrounding the creek which is about a foot wide and slow moving. The banks of the creek get progressively higher as the creek approaches the railroad tracks. On the other side of the tracks the banks widen and level out once again, and the flow increases.

3.2 TOPOGRAPHY

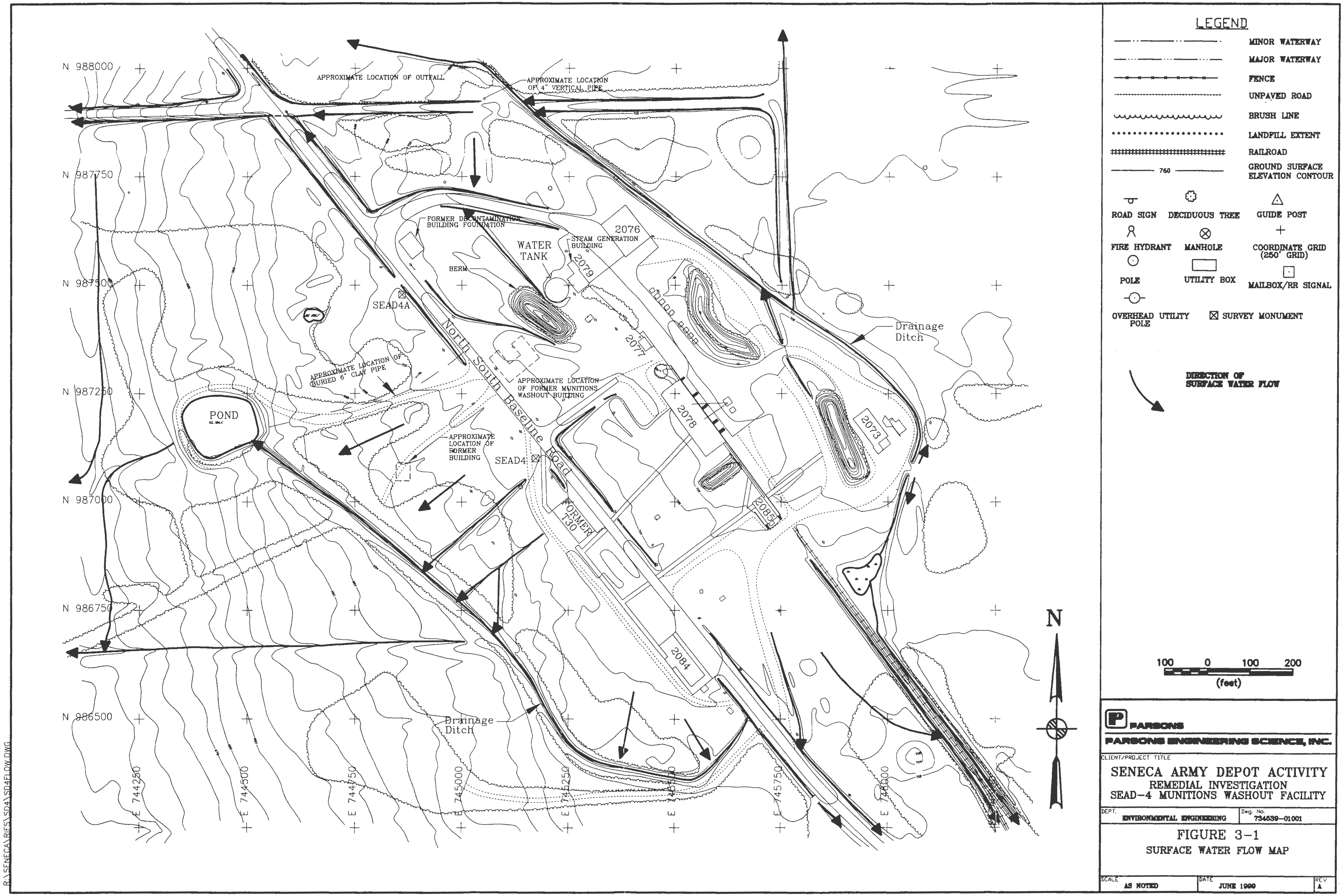
The topography at SEAD-4 is generally flat in the area east of North South Baseline Road and slopes to the west on the portion of the site which is west of the Baseline Road. The ground surface becomes steeper near the pond and the western drainage ditch.

3.3 HYDROLOGY

Surface water flow from precipitation events is controlled by local topography including the two man-made drainage ditches (both approximately three feet deep) into which most runoff from the facility flows. **Figure 3-1** shows the surface water flow for the site.

Runoff toward the east and north of the facility generally flows into the eastern drainage ditch, which flows to the northwest. Surface water in this ditch flows west under North South Baseline Road and then flows into Indian Creek just north of the facility. Indian Creek begins in the southwestern portion of the SEDA and flows south-southwest. After it passes out of the SEDA, it continues south-southwest until tributaries join it, where it flows in a more westerly direction. Eventually it flows into Seneca Lake.

Runoff toward the west of the facility flows into the western ditch which drains to the north into the pond located approximately 500 feet west of the former Munitions Washout Building. The pond is approximately 150 feet in diameter and is man-made. It is the only sustained water body on site. Air photos from 1968 show that from an outlet on the western edge of the pond, water in the pond flowed to the west and eventually to the south through small drainage swales and drainage ditches alongside the SEDA railroad tracks and roads. This natural outlet no longer exists and overflow is



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CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
REMEDIAL INVESTIGATION
SEAD-4 MUNITIONS WASHOUT FACILITY

DEPT.
ENVIRONMENTAL ENGINEERING

Dwg. No.
734639-01001

FIGURE 3-1

SURFACE WATER FLOW MAP

SCALE
AS NOTED

DATE
JUNE 1999

REV
A

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piped immediately to the west of the pond by a PVC overflow pipe located on the western bank of the pond. Currently, the static water level of the pond is low enough that overflow is unusual and the pond is stagnant.

While the majority of the surface water runoff flows into either of the two main drainage ditches described above, a minor amount of runoff is directed either into the drainage ditches flowing north along North South Baseline Road or into the drainage ditches flowing south along North South Baseline Road and the SEDA railroad tracks.

Precipitation data from the Aurora Research Farm monitoring station, were reviewed to gain a perspective on the seasonal variations in rainfall that would directly impact surface water flow. These data indicate that, historically, June has the greatest amount of rainfall at 3.9 inches, and the winter months of January and February generally have had the least amount of rainfall.

3.4 SITE GEOLOGY

The site geology is characterized by gray Devonian shale with a thin weathered zone where it contacts the overlying mantle of Pleistocene till. This stratigraphy is consistent over the entire site. Additionally, artificial fill occurs above the till at locations around the buildings and the pond on the site. Boring logs for SEAD-4 are presented in Appendix B.

In most of the soil borings, a thin layer of topsoil was observed, usually less than a foot thick, within one foot of the ground surface. The depths of the soil borings were up to 11 feet below the ground surface.

3.4.1 Filled Areas

Based on data from the boring and well logs, a thin layer of fill covers many areas of the site. The fill becomes significantly thicker around the pond. This may be due to the dredging of the pond and its subsequent disposal around the surrounding area.

3.4.2 Till

The predominant surficial geologic unit present at the site is dense till. The till is distributed across the entire site and ranges in thickness from 0.5 feet to as much as 4.6 feet based upon refusal data collected during the ESI and RI, although the average thickness of the till on-site is only 1.6 feet. The thickest section of glacial till was encountered at SB4-24, located at SS4-8 in Area 1 (western part of the site). The thinnest section of glacial till was found at MW4-9, located behind T30 at the location of SB4-10 from the ESI, while till was entirely absent at locations SB4-12, SB4-16, SB4-17, SB4-26, SB4-27, SB4-28 and MW4-7. The till is generally characterized by light gray to olive gray clay and silt with some black shale fragments (up to 0.25 inches in diameter) and traces of fine sand with some medium sized gravel. Larger shale fragments (rip-up clasts) were also observed at many locations near the till/weathered shale contact and are probably ripped-up clasts removed by the once-active glacier.

Darian silt-loam soils, 0 to 18 inches thick, are developed in till derived mainly from local alkaline and calcareous, dark-gray and black silty shale and a small quantity of limestone (Hutton, 1972). These surficial soils are somewhat poorly drained and have a silt clay loam and clay subsoil. These are nearly level to gently sloping soils that have developed on the uplands in the central part of Seneca County. In general, 0-3 percent slopes are associated with these soils (Hutton, 1972).

Grain size analyses were performed on surface soils and subsurface soils that were sampled as part of the soil sampling program. Grain size analyses were performed on three soil samples collected from varying depths in soil borings SB4-11, SB4-15, and SB4-28 at SEAD-4 (Appendix E). A till/weathered shale sample collected from 2 to 2.9 feet in boring SB4-11 contained 25 percent silt and clay. A till sample collected from 2 to 4 feet at boring SB4-15 contained 40 percent silt and clay. A till/weathered shale sample at 2 to 4 feet in SB4-28 contained 55 percent silt and clay.

Grain size analysis curves for till samples collected during the installation of monitoring wells on another portion of SEDA show a wide distribution of sediment sizes (Metcalf & Eddy, 1989). Based on all of the available grain size analyses at SEDA, the till generally has a high percentage of silt and clay with lesser amounts of sand and fine gravel-sized particles (47 to 93 percent of the sample passed the No. 200 sieve). The porosities of five gray-brown silty clay (i.e., till) samples ranged from 34.0 percent to 44.2 percent with an average of 37.3 percent (USAEHA, 1985).

These grain size data are approximately consistent with data published by the Soil Conservation Service (Hutton, 1972) that show the Darian Series (DaA) soils in Seneca County contain between 55 and 75 percent silt and clay (i.e., this percentage passes the no. 200 sieve).

The minimum, maximum and average background concentrations of selected inorganic constituents in the till located on SEDA have been extensively characterized. These data are discussed in Section 1.0 and presented in **Table 1-4**.

3.4.3 Weathered Shale

A zone of weathered gray shale of variable thickness was encountered below the till at many of the locations drilled on-site. The upper boundary of the weathered shale was recorded in split spoon samples and the base of the weathered shale was, for the purposes of this investigation, defined as the depth of refusal with the hollow stem augers or where augering became abruptly difficult and slow. The thickness of the weathered shale ranges between 0.3 feet (at SB4-8) to 1.3 feet (at SB4-16) on the site. The average thickness on the site is 0.7 feet. Differential weathering through geologic time is likely responsible for the variable thickness. No outcrops of weathered or competent shale are exposed at SEAD-4. See **Table 3-1** and **Figure 3-2** for details.

3.4.4 Competent Shale

No bedrock coring was performed at SEAD-4, however, information on the competent shale is available from Mozola (1951) and cores obtained from other sites at SEDA. The bedrock underlying the site is composed of the Moscow Formation of the Devonian age Hamilton Group, according to the Geologic Map of New York, Finger Lakes Sheet (1970). Specifically, the site lies in the lower one-quarter of the Moscow Formation. The lower two thirds of the Moscow shale is soft, gray, and calcareous and contains an abundance of fossils (Mozola, 1951). The upper or younger part of the Moscow shale is dark, highly friable, and less calcareous than the lower two-thirds. Weathered surfaces are generally medium to light gray and may be stained with iron oxide. Many of the joint openings in the shale strike in two predominant joint directions, N 65° E and N 25-30° W (Mozola, 1951). These joints are primarily vertical. Merrin (1992) cites three prominent vertical joint directions of northeast, north-northwest, and east-northeast in outcrops of the Genesse Formation 15 miles southeast of SEAD-25 near Ithaca, New York. The Hamilton Group is a gray-black, calcareous shale that is fissile and exhibits parting (or separation) along bedding planes.

TABLE 3-1

SEAD-4 - SUMMARY OF SUBSURFACE STRATIGRAPHY

SEAD-4 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

LOCATION ID	LOCATION ELEVATION	DEPTH TO TOP OF SHALE *	EASTING	NORTHING	THICKNESS OF FILL (ft)	THICKNESS OF OVERBURDEN (ft)
SB4-1	NA	9.5	745822.777	987477.072	1.5	9.5
SB4-2	NA	2.5	744938.98	987818.31	NA	2.5
SB4-3	NA	8	745020.76	0	2	8
SB4-4	NA	8.7	744205.874	987051.222	NA	8.7
SB4-5	NA	3.6	745115.16	987356.13	2	3.6
SB4-6	NA	2.2	744832.76	987031.06	NA	2.2
SB4-7	NA	8.3	745271.36	987432.55	NA	8.3
SB4-8	NA	5.6	745073.08	987359.05	NA	5.6
SB4-9	NA	3	745583.37	986552.16	NA	3
SB4-10	NA	4	745193.37	986900.54	NA	4
SB4-11	NA	2.9	744371.996	986939.954	1.6	2.9
SB4-12	NA	6.4	744405.962	987072.907	6.4	7.3
SB4-13	NA	2	745257.177	986958.295	1.8	3.8
SB4-14	NA	4	745474.726	986608.387	1.2	4.8
SB4-15	NA	4.5	745566.11	986427.681	3.5	5.6
SB4-16	NA	3	744847.455	987619.019	3	4.3
SB4-17	NA	2	744863.122	987557.702	1.5	3.2
SB4-18	NA	5.5	745354.502	987692.409	3.5	6.5
SB4-19	NA	5.2	745419.522	987678.167	4.2	5.2
SB4-20	NA	6.8	744274.891	987099.925	3.5	8.6
SB4-21	NA	10.3	744167.319	986981.118	1.3	10.3
SB4-22	NA	NA	744263.568	987214.491	5.2	7.6
SB4-23	NA	6.5	744373.969	987088.612	4.7	6.8
SB4-24	NA	10.4	744165.904	987114.069	3	8.6
SB4-25	NA	7.5	744373.969	987088.612	5.4	7.5
SB4-26	NA	4.5	746128.379	986803.32	0.8	5
SB4-27	NA	2.5	744924.482	987609.887	2.5	3.4
SB4-28	NA	2.6	744917.954	987561.615	2.6	3.4

NA = Not Available

* In feet, below ground level

TABLE 3-1

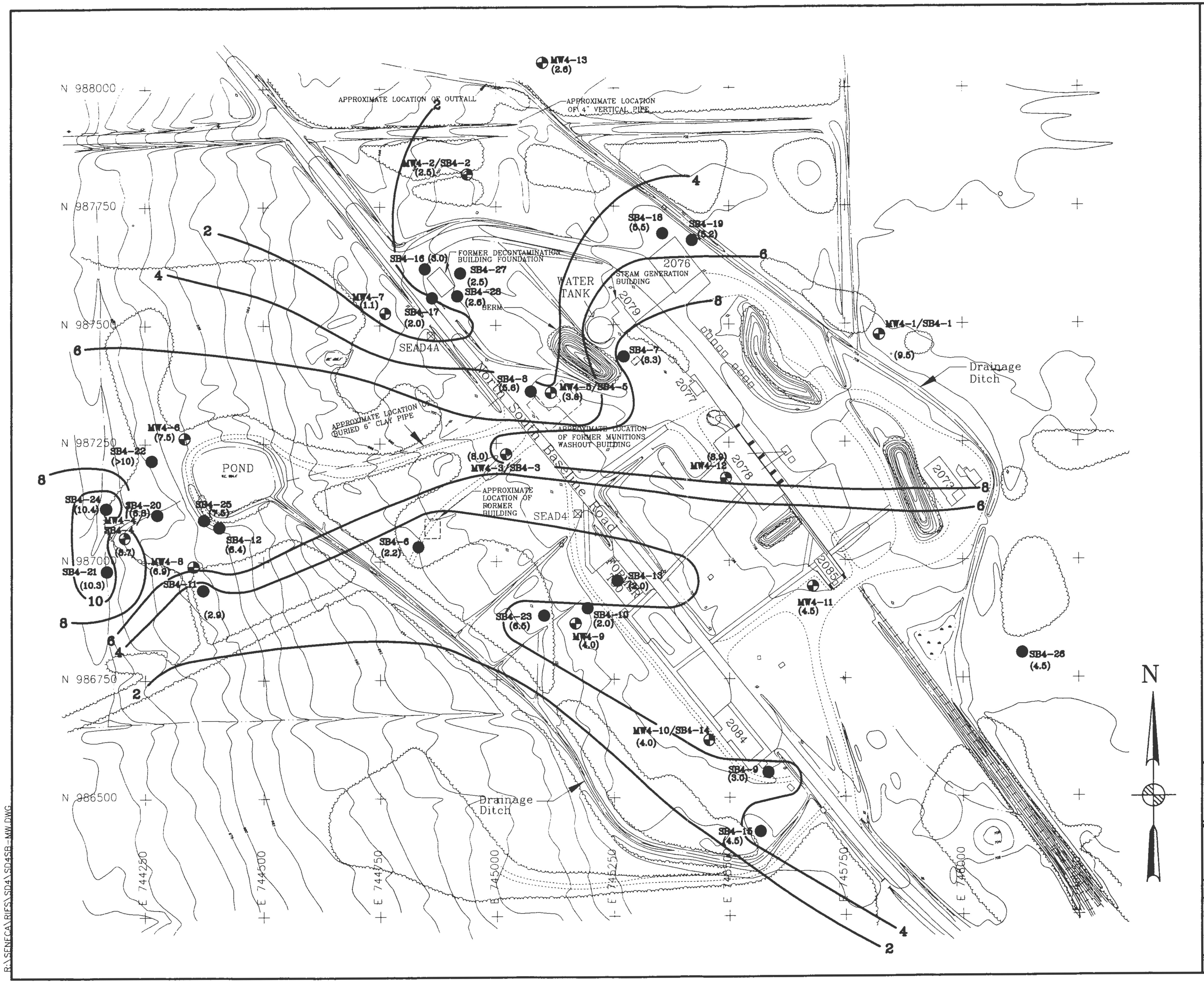
SEAD-4 - SUMMARY OF SUBSURFACE STRATIGRAPHY

SEAD-4 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

LOCATION ID	LOCATION ELEVATION	DEPTH TO TOP OF SHALE *	EASTING	NORTHING	THICKNESS OF FILL (ft)	THICKNESS OF OVERBURDEN (ft)
MW4-1	NA	9.5	745822.777	987477.072	1.5	9.5
MW4-2	NA	2.5	744938.98	987818.31	NA	2.5
MW4-3	NA	8	745020.76	987226.64	2.0	8
MW4-4	NA	8.7	744205.874	987051.222	NA	8.7
MW4-5	NA	3.6	745115.16	987356.13	2.0	3.6
MW4-6	NA	7.5	744322.63	987264.334	3.5	7.5
MW4-7	697.26	1.1	744364.346	987011.058	1.1	1.5
MW4-8	681.74	6.9	744364.346	987011.058	3.8	6.9
MW4-9	701.35	2	745175.596	986916.04	1.2	3
MW4-10	704.51	4	745474.726	986608.387	1.2	4.8
MW4-11	705.66	4.5	745667.644	986968.819	1.8	5.3
MW4-12	707.72	8.9	745505.291	987177.087	4.3	8.9
MW4-13	698.66	2.6	745269.584	987862.841	1.4	3

NA = Not Applicable

* In feet, below ground level



LEGEND

- MINOR WATERWAY
- MAJOR WATERWAY
- FENCE
- UNPAVED ROAD
- BRUSH LINE
- LANDFILL EXTENTS
- RAILROAD
- 760 GROUND SURFACE ELEVATION CONTOUR
- ROAD SIGN
- DECIDUOUS TREE
- GUIDE POST
- FIRE HYDRANT
- ⊗ MANHOLE
- + COORDINATE GRID (250' GRID)
- ⊙ POLE
- ▭ UTILITY BOX
- ⊡ MAILBOX/RR SIGNAL
- OVERHEAD UTILITY POLE
- ☒ SURVEY MONUMENT
- MONITORING WELL
- ● SOIL BORING
- (4.0) DEPTH, IN FEET, TO THE TOP OF SHALE

100 0 100 200
(feet)

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CLIENT/PROJECT TITLE
SENECA ARMY DEPOT ACTIVITY
REMEDIAL INVESTIGATION
SEAD-4 MUNITIONS WASHOUT FACILITY

DEPT. ENVIRONMENTAL ENGINEERING
Dwg. No. 734539-01001

FIGURE 3-2
COMPETENT SHALE TOPOGRAPHY MAP

SCALE 1" = 200'
DATE JUNE 1999
REV A

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Competent, calcareous black shale was encountered at depths between approximately 4 and 11 feet below ground surface. The elevations of the competent bedrock determined during the drilling and seismic programs indicate that the shale slopes to the west mimicking the land surface. The upper portion of the competent shale (0.2 to 2.5 feet) is weathered. The bedrock topographic map is presented in **Figure 3-2**.

3.4.5 Site Stratigraphy

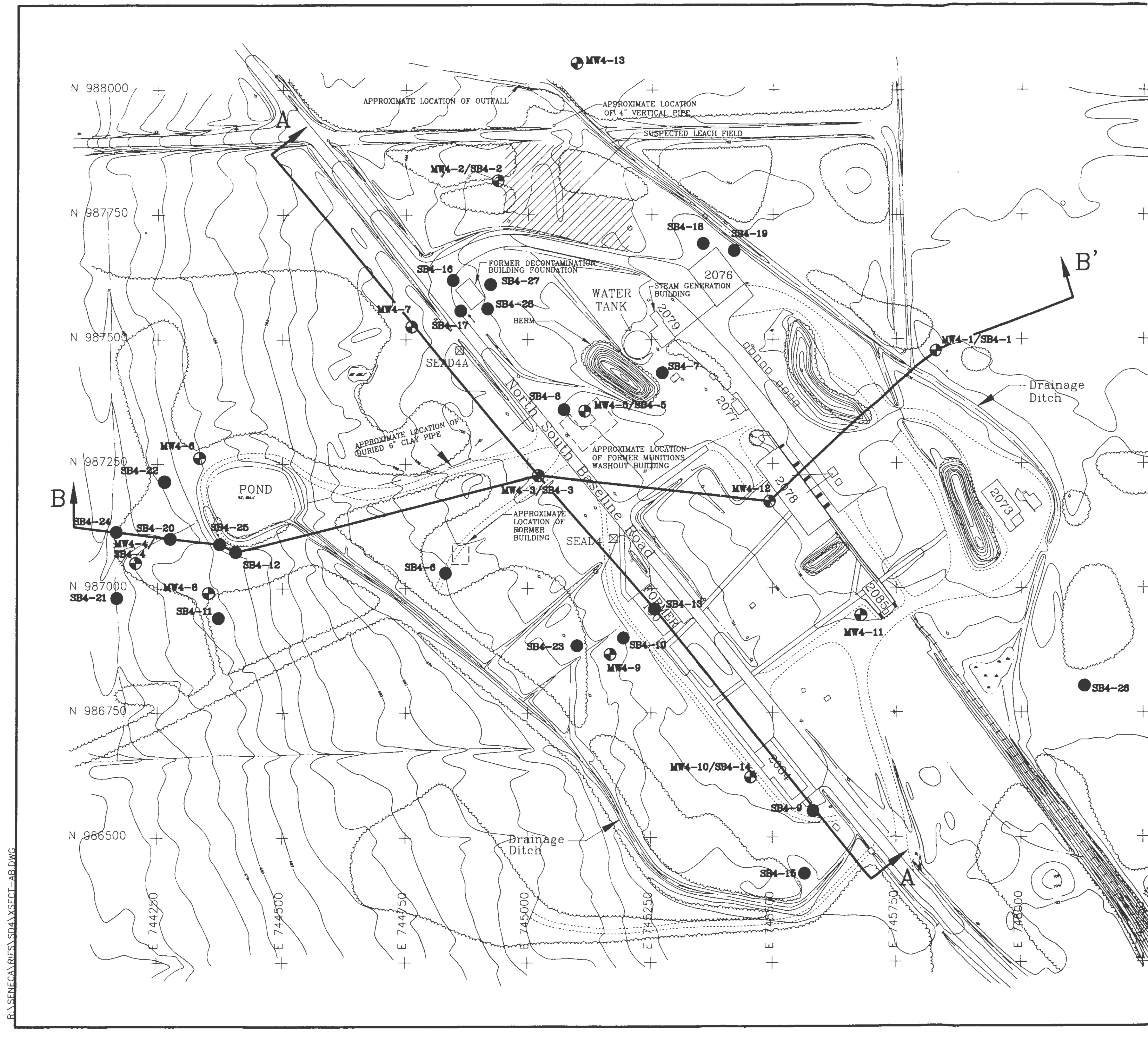
Two geologic cross-sections were constructed for the site. The locations of these sections are shown in **Figure 3-3**. Cross-sections A-A' and B-B' show the consistent till, weathered shale, competent shale stratigraphy beneath the site based on data from borings and monitoring wells (**Figures 3-4 and 3-5**). Also, both cross-sections show the presence of fill near the former Building T-30, Building 2078, and the area around the man-made pond. The sections were drawn to provide a somewhat detailed view of the subsurface stratigraphy by intersecting as many data points (i.e., soil borings or monitoring wells) as possible while maintaining a uniform direction for the cross-section.

3.5 GEOPHYSICAL RESULTS

Three geophysical investigations were performed at SEAD-4. A seismic survey was performed to help define groundwater flow directions at the site prior to installation of any monitoring wells. The GPR and EM-31surveys were performed to delineate the location of the suspected leach field, locations of subsurface pipes and structures that may have carried the wastewater from the washout operation to the suspected leach field, and the location of a suspected underground concrete tank or pit near Building 2076. The locations where the geophysical investigations were conducted are shown in **Figure 2-1**. The results of these various investigations are summarized in detail below.

3.5.1 Seismic Refraction Survey

The results of the seismic refraction survey conducted in SEAD-4 are shown in **Table 3-2**. The location of the individual seismic transects are shown in **Figure 2-1**. The seismic profiles detected 5 to 15 feet of unconsolidated overburden (1,000-7,700 feet/second) overlying bedrock (12,000-14,000 ft/s). In particular, the unconsolidated material included unsaturated overburden (1,000-1,400 ft/s), compact unsaturated till (3,500-4,200 ft/s), and saturated till (5,000-7,700 ft/s).


MW4-13
N 988000
APPROXIMATE LOCATION OF OUTFALL
APPROXIMATE LOCATION OF 4" VERTICAL PIPE
SUSPECTED LEACH FIELD
A
MW4-2/SB4-2
N 987750
SB4-18
SB4-19
B'
SB4-16
FORMER DECONTAMINATION BUILDING FOUNDATION
SB4-27
2076
WATER TANK
STEAM GENERATION BUILDING
SB4-28
MW4-7
SB4-17
BERM
2079
N 987500
MW4-1/SB4-1
SEAD4A
SB4-7
Drainage Ditch
North South Baseline Road
SB4-8
MW4-5/SB4-5
2077
APPROXIMATE LOCATION OF BURIED 6" CLAY PIPE
APPROXIMATE LOCATION OF FORMER MUNITIONS WASHOUT BUILDING
MW4-6
N 987250
SB4-22
POND
MW4-3/SB4-3
MW4-12
2078
B
2073
SB4-24
SB4-20
SB4-25
APPROXIMATE LOCATION OF FORMER BUILDING
SEAD4
MW4-4/SB4-4
SB4-12
SB4-6
N 987000
MW4-8
SB4-21
SB4-11
FORMER
SB4-13
2085
MW4-11
SB4-23
SB4-10
MW4-9
SB4-26
N 986750
MW4-10/SB4-14
2084
SB4-9
N 986500
Drainage Ditch
A'
SB4-15
E 744250
E 744500
E 744750
E 745000
E 745250
E 745500
E 745750
E 746000
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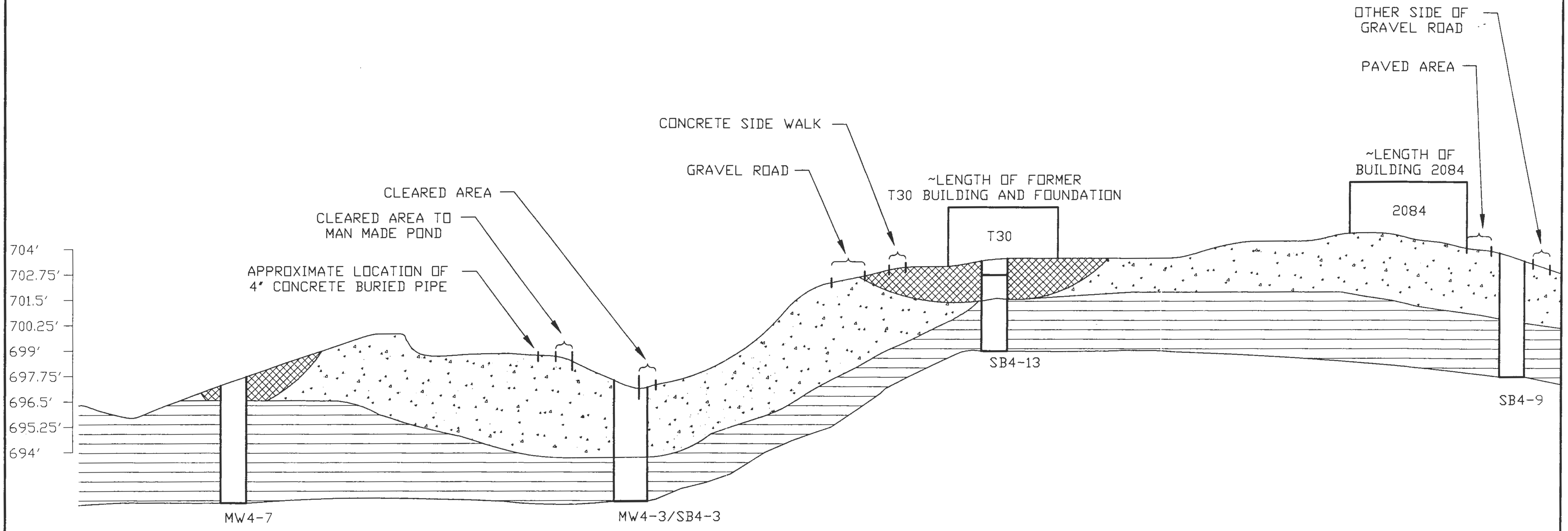

LEGEND:

▨ FILL

☰ WEATHERED SHALE

⁘ TILL

☐ CONCRETE

SCALE:
VERTICAL 1" = 5'
HORIZONTAL 1" = 100'

R:\SENECA\RIFS\SD4\XSECT-A.DWG

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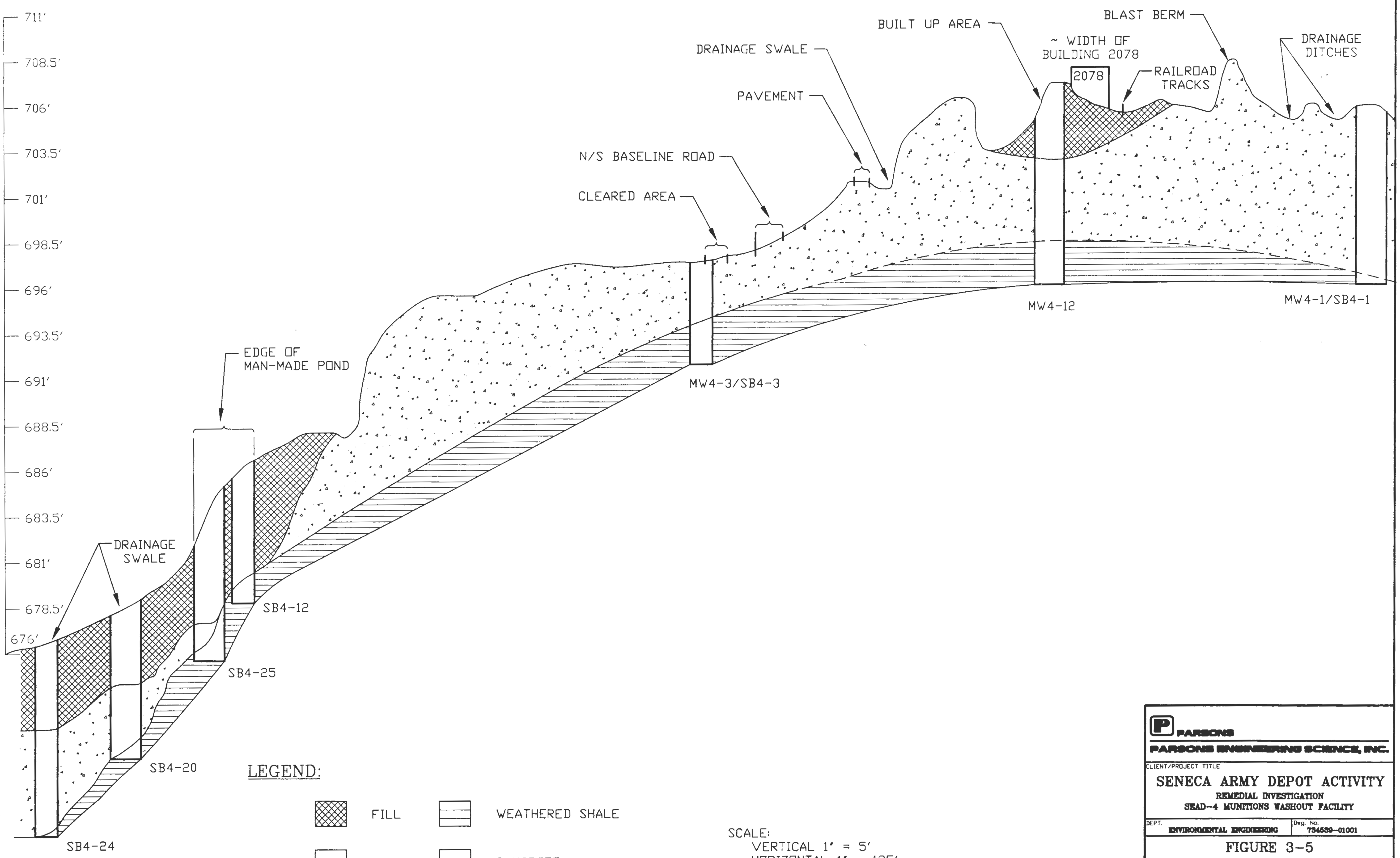
REMEDIAL INVESTIGATION
SEAD-4 MUNITIONS WASHOUT FACILITY

DEPT.	Dwg. No.
ENVIRONMENTAL ENGINEERING	734539-01001

FIGURE 3-4
GEOLOGICAL CROSS SECTION A-A'

SCALE	DATE	REV
AS NOTED	JULY 1999	A



R:\SENECA\RIFS\SD4\XSECT-B.DWG

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SENECA ARMY DEPOT ACTIVITY
REMEDIAL INVESTIGATION
SEAD-4 MUNITIONS WASHOUT FACILITY

DEPT. ENVIRONMENTAL ENGINEERING

Dwg. No. 734539-01001

FIGURE 3-5
GEOLOGICAL CROSS SECTION B-B'

SCALE AS NOTED

DATE JULY 1999

REV A

TABLE 3-2

SEAD-4 - RESULTS OF SEISMIC REFRACTION SURVEY

SEAD-4 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

Profile Number	Distance on Profile (feet) [1]	Ground Elevation (feet)[2]	Water Table		Bedrock	
			Depth (feet)	Elevation (feet)	Depth (feet)	Elevation (feet) [2]
P1	0	117.8	NA	NA	5.4	112.4
	57.5	117.5	NA	NA	6.3	111.2
	115.0	117.7	NA	NA	5.4	112.3
P2	0.0	113.4	2.6	110.8	7.6	105.8
	57.5	113.4	2.5	110.9	7.2	106.2
	115.0	113.0	1.5	111.5	6.1	106.9
P3	0.0	116.3	2.5	113.8	9.5	106.8
	57.5	116.6	1.6	115.0	10.4	106.2
	115.0	117.1	1.7	115.4	11.4	105.7
P4	0.0	104.1	3.5	100.6	12.5	91.6
	57.5	102.1	4.3	97.8	14.5	87.6
	115.0	100.0	3.5	96.5	9.2	90.8

1 All distances are in feet along the axis of the seismic profile and were measured from geophone #1 of each profile.

2 All elevations are relative to an arbitrary datum established at the geophone located at the end of the SEAD-4 seismic profile P4.

Note that due to inherent limitations of the seismic refraction method, a thin layer of saturated overburden (less than 2 feet) overlying the bedrock surface would be undetectable.

NA = Not available

Saturated overburden was only detected beneath profile P4 near the pond. At the locations of the other profiles, either saturated overburden was not present or the saturated layer was too thin to be detected by the seismic refraction method. Profiles P2 and P3 suggest that a layer of compact, unsaturated till is present at a depth of 1 to 3 feet.

A review of the relative elevation of bedrock, presented in **Table 3-2**, demonstrates that the bedrock surface slopes to the west or southwest following the slope of the surface topography. Groundwater flow is also expected to be directed to the west or southwest, following the slope of the relatively impermeable bedrock surface.

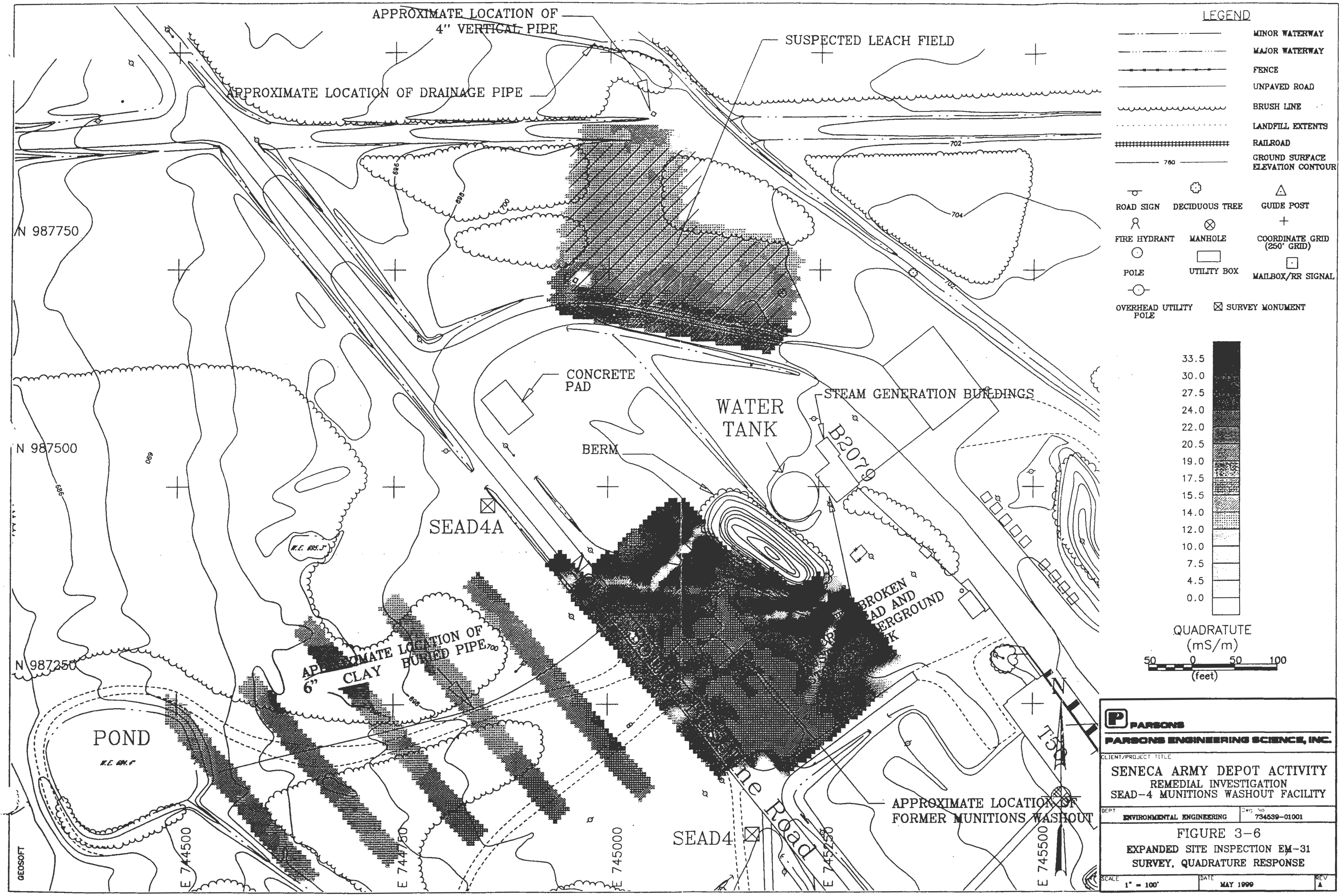
3.5.2 EM-31 Survey

An EM-31 survey was conducted in the following four areas: the vicinity of the former washout plant, the suspected leach field, the drainage pipe leading west to the man-made pond, and Building 2076. The quadrature response from the suspected leach field clearly shows the more conductive road bed and the effects of the two concrete tanks, as shown in **Figure 3-6**. Otherwise, the apparent conductivity (quadrature response) of the ground is extremely uniform in this area. The in-phase response shows a greater variability, perhaps suggestive of disrupted ground, as shown in **Figure 3-7**.

The quadrature response in the area of the former munitions washout plant is dominated by the linear signatures of buried pipes, as shown in **Figure 3-6**. Four pipes are clearly visible. Large anomalies in the south and east corners of this grid are due to reinforced concrete pads. The pipes are also evident in the in-phase response; however, this parameter exhibits considerably more variability, perhaps due to disturbed soil and buried metallic debris (**Figure 3-7**).

The EM lines acquired between the road and the pond failed to detect any significant anomalies as shown in **Figures 3-6 and 3-7**. Both EM parameters exhibit very little variability, suggesting that the soil is relatively uniform and undisturbed. The clay pipe which discharges into the pond was not detected.

For the EM-31 survey conducted around Building 2076, the most pronounced feature in the terrain conductivity data is from metal associated with Building 2076 (Appendix A). One anomaly that was not attributable to cultural sources such as the building and culverts was evident south of



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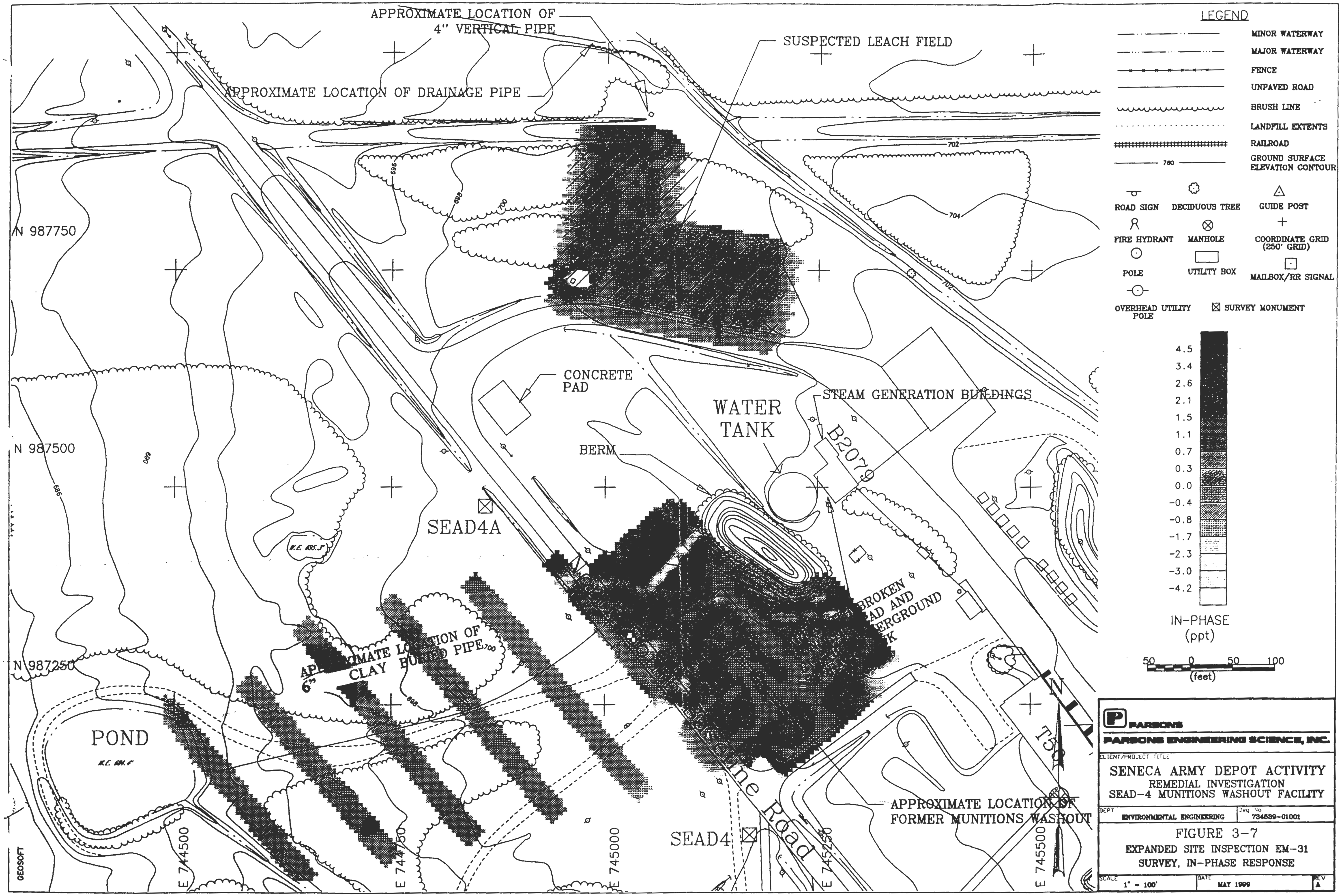
SENECA ARMY DEPOT ACTIVITY
REMEDIAL INVESTIGATION
SEAD-4 MUNITIONS WASHOUT FACILITY

DEPT	DWG NO
ENVIRONMENTAL ENGINEERING	734539-01001

FIGURE 3-6
EXPANDED SITE INSPECTION EM-31
SURVEY, QUADRATURE RESPONSE

SCALE	DATE	REV
1" = 100'	MAY 1999	A



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REMEDIAL INVESTIGATION
SEAD-4 MUNITIONS WASHOUT FACILITY

DEPT	Dwg No
ENVIRONMENTAL ENGINEERING	734639-01001

FIGURE 3-7
EXPANDED SITE INSPECTION EM-31
SURVEY, IN-PHASE RESPONSE

SCALE	DATE	REV
1" = 100'	MAY 1999	A

Building 2076. The anomaly trends north/south and corresponds to a septic tank located near the building. No anomalous response in the in-phase response was recognized at the location of this anomaly.

3.5.3 GPR Survey

GPR surveys were conducted in all of the areas investigated by the EM-31 survey. The locations of the surveys are shown on Figure 2-1. The depth of penetration was limited to about 3 to 5 feet due to the abundance of electrically conductive clay in the overburden.

The GPR survey conducted in the vicinity of the former munitions washout plant detected numerous anomalous responses that may be classified as linear anomalies, point source anomalies, and stratigraphic anomalies. Some of the linear anomalies correspond to segments of buried pipes detected by the EM-31 survey. Point source anomalies are very common to the GPR method. Such anomalies may be attributed to buried metallic debris, construction debris, boulders, or local inhomogeneities in the soil. Stratigraphic anomalies are typically evidenced by disruption of layering of the soil or by local changes in the electrical properties of the soil. Stratigraphic anomalies are typically caused by excavation and backfilling, although natural variation in the composition of glacial till may produce such effects.

Figure 3-8 shows the GPR profile record acquired across profile A-A' located near the former munitions washout plant. The left half of the GPR record acquired across profile A-A' shows limited penetration of only about 15 nanoseconds (ns) or about 3 feet. The right half of the profile shows 6 to 8 hyperbolic anomalies located at about 10 ns (2 feet), reverberating to a time of about 30 ns. This record is characteristic of the GPR survey conducted in this grid. Areas of abundant hyperbolic anomalies are interspersed with areas of limited penetration. Some of the hyperbolic anomalies can be correlated from line to line (linear anomalies) but most appear to be isolated sources.

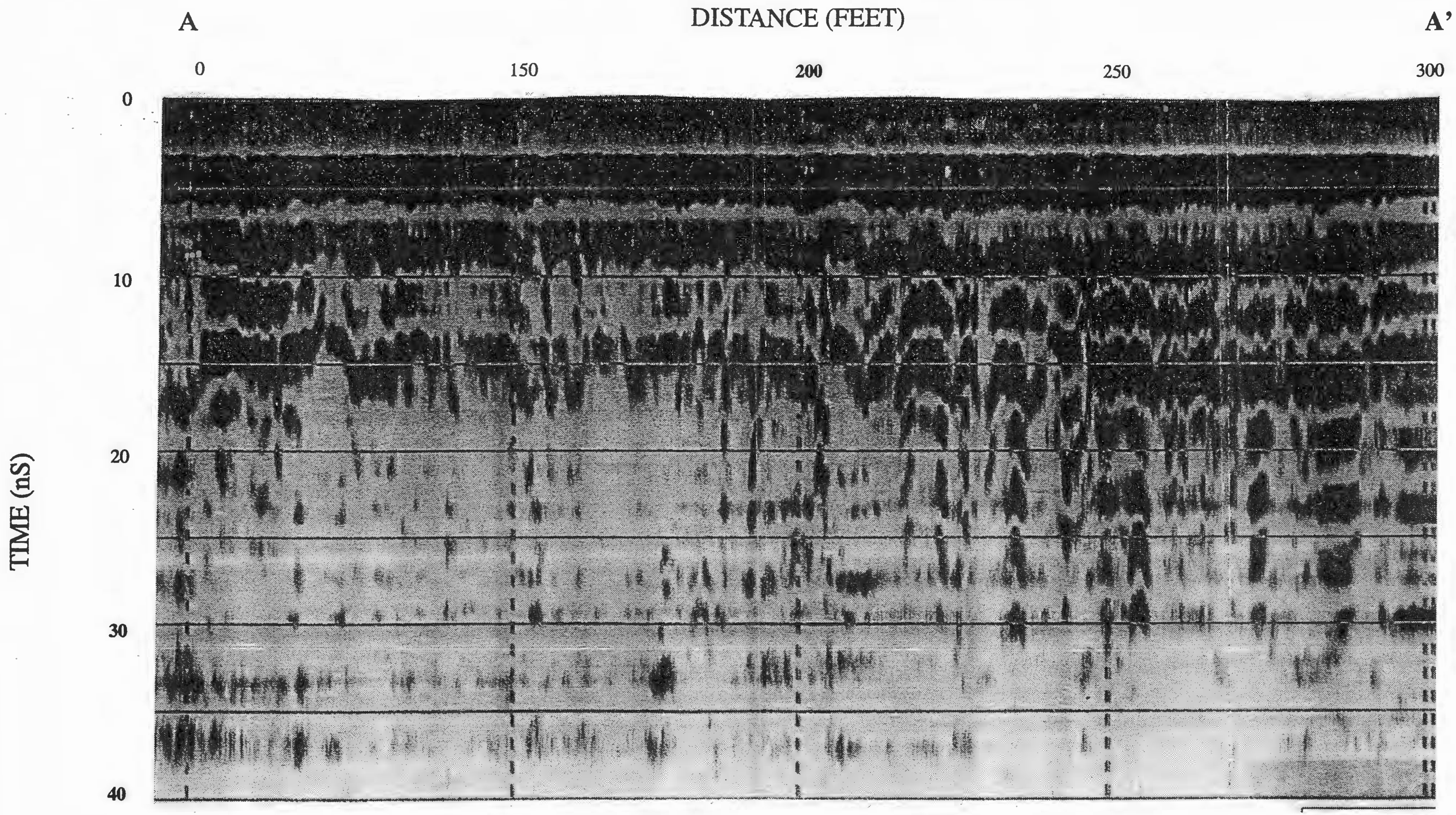

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FIGURE 3–8
EXPANDED SITE INSPECTION
GPR PROFILE A–A'

NA	DATE MAY 1999	REV A

R:\GRAPHICS\SENECA\RADAR\SD4-AA.CDR

The GPR survey conducted in the area of the suspected leach field detected an anomalous zone parallel to the road in the main section of the grid. This zone is characterized by strong banding and reverberation throughout the record. An example of the response is shown in profile B-B' from about 55 to 80 feet along the length of the profile, as shown in **Figure 3-9**. No pronounced linear anomalies or pipes were detected in this area.

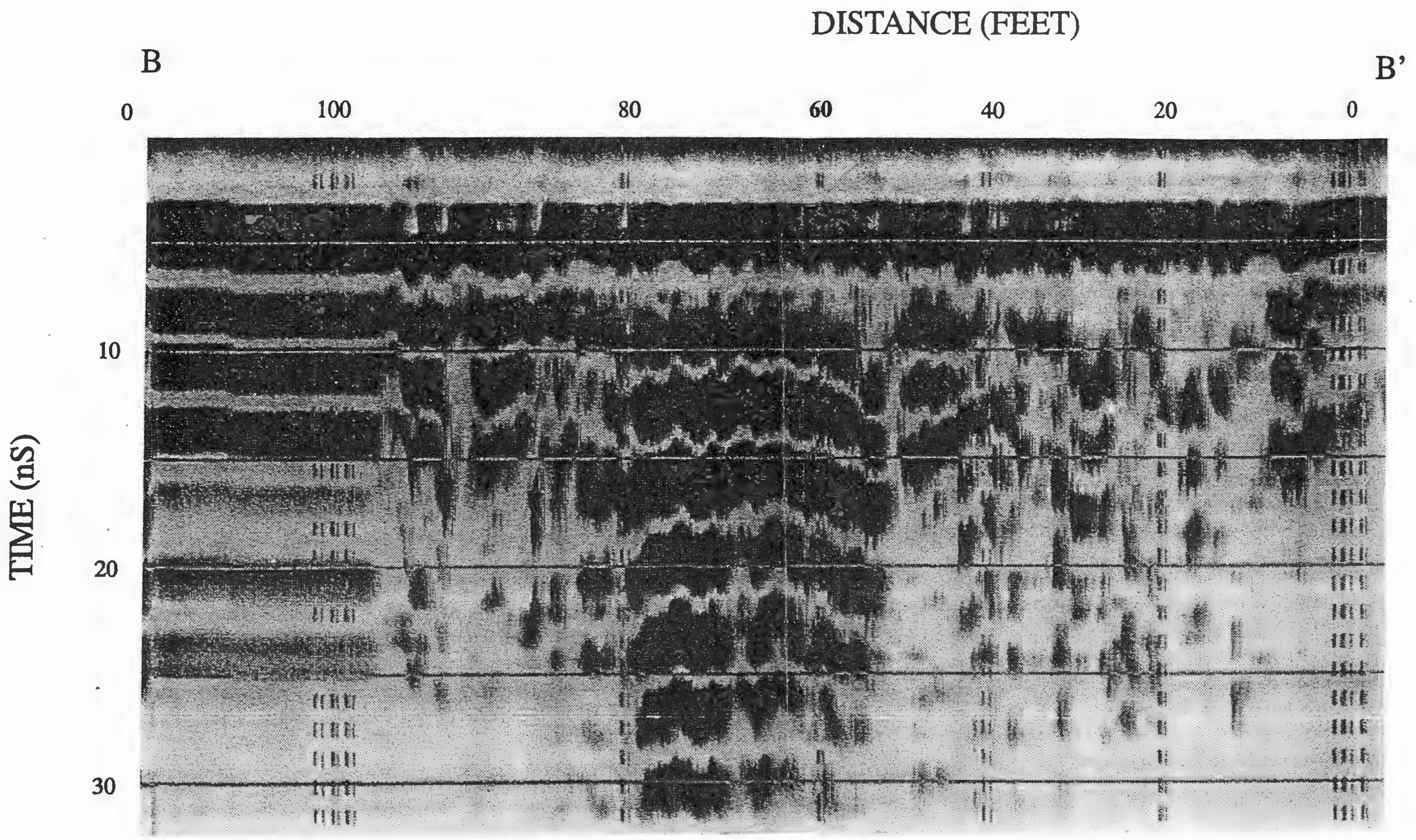
The GPR profiles between the road and the pond did not detect any continuous anomalies that could be attributed to the 6-inch clay pipe that terminates at the pond. Several strong hyperbolic anomalies were observed in the transect along the road; however, none of these features could be traced away from the road. The GPR records acquired in this area were conspicuously devoid of anomalous responses.

The GPR survey conducted in the vicinity of Building 2076 included four GPR profiles located bi-directionally across the anomaly detected in the EM-31 data (**Figure 2-1**). Three lines were oriented east/west and one was oriented north/south. All four records detected a hyperbolic anomaly ranging in depth from five feet closest to the building, to seven feet further south. The east/west GPR profiles did not fully characterize the western extent of the anomaly, suggesting that the subsurface feature may extend beneath the roadway and be larger than the 40-foot limit of the survey lines. The GPR records exhibit a near surface hyperbolic anomaly suggesting the existence of a utility line trending north/south from 110E to 115E. The GPR responses are provided in Appendix A.

3.6 HYDROGEOLOGY

3.6.1 Groundwater Flow Directions in the Till/Weathered Shale Aquifer

The groundwater flow direction in the till/weathered shale aquifer on the site is generally toward the west based on the groundwater elevations measured in the thirteen monitoring wells on March 16, 1999. It is likely that there may be local variations in the flow direction and gradient. The noticeable steepening of the land surface gradient in the western portion of the site when compared to the eastern portion is also present in the groundwater gradient across the site. The distribution of groundwater in the till aquifer is characterized by moist soil with coarse-grained



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Dwg No 734539-01001

FIGURE 3-9
EXPANDED SITE INSPECTION
GPR PROFILE B-B'

SCALE NA
DATE MAY 1999
REV A

R:\GRAPHICS\SENECA\RADAR\SD4-BB.CDR

lenses of water-saturated soil, and in most instances the deeper weathered shale horizons are saturated. Recharge of water to the monitoring wells during sampling was generally good.

At SEDA, springtime is typically a season of high water tables, compared to the late summer and fall. The maximum relief over the entire site is 57 feet. Based on groundwater elevation data from other sites at SEDA (i.e., the Ash Landfill), the late summer and early fall is typically a time when the saturated thickness of the till/weathered shale aquifer is smallest for the year. It is apparent from the saturated thickness of the till/weathered shale aquifer that seasonal precipitation events are likely to have an influence on groundwater flow. Thus, in the late summer to early fall the flow directions and gradients are likely to controlled more by bedrock topography than by a sustained regional gradient (i.e., groundwater would tend to collect in bedrock topographic lows).

Depth to water measurements for three separate events (April 4, 1994, March 1999, and July 1999) were made to evaluate any seasonal changes in groundwater flow direction and gradient at SEAD-4 (**Table 3-3**). The April 4, 1994 data set was not contoured for this report because it contains only three data points; this map is shown in Parsons ES, 1995a.

A groundwater contour map was prepared using the March 16, 1999 data set, and it clearly indicates that groundwater flow is toward the west on the western portion of the site and not well defined on the eastern portion of the site (**Figure 3-10**). The contour interval on the figure is two feet. Groundwater elevations range from a high of 703.20 feet immediately west of Building 2084 to a low of 677.84 feet just downgradient of the pond. The maximum relief over the entire site is 25.36 feet. Saturated thicknesses for the aquifer at SEAD-4 were between 2.6 feet and 10 feet. In the eastern portion of the site near the former Munitions Washout Building, the horizontal groundwater gradient was calculated to be 0.002 ft/ft between wells MW4-1 and MW4-5. On the western portion of the site, the gradient between MW4-5 and MW4-4 was calculated to be 0.019 ft/ft and groundwater flow is to the west.

A groundwater contour map was prepared using the July 6, 1999 data set, and it also clearly indicates that groundwater flow is toward the west on the western portion of the site and not well defined on the eastern portion of the site (**Figure 3-11**). The contour interval on the figure is two feet. Groundwater elevations range from a high of 699.99 feet immediately west of Building 2078 to a low of 673.86 feet just downgradient of the pond. The maximum relief over the entire site is 26.13 feet. In the eastern portion of the site near the former Munitions Washout Building, the

Table 3-3

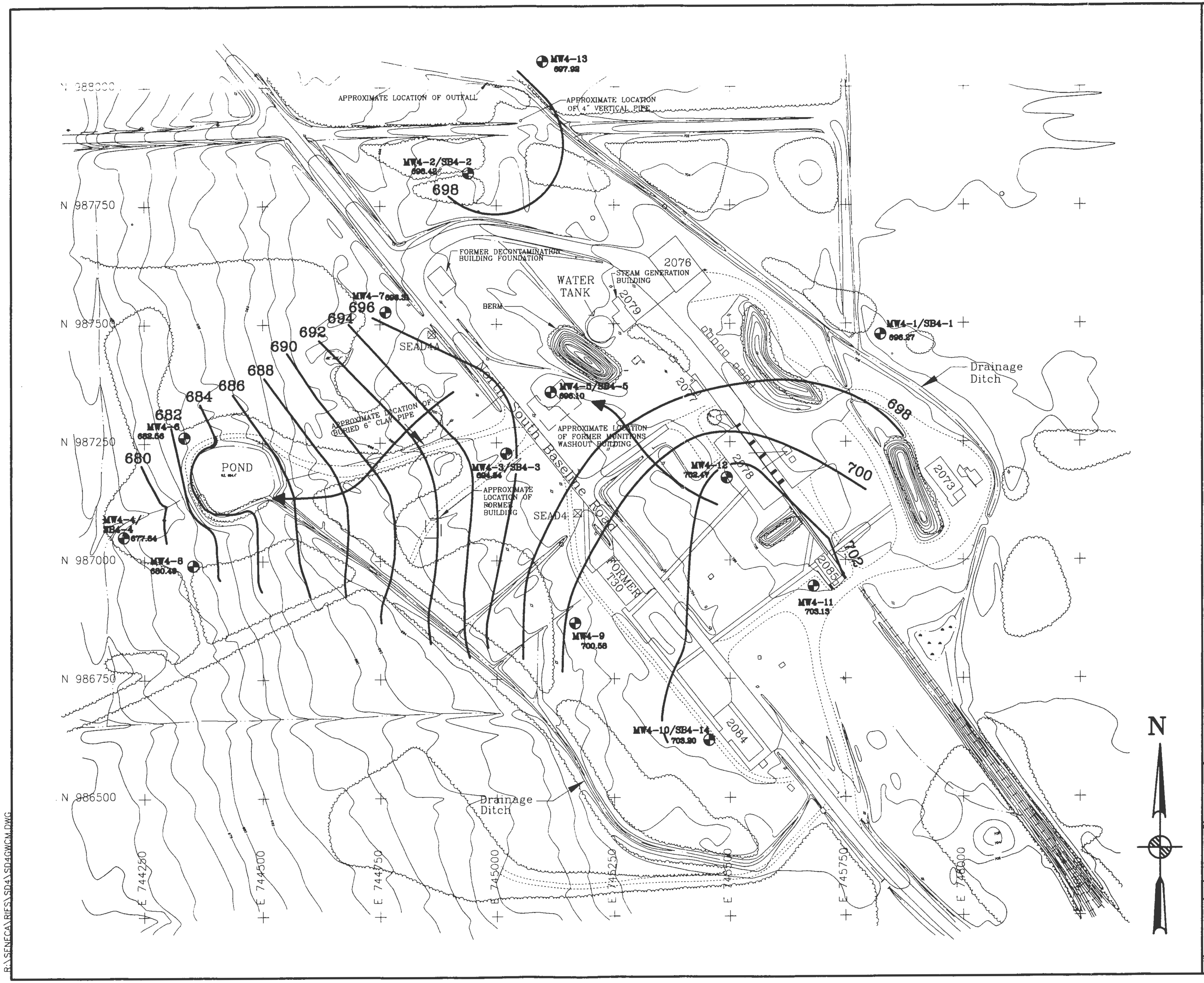
SEAD-4 - Water Table Elevations in Monitoring Wells

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Monitoring Well	Top of PVC Elevation (1) (feet)	April 4, 1994		March 16, 1999		July 6, 1999	
		Depth to Water (feet)	Water Table Elevation (feet)	Depth to Water (feet)	Water Table Elevation (feet)	Depth to Water (feet)	Water Table Elevation (feet)
MW4-1	700.12	3.45	696.67	3.85	696.27	9.03	691.09
MW4-2	702.44	3.28	699.16	4.02	698.42	6.1	696.34
MW4-3	699.90	4.47	695.43	5.06	694.84	9.13	690.77
MW4-4	680.37	2.38	677.99	2.53	677.84	6.51	673.86
MW4-5	700.46	3.91	696.55	4.36	696.10	7.82	692.64
MW4-6	686.12	NA	NA	3.56	682.56	9.20	676.92
MW4-7	699.46	NA	NA	3.15	696.31	6.77	692.69
MW4-8	684.08	NA	NA	3.59	680.49	8.56	675.52
MW4-9	703.66	NA	NA	3.08	700.58	7.16	696.50
MW4-10	706.72	NA	NA	3.52	703.20	7.55	699.17
MW4-11	708.20	NA	NA	5.07	703.13	8.42	699.78
MW4-12	710.11	NA	NA	7.64	702.47	10.12	699.99
MW4-13	700.92	NA	NA	3.00	697.92	7.45	693.47

Notes:

(1) Elevations are relative to the North American Vertical Datum (NAVD) 1988.
(2) April 4, 1994 data were collected as part of the ESI.
(3) NA = Not Available.



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LEGEND

—·—··—	MINOR WATERWAY
—·—·—	MAJOR WATERWAY
—×—×—×—	FENCE
········	UNPAVED ROAD
︵︵︵︵	BRUSH LINE
• • • • • •	LANDFILL EXTENT
##########	RAILROAD
—— 760 ——	GROUND SURFACE ELEVATION CONTOUR

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

MW4-3
695.4
MONITORING WELL WITH WATER TABLE ELEVATION

692
GROUNDWATER ELEVATION CONTOUR ARROW INDICATES DIRECTION OF GROUNDWATER FLOW

NOTES

1. MONITORING WELL WATER LEVEL SURVEY DATE: 3/99
2. GROUNDWATER CONTOUR ELEVATION DATUM IS NAVD OF 1988

100 0 100 200
(feet)

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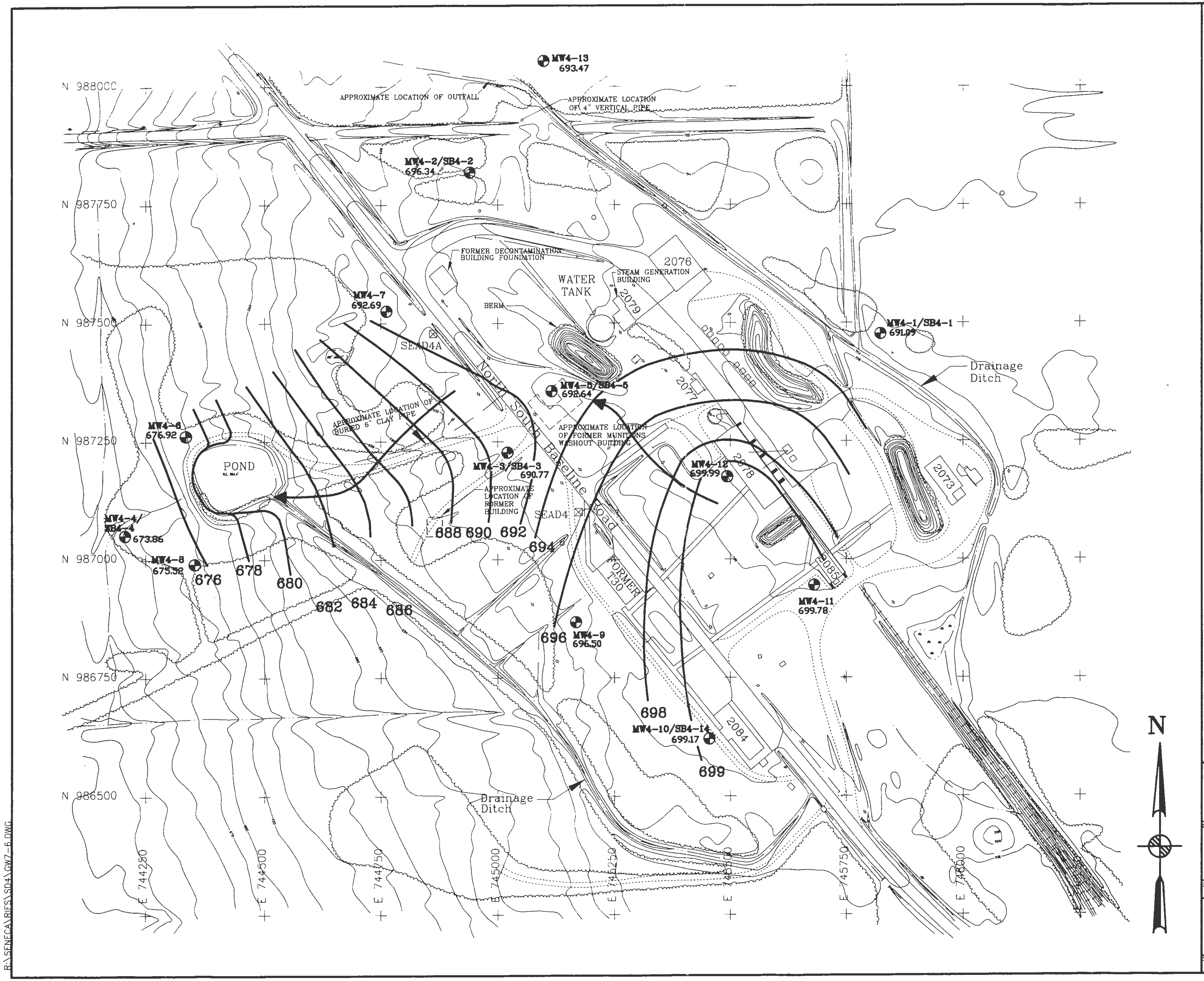
DEPT. ENVIRONMENTAL ENGINEERING
Dwg. No. 734539-01001

FIGURE 3-10
GROUNDWATER ELEVATION MAP
MARCH 1999

SCALE 1" = 200'
DATE JUNE 1999
REV A



LEGEND

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

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

MW4-3 695.4 MONITORING WELL WITH WATER TABLE ELEVATION

692 GROUNDWATER ELEVATION CONTOUR ARROW INDICATES DIRECTION OF GROUNDWATER FLOW

NOTES

1. MONITORING WELL WATER LEVEL SURVEY DATE: 7/6/99
2. GROUNDWATER CONTOUR ELEVATION DATUM IS NAVD OF 1988

100 0 100 200
(feet)

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REMEDIAL INVESTIGATION
SEAD-4 MUNITIONS WASHOUT FACILITY

DEPT.	Dwg. No.
ENVIRONMENTAL ENGINEERING	734539-01001

FIGURE 3-11
GROUNDWATER ELEVATION MAP
JULY 6, 1999

SCALE	DATE	REV
1" = 200'	JULY 1999	A

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horizontal groundwater gradient was calculated to be 0.002 ft/ft between wells MW4-1 and MW4-5. On the western portion of the site, the gradient between MW4-5 and MW4-4 was calculated to be 0.019 ft/ft and groundwater flow is to the west.

3.6.2 Hydraulic Conductivities in the Till/Weathered Shale Aquifer

Horizontal hydraulic conductivities were determined for seven till/weathered shale wells at SEAD-4 (**Table 3-4**).

Hydraulic conductivities for all seven wells were calculated using the method described by Bouwer and Rice (1976) as described in Section 2.0. The slug test data and hydraulic conductivity results are presented Appendix D.

Hydraulic conductivity values for the shallow till/weathered shale aquifer range from 4.76 x 10^{-4} cm/sec to 4.68 x 10^{-3} cm/sec and the geometric mean was 1.24 x 10^{-3} cm/sec. Published hydraulic conductivity values for till or representative materials are: 1) 0.49 m/day (5.67 x 10^{-4} cm/sec) for a repacked predominantly sandy till (Todd, 1980), and 2) from 10^{-2} to 10^{-3} m/day (10^{-5} to 10^{-6} cm/sec) for representative materials of silt, sand, and mixtures of sand, silt, and clay (Todd, 1980). No published hydraulic conductivity values for weathered shale were identified. While the measured values are slightly greater than the values cited in literature above, they represent a combined effect of the till and weathered shale.

3.6.3 Velocity of Groundwater in the Till/Weathered Shale Aquifer

Using Darcy's Law, the average linear velocity of groundwater in the shallow till/weathered shale aquifer was calculated. The velocity estimate was calculated using the geometric mean of the site hydraulic conductivity, an estimated effective porosity, and measured on-site groundwater gradients. A porosity estimate for weathered fissile shale with large amounts of silt in the interstices could not be located in the literature. Therefore, effective porosities for the till of 15 percent to 20 percent were used in the calculations.

It is noteworthy that at SEAD-4 there is a well defined direction of groundwater flow to the west and a groundwater gradient that is maintained throughout the year based on the groundwater topography map discussed above for March 1999.

TABLE 3-4

SEAD-4 - Hydraulic Conductivity (K) Values for the Till/Weathered Shale Aquifer

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Location ID	Test Name	K (cm/sec)	K(ft/day)
MW4-6	9	1.84E-03	5.20
MW4-7 *	5	NA	NA
MW4-8	8	3.05E-03	8.66
MW4-9	6	4.76E-04	1.35
MW4-10	07	1.06E-03	3.01
MW4-11	05	5.07E-04	1.44
MW4-12	06	4.68E-03	13.27
MW4-13	7	6.62E-04	1.88

Summary Information

Maximum:	4.68E-03	13.27
Minimum:	4.76E-04	1.35
Geometric Mean:	1.24E-03	3.51
Median:	1.06E-03	3.01

Note:

*The slug test data collected at this monitoring well were inaccurate due to the low groundwater level.

NA = Not available.

The average linear velocity of groundwater in the till/weathered shale aquifer was calculated using the method described by Darcy's Law. The Darcy equation for the average linear velocity (*V*) of groundwater flow (Freeze and Cherry 1979) is:

$$V = \frac{K \frac{dh}{dl}}{n}$$

where:

K is the horizontal hydraulic conductivity (cm/sec);
n is the estimated effective porosity (percent); and
dh/dl is the hydraulic gradient (ft/ft).

For the calculation of the groundwater flow velocity in March 1999 the input values used in the equation were: 1) a hydraulic conductivity of 1.2×10^{-3} cm/sec (3.5 ft/day), 2) an effective porosity of 15 percent (0.15) to 20 percent (0.20), and 3) a groundwater gradient of 0.002 ft/ft (between wells MW4-1 and MW4-5) in the eastern portion of the site and .019 ft/ft (between MW4-5 and MW4-4) in the western portion of the site. Total porosities for till samples from another location at SEDA ranged from 34.0 percent to 44.2 percent with an average of 37.3 percent. Therefore, an effective porosity of 15 percent to 20 percent was determined to be reasonable.

To calculate the groundwater flow velocity between well MW4-1 and MW4-5 in the eastern portion of the site for March 1999 the above referenced input parameter values were used, with a groundwater gradient (0.002 ft/ft was used). By substituting into the above-reference equation, the groundwater velocity was calculated to be 0.035 ft/day (or 13 ft/year) at 20 percent effective porosity, and 0.047 feet/day (or 17 feet/year) at 15 percent porosity.

Also, for the March 1999 data, another groundwater velocity was calculated for the western portion of the site. For this calculation a gradient of 0.019 ft/ft between wells MW4-5 and MW4-4 was used and the hydraulic conductivity and effective porosity remained the same. Substituting the above-referenced values into the Darcy equation yields an average linear velocity of 0.33 feet/day (or 120 ft/year) at 20 percent effective porosity, and 0.44 feet/day (or 161 feet/year) at 15 percent effective porosity.

Based on the discussion above, it is important to note that the highly variable nature of the saturated thicknesses of the till/weathered shale aquifer may result in varying degrees of influence from the local bedrock topography on the direction and velocity of groundwater flow throughout the year. Thus, the calculated groundwater velocities are not likely to be sustained. Therefore, the actual direction and distance of groundwater flow as indicated by the calculated velocities are likely to vary throughout the year.

3.7 ECOLOGICAL INVESTIGATION

3.7.1 Introduction

A qualitative assessment of SEAD-4 was conducted to determine the ecological character of the site. The assessment addresses the potentially significant risks to the following biological groups and special-interest resources associated with the site: vegetation, wildlife, aquatic life, endangered and threatened species, and wetlands. The assessment was conducted within the SEAD-4 site and the surrounding area within a radius of 0.5 mile. The study area includes intermittent and perennial drainage ditches, a man-made pond and terrestrial areas within the 0.5-mile radius.

The results of the ecological assessment will be used in the Ecological Risk Assessment (ERA) component of the Baseline Risk Assessment (BRA). The BRA will 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.

3.7.2 Site Habitat Characterization

Site-specific data were compiled regarding the types of habitats and wildlife species found in the site vicinity. The data were compiled during a site visit conducted in September 1999. In order to characterize the site and the habitats within the 0.5-mile radius, pedestrian surveys were conducted throughout the study area and a comprehensive list of all species observed was prepared. This list is included as **Table 3-5**. Observations included sightings, vocalizations,

Table 3-5
Species Observed at SEAD-4
Seneca Army Depot Activity

Species Observed		Terrestrial System			Riverine System	Lacustrine System	Palustrine System	
		Open Uplands		Forested Uplands	Riverine Cultural	Lacustrine Cultural	Forested Wetlands	Open Wetlands
Common Name	**Scientific Name**	Successional Old Field	Successional Shrubland	Successional Southern Hardwoods	Ditch/ Artificial Stream	Artificial Pond	Floodplain Forest	Shallow Emergent Marsh
Canopy Trees								
Red maple	*Acer rubrum*			X			X	
Silver maple	*Acer saccarum*			X			X	
Tree-of-heaven	*Ailanthes altissima*			X				
Gray birch	*Betula populifolia*			X			X	
Pignut hickory	*Carya glabra*			X				
Shagbark hickory	*Carya ovata*			X				
White ash	*Fraxinus americana*			X			X	
Black walnut	*Juglans nigra*			X				
Eastern cottonwood	*Populus deltoides*			X			X	
White oak	*Quercus alba*						X	
Chestnut oak	*Quercus prinus*						X	
Northern red oak	*Quercus rubra*						X	
Black locust	*Robinia pseudo-acacia*			X				
Basswood	*Tilia americana*			X			X	
American elm	*Ulmus americana*			X			X	
Understory Trees and Shrubs								
Gray birch	*Betula populifolia*			X			X	
American hornbeam	*Carpinus caroliniana*						X	
Red-osier dogwood	*Cornus stolonifera*		X	X				
Hawthorne	*Craetegus* sp.		X	X			X	
Eastern red cedar	*Juniperus virginiana*		X	X				
White mulberry	*Morus alba*		X	X				
Cherry	*Prunus* sp.		X	X				
Black cherry	*Prunus serotina*	X	X	X				
Black willow	*Salix nigra*						X	
Euro. buckthorn	*Rhamnus cathartica*	X	X	X			X	

Table 3-5
Species Observed at SEAD-4
Seneca Army Depot Activity

Species Observed		Terrestrial System			Riverine System	Lacustrine System	Palustrine System	
		Open Uplands		Forested Uplands	Riverine Cultural	Lacustrine Cultural	Forested Wetlands	Open Wetlands
Common Name	**Scientific Name**	Successional Old Field	Successional Shrubland	Successional Southern Hardwoods	Ditch/ Artificial Stream	Artificial Pond	Floodplain Forest	Shallow Emergent Marsh
Understory Trees and Shrubs (cont.)								
Staghorn Sumac	*Rhus typhinia*	X	X	X				
Wild rose	*Rosa multiflora*		X	X				
Red raspberry	*Rubus idacus*	X	X	X				
Herbaceous Plants								
Yarrow	*Achillea millefolium*	X	X					
Common ragweed	*Ambrosia artimisiifolia*	X	X	X	X			
Milkweed	*Asclepias syriaca*	X	X					
New England aster	*Aster novae-anglaie*	X	X					
Yellow wild indigo	*Baptisia tinctoria*	X	X					
False nettle	*Boehmaria cylindrica*						X	
Spotted knapweed	*Centaurea maculosa*	X	X					
Common chickweed	*Cerastium arvense*	X			X			
Chicory	*Cichorium intybus*	X						
White daisy	*Chrysanthemum*	X						
Orchard grass	*Dactylis glomerata*	X						
Queen Anne's lace	*Daucus carota*	X	X		X			
Teasel	*Dipsacus sylvestris*	X	X					
Equisetum	*Equisetum hymale*				X			
Common strawberry	*Fragaria virginiana*	X						
Manna grass	*Glyceria borealis*	X						
Hawkweed	*Hieracium* sp.	X						
Butter and eggs	*Linaria vulgaris*	X						
Purple loosestrife	*Lythrum salicaria*				X			X
White sweet clover	*Melilotus alba*	X						
Evening primrose	*Oenothera biennis*	X						
Yellow wood sorrel	*Oxalis stricta*	X						

Table 3-5 (Cont.)
Species Observed at SEAD-4
Seneca Army Depot Activity

Species Observed		Terrestrial System			Riverine System	Lacustrine System	Palustrine System	
		Open Uplands		Forested Uplands	Riverine Cultural	Lacustrine Cultural	Forested Wetlands	Open Wetlands
Common Name	**Scientific Name**	Successional Old Field	Successional Shrubland	Successional Southern Hardwoods	Ditch/ Artificial Stream	Artificial Pond	Floodplain Forest	Shallow Emergent Marsh
Herbaceous Plants (cont.)								
Panic grass	*Panicum* spp.	X			X			
Virginia creeper	*Parthenocissus quinquefolia*	X	X	X			X	
Common reed	*Phragmites australis*	X			X			X
Poke weed	*Phytolacca americana*	X	X					
English plaintain	*Plantago lanceolata*	X						
Bluegrass	*Poa palustris*	X						
Pickerelweed	*Pontedaria cordata*				X			
Black-eyed susan	*Rudbeckia hirta*	X			X			
Goldenrod	*Solidago graminifolia*	X			X			
Canada goldenrod	*Solidago canadensis*	X	X		X			
Dandelion	*Taraxacum officinale*	X						
Poison ivy	*Toxicodendron radicans*	X	X	X	X		X	
No common name	*Tragopogon officinale*	X						
White clover	*Trifolium repens*	X						
Cattail	*Typha latifolia*				X			X
Common mullein	*Verbascum thapsis*	X	X					
Wild grape	*Vitis* sp.	X	X	X	X		X	
Birds								
Great blue heron	*Ardea herodias*				X	X		
Red-tailed hawk	*Buteo jamaicensis*	X	X					
Northern cardinal	*Cardinalis cardinalis*	X	X	X			X	
Great blue heron	*Ardea herodias*				X	X		
Red-tailed hawk	*Buteo jamaicensis*	X	X					
Northern cardinal	*Cardinalis cardinalis*	X	X	X			X	
Turkey vulture	*Cathartes aura*	X						
Blue jay	*Cyanocitta cristata*	X	X	X			X	

Table 3-5 (Cont.)
Species Observed at SEAD-4
Seneca Army Depot Activity

Species Observed		Terrestrial System			Riverine System	Lacustrine System	Palustrine System	
		Open Uplands		Forested Uplands	Riverine Cultural	Lacustrine Cultural	Forested Wetlands	Open Wetlands
Common Name	**Scientific Name**	Successional Old Field	Successional Shrubland	Successional Southern Hardwoods	Ditch/ Artificial Stream	Artificial Pond	Floodplain Forest	Shallow Emergent Marsh
Birds								
Northern flicker	*Colaptes auratus*			X			X	
American crow	*Corvus brachyrhynchos*	X	X	X				
Gray catbird	*Dumetella carolinensis*	X	X					
American kestrel	*Falco sparvarius*	X						
Wild turkey	*Meleagris gallopavo*	X	X	X			X	
Mocking bird	*Mimus polyglottos*	X	X	X			X	
Great crested flycatcher	*Myiarchus crinitus*			X			X	
Black-capped chickadee	*Parus atricapillus*		X	X			X	
Rufous-sided towhee	*Pipilo erythrophthalmus*		X					
European starling	*Sturnus vulgaris*	X	X	X				
Tree swallow	*Tachycineta bicolor*	X						
Brown thrasher	*Toxostoma rufum*		X	X			X	
American robin	*Turdus migratorius*	X	X	X			X	
Mourning dove	*Zenaida macroura*	X	X	X				
Mammals								
Red fox	*Canis rufus*	X	X				X	
Opossum	*Didelphis virginiana*	X	X	X	X		X	
Bobcat	*Felis rufus*	X	X	X			X	
Mouse	*Peromyscus* sp.	X	X	X				
White-tailed deer	*Odocoileus virginianus*	X	X				X	
Raccoon	*Procyon lotor*	X	X	X	X	X	X	X
Eastern gray squirrel	*Sciurus carolinensis*			X			X	
Eastern cottontail rabbit	*Sylvilagus floridanus*	X	X	X			X	
Fish								
Largemouth bass	*Micropterus salmoides*					X		

tracks, burrows, nests, and scat. Observations and assessments were concentrated on undeveloped upland areas, waterways, and wetlands within the study area. Only limited, informal biological sampling was conducted to determine the species present within the study area. Sampling included small mammal trapping on three consecutive nights, and seining in the wetlands for fish and invertebrates. No extensive quantitative sampling was conducted during this preliminary phase of the evaluation.

The vegetation communities within the study area were evaluated using the classification system developed by the New York State Department of Environmental Conservation (NYSDEC) Natural Heritage Program Ecological Communities of New York State (Reschke, 1990).

Information presented in this section was assembled through a combination of literature review, file searches, telephone interviews, office visits, and site inspection. Information was obtained from various departments of the NYSDEC, Cornell University, the U. S. Fish and Wildlife Service (USFWS), and from various publications. Site-specific resource information was obtained from previous ecological characterizations, the Seneca Army Depot Natural Resources Management Plan (SEDA, 1992c), the Rare Species Survey Seneca Army Depot Activity (USFWS 1996), the Wetland Delineation Report for the New York State Department of Correctional Services (NYSOGS, 1998), and the Wetlands, Fish, and Wildlife Plan (SEDA, 1995). Regional information was obtained from the USGS 7.5 minute Romulus, Ovid, Dreden, and Geneva South quadrangle maps, the USFWS National Wetland Inventory maps, and digital ortho quadrangle aerial photography.

Meteorology

The climate in the vicinity of the Seneca Army Depot is temperate, with moderately cold winters and warm, humid summers. Temperatures reach 90° Fahrenheit or higher for 8 to 15 days during the months Of June, July, or August. Lake Ontario, Seneca, and Cayuga Lakes have a moderating effect on both daytime highs and nighttime low temperatures. Rainfall is heaviest during the late spring and summer growing season with averages between 14.5 and 15.5 inches. Total annual precipitation ranges from 26.5 to 37.5 inches. At least one inch of snow covers the ground from early December to the middle of March, with an average annual snowfall of 60 to 65 inches.

Physical Site Description

The Seneca Army Depot is located west of Romulus, NY, and 12 miles south of Geneva and Seneca Falls, NY. The installation lies within the southern portion of the area described in the Ecological Communities of New York State (NYSDEC, 1990) as the Great Lakes Plain, on the northern edge of the Appalachian Plateau. The Seneca Army Depot is composed of approximately 10,600 acres of a high, broad plateau separating Cayuga Lake to the east, and Seneca Lake to the west. The topography across the installation slopes gently from 765 feet at the southeast corner to 585 feet at the northwest corner.

Four watersheds are present on the installation (USDA, 1989). Kendig Creek drains the central portion of the installation into Seneca Lake. Reeder Creek drains the northwest and north-central portions of the installation. The northeast portion of the installation drains into Kendaia Creek, which flows north into the Cayuga-Seneca Canal. The southern portion of the installation is drained into Indian Creek, which discharges into Seneca Lake near Sampson Park.

The SEAD–4 area is located in the southwestern portion of the Indian Creek watershed. The features on the site include various abandoned buildings, munitions storage igloos, railroad tracks; a network of paved and gravel roads, an excavated pond, and undeveloped areas. Off-base land use within the 0.5-mile radius study area is predominantly agricultural and residential.

The site has been filled, drained, and graded. The rocky substrate is shale excavated from a nearby borrow pit. Ditches draining the site are small, intermittent and do not support wetland species except in occasional depressions. The ditches either connect to Silver Creek to the east or Indian Creek to the west. Both creeks have been highly altered to enhance drainage. They have been excavated so that they are deeper, wider, and straighter and the spoil from the excavation has been placed on the banks to prevent flooding. The ditches/creeks also have been cleared and snagged of all streambed vegetation. These creeks form a confluence at the southern boundary of the installation.

Land Use and Vegetative Cover

All areas of the installation have been altered to varying degrees by management practices, whether from mission-related maintenance activities within the last 40 years, or from historical farming practices. With the on-going closure of the installation, some management activities such as mowing and silviculture have been reduced or terminated due to lack of manpower, or due to the change in mission.

Although the installation is in the closure process, access is still restricted by a high chain-link fence topped by barbed wire. A gate on the eastern side of the installation (the former main gate) is the only remaining official access point. A paved patrol road circles the entire facility, although regular patrols are no longer conducted. A network of paved and gravel roads totaling 141 miles traverses the installation. Many of the roads are in disrepair or have become overgrown due to the lack of traffic and regular maintenance.

The installation is divided into three categories, based on the pre-closure facility land use. The Main Post is 9,832 acres and consists of an exclusion area containing partially buried, reinforced concrete munitions storage igloos, general storage magazines, and warehouses. The cantonment area of the installation is 755 acres and consists of the North and South Posts. The North Post, at the north end of the Main Post, includes troop housing, troop support, and community services. The South Post is located in the southeast portion of the facility near Route 96 and is a developed area containing warehouses, administration buildings, quarters, and community services. Only a few of the buildings in the installation are still in use by the staff of 60 remaining on the base.

Upland Communities

Successional Old Field. The majority of the SEAD-4 study area falls into this vegetation classification (**Figure 3-12**) This habitat type occurs in areas in which the vegetation and/or soil have been altered by clear-cutting, grading, draining, mowing, or other activities commonly associated with land management practices. The vegetative cover in these areas is limited to herbaceous species common to recently or routinely disturbed areas and includes numerous nuisance exotic and opportunistic species. All upland areas within the study area that do not support a shrub or tree stratum exceeding 50% cover fall into this classification. Much of the munitions storage area was routinely mowed for security measures, as were the shoulders of the roadways and the areas around facilities. Now that the base is officially closed, mowing has become less frequent or has been terminated altogether, and the opportunistic species are successfully competing with the introduced turf and native grass species. Depending upon the specific site conditions, species present include goldenrod, chickweed, New England aster,

LEGEND

▭ Study Area

Land Use/Cover

▥ Shallow Emergent Marsh

▨ Floodplain Forest

■ Ditch/Altered Stream

░ Artificial Pond

▧ Successional Old Field

▤ Successional Shrubland

▒ Successional Southern Hardwoods

▦ Terrestrial Cultural (Various Types)

N

W E

S

0 850 1700 Feet

PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
REMEDIAL INVESTIGATION
SEAD-4 MUNITION WASHOUT FACILITY

FIGURE 3-12
LAND USE/COVER

NOVEMBER 1999 **SCALE 1" = 850 feet**

Queen Anne's lace, ragweed, wild strawberry, and dandelion. Many areas are rapidly succeeding into shrublands, as can be determined by the presence of red-osier, sumac, eastern red cedar sapling, multiflora rose, and serviceberry.

This vegetation classification provided excellent habitat for the white-tailed deer which were often observed foraging in the old field areas adjacent to forest and shrub communities. Other species commonly observed in this habitat include eastern cottontail rabbit, numerous songbirds, red fox, and raccoon.

Successional Shrub. This vegetation classification is characterized by a dominance of shrub species, and less than 50% cover of canopy trees. The species in this community include red-osier dogwood, staghorn sumac, wild plum, European buckthorn, red raspberry, black cherry, wild rose, and saplings of early successional trees such as black locust, red maple, and tree-of-heaven. In drier areas, these shrubs can form dense thickets, while in depressions, the dominant species are more mesic varieties such as the red osier dogwood and red raspberry. The groundcover in the successional shrub community is usually dominated by various graminoid species, interspersed with opportunistic forb species. This vegetation community is very popular with songbirds, especially migrating species. Those observed in this area included cedar waxwing, American robin, brown thrasher, blue jay, mocking bird, European starling, gray catbird, and rufous-sided towhee. Also common in this habitat are the common and white white-tailed deer, raccoon, and eastern cottontail rabbit.

Successional Southern Hardwoods. Successional southern hardwood communities develop on sites that have cleared, graded logged, or otherwise disturbed. The canopy, which may form within 7 years of disturbance, is usually composed of fast-growing species that require a significant amount of light. When the canopy in this community becomes fairly dense, the canopy species usually do not reproduce because of the reduced sunlight, and shade-tolerant trees become established.

This vegetation community is characterized by the dominance of early and mid-successional native and introduced tree species. Common canopy species include gray birch, black locust, American elm, silver maple, and eastern cottonwood. Understory species include those found in the old field communities. The wildlife found in this habitat included common white-tailed deer, black-capped chickadee, tufted titmouse, northern cardinal, northern flicker, downy woodpecker, raccoon, opossum, eastern gray squirrel, and the white white-tailed deer.

Wetland Communities

All wetlands within the 0.5-mile radius have been altered to some degree by land management practices. Natural creeks have been straightened and channelized, and former wetland areas have been drained and filled.

Artificial Pond. A small (0.72 acres) pond is located west of the abandoned buildings in the southern region of the installation. The pond was excavated historically as a shale gravel pit for fill material. More recently, the side slopes were graded to create littoral shelves, and the pond was stocked with bass. Currently, the pond provides little habitat, and seining the pond produced one small bass fingerling. The side slopes have a sparse cover of upland forb species and there are no emergent, floating, or submerged aquatic vegetative species, with the exception of green algae mats. The water is relatively clear, but stained dark. The substrate in the bottom of the pond is approximately one foot deep, and is black, flocculent muck with a sulfur odor. The water level in the pond was very low due to the severe drought this area had experienced during the previous summer, and appeared to be approximately 3 feet deep to the top of the muck. The normal water elevation was estimated to be at least 3.5 feet lower than the water level indicators on the side slopes. During the rainy season, the water in the pond increases and discharges through a 12" PVC pipe in the berm on the southern side of the pond. The discharge flows into a depression and then sheet-flows to the south. The depression was vegetated with cattail, but no other wetland indicator species were present.

This pond offers marginal wildlife habitat due to the lack of vegetation and the poor water quality. The absence of emergent aquatic macrophytes in the pond is likely due in part to the fact that the substrate would not easily support rooted vegetation. The flocculent material is too loose and undifferentiated to support plant roots, and the shale substrate is very hard and lacking in organic material. The green algal mats likely indicate stagnant water. The small fish taken from this pond was a bass of the variety that was introduced into the pond a few years ago, and the lack of additional biota may be the result of predation or the lack of sufficient substrate.

There are, however, numerous tracks of wading birds, raccoons, deer, and other wildlife around the pond, likely due to the fact that the pond is one of the few water sources on the installation.

Ditch/Artificial Stream. Several channelized streams and excavated drainage ditches are found throughout the study area. Only the largest of the ditches had standing water present, and no flow was observed. These large ditches were vegetated with cattail, purple loosestrife, cardinal flower, golden rod, and other herbaceous species. Many of the ditches support common upland ruderal species and likely only function as conveyance systems during severe storms. No wildlife was observed in the ditches within the study area, but muskrat and beaver were observed in ditches in the northern portion of the installation, so it can be assumed that the ditches within the study area provide habitat for these animals during the summer when water levels are higher.

Floodplain Forest. Floodplain forests within the study area were located along the ditch in the southeastern portion of the installation. The ditch is the channelized remnant of Silver Creek, which at one time meandered through the floodplain. The forest has a dense, closed canopy of various deciduous hardwood trees such as red and silver maple, gray birch, northern red oak, white ash, cotton wood, and basswood. There is a sparse understory of saplings of the canopy trees. The groundcover is also sparse and is dominated by vines of Virginia creeper and poison ivy. The impacts of the hydrological alterations of the stream were obvious in that there were no signs of recent flooding events or normal seasonal inundation. Despite the hydrological alterations, the forest provided valuable foraging and cover habitat for numerous wildlife species. The numerous deer and turkey on the installation were routinely observed taking cover in the forested areas.

Shallow Emergent Marsh. A shallow emergent marsh is located adjacent to the western patrol road near the airfield. The marsh formed as a result of impounding the discharge from a man-made ditch in the low area next to the road. The dead trees in the vicinity indicate that the impoundment is fairly recent. Another indicator of the recent origin and artificiality of the wetland is the predominance of nuisance and opportunistic vegetation (Typha latifolia and Phragmites australis) and the low organic content of the soils. There was no standing water in the wetland at the time of the site assessment, likely due to the recent drought. Despite the disturbed and artificial nature of the wetland, it is one of the few marshes on the installation, and therefore valuable habitat. Ephemeral marshes such as this one are especially important to piscivorous avifauna species for foraging habitat.

Terrestrial Cultural Communities

Terrestrial cultural communities were combined on the vegetation community map included in this report. The features included in this category are roadways, buildings, residential areas, agricultural areas, railroad tracks, and other areas of anthropogenic origin that provide marginal habitat.

Paved Roads. The Seneca Army Depot has a network of paved and gravel roads that total 141 miles. The roads do not offer forage opportunities for most species, but do provide basking areas for ectothermic species during cooler weather, and therefore offer prey opportunities for certain predators. During the site investigation, a red-tailed hawk was observed taking a small snake from one of the perimeter roads. The hawks were frequently observed on poles and in trees adjacent to the roads waiting for prey.

Prior to the closure of the installation, the road shoulders were routinely mowed. Since the closure mowing has been cut back significantly, and the shoulders have reverted to successional old field vegetation. This will have a beneficial effect on wildlife habitat as long as the traffic levels remain low.

Abandoned Structures. The abandoned buildings in the vicinity of SEAD-4 provide nesting habitat for barn swallows, roosting sites for bats, and shelter for small mammals. No other habitat utilization of the abandoned buildings was observed. Although no bats or bat droppings were observed in the vicinity, it is known that bats inhabit the base and the abandoned buildings provide excellent habitat.

Railroads. Railroad tracks in the vicinity of the site were observed as being hunting grounds of red-tailed hawk and great horned owl during the field visits. These birds occupied prominent perches adjacent to railroad corridors frequently during the site visits. Railroads apparently serve as trails for nocturnal creatures, as tracks and scat of skunk, raccoon, fox, and opossum were observed frequently. Poor rooting substrate and herbicide application suppress vegetation along the tracks and shoulders.

Wildlife Resources

Wildlife resources at the Seneca Army Depot are intensively managed under a cooperative conservation and development plan developed in conjunction with the NYSDEC (1992). The objectives of the fish and wildlife management plan are to:

- Protect and develop habitat for the production of game and non-game species;
- Control white-tailed deer (Odocoileus virginianus) harvest (with additional emphasis on white-tailed deer management);
- Enhance non-game species populations for their aesthetic, recreational, and educational values; and
- Establish long range goals for selected species including eastern bluebird (Salia salis), ring-necked pheasant (Phasianus colchicus), wood duck, white-tailed deer, and wild turkey (Meleagris gallopavo).

Commonly occurring small game mammals in the installation include eastern cottontail rabbit (Sylvilagus floridanus), gray squirrel (Sciurus carolinensis), raccoon (Procyon lotor), snowshoe hare (Lepus americanus), muskrat (Ondatra zibithecus), beaver (Castor canadensis), eastern coyote (Canis latrans), red fox (Vulpes vulpes), and gray fox (Urocyon cinereoargenteus). Ruffed grouse (Bonasa umbellus), ring-necked pheasant, and wild turkey also inhabit the depot. Waterfowl are attracted to wetlands on and around the depot, particularly the 87-acre "duck ponds" created in the northeast corner of the property during the 1970s.

The wildlife within 0.5 mile of the site consists of upland species, particularly those favoring old fields and shrublands, since these are abundant habitats in the study area. The mixture of these habitats with small woodlots and tree rows provides ideal habitat for white-tailed deer, which are common throughout the installation. Many non-game species also are present in the depot and potentially utilize habitats within the 0.5-mile study area. Tracks, presumed to be of eastern coyote, coy-dog, or feral dog, were observed along the railroad tracks throughout the site. (While their tracks are often indistinguishable, no domestic dogs remain on the installation since base closure.) Tracks of white-tailed deer, raccoon, and rabbit also were observed adjacent to the site. Wildlife evidence and direct observations made during site visits are presented in **Table 3-5**.

Endangered Species and Significant Habitats

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. Field investigation of the site determined that the surrounding area is highly modified and has a disturbed ecology resulting from management consistent with mission activities. Highly disturbed sites are characteristically colonized by opportunistic species and do not typically support rare or endangered flora and fauna. No rare or endangered species were observed during the site assessment.

There is always the potential, however, for the site to be utilized by an endangered or threatened species in the future. **Table 3-6** provides a list of the state- and federally-listed species that may at some time occur in the vicinity of or on the SEAD.

The installation is the focus of wildlife and forestry management practices being conducted at the depot. Wildlife management efforts focusing on waterfowl, songbirds, and game populations have been conducted for many years.

The habitat value of the SEAD-4 site itself is considered fair due to the recovery of the vegetative cover and the recent lack of human activity. Numerous songbirds were heard and observed around the site, and burrows and scat of the eastern cottontail were commonly observed.

3.7.3 Habitat Assessment

Resource Value to Humans

The Seneca Army Depot represents a unique opportunity for wildlife and pest control research in New York State due to its large size and continuous perimeter fencing. The depot property represents significant value to humans resulting from decades of wildlife management and scientific research. The NYSDEC has used the depot white-tailed deer population to develop population, growth, and reproduction models. Currently a Cornell University/NYSDEC white-tailed deer immuno-contraception study is being conducted with a captive herd in the Q area of

Table 3-6
Flora and Fauna Listed by the State of New York or the USFWS as Endangered, Threatened, or of Special Concern That May Occur on the Seneca Army Depot

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Common Name	Scientific Name	Federal	State
Plants			
Small whorled pogonia	*Isotoria medeloides*	T	T
Birds			
Sharp-shinned hawk	*Accipiter striatus*		SSC
Cooper's hawk	*Accipiter cooperii*		SSC
Northern goshawk	*Acciptier gentilis*		SSC
Short-eared owl	*Asio flammeus*		E
American bittern	*Botaurus lentiginosus*		SSC
Red-shouldered hawk	*Buteo lineatus*		SSC
Whip-poor-will	*Caprimulgus minor*		SSC
Common night-hawk	*Chordeiles minor*		SSC
Northern harrier	*Circus cyaneus*		T
Peregrine falcon	*Falco peregrinus*		E
Common loon	*Gavia immer*		SSC
Bald eagle	*Haliaeetus leucocephalus*		T
Least bittern	*Ixobrychus exilis*		T
Loggerhead shrike	*Lanius ludovicianus*		E
Red-headed woodpecker	*Melanerpes erythrocephalus*		SSC
Pied-billed grebe	*Podilmbus podiceps*		T
Osprey	*Pandion haliaetus*		SSC
Reptiles and Amphibians			
Wastern spiny softshell	*Apalone spinifera*		SSC
Worm snake	*Carphophis amoenum*		SSC
Spotted turtle	*Clemmys guttata*		SSC
Southern leopard frog	*Rana sphenocephala utricularius*		SSC
Eastern spadefoot toad	*Scaphiopus holbrookii*		SSC
Eastern box turtle	*Terrapene carolina*		SSC
Mammals			
Indiana bat	*Myotis sodalis*		SSC
Small-footed bat	*Myotis leibii*		SSC
New England cottontail	*Sylvilagus trasitionalis*		SSC

the Main Post. NYSDEC biologists participate in annual harvests by inspecting field-dressed deer for disease and parasites, aging specimens, and measuring beam diameter (SEDA, 1992c). NYSDEC conducted studies in the 1960s on fox reproduction inhibition using diethyl stilbestrol (DES) to control the spread of rabies. Cornell University entomologists have conducted studies on the ability of northern corn rootworm to traverse areas of non-croplands at the depot (SEDA, 1992c).

Consumptive use of wildlife consists of hunting of upland birds, predators, waterfowl, and white-tailed deer. Harvest of deer is closely monitored to maintain the population below carrying capacity of the depot habitat (SEDA, 1995). Hunting on the property is presently limited to current and retired military personnel and limited numbers of guests. Hunting is conducted during both the Southern Zone archery and firearms hunting seasons in accordance with New York State regulations. Discontinuation of the military mission of the depot may have significant impacts on the types and intensity of human utilization of wildlife resources in the future. The white deer on the installation are highly desirable hunting trophies.

The consumptive wildlife resource value of the SEAD-4 property to humans is considered high. The site is relatively remote, game is plentiful, and the low vegetation in some areas facilitates the spotting of the larger game species. Evidence of non-consumptive wildlife resource utilization, such as bird watching, wildlife observation, photography, and amateur study was not observed during the site evaluation, but the potential for such activity would be high if the public was provided limited access to the installation. The white white-tailed deer population is an unusual herd that has an important aesthetic value. The wetlands within and adjacent to the site do not provide exploitable fisheries resources, due to the negative water quality impacts caused by human activity. No recreational fishing resources are available within the 0.5-mile study area.

4.0 NATURE AND EXTENT OF IMPACTS

Data quality objectives for this RI follow the guidance described in Data Quality Objective (DQO) for Remedial Response Activities: Development Process (US EPA, March 1987) that is described in the approved Generic Installation RI/FS Workplan for SEDA. This DQO document has been replaced by the Data Quality Objectives Process for Superfund: Interim Final Guidance (USEPA, 1993). Although the workplans for this site referenced the earlier DQO document (USEPA, 1987), a review of the Interim Final Guidance (USEPA, 1993) indicates that the development of the field investigation program for SEAD-4 essentially followed the steps outlined in the Interim Final Guidance. These steps include development of a conceptual site model, defining the exposure scenarios, determining the regulatory objectives, defining the boundaries of the study area, and developing a judgmental sampling plan for the field investigation program. The non-probabilistic approach to developing a sampling program was used because the objective of the program was to establish that a threat exists in a complete exposure pathway by confirming the presence of a hazardous chemical substance associated with the site, based on visual and historical information on the chemical sources. The specific locations of chemical impacts were identified during the ESI and from historical information about activities conducted at the sites. In order to maintain consistency between the Generic Installation RI/FS Workplan, the Scoping Plan for SEAD-4, and the reports prepared for SEDA, this report will continue to reference the earlier DQO document.

4.1 INTRODUCTION

This section presents the analytical results for all media sampled at SEAD-4. Data from the ESI and the RI investigations have been merged into a single data base and they are discussed as a whole in this RI report.

The investigation activities performed for the RI generated Level I, Level II, and Level IV analytical data. These data categories are described in the earlier DQO document (USEPA, 1987). The Interim Final Guidance (USEPA, 1993) describes two data categories, screening data with definitive confirmation, and definitive data. These three categories are associated with specific quality assurance and quality control elements. The Level I, II, and IV data meet the applicable QA/QC requirements for screening and definitive data which are presented in the

Interim Final Guidance. To maintain consistency between the workplans and reports prepared for SEDA, the data categories will continue to be referred to using "Level" terminology.

The Level I data was gathered primarily for health and safety reasons during soil boring and monitoring well sampling activities using field screening instruments (such as a Thermoenvironmental, Inc. OVM 580B and a Miniram PDM-3 dust monitor). Level II analyses were used to locate additional surface soil sampling locations in two areas of SEAD-4 known to have high chromium in the soil. Level IV analyses were used to generate data that would positively identify constituents at SEAD-4, and define the extent of their impacts in seven types of media. The six types of media at SEAD-4 are as follows:

- Surface Soil;
- Subsurface Soil;
- Groundwater;
- Surface Water;
- Sediment; and
- Building Debris/Soil Samples.

For each of these media, the parameter groups analyzed for include: VOCs, SVOCs, pesticides and PCBs, metals, nitroaromatics, nitrate-nitrogen, and herbicides (ESI only); the VOC and SVOC analyses also included the identification and quantification of tentatively identified compounds (TICs) (refer to Appendix F). Building material samples were collected from inside six buildings and also analyzed for parameters listed above as part of the RI.

The Level IV analytical results are discussed first by media and then by constituent group. The analytical results are summarized on data tables and, where appropriate, maps are used to show the horizontal and vertical distribution of constituents of concern at the site. Complete analytical data tables are in Appendix F.

4.2 BUILDING MATERIALS

Six soil/debris samples were collected from the interior of Buildings 2084, 2085, 2073, 2078, 2076, and 2079 during the RI field program. The six samples were submitted for the chemical analyses described in Section 2.8.

Summary statistics for the building materials analyses are shown in **Table 4-1**. The table of results of the chemical analyses for the building materials is presented in Appendix F.

4.2.1 Volatile Organic Compounds

One VOC, acetone, was detected in all six soil/debris samples collected from six buildings at the site (**Table 4-1**). The concentrations of acetone ranged from 3 J µg/kg to a maximum concentration of 40 µg/kg, which was detected in the sample from Building 2085.

4.2.2 Semivolatile Organic Compounds

Twenty-five SVOCs were detected in the soil/debris samples (**Table 4-1**). Most of the maximum concentrations were detected in the sample collected from Building 2078. Maximum concentrations of benzo(a)anthracene (5,200 µg/kg), benzo(a)pyrene (8,500 µg/kg), bis(2-ethylhexyl)phthalate (890,000 µg/kg), dibenz(a,h)anthracene (3,000 J µg/kg), chrysene (13,000 J µg/kg), phenanthrene (23,000 J µg/kg),and pyrene (25,000 µg/kg) were detected in the building sample collected from Building 2078.

4.2.3 Pesticides and PCBs

Eighteen pesticides/PCBs were detected in the soil/debris samples (**Table 4-1**). The maximum concentrations of pesticides/PCBs were found in sample collected from Building 2073. 4,4'-DDE and 4,4'-DDT were detected in all the samples. The maximum concentrations of 4,4'-DDE (1,200 J µg/kg) and 4,4'-DDT (5,600 µg/kg) were detected in the sample from Building 2073.

Arochlor-1254 was detected in five samples with the maximum concentration (91,000 µg/kg) detected in the sample from Building 2073. Arochlor-1260 was detected in four samples and the maximum concentration of 3,100 µg/kg) was detected in the sample from Building 2079.

Table 4-1

Summary Statistics for Building Material Samples
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

			FREQUENCY	NUMBER	NUMBER
			OF	OF	OF
	UNITS	MAXIMUM	DETECTION	DETECTS	ANALYSES
Volatile Organic Compounds					
Acetone	UG/KG	40	100%	6	6
Semivolatile Organic Compounds					
2,4-Dinitrotoluene	UG/KG	360	33%	2	6
2-Methylnaphthalene	UG/KG	1500	33%	2	6
Acenaphthene	UG/KG	1400	67%	4	6
Anthracene	UG/KG	690	83%	5	6
Benzo(a)anthracene	UG/KG	5200	83%	5	6
Benzo(a)pyrene	UG/KG	8500	100%	6	6
Benzo(b)fluoranthene	UG/KG	11000	100%	6	6
Benzo(ghi)perylene	UG/KG	8700	100%	6	6
Benzo(k)fluoranthene	UG/KG	8300	50%	3	6
Bis(2-Ethylhexyl)phthalate	UG/KG	890000	100%	6	6
Butylbenzylphthalate	UG/KG	1600	50%	3	6
Carbazole	UG/KG	5800	67%	4	6
Chrysene	UG/KG	13000	100%	6	6
Di-n-butylphthalate	UG/KG	32000	100%	6	6
Dibenz(a,h)anthracene	UG/KG	3000	67%	4	6
Dibenzofuran	UG/KG	1500	33%	2	6
Diethyl phthalate	UG/KG	130	33%	2	6
Fluoranthene	UG/KG	25000	100%	6	6
Fluorene	UG/KG	760	50%	3	6
Indeno(1,2,3-cd)pyrene	UG/KG	7500	83%	5	6
N-Nitrosodiphenylamine	UG/KG	66	17%	1	6
Naphthalene	UG/KG	1300	50%	3	6
Pentachlorophenol	UG/KG	4900	33%	2	6
Phenanthrene	UG/KG	23000	100%	6	6
Pyrene	UG/KG	25000	100%	6	6
Explosives					
1,3-Dinitrobenzene	UG/KG	180	33%	2	6
2,4,6-Trinitrotoluene	UG/KG	260	17%	1	6
2,4-Dinitrotoluene	UG/KG	1900	50%	3	6
2-amino-4,6-Dinitrotoluene	UG/KG	320	33%	2	6
4-amino-2,6-Dinitrotoluene	UG/KG	300	17%	1	6
RDX	UG/KG	200	17%	1	6
Tetryl	UG/KG	820	17%	1	6
Pesticides/PCBs					
4,4'-DDD	UG/KG	35	67%	4	6
4,4'-DDE	UG/KG	1200	100%	6	6
4,4'-DDT	UG/KG	5600	100%	6	6
Alpha-Chlordane	UG/KG	780	67%	4	6
Aroclor-1254	UG/KG	91000	83%	5	6
Aroclor-1260	UG/KG	3100	67%	4	6
Beta-BHC	UG/KG	31	17%	1	6
Dieldrin	UG/KG	1100	83%	5	6
Endosulfan I	UG/KG	160	33%	2	6
Endosulfan II	UG/KG	30	33%	2	6
Endosulfan sulfate	UG/KG	200	33%	2	6
Endrin	UG/KG	320	50%	3	6
Endrin aldehyde	UG/KG	390	83%	5	6
Endrin ketone	UG/KG	370	50%	3	6
Gamma-Chlordane	UG/KG	95	83%	5	6
Heptachlor	UG/KG	34	17%	1	6
Heptachlor epoxide	UG/KG	360	83%	5	6

Table 4-1
Summary Statistics for Building Material Samples
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

	UNITS	MAXIMUM	FREQUENCY OF DETECTION	NUMBER OF DETECTS	NUMBER OF ANALYSES
Methoxychlor	UG/KG	390	50%	3	6
Metals					
Aluminum	MG/KG	6110	100%	6	6
Antimony	MG/KG	26.1	100%	6	6
Arsenic	MG/KG	33.6	100%	6	6
Barium	MG/KG	3560	100%	6	6
Beryllium	MG/KG	0.46	33%	2	6
Cadmium	MG/KG	132	83%	5	6
Calcium	MG/KG	253000	100%	6	6
Chromium	MG/KG	1840	100%	6	6
Cobalt	MG/KG	37.1	100%	6	6
Copper	MG/KG	1220	100%	6	6
Cyanide	MG/KG	28.7	67%	4	6
Iron	MG/KG	362000	100%	6	6
Lead	MG/KG	12000	100%	6	6
Magnesium	MG/KG	17600	100%	6	6
Manganese	MG/KG	1630	100%	6	6
Mercury	MG/KG	62.8	100%	6	6
Nickel	MG/KG	1330	100%	6	6
Potassium	MG/KG	3750	100%	6	6
Silver	MG/KG	0.57	100%	6	6
Sodium	MG/KG	1530	100%	6	6
Thallium	MG/KG	7	83%	5	6
Vanadium	MG/KG	948	100%	6	6
Zinc	MG/KG	6100	100%	6	6

4.2.4 Nitroaromatics

Seven nitroaromatic compounds were detected in the soil/debris samples (**Table 4-1**). The compound 2,4-dinitrotoluene was detected in three of the samples, and the maximum concentration (1,900 J µg/kg) was detected in the sample from Building 2085.

The compounds 1,3-dinitrobenzene and 2-amino-4,6-dinitrotoluene were also detected, but each in only two samples. The maximum concentration of the compound 1,3,-dinitrobenzene (180 µg/kg) was detected in the sample from Building 2078. The maximum concentrations of 2-amino-4,6-dinitrotoluene (320 J µg/kg) were detected in the sample from Building 2085.

4.2.5 Metals

Twenty-two metals were detected in the soil/debris samples collected from six buildings at SEAD-4 (**Table 4-1**). Barium was detected in all six soil/debris samples and its maximum concentration of 3560 mg/kg was found in Building 2084. Chromium was detected in all six soil/debris samples with the maximum concentration of 1840 mg/kg found in Building 2084. Copper was detected in all six samples and its maximum concentration of 1,220 mg/kg was found in Building 2079. Lead was found in all six samples. The maximum concentration of lead, 12,000 mg/kg, was detected in Building 2084. Nickel was detected in all six samples, with the maximum concentration (1,330 mg/kg) found in Building 2079. Zinc was detected in all six samples, the maximum concentration, 6,100 mg/kg, was found in Building 2078.

4.2.6 Other Constituents

Nitrate/Nitrite-Nitrogen

Nitrate/Nitrite-Nitrogen was detected in all six soil/debris samples. The nitrate/nitrite-nitrogen concentrations ranged from 4.7 mg/kg to 94.8 mg/kg.

4.3 LEVEL II SCREENING ANALYSIS

As described in the SEAD-4 Project Scoping Plan, Level II screening for chromium was performed on surface soil samples collected from Areas 1 and 2 located on the western portion of the site. In Area 1, 25 surface soil samples (SS4-8 through SS4-32) were initially submitted for Level II screening. Ten of these samples, which either contained high concentrations of chromium or were used to check false negatives, were then submitted for Level IV analysis. In Area 2, 20 surface soil samples (SS4-33 through SS4-52) were initially submitted for Level II screening and six of these soil samples were later submitted for Level IV analysis.

Table 4-2 presents the results of the Level II chromium screening for surface soil as well as the results of Level IV analyses for surface soils and sediments. **Figures 4-1 and 4-2** present Level II data for chromium and, if Level II data are not available, Level IV data are presented. The Level IV chromium results will be discussed later as part of the soil and sediment sections. The Level II chromium screening results showed high chromium levels in surface soil samples collected from the northern and western edges of the Area 1 grid. Based on these results, 14 additional surface soil samples were collected in an area to the north and west of Area 1; these samples were submitted for Level II chromium screening. Four of the surface soil samples (SS4-83 through SS4-86) were located west of the Area 1 grid; six surface soil samples (SS4-87 through SS4-89 and SS4-96 through SS4-98) were located in a grid pattern west of the pond; and four soil samples (SS4-93, 94, 95, and 99) were located on the northern and eastern edges of the pond.

The Level II chromium screening results indicated high chromium levels in surface soils sampled from drainage ditches within Area 2. Based on these results, two additional surface soil samples (SS4-90 and SS4-91) were collected near SS4-42 and SS4-38, which had high chromium levels in the Level II screening.

TABLE 4-2

CHROMIUM SCREENING RESULTS

SENECA ARMY DEPOT
SEAD-4 REMEDIAL INVESTIGATION REPORT

LOCATION ID	SAMPLE NUMBER	CHROMIUM SCREENING (mg/Kg)	LEVEL IV RESULT (mg/Kg)	AREA	RPD @ (%)
SS4-8	043001	5400	6590	1	19.8
SS4-8 *	043002	5300	NA	1	NA
SS4-9	043003	6600	6590	1	0.2
SS4-10	043004	3600	4480	1	21.8
SS4-11	043005	380	381	1	0.3
SS4-12	043006	1280	2730	1	72.3
SS4-13	043007	4800	10100	1	71.1
SS4-14	043008	18	20.9	1	14.9
SS4-15	043009	17.3	NA	1	NA
SS4-16	043010	15.1	NA	1	NA
SS4-17	043011	18.8	NA	1	NA
SS4-18	043012	1710	2840	1	49.7
SS4-19	043013	21	23.5	1	11.2
SS4-20	043014	17.3	NA	1	NA
SS4-21	043015	16.3	NA	1	NA
SS4-22	043016	14.7	NA	1	NA
SS4-23	043017	13.5	NA	1	NA
SS4-24	043018	14.6	NA	1	NA
SS4-25	043019	14.1	NA	1	NA
SS4-26	043020	15.3	NA	1	NA
SS4-27	043021	14.2	NA	1	NA
SS4-28	043022	15.4	NA	1	NA
SS4-29	043023	78	92.1	1	16.6
SS4-30	043024	24	NA	1	NA
SS4-31	043025	21	NA	1	NA
SS4-32	043026	23	NA	1	NA

Note:

NA = Not Applicable

* This is a duplicate sample.

@ RPD = Relative Percent Difference

TABLE 4-2

CHROMIUM SCREENING RESULTS

SENECA ARMY DEPOT
SEAD-4 REMEDIAL INVESTIGATION REPORT

LOCATION ID	SAMPLE NUMBER	CHROMIUM SCREENING (mg/Kg)	LEVEL IV RESULT (mg/Kg)	AREA	RPD @ (%)
SS4-33	043027	14.3	NA	2	NA
SS4-34	043028	27	NA	2	NA
SS4-35	043029	25	31.8	2	23.9
SS4-36	043030	14.7	19	2	25.5
SS4-37	043031	15.9	NA	2	NA
SS4-38	043032	67	77.8	2	14.9
SS4-39	043033	22	NA	2	NA
SS4-40	043034	15.2	NA	2	NA
SS4-41	043035	17.4	NA	2	NA
SS4-42	043036	1320	1620	2	20.4
SS4-44	043039	17.9	NA	2	NA
SS4-45	043040	17.7	NA	2	NA
SS4-46	043041	13.5	18.4	2	30.7
SS4-47	043042	19.4	26.8	2	32.0
SS4-48	043043	11.2	NA	2	NA
SS4-49	043044	12.4	NA	2	NA
SS4-50	043045	14.2	NA	2	NA
SS4-51	043046	13.4	NA	2	NA
SS4-52	043047	10.8	NA	2	NA
SS4-84	043094	24	NA	1	NA
SS4-85	043095	84	129	1	42.3
SS4-86	043096	43	64.8	1	40.4
SS4-87	043097	17.6	NA	1	NA
SS4-88	043098	12.6	NA	1	NA
SS4-89	043099	23	NA	1	NA
SS4-90	043100	2300	1730	2	28.3

Note:

NA = Not Applicable

* This is a duplicate sample.

@ RPD = Relative Percent Difference

TABLE 4-2

CHROMIUM SCREENING RESULTS

SENECA ARMY DEPOT
SEAD-4 REMEDIAL INVESTIGATION REPORT

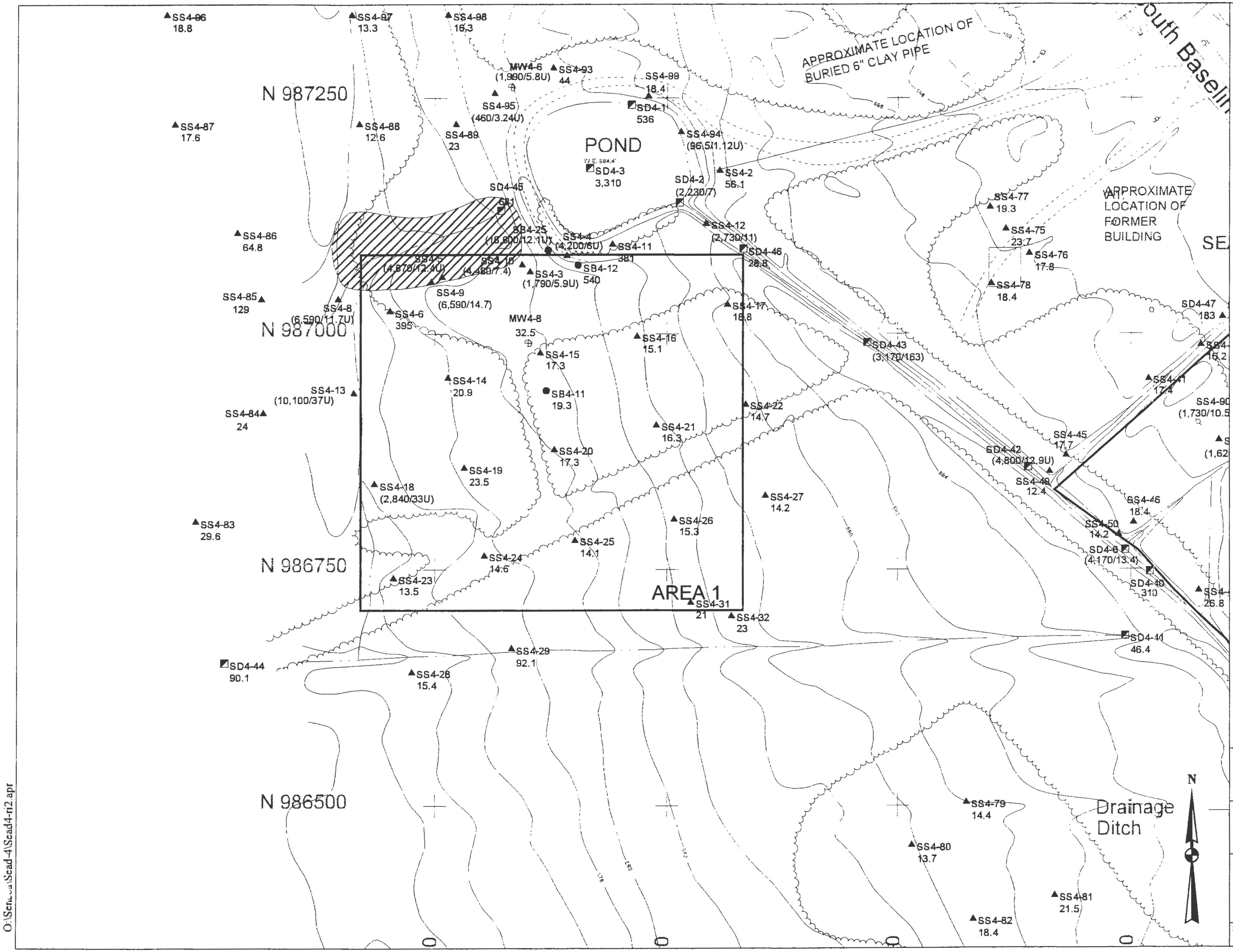
LOCATION ID	SAMPLE NUMBER	CHROMIUM SCREENING (mg/Kg)	LEVEL IV RESULT (mg/Kg)	AREA	RPD @ (%)
SS4-91	043101	16.2	NA	2	NA
SS4-93	043103	44	NA	1	NA
SS4-94	043104	123	96.5	1	24.1
SS4-95	043105	280	460	1	48.6
SS4-96	043106	18.8	NA	1	NA
SS4-97	043107	13.3	NA	1	NA
SS4-98	043108	16.3	NA	1	NA
SS4-99	043147	18.4	NA	1	NA

Note:

NA = Not Applicable

* This is a duplicate sample.

@ RPD = Relative Percent Difference



LEGEND

⊕ 29.7 Monitoring Well Sample Location with Chromium Value (mg/Kg)

● 19.1 Soil Boring Sample Location with Chromium Value (mg/Kg)

▲ 17.1 Surface Soil Sample Location with Chromium Value (mg/Kg)

◪ 20.3 Sediment Sample Location with Chromium Value (mg/Kg)

▨ Approximate Location of Dredged Material

(4.0/23) Total Chromium/Hexavalent Chromium

100 0 100
(feet)

PARSONS
PARSONS ENGINEERING SCIENCE, INC.

SENECA ARMY DEPOT ACTIVITY
REMEDIAL INVESTIGATION
SEAD-4 MUNITIONS WASHOUT FACILITY

FIGURE 4-1
CHROMIUM CONCENTRATIONS IN
SURFACE SOIL SEDIMENT
IN AREA 1 (MG/KG)

SCALE	DATE	REV
1:100		SHEET 1 OF 1

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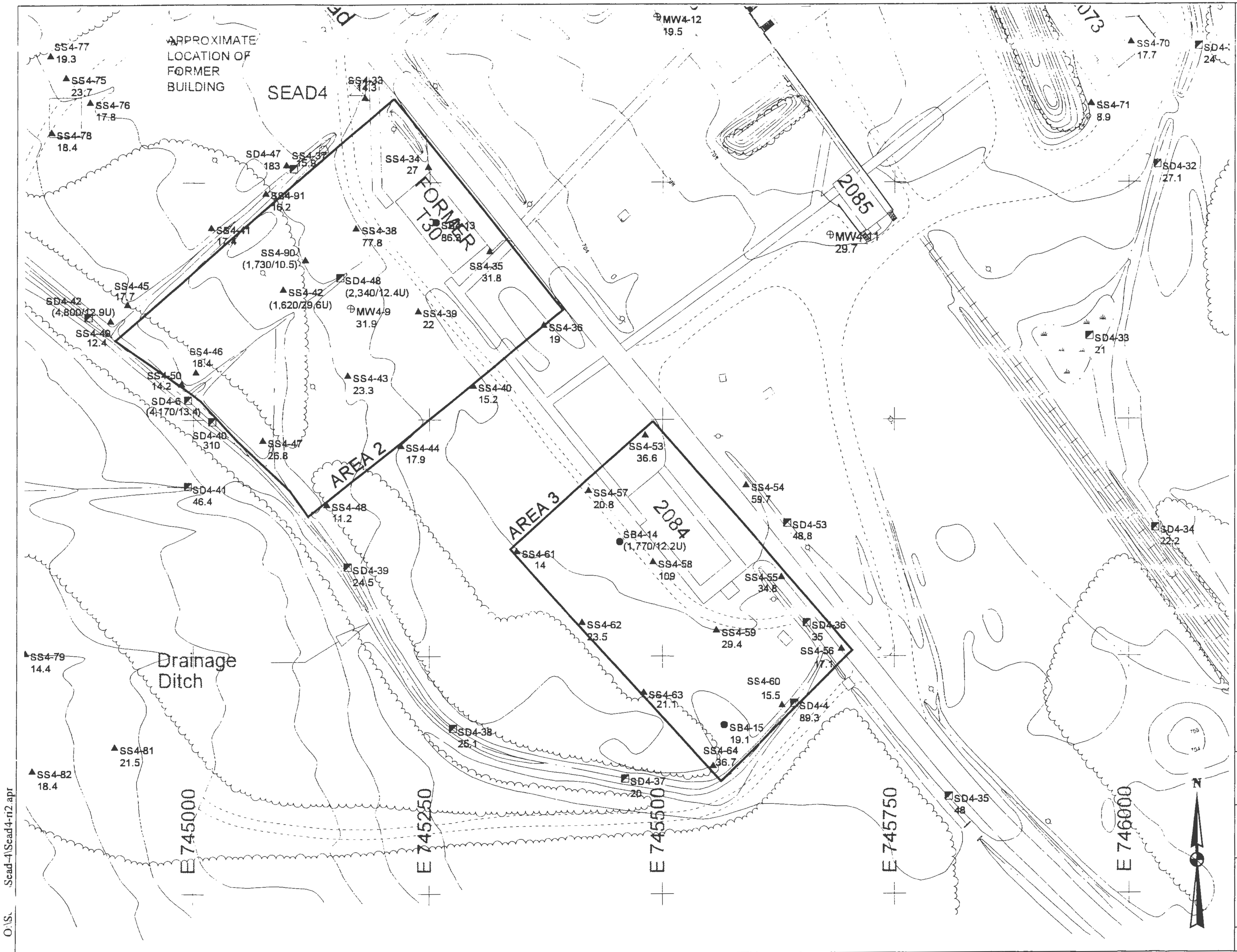

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LEGEND

⊕ 29.7 Monitoring Well Sample Location with Chromium Value (mg/Kg)

● 19.1 Soil Boring Sample Location with Chromium Value (mg/Kg)

▲ 17.1 Surface Soil Sample Location with Chromium Value (mg/Kg)

◪ 20.3 Sediment Sample Location with Chromium Value (mg/Kg)

(4.0/23) Total Chromium/Hexavalent Chromium

100 0 100
(feet)

PARSONS
PARSONS ENGINEERING SCIENCE, INC.

SENECA ARMY DEPOT ACTIVITY
REMEDIAL INVESTIGATION
SEAD-4 MUNITIONS WASHOUT FACILITY

FIGURE 4-2
CHROMIUM CONCENTRATIONS IN SURFACE SOILS AND SEDIMENT IN AREAS 2 AND 3 (MG/KG)

SCALE	DATE	REV
1:100		SHEET 1 OF 1

The concentration of chromium from the Level II analyses ranges from a low of 10.8 mg/kg to a high of 6,600 mg/kg. The highest concentrations of chromium were detected in the following samples:

SS4-8 (5400 mg/Kg),
SS4-9 (6,600 mg/Kg),
SS4-10 (3,600 mg/Kg),
SS4-12 (1,280 mg/Kg),
SS4-13 (4,800 mg/Kg),
SS4-18 (1,710 mg/Kg),
SS4-42 (1,320 mg/Kg), and
SS4-90 (2,300 mg/Kg).

Samples SS4-8 and SS4-9 were located in the dredge material from the pond. SS4-10 and SS4-12 were located at the southern edge of the pond. SS4-13 and SS4-18 were located on the western edge of the Area 1 grid. For sample SS4-13, the Level II analysis indicated a concentration of 4800 mg/kg of chromium, while the Level IV analysis determined 10,100 mg/kg of chromium. Samples SS4-42 and SS4-90 were located in a drainage ditch in the center of Area 2.

Surface soil samples collected from Area 3 (SS4-53 through SS4-64) and other locations at SEAD-4 (SS4-65 through SS4-82) were sent for Level IV analysis and did not undergo any Level II screening.

The reason for conducting Level II screening was to efficiently delineate the contamination within Areas 1 and 2 at SEAD-4. During the ESI, soil samples (SS4-1 through SS4-6 and SS4-10) were collected from these two areas contained high levels of total chromium. The results of the Level II analyses were used to locate additional surface soil samples and soil borings within Areas 1 and 2.

Level II screening was used for the following additional reasons:

- Cost - Level II screening was approximately three (3) times less costly than Level IV analyses.

- Efficiency - It was determined that screening could provide a basis for locating additional surface soil samples and soil borings within Areas 1 and 2.

- Turnaround time - Level II results were available within 24 hours enabling the field personnel to make decisions concerning field operations. Level IV analyses require up to 35 days to be completed.

4.3.1 Procedures Used for Level II Screening

Level II screening work was performed only for chromium. All sample screening was performed under controlled conditions in the laboratory. The method used for screening chromium followed the identical sample preparation steps as those which were required for Level IV analysis. The only difference between the screening method and the Level IV analyses is the amount of QA/QC supporting information performed. In addition, the screening analysis is not supported by a NYSDEC ASP Superfund Category deliverable.

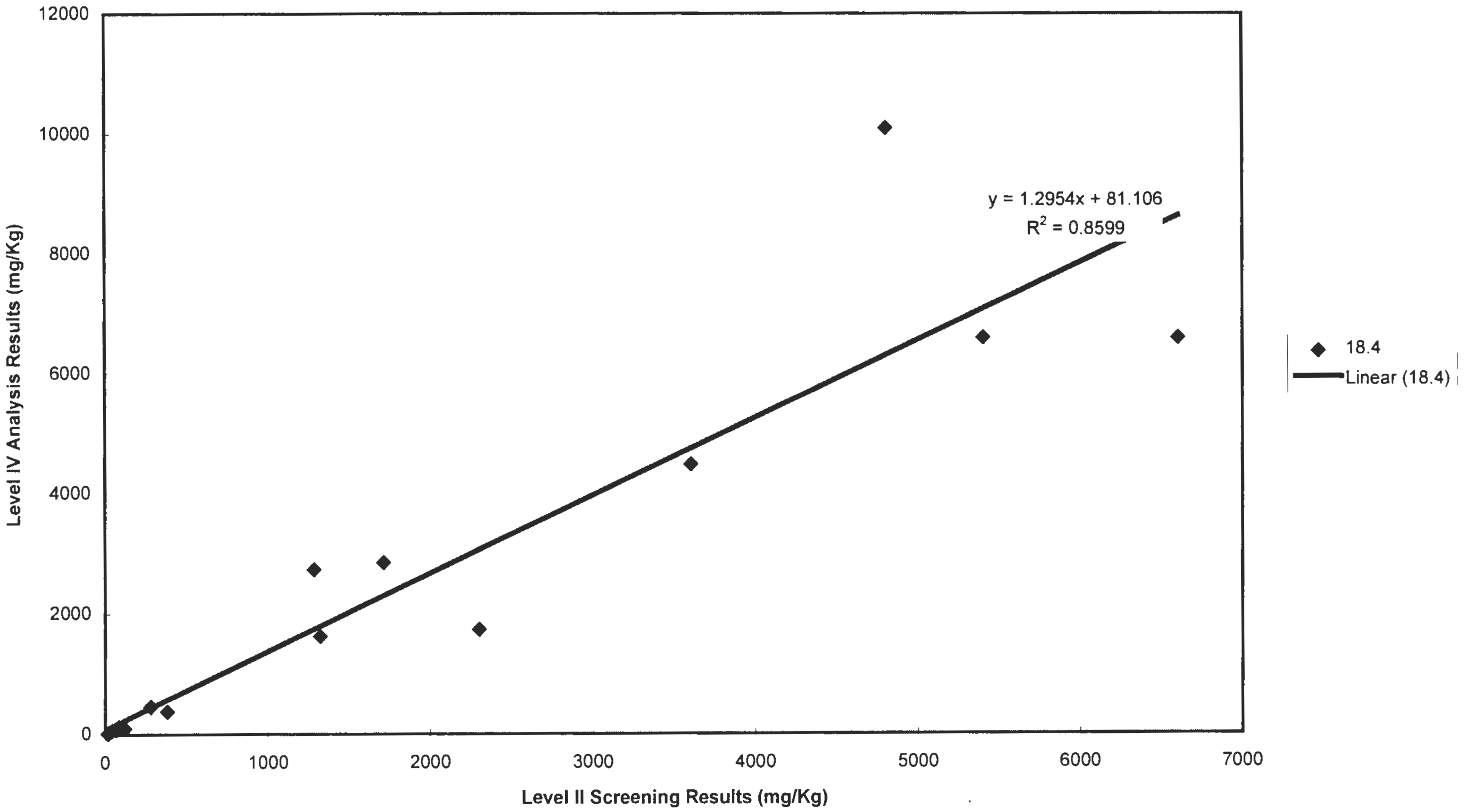
4.3.2 Level II Versus Level IV Results

In order to evaluate the overall effectiveness of the Level II screening program, it was necessary to compare the Level II and Level IV results. It is important to assure that the low concentration results are accurate in comparison with the Level IV results. That is, a comparison of the Level II and the Level IV results ensured that the Level II screening did not indicate false negative (no contamination) results. The results of the Level II screening and the associated Level IV sample analysis are presented in **Table 4-2.**

A total of 61 surface soil samples were screened. The Level II screening analyses detected chromium in all the samples collected from Areas 1 and 2. Of these 61 samples, 21 samples underwent Level IV analysis. Of these 21 samples analyzed using Level IV methods, all contained chromium above the detection limits.

A regression analysis data has been performed on the surface soil data in Table 4-3 to evaluate the relationship between the Level II and Level IV data. **Figure 4-3** shows a plot of the Level II versus Level IV surface soil data along with a plot of the best fit regression line. The regression

Figure 4-3
Level II vs. Level IV Screening Results for Chromium in Surface Soils



h:\eng\seneca\s4ri\tables\regression Chart 2 analysis yielded an R-squared value of .8599, which is indicative of a strong linear relationship existing between the Level II and Level IV results. The slope of the best fit regression line was determined to be 1.295 indicating that the Level II screening results predicted lower concentrations than the actual Level IV results by approximately 30 percent. This analysis suggests that the Level II screening method is capable of reliably predicting the concentrations of chromium in soil samples.

The surface soil analytical results were also evaluated to determine if there was a significant difference between the results obtained from the Level II and Level IV analyses. The first step was to determine if one analysis consistently yielded higher concentrations. From the results of the regression analysis presented above, it was determined that the Level IV analysis yielded higher concentrations than the Level II analysis.

The second step was to evaluate the comparability of the two sets of analytical results. This was accomplished by looking at the set of duplicate soil samples (SS4-8) and comparing the relative percent differences (RPDs) calculated for each method with those calculated between methods. The RPD values are presented in **Table 4-2**. There was little difference between the RPD values. RPD values calculated for Level II was 1.9 percent. Between the methods, the RPD was 19.8 percent. This indicates that the variability between results is likely due to the heterogeneous nature of the soil samples and not to any differences between the methods.

4.4 SOIL

The discussion of soils is divided into surface soils and subsurface soils within each chemical class. Surface soil is defined as soil that exists from 0 to 2 inches below the ground surface or organic matter. Subsurface soil occurs below 2 inches.

NYSDEC Technical and Administrative Guidance Memorandum (TAGM) HWR-94-4046 (revised January 24, 1994) values were determined to be the most appropriate as a basis of comparison for the soil sample results. For metals, the values used for comparison are from the NYSDEC TAGM, or the background concentration determined from the SEDA-wide database of 57 background samples, whichever was higher. The NYSDEC TAGM also presents maximum soil cleanup objective values for analyte groups as follows: total VOCs <= 10 ppm, total SVOCs

<= 500 ppm, individual SVOCs <= 50 ppm, and total pesticides <= 10 ppm. Soil sample results were also compared to these total values.

Summary statistics for the surface soil and subsurface soil analyses are shown in **Tables 4-3 and 4-4**. The tables of results of the chemical analyses for surface and subsurface soils are presented in Appendix F.

4.4.1 Volatile Organic Compounds

Surface Soils

A total of eight volatile organic compounds were detected in the surface soil samples (**Table 4-3**). None of the compounds were detected at concentrations exceeding the associated TAGM value. None of the samples had total VOC concentrations exceeding 10 ppm. Summary statistics information indicates that methylene chloride, which is a common laboratory contaminants, was detected in some of the surface soil samples at low concentrations. Acetone, which is also a common laboratory contaminant, was detected in 27 samples. Maximum concentrations of acetone were 140 µg/kg at SS4-81 and 120 J µg/kg at SS4-57.

However, since these compounds appear in laboratory blanks, they are not believed to be representative of the true soil chemistry.

Toluene was detected in 25 of the surface soil samples at concentrations below the NYSDEC TAGM value of 1500 µg/kg. A maximum concentration of 14 J µg/kg was detected in SS4-19. Trichloroethene was detected in three samples at a maximum concentration of 3 µg/kg, which is well below the NYSDEC TAGM criteria of 700 µg/kg.

Detection limits for all VOC compounds were below the respective TAGM values.

Subsurface Soils

Six VOCs were detected in 34 of the subsurface soil samples collected at the site during the ESI and the RI programs(**Table 4-4**). All the VOCs were detected at concentrations well below the

Table 4-3
Summary Statistics for Surface Soil Samples
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

ANALYTE	UNITS	MAXIMUM	FREQUENCY OF DETCTION	NYSDEC TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES
Volatile Organic Compounds							
1,1-Dichloroethane	UG/KG	2	2.33%	200	0	2	86
1,2-Dichloroethene (total)	UG/KG	4	3.49%		0	3	86
Acetone	UG/KG	140	31.40%	200	0	27	86
Benzene	UG/KG	1	1.16%	60	0	1	86
Methyl butyl ketone	UG/KG	9	1.16%		0	1	86
Methylene chloride	UG/KG	3	1.16%	100	0	1	86
Toluene	UG/KG	14	29.07%	1500	0	25	86
Trichloroethene	UG/KG	3	3.49%	700	0	3	86
Semivolatile Organic Compounds							
2-Methylnaphthalene	UG/KG	35	16.28%	36400	0	14	86
Acenaphthene	UG/KG	78	9.30%	50000	0	8	86
Acenaphthylene	UG/KG	32	9.30%	41000	0	8	86
Anthracene	UG/KG	110	17.44%	50000	0	15	86
Benzo(a)anthracene	UG/KG	560	82.56%	224	5	71	86
Benzo(a)pyrene	UG/KG	450	80.23%	61	11	69	86
Benzo(b)fluoranthene	UG/KG	890	80.23%	1100	0	69	86
Benzo(ghi)perylene	UG/KG	310	54.65%	50000	0	47	86
Benzo(k)fluoranthene	UG/KG	510	50.00%	1100	0	43	86
Bis(2-Ethylhexyl)phthalate	UG/KG	13000	59.30%	50000	0	51	86
Butylbenzylphthalate	UG/KG	12000	11.63%	50000	0	10	86
Carbazole	UG/KG	120	22.09%		0	19	86
Chrysene	UG/KG	570	86.05%	400	4	74	86
Di-n-butylphthalate	UG/KG	220	44.19%	8100	0	38	86
Di-n-octylphthalate	UG/KG	44	8.14%	50000	0	7	86
Dibenz(a,h)anthracene	UG/KG	130	22.09%	14	12	19	86
Dibenzofuran	UG/KG	58	16.28%	6200	0	14	86
Diethyl phthalate	UG/KG	22	16.28%	7100	0	14	86
Fluoranthene	UG/KG	1100	93.02%	50000	0	80	86
Fluorene	UG/KG	74	5.81%	50000	0	5	86
Indeno(1,2,3-cd)pyrene	UG/KG	320	53.49%	3200	0	46	86
N-Nitrosodiphenylamine	UG/KG	19	1.16%		0	1	86
Naphthalene	UG/KG	74	12.79%	13000	0	11	86
Phenanthrene	UG/KG	640	87.21%	50000	0	75	86
Phenol	UG/KG	17	2.33%	30	0	2	86
Pyrene	UG/KG	990	88.37%	50000	0	76	86
Explosives							
1,3,5-Trinitrobenzene	UG/KG	120	1.16%		0	1	86
2,4,6-Trinitrotoluene	UG/KG	72	1.16%		0	1	86
2,4-Dinitrotoluene	UG/KG	330	2.33%		0	2	86
2-amino-4,6-Dinitrotoluene	UG/KG	90	1.16%		0	1	86
4-Nitrotoluene	UG/KG	390	1.27%		0	1	79
Pesticides/PCBs							
4,4'-DDD	UG/KG	190	23.26%	2900	0	20	86
4,4'-DDE	UG/KG	160	31.40%	2100	0	27	86
4,4'-DDT	UG/KG	760	33.72%	2100	0	29	86
Aldrin	UG/KG	2.2	1.16%	41	0	1	86

Table 4-3
Summary Statistics for Surface Soil Samples
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

ANALYTE	UNITS	MAXIMUM	FREQUENCY OF DETCTION	NYSDEC TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES
Alpha-BHC	UG/KG	2.4	5.81%	110	0	5	86
Alpha-Chlordane	UG/KG	4.9	9.30%		0	8	86
Total PCBs	UG/KG	360	27%	1000	0	23	86
Beta-BHC	UG/KG	7.6	11.63%	200	0	10	86
Dieldrin	UG/KG	7.4	5.81%	44	0	5	86
Endosulfan I	UG/KG	1.7	4.65%	900	0	4	86
Endosulfan II	UG/KG	5.2	3.49%	900	0	3	86
Endosulfan sulfate	UG/KG	3.8	1.16%	1000	0	1	86
Endrin	UG/KG	27	3.49%	100	0	3	86
Endrin aldehyde	UG/KG	20	11.63%		0	10	86
Endrin ketone	UG/KG	4.2	3.49%		0	3	86
Gamma-Chlordane	UG/KG	7.4	9.30%	540	0	8	86
Heptachlor	UG/KG	4.2	3.49%	100	0	3	86
Heptachlor epoxide	UG/KG	3.6	4.65%	20	0	4	86
Metals							
Aluminum	MG/KG	18800	100.00%	19520 *	0	86	86
Antimony	MG/KG	148	39.53%	6 *	15	34	86
Arsenic	MG/KG	14.6	100.00%	8.9 *	4	86	86
Barium	MG/KG	278	100.00%	300	0	86	86
Beryllium	MG/KG	1.8	100.00%	1.13 *	1	86	86
Cadmium	MG/KG	2.3	12.79%	2.46 *	0	11	86
Calcium	MG/KG	196000	100.00%	125300 *	3	86	86
Chromium	MG/KG	18600	100.00%	30 *	37	86	86
Chromium, Hexavalent	MG/KG	14.7	26.67%		0	4	15
Cobalt	MG/KG	19.9	100.00%	30	0	86	86
Copper	MG/KG	7330	100.00%	33 *	30	86	86
Cyanide	MG/KG	0.87	2.33%	0.35	2	2	86
Iron	MG/KG	64600	100.00%	37410 *	2	86	86
Lead	MG/KG	11200	91.86%	24.4 *	36	79	86
Magnesium	MG/KG	35300	100.00%	21700 *	1	86	86
Manganese	MG/KG	1540	100.00%	1100 *	3	86	86
Mercury	MG/KG	1.2	52.33%	0.1	16	45	86
Nickel	MG/KG	228	100.00%	50 *	1	86	86
Potassium	MG/KG	2340	100.00%	2623 *	0	86	86
Selenium	MG/KG	3.4	23.26%	2	1	20	86
Silver	MG/KG	1.7	5.81%	0.8 *	1	5	86
Sodium	MG/KG	1270	33.72%	188 *	2	29	86
Thallium	MG/KG	5.4	22.09%	0.855 *	16	19	86
Vanadium	MG/KG	1250	100.00%	150	1	86	86
Zinc	MG/KG	2020	100.00%	115 *	29	86	86
Nitrate/Nitrite	MG/KG	8.06	100.00%			66	66

* The soil criteria for these inorganics are 95 th percentile site background values.

Table 4-4

Summary Statistics for Subsurface Soil Samples
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECT	NUMBER OF ANALYSES
Volatiles							
Acetone	UG/KG	31	9%	200	0	7	76
Chloroform	UG/KG	15	8%	300	0	6	76
Ethyl benzene	UG/KG	1	1%	5500	0	1	76
Methylene chloride	UG/KG	2	3%	100	0	2	76
Toluene	UG/KG	13	28%	1500	0	21	76
Total Xylenes	UG/KG	8	4%	1200	0	3	76
Semivolatile Organics							
2-Methylnaphthalene	UG/KG	260	4%	36400	0	3	76
Acenaphthene	UG/KG	88	3%	50000	0	2	76
Acenaphthylene	UG/KG	170	4%	41000	0	3	76
Anthracene	UG/KG	340	4%	50000	0	3	76
Benzo(a)anthracene	UG/KG	1100	7%	224	2	5	76
Benzo(a)pyrene	UG/KG	880	8%	61	2	6	76
Benzo(b)fluoranthene	UG/KG	730	9%	1100	0	7	76
Benzo(ghi)perylene	UG/KG	270	3%	50000	0	2	76
Benzo(k)fluoranthene	UG/KG	890	5%	1100	0	4	76
Bis(2-Ethylhexyl)phthalate	UG/KG	2000	11%	50000	0	8	76
Butylbenzylphthalate	UG/KG	120	1%	50000	0	1	76
Carbazole	UG/KG	160	1%		0	1	76
Chrysene	UG/KG	1000	11%	400	2	8	76
Di-n-butylphthalate	UG/KG	63	24%	8100	0	18	76
Di-n-octylphthalate	UG/KG	37	21%	50000	0	16	76
Dibenz(a,h)anthracene	UG/KG	43	1%	14	1	1	76
Dibenzofuran	UG/KG	33	1%	6200	0	1	76
Fluoranthene	UG/KG	2400	11%	50000	0	8	76
Fluorene	UG/KG	330	4%	50000	0	3	76
Indeno(1,2,3-cd)pyrene	UG/KG	260	3%	3200	0	2	76
Naphthalene	UG/KG	130	3%	13000	0	2	76
Phenanthrene	UG/KG	1400	8%	50000	0	6	76
Pyrene	UG/KG	1800	9%	50000	0	7	76
Nitroaromatics							
Tetryl	UG/KG	67	1%		0	1	76
Pesticides/PCBs							
4,4'-DDE	UG/KG	21	4%	2100	0	3	76
4,4'-DDT	UG/KG	2.9	1%	2100	0	1	76
Aldrin	UG/KG	8.2	1%	41	0	1	76
Alpha-Chlordane	UG/KG	10	1%		0	1	76
Total PCBs	UG/KG	1600	7%	10000	0	5	76
Beta-BHC	UG/KG	1.4	1%	200	0	1	76
Delta-BHC	UG/KG	5.9	1%	300	0	1	76
Endosulfan I	UG/KG	11	1%	900	0	1	76
Endrin	UG/KG	34	1%	100	0	1	76
Endrin aldehyde	UG/KG	3.7	1%		0	1	76
Herbicides							
Dicamba	UG/KG	23	3%		0	1	39
Metals							
Aluminum	MG/KG	21000	100%	19520 *	3	76	76
Antimony	MG/KG	57.8	28%	6 *	10	21	76
Arsenic	MG/KG	21.5	100%	8.9 *	4	76	76
Barium	MG/KG	133	100%	300	0	76	76

Table 4-4

Summary Statistics for Subsurface Soil Samples
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECT	NUMBER OF ANALYSES
Beryllium	MG/KG	1	99%	1.13 *	0	75	76
Cadmium	MG/KG	1.5	4%	2.46 *	0	3	76
Calcium	MG/KG	102000	100%	125300 *	0	76	76
Chromium	MG/KG	3820	80%	30 *	17	61	76
Cobalt	MG/KG	29.1	100%	30	0	76	76
Copper	MG/KG	2250	100%	33 *	14	76	76
Iron	MG/KG	40900	100%	37410 *	6	76	76
Lead	MG/KG	251	100%	24.4 *	6	76	76
Magnesium	MG/KG	32000	100%	21700 *	3	76	76
Manganese	MG/KG	2100	78%	1100 *	5	59	76
Mercury	MG/KG	0.12	45%	0.1	1	34	76
Nickel	MG/KG	62.3	100%	50 *	8	76	76
Potassium	MG/KG	2490	100%	2623 *	0	76	76
Selenium	MG/KG	0.86	33%	2	0	25	76
Silver	MG/KG	1.2	8%	0.8 *	4	6	76
Sodium	MG/KG	134	61%	188 *	0	46	76
Vanadium	MG/KG	31	100%	150	0	76	76
Zinc	MG/KG	1010	100%	115 *	12	76	76
Nitrate/Nitrite	MG/KG	2.7	100%			37	37

* The soil criteria for these inorganics are the 95th percentile site background values.

associated TAGM value. None of the samples had total VOC concentrations exceeding 10 ppm. Acetone, chloroform, and toluene were the most prevalent types of VOCs present.

The maximum concentration of toluene of 13 µg/kg was detected in the soil from MW4-6 (6-6.5 feet). MW4-6 is located near the pond. Toluene was also detected in soil samples from three soil borings MW4-12 (8-8.8 feet), SB4-12 (6-6.4 feet), and SB4-14 (2-3 feet) at concentrations of 5 µg/kg. MW4-12 is located adjacent to Building 2078 and SB4-14 is located adjacent to Building 2084. Soil boring SB4-12 is located on the south side of the pond. These concentrations are well below the NYSDEC TAGM 1500 µg/kg.

Since acetone and chloroform appear in laboratory blanks, they are likely laboratory contaminants. Both of these compounds were generally detected at low concentrations in subsurface soils and are not believed to be representative of the true soil chemistry at SEAD-4. Acetone was detected at a maximum concentration of 31 µg/kg from 2-3.3 feet in monitoring well location MW4-11. This concentration was below the NYSDEC TAGM criteria value of 200 µg/kg.

Detection limits for all VOC compounds were below the respective TAGM values.

4.4.2 Semivolatile Organic Compounds

Surface Soils

SVOCs, mainly PAHs, were detected in the surface soils samples at SEAD-4 (**Table 4-3**). Four PAH compounds were detected at concentrations above their respective TAGM values. Generally, the PAHs exceeded their TAGM values in samples collected from locations adjacent to Building 2084. None of the soil samples had total SVOC concentrations exceeding 500 ppm or individual SVOC concentrations exceeding 50 ppm.

The highest concentrations of carcinogenic PAH compounds were detected in the two surface soil samples, SS4-55 and SB4-17. **Figures 2-8 and 2-9** show the location of these surface soil samples. The highest total carcinogenic PAH concentration was 2,970 µg/kg at SS4-55. SS4-55 is located adjacent to Building 2084. The second highest concentration of total carcinogenic PAHs was 2,300 µg/kg detected at SB4-17, which is located adjacent to the former building foundation near North South Baseline Road. Phenol was detected in only two samples at concentrations of 7.1 J µg/kg in SS4-11 and 17 J µg/kg in SS4-9 .

Five phthalates was detected in the surface soil samples. All phthalate compounds were detected at concentrations below the associated NYSDEC TAGM criteria.

Detection limits for the SVOC compounds benzo(a)pyrene, dibenz(a,h)anthrancene, and phenol were above the associated NYSDEC TAGM values.

Subsurface Soils

SVOCs were detected in 41 of the subsurface soils samples at SEAD-4, and the NYSDEC TAGMs for soil were exceeded in one subsurface sample (**Table 4-4**). None of the soil samples had total SVOC concentrations exceeding 500 ppm or individual SVOC concentrations exceeding 50 ppm.

Four PAH compounds, benzo(a)anthracene, benzo(a)pyrene, chrysene, and dibenz(a,h)anthracene, were detected at concentrations above the TAGM. All of the exceedances were found in soil from MW4-12 (2-3.4 feet). MW4-12 is located adjacent to Building 2078. Benzo(a)anthracene was detected at a concentration of 320 µg/kg , which slightly exceeds the TAGM value of 224 µg/kg. Benzo(a)pyrene was detected at a concentration of 260µg/kg , which exceeds the TAGM value of 61 µg/kg. Chrysene was detected at a concentration of 470 µg/kg, which slightly exceeds the TAGM value of 400 µg/kg. Dibenz(a,h)anthracene was detected at a concentration of 48 µg/kg , which exceeds the TAGM value of 14 µg/kg.

The highest total carcinogenic PAH concentration (1518 µg/kg) was found in MW4-12 (2-3.4 feet).

The detection limits for the SVOC compounds benzo(a)pyrene and dibenz(a,h)anthracene exceeded the respective TAGM values.

4.4.3 Pesticides and PCBs

Surface Soils

Nineteen pesticides were detected in the surface soil samples from SEAD-4 (**Table 4-3**), however, all of the pesticides were detected at concentrations below their respective TAGM criteria. None of the soil samples contained total pesticide concentrations exceeding 10 ppm.

Two PCBs, Aroclor-1254 and Aroclor-1260, were detected in the surface soil samples at concentrations below their respective TAGM criteria for all samples. The total PCB concentrations were below the TAGM criteria of 1000 ug/kg.

Detection limits for the pesticide and PCB compounds were below the respective TAGM values.

Subsurface Soils

A total of nine pesticides and two PCBs were detected in the subsurface soil samples at SEAD-4 (**Table 4-4**). Pesticides were detected in the subsurface soil samples, however, at concentrations well below the respective TAGM values. None of the soil samples contained total pesticide concentrations exceeding 10 ppm.

The total PCB concentrations were below the TAGM criteria of 1000 ug/kg.

Detection limits for the pesticide and PCB compounds were below the respective TAGM values.

4.4.4 Nitroaromatics

Surface Soils

The five nitroaromatic compounds, 4-nitrotoluene, 2,4-dinitrotoluene, 2,4,6-trinitrotoluene, 2-amino-4,6-dinitrotoluene, and 1,3,5-trinitrobenzene, were detected in the surface soil samples collected at SEAD-4 (**Table 4-3**). 2,4-Dinitrotoluene was detected in two of the 86 surface soil samples. The maximum concentration of 330 μg/kg was found in surface soil sample SS4-55, which is located adjacent to Building 2084. The second detection of 2,4-dinitrotoluene, 280 µg/kg, was found in sample SS4-66, which is located near the berm on the western portion of the site. There is no NYSDEC TAGM criteria for this compound. 2,4,6-Trinitrotoluene was detected in only one surface soil sample (SS4-1) at a concentration of 72 J µg/kg. The compound 2-amino-4,6-dinitrotoluene was detected in only one surface soil sample (SS4-1) at a concentration of 90 J µg/kg; there is no NYSDEC TAGM criteria for this compound. SS4-1 is located in the approximate location of the former Munitions Washout Building. 1,3,5-Trinitrobenzene was detected in only one surface soil sample at a concentration of 120 J µg/kg in SS4-1. There is no NYSDEC TAGM criteria for this compound.

For the compound 2,6-dinitrotoluene, the detection limits were below the TAGM value for all samples.

Subsurface Soils

One nitroaromatic compound was detected in the subsurface soil samples from SEAD-4 (**Table 4-4**). The compound detected, Tetryl, was detected in one sample at a concentration of 67 J µg/kg found in soil sample SB4-9 (2-4 feet). There is no NYSDEC TAGM criteria value for this compound.

4.4.5 Herbicides

Surface Soils

The surface soil samples which were collected during the ESI were analyzed for herbicides; soil samples collected during the RI were not analyzed for herbicides (**Table 4-3**). No herbicide compounds were detected in the surface soils analyzed during the ESI.

Subsurface Soils

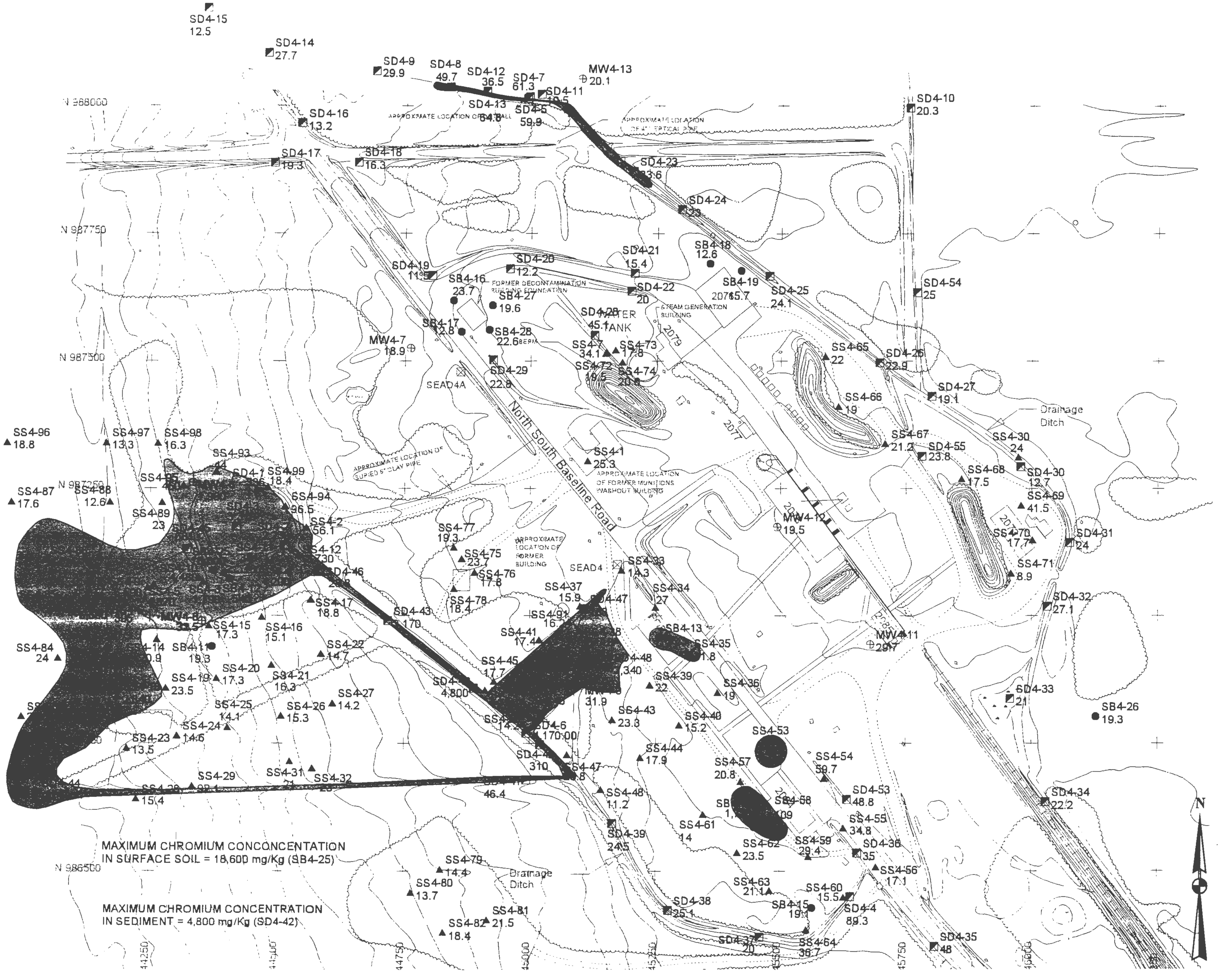
The herbicide Dicamba was detected in a single surface soil sample, SB4-4-1 at a concentration of 23 ug/kg. There is no TAGM for reported concentrations of Dicamba in soils. No other herbicide compounds were reported.

4.4.6 Metals

Surface Soils

Twenty-four metals were detected in the 86 surface soil samples analyzed at SEAD-4 (**Table 4-3**). Hexavalent chromium was also detected. Nineteen metals were found at concentrations that exceeded their respective NYSDEC TAGM value. The metals that exceeded the standards are as follows: antimony, arsenic, beryllium, calcium, chromium, copper, cyanide, iron, lead, magnesium, manganese, mercury, nickel, selenium, silver, sodium, thallium, vanadium, and zinc. While all of the metals can occur naturally in soil, several of them are more common constituents of soil (i.e., calcium, iron, magnesium, manganese, and sodium) and are not considered to pose a significant health risk at SEAD-4. The remaining metals (i.e., antimony, arsenic, beryllium, chromium, copper, cyanide, lead, mercury, nickel, selenium, silver, thallium, vanadium, and zinc) are considered to be more toxic and, therefore, are more pertinent to a discussion of significant impacts at the site.

Antimony was detected above the TAGM criteria in 15 of the 86 samples and its maximum concentration of 148 J mg/kg was found in SB4-25. Arsenic was detected in all of the surface soil samples and four of the samples contained concentrations of arsenic above the TAGM criteria. Its maximum concentration of 14.6 mg/kg was also detected in SB4-25. Soil boring SB4-25 is located at the southern edge of the pond. Beryllium was detected above the TAGM value only one of the 86 surface soil samples, and for this sample, the concentration only slightly exceeded the TAGM value of 1.13 mg/kg. Chromium was detected above its TAGM value in 37 of the 86 samples, however, in nine of the samples, the concentrations only slightly exceeded the TAGM criteria of 30 mg/kg. The maximum concentration of 18,600 J mg/kg was found at SB4-25. Chromium was also detected at a concentration of 10,100 J mg/kg at SS4-13, which is located southwest of the pond in Area 1. **Figure 4-4** shows the distribution of chromium in the surface soils and sediment on the entire site. In general, higher concentrations of chromium were detected in surface soils from Area 1, which is located in an area south of the pond, and from a drainage ditch in Area 2, which is located around former Building T30. **Figures 4-1 and 4-2** present Level II chromium screening data for surface soil and sediment in Areas 1 and 2. Copper was detected in all of the 86 surface soil samples with a maximum concentration of 7,330 mg/kg detected in sample SB4-25. **Figure 4-5** shows the distribution of copper in the surface soils. Copper exceeded the TAGM value of 33 mg/kg in 30 surface soil



MAXIMUM CHROMIUM CONCONCENTATION IN SURFACE SOIL = 18,600 mg/Kg (SB4-25)

MAXIMUM CHROMIUM CONCENTRATION IN SEDIMENT = 4,800 mg/Kg (SD4-42)

LEGEND

⊕	MW4-12 29.7	Monitoring Well Sample Location with LOC_ID and Chromium Value (mg/Kg)
●	SB4-24 19.1	Soil Boring Sample Location with LOC_ID and Chromium Value (mg/Kg)
▲	SS4-27 17.1	Surface Soil Sample Location with LOC_ID and Chromium Value (mg/Kg)
▨	SD4-23 20.3	Sediment Sample Location with LOC_ID and Chromium Value (mg/Kg)

Note: NYSDEC Recommended TAGM Soil Clean-up Objectives for Chromium is 10 mg/Kg or Site Background. The 95th percentile of the Seneca Chromium Background in Soil is 30 mg/Kg.

Shaded areas indicate soill/sediment with Chromium concentrations above site background

200 0 200
(feet)

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FIGURE 4-4
CHROMIUM IN SURFACE SOILS
AND SEDIMENT (MG/KG)
ABOVE BACKGROUND

SCALE	DATE	REV
1:200		SHEET 1 OF 1

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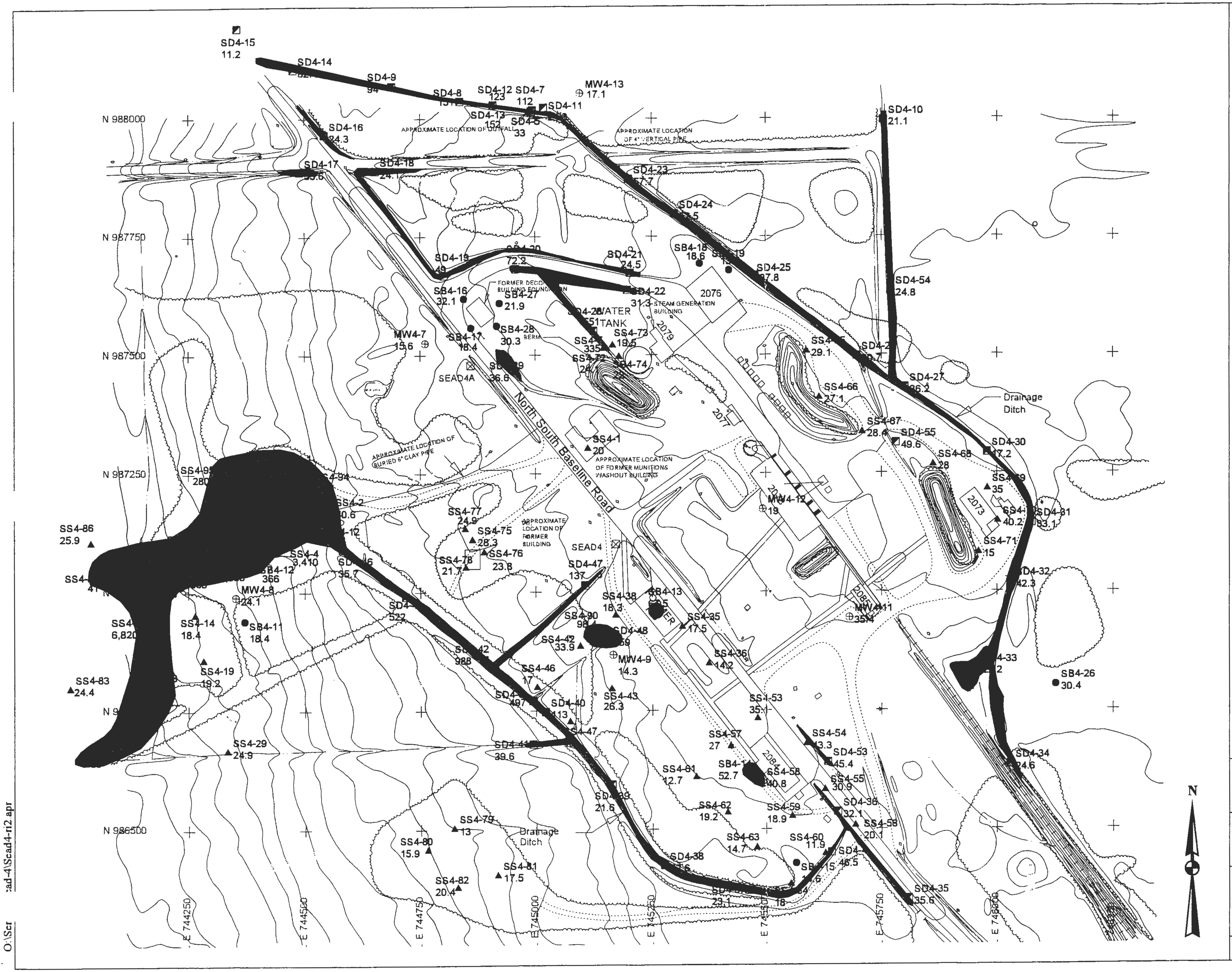
samples. Cyanide was detected in only two samples at a maximum concentration of 0.87 mg/kg found in SS4-59. Lead was detected in 36 of the samples above the TAGM; a maximum concentration of 11,200 mg/kg was found at SB4-14. **Figure 4-6** shows the distribution of lead in the surface soils. Mercury exceeded the TAGM value of 0.1 mg/kg in 16 samples. The concentrations that exceeded the TAGM ranged from 0.11 mg/kg to 1.2 mg/kg (SB4-25). Nickel was detected in only one sample above the NYSDEC TAGM criteria. The maximum concentration of 228 J mg/kg was detected in SS4-7. Selenium was found in only one sample above the NYSDEC TAGM criteria. Silver was found in one sample above the NYSDEC TAGM criteria. The maximum concentration of 1.7 J mg/kg was found in SB4-25. Thallium exceeded the NYSDEC TAGM criteria in 16 samples and the maximum concentration of 5.4 J mg/kg in SB4-25 exceeded the TAGM value of 0.855 mg/kg. Vanadium exceeded the NYSDEC TAGM criteria in only one sample, SS4-7. SS4-7 is located near the water tank. Thirteen metals were detected at concentrations exceeding the TAGM criteria in SS4-7. Lastly, zinc was found to exceed the TAGM criteria in 29 of the samples; its maximum concentration 2,020 J mg/kg was detected in sample SB4-25.

Calcium was detected at a maximum concentration of 196,000 mg/kg (SS4-7), which is greater than the SEDA background average of 45,158 mg/kg. Iron was detected at a maximum concentration of 64,600 mg/kg (SS4-7), which is greater than the SEDA background average of 25,221 mg/kg. Magnesium was detected at a maximum concentration of 35,300 mg/kg, which is greater than the SEDA background average of 10,430 mg/kg. Manganese was detected at a maximum concentration of 1,540 mg/kg, which is greater than the SEDA background average of 599 mg/kg. Sodium was detected at a maximum concentration of 1,270 mg/kg (SS4-7), which is greater than the SEDA background average of 90 mg/kg. The average concentrations for these five compounds were less than the SEDA background averages.

Nine of the maximum concentrations of metals were detected in the surface soil sample from SB4-25.

Hexavalent chromium was analyzed for at 15 surface soil locations, which had high concentrations of total chromium (**Table 2-2**). The results of the chemical analysis indicate that the hexavalent chromium was detected in four surface soil samples (**Table 4-5**). The maximum concentration of 14.7 mg/Kg was found in soil sample SS4-9, which is located southeast of the pond in Area 1. The total chromium concentration for soil sample SS4-9 was 6590 mg/Kg.



LEGEND

⊕	MW4-12 29.7	Monitoring Well Sample Location with LOC_ID and Copper Value (mg/Kg)
●	SB4-24 19.1	Soil Boring Sample Location with LOC_ID and Copper Value (mg/Kg)
▲	SS4-27 17.1	Surface Soil Sample Location with LOC_ID and Copper Value (mg/Kg)
▨	SD4-23 20.3	Sediment Sample Location with LOC_ID and Copper Value (mg/Kg)

Note: NYSDEC Recommended TAGM for Soil Clean-up Objective for Copper is 25 mg/Kg or Site Background. The 95th percentile of the Seneca Copper Background in Soil is 33 mg/Kg. The LEL for Copper in Sediment is 16 mg/Kg.

Shaded areas indicate soil/sediment with Copper concentrations above site background and sediment criteria.

200 0 200
(feet)

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SEAD-4 MUNITIONS WASHOUT FACILITY

FIGURE 4-5
COPPER IN SURFACE SOILS
AND SEDIMENT (MG/KG)
ABOVE BACKGROUND

SCALE	DATE	REV
1:200		SHEET 1 OF 1

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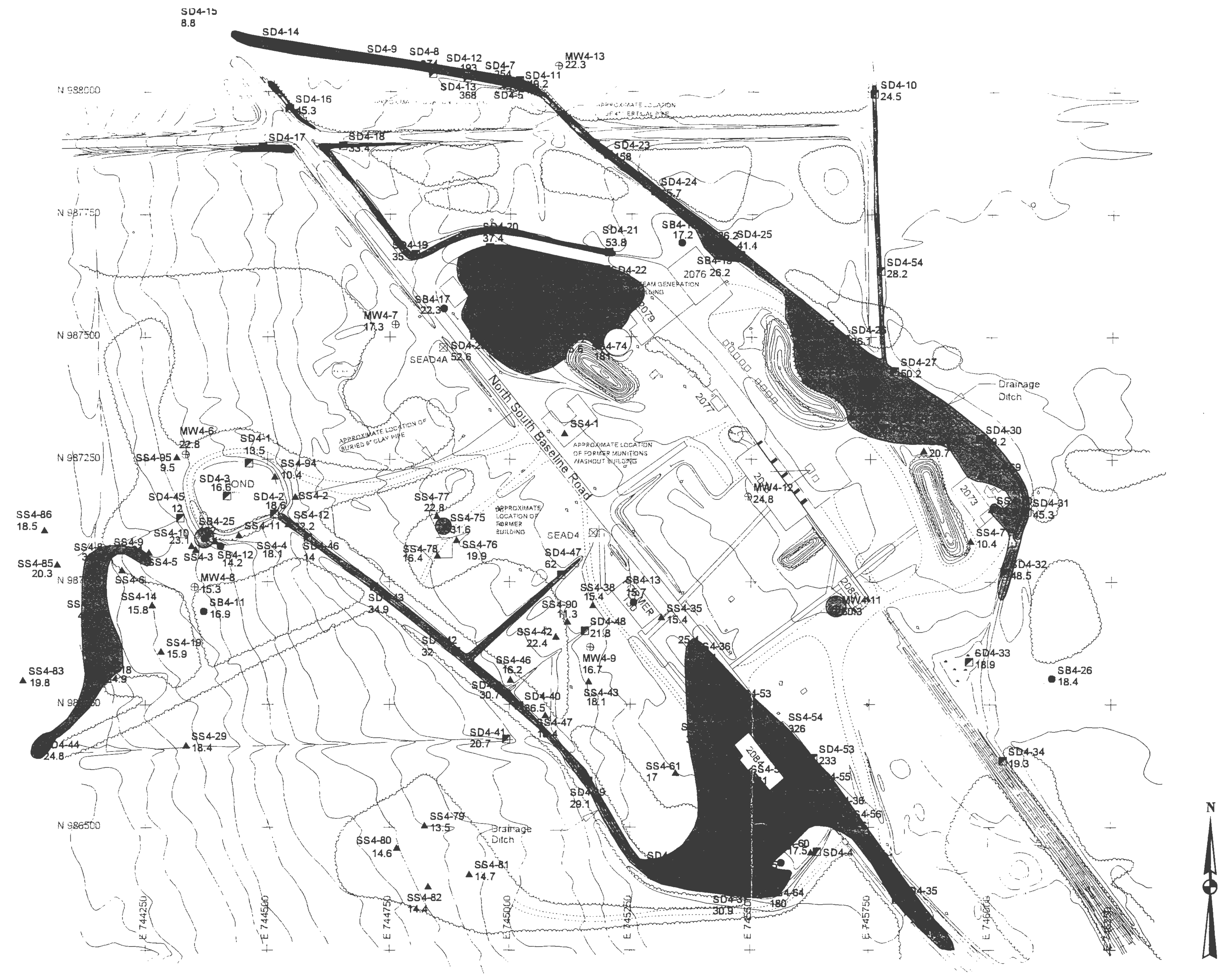

LEGEND

⊕	MW4-12 29.7	Monitoring Well Sample Location with LOC_ID and Lead Value (mg/Kg)
●	SB4-24 19.1	Soil Boring Sample Location with LOC_ID and Lead Value (mg/Kg)
▲	SS4-27 17.1	Surface Soil Sample Location with LOC_ID and Lead Value (mg/Kg)
▨	SD4-23 20.3	Sediment Sample Location with LOC_ID and Lead Value (mg/Kg)

Note: NYSDEC recommended soil clean-up objectives for Lead is SiteBackground. The 95th perentile of Site Lead Background is 23.8 mg/Kg.

Shaded areas indicate soill/sediment with lead concentrations above site background

200 0 200
(feet)

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FIGURE 4-6
LEAD IN SURFACE SOILS
AND SEDIMENT (MG/KG)
ABOVE BACKGROUND

SCALE	DATE	REV
1:200		SHEET 1 OF 1

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For the metal cyanide, several samples had detection limits above the respective TAGM values.

Subsurface Soils

Metals were detected in all of the subsurface soil sample locations at the site (**Table 4-4**). Thirteen metals were found at concentrations that exceeded their respective NYSDEC TAGM values. The metals that exceeded the TAGM values are as follows: aluminum, antimony, arsenic, chromium, copper, iron, lead, magnesium, manganese, mercury, nickel, silver, and zinc. While all of the metals can occur naturally in soil, three of them are more common constituents of soil (i.e., iron, magnesium, manganese) and are generally considered to be less toxic than the others listed. The remaining metals (i.e., aluminum, antimony, arsenic, chromium, copper, lead, mercury, nickel, silver, and zinc) are considered to be more toxic and, therefore, are more pertinent to a discussion of significant impacts at the site.

Aluminum exceeded the TAGM value of 19,520 mg/kg in three samples. A maximum concentration of 20,100 mg/kg was detected in soil sample SB4-9 (2-4 feet). Antimony exceeded the TAGM value in ten of the 76 samples and its maximum concentration of 57.8 J mg/kg was found at MW4-4 at a depth of 0-2 feet. Arsenic was detected above the TAGM value of 8.9 mg/kg in four the 76 samples. The maximum concentration of 21.5 mg/kg was detected in soil sample MW4-1 (8-10 feet). Chromium exceeded the TAGM value of 30 mg/kg in 17 samples. A maximum concentration of 3,820 mg/kg was detected at SB4-25 at a depth of 2-3.5 feet. SB4-25 is located on the southern edge of the pond. Chromium was detected in sample SB4-10 at depths of 2-4 feet and 4 to 6 feet at concentrations of 2,560 mg/kg and 2,470 mg/kg, respectively. SB4-10 is located adjacent to former Building T-30. Chromium was detected in MW4-8 (6-6.5 feet) at a concentration of 2,000 mg/kg. MW4-8 is located just south of the pond. Copper was detected above the TAGM value of 33 mg/kg in 14 out of the 76 samples. The maximum concentration of copper was 2,250 mg/kg at SB4-25 (2-3.5 feet). Copper was also found at SB4-10 at depths of 2-4 feet and 4-6 feet at concentrations of 1,790 mg/kg and 2,030 mg/kg, respectively. Lead was detected in six of the samples above the TAGM value of 24.4 mg/kg. The maximum concentration of 251 mg/kg was found in the 2- to 3-foot sample at SB4-14, which is located adjacent to Building 2084. Mercury exceeded its TAGM value of 0.1 mg/kg in only one sample. Mercury was detected in the 2- to 3.5-foot sample of SB4-25 at a concentration of 0.12 J mg/kg. The TAGM for nickel was exceeded in eight samples. The

TABLE 4-5
HEXAVALENT CHROMIUM RESULTS

SENECA ARMY DEPOT ACTIVITY
SEAD-4 REMEDIAL INVESTIGATION REPORT

Sampling Location ID	Sample Number	Concentration of Hexavalent Chromium (mg/Kg)
SS4-3	43201	5.9 U
SS4-4	43181	6 U
SS4-5	43188	12.4 U
SS4-8	43183	11.7 U
SS4-9	43180	14.7
SS4-10	43197	7.4
SS4-12	43190	11
SS4-13	43200	14.9 U
SS4-13 Duplicate	43185	37 U
SS4-18	43186	33 U
SS4-42	43198	29.6 U
SS4-90	43199	10.5
SS4-94	43104	1.12 U
SS4-95	43105	3.24 U
SB4-14/MW4-10	43191	12.2 U
SB4-25	43196	12.1 U
MW4-6	43195	5.8 U
SD4-2	43189	7 U
SD4-6	43187	13.4 U
SD4-42	43194	12.9 U
SD4-43	43184	163
SD4-48	43193	12.4 U

maximum concentration of 62.3 mg/kg was detected at MW4-1/SB4-1 at a depth of 8 to 10 feet. Silver was detected above the TAGM value of 0.8 mg/kg in four of the 76 soil samples. Lastly, zinc was found to exceed the TAGM value of 115 mg/kg in 12 samples; the maximum concentration of 1010 mg/kg was detected in MW4-4 (0-2 feet).

The group of metals consisting of iron, magnesium, and manganese, are not considered to pose a significant health risk at SEAD-4, as these are common components of soil. None of these metals exceeded their respective TAGM values by more than 1.9 times and they represent a range of concentrations that approach background.

The soil samples from SB4-10, SB4-14, and SB4-25 contained the highest concentrations of metals and had the most NYSDEC TAGM exceedences. SB4-10 is located near the former Building T-30; SB4-14 is located near Building 2084; and SB4-25 is located on the southern edge of the pond.

For the metals cyanide and thallium, the detection limits exceeded the respective TAGM values for most of the samples.

4.4.7 Other Constituents

Nitrate/Nitrite-Nitrogen

Surface Soils

Nitrate/nitrite-nitrogen was detected in 85 surface sample locations at concentrations ranging between 0.01 mg/kg and 8.06 mg/kg (**Table 4-3**). The highest of these concentrations was measured in the surface sample at SS4-90.

Subsurface Soils

Nitrate/nitrite-nitrogen was detected in all 60 of the subsurface samples at concentrations ranging between 0.01 mg/kg and 3.3 mg/kg (**Table 4-4**). The highest concentration was found in the sample from TP4-1 at a depth of 3 feet.

4.5 GROUNDWATER

A total of 13 groundwater monitoring wells were installed at SEAD-4. Five monitoring wells, MW4-1, MW4-2, MW4-3, MW4-4, and MW4-5 were installed during the ESI field program and eight additional overburden monitoring wells, MW4-6 through MW4-13, were installed during the RI field program. Three rounds of groundwater sampling were conducted by the end of the RI project at SEAD-4. One round was conducted for the ESI in late 1993 and early 1994, a second in March 1999 as part of the RI. The third round was conducted in July 1999 as part of the RI at SEAD-4. Monitoring wells MW4-1, MW4-3, and MW4-4 were sampled three times; MW4-2 and MW4-5 were dry during the third round. The eight monitoring wells installed during the RI were sampled twice.

The discussion below will focus on the more recent groundwater data collected from the wells during the RI (March 1999 and July 1999) because this data depicts the most recent groundwater conditions at SEAD-4, and represents a larger database since several of the wells were not installed for the ESI. Furthermore, the low-flow groundwater sampling method was implemented during the RI field program and resulted in low turbidity groundwater samples, which are more representative of the groundwater at the site.

Groundwater results were compared to the lowest value from the following criteria: New York State Class GA standards, Federal Drinking Water Standards Maximum Contaminant Levels (MCLs) and secondary MCLs.

Summary statistics for the groundwater analyses are shown in **Table 4-6**. The table of the results of the chemical analyses for the groundwater from the ESI and the RI is presented in Appendix F.

4.5.1 Volatile Organic Compounds

Groundwater Sampling Round 1 - March 1999

Five volatile organic compounds were detected in three of the 13 monitoring wells sampled at the site (**Table 4-6**).

Table 4-6A
Summary Statistics for Groundwater Samples
Round 1
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

ANALYTE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	GW CRITERIA	CRITERIA USED	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES
Volatile Organic Compounds								
Acetone	UG/L	8	7%			0	1	14
Benzene	UG/L	2	7%	1	NYS GA	1	1	14
Ethyl benzene	UG/L	6	7%	5	NYS GA	1	1	14
Toluene	UG/L	0.4	7%	5	NYS GA	0	1	14
Total Xylenes	UG/L	4	7%	5	NYS GA	0	1	14
Semivolatile Organic Compounds								
4-Methylphenol	UG/L	2.2	7%	1	NYS GA	1	1	14
Bis(2-Ethylhexyl)phthalate	UG/L	1.1	7%	5	NYS GA	0	1	14
Di-n-butylphthalate	UG/L	0.15	7%	50	NYS GA	0	1	14
Diethyl phthalate	UG/L	0.072	14%			0	2	14
Naphthalene	UG/L	2.2	7%			0	1	14
Phenol	UG/L	0.4	7%	1	NYS GA	0	1	14
Nitroaromatics								
2-Nitrotoluene	UG/L	0.87	7%	5	NYS GA	0	1	14
3-Nitrotoluene	UG/L	2.6	7%	5	NYS GA	0	1	14
4-Nitrotoluene	UG/L	10	7%	5	NYS GA	1	1	14
Nitrobenzene	UG/L	0.89	7%	0.4	NYS GA	1	1	14
Pesticides/PCBs								
Aldrin	UG/L	0.0036	7%	0	NYS GA	1	1	14
Alpha-BHC	UG/L	0.0028	7%	0.01	NYS GA	0	1	14
Gamma-Chlordane	UG/L	0.0054	7%	0.05	NYS GA	0	1	14
Heptachlor	UG/L	0.0038	7%	0.04	NYS GA	0	1	14
Metals								
Aluminum	UG/L	2430	92%	50	EPA SEC. MCL	11	12	13
Antimony	UG/L	13.8	38%	3	EPA MCL	3	5	13
Barium	UG/L	53.8	100%	1000	NYS GA	0	13	13
Beryllium	UG/L	0.26	15%	4	EPA MCL	0	2	13
Calcium	UG/L	134000	100%			0	13	13
Chromium	UG/L	260	62%	50	NYS GA	1	8	13
Cobalt	UG/L	1.5	8%			0	1	13
Copper	UG/L	4.3	15%	200	NYS GA	0	2	13
Iron	UG/L	2310	85%	300	NYS GA	4	11	13
Magnesium	UG/L	51700	100%			0	13	13
Manganese	UG/L	378	85%	300	NYS GA	1	11	13
Nickel	UG/L	6	62%	100	NYS GA	0	8	13
Potassium	UG/L	4570	100%			0	13	13
Selenium	UG/L	24	46%	10	NYS GA	3	6	13
Silver	UG/L	1.2	23%	50	NYS GA	0	3	13
Sodium	UG/L	82600	100%	20000	NYS GA	3	13	13
Thallium	UG/L	4.9	23%	2	EPA MCL	3	3	13
Vanadium	UG/L	4.3	38%			0	5	13
Zinc	UG/L	82.8	100%			0	13	13
Nitrate/Nitrite	MG/L	0.09		10		0		4

Table 4-6B
Summary of Statistics for Groundwater Samples
Round 2
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

ANALYTE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	GW CRITERIA	CRITERIA USED	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES
Semivolatile Organic Compounds								
4-Methylphenol	UG/L	0.53	9%	1	NYS GA	0	1	11
Pesticides/PCBs								
Aroclor-1260	UG/L	0.079	9%	0.09	NYS GA	0	1	11
Delta-BHC	UG/L	0.0041	9%	0.04	NYS GA	0	1	11
Heptachlor	UG/L	0.0056	9%	0.04	NYS GA	0	1	11
Metals								
Aluminum	UG/L	3820	92%	50	EPA SEC. MCL	10	11	12
Arsenic	UG/L	6.5	25%	5	EPA MCL	3	3	12
Barium	UG/L	121	100%	1000	NYS GA	0	12	12
Cadmium	UG/L	0.55	8%	5	NYS GA	0	1	12
Calcium	UG/L	128000	100%			0	12	12
Chromium	UG/L	21.8	67%	50	NYS GA	0	8	12
Cobalt	UG/L	3.9	8%			0	1	12
Copper	UG/L	10.2	42%	200	NYS GA	0	5	12
Iron	UG/L	6900	92%	300	NYS GA	7	11	12
Lead	UG/L	1	8%	15	EPA MCL	0	1	12
Magnesium	UG/L	49000	100%			0	12	12
Manganese	UG/L	855	100%	300	NYS GA	2	12	12
Nickel	UG/L	9.9	17%	100	NYS GA	0	2	12
Potassium	UG/L	14400	100%			0	12	12
Selenium	UG/L	3.9	17%	10	NYS GA	0	2	12
Silver	UG/L	2.5	8%	50	NYS GA	0	1	12
Sodium	UG/L	63100	100%	20000	NYS GA	3	12	12
Vanadium	UG/L	11.4	17%			0	2	12
Zinc	UG/L	81.1	67%			0	8	12
Nitrate/Nitrite	MG/L	0.15		10		0		5

Benzene was detected in one groundwater sample from MW4-10 at a concentration of 2 μg/L, which is above the NYS Class GA standard of 1.0 μg/L. Ethyl benzene was also detected in the groundwater sample from MW4-10 at a concentration of 6 μg/L, which is above the NYS Class GA standard of 5 μg/L.

Groundwater Sampling Round 2 - July 1999

No volatile organic compounds were detected in 11 monitoring wells sampled at the site (**Table 4-6**).

4.5.2 Semivolatile Organic Compounds (SVOCs)

Groundwater Sampling Round 1 - March 1999

Six SVOCs were detected in the 13 monitoring wells sampled at the site during the RI (**Table 4-6**). All of the compounds, except 4-methylphenol, were detected at concentrations well below the associated NYS Class GA standard. 4-Methylphenol was detected in MW4-10 at a concentration of 2.2 μg/L which exceeds the GA standard of 1 μg/L. Bis(2-Ethylhexyl)phthalate was detected in one of the groundwater samples. A maximum concentration of 1.1 μg/L was detected in the groundwater from monitoring well MW4-4. Diethyl phthalate was detected in two of the monitoring wells. A maximum concentration of 0.072 J μg/L was detected in MW4-5.

The NYS Class GA Standard for phenol (1.0 μg/L) was exceeded by the detection limit for all of the samples. The detection limit was 1.1 μg/L.

Groundwater Sampling Round 2 - July 1999

One SVOC was detected in the 11 monitoring wells sampled at the site during the RI (**Table 4-6**). 4-Methylphenol was detected in monitoring well MW4-10 at a concentration below the associated NYS Class GA standard.

4.5.3 Pesticide and PCBs

Groundwater Sampling Round 1 - March 1999

Four pesticides were found in three of the groundwater samples collected from the 13 monitoring wells sampled at SEAD-4 (**Table 4-6**) Aldrin and heptachlor were detected in the groundwater sample from MW4-7at a concentration of .0036 J µg/L and .0038 J µg/L, respectively. The NYS GA standard for Aldrin is 0 µg/L. Gamma-chlordane was detected at a concentration of .0054 J µg/L in MW4-13. Alpha-BHC was detected in MW4-12 at a concentration of .0028 J µg/L.

Groundwater Sampling Round 2 – July 1999

Two pesticides were found in two of the groundwater samples collected from the 11 monitoring wells sampled at SEAD-4 (**Table 4-6**) Heptachlor was detected in the groundwater sample from MW4-12 at a concentration of .00056 J µg/L. Delta-BHC was detected at a concentration of .0041 J µg/L in MW4-8. Aroclor-1260 was detected in monitoring well MW4-10 at an estimated concentration of .079 J µg/L, which is below the NYS Class GA standard.

4.5.4 Nitroaromatics

Groundwater Sampling Round 1 - March 1999

Four nitroaromatic compounds were detected in the groundwater samples collected from the 13 monitoring wells sampled at SEAD-4 (**Table 4-6**). 4-Nitrotolene was detected at a concentration of 10 µg/L, which exceeds the NYS GA standard of 5 µg/L. Nitrobenzene was detected at a concentration of 0.89 µg/L, which exceeds the NYS GA standard of 0.4 µg/L. Both compounds were detected in groundwater from MW4-10.

Groundwater Sampling Round 2 - July 1999

No nitroaromatic compounds were detected in the groundwater samples collected from the 11 monitoring wells sampled at SEAD-4 (**Table 4-6**).

4.5.5 Herbicides

Herbicides were not analyzed as part of the RI groundwater sampling program. [However, no herbicides were found in wells MW4-1 through MW4-5 based on results of samples analyzed as part of the ESI program.]

4.5.6 Metals

Groundwater Sampling Round 1 - March 1999

Nineteen metals were detected in the thirteen monitoring wells sampled at SEAD-4 (**Table 4-6**).

Eight metals were found at concentrations that exceeded their respective NYS Class GA or EPA MCL standard. Aluminum was detected in 11 monitoring wells at concentrations above the EPA Secondary MCL. Antimony was detected in three samples at concentrations that exceed the EPA MCL of 3 μg/L. Chromium was detected in one monitoring well at a concentration above the NYS Class GA standard of 50 μg/L. The maximum concentration of chromium of 260 μg/L was detected in groundwater from monitoring well MW4-9, which is located just west of former Building T-30. Iron, with a maximum concentration of 2,310 μg/L in MW4-1, exceeded the GA standard in four of the 13 wells sampled on-site. Manganese was detected at a maximum concentration of 378 μg/L in monitoring well MW4-13, which exceeded the NYS GA standard of 300 μg/L. Selenium exceeded the GA standard in three of the wells at SEAD-4, with a maximum concentration of 24 μg/L being detected at MW4-8. Sodium was detected in groundwater from three monitoring wells at concentrations above the NYS GA standard of 20,000 μg/L. The maximum concentration of sodium of 82,600 μg/L was detected in groundwater from MW4-11. Thallium was detected in three groundwater samples at concentrations exceeding the EPA MCL of 2 μg/L.

None of the metals had detection limits above the respective NYS GA standard.

Groundwater Sampling Round 2 - July 1999

Nineteen metals were detected in the 11 monitoring wells sampled at SEAD-4 (**Table 4-6**).

Five metals were found at concentrations that exceeded their respective NYS Class GA or EPA MCL standard. Aluminum was detected in ten groundwater samples at concentrations exceeding the EPA Secondary MCL. Arsenic exceeded the EPA MCL of 5 μg/L in three monitoring wells. Iron, with a maximum concentration of 6,900 μg/L in MW4-7, exceeded the GA standard in seven of the 11 wells sampled on-site. Manganese was detected at a maximum concentration of 855 μg/L in monitoring well MW4-13, which exceeded the NYS GA standard of 300 μg/L. Sodium was detected in groundwater from three monitoring wells at concentrations above the NYS GA standard of 20,000 μg/L. The maximum concentration of sodium of 63,100μg/L was detected in groundwater from MW4-11.

None of the metals had detection limits above the respective NYS GA standard.

4.5.7 Other Constituents

Nitrate/Nitrite-Nitrogen

Nitrate/nitrite-nitrogen was detected in the groundwater samples ranging from 0.01 μg/L to 0.16 μg/L in Round 1 samples (**Table 4-6**).

4.6 SURFACE WATER

The surface water at SEAD-4 has not been classified by NYSDEC. However, because the drainage ditches near SEAD-4 form the headwaters for Indian Creek, the lower portion of which is designated as Class C surface water by NYSDEC, the Class C standards were used to provide a basis of comparison for the on-site surface water chemical data. The Class C standards are not strictly applicable to the surface water found at SEAD-4.

Summary statistics for the surface water analyses from the ESI and the RI are shown in **Table 4-7**. The table of results of the chemical analyses of the surface water is presented in Appendix F.

Table 4-7

Summary Statistics for Surface Water Samples
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

		MAXIMUM	FREQUENCY OF DETECTION	NYS CLASS C	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES
Volatile Organic Compounds							
Acetone	UG/L	4	30.77%		0	4	13
Semivolatile Organic Compounds							
Anthracene	UG/L	0.068	7.69%		0	1	13
Benzo(a)anthracene	UG/L	0.18	7.69%		0	1	13
Benzo(a)pyrene	UG/L	0.15	7.69%		0	1	13
Benzo(b)fluoranthene	UG/L	0.15	7.69%		0	1	13
Benzo(ghi)perylene	UG/L	0.073	7.69%		0	1	13
Benzo(k)fluoranthene	UG/L	0.16	7.69%		0	1	13
Bis(2-Ethylhexyl)phth	UG/L	0.22	23.08%	0.6	0	3	13
Butylbenzylphthalate	UG/L	0.076	7.69%		0	1	13
Carbazole	UG/L	0.054	7.69%		0	1	13
Chrysene	UG/L	0.18	7.69%		0	1	13
Fluoranthene	UG/L	0.41	15.38%		0	2	13
Indeno(1,2,3-cd)pyre	UG/L	0.069	7.69%		0	1	13
Phenanthrene	UG/L	0.35	7.69%		0	1	13
Pyrene	UG/L	0.25	15.38%		0	2	13
Explosives							
1,3-Dinitrobenzene	UG/L	0.07	7.69%		0	1	13
Pesticides/PCBs							
Alpha-Chlordane	UG/L	0.0077	7.69%		0	1	13
Beta-BHC	UG/L	0.0041	7.69%		0	1	13
Gamma-Chlordane	UG/L	0.0064	7.69%		0	1	13
Metals							
Aluminum	UG/L	7350	100.00%	100	7	13	13
Antimony	UG/L	6.6	38.46%		0	5	13
Arsenic	UG/L	4.2	7.69%	150	0	1	13
Barium	UG/L	213	100.00%		0	13	13
Cadmium	UG/L	11.6	46.15%	1.862822	1	6	13
Calcium	UG/L	159000	100.00%		0	13	13
Chromium	UG/L	44.8	30.77%	347.2701	0	4	13
Cobalt	UG/L	19.6	7.69%	5	1	1	13
Copper	UG/L	97	76.92%	20.28773	4	10	13
Iron	UG/L	16600	100.00%	300	7	13	13
Lead	UG/L	117	30.77%	7.16381	2	4	13
Magnesium	UG/L	32700	100.00%		0	13	13
Manganese	UG/L	2350	100.00%		0	13	13
Nickel	UG/L	32.6	15.38%	154.4886	0	2	13
Potassium	UG/L	4790	100.00%		0	13	13
Silver	UG/L	1.7	15.38%	0.1	2	2	13
Sodium	UG/L	36200	100.00%		0	13	13
Thallium	UG/L	2.4	7.69%	8	0	1	13
Vanadium	UG/L	22.5	30.77%	14	1	4	13
Zinc	UG/L	492	100.00%	141.3798	1	13	13
Nitrate/Nitrite	MG/L	0.25	100.00%			9	9

4.6.1 Volatile Organic Compounds

One VOC, acetone, was found in four of the surface water samples at concentrations ranging from 2 µg/l to 4 µg/l (**Table 4-7**). There is no New York State Class C surface water standard for this compound.

4.6.2 Semivolatile Organic Compounds

SVOC's were detected at eight of the surface water sampling locations at SEAD-4 (**Table 4-7**). None of the SVOC compounds exceeded the associated New York State Class C surface water standard

4.6.3 Pesticide and PCBs

Pesticides were found in seven surface water samples. There are no NYS Class C surface water standards criteria for these compounds.

4.6.4 Nitroaromatics

The nitroaromatic compound, 1,3-Dinitrobenzene, was detected at an estimated concentration of 0.07 µg/L in the sample labeled 4PIPE collected from the vertical stand pipe located adjacent to the suspected leach field location.

4.6.5 Herbicides

Herbicides were not analyzed as part of the RI surface water sampling program. However, no herbicide compounds were found in the surface water samples collected at SEAD-4 during the ESI.

4.6.6 Metals

NYS Class C surface water quality standards were used as a basis of comparison for the surface water samples. The Class C surface water quality standard values for chromium, copper, lead, nickel, and zinc are based on the hardness of the surface water at the site. Hardness is expressed as the total concentration of Ca^{2+} and Mg^{2+} as mg/L equivalent of $CaCO_3$ (Freeze and Cherry, 1979). Hardness (H) can be determined by substituting the concentrations of Ca^{2+} and Mg^{2+} , expressed in mg/L, in the expression shown below:

$$H = 2.5\left(Ca^{2+}\right) + 4.1\left(Mg^{2+}\right)$$

Using this equation, and the average calcium and magnesium concentrations of 64.4 mg/L and 6.6 mg/L, respectively, from the background surface water sample locations at SEDA, a hardness value of 188.18 mg/L was calculated for SEAD-4. This hardness value was used in the calculation of the NYS Class C standards for the metals mentioned above. The surface water locations were selected as the most appropriate "background" locations for SEAD-4 because these sites were less likely to have been impacted by contaminants from the sites.

Metals were detected at all 11 surface water sampling locations at SEAD-4 (**Table 4-7**). Nine metals (aluminum, cadmium, cobalt, copper, iron, lead, silver, vanadium, and zinc) were found at concentrations that exceeded their respective NYS Class C surface water standards. Aluminum was detected in 13 of the surface water samples; seven of which exceeded the NYS Class C standard of 100 µg/L. The maximum concentration of 7350 µg/L was found in sample SW4-13, which is located in the ditch at the northern portion of the site. Cadmium was detected in six surface water samples. Only one sample (SW4-13) had a concentration of 11.6 µg/L, which is above the Class C standard of 1.8 µg/L. Chromium was detected in four samples with no samples exceeding the NYS Class C standard of 347 µg/L. The maximum concentration of 44.8 µg/L was detected in surface water sample SW4-2, which was collected at the southeast edge of the pond. Cobalt was detected in one sample location, SW4-13, at a concentration of 19.6 µg/L. The NYS Class C standard is 5 µg/L. The NYS Class C standard for copper (20.3 µg/L) was exceeded in four surface water samples. The maximum concentration of 97 µg/L was detected in SW4-13. Iron, which exceeded the NYS standard in seven samples, was found at a maximum concentration of 16,600 µg/L at SW4-13. Lead exceeded the standard in two samples. The maximum concentration of lead (117 µg/L) was detected in SW4-13. Silver was detected in two samples, both of which exceeded the Class C standard of 0.1 µg/L. The concentration of silver in sample SW4-12 was1 µg/L and in sample SW4-19, 1.7 µg/L. Vanadium was detected in one sample (SW4-13) above the standard. The sample concentration was 22.5 µg/L and the standard concentration was 14 µg/L. Zinc was detected in one sample above the standard with the concentration of 492 µg/L detected in SW4-13. Several of the maximum concentrations of the metals were detected in the surface water sample SW4-13, which is located in the drainage ditch at the northern portion of the site.

4.6.7 Other Constituents

Nitrate/Nitrite-Nitrogen

Nitrate/nitrite-nitrogen was detected in all of the surface water samples at concentrations ranging from 0.01 mg/L to 0.33 mg/L (**Table 4-7**). There is no NYS Class C standard criteria value for nitrate/nitrite-nitrogen.

4.7 SEDIMENT

For the purposes of the discussion of criteria exceedences below, sediment results were compared to the lowest of several available New York State guidelines for sediment. These standards included: the New York State lowest effect level (NYS LEL), New York State human health bioaccumulation criteria (NYS HHB), New York State benthic aquatic life acute toxicity criteria (NYS BALAT), New York State benthic aquatic life chronic toxicity criteria (NYS BALCT), and New York State wildlife bioaccumulation criteria (NYS WB). The criteria were developed based on an average organic carbon level of 3.91% in the sediment. This is the SEDA-wide organic carbon level.

Summary statistics for the sediment analyses are shown in **Table 4-8**. The table of results of chemical analyses for the sediment is presented in Appendix F.

4.7.1 Volatile Organic Compounds

VOC's were detected in 31 of the 58 sediment samples taken at SEAD-4 (**Table 4-8**). There are New York State sediment guidelines only for toluene and xylene. Neither of these compounds were detected at concentrations above the criteria.

Acetone was detected most frequently, in 15 out of the 58 samples. A maximum concentration of 210 µg/kg was detected in the sediment sample SD4-1, which is located near the pond.

Table 4-8

Summary Statistics for Sediment Samples
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

ANALYTE	UNIT	MAX	FREQUENCY	NYS CRITERIA (1)	SPECIFIC CRITERIA (2)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES
VOLATILES								
Acetone	UG/KG	210	26%			0	15	58
Carbon disulfide	UG/KG	18	9%			0	5	58
Chloroform	UG/KG	14	3%			0	2	58
Methyl chloride	UG/KG	5	2%			0	1	58
Methyl ethyl ketone	UG/KG	49	2%			0	1	58
Methylene chloride	UG/KG	11	5%			0	3	58
Styrene	UG/KG	3	3%			0	2	58
Toluene	UG/KG	42	9%	1916.15	BENTHIC-CHRONIC	0	5	58
Total Xylenes	UG/KG	7	3%	3597.66	BENTHIC-CHRONIC	0	2	58
SEMIVOLATILE ORGANICS								
1,4-Dichlorobenzene	UG/KG	73	2%	469.26	BENTHIC-CHRONIC	0	1	58
2-Methylnaphthalene	UG/KG	31	9%	1329.57	BENTHIC-CHRONIC	0	5	58
4-Methylphenol	UG/KG	140	10%	19.55	BENTHIC-CHRONIC	2	6	58
Acenaphthene	UG/KG	610	19%	5474.7	BENTHIC-CHRONIC	0	11	58
Acenaphthylene	UG/KG	130	17%			0	10	58
Anthracene	UG/KG	1700	47%	4184.24	BENTHIC-CHRONIC	0	27	58
Benzo(a)anthracene	UG/KG	5900	84%	50.84	NYDEC HHB	26	49	58
Benzo(a)pyrene	UG/KG	5100	84%	50.84	NYDEC HHB	26	49	58
Benzo(b)fluoranthene	UG/KG	4800	88%	50.84	NYDEC HHB	35	51	58
Benzo(ghi)perylene	UG/KG	3200	78%			0	45	58
Benzo(k)fluoranthene	UG/KG	5700	43%	50.84	NYDEC HHB	20	25	58
Bis(2-Ethylhexyl)phthalate	UG/KG	42000	40%	7801.45	BENTHIC-CHRONIC	1	23	58
Butylbenzylphthalate	UG/KG	16	9%			0	5	58
Carbazole	UG/KG	500	40%			0	23	58
Chrysene	UG/KG	6200	90%	50.84	NYDEC HHB	34	52	58
Di-n-butylphthalate	UG/KG	250	47%			0	27	58
Di-n-octylphthalate	UG/KG	46	5%			0	3	58
Dibenz(a,h)anthracene	UG/KG	1200	50%			0	29	58
Dibenzofuran	UG/KG	230	17%			0	10	58
Diethyl phthalate	UG/KG	17	3%			0	2	58
Fluoranthene	UG/KG	16000	93%	39887.1	BENTHIC-CHRONIC	0	54	58
Fluorene	UG/KG	660	22%	312.84	BENTHIC-CHRONIC	1	13	58
Hexachlorobenzene	UG/KG	840	3%	5.87	NYDEC HHB	2	2	58
Indeno(1,2,3-cd)pyrene	UG/KG	3100	74%	50.84	NYDEC HHB	21	43	58
N-Nitrosodiphenylamine	UG/KG	760	2%			0	1	58
N-Nitrosodipropylamine	UG/KG	410	2%			0	1	58
Naphthalene	UG/KG	13	12%	1173.15	BENTHIC-CHRONIC	0	7	58
Phenanthrene	UG/KG	7900	88%	4692.60	BENTHIC-CHRONIC	1	51	58
Phenol	UG/KG	210	7%	19.55	BENTHIC-CHRONIC	4	4	58
Pyrene	UG/KG	12000	93%	37579.91	BENTHIC-CHRONIC	0	54	58
EXPLOSIVES								
2-Nitrotoluene	UG/KG	450	2%			0	1	49
2-amino-4,6-Dinitrotoluene	UG/KG	200	2%			0	1	58
4-amino-2,6-Dinitrotoluene	UG/KG	140	2%			0	1	58
PESTICIDES/PCBs								
4,4'-DDD	UG/KG	90	22%	0.39	NYDEC HHB	13	13	58
4,4'-DDE	UG/KG	86	33%	0.39	NYDEC HHB	19	19	58
4,4'-DDT	UG/KG	45	28%	0.39	NYDEC HHB	16	16	58
Aldrin	UG/KG	2.8	5%	3.91	NYDEC HHB	0	3	58
Alpha-Chlordane	UG/KG	44	14%	0.04	NYDEC HHB	8	8	58
PCBS (Total)	UG/KG	830	45%	0.03	NYDEC HHB	26	26	58

Table 4-8

Summary Statistics for Sediment Samples
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

ANALYTE	UNIT	MAX	FREQUENCY	NYS CRITERIA (1)	SPECIFIC CRITERIA (2)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES
Beta-BHC	UG/KG	3.3	7%			0	4	58
Dieldrin	UG/KG	18	7%	3.91	NYDEC HHB	4	4	58
Endosulfan I	UG/KG	1.9	2%	1.17	BENTHIC-CHRONIC	1	1	58
Endosulfan II	UG/KG	6.8	3%	1.17	BENTHIC-CHRONIC	2	2	58
Endosulfan sulfate	UG/KG	12	9%			0	5	58
Endrin aldehyde	UG/KG	15	12%			0	7	58
Endrin ketone	UG/KG	62	7%			0	4	58
Gamma-Chlordane	UG/KG	40	17%	0.04	NYDEC HHB	10	10	58
Heptachlor	UG/KG	2.4	2%	0.03	NYDEC HHB	1	1	58
Heptachlor epoxide	UG/KG	10	10%	0.03	NYDEC HHB	6	6	58
Methoxychlor	UG/KG	68	3%			0	2	58
HERBICIDES								
2,4,5-T	UG/KG	21	11%			0	1	9
METALS								
Aluminum	MG/KG	22100	100%			0	58	58
Antimony	MG/KG	82.7	53%	2	NYS LEL	20	31	58
Arsenic	MG/KG	37.7	98%	6	NYS LEL	19	57	58
Barium	MG/KG	488	100%			0	58	58
Beryllium	MG/KG	1.1	100%			0	58	58
Cadmium	MG/KG	34.1	47%	0.6	NYS LEL	24	27	58
Calcium	MG/KG	140000	100%			0	58	58
Chromium	MG/KG	4800	100%	26	NYS LEL	28	58	58
Cobalt	MG/KG	28.4	100%			0	58	58
Copper	MG/KG	2640	100%	16	NYS LEL	55	58	58
Iron	MG/KG	87900	100%	20000	NYS LEL	45	58	58
Lead	MG/KG	374	95%	31	NYS LEL	35	55	58
Magnesium	MG/KG	27900	100%			0	58	58
Manganese	MG/KG	5480	100%	460	NYS LEL	28	58	58
Mercury	MG/KG	2.4	59%	0.15	NYS LEL	16	34	58
Nickel	MG/KG	453	100%	16	NYS LEL	58	58	58
Potassium	MG/KG	3460	100%			0	58	58
Selenium	MG/KG	6.1	41%			0	24	58
Silver	MG/KG	1.7	45%	1	NYS LEL	4	26	58
Sodium	MG/KG	1370	64%			0	37	58
Vanadium	MG/KG	1140	100%			0	58	58
Zinc	MG/KG	1150	100%	120	NYS LEL	41	58	58
Nitrate/Nitrite	MG/KG	56.8	100%				46	46

Notes:

(1) Criteria calculated using a TOC of 3.91%. This is a site wide TOC value.

(2) NYSDEC HHB = NYS HUMAN HEALTH BIOACCUMULATION CRITERIA
BENTHIC-CHRONIC = NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITERIA
NYDEC W/H = NYS WILD/HUMAN BIOACCUM CRITERIA
NYS LEL = NYS LOWEST EFFECT LEVEL

4.7.2 Semivolatile Organic Compounds

SVOCs, mainly PAHs, were detected at all but two of the sediment sample locations at SEAD-4. The applicable New York State standards for sediment were exceeded for 12 of the compounds (**Table 4-8**).

Benzo(a)anthrancene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene, and indeno(1,2,3-cd)pyrene were detected in 14 sediment samples at concentrations above their respective NYS criteria. Exceedences were detected in samples SD4-4, SD4-7, SD4-12, SD4-16, SD4-17, SD4-18, SD4-27, SD4-29, SD4-36, SD4-43, SD4-47, SD4-50, SD4-51, and SD4-52. Bis(2-Ethylhexyl)phthalate, fluorene, and phenanthrene were each detected in one sample at concentrations above the criteria. 4-Methylphenol, hexachlorobenzene, and phenol also exceeded their guidance level. SD4-16 and SD4-17 are located in the drainage ditches north of the site. SD4-36 is located in the ditch near Building 2084.

4.7.3 Pesticides and PCBs

A total of sixteen pesticides and two PCBs were detected in the sediment samples collected at SEAD-4 and 11 of these compounds exceeded their NYS sediment criteria values (**Table 4-8**). The most significant exceedences for four of the 11 compounds were for the sediment sample SD4-12, which was collected from the drainage ditch at the northern portion of the site.

4,4-DDD was detected in 13 samples at concentrations exceeding the NYS criteria value of 0.39 µg/kg. A maximum concentration of 90 µg/kg was detected in sample SD4-8. 4,4-DDE and 4,4-DDT were detected in 19 and 16 samples respectively at concentrations above the NYS criteria value of 0.39 µg/kg (for each compound). The maximum concentration of 4,4-DDE was found in the SD4-8 sample at 86 µg/kg and the maximum concentration of 4,4-DDT was found in the SD4-12 sample at 45 µg/kg. Dieldrin exceeded the NYS criteria in four samples; the maximum concentration of 18 µg/kg was found in SD4-12. Endosulfan II exceeded the NYS criteria in two samples; the maximum concentration of 6.8 µg/kg was found in SD4-16. Heptachlor epoxide was detected in six samples at concentrations exceeding the NYS criteria of 0.03 µg/kg. A maximum concentration of 10 µg/kg was detected in sample SD4-12. Alpha-chlordane and gamma-chlordane were detected in 8 and 10 samples respectively above their NYS criteria. The maximum concentrations of 44 J µg/kg and 40J µg/kg, respectively, were detected in sample

SD4-13. The remaining pesticides, Heptachlor and Endosulfan I, were each detected above the criteria in one sample.

Two PCB compounds were detected in the sediment samples. Aroclor-1254 and Aroclor-1260 were detected in 26 samples at concentrations above the NYS criteria of 0.03 µg/kg for total PCBs. The maximum concentrations of both compounds (580 µg/kg for Aroclor-1254 and 250 µg/kg for Aroclor-1260) were detected in sample SD4-12.

4.7.4 Nitroaromatics

Three nitroaromatic compounds were detected in the sediment samples. The nitroaromatic compound, 2-amino-4,6-dinitrotoluene, was detected at one of the sediment sample locations at SEAD-4 (**Table 4-8**). The detected concentration of 200 µg /kg was found in SD4-48, which is located southwest of the Former T30 Building. The nitroaromatic compound, 4-amino-2,6-dinitrotoluene, was detected at one of the sediment sample locations at SEAD-4. The detected concentration of 140 µg /kg was found in SD4-2, which is located in the ditch at the entrance to the pond. There are no NYSD criteria value for either compound. 2-Nitrotoluene was detected in one sample at a concentration of 450 J µg /kg in SD4-17.

4.7.5 Herbicides

The compound 2,4,5-T was identified in one sample, SD4-1, at an estimated concentration of 21 J µg/kg. SD4-1 was collected from the north side of the pond. This compound was the only herbicide detected on site. There is no NYSDEC sediment criteria for this compound.

4.7.6 Metals

Metals were detected in all 58 sediment samples collected at the site (**Table 4-8**). New York State lowest effect levels (LELs), as defined in Technical Guidance for Screening of Contaminated Sediments (NYSDEC, 1993) were used as a basis of comparison of metals concentrations in for the sediment samples.

Twelve metals (antimony, arsenic, cadmium, chromium, copper, iron, lead, manganese, mercury, nickel, silver, and zinc) were found to exceed the LEL criteria. Chromium levels most sample locations. Higher concentrations of copper were detected in sediment samples located in the ditches north of the site, in the western ditch, and near the pond.

Hexavalent chromium was analyzed at five sediment locations, which had high concentrations of total chromium (**Table 2-2**). The results of the chemical analysis indicate that the hexavalent chromium was detected in one surface soil sample (**Table 4-5**). A concentration of 163 mg/Kg was found in sediment sample SD4-43, which is located in the western ditch between Areas 1 and 2. The total chromium concentration for sediment sample SD4-43 was 3170 mg/Kg.

4.7.7 Other Constituents

Nitrate/Nitrite-Nitrogen

Nitrate/nitrite-nitrogen was detected in 46 of the sediment samples collected at SEAD-4 (**Table 4-8**). The concentrations ranged from 0.02 mg/kg to 56.8 mg/kg. There is no New York State standard for this compound.

4.8 SUMMARY OF THE EXTENT OF IMPACTS AT SEAD-4

On the basis of the analytical results obtained for the media at SEAD-4, the most significant impact to the site is from metals. Impacts from SVOCs and pesticides were also identified.

The subsurface soils at SEAD-4 have been impacted primarily by metals. Of the 13 metals which exceeded their respective TAGM values, ten metals were considered to be more toxic. Aluminum, antimony, arsenic, chromium, copper, lead, mercury, nickel, silver, and zinc were detected in the subsurface soil samples at concentrations above the respective TAGM values.

Chromium exceeded the TAGM value of 30 mg/kg in 17 subsurface soil samples. A maximum concentration of 3,820 mg/kg was detected in SB4-25 at a depth of 2-3.5 feet. SB4-25 is located on the southern edge of the pond. The soil sample from MW4-8 (6-6.5 feet) contained high concentrations of chromium. MW4-8 is also located south of the pond. Two high concentrations of chromium were detected in SB4-10 (at depth intervals of 2-4 feet and 4-6 feet), which is located adjacent to former Building T-30. High concentrations of copper were also detected in the samples from SB4-10 and SB4-25. On the basis of the subsurface soil data, the highest concentrations of metals were found in the soil samples from SB4-10, SB4-14, and SB4-25. SB4-14 is located near Building 2084. Impacts from the remaining organic and inorganic constituents which were detected in the subsurface soil samples were less significant than the impacts from metals discussed above.

The surface soils at SEAD-4 have been impacted primarily by metals and SVOCs. Of the 19 metals which exceeded their respective TAGM values, 14 metals were considered to be more toxic. Antimony, arsenic, beryllium, chromium, copper, cyanide, lead, mercury, nickel, selenium, silver, thallium, vanadium, and zinc were detected in the surface soil samples at concentrations above the respective TAGM values. Chromium, copper, lead, and zinc had the largest percentage of samples exceeding the TAGM values. Nine of the maximum concentrations of metals were detected in surface soil sample SB4-25, which is located at the southern edge of the pond.

Although there were detections of chromium in surface soil samples collected throughout the site, the highest concentrations of chromium were detected in surface soil samples from Area 1, a drainage ditch in Area 2, and a drainage ditch connecting the two areas. High concentrations of copper were also found in the same locations as the high chromium concentrations.

Hexavalent chromium was analyzed at 15 surface soil locations, which had high concentrations of total chromium. The maximum concentration of 14.7 mg/Kg was found in soil sample SS4-9, which is in Area 1. The total chromium concentration for soil sample SS4-9 was 6590 mg/Kg.

Four SVOCs were detected in the surface soils at concentrations above the associated TAGM value. The highest concentrations of benzo(a)anthracene, chrysene, benzo(a)pyrene, and dibenz(a,h)anthracene in surface soils were detected in samples collected from SS4-54 SS4-55 and SS4-56, which are all located near Building 2084.

Groundwater at SEAD-4 has been impacted by metals. Eight metals, aluminum, antimony, chromium, iron, manganese, selenium, sodium, and thallium, were found in one or more of the groundwater samples at concentrations above the NYS Class GA or EPA MCL standard. Chromium was detected in one monitoring well at concentration above the NYS Class GA standard. The concentration of chromium (260 ug/L) was detected in MW4-9, which is located west and downgradient of former Building T-30.

Generally, surface water impacts were from metals, nine of which were found at concentrations that exceeded their standards.

Sediment at the site has been impacted by pesticides, PCBs, and metals. High concentrations of chromium were detected in sediment samples collected along the western ditch and near the pond. High concentrations of copper were detected in the sediment samples from the western ditch, near the pond, and in the ditches north of the site.

Of the pesticides and PCBs, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, and Aroclor-1254 were detected most frequently in the sediment samples. Aroclor-1254 was detected in 26 of the 58 samples, with the concentrations in all 26 samples exceeding the NYS criteria.

In the building material samples collected from six buildings at SEAD-4, metals, SVOCs, pesticides, PCBs, and nitroaromatics were detected at high concentrations.

5.0 CONTAMINANT FATE AND TRANSPORT

Chapter five presents a site-specific conceptual site model, summarizes the chemical impacts present in various media at the site, and describes the potential transport of constituents of concern from the site. The chapter is organized into four sections, the first two address physical and chemical characteristics at SEAD-4, the third section deals with contaminant fate, and the fourth section with contaminant transport.

5.1 CONCEPTUAL SITE MODEL OF SEAD-4

The conceptual site model for SEAD-4 combines both site conditions and expected pollutant behavior into a cohesive understanding of the site. Taken together, the information collected during the groundwater, surface water, sediment, surface soil, and subsurface soil sampling, as well as survey data and field observations describe the physical characteristics of the site and chemical characteristics of the source areas at SEAD-4. Quantified, these characteristics become the framework for cursory partitioning and transport models that predict the behavior of inorganic constituents of concern at SEAD-4. The conceptual site model is the information described in the following subsections that defines the physical and chemical setting for subsequent modeling discussions.

5.1.1 Summary of Physical Site Characteristics

SEAD-4 is the Munitions Washout Facility located in the southwestern portion of SEDA. The Munitions Washout Facility was part of the Ammunition Workshop Facility, which is still in operation. The workshop facility is approximately 30 acres in size and is characterized by developed and undeveloped areas (**Figure 1-3**). It is surrounded by open grassland and low, thick brush on all sides. North South Baseline Road is the main access road to the facility and bisects the site running from south-southeast to north-northwest. There is also a network of minor paved driveways in the eastern half of the site. The SEDA railroad tracks lead into the site from the southeast and terminate in the vicinity of Buildings 2078 and 2085. There is a man-made pond on the site which is approximately 150 feet in diameter.

The predominant surficial geologic unit present at the site is dense till. The till is distributed across the entire site and ranges in thickness from 0.5 feet to as much as 4.6 feet. In most locations a thin layer of fill covers the surface of the site. The fill becomes significantly thicker near the pond. A zone of gray weathered shale of variable thickness is present below the till. The thickness of the weathered shale ranges between 0.3 feet to 1.3 feet on the site. The average thickness on the site is 0.7 feet. Lastly, gray competent shale is present between 4 feet and 11 feet below the land surface.

Precipitation data from the nearest monitoring station (the Aurora Research Farm) was assessed to gain a perspective on the seasonal variations in precipitation that would directly impact surface water flow. This data indicates that, historically, June has the greatest amount of precipitation 3.9 inches, and the winter months (January and February) generally have the least amount of precipitation (**Figure 1-10**). Annual precipitation is approximately 30 inches. Surface water flow from precipitation events is controlled by local topography. Overall site relief is low, and generally the land surface slopes to the west. Surface water flow in drainage ditches on the west of the facility flows into the pond. Runoff toward the east and north of the facility generally flows into the eastern drainage ditch, which flows northeast.

Till, including the weathered shale immediately below the till, and the underlying competent shale/limestone are the two distinct geologic units at SEAD-4 that store and transmit groundwater. The till and weathered shale behave as a single unconfined hydrological unit. The groundwater flow direction in the till/weathered shale aquifer on the site is generally toward the west based on the groundwater elevations measured in the 13 monitoring wells in March 1999. The noticeable steepening of the land surface gradient in the western portion of the site is also present in the groundwater gradient. More specifically, the groundwater contour map from March 1999 indicates that the groundwater flow is toward the west on the western portion of the site and not as well defined on the eastern portion of the site.

5.1.2 Summary of Chemical Impacts

On the basis of the analytical results obtained for the five media (sediment, surface water, groundwater, surface soils, and subsurface soils), the most significant impacts to the site are from inorganics (i.e., metals), SVOCs, and pesticide/PCB compounds.

The results of the chemical analyses show that subsurface soil at SEAD-4 have been impacted primarily by metals. Antimony, copper, chromium, lead, and zinc were detected at significant concentrations above their respective TAGM values in the subsurface soil samples. The remaining organic and inorganic constituents which were detected in the subsurface soil samples were considered to pose little impact due to their detection at concentrations which were below or only slightly above their respective TAGM values.

The results of the chemical analyses show that surface soil at the site have been impacted primarily by SVOCs and metals. Other constituents that were detected, but are considered to pose little impact, include volatile organic compounds, pesticides and PCBs, herbicides, nitroaromatic compounds and nitrate/nitrite nitrogen. Only small numbers of these constituents exceed their respective TAGM values.

A total of 26 SVOCs were detected at varying concentrations in the surface soil samples analyzed. The compounds benzo(a)anthracene, chrysene, benzo(a)pyrene, and dibenz(a,h)anthracene were reported in surface soil samples at concentrations exceeding the associated TAGM values. The four compounds were found at maximum concentrations of 560 µg/kg, 570 µg/kg, 450 µg/kg, and 130 µg/kg, respectively, in the surface soil sample SS4-55, located adjacent to Building 2084.

Of the 24 metals reported in the surface soil, 19 of these were found in one or more samples at concentrations above the TAGM value. While the majority of these exceedances were found in only one or two samples, or were only marginally above the TAGM values, several metals were identified at concentrations which were significantly above the TAGM values. Of particular note are the metals antimony, chromium, copper, and zinc, where a large percentage of the samples exceeded the TAGM values. The highest concentrations of these metals (antimony at 148 J mg/kg, chromium at 18,600 J mg/kg, copper at 7,330 mg/kg, and zinc at 2,020 N mg/kg) were found in surface soil sample SB4-25, which is located at the southern edge of the pond, in and near the area where the sediment previously dredged from the pond is located.

Groundwater at the site has been impacted by metals. The five metals chromium, iron, manganese, selenium, and sodium were found in one or more of the groundwater samples at concentrations above the NYS Class GA standard values.

Other constituents that were detected in the groundwater samples include SVOCs and nitrate/nitrite nitrogen. The SVOC diethylpthalate was detected in eight monitoring wells and at a maximum concentration of 0.11 JB µg/L at MW4-6. This concentration is well below the NYSDEC GA groundwater standard. Nitrate/nitrite-nitrogen was detected in all of the wells. Constituents that were not detected in the groundwater include PCBs and herbicides.

In the surface water samples, nine metals were found at concentrations above the respective NYS Class C standard. In addition, one nitroaromatic compound (1,3-dinitrotoluene) was detected in the sample from the vertical pipe at the suspected leach field. Other constituents that were detected, but are considered to pose little impact, include volatile organic compounds, SVOCs, pesticides, and nitrate/nitrite nitrogen.

Sediment at the site has been impacted by SVOCs, pesticides, PCBs, and metals. Other constituents that were detected, but are considered to pose little impact, include volatile organic compounds, herbicides and nitrate/nitrite nitrogen. These latter constituents were detected at low concentrations and/or in only a small number of samples. In general, the exceedances were only slightly above their respective TAGM values. One nitroaromatic compound was detected in the sediment at SEAD-4.

Twelve metals were found at concentrations above the NYSDEC criteria values. Of these metals, antimony, arsenic, chromium, copper, lead, nickel, and zinc appear in a large number of samples and/or at concentrations greater than the criteria value.

On the basis of the chemical data collected at SEAD-4, the most predominant impacts are from metals, SVOCs, and pesticide/PCB compounds. The fate and transport sections that follow will focus on these compounds.

5.2 CONTAMINANT FATE AT SEAD-4

Contaminant fate refers to the chemical characteristics and predictable behaviors of a constituent of concern within different media at a site. This section presents a discussion of the fate characteristics of chemicals found at SEAD-4 and how the chemical-specific fate controls the distribution at the site. Although the chemicals found at SEAD-4 were generally similar, this discussion will identify at which sites the chemicals were found. The complete analytical results for SEAD-4 are summarized in Chapter 4 and listed completely in Appendix G.

On the basis of the chemical impacts at both SEAD-4, the discussion of chemical fate will focus on metals in soil, however, the fate of organic chemicals found at the sites will also be discussed.

5.2.1 Overview of Compound Fate

5.2.1.1 Fate of Inorganics (metals)

This section is intended to provide background information that may be helpful when evaluating the fate of metals in soils at SEAD-4.

All soils naturally contain trace levels of metals. The concentration of metals in "uncontaminated" soils is primarily related to the geology of the parent material from which the soil was derived. Therefore, the concentrations of these metals can vary significantly depending on the composition of the parent bedrock material. Background concentrations for metals in till at SEDA have been established through an extensive sampling program that includes 57 samples of till (**Table 1-1 and Appendix F**) .

Water is generally responsible for the mobility of metals in soil systems. Metals associated with the aqueous phase of soil are subject to movement with soil water, and may be transported through the vadose zone to groundwater. However, the rate of migration of the metal usually does not equal the rate of water movement through the soil due to fixation and adsorption reactions (Dragun, 1988). While metals, unlike hazardous organics can not be degraded (McLean and Bledsoe, 1992) they may become immobile due to mechanisms of adsorption and precipitation.

Immobilization of metals, by mechanisms of adsorption and precipitation, will prevent movement of the metals to groundwater. Metals-soil interaction is such that when metals are introduced at the soil surface, downward transportation does not occur to any great extent unless the metal retention capacity of the soil is overloaded, or metal interaction with the associated waste matrix enhances mobility. Changes in soil environment conditions over time, such as the degradation of the organic waste matrix, changes in pH, redox potential, or soil solution composition, due to natural weathering processes, also may enhance the mobility of metals. The extent of vertical impacts is intimately related to the soil solution and surface chemistry of the soil matrix with reference to the metal and waste matrix in question.

In soils, metals are found in one or more of several categories in the soil. These categories as defined by Shuman (1991) are as follows:

1. dissolved in the soil solution;
2. occupying exchange sites on inorganic soil constituents;
3. specifically adsorbed on inorganic soil constituents;
4. associated with insoluble soil organic matter;
5. precipitated as pure or mixed solids;
6. present in the structure of secondary minerals; and/or
7. present in the structure of primary minerals.

In situations where metals have been introduced into the environment through human activities (as at SEAD-4), metals are associated with the first five categories. Native metals may be associated with the first five categories depending on the geological history of the area. The aqueous fraction, and those fractions in equilibrium with this fraction (i.e., the exchange fraction) are of primary importance when considering the migration potential of metals associated with soils.

The following paragraphs discuss general aspects of adsorption and leaching of metals in soil. In general, most soil possess a negative charge (Dragun, 1988), which is due to negative charges associated with clay surfaces. And, these negative charges on soil mineral surfaces are responsible for attracting cationic species of elements at soil surfaces.

However, humus, is also responsible for the accumulation of cationic species of elements at soil surfaces. Humus is the relatively stable fraction of soil organic matter that remains in soil after the chemicals comprising the plant and animal residues have decomposed (Dragun, 1988). Humus is colloidal in structure and the colloid surface possesses functional groups that posses negative charges. These charges are responsible for accumulating cationic species of elements at soil surfaces.

The process by which an ion in water, such as Cu^{2+}, is attracted to soil surface and displaces another cation is known as ion exchange. The term cation exchange specifically refers to the exchange between cations balancing the surface charge on the soil surface and the cations dissolved in water (Dragun, 1988). The total amount of cations adsorbed by these negative charges on a unit mass of soil is defined as the cation exchange capacity of the soil (CEC), which is a stoichiometric and reversible process (Dragun, 1988).

The process by which a cation combines with molecules or anions containing free pairs of electrons is known as complex formation (Dragun, 1988). The cation-anion or cation-molecule combination is known as a complex. The anion(s) or molecule(s) with which the cation forms a complex is usually referred to as a ligand.

According to Dragun (1988), the equilibrium distribution of a cation is governed by two opposing rate processes, the adsorption rate and the desorption rate. The adsorption rate is the rate at which the dissolved cation in water transfers into the adsorbed state. The desorption rate is the opposite process; it is the rate at which the cation transfers from the adsorbed state into water. The extent of adsorption is expressed using the adsorption coefficient or distribution coefficient, K_d. The distribution coefficient is defined as the ratio of the concentration of a solute adsorbed on soil surfaces to the concentration of the solute in water. The greater the extent of adsorption, the greater the magnitude of K_d. K_d values are different among the various metals, and K_ds measured for an individual metal in soil can vary.

Another property of soil that is often correlated with potential migration of metals is soil pH (McLean and Bledsoe, 1992). At soil pH of greater than 6.5, most metals, especially those normally present as cations, are fairly immobile. At higher pH values, metals can form insoluble carbonate and hydroxide complexes. Metals would be most mobile in highly acidic soils, e.g., those with a pH of 5 or less. The chemistry of all cationic metals in soil is also controlled by pH. While direct measurements of soil pH are not available for SEAD-4, the pH of groundwater from the seven well samples during Round 1 was 7.5 and the pH of surface water samples was 7.6. And, by association the pH of the soil is approximately 7.5, as one would not expect its pH to be considerably different than the pH of the groundwater or surface water. Additionally, Hutton (1972), indicates that Darian (DaA) soils like those found at SEAD-4 have pH values that vary depending on the depth of the soil. The pH values are as follows:

1. pH of 5.1 to 7.0 from 0 to 10 inches below the ground surface;
2. pH of 6.1 to 7.5 from 10 to 24 inches below the ground surface;
3. pH of 7.0 to 8.4 from 24 to 50 inches below the ground surface (calcareous soil).

These data provide support for our contention that the pH value for groundwater of 7.5 approximately reflects that pH of the soil found at SEAD-4. This pH value is considered to be neutral.

Dragun (1988) reveals several general trends regarding element mobility using the results of studies of 10 soils in the published literature. They are as follows:

1. Cations and anions exhibit low mobility in clay and silty clay soils. As the surface areas and the clay content increases, the ability of the soil to retain cations and anions will generally increase. [Thus, the high silt and clay content of the soils at SEAD-4 would tend to reduce the mobility of cations in soil.]
2. Cations usually exhibit moderate to high mobility in sandy, loamy sand, and sandy loam soil.
3. Cations can exhibit low, moderate, or high mobility in soils with intermediate textures. and
4. Anions usually exhibit relatively low mobility in clay and silty clay soils and moderate to high mobility in other soil types. [Thus, the high silt and clay content of the soils at SEAD-4 would tend to reduce the mobility of anions in soil.]

As mentioned above, the leaching of metals from soils is controlled by numerous factors. An important consideration for leach of metals is the chemical form (base metal or cation) present in the soil. However, at SEAD-4, the exact form (or speciation) of the individual inorganics is not known.

The leaching of metals from soils is substantial if the metal exists as a soluble salt. Metallic salts have been identified as a component of such items as tracer ammunition, ignition compositions, incendiary ammunition, flares, colored smoke and primer explosive compositions.

The discussion of the individual metals below, is meant to provide an overview of the characteristics that affect the fate of each of the metals, and is not restricted to discussion of metal oxides only. Much of the information below was obtained from McLean and Bledsoe (1992).

Arsenic

In the soil environment arsenic exists as either arsenate, As (V), or arsenite, As(III), however, arsenite is the more toxic form. And, arsenite compounds are reported to be 4 to 10 times more soluble than arsenate compounds (McLean and Bledsoe, 1992).

The adsorption of both forms of arsenic is strongly pH dependent. Griffin and Shimp (1978) found that arsenate had a maximum adsorption in soils with a pH of 5. These same researchers found that arsenite sorption was observed to increase over a pH range of 3 to 9. Other researches found the maximum adsorption of As(III) by iron oxide occurred at pH of 7.

Both pH and redox are important in assessing the fate of arsenic in soil. At high redox levels, As(V) predominates and arsenic mobility is low and as the pH increases or the redox decreases As(III) predominates (McLean and Bledsoe, 1992). The reduced form of arsenic is more subject to leaching because of its high solubility. Also, arsenite, As(III), can be oxidized to As(V) and manganese oxides are the primary electron acceptor in this oxidation (Oscarson et al., 1983).

Barium

Barium is a highly reactive metals that occurs naturally only in the combined state. Most barium is released into the environment form industrial sources in forms that do not become widely dispersed. In the atmosphere, barium is likely to be present in particulate form. Environmental fate processes may transform one barium compound to another; however, barium itself is not degraded. It is removed from the atmosphere primarily by wet or dry deposition.

Barium in soil may be taken up to a small extent either by vegetation, or transported through soil with precipitation. Barium is not very mobile in most soil systems. The higher the level of organic matter in the soil, the greater the adsorption. The presence of calcium carbonate will also limit mobility, since barium will form barium carbonate ($BaCO_3$), an insoluble carbonate.

Chromium

Chromium exists in two possible oxidation states in soils, trivalent chromium, Cr(III), and hexavalent chromium Cr(VI). Hexavalent chromium is the more toxic of the two forms.

Forms of Cr(VI) in soils predominate at pH values of less than 6.5. Because of the anionic structure of Cr(VI), its association with soil surfaces is limited to positively charged exchanges sites, the number of which decreases with increasing soil pH (McLean and Bledsoe, 1992). Generally, hexavalent chromium is highly mobile in soils. However, some researches have found that clay soil, containing free iron and manganese oxides, significantly retarded Cr(VI) migration. Cr(VI) was also found to be highly immobile in alkaline soils.

Trivalent chromium is readily adsorbed by soils. Hexavalent chromium can be reduced to Cr(III) under normal soil pH and redox conditions and soil organic matter has been identified as the electron donor in this reaction (Bartlett and Kimble, 1976; Bloomfield and Pruden, 1980). Barlett and James (1979) showed that Cr(III) could be oxidized under conditions prevalent in some soils.

Copper

Copper is dispersed through the atmosphere primarily as a result of anthropogenic activities. Environmental fate processes may transform one form of copper to another; however, copper itself is not degraded. Most of the copper in the atmosphere occurs in the aerosol form, and long-distance transport may occur. Wet or dry deposition is expected to be the primary fate process in air.

The degree of persistence of copper in soil depends on the soil characteristics and the forms of the copper that are present. Copper is retained in soils through exchange and specific adsorption mechanisms (McLean an Bledsoe, 1992). At concentrations found in native soils, copper precipitates are unstable. This may not be the case in waste-soil systems and precipitation may be an important mechanism of retention. McLean and Bledsoe (1992) state that copper is adsorbed to a greater extent by soils and soil constituents than other metals studied (arsenic, cadmium, nickel, zinc, mercury, silver, and selenium), with the exception of lead. They note, however, that copper has a high affinity for soluble organic ligands and the formation of these complexes may greatly enhance copper mobility in soil. Copper is not expected to volatilize from soil.

Lead

Lead is extremely persistent in both soil and water. Environmental fate processes that transform one lead compound to another, however, the lead is generally present in the +2 oxidation state, and will form lead oxides, although the lead itself is not degraded.

Soluble lead added to the soil reacts with clays, phosphates, sulfates, carbonates, hydroxides, and organic matter such that lead solubility is greatly reduced. At pH values above 6, lead is either adsorbed on clay surfaces or forms lead carbonate. Generally, studies that evaluate the relative affinity of metals for soils and soil constituents, lead is sorbed by soils and soil constituents to the greatest extent compared to Cu, Zn, Cd, and Ni (McLean and Bledsoe, 1992). Some authors have demonstrated decreased sorption of lead in the presence of complexing ligands and complexing cations. Lead has a strong affinity for organic ligands and the formation of such complexes may greatly increase the mobility of lead in soil.

Mercury

The distribution of mercury species in soils (elemental mercury, mercurous ions, and mercuric ions) is dependent on soil pH and redox potential (McLean and Bledsoe, 1992). Both the mercurous and mercuric cations are adsorbed by clay minerals, oxides, and organic matter. Adsorption is pH dependent, increasing with increasing pH. Mercurous and mercuric mercury are also immobilized by forming various precipitous, Mercurous mercury precipitates with chloride, phosphate, carbonate, and hydroxide. At concentrations of mercury commonly found in soil, only the phosphate precipitate is stable. In alkaline soils, mercuric mercury will precipitate with carbonate and hydroxide to form a stable solid phase. At lower pH and high chloride concentrations, HgCl2 is formed. Divalent mercury also will form complexes with soluble organic matter, chlorides, and hydroxides that may contribute to its mobility (Kinniburgh and Jackson, 1978).

Under mildly reducing conditions, both organically bound mercury and inorganic mercury compounds may be degraded to the elemental form of mercury, Hg0. Elemental mercury can readily be converted to methyl or ethyl mercury by biotic and abiotic processes (Roger, 1976, 1977). These are the most toxic forms of mercury. Some researchers have estimated that mercury can be removed due to volatilization and/or precipitation and the removal increased with pH. The volatilization was found to be inversely related to soil adsorption capacity.

Nickel

Nickel does not form insoluble precipitates in unpolluted soils and retention of nickel is, therefore, exclusively through adsorption mechanisms (McLean and Bledsoe, 1992). Nickel will adsorb to clays, iron, and manganese oxides, and organic matter and it thus removed from the soil solution. The formation of complexes nickel with both inorganic and organic ligands will increase nickel mobility in soils.

Zinc

Zinc is stable in dry air, but upon exposure to moist air it will form a white coating composed of basic carbonate. Zinc loses electrons (oxidizes) in aqueous environments. In the environment zinc is found primarily in the +2 oxidation state. Elemental zinc is insoluble and most zinc compounds show negligible solubility as well, with the exception of elements (other than fluoride) from Group VIIa of the Periodic Table compounded with zinc (i.e., $ZnCl_2$, and ZnI_2) that show a general 4:1 compound to water solubility level. In contaminated waters, zinc often complexes with a variety of organic and inorganic ligands. Therefore, the overall mobility of zinc in an aqueous environment, or through moist to wet soils, may be accelerated by compounding/complexing reactions.

Zinc is readily adsorbed to clay minerals, carbonates, or hydrous oxides. Several authors noted in McLean and Bledsoe (1992) found that the greatest percent of the total zinc found in "polluted" soils and sediments was associated with iron and magnesium oxides. Precipitation of zinc is not a major mechanism of retention of zinc in soils because of the relatively high solubility of zinc compounds. Precipitation may be a more significant mechanism of zinc retention in soil-waste systems. Zinc adsorption increases with pH, and hydrolized species are strongly adsorbed to soil surfaces. McLean and Bledsoe (1992) also state that zinc forms complexes with inorganic and organic ligands that will affect its adsorption reactions with the soil surface. Volatilization of zinc is not an important process from soil or water.

5.2.1.2 Fate of Organics

On the basis of the chemical data at SEAD-4, the organics that will be addressed in this section include the following: semivolatile organic compounds, pesticides/PCBs, and nitroaromatics.

However, as noted in the previous sections, impacts from these chemicals are not believed to be as significant as those for inorganics.

Organic compounds are affected by both external site conditions and the compounds' inherent chemical and physical properties. These properties will, in combination, determine the compound state and provide insight into its mobility within a media. In the following discussion, the fate characteristics of semivolatile organic compound, pesticides/PCBs, herbicides, and explosives are discussed.

Semivolatile Organic Compounds

Semivolatile organics are characterized by low vapor pressures and low Henry's Law constants, indicating little potential for volatilization (**Table 5-1**). High sorption coefficients (7,500 ml/g) indicate that these chemicals will tend to stay sorbed to the soil, and will migrate only in conjunction with the soil itself.

Polynuclear Aromatic Hydrocarbons (PAHs)

PAH compounds have a high affinity for organic matter and low water solubility. Most PAHs have organic carbon partition coefficient (K_{OC}) values greater than 2,000 ml/g, indicating that they are immobile (**Table 5-2**). [K_{OC} is the ratio of the amount of the compound present in the organic fraction to that present in the aqueous fraction, at equilibrium]. Water solubility tends to decrease and affinity for organic material tends to increase with increasing molecular weight (Gas Research Institute, 1988). Therefore, naphthalene is much more soluble in water than is benzo(a)pyrene. When present in soil or sediments, PAHs tend to remain bound to the soil particles and dissolve only slowly into groundwater or the overlying water column. Because of the high affinity for organic matter, the physical fate of the chemicals is usually controlled by the transport of particulates. Thus, soil, sediment and suspended particulate matter (in air) represent important media for the transport of the chemicals.

Table 5-1

Summary of Fate and Transport Parameters for Selected Organic Compounds of Concern

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Compound	Solubility (mg/l)	Vapor Pressure (mmHg)	Henry's Law Constant (atm-m^3/mol)	Organic Carbon Partition Coefficient, Koc (ml/g)	Octanol-Water Partition Coefficient, Kow	Half-Life (days)	Bioconcentration Factor (BCF)
Semivolatile Organic Compounds							
Phenol	93000	0.341	4.54E-07	14.2	28.8	3-5	1.4-2
1.4-dichlorobenzene	79	1.18	2.89E-03	1,700	3,980		60-117
2-Methylphenol	25000	0.24	1.50E-06	274	89.1	1-3	
4-Methylphenol		0.11	4.43E-07	267	85.1	1-3	
2.4-Dimethylphenol	4200	0.0573	2.38E-06	222	263	1-3	9.5-150
Benzoic Acid	2700			248	74.1		
Naphthalene	31.7	0.23	1.15E-03	1,300	2,760	1-110	44-95
2-Methylnaphthalene	25.4	0.0083	5.80E-05	8,500	13,000	1-3	
2-Chloronaphthalene	6.74	0.017	4.27E-04	4,160	13,200		
2.6-Dinitrotoluene	1320	0.018	3.27E-06	92	100	4	4.6
4-Chloroaniline	3900	0.025	1.07E-05				
Acenaphthylene	3.93	0.029	1.48E-03	2,500	5,010		
Acenaphthene	3.42	0.00155	9.20E-05	4,600	10,000		
Dibenzofuran				4,160	13,200		
2.4-Dinitrotoluene	240	0.0051	5.09E-06	45	100	5	
Diethylphthalate	896	0.0035	1.14E-06	142	316	1-3	14-117
Carbazole							
Fluorene	1.69	0.00071	6.42E-05	7,300	15,800	32-60	
N-Nitrosodiphenylamine	113		1.40E-06	650	1,350	4	65-217
N-Nitroso-di-n-propylamine							
Hexachlorobenzene	0.006	0.000019	6.81E-04	3,900	170,000		
Pentachlorophenol	14	0.00011	2.75E-06	53,000	100,000		13-6300
Phenanthrene	1	0.00021	1.59E-04	14,000	28,800	1-200	
Anthracene	0.045	0.000195	1.02E-03	14,000	28,200	200-460	
Di-n-butylphthalate	13	0.00001	2.82E-07	170,000	398,000	1-3	89-1800
Fluoranthene	0.206	0.0177	6.46E-06	38,000	79,400	140-440	
Pyrene	0.132	2.50E-06	5.04E-06	38,000	75,900	9-1900	
Butylbenzylphthalate	2.9	8.60E-06	1.20E-06	28,400	58,900		663
Benzo(a)anthracene	0.0057	1.50E-07	1.16E-06	1,380,000	398,000	240-680	
Chrysene	0.0018	6.30E-09	1.05E-06	200,000	407,000	160-1900	

Table 5-1

Summary of Fate and Transport Parameters for Selected Organic Compounds of Concern

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Compound	Solubility (mg/l)	Vapor Pressure (mmHg)	Henry's Law Constant (atm-m³/mol)	Organic Carbon Partition Coefficient, Koc (ml/g)	Octanol-Water Partition Coefficient, Kow	Half-Life (days)	Bioconcentration Factor (BCF)
Bis(2-Ethylhexyl)phthalate	0.285	2.00E-07	3.61E-07	5,900	9,500	Neg. Deg.	
Di-ni-octylphthalate	3			2,400,000	1,580,000,000		
Benzo(b)fluoranthene	0.014	5.00E-07	1.19E-05	550,000	1,150,000	360-610	
Benzo(k)fluoranthene	0.0043	5.10E-07	3.94E-05	550,000	1,150,000	910-1400	
Benzo(a)pyrene	0.0012	0.000568	1.55E-06	5,500,000	1,150,000	220-530	
Indeno(1,2,3-cd)pyrene	0.00053	1.00E-10	6.86E-08	1,600,000	3,160,000	600-730	
Dibenz(a,h)anthracene	0.0005	5.20E-11	7.33E-08	3,300,000	6,310,000	750-940	
Benzo(g,h,i)perylene	0.0007	1.03E-10	5.34E-08	1,600,000	3,240,000	590-650	
Pesticides/PCBs							
beta-BHC	0.24	2.80E-07	4.47E-07	3,800	7,940	Neg. Deg.	
gamma-BHC (Lindane)	7.8	0.00016	7.85E-06	1,080	7,940	Neg. Deg.	250
gamma-Chlordane							
Heptachlor	0.18	0.0003	8.19E-04	0.00012	25,100	Neg. Deg.	3600-37000
Aldrin	0.18	6.00E-06	1.60E-05	96,000	200,000	Neg. Deg.	3890-12260
Endosulfan I	0.16	0.00001	3.35E-05	2,030	3,550		
Heptachlor epoxide	0.35	0.0003	4.39E-04	220	501	Neg. Deg.	851-66000
Dieldrin	0.195	1.78E-07	4.58E-07	1,700	3,160	Neg. Deg.	3-10000
4.4'-DDE	0.04	6.50E-06	6.80E-05	4,400,000	10,000,000	Neg. Deg.	110000
Endrin	0.024	2.00E-07	4.17E-06	19,100	218,000	Neg. Deg.	1335-49000
Endosulfan II	0.07	0.00001	7.65E-05	2,220	4,170		
4.4'-DDD	0.16	2.00E-09	3.10E-05	240,000	360,000	Neg. Deg.	
Endosulfan sulfate	0.16			2,330	4,570		
4.4'-DDT	0.005	5.50E-06	5.13E-04	243,000	1,550,000	Neg. Deg.	38642-110000
Endrin aldehyde							
Endrin ketone							
alpha-Chlordane	0.56	0.00001	9.63E-06	140,000	2,090	Neg. Deg.	400-38000
Aroclor-1254	0.012	0.00008	2.70E-03	42,500	1,070,000	42	10E4-10E6
Aroclor-1260	0.0027	0.000041	7.10E-03	1,300,000	13,800,000	Neg. Deg.	10E4-10E6
Herbicides							
MCPA							
MCPP							

Table 5-1

Summary of Fate and Transport Parameters for Selected Organic Compounds of Concern

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Compound	Solubility (mg/l)	Vapor Pressure (mmHg)	Henry's Law Constant ($atm\text{-}m^3/mol$)	Organic Carbon Partition Coefficient, Koc (ml/g)	Octanol-Water Partition Coefficient, Kow	Half-Life (days)	Bioconcentration Factor (BCF)
2,4,5-T	278	7.5E-07	8.68E-09	650			65
Nitroaromatics							
1,3-Dinitrobenzene	470			150	41.7		
Tetryl							
2-amino-4,6-Dinitrotoluene							
2,6-Dinitrotoluene	182	0.018	3.27E-06	249	100	4	4.6
2,4-Dinitrotoluene	270	0.0051	5.09E-06	201	100	5	

References:

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

Table 5-2

Relative Relationship Between Koc and Mobility of Organic Chemicals

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Koc	Class	Mobility
>2,000	I	Immobile
500-2,000	II	Low Mobility
150-500	III	Intermediate Mobility
50-150	IV	Mobile
<50	V	Very Mobile

Notes:
1) Koc = Organic carbon partition coefficient
2) Source: Dragun, 1988.

Because of their high affinity for organic matter, PAH compounds are readily taken up (bioaccumulated) by living organisms. However, organisms have the potential to metabolize the chemicals and to excrete the polar metabolites (Gas Research Institute, 1988). The ability to do this varies among organisms. Fish appear to have well-developed systems for metabolizing the chemicals. The metabolites are excreted. Shellfish (bi-valves) appear to be less able to metabolize the compounds (Gas Research Institute, 1988). As a result, while PAH compounds are seldom high in fish tissues, they can be high in shellfish tissues.

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

Phenolic Compounds

Phenolic compounds, classified as SVOCs, generally have lower Koc values than PAHs (< 300 ml/g) are highly water soluble and, therefore, easily leach from soil environments into the underlying groundwater. They are not persistent in surface water environments. Phenolics are not as volatile as benzene, xylene or toluene, but can volatilize at a moderate rate. Therefore, there may be some potential for exposure to gases. Non-chlorinated phenolic compounds are not readily bioaccumulated by terrestrial or aquatic biota (Gas Research Institute, 1988).

Pesticides/PCBs

The pesticide compounds 4,4-DDT, 4,4-DDE, and 4,4-DDD are all expected to be highly immobile in the soil/groundwater environment when present at low dissolved concentrations (Installation Restoration Program Toxicity Guide, 1987). Bulk quantities of these compounds dissolved in an organic solvent could be transported through the unsaturated zone as the result of a spill. However, their extremely low solubility and their strong tendency to sorb to soils results in a very slow transport rate in soils.

The fate of Aroclor® mixtures (including 1254 and 1260, which were found at SEDA) is a direct function of their relative composition with respect to the individual chlorinated biphenyl species. These individual species in a pure state are generally solids at room temperature, but Aroclor®

mixtures are oily at room temperature. Based on equilibrium partitioning modeling cited in the Installation Restoration Program Toxicity Guide (1987), almost all of the Aroclor® mixtures are expected to be associated with the stationary (or soil) phase. Much less than 1 percent is expected to partition to the soil-water phase, and only a small amount would be available to migrate via the downward movement of infiltrating water. Generally, groundwater beneath soils that contain PCBs is not expected to be adversely impacted.

6.0 BASELINE RISK ASSESSMENT INTRODUCTION

This section of the SEAD-4 Remedial Investigation report will present the baseline human health risk assessment that were performed for the Munitions Washout Facility (SEAD-4). The ecological risk assessment is presented in Section 7.0. The workplan for this risk assessment was included in the "Project Scoping Plan for the Remedial Investigation Feasibility Study at SEAD-4" (Parsons ES, 1996), which was submitted to USEPA Region II. The exposure scenarios that are evaluated in the baseline human health risk assessment (BRA) are:

- exposure of a current site worker to on-site contaminants
- exposure of a future park worker to on-site contaminants
- exposure of a future construction worker to on-site contaminants
- exposure of a future recreational visitor (child) to on-site contaminants
- exposure of a future resident to on-site contaminants.

Included in the sections that follow are brief descriptions of the Munitions Washout Facility's operating history and site characteristics, as well as full discussions on the identification of potential chemicals of concern, the screening of on-site inorganic element concentrations in soils, and determining reasonable and conservative exposure concentrations. Following these discussions, the report presents first the exposure scenarios that were defined for the human health BRA, followed by the human health risk calculations that quantify the carcinogenic and non-carcinogenic risk for the various exposure scenarios.

6.1 OVERVIEW

The primary mandate of the Superfund program is to protect both human health and the environment from current and potential threats posed by uncontrolled hazardous substance releases. As part of the Remedial Investigation, the Munitions Washout Facility (SEAD-4) was evaluated to assess potential risks to human health and the environment. This baseline risk assessment provides a framework for developing and presenting the necessary risk information to assist in remedial action decisions.

The objectives of the baseline risk assessment are the following:

- help determine whether additional response actions are necessary at the site;

- provide a basis for determining residual chemical levels that are adequately protective of human health and the environment;
- provide a basis for comparing potential health impacts of various remedial alternatives; and
- support selection of the "No Action" remedial alternative, where appropriate.

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

The baseline risk assessment (BRA) is divided into two basic components: the human health evaluation and the ecological risk assessment evaluation. As part of the human health BRA, separate risk calculations are presented for current and future onsite land-use scenarios. The ecological risk assessment presents risk calculations for current site conditions only (Section 7).

6.1.1 Site Description

SEDA is an active military facility located near Romulus, New York. The facility is located in an uplands area, at an elevation of approximately 600 feet above Mean Sea Level (MSL), that forms a divide separating two of the New York Finger Lakes, Cayuga Lake on the east and Seneca Lake on the west. Sparsely populated farmland covers most of the surrounding area. New York State Highways 96 and 96A adjoin SEDA on its east and west boundaries, respectively.

The Munitions Washout Facility (SEAD-4) is located in the southwestern portion of SEDA. The Munitions Washout Facility was part of the Ammunition Workshop Facility, which is still in operation.

The site itself is 30 acres in size and is characterized by developed and undeveloped areas. Eleven buildings existed at the Ammunition Workshop Facility during the years that the Munitions Washout Building was operating. The Introduction (Section 1) and the Detailed Site Description (Section 3.1) portions of this report provide complete details on the site.

6.1.2 General Site History

SEDA was constructed in 1941 and has been owned by the United States Government and operated by the Army since this time. Since its inception, SEDA's primary mission has been the receipt, storage, maintenance, and supply of military items. Prior to construction of the depot, the site was used for farming.

The Munitions Washout Facility (SEAD-4) was in use from approximately 1948 to 1963. The Site History section of this report (Section 1.3.2) presents further information on this site's operating history.

In July,1995 the BRAC Commission voted to recommend closure of SEDA. Congress approved the recommendation, which became public law on October 1, 1995. As part of the 1995 BRAC process, a Land Redevelopment Authority comprised of representatives of the local public was established. This group commissioned a study to recommend future uses for the Seneca Army Depot. The Land Reuse Plan that was produced designated the area which contains SEAD-4 as a "Conservation/Recreation Area".

6.1.3 General Sampling Locations and Media

During the RI and previous investigations, samples of soil, building debris, groundwater, surface water and sediment were collected. A total of six soil/debris samples were collected from inside the buildings; one from each of the six buildings. Soil samples were collected from random surface soil locations, biased surface soil locations where contaminants were likely to accumulate, and soil borings locations. Groundwater samples were collected from 13 groundwater monitoring wells situated throughout the site. Surface water and sediment samples were collected from the drainage ditches throughout SEAD-4 and from the pond. Complete details of all sampling locations are provided in the Study Area Investigation portion of this report (Section 2).

Following the collection and validation of these data, subsets of this collected data were utilized to establish the Exposure Point Concentrations (EPCs) for the various exposure scenarios used in the risk assessments. Metals concentrations in soil and groundwater were further screened to determine if the site concentrations were different from background conditions. The selection of the data to be used to determine EPC values considered the sample media and the location and the depth of the sample, and is consistent with the identified exposure scenarios.

EPCs were determined for the following exposure routes for this risk assessment:

1. Dermal contact with surface water and sediments while wading in the associated drainage ditches and the pond.
2. Incidental ingestion and dermal contact to on-site soils (both surface and subsurface soils).
3. Incidental ingestion of sediments in the drainage ditches, when dry.
4. Inhalation of particulate matter in ambient air.
5. Inhalation of particulate matter in indoor air.
6. Ingestion and dermal contact with dust and debris (solids) inside the buildings.
7. Ingestion, dermal contact, and inhalation of groundwater.

All on-site surface water and sediment data collected from SEAD-4 were used to estimate the EPC, for future land use scenarios only. Current surface water and sediment scenarios were not considered plausible because it is unlikely that the current site worker would wade in the on-site drainage swales.

All on-site groundwater data collected from SEAD-4 were used to estimate the EPCs for future land use scenario only. Groundwater is not currently used as drinking water at all at SEDA but is delivered by pressure pipe from an off-site water supply.

Groundwater flow in the till/weathered shale aquifer at SEAD-4 is generally toward the west. Three drinking water wells are located downgradient and within a one-mile radius of SEAD-4 (**Figure 1-12**). These three wells are located at the Seneca Army Airfield. There are no public supply wells within a one-mile radius of SEAD-4.

All on-site surface soil samples from the 0 to 0.5 foot range were used in estimating the EPCs due to on-site dermal exposure and soil ingestion for the current site worker, future recreational visitor, future park worker, and future resident scenarios. All surface and subsurface soil samples were combined and used in estimating the EPCs for soil ingestion and dermal exposure for the future construction worker scenario. Each soil data set was again used as input to a model to estimate ambient air EPCs of compounds contained in airborne particles derived from soil.

The indoor building debris samples were used to calculate the indoor air EPCs and the ingestion and dermal contact EPCs, respectively, for the future park worker scenario.

6.1.4 Methodology and Organization of Document

The methodology employed for this baseline risk assessment follows USEPA guidance. The relationships of the major steps involved are presented in flowchart form in **Figure 6-1**. This section contains seven major subsections, as follows:

1. Identification of Chemicals of Concern (Section 6.2)

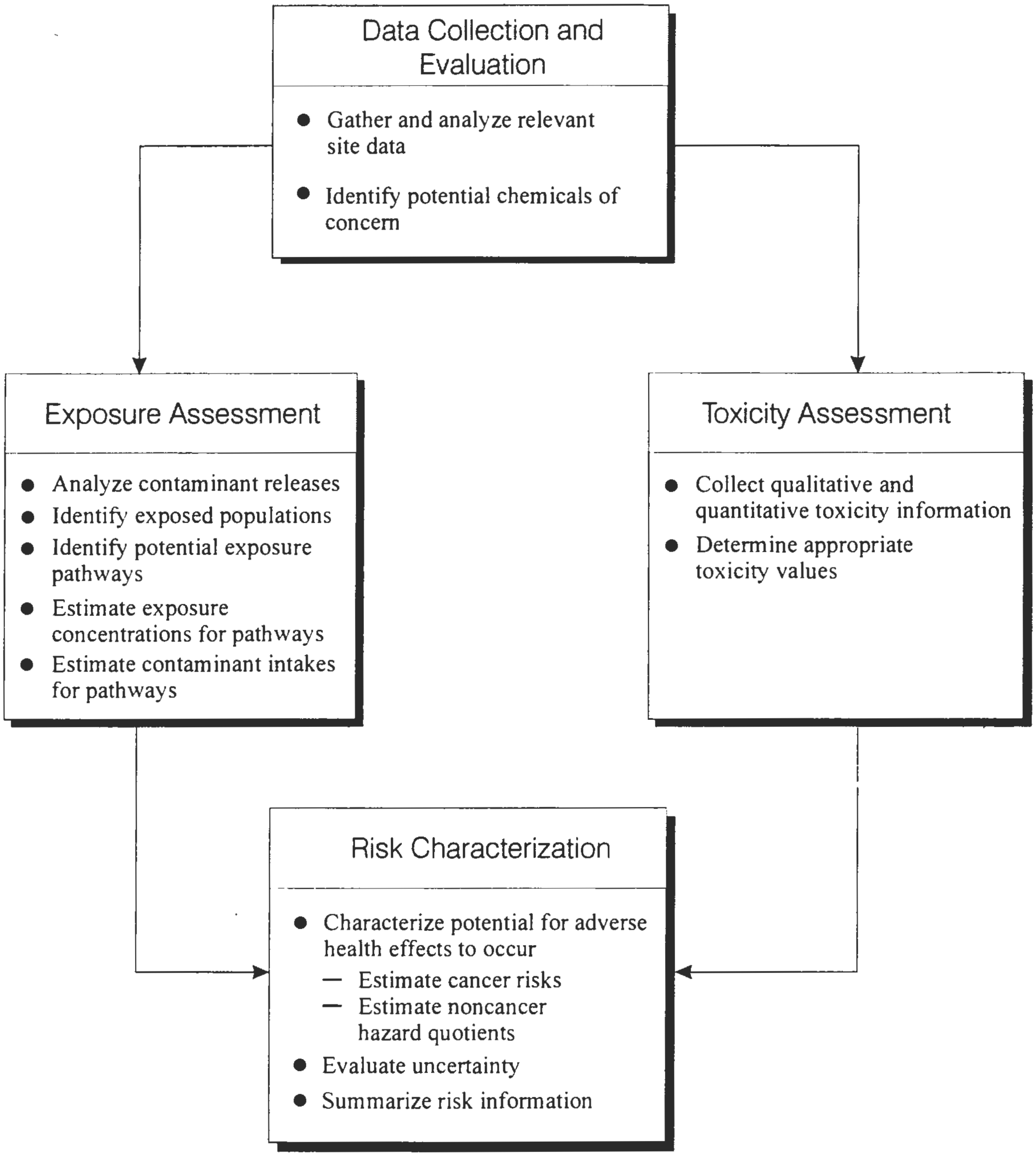
This section provides site-related data along with background chemical data. Detailed summaries and statistical analyses of these data are provided in this section. All chemicals with validated detections in the applicable environmental media were evaluated in the risk assessment. The relevant exposure pathway risks were calculated for each detected chemical. Where appropriate, statistical analyses were performed to compare on-site chemical concentrations with available background data. Based on these analyses, certain compounds were dropped from the baseline risk assessment. The process is described in detail in section 6.2.2.

2. Exposure Assessment (Section 6.3)

This section includes derivation and presentation of the applicable exposure point concentrations (EPCs) used in the human health risk assessment. Exposure point concentrations for the baseline risk assessment are based on analytical data and modeling results. The EPCs provided are used for both current and future onsite land-use scenarios, and correspond to the applicable exposure pathways for the baseline risk assessment. The calculated intake and risk values for all exposure scenarios are presented in two forms: Reasonable Maximum Exposure (RME) and Central Tendency (CT), based on Superfund guidance. Equations used to calculate intakes for all applicable exposure pathways are presented in this section. Detailed exposure/risk calculation spreadsheets are included in Appendix I.

3. Toxicity Assessment (Section 6.4)

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.



Source: USEPA, 1989a

PARSONS
PARSONS ENGINEERING SCIENCE INC

CLIENT/PROJECT TITLE
SENECA ARMY DEPOT ACTIVITY
SEAD-4 Remedial Investigation

DEPT ENVIRONMENTAL ENGINEERING
DWG NO 734539

FIGURE 6-1

BASELINE RISK ASSESSMENT PROCESS

SCALE Not Applicable
DATE November 1999

H:\ENG\SENECA\S4ri\RISK FIG6-1 CDR

4. Risk Characterization (Section 6.5)

This section presents the risk calculations for all human health exposure pathways for current and future land use. Non-carcinogenic and carcinogenic risk estimates are summarized for each receptor and exposure pathway. Detailed Hazard Quotients and Carcinogenic Risk calculations are included in **Appendix G.**

5. Ecological Risk Assessment (Section 7.0)

This section provides an identification and characterization of potential risks posed to environmental receptors. Included are an assessment of the ecological communities and dominant flora and fauna in the vicinity of SEAD-4, and an identification of potential pathways for receptor exposure.

6. Uncertainty (Section 6.7)

This section discusses the potential uncertainties of the methodology, assumptions, judgments, and data used in the risk assessment.

7. Summary (Section 6.8)

In this final section. all conclusions and results are summarized for the human health and ecological risk assessments.

6.2 IDENTIFICATION OF CHEMICALS OF POTENTIAL CONCERN

The usability of site-related chemical data is a critical factor in assessing the human health effects of chemical contamination. The usability of these data depends on their availability, defensibility, and quality. Data availability depends on sampling history, while data defensibility depends on documentation, analytical methods, detection and reporting limits, and data validation. Data quality is measured via precision, accuracy, representativeness, completeness, and comparability.

Site-related chemical data must be managed and manipulated in order to determine representative concentrations of contaminants. Elements of data manipulation include combining multiple analyses of individual samples, incorporating results from the analyses of blind field duplicates, and addressing non-detected analytes in computing pertinent statistics. This section discusses these issues along with summarizing detected chemicals in environmental media and background.

Data collected during the RI were evaluated for suitability of use in the risk assessment as discussed in RAGS (EPA, 1989a). These decisions were based on analytical methods, quantitation limits, qualifiers, and blank contamination. The suitable RI data were then evaluated to determine relevant exposure point concentrations (EPCs) for all chemicals of potential concern (COPCs), for which an exposure assessment, a toxicity assessment, and a risk characterization were performed.

6.2.1 Site-specific Data Collection Considerations

6.2.1.1 Background Sampling

Background soil samples and groundwater samples were compiled for this RI. Only inorganic constituents have been evaluated. Anthropogenic organic constituents have not been considered. This has produced a more conservative risk assessment since all organic constituents have been assumed to be present due to previous site activities. The results are discussed in Section 6.2.3. Background soil and groundwater samples from the SEAD 25 RI, 25 ESIs, the Ash Landfill, and the OB Grounds site have been combined into the background database. This was done so that the statistical evaluation of the data would be representative of the variations in the site soil and groundwater. Geologically, the soil material is identical throughout SEDA, having been deposited from the same source. This fact justifies combining the background soil and groundwater chemical composition data from all SEDA background locations into a single database.

The background groundwater data were also subject to a criterion of having low turbidity levels. It was found that samples collected prior to implementing the USEPA's low-flow purging and pumping draft SOP, samples with high Nephelometric turbidity units (NTUs) (greater than 50) had unrealistic concentrations of inorganic elements. The reported concentrations were often much higher than one could expect to be dissolved in groundwater, and it was concluded that the high reported concentrations were due to the high amount of suspended particulates in the groundwater samples. In addition, several locations were re-sampled using the draft EPA low flow purging and pumping protocols where high NTU groundwater samples had been collected in the past. The results from these locations showed that the concentrations of dissolved inorganic elements in the low NTU samples were greatly reduced when compared to the reported concentrations in those samples with high NTUs. This further reinforces the conclusion that the results from the high NTU samples were not representative of the true dissolved inorganic element concentrations in the background groundwater.

6.2.1.2 Sampling Locations and Media

Five media were sampled during the SEAD-4 RI: building debris, soil, groundwater, surface water, and sediment. Building debris samples were collected from six locations, surface soils were collected from 98 locations, subsurface soils were collected from 28 locations, groundwater samples were collected from 13 locations, surface water samples were collected from nine locations, and sediment samples were collected from 55 locations. The Study Area Investigation, SEAD-4 section of this report (Section 2.0) presents detailed descriptions of all media samples that have been collected from SEAD-4.

6.2.1.3 Sampling Methods

Detailed sampling methods are described in Section 2.0, however a brief description of the sampling of the five media, surface water, sediment, soil, groundwater and building debris is provided below.

Surface water samples were collected from several locations on the site by directly filling the appropriate sample containers, or when the water depth was relatively shallow, sample containers were filled by bailing water into sample containers with a decontaminated glass beaker.

Sediment samples were collected by scooping sediment into a decontaminated stainless steel bowl with a decontaminated trowel. Volatile organic analyte (VOA) samples were taken first, prior to any mixing of the sediments. Then, the bowl was refilled with additional sediment, if required, thoroughly mixed and the appropriate sample containers filled with sediment.

Soil borings were performed using a drilling rig equipped with 4.25-inch hollow stem augers. All borings were advanced to refusal on competent bedrock. During drilling, soil samples were collected continuously at 2-foot intervals using a decontaminated 2 or 1.5 foot split spoon sampler according to the method described in ASTM-D 1586-84. Three soil samples were collected for level IV analysis from each boring. Samples were collected from the surface (0 to 0.5 feet), at an intermediate zone (between 0.5 and 4 feet), and from the top of the water table, except where geologic or water table conditions prevented the collection of these samples.

During the RI groundwater sampling program, groundwater monitoring wells were sampled according to the Draft EPA SOP titled Groundwater Sampling Procedure, Low Flow Pump Purging and Sampling (EPA, May 15, 1995).

During the RI, building debris samples were collected from six of the buildings. The location of the samples was selected based on an evaluation of the most likely area to be impacted by activities within the building.

6.2.1.4 QA/QC Methods

QA/QC samples were analyzed to assess the purpose of assessing the quality of the sampling effort and the analytical data. The QA/QC samples included splits, field duplicates, field equipment blanks, trip blanks, and matrix spike/matrix spike duplicates. 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. A field equipment blank was collected at a rate of one per field equipment decontamination event to detect contamination introduced from field sampling equipment or due to 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.

6.2.1.5 Analytical Methods

NYSDEC CLP statement of work methods were used for the analysis of organic and inorganic constituents in soil, sediment, groundwater, and surface water. Herbicides, explosives, and nitrates were analyzed using EPA Methods 8150, 8330, and 353.2, respectively.

6.2.2 Data Usability

The data usability criteria for documentation, analytical methods, data validation, precision, accuracy, representativeness, comparability, and completeness are discussed in this section.

The RI data were collected during two investigations, the SEAD-4 ESI and the SEAD-4 RI. The ESI began in the fall of 1993 and the RI began in the fall of 1998.

The data used for the risk assessment were grouped into seven databases, one for each of the exposure route/exposure scenarios that were developed from the exposure point pathway models. Each database contains data specific for one of the following: surface soils (defined as soil samples collected from 0 to 6 inches below grade), surface and subsurface soils (i.e. all soils data), surface and subsurface soils to a depth of four feet (for the burrowing animal pathway of the ecological risk assessment), groundwater, surface water, sediments, and building solids.

The following sections describe the processes by which the data were analyzed, examined, and reduced to arrive at a list of analytes and their representative concentrations, for each exposure pathway addressed in the baseline human health and ecological risk assessments.

6.2.2.1 Documentation

Documentation of sample collection and laboratory analysis is essential in order to authenticate conclusions derived from data. Standard operating procedures (SOPs) for field collection of samples are in Appendix A of the Project Workplan, and were followed during sample collection. Formal chain-of-custody records that included sample IDs, date sampled, sample collector, analyses and methods required, matrix, preservation per analysis, and comments were maintained.

Laboratory SOPs were used for all analyses required. Deviations from these SOPs were documented in case narratives that were part of each sample delivery group (SDG). Deviations from these SOPs were minor and did not adversely affect data quality.

6.2.2.2 Evaluation of Analytical Methods

All data used in the risk assessment were generated using level IV CLP protocols. Although level I field screening data were collected as part of the RI, they were not used in the quantitative risk assessment. Since the RI/FS ultimately requires decisions regarding future site remedial actions, the data collected must be of sufficient quality to support this decision making process. The CLP was developed to ensure that consistent QA/QC methods are used when evaluating Superfund site samples. However, this does not mean that all CLP data are automatically of sufficient quality and reliability for use in the quantitative risk assessment.

The data used in this baseline risk assessment were validated in compliance with EPA Region II validation guidelines. The following criteria were considered and used to validate the data: spike/matrix spike duplicates, field duplicates, internal standard performance, compound identification, compound quantitation, spike sample recovery for metals, laboratory duplicates for metals, interference for metals, and qualifiers. Several steps were taken to ensure that the data were appropriate and reliable for use in the risk assessment. These steps, such as evaluation of quantitation limits, are discussed in the following sections.

6.2.2.3 Evaluation of Quantitation Limits and Data Reduction

Five points were considered when evaluating methods and reducing data based on sample quantitation limits (SQLs

1) SQLs and their relation to reference concentrations,
2) 2) unusually high SQLs,
3) 3) when only some samples in a medium test positive for a chemical,
4) 4) when SQLs are not available, and
5) 5) when chemicals are not detected in any sample in a medium.

Each of these points is discussed below.

SQLs and their relation to reference concentrations

To ensure that volatile organic analyses of groundwater could be compared to reference standards, both Round 1 and Round II samples were analyzed using Method 524.2 with a level IV data package (to attain the lower sample quantitation limits).

Unusually high SQLs

The data in each of the databases for SEAD-4 were evaluated to determine if there were any unusually high SQLs. The mean and the standard deviation of the normal data were calculated for each analyte in each of the databases. The 95th percentile upper confidence limit (95% UCL) of the mean of the normal data was then calculated as follows:

$$95\%\, UCL = \overline{X} + t\left(s / n^{0.5}\right)$$

where:

$\overline{X}$ = the mean concentration
s = the standard deviation of the sample results
n = the number of samples
t = Student-t statistic for a one tailed t-test at the 95th confidence level

The 95% UCL is the value for which there is 95 percent confidence that the actual site mean does not exceed this value.

Unusually high SQLs that caused the 95% UCL of the normal data to exceed the actual maximum detected value were eliminated in accordance with RAGS (Section 5.3.2) guidance. The 95% UCL was then recalculated and the comparison repeated until either no unusually high SQLs caused the 95% UCL to exceed the maximum detected value or all unusually high SQLs had been eliminated.

Only some samples in a medium test positive for a chemical

Sometimes only some samples in a medium tested positively for a chemical. In the other samples the chemical was not measured above the quantitation limit, but it could be present just below the quantitation limit or it may not be there at all. To account for these possibilities, non-detected results were included in the risk assessment at one-half the SQL.

SQLs not available

SQLs were provided by the laboratory for every analyte that was not detected so no adjustment had to be made for non-detects without SQLs.

Chemicals are not detected in any sample in a medium

If for a given analyte in a medium, the validated results were all non-detects or rejected (qualifier = U, UJ, UR, JR or R), that analyte was eliminated from the risk assessment for that particular medium.

6.2.2.4 Evaluation of Qualified and Coded Data

Qualifiers are attached to data by laboratories conducting analyses and by data validation personnel. These qualifiers often pertain to QA/QC problems and may indicate questions concerning chemical identity, chemical concentration, or both. The qualifiers used are as follows:

U	The analyte was not detected.
UJ	The analyte was not detected; however, the associated reporting limit is approximate.
J	The analyte was positively identified; however, QC results indicate that the reported concentration may not be accurate and is therefore an estimate.
R, JR, UR	The analyte was rejected due to laboratory QC deficiencies, sample preservation problems, or holding time exceedance. The presence or absence of the analyte cannot be determined.

Before data were used in the quantitative risk assessment all qualifiers were addressed. This was done according to the prescribed data validation procedures. The end result of the data validation was four possible situations: 1) the result was rejected by either laboratory or data validation personnel and considered unusable (R, JR, UR), 2) the compound was analyzed for but was not detected (U), 3) the result was an estimated value (J), or 4) the result was unqualified. Data that was not detected by the laboratory (U) and was assigned a J by the data validation personnel, is considered a non-detect for the risk assessment (UJ).

6.2.2.5 Chemicals in Blanks

Blanks are QC samples analyzed in the same manner as environmental samples, and provide a means of identifying possible contamination of environmental samples. Sources of contamination include the laboratory, the sampling environment, and the sampling equipment. To address contamination, three types of blanks were analyzed: method blanks, trip blanks, and equipment rinsates. Method blanks consisted of laboratory reagent water or pre-purified and extracted sand taken through the same analytical process as environmental samples. Trip blanks consisted of distilled water poured into a 40-milliliter glass vial and sealed with a Teflon septum for soil and water samples. The trip blanks accompanied sample bottles to the field during sample collection. Trip blanks were not opened during sample collection. Equipment rinsates consisted of deionized water poured into or pumped through sampling devices and then transferred to sample bottles.

According to the data validation guidelines, if the blank contained detectable levels of a common laboratory contaminant, then the sample results were considered positive (unqualified hit) only if the concentration in the sample exceeded ten times the maximum amount detected in any blank. If the concentration in the sample was less than ten times the maximum amount detected in the blank, it was concluded that the chemical was not detected. Common laboratory contaminants are acetone, 2-butanone, methylene chloride, toluene, and phthalate esters. If the blank contained detectable levels of a chemical that is not a common laboratory contaminant, then the sample results were considered positive (unqualified hit) only if the concentration in the sample exceeded five times the maximum amount detected in any blank. If the concentration in the sample was less than five times the maximum amount detected in the blank, it was concluded that the chemical was not detected. This procedure was performed as part of the data validation.

6.2.2.6 Precision

The term precision is used to describe the reproducibility of results. It can be defined as the agreement between the numerical values of two or more measurements resulting from the same process. In the case of chemical analyses, precision is determined through the analyses of duplicate environmental samples. Duplicate sample analyses include matrix spikes, blank spikes, blind field duplicates, and replicate instrumental analyses of individual environmental samples.

Matrix spikes involve the introduction of compounds or elements to samples of known concentrations. The assumption is that these introduced compounds will be recovered from environmental samples to the same degree as in matrix spikes. Blank spikes involve the introduction of compounds or elements to laboratory reagent water or pre-purified and extracted sand. Blank spikes eliminate the possibility of matrix interference's or contributions, thereby monitoring analytical performance from sample preparation to analysis. Blind field duplicates are samples labeled with a fictitious sample ID taken from an existing sampling location. They are collected simultaneously with a properly labeled sample and provide the most legitimate means of assessing precision.

Precision estimates were obtained using the relative percent difference (RPD) between duplicate analyses. Overall precision, as well as precision control limits, were estimated using a weighted combination of RPDs from spikes and duplicate analyses. Precision and RPD were acceptable.

6.2.2.7 Accuracy

Accuracy is the degree to which a measurement represents the true value of that parameter. Estimates of accuracy are more difficult to obtain than precision since accuracy requires knowledge of the true quantity being measured. In the case of chemical analyses, accuracy is determined through the introduction of compounds or elements to samples of known concentrations, or analytical spikes. The assumption is that compounds will be recovered from environmental samples to the same degree as in analytical spikes.

Two types of compounds were added to environmental samples to assess accuracy: surrogate compounds and matrix spike compounds. Surrogates are compounds that closely approximate target analytes in structure, but are not target analytes. Surrogate compounds generally are added to samples in the preparation stages and monitor the effectiveness of the preparation process. Matrix spike compounds are target analytes that are added based upon expectations of matrix interference's, that impede analyte detection. Laboratory method blank samples were spiked with surrogate compounds, per analysis day, as an additional means of estimating accuracy. The accuracy of chemical analyses was estimated using the percent recovery (PR) of compounds or elements that were added to analytical spikes. Accuracy and PR were acceptable.

6.2.2.8 Representativeness

Representativeness expresses the extent to which sample data characterize the population or environmental media. Factors influencing representativeness include sample collection, selection of sampling locations representative of site conditions, and use of appropriate chemical methods for sample analyses. Appropriate chemical analysis methods were followed as described in Section 6.2.2.2 Sampling from locations representative of site conditions was achieved through implementation of the approved field sampling plan. Blind field duplicates were collected and analyzed in order to assess the influence of sample collection on representativeness. Approximately 5 percent of field samples were collected in duplicate. Representativeness was estimated using the RPD between blind field duplicates and was acceptable.

6.2.2.9 Comparability

Comparability refers to the consistency of one laboratory's results with others. Comparability factors include the use of standard analytical methodologies, data reported in standard or consistent units, appropriate frequency of applicable QC analyses, and laboratory participation in appropriate performance evaluation studies. All data were reported in appropriate and acceptable units. The laboratory performing the CLP inorganic and organic analyses participated in the quarterly USEPA blind performance evaluation program and the MRD performance evaluation program. Their performance in this program was acceptable.

6.2.2.10 Completeness

Completeness measures the amount of usable data relative to the amount of samples collected and analyzed. The completeness goal in the project workplan was 90 percent. Completeness was acceptable.

6.2.2.11 Tentatively Identified Compounds

Tentatively identified compounds (TICs) are compounds not specified on the Target Analyte List for quantification but were identified in the sample. TICs were grouped into two major classes: identified compounds and unknown compounds. Chromatographic peaks determined by the laboratory to be a unique compound were identified and quantified. Chromatographic peaks were identified through mass spectral library searches during sample analyses. Chromatographic peaks that failed absolute identification through mass spectral library searches were categorized into general classes by the laboratory. Although a significant number of TICs were detected in the soil samples, they are predominantly unknown alkanes, unknown aliphatic compounds and unknown PAHs, and are not included in the quantitative risk assessment, but are generally discussed in Section 6.5.1.3.

6.2.3 Site-specific Data Evaluation Considerations

Two major criteria were used to evaluate and select analytes that would be used in the quantitative risk assessment. The first criteria was applied to all of the analytes that were analyzed for in each database and consisted of selecting only those analytes that were detected in one or more of the environmental samples. The second criteria was applied only to the inorganic analyte data and consisted of determining if any analytes were present in the SEAD-4 sample populations at concentrations that tended to be above those found in background sample populations. The following paragraphs describe the various steps that were used to implement these criteria.

The first step in evaluating the data from SEAD-4 was to create the seven media-specific databases. Each database was examined separately in the site-specific data evaluations.

The data used in the databases (and the quantitative risk assessments) were validated as described previously. The data in each database were then reviewed and all compounds that were not detected in any sample in a particular database were deleted from that database, consistent with RAGs guidance. **Table 6-1** summarizes the list of chemicals that were deleted from each of the databases for SEAD-4.

An intermediate step, which did not reduce the list of analytes any further but did eliminate data that would have "caused the calculated exposure concentration to exceed the maximum detected

TABLE 6-1
ANALYTES NOT DETECTED IN ANY SAMPLE
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Analyte	Building Debris	Surface Soil	Subsurface Soils	Sediment	Groundwater	Surface Water
Volatile Organics						
1,1,1-Trichloroethane	X	X	X	X	X	X
1,1,1,2-Tetrachloroethane					X	X
1,1,2,2-Tetrachloroethane	X	X	X	X	X	
1,1,2-Trichloroethane	X	X	X	X	X	X
1,1-Dichloroethane	X	X	X	X	X	X
1,1-Dichloroethene	X		X	X	X	X
1,1-Dichloropropene					X	
1,2-Dichloroethane	X	X	X	X		
1,2-Dichloroethene (total)	X		X	X		
1,2-Dichloropropane	X	X	X	X		
1,2,3-Trichlorobenzene					X	
1,2,3-Trichloropropane					X	
1,2,4-Trichlorobenzene					X	X
1,2,4-Trimethylbenzene					X	
1,2-Dibromo-3-chloropropane					X	X
1,2-Dibromoethane					X	X
1,2-Dichlorobenzene					X	X
1,2-Dichloroethane					X	X
1,2-Dichloroethene (total)					X	X
1,2-Dichloropropane					X	X
1,3,5-Trimethylbenzene					X	
1,3-Dichlorobenzene					X	X
1,3-Dichloropropane					X	
1,4-Dichlorobenzene					X	X
2,2-Dichloropropane					X	
2-Chlorotoluene					X	
2-Nitropropane					X	
Acrylonitrile					X	
Allyl chloride					X	
Benzene	X		X	X		X
Bromobenzene					X	
Bromochloromethane					X	X
Bromodichloromethane	X	X	X	X	X	X
Bromoform	X	X	X	X	X	X
Butyl chloride					X	
Carbon disulfide	X	X	X		X	X
Carbon tetrachloride	X	X	X	X	X	X
Chloracetonitrile					X	
Chlorobenzene	X	X	X	X	X	X
Chlorodibromomethane	X	X	X	X	X	X
Chloroethane	X	X	X	X	X	X
Chloroform	X	X			X	X
Cis-1,2-Dichloroethene					X	X
Cis-1,3-Dichloropropene	X	X	X	X	X	X
Dichlorodifluoromethane					X	
Dichloromethyl methyl ketone					X	
Ethyl benzene	X	X		X		X
Ethyl ether					X	
Ethyl methacrylate					X	
Hexachlorobutadiene					X	
Hexachloroethane					X	
Isopropylbenzene					X	
Methacrylonitrile					X	
Methyl 2-propenoate					X	
Methyl Tertbutyl Ether					X	
Methyl bromide	X	X	X	X	X	X
Methyl butyl ketone	X		X	X	X	X
Methyl chloride	X	X	X		X	X
Methyl ethyl ketone	X	X	X		X	X
Methyl iodide					X	
Methyl isobutyl ketone	X	X	X	X	X	X
Methyl methacrylate					X	
Methylene bromide					X	
Methylene chloride	X				X	X
Naphthalene					X	
Nitrobenzene					X	
Ortho Xylene					X	
Pentachloroethane					X	
Propionitrile					X	
Propylbenzene					X	
Styrene	X	X	X		X	X

TABLE 6-1
ANALYTES NOT DETECTED IN ANY SAMPLE
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Analyte	Building Debris	Surface Soil	Subsurface Soils	Sediment	Groundwater	Surface Water
Tetrachloroethene	X	X	X	X	X	X
Tetrahydrofuran					X	
Toluene	X					X
Total Xylenes	X	X				X
Trans-1,2-Dichloroethene					X	X
Trans-1,3-Dichloropropene	X	X	X	X	X	X
Trans-1,4-Dichloro-2-butene					X	
Trichloroethene	X		X	X	X	X
Trichlorofluoromethane					X	
Vinyl chloride	X	X	X	X	X	X
Semivolatile Organics						
n-Butylbenzene					X	
p-Chlorotoluene					X	
p-Isopropyltoluene					X	
sec-Butylbenzene					X	
tert-Butylbenzene					X	
1,2,4-Trichlorobenzene	X	X	X	X	X	X
1,2-Dichlorobenzene	X	X	X	X	X	X
1,3-Dichlorobenzene	X	X	X	X	X	X
1,4-Dichlorobenzene	X	X	X		X	X
2,2'-oxybis(1-Chloropropane)		X	X	X	X	X
2,4,5-Trichlorophenol	X	X	X	X	X	X
2,4,6-Trichlorophenol	X	X	X	X	X	X
2,4-Dichlorophenol	X	X	X	X	X	X
2,4-Dimethylphenol	X	X	X	X	X	X
2,4-Dinitrophenol	X	X	X	X	X	X
2,4-Dinitrotoluene	X	X	X	X	X	X
2,6-Dinitrotoluene		X	X	X	X	X
2-Chloronaphthalene	X	X	X	X	X	X
2-Chlorophenol	X	X	X	X	X	X
2-Methylnaphthalene					X	X
2-Methylphenol	X	X	X	X	X	X
2-Nitroaniline	X	X	X	X	X	X
2-Nitrophenol	X	X	X	X	X	X
3,3'-Dichlorobenzidine	X	X	X	X	X	X
3-Nitroaniline	X	X	X	X	X	X
4,6-Dinitro-2-methylphenol	X	X	X	X	X	X
4-Bromophenyl phenyl ether	X	X	X	X	X	X
4-Chloro-3-methylphenol	X	X	X	X	X	X
4-Chloroaniline	X	X	X	X	X	X
4-Chlorophenyl phenyl ether	X	X	X	X	X	X
4-Methylphenol	X	X	X			X
4-Nitroaniline	X	X	X	X	X	X
4-Nitrophenol	X	X	X	X	X	X
Acenaphthene					X	X
Acenaphthylene	X				X	X
Anthracene					X	
Benzo(a)anthracene					X	
Benzo(a)pyrene					X	
Benzo(b)fluoranthene					X	
Benzo(ghi)perylene					X	
Benzo(k)fluoranthene					X	
Bis(2-Chloroethoxy)methane	X	X	X	X	X	X
Bis(2-Chloroethyl)ether	X	X	X	X	X	X
Bis(2-Chloroisopropyl)ether	X	X	X	X	X	X
Butylbenzylphthalate					X	
Carbazole					X	
Chrysene					X	
Di-n-butylphthalate						X
Di-n-octylphthalate	X				X	X
Dibenz(a,h)anthracene					X	X
Dibenzofuran					X	X
Diethyl phthalate			X			X
Dimethylphthalate	X	X	X	X	X	X
Fluoranthene					X	
Fluorene					X	X
Hexachlorobenzene	X	X	X		X	X
Hexachlorobutadiene	X	X	X	X	X	X
Hexachlorocyclopentadiene	X	X	X	X	X	X
Hexachloroethane	X	X	X	X	X	X
Indeno(1,2,3-cd)pyrene					X	
Isophorone	X	X	X	X	X	X

TABLE 6-1
ANALYTES NOT DETECTED IN ANY SAMPLE
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Analyte	Building Debris	Surface Soil	Subsurface Soils	Sediment	Groundwater	Surface Water
N-Nitrosodiphenylamine			X		X	X
N-Nitrosodipropylamine	X	X	X		X	X
Naphthalene						X
Nitrobenzene	X	X	X	X	X	X
Pentachlorophenol		X	X	X	X	X
Phenanthrene					X	
Phenol	X		X			X
Pyrene					X	
Nitroaromatics						
1,3,5-Trinitrobenzene	X		X	X	X	X
1,3-Dinitrobenzene		X	X	X	X	
2,4,6-Trinitrotoluene			X	X	X	X
2,4-Dinitrotoluene			X	X	X	X
2,6-Dinitrotoluene	X	X	X	X	X	X
2-Nitrotoluene	X	X	X			X
2-amino-4,6-Dinitrotoluene			X		X	X
3-Nitrotoluene	X	X	X	X		X
4-Nitrotoluene	X		X	X		X
4-amino-2,6-Dinitrotoluene		X	X		X	X
HMX	X	X	X	X	X	X
Nitrobenzene	X	X	X	X		X
RDX		X	X	X	X	X
Tetryl		X		X	X	X
Pesticides/PCBs						
4,4'-DDD			X		X	X
4,4'-DDE					X	X
4,4'-DDT					X	X
Aldrin	X					X
Alpha-BHC	X		X	X		X
Alpha-Chlordane					X	
Aroclor-1016	X	X	X	X	X	X
Aroclor-1221	X	X	X	X	X	X
Aroclor-1232	X	X	X	X	X	X
Aroclor-1242	X	X	X	X	X	X
Aroclor-1248	X	X		X	X	X
Aroclor-1254					X	X
Aroclor-1260			X			X
Beta-BHC					X	
Delta-BHC	X	X		X		X
Dieldrin			X		X	X
Endosulfan I					X	X
Endosulfan II			X		X	X
Endosulfan sulfate			X		X	X
Endrin				X	X	X
Endrin aldehyde					X	X
Endrin ketone			X		X	X
Gamma-BHC/Lindane	X	X	X	X	X	X
Gamma-Chlordane			X			
Heptachlor			X			X
Heptachlor epoxide			X		X	X
Hexachlorobenzene					X	X
Methoxychlor		X	X		X	X
Toxaphene	X	X	X	X	X	X
Herbicides						
2,4,5-T		X	X		X	X
2,4,5-TP/Silvex		X	X	X	X	X
2,4-D		X	X	X	X	X
2,4-DB		X	X	X	X	X
Dalapon		X	X	X	X	X
Dicamba		X		X	X	X
Dichloroprop		X	X	X	X	X
Dinoseb		X	X	X	X	X
MCPA		X	X	X	X	X
MCPP		X	X	X	X	X
Metals						
Beryllium						X
Cyanide			X	X	X	X
Mercury						X
Selenium	X					X
Thallium			X	X		

concentration" (EPA, 1989a), is the procedure by which samples were eliminated due to unusually high quantitation limits. This procedure is discussed in Section 6.2.2.3.

For inorganics, the site data set was compared against the SEDA background data set to determine if the site data set is statistically different from the background data set. This background comparison was performed for two media: soil and groundwater.

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. This comparison method was recommended by USEPA Region 2.

Inorganic constituents which were not detected in any sample were eliminated from further consideration, consistent with RAGS (EPA, 1989a).

Only inorganic constituents were compared to background. Anthropogenic organic constituents have not been considered. Organic compounds were eliminated from further consideration only if they were not detected at a particular site. This has produced a more conservative risk assessment since all organic constituents have been assumed to be present due to previous site activities. Background data sets are provided in **Appendix F**.

Nine inorganic analytes were found to occur in the SEAD-4 soil dataset at average concentrations that were greater than twice the average for those observed in the background soil measurements. They are antimony, chromium, copper, cyanide, lead, mercury, thallium, hexavalent chromium, and zinc. These inorganic constituents in soil were retained for further analysis in the risk assessment performed for SEAD-4.

For the groundwater samples, five inorganic analytes were found to occur in the groundwater dataset at average concentrations that were twice the background average. They are beryllium, cadmium, chromium, selenium, and silver. These inorganic constituents in groundwater were retained for further analysis in the risk assessment performed for SEAD-4.

Tables 6-2A through 6-2D summarize the results of average comparisons for the soil dataset and the groundwater dataset, respectively.

TABLE 6-2A
INORGANICS ANALYSIS OF SOIL
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

	Average of Background Soils (mg/kg)	2 x Average of Background Soils (mg/kg)	Average of SEAD-4 Total Soils (mg/kg)	Is Average of Site data > than 2 x Average of Background data?
Aluminum	13340.53	26681.05	12216.58	No
Antimony	**3.56**	**7.12**	**16.49**	**Yes**
Arsenic	5.08	10.15	5.21	No
Barium	78.43	156.86	75.73	No
Beryllium	0.67	1.33	0.55	No
Cadmium	0.97	1.94	1.00	No
Calcium	45449.65	90899.30	25074.49	No
Chromium	**20.32**	**40.64**	**620.31**	**Yes**
Cobalt	11.39	22.79	11.08	No
Copper	**20.99**	**41.97**	**306.68**	**Yes**
Cyanide	**0.27**	**0.54**	**0.79**	**Yes**
Iron	24704.74	49409.47	25225.95	No
Lead	**16.47**	**32.95**	**156.03**	**Yes**
Magnesium	10290.18	20580.35	6736.52	No
Manganese	576.14	1152.28	533.06	No
Mercury	**0.04**	**0.09**	**0.11**	**Yes**
Nickel	30.39	60.79	31.45	No
Potassium	1487.25	2974.49	1353.34	No
Selenium	0.63	1.26	0.57	No
Silver	0.46	0.92	0.70	No
Sodium	99.42	198.84	102.19	No
Thallium	**0.43**	**0.86**	**1.52**	**Yes**
Vanadium	21.41	42.82	29.19	No
Zinc	67.80	135.60	183.00	Yes
Chromium, Hexavalent	0.00	0.00	14.66	Yes

Notes:
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.
The list of background soil samples is presented in Appendix F.
Only detections (no qualifier or J qualifier) were used in the calculation of SEAD-4 averages.

TABLE 6-2B
INORGANICS ANALYSIS OF SOIL
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

	Average of Background Soils (mg/kg)	2 x Average of Background Soils (mg/kg)	Average of SEAD-4 Subsurface Soils (mg/kg)	Is Average of Site data > than 2 x Average of Background data?
Aluminum	13340.53	26681.05	12883.61	No
Antimony	**3.56**	**7.12**	**12.19**	**Yes**
Arsenic	5.08	10.15	5.47	No
Barium	78.43	156.86	69.80	No
Beryllium	0.67	1.33	0.57	No
Cadmium	0.97	1.94	0.81	No
Calcium	45449.65	90899.30	31058.47	No
Chromium	**20.32**	**40.64**	**242.49**	**Yes**
Cobalt	11.39	22.79	12.18	No
Copper	**20.99**	**41.97**	**155.60**	**Yes**
Cyanide	0.27	0.54	0.00	No
Iron	24704.74	49409.47	27131.94	No
Lead	16.47	32.95	17.57	No
Magnesium	10290.18	20580.35	8219.03	No
Manganese	576.14	1152.28	571.47	No
Mercury	0.04	0.09	0.05	No
Nickel	30.39	60.79	34.13	No
Potassium	1487.25	2974.49	1274.82	No
Selenium	0.63	1.26	0.41	No
Silver	0.46	0.92	0.88	No
Sodium	99.42	198.84	83.22	No
Thallium	0.43	0.86	0.00	No
Vanadium	21.41	42.82	20.43	No
Zinc	67.80	135.60	119.75	No
Chromium, Hexavalent	0.00	0.00	0.00	No

Notes:

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.

The list of background soil samples is presented in Appendix F.

These calculations do not include sediment samples.

Only detections (no qualifier or J qualifier) were used in the calculation of SEAD-4 averages.

TABLE 6-2C
INORGANICS ANALYSIS OF SOIL
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

	Average of Background Soils (mg/kg)	2 x Average of Background Soils (mg/kg)	Average of SEAD-4 Surface Soils (mg/kg)	Is Average of Site data > than 2 x Average of Background data?
Aluminum	13340.53	26681.05	11879.24	No
Antimony	**3.56**	**7.12**	**19.77**	**Yes**
Arsenic	5.08	10.15	5.06	No
Barium	78.43	156.86	82.14	No
Beryllium	0.67	1.33	0.56	No
Cadmium	0.97	1.94	1.02	No
Calcium	45449.65	90899.30	19685.33	No
Chromium	**20.32**	**40.64**	**842.13**	**Yes**
Cobalt	11.39	22.79	10.31	No
Copper	**20.99**	**41.97**	**436.52**	**Yes**
Cyanide	**0.27**	**0.54**	**0.79**	**Yes**
Iron	24704.74	49409.47	23927.17	No
Lead	**16.47**	**32.95**	**266.44**	**Yes**
Magnesium	10290.18	20580.35	5495.00	No
Manganese	576.14	1152.28	520.70	No
Mercury	**0.04**	**0.09**	**0.14**	**Yes**
Nickel	30.39	60.79	29.57	No
Potassium	1487.25	2974.49	1422.75	No
Selenium	0.63	1.26	0.71	No
Silver	0.46	0.92	0.69	No
Sodium	99.42	198.84	121.36	No
Thallium	0.43	0.86	1.51	Yes
Vanadium	21.41	42.82	35.77	No
Zinc	67.80	135.60	240.84	Yes
Chromium, Hexavalent	0.00	0.00	10.93	Yes

Notes:
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.
These calculations do not include sediment samples.
The list of background soil samples is presented in Appendix F.
Only detections (no qualifier or J qualifier) were used in the calculation of SEAD-4 averages.

TABLE 6-2D
INORGANICS ANALYSIS OF GROUNDWATER
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

	Average of Background Groundwater (ug/L)	2 x Average of Background Groundwater (ug/L)	Average of SEAD-4 Groundwater (ug/L)	Is Average of Site data > than 2 x Average of Background data?
Aluminum	2923.01	5846.01	645.66	No
Antimony	33.18	66.36	14.21	No
Arsenic	5.63	11.25	4.73	No
Barium	81.20	162.40	44.96	No
Beryllium	**0.90**	**1.80**	**2.26**	**Yes**
Cadmium	**0.00**	**0.00**	**3.08**	**Yes**
Calcium	115619.35	231238.71	89625.93	No
Chromium	**8.67**	**17.34**	**19.58**	**Yes**
Cobalt	6.84	13.68	4.70	No
Copper	5.39	10.78	9.30	No
Cyanide	0.00	0.00	0.00	No
Iron	4476.26	8952.53	950.30	No
Lead	6.59	13.18	1.42	No
Magnesium	28567.74	57135.48	18103.33	No
Manganese	231.41	462.82	186.35	No
Mercury	0.05	0.10	0.04	No
Nickel	10.57	21.14	3.94	No
Potassium	4065.59	8131.17	3311.48	No
Selenium	**2.13**	**4.26**	**6.98**	**Yes**
Silver	**0.83**	**1.66**	**2.52**	**Yes**
Sodium	15020.67	30041.33	16381.48	No
Thallium	3.90	7.80	3.97	No
Vanadium	8.23	16.46	4.66	No
Zinc	25.37	50.74	20.44	No

Notes:
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.
ND = Compound was not detected above the detection limit.
The list of background groundwater samples is presented in Appendix F.
Only detections (no qualifier or J qualifier) were used in the calculation of SEAD-4 averages.

At this stage all qualifiers were no longer considered in the data analyses. For all subsequent operations that involved the use of data from the databases, all results with either no qualifier or a J qualifier were taken at full value and all non-detect (U or UJ qualifier) results were taken at half of the value.

6.2.4 Data Quantification for Use in the Risk Assessment

After eliminating inorganic analytes present at background levels from the risk assessment, exposure point concentrations (EPCs) were calculated for each of the remaining detected analytes in each media at SEAD-4. EPCs for both the reasonable maximum exposure (RME) and central tendency (CT) risk calculations are equal to the 95 percent upper confidence limit (UCL) of the arithmetic mean of the concentration (EPA, May 1992).

Background samples were included in the calculation of EPCs. Samples from MW4-1/SB4-1 were included in the EPC calculations for groundwater and soils at SEAD-4.

The analytical results of each pair of samples and duplicate samples were averaged to produce single sets of results used to calculate EPCs for each detected analyte. The following logic was used to average the results of samples and their duplicate samples

- If an analyte was detected in both the sample and duplicate sample, then the detected values were averaged.
- If an analyte was not detected in either the sample or duplicate sample, then one-half the sample quantitation limits (SQLs) were averaged.
- If an analyte was detected in only one sample of a sample-duplicate pair and the SQL of the other sample was less than four times the detected value, then the analyte
- was considered present at a level equal to the average of the detected value and one-half of the SQL.
- If an analyte was detected in only one sample of a sample-duplicate pair and the SQL of the other sample was greater than or equal to four times the detected value, then the analyte was considered present at the detected level.
- The EPC, or the 95% UCL of the mean concentration, was calculated for each analyte using the following algorithm:

1. A list of concentrations was tabulated for each detected analyte using one-half of the SQL for all negative results.

2. Each analyte distribution was tested for normality by either the Shapiro-Wilk Test for less than or equal to 50 samples, or the D'Agostino Test for more than 50 samples (Gilbert, 1987, pp. 158-42). A normal distribution was assumed if the distribution passed the test at the 0.05 significance level, otherwise the distribution was assumed to be lognormal.
3. The 95 percent UCL of the mean was calculated using the t-statistic for normal distributions or the H-statistic for lognormal distributions (see Gilbert, 1987). If the 95 percent UCL of the mean exceeded the maximum detected concentration, then the following steps were executed.
4. The set of results was tested for unusually high SQLs. An unusually high SQL was assumed to exceed 1.5 times the average SQL.
5. If an unusually high SQL was present and the 95 percent UCL of the mean exceeded the maximum detected concentration, then the sample with the highest SQL was excluded from the data set and the statistics were re-calculated (1 through 4, above).
6. Analytical results with unusually high SQLs were removed one-by-one until either (a) the 95 percent UCL of the mean no longer exceeded the maximum detected concentration or (b) no more unusually high SQLs were present.
7. In cases where the final 95 percent UCL exceeded the maximum detected concentration, the maximum detected concentration was selected as the EPC. In these cases, the maximum detected concentration is believed to be a better conservative (upper bound) estimate of the mean than the established 95% UCL for various reasons, including small sample populations, small number of detected values, poor knowledge of the underlying statistical distribution based on available data, and variable SQLs.

Table 6-3 lists the chemicals of potential concern for the baseline human health and ecological risk assessments in all soils, surface soils (0 to 6 inches), debris, surface water, sediment, and groundwater. For each analyte detected in each sample medium, this table presents the number of analyses performed, the number of times detected, the frequency of detection, the mean and standard deviation of the sampled concentration, the maximum detected concentration, the result of the test for normality, and the 95 percent UCL of the mean of the sampled concentration (RME and the CT concentrations).

Table 6-4 provides a summary of all chemicals quantified in the human health risk assessment. This table lists the analytes found in each sampled medium, less the inorganic analytes found at background levels.

Table 6-3
Total Soil Exposure Point Concentration Summary

SEAD-4 - Remedial Investigation
Seneca Army Depot Activity

Analyte	No. of Valid Analyses	No. of Rejected	No. of Hits	Frequency (%)	Mean (mg/kg)	Standard Deviation (mg/kg)	Max Hit (mg/kg)	Normal?	95% UCL of Mean (mg/kg)	Exposure Point Concentration (EPC)* (mg/kg)
Volatile Organics										
1,1-Dichloroethane	151	1	2	1.00%	6.11E-03	9.90E-04	2.00E-03	FALSE	6.28E-03	2.00E-03
1,2-Dichloroethene (total)	151	1	3	2.00%	6.13E-03	9.20E-04	4.00E-03	FALSE	6.24E-03	4.00E-03
Acetone	152	0	33	22.00%	1.02E-02	1.68E-02	1.40E-01	FALSE	9.52E-03	9.52E-03
Benzene	151	1	1	1.00%	6.15E-03	9.70E-04	1.00E-03	FALSE	6.34E-03	1.00E-03
Chloroform	152	0	6	4.00%	6.68E-03	5.75E-03	1.50E-02	FALSE	6.73E-03	6.73E-03
Ethyl benzene	151	1	1	1.00%	6.15E-03	9.70E-04	1.00E-03	FALSE	6.34E-03	1.00E-03
Methyl butyl ketone	152	0	1	1.00%	6.65E-03	5.65E-03	9.00E-03	FALSE	6.64E-03	6.64E-03
Methylene chloride	151	1	3	2.00%	6.11E-03	1.02E-03	3.00E-03	FALSE	6.29E-03	3.00E-03
Toluene	152	0	44	29.00%	6.04E-03	5.99E-03	1.40E-02	FALSE	6.45E-03	6.45E-03
Total Xylenes	152	0	3	2.00%	6.63E-03	5.66E-03	8.00E-03	FALSE	6.64E-03	6.64E-03
Trichloroethene	151	1	3	2.00%	6.10E-03	1.00E-03	3.00E-03	FALSE	6.25E-03	3.00E-03
Semivolatile Organics										
2-Methylnaphthalene	152	0	16	11.00%	8.91E-02	8.04E-02	2.60E-01	FALSE	1.10E-01	1.10E-01
Acenaphthene	147	5	9	6.00%	8.08E-02	6.54E-02	8.80E-02	FALSE	9.25E-02	8.80E-02
Acenaphthylene	152	0	10	7.00%	8.88E-02	7.78E-02	1.70E-01	FALSE	1.01E-01	1.01E-01
Anthracene	152	0	16	11.00%	8.95E-02	8.05E-02	3.40E-01	FALSE	1.02E-01	1.02E-01
Benzo(a)anthracene	152	0	72	47.00%	9.22E-02	1.28E-01	1.10E+00	FALSE	1.27E-01	1.27E-01
Benzo(a)pyrene	152	0	71	47.00%	9.17E-02	1.14E-01	8.80E-01	FALSE	1.20E-01	1.20E-01
Benzo(b)fluoranthene	152	0	72	47.00%	1.04E-01	1.34E-01	8.30E-01	FALSE	1.25E-01	1.25E-01
Benzo(ghi)perylene	152	0	47	31.00%	8.95E-02	8.34E-02	3.00E-01	FALSE	1.10E-01	1.10E-01
Benzo(k)fluoranthene	152	0	44	29.00%	9.18E-02	1.09E-01	8.90E-01	FALSE	1.06E-01	1.06E-01
Bis(2-Ethylhexyl)phthalate	152	0	55	36.00%	4.26E-01	1.68E+00	1.30E+01	FALSE	2.59E-01	2.59E-01
Butylbenzylphthalate	152	0	10	7.00%	1.32E-01	5.73E-01	7.10E+00	FALSE	1.10E-01	1.10E-01
Carbazole	152	0	18	12.00%	8.64E-02	7.79E-02	1.60E-01	FALSE	1.04E-01	1.04E-01
Chrysene	152	0	78	51.00%	9.69E-02	1.29E-01	1.00E+00	FALSE	1.25E-01	1.25E-01
Di-n-butylphthalate	152	0	51	34.00%	6.56E-02	7.00E-02	1.90E-01	FALSE	8.15E-02	8.15E-02
Di-n-octylphthalate	149	3	23	15.00%	8.12E-02	6.97E-02	4.40E-02	FALSE	1.01E-01	4.40E-02
Dibenz(a,h)anthracene	152	0	18	12.00%	8.81E-02	7.74E-02	1.25E-01	FALSE	1.02E-01	1.02E-01
Dibenzofuran	147	5	14	10.00%	7.93E-02	6.68E-02	5.80E-02	FALSE	9.55E-02	5.80E-02
Diethyl phthalate	148	4	13	9.00%	8.18E-02	6.94E-02	2.20E-02	FALSE	9.67E-02	2.20E-02
Fluoranthene	152	0	83	55.00%	1.18E-01	2.38E-01	2.40E+00	FALSE	1.28E-01	1.28E-01
Fluorene	152	0	8	5.00%	9.01E-02	7.81E-02	3.30E-01	FALSE	9.94E-02	9.94E-02
Indeno(1,2,3-cd)pyrene	152	0	46	30.00%	8.73E-02	8.31E-02	2.70E-01	FALSE	1.12E-01	1.12E-01
N-Nitrosodiphenylamine	146	6	1	1.00%	8.29E-02	6.56E-02	1.90E-02	FALSE	9.02E-02	1.90E-02
Naphthalene	152	0	13	9.00%	8.82E-02	7.72E-02	1.30E-01	FALSE	1.06E-01	1.06E-01
Phenanthrene	152	0	76	50.00%	1.07E-01	1.84E-01	1.40E+00	FALSE	1.38E-01	1.38E-01
Phenol	146	6	2	1.00%	8.26E-02	6.57E-02	1.70E-02	FALSE	9.09E-02	1.70E-02
Pyrene	152	0	78	51.00%	1.16E-01	2.03E-01	1.80E+00	FALSE	1.39E-01	1.39E-01
Pesticides/PCBs										
4,4'-DDD	152	0	19	13.00%	3.97E-03	1.55E-02	1.90E-01	FALSE	3.03E-03	3.03E-03
4,4'-DDE	152	0	29	19.00%	4.34E-03	1.34E-02	1.60E-01	FALSE	3.56E-03	3.56E-03
4,4'-DDT	152	0	28	18.00%	8.55E-03	6.16E-02	7.60E-01	FALSE	3.94E-03	3.94E-03
Aldrin	152	0	2	1.00%	1.11E-03	6.20E-04	8.20E-03	FALSE	1.12E-03	1.12E-03
Alpha-BHC	152	0	5	3.00%	1.10E-03	4.00E-04	2.40E-03	FALSE	1.13E-03	1.13E-03
Alpha-Chlordane	152	0	9	6.00%	1.16E-03	8.20E-04	1.00E-02	FALSE	1.18E-03	1.18E-03
Aroclor-1248	152	0	1	1.00%	2.11E-02	7.16E-03	2.70E-02	FALSE	2.15E-02	2.15E-02
Aroclor-1254	152	0	24	16.00%	3.95E-02	1.34E-01	1.60E+00	FALSE	3.10E-02	3.10E-02
Aroclor-1260	152	0	3	2.00%	2.18E-02	1.04E-02	1.10E-01	FALSE	2.22E-02	2.22E-02
Beta-BHC	152	0	11	7.00%	1.22E-03	7.50E-04	7.60E-03	FALSE	1.25E-03	1.25E-03
Delta-BHC	152	0	1	1.00%	1.09E-03	4.40E-04	5.90E-03	FALSE	1.11E-03	1.11E-03
Dieldrin	152	0	5	3.00%	2.21E-03	9.70E-04	7.40E-03	FALSE	2.26E-03	2.26E-03
Endosulfan I	152	0	5	3.00%	1.13E-03	8.30E-04	1.10E-02	FALSE	1.13E-03	1.13E-03
Endosulfan II	152	0	3	2.00%	2.14E-03	7.60E-04	5.20E-03	FALSE	2.18E-03	2.18E-03
Endosulfan sulfate	152	0	1	1.00%	2.12E-03	7.30E-04	3.80E-03	FALSE	2.16E-03	2.16E-03
Endrin	152	0	4	3.00%	2.43E-03	3.30E-03	3.40E-02	FALSE	2.34E-03	2.34E-03
Endrin aldehyde	152	0	9	6.00%	2.34E-03	1.71E-03	2.00E-02	FALSE	2.38E-03	2.38E-03
Endrin ketone	152	0	2	1.00%	2.13E-03	7.40E-04	4.20E-03	FALSE	2.17E-03	2.17E-03

Table 6-3
Total Soil Exposure Point Concentration Summary

SEAD-4 - Remedial Investigation
Seneca Army Depot Activity

Analyte	No. of Valid Analyses	No. of Rejected	No. of Hits	Frequency (%)	Mean (mg/kg)	Standard Deviation (mg/kg)	Max Hit (mg/kg)	Normal?	95% UCL of Mean (mg/kg)	Exposure Point Concentration (EPC)* (mg/kg)
Pesticides/PCBs (cont)										
Gamma-Chlordane	152	0	8	5.00%	1.21E-03	8.90E-04	7.40E-03	FALSE	1.24E-03	1.24E-03
Heptachlor	152	0	3	2.00%	1.11E-03	4.50E-04	4.20E-03	FALSE	1.13E-03	1.13E-03
Heptachlor epoxide	152	0	4	3.00%	1.12E-03	4.70E-04	3.60E-03	FALSE	1.15E-03	1.15E-03
Herbicides										
Dicamba	43	0	1	2.00%	3.19E-03	1.61E-03	1.31E-02	FALSE	3.36E-03	3.36E-03
Nitroaromatics										
1,3,5-Trinitrobenzene	152	0	1	1.00%	6.18E-02	5.26E-03	1.20E-01	FALSE	6.28E-02	6.28E-02
2,4,6-Trinitrotoluene	152	0	1	1.00%	6.15E-02	2.40E-03	7.20E-02	FALSE	6.26E-02	6.26E-02
2,4-Dinitrotoluene	152	0	2	1.00%	6.38E-02	2.08E-02	2.80E-01	FALSE	6.47E-02	6.47E-02
2-amino-4,6-Dinitrotoluene	152	0	1	1.00%	6.16E-02	3.23E-03	9.00E-02	FALSE	6.27E-02	6.27E-02
4-Nitrotoluene	109	0	1	1.00%	6.30E-02	3.16E-02	3.90E-01	FALSE	6.39E-02	6.39E-02
Metals										
Antimony	152	0	52	34.00%	6.26	17.61	148	FALSE	5.95	5.95
Chromium	152	0	138	91.00%	583.47	2011.43	18600	FALSE	378.44	378.44
Chromium, Hexavalent	15	0	4	27.00%	8.15	4.42	14.7	TRUE	10.15	10.15
Copper	152	0	152	100.00%	308.02	1030.04	7330	FALSE	167.17	167.17
Cyanide	152	0	2	1.00%	0.33	0.08	0.87	FALSE	0.34	0.34
Lead	152	0	145	95.00%	93.81	753.03	9280 *	FALSE	37.27	37.27
Mercury	152	0	74	49.00%	0.07	0.12	1.2	FALSE	0.06	0.06
Thallium	152	0	17	11.00%	1.02	1.42	5.4	FALSE	1.27	1.27
Zinc	152	0	152	100.00%	173.3	279.98	2020	FALSE	165.98	165.98

Notes:

* The maximum value is the average of the sample and duplicate sample at SB4-14 (0-0.2') of 11,200 mg/kg (duplicate) and 7,360 mg/kg(sample).

Table 6-3
Surface Soil Exposure Point Concentration Summary

SEAD-4 - Remedial Investigation
Seneca Army Depot Activity

Analyte	No. of Valid Analyses	No. of Rejected	No. of Hits	Frequency (%)	Mean (mg/Kg)	Standard Deviation (mg/Kg)	Max Hit (mg/Kg)	Normal?	95% UCL of Mean (mg/Kg)	Exposure Point Concentration (EPC)* (mg/Kg)
Volatile Organics										
1,1-Dichloroethane	79	1	2	3.00%	7.12E-03	2.32E-03	2.00E-03	FALSE	7.58E-03	2.00E-03
1,2-Dichloroethene (total)	79	1	3	4.00%	7.15E-03	2.25E-03	4.00E-03	FALSE	7.49E-03	4.00E-03
Acetone	80	0	30	38.00%	1.41E-02	2.25E-02	1.40E-01	FALSE	1.39E-02	1.39E-02
Benzene	79	1	1	1.00%	7.18E-03	2.27E-03	1.00E-03	FALSE	7.70E-03	1.00E-03
Methyl butyl ketone	80	0	1	1.00%	8.04E-03	7.86E-03	9.00E-03	FALSE	8.19E-03	8.19E-03
Methylene chloride	79	1	1	1.00%	7.21E-03	2.21E-03	3.00E-03	FALSE	7.55E-03	3.00E-03
Toluene	79	1	22	28.00%	6.29E-03	2.60E-03	7.00E-03	FALSE	7.05E-03	7.00E-03
Trichloroethene	79	1	3	4.00%	7.09E-03	2.34E-03	3.00E-03	FALSE	7.54E-03	3.00E-03
Semivolatile Organics										
2-Methylnaphthalene	70	10	13	19.00%	4.32E-02	2.15E-02	3.50E-02	FALSE	5.63E-02	3.50E-02
Acenaphthene	78	2	7	9.00%	6.29E-02	5.45E-02	7.80E-02	FALSE	7.49E-02	7.49E-02
Acenaphthylene	70	10	7	10.00%	4.56E-02	1.54E-02	5.19E-02	FALSE	5.11E-02	5.11E-02
Anthracene	80	0	13	16.00%	6.72E-02	7.04E-02	1.10E-01	FALSE	7.54E-02	7.54E-02
Benzo(a)anthracene	80	0	67	84.00%	6.44E-02	1.08E-01	5.60E-01	FALSE	8.40E-02	8.40E-02
Benzo(a)pyrene	80	0	65	81.00%	6.71E-02	1.03E-01	4.40E-01	FALSE	8.56E-02	8.56E-02
Benzo(b)fluoranthene	80	0	65	81.00%	9.46E-02	1.54E-01	8.30E-01	FALSE	1.15E-01	1.15E-01
Benzo(ghi)perylene	80	0	45	56.00%	6.83E-02	8.27E-02	3.00E-01	FALSE	8.56E-02	8.56E-02
Benzo(k)fluoranthene	80	0	39	49.00%	7.02E-02	9.41E-02	5.10E-01	FALSE	8.23E-02	8.23E-02
Bis(2-Ethylhexyl)phthalate	80	0	62	77.00%	6.43E-01	2.27E+00	1.30E+01	FALSE	4.19E-01	4.19E-01
Butylbenzylphthalate	80	0	9	11.00%	1.51E-01	7.89E-01	7.10E+00	FALSE	9.52E-02	9.52E-02
Carbazole	80	0	17	21.00%	6.54E-02	7.34E-02	1.20E-01	FALSE	8.12E-02	8.12E-02
Chrysene	80	0	70	88.00%	7.50E-02	1.17E-01	5.70E-01	FALSE	9.49E-02	9.49E-02
Di-n-butylphthalate	80	0	41	51.00%	5.98E-02	7.43E-02	2.70E-01	FALSE	8.74E-02	8.74E-02
Di-n-octylphthalate	71	9	7	10.00%	4.71E-02	1.75E-02	5.28E-02	FALSE	5.61E-02	5.28E-02
Dibenz(a,h)anthracene	80	0	17	21.00%	6.82E-02	7.27E-02	1.25E-01	FALSE	7.97E-02	7.97E-02
Dibenzofuran	71	9	13	18.00%	4.42E-02	2.11E-02	5.80E-02	FALSE	5.76E-02	5.76E-02
Diethyl phthalate	70	10	13	19.00%	4.26E-02	2.09E-02	2.20E-02	FALSE	5.25E-02	2.20E-02
Fluoranthene	80	0	75	94.00%	9.81E-02	1.87E-01	1.05E+00	FALSE	1.09E-01	1.09E-01
Fluorene	79	1	5	6.00%	6.76E-02	6.24E-02	7.40E-02	FALSE	7.25E-02	7.25E-02
Indeno(1,2,3-cd)pyrene	80	0	44	55.00%	6.49E-02	8.16E-02	2.70E-01	FALSE	8.63E-02	8.63E-02
N-Nitrosodiphenylamine	70	10	1	1.00%	4.95E-02	1.60E-02	1.90E-02	FALSE	5.24E-02	1.90E-02
Naphthalene	77	3	11	14.00%	5.78E-02	4.73E-02	7.40E-02	FALSE	7.37E-02	7.37E-02
Phenanthrene	80	0	70	88.00%	7.53E-02	1.28E-01	6.40E-01	FALSE	9.51E-02	9.51E-02
Phenol	70	10	2	3.00%	4.90E-02	1.69E-02	1.70E-02	FALSE	5.34E-02	1.70E-02
Pyrene	80	0	71	89.00%	9.24E-02	1.65E-01	9.80E-01	FALSE	1.15E-01	1.15E-01
Pesticides/PCBs										
4,4'-DDD	80	0	19	24.00%	5.89E-03	2.13E-02	1.90E-01	FALSE	4.52E-03	4.52E-03
4,4'-DDE	80	0	26	32.00%	6.45E-03	1.82E-02	1.60E-01	FALSE	5.66E-03	5.66E-03
4,4'-DDT	80	0	27	34.00%	1.46E-02	8.48E-02	7.60E-01	FALSE	7.12E-03	7.12E-03
Aldrin	80	0	1	1.00%	1.26E-03	4.10E-04	2.20E-03	FALSE	1.32E-03	1.32E-03
Alpha-BHC	80	0	5	6.00%	1.29E-03	4.30E-04	2.40E-03	FALSE	1.35E-03	1.35E-03
Alpha-Chlordane	80	0	8	10.00%	1.34E-03	5.90E-04	4.90E-03	FALSE	1.41E-03	1.41E-03
Aroclor-1254	80	0	20	25.00%	3.94E-02	5.50E-02	3.10E-01	FALSE	3.96E-02	3.96E-02
Aroclor-1260	80	0	3	4.00%	2.58E-02	1.26E-02	1.10E-01	FALSE	2.71E-02	2.71E-02
Beta-BHC	80	0	10	13.00%	1.51E-03	9.20E-04	7.60E-03	FALSE	1.60E-03	1.60E-03
Dieldrin	80	0	5	6.00%	2.64E-03	1.13E-03	7.40E-03	FALSE	2.79E-03	2.79E-03
Endosulfan I	80	0	4	5.00%	1.26E-03	4.00E-04	1.70E-03	FALSE	1.32E-03	1.32E-03
Endosulfan II	80	0	3	4.00%	2.49E-03	8.40E-04	5.20E-03	FALSE	2.62E-03	2.62E-03
Endosulfan sulfate	80	0	1	1.00%	2.46E-03	7.90E-04	3.80E-03	FALSE	2.57E-03	2.57E-03
Endrin	80	0	3	4.00%	2.75E-03	2.85E-03	2.70E-02	FALSE	2.80E-03	2.80E-03
Endrin aldehyde	80	0	8	10.00%	2.81E-03	2.19E-03	2.00E-02	FALSE	2.93E-03	2.93E-03
Endrin ketone	80	0	2	3.00%	2.44E-03	7.70E-04	4.20E-03	FALSE	2.56E-03	2.56E-03
Gamma-Chlordane	80	0	8	10.00%	1.49E-03	1.14E-03	7.40E-03	FALSE	1.61E-03	1.61E-03
Heptachlor	80	0	3	4.00%	1.29E-03	5.20E-04	4.20E-03	FALSE	1.36E-03	1.36E-03
Heptachlor epoxide	80	0	4	5.00%	1.32E-03	5.30E-04	3.60E-03	FALSE	1.40E-03	1.40E-03

Table 6-3
Surface Soil Exposure Point Concentration Summary

SEAD-4 - Remedial Investigation
Seneca Army Depot Activity

Analyte	No. of Valid Analyses	No. of Rejected	No. of Hits	Frequency (%)	Mean (mg/Kg)	Standard Deviation (mg/Kg)	Max Hit (mg/Kg)	Normal?	95% UCL of Mean (mg/Kg)	Exposure Point Concentration (EPC)* (mg/Kg)
Nitroaromatics										
1,3,5-Trinitrobenzene	80	0	1	1.00%	6.64E-02	1.80E-02	1.20E-01	FALSE	6.88E-02	6.88E-02
2,4,6-Trinitrotoluene	80	0	1	1.00%	6.58E-02	1.70E-02	7.20E-02	FALSE	6.81E-02	6.81E-02
2,4-Dinitrotoluene	80	0	1	1.00%	6.70E-02	2.39E-02	2.25E-01	FALSE	6.95E-02	6.95E-02
2-amino-4,6-Dinitrotoluene	80	0	1	1.00%	6.60E-02	1.72E-02	9.00E-02	FALSE	6.83E-02	6.83E-02
4-Nitrotoluene	73	0	1	1.00%	7.03E-02	4.19E-02	3.90E-01	FALSE	7.30E-02	7.30E-02
Metals										
Antimony	80	0	31	39.00%	8.21	22.67	148	FALSE	9.11	9.11
Chromium	80	0	80	100.00%	916.29	2663.41	18600	FALSE	1189.19	1189.19
Chromium, Hexavalent	15	0	4	27.00%	8.15	4.42	14.7	TRUE	10.15	10.15
Copper	80	0	80	100.00%	463.61	1344.75	7330	FALSE	387.17	387.17
Cyanide	80	0	2	3.00%	0.41	0.15	0.87	FALSE	0.43	0.43
Lead	80	0	73	91.00%	162.57	1035.8	9280 *	FALSE	68.54	68.54
Mercury	80	0	42	52.00%	0.1	0.16	1.2	FALSE	0.1	0.1
Thallium	80	0	17	21.00%	1.14	1.47	5.4	FALSE	1.4	1.4
Zinc	80	0	80	100.00%	229.08	361.95	2020	FALSE	243.78	243.78

Notes:

* The maximum value is the average of the sample and duplicate sample at SB4-14 (0-0.2') of 11,200 mg/kg (duplicate) and 7,360 mg/kg(sample).

Table 6-3
Groundwater Exposure Point Concentration Summary

SEAD-4 - Remedial Investigation
Seneca Army Depot Activity

Analyte	No. of Valid Analyses	No. of Rejected	No. of Hits	Frequency (%)	Mean (mg/L)	Standard Deviation (mg/L	Max Hit (mg/L)	Normal?	95% UCL of Mean (mg/L)	Exposure Point Concentration (EPC)* (mg/L)
Volatile Organics										
Acetone	28	0	1	4.00%	3.14E-03	1.36E-03	8.00E-03	FALSE	3.50E-03	3.50E-03
Benzene	28	0	1	4.00%	1.27E-03	1.80E-03	2.00E-03	FALSE	1.92E-03	1.92E-03
Ethyl benzene	28	0	1	4.00%	1.41E-03	2.01E-03	6.00E-03	FALSE	2.25E-03	2.25E-03
Toluene	23	5	1	4.00%	3.90E-04	1.20E-04	4.00E-04	FALSE	4.50E-04	4.00E-04
Total Xylenes	28	0	1	4.00%	1.34E-03	1.87E-03	4.00E-03	FALSE	2.10E-03	2.10E-03
Semivolatile Organics										
4-Methylphenol	28	0	2	7.00%	1.42E-03	1.83E-03	2.20E-03	FALSE	1.91E-03	1.91E-03
Bis(2-Ethylhexyl)phthalate	24	4	1	4.00%	9.00E-04	9.90E-04	1.10E-03	FALSE	1.10E-03	1.10E-03
Di-n-butylphthalate	23	5	1	4.00%	5.10E-04	8.00E-05	1.50E-04	FALSE	5.70E-04	1.50E-04
Diethyl phthalate	27	1	5	19.00%	6.70E-04	8.80E-04	9.00E-04	FALSE	8.90E-04	8.90E-04
Naphthalene	28	0	1	4.00%	1.42E-03	1.83E-03	2.20E-03	FALSE	1.91E-03	1.91E-03
Phenol	23	5	1	4.00%	5.20E-04	4.00E-05	4.00E-04	FALSE	5.40E-04	4.00E-04
Pesticides/PCBs										
Aldrin	23	5	1	4.00%	7.43E-06	1.03E-05	3.60E-06	FALSE	9.74E-06	3.60E-06
Alpha-BHC	23	5	1	4.00%	7.41E-06	1.03E-05	2.80E-06	FALSE	9.69E-06	2.80E-06
Aroclor-1260	23	5	1	4.00%	5.00E-05	1.00E-05	8.00E-05	FALSE	6.00E-05	6.00E-05
Delta-BHC	24	4	1	4.00%	7.45E-06	1.03E-05	4.10E-06	FALSE	9.78E-06	4.10E-06
Gamma-Chlordane	25	3	1	4.00%	7.49E-06	1.03E-05	1.00E-05	FALSE	9.89E-06	9.89E-06
Heptachlor	25	3	2	8.00%	7.54E-06	1.03E-05	1.00E-05	FALSE	9.97E-06	9.97E-06
Nitroaromatics										
2-Nitrotoluene	25	0	1	4.00%	1.50E-04	1.50E-04	8.70E-04	FALSE	1.70E-04	1.70E-04
3-Nitrotoluene	25	0	1	4.00%	2.20E-04	5.00E-04	2.60E-03	FALSE	2.20E-04	2.20E-04
4-Nitrotoluene	25	0	1	4.00%	5.20E-04	1.98E-03	1.00E-02	FALSE	3.30E-04	3.30E-04
Nitrobenzene	25	0	1	4.00%	1.60E-04	1.50E-04	8.90E-04	FALSE	1.70E-04	1.70E-04
Metals										
Beryllium	29	0	3	10.00%	3.60E-04	1.15E-03	6.30E-03	FALSE	3.60E-04	3.60E-04
Cadmium	29	0	2	7.00%	5.80E-04	1.01E-03	5.60E-03	FALSE	7.50E-04	7.50E-04
Chromium	29	0	19	66.00%	1.24E-02	4.79E-02	2.60E-01	FALSE	1.54E-02	1.54E-02
Selenium	29	0	11	38.00%	3.11E-03	4.94E-03	2.40E-02	FALSE	4.24E-03	4.24E-03
Silver	29	0	6	21.00%	1.31E-03	1.18E-03	6.70E-03	FALSE	1.69E-03	1.69E-03

Table 6-3
Surface Water Exposure Point Concentration Summary

SEAD-4 - Remedial Investigation
Seneca Army Depot Activity

Analyte	No. of Valid Analyses	No. of Rejected	No. of Hits	Frequency (%)	Mean (mg/L)	Standard Deviation (mg/L	Max Hit (mg/L)	Normal?	96% UCL of Mean (mg/L)	Exposure Point Concentration (EPC)* (mg/L)
Volatile Organics										
Acetone	10	0	4	40.00%	3.55E-03	1.19E-03	4.00E-03	TRUE	4.23E-03	4.00E-03
Semivolatile Organics										
Anthracene	10	0	1	10.00%	1.81E-03	2.21E-03	7.00E-05	FALSE	1.36E-02	7.00E-05
Benzo(a)anthracene	10	0	1	10.00%	1.82E-03	2.20E-03	1.80E-04	FALSE	8.19E-03	1.80E-04
Benzo(a)pyrene	10	0	1	10.00%	1.82E-03	2.20E-03	1.50E-04	FALSE	8.82E-03	1.50E-04
Benzo(b)fluoranthene	10	0	1	10.00%	1.82E-03	2.20E-03	1.50E-04	FALSE	8.82E-03	1.50E-04
Benzo(ghi)perylene	10	0	1	10.00%	1.81E-03	2.21E-03	7.00E-05	FALSE	1.30E-02	7.00E-05
Benzo(k)fluoranthene	10	0	1	10.00%	1.82E-03	2.20E-03	1.60E-04	FALSE	8.59E-03	1.60E-04
Bis(2-Ethylhexyl)phthalate	10	0	3	30.00%	1.77E-03	2.23E-03	3.60E-04	FALSE	1.21E-02	3.60E-04
Butylbenzylphthalate	10	0	1	10.00%	1.83E-03	2.19E-03	2.90E-04	FALSE	7.05E-03	2.90E-04
Carbazole	10	0	1	10.00%	1.81E-03	2.21E-03	5.00E-05	FALSE	1.59E-02	5.00E-05
Chrysene	10	0	1	10.00%	1.82E-03	2.20E-03	1.80E-04	FALSE	8.19E-03	1.80E-04
Fluoranthene	10	0	2	20.00%	1.82E-03	2.20E-03	4.10E-04	FALSE	7.28E-03	4.10E-04
Indeno(1,2,3-cd)pyrene	10	0	1	10.00%	1.81E-03	2.21E-03	7.00E-05	FALSE	1.35E-02	7.00E-05
Phenanthrene	10	0	1	10.00%	1.84E-03	2.18E-03	3.50E-04	FALSE	6.73E-03	3.50E-04
Pyrene	10	0	2	20.00%	1.80E-03	2.21E-03	2.80E-04	FALSE	8.08E-03	2.80E-04
Pesticides/PCBs										
Alpha-Chlordane	7	3	1	14.00%	3.28E-06	1.95E-06	7.70E-06	FALSE	4.83E-06	4.83E-06
Beta-BHC	7	3	1	14.00%	2.77E-06	5.88E-07	4.10E-06	FALSE	3.20E-06	3.20E-06
Gamma-Chlordane	7	3	1	14.00%	3.10E-06	1.46E-06	6.40E-06	FALSE	4.22E-06	4.22E-06
Nitroaromatics										
1,3-Dinitrobenzene	10	0	1	10.00%	1.10E-04	3.00E-05	7.00E-05	FALSE	1.30E-04	7.00E-05
Metals										
Aluminum	10	0	10	100.00%	8.74E-01	2.28E+00	7.35E+00	FALSE	8.41E+00	7.35E+00
Antimony	10	0	5	50.00%	8.65E-03	9.68E-03	6.60E-03	FALSE	2.74E-02	6.60E-03
Arsenic	10	0	1	10.00%	1.27E-03	1.07E-03	4.20E-03	FALSE	2.08E-03	2.08E-03
Barium	10	0	10	100.00%	6.56E-02	5.45E-02	2.13E-01	FALSE	1.10E-01	1.10E-01
Cadmium	10	0	6	60.00%	1.86E-03	3.48E-03	1.16E-02	FALSE	1.16E-02	1.16E-02
Calcium	10	0	10	100.00%	9.41E+01	3.46E+01	1.59E+02	TRUE	1.14E+02	1.14E+02
Chromium	10	0	3	30.00%	8.08E-03	1.45E-02	4.48E-02	FALSE	2.67E-01	4.48E-02
Cobalt	10	0	1	10.00%	3.15E-03	5.83E-03	1.96E-02	FALSE	7.75E-03	7.75E-03
Copper	10	0	9	90.00%	2.29E-02	3.51E-02	9.70E-02	FALSE	1.14E+00	9.70E-02
Iron	10	0	10	100.00%	2.02E+00	5.13E+00	1.66E+01	FALSE	2.44E+01	1.66E+01
Lead	10	0	4	40.00%	1.35E-02	3.64E-02	1.17E-01	FALSE	1.26E-01	1.17E-01
Magnesium	10	0	10	100.00%	1.67E+01	8.49E+00	3.27E+01	FALSE	2.31E+01	2.31E+01
Manganese	10	0	10	100.00%	3.15E-01	7.23E-01	2.35E+00	FALSE	9.34E+00	2.35E+00
Nickel	10	0	2	20.00%	4.60E-03	9.86E-03	3.26E-02	FALSE	1.10E-02	1.10E-02
Potassium	10	0	10	100.00%	2.32E+00	1.16E+00	4.79E+00	FALSE	3.15E+00	3.15E+00
Silver	10	0	2	20.00%	1.37E-03	1.17E-03	1.70E-03	FALSE	3.00E-03	1.70E-03
Sodium	10	0	10	100.00%	2.04E+01	7.25E+00	3.62E+01	TRUE	2.46E+01	2.46E+01
Thallium	10	0	1	10.00%	1.73E-03	6.10E-04	2.40E-03	FALSE	2.63E-03	2.40E-03
Vanadium	10	0	4	40.00%	4.10E-03	6.83E-03	2.25E-02	FALSE	1.24E-02	1.24E-02
Zinc	10	0	10	100.00%	6.50E-02	1.50E-01	4.92E-01	FALSE	3.04E-01	3.04E-01

Table 6-3
Sediment Exposure Point Concentration Summary

SEAD-4 - Remedial Investigation
Seneca Army Depot Activity

Analyte	No. of Valid Analyses	No. of Rejected	No. of Hits	Frequency (%)	Mean (mg/Kg)	Standard Deviation (mg/Kg)	Max Hit (mg/Kg)	Normal?	95% UCL of Mean (mg/Kg)	Exposure Point Concentration (EPC)* (mg/Kg)
Volatile Organics										
Acetone	55	0	14	25.00%	2.27E-02	4.06E-02	2.10E-01	FALSE	2.36E-02	2.36E-02
Carbon disulfide	55	0	4	7.00%	1.01E-02	4.06E-03	1.80E-02	FALSE	1.09E-02	1.09E-02
Chloroform	55	0	2	4.00%	1.03E-02	4.23E-03	1.40E-02	FALSE	1.11E-02	1.11E-02
Methyl chloride	54	1	1	2.00%	9.90E-03	3.78E-03	5.00E-03	FALSE	1.07E-02	5.00E-03
Methyl ethyl ketone	55	0	1	2.00%	1.07E-02	6.37E-03	4.90E-02	FALSE	1.16E-02	1.16E-02
Methylene chloride	55	0	3	5.00%	9.73E-03	3.56E-03	1.10E-02	FALSE	1.07E-02	1.07E-02
Styrene	54	1	2	4.00%	1.00E-02	4.06E-03	3.00E-03	FALSE	1.11E-02	3.00E-03
Toluene	55	0	5	9.00%	1.02E-02	5.03E-03	4.20E-02	FALSE	1.13E-02	1.13E-02
Total Xylenes	54	1	2	4.00%	1.01E-02	3.93E-03	7.00E-03	FALSE	1.10E-02	7.00E-03
Semivolatile Organics										
1,4-Dichlorobenzene	53	2	1	2.00%	1.63E-01	2.60E-01	7.30E-02	FALSE	1.81E-01	7.30E-02
2-Methylnaphthalene	42	13	5	12.00%	5.99E-02	3.09E-02	3.10E-02	FALSE	8.53E-02	3.10E-02
4-Methylphenol	51	4	6	12.00%	1.07E-01	1.11E-01	1.40E-01	FALSE	1.37E-01	1.37E-01
Acenaphthene	55	0	10	18.00%	2.15E-01	4.73E-01	6.10E-01	FALSE	2.73E-01	2.73E-01
Acenaphthylene	50	5	10	20.00%	9.43E-02	1.04E-01	1.30E-01	FALSE	1.29E-01	1.29E-01
Anthracene	55	0	25	45.00%	2.20E-01	5.14E-01	1.70E+00	FALSE	3.04E-01	3.04E-01
Benzo(a)anthracene	55	0	46	84.00%	3.53E-01	9.28E-01	5.90E+00	FALSE	5.62E-01	5.62E-01
Benzo(a)pyrene	55	0	46	84.00%	3.66E-01	9.12E-01	5.10E+00	FALSE	5.54E-01	5.54E-01
Benzo(b)fluoranthene	55	0	48	87.00%	4.02E-01	8.58E-01	4.80E+00	FALSE	5.67E-01	5.67E-01
Benzo(ghi)perylene	55	0	42	76.00%	2.51E-01	5.60E-01	3.20E+00	FALSE	3.25E-01	3.25E-01
Benzo(k)fluoranthene	55	0	23	42.00%	3.66E-01	9.29E-01	5.70E+00	FALSE	3.98E-01	3.98E-01
Bis(2-Ethylhexyl)phthalate	55	0	21	38.00%	1.09E+00	5.67E+00	4.20E+01	FALSE	6.99E-01	6.99E-01
Butylbenzylphthalate	42	13	5	12.00%	6.05E-02	3.00E-02	1.60E-02	FALSE	7.59E-02	1.60E-02
Carbazole	55	0	21	38.00%	2.12E-01	4.77E-01	5.00E-01	FALSE	3.53E-01	3.53E-01
Chrysene	55	0	49	89.00%	3.71E-01	9.51E-01	6.20E+00	FALSE	5.64E-01	5.64E-01
Di-n-butylphthalate	55	0	26	47.00%	1.77E-01	4.31E-01	2.50E-01	FALSE	2.29E-01	2.29E-01
Di-n-octylphthalate	43	12	3	7.00%	6.30E-02	2.73E-02	4.60E-02	FALSE	7.60E-02	4.60E-02
Dibenz(a,h)anthracene	55	0	27	49.00%	2.41E-01	5.06E-01	1.20E+00	FALSE	3.88E-01	3.88E-01
Dibenzofuran	54	1	9	17.00%	1.61E-01	3.25E-01	2.30E-01	FALSE	2.10E-01	2.10E-01
Diethyl phthalate	42	13	2	5.00%	6.41E-02	2.74E-02	1.70E-02	FALSE	7.55E-02	1.70E-02
Fluoranthene	55	0	51	93.00%	5.81E-01	2.18E+00	1.60E+01	FALSE	6.81E-01	6.81E-01
Fluorene	55	0	11	20.00%	2.10E-01	4.75E-01	6.60E-01	FALSE	2.44E-01	2.44E-01
Hexachlorobenzene	55	0	2	4.00%	2.51E-01	4.93E-01	8.40E-01	FALSE	2.76E-01	2.76E-01
Indeno(1,2,3-cd)pyrene	55	0	40	73.00%	2.54E-01	5.67E-01	3.10E+00	FALSE	3.63E-01	3.63E-01
N-Nitrosodiphenylamine	55	0	1	2.00%	2.48E-01	4.91E-01	7.60E-01	FALSE	2.70E-01	2.70E-01
N-Nitrosodipropylamine	55	0	1	2.00%	2.45E-01	4.87E-01	4.10E-01	FALSE	2.67E-01	2.67E-01
Naphthalene	42	13	7	17.00%	5.74E-02	3.21E-02	1.30E-02	FALSE	8.47E-02	1.30E-02
Phenanthrene	55	0	48	87.00%	3.16E-01	1.08E+00	7.90E+00	FALSE	3.74E-01	3.74E-01
Phenol	53	2	4	8.00%	1.70E-01	2.59E-01	2.10E-01	FALSE	1.96E-01	1.96E-01
Pyrene	55	0	51	93.00%	4.76E-01	1.65E+00	1.20E+01	FALSE	6.34E-01	6.34E-01
Pesticides/PCBs										
4,4'-DDD	55	0	12	22.00%	7.15E-03	1.46E-02	9.00E-02	FALSE	7.07E-03	7.07E-03
4,4'-DDE	55	0	17	31.00%	6.97E-03	1.37E-02	8.60E-02	FALSE	6.93E-03	6.93E-03
4,4'-DDT	55	0	15	27.00%	5.30E-03	6.45E-03	4.20E-02	FALSE	5.75E-03	5.75E-03
Aldrin	55	0	3	5.00%	1.74E-03	7.00E-04	2.80E-03	FALSE	1.88E-03	1.88E-03
Alpha-Chlordane	55	0	7	13.00%	3.81E-03	7.52E-03	4.40E-02	FALSE	3.73E-03	3.73E-03
Aroclor-1254	55	0	24	44.00%	7.51E-02	9.96E-02	4.95E-01	FALSE	8.58E-02	8.58E-02
Aroclor-1260	55	0	8	15.00%	4.57E-02	4.78E-02	2.30E-01	FALSE	4.97E-02	4.97E-02
Beta-BHC	55	0	3	5.00%	1.76E-03	7.20E-04	3.30E-03	FALSE	1.91E-03	1.91E-03
Dieldrin	55	0	3	5.00%	3.53E-03	2.23E-03	1.70E-02	FALSE	3.81E-03	3.81E-03
Endosulfan I	55	0	1	2.00%	1.70E-03	6.80E-04	1.90E-03	FALSE	1.84E-03	1.84E-03
Endosulfan II	55	0	2	4.00%	3.40E-03	1.41E-03	6.80E-03	FALSE	3.67E-03	3.67E-03
Endosulfan sulfate	55	0	5	9.00%	3.64E-03	1.91E-03	1.20E-02	FALSE	3.96E-03	3.96E-03
Endrin aldehyde	55	0	7	13.00%	3.86E-03	2.39E-03	1.50E-02	FALSE	4.23E-03	4.23E-03
Endrin ketone	55	0	4	7.00%	4.90E-03	8.67E-03	6.20E-02	FALSE	4.86E-03	4.86E-03
Gamma-Chlordane	55	0	9	16.00%	3.66E-03	6.69E-03	4.00E-02	FALSE	3.74E-03	3.74E-03
Heptachlor	55	0	1	2.00%	1.72E-03	6.90E-04	2.40E-03	FALSE	1.85E-03	1.85E-03
Heptachlor epoxide	55	0	5	9.00%	1.86E-03	1.22E-03	8.60E-03	FALSE	2.01E-03	2.01E-03
Methoxychlor	55	0	2	4.00%	1.83E-02	9.78E-03	6.80E-02	FALSE	1.98E-02	1.98E-02

Table 6-3
Sediment Exposure Point Concentration Summary

SEAD-4 - Remedial Investigation
Seneca Army Depot Activity

Analyte	No. of Valid Analyses	No. of Rejected	No. of Hits	Frequency (%)	Mean (mg/Kg)	Standard Deviation (mg/Kg)	Max Hit (mg/Kg)	Normal?	95% UCL of Mean (mg/Kg)	Exposure Point Concentration (EPC)* (mg/Kg)
Nitroaromatics										
2-Nitrotoluene	46	0	1	2.00%	6.85E-02	5.75E-02	4.50E-01	FALSE	7.09E-02	7.09E-02
2-amino-4,6-Dinitrotoluene	55	0	1	2.00%	6.34E-02	1.89E-02	2.00E-01	FALSE	6.54E-02	6.54E-02
4-amino-2,6-Dinitrotoluene	55	0	1	2.00%	6.22E-02	1.08E-02	1.40E-01	FALSE	6.37E-02	6.37E-02
Herbicides										
2,4,5-T	9	0	1	11.00%	7.29E-03	5.61E-03	2.10E-02	FALSE	1.21E-02	1.21E-02
Metals										
Aluminum	55	0	55	100.00%	12780.73	3364.37	22100	TRUE	13540.25	13540.25
Antimony	55	0	30	55.00%	8.35	16.15	82.7	FALSE	15.33	15.33
Arsenic	55	0	54	98.00%	6.3	5.64	37.7	FALSE	7.26	7.26
Barium	55	0	55	100.00%	109.57	75.38	488	FALSE	119.73	119.73
Beryllium	55	0	55	100.00%	0.64	0.21	1.1	TRUE	0.68	0.68
Cadmium	55	0	26	47.00%	2.22	5.27	34.1	FALSE	6.1	6.1
Calcium	55	0	55	100.00%	35277.09	32082.69	140000	FALSE	50003	50003
Chromium	55	0	55	100.00%	419.49	1081.32	4800	FALSE	448.91	448.91
Cobalt	55	0	55	100.00%	13.52	4.91	28.4	FALSE	14.59	14.59
Copper	55	0	55	100.00%	181.68	428.71	2640	FALSE	205.23	205.23
Iron	55	0	55	100.00%	28235.45	13343.88	87900	FALSE	30742.53	30742.53
Lead	55	0	52	95.00%	76.87	88.57	374	FALSE	98.98	98.98
Magnesium	55	0	55	100.00%	7027.36	3798.89	27900	FALSE	7724.95	7724.95
Manganese	55	0	55	100.00%	738.59	827.09	5480	FALSE	840.49	840.49
Mercury	55	0	33	60.00%	0.19	0.35	2.4	FALSE	0.24	0.24
Nickel	55	0	55	100.00%	45.48	57.25	453	FALSE	47.28	47.28
Potassium	55	0	55	100.00%	1817.41	583.18	3460	TRUE	1949.07	1949.07
Selenium	55	0	24	44.00%	0.97	1.11	6.1	FALSE	1.17	1.17
Silver	55	0	25	45.00%	0.5	0.4	1.7	FALSE	0.64	0.64
Sodium	55	0	36	65.00%	146.38	196.24	1370	FALSE	175.68	175.68
Vanadium	55	0	55	100.00%	49.29	150.39	1140	FALSE	42.03	42.03
Zinc	55	0	55	100.00%	278.09	231.46	1150	FALSE	336.46	336.46

Table 6-3
Building Debris Exposure Point Concentration Summary

SEAD-4 - Remedial Investigation
Seneca Army Depot Activity

Analyte	No. of Valid Analyses	No. of Rejected	No. of Hits	Frequency (%)	Mean (mg/kg)	Standard Deviation (mg/kg)	Max Hit (mg/kg)	Normal?	95% UCL of Mean (mg/kg)	Exposure Point Concentration (EPC)* (mg/kg)
Volatile Organics										
Acetone	6	0	6	100.00%	1.52E-02	1.40E-02	4.00E-02	TRUE	2.62E-02	4.00E-02
Semivolatile Organics										
2,4-Dinitrotoluene	5	1	2	40.00%	2.10E-01	8.40E-02	3.60E-01	FALSE	3.18E-01	3.60E-01
2-Methylnaphthalene	6	0	2	33.00%	3.95E-01	5.41E-01	1.50E+00	FALSE	1.70E+00	1.50E+00
Acenaphthene	6	0	4	67.00%	3.41E-01	5.27E-01	1.40E+00	FALSE	3.69E+01	1.40E+00
Anthracene	6	0	5	83.00%	2.64E-01	3.15E-01	6.90E-01	FALSE	3.65E+01	6.90E-01
Benzo(a)anthracene	6	0	5	83.00%	1.47E+00	2.01E+00	5.20E+00	FALSE	1.96E+02	5.20E+00
Benzo(a)pyrene	6	0	6	100.00%	1.95E+00	3.29E+00	8.50E+00	FALSE	3.84E+04	8.50E+00
Benzo(b)fluoranthene	6	0	6	100.00%	2.64E+00	4.16E+00	1.10E+01	FALSE	3.88E+03	1.10E+01
Benzo(ghi)perylene	6	0	6	100.00%	1.89E+00	3.38E+00	8.70E+00	FALSE	1.23E+04	8.70E+00
Benzo(k)fluoranthene	6	0	3	50.00%	2.05E+00	3.18E+00	8.30E+00	FALSE	4.28E+02	8.30E+00
Bis(2-Ethylhexyl)phthalate	6	0	6	100.00%	2.36E+02	3.61E+02	8.90E+02	FALSE	3.96E+08	8.90E+02
Butylbenzylphthalate	5	1	3	60.00%	6.73E-01	7.17E-01	1.60E+00	FALSE	3.09E+01	1.60E+00
Carbazole	6	0	4	67.00%	1.11E+00	2.30E+00	5.80E+00	FALSE	4.41E+02	5.80E+00
Chrysene	6	0	6	100.00%	2.84E+00	5.04E+00	1.30E+01	FALSE	1.61E+04	1.30E+01
Di-n-butylphthalate	6	0	6	100.00%	6.21E+00	1.27E+01	3.20E+01	FALSE	5.33E+03	3.20E+01
Dibenz(a,h)anthracene	6	0	4	67.00%	7.46E-01	1.13E+00	3.00E+00	FALSE	1.02E+01	3.00E+00
Dibenzofuran	6	0	2	33.00%	3.87E-01	5.46E-01	1.50E+00	FALSE	1.80E+00	1.50E+00
Diethyl phthalate	5	1	2	40.00%	1.33E-01	6.64E-02	1.30E-01	TRUE	1.93E-01	1.30E-01
Fluoranthene	6	0	6	100.00%	5.31E+00	9.81E+00	2.50E+01	FALSE	7.85E+04	2.50E+01
Fluorene	6	0	3	50.00%	2.60E-01	2.57E-01	7.60E-01	FALSE	3.43E+00	7.60E-01
Indeno(1,2,3-cd)pyrene	6	0	5	83.00%	1.67E+00	2.89E+00	7.50E+00	FALSE	5.69E+03	7.50E+00
N-Nitrosodiphenylamine	5	1	1	20.00%	1.51E-01	4.80E-02	6.60E-02	FALSE	2.82E-01	6.60E-02
Naphthalene	6	0	3	50.00%	3.28E-01	4.80E-01	1.30E+00	FALSE	7.81E+00	1.30E+00
Pentachlorophenol	5	1	2	40.00%	1.39E+00	1.97E+00	4.90E+00	FALSE	2.24E+01	4.90E+00
Phenanthrene	6	0	6	100.00%	4.50E+00	9.13E+00	2.30E+01	FALSE	8.15E+04	2.30E+01
Pyrene	6	0	6	100.00%	5.04E+00	9.88E+00	2.50E+01	FALSE	1.70E+05	2.50E+01
Pesticides/PCBs										
4,4'-DDD	6	0	4	67.00%	2.46E-02	1.26E-02	3.50E-02	TRUE	3.46E-02	3.50E-02
4,4'-DDE	6	0	6	100.00%	2.78E-01	4.60E-01	1.20E+00	FALSE	1.70E+01	1.20E+00
4,4'-DDT	6	0	6	100.00%	1.79E+00	2.12E+00	5.60E+00	TRUE	3.47E+00	5.60E+00
Alpha-Chlordane	6	0	4	67.00%	1.37E-01	3.15E-01	7.80E-01	FALSE	6.14E+03	7.80E-01
Aroclor-1254	6	0	5	83.00%	1.69E+01	3.64E+01	9.10E+01	FALSE	1.48E+07	9.10E+01
Aroclor-1260	6	0	4	67.00%	9.89E-01	1.17E+00	3.10E+00	TRUE	1.92E+00	3.10E+00
Beta-BHC	6	0	1	17.00%	8.28E-03	1.15E-02	3.10E-02	FALSE	1.86E-01	3.10E-02
Dieldrin	6	0	5	83.00%	3.06E-01	4.42E-01	1.10E+00	FALSE	3.06E+03	1.10E+00
Endosulfan I	6	0	2	33.00%	3.12E-02	6.32E-02	1.60E-01	FALSE	1.46E+01	1.60E-01
Endosulfan II	6	0	2	33.00%	1.80E-02	1.35E-02	3.00E-02	TRUE	2.87E-02	3.00E-02
Endosulfan sulfate	6	0	2	33.00%	4.59E-02	7.65E-02	2.00E-01	FALSE	8.61E+00	2.00E-01
Endrin	6	0	3	50.00%	6.93E-02	1.24E-01	3.20E-01	FALSE	6.46E+01	3.20E-01
Endrin aldehyde	6	0	5	83.00%	1.05E-01	1.49E-01	3.90E-01	FALSE	1.35E+02	3.90E-01
Endrin ketone	5	1	3	60.00%	8.69E-02	1.59E-01	3.70E-01	FALSE	3.30E+03	3.70E-01
Gamma-Chlordane	6	0	5	83.00%	3.04E-02	3.53E-02	9.50E-02	TRUE	5.85E-02	9.50E-02
Heptachlor	6	0	1	17.00%	1.11E-02	1.30E-02	3.40E-02	TRUE	2.15E-02	3.40E-02
Heptachlor epoxide	6	0	5	83.00%	7.50E-02	1.41E-01	3.60E-01	FALSE	1.04E+02	3.60E-01
Methoxychlor	6	0	3	50.00%	1.20E-01	1.50E-01	3.90E-01	TRUE	2.39E-01	3.90E-01
Nitroaromatics										
1,3-Dinitrobenzene	6	0	2	33.00%	9.33E-02	5.32E-02	1.80E-01	FALSE	1.76E-01	1.80E-01
2,4,6-Trinitrotoluene	6	0	1	17.00%	9.33E-02	8.17E-02	2.60E-01	FALSE	2.03E-01	2.60E-01
2,4-Dinitrotoluene	6	0	3	50.00%	5.33E-01	7.14E-01	1.90E+00	FALSE	4.70E+01	1.90E+00
2-amino-4,6-Dinitrotoluene	6	0	2	33.00%	1.38E-01	1.22E-01	3.20E-01	FALSE	5.54E-01	3.20E-01
4-amino-2,6-Dinitrotoluene	6	0	1	17.00%	1.00E-01	9.80E-02	3.00E-01	FALSE	2.46E-01	3.00E-01
RDX	6	0	1	17.00%	8.33E-02	5.72E-02	2.00E-01	FALSE	1.49E-01	2.00E-01
Tetryl	6	0	1	17.00%	1.87E-01	3.10E-01	8.20E-01	FALSE	1.44E+00	8.20E-01

Table 6-3
Building Debris Exposure Point Concentration Summary

SEAD-4 - Remedial Investigation
Seneca Army Depot Activity

Analyte	No. of Valid Analyses	No. of Rejected	No. of Hits	Frequency (%)	Mean (mg/kg)	Standard Deviation (mg/kg)	Max Hit (mg/kg)	Normal?	95% UCL of Mean (mg/kg)	Exposure Point Concentration (EPC)* (mg/kg)
Metals										
Aluminum	6	0	6	100.00%	4043.33	1364.91	6110	TRUE	5126.02	6110
Antimony	6	0	6	100.00%	12.59	9	26.1	TRUE	19.73	26.1
Arsenic	6	0	6	100.00%	18.88	9.34	33.6	TRUE	26.29	33.6
Barium	6	0	6	100.00%	1573.33	1309.55	3560	TRUE	2612.1	3560
Beryllium	6	0	2	33.00%	0.12	0.19	0.46	FALSE	57.81	0.46
Cadmium	6	0	5	83.00%	45.84	45.93	132	TRUE	82.27	132
Calcium	6	0	6	100.00%	77633.33	87962.12	253000	FALSE	415954	253000
Chromium	6	0	6	100.00%	475.5	686.13	1840	FALSE	15006.55	1840
Cobalt	6	0	6	100.00%	26	8.18	37.1	TRUE	32.49	37.1
Copper	6	0	6	100.00%	587.67	347.76	1220	FALSE	1095.13	1220
Cyanide	6	0	4	67.00%	5.65	11.31	28.7	FALSE	1030.21	28.7
Iron	6	0	6	100.00%	180183.3	116969.75	362000	TRUE	272966.8	362000
Lead	6	0	6	100.00%	3793.83	4276.28	12000	FALSE	26816.69	12000
Magnesium	6	0	6	100.00%	10473.33	5378.47	17600	TRUE	14739.68	17600
Manganese	6	0	6	100.00%	966.5	451.91	1630	TRUE	1324.97	1630
Mercury	6	0	6	100.00%	10.88	25.44	62.8	FALSE	45681.85	62.8
Nickel	6	0	6	100.00%	290.12	511.66	1330	FALSE	7753.82	1330
Potassium	6	0	6	100.00%	1888	1032.43	3750	TRUE	2706.95	3750
Silver	6	0	6	100.00%	0.49	0.05	0.57	TRUE	0.53	0.57
Sodium	6	0	6	100.00%	817.67	501.76	1530	TRUE	1215.68	1530
Thallium	6	0	5	83.00%	2.71	2.41	7	TRUE	4.63	7
Vanadium	6	0	6	100.00%	179.87	376.45	948	FALSE	13914.57	948
Zinc	6	0	6	100.00%	4013.33	1827.37	6100	TRUE	5462.85	6100

Note: The 95 UCL of the Mean was not calculated because there were only six analyses of Building Debris material.
The maximum concentration was used for the EPC.

Table 6-4
List of Chemical by Media Quantified in the Human Health Risk Assessment

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

COMPOUNDS	Ambient Air	Surface Soils	Total Soils	Surface Water	Sediment	Building Debris	Groundwater
VOLATILE ORGANICS							
1,1-Dichloroethane	X	X	X				
1,2-Dichloroethene (total)	X	X	X				
Acetone	X	X	X	X	X	X	X
Benzene	X	X	X				X
Carbon Disulfide					X		
Chloroform	X	X	X		X		
Ethylbenzene	X		X				X
Methyl butyl ketone	X	X	X				
Methyl ethyl ketone					X		
Methylene chloride	X	X	X		X		
Styrene					X		
Tetrachloroethene							
Toluene	X	X	X		X		X
Trichloroethene	X	X	X				
Xylene (total)	X		X		X		X
SEMIVOLATILE ORGANICS							
1,4-Dichlorobenzene					X		
2-Methylnaphthalene	X	X	X		X	X	
4-Methylphenol					X		X
Acenaphthene	X	X	X		X	X	
Acenaphthylene	X	X	X		X		
Anthracene	X	X	X	X	X	X	
Benzo(a)anthracene	X	X	X	X	X	X	
Benzo(a)pyrene	X	X	X	X	X	X	
Benzo(b)fluoranthene	X	X	X	X	X	X	
Benzo(g,h,i)perylene	X	X	X	X	X	X	
Benzo(k)fluoranthene	X	X	X	X	X	X	
bis(2-Ethylhexyl)phthalate	X	X	X	X	X	X	X
Butylbenzylphthalate	X	X	X	X	X	X	
Carbazole	X	X	X	X	X	X	
Chrysene	X	X	X	X	X	X	
Dibenz(a,h)anthracene	X	X	X		X	X	
Dibenzofuran	X	X	X		X	X	
Diethylphthalate	X	X	X		X	X	X
Di-n-butylphthalate	X	X	X		X	X	X
Di-n-octylphthalate	X	X	X		X		
Fluoranthene	X	X	X	X	X	X	
Fluorene	X	X	X		X	X	
Hexachlorobenzene					X		
Indeno(1,2,3-cd)pyrene	X	X	X	X	X	X	
N-Nitrosodiphenylamine	X	X	X		X	X	
N-Nitrosodipropylamine					X		
Naphthalene	X	X	X		X	X	X
Pentachlorophenol						X	

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Table 6-4
List of Chemical by Media Quantified in the Human Health Risk Assessment

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

COMPOUNDS	Ambient Air	Surface Soils	Total Soils	Surface Water	Sediment	Building Debris	Groundwater
Phenanthrene	X	X	X	X	X	X	
Phenol	X	X	X		X		X
Pyrene	X	X	X	X	X	X	
Pesticides/PCBs							
4,4'-DDD	X	X	X		X	X	
4,4'-DDE	X	X	X		X	X	
4,4'-DDT	X	X	X		X	X	
Aldrin	X	X	X		X		X
alpha-BHC	X	X	X				X
alpha-Chlordane	X	X	X	X	X	X	
Aroclor-1248	X		X				
Aroclor-1254	X	X	X		X	X	
Aroclor-1260	X	X	X		X	X	X
Beta-BHC	X	X	X	X	X	X	
delta-BHC	X		X				X
Dieldrin	X	X	X		X	X	
Endosulfan I	X	X	X		X	X	
Endosulfan II	X	X	X		X	X	
Endosulfan sulfate	X	X	X		X	X	
Endrin	X	X	X			X	
Endrin aldehyde	X	X	X		X	X	
Endrin ketone	X	X	X		X	X	
Gamma-Chlordane	X	X	X	X	X	X	X
Heptachlor	X	X	X		X	X	X
Heptachlor epoxide	X	X	X		X	X	
Methoxychlor					X	X	
HERBICIDES							
2,4-DB							
2,4,5-T					X		
Dalapon							
Dicamba	X		X				
NITROAROMATICS							
1,3-Dinitrobenzene				X		X	
2-Nitrotoluene					X		X
3-Nitrotoluene							X
4-Nitrotoluene	X	X					X
1,3,5-Trinitrobenzene	X	X	X				
2,4,6-Trinitrotoluene	X	X	X			X	
2,4-Dinitrotoluene	X	X	X			X	
2,6-Dinitrotoluene							
2-amino-4,6-Dinitrotoluene	X	X			X	X	
Nitrobenzene							X
RDX						X	

Table 6-4
List of Chemical by Media Quantified in the Human Health Risk Assessment

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

COMPOUNDS	Ambient Air	Surface Soils	Total Soils	Surface Water	Sediment	Building Debris	Groundwater
Tetryl						X	
METALS							
Aluminum				X	X	X	
Antimony	X	X	X	X	X	X	
Arsenic				X	X	X	
Barium				X	X	X	
Beryllium					X	X	X
Cadmium				X	X	X	X
Calcium				X	X	X	
Chromium	X	X	X	X	X	X	X
Chromium, Hexavalent	X	X	X				
Cobalt				X	X	X	
Copper	X	X	X	X	X	X	
Cyanide	X	X	X			X	
Iron				X	X	X	
Lead	X	X	X	X	X	X	
Magnesium				X	X	X	
Manganese				X	X	X	
Mercury	X	X	X		X	X	
Nickel				X	X	X	
Potassium				X	X	X	
Selenium					X		X
Silver				X	X	X	X
Sodium				X	X	X	
Thallium	X	X	X	X		X	
Vanadium				X	X	X	
Zinc	X	X	X	X	X	X	

Notes:

Lead was evaluated qualitatively since no approved RfD, RfC, slope factor, or inhalation unit risk are currently available.

6.3 EXPOSURE ASSESSMENT

6.3.1 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 COPC are available.

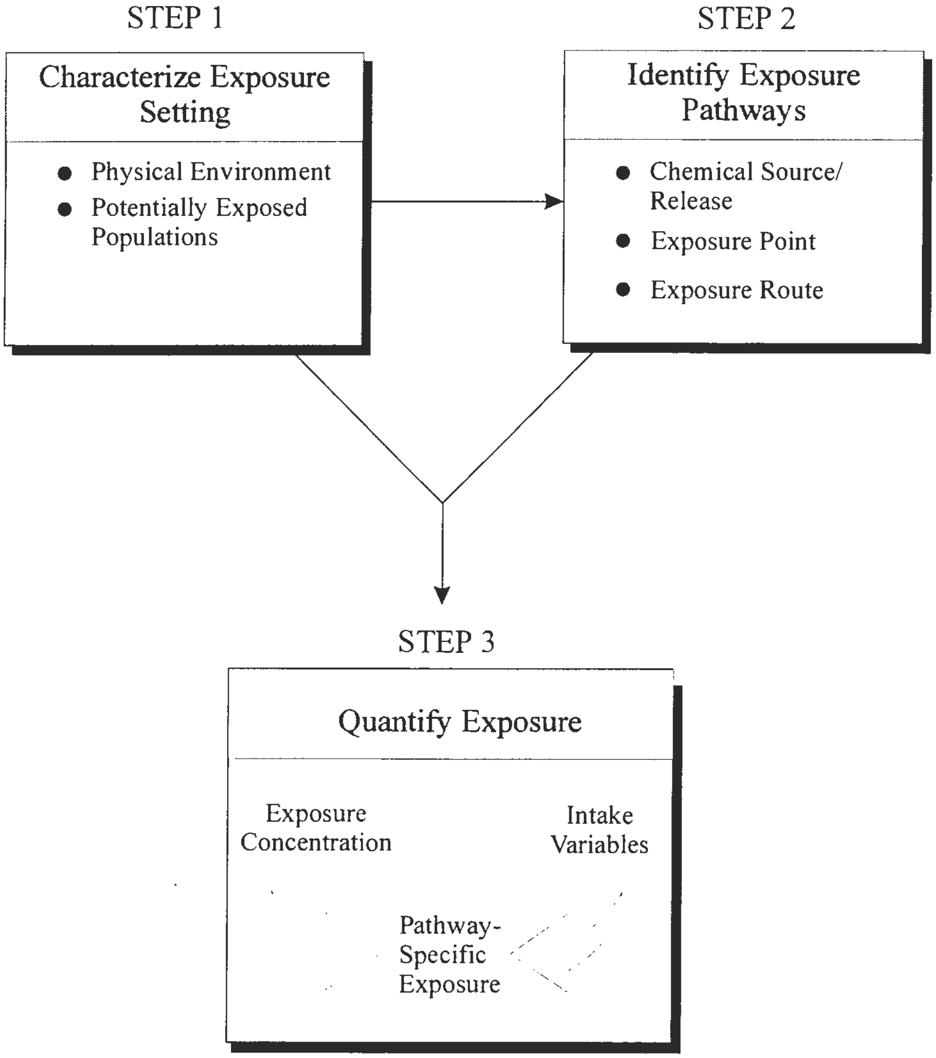
The exposure assessment consists of three steps (USEPA, 1989a):

1) **Characterize Exposure Setting:** Contained within this step is general information concerning the physical characteristics of the site as it pertains to potential considerations affecting exposure. The physical setting involves climate, vegetation, soil characteristics, 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.

2) **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.

3) **Quantify Exposure:** In this final process, 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 6-2 illustrates the exposure assessment process.



Source: USEPA, 1989a

PARSONS

PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY

SEAD-4 Remedial Investigation

DEPT ENVIRONMENTAL ENGINEERING DWG NO 734539

FIGURE 6-2

EXPOSURE ASSESSMENT PROCESS

SCALE Not Applicable DATE November 1999

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6.3.2 Physical Setting

SEDA lies on the western side of a series of north to south trending rock terraces which separate Cayuga Lake on the east and Seneca Lake on the west. The rock terraces range in elevation from 490 feet above MSL in northern Seneca County to as much as 1,600 feet above MSL at the southern end of the lakes. Elevations on SEDA range from 450 feet above MSL on the western boundary to 760 feet above MSL in the southeast corner. The Depot's land surface generally slopes to the west and north.

Land use is divided into three categories on SEDA. The Main Post accounts for 9,832 acres and consists of an exclusion area containing partially buried, reinforced concrete igloos, general storage magazines, and warehouses. The containment areas of the facility consist of the North and South Posts. The South Post is located in the southwest portion of the facility near Rte. 96 and is a developed area containing warehouses, administration buildings, quarters, and community services. The North Post, at the north end of the Main Post, includes troop housing, troop support and community services.

SEAD-4 is located in the southwestern portion of SEDA and is situated on approximately 30-acres of land. Eleven buildings existed at the site during the years that the Munitions Washout Building was operating. Four buildings were demolished. The facility is almost entirely surrounded by two drainage ditches. There is a man-made pond on the western edge of the site.

6.3.2.1 Climate

A cool climate exists in the locality of SEDA with temperatures ranging from an average of 23°F in January to 69°F in July. Marked temperature differences are found between daytime highs and nighttime lows during the summer and portions of the transitional seasons. Precipitation is well-distributed, averaging approximately 3 inches per month. The annual average snowfall is approximately 100 inches. Wind velocities are moderate, but during the winter months, there are numerous days with sufficient winds to cause blowing and drifting snow. Daily precipitation data measured at the Aurora Research Farm in Aurora, New York for the period (1957-1991) were obtained from the Northeast Regional Climate Center at Cornell University. The maximum 24-hour precipitation measured at this station during this period was 3.91 inches on September 26, 1975. Values of 35 inches mean annual pan evaporation and 28 inches for annual lake evaporation were reported. An independent value of 27 inches for mean annual evaporation from open water surfaces was estimated from an isoplethic figure found in "*Water Atlas of the United States*" (Water Information Center, 1973).

SEDA is located in the Genessee-Finger Lakes Air Quality Control Region (AQCR). The AQCR is designated as non-attainment for ozone and attainment or unclassified for all other criteria pollutants. Data for existing air quality in the immediate area surrounding SEDA, however, can not be obtained since the nearest state air quality stations are 40 to 50 miles away from the army depot.

6.3.2.2 Vegetation

The vegetative communities within the 0.5-mile study area are predominantly upland cover types unevenly distributed among the developed areas of the South Post. Cover types include mown lawns, old fields, shrublands, and deciduous forest. Unvegetated areas consist of open storage lots, railroads, paved roads, and buildings. Unvegetated corridors are maintained by herbicide application along the railroad tracks adjacent to the site.

The majority of the SEAD-4 site falls into the Old Field classification. Now that the base is being closed, mowing of the site has become less frequent or has been terminated altogether, and the opportunistic species are successfully competing with the introduced turf and native grass species. Species present include goldenrod, chickweed New England astern, Queen Anne's lace, ragweed, wild strawberry, and dandelion. Many areas are rapidly succeeding into shrubland.

The types and distribution of vegetative communities surrounding the site result from decades of human modification of the environment of South Post and the ammunition area (Main Post) (SEDA, 1992a, c). Mowing, drainage diversion, building construction, landscaping practices, forestry practices, plantations, and herbicide application all control the composition of vegetation surrounding the site.

A detailed discussion of the site vegetation is found in section 3.7 of the RI report.

6.3.2.3 Geologic Setting and Soil Classification

The site geology is characterized by gray Devonian shale with a thin weathered zone where it contacts the overlying mantle of Pleistocene till. This stratigraphy is consistent over the entire site. Artificial fill covers many areas of the site. The fill becomes significantly thicker around the pond.

The predominant surficial geologic unit present at the site is dense till. The till is distributed across the entire site and ranges in thickness from 0.5 feet to as much as 4.6 feet based upon refusal data collected during the ESI and RI, although the average thickness of the till on-site is only 1.6 feet. The till is generally characterized by brown to olive gray silt and clay, trace of fine sand with few fine to coarse gravel-sized inclusions of weathered shale. The general Unified Soil Classification System description of the till on-site is as follows: Clay-silt, brown to olive gray, 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).

A zone of gray weathered shale of variable thickness was encountered below the till at all of the locations drilled on-site. This zone is characterized by fissile shale with a large amount of brown interstitial silt and clay. The thickness of the weathered shale on the site ranges between 0.3 feet to 1.3 feet, with an average thickness of 0.7 feet. Differential weathering through geologic time is likely responsible for the variable thickness. No outcrops of weathered or competent shale are exposed at SEAD-4. Gray competent shale was encountered between 4 feet and 11 feet below the land surface in the borings performed on the site.

A detailed discussion of the Site Geology is provided in section 3.4 for the RI Report.

6.3.2.4 Surface Water Hydrology

Surface water flow from precipitation events is controlled by local topography including the two man-made drainage ditches into which most runoff from the facility flows.

Runoff toward the east and north of the site generally flows into the eastern drainage ditch, which flows to the northwest. Surface water in this ditch flows west under North South Baseline Road and then flows into Indian Creek just north of the facility.

Runoff toward the west of the site flows into the western ditch which drains to the north into the pond. The pond is approximately 150 feet in diameter and is man-make. It is the only sustained water body on site.

6.3.2.5 Groundwater Hydrology

The hydrogeologic properties of the site were characterized in accordance with the investigation programs described in Section 2.0. The groundwater flow direction in the till/weathered shale aquifer on the site is generally toward the west based on the groundwater elevations measured in the 13 monitoring wells.

A groundwater contour map was prepared using the March 16, 1999 data set. This map indicates that groundwater flow direction is toward the west on the western portion of the site and not well defined on the eastern portion of the site. Groundwater elevations range from a high of 703.20 feet immediately west of Building 2084 to a low of 677.84 feet just downgradient of the pond. The maximum relief over the entire site is 25.36 feet. Saturated thicknesses for the aquifer at SEAD-4 were between 2.6 feet and 10 feet. In the eastern portion of the site, the horizontal groundwater gradient was calculated to be 0.002 ft/ft. On the western portion of the site, the gradient was calculated to be 0.019 ft/ft and groundwater flow is to the west.

A second groundwater contour map was constructed based on depth to water measurements made on July 6, 1999. This map indicates that groundwater flow is toward the west on the western portion of the site and not well defined on the eastern portion of the site. Groundwater elevations range from a high of approximately 700 feet immediately west of Building 2078 to a low of 673.86 feet just downgradient of the pond. The maximum relief of the water table over the site is 26.13 feet. The horizontal groundwater gradient was calculated to be 0.002 ft/ft in the eastern portion of the site. On the western portion of the site, the gradient was calculated to be 0.019 ft/ft and groundwater flow was to the west.

The groundwater flow velocity was calculated for the March 1999 data. A linear velocity of 0.035 feet/day (or 13 feet/year) at 20 percent effective porosity, and 0.047 feet/day (or 17 feet/year) at 15 percent effective porosity was determined for the eastern portion of the site. A linear velocity of 0.33 feet/day (or 120 feet/year) at 20 percent effective porosity, and 0.44 feet/day (or 161 feet/year) at 15 percent effective porosity was determined for the western portion of the site.

It is important to note that the highly variable nature of the saturated thicknesses of the till/weathered shale aquifer may result in varying degrees of influence from the local bedrock topography on the direction and velocity of groundwater flow throughout the year. Therefore, the actual direction and distance of groundwater flow as indicated by the calculated velocities are likely to vary throughout the year.

A detailed discussion of the Groundwater Hydrology is provided in section 3.6 of the RI report.

6.3.3 Land Use and Potentially Exposed Populations

6.3.3.1 Current Land Use

Building 2073 is the only building at SEAD-4 that is currently used. Offsite residents are not considered to be potential receptors due to the distances between offsite residences and SEAD-4. There are no drinking water supply wells at SEAD-4.

Access to the site is restricted by perimeter chain link fencing. This site has no actual site workers but is occasionally patrolled by site security personnel. As a result, it is unrealistic to assume that the workers from nearby sites will spend a significant amount of time on this site, and the most reasonable current on-site receptor was considered to be an infrequent Site Worker. The potential exposures occurring during onsite work have been evaluated in the risk assessment.

6.3.3.2 Potential Future Land Use

EPA guidance for determining future land uses recommends that, 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 sites 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 the Army to 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 Base Realignment and Closure (BRAC) process, a Land Redevelopment Authority comprised of representatives of the local public, was established. This group commissioned a study to recommend future uses for the Seneca Army Depot. The Land Reuse Plan which was produced designated various uses for different parcels of SEDA ranging from conservation/recreation to institutional, industrial and residential. The area which contains SEAD-4 was designated "Conservation/Recreation Area".

In this human health assessment the future land use of SEAD-4 was considered to be conservation and recreation. The decision to perform a remedial action will be based upon this anticipated future land use. At such time that the property is intended to be transferred in accordance with CERCLA, the Army will notify all appropriate regulatory agencies and will perform any additional investigations and remedial actions to assure that the change in the intended land use is protective of human health and the environment.

NYSDEC has established a goal for site remediation to "restore the site to pre-disposal conditions, to the extent feasible and authorized by law." [6 NYCRR 375-1.10]. This risk assessment includes a residential receptor scenario, as a basis for considering the site conditions in terms of this regulatory "pre-disposal" goal.

6.3.3.3 Potentially Exposed Populations

For purposes of this baseline risk assessment, five types of potentially exposed populations were considered. Under the current land-use scenario, there is one single exposed population: site workers. The future land-use scenario assumes that SEAD-4 is part of a conservation and recreation area. In this scenario, there are three (3) exposed populations:

1) Park workers;
2) Construction workers who work for a short term onsite;

3) Recreational visitors, who occasionally visit the property; and
4) Residents (for pre-disposal goal evaluation).

6.3.4 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.

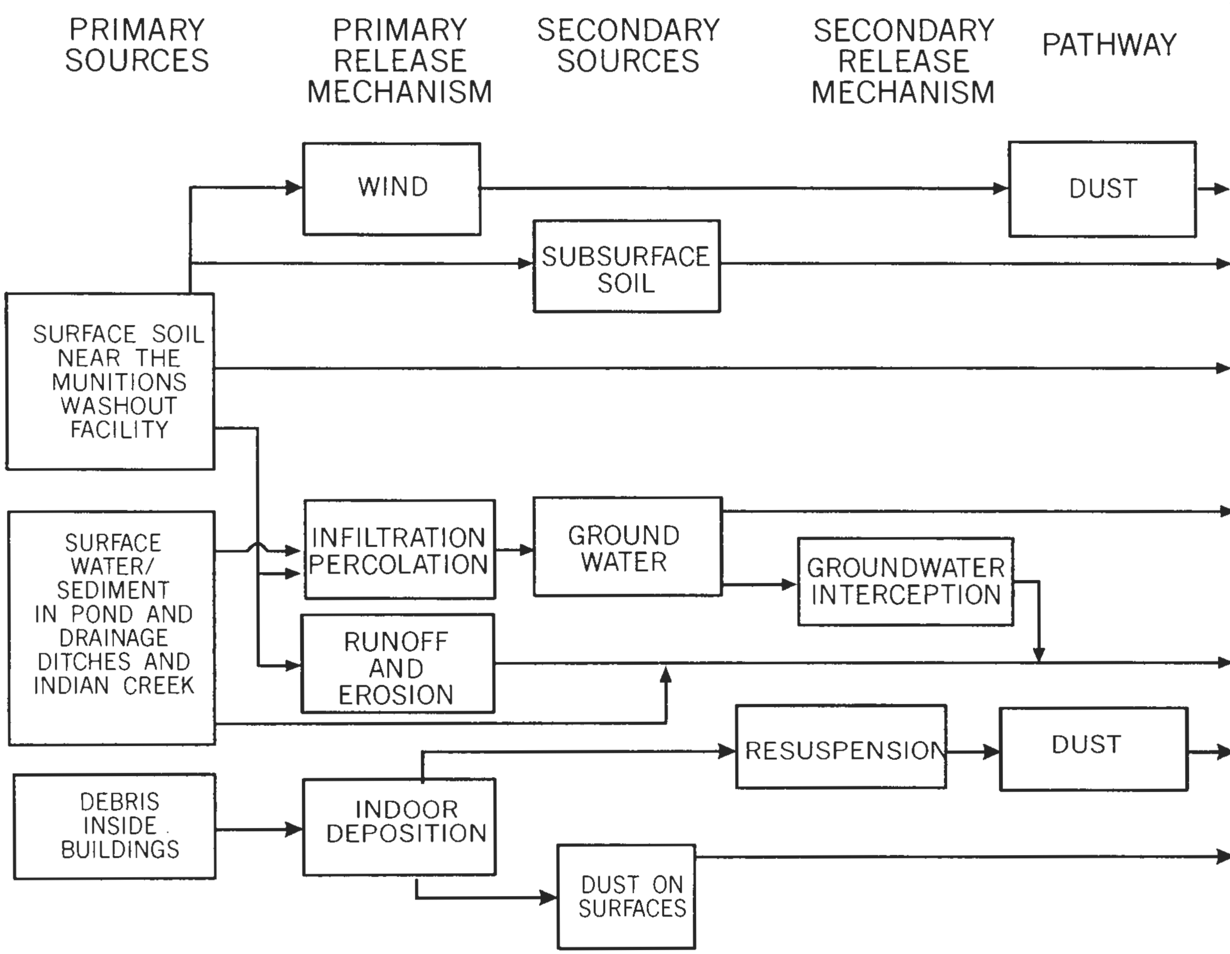
A pathway cannot be completed unless each of these elements is present. The sources and mechanisms for release of chemicals and the environmental transport mediums are described in Section 5, Contaminant Fate and Transport. **Figure 6-3** illustrates the completed exposure pathways for SEAD-4.

6.3.4.1 Sources and Receiving Media

The wastes generated from the process conducted at the Munitions Washout Facility included wastewater containing dissolved explosive compounds. The wastewater was discharged on site and is considered to have been a source of potential contaminants at SEAD-4. Currently, the sources of potential contaminants are the soil into which the wastewater leached, and the surface water and sediment in the drainage ditches and the pond through which the wastewater may have flowed. Surface dust within the buildings is also a potential source of exposure.

6.3.4.2 Fate and Transport

The environmental fate associated with COPCs found at SEAD-4 is discussed in detail in Section 5.



EXPOSURE ROUTE	RECEPTOR					
	HUMAN					
	CURRENT SITE WORKER	FUTURE PARK WORKER OUTDOOR	FUTURE PARK WORKER INDOOR	FUTURE RECREATIONAL VISITOR	FUTURE CONSTRUCTION WORKER	RESIDENTIAL
INHALATION	●	●	NA	●	●	●
INGESTION	NA	NA	NA	NA	●	NA
DERMAL CONTACT	NA	NA	NA	NA	●	NA
INGESTION	●	●	NA	●	●	●
DERMAL CONTACT	●	●	NA	●	●	●
INGESTION	NA	●	●	●	NA	●
INHALATION	NA	NA	NA	●	NA	●
DERMAL CONTACT	NA	NA	NA	●	NA	●
INGESTION	NA	NA	NA	●	NA	●
DERMAL CONTACT	NA	●	NA	●	NA	●
INHALATION	NA	NA	●	NA	NA	NA
INGESTION	NA	NA	●	NA	NA	NA
DERMAL CONTACT	NA	NA	●	NA	NA	NA

● PATHWAY CONSIDERED TO POSE POTENTIAL RISK

NA NOT APPLICABLE TO RECEPTOR

PARSONS
PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE
SENECA ARMY DEPOT
SEAD-4 RI/FS
MUNITIONS WASHOUT FACILITY

DEPT ENVIRONMENTAL ENGINEERING
DWG NO 734539-01001

FIGURE 6-3
EXPOSURE PATHWAY SUMMARY

SCALE NA
DATE JUNE 2000

6.3.4.2.1 Volatile Organics

A relatively small number of volatile organic compounds (VOCs) were detected in soil, groundwater, surface water, sediment and indoor solids at SEAD-4. 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.

6.3.4.2.2 Semi-Volatile Organics

The principal semi-volatile compounds found in SEAD-4 are PAHs. Generally, these constituents are relatively persistent and immobile in the environment. This was verified by the RI sampling programs, which measured elevated concentrations of these constituents in the soil, but not in the groundwater.

Pesticides,PCBs, and phthalates were detected in the building debris, surface soils, and sediment at SEAD-4.

6.3.4.2.3 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 were considered in the fate and transport evaluation. 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.

6.3.4.3 Integration of Exposure Pathways

In this section, the final assembly of the components required to accurately construct an exposure pathway is performed. The proper framework of an exposure pathway involves a source, transport medium, exposure point, and an exposure route. The pertinent exposure pathways for SEAD-4 are summarized in **Figure 6-3**. According to RAGS (USEPA, 1989a), a pathway is considered incomplete if one or more of these components is not present with the exception of the transport medium, which may be absent in the case of direct exposures. Hence, the conclusion, if there is not a complete pathway, there can be no risk resulting from that theoretical pathway. For the purposes of this baseline risk assessment (BRA), current and future human exposure pathways have been identified as potential pathways which meet the criteria for an exposure pathway (exposure to surface water and sediment are counted separately).

The following pathways were not quantified based on the rationale below:

1. Exposure to surface water and sediment while swimming were considered to be unrealistic pathways of exposure because the depth of drainage ditches is at most only a few inches and the manmade pond is unsuitable and unattractive for swimming. (Occasional, incidental contact with surface water and sediment are evaluated.)

2. Ingestion and dermal contact with soil by current offsite area residents was eliminated from the risk assessment based on the unlikely occurrence of a trespasser at SEAD-4. Security on the depot remains in place which prohibits unauthorized entrance to the grounds.

3. The most realistic current on-site exposure scenario is considered to be the site worker scenario. Because the assumptions are based on present data, it was determined that modeling a future site worker would yield no different risks than the current land use scenario.

6.3.4.4 Summary of Exposure Pathways to be Quantified

The pathways presented reflect the current onsite and the projected future onsite use of the Former Munitions Washout Facility. This section presents the rationale for including these exposure pathways in this risk assessment.

<u>Inhalation of Particulate Matter in Ambient Air</u>

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 current and future receptors.

Inhalation of Particulate Matter in Indoor Air

Site chemicals of potential concern were measured in building debris samples in six buildings at SEAD-4. These results indicate that resuspension of soil or indoor dust is a potential transport medium for onsite human exposure to COPCs. These debris sampling results were used to estimate inhalation exposures for future park workers at the site.

Incidental Ingestion and Dermal Contact to Indoor Dust

As described above, COPCs are present in the building debris samples in six buildings at SEAD-4. These results indicate that direct contact with surface dust by future building occupants could result in ingestion and/or dermal exposures. These debris sampling results were used to estimate ingestion and dermal exposures for future park workers at the site.

Incidental Ingestion and Dermal Contact to On-Site Surface Soils

During the course of daily activities, an on-site worker, recreational visitor or resident could come into contact with site surface soils and involuntarily ingest and/or have their skin exposed to them. Therefore, exposure via dermal contact and soil ingestion was assessed for current infrequent site workers, future park workers, and recreational visitors.

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

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 possible future construction worker.

Incidental Dermal Contact to Surface Water and Sediment

There is a pond at SEAD-4 on the western portion of the site. In addition, pools of surface water form in drainage ditches at the site following precipitation. This surface water and the associated wet soil, or sediment, may contain chemicals found in the surface soils, since these ditches will collect runoff and soil eroded by the rainfall. Because this site is located in the conservation area, park workers and recreational visitors may contact and have their skin exposed to surface water or sediment. Due to current site access restrictions, a trespasser could not contact these water bodies. Therefore, exposures to surface water and sediments via dermal contact were assessed for a future recreational visitor, park worker and resident.

Incidental Ingestion of Sediment

When the drainage ditches are dry, there is potential for contact with the sediment contained in the ditches. While dermal contact with this sediment has been addressed above, there is also the potential that a future recreational visitor or resident might ingest some of this sediment (similar to soil ingestion). Ingestion exposure to sediment would be limited, since the sediment would often be covered by surface water or snow. Exposure to sediment by ingestion was assessed quantitatively for a future recreational visitor and resident.

Ingestion of Groundwater

The groundwater beneath the SEAD-4 is not currently used as a drinking water source for current site workers and there is no current on-site use of groundwater as a potable water source. Additionally, it is unlikely that a groundwater well would be installed for use by future construction workers. Therefore, ingestion of groundwater is not considered a completed pathway for each of these scenarios. For other future receptors, 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 form the water treatment plant a the Town of Waterloo. The source of this water is Lake Seneca. It is unlikely that groundwater wells 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. Therefore, this is considered a complete pathway and data from the on-site wells are used to calculate exposure concentrations.

Inhalation and Dermal Contact with Groundwater while Showering

Recreational visitors and residents 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.

6.3.5 Quantification of Exposure

In this section, each receptor's potential exposures to chemicals of potential concern (COPCs) is 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). These calculations generally involve two steps. First, representative chemical concentrations in the environment, or exposure point concentrations (EPCs), are determined for each pathway and receptor. From these EPC values, the amount of chemical which 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 **Appendix G.**

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 overestimate exposure. USEPA (1993) recommends 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 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 is also evaluated for comparison purposes and is generally based on mean exposure parameters. In accordance with this EPA guidance, both the CT and RME scenarios have been evaluated in this 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. Short-term (i.e., subchronic) and acute exposures were evaluated only for the construction worker and recreational visitor (child) who have exposure durations ranging from 1 to 5 years.

Exposure-point concentrations (EPCs) were estimated for all pathways selected for quantitative evaluation. These concentrations are based on measured values (for soil, sediment, surface water, indoor debris and groundwater) or on calculated estimates (for ambient air). 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 exposure-point concentrations 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 noncarcinogenic effects, it is the exposure time (specific to the scenario being assessed) and for carcinogenic effects, it is lifetime (70 years).

6.3.5.1 Exposure Assumptions

An important aspect of exposure assessment is the determination of sets of assumptions regarding the manner in which receptors may be exposed to contaminants. USEPA 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 receptors: current site worker, future park worker, future construction worker, future child recreator and future resident. The exposure assumptions for these scenarios are intended to approximate the frequency and duration of time and manner in which receptors are exposed to environmental media. For example, the worker scenarios are intended to approximate the exposure potential of those employed at the site.

Two types of exposure estimates are presented in this risk assessment: RME and CT. Exposure assumptions specific to each type of estimate were used. Details of the exposure assumptions and parameters for each exposure scenario are shown in **Table 6-5**.

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

- 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

In the following sections, the methods used to calculate exposures by each pathway are explained. Tables which show the human intake or absorbed dose values calculated for each exposure scenario are contained in **Appendix G**. These intakes and doses are used to assess overall carcinogenic and non-carcinogenic risk, as discussed later in the risk characterization section (Section 6.5).

6.3.5.2 Exposure Scenarios

The four exposure scenarios and their respective exposure assumptions in this assessment are described below.

Current Site Worker. Current workers at the site are security guards who drive throughout the entire SEDA checking locks and gates. Therefore, the current site worker is assumed to visit SEAD-4 infrequently. During these visits, this worker inhales the ambient air at SEAD-4 and may ingest or dermally contact the surface soil there. Based on professional judgment, it was assumed that the current site worker visits SEAD-4 on 20 days per year, as the reasonable maximum exposure (RME) and 10 days per year, as the central tendency (CT). All other exposure factors used in the exposure assessment were obtained from EPA guidance documents, as noted in **Table 6-5**.

11/09/99

Table 6-5

EXPOSURE FACTOR ASSUMPTIONS

SEAD 4-Remedial Investigation
Seneca Army Depot Activity

RECEPTOR	EXPOSURE ROUTE	RME/CT	PARAMETER	VALUE	UNITS	BASIS	SOURCE
CURRENT SITE WORKER	**Inhalation of Dust in Ambient Air** (Air EPC Calculated from Surface Soil Only)	RME & CT	Inhalation Rate	9.6	m3/day	Average inhalation rate for moderate activity is 1.2 m3/hr, 8 hr work day	USEPA, 1997
			Body Weight	70	kg	Standard reference weight for adult males	USEPA, 1991
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Exposure Frequency	20	days/yr	Assumed	BPJ
			Exposure Duration	25	years	Upper bound time for employment at a job	USEPA, 1991, 1993
			Averaging Time - Nc	9125	days	25 years	USEPA, 1989
		CT	Exposure Frequency	10	days/yr	Assumed	BPJ
			Exposure Duration	7	years	Mean time for employment at a job	USEPA, 1997
			Averaging Time - Nc	2555	days	7 years	USEPA, 1989
	Ingestion of Soil (Soil EPC Calculated from Surface Soil Only)	RME & CT	Body Weight	70	kg	Standard reference weight for adult males	USEPA, 1991
			Fraction Ingested	1	(unitless)	100% ingestion, conservative assumption	BPJ
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Ingestion Rate	100	mg soil/day	Upper bound worker exposure to dirt and dust	USEPA, 1993
			Exposure Frequency	20	days/yr	Assumed	BPJ
			Exposure Duration	25	years	Upper bound time for employment at a job	USEPA, 1991, 1993
			Averaging Time - Nc	9125	days	25 years	USEPA, 1989
		CT	Ingestion Rate	50	mg soil/day	Average worker exposure to dirt and dust	USEPA, 1993
			Exposure Frequency	10	days/yr	Assumed	BPJ
			Exposure Duration	7	years	Mean time for employment at a job	USEPA, 1997
			Averaging Time - Nc	2555	days	7 years	USEPA, 1989
	Dermal Contact - Soil (Soil EPC Calculated from Surface Soil Only)	RME & CT	Body Weight	70	kg	Standard reference weight for adult males	USEPA, 1991
			Absorption Factor	Compound	Specific		USEPA, 1992
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Skin Contact Surface Area	5800	cm2	Hands, legs, arms, neck and head exposed, 25% of upper bound body skin area of ad	USEPA, 1992
			Soil to Skin Adherence Factor	1	mg/cm2	Upper bound soil to skin adherence factor	USEPA, 1992
			Exposure Frequency	20	days/yr	Assumed	BPJ
			Exposure Duration	25	years	Upper bound time for employment at a job	USEPA, 1991, 1993
			Averaging Time - Nc	9125	days	25 years	USEPA, 1989
		CT	Skin Contact Surface Area	5000	cm2	Hands, legs, arms, neck and head exposed, 25% of average body skin area of adult	USEPA, 1992
			Soil to Skin Adherence Factor	0.2	mg/cm2	Average soil to skin adherence factor	USEPA, 1992
			Exposure Frequency	10	days/yr	Assumed	BPJ
			Exposure Duration	7	years	Mean time for employment at a job	USEPA, 1997
			Averaging Time - Nc	2555	days	7 years	USEPA, 1989

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

Source References:
BPJ: Best Professional Judgement.
- 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

Table 6-5

EXPOSURE FACTOR ASSUMPTIONS

SEAD 4-Remedial Investigation
Seneca Army Depot Activity

RECEPTOR	EXPOSURE ROUTE	RME/CT	PARAMETER	VALUE	UNITS	BASIS	SOURCE
FUTURE CONSTRUCTION WORKER	**Inhalation of Dust in Ambient Air** (Air EPC Calculated from Surface and Subsurface Soils)	RME & CT	Inhalation Rate	10.4	m3/day	Average inhalation rate for outdoor worker is 1.3 m3/hr, 8 hr work day	USEPA, 1997
			Body Weight	70	kg	Standard reference weight for adult males	USEPA, 1991
			Exposure Duration	1	year	Upper bound time of employment for constr. worker	USEPA, 1991
			Averaging Time - Nc	365	days	1 year	USEPA, 1989
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Exposure Frequency	250	days/yr	Assumes works 5 days/wk and 10 days/yr vacation	USEPA, 1991
		CT	Exposure Frequency	219	days/yr	Mean for adult workers	USEPA, 1993
	Ingestion of Soil (Soil EPC Calculated from Surface and Subsurface Soils)	RME & CT	Body Weight	70	kg	Standard reference weight for adult males	USEPA, 1991
			Fraction Ingested	1	(unitless)	100% ingestion, conservative assumption	BPJ
			Exposure Duration	1	year	Upper bound time of employment for constr. worker	USEPA, 1991
			Averaging Time - Nc	365	days	1 year	USEPA, 1989
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Ingestion Rate	480	mg soil/day	Assumed IR for intensive construction work	USEPA, 1991, 1993
			Exposure Frequency	250	days/yr	Assumes works 5 days/wk and 10 days/yr vacation	USEPA, 1991
		CT	Ingestion Rate	100	mg soil/day	Assumed average IR for construction work	USEPA, 1993
			Exposure Frequency	219	days/yr	Mean for adult workers	USEPA, 1993
	Dermal Contact - Soil (Soil EPC Calculated from Surface and Subsurface Soils)	RME & CT	Body Weight	70	kg	Standard reference weight for adult males	USEPA, 1991
			Absorption Factor	Compound Specific			USEPA, 1992
			Exposure Duration	1	year	Upper bound time of employment for constr. worker	USEPA, 1991
			Averaging Time - Nc	365	days	1 year	USEPA, 1989
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Skin Contact Surface Area	5800	cm2	Hands, legs, arms, neck and head exposed, 25% of upper bound body skin area of adul	USEPA, 1992
			Soil to Skin Adherence Factor	1	mg/cm2	Upper bound soil to skin adherence factor	USEPA, 1992
			Exposure Frequency	250	days/yr	Assumes works 5 days/wk and 10 days/yr vacation	USEPA, 1991
		CT	Skin Contact Surface Area	5000	cm2	Hands, legs, arms, neck and head exposed, 25% of average body skin area of adult	USEPA, 1992
			Soil to Skin Adherence Factor	0.2	mg/cm2	Average soil to skin adherence factor	USEPA, 1992
			Exposure Frequency	219	days/yr	Mean for adult workers	USEPA, 1993

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

Source References:
BPJ: Best Professional Judgement.
- 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

Table 6-5

EXPOSURE FACTOR ASSUMPTIONS

SEAD 4-Remedial Investigation
Seneca Army Depot Activity

RECEPTOR	EXPOSURE ROUTE	RME/CT	PARAMETER	VALUE	UNITS	BASIS	SOURCE
FUTURE RECREATIONAL VISITOR (CHILD)	**Inhalation of Dust in Ambient Air** (Air EPC Calculated from Surface Soil Only)	RME & CT	Inhalation Rate	8.7	m3/day	Average inhalation rate for a child 1-12 years old.	USEPA, 1997
			Body Weight	15	kg	Standard reference weight for children less than 6 years old.	USEPA, 1991,1993
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Exposure Frequency	14	days/yr	Assumes 2 weeks.	BPJ
			Exposure Duration	5	years	Assumed	BPJ
			Averaging Time - Nc	1825	days	5 years	USEPA, 1989
		CT	Exposure Frequency	7	days/yr	Assumes 1 week.	BPJ
			Exposure Duration	1	year	Assumed	BPJ
			Averaging Time - Nc	365	days	1 year	USEPA, 1989
	Ingestion of Soil (Soil EPC Calculated from Surface Soil Only)	RME & CT	Body Weight	15	kg	Standard reference weight for children less than 6 years old.	USEPA, 1991,1993
			Fraction Ingested	1	(unitless)	100% ingestion, conservative assumption	BPJ
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Ingestion Rate	200	mg soil/day	Maximum IR for a child	USEPA, 1993
			Exposure Frequency	14	days/yr	Assumes 2 weeks.	BPJ
			Exposure Duration	5	years	Assumed	BPJ
			Averaging Time - Nc	1825	days	5 years	USEPA, 1989
		CT	Ingestion Rate	100	mg soil/day	Average IR for a child	USEPA, 1993
			Exposure Frequency	7	days/yr	Assumes 1 week.	BPJ
			Exposure Duration	1	year	Assumed	BPJ
			Averaging Time - Nc	365	days	1 year	USEPA, 1989
	Dermal Contact - Soil (Soil EPC Calculated from Surface Soil Only)	RME & CT	Body Weight	15	kg	Standard reference weight for children less than 6 years old.	USEPA, 1991,1993
			Absorption Factor	Compound Specific			USEPA, 1992
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Skin Contact Surface Area	2300	cm2	Upper bound skin surface exposed to soil for child age 5-6.	USEPA, 1992
			Soil to Skin Adherence Factor	1	mg/cm2	Upper bound soil to skin adherence factor	USEPA, 1992
			Exposure Frequency	14	days/yr	Assumes 2 weeks.	BPJ
			Exposure Duration	5	years	Assumed	BPJ
			Averaging Time - Nc	1825	days	5 years	USEPA, 1989
		CT	Skin Contact Surface Area	1980	cm2	Average skin surface exposed to soil for child age 5-6.	USEPA, 1992
			Soil to Skin Adherence Factor	0.2	mg/cm2	Average soil to skin adherence factor	USEPA, 1992
			Exposure Frequency	7	days/yr	Assumes 1 week.	BPJ
			Exposure Duration	1	year	Assumed	BPJ
			Averaging Time - Nc	365	days	1 year	USEPA, 1989
	Inhalation of Groundwater	RME & CT	Inhalation Rate	0.3	m3/hr	Inhalation rate for sedentary children ages 3-10	USEPA, 1997
			Body Weight	15	kg	Standard reference weight for children less than 6 years old.	USEPA, 1991,1993
			Event Frequency	1	shower/day	Typical showering frequency for 90% of American population	USEPA, 1992
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Exposure Frequency	14	days/yr	Assumes 2 weeks.	BPJ
			Event Duration	15	min/day	Upper bound shower duration	USEPA, 1992, 1997
			Exposure Duration	5	years	Assumed	BPJ
			Averaging Time - Nc	1825	days	5 years	USEPA, 1989
		CT	Exposure Frequency	7	days/yr	Assumes 1 week.	BPJ
			Event Duration	10	min/day	Average shower duration	USEPA, 1992, 1997
			Exposure Duration	1	year	Assumed	BPJ
			Averaging Time - Nc	365	days	1 year	USEPA, 1989

Table 6-5

EXPOSURE FACTOR ASSUMPTIONS

SEAD 4-Remedial Investigation
Seneca Army Depot Activity

RECEPTOR	EXPOSURE ROUTE	RME/CT	PARAMETER	VALUE	UNITS	BASIS	SOURCE
FUTURE RECREATIONAL VISITOR (CHILD)	**Ingestion of Groundwater**	RME & CT	Body Weight	15	kg	Standard reference weight for children less than 6 years old.	USEPA, 1991,1993
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Ingestion Rate	1	liter/day	Approximate 90th percentile value for children 1-11 years old.	USEPA, 1997
			Exposure Frequency	14	days/yr	Assumes 2 weeks.	BPJ
			Exposure Duration	5	years	Assumed	BPJ
			Averaging Time - Nc	1825	days	5 years	USEPA, 1989
		CT	Ingestion Rate	0.74	liters/day	Average IR for a child 1-10 years old	USEPA, 1997
			Exposure Frequency	7	days/yr	Assumes 1 week.	BPJ
			Exposure Duration	1	year	Assumed	BPJ
			Averaging Time - Nc	365	days	1 year	USEPA, 1989
	Dermal Contact - Groundwater	RME & CT	Body Weight	15	kg	Standard reference weight for children less than 6 years old.	USEPA, 1991,1993
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Skin Contact Surface Area	9180	cm2	Upper bound skin surface area for children.	USEPA, 1992
			Exposure Frequency	14	days/yr	Assumes 2 weeks.	BPJ
			Exposure Time	0.25	hours/day	Upper bound showering duration. (15 min)	USEPA, 1992
			Exposure Duration	5	years	Assumed	BPJ
			Averaging Time - Nc	1825	days	5 years	USEPA, 1989
		CT	Skin Contact Surface Area	7930	cm2	Average skin surface area for children.	USEPA, 1992
			Exposure Frequency	7	days/yr	Assumes 1 week.	BPJ
			Exposure Time	0.17	hours/day	Average showering duration (10 min).	USEPA, 1992
			Exposure Duration	1	year	Assumed	BPJ
			Averaging Time - Nc	365	days	1 year	USEPA, 1989
	Dermal Contact - Surface Water	RME & CT	Body Weight	15	kg	Standard reference weight for children less than 6 years old.	USEPA, 1991,1993
			Exposure Time	1	hour/day	Upper bound water contact period.	USEPA, 1992
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Skin Contact Surface Area	4625	cm2	Feet and legs exposed; 25% of upper bound body skin area of a 12-15 year old	USEPA, 1991
			Exposure Frequency	7	days/yr	Assumes contact occurs every second day.	BPJ
			Exposure Duration	5	years	Assumed	BPJ
			Averaging Time - Nc	1825	days	5 years	USEPA, 1989
		CT	Skin Contact Surface Area	3725	cm2	Feet and legs exposed; 25% of average body skin area of a 12-15 year old	USEPA, 1992
			Exposure Frequency	4	days/yr	Assumes contact occurs every second day.	BPJ
			Exposure Duration	1	year	Assumed	BPJ
			Averaging Time - Nc	365	days	1 year	USEPA, 1989
	Dermal Contact - Sediment	RME & CT	Body Weight	15	kg	Standard reference weight for children less than 6 years old.	USEPA, 1991,1993
			Absorption Factor	Compound Specific			USEPA, 1992
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Skin Contact Surface Area	4625	cm2	Hands, legs, arms, neck, and head exposed, 25% of upper body.	USEPA, 1992
			Soil to Skin Adherence Factor	1	mg/cm2	Upper bound soil to skin adherence factor	USEPA, 1992
			Exposure Frequency	7	days/yr	Assumes contact occurs every second day.	BPJ
			Exposure Duration	5	years	Assumed	BPJ
			Averaging Time - Nc	1825	days	5 years	USEPA, 1989
		CT	Skin Contact Surface Area	3725	cm2	Feet and legs exposed; 25% of body skin area of a 12-15 year old	USEPA, 1992
			Soil to Skin Adherence Factor	0.2	mg/cm2	Average soil to skin adherence factor	USEPA, 1992
			Exposure Frequency	4	days/yr	Assumes contact occurs every second day.	BPJ
			Exposure Duration	1	year	Assumed	BPJ
			Averaging Time - Nc	365	days	1 year	USEPA, 1989

Table 6-5

EXPOSURE FACTOR ASSUMPTIONS

SEAD 4-Remedial Investigation
Seneca Army Depot Activity

RECEPTOR	EXPOSURE ROUTE	RME/CT	PARAMETER	VALUE	UNITS	BASIS	SOURCE
FUTURE RECREATIONAL VISITOR (CHILD)	**Ingestion - Sediment**	RME & CT	Body Weight	15	kg	Standard reference weight for children less than 6 years old.	USEPA, 1991,1993
			Fraction Ingested	1	(unitless)	100% ingestion, conservative assumption	BPJ
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Ingestion Rate	200	mg/day	Maximum IR for a child	USEPA, 1993
			Exposure Frequency	7	days/yr	Assumes contact occurs every second day	BPJ
			Exposure Duration	5	years	Assumed	BPJ
			Averaging Time - Nc	1825	days	5 years	USEPA, 1989
		CT	Ingestion Rate	100	mg/day	Average IR for a child	USEPA, 1993
			Exposure Frequency	4	days/yr	Assumes contact occurs every second day	BPJ
			Exposure Duration	1	year	Assumed	BPJ
			Averaging Time - Nc	365	days	1 year	USEPA, 1989

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

Source References:
BPJ: Best Professional Judgement.
- 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

Table 6-5

EXPOSURE FACTOR ASSUMPTIONS

SEAD 4-Remedial Investigation
Seneca Army Depot Activity

RECEPTOR	EXPOSURE ROUTE	RME/CT	PARAMETER	VALUE	UNITS	BASIS	SOURCE
FUTURE PARK WORKER	**Inhalation of Dust in Ambient Air** (Air EPC Calculated from Surface Soil Only)	RME & CT	Inhalation Rate	8	m3/day	Average inhalation rate for light activity is 1 m3/hr, 8 hr work day	USEPA, 1997
			Body Weight	70	kg	Standard reference weight for adult males	USEPA, 1991
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Exposure Frequency	175	days/yr	Works on-site 5 days/wk, 8 months/yr (35 weeks).	BPJ
			Exposure Duration	25	years	Upper bound time for employment at a job	USEPA, 1991, 1993
			Averaging Time - Nc	9125	days	25 years	USEPA, 1989
		CT	Exposure Frequency	153	days/yr	Adjusted for 8 months per year	USEPA, 1993
			Exposure Duration	7	years	Mean time for employment at a job	USEPA, 1997
			Averaging Time - Nc	2555	days	7 years	USEPA, 1989
	Inhalation of Dust in Indoor Air (Air EPC Calculated from Building Debris)	RME & CT	Inhalation Rate	8	m3/day	Average inhalation rate for light activity is 1 m3/hr, 8 hr work day	USEPA, 1997
			Body Weight	70	kg	Standard reference weight for adult males	USEPA, 1991
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Exposure Frequency	175	days/yr	Works on-site 5 days/wk, 8 months/yr (35 weeks).	BPJ
			Exposure Duration	25	years	Upper bound time for employment at a job	USEPA, 1991, 1993
			Averaging Time - Nc	9125	days	25 years	USEPA, 1989
		CT	Exposure Frequency	153	days/yr	Adjusted for 8 months per year	USEPA, 1993
			Exposure Duration	7	years	Mean time for employment at a job	USEPA, 1997
			Averaging Time - Nc	2555	days	7 years	USEPA, 1989
	Ingestion of Indoor Dust/Dirt	RME & CT	Body Weight	70	kg	Standard reference weight for adult males	USEPA, 1991
			Fraction Ingested	1	(unitless)	100% ingestion, conservative assumption	BPJ
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Ingestion Rate	100	mg soil/day	Upper bound worker exposure to dirt and dust	USEPA, 1993
			Exposure Frequency	175	days/yr	Works on-site 5 days/wk, 8 months/yr (35 weeks)	BPJ
			Exposure Duration	25	years	Upper bound time for employment at a job	USEPA, 1991, 1993
			Averaging Time - Nc	9125	days	25 years	USEPA, 1989
		CT	Ingestion Rate	50	mg soil/day	Average worker exposure to dirt and dust	USEPA, 1993
			Exposure Frequency	153	days/yr	Adjusted for 8 months per year	USEPA, 1993
			Exposure Duration	7	years	Mean time for employment at a job	USEPA, 1997
			Averaging Time - Nc	2555	days	7 years	USEPA, 1989
	Dermal Contact - Indoor Dust/Dirt	RME & CT	Body Weight	70	kg	Standard reference weight for adult males	USEPA, 1991
			Absorption Factor	Compound Specific			USEPA, 1992
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Skin Contact Surface Area	5800	cm2	Hands, legs, arms, neck and head exposed, 25% of upper bound body skin area of adu	USEPA, 1992
			Soil to Skin Adherence Factor	1	mg/cm2	Upper bound soil to skin adherence factor	USEPA, 1992
			Exposure Frequency	175	days/yr	Works on-site 5 days/wk, 8 months/yr (35 weeks)	BPJ
			Exposure Duration	25	years	Upper bound time for employment at a job	USEPA, 1991, 1993
			Averaging Time - Nc	9125	days	25 years	USEPA, 1989
		CT	Skin Contact Surface Area	5000	cm2	Hands, legs, arms, neck and head exposed, 25% of average body skin area of adult	USEPA, 1992
			Soil to Skin Adherence Factor	0.2	mg/cm2	Average soil to skin adherence factor	USEPA, 1992
			Exposure Frequency	153	days/yr	Adjusted for 8 months per year	USEPA, 1993
			Exposure Duration	7	years	Mean time for employment at a job	USEPA, 1997
			Averaging Time - Nc	2,555	days	7 years	USEPA, 1989

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EXPOSURE FACTOR ASSUMPTIONS

SEAD 4-Remedial Investigation
Seneca Army Depot Activity

RECEPTOR	EXPOSURE ROUTE	RME/CT	PARAMETER	VALUE	UNITS	BASIS	SOURCE
Future Park Worker	**Ingestion of Soil** (Soil EPC Calculated from Surface Soil Only)	RME & CT	Body Weight	70	kg	Standard reference weight for adult males	USEPA, 1991
			Fraction Ingested	1	(unitless)	100% ingestion, conservative assumption	BPJ
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Ingestion Rate	100	mg soil/day	Upper bound worker exposure to dirt and dust	USEPA, 1993
			Exposure Frequency	175	days/yr	Works on-site 5 days/wk, 8 months/yr (35 weeks)	BPJ
			Exposure Duration	25	years	Upper bound time for employment at a job	USEPA, 1991, 1993
			Averaging Time - Nc	9125	days	25 years	USEPA, 1989
		CT	Ingestion Rate	50	mg soil/day	Average worker exposure to dirt and dust	USEPA, 1993
			Exposure Frequency	153	days/yr	Adjusted for 8 months per year	USEPA, 1993
			Exposure Duration	7	years	Mean time for employment at a job	USEPA, 1997
			Averaging Time - Nc	2555	days	7 years	USEPA, 1989
	Dermal Contact - Soil (Soil EPC Calculated from Surface Soil Only)	RME & CT	Body Weight	70	kg	Standard reference weight for adult males	USEPA, 1991
			Absorption Factor	Compound	Specific		USEPA, 1992
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Skin Contact Surface Area	5800	cm2	Hands, legs, arms, neck and head exposed, 25% of upper bound body skin area of adu	USEPA, 1992
			Soil to Skin Adherence Factor	1	mg/cm2	Upper bound soil to skin adherence factor	USEPA, 1992
			Exposure Frequency	175	days/yr	Works on-site 5 days/wk, 8 months/yr (35 weeks)	BPJ
			Exposure Duration	25	years	Upper bound time for employment at a job	USEPA, 1991, 1993
			Averaging Time - Nc	9125	days	25 years	USEPA, 1989
		CT	Skin Contact Surface Area	5000	cm2	Hands, legs, arms, neck and head exposed, 25% of average body skin area of adult	USEPA, 1992
			Soil to Skin Adherence Factor	0.2	mg/cm2	Average soil to skin adherence factor	USEPA, 1992
			Exposure Frequency	153	days/yr	Adjusted for 8 months per year	USEPA, 1993
			Exposure Duration	7	years	Mean time for employment at a job	USEPA, 1997
			Averaging Time - Nc	2,555	days	7 years	USEPA, 1989
	Ingestion of Groundwater	RME & CT	Body Weight	70	kg	Standard reference weight for adult males	USEPA, 1991
			Ingestion Rate	1	liters/day	Standard occupational ingestion rate.	USEPA, 1991
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Exposure Frequency	175	days/yr	Works on-site 5 days/wk, 8 months/yr (35 weeks)	BPJ
			Exposure Duration	25	years	Upper bound time for employment at a job	USEPA, 1991, 1993
			Averaging Time - Nc	9125	days	25 years	USEPA, 1989
		CT	Exposure Frequency	153	days/yr	Adjusted for 8 months per year	USEPA, 1993
			Exposure Duration	7	years	Mean time for employment at a job	USEPA, 1997
			Averaging Time - Nc	2555	days	7 years	USEPA, 1989

Table 6-5

EXPOSURE FACTOR ASSUMPTIONS

SEAD 4-Remedial Investigation
Seneca Army Depot Activity

RECEPTOR	EXPOSURE ROUTE	RME/CT	PARAMETER	VALUE	UNITS	BASIS	SOURCE
FUTURE PARK WORKER	**Dermal Contact - Surface Water**		Body Weight	70	kg	Standard reference weight for adult males	USEPA, 1991
		RME & CT	Absorption Factor	Compound Specific			USEPA, 1992
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
			Skin Contact Surface Area	2490	cm2	Adult male hands and forearms - upper bound.	USEPA, 1992
		RME	Exposure Frequency	18	days/yr	Assumes activity occurs 10% of work days.	BPJ
			Exposure Time	1	hour/day	Contact time during occasional site maintenance work.	BPJ
			Exposure Duration	25	years	Upper bond time for employment at a job.	USEPA, 1991,1993
			Averaging Time - Nc	9125	days	25 years	USEPA, 1989
			Skin Contact Surface Area	1980	cm2	Adult male hands and forearms - average.	USEPA, 1992
		CT	Exposure Frequency	8	days/yr	Assumes activity occurs 5% of work days.	BPJ
			Exposure Time	1	hr/day	Contact time during occasional site maintenance work.	BPJ
			Exposure Duration	7	years	Mean time for employment at a job.	BPJ
			Averaging Time - Nc	365	days	1 year	USEPA, 1989
	Dermal Contact - Sediment		Body Weight	70	kg	Standard reference weight for adult males	USEPA, 1991
		RME & CT	Absorption Factor	Compound Specific			USEPA, 1992
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
			Skin Contact Surface Area	2490	cm2	Adult male hands and forearms - upper bound.	USEPA, 1992
			Soil to Skin Adherence Factor	1	mg/cm2	Upper bound soil to skin adherence factor	USEPA, 1992
		RME	Exposure Frequency	18	days/yr	Assumes activity occurs 10% of work days.	BPJ
			Exposure Duration	25	years	Upper bond time for employment at a job.	USEPA, 1991,1993
			Averaging Time - Nc	9125	days	25 years	USEPA, 1989
			Skin Contact Surface Area	1980	cm2	Adult male hands and forearms - average.	USEPA, 1992
			Soil to Skin Adherence Factor	0.2	mg/cm2	Average soil to skin adherence factor	USEPA, 1992
		CT	Exposure Frequency	8	days/yr	Assumes activity occurs 5% of work days.	BPJ
			Exposure Duration	7	years	Mean time for employment at a job.	BPJ
			Averaging Time - Nc	365	days	1 year	USEPA, 1989

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

Source References:
BPJ: Best Professional Judgement.
- 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

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EXPOSURE FACTOR ASSUMPTIONS

SEAD 4-Remedial Investigation
Seneca Army Depot Activity

RECEPTOR	EXPOSURE ROUTE	RME/CT	PARAMETER	VALUE	UNITS	BASIS	SOURCE
RESIDENT (ADULT)	**Inhalation of Dust in Ambient Air** (Air EPC Calculated from Surface Soil Only)	RME & CT	Inhalation Rate	20	m3/day	Assumed inhalation rate for adult receptors.	USEPA, 1991, 1993
			Body Weight	70	kg	Standard reference wieght for adult males.	USEPA, 1991
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Exposure Frequency	350	days/yr	Standard upper bound residential default	USEPA, 1993
			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	8760	days	24 years	USEPA, 1989
		CT	Exposure Frequency	234	days/yr	Standard residential CT (average) default.	USEPA, 1993
			Exposure Duration	7	year	Average length of residence in same home: 9 years (7 adult, 2 child assumed)	USEPA, 1993, 1997
			Averaging Time - Nc	2555	days	7 years	USEPA, 1989
	Ingestion of Soil (Soil EPC Calculated from Surface Soil Only)	RME & CT	Body Weight	70	kg	Standard reference wieght for adult males.	USEPA, 1991
			Fraction Ingested	1	(unitless)	100% ingestion, conservative assumption	BPJ
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Ingestion Rate	100	mg soil/day	Upper bound residential adult exposure to indoor and outdoor dirt and dust.	USEPA, 1991
			Exposure Frequency	350	days/yr	Standard upper bound residential default	USEPA, 1993
			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	8760	days	24 years	USEPA, 1989
		CT	Ingestion Rate	50	mg soil/day	Average residential adult exposure to indoor and outdoor dirt and dust.	USEPA, 1993
			Exposure Frequency	234	days/yr	Standard residential CT (average) default.	USEPA, 1993
			Exposure Duration	7	year	Average length of residence in same home: 9 years (7 adult, 2 child assumed)	USEPA, 1993, 1997
			Averaging Time - Nc	2555	days	7 years	USEPA, 1989
	Dermal Contact - Soil (Soil EPC Calculated from Surface Soil Only)	RME & CT	Body Weight	70	kg	Standard reference wieght for adult males.	USEPA, 1991
			Absorption Factor	Compound Specific			
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Skin Contact Surface Area	5800	cm2	Upper bound adult skin surface exposed to soils.	USEPA, 1992
			Soil to Skin Adherence Factor	1	mg/cm2	Upper bound soil to skin adherence factor	USEPA, 1992
			Exposure Frequency	350	days/yr	Standard upper bound residential default	USEPA, 1993
			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	8760	days	24 years	USEPA, 1989
		CT	Skin Contact Surface Area	5000	cm2	Upper bound adult skin surface exposed to soil.	USEPA, 1992
			Soil to Skin Adherence Factor	0.2	mg/cm2	Average soil to skin adherence factor	USEPA, 1992
			Exposure Frequency	234	days/yr	Standard residential CT (average) default.	USEPA, 1993
			Exposure Duration	7	year	Average length of residence in same home: 9 years (7 adult, 2 child assumed)	USEPA, 1993, 1997
			Averaging Time - Nc	2555	days	7 years	USEPA, 1989
	Inhalation of Groundwater	RME & CT	Inhalation Rate	0.5	m3/hr	Inhalation rate for sedentary adults	USEPA. 1997.
			Body Weight	70	kg	Standard reference wieght for adult males.	USEPA, 1991
			Event Frequency	1	shower/day	Typical showering frequency for 90% of American population	USEPA, 1992
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Exposure Frequency	350	days/yr	Standard upper bound residential default	USEPA, 1993
			Event Duration	15	min/day	Upper bound shower duration	USEPA, 1992, 1997
			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	8760	days	24 years	USEPA, 1989
		CT	Exposure Frequency	234	days/yr	Standard residential CT (average) default.	USEPA, 1993
			Event Duration	10	min/day	Average shower duration	USEPA, 1992, 1997
			Exposure Duration	7	years	Average length of residence in same home: 9 years (7 adult, 2 child assumed)	USEPA, 1993, 1997
			Averaging Time - Nc	2555	days	7 years	USEPA, 1989

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EXPOSURE FACTOR ASSUMPTIONS

SEAD 4-Remedial Investigation
Seneca Army Depot Activity

RECEPTOR	EXPOSURE ROUTE	RME/CT	PARAMETER	VALUE	UNITS	BASIS	SOURCE
RESIDENT (ADULT)	**Ingestion of Groundwater**	RME & CT	Body Weight	70	kg	Standard reference wieght for adult males.	USEPA, 1991
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Ingestion Rate	2	liter/day	90th percentile for adult residents.	USEPA, 1989.
			Exposure Frequency	350	days/yr	Standard upper bound residential default	USEPA, 1993
			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	8760	days	24 years	USEPA, 1989
		CT	Ingestion Rate	1.4	liter/day	Average ingestion rate for adults	USEPA, 1993
			Exposure Frequency	234	days/yr	Standard residential CT (average) default.	USEPA, 1993
			Exposure Duration	7	years	Average length of residence in same home: 9 years (7 adult, 2 child assumed)	USEPA, 1993, 1997
			Averaging Time - Nc	2555	days	7 years	USEPA, 1989
	Dermal Contact - Groundwater	RME & CT	Body Weight	70	kg	Standard reference wieght for adult males.	USEPA, 1991
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Skin Contact Surface Area	23,000	cm2	Upper bound total skin surface area for adults.	USEPA, 1992
			Exposure Frequency	350	days/yr	Standard upper bound residential default	USEPA, 1993
			Exposure Time	0.25	hours/day	Upper bound of time spent in shower (15 minutes).	USEPA, 1992
			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	8760	days	24 years	USEPA, 1989
		CT	Skin Contact Surface Area	20,000	cm2	Average total skin surface area for adults.	USEPA, 1992
			Exposure Frequency	234	days/yr	Standard residential CT (average) default.	USEPA, 1993
			Exposure Time	0.17	hours/day	Average showering duration (10 min).	USEPA, 1992
			Exposure Duration	7	years	Average length of residence in same home: 9 years (7 adult, 2 child assumed)	USEPA, 1993, 1997
			Averaging Time - Nc	2555	days	7 years	USEPA, 1989
	Dermal Contact - Surface Water	RME & CT	Body Weight	70	kg	Standard reference wieght for adult males.	USEPA, 1991
			Exposure Time	1	hour/day	Upper bound water contact period.	USEPA, 1992
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Skin Contact Surface Area	8680	cm2	Upper bound adult skin surface area of legs, feet, arms and hands	USEPA, 1997
			Exposure Frequency	45	days/yr	Assumes contact occurs every second day during summer months	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	8760	days	24 years	USEPA, 1989
		CT	Skin Contact Surface Area	6360	cm2	Average adult skin surface area of legs, feet, arms and hands	USEPA, 1997
			Exposure Frequency	15	days/yr	1 day/wk, 15 wk/yr during summer months.	BPJ
			Exposure Duration	7	years	Average length of residence in same home: 9 years (7 adult, 2 child assumed)	USEPA, 1993, 1997
			Averaging Time - Nc	2555	days	7 years	USEPA, 1989
	Dermal Contact - Sediment	RME & CT	Body Weight	70	kg	Standard reference wieght for adult males.	USEPA, 1991
			Absorption Factor	Compound Specific			USEPA, 1992
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Skin Contact Surface Area	8680	cm2	Adult male hands and forearms.	USEPA, 1992
			Soil to Skin Adherence Factor	1	mg/cm2	Upper bound soil to skin adherence factor	USEPA, 1992
			Exposure Frequency	45	days/yr	Assumes contact occurs every second day during summer months	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	8760	days	24 years	USEPA, 1989
		CT	Skin Contact Surface Area	6360	cm2	Average adult skin surface area of legs, feet, arms and hands	USEPA, 1997
			Soil to Skin Adherence Factor	0.2	mg/cm2	Average soil to skin adherence factor	USEPA, 1992
			Exposure Frequency	15	days/yr	1 day/wk, 15 wk/yr during summer months.	BPJ
			Exposure Duration	7	years	Average length of residence in same home: 9 years (7 adult, 2 child assumed)	USEPA, 1993, 1997
			Averaging Time - Nc	2555	days	7 years	USEPA, 1989

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EXPOSURE FACTOR ASSUMPTIONS

SEAD 4-Remedial Investigation
Seneca Army Depot Activity

RECEPTOR	EXPOSURE ROUTE	RME/CT	PARAMETER	VALUE	UNITS	BASIS	SOURCE
RESIDENT (ADULT)	**Ingestion - Sediment**	RME & CT	Body Weight	70	kg	Standard reference wieght for adult males.	USEPA, 1991
			Fraction Ingested	1	(unitless)	100% ingestion, conservative assumption	BPJ
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Ingestion Rate	100	mg/day	Upper bound residential adult exposure to indoor and outdoor dirt and dust.	USEPA, 1991
			Exposure Frequency	45	days/yr	Assumes contact occurs every second day during summer months	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	8760	days	24 years	USEPA, 1989
		CT	Ingestion Rate	50	mg/day	Average residential adult exposure to indoor and outdoor dirt and dust.	USEPA, 1993
			Exposure Frequency	15	days/yr	1 day/wk, 15 wk/yr during summer months.	BPJ
			Exposure Duration	7	years	Average length of residence in same home: 9 years (7 adult, 2 child assumed)	USEPA, 1993, 1997
			Averaging Time - Nc	2555	days	7 years	USEPA, 1989

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

Source References:
BPJ: Best Professional Judgement.
- 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, Draft update to 1990 handbook

Table 6-5

EXPOSURE FACTOR ASSUMPTIONS

SEAD 4-Remedial Investigation
Seneca Army Depot Activity

RECEPTOR	EXPOSURE ROUTE	RME/CT	PARAMETER	VALUE	UNITS	BASIS	SOURCE
RESIDENT (CHILD)	**Inhalation of Dust in Ambient Air** (Air EPC Calculated from Surface Soil Only)	RME & CT	Inhalation Rate	8.7	m3/day	Average inhalation rate for a child 1-12 years old.	USEPA, 1997
			Body Weight	15	kg	Standard reference weight for children less than 6 years old.	USEPA, 1991,1993
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Exposure Frequency	350	days/yr	Standard upper bound residential default	USEPA, 1993
			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	2190	days	6 years.	USEPA, 1989
		CT	Exposure Frequency	234	days/yr	Standard residential CT (average) default.	USEPA, 1993
			Exposure Duration	2	years	Average length of residence in same home: 9 years (7 adult, 2 child assumed)	USEPA, 1993, 1997
			Averaging Time - Nc	730	days	2 years	USEPA, 1989
	Ingestion of Soil (Soil EPC Calculated from Surface Soil Only)	RME & CT	Body Weight	15	kg	Standard reference weight for children less than 6 years old.	USEPA, 1991,1993
			Fraction Ingested	1	(unitless)	100% ingestion, conservative assumption	BPJ
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Ingestion Rate	200	mg soil/day	Maximum IR for a child	USEPA, 1993
			Exposure Frequency	350	days/yr	Standard upper bound residential default	USEPA, 1993
			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	2190	days	6 years	USEPA, 1989
		CT	Ingestion Rate	100	mg soil/day	Average IR for a child	USEPA, 1993
			Exposure Frequency	234	days/yr	Standard residential CT (average) default.	USEPA, 1993
			Exposure Duration	2	years	Average length of residence in same home: 9 years (7 adult, 2 child assumed)	USEPA, 1993, 1997
			Averaging Time - Nc	730	days	2 years	USEPA, 1989
	Dermal Contact - Soil (Soil EPC Calculated from Surface Soil Only)	RME & CT	Body Weight	15	kg	Standard reference weight for children less than 6 years old.	USEPA, 1991,1993
			Absorption Factor	Compound	Specific		USEPA, 1992
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Skin Contact Surface Area	2300	cm2	Upper bound skin surface exposed to soil for child age 5-6.	USEPA, 1992
			Soil to Skin Adherence Factor	1	mg/cm2	Upper bound soil to skin adherence factor	USEPA, 1992
			Exposure Frequency	350	days/yr	Standard upper bound residential default	USEPA, 1993
			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	2190	days	6 years.	USEPA, 1989
		CT	Skin Contact Surface Area	1980	cm2	Average skin surface exposed to soil for child age 5-6.	USEPA, 1992
			Soil to Skin Adherence Factor	0.2	mg/cm2	Average soil to skin adherence factor	USEPA, 1992
			Exposure Frequency	234	days/yr	Standard residential CT (average) default.	USEPA, 1993
			Exposure Duration	2	years	Average length of residence in same home: 9 years (7 adult, 2 child assumed)	USEPA, 1993, 1997
			Averaging Time - Nc	730	days	2 years	USEPA, 1989
	Inhalation of Groundwater	RME & CT	Inhalation Rate	0.3	m3/hr	Inhalation rate for sedentary children ages 3-10	USEPA, 1997
			Body Weight	15	kg	Standard reference weight for children less than 6 years old.	USEPA, 1991,1993
			Event Frequency	1	shower/day	Typical showering frequency for 90% of American population	USEPA, 1992
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Exposure Frequency	350	days/yr	Standard upper bound residential default	USEPA, 1993
			Event Duration	15	min/day	Upper bound shower duration	USEPA, 1992, 1997
			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	2190	days	6 years	USEPA, 1989
		CT	Exposure Frequency	234	days/yr	Standard residential CT (average) default.	USEPA, 1993
			Event Duration	10	min/day	Average shower duration	USEPA, 1992, 1997
			Exposure Duration	2	years	Average length of residence in same home: 9 years (7 adult, 2 child assumed)	USEPA, 1993, 1997
			Averaging Time - Nc	730	days	2 years	USEPA, 1989

Table 6-5

EXPOSURE FACTOR ASSUMPTIONS

SEAD 4-Remedial Investigation
Seneca Army Depot Activity

RECEPTOR	EXPOSURE ROUTE	RME/CT	PARAMETER	VALUE	UNITS	BASIS	SOURCE
RESIDENT (CHILD)	**Ingestion of Groundwater**	RME & CT	Body Weight	15	kg	Standard reference weight for children less than 6 years old.	USEPA, 1991,1993
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Ingestion Rate	1	liter/day	Approximate 90th percentile value for children 1-11 years old.	USEPA, 1997
			Exposure Frequency	350	days/yr	Standard upper bound residential default	USEPA, 1993
			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	2190	days	6 years.	USEPA, 1989
		CT	Ingestion Rate	0.74	liters/day	Average IR for a child 1-10 years old	USEPA, 1997
			Exposure Frequency	234	days/yr	Standard residential CT (average) default.	USEPA, 1993
			Exposure Duration	2	years	Average length of residence in same home: 9 years (7 adult, 2 child assumed)	USEPA, 1993, 1997
			Averaging Time - Nc	730	days	2 years	USEPA, 1989
	Dermal Contact - Groundwater	RME & CT	Body Weight	15	kg	Standard reference weight for children less than 6 years old.	USEPA, 1991,1993
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Skin Contact Surface Area	9180	cm2	Upper bound skin surface area for children.	USEPA, 1992
			Exposure Frequency	350	days/yr	Standard upper bound residential default	USEPA, 1993
			Exposure Time	0.25	hours/day	Upper bound showering duration. (15 min)	USEPA, 1992
			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	2190	days	6 years.	USEPA, 1989
		CT	Skin Contact Surface Area	7930	cm2	Average skin surface area for children.	USEPA, 1992
			Exposure Frequency	234	days/yr	Standard residential CT (average) default.	USEPA, 1993
			Exposure Time	0.17	hours/day	Average showering duration (10 min).	USEPA, 1992
			Exposure Duration	2	years	Average length of residence in same home: 9 years (7 adult, 2 child assumed)	USEPA, 1993, 1997
			Averaging Time - Nc	730	days	2 years	USEPA, 1989
	Dermal Contact - Surface Water	RME & CT	Body Weight	15	kg	Standard reference weight for children less than 6 years old.	USEPA, 1991,1993
			Exposure Time	1	hour/day	Upper bound water contact period.	USEPA, 1992
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Skin Contact Surface Area	2170	cm2	Upper bound child skin surface area of legs, feet, arms and hands	USEPA, 1997
			Exposure Frequency	45	days/yr	Assumes contact occurs every second day during summer months	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	2190	days	6 years.	USEPA, 1989
		CT	Skin Contact Surface Area	1590	cm2	Average child skin surface area of legs, feet, arms and hands	USEPA, 1997
			Exposure Frequency	15	days/yr	1 day/wk, 15 wk/yr during summer months.	BPJ
			Exposure Duration	2	years	Average length of residence in same home: 9 years (7 adult, 2 child assumed)	USEPA, 1993, 1997
			Averaging Time - Nc	730	days	2 years	USEPA, 1989

Table 6-5

EXPOSURE FACTOR ASSUMPTIONS

SEAD 4-Remedial Investigation
Seneca Army Depot Activity

RECEPTOR	EXPOSURE ROUTE	RME/CT	PARAMETER	VALUE	UNITS	BASIS	SOURCE
RESIDENT (CHILD)	**Dermal Contact - Sediment**	RME & CT	Body Weight	15	kg	Standard reference weight for children less than 6 years old.	USEPA, 1991,1993
			Absorption Factor	Compound Specific			USEPA, 1992
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Skin Contact Surface Area	2170	cm2	Upper bound child skin surface area of legs, feet, arms and hands	USEPA, 1997
			Soil to Skin Adherence Factor	1	mg/cm2	Upper bound soil to skin adherence factor	USEPA, 1992
			Exposure Frequency	45	days/yr	Assumes contact occurs every second day during summer months	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	2190	days	6 years.	USEPA, 1989
		CT	Skin Contact Surface Area	1590	cm2	Average child skin surface area of legs, feet, arms and hands	USEPA, 1997
			Soil to Skin Adherence Factor	0.2	mg/cm2	Average soil to skin adherence factor	USEPA, 1992
			Exposure Frequency	15	days/yr	1 day/wk, 15 wk/yr during summer months.	BPJ
			Exposure Duration	2	years	Average length of residence in same home: 9 years (7 adult, 2 child assumed)	USEPA, 1993, 1997
			Averaging Time - Nc	730	days	2 years	USEPA, 1989
	Ingestion - Sediment	RME & CT	Body Weight	15	kg	Standard reference weight for children less than 6 years old.	USEPA, 1991,1993
			Fraction Ingested	1	(unitless)	100% ingestion, conservative assumption	BPJ
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Ingestion Rate	200	mg/day	Maximum IR for a child	USEPA, 1993
			Exposure Frequency	45	days/yr	Assumes contact occurs every second day during summer months	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	2190	days	6 years.	USEPA, 1989
		CT	Ingestion Rate	100	mg/day	Average IR for a child	USEPA, 1993
			Exposure Frequency	15	days/yr	1 day/wk, 15 wk/yr during summer months.	BPJ
			Exposure Duration	2	years	Average length of residence in same home: 9 years (7 adult, 2 child assumed)	USEPA, 1993, 1997
			Averaging Time - Nc	730	days	2 years	USEPA, 1989

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

Source References:
BPJ: Best Professional Judgement.
- 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

Future Construction Worker. Future construction workers are assumed to spend one year working at SEAD-4, which is a typical duration for a significant construction project. These workers spend each working day at SEAD-4 (5 days/week for 50 weeks, RME; slightly less for the CT). During this time, this worker inhales the ambient air at SEAD-4 and may ingest or dermally contact 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. All other exposure factors used in the exposure assessment were obtained from EPA guidance documents, as noted in **Table 6-5**.

Future Park Workers. The park worker's work schedule differs from other workers discussed above. The park worker is assumed to work onsite for only 8 months (35 weeks; slightly less for the CT) per year from Spring through Autumn, when the conservation area would be used by recreational visitors. The workday (8 hours/day) and exposure duration (25 years for RME; 7 years for CT) are the same as other workers. Two different park workers are considered: an indoor worker and an outdoor worker. The indoor worker works primarily in one of the existing buildings onsite. This worker inhales the indoor air, ingests groundwater, and ingests and dermally contacts surface dust within the building. The outdoor worker spends nearly all of his/her time outdoors. This worker inhales the ambient air, ingests groundwater, and ingests and dermally contacts surface soil. In addition, the outdoor park worker may occasionally dermally contact surface water and sediment in the conservation area.

Future 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 an campground, for a consecutive two-week period (24 hours/day, 14 days/year for RME) each year for 5 years (RME). For the CT, the recreational visitor was assumed to reside in the area for 7 days/year for 1 year. 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, and ingest sediment in the conservation area.

Future Resident. The resident is assumed to reside continuously at the site for 30 years (RME) or 9 years (CT). The resident is assumed to be a child for a portion of this duration: 6 years (RME) and 2 years (CT). The resident inhales the ambient air, ingests groundwater, inhales and dermally contacts groundwater during showering, and ingests and dermally contacts surface soil. In addition, the resident may occasionally dermally contact surface water and sediment, and ingest sediment in the conservation area.

6.3.5.3 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 current and future receptors. Ambient PM concentrations for a construction worker were estimated using an emission and dispersion model. PM concentrations for the site worker, future park worker and recreational visitor receptors were based on existing site air measurements shown in **Table 6-6.**

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 USEPA'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)

TABLE 6-6
SUSPENDED PARTICULATE CONCENTRATIONS MEASURED AT SEDA
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

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

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

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 SEAD-4 for a one year period. To conservatively estimate potential particulate emissions from construction activities during this period, it was assumed that the area of SEAD-4 where metals and SVOCs were detected in the soils and sediments (an approximate 820,500 square foot area) is excavated to a depth of two meters over the course of one year. This results in the following mass of soil removed:

Mass = Area x Depth x Soil Bulk Density

= 76,225 square meters x 2 meters x 1.5 g/cm^3 x 10^6 cm^3/m^3
= 2.29 x 10^{11} grams
= 2.29 x 10^8 kg

Other parameter values for the model are as follows:

k = 0.35 for PM_{10} (USEPA 1993)
U = 4.4 m/sec, average wind speed for Syracuse, NY (USEPA 1985)
X = 10%, recommended default (USEPA 1993)

With these values for M, k, U and X, the emission rate (E) from excavation activities is calculated to be 33,100 grams of PM_{10} over the course of a year. This emission rate would be representative if all soil excavated at the site were contaminated, and if local climatic factors did not suppress emission. For example, precipitation, snow cover and frozen soil in the winter will minimize emission. To account for these climatic/seasonal facotrs, it was assumed that emissions occur only half of the construction time. This results in a representative emission rate (E) of 16,600 grams/year. This is equivalent to an average emission of 2.30 mg/sec, assuming emission occur only during work days: 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 30 work days (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:
E = emission rate (g/sec)
0.094 = empirical constant (g/sec)
s = percent silt content (%)
X = percent moisture content (%)

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 10.59 mg/sec of PM_{10} emissions, assuming all emissions occur during working hours.

Total annual average emissions from excavation and grading are estimated as 2.30 mg/sec + 10.59 mg/sec = 12.89 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_{10} 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. To determine W, the construction activity is assumed to be confined to approximately 100 square meters at any time. This area is assumed to be square, and W is the square root of 100 m^2, or 10 meters. H is assumed to be the height of the breathing zone, or 1.75 meters.

With these values, the PM_{10} exposure concentration for a construction worker is calculated as 0.167 mg/m^3. All of this PM_{10} was assumed to be airborne soil released from SEAD-4 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^3)
CS = chemical concentration in soil (mg/kg soil)
PM_{10} = PM_{10} concentration (ug/m^3)
CF = conversion factor (10^{-9} kg/ug)

These calculated CA values are the inhalation EPCs for the dust inhalation scenarios for most chemicals. **Table G-1 (in Appendix G)** shows the inhalation EPCs for the future construction workers.

Site Worker, Future Park Worker, Future Recreational Visitor and Future Resident 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 6-6**. Both Total

Suspended Particulate Matter (TSP) and particulate matter less than 10um aerodynamic diameter (PM_{10}) were measured. TSP includes all particles which can remain suspended in air, while PM_{10} includes only smaller particles which can be inhaled (particles larger than 10um diameter typically cannot enter the narrow airways in the lung).

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

The concentration of particulate-associated chemicals in ambient air, (CA) was calculated with the same equation [$CA = CS \times PM_{10} \times CF$] used for the construction worker, above.

The ambient air exposure point concentrations used in the intake calculations are shown in **Table G-1 (Appendix G).**

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

$$\textbf{Intake (mg/kg/day)} = \frac{\underline{\textbf{CA x IR x EF x ED}}}{\textbf{BW x AT}}$$

where:

CA = Chemical concentration in air (mg/m^3)
IR = Inhalation Rate (m^3/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 **Tables G-2 and G-3** for RME and CT, respectively.

6.3.5.4 Inhalation of Indoor Air

This pathway considers the inhalation of airborne particulate matter by future park workers inside the existing buildings at SEAD-4.

In the absence of a specific dust-generating activity, indoor PM_{10} concentrations tend to be similar to outdoor PM_{10} concentrations. Therefore, the same PM_{10} concentration used to estimate non-construction ambient air exposures was used to represent indoor air conditions. The entire particulate loading was assumed to be derived from the debris within the SEAD-4 buildings, as represented by the indoor debris EPCs for the site.

The concentration of particulate-associated chemicals in indoor air, (CA) was calculated with the same equation [$CA = CS \times PM_{10} \times CF$] used for the construction worker, above.

The indoor air exposure point concentrations used in the intake calculations are shown in **Table G-4 (Appendix G).**

The same intake equation used for exposure to ambient air, above, was used to calculate intakes from indoor air exposure. The results of these calculations are shown in **Tables G-5 and G-6**.

6.3.5.5 Incidental Ingestion of Soil (current and future land use)

Due to the present limited access to the SEAD-4, the current ingestion of on-site soils is limited to an infrequent site worker. Future scenarios include the construction worker, outdoor park worker, recreational visitor and resident.

The soil data collected from the Remedial Investigation were compiled and the EPCs were calculated for each compound. For the current site worker, future park worker, and recreational visitor exposures, only surface soil data collected from the 0 to 0.5 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):

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

Where:

CS = Chemical Concentration in Soil (mg/kg soil)
IR = Ingestion Rate (mg soil/day)
CF = Conversion Factor (1 Kg/10^6 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 **Tables G-12 and G-13.**

6.3.5.6 Dermal Contact with Soils

The same receptors considered to have the potential to ingest soil may also contact the same soils dermally. These receptors include the current site worker, future construction worker, future outdoor park worker, future recreational visitor and resident receptors.

As with the soil ingestion scenarios, the chemical concentration of the soils were taken from the 0 to 0.5 foot depth and used as the exposure point concentrations for the site worker, future park worker, and future recreational visitor exposures, while the chemical concentration of all soils was used as the exposure point concentration for the construction worker scenario.

The equation for the absorbed dose from dermal exposure is as follows, based on guidance in USEPA 1992:

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

Where:

CS = Chemical Concentration in Soil (mg/kg soil)
CF = Conversion Factor (10^{-6} kg/mg)
AF = Soil to Skin Adherence Factor (mg/cm^2)
ABS = Absorption Factor (unitless)
SA = Skin Surface Area Available for Contact (cm^2)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
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 absorbed dose per event as defined in the USEPA 1992 guidance.

The exposure calculations are summarized in **Tables G-14 and G-15**.

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 which 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 (typically soil, surface water, sediment or dust). USEPA 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 USEPA 1992b:

Current Site Worker, Future Park Worker, Future Construction Worker and Future Adult Resident (Soil) The hands, legs, arms, neck and head may be exposed. These comprise approximately 25% of the total body surface area. USEPA 1992b recommends surface area values of 5800 cm^2 for the RME and 5000 cm^2 for the CT as representative of these exposed body parts.

Future Recreational Visitor and Future Resident – Child (Soil) 25% of total body area was assumed for children age 5-6. This results in surface area exposure values of 2300 cm^2 for the RME and 1980 cm^2 for the CT.

Future Recreational Visitor – Child (Groundwater) The entire body surface may be exposed during showering. EPA 1992 recommends a surface area value of 9,180 cm^2 for the RME, and 7130 cm^2 for the CT, as representative of the entire body of a child.

Park Worker (Surface Water and Sediment) The hands and forearms may be exposed. EPA 1992 recommends a surface area value of 2490 cm^2 for the RME and 1980 cm^2 for the CT as representative of these parts of the adult body.

Recreational Visitor – Child (Surface Water and Sediment) 25% of total body area was assumed for adolescents age 12-15. This results in a surface area exposure value of 4625 cm^2 for the RME and 3725 $cm^2$for the CT .

The potential magnitude of exposure depends on the amount of soil which adheres to the exposed skin. Again, USEPA 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 solid media (soil, sediment, and dust) some chemicals may be strongly bound to the matrix which reduces their ability to absorb through the skin. Chemical-specific absorption factors as provided by USEPA were used in this assessment. USEPA Region II recommends quantifying dermal exposure for cadmium, arsenic, PCBs, dioxins/furans and pentachorophenol (others are under development) only since credible values are not available for other chemicals of concern. Of these compounds, only PCBs were detected in any soil. For PCBs, an absorption factor (ABS) of 6 percent (0.06) was used in the total soils scenario for the future construction worker, which is at the high end of the range recommended by EPA, 0.6 to 6 percent (EPA, 1992b).

No other compounds were considered quantitatively for dermal exposure from soil in this risk assessment.

The reader should note that in the guidance document Dermal Exposure Assessment: Principles and Applications (USEPA 1992b), EPA cautions that "dermal exposure is the least well understood of the major exposure routes. Very little chemical-specific data are available, especially for soils, and the predictive techniques have not been well validated." EPA further states that dermal exposure/risk estimates have considerable uncertainty, and in some cases may be overly conservative.

6.3.5.7 Incidental Ingestion of Indoor Surface Dust

Future park workers in the buildings may contact and ingest dust which has settled on surfaces in the building. Chemical data for this exposure route is represented by the solids collected inside the buildings and analyzed in the Remedial Investigation. The RME and CT EPCs for this exposure pathway were calculated for each compound from this data set.

The same intake equation used for ingestion of soil was used to calculate intakes from ingestion of indoor dust. The chemical concentrations in indoor solids (mg/kg) were used in place of soil concentrations. The results of these calculations are shown in **Tables G-8 and G-9**.

6.3.5.8 Incidental Dermal Contact with Indoor Surface Dust

Future indoor park workers may dermally contact surface dust inside the buildings. The RME and CT EPCs for this exposure pathway were the same as those calculated for surface dust ingestion, above.

The same intake equation used for dermal contact with soil was used to calculate intakes from dermal contact with indoor dust. The chemical concentrations in indoor solids (mg/kg) were used in place of soil concentrations. Of the compounds recommended by USEPA Region II for dermal exposure assessment (see discussion in Section 6.3.5.6), pentachorophenol, PCBs, arsenic and cadmium were detected in indoor solids. The same dermal absorption factor (ABS) used for PCBs in soil was used here. Dermal absorption factors (ABS) of 0.1% (0.001) for arsenic and 1% percent (0.01) for cadmium were used (EPA 1992b). The absorption factor used for pentachlorophenol is 1% (0.01).

No other compounds were evaluated quantitatively for dermal adsorption from indoor dust. The results of these calculations are shown in **Tables G-10 and G-11**.

6.3.5.9 Groundwater Ingestion (Future)

The water supply within the Depot boundaries is not from the aquifer under the site. Currently, all water used at the SEDA is piped up from nearby Seneca Lake. Therefore, exposures from on-site usage of groundwater are quantified only for future receptors.

The Round I and Round II groundwater sampling programs performed during the RI and the sampling results from the ESI were used as the foundation to establish exposure concentrations for all groundwater chemicals of concern. The EPC was calculated for all compounds used in the future land use scenario.

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

$$\textbf{Intake (mg/kg-day)} = \frac{\textbf{CW x IR x EF x ED}}{\textbf{BW x AT}}$$

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 **Tables G-20 and G-21.**

6.3.5.10 Dermal Contact to Groundwater while Showering/Bathing

The recreational visitor and resident 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, taken from RAGS (EPA, 1989a) is as follows:

$$\textbf{Absorbed Dose (mg/kg-day)} = \frac{\textbf{DA x SA x EF x ED}}{\textbf{BW x AT}}$$

Where:

DA = Absorbed Dose per event (mg/cm^2 - event)
SA = Skin Surface Area Available for Contact (cm^2)
EF = Exposure Frequency (days/year)
ED = Exposure Duration (years)
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 EPAs "Dermal Exposure Assessment: Principles and Applications," (EPA, 1992).

For organics, a parameter, B is first calculated. The B value was adopted from the Bunge Model (Cleek and Bunge, 1992). This value attempts to characterize the relative contribution of each compounds specific permeability coefficient (K_p value) in the stratum corneum and the viable epidermis. The B-values for certain compounds are listed in Table 5-8 of the Dermal Exposure Assessment Manual, EPA, 1992. For any compounds not listed in this table, B-values are derived using the following equation:

$$\mathbf{B} \approx \frac{\mathbf{Kow}}{\mathbf{10{,}000}}$$

where: Kow is the octanol-water partitioning coefficient (dimensionless).

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:

$$\mathbf{DA = 2\ K_p\ x\ CW\ x\ CF} \sqrt{\frac{6 \times \tau \times ET}{\pi}}$$

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

$$\mathbf{DA_{event} = K_p\ x\ CW\ x\ CF} \left[\frac{ET + 2(1 + 3B)\tau}{1 + B} \right]$$

where for both equations:

K_p = 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)
CF = Volume Conversion Factor = $0.001 L/cm^3$

The exposure times for showering are assumed to be 15 minutes/day (0.25 hr/day) for the RME, and 10 minutes/day for CT, as recommended in the Dermal Exposure Assessment Manual, EPA, 1992.

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 (Kp) 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 Table 5-8 of the Dermal Exposure Assessment Manual, EPA, 1992, or calculated. All chemicals not having lag times were derived using the following equation:

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

where:

$\int_{sc}$ = thickness of the stratum corneum, assume (0.001) (cm)
D_{sc} = Stratum corneum diffusion coefficient (cm^2/hr)

The t* value for each organic compound found in ground water is shown below.

Compound	t* (hours)
Acetone	0.47
Benzene	0.63
Ethylbenzene	1.3
Toluene	0.77
Xylene	1.4
4-Methylphenol	0.96
Bis(2-Ethylhexyl)phthalate	174.56
Diethylphthalate	4.7
Di-n-butylphthalate	29.0
Phenol	0.79
2-Nitrotoluene	1.441
3-Nitrotoluene	1.441
4-Nitrotoluene	1.441
Nitrobenzene	1.18
Aldrin	36.0
Alpha-BHC	40.54
Aroclor-1260	25.0
Delta-BHC	37.39
Gamma-Chlordane	130.0
Heptachlor	94.0

The exposure time, 0.25 hour for RME and 0.17 for CT, is less than t* in all cases. Therefore, the first equation for DA, above, was used for all organic compounds.

In the Dermal Exposure Assessment Manual (EPA 1992), EPA cautions that the above approach for calculating dermal exposures to organic chemicals in water may be overly conservative. EPA expressed concern that preliminary testing of this model indicated that for some compounds the absorbed dose from dermal exposure during showering was much greater than the dose from ingestion of 2 L/day of water. EPA further states that model validation is difficult due to a lack of data.

For inorganics, DA was calculated by:

$$\mathbf{DA = K_p \times CW \times ET \times CF}$$

USEPA in the Dermal Exposure Assessment & Guidelines (EPA, 1992) recommends Dermal Permeability Coefficients (K_p) 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:

$$\mathbf{Log\ K_p = -2.72 + 0.71\ (log\ K_{o/w}) - 0.0061\ (MW)}$$

Many inorganic compounds do not have specified recommended K_p values. In this case, K_p was assumed to be 1 x 10^{-3} as the default value recommended by EPA (EPA, 1992).

Exposure to chemicals in groundwater during showering occurs via two routes: inhalation of volatile chemicals which partition into the air from the hot shower water, and dermal contact. The analyses of these two exposure routes assumes that release of volatile chemicals to the air occurs quickly, and that only the quantities which remain in the water stream are available for dermal contact. The calculations of exposure from inhalation assume that the water from the shower nozzle has the same concentration as groundwater, and the groundwater EPC is used. However, for dermal contact, the EPCs are first adjusted to subtract the amount of each chemical which partitions into the air. This adjusted EPC, referred to as C_{derm} , is calculated as:

$$\mathbf{C_{derm} = EPC_{gw}\ (1-f_e)}$$

where: EPC_{gw} = groundwater exposure point concentration (at the shower nozzle), mg/L
f_e = fraction of chemical emitted to the air in the shower, dimensionless

The fraction emitted (f_e) is calculated as:

$$\mathbf{f_e = (EPC_{air}\ x\ F_a)\ /\ (EPC_{gw}\ x\ F_w)}$$

where: EPC_{air} = air exposure point concentration in the shower (mg/m^3)
F_a = air flow rate (ventilation rate) in the shower (m^3/min)
F_w = water flow rate in the shower (L/min)

This C_{derm} value is used as CW in the calculations of absorbed dose per event (DA) in the assessment of dermal exposure during showering. The calculated C_{derm} values are shown in **Tables G-22 and G-23**.

The dermal exposure calculations are summarized in **Appendix G**.

6.3.5.11 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:

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

for $t_S > 0$

where:

C_S = average concentration of a volatile compound in the shower air over a duration of t_S minutes (mg/m^3)

C_{inf} = asymptotic concentration in air if shower ran for a long time (much longer than 15 minutes), calculated below (mg/m^3)

t_S = time in shower, RME value for an adult is 15 minutes (min)

k = rate constant for exponential function, defined below (1/min)

C_{inf} = $[(E)(F_w)(C_t)]/F_a$

k = F_a/V_b

F_w = flow rate of water in shower, RME value is 19 L/min; CT value is 8 L/min (L/min)
C_t = concentration in shower water, determined case by case; C_t 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^3/min
V_b = volume of bathroom, typical value is 12 m^3 (m^3)
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^3-atm/mol)

H_{TCE} = Henry's law constant for TCE, typical value is $H_{TCE} = 9.10E^{-3}$ (m^3- atm/mol)

The calculated average concentrations in the air in the shower are presented in **Tables G-16 and G-17.**

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

$$\textbf{Intake (mg/kg-day)} = \frac{\textbf{CA x IR x EF x ED}}{\textbf{BW x AT}}$$

Where:
CA = Chemical Concentration in Air (mg/m^3)
IR = Inhalation Rate (m^3/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 G-18 and G-19**.

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

6.3.5.12 Dermal Contact to Surface Water while Wading

At SEADs located in the Conservation/Recreation area, the Park Worker, Recreational Visitor and Resident may occasionally come into contact with surface water or sediment. The Park Worker may occasionally put his hands and arms in standing surface water as part of his work. A Child Recreational Visitor or Resident may occasionally walk through or play in standing water.

The equations used to calculate dermally-absorbed doses from surface water are the same as those used for dermal contact with ground water during showering. See Section 6.3.10, 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 equation used to calculate the absorbed dose per event (DA) for organic compounds depends on the value of t* for the specific compound. The t* value for each organic compound found in surface water is shown below.

Compound	t* (hours)
Acetone	0.47
Anthracene	5.60
Benzo(a) anthracene	10.0
Benzo(a)pyrene	14.0
Benzo(b)fluoranthene	14.0
Benzo(g,h,i)perylene	20.0
Benzo(k)fluoranthene	14.29
Bis(2-Ethylhexyl)phthalate	174.56
Butylbenzylphthalate	34.55
Carbazole	5.0
Chrysene	10.0
Fluoranthene	7.30
Indeno(1,2,3-cd)pyrene	20.0
Phenanthrene	5.6
Pyrene	7.3
1,3-Dinitrobenzene	2.23
Alpha-chlordane	119.39
Beta-BHC	40.54
Gamma-Chlordane	130.0

The exposure time, one hour, is less than t* for all compounds except acetone. Therefore, the first equation for DA shown in Section 6.3.5.10 was used for all organic compounds except acetone. The second equation for DA shown in Section 6.3.5.10 was used for acetone.

The dermal exposure calculations for surface water are summarized in **Tables G-24 and G-25**.

6.3.5.13 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 child recreational visitor and resident.

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. See Section 6.3.5.6, 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 USEPA guidance regarding the values assigned to each of these exposure parameters.

Of the compounds recommended by USEPA Region II for dermal exposure assessment (see discussion in Section 6.3.5.6), arsenic, cadmium, and PCBs were detected in sediment. An absorption factor (ABS) of 1% (0.01) was used for cadmium and an ABS of 0.1% (.001) was used for arsenic as recommended by EPA (EPA, 1992). An absorption factor of 6% (0.06) was used for PCBs. No other compounds were considered quantitatively for dermal exposure for sediment.

The dermal exposure calculations for sediment are summarized in **Tables G-25 and G-26.**

6.3.5.14 Incidental Ingestion of Sediment

Ingestion of sediment is assumed to occur when the drainage ditches are dry, when the sediment could potentially be ingested in the same manner as soil. This pathway is assumed to have the same exposure frequency (EF) and exposure duration (ED) used for the surface water pathway, since ingestion of dry sediment is expected to be about as infrequent as wading in the wet drainage ditches. The recreational visitor and resident are considered for this exposure route.

The Exposure Point Concentrations (EPCs) for each chemical of concern were calculated based on all sediment data collected in the RI sampling program.

The chemical intake from ingestion of sediment is calculated by the same method used for ingestion of soil. The equation for intake is as follows (USEPA, 1989a):

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

Where:

CS = Chemical Concentration in Sediment (mg/kg)
IR = Ingestion Rate (mg sediment/kg)
CF = Conversion Factor (10^{-6} kg/mg)
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 **Tables G-27 and G-28**.

6.4 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 noncarcinogenic 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) (USEPA, 1994) were consulted. Finally, the USEPA 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 6-7** for both noncarcinogenic and carcinogenic effects.

6.4.1 Noncarcinogenic Effects

For chemicals that exhibit noncarcinogenic (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 noncarcinogenic effects for use in risk assessment are generally developed using USEPA 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 noncarcinogenic 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 that 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.

TABLE 6-7
TOXICITY VALUES
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Analyte	Oral RfD (mg/kg-day)		Inhalation RfD (mg/kg-day)		Carc. Slope Oral (mg/kg-day)-1		Rank Wt. of Evidence	Carc. Slope Inhalation (mg/kg-day)-1		Dermal RfD (mg/kg-day)		Carc. Slope Dermal (mg/kg-day)-1		Oral Absorption Factor	
Volatile Organics															
1,1-Dichloroethane	1.00E-01	b	4.00E-02	b	NA		C	NA		1.00E-01	f	NA		1.00	
1,2-Dichloroethene (total)	9.00E-03	b	NA	b	NA	e	D	NA	e	9.00E-03	g	NA	h	1.00	j
Acetone	1.00E-01	a	NA	a	NA	a	D	NA	a	1.00E-01	f	NA		1.00	j
Benzene	3.00E-03	i	1.71E-03	i	2.90E-02	a	A	2.73E-02	a	2.85E-03	f	3.05E-02	g	0.95	k
Carbon disulfide	1.00E-01	a	2.00E-01	a	NA	a	NA	NA	a	6.30E-02	f	NA		0.63	k
Chloroform	1.00E-02	a	NA	a	6.10E-03	a	B2	8.05E-02	a	1.00E-02	f	6.10E-03	g	1.00	k
Ethyl benzene	1.00E-01	a	2.86E-01	a	NA	a	D	NA	a	1.00E-01	f	NA		1.00	
Methyl butyl ketone	NA	b	NA	b	NA	a	NA	NA	a	NA		NA	a	1.00	j
Methylene chloride	6.00E-02	a	8.57E-01	b	7.50E-03	a	B2	1.65E-03	a	5.88E-02	f	7.65E-03	g	0.98	k
Methyl ethyl ketone	6.00E-01	a	2.86E-01	a	NA	a	D	NA	a	6.00E-01	f	NA		1.00	j
Styrene	2.00E-01	a	2.86E-01	e	NA	a	NR	NA	a	2.00E-01	f	NA	a	1.00	j
Tetrachloroethene	1.00E-02	a	NA	e	5.20E-02	c	NR	2.00E-03	c	1.00E-02	f	5.20E-02	g	1.00	j
Toluene	2.00E-01	a	1.14E-01	a	NA	a	D	NA	a	2.00E-01	f	NA		1.00	j
Trichloroethene	NA	a	NA	e	1.10E-02	c	NA	6.00E-03	c	NA		1.22E-02	g	0.90	k
Total Xylenes	2.00E+00	a	NA	e	NA	a	D	NA	a	1.80E+00	f	NA		0.90	k
Semivolatiles*															
1,4-Dichlorobenzene	NA	a	2.28E-01	e	2.40E-02	b	B2	NA	a	NA	a	2.40E-02	a	1.00	j
2-Methylnaphthalene	4.00E-02	i	NA	a	NA	a	NA	NA	a	4.00E-02	f	NA		1.00	j
4-Methylphenol	5.00E-03	b	NA	a	NA	a	C	NA	a	5.00E-03	f	NA		1.00	
Acenaphthene	6.00E-02	a	NA	a	NA	a	NA	NA	a	6.00E-02	f	NA		1.00	j
Acenaphthylene	NA	e	NA	a	NA	a	D	NA	a	NA		NA		1.00	j
Anthracene	3.00E-01	a	NA	a	NA	a	D	NA	a	3.00E-01	f	NA		1.00	j
Benzo(a)anthracene	NA	a	NA	a	7.30E-01	c	B2	NA	a	NA		7.30E-01	g	1.00	j
Benzo(a)pyrene	NA	a	NA	a	7.30E+00	a	B2	NA	a	NA		1.46E+01	g	0.50	k
Benzo(b)fluoranthene	NA	a	NA	a	7.30E-01	c	B2	NA	a	NA		7.30E-01	g	1.00	j
Benzo(ghi)perylene	NA	a	NA	a	NA	a	D	NA	a	NA		NA		1.00	j
Benzo(k)fluoranthene	NA	a	NA	a	7.30E-02	c	B2	NA	a	NA		7.30E-02	g	1.00	j
Bis(2-Ethylhexyl)phthalate	2.00E-02	a	NA	a	1.40E-02	a	B2	NA	a	1.00E-02	f	2.80E-02	g	0.50	k
Butylbenzylphthalate	2.00E-01	b	NA	a	NA	a	C	NA	a	2.00E-01	f	NA		1.00	j
Carbazole	NA	a	NA	a	2.00E-02	b	B2	NA	a	NA		2.00E-02	g	1.00	j
Chrysene	NA	a	NA	a	7.30E-03	c	B2	NA	a	NA		7.30E-03	g	1.00	j
Dibenz(a,h)anthracene	NA	a	NA	a	7.30E+00	c	B2	NA	a	NA		7.30E+00	g	1.00	j
Dibenzofuran	NA	a	NA	a	NA	a	D	NA	a	NA		NA		1.00	j
Diethyl phthalate	8.00E-01	b	NA	a	NA	a	D	NA	a	8.00E-01	f	NA		1.00	j
Di-n-butylphthalate	1.00E-01	a	NA	a	NA	a	D	NA	a	9.00E-02	f	NA		0.90	k
Di-n-octylphthalate	2.00E-02	b	NA	a	NA	a	NA	NA	a	2.00E-02	f	NA		1.00	j
Fluoranthene	4.00E-02	a	NA	a	NA	a	D	NA	a	4.00E-02	f	NA		1.00	j
Fluorene	4.00E-02	a	NA	a	NA	a	D	NA	a	4.00E-02	f	NA		1.00	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	1.00	
Indeno(1,2,3-cd)pyrene	NA	a	NA	a	7.30E-01	c	B2	NA	a	NA		7.30E-01	g	1.00	j
N-Nitrosodiphenylamine	NA	a	NA	a	4.90E-03	a	B2	NA	a	NA		4.90E-03	g	1.00	j
N-Nitrosodipropylamine	NA	a	NA	a	7 00E+00	a	B2	NA	a	NA		7.00E+00	g	1.00	j
Naphthalene	2.00E-02	a	8.60E-04	a	NA	a	C	NA	a	2.00E-02	f	NA		1.00	j
Pentachlorophenol	3.00E-02	a	NA	a	1.20E-01	a	B2	NA	a	3.00E-02	f	1.20E-01	g	1.00	j
Phenanthrene	NA	a	NA	a	NA	a	D	NA	a	NA		NA		1.00	j
Phenol	6.00E-01	a	NA	a	NA	a	D	NA	a	5.40E-01	f	NA		0.90	k
Pyrene	3.00E-02	a	NA	a	NA	a	D	NA	a	3.00E-02	f	NA		1.00	k
Pesticides/PCBs															
4,4'-DDD	NA	a	NA	a	2.40E-01	a	B2	NA	a	NA		1.20E+00	g	0.20	k
4,4'-DDE	NA	a	NA	a	3.40E-01	a	B2	NA	a	NA		1.70E+00	g	0.20	k
4,4'-DDT	5.00E-04	a	NA	a	3.40E-01	a	B2	3.40E-01	a	1.00E-04	f	1.70E+00	g	0.20	k
Aldrin	3.00E-05	a	NA	a	1.70E+01	a	B2	1.72E+01	a	1.50E-05	f	3.40E+01	g	0.50	k
Aroclor-1248	NA	a	NA	a	NA		NR	NA		NA		NA			
Aroclor-1254	2.00E-05	a	NA	a	2.00E+00	a	B2	4.00E-01	a	1.80E-05	f	2.22E+00	g	0.90	k
Aroclor-1260	2.00E-05	m	NA	a	2.00E+00	a	B2	4.00E-01	a	1.80E-05	f	2.22E+00	g	0.90	k
Dieldrin	5.00E-05	a	NA	a	1.60E+01	a	B2	1.61E+01	a	2.50E-05	f	3.20E+01	g	0.50	k
Endosulfan I	6.00E-03	n	NA	a	NA	a	NA	NA	a	6.00E-03	f	NA		1.00	j
Endosulfan II	6.00E-03	n	NA	a	NA	a	NA	NA	a	6.00E-03	f	NA		1.00	j
Endosulfan sulfate	6.00E-03	n	NA	a	NA	a	NA	NA	a	6.00E-03	f	NA		1.00	j
Endrin	3.00E-04	a	NA	a	NA	a	D	NA	a	3.00E-04	f	NA		1.00	j
Endrin aldehyde	NA	a	NA	a	NA	a	NA	NA	a	NA		NA		1.00	j
Endrin ketone	NA	a	NA	a	NA	a	NA	NA	a	NA		NA		1.00	j
Heptachlor	5.00E-04	a	NA	a	4.50E+00	a	B2	4.55E+00	a	5.00E-04	f	4.50E+00	g	1.00	j
Heptachlor epoxide	1.30E-05	a	NA	a	9.10E+00	a	B2	9.10E+00	a	1.30E-05	f	9.10E+00	g	1.00	j
Methoxychlor	5.00E-03	a	NA	a	NA	a	D	NA	a	5.00E-03	f	NA		1.00	j
Alpha-BHC	NA	a	NA	a	6.30E+00	a	B2	6.30E+00	a	NA		6.30E+00	g	1.00	j
Alpha-Chlordane	5.00E-04	o	2.00E-04	o	3.50E-01	o	B2	3.50E-01	o	5.00E-04	f	3.50E-01	g	1.00	j
Beta-BHC	NA	a	NA	a	1 80E+00	a	C	1.86E+00	a	NA		1.80E+00	g	1.00	j
Gamma-Chlordane	5.00E-04	o	2.00E-04	o	3.50E-01	o	B2	3.50E-01	o	5.00E-04	f	3.50E-01	g	1.00	j
Delta-BHC	NA	a	NA	a	NA	a	NA	NA	a	NA		NA		1.00	j
Nitroaromatics*															
2-Nitrotoluene	1.00E-02	b	NA	b	NA	b	NR	NA	b	1.00E-02	f	NA	b	1.00	j
3-Nitrotoluene	1.00E-02	b	NA	b	NA	b	NR	NA	b	1.00E-02	f	NA	b	1.00	j
4-Nitrotoluene	1.00E-02	b	NA	b	NA	b	NR	NA	b	1.00E-02	f	NA	b	1.00	j
1,3,5-Trinitrobenzene	3.00E-02	a	NA	a	NA	a	NA	NA	a	5.00E-05	f	NA		1.00	j

TABLE 6-7
TOXICITY VALUES
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Analyte	Oral RfD (mg/kg-day)		Inhalation RfD (mg/kg-day)		Carc. Slope Oral (mg/kg-day)-1		Rank Wt. of Evidence	Carc. Slope Inhalation (mg/kg-day)-1		Dermal RfD (mg/kg-day)		Carc. Slope Dermal (mg/kg-day)-1		Oral Absorption Factor	
2,4-Dinitrotoluene	2.00E-03	a	NA	a	6.80E-01	a	B2	NA	a	2.00E-03	f	6.80E-01	g	1.00	j
2,6-Dinitrotoluene	1.00E-03	b	NA	a	6.80E-01	a	B2	NA	a	1.00E-03	f	6.80E-01	g	1.00	j
2,4,6-Trinitrotoluene	5.00E-04	a	NA	a	3.00E-02	a	C	NA	a	5.00E-04	f	3.00E-02	g	0.60	k
2-amino-4,6-Dinitrotoluene	NA	a	NA	a	NA	a	NA	NA	a	NA	f	NA	g	1.00	j
4-amino-2,6-Dinitrotoluene	NA	a	NA	a	NA	a	NA	NA	a	NA	f	NA	g	1.00	j
Nitrobenzene	5.00E-04	a	5.71E-04	b	NA	a	D	NA	a	5.00E-04	f	NA	g	1.00	j
Tetryl	1.00E-02	b	NA	a	NA	a	NA	NA	a	1.00E-02	f	NA	g	1.00	j
RDX	3.00E-03	a	NA	a	1.10E-01	a	C	NA	a	3.00E-03	f	1.10E-01	g	1.00	j
Metals															
Aluminum	1.00E+00	i	1.43E-03	m	NA	a	D	NA	a	4.00E-02	f	NA		0.04	k
Antimony	4.00E-04	a	NA	e	NA	a	B1	NA	a	4.00E-04	f	NA		0.01	k
Arsenic	3.00E-04	a	NA	e	1.50E+00	d	A	1.51E+01	a	2.40E-04	f	1.88E+00	g	0.80	k
Barium	7.00E-02	a	1.43E-04	b	NA	a	D	NA	a	3.50E-02	f	NA		0.50	k
Beryllium	2.00E-03	a	6.00E-06	a	NA	a	B2	8.40E+00	a	2.00E-05	f	NA		0.01	k
Cadmium	5.00E-04	p	NA	a	NA	a	B1	6.30E+00	a	5.00E-05	f	NA		0.10	l
Calcium	NA	a	NA	a	NA	a	NA	NA	a	NA		NA		1.00	j
Chromium, Hexavalent	3.00E-03	a	2.80E-05	q	NA	a	A	4.20E+01	q	6.00E-05	f	NA		0.02	k
Chromium	1.50E+00	a	NA	a	NA	a	D	NA	a	3.00E-02	f	NA		0.02	k
Cobalt	6.00E-02	m	NA	a	NA	a	NA	NA	a	3.00E-03	f	NA		0.05	k
Copper	4.00E-02	b	NA	a	NA	a	D	NA	a	2.40E-02	f	NA		0.60	k
Cyanide	2.00E-02	a	NA	a	NA	a	D	NA	a	1.00E-02	f	NA		0.50	k
Iron	3.00E-01	e	NA	a	NA	a	NR	NA	a	6.00E-02	f	NA		0.20	k
Lead	NA	a	NA	a	NA	a	B2	NA	a	NA		NA		0.15	k
Magnesium	NA	a	NA	a	NA	a	D	NA	a	NA		NA		1.00	j
Manganese	5.00E-02	r	1.40E-05	a	NA	a	D	NA	a	1.50E-03	f	NA		0.03	k
Mercury	3.00E-04	s	8.57E-05	a	NA	a	D	NA	a	3.00E-06	f	NA		0.01	k
Nickel	2.00E-02	a	NA	a	NA	a	NR	NA	a	8.00E-04	f	NA		0.04	k
Potassium	NA	a	NA	a	NA	a	NA	NA	a	NA		NA		1.00	j
Selenium	5.00E-03	a	NA	a	NA	a	D	NA	a	4.50E-03	f	NA		0.90	k
Silver	5.00E-03	a	NA	a	NA	a	D	NA	a	1.00E-03	f	NA		0.20	k
Sodium	NA	a	NA	a	NA	a	NA	NA	a	NA		NA		1.00	j
Thallium	8.00E-05	t	NA	a	NA	a	D	NA	a	8.00E-05	f	NA		1.00	k
Vanadium	7.00E-03	b	NA	a	NA	a	D	NA	a	7.00E-05	f	NA		0.01	k
Zinc	3.00E-01	a	NA	a	NA	a	D	NA	a	7.50E-02	f	NA		0.25	k
Herbicides															
2,4,5-T	1.00E-02	a	NA	a	NA	a	NA	NA	a	1.00E-02	f	NA		1.00	j
2,4-DB	8.00E-03	a	NA	a	NA	a	NA	NA	a	8.00E-03	f	NA		1.00	j
Dalapon	3.00E-02	a	NA	a	NA	a	NA	NA	a	3.00E-02	f	NA		1.00	j
Dicamba	3.00E-02	a	NA	a	NA	a	NA	NA	a	3.00E-02	f	NA		1.00	j

a = Taken from the Integrated Risk Information System (IRIS) (Online August 1999)
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 (1999) provided by EPA Technical Support Center.
(Inhalation RfD's were derived from EPA RfC's based on the assumption of 20 m3/day inhalation rate and 70 kg body weight.)
f = Calculated from oral RFD value. (Dermal Rfd = Oral Rfd * Oral Absorption Factor)
g = Calculated from oral slope factor (Dermal Slope Factor = Oral Slope Factor/Oral Absorption Efficiency)
h = Slope factor is for the mixture of 2,4/2,6-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 m3/day inhalation rate and 70 kg body weight.)
j = Where no oral absorption efficiency data are available, EPA Region 2 recommends that no adjustment be made for relative absorption (i.e. assume oral absorption factor = 1.0)
k = Taken from ATSDR Toxicity Profiles (1989 - 1995)
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 managenese, 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
NA = Not Available
*Dinitrotoluene, 2,4- and dinitrotoluene, 2,6- were analyzed as both nitroaromatics and semivolatiles.

6.4.1.1 References Doses for Oral and Inhalation Exposure

The types of toxicity values used to evaluate the noncarcinogenic 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 noncarcinogenic 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^3). 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^3/day and an adult body weight of 70 kg. Thus:

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

6.4.1.2 Reference Doses for Dermal Exposure

USEPA 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.

In the absence of dermal reference toxicity values, USEPA has suggested (USEPA, 1989a) that in some cases it is appropriate to modify an oral RfD so it can be used to estimate the hazard incurred by dermal exposure. This requires that the toxic endpoints observed are the same for both oral and dermal exposure, and that one have quantitative estimates of both dermal and oral absorption of the chemical. This information is not available for most priority pollutants, and oral toxicity values are nevertheless often used to quantify risks associated with dermal exposure. As a consequence, any valuation of the contribution of dermal exposure to the overall hazard needs to be viewed as highly tentative at best.

USEPA RAGS (1989a) provides guidance for use of oral toxicity values in determining dermal toxicity. RfDs are expressed as the amount of substance administered per unit time and unit body weight (administered-dose), whereas exposure estimates for the dermal route of exposure are expressed as the amount of substance absorbed into the body per unit time and unit body weight (absorbed-dose). Thus, for dermal exposure to contaminants in water or in soil, it is necessary to adjust an oral toxicity value from an administered to an absorbed dose. Where oral absorption efficiencies were available, the oral RfD was converted to a dermal RfD by multiplying by oral absorption efficiency. Oral absorption factors and the calculated dermal RfDs are shown in **Table 6-7**.

In the absence of any information on absorption for the substance or chemically related substances, an oral absorption efficiency of 100 percent was assumed in accordance with USEPA Region 2 guidance (personal communication between A. Schatz of Parsons and M. Maddeloni of EPA Region 2).

6.4.1.3 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 children, trespassers, and construction workers, chronic RfDs and RfCs were used to conservatively assess risks for shorter exposure periods.

6.4.2 Health Criteria for 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.

USEPA'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 1×10^{-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. USEPA considers total excess lifetime cancer risks within the range of 10^{-4} (one in ten thousand) to 10^{-6} (USEPA, 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 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 USEPA 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. USEPA'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 USEPA 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 USEPA to evaluate risks associated with several potential routes of exposure (USEPA, 1989b).

A number of the chemicals of potential concern have been classified as carcinogens or potential carcinogens by USEPA, and each of these has also been assigned a carcinogenicity weight-of-evidence category, as shown in **Table 6-7**. These chemicals are:

Group A - Human Carcinogens

Arsenic
Benzene
Chromium VI

Group B - Probable Human Carcinogens

Chloroform
Methylene Chloride
2,4-Dinitrotoluene
2,6-Dinitrotoluene
Benzo(a)anthracene
Benzo(a)pyrene

Benzo(b)fluoranthene
Benzo(k)fluoranthene
Carbazole
Chrysene
Dibenz(a,h)anthracene
Hexachlorobenzene
Indeno(1,2,3-cd)pyrene
N-Nitrosodiphenylamine
N-Nitroso-di-n-propylamine
Pentachlorophenol
bis(2-Ethylhexyl)phthalate
DDE, 4,4'-
DDD, 4,4'-
DDT, 4,4'-
Aldrin
Aroclor -1254
Aroclor-1260
Dieldrin
Heptachlor
Heptachlor epoxide
Toxaphene
alpha-Chlordane
alpha-BHC
gamma-Chlordane
Antimony
Beryllium
Cadmium
Lead

Group C - Possible Human Carcinogens

1,1-Dichloroethane
2,4,6-Trinitrotoluene
4-Methylphenol
Butylbenzylphthalate

Naphthalene
beta-BHC

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-4 with potential carcinogenic effects are shown in **Table 6-7** along with their cancer slope factors.

6.4.2.1 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 $(mg/kg\text{-}day)^{-1}$. Inhalation unit risk factors are reported in units of risk per concentration $(mg/m^3)^{-1}$. To make use of the unit risk factors in calculating risks they first had to be converted to inhalation slope factors in units of $(mg/kg\text{-}day)^{-1}$. This conversion was made by assuming an inhalation rate of 20 m^3/day and an adult bodyweight of 70 kg. Thus:

Inhalation slope factor $(mg/kg\text{-}day)^{-1}$

$$UnitRisk\left(\frac{ug}{m^3}\right)^{-1} \times \frac{day}{20m^3} \times 70kg \times \frac{1000ug}{mg}$$

6.4.2.2 Cancer Slope Factors for Dermal Exposure

As discussed above, USEPA has not derived toxicity values for the dermal route of exposure. In the absence of dermal reference toxicity values, USEPA has suggested (USEPA, 1989a) 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. The same values presented in Section 6.4.1.2 were used, however, if chemical specific modification factors were unavailable, oral values are 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 PAH's which are carcinogens at the point of contact, i.e., to skin.

6.4.2.3 Toxic Equivalency Factors

When slope factors and unit risks were not available for all potentially carcinogenic members of a chemical class, toxicity values were calculated using toxicity equivalency factors (TEFs). TEFs are values that compare the carcinogenic potential of a given chemical in a class to the carcinogenic potential of a chemical in the class that has a verified slope factor and/or unit risk. USEPA has provided TEFs for PAHs (USEPA, 1993b). TEF values are as follows:

PAH	TEF
Benzo(a)pyrene	**1.0**
Benzo(a)anthracene	**0.1**
Benzo(b)fluoranthene	**0.1**
Benzo(k)fluoranthene	**0.01**
Dibenzo(a,h)anthracene	**1.0**
Chrysene	**0.001**
Indeno(1,2,3-cd)pyrene	**0.1**

To calculate a slope factor or unit risk for a given PAH the appropriate TEF value is multiplied by the slope factor or unit risk for benzo(a)pyrene.

6.5 RISK CHARACTERIZATION

6.5.1 Introduction

To characterize risk, toxicity and exposure assessments were summarized and integrated into quantitative and qualitative expressions of risk. To characterize potential noncarcinogenic 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.

6.5.1.1 Noncarcinogenic Effects

The potential for noncarcinogenic 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:

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

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 noncarcinogenic effects posed by more than one chemical, a hazard index (HI) approach has been developed by the USEPA. 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:

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

Where:

E_i = the exposure level or intake of the I
toxicant, and
RfD_i = reference dose for the i^{th} toxicant.

While any single chemical with an exposure level greater that 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 noncarcinogenic 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.

6.5.1.2 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:

$$Risk = CDI \times SF$$

Where:

Risk = A unitless probability of an individual developing cancer,
CDI = Chronic Daily Intake over 70 years (mg/kg-day), and
SF = Slope Factor $(mg/kg\text{-}day)^{-1}$

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 USEPA assumes that the risks are additive. That is to say:

$$\mathbf{Risk_T = Risk1 + Risk2 + \ldots + Risk_i}$$

Where:

$Risk_T$ = Total cancer risk, expressed as a unitless probability, and
$Risk_i$ = Risk estimate for the ith 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}.

6.5.1.3 Tentatively Identified Compounds

VOC and semivolatile organic analyses of soil, sediment and surface water samples included tentatively identified compounds (TICs). While VOC TICs were found sporadically, semivolatile TICs were consistently found at total concentrations which often exceeded the total TCL compounds. The TICs consist primarily of unknown compounds and compounds not known to be toxic. It is likely that there is some risk added by the TICs at the site, but this risk is likely not significant when compared to the risk presented by the TCL chemicals.

6.5.2 Summary of Cancer and Noncancer Risks

Human health risks were calculated for one current and five future exposure scenarios:

- Current site worker
- Future outdoor park worker
- Future indoor park worker
- Future construction worker
- Future recreational visitor
- Future resident.

The potential exposure routes associated with each exposure scenario are as follows:

Current Site Worker: Inhalation of ambient air, ingestion of soil, and dermal contact with soil.

Outdoor Park Worker: Inhalation of ambient air, ingestion of soil, dermal contact with soil, ingestion of groundwater, and dermal contact with surface water and sediment.

Indoor Park Worker: Inhalation of indoor air, ingestion of surface dust, dermal contact with surface dust, and ingestion of groundwater.

Construction Worker: Inhalation of ambient air, ingestion of soil, and dermal contact with soil.

Recreational visitor (child): Inhalation of ambient air, ingestion of soil, dermal contact with soil, ingestion of groundwater, dermal contact with and inhalation of groundwater while showering, dermal contact with surface water and sediment, and ingestion of sediment.

Resident: Inhalation of ambient air, ingestion of soil, dermal contact with soil, ingestion of groundwater, dermal contact with and inhalation of groundwater while showering, dermal contact with surface water and sediment, and ingestion of sediment.

Tables 6-8 and 6-9 summarize the calculated cancer and noncancer risks for all exposure scenarios considered in this risk assessment. **Table 6-8** summarizes the reasonable maximum exposure (RME) scenarios and **Table 6-9** summarizes the central tendency (CT) scenarios. The risk calculations for each exposure scenario and exposure route are discussed in the following sections. **Tables 6-8 and 6-9** also serve as a guide to tables in **Appendix G,** which show risk calculations for each exposure route. The following sections highlight the exposure scenarios at each site which result in risks that exceed the USEPA defined targets (lifetime cancer risk range of 10^{-4} to 10^{-6}; non-cancer hazard index less than one).

6.5.2.1 Current Site Worker

Three exposure routes were evaluated for the site worker. The total cancer risk from all exposure routes is below the EPA target range for both the RME and CT. Likewise, the total non-cancer hazard index from all exposure routes is less than one for both the RME and CT.

TABLE 6-8
CALCULATION OF TOTAL NONCARCINOGENIC AND CARCINOGENIC RISKS
REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-4
SEAD- 4 Remedial Investigation
Seneca Army Depot Activity

RECEPTOR	EXPOSURE ROUTE	EXPOSURE/RISK CALCULATIONS Table Number	HAZARD INDEX	CANCER RISK
CURRENT SITE WORKER	**Inhalation of Dust in Ambient Air**	Table G-2	**5E-05**	**2E-08**
	Ingestion of Soil	Table G-11	**5E-03**	**5E-08**
	Dermal Contact to Soil	Table G-13	**1E-03**	**1E-08**
	TOTAL RECEPTOR RISK (Nc & Car)		*6E-03*	*8E-08*
FUTURE OUTDOOR PARK WORKER	**Inhalation of Dust in Ambient Air**	Table G-2	**3E-04**	**1E-07**
	Ingestion of Soil	Table G-11	**4E-02**	**4E-07**
	Dermal Contact to Soil	Table G-13	**9E-03**	**1E-07**
	Ingestion of Ground Water	Table G-19	**5E-02**	**8E-07**
	Dermal Contact to Surface Water	Table G-23	**4E-03**	**9E-06**
	Dermal Contact to Sediment	Table G-27	**3E-03**	**2E-08**
	TOTAL RECEPTOR RISK (Nc & Car)		*1E-01*	*1E-05*
FUTURE INDOOR PARK WORKER	**Inhalation of Dust in Indoor Air**	Table G-5	**1E-01**	**5E-07**
	Ingestion of Indoor Dust/Dirt	Table G-7	**5E+00**	**9E-05**
	Dermal Contact to Indoor Dust/Dirt	Table G-9	**2E+01**	**3E-04**
	Ingestion of Ground Water	Table G-19	**5E-02**	**8E-07**
	TOTAL RECEPTOR RISK (Nc & Car)		*2E+01*	*3E-04*
FUTURE RECREATIONAL VISITOR (CHILD)	**Inhalation of Dust Ambient Air**	Table G-2	**1E-04**	**1E-08**
	Ingestion of Soil	Table G-11	**3E-02**	**6E-08**
	Dermal Contact to Soil	Table G-13	**1E-03**	**4E-09**
	Inhalation of Ground Water	Table G-17	**6E-04**	**2E-09**
	Ingestion of Ground Water	Table G-19	**2E-02**	**6E-08**
	Dermal Contact to Ground Water	Table G-21	**2E-01**	**6E-07**
	Dermal Contact to Surface Water	Table G-23	**2E-02**	**6E-06**
	Dermal Contact to Sediment	Table G-27	**1E-02**	**1E-08**
	Ingestion of Sediment	Table G-25	**6E-02**	**4E-07**
	TOTAL RECEPTOR RISK (Nc & Car)		*4E-01*	*7E-06*
FUTURE CONSTRUCTION WORKER	**Inhalation of Dust in Ambient Air**	Table G-2	**6E-03**	**1E-07**
	Ingestion of Soil	Table G-11	**2E-01**	**1E-07**
	Dermal Contact to Soil	Table G-13	**1E-02**	**6E-09**
	TOTAL RECEPTOR RISK (Nc & Car)		*2E-01*	*3E-07*

TABLE 6-8 (cont.)
CALCULATION OF TOTAL NONCARCINOGENIC AND CARCINOGENIC RISKS
REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-4
SEAD- 4 Remedial Investigation
Seneca Army Depot Activity

RECEPTOR	EXPOSURE ROUTE	EXPOSURE/RISK CALCULATIONS Table Number	ADULT HAZARD INDEX	CHILD HAZARD INDEX	LIFETIME CANCER RISK
FUTURE RESIDENT	**Inhalation of Dust in Ambient Air**	Table G-2	**2E-03**	**3E-03**	**1E-06**
	Ingestion of Soil	Table G-11	**8E-02**	**8E-01**	**3E-06**
	Dermal Contact to Soil	Table G-13	**2E-02**	**3E-02**	**4E-07**
	Inhalation of Ground Water	Table G-17	**5E-03**	**2E-02**	**2E-07**
	Ingestion of Ground Water	Table G-19	**2E-01**	**5E-01**	**5E-06**
	Dermal Contact to Ground Water	Table G-21	**3E+00** *	**6E+00** *	**6E-05**
	Dermal Contact to Surface Water	Table G-23	**4E-02**	**5E-02**	**1E-04** **
	Ingestion of Sediment	Table G-25	**4E-02**	**4E-01**	**4E-06**
	Dermal Contact to Sediment	Table G-27	**3E-02**	**3E-02**	**2E-07**
	TOTAL RECEPTOR RISK (Nc & Car)		***3E+00***	***7E+00***	***2E-04***

Notes:

* Risk via this route are driven by Aroclor-1260. The reader is cautioned that these values grossly overestimate the risk due to low frequency of detection and excessive conservatism in the dermal absorption model for highly lipophilic compounds, such as PCBs See Sections 6.5.2.6 and 6.5.4 for further discussion.

**Risk via this route are driven by PAHs. The reader is cautioned that these values grossly overestimate the risk due to low frequency of detection and excessive conservatism in the dermal absorption model for highly lipophilic compounds, such as PAHs See Sections 6.5.2.6 and 6.5.4 for further discussion.

TABLE 6-9
CALCULATION OF TOTAL NONCARCINOGENIC AND CARCINOGENIC RISKS
CENTRAL TENDENCY (CT) - SEAD-4
SEAD- 4 Remedial Investigation
Seneca Army Depot Activity

RECEPTOR	EXPOSURE ROUTE	EXPOSURE/RISK CALCULATIONS Table Number	HAZARD INDEX	CANCER RISK
CURRENT SITE WORKER	Inhalation of Dust in Ambient Air	Table G-3	2E-05	3E-09
	Ingestion of Soil	Table G-12	1E-03	3E-09
	Dermal Contact to Soil	Table G-14	9E-05	3E-10
	TOTAL RECEPTOR RISK (Nc & Car)		*1E-03*	*6E-09*
FUTURE OUTDOOR PARK WORKER	Inhalation of Dust in Ambient Air	Table G-3	3E-04	3E-08
	Ingestion of Soil	Table G-12	2E-02	5E-08
	Dermal Contact to Soil	Table G-14	1E-03	5E-09
	Ingestion of Ground Water	Table G-20	5E-02	2E-07
	Dermal Contact to Surface Water	Table G-24	1E-02	9E-07
	Dermal Contact to Sediment	Table G-28	1E-03	4E-10
	TOTAL RECEPTOR RISK (Nc & Car)		*8E-02*	*1E-06*
FUTURE INDOOR PARK WORKER	Inhalation of Dust in Indoor Air	Table G-6	1E-01	1E-07
	Ingestion of Indoor Dust/Dirt	Table G-8	2E+00	1E-05
	Dermal Contact to Indoor Dust/Dirt	Table G-10	2E+00	8E-06
	Ingestion of Ground Water	Table G-20	5E-02	2E-07
	TOTAL RECEPTOR RISK (Nc & Car)		*4E+00*	*2E-05*
FUTURE RECREATIONAL VISITOR (CHILD)	Inhalation of Dust Ambient Air	Table G-3	7E-05	1E-09
	Ingestion of Soil	Table G-12	8E-03	3E-09
	Dermal Contact to Soil	Table G-14	1E-04	6E-11
	Inhalation of Ground Water	Table G-18	2E-04	1E-10
	Ingestion of Ground Water	Table G-20	7E-03	4E-09
	Dermal Contact to Ground Water	Table G-22	9E-02	5E-08
	Dermal Contact to Surface Water	Table G-24	7E-03	5E-07
	Dermal Contact to Sediment	Table G-28	9E-04	2E-10
	Ingestion of Sediment	Table G-26	2E-02	2E-08
	TOTAL RECEPTOR RISK (Nc & Car)		*1E-01*	*6E-07*
FUTURE CONSTRUCTION WORKER	Inhalation of Dust in Ambient Air	Table G-3	5E-03	9E-08
	Ingestion of Soil	Table G-12	4E-02	3E-08
	Dermal Contact to Soil	Table G-14	2E-03	9E-10
	TOTAL RECEPTOR RISK (Nc & Car)		*4E-02*	*1E-07*

TABLE 6-9 (cont.)
CALCULATION OF TOTAL NONCARCINOGENIC AND CARCINOGENIC RISKS
CENTRAL TENDENCY (CT) - SEAD-4
SEAD- 4 Remedial Investigation
Seneca Army Depot Activity

RECEPTOR	EXPOSURE ROUTE	EXPOSURE/RISK CALCULATIONS Table Number	ADULT HAZARD INDEX	CHILD HAZARD INDEX	LIFETIME CANCER RISK
FUTURE RESIDENT	**Inhalation of Dust in Ambient Air**	Table G-3	**1E-03**	**2E-03**	**2E-07**
	Ingestion of Soil	Table G-12	**3E-02**	**3E-01**	**3E-07**
	Dermal Contact to Soil	Table G-14	**2E-03**	**4E-03**	**1E-08**
	Inhalation of Ground Water	Table G-18	**2E-03**	**6E-03**	**2E-08**
	Ingestion of Ground Water	Table G-20	**1E-01**	**2E-01**	**7E-07**
	Dermal Contact to Ground Water	Table G-22	**2E+00** *	**3E+00** *	**1E-05**
	Dermal Contact to Surface Water	Table G-24	**1E-02**	**1E-02**	**7E-06**
	Ingestion of Sediment	Table G-26	**7E-03**	**6E-02**	**2E-07**
	Dermal Contact to Sediment	Table G-28	**1E-03**	**1E-03**	**3E-09**
	TOTAL RECEPTOR RISK (Nc & Car)		***2E+00***	***3E+00***	***2E-05***

Notes:
* Risk via this route are driven by Aroclor-1260. The reader is cautioned that these values grossly overestimate the risk due to low frequency of detection and excessive conservatism in the dermal absorption model for highly lipophilic compounds, such as PCBs. See Sections 6.5.2.6 and 6.5.4 for further discussion.

6.5.2.2 Future Outdoor Park Worker

Six exposure routes were evaluated for the outdoor park worker. The total cancer risk from all exposure routes is within the EPA target range for both the RME and CT. The total non-cancer hazard index from all exposure routes is less than one for both the RME and CT.

6.5.2.3 Future Indoor Park Worker

Four exposure routes were evaluated for the indoor park worker. For the RME, the total cancer risk from all exposure routes, 3 x 10^{-4}, exceeds the EPA target range. For both the RME and CT, the total non-cancer hazard index from all exposure routes is greater than one: RME HI=20, CT HI=4. Ingestion and Dermal Contact with Indoor Dust are the exposure routes responsible for the calculated risks. The chemical that drives all of these risks is Aroclor-1254. For the RME, Aroclor-1254 poses the following calculated risk levels: cancer risk = 2 x 10^{-4} (dust dermal contact), cancer risk = 4 x 10^{-5} (dust ingestion); HQ = 20 (dust dermal contact), HQ = 3 (dust ingestion).

6.5.2.4 Future Construction Worker

Three exposure routes were evaluated for the construction worker. The total cancer risk from all exposure routes is below the EPA target range for both the RME and CT. Likewise, the total non-cancer hazard index from all exposure routes is less than one for both the RME and CT.

6.5.2.5 Future Recreational Visitor (Child)

Nine exposure routes were evaluated for the child recreational visitor. The total cancer risk from all exposure routes is within the EPA target range for both the RME and CT. The total non-cancer hazard index from all exposure routes is less than one for both the RME and CT.

6.5.2.6 Future Resident

Nine exposure routes were evaluated for the future resident. For the RME, the total cancer risk from all exposure routes, 2 x 10^{-4}, exceeds the EPA target range. For both the RME and CT, the total non-cancer hazard index from all exposure routes is greater than one for both the adult and child resident. For the adult, the HI = 3 (RME) and 2 (CT). For the child, the HI = 7 (RME) and 3 (CT).

Dermal Contact with Groundwater and Surface Water are the exposure routes responsible for the calculated RME cancer risk. The chemicals that drive this risk level are: Aroclor-1260, cancer risk = 6×10^{-5} (groundwater dermal contact); and benzo(a)pyrene, cancer risk = 8×10^{-5} (surface water dermal contact).

Dermal Contact with Groundwater is the exposure route responsible for the calculated RME and CT adult and child non-cancer risk. The chemical that drives all of these risks is Aroclor-1260. For the RME, Aroclor-1260 exhibited the following calculated hazard quotients: HQ = 3 (adult), HQ = 6 (child). For the CT, Aroclor-1260 exhibited the following calculated hazard quotients: HQ = 2 (adult), HQ = 3 (child).

The reader is cautioned that the HQ and cancer risk values attributed to benzo(a)pyrene and Aroclor-1260 due to dermal contact with water are highly uncertain and may grossly overestimate actual risks. Both compounds were detected only once in their respective media (benzo(a)pyrene in surface water: 1 sample of 13, Aroclor-1260 in groundwater: 1 sample of 30). In both cases, the reported concentration was a very low estimated value, lower than the quantitation limit for the samples. Therefore, it is highly unlikely that either compound is pervasive in either surface water or groundwater across SEAD-4, and it is possible that the detections were analytical artifacts associated with the laboratory's effort to identify and semi-quantify compounds at very low concentrations. Also, in "Dermal Exposure Assessment: Principals and Applications", USEPA warns that its exposure assessment method for dermal contact with water during showering or swimming may yield seemingly unreasonable (i.e., counterintuitive) results. For instance, the absorbed dose due to dermal contact may exceed the dose received by direct ingestion of the same water. This, in fact, was the case for Aroclor-1260 in groundwater. It should also be noted that the single detected Aroclor-1260 concentration was below the applicable New York drinking water standard. These and other related issues are discussed further in the Uncertainty Section (Section 6.5.4).

6.5.3 Risk Characterization for Lead

The previous analyses of the current and future land use exposure scenarios do not include any quantification of risk for lead since no approved RfD, RfC, slope factor or inhalation unit risk currently are available. Lead was consistently detected at SEAD-4 in all media. This section qualitatively addresses the risk from lead exposure at SEAD-4.

The effects of lead are the same regardless of whether it enters the body through breathing or ingestion. The major health threat from lead arises from the damage it causes to the brain, especially in fetuses, infants and young children, which are not part of the current site users. Young and developing humans are highly sensitive to its effects. Also, young children are prone to ingest more lead as a result of normal mouthing behavior. Decreased IQ and reduced growth may result from childhood exposure. Fetal exposure may result in preterm birth, reduced birth weight, and decreased IQ. Some of the health effects of lead, particularly changes in the levels of certain blood enzymes and in aspects of children's neurobehavioral development, may occur at blood levels so low as to be essentially without a threshold.

Lead exposures may increase blood pressure in middle-aged men. High-level exposure can severely damage the brain and kidneys in adults or children. In addition, high doses of lead will cause abortion and damage to the male reproductive system. The USEPA currently does not provide any toxicity values for lead. The USEPA has placed lead in weight-of-evidence Group B2, indicating that it is a probable human carcinogen.

USEPA has developed different approaches for assessing risks from adult and child exposure to lead. To address adult exposures, EPA issued "Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil" (USEPA, December 1996). EPA has addressed residential soil exposures (including children) in the Office of Solid Waste and Emergency Response (OSWER) Interim Directive #9355.4-12 titled "Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities" (USEPA, August 1994). The analysis of potential risk from exposure to lead at SEAD-4 follows these recommendations for adult and child exposures, respectively.

Residential Exposure

To qualitatively assess risks from child residential lead exposure, the site concentrations are compared with the screening level presented in the OSWER Interim Directive #9355-12. In this Directive, EPA presents a screening level of 400 mg/kg lead in soil, based on the agency's running of the Integrated Exposure Uptake Biokinetic (IEUBK) Model with default parameters.

This Directive indicates that this screening level may be used a tool to determine which sites or portions of sites do not require further study.

Adult Occupational Exposure

To qualitatively assess risks from adult occupational lead exposure, the site concentrations are compared with risk-based remediation goals (RBRGs) presented in "Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil" (USEPA, December 1996). In this report, EPA presents a model to calculate target soil concentrations of lead (RBRGs) at which the exposure for a women of child-bearing age would minimize risk to her fetus. Thus, while adult exposure is addressed by EPA's analysis, the most sensitive receptor (i.e., the fetus) is being protected.

EPA has calculated RBRGs for lead in soil using their recommended default parameters as inputs to the model. For a worker population exposed for 219 days per year, EPA suggests an RBRGs in the range 750 - 1750 mg/kg lead in soil.

As shown in **Table 6-3**, the average concentrations for lead in surface soil, total soils and sediment range from 77 to 163 mg/kg, which are lower than any of the EPA recommended screening levels discussed above. The average lead concentration in solids inside the buildings is 3800 mg/kg, which is higher than the EPA recommended screening levels for soils. The EPC for indoor air, also shown in **Table 6-3** is 0.2 ug/m^3 while the highest outdoor air EPC is 0.006 ug/m^3. These values are lower than the National Ambient Air Quality Standard for lead, which is 1.5 ug/m^3 (based on a 3-month average).

These results suggest that lead may pose a health risk upon regular exposure to the site indoor solids. However, the soils, indoor air and ambient air exposure pathways do not appear to pose unacceptable risk from lead. The most susceptible receptors would be the future indoor park worker.

6.5.4 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.

6.5.4.1 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 which includes a complete list of the chemicals by media and their representative concentrations used in the risk assessment. The sampling and analysis was part of the comprehensive RI effort and addressed various objectives in addition to the risk assessment. Therefore, the samples were not collected randomly but were collected from areas of the site known to be contaminated. This type of non-random sampling biases the data collected toward overestimating chemical concentrations from the site. The judgmental bias in the sample collection also limits the applicability of statistics to the database. Because the statistics used to calculate the upper limit of the 95th-percentile confidence interval assume that the data represents a randomly distributed population, and the database does not, there is inherent uncertainty in the application of statistics. Collection of non-random, judgmental samples was necessary to adequately characterize the nature and extent of contamination which is an objective of the RI.

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, 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 95th UCLs were used to calculate site-related risks. Since that assumption implies chronic exposure to the 95th UCL concentration, this assumption is likely to overestimate risk.

If a chemical was detected, it was retained in the risk assessment regardless of how frequently it was detected. To calculate the upper limit of the 95th-percentile confidence interval, chemicals were assumed to be present in all samples in a media. When the chemical was not detected in a sample, one-half of the SQL was used. Especially for chemicals that were detected in only a few samples, the upper limit of the 95th-percentile confidence interval probably greatly overestimates the amount of the chemical present and, consequently, the risk from the chemical.

RAGS guidance (USEPA, 1989a) states that if a small number of TICs are present relative to TCL compounds, they can be eliminated in the risk assessment. This process has the possibility of underestimating risk.

The database also includes a number of data validation flags, indicating uncertainty in the reliability of the performance of the analyses done by the laboratory. Flagged data were retained following RAGS guidance.

6.5.4.2 Uncertainty in Exposure Assessment

There are inherent uncertainties in predicting future land uses and future chemical concentrations. Future land use scenarios were based on current plans for redevelopment of this portion of SEDA. Current land uses were identified by characterizing the site's physical setting.

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 park worker is assumed to occupy the buildings in their present condition. It is unlikely that these buildings will be used “as is” without some renovation. This assumption yields an overestimate of risk for this scenario.

Once pathways are identified, exposure point concentrations 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 exposure point concentrations and exposure assumptions and their potential impact on the assessment are described in the following paragraphs.

As summarized in **Table 6-5**, there are many factors which 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 RME scenarios particularly, upper bound values were selected for each exposure factor. In the calculations of RME exposure, these multiple upper-bound exposure factor estimates compound to yield intakes and absorbed doses which overestimate likely exposure levels.

There is further uncertainty in the quantitative dermal exposure assessments for soil and sediment, since these assessments have been limited to just five compounds with credible dermal absorption factors. Many other compounds were measured in soil and sediment which might be absorbed through the skin, although reliable quantitative absorption factors are not available. Ignoring this larger group of chemicals results in quantitative exposure estimates (absorbed doses) which underestimate the true potential exposures from dermal contact. Consequently, any risk associated with these compounds is also underestimated.

There is considerable uncertainty in the quantitative dermal exposure assessments for surface water (during swimming or wading) and groundwater (during showering). USEPA has cautioned that its recommended approach for calculating dermal exposures to organic chemicals in water may be overly conservative. EPA expressed concern that for some compounds its model estimates absorbed dose from dermal exposure during showering that are much greater than the dose from ingestion of 2 L/day of water. EPA further states that model validation is difficult due to a lack of data. This effect is most notable for compound with high estimated Kp values (Kp > 0.1 cm/hr), such as PCBs and PAHs. Consequently, risks associated with these compounds may be overestimated.

There is also uncertainty associated with using oral toxicity values to calculate dermal risks. As seen in the literature, there are differences between oral and inhalation absorption efficiencies. These differences vary and will likely cause either underestimation or overestimation of dermal risks. The efficiencies are generally within 1 order of magnitude of each other, so the uncertainty introduced is less than 1 order of magnitude.

The EPCs 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, that would reduce the current concentrations. Therefore, this steady state assumption tends to overestimate exposure levels.

6.5.4.3 Uncertainty in Toxicity Assessment

Of the chemicals of potential concern, a number had no reference dose or slope factors. They are:

- acenaphthylene
- benzo(g,h,i)perylene
- dibenzofuran
- phenanthrene
- Arochlor-1248
- calcium
- lead
- magnesium
- potassium
- sodium
- Endrin Aldehyde
- Endrin Ketone
- delta-BHC
- Methoxychlor
- 2-amino 4,6-dinitrotoluene
- 2-nitrotoluene
- 3-nitrotoluene
- 4-nitrotoluene
- nitrobenzene
- RDX

Several of these compounds have toxicity information such as weight of evidence classification indicating a strong potential for adverse health effects, particularly lead. The absence of toxicity values of these chemicals tends to underestimate risks.

There is considerable uncertainty inherent in the toxicity values for both carcinogens and noncarcinogens. 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 which 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 to calculate risks from dermal exposure because the USEPA has not derived toxicity values for this route of exposure. 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. This is due to the lack of scientific studies available to quantify dermal toxicity and carcinogenic potential for the vast majority of priority pollutants and because chemical specific information needed to convert ingested dose to absorbed dose is not available.

6.5.4.4 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 synergism's and antagonisms among chemicals, and assumes similarity in mechanisms of action and metabolism. Synergism is the amplification of one chemical's toxic effect by the presence of a second chemical. For example, it is known that smokers also exposed to asbestos have higher lung cancer incidence than either smokers or asbestos workers alone. Ignoring synergism to the extent that it may occur at environmental levels tends to underestimate risk. Antagonism is the reduction of one chemical's toxic effect by the presence of a second chemical. For example, certain foods (such as broccoli) contain chemicals believed to be anticarcinogenic. Ignoring antagonism tends to overestimate risk. Risks summed for chemicals having various weight-of-evidence classifications as well as different target organs may also tend to overestimate risk.

6.5.4.5 Uncertainty Pertaining to Dermal Risks from PCBs and PAHs in Water

As highlighted in the Risk Characterization section (Section 6.5.2.6), there is considerable uncertainty associated specifically with dermal exposures to PCBs and PAHs in surface water and groundwater at SEAD-4. Areas of uncertainty are discussed below:

1. Low frequency of detection. Aroclor-1260 (PCB) was detected in just one of 30 groundwater samples. Benzo(a)pyrene and other PAHs were detected in just one of 13 surface water samples. The statistical treatment of these datasets to develop EPCs is highly uncertain, since it is dominated by "non-detect" values and the underlying distributions cannot be determined. Potential exposures to compounds detected so sporadically cannot be characterized with confidence.

2. Compounds detected in one of two sampling rounds. Aroclor-1260 was detected in just one of two sampling rounds from the same set of wells. Therefore, its presence is unconfirmed in the second set of tests.

3. Concentrations reported below the Sample Quantitation Limit (SQL). The single detected results for both Aroclor-1260 in groundwater and benzo(a)pyrene in surface water were estimated values below the SQL. Identification and quantitation near the analytical detection is highly uncertain, and these results may be artifacts of the analytical process.

4. Dermal exposure modeling is highly uncertain. USEPA believes that its recommended model for estimating absorbed doses of organic compounds from dermal contact with water may overestimate true potential doses. Absorbed doses from dermal exposure that greatly exceed the ingestion dose from the same water are counterintuitive and do not appear to be realistic. The model has not been adequately validated.

5. Unrealistically high fraction of PCB in water absorbed during showering. A comparison of the absorbed dose of Aroclor-1260 during showering to the total mass of Aroclor-1260 contained in the water indicates that the dermal exposure model overestimates exposure. For example, the model estimates that the adult resident absorbs more than 30% of the Aroclor-1260 contained in the water released during the shower. The model used in this assessment assumed that 100% of the skin surface was in contact with the water (other researchers have estimated 40%). Therefore, PCB absorbed dose and risk are probably overestimated.

6.5.4.6 Central Tendency Risk

In addition to the RME risks detailed in previous sections, central tendency risks were calculated for the exposure scenarios. These results are summarized in **Table 6-9**. As described by EPA, the central tendency risk approximates the arithmetic mean or median risk, as opposed to the RME risk which describes exposures above the 90th percentile of the population distribution.

The central tendency risk is calculated by replacing some of the 95th percentile exposure parameters with 50th percentile or median values. For example, the 95th percentile value for employment at a single workplace, 25 years, is replaced by a more typical value of 7 years. Other values are replaced as described in the EPA guidance.

The central tendency risk, when compared to the RME risk helps to illustrate the uncertainty inherent in calculating only the RME risks. A comparison of **Table 6-8 to 6-9** indicates that the central tendency HI's are about 20% to 80% of the RME HI's and the central tendency cancer risks are <10% to 33% of the RME risks.

6.7 SUMMARY OF HUMAN HEALTH RISK ASSESSMENT

The human health risk assessment was performed in accordance with the USEPA's Risk Assessment Guidance for Superfund (EPA,1989b). The human health risk assessment considered six potential exposure scenarios: a current site worker, a future park worker, a future construction worker, a future recreational visitor, and a residential adult. The results of the human health risk assessment show that only a future industrial worker or construction worker has the potential to be exposed to chemicals of concern at levels that are above those defined by the USEPA

Human health risks were calculated for following exposure scenarios:

1) current on-site worker;
3) future outdoor park worker
3) future indoor park worker;
4) future on-site construction worker;
5) future recreational visitor;
6) future resident.

Of these receptors, only the future indoor park worker and future resident exhibit risks of cancer above the USEPA target risk range. These same receptors also exhibit non-cancer health risk.

As shown in Table 6-8, the RME excess cancer risk for the indoor park worker of 3 x 10^{-4} and the hazard index of 20 are due primarily to dermal contact with indoor dust. Ingestion of indoor dust also poses a non-cancer risk which results in a hazard index greater than 1. In evaluating this result, the likelihood of occupancy of buildings in their current state by park workers should be considered. If the buildings are renovated prior to occupancy, or if indoor park operations are housed in a new building, then the risks to future workers would be much lower than estimated in this assessment.

As shown in Table 6-8, the RME excess cancer risk for the resident of 2 x 10^{-4} and the hazard indices of 7 (child) and 3 (adult) are due primarily to dermal contact with groundwater and surface water. The combined ingestion of soil and sediment also poses a non-cancer risk which results in a hazard index greater than 1. These results are due to exposures estimated from the detection of very low levels of Aroclor-1260 in one groundwater sample and PAHs in one surface water sample. The Aroclor-1260 detection was found in the groundwater sample from MW4-10, which is located adjacent to Building 2084. These results are considered highly uncertain and probable overestimates of risk, as qualified in the Risk Characterization and Uncertainty sections of this report.

Both the carcinogenic and non-cancer health risks for all other receptors were within or below the USEPA target levels: the current site worker, future outdoor park worker, future construction worker and future recreational visitor.

The potential risks from exposure to lead in soil were assessed separately from other compounds. The soil and sediment results were compared with USEPA screening levels for residential and occupational exposures. The SEAD-4 average lead concentrations were all less than the applicable screening levels. Therefore, there is no expected health risk to resident children or working adults due to exposure to current or future lead at the site.

7.0 ECOLOGICAL RISK ASSESSMENT (ERA)

An ecological risk assessment (ERA) was undertaken at SEAD-4, the Munitions Washout Facility, to evaluate whether hazardous substance releases have the potential to cause adverse effects to ecological resources. This section provides a description of the methodology and results. Complete risk calculation tables, including toxicity reference values and estimated exposures, are provided in Appendix H.

7.1 INTRODUCTION

In addition to the evaluation of human health, potential risk posed by site contaminants to other environmental receptors must also be considered. The requirement for an evaluation of environmental risk to the ecological communities at this site is described in CERCLA, as amended by the Superfund Amendments and Reauthorization Act (SARA) and the New York Rules for Inactive Hazardous Waste Disposal Sites.

This ERA was conducted in accordance with several USEPA and New York State Department of Environmental Conservation (NYSDEC) guidance documents including "Ecological Risk Assessment Guidance for Superfund (ERAGS): Process for Designing and Conducting Ecological Risk Assessments" (USEPA, 1997), "Guidelines for Ecological Risk Assessment" (USEPA, 1998), "Fish and Wildlife Impact Analysis" (NYDEC, 1994).

The current USEPA ecological risk assessment paradigm includes eight general steps:

1. Screening-Level Problem Formulation and Effects Evaluation (toxicity).
2. Screening-Level Exposure Estimate and Risk Calculation.
3. Baseline Problem Formulation.
4. Study Design and DQO Process.
5. Verification of Field Sampling Design.
6. Site Investigation and Data Analysis.
7. Risk Characterization.
8. Risk Management (USEPA 1997).

The ecological risk assessment presented in this section includes a screening-level ecological risk assessment (SLERA, Steps 1 and 2) and further refinement of contaminants of concern (COCs).

Upon completion of screening-ERA Step 2, there is a Scientific Management Decision Point (SMDP) with three possible decisions:

- There is adequate information to conclude that ecological risks are negligible and therefore no need for remediation on the basis of ecological risks,
- The information is not adequate to make a decision at this point and the ERA process should continue to a baseline ERA, or
- The information indicates a potential for adverse ecological effects, and a more thorough assessment is warranted.

The results of this ERA indicate the contaminants of potential concern (COPCs). The refinement of COCs helps streamline the overall ERA process by considering additional components early in the baseline ERA. The results of the ecological risk assessment presented will be used to determine the need for further study. The baseline ERA if conducted will further evaluate potential or actual adverse ecological effects associated with site-related contaminants and results will be used to develop appropriate remedial measures, if required.

7.2 STEP 1A: SCREENING-LEVEL PROBLEM FORMULATION

This step considers environmental characteristics of the site, contaminants present, potential fate and transport processes, and potential receptor categories and exposure pathways. A brief ecological characterization is provided, COPCs are identified, and a preliminary conceptual site model (CSM) is presented.

7.2.1 Environmental Setting

This description of ecological characteristics of the SEAD-4 site is based on a combination of literature review, file searches, telephone interviews, office visits, and a site survey. The assessment included biological groups and special-interest resources associated with the site including vegetation, wildlife, aquatic life, endangered and threatened species, and wetlands. Information was obtained from various departments of the NYSDEC, Cornell University, the U.S. Fish and Wildlife Service (USFWS), and from various publications. Site-specific resource information was obtained from previous ecological characterizations, the Seneca Army Depot Natural Resources Management Plan (SEDA, 1992c), the Rare Species Survey Seneca Army Depot Activity (USFWS 1996), the Wetland Delineation Report for the New York State Department of Correctional Services (NYSOGS, 1998), and the Wetlands, Fish, and Wildlife Plan (SEDA, 1995). Regional information was obtained from the USGS quadrangle maps, the USFWS National Wetland Inventory maps, and digital ortho quadrangle aerial photography.

Site-specific habitat and wildlife species information was obtained during September 1999 site surveys performed by Parsons ES ecologists. During the field survey, observations and assessments were concentrated on undeveloped upland areas, ponds, and drainage swales within the study area. Only limited, informal biological sampling was conducted to determine the species present within the study area. Sampling included small mammal trapping on three consecutive nights, and seining in the artificial pond and drainage ditches for fish and invertebrates. No extensive quantitative sampling was conducted during this preliminary phase of the evaluation. A summary of the site ecological characterization is provided in this section. A complete ecological characterization of the site and 0.5-mile vicinity is provided in **Section 3.7**. The proposed future land use for this site is as a conservation/recreation area.

Physical Site Description

The Seneca Army Depot lies within the southern portion of the area described in the Ecological Communities of New York State (NYSDEC, 1990) as the Great Lakes Plain, on the northern edge of the Appalachian Plateau. The Seneca Army Depot is composed of approximately 10,600 acres of a high, broad plateau separating Cayuga Lake to the east, and Seneca Lake to the west. The topography across the installation slopes gently from 765 feet at the southeast corner to 585 feet at the northwest corner. All areas of the installation have been altered to varying degrees by management practices, whether from mission-related maintenance activities within the last 40 years, or from historical farming practices. With the on-going closure of the installation, some management activities such as mowing and silviculture have been reduced or terminated due to lack of manpower, or due to the change in mission. Off-base land use is predominantly agricultural and residential.

SEAD-4, part of the former Ammunition Workshop Facility, is approximately 30 acres in size, and is located in the southwestern portion of the SEDA. This area is part of the southwestern portion of the Indian Creek watershed that ultimately discharges into Seneca Lake near Sampson

Park. The site comprises various abandoned buildings, railroad tracks; a network of paved and gravel roads, an excavated pond, and undeveloped areas. The site has been filled, drained, and graded. The rocky substrate is shale excavated from a nearby borrow pit. Ditches draining the site are small, intermittent and do not support wetland species except in occasional depressions. The ditches either connect to Silver Creek to the east or Indian Creek to the west. Both creeks have been highly altered to enhance drainage. They have been excavated so that they are deeper, wider, and straighter and the spoil from the excavation has been placed on the banks to prevent flooding. The ditches/creeks also have been cleared and snagged of all streambed vegetation. These creeks form a confluence at the southern boundary of the installation.

Vegetative Communities and Habitat

In addition to the developed areas, the SEAD-4 site includes several large disturbed upland areas providing terrestrial habitat, and a small pond that provides aquatic habitat. Based on the site review, the extensive drainage ditches around the perimeter of the site contain water only very briefly after storm events. These areas in general do not support aquatic life. A detailed discussion is presented in the following section.

Terrestrial community types present include successional old field, successional scrub, and successional southern hardwoods. All wetlands within the 0.5-mile radius have been altered to some degree by land management practices. Natural creeks have been straightened and channelized, and former wetland areas have been drained and filled.

Successional Old Field. The majority of the SEAD-4 study area falls into this vegetation classification. This habitat type occurs in areas in which the vegetation and/or soil have been altered by clear-cutting, grading, draining, mowing, or other activities commonly associated with land management practices. The vegetative cover in these areas is limited to herbaceous species common to recently or routinely disturbed areas and includes numerous nuisance exotic and opportunistic species. All upland areas within the study area that do not support a shrub or tree stratum exceeding 50% cover fall into this classification. Much of the munitions storage area was routinely mowed for security measures, as were the shoulders of the roadways and the areas around facilities. Now that the base is officially closed, mowing has become less frequent or has been terminated altogether, and the opportunistic species are successfully competing with the introduced turf and native grass species. Depending upon the specific site conditions, species present include goldenrod, chickweed, New England aster, Queen Anne's lace, ragweed, wild strawberry, and dandelion. Many areas are rapidly succeeding into shrublands, as can be determined by the presence of red-osier dogwood, sumac, eastern red cedar sapling, multiflora rose, and serviceberry. This vegetation classification provided excellent habitat for the white-tailed deer which were often observed foraging in the old field areas adjacent to forest and shrub communities. Other species commonly observed in this habitat include eastern cottontail rabbit, numerous songbirds, red fox, and raccoon.

Successional Shrub. This vegetation classification is characterized by a dominance of shrub species, and less than 50% cover of canopy trees. The species in this community include red-osier dogwood, staghorn sumac, wild plum, European buckthorn, red raspberry, black cherry, wild rose, and saplings of early successional trees such as black locust, red maple, and tree-of-heaven. In drier areas, these shrubs can form dense thickets, while in depressions, the dominant species are more mesic varieties such as the red osier dogwood and red raspberry. The groundcover in the successional shrub community is usually dominated by various graminoid species, interspersed with opportunistic forb species. This vegetation community is very popular with songbirds, especially migrating species. Those observed in this area included cedar waxwing, American robin, brown thrasher, blue jay, mocking bird, European starling, gray catbird, and rufous-sided towhee. Also common in this habitat are the common and white white-tailed deer, raccoon, and eastern cottontail rabbit.

Successional Southern Hardwoods. Successional southern hardwood communities develop on sites that have cleared, graded logged, or otherwise disturbed. The canopy, which may form within 7 years of disturbance, is usually composed of fast-growing species that require a significant amount of light. When the canopy in this community becomes fairly dense, the canopy species usually do not reproduce because of the reduced sunlight, and shade-tolerant trees become established. This vegetation community is characterized by the dominance of early and mid-successional native and introduced tree species. Common canopy species include gray birch, black locust, American elm, silver maple, and eastern cottonwood. Understory species include those found in the old field communities. The wildlife found in this habitat included common white-tailed deer, black-capped chickadee, tufted titmouse, northern cardinal, northern flicker, downy woodpecker, raccoon, opossum, eastern gray squirrel, and the white white-tailed deer.

Artificial Pond. A small (0.72 acres) pond is located west of the abandoned buildings in the southern region of the installation. The pond was excavated historically as a shale gravel pit for fill material. More recently, the side slopes were graded to create littoral shelves, and the pond was stocked with bass. Currently, the pond provides little habitat, and seining the pond produced one small bass fingerling. The side slopes have a sparse cover of upland forb species and there are no emergent, floating, or submerged aquatic vegetative species, with the exception of green algae mats. The water is relatively clear, but stained dark. The substrate in the bottom of the pond is approximately one foot deep, and is black, flocculent muck with a sulfur odor. The water level in the pond was very low due to the severe drought this area had experienced during the previous summer, and appeared to be approximately 3 feet deep to the top of the muck. The normal water elevation was estimated to be at least 3.5 feet lower than the water level indicators on the side slopes. During the rainy season, the water in the pond increases and discharges through a 12" PVC pipe in the berm on the southern side of the pond. The discharge flows into a depression and then sheet-flows to the south. The depression was vegetated with cattail, but no other wetland indicator species were present. This pond offers marginal wildlife habitat due to the lack of vegetation and the low water volume. There are, however, numerous tracks of wading birds, raccoons, deer, and other wildlife around the pond, likely due to the fact that the pond is one of the few water sources on the installation.

Ditch/Artificial Stream. Several channelized streams and excavated drainage ditches are found throughout the study area. Only the largest of the ditches had standing water present, and no flow was observed. These large ditches were vegetated with cattail, purple loosestrife, cardinal flower, goldenrod, and other herbaceous species. Many of the ditches support common upland ruderal species and likely only function as conveyance systems during severe storms. No wildlife was observed in the ditches within the study area, although muskrat and beaver were observed in ditches in the northern portion of the installation. A detailed characterization of drainage ditch soils is presented in the following section.

Wildlife Resources. Wildlife resources at the Seneca Army Depot are intensively managed under a cooperative conservation and development plan developed in conjunction with the NYSDEC (1992). The objectives of the fish and wildlife management plan are to protect and develop habitat for the production of game and non-game species; control white-tailed deer harvest (with additional emphasis on white-tailed deer management); enhance non-game species populations for their aesthetic, recreational, and educational values; and establish long range goals for selected species including eastern bluebird, ring-necked pheasant, wood duck, white-tailed deer, and wild turkey.

Wildlife in the vicinity of SEAD-4 is primarily upland species, particularly those favoring old fields and shrublands, since these are abundant habitats in the study area. The mixture of these habitats with small woodlots and tree rows provides ideal habitat for white-tailed deer, which are common throughout the installation. Commonly occurring small game mammals in the installation include eastern cottontail, gray squirrel, raccoon, snowshoe hare, muskrat, beaver, eastern coyote, red fox, and gray fox. Ruffed grouse, ring-necked pheasant, and wild turkey also inhabit the depot. Waterfowl are attracted to wetlands on and around the depot, particularly the 87-acre "duck ponds" created in the northeast corner of the property during the 1970s. Many non-game species also are present in the depot and potentially utilize available habitat. Tracks of raccoon and rabbit were observed adjacent to the site.

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. Field investigation of the site determined that the surrounding area is highly modified and has a disturbed ecology resulting from management consistent with mission activities. Highly disturbed sites are characteristically colonized by opportunistic species and do not typically support rare or endangered flora and fauna. No rare or endangered species were observed during the site assessment.

The installation is the focus of wildlife and forestry management practices being conducted at the depot. Wildlife management efforts focusing on waterfowl, songbirds, and game populations have been conducted for many years. The habitat value of the SEAD-4 site itself is considered fair due to the recovery of the vegetative cover and the recent lack of human activity. Numerous songbirds were heard and observed around the site, and burrows and scat of the eastern cottontail were commonly observed.

7.2.2 Drainage Ditch Soil Characterization

In order to evaluate the ecological receptors of the drainage ditch system at the site, a site visit was conducted by Parsons expert on November 29, 2001 to characterize drainage ditch soils. Our observations at the site suggest that the drainage ditch system at the site does not support aquatic life. Therefore, ecological receptors of terrestrial habitat are appropriate to be selected to evaluate the environmental effects by the drainage ditches. The rationales supporting this conclusion include:

- Soils are non-hydric or not regulated as wetlands;
- Vegetation generally consists of plant species that occur predominantly in nonwetland habitats;
- Hydrology of the ditches does not supply a dependable habitat for benthic macroinvertebrates.

Soils are non-hydric or not regulated as wetlands

The USDA Soil Conservation Service Soil Survey for Seneca County was consulted. Two soil types are found at SEAD-4: Angola (AnA and AnB) and Darien (DaA). Though both soils are classified as 'Somewhat Poorly Drained', neither soil type is listed as hydric in the USDA NRCS list of Hydric soils of the United States (www.Statlab.iastate.edu/soils/hydric); the reference list used by the USACE in the revised 1987 Delineation Manual. Some areas where the ditches have been excavated into groundwater possess some hydric features. However, stormwater management is a necessary and beneficial activity that can create wetlands where none existed before. Nationwide Wetlands Permit #41 (Reshaping Existing Drainage Ditches) of the Code of Federal Regulations 33 Part 330 reads: "This nationwide permit does not apply to reshaping drainage ditches constructed in uplands, since these areas are not waters of the United States, and thus no permit from the Corps is required". The ditches at SEAD-4 were carved into upland soils Angola and Darien. The US Fish and Wildlife Service's National Wetland Inventory map for this area was also consulted. The map identified wetlands only in the northern portion of SEAD-4 (the swale area associated with samples SWSD4-14 through SWSD4-11).

Vegetation generally consists of plant species that occur predominantly in nonwetland habitats

Vegetation on the whole site is dominated by autumn olive (*Elaeagnus umbellate*) and poverty grass (*Aristida dichotomy*). Autumn olive was once extensively planted for erosion control, but today it is used less due to its tendency to spread over a site, limiting species diversity. Both autumn olive and poverty grass inhabit dry, disturbed soils. In the majority of ditches at SEAD-4, the vegetation was dominated by upland species of grasses and forbs as rated by Reed, P.B., Jr. (1988) in The National List of Plant Species that Occur in Wetlands: Northeast (Region 1). In some places, the ditches had been excavated down into the seasonal high groundwater table and supported wetland communities dominated by cattails and rushes. However, as described above, wetlands that form in stormwater drainage ditches that were carved into upland soils are not regulated under 33 CFR Part 330.

The site has excellent stormwater management. The water migrates down almost level ditches that essentially act as level spreaders for stormwater runoff. Dug sumps are generally present at roadway culverts. These small sumps sometimes support a limited wetland community (about 5 feet or less in diameter), but these sump areas are isolated and not part of larger wetlands ecosystems.

Hydrology of the ditches does not supply a dependable habitat for benthic macroinvertebrates

Though the Angola and Darien soils are not listed as hydric, the seasonal high groundwater is close to the surface (0.5 to 1.5 feet). In some locations, the stormwater ditches were excavated down to the groundwater, enabling these areas to sustain wetland vegetation. However, none of the ditches at SEAD-4 represent adequate habitat for benthic macroinvertebrate organisms.

Information contained in Dates and Byrne (1997) *Living Waters, Using Benthic Macroinvertebrates and Habitat to Assess Your River's Health*, River Network, Montpelier, VT is useful in assessing the habitat value of the SEAD-4 stormwater ditches for benthic macroinvertebrates. Benthic organisms are generally found in flowing waters. A current velocity of 0.5 to 2.5 feet per second supports the most diverse communities. Their habitat ranges from shallow, fast moving, rocky bottom areas known as riffles; to deeper, slower moving sandy and gravely bottom areas known as runs; to deep, slow moving muddy-bottom areas known as pools. The cobbly condition of riffles supports the widest variety of macroinvertebrates. Runs contain a smaller variety. And, the uniform bottoms of pools, with smaller soil particle sizes like sands and silts, provide very limited living spaces and surfaces for macroinvertebrates to hold onto. Thus, pools support only a very limited variety of macroinvertebrates. Some macroinvertebrates are very sensitive to temperature levels and fluctuations. Temperature also affects the amount of dissolved oxygen that the water can hold, with cold water holding the most. Macroinvertebrates are sensitive to water level fluctuations, since dry areas are no longer available for living, feeding, and breeding areas for aquatic organisms.

The stormwater ditches at SEAD-4 (including the swale area associated with samples SWSD4-14 through SWSD4-11), do not contain waters moving at a current velocity of 0.5 to 2.5 feet per second. No riffles or cobble bottoms are present. The ditch bottoms are, generally, well vegetated with a grasses and rushes. The soils in the ditches are composed of smaller soil particle sizes like loam and clay. When present, the shallow nature of the water in the ditches provides little insulation against temperature fluctuations. And, the intermittent nature of the water supply (rainfall) in most of the ditches would cause the ditches to be an undependable living, feeding, and breeding ground for benthic organisms.

The SEAD-4 swales currently provide groundwater recharge, stormwater storage, nutrient removal, and sediment stabilization. They could likely act as a "treatment area" for potential on site contamination. The stormwater ditch systems appears to be providing excellent stormwater management, and are likely keeping most stormwater runoff from leaving the site, by allowing the water to slowly infiltrate into the soils and back into the groundwater as the water migrates slowly down the nearly level ditch system.

Figure 7-1 shows the characterization of the ditch areas based on the above discussion.

7.2.3 Ecological COPCs

Contaminants of potential concern (COPCs) were identified by comparing maximum detected concentrations in samples collected during the RFI to ecological risk-based screening values. Soil sample and groundwater sample locations are provided in **Figures 2-8 and 2-9**. Surface water, drainage ditch soil, and sediment sample locations are provided in **Figures 2-10 and 2-11**. All analytical data were validated prior to inclusion in the ERA. Ecological risk-based criteria used for identification of COPCs were based on conservative (i.e., health protective) generic values derived by various regulatory bodies. Screening values are typically developed to address a wide variety of receptor species for that medium. These values are used to identify contaminants for further evaluation, and exceedances are not necessarily indicative of significant ecological risk.

An analyte was identified as COPCs if the maximum concentration was greater than the screening value or if there was no screening value available. Analytes with a frequency of detection less than 5% were not considered to be COPCs. This approach is in compliance with EPA's approach of reducing COPCs in evaluating human health risk (USEPA, 1989).

LEGEND

☐ Sediment - supportive of an aquatic environment

☐ Drainage Ditch - not supportive of an aquatic environment

🟧 Soil

200 0 200
(feet)

PARSONS
PARSONS ENGINEERING SCIENCE, INC.

SENECA ARMY DEPOT ACTIVITY
REMEDIAL INVESTIGATION
SEAD-4 MUNITIONS WASHOUT FACILITY

FIGURE 7-1
SOIL CHARACTERIZATION
WITHIN THE DITCHES AT SEAD-4

SCALE	DATE	REV
1:200	JAN 2002	SHEET 1 OF 1

O:\Seneca\ 4\Sead4-fs.apr

For this ERA, field sampling data were used to calculate the concentrations of COPCs identified in surface soil (0 to 1 foot bls), subsurface soil (0 to 4 feet bls), drainage ditch soil, surface water, and pond sediment. Statistical summaries for all detected analytes are provided in Appendix H on **Tables H.1 to H.4**. Comparisons of maximum detections to screening values are shown on **Tables H.5 to H.8**. COPCs are summarized on **Table 7-1** and **Table H.9**, and are discussed below.

Soil. Soil ecological COPCs were identified by comparing maximum detected concentrations to the lowest ecological risk-based screening values. Sources of screening values referenced include:

- Oak Ridge National Laboratory soil criteria (Elfroymson et al. 1997)
- Canadian soil quality guideline values (CCME 1997)
- Ministry of Housing, Spatial Planning and Environment criteria (1994)
- Updated Dutch Soil Cleanup Criteria (Petts et al. 1997)
- Dutch Soil Cleanup (Interim) Act Criteria (Beyer, 1990)

COPCs identified for surface and mixed soils, and screening values are provided on **Tables H.5 and H.6**, respectively.

Ecological COPCs for surface soil (0-1'bls) based on exceedance of screening criteria include:

- Five PAHs.
- Total PCBs.
- Five pesticides.
- Eighteen metals.

Additional surface soil contaminants identified as COPCs due to a lack of screening criteria included: one volatile and sixteen semivolatile compounds.

Table 7-1
List of Chemical by Media Quantified in the Ecological Assessment

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

COMPOUNDS	Surface Soil 0-1 ft.	Mixed Soil 0-4 ft.	Ditch Soil	Surface Water	Sediment
VOLATILE ORGANICS					
Acetone	X	X	X		X
Carbon Disulfide					X
Methyl ethyl ketone					X
SEMIVOLATILE ORGANICS					
2-Methylnaphthalene	X	X	X		
4-Methylphenol			X		X
Acenaphthene	X	X	X		
Acenaphthylene	X	X	X		
Anthracene	X	X	X		
Benzo(a)anthracene	X	X	X	X	
Benzo(a)pyrene	X	X	X	X	
Benzo(b)fluoranthene	X	X	X	X	
Benzo(g,h,i)perylene	X	X	X	X	
Benzo(k)fluoranthene	X	X	X	X	
bis(2-Ethylhexyl)phthalate	X	X	X		
Butylbenzylphthalate	X	X	X		
Carbazole	X	X	X	X	
Chrysene	X	X	X	X	
Dibenz(a,h)anthracene	X	X	X		
Dibenzofuran	X	X	X		
Di-n-octylphthalate	X	X			
Fluoranthene	X	X	X		
Fluorene	X	X	X		
Indeno(1,2,3-cd)pyrene	X	X	X	X	
Naphthalene		X			
N-Nitrosodipropylamine					X
Phenanthrene	X	X	X		
Phenol			X		
Pyrene	X	X	X		
Pesticides/PCBs					
4,4'-DDD	X	X	X		
4,4'-DDE	X	X	X		
4,4'-DDT	X	X	X		
Aldrin			X		
alpha-Chlordane				X	
Aroclor-1254	X	X	X		
Aroclor-1260			X		
Beta-BHC	X	X	X		
Dieldrin	X		X		
Endrin ketone			X		
Gamma-Chlordane				X	
HERBICIDES					
2,4,5-T					X
NITROAROMATICS					
1,3-Dinitrobenzene				X	
4-Amino-2,6-Dinitrotoluene					X
METALS					
Aluminum	X	X		X	X
Antimony	X	X	X		X
Arsenic	X	X			X
Barium	X	X		X	X
Beryllium	X	X			X
Cadmium	X	X	X	X	
Chromium (total)	X	X	X		X
Chromium VI	X	X	X		X
Cobalt		X		X	X
Copper	X	X	X	X	X
Iron	X	X		X	X
Lead	X	X	X	X	
Manganese	X	X		X	X
Mercury	X	X	X		X
Nickel	X	X			X
Selenium	X	X			
Silver				X	
Thallium	X	X			
Vanadium	X	X	X	X	X
Zinc	X	X	X	X	X

Ecological COPCs for mixed soil (0-4' bls, **Table H.6**) based on exceedance of screening criteria included:

- Six PAHs.
- Four pesticides.
- Total PCBs.
- Nineteen metals.

Additional mixed soil contaminants identified as COPCs due to a lack of screening criteria included: one volatile and sixteen semivolatile compounds.

An additional screening was conducted for metals in soils. Average metals concentrations in surface and mixed soils were compared to average background concentrations (**Tables 7-2A – 7 -2B**). It is assumed that local biota are adapted to naturally occurring metals concentrations, and only those metals that exceeded the 2 times average concentration were included as COPCs. Following this screening, eight metals were included as surface soil COPCs and six were included as mixed soil COPCs.

Drainage Ditch Soil. Drainage ditch soil COPCs were identified by comparing maximum detected concentrations to the lowest ecological risk-based screening criteria (**Table H.7A**). As discussed in Section 7.2.2, the drainage ditch systems at the site are nonwetlands or not regulated as wetlands. They do not support aquatic life. Therefore, the same criteria used for soil were used for screening the drainage ditch soil COPCs. Ecological COPCs for drainage ditch soil (**Table H.7A**) based on exceedance of screening criteria included:

- Six semivolatiles (including five PAHs)
- Two Aroclors
- Seven pesticides
- Eighteen metals

TABLE 7-2A
INORGANICS ANALYSIS OF SURFACE SOIL (0-1')
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

	Average of Background Soils (mg/kg)	2 x Average of Background Soils (mg/kg)	Average of SEAD-4 Surface Soils (0 - 1') (mg/kg)	Is Average of Site data > than 2 x Average of Background data?
Aluminum	13341	26681	11652	No
Antimony	3.56	7.12	8.21	Yes
Arsenic	5.08	10.15	4.96	No
Barium	78.43	156.86	79.71	No
Beryllium	0.67	1.33	0.55	No
Cadmium	0.97	1.94	0.17	No
Calcium	45450	90899	20529	No
Chromium (total)	20.32	40.64	916	Yes
Chromium, Hexavalent	0.00	0.00	8.15	Yes
Cobalt	11.39	22.79	10.12	No
Copper	20.99	41.97	464	Yes
Cyanide	0.27	0.54	0.41	No
Iron	24705	49409	23674	No
Lead	16.47	32.95	163	Yes
Magnesium	10290	20580	5502	No
Manganese	576	1152	508	No
Mercury	0.04	0.09	0.10	Yes
Nickel	30.39	60.79	29.49	No
Potassium	1487	2974	1422	No
Selenium	0.63	1.26	0.47	No
Silver	0.46	0.92	0.19	No
Sodium	99.42	199	68.56	No
Thallium	0.43	0.86	1.14	Yes
Vanadium	21.41	42.82	37.26	No
Zinc	67.80	136	229	Yes

Notes:

A "Yes" value indicates that site metal levels are higher than background levels and metal will be retained for risk assess

A "No" value indicates that levels are considered to be similar to background levels and metal will not be retained for risk assessment.

The list of background soil samples is presented in Appendix F.

Half of the detection limit was used for nondetects in the calculation of SEAD-4 averages.

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TABLE 7-2B
INORGANICS ANALYSIS OF MIXED SOIL (0-4')
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

	Average of Background Soils (mg/kg)	2 x Average of Background Soils (mg/kg)	Average of SEAD-4 Mixed Soils (0 - 4') (mg/kg)	Is Average of Site data > than 2 x Average of Background data?
Aluminum	13341	26681	12427	No
Antimony	3.56	7.12	6.98	No
Arsenic	5.08	10.15	5.08	No
Barium	78.43	157	78.96	No
Beryllium	0.67	1.33	0.57	No
Cadmium	0.97	1.94	0.17	No
Calcium	45450	90899	22339	No
Chromium	20.32	40.64	685	Yes
Chromium, Hexavalent	0.00	0.00	8.15	Yes
Cobalt	11.39	22.79	10.98	No
Copper	20.99	41.97	360	Yes
Cyanide	0.27	0.54	0.35	No
Iron	24705	49409	25303	No
Lead	16.47	32.95	113.97	Yes
Magnesium	10290	20580	6380	No
Manganese	576	1152	520	No
Mercury	0.04	0.09	0.08	No
Nickel	30.39	60.79	31.49	No
Potassium	1487	2974	1390	No
Selenium	0.63	1.26	0.40	No
Silver	0.46	0.92	0.23	No
Sodium	99.42	199	60.79	No
Thallium	0.43	0.86	0.96	Yes
Vanadium	21.41	42.82	32.18	No
Zinc	67.80	136	192	Yes

Notes:

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 r assessment.

The list of background soil samples is presented in Appendix F.

Half of the detection limit was used for nondetects in the calculation of SEAD-4 averages.

In addition, one volatile and sixteen semivolatiles (including eleven PAHs) were identified as COPCs due to a lack of screening criteria.

An additional screening was conducted for metals in soils. Average metal concentrations in drainage ditch soils were compared to average background concentrations (**Tables 7-2C**). Nine metals exceeded the 2 times average concentration and were included as drainage ditch soil COPCs.

Sediment. The ecological COPCs for the artificial pond sediment were identified by comparing the maximum concentrations of the pond sediment to the lowest ecological risk-based screening criteria. (**Table H.7B**) The criteria used were from the NYSDEC Technical Guidance for Screening Contaminated Sediments (NYSDEC, 1999) or from USEPA (USEPA, 1999). Ecological COPCs for sediment based on exceedance of threshold effects level (TEL) screening value included:

- One semivolatile
- Ten metals

In addition, three volatiles, one semivolatile, one nitroaromatic compound, one herbicide, and five metals were identified as COPCs due to a lack of screening criteria.

Surface Water. Surface water ecological COPCs were identified by comparing maximum detected concentrations to ecological risk-based screening criteria (**Table H.8**). These criteria, in the order in which they were applied, were:

- New York Ambient Water Quality Standards and Guidance Values (NY Division of Water, 1998); and
- USEPA Freshwater Surface Water Screening Values (USEPA, 1995).

TABLE 7-2C
INORGANICS ANALYSIS OF DITCH SOIL
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

	Average of Background Soils (mg/kg)	2 x Average of Background Soils (mg/kg)	Average of SEAD-4 Ditch Soils (mg/kg)	Is Average of Site data > than 2 x Average of Background data?
Aluminum	13341	26681	13005	No
Antimony	3.56	7.12	7.58	Yes
Arsenic	5.08	10.15	6.49	No
Barium	78.43	157	115	No
Beryllium	0.67	1.33	0.66	No
Cadmium	0.97	1.94	2.51	Yes
Calcium	45450	90899	34363	No
Chromium (total)	20.32	40.64	353	Yes
Chromium, Hexavalent	0.00	0.00	37.17	Yes
Cobalt	11.39	22.79	14.02	No
Copper	20.99	41.97	111	Yes
Cyanide	0.27	0.54		No
Iron	24705	49409	29238	No
Lead	16.47	32.95	85.46	Yes
Magnesium	10290	20580	6929	No
Manganese	576	1152	790	No
Mercury	0.04	0.09	0.21	Yes
Nickel	30.39	60.79	48.29	No
Potassium	1487	2974	1865	No
Selenium	0.63	1.26	1.08	No
Silver	0.46	0.92	0.49	No
Sodium	99.42	199	156	No
Thallium	0.43	0.86		No
Vanadium	21.41	42.82	53.56	Yes
Zinc	67.80	136	281	Yes

Notes:

A "Yes" value indicates that site metal levels are higher than background levels and metal will be retained for risk assess

A "No" value indicates that levels are considered to be similar to background levels and metal will not be retained for risk assessment.

The list of background soil samples is presented in Appendix F.

Half of the detection limit was used for nondetects in the calculation of SEAD-4 averages.

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Because surface water features do not intercept groundwater on-site, groundwater exposure pathways were considered incomplete for ecological receptors. Because groundwater pathways were considered incomplete, groundwater contaminants were not identified as ecological COPCs. Ecological COPCs for surface water based on exceedance of screening values include:

- One PAH.
- Two pesticides.
- Nine metals.

In addition, seven semivolatiles, one nitroaromatic, and two metals were identified as COPCs due to a lack of screening criteria.

As discussed in Section 7.2.2, the extensive drainage ditches around the perimeter of the site contain water only very briefly after storm events. These areas do not support aquatic life. Samples collected in these ditches after rain events were identified as surface water and were included as such in the initial screening.

7.2.4 Preliminary Ecological Conceptual Site Model (CSM)

Soil, drainage ditch soil, sediment and surface water COPCs include PCBs, pesticides, semivolatiles, volatiles, and metals. Ecotoxicity associated with these types of contaminants includes the effects associated with direct as well as indirect exposures. Contaminants such as PCBs have a demonstrated potential to bioaccumulate and pose risks to higher trophic level species consuming prey items in which these contaminants have accumulated. Other COPCs such as volatiles do not tend to accumulate significantly in most species and pose risks primarily through direct acute exposures.

The preliminary CSM identifies potentially complete contaminant exposure pathways for ecological receptors. A complete exposure pathway consists of a source and mechanism of contaminant release, a transport mechanism for the released contaminants, a point of contact, and a route of contaminant entry into the receptor. If any of these elements is missing, the pathway is incomplete. Although specific species are not evaluated at this stage of the ERA, general receptors are identified to allow evaluation of potentially complete pathways.

Soil invertebrates may be directly exposed to contaminants at the SEAD-4 site. For this screening assessment, potential impacts to invertebrates were qualitatively evaluated by comparing maximum detected concentrations to screening benchmarks for earthworms and microorganisms.

Small mammal populations likely to be present at SEAD-4 include shrews, and mice and other rodents. The short-tailed shrew is a carnivore, subsisting primarily on soil invertebrates. The shrew may be directly exposed to contaminants during burrowing activities and indirectly through prey consumption. For this reason, the shrew was considered representative of maximum exposures and was used to evaluate potential risk for small carnivorous mammals. Although toxicity data for shrews are scarce, surrogate data from controlled laboratory studies on mice and rats are available for most soil contaminants detected at SEAD-4.

An additional evaluation of soils was undertaken to account for potential contaminant uptake by plants. Although not observed on-site, the meadow vole was selected as the herbivorous mammalian receptor based on previous comments from NYSDEC. The meadow vole subsists almost entirely on vegetative matter. The vole may be directly exposed to contaminants during burrowing activities and indirectly through consumption of contaminated plant materials. For this reason, the vole was considered representative of maximum exposures and was used to evaluate potential risk for small herbivorous mammals. Although toxicity data for voles are scarce, surrogate data from controlled laboratory studies on mice and rats are available for most soil contaminants detected at SEAD-4.

In order to further evaluate the potential effects of contaminants uptaken by plants, a seed eating species was selected. The mourning dove, a granivorous bird, was selected. It was assumed that the majority of the dove's diet consists of plant matter with minor contributions from surface soil and animal matter. The dove was considered to be representative of the maximum exposure for seed-eating birds. Surrogate toxicity data from other avian species were used for soil contaminants found at SEAD-4.

A raptor, at the top of the food chain could be affected by bioaccumulative COPCs present in prey captured on-site. Raptor prey includes small and medium-sized vertebrates such as mice, rabbits, and herptiles that could accumulate soil contaminants. A red-tailed hawk was selected to evaluate raptors because it was observed near the site. Red-tailed hawk exposure is almost entirely through the food chain. For this reason, the red-tailed hawk was considered representative of maximum exposures and was used to evaluate potential risk for raptors. Although toxicity data specific to the hawk are limited, surrogate avian toxicity data are available for most soil contaminants detected at SEAD-4.

Although little aquatic/wetland habitat is present at SEAD-4, the artificial pond does have permanent water and therefore may represent habitat for fish species, amphibians, and piscivorous wetland birds. Fish and amphibians may be exposed to surface water contaminants in the pond. Direct exposures were considered the primary exposure route. Largemouth bass, a free-swimming teleost fish, was chosen to evaluate direct exposure to surface water contaminants. The bass was selected because it is a common species that was found at the site. Aquatic toxicity data are available for most surface water contaminants detected at SEAD-4. The northern leopard frog, an amphibian, was chosen to evaluate direct exposure to surface water contaminants.

In addition, higher trophic level wetland species like wading birds may be exposed directly to contaminants in water and sediment or through ingestion of contaminants that bioaccumulate in prey. The great blue heron was selected because it was noted to be present during the site visit. Great blue heron prey includes primarily crustaceans, amphibians and small fish that could be exposed to contaminated sediment or surface water. Potential heron exposure is almost entirely through the food chain.

As discussed in Section 7.2.2, the drainage ditch systems at the site are nonwetlands or not regulated as wetlands. They do not support aquatic life. Therefore, the ecological receptors selected for the site soil (invertebrates, voles, shrews, doves, and hawks) will be used for the drainage ditch system at SEAD-4. Aquatic receptors selected for the artificial pond (bass, frog and great blue heron) are not used for ditch soils. The great blue heron feeds primarily on aquatic animal life and is adapted for wading in shallow water (USEPA, 1993); therefore, the artificial pond at the site provides a better habitat than the ditch systems. Based on the above discussion, invertebrates, voles, shrews, doves, and hawks are appropriate ecological receptors for the ditch systems.

The preliminary CSM for evaluation of potential ecological risk at SEAD-4 is summarized in **Figure 7-2**. As shown in this figure, potentially complete exposure pathways for contaminants at the SEAD-4 site include: direct exposures for soil and sediment invertebrates, direct and food chain exposures to soil and drainage ditch soil for terrestrial birds and mammals, direct exposures to surface water for fish and amphibians, and direct and food chain exposures to surface water and sediment for fish-eating birds.

7.3 STEP 1B: SCREENING-LEVEL EFFECTS EVALUATION (TOXICITY)

Contaminants exceeding screening criteria were identified as COPCs. Further evaluation of potential adverse effects to potential ecological receptors by the COPCs was conducted. This section presents the development of wildlife toxicity reference values (TRVs) and invertebrate risk screening values.

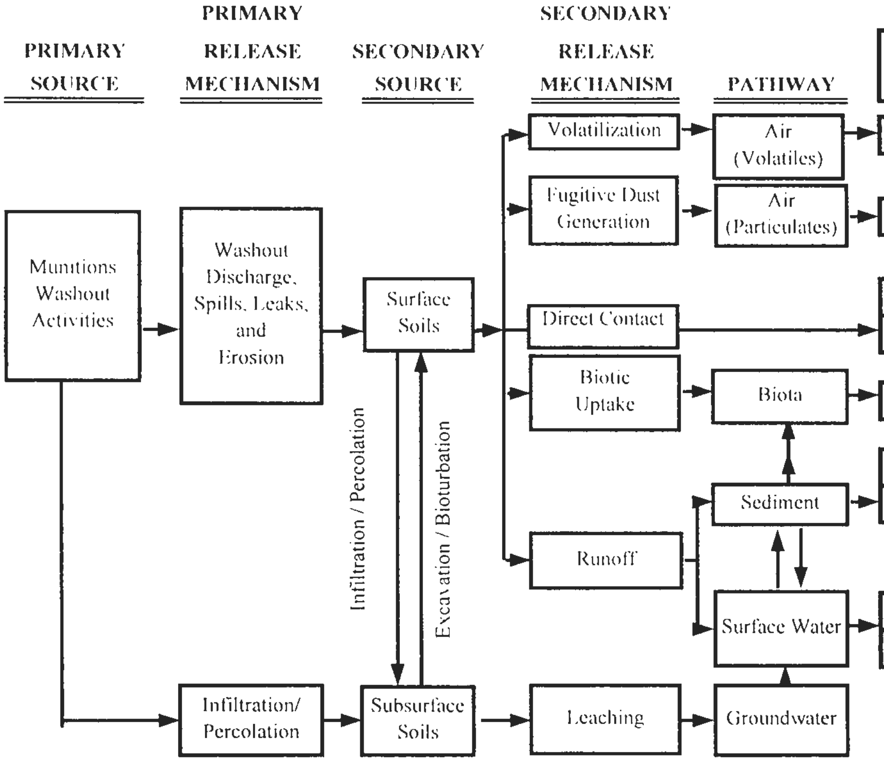
7.3.1 Invertebrate Risk Screening for Soil and Sediment COPCs

For soil and drainage ditch soil COPCs, potential adverse impacts to soil invertebrates, and soil microorganisms and microbial processes were assessed by comparing maximum detected concentrations in soil samples and drainage ditch soil samples to screening benchmarks (Efroymson, Will, and Suter 1997). Screening benchmarks were available for metals and a few organic COPCs.

7.3.2 Development of Wildlife TRVs for Soil and Sediment COPCs

To evaluate potential adverse effects for wildlife exposure to site contaminants, estimated exposures are compared to TRVs. 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 at the site. In accordance with USEPA guidance, the lowest available, appropriate toxicity values were used with modifying factors to ensure a conservative (protective) screening-level evaluation.

FIGURE 7-2
CONCEPTUAL SITE MODEL FOR ECOLOGICAL RISK
SEAD-4
Seneca Army Depot, NY



EXPOSURE ROUTE$^{(3)}$	POTENTIAL ECOLOGICAL EXPOSURE PATHWAYS$^{(1)}$								
	Soil					Surface Water/Sediment			
	Soil Inverts	Vole	Shrew	Hawk	Dove	Sediment Inverts	Largemouth Bass	Heron	Frog
Inhalation	—	○	○	○	○	—	—	—	—
Inhalation	—	○	○	○	○	—	—	—	—
Ingestion	○	●	●	○	●	—	—	—	—
Contact	○	○	○	○	○	—	—	—	—
Ingestion	—	●	●	●	●	—	○	●	—
Ingestion	—	—	—	—	—	○	—	●	—
Contact	—	—	—	—	—	○	—	○	○
Ingestion	—	—	—	—	—	—	●	●	●
Contact	—	—	—	—	—	—	●	○	●

Legend

→ = Pathways -- past, current, and hypothetical future
● = Principal pathways for quantitative evaluation
○ = Pathways for qualitative evaluation only
— = Incomplete pathways

Note:

1 Potentially complete ecological exposure pathways under current and future land use scenarios

The order of taxonomic preference when choosing TRVs was data from studies using (1) native species potentially present at the site, or (2) proxy species, such as commonly studied laboratory species. The preferred toxicity test was the lowest appropriate chronic No Observed Adverse Effect Level (NOAEL) for non-lethal or reproductive effects. Values based on chronic studies were preferred. If NOAEL data were not available for a contaminant, the next preferred endpoints for TRV derivation were chronic or subchronic Lowest Observed Adverse Effect Levels (LOAEL), then acute endpoints including LD_{50} (median lethal dose) in diet, or an LC_{50} (median lethal concentration).

When preferred toxicity tests were not available, other toxicity values selected from the literature were modified through the application of conversion factors to derive a TRV for each COPC. Two factors are used to convert other types of study results into TRVs comparable to NOAEL and LOAEL studies. The factors are used to adjust for 1) study duration, and 2) end point (e.g. LD 50 or LC 50). These factors were multiplied together to derive the total conversion factor. The reported effects dose was divided by the total conversion factor to account for potential uncertainties in extrapolation from one endpoint to another. Support for the conversion factors used in this assessment come from EPA guidance (USEPA 1997), which is based on data reviews of large numbers of exposure studies. Application of conversion factors to individual studies was based on professional judgement.

Bird NOAEL and LOAEL TRVs and the data used to derive them including test organisms, effect dose, and study duration, are summarized in **Tables H.10 and H.11**. Small mammal NOAEL and LOAEL TRVs and information used to derive them including test organisms, effect dose, and study duration, are summarized in **Tables H.12 and H.13**. Fish TRVs and the information used to derive them including test organism, effect dose, and study duration, are summarized in **Table H.14.** Adverse effects concentrations for amphibians are presented in **Table H.17**.

TRVs were not available for several volatile or semivolatile organic COPCs detected in soil samples. For some of these, maximum detects were above screening criteria, for others no screening criteria were available. No TRVs for birds were available for butylbenzylphthalate, carbazole, di-n-octylphthalate, phenol, antimony, and iron. No TRV for mammals was available for dibenzofuran. No TRV for fish was available for dibenzofuran. Potential ecological risks associated with these contaminants could not be further evaluated.

7.4 STEP 2A: SCREENING-LEVEL EXPOSURE ESTIMATE

To compare potential wildlife exposures to adverse effect levels, an estimate of contaminant exposures, in dosage or concentration, is required. Exposure estimates are concentrations of COPCs in the site media and concentrations or dosages of the contaminants to which the receptor is potentially exposed. These estimates may include direct exposure to site contaminants and/or food chain exposure to bioaccumulative contaminants.

Ecological exposures may involve processes that increase or decrease the exposure concentration above or below the measured concentrations in physical media. Thus, some exposure estimates incorporate exposure factors (e.g., dietary soil intake and bioaccumulation factors). Soil to plant uptake factors and bioaccumulation factors used to evaluate potential risk by soil COPCs at SEAD-4 are provided in **Table H.15**.

In order to quantify exposures of terrestrial wildlife receptors to each COPC in soil or drainage ditch soil, a daily intake of each contaminant was calculated. Conversion of the environmental concentration of each COPC in soil or drainage ditch soil to an estimated daily intake for a receptor at the site was necessary prior to evaluation of potential toxicity effects. Exposure rates for the terrestrial receptors were based upon ingestion of contaminants from soil or drainage ditch soil and from consumption of other organisms. The ERA did not attempt to measure potential risk from dermal and/or inhalation exposure pathways due to the scarcity of data available for these pathways.

For terrestrial wildlife, direct and indirect exposures were evaluated using an exposure model consistent with USEPA guidance (USEPA, 1995a, 1997). This simple model 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. Information regarding body weights, food ingestion rates, and dietary composition was obtained from several sources including USEPA's Wildlife Exposure Factors Handbook (USEPA, 1993). For upland birds and mammals, algorithms from Nagy (1987) were used to estimate food intake based on body mass. Average body weights for the short-tailed shrew, meadow vole, mourning dove, red-tailed hawk, and great blue heron, along with food intake estimates are summarized on **Table H.16**. Exposure calculations are provided in additional tables in **Appendix H**.

Because the feeding habits of terrestrial mammals may include ingestion of contaminated plant materials (e.g., seeds) and soil invertebrates, potential exposures to bioaccumulative soil contaminants in food items were evaluated using contaminant-specific soil-to-plant uptake factors and bioaccumulation factors. The soil-to-plant uptake factors were obtained from the scientific literature. Bioaccumulation factors were calculated based on chemical-specific partitioning coefficients from the literature. Soil-to-plant uptake factors and bioaccumulation factors are provided in **Table H.15**. All calculations and assumptions used to estimate daily intakes for soil and biota are provided in exposure calculation tables for each receptor.

For fish-eating birds, potential contaminant exposure includes ingestion of surface water, ingestion of sediment, and ingestion of contaminated prey organisms. Direct and indirect exposures were evaluated using an exposure model consistent with USEPA guidance (USEPA 1995a, 1997). This simple model accounts for exposure via incidental ingestion of contaminated sediment, and ingestion of lower trophic level animals associated with sediment or surface water contamination. Information regarding body weights, food ingestion rates, and dietary composition was obtained from several sources including USEPA's Wildlife Exposure Factors Handbook (USEPA, 1993). Body weights, intake estimates and dietary breakdown for the great blue heron are summarized in **Table H.16**.

For organic COPCs in sediment, partitioning coefficients (Koc) were used to estimate pore water concentrations. For sediment metal COPCs, partitioning coefficients (Kd) were used to estimate pore water concentrations. Bioaccumulation factors (BAFs) were used to estimate heron intake from contaminated prey (fish). BAFs were calculated using BCFs, which estimate concentration from the water to an aquatic prey item, and food chain multipliers (FCMs), which account for increasing concentrations at higher trophic levels (USEPA 1995a). In accordance with USEPA guidance, BCFs were used as reported in the literature, or derived from octanol water coefficient (log Kow) values. All factors used to estimate heron exposures including partitioning coefficients, BAFs, BCFs, and FCMs are provided in exposure calculation tables in **Appendix H**.

7.5 STEP 2B: SCREENING-LEVEL RISK CALCULATION

The risk calculation step uses the results of the wildlife exposure and toxicity reference values to calculate a hazard quotient (HQ) for each COPC. An HQ is a ratio of the estimated exposure dose (for mammal and bird receptors) or exposure concentration (for fish) of a contaminant to the TRV. Generally, the greater this ratio, or quotient, the greater the likelihood of an effect. A quotient equal to one is considered the threshold level at which effects may occur.

It should be emphasized that this is a screening level ERA and as such will likely overestimate risks because conservative (protective) estimates of potential chronic exposures and toxicity are used. For instance, it is assumed, but highly unlikely, that a receptor will only be exposed to maximum detected concentrations of all contaminants at the site. Further, the NOAEL TRVs used to calculate the HQs are, in general, highly conservative. The results of Steps 1 and 2 are not necessarily intended to reflect actual conditions at the site but to help focus efforts of further study, if necessary. HQs for mammal, bird, and fish receptors, for soil, drainage ditch soil, pond sediment, and surface water contaminants are reviewed below.

7.5.1 COPCs with NOAEL HQs Greater than One

For mammal and bird receptors, HQs were calculated for the no observable adverse effects level (NOAEL) assuming a site utilization factor of 100%. TRVs based on reported NOAEL values for avian species were compared to estimated exposures for three avian receptors, the great blue heron, the red-tailed hawk, and the mourning dove. TRVs based on reported NOAEL values for rodents were compared to estimated exposures for two mammal receptors, the short-tailed shrew and the meadow vole. TRVs based on reported NOAEL values for aquatic species were compared to estimated exposures for the largemouth bass. NOAEL HQs for soil, drainage ditch soil, surface water, and sediment contaminants are discussed in the following subsections.

Soil COPCs

To evaluate potential ecological risks associated with soil contaminants at SEAD-4, assessment endpoints of no substantial adverse effects on survival, growth, and reproduction of resident mammal populations were selected. TRVs based on reported NOAEL values for avian species were compared to estimated exposures for two avian species (red-tailed hawk and mourning dove). TRVs based on reported NOAEL values for rodents were compared to estimated exposures for mammals (short-tailed shrew and meadow vole). Estimated exposures to surface and subsurface soil COPCs for the vole, shrew, hawk, and dove are provided on **Tables H.18-19, H.22-23, H.26-27**, and **H.30-31,** respectively. Calculated HQs for surface and subsurface soil COPCs for the vole, shrew, hawk, and dove are provided on **Tables H.20-21, H.24-25, H.28-29**, and **H.32-33,** respectively. In addition, an invertebrate risk screen for earthworms and microorganism was performed and is presented in **Table H.34**.

Soil COPCs generating NOAEL max HQs greater than one for bird and/or small mammals included benzo(a)pyrene, bis(2-ethylhexyl)phthalate, di-n-octylphthalate, total Aroclor, 4,4'-DDT, antimony, chromium (total), chromium VI, copper, lead, mercury, thallium, and zinc (see **Tables 7-3 and 7-4**).

Chemicals evaluated with NOAEL HQs greater than one based on the maximum concentration (NOAEL max) for the vole include antimony and lead in surface and mixed soils. For the shrew, NOAEL max HQs were calculated to be greater than one for bis(2-ethylhexyl)phthalate, di-n-octylphthalate, total Aroclor, chromium (total), copper, lead, and zinc in surface and mixed soils; benzo(a)pyrene in mixed soils only; and antimony and thallium in surface soils only. The NOAEL max HQ exceeded one for the dove exposed to bis(2-ethylhexyl)phthalate, 4,4'-DDT, chromium (total), copper, lead, and zinc in both surface and mixed soils. For the hawk, bis(2-ethylhexyl)phthalate, total Aroclor, chromium (total), chromium VI, copper, lead, mercury, and zinc had a NOAEL max HQ greater than one for surface and mixed soils; and thallium for surface soils only. For the invertebrate screen, chromium (total), chromium VI, copper, lead, and zinc exceeded the respective benchmark values (**Table H.34**).

Drainage Ditch Soil COPCs

The same approach used to evaluate potential ecological risks associated with soil was used for drainage ditch soil contaminants at SEAD-4. Estimated exposures to drainage ditch soil COPCs for the vole, shrew, hawk, and dove are provided in **Tables H.35, H.37, H.39**, and **H.41,** respectively. Calculated HQs for drainage ditch soil COPCs for the vole, shrew, hawk, and dove are provided in **Tables H.36, H.38, H.40**, and **H.42,** respectively. In addition, an invertebrate risk screen for earthworms and microorganism was performed and is presented in **Table H.43**.

TABLE 7-3
Summary of Ecological Hazard Quotients > 1 - Surface Soil (0-1' bls)
SEAD 4
Seneca Army Depot, NY

Constituent	Herbivorous Mammal (Vole)				Carnivorous Mammal (Shrew)				Grainivorous Bird (Dove)				Carnivorous Bird (Hawk)			
	NOAEL Max HQ	NOAEL Mean HQ	LOAEL Max HQ	LOAEL Mean HQ	NOAEL Max HQ	NOAEL Mean HQ	LOAEL Max HQ	LOAEL Mean HQ	NOAEL Max HQ	NOAEL Mean HQ	LOAEL Max HQ	LOAEL Mean HQ	NOAEL Max HQ	NOAEL Mean HQ	LOAEL Max HQ	LOAEL Mean HQ
Semi-volatiles																
Bis(2-ethylhexyl)phthalate	0.0	0.0	0.0	0.0	**3.6**	0.2	0.4	0.0	**1.4**	0.1	**1.4**	0.1	**1.9**	0.1	**1.9**	0.1
Di-n-octylphthalate	0.0	NR	0.0	NR	**1.7**	NR	**1.7**	NR	--	--	--	--	--	--	--	--
PCBs/Pesticides																
Total PCBs	0.0	0.0	0.0	0.0	**12**	**1.8**	**1.2**	0.2	0.1	0.0	0.0	0.0	**1.8**	0.3	0.2	0.0
4,4'-DDT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**2.6**	0.0	0.3	0.0	0.4	0.0	0.0	0.0
Metals																
Antimony	**1.9**	0.1	0.2	0.0	**499**	**28**	**50**	**2.8**	--	--	--	--	--	--	--	--
Chromium (total)	0.0	0.0	0.0	0.0	**1.2**	0.1	**1.2**	0.1	**287**	**14**	**57**	**2.8**	**1581**	**78**	**316**	**16**
Chromium VI	0.0	0.0	0.0	0.0	0.8	0.4	0.2	0.1	0.2	0.1	0.0	0.0	**1.2**	0.7	0.2	0.1
Copper	0.4	0.0	0.3	0.0	**77**	**4.9**	**59**	**3.7**	**3.0**	0.2	**2.3**	0.1	**12**	0.7	**8.9**	0.6
Lead	**1.2**	0.0	0.1	0.0	**556**	**9.7**	**56**	1.0	**231**	**4.0**	**23**	0.4	**555**	**10**	**555**	**10**
Mercury	0.0	0.0	0.0	0.0	0.9	0.1	0.9	0.1	0.6	0.1	0.3	0.0	**1.1**	0.1	**1.1**	0.1
Thallium	0.5	0.1	0.1	0.0	**40**	**8.4**	**3.9**	0.8	0.6	0.1	0.6	0.1	**1.5**	0.3	**1.5**	0.3
Zinc	0.0	0.0	0.0	0.0	**29**	**3.2**	**14**	**1.6**	**17**	**1.9**	**1.8**	0.2	**151**	**17**	**17**	**1.9**

NOAEL - No Observed Adverse Effect Level

LOAEL - Lowest Observed Adverse Effect Level

HQ - Hazard quotient, calculated as HQ exposure rate based on maximum or mean soil concentration / NOAEL or LOAEL value

"--" Incalculable due to lack of toxicity values

1 - See text for explanation

NR Not Reported, mean concentration larger than max because of using 1/2 detection limit to calculate

TABLE 7-4
Summary of Ecological Hazard Quotients > 1 - Mixed Soil (0-4' bls)
SEAD 4
Seneca Army Depot, NY

Constituent	Herbivorous Mammal (Vole)				Carnivorous Mammal (Shrew)				Grainivorous Bird (Dove)				Carnivorous Bird (Hawk)			
	NOAEL Max HQ	NOAEL Mean HQ	LOAEL Max HQ	LOAEL Mean HQ	NOAEL Max HQ	NOAEL Mean HQ	LOAEL Max HQ	LOAEL Mean HQ	NOAEL Max HQ	NOAEL Mean HQ	LOAEL Max HQ	LOAEL Mean HQ	NOAEL Max HQ	NOAEL Mean HQ	LOAEL Max HQ	LOAEL Mean HQ
PAHs																
Benzo(a)pyrene	0.0	0.0	0.0	0.0	**1.7**	0.2	0.2	0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Semi-volatiles																
Bis(2-ethylhexyl)phthalate	0.0	0.0	0.0	0.0	**3.6**	0.1	0.4	0	**1.4**	0.1	**1.4**	0.1	**1.9**	0.1	**1.9**	0.1
Di-n-octylphthalate	0.0	NR	0.0	NR	**1.7**	NR	**1.7**	NR	--	--	--	--	--	--	--	--
PCBs/Pesticides																
Total PCBs	0.1	0.0	0.0	0.0	**54**	**1.5**	**5.4**	0.2	0.5	0.0	0.0	0.0	**7.9**	0.3	0.8	0.0
4,4'-DDT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	**2.6**	0.0	0.3	0.0	0.4	0.0	0.0	0.0
Metals																
Chromium (total)	0.0	0.0	0.0	0.0	**1.2**	0.0	**1.2**	0.0	**287**	**11**	**57**	**2.1**	**1581**	**58**	**316**	**12**
Chromium VI	0.0	0.0	0.0	0.0	0.8	0.4	0.2	0.1	0.2	0.1	0.0	0.0	**1.2**	0.7	0.2	0.1
Copper	0.4	0.0	0.3	0.0	**77**	**3.8**	**59**	**2.9**	**3.0**	0.1	**2.3**	0.1	**12**	0.6	**8.9**	0.4
Lead	**1.2**	0.0	0.1	0.0	**556**	**6.8**	**56**	0.7	**231**	**2.8**	**23**	0.3	**555**	**6.8**	**555**	**6.8**
Mercury	0.0	0.0	0.0	0.0	0.9	0.1	0.9	0.1	0.6	0.0	0.3	0.0	**1.1**	0.1	**1.1**	0.1
Zinc	0.0	0.0	0.0	0.0	**29**	**2.7**	**14**	**1.4**	**17**	**1.6**	**1.8**	0.2	**151**	**14**	**17**	**1.6**

NOAEL - No Observed Adverse Effect Level

LOAEL - Lowest Observed Adverse Effect Level

HQ - Hazard quotient, calculated as HQ = exposure rate based on maximum or mean soil concentration / NOAEL or LOAEL value

"--" Incalculable to to lack of toxicity values

1 - See text for explanation

NR - Not Reported, mean concentration larger than max because of using 1/2 detection limit to calculate

Drainage ditch soil COPCs generating NOAEL max HQs greater than one for bird and/or small mammals included benzo(a)pyrene, bis(2-ethylhexyl)phthalate, Aroclor-1254, Aroclor-1260, antimony, chromium (total), chromium VI, copper, lead, mercury, vanadium, and zinc (see **Table 7-5**).

For the shrew, NOAEL max HQs were calculated to be greater than one for all the above compounds except for chromium (total). Chemicals evaluated with NOAEL HQs greater than one based on the maximum concentrations (NOAEL max) for the vole include antimony and vanadium. The NOAEL max HQ exceeded one for the dove exposed to bis(2-ethylhexyl)phthalate, chromium (total), chromium (VI), lead, mercury, vanadium, and zinc. For the hawk, NOAEL max HQs were greater than one for all the above compounds except for benzo(a)pyrene. For the invertebrate screen, cadmium, chromium (total), chromium VI, copper, mercury, vanadium, and zinc exceeded the respective benchmark values (**Table H.43**).

Sediment COPCs

To evaluate potential ecological risks associated with sediment/surface water contaminants at SEAD-4, assessment endpoints of no substantial adverse effects on survival, growth, and reproduction of fish-eating bird populations were selected. TRVs based on NOAEL values were compared to estimated exposures for the great blue heron. Estimated exposures to sediment/surface water COPCs for the great blue heron are provided in **Tables H.44 and H.45**. Calculated HQs for sediment COPCs for the heron are provided in **Table H.46.**

Sediment/surface water COPCs generating NOAEL max HQs greater than one for the fish eating bird receptor (great blue heron) include aluminum, chromium (total), and zinc (**Table 7-6**).

TABLE 7-5
Summary of Ecological Hazard Quotients > 1 - Ditch Soil
SEAD 4
Seneca Army Depot, NY

Constituent	Herbivorous Mammal (Vole)				Carnivorous Mammal (Shrew)				Grainivorous Bird (Dove)				Carnivorous Bird (Hawk)			
	NOAEL Max HQ	NOAEL Mean HQ	LOAEL Max HQ	LOAEL Mean HQ	NOAEL Max HQ	NOAEL Mean HQ	LOAEL Max HQ	LOAEL Mean HQ	NOAEL Max HQ	NOAEL Mean HQ	LOAEL Max HQ	LOAEL Mean HQ	NOAEL Max HQ	NOAEL Mean HQ	LOAEL Max HQ	LOAEL Mean HQ
PAHs																
Benzo(a)pyrene	0.0	0.0	0.0	0.0	**10**	0.8	**1.0**	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Semi-volatiles																
Bis(2-ethylhexyl)phthalate	0.0	0.0	0.0	0.0	**12**	0.3	**1.2**	0.0	**4.7**	0.1	**4.7**	0.1	**6.2**	0.2	**6.2**	0.2
PCBs/Pesticides																
Aroclor-1254	0.0	0.0	0.0	0.0	**20**	**2.6**	**2.0**	0.3	0.2	0.0	0.0	0.0	**2.5**	0.3	0.2	0.0
Aroclor-1260	0.0	0.0	0.0	0.0	**8.4**	**1.6**	0.8	0.2	0.1	0.0	0.0	0.0	**1.1**	0.2	0.1	0.0
Metals																
Antimony	**1.0**	0.1	0.1	0.0	**279**	**26**	**28**	**2.6**	--	--	--	--	--	--	--	--
Chromium (total)	0.0	0.0	0.0	0.0	0.3	0.0	0.3	0.0	**74**	**5.5**	**15**	**1.1**	**408**	**30**	**82**	**6.0**
Chromium VI	0.0	0.0	0.0	0.0	**8.8**	**2.0**	**2.2**	0.5	**2.5**	0.6	0.5	0.1	**13.9**	**3.2**	**2.8**	0.6
Copper	0.1	0.0	0.0	0.0	**10**	**1.2**	**7.9**	0.88	0.4	0.0	0.3	0.0	**1.6**	0.2	**1.2**	0.1
Lead	0.0	0.0	0.0	0.0	**22**	**5.1**	**2.2**	0.5	**9.3**	**2.1**	0.9	0.2	**22**	**5.1**	**22**	**5.1**
Mercury	0.0	0.0	0.0	0.0	**1.8**	0.2	**2.1**	0.2	**1.3**	0.1	0.6	0.1	**2.1**	0.2	**2.1**	0.2
Vanadium	**5.0**	0.2	0.4	0.0	**1338**	**63**	**134**	**6.3**	**1.8**	0.1	**1.8**	0.1	**11**	0.5	**11**	0.5
Zinc	0.0	0.0	0.0	0.0	**16**	**4.0**	**8.2**	**2.0**	**9.4**	**2.3**	**1.0**	0.3	**86**	**21.0**	**9.5**	**2.3**

NOAEL - No Observed Adverse Effect Level

LOAEL - Lowest Observed Adverse Effect Level

HQ - Hazard quotient, calculated as HQ exposure rate based on maximum or mean soil concentration / NOAEL or LOAEL value

"--" Incalculable due to lack of toxicity values

NR - Not Reported, mean concentration larger than max because of using 1/2 detection limit to calculate

TABLE 7-6
Summary of Ecological Hazard Quotients > 1 - Sediment and Surface Water
SEAD 4
Seneca Army Depot, NY

Constituent	Great Blue Heron NOAEL Max Hazard Quotient	Great Blue Heron NOAEL Mean Hazard Quotient	Great Blue Heron LOAEL Max Hazard Quotient	Great Blue Heron LOAEL Mean Hazard Quotient	Largemouth Bass Max Hazard Quotient	Largemouth Bass Mean Hazard Quotient	Northern Leopard Frog Max Hazard Quotient	Northern Leopard Frog Mean Hazard Quotient
Metals								
Aluminum	**4.8**	**2.1**	**4.8**	**2.1**	**6.6**	0.8	**147**	**17**
Cadmium	na	na	na	na	**23**	**3.7**	0.3	0.0
Chromium (total)	**42**	**26**	**8.5**	**5.2**	na	na	na	na
Cobalt	--	--	--	--	**3.3**	0.5	--	--
Copper	0.8	0.4	0.6	0.3	0.1	0.0	**1.9**	0.5
Iron	--	--	--	--	**11**	**1.3**	--	--
Manganese	0.0	0.0	0.0	0.0	**1.8**	0.2	--	--
Vanadium	0.0	0.0	0.0	0.0	**14**	**2.6**	--	--
Zinc	**6.5**	**1.2**	0.7	0.1	**4.1**	0.5	0.2	0.0

"--" Incalculable to to lack of toxicity values.
na - Not a COPC in this media.

Surface Water COPCs

To evaluate potential ecological risks associated with direct exposure to surface water contaminants at SEAD-4, assessment endpoints of no substantial adverse effects on survival, growth, and reproduction of fish populations were selected. TRVs based on NOAEL max values were compared to estimated exposures for the largemouth bass. Estimated exposures to surface water COPCs for the largemouth bass are provided in **Table H.47**. Calculated HQs for surface water COPCs for the bass are provided in **Table H.48**. Surface water COPCs generating max HQs greater than one for the fish receptor includes aluminum, cadmium, cobalt, iron, manganese, vanadium, and zinc (**Table 7-6**).

To evaluate potential ecological risks associated with exposure to surface water by amphibians, HQs were calculated by comparing mean and max exposure concentrations with effects levels (**Table H.49**). Calculated HQs for amphibians (northern leopard frog) are provided in **Table H.50**. The only surface water COPCs with concentrations that generated max HQs greater than one was aluminum and copper (**Table 7-6**).

Uncertainties for ERA Steps 1 and 2

Exposure associated with intake of contaminants through the food chain was addressed by modeling food chain transfer of chemical residues through plants and prey items. This may result in overestimation or underestimation of risk. The degree of uncertainty in the exposure estimate increases with the increasing distance of the receptor from the base of the food chain. No site-specific data are available for bioaccumulation or bioconcentration factors.

Exposure from dermal contact and inhalation of contaminants were not quantifiable for ecological receptors. However, this does not significantly increase the uncertainty of the estimated exposure because, for most receptors, exposure via these routes is likely to be minimal relative to intakes via ingestion.

Exposure to sediment COPCs was conducted by estimating pore water concentrations from measured sediment concentrations, where surface water concentrations are not available. Considerable uncertainty is inherent in the factors used in this estimation, especially for the metals. This method may tend to overestimate or underestimate risk, depending on valence state of the metal, and organic carbon content, bulk density, and pH of the sediment.

There is uncertainty associated with the TRVs used for this ERA because the majority of the toxicity data were not specific to receptors at this site. However, the TRVs used were conservative, and modified by conversion factors where necessary to increase the applicability of the data to the assessment. The HQs calculated from conservative TRVs, maximum detection exposure concentrations, 100% relative bioavailability, and 100% site utilization factors are intended to provide confidence that the risk assessment yields reasonably conservative estimates of the potential risk of adverse ecological effects on the assessment endpoints. The approach is in compliance with the ERAG (USEPA, 1997). There is also uncertainty associated with overall risks due to a lack of toxicity data for some chemicals, since HQs could not be evaluated.

7.6 ERA STEP 3: PROBLEM FORMULATION

For Steps 1 and 2, conservative (i.e., health protective) assumptions were used to calculate screening level HQs in compliance with the ERAG (USEPA, 1997). These highly conservative assumptions in general would result in overestimation of the risks to the ecological receptors. Section 7.6.1 presents several default assumptions used in the SLERA and their effects on the risk evaluation. Due to the conservative nature of these assumptions, additional evaluation is required to more fully characterize and focus on potential ecological risks and determine if further evaluation is warranted. This additional risk characterization performed as part of the ERA Step 3 is discussed in Sections 7.6.2 through 7.6.5 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.

7.6.1 Overall Conservative Evaluation of Ecological Risks in Steps 1 and 2

As guided by the ERAG, 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 presents three major parameters for which conservative estimations were used: the relative bioavailability, the foraging factor, and the NOAEL/LOAEL multiplier. In addition, the impact of SEAD-4 to the habitat in the overall SENECA conservation/recreation area is addressed.

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 (diet, water, etc.). For example, metals in solid matrices are frequently bound to particles or complexed with other elements. These tendencies would tend to limit the bioavailability of chemicals of potential ecological concern to receptors.

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, and (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, quoted by 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).

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

Foraging Factor

Although the foraging factors were assumed to be one for the SLERA, the site foraging factors for the site-specific receptors, especially mourning doves and red-tailed hawks, are generally less than one, i.e., the receptors only spend part of the time at the site. For example, mourning doves are abundant from Alaska and southern Canada to Panama. Birds in the northern half of the breeding range are known to migrate in the fall to winter quarters in various southern locations, returning to breeding grounds in the spring (e.g., http://www.fs.fed.us/database/feis/animals/bird/zema/biological_data_and_habitat_requirements.html). Therefore, a foraging factor of 0.5 would be appropriate for the mourning dove. A foraging range of 576 acres is reported for the red-tailed hawks (Preston and Bean, 1993). As SEAD-4 is approximately 30 acres, the foraging factor for the hawk would be less than 10%. In addition, only part of SEAD-4 has been impacted by the contaminants. Therefore, the above foraging factors (0.5 for the mourning dove and 0.1 for the hawk) are still conservative estimates.

NOAEL/LOAEL Multiplier

A NOAEL is preferred to a LOAEL as a screening ecotoxicity value to ensure that risk is not underestimated (USEPA, 1997). However, NOAELs currently 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 ERAG, which is used to support the use of 0.1 as the NOAEL/LOAEL multiplier, indicates that 96% of chemicals included in the review had 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.

Impact to Habitat in the Overall Seneca Conservation/Recreation Area

A comparison of the affected area at SEAD-4 with the overall conservation/recreation area indicates that the impact to the habitat in the conservation/recreation area is minimal. Under the Reuse Plan and Implementation Strategy for Seneca Army Depot, SEAD-4 has been included in the conservation/recreation area, which encompasses approximately 7,585 acres. The area at SEAD-4, which has concentrations of lead and chromium exceeding the proposed goals, is approximately 2 acres, or 0.03% of the total acreage of the conservation/recreation area.

7.6.2 Identification of Soil COCs

Based on the calculated risk estimates in Step 2, five organic compounds and several metals were identified as potential soil COCs: benzo(a)pyrene (mixed soils only), bis(2-ethylhexyl)phthalate, di-n-octylphthalate, total PCBs, 4,4'-DDT, antimony (surface soil only), chromium (total), chromium VI, copper, lead, mercury, thallium (surface soil only), and zinc (see **Table 7-3**). The rationale for identifying or excluding each of these compounds as a COC is discussed below.

For benzo(a)pyrene, all HQs were less than one (**Table 7-3** and **7-4**) with the exception of the shrew NOAEL max HQ for mixed soils (1.7). No criteria were available to assess impacts to soil invertebrates (**Table H.34**). This compound is unlikely to generate ecological risk and should not be considered further.

For bis(2-ethylhexyl)phthalate, NOAEL max HQs for the shrew, dove, and hawk were greater than one (**Table 7-3** and **7-4**) but less than five, and all HQs based on the mean for all species were less than one. No criteria were available to assess impacts to soil invertebrates (**Table H.34**). Bis(2-ethylhexyl)phthalate has a low probability of generating ecological risk, and should not be considered further.

There were several limitations with assessing the ecological risk of di-n-octylphthalate. No TRV was available to assess exposure to birds. Also, the calculated mean concentration was greater than the maximum concentration because of the use of ½ of the detection limit for those samples with di-n-octylphthalate below the detection limit. No criteria were available to assess impacts to soil invertebrates (**Table H.34**). The NOAEL max and LOAEL max HQs for the shrew were just above one (1.7), and for the vole were less than one (**Table 7-3** and **7-4**). Additionally, frequency of detection was low; 7 of 71 surface soil samples and 14 of 177 mixed soil samples. Based on low HQs for mammal receptors and low detection frequency, di-n-octylphthalate should not be considered further.

Total PCB concentrations in mixed soils were higher than in surface soils and generated somewhat higher HQs, however the probability of receptor exposure to subsurface soils is lower. The highest subsurface HQ calculated (54) was the NOAEL max for the shrew. The HQ calculations were based on the maximum value of 1.6 mg/kg in a sample from 2 feet bls. This concentration was 5 times greater than the next highest concentration of 0.31 mg/kg in a surface soil sample. The single elevated subsurface soil sample results in HQs that are likely to overestimate exposure.

For surface soils, total PCB HQs for the dove and vole were less than one. The NOAEL max HQ for the hawk was greater than one (**Table 7-3** and **7-4**), but calculations based on a site foraging factor of 10% was all less than one (**Table 7-6**). For the shrew, HQs based on maximum concentrations were above one, but based on the mean were either just above one (1.8) or less than one. No criteria were available to assess impacts to soil invertebrates (**Table H.34**). Additionally, frequency of detection was low; 23 of 80 surface soil samples and 28 of 122 mixed soil samples. Based on low HQs and low detection frequency, PCBs should not be considered further.

For 4,4'-DDT, all HQs were less than one (**Table 7-3** and **7-4**) with the exception of the dove NOAEL max HQs for surface and mixed soils (2.6). No criteria were available to assess impacts to soil invertebrates (**Table H.34**). This compound is unlikely to generate ecological risk and should not be considered further.

Antimony exposure could not be assessed for birds because of the lack of a TRV value. No criteria were available to assess impacts to soil invertebrates (**Table H.34**). NOAEL max HQs for the meadow vole were just above one (1.9) and alternate HQ calculations were less than one. While all but one of the HQs for the shrew were greater than 10, the TRV for antimony is based on a drinking water study, and metals tend to be more bioavailable in their soluble forms. Antimony has been shown to adsorb strongly to most soils with a median percent adsorption of 93% and as much as 100% adsorption in several soil types (ATSDR, 1992). Therefore, antimony is not expected to be bioavailable at this site and should not be considered a COC.

Ecological risk from chromium in soils was assessed for both total chromium and chromium VI. The chromium VI is typically considered the most toxic of the forms of chromium, and was analyzed in a subset of soil samples (15 of 80). For chromium VI, all HQs were less than one (Table **7-3** and **7-4**) with the exception of the hawk NOAEL max HQs for surface and mixed soils (1.2). However calculations based on a site foraging factor of 10% were all less than one (**Table 7-6**). Chromium VI is unlikely to generate ecological risk and should not be considered further.

HQs for chromium (total) were consistently above one for the avian receptors. Additionally, chromium (total) contamination in the environment has been well studied, and concentrations at SEAD 4 are clearly elevated. Chromium (total) should be considered a contaminant of concern.

For copper, NOAEL max HQs for all soil receptors but the vole were greater than one. Copper exceeded the soil benchmark concentrations for impacts to invertebrates (**Table H.34**). However, with the exception of the LOAEL max HQ for the shrew, all alternative exposure calculations resulted in HQs of less than five (for hawk HQs based on 10% SFF, see **Table 7-6**), and many of these were less than one (**Tables 7-3** and **7-4**). The screening level ERA makes the initial assumption that the contaminant is 100% bioavailable, but this is typically not the case. Copper binds relatively strongly to soils. This adsorption to soils is less affected by pH than other metals, making copper less likely to become bioavailable in the acidic conditions of an animal's digestive tract (ATSDR, 1990). Therefore, copper is not expected to pose any significant adverse effects at the site and should not be considered a COC.

HQs for lead were consistently above one for all receptors but the vole. Additionally, lead contamination in the environment has been well studied, and concentrations at SEAD 4 are clearly elevated. Lead should be considered a contaminant of concern.

For mercury, all HQs were less than one (**Table 7-3** and **7-4**) with the exception of the hawk NOAEL and LOAEL max HQs for surface and mixed soils (1.1). Use of a hawk SFF of 10% (**Table 7-6**) resulted in all HQs less than one. The maximum concentration of mercury was less than the benchmark concentrations for impacts to invertebrates (**Table H.34**). This compound is unlikely to generate ecological risk and should not be considered further.

Another potential COC for soil was thallium. Thallium is considered a neurotoxicant like lead. Detection frequency of thallium was low (21%). HQs for all species but the shrew were less than one, and all alternate exposure calculations for the shrew were less than 10, with the LOAEL mean HQ less than one (**Tables 7-3 and 7-4**). The TRV for thallium is based on a drinking water study, and metals tend to be more bioavailable in their soluble forms. Based on the low detection frequency, three of four receptor species with HQs less than one, and the likelihood that use of a drinking water exposure study has resulted in an overestimation of risk, thallium should not be considered a COC.

For zinc, all receptors but the vole had NOAEL max HQs greater than one. However, with the exception of the shrew LOAEL max HQ of 14, alternative exposure calculations ranged from 3.2 to less than one. Zinc is an essential nutrient and is relatively nontoxic to most animals because they can physiologically regulate zinc absorption and excretion. Bioaccumulation of zinc is assumed for the ERA, although zinc does not tend to magnify significantly in terrestrial food chains. Because of the majority of low HQ values and the ability of organisms to physiologically regulate zinc, it is unlikely to generate significant risk, and should not be considered a COC.

Based on the results of the screening-level ERA at SEAD-4, two COCs, chromium (total) and lead, were identified for soil. To further evaluate potential risks associated with chromium (total) and lead in soil at SEAD-4, assessment endpoints, and measurement endpoints relevant to the assessment endpoints, need to be established. Based on conditions at SEAD-4 and potential adverse impacts associated with chromium and lead in soil, appropriate assessment endpoints include no substantial adverse toxicological effects to invertebrates based on direct exposures and no substantial adverse toxicological effects to birds and small mammals based on direct or food chain exposure to contaminants in soils.

Potential measurement endpoints relate to the bioavailability of lead to invertebrates and small terrestrial mammals. This measurement endpoint will help determine if estimated exposures and potential adverse effects are likely based on the bioavailability of chromium and lead in soil at the site. A secondary measurement endpoint includes risk calculations resulting in a LOAEL Hazard Quotient (HQ) of less than one for chromium and lead. The secondary endpoint is based on the assumption that an HQ less than one would suggest limited potential for adverse effects to birds and small terrestrial animals.

7.6.3 Identification of Drainage Ditch Soil COCs

Based on the calculated risk estimates in Step 2, four organic compounds and eight metals were identified as potential soil COCs: benzo(a)pyrene, bis(2-ethylhexyl)phthalate, Aroclor-1254 and Aroclor-1260, antimony, chromium (total), chromium VI, copper, lead, mercury, vanadium, and zinc (see **Table 7-5**). The rationale for identifying or excluding each of these compounds as a COC is discussed below.

For benzo(a)pyrene, all HQs were less than one (**Table 7-5**) with the exception of the shrew NOAEL max HQ and LOAEL max HQ (10.1 and 1.0, respectively). The NOAEL for benzo(a)pyrene is based on a LOAEL for the mouse where benzo(a)pyrene was fed to the test animals during the gestation stage and a decrease in pub weights was noted. The NOAEL was developed by applying a NOAEL/LOAEL multiplier of 0.1 to this LOAEL. If the LOAEL is used in the calculations as the critical effects exposure dose, the LOAEL max and the LOAEL mean HQs are not greater than one. In addition, Magee et al. (1996) proposed default values for oral absorption of PAH compounds based on a review of available studies. If the proposed value for carcinogenic PAHs, 0.29, is used, the NOAEL max HQ is less than 3 and the LOAEL max HQ is less than 0.3. No criteria were available to assess impacts to soil invertebrates (**Table H.43**). Based on the above discussion, this compound is unlikely to generate ecological risk and should not be considered further.

For bis(2-ethylhexyl)phthalate, NOAEL max HQs and LOAEL max HQs for the shrew, dove, and hawk were greater than one (**Table 7-5**), and all HQs based on the mean for all species were less than one. If a foraging factor of 0.1 is used for the hawk (**Table 7-7**), the HQs will be less than one. The NOAEL max HQ and LOAEL max HQ for the dove will be decreased to 2 if a foraging factor of 0.5 is used. In addition, bis(2-ethylhexyl)phthalate was detected in less than half of the ditch soil samples, suggesting it is not a common contaminant in the ditch system. No criteria were available to assess impacts to soil invertebrates (**Table H.43**). Since all HQs based on the mean for all species were less than one and bis(2-ethylhexyl)phthalate was detected in less than half of the ditch soil samples, bis(2-ethylhexyl)phthalate has a low probability of generating ecological risk, and should not be considered further.

The shrew and hawk exposed to Aroclor-1254 and Aroclor-1260 had HQs greater than one. However, if a foraging factor of 0.1 is used for the hawk (**Table 7-7**), the HQs will be less than one. The NOAEL for Aroclor-1254 is based on a LOAEL for Oldfield mouse where Aroclor-1254 was fed to the test animals for 12 months (including the gestation stage) and decrease of litter numbers, offspring weights, and offspring survival were noted. The NOAEL was developed by applying a NOAEL/LOAEL multiplier of 0.1 to this LOAEL. If the LOAEL is used in the calculations as the critical effects exposure dose, then the LOAEL mean HQ is less than one and the LOAEL max HQ is two. There are no TRV data available for Aroclor-1260 and the TRVs for Aroclor-1254 were used. Aroclor-1254 and Aroclor-1260 were detected in 46% and 17% of the ditch soil samples, respectively. PCBs are not common contaminants in soils either and the two aroclors were detected in 25% and 4% of the surface soil samples, respectively. No criteria were available to assess impacts to soil invertebrates (**Table H.43**). Based on low HQs calculated using the LOAEL and low detection frequencies, PCBs should not be considered further.

TABLE 7-7
Summary of Ecological Hazard Quotients > 1 - Hawk SFF = 10%
SEAD 4
Seneca Army Depot, NY

Constituent	Hawk - Surface Soils				Hawk - Mixed Soils				Hawk - Ditch Soils			
	NOAEL Max HQ	NOAEL Mean HQ	LOAEL Max HQ	LOAEL Mean HQ	NOAEL Max HQ	NOAEL Mean HQ	LOAEL Max HQ	LOAEL Mean HQ	NOAEL Max HQ	NOAEL Mean HQ	LOAEL Max HQ	LOAEL Mean HQ
PAHs												
Benzo(a)pyrene	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Semi-volatiles												
Bis(2-ethylhexyl)phthalate	0.2	0.0	0.2	0.0	0.2	0.0	0.2	0.0	0.6	0.0	0.6	0.0
Di-n-octylphthalate	--	--	--	--	--	--	--	--	na	na	na	na
PCBs/Pesticides												
Total PCBs[1]	0.2	0.0	0.0	0.0	0.8	0.0	0.1	0.0	na	na	na	na
Aroclor-1254	na	na	na	na	na	na	na	na	0.2	0.0	0.0	0.0
Aroclor-1260	na	na	na	na	na	na	na	na	0.1	0.0	0.0	0.0
4,4'-DDT	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Metals												
Chromium (total)	**158**	**7.8**	**32**	**1.6**	**158**	**5.8**	**32**	**1.2**	**41**	**3.0**	**8.2**	**0.6**
Chromium VI	0.1	0.1	0.0	0.0	0.1	0.1	0.0	0.0	**1.4**	0.3	0.3	0.1
Copper	**1.2**	0.1	0.9	0.1	**1.2**	0.1	0.9	0.0	0.2	0.0	0.1	0.0
Lead	**56**	**1.0**	**56**	**1.0**	**56**	**0.7**	**56**	**0.7**	**2.2**	0.5	**2.2**	0.5
Mercury	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.0	0.2	0.0	0.2	0.0
Thallium	0.1	0.0	0.1	0.0	0.1	0.0	0.1	0.0	na	na	na	na
Vanadium	**1.2**	0.0	**1.2**	0.0	**1.2**	0.0	**1.2**	0.0	**1.1**	0.1	**1.1**	0.1
Zinc	**15**	**1.7**	**1.7**	0.2	**15**	**1.4**	**1.7**	0.2	**8.6**	**2.1**	**1.0**	0.2

NOAEL - No Observed Adverse Effect Level
LOAEL - Lowest Observed Adverse Effect Level
HQ - Hazard quotient, calculated as HQ = exposure rate based on maximum or mean soil concentration / NOAEL or LOAEL value
"--" Incalculable due to lack of toxicity values
1 - The ecological risk assessment for the surface and mixed soils considered all PCBs together as "total PCBs"
na - not a COPC in this media

Antimony exposure could not be assessed for birds because of the lack of a TRV value. No criteria were available to assess impacts to soil invertebrates (**Table H.43**). The NOAEL max HQ for the meadow vole was one and alternate HQs were less than one. While all but one of the HQs for the shrew were greater than 10, the TRV for antimony is based on a drinking water study, and metals tend to be more bioavailable in their soluble forms. Antimony has been shown to adsorb strongly to most soils with a median percent adsorption of 93% and as much as 100% adsorption in several soil types (ATSDR, 1992). Antimony is not expected to be bioavailable at this site. In addition, antimony was only detected in approximately half of the ditch soil samples; the average antimony concentration only slightly exceeds two times the average background concentration. Therefore, antimony should not be considered as a COC.

Ecological risk from chromium in ditch soils was assessed for both total chromium and chromium VI. The chromium VI is typically considered the most toxic of the forms of chromium, and was analyzed in a subset of ditch soil samples (5 of 48). For chromium VI, all HQs associated with the maximum concentration were greater than one (**Table 7-5**) for the shrew, dove, and hawk with the exception of the LOAEL max HQ for the dove. However calculations based on a site foraging factor of 10% were all less than one (**Table 7-7**) for the hawk except that the NOAEL max HQ was slightly greater than one (1.4). The NOAEL max HQ for the dove is slightly greater than one (1.3) if a site foraging factor of 50% is used. All HQs associated with the mean ditch soil concentration were less than one with the exception of the shrew NOAEL mean HQ (2.0). The TRV for chromium (VI) is based on a drinking water study, and metals tend to be more bioavailable in their soluble forms. Soil-associated chromium (VI) has been shown to be relatively less bioavailable. For example, Witmer et al. (1991) observed that rats administered 240 umoles/kg soil-associated chromium excreted ten times more of the dose than rats administered the same chromium dose administered as a hexavalent salt ($CaCrO_4$) within two days, suggesting a relative bioavailability of about 0.1. If a bioavailability value of 0.1 and the appropriate foraging factors are used, all the HQs will be less than one. Therefore, chromium VI is unlikely to generate ecological risk and should not be considered further.

HQs for chromium (total) were consistently above one for the avian receptors, even after considering the foraging factors. Additionally, chromium (total) contamination in the environment has been well studied, and concentrations at SEAD 4 are clearly elevated. Chromium (total) should be considered a contaminant of concern.

For copper, NOAEL max HQs for the shrew and hawk were greater than one (10.4 and 1.6, respectively, for the shrew and hawk). Copper exceeded the soil benchmark concentrations for impacts to invertebrates (**Table H.43**). However, copper will not pose risk to the hawk if a site foraging factor of 0.1 is considered. All HQs associated with the mean copper concentration were less than one with the exception of the NOAEL HQ for the shrew, which was slightly above one (1.2, see **Table 7-6**). The screening level ERA made the initial assumption that the contaminant was 100% bioavailable, but this is typically not the case. Copper binds relatively strongly to soils. This adsorption to soils is less affected by pH than other metals, making copper less likely to become bioavailable in the acidic conditions of an animal's digestive tract (ATSDR, 1990). Therefore, copper is not expected to pose adverse effects at the site and should not be considered a COC.

HQs for lead were above one for all receptors but the vole. The HQs associated with the mean lead concentration will be less than or approximately one and the HQs associated with the maximum lead concentration will be less than five for the dove and hawk receptors if appropriate site foraging factors are used. The oral bioavailability of lead in soil has been more extensively studied than any other metal. EPA assumes a relative bioavailability factor for lead of 0.6 in its adult lead model (USEPA, 1996). In addition, a conservative BAF value was used to evaluate the risk to the shrew. The EPA (2000) recommended a BAF value for lead (0.266) that is approximately nine times lower than the value used in the SLERA. Since animal intake contributed more than 99% of the total lead intake by the shrew, using a BAF value of 0.266 will decrease the HQs approximately nine times. Therefore, all HQs for the shrew will be less than one and the NOAEL max HQ will approximate one if a bioavailability value of 0.6 and a BAF value of 0.266 are used. Based on the above discussion, lead in the drainage ditch soil is not expected to pose significant adverse effects and should not be considered as a COC.

For mercury, all HQs associated with the mean concentration were less than one (**Table 7-5**) for all the receptors. All HQs associated with the maximum concentration were slightly greater than one (the maximum=2.1) for the shrew, dove, and hawk with the exception of the LOAEL max HQ for the dove, which was 0.6. Use of a hawk site foraging factor of 10% (**Table 7-7**) and a dove site foraging factor of 50% resulted in all HQs less than one for the dove and hawk. The maximum concentration of mercury was less than the benchmark concentrations for impacts to microorganisms but greater than the earthworm benchmark values (**Table H.43**). This compound is unlikely to generate ecological risk and should not be considered further.

Another potential COC for soil was vanadium. All HQs associated with the maximum concentration exceeded one for all receptors with the exception of the LOAEL max HQ for the vole. All HQs associated with the mean concentration were less than one with the exception of the HQs for the shrew (**Table 7-5**). The elevated HQs were caused by one sampling result. Vanadium was detected at SD4-28 with an elevated concentration of 1140 mg/kg. Vanadium detected at all the other locations in the drainage ditches was less than the TAGM value, 150 mg/kg. The maximum and mean concentrations excluding this spot (SD4-28) are 74.9 mg/kg (SD4-20) and 30.5 mg/kg, respectively, as compared to the original maximum and mean concentrations of 1140 mg/kg and 53.6 mg/kg. The mean concentration excluding the hot spot does not exceed two times of the background. Therefore, except in the area of SD4-28, vanadium should not be considered as a COC.

For zinc, all receptors but the vole had NOAEL max HQs greater than one. However, alternative exposure calculations ranged from 0.3 to 4.0. Use of appropriate foraging factors will result in NOAEL max HQs less than 10 and all other HQs less than or approximately one for the dove and hawk. Zinc is an essential nutrient and is relatively nontoxic to most animals because they can physiologically regulate zinc absorption and excretion. Zinc is capable of forming complexes with a variety of organic and inorganic complexing groups. Sorption is the dominant reaction of zinc (ATSDR, 1997). Bioaccumulation of zinc is assumed for the ERA. However, zinc does not tend to magnify significantly in terrestrial food chains. Because of the majority of low HQ values and the ability of organisms to physiologically regulate zinc, it is unlikely to generate significant risk, and should not be considered a COC.

Based on the results of the screening-level ERA at SEAD-4, chromium (total) was identified as a COC for drainage ditch soil. In addition, an elevated vanadium concentration identified at SD4-28 raised concern to the ecological receptors. To further evaluate potential risks associated with chromium (total) and vanadium in drainage ditch soils at SEAD-4, assessment endpoints, and measurement endpoints relevant to the assessment endpoints, need to be established. Based on conditions at SEAD-4, appropriate assessment endpoints include no substantial adverse toxicological effects to invertebrates based on direct exposures and no substantial adverse toxicological effects to birds and small mammals based on direct or food chain exposure to contaminants in soils.

Potential measurement endpoints relate to the bioavailability of COCs to invertebrates and small terrestrial mammals. This measurement endpoint will help determine if estimated exposures and potential adverse effects are likely based on the bioavailability of chromium and vanadium in ditch soil at the site. A secondary measurement endpoint includes risk calculations resulting in a LOAEL Hazard Quotient (HQ) of less than one for chromium and vanadium. The secondary endpoint is based on the assumption that an HQ less than one would suggest limited potential for adverse effects to birds and small terrestrial animals.

7.6.4 Identification of Sediment/Surface Water COCs

Great blue heron exposure is calculated assuming exposure to both sediment and surface water. Based on the calculations in Step 2, three metals were identified as potential COCs: aluminum, chromium (total), and zinc. The great blue herons are seasonal residents in New York State, spending around half the year at the site (http://www.mbr-pwrc.usgs.gov/bbs/anim/h1940.html). In addition, the foraging range of the blue heron is approximately 1.6 acres (Butler, 1992) while the size of the pond is approximately 0.7 acres. Therefore, a foraging factor of 0.25 is a more reasonable estimate. If the foraging factor of 0.25 is considered, the HQs for the great blue heron will be approximately equal to or less than one for aluminum and zinc. Therefore, only chromium is considered as a COC for the sediment in the artificial pond and will be considered further.

Based on the results of the screening-level ERA for sediments at SEAD 4, one COC was identified in site sediment/surface water: chromium (total). To further evaluate potential risks associated with chromium in sediment/surface water, assessment endpoints, and measurement endpoints relevant to the assessment endpoints, need to be established. Based on conditions at this site and potential adverse impacts associated with chromium, appropriate assessment endpoints include no substantial adverse toxicological effects to fish-eating birds based on direct contact with sediments and contact through the food chain. The assessment endpoint is intended to protect birds from the effects of metals toxicity.

7.6.5 Identification of Surface Water COCs

For this risk assessment it was assumed that all surface water samples taken represented areas that could support fish species. Initial exposure calculations using the largemouth bass receptor identified seven metals with NOAEL max HQs greater than one (aluminum, cadmium, cobalt, iron, manganese, vanadium, and zinc). However, a majority of the surface water samples were taken from areas that only have intermittent surface water present. To more realistically evaluate surface water contaminants, a re-evaluation was performed using only those data representing standing water at the site (i.e., SW4-1 and SW4-2) for the seven contaminants with NOAEL max HQs greater than one. The results indicated that all contaminants in surface water supporting fish (i.e., SW4-1 and SW4-2) either were not detected (cadmium, cobalt, and vanadium) or had NOAEL max HQs less than one (aluminum = 0.3, iron = 0.4, manganese = 0.0 and zinc = 0.2). Using these data to screen against amphibian effects concentrations resulted in only one compound with a NOAEL max HQ greater than one (Aluminum = 6). All other chemicals were either not detected, had no data for the effects concentration, or had calculated NOAEL max HQs less than one. Therefore, no further study is required for surface water.

7.7 SCREENING-LEVEL ERA SUMMARY

In accordance with USEPA guidance, a screening level ERA was performed to evaluate soil, surface water and sediment contaminants at the SEAD-4 site. This ERA was completed in several steps.

For Steps 1 and 2, NOAEL toxicity values and default exposure assumptions were used to calculate screening level HQs. Due to the conservative nature of these assumptions, additional evaluation was required to more fully characterize potential ecological risks and determine if further evaluation is warranted. In accordance with USEPA guidance, this additional evaluation was performed as part of the problem formulation in Step 3.

For soils, maximum detected concentrations were compared to screening criteria to identify COPCs (Step 1). Potential exposures and effects resulting from maximum concentrations of soil contaminants were then evaluated by estimating potential direct and indirect exposures for terrestrial wildlife (short-tailed shrew, meadow vole, red-tailed hawk, and mourning dove) and comparing exposures based on maximum chemical concentrations to NOAEL toxicity reference values (Step 2). Following completion of Steps 1 and 2, soil COPCs with NOAEL HQs greater than one included: benzo(a)pyrene, bis(2-ethylhexyl)phthalate, di-n-octylphthalate, total Aroclor, 4,4'-DDT, antimony, chromium (total), chromium VI, copper, lead, thallium, and zinc. Based on the results of ERA Steps 1-3, soil metals concentrations suggest a potential for adverse ecological effects, and a further investigation may be warranted to evaluate chromium (total) and lead in soil.

The same approach used for soils was used for drainage ditch soils. Following completion of Steps 1 and 2, COPCs with NOAEL HQs greater than one included: benzo(a)pyrene, bis(2-ethylhexyl)phthalate, Aroclor-1254, Aroclor-1260, antimony, chromium (total), chromium VI, copper, lead, mercury, vanadium, and zinc. Based on the results of ERA Steps 1-3, chromium (total) in drainage ditch soil suggests a potential for adverse ecological effects and a further investigation may be warranted. In addition, a vanadium hot spot identified at SD4-28 (1140 mg/kg) raised concern to the ecological receptors and further investigation may be warranted.

Potential exposures and effects resulting from maximum concentrations of sediment/surface water contaminants were evaluated by estimating potential direct and indirect exposures for fish eating birds (great blue heron) and comparing exposures based on maximum concentrations to NOAEL toxicity reference values. Further evaluation of sediment/surface water contamination indicates three sediment COPCs with HQs greater than one: aluminum, chromium (total), and zinc. Based on the results of ERA Steps 1-3, sediment/surface water concentrations suggest a potential for adverse ecological effects, and a further investigation may be warranted to evaluate chromium (total) in sediments.

Potential exposures and effects resulting from maximum concentrations of surface water contaminants were also evaluated by estimating potential direct and indirect exposures for aquatic wildlife (largemouth bass and amphibians) and comparing exposures based on maximum concentrations to NOAEL toxicity reference values. Further evaluation excluding intermittent surface water data and using only data from a standing water body indicated no surface water COPCs with NOAEL HQs greater than one for the bass and only one compound (aluminum) with an HQ greater than one (HQ = 6) in the amphibian screening test.

Typically, there is a SMDP immediately following ERA Step 2. However, for this ERA, Steps 1-3 was performed concurrently. Therefore, SMDPs 1 and 2 were combined and performed following Step 3. For SMDP 1, there are three possible decisions:

- There is adequate information to conclude that ecological risks are negligible and therefore no need for remediation on the basis of ecological risks;
- The information is not adequate to make a decision at this point and the ERA process should continue to a baseline ERA; or
- The information indicates a potential for adverse ecological effects, and a more thorough assessment is warranted.

SMDP 2 requires agreement from risk managers and regulators on four items: contaminants of concern, assessment endpoints, exposure pathways, and risk questions. To further evaluate potential risks associated with COCs in soil (chromium and lead) and COCs in ditch soils (chromium and vanadium) at SEAD-4, assessment endpoints, and measurement endpoints relevant to the assessment endpoints, need to be established. Based on conditions at SEAD-4 and potential adverse impacts associated with chromium and lead in soil, appropriate assessment endpoints include no substantial adverse toxicological effects to small mammals based on direct or food chain exposure to contaminants in soils. The assessment endpoint for lead is intended to protect small mammals from the effects of lead accumulation and potential toxicity to nervous and reproductive systems. The assessment endpoint for chromium is intended to protect small mammals and birds from the oxidizing and enzyme inhibiting effects of chromium. The assessment endpoint for vanadium is intended to protect small mammals from the adverse reproductive effects of chromium. A primary measurement endpoint includes risk calculations resulting in a LOAEL max Hazard Quotient (HQ) of one for chromium, lead, and vanadium. The measurement endpoint is based on the assumption that an HQ of less than one would suggest limited potential for adverse effects to small terrestrial animals.

To further evaluate potential risks associated with chromium (total) in sediments, assessment endpoints, and measurement endpoints relevant to the assessment endpoints, need to be established. Based on conditions at this site and potential adverse impacts associated with chromium, appropriate assessment endpoints include no substantial adverse toxicological effects to fish-eating birds based on direct contact with sediments and contact through the food chain. The assessment endpoint is intended to protect birds from the effects of metals toxicity. A primary measurement endpoint includes risk calculations resulting in a LOAEL max HQ of one for chromium. The measurement endpoint is based on the assumption that an HQ of less than one would suggest limited potential for adverse effects to wetland-associated wildlife.

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8.0 SUMMARY

This section summarizes the information regarding chemical impacts to environmental media based on the Remedial Investigation at SEAD-4, the Munitions Washout Facility. Reviews of the human health and ecological risk assessments that were performed for this site are presented. Detailed descriptions of the chemical impacts at the site and the risk characterizations are presented in Sections 4, 6, and 7 of this report.

8.1 Summary of Extent of Impacts

The nature and extent of constituents of concern at SEAD-4 were evaluated through a comprehensive field investigation program. The remedial investigation at SEAD-4 included a geophysical survey and sampling of building debris/soil (collected from indoor building locations), surface and subsurface soils, surface water and sediment, and groundwater. The primary constituents of concern are metals, though additional impacts from SVOCs and pesticides were identified.

Geophysical Investigation

A geophysical investigation was carried out for both the ESI and the RI. The geophysical investigation for the ESI was tailored to track groundwater flow so that the direction of possible contaminant flow could be followed and to determine the location of a suspected leach field. For the RI, the investigation was geared toward verifying whether or not specific pits or concrete tanks existed in certain areas of the site.

As part of the geophysical investigation for the RI, EM-31 and GPR surveys were performed around the north, south, and east sides of Building 2076 to determine the existence of an underground concrete tank or pit used for laundry wash water that was suspected to be contaminated with explosives. Building 2076 was the employee break room and laundry facility. The wash water was released to a floor drain that connected to a dry well (in the form of a concrete tank or pit).

Bi-directional GPR profiles were collected over an EM-31 quadrature anomaly south of Building 2076. The profiles showed a large, hyperbolic reflector in each record. The GPR data suggests that there is a large object in the subsurface south of Building 2076. According to the Army, this tank is a septic tank that is connected to Building 2076 and has been maintained and pumped regularly.

Building Debris

In the building material samples collected from six buildings at SEAD-4, metals, SVOCs, pesticides, and PCBs were detected at high concentrations.

Subsurface Soils

The subsurface soils at SEAD-4 have been impacted primarily by metals. Of the 13 metals which exceeded their respective TAGM values, ten metals were considered to be more toxic. Aluminum, antimony, arsenic, chromium, copper, lead, mercury, nickel, silver, and zinc were detected in the subsurface soil samples at concentrations above the respective TAGM values.

Chromium exceeded the TAGM value in 17 subsurface soil samples. A maximum concentration of 3,820 mg/kg was detected in SB4-25 at a depth of 2-3.5 feet. SB4-25 is located on the southern edge of the pond. The subsurface soil sample from MW4-8 (6-6.5 feet) also contained high concentrations of chromium. MW4-8 is also located south of the pond. Two high concentrations of chromium were detected in SB4-10 (at depth intervals of 2-4 feet and 4-6 feet), which is located adjacent to former Building T-30. High concentrations of copper were detected in the subsurface samples from SB4-10 and SB4-25.

On the basis of the subsurface soil data, the highest concentrations of metals were found in the soil samples from SB4-10, SB4-14, and SB4-25. SB4-10 is located adjacent to former Building T-30; SB4-14 is located near Building 2084; and SB4-25 is located on the southern edge of the pond. Impacts from the remaining organic and inorganic constituents which were detected in the subsurface soil samples were less significant than the impacts from metals discussed above.

Surface Soils

The surface soils at SEAD-4 have been impacted primarily by metals and SVOCs. Of the 19 metals which exceeded their respective TAGM values, 14 metals were considered to be more toxic. Antimony, arsenic, beryllium, chromium, copper, cyanide, lead, mercury, nickel, selenium, silver, thallium, vanadium, and zinc were detected in the surface soil samples at concentrations above the respective TAGM values. Chromium, copper, lead, and zinc had the largest percentage of samples exceeding the TAGM values. Nine of the maximum concentrations of metals were detected in surface soil sample SB4-25, which is located at the southern edge of the pond.

Although there were detections of chromium in surface soil samples collected throughout the site, the highest concentrations of chromium were detected in surface soil samples from Area 1, a drainage ditch in Area 2, and a drainage ditch connecting the two areas. High concentrations of copper were also found in the same locations as the high chromium concentrations.

Four SVOCs were detected in the surface soils at concentrations above the associated TAGM value. The highest concentrations of benzo(a)anthracene, chrysene, benzo(a)pyrene, and dibenz(a,h)anthracene in surface soils were detected in samples collected from SS4-54 SS4-55 and SS4-56, which are all located near Building 2084.

Groundwater

Groundwater at SEAD-4 has been impacted by metals. Eight metals, aluminum, antimony, chromium, iron, manganese, selenium, sodium, and thallium, were found in one or more of the groundwater samples at concentrations above the NYS Class GA or EPA MCL standard.

Chromium was detected in one monitoring well, MW4-9, at a concentration above the NYS Class GA standard of 50 ug/L. MW4-9 is located west of former Building T-30. A chromium concentration of 260 ug/L was detected in MW4-9 from the Round 1 Sampling Program. The turbidity of the groundwater sample was 31. However, the concentration of chromium from the Round 2 Sampling Program was 21.8 ug/L and the turbidity of the sample was 3.7.

A comparison to background groundwater samples collected from SEDA indicates that maximum concentrations of aluminum, antimony, iron, and manganese in background groundwater samples were greater than maximum concentrations in the groundwater samples from SEAD-4. Concentrations of sodium and thallium in background groundwater samples also exceeded the respective NYS Class GA standards.

Surface Water

Generally, surface water impacts were from metals, nine of which were found at concentrations that exceeded their standards. The nine metals are aluminum, cadmium, cobalt, copper, iron, lead, silver, vanadium, and zinc. Several of the maximum concentrations of the metals were detected in the surface water sample SW4-13, which is located in the drainage ditch at the northern portion of the site.

Sediment

Sediment at the site has been impacted by pesticides, PCBs, and metals. High concentrations of chromium were detected in sediment samples collected along the western ditch and near the pond. High concentrations of copper were detected in the sediment samples from the western ditch, near the pond, and in the ditches north of the site.

Of the pesticides and PCBs, 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, and Aroclor-1254 were detected most frequently in the sediment samples. Aroclor-1254 was detected in 26 of the 58 samples, with the concentrations in all 26 samples exceeding the NYS criteria.

8.2 Human Health Risk Assessment

Human health risk calculations were performed for seven potential exposure scenarios:

- Current site worker
- Future indoor park worker
- Future outdoor park worker
- Future construction worker
- Future recreational visitor (child)
- Future adult resident
- Future child resident

Of these receptors, only the future indoor park worker and future resident exhibit risks of cancer above the USEPA target risk range. These same receptors also exhibit non-cancer health risk.

The RME excess cancer risk for the indoor park worker of 3 x 10^{-4} and the hazard index of 20 are due primarily to dermal contact with indoor dust. Ingestion of indoor dust also poses a non-cancer risk which results in a hazard index greater than 1. In evaluating this result, the likelihood of occupancy of buildings in their current state by park workers should be considered. If the buildings are renovated prior to occupancy, or if indoor park operations are housed in a new building, then the risks to future workers would be much lower than estimated in this assessment.

The RME excess cancer risk for the resident of 2 x 10^{-4} and the hazard indices of 7 (child) and 3 (adult) are due primarily to dermal contact with groundwater and surface water. The combined ingestion of soil and sediment also poses a non-cancer risk which results in a hazard index greater than 1. These results are due to exposures estimated from the detection of very low levels of Aroclor-1260 in one groundwater sample and PAHs in one surface water sample. These results are considered highly uncertain and probable overestimates of risk, as qualified in the Risk Characterization and Uncertainty sections of this report. As stated in Section 5, Arochlor mixtures are expected to be associated with the soil phase. Much less than 1 percent is expected to partition to the soil-water phase, and only a small amount would be available to migrate via the downward movement of infiltrating water. The detection of Arochlor - 1260 in the groundwater sample may be due to laboratory error.

Both the carcinogenic and non-cancer health risks for all other receptors were within or below the USEPA target levels: the current site worker, future outdoor park worker, future construction worker and future recreational visitor.

The potential risks from exposure to lead in soil were assessed separately from other compounds. The soil and sediment results were compared with USEPA screening levels for residential and occupational exposures. The SEAD-4 average lead concentrations were all less than the applicable screening levels. Therefore, there is no expected health risk to resident children or working adults due to exposure to current or future lead at the site.

8.3 Ecological Risk Assessment

In accordance with USEPA guidance, a screening level ERA was performed to evaluate soil, surface water and sediment contaminants at the SEAD-4 site. This ERA was completed in several steps.

For Steps 1 and 2, NOAEL toxicity values and default exposure assumptions were used to calculate screening level HQs. Due to the conservative nature of these assumptions, additional evaluation was required to more fully characterize potential ecological risks and determine if further evaluation is warranted. In accordance with USEPA guidance, this additional evaluation was performed as part of the problem formulation in Step 3.

For soils, maximum detected concentrations were compared to screening criteria to identify COPCs (Step 1). Potential exposures and effects resulting from maximum concentrations of soil contaminants were then evaluated by estimating potential direct and indirect exposures for terrestrial wildlife (short-tailed shrew, red-tailed hawk, meadow vole, and mourning dove) and comparing exposures to NOAEL toxicity values (Step 2). Following completion of Steps 1 and 2, soil COPCs with NOAEL HQs greater than one included: benzo(a)pyrene, bis(2-ethylhexyl)phthalate, di-n-octylphthalate, Aroclor 1254, DDT, antimony, chromium, copper, lead, thallium, and zinc.

Based on the results of ERA Steps 1-3, soil metals concentrations suggest a potential for adverse ecological effects, and a further investigation may be warranted to evaluate lead in soil.

Potential exposures and effects resulting from maximum concentrations of sediment contaminants were evaluated by estimating potential direct and indirect exposures for aquatic wildlife (great blue heron) and comparing exposures to NOAEL toxicity values. Further evaluation of sediment contamination indicates seven sediment COPCs with HQs greater than 1: bis(2-ethylhexyl)phthalate, 4,4'-DDD, aluminum, barium, chromium, copper, lead, mercury, selenium, and zinc.

Based on the results of ERA Steps 1-3, sediment metals concentrations suggest a potential for adverse ecological effects, and a further investigation may be warranted to evaluate chromium, copper, and zinc in soil.

Potential exposures and effects resulting from maximum concentrations of surface water contaminants were also evaluated by estimating potential direct and indirect exposures for aquatic wildlife (largemouth bass and amphibians) and comparing exposures to NOAEL toxicity values. Further evaluation excluding stormwater runoff data and using only data from a standing water body indicated no surface water COPCs with NOAEL HQs greater than 1 for the bass and one compound, aluminum, with an HQ greater than 1 in the amphibian screen.

Some of the additional information used to help characterize risks included a comparison of sediment concentrations to soil background concentrations. In addition sediment and surface water data were re-evaluated to more realistically model conditions at the site.

Upon completion of ERA Steps 1-3, there is a SMDP with three possible decisions:

- There is adequate information to conclude that ecological risks are negligible and therefore no need for remediation on the basis of ecological risks;
- The information is not adequate to make a decision at this point and the ERA process should continue to a baseline ERA; or
- The information indicates a potential for adverse ecological effects, and a more thorough assessment is warranted.

To further evaluate potential risks associated with lead in soil at SEAD-4, assessment endpoints, and measurement endpoints relevant to the assessment endpoints, need to be established. Based on conditions at SEAD-4 and potential adverse impacts associated with lead in soil, appropriate assessment endpoints include no substantial adverse toxicological effects to invertebrates based on direct exposures and no substantial adverse toxicological effects to small mammals based on direct or foodchain to contaminants in soils. The assessment endpoint is intended to protect small mammals from the effects of lead accumulation and potential toxicity to nervous and reproductive systems. Potential measurement endpoints relate to the bioavailability of lead to invertebrates and small terrestrial mammals. This measurement endpoint will help determine if estimated exposures and potential adverse effects are likely based on the bioavailability of lead in soil at the site. A secondary measurement endpoint includes risk calculations resulting in a LOAEL Hazard Quotient (HQ) of less than one for lead. The secondary endpoint is based on the assumption that an HQ less than one would suggest limited potential for adverse effects to small terrestrial animals.

To further evaluate potential risks associated with chromium, copper, and zinc in sediments, assessment endpoints, and measurement endpoints relevant to the assessment endpoints, need to be established. Based on conditions at this site and potential adverse impacts associated with these chemicals, appropriate assessment endpoints include no substantial adverse toxicological effects to fish-eating birds based on direct contact with sediments and contact through the food chain. The assessment endpoint is intended to protect birds from the effects of metals toxicity.

8.4 Conclusion

Available information collected from SEAD-4 defines the nature and extent of contamination in each of the media. No information needs remain towards performing a remediation feasibility study.

Appendix A

NAEVA Geophysics Inc. Report

NAEVA GEOPHYSICS INC.
A SUBSIDIARY OF NORTH AMERICAN EXPLORATION OF VIRGINIA INC.
Subsurface Geophysical Surveys

GPR
MAGNETICS
ELECTROMAGNETICS
SEISMICS
RESISTIVITY
UTILITY LOCATION
BOREHOLE LOGGING
BOREHOLE CAMERA
STAFF SUPPORT

Results of Geophysical Investigation

Seneca Army Depot
Romulus, New York

Prepared for: **Parsons Engineering Science**
Canton, Massachusetts

Dates of Investigation: **January 5 and 6, 1999**

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Results of Geophysical Investigation
Seneca Army Depot
Romulus, NY

Introduction

On January 5 and 6, 1999, NAEVA Geophysics Inc. conducted geophysical investigations on portions of property at Seneca Army Depot in Romulus, NY. The purpose of the investigations was to identify geophysical anomalies that may represent disposal pits and/or concrete tanks.

As defined by Mark Baker, (Parsons Engineering Science), the primary Area of Concern (AOC 1) surrounded Building #2076. Tom Hogge established a survey grid on January 4, 1999, prior to data collection. AOC 1 covers an area of approximately 200 feet by 250 feet around the north, south and east sides of Building #2076 (Figure 1). A drainage ditch defines the northeastern limit of the survey. The northwestern and southern survey lines terminate at thick vegetation, and the western boundary coincides with a roadway.

Unanticipated production achievements allowed for a second EM-31 investigation to be conducted on January 6, 1999. Area of concern 2 (AOC 2) the Indian Creek Burial Site covered approximately 300 feet by 300 feet (Figure 2). AOC 2 is part of an EBS investigation not associated with AOC 1.

Survey Design

Data collection was conducted along the north/south survey lines, which were marked using temporary spray paint at 25-foot intervals. In this report, lines correspond to north/south traverses while stations correspond to data sample locations. Data were collected at 5-foot stations along parallel traverses spaced 10 feet apart.

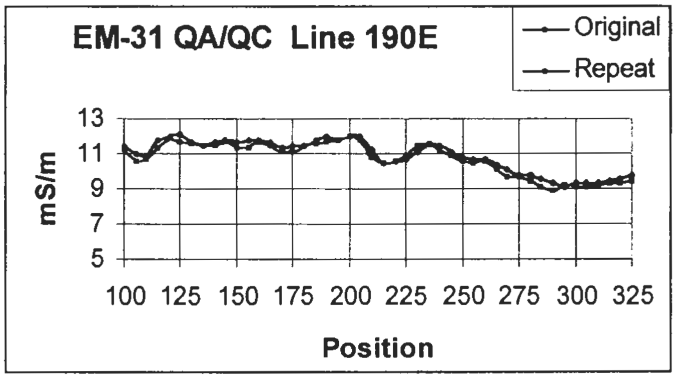
AOC 1: Survey grid control was established from the southwest corner of Building #2076. A designated station (grid origin 100N, 100E) was located 87feet 6 inches south of the building corner(Azimuth: 335 degrees). Survey lines were oriented parallel with the east/west walls of the building. For the purpose of reacquiring the grid, NAEVA personnel placed labeled pink flagging at four corner stations of the grid. An additional labeled flag was placed at 100N + 110E.

Quality Assurance/Quality Control

A calibration check was conducted on the EM-31 out of the grid area using the manufacturer's standard procedure prior to collecting data each day. All readings were within specification.

Additionally, a standard evaluation of consistency was conducted with the EM-31 by repeating survey lines during data collection. The successful "repeatability" of the character of the lines viewed in profile validates the data. Chart 1 displays the repeat data for line 190E.

Chart 1



Conclusions

The purpose of the geophysical investigation was to identify any disposal pits and/or concrete tanks. One potential target is recognized in the data of AOC 1 that warrants further intrusive investigations. The terrain conductivity anomaly present in the southwestern portion of the survey from 120N to 180N corresponds with a significant subsurface feature exhibited in the radar data. The feature appears to occur deeper further south from the building.

Additional information in the quadrature phase data indicates an increase in terrain conductivity proximal to building #2076. Although the absolute values are not highly anomalous and may represent simply a change in fill material associated with the building, elevated conductivity is evident well beyond the distance of expected cultural influence of the building structure.

AOC 2: The EM-31 data provides no evidence for the presence of any disposed materials in the survey area.

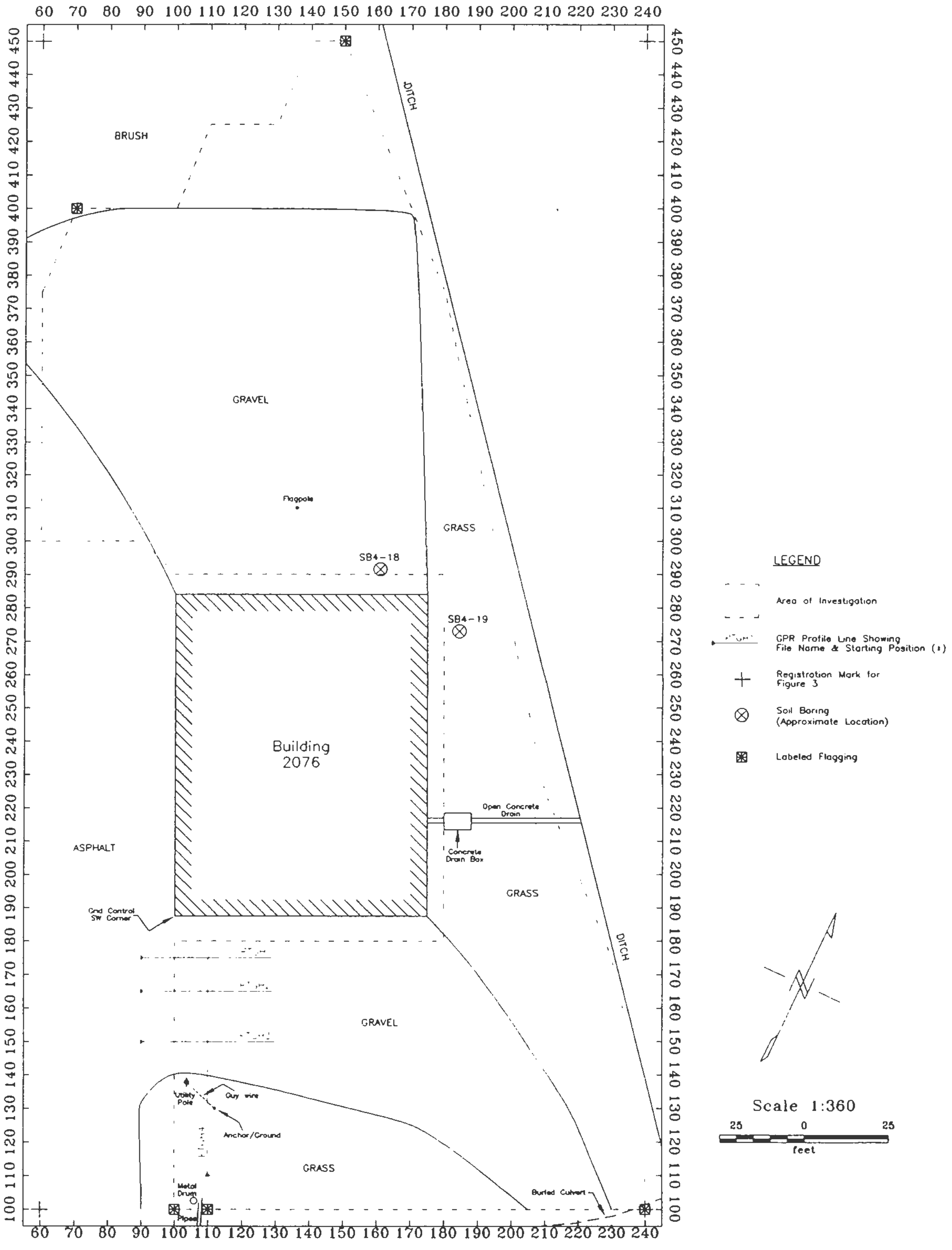


Figure 1

NAEVA GEOPHYSICS INC.
A SUBSIDIARY OF NORTH AMERICAN EXPLORATION OF VIRGINIA, INC.
Subsurface Geophysical Surveys
P.O. BOX 7325, CHARLOTTESVILLE, VA 22906
(804) 978-3187 (804) 973-9791 FAX

Parsons Engineering Science

Area of Geophysical Investigation
Building #2076 (AOC 1)
Seneca Army Depot, Romulus, NY

Date of Investigation: January 5, 1999

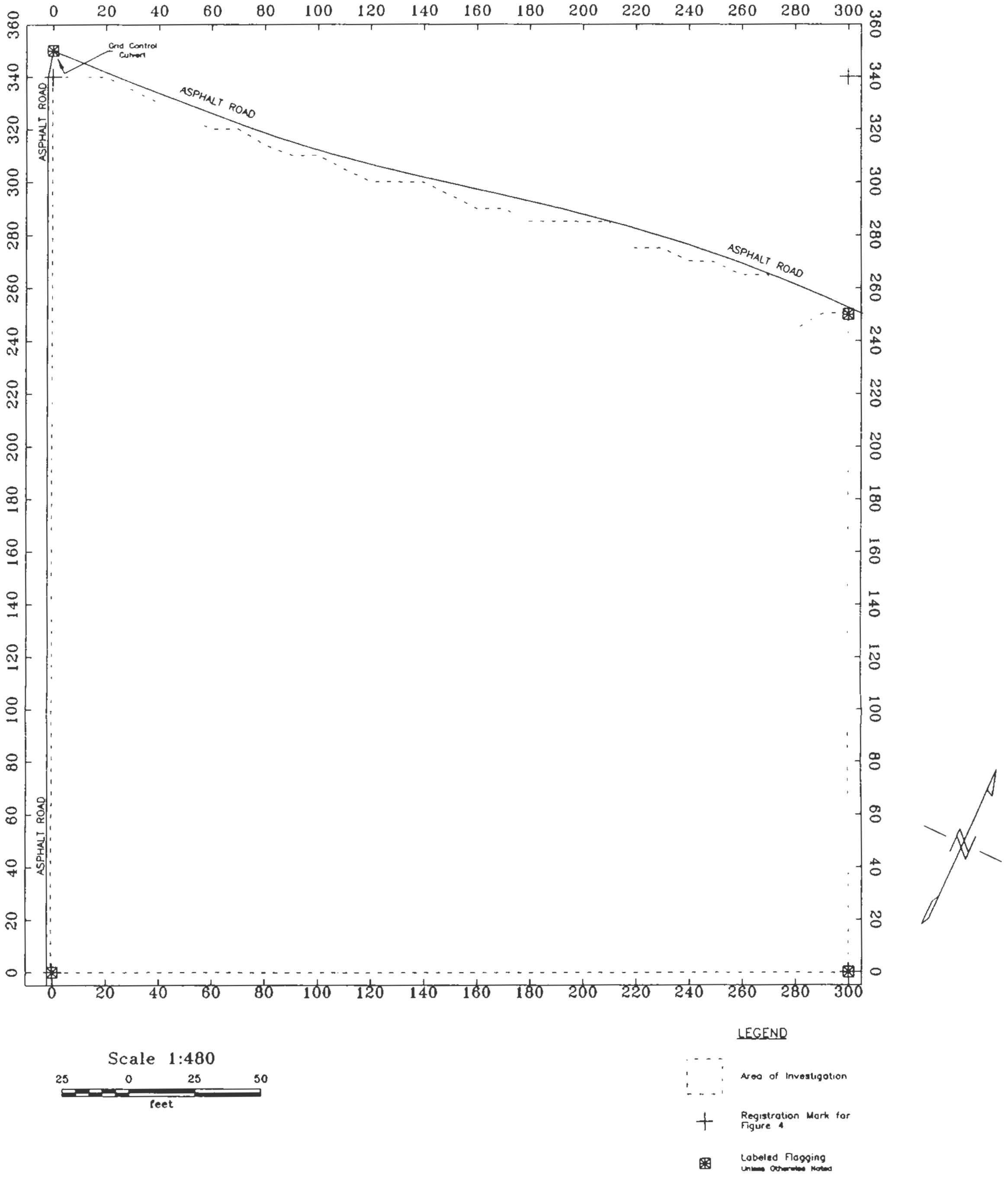


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Figure 2

Parsons Engineering Science

Area of Geophysical Investigation
Indian Creek Burial Site (AOC 2)
Seneca Army Depot

Date of Investigation: January 6, 1999

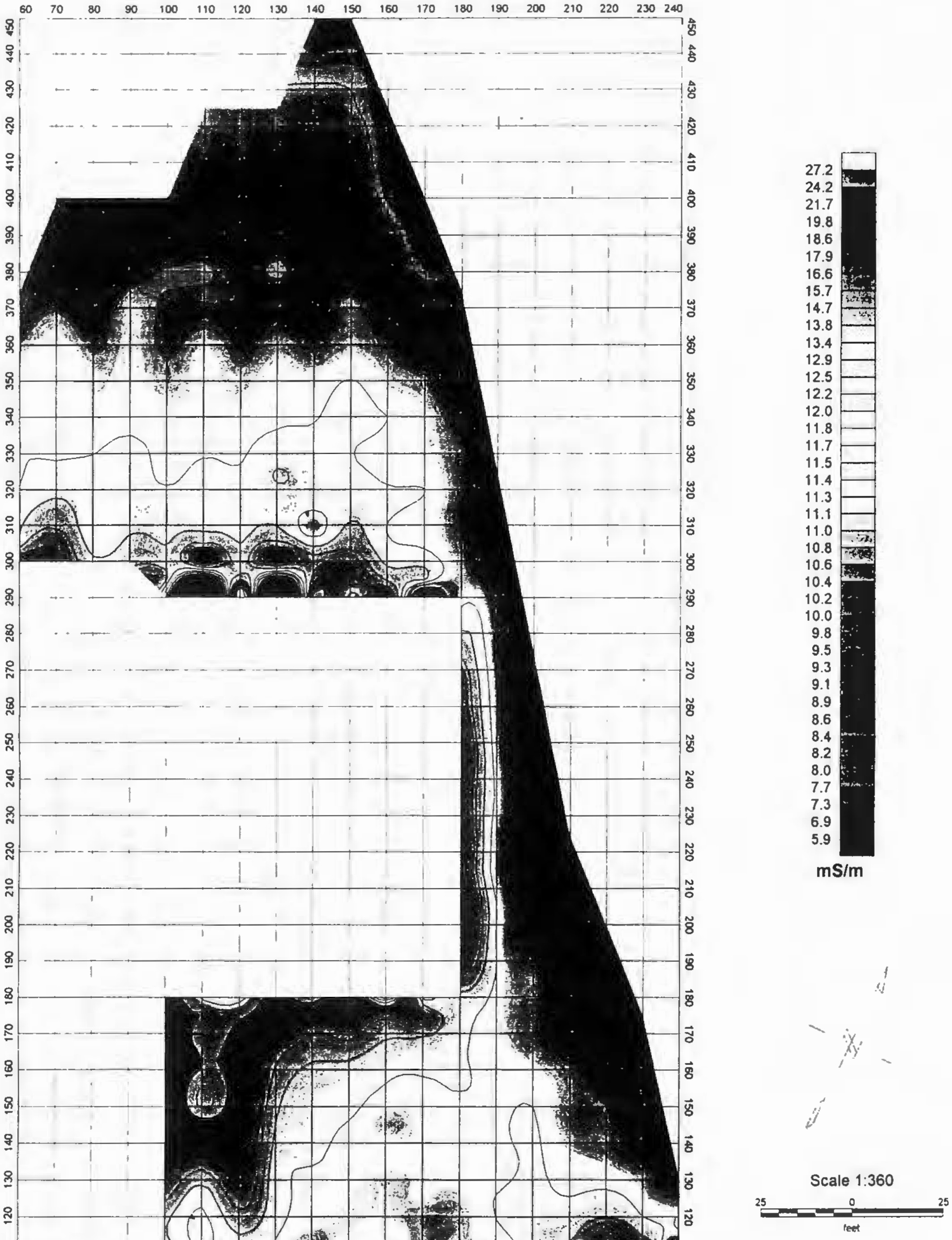

Figure 3

NAEVA GEOPHYSICS INC.
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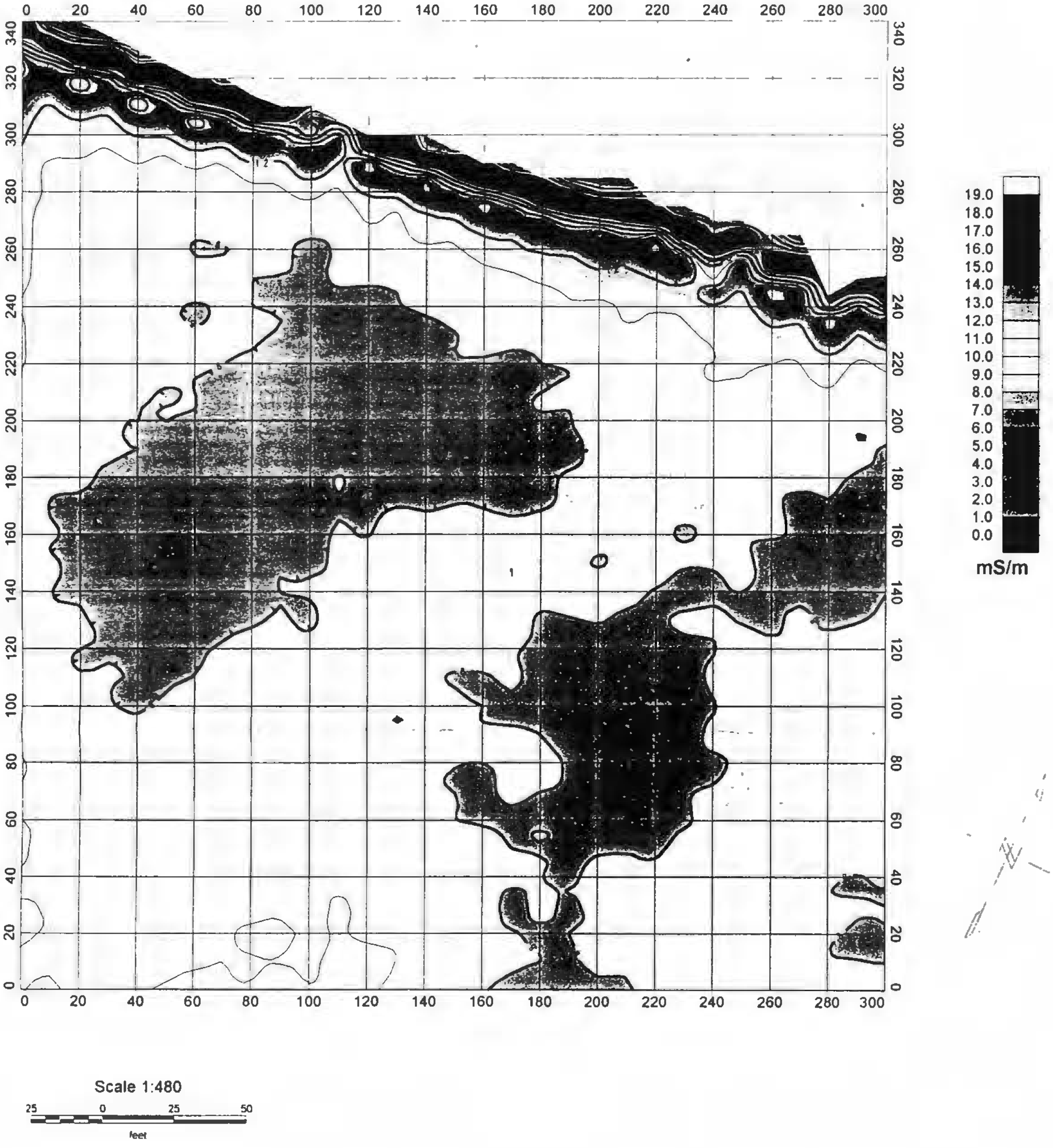
Parsons Engineering Science

EM-31 Terrain Conductivity
Building #2076 (AOC1)
Seneca Army Depot, Romulus, NY

Date of Investigation: January 5, 1999



NAEVA GEOPHYSICS INC.
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Subsurface Geophysical Surveys
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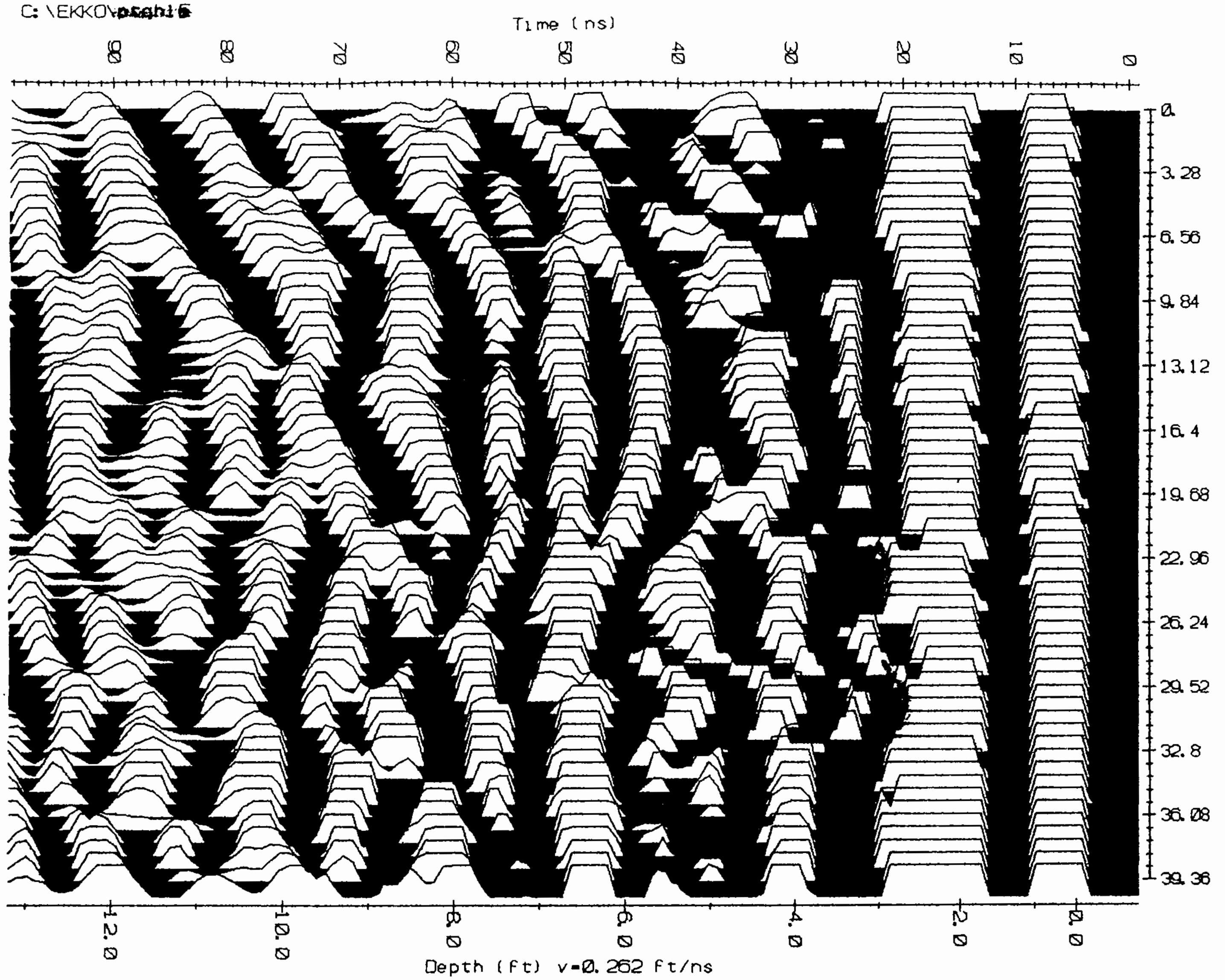
Figure 4

Parsons Engineering Science

Em-31 Terrain Conductivity
Indian Creek Burial Site (AOC 2)
Seneca Army Depot

Date of Investigation: January 6, 1999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32.8
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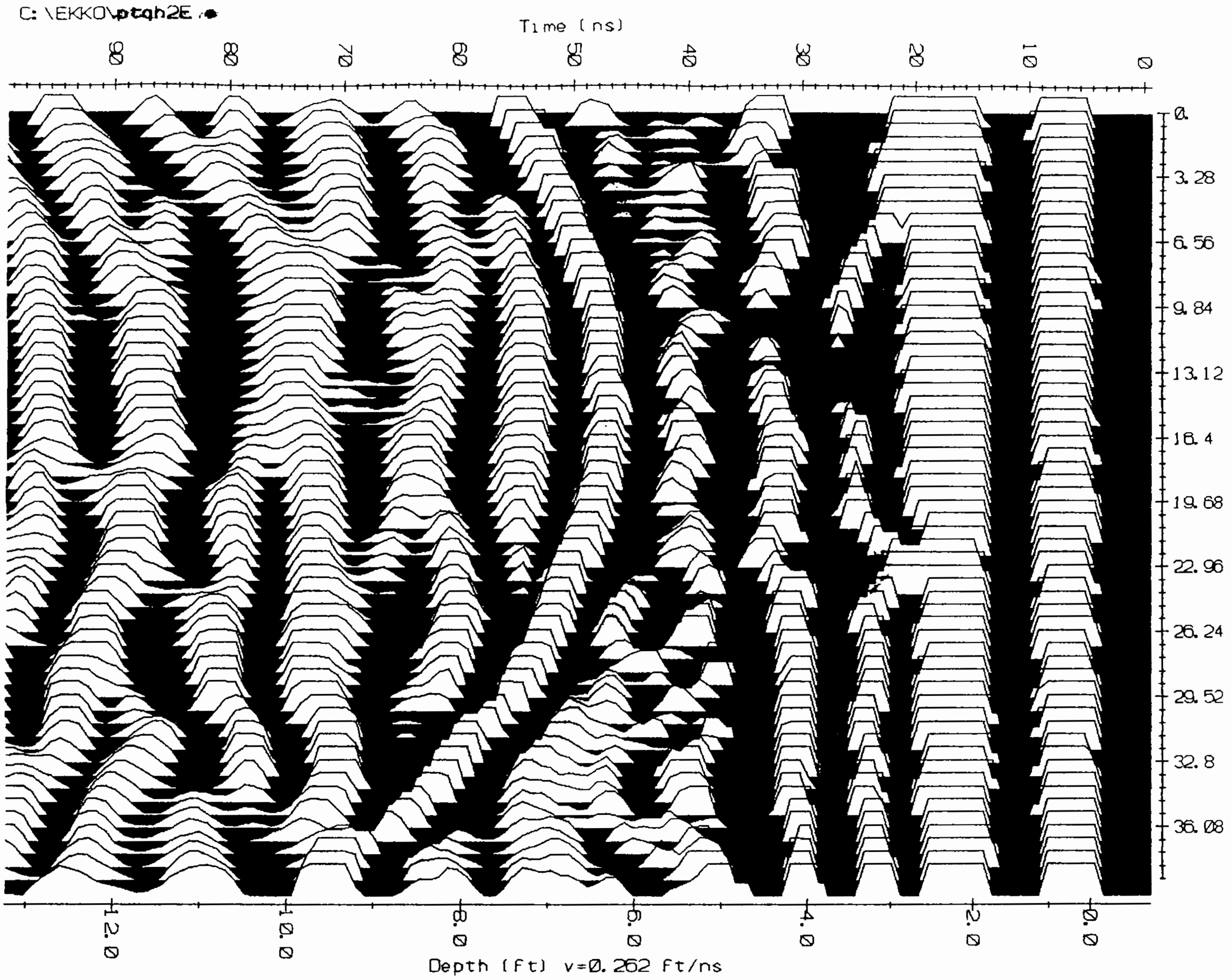
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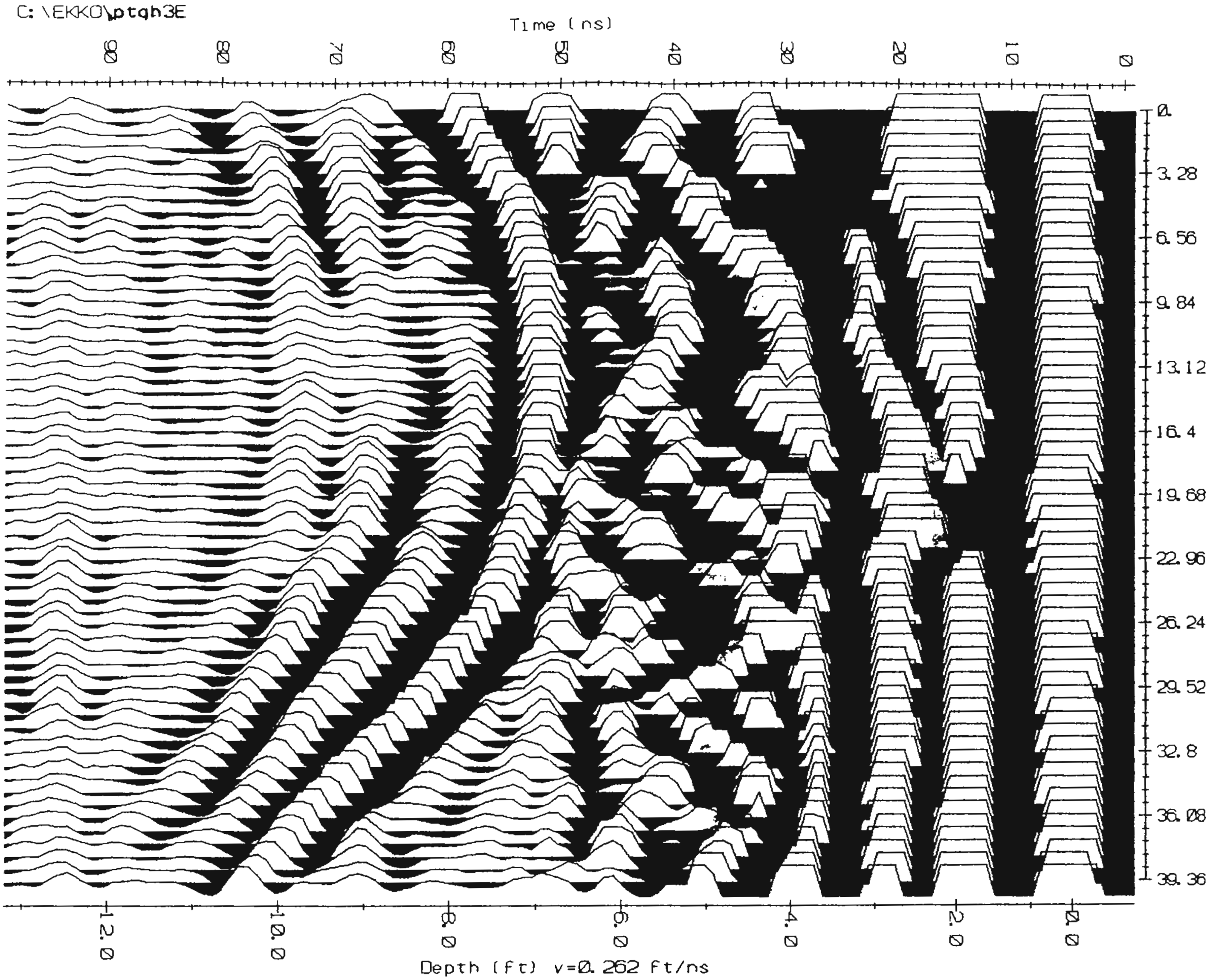
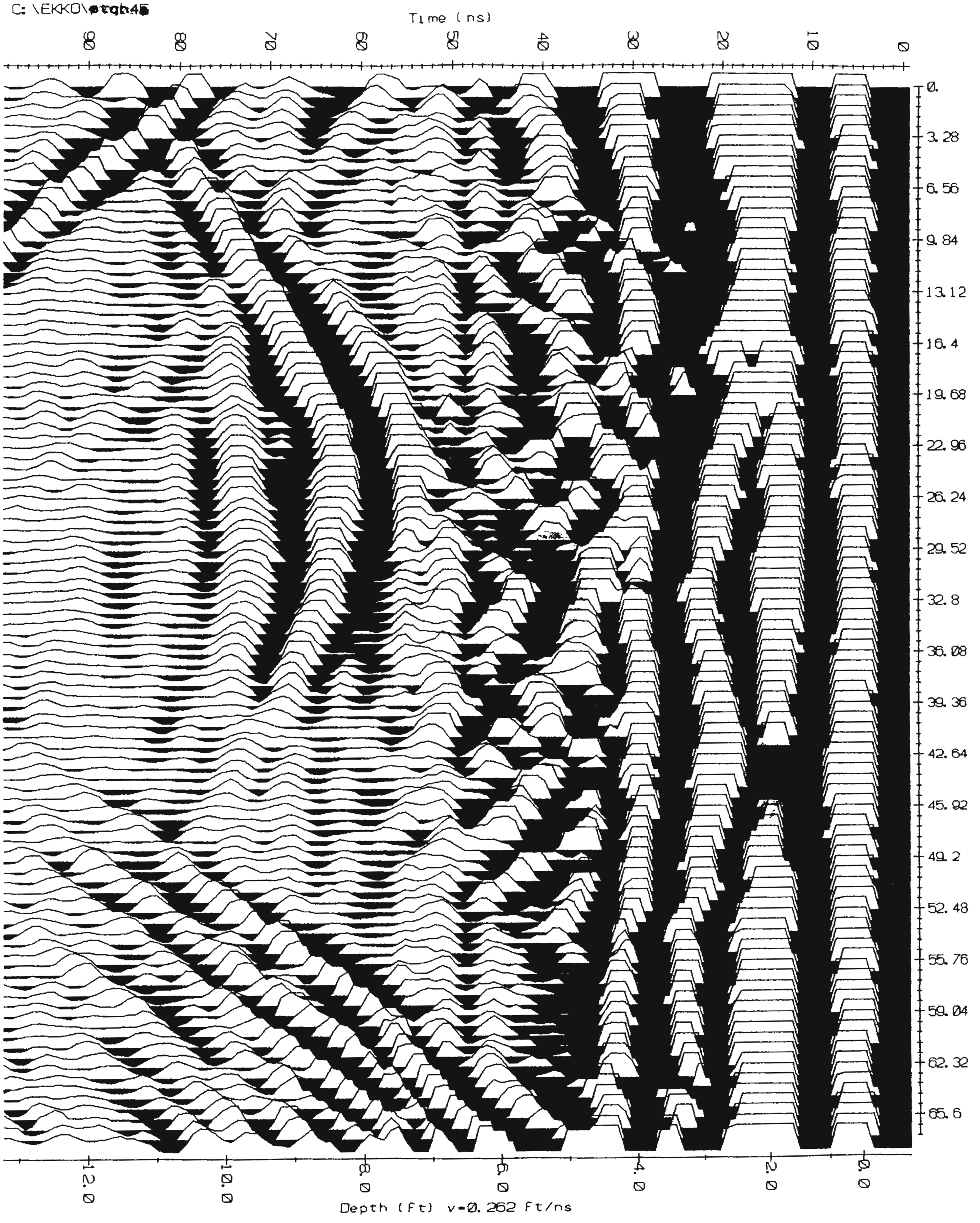
19.68
22.96
26.24
29.52
32.8
36.08
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Depth (ft) v=0.262 ft/ns


C:\EKKO\ptgh3E
Time (ns)
90
80
70
60
50
40
30
20
10
0
0.
3.28
6.56
9.84
13.12
16.4
19.68
22.96
26.24
29.52
32.8
36.08
39.36
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Depth (ft) v=0.262 ft/ns


C: \EKKO\stqh45
Time (ns)
90
80
70
60
50
40
30
20
10
0
0.
3.28
6.56
9.84
13.12
16.4
19.68
22.96
26.24
29.52
32.8
36.08
39.36
42.64
45.92
49.2
52.48
55.76
59.04
62.32
65.6
12.0
10.0
8.0
6.0
4.0
2.0
0.0
Depth (ft) v=0.262 ft/ns

Appendix B

Test Pit Logs and Soil Boring Logs

Test Pit Logs

PAGE 1 OF 1

TEST PIT REPORT

ENGINEERING-SCIENCE, INC.	CLIENT: USACE	TEST PIT #: TP4-1

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
ok ~~Det~~ OVM	PID	0	11/10/93 0800
Victoreen		ok ~~40~~ <1 wrong units	11/10/93 0830

DATE START: 11/10/93
DATE FINISH: 11/10/93

INSPECTOR: DMK
CONTRACTOR: UXB

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
				topsoil	several inches of topsoil Pit is pretty uniform	
1					Clay loam	
2				uniform clay clay-loam	no odd color no foreign material	
3	<1 0/~~50~~ ok	TP4-1 11/10/93 0850	3 feet		lt brown dry clay, loam few rocks	Photo # 10, 11 Pit located 3' to 6' up berm
4						

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP4-1

ver. 1/ 15-Oct-93

TSTPITP2.WK1

PAGE 1 OF 1

TEST PIT REPORT

ENGINEERING-SCIENCE, INC.	CLIENT: USACE	TEST PIT #: TP 4-2

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM	PID	0	11/16/93 0800
Victoreen 190		<1	11/16/93 0830

DATE START: 11/3/93
DATE FINISH: 11/3/93

INSPECTOR: DMK
CONTRACTOR: UXB

SCALE (FT)	VOC./ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
				Topsoil		
1						
2				uniform clay clay loam		
3	0/<1	TP4-2 11/16/93 0910	3feet		lt brown-clay clay, clay-clay loam some rocks No foreign material	Photos 12 & 13 Pit located 3' to 5' up berm

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP4-2

PAGE 1 OF 1

TEST PIT REPORT

ENGINEERING–SCIENCE, INC.	CLIENT: SEAD	TEST PIT #: TP4-3

PROJECT: SENECA 10 SWMU INVESTIGATION
LOCATION: SEAD 4 TEST PIT TRIPLET LOCATION

JOB NUMBER: 720477-01000
EST. GROUND ELEV.
INSPECTOR: JWC
CONTRACTOR: ES/UXB
START DATE: 12/5/93
COMPLETION DATE: 12/5/93
CHECKED BY:
DATE CHECKED:

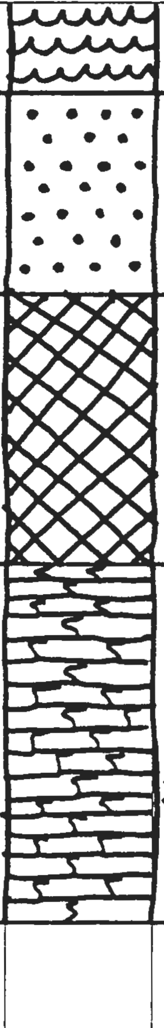
TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
6'	3'	4'	BACK HOE

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM-580B	10.0eV	0	10:20am 12/5/93
LEL/O_2/H_2S			

COMMENTS: sample TP4-3.
SHALLOW OVERBURDEN SOILS
WELL DEFINED UNITS
1 ORGANIC 4 VOC -40ML
1 INORGANIC 1 EXPLOSIVE
1 METALS
TOTAL SAMPLES: [8]



SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
					TOPSOIL, ROOT SYSTEMS HIGH ORGANIC CONTENT	~6"
1					LIGHT BROWN SILTY SAND FINE GRAINED <200 SIEVE SIZE w/SOME CLAY – GLACIAL TILL	7"
2					DARK TO MEDIUM (OLIVE) GREY UNIT Defining GLACIAL TILL PHASING INTO WEATHERED SHALE LAYER [WELL-DEFINED SHALE UNIT	18"
3 4					CONSISTENT SHALE UNIT – EXCAVATION TO BACKHOE Refusal *NO INTRUSIVE presence	17-18"
5					SHALE CONTINUATION	

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS TEST PIT #: TP4-3

PAGE 1 OF 1

TEST PIT REPORT

TIME 10:00 AM

ENGINEERING–SCIENCE, INC.	CLIENT: SEAD	TEST PIT #: TP4-4

PROJECT: SENECA 10 SWMU INVESTIGATIONS
LOCATION: SEAD 4 TEST PIT TRIPLET LOCATION

JOB NUMBER: 720477-0
EST. GROUND ELEV.
INSPECTOR: JWC
CONTRACTOR: ES/UXB
START DATE: 12/5/93
COMPLETION DATE: 12/5/93
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
~~[illegible]~~	~~[illegible]~~		
65'	3'	4'	BACKHOE

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM-580B	10.0 eV	0	12/5/93
LEL/O2/H_2S		—	12/5/93

COMMENTS:

SHALLOW OVERBURDEN SOILS
WELL DEFINED UNITS
1 ORGANICS – 500 ML
1 INORGANICS – 500 ML
4 VOC – 40 ML
1 EXPLOSIVE – 40 ML
1 METALS – 40 ML

TOTAL SAMPLES: 8

SCALE (FT)	VOC/RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
	0 BGD			〰	TOPSOIL, ROOT SYSTEMS HIGH ORGANIC CONTENT	7"
1	0 BGD			⁘	LIGHT BROWN SILTY SAND FINE WITH SOME CLAY – TILL < 200 SIEVE SIZE	7"
2	0 BGD	FOUR BOWLS AT SIDES OF THE PIT ~2 SAMPLE TP4-4	~2'	▨	DARK-GREY → OLIVE GREY SOILS/TILL WHICH PHASE INTO WEATHERED SHALE LAYER [WELL-DEFINED SHALE UNIT]	18"
3	0 BGD			▤	CONSISTENT SHALE UNIT – LARGE PIECES EXCAVATION TO BACKHOE REFUSAL (NO INTRUSIVE PRESENCE NOTED)	ALL NATURAL WELL SORTED SHALE
4						
5						

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP4-4

PAGE 1 OF 1

TEST PIT REPORT

TIME 9:40 AM

ENGINEERING-SCIENCE, INC.	CLIENT: SEAD	TEST PIT #: TP4-5

PROJECT: SENECA 10 SWMU INVESTIGATIONS
LOCATION: SEAD 4 TEST PIT TRIPLET LOCATION

JOB NUMBER: 720477-0100
EST. GROUND ELEV.
INSPECTOR: JWC
CONTRACTOR: ES
START DATE: 12/5/93
COMPLETION DATE: 12/5/93
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
6'	3'	3.5-4'	BACKHOE

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM-580B	10.0 EV	0	12/5/93
LEL/O2/H2S		—	12/5/93

COMMENTS:
SHALLOW OVERBURDEN SOILS
WELL DEFINED UNITS

TOTAL SAMPLES: [8]

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
	0			〰	TOPSOIL, ROOT SYSTEMS	} 6"
1	0			⁘	LIGHT BROWN SILTY SAND FINE W/ SOME ~~CLAY~~ - TILL < 200 SIEVE SIZE	} 8"
2	0	Sample TP4-5 (FOUR) BOWLS AT SIDES OF THE PIT	~2'	▩	DARKER GREY SOILS UNIT DEFINING TILL PHASING INTO WEATHERED SHALE LAYER [WELL-DEFINED SHALE UNIT]	} 16"
3	0			≋	CONSISTENT SHALE UNIT - EXCAVATION TO BACKHOE REFUSAL NO INTRUSIVE PRESENCE NOTED	ALL NATURAL WELL SORTED
4 5					BACKHOE REFUSAL SHALE CONTINUATION ↓	

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP4-5

ver. 1/ 05-Nov-93

TSTPIT.WK1

PAGE 1 OF 1

TEST PIT REPORT

ENGINEERING-SCIENCE, INC.	CLIENT: SEAD	TEST PIT #: TP4-6

PROJECT: SENECA 10 SWMU INVESTIGATION
LOCATION: SEAD 4 CLAY PIPE TRACE

JOB NUMBER: 720477-01000
EST. GROUND ELEV.
INSPECTOR: JWC
CONTRACTOR: ES/V&B
START DATE: 12/5/93
COMPLETION DATE: 12/6/93
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
48'	3'	6'	BACKHOE

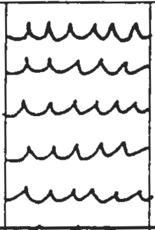
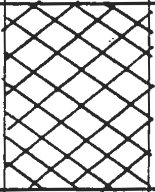
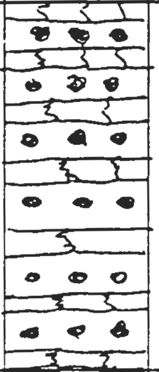
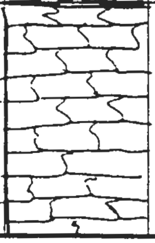
MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM-580B	10.0	0	12/5/93 13:00
LEL/O2/H2S	—	—	" "

COMMENTS: Excavated perpendicular to 6" clay pipe Direction but were unable to locate intersection

Sample: TP4-6

TOTAL SAMPLES [8]

SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
1	0				TOPSOIL	12"
	0				DARK GREY CLAYEY SAND WITH SOME INTERBEDDED SHALE CLASTS	11"
2	0				Small Region of Hematitic Soil medium-Fine	7"
3 4	0				WEATHERED SHALE UNIT W/DARK GREY TILL	18"
5	0				more Competent SHALE UNIT	

SEE MASTER ACRONYM LIST FOR COMPLETE LISTING OF ABBREVIATIONS

TEST PIT #: TP4-6

PAGE 1 OF 1

TEST PIT REPORT

TIME 17:30

ENGINEERING-SCIENCE, INC. CLIENT: SEAD

TEST PIT #: TP4-7

PROJECT: SEAD 10 SWMU INVESTIGATION
LOCATION: SEAD 4 CLAY PIPE TRACE

JOB NUMBER: 720477-01000
EST. GROUND ELEV.
INSPECTOR: JWC
CONTRACTOR: ES/UXB
START DATE: 12/5/93
COMPLETION DATE: 12/5/93
CHECKED BY:
DATE CHECKED:

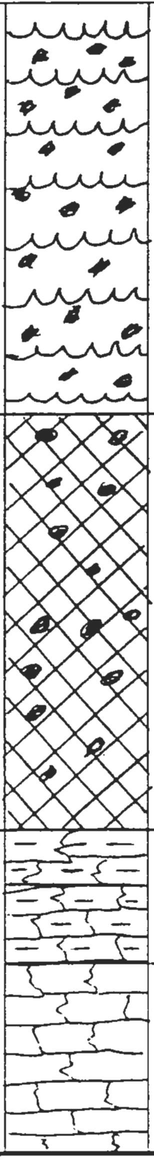
TEST PIT DATA

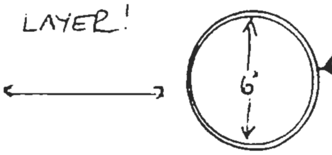
LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
6'	3'	5'	BACKHOE

MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM-580B	10.0 ev	0	12/5/93
LEL/O_2/H_2S		—	12/5/93

COMMENTS:
~ 200' NE of the POND
T.P. WAS EXCAVATED UNTIL CLAY PIPE WAS DISCOVERED.
Sample: TP4-7
TOTAL SAMPLES: [8]





SCALE (FT)	VOC/RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
1	0 BGD				TOPSOIL W/ ROOT SYSTEM high ORGANIC content EVIDENCE of INTRUSIVE LIGHT BROWN – GREY SOILS SMALL SHALE fRAGMENTS	HIGH GROUND – ALMOST BERM-LIKE 22"
2 3	0 BGD	2 BOWL SAMPLES			DARK GREY SILTY CLAYEY SAND WITH SOME SHALE CLASTS SURROUNDING SHALE UNIT WAS HIGHER THAN AREA of PIPE! This implied that the pipe was trenched into the overburden shale unit!	21"
4 5	0 BGD	2 BOWL SAMPLES			FINE LIGHT GREY SILTY SAND LAYER!	SAMPLED CLAY PIPE

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

ver. 1/ 05-Nov-93

TSTPIT.WK1

PAGE 1 OF 1

TEST PIT REPORT

TIME 12:15 AM

ENGINEERING-SCIENCE, INC.	CLIENT: SEAD	TEST PIT #: TP4-8

PROJECT: SEAD 10 SWMU INVESTIGATION
LOCATION: SEAD 4

JOB NUMBER: 720477-01000
EST. GROUND ELEV.
INSPECTOR: JWC
CONTRACTOR: ES/UXB
START DATE: 12/5/93
COMPLETION DATE: 12/5/93
CHECKED BY:
DATE CHECKED:

TEST PIT DATA

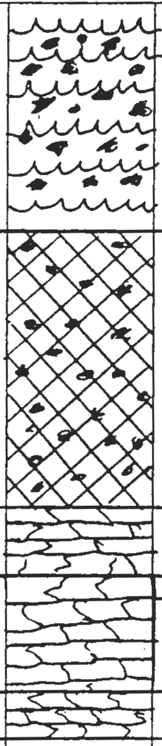
LENGTH	WIDTH	DEPTH	EXCAVATION/SHORING METHOD
6'	3'	3'	BACKHOE

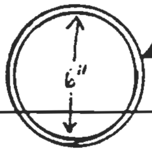
MONITORING DATA

INSTRUMENT	DETECTOR	BACKGROUND	TIME/DATE
OVM-580B	10.0 eV	0	12/5/93
LEL/O2/H2S		—	12/5/93

COMMENTS: ~75' NE of the POND
T.P. WAS EXCAVATED UNTIL CLAY PIPE WAS DISCOVERED

TOTAL SAMPLES: 8



SCALE (FT)	VOC/ RAD.	SAMPLE NUMBER	SAMPLE DEPTH RANGE	STRATA SCHEMATIC	DESCRIPTION OF MATERIALS (BURMEISTER METHODOLOGY)	REMARKS
1	0 BGD.				TOPSOIL WITH SMALL SHALE FRAGMENTS INTERBEDDED EVIDENCE OF INTRUSION LIGHT BROWN — GREY SOILS	12"
2	0				DRK. GREY SILTY CLAYEY SAND WITH SOME CLASTS OF SHALE	14"
					SHALE FRAGMENTS LARGE 4–6" PIECES	3"
3	0 BGD.	4 BOWLS TAKEN AROUND PIPE	~32" Sample TP4-8		 6"	CLAY PIPE 7"
					WATER FLOWING THROUGH TO THE POND	
4						
5						

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

ver. 1/ 05-Nov-93

TSTPIT.WK1

Soil Boring Logs

LOG OF BORING NO. SB4-1/MW4-1

Sheet 1 of 1

PROJECT: SEDA
PROJECT LOCATION: Seneca Army Depot, Romulus, New York
ASSOCIATED AREA/UNIT: SEAD 4
PROJECT NO.: 734539
DATE STARTED: 12/6/1993
DATE COMPLETED 12/6/1993
DRILLING CONTRACTOR: Maxim
DRILLING METHOD: HSA 8"
SAMPLING METHOD: Split Spoon

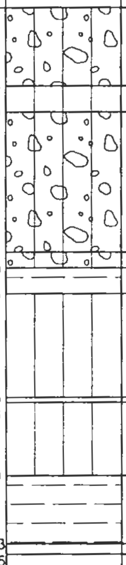
TOTAL DEPTH: 10.5
DEPTH TO WATER:
BORING LOCATION:

COORDINATE SYSTEM: NAD83
GROUND SURFACE ELEVATION:
ELEVATION DATUM: NAVD88
INSPECTOR: ES/LB
CHECKED BY:

This log is part of a report prepared by Parsons Engineering-Science, Inc. for the named company and should be read together with the report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations.

Sample Number	Blow Counts (# Blows per 6")	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)
4-1.1 -1.5	2	2	0	
	2			
	4			
	5			
4-1.2	6	2	0	
	8			
	10			
4-1.3	12	2	0	
	8			
	12			
	21			
4-1.4	31	2	0	
	28			
	22			
	32			
4-1.6	35	2		
	16			
	32			
	42			
	100/.1			

Depth (ft): 0 1 2 3 4 5 6 7 8 9 10 11 12 13 14 15 16 17 18 19 20



Soil Description Macro	DESCRIPTION	USCS Class	Stratum Class
0	Light brown SILT and SHALE fragments, little Clay, moist	MLG	
1.5	Light brown SILT, some Clay, trace Shale fragments, oxidation, light	ML	
2.0	Light brown SILT, some Shale fragments, little Clay, moist, dense	MLG	
4.7 5.0	Light brown SILT, some Clay, little Shale fragment, moist	ML	
5.5	Gray, weathered SHALE	WSH	
	Light brown SILT, some Clay, little Shale fragments, dense, moist	ML	
7.5 7.6	Weathered SHALE	WSH	
	Light brown SILT, some Clay, little Shale fragments, dense, moist	ML	
9.0	Weathered SHALE	WSH	
10.3 10.5	No Recovery		
	Auger Refusal at 10.5'		

NOTES:

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UNITED STATES ARMY CORPS OF ENGINEERS
Seneca Army Depot
Romulus, New York

LOG OF BORING SB4-1/MW4-1

LOG OF BORING NO. SB4-2/MW4-2

Sheet 1 of 1

PROJECT: SEDA
PROJECT LOCATION: Seneca Army Depot, Romulus, New York
ASSOCIATED AREA/UNIT: SEAD 4
PROJECT NO.: 734539
DATE STARTED: 11/10/1993
DATE COMPLETED 11/10/1993
DRILLING CONTRACTOR: Maxim
DRILLING METHOD: HSA 8"
SAMPLING METHOD: Split Spoon

TOTAL DEPTH: 4
DEPTH TO WATER:
BORING LOCATION:

COORDINATE SYSTEM: NAD83
GROUND SURFACE ELEVATION:
ELEVATION DATUM: NAVD88
INSPECTOR: ES
CHECKED BY:

This log is part of a report prepared by Parsons Engineering-Science, Inc. for the named company and should be read together with the report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations.

Sample Number	Blow Counts (# Blows per 6")	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	Soil Description Macro	DESCRIPTION	USCS Class	Stratum Class
4-2.1	6 8 9	1.2	0		0 1.2		Medium brown SILT, some Clay, little rounded Cobbles, moist	ML	
					2.0		No Recovery		
4-2.2	11 45 100/.5	1.7	0		2.5		Medium brown SILT, some Clay, little Cobbles, moist	ML	
					3.7		Weathered SHALE, dry	WSH	
					4.0		No Recovery		
							Auger Refusal at 4'		

NOTES:

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UNITED STATES ARMY
CORPS OF ENGINEERS
Seneca Army Depot
Romulus, New York

LOG OF BORING SB4-2/MW

LOG OF BORING NO. SB4-3/MW4-3

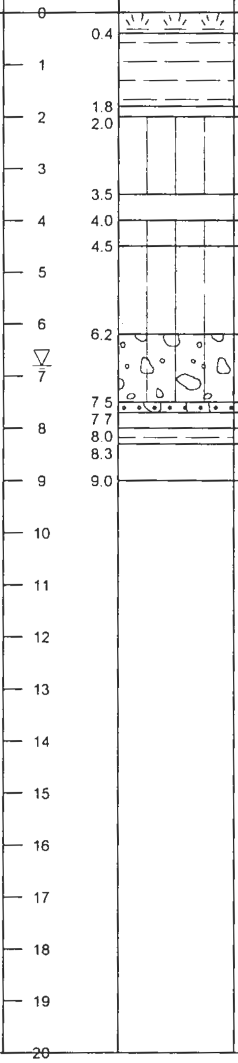
Sheet 1 of 1

PROJECT:	SEDA
PROJECT LOCATION:	Seneca Army Depot, Romulus, New York
ASSOCIATED AREA/UNIT:	SEAD 4
PROJECT NO.:	734539
DATE STARTED:	11/10/1993
DATE COMPLETED	11/10/1993
DRILLING CONTRACTOR:	Maxim
DRILLING METHOD:	HSA 8"
SAMPLING METHOD:	Split Spoon

TOTAL DEPTH:	9
DEPTH TO WATER:	6.8
BORING LOCATION:	
COORDINATE SYSTEM:	NAD83
GROUND SURFACE ELEVATION:	
ELEVATION DATUM:	NAVD88
INSPECTOR:	ES
CHECKED BY:	

This log is part of a report prepared by Parsons Engineering-Science, Inc. for the named company and should be read together with the report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations.

Sample Number	Blow Counts (# Blows per 6")	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)
4-3.1	9 26 26 18	1.8	0	
4-3.2	16 16 28	1.5	0	
4-3.3	30 15 26 36	2	0	
4-3.4	90 33 46 100/.5	1.7	0	



Depth (ft)	DESCRIPTION	USCS Class	Stratum Class
0–0.4	Topsoil	TOP	
0.4–1.8	Gray, weathered SHALE fill, some Silt, moist	WSH	
1.8–2.0	No Recovery		
2.0–3.5	Light brown SILT, some Clay, little Cobbles, oxidation, dense, moist	ML	
3.5–4.0	No Recovery		
4.0–4.5	Light brown SILT, some Clay, little Cobbles, oxidation, dense, moist, Sand lense at bottom of interval	ML	
4.5–6.2	Light brown SILT, some fine Sand, little Shale fragments, moist, weathered Shale lense at 5'	MLS	
6.2–7.5	Light brown to light gray SILT, some weathered Shale fragments, moist to wet	MLG	
7.5–7.7	Light brown, fine SAND, some Shale fragments, wet	SWG	
7.7–8.0	No Recovery		
8.0–8.3	Weathered Shale	WSH	
8.3–9.0	No Recovery		
	Auger Refusal at 9'		

NOTES:

PARSONS

PARSONS ENGINEERING SCIENCE, INC.

UNITED STATES ARMY
CORPS OF ENGINEERS
Seneca Army Depot
Romulus, New York

LOG OF BORING SB4-3/MW4-3

LOG OF BORING NO. SB4-4/MW4-4

Sheet 1 of 1

PROJECT: SEDA
PROJECT LOCATION: Seneca Army Depot, Romulus, New York
ASSOCIATED AREA/UNIT: SEAD 4
PROJECT NO.: 734539
DATE STARTED: 12/5/1993
DATE COMPLETED 12/5/1993
DRILLING CONTRACTOR: Maxim
DRILLING METHOD: HSA 8"
SAMPLING METHOD: Split Spoon

TOTAL DEPTH: 10
DEPTH TO WATER:
BORING LOCATION:

COORDINATE SYSTEM: NAD83
GROUND SURFACE ELEVATION:
ELEVATION DATUM: NAVD88
INSPECTOR: ES
CHECKED BY:

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Sample Number	Blow Counts (# Blows per 6")	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	Soil Description Macro	DESCRIPTION	USCS Class	Stratum Class
4-4.1	1	2	0		0		Organic matter		
4-4.5	1								
	2				1.0		Light brown SILT, some Clay, little Organic matter, moist	ML	
	5	0.25			1.5		Light brown SILT, some Clay, little Shale fragments, dense, moist	ML	
	36				2.3		No Recovery		
	37								
	30								
4-4.2	40	2	0		4.0		Light brown SILT, some fine Sand, little Shale fragments, dense, moist	MLS	
	20								
	28								
	38								
4-4.3	50	1	0						
	45				6.7				
	58				7.0		Light brown SILT, some fine Sand, some large Shale fragments, dense, moist	MLS	
	100/.3	0.5	0				No Recovery		
	62								
	100/.1								
					10.0		Auger Refusal at 10'		

NOTES:

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Seneca Army Depot
Romulus, New York

LOG OF BORING SB4-4/MW4

LOG OF BORING NO. SB4-5/MW4-5

Sheet 1 of 1

PROJECT: SEDA
PROJECT LOCATION: Seneca Army Depot, Romulus, New York
ASSOCIATED AREA/UNIT: SEAD 4
PROJECT NO.: 734539
DATE STARTED: 12/5/1993
DATE COMPLETED 12/5/1993
DRILLING CONTRACTOR: Maxim
DRILLING METHOD: HSA 8"
SAMPLING METHOD: Split Spoon

TOTAL DEPTH: 6
DEPTH TO WATER:
BORING LOCATION:

COORDINATE SYSTEM: NAD83
GROUND SURFACE ELEVATION:
ELEVATION DATUM: NAVD88
INSPECTOR: ES/LB
CHECKED BY:

Sample Number	Blow Counts (# Blows per 6")	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	Soil Description Macro	DESCRIPTION	USCS Class	Stratum Class
4-5.1	2	2	0		0		Topsoil	TOP	
	5 7				1	0.5	Light brown SILT, some Clay, little Wood, Concrete and Shale fragments, moist	ML	
4-5.2	7 11	1.8	0		2	2.0	Light brown SILT, some Clay, dense, moist	ML	
	16 28				3	3.0	Light brown SILT, some Clay, some Shale fragments, moist	MLG	
	100/.3				4 5	3.8	No Recovery		
					6 7 8 9 10 11 12 13 14 15 16 17 18 19 20	6.0	Auger Refusal at 6'		

NOTES:

UNITED STATES ARMY CORPS OF ENGINEERS
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Romulus, New York

LOG OF BORING SB4-5/MW4-5

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LOG OF BORING NO. SB4-6

Sheet 1 of 1

PROJECT: SEDA
PROJECT LOCATION: Seneca Army Depot, Romulus, New York
ASSOCIATED AREA/UNIT: SEAD 4
PROJECT NO.: 734539
DATE STARTED: 12/6/1993
DATE COMPLETED 12/6/1993
DRILLING CONTRACTOR: Maxim
DRILLING METHOD: HSA 8"
SAMPLING METHOD: Split Spoon

TOTAL DEPTH: 2.8
DEPTH TO WATER:
BORING LOCATION:

COORDINATE SYSTEM: NAD83
GROUND SURFACE ELEVATION:
ELEVATION DATUM: NAVD88
INSPECTOR: BH/MCB
CHECKED BY:

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Sample Number	Blow Counts (# Blows per 6")	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	Soil Description Macro	DESCRIPTION	USCS Class	Stratum Class
4-6.1	4	1.2	0		0		Organic matter, Loam		
	6								
	10				1	1.0 1.2	SAND, some Clay and rock fragments	SPG	
	28						No Recovery		
4-6.2	92	0.8	0		2	2.0	Weathered SHALE, wet	WSH	
	100/.3				3	2.8	Auger Refusal at 2.8'		
					4				
					5				
					6				
					7				
					8				
					9				
					10				
					11				
					12				
					13				
					14				
					15				
					16				
					17				
					18				
					19				
					20				

NOTES:

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Romulus, New York

LOG OF BORING SB

LOG OF BORING NO. SB4-7

Sheet 1 of 1

PROJECT: SEDA
PROJECT LOCATION: Seneca Army Depot, Romulus, New York
ASSOCIATED AREA/UNIT: SEAD 4
PROJECT NO.: 734539
DATE STARTED: 12/5/1993
DATE COMPLETED 12/5/1993
DRILLING CONTRACTOR: Maxim
DRILLING METHOD: HSA 8"
SAMPLING METHOD: Split Spoon

TOTAL DEPTH: 8.3
DEPTH TO WATER: 4.5
BORING LOCATION:

COORDINATE SYSTEM: NAD83
GROUND SURFACE ELEVATION:
ELEVATION DATUM: NAVD88
INSPECTOR: BH/MCB
CHECKED BY:

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Sample Number	Blow Counts (# Blows per 6")	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)
4-7.1	3	1.7	0		0
	7				1
	9				
	10				2
4-7.2	13	1.8	0		
	16				3
	25				
4-7.3	26	1.8	0		4
	28				▽
	36				5
	42				
4-7.4	45	2	0		6
	26				7
	28				
	38	0 3	0		8
	52				
					9
					10
					11
					12
					13
					14
					15
					16
					17
					18
					19
					20

Depth (ft)	Soil Description Macro	DESCRIPTION	USCS Class	Stratum Class
		ORGANIC material, some Shale, Clay and Sand	GPS	
0.7		SHALE and CLAY, oxidation, dense, dry	GC	
1.7		No Recovery		
2.0		Weathered SHALE and CLAY, oxidation, dense, dry	GC	
3.8		No Recovery		
4.0		Weathered SHALE and CLAY, oxidation, dense, dry	GC	
4.5		CLAY, some Shale fragments, wet	GC	
5.8		No Recovery		
6 0		CLAY, some Shale fragments, wet	GC	
7.0		CLAY and SAND	SC	
8.3		Auger Refusal at 8.3'		

NOTES:

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Romulus, New York

LOG OF BORING SB4-7

LOG OF BORING NO. SB4-8

Sheet 1 of 1

PROJECT: SEDA
PROJECT LOCATION: Seneca Army Depot, Romulus, New York
ASSOCIATED AREA/UNIT: SEAD 4
PROJECT NO.: 734539
DATE STARTED: 12/5/1993
DATE COMPLETED 12/5/1993
DRILLING CONTRACTOR: Maxim
DRILLING METHOD: HSA 8"
SAMPLING METHOD: Split Spoon

TOTAL DEPTH: 5.6
DEPTH TO WATER:
BORING LOCATION:

COORDINATE SYSTEM: NAD83
GROUND SURFACE ELEVATION:
ELEVATION DATUM: NAVD88
INSPECTOR: BH/MCB
CHECKED BY:

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Sample Number	Blow Counts (# Blows per 6")	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	Soil Description Macro	DESCRIPTION	USCS Class	Stratum Class
4-8.1	5	2	0		0	0.5	Weathered SHALE and ORGANIC material	FL	
	5				1		SAND, some Clay	SC	
	7								
4-8.2	8	1.8	0		2	2.0	CLAY and SAND, some Shale fragments, wet	SC	
	10								
	10				3				
	15					3.8			
4-8.3	20	1.9	0		4	4.0	No Recovery		
	17					4.3	CLAY and SAND, some Shale fragments, wet	SC	
	32				5		Weathered SHALE, some Sand, some Clay, some Gravel,	GPS	
	50					5.6	oxidation, moist		
	100/.6				6		Auger Refusal at 5.6'		
					7				
					8				
					9				
					10				
					11				
					12				
					13				
					14				
					15				
					16				
					17				
					18				
					19				
					20				

NOTES:

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LOG OF BORING SB4

LOG OF BORING NO. SB4-9

Sheet 1 of 1

PROJECT: SEDA
PROJECT LOCATION: Seneca Army Depot, Romulus, New York
ASSOCIATED AREA/UNIT: SEAD 4
PROJECT NO.: 734539
DATE STARTED: 12/5/1993
DATE COMPLETED 12/5/1993
DRILLING CONTRACTOR: Maxim
DRILLING METHOD: HSA 8"
SAMPLING METHOD: Split Spoon

TOTAL DEPTH: 5.9
DEPTH TO WATER:
BORING LOCATION:

COORDINATE SYSTEM: NAD83
GROUND SURFACE ELEVATION:
ELEVATION DATUM: NAVD88
INSPECTOR: BH/MCB
CHECKED BY:

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Sample Number	Blow Counts (# Blows per 6")	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	Soil Description Macro	DESCRIPTION	USCS Class	Stratum Class
4-9.1	2	2	0		0		ORGANIC material, some Root fragments, some Sand		
	4				0.5		SAND, some Gravel, little Clay, little Shale fragments, oxidation	SPG	
	5								
4-9.2	6	2	0						
	14								
	25				3.0		Weathered SHALE, some Sand, dry	WSH	
	32								
4-9.3	38	2	0						
	32								
	48								
	23				5.9		Auger Refusal at 5.9'		
	100/.3								

NOTES:

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Seneca Army Depot
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LOG OF BORING SB4-9

LOG OF BORING NO. SB4-10

Sheet 1 of 1

PROJECT: SEDA
PROJECT LOCATION: Seneca Army Depot, Romulus, New York
ASSOCIATED AREA/UNIT: SEAD 4
PROJECT NO.: 734539
DATE STARTED: 12/6/1993
DATE COMPLETED 12/6/1993
DRILLING CONTRACTOR: Maxim
DRILLING METHOD: HSA 8"
SAMPLING METHOD: Split Spoon

TOTAL DEPTH: 5.2
DEPTH TO WATER:
BORING LOCATION:

COORDINATE SYSTEM: NAD83
GROUND SURFACE ELEVATION:
ELEVATION DATUM: NAVD88
INSPECTOR: BH/MCB
CHECKED BY:

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Sample Number	Blow Counts (# Blows per 6")	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	Soil Description Macro	DESCRIPTION	USCS Class	Stratum Class
4-10.1	3	1.7	0		0	▨	CLAY and SAND, trace Gravel	SC	
	6				1				
	10								
	11				1.7		No Recovery		
4-10.2	24	2	0		2.0	▨	CLAY, some Shale fragments, some Sand	CLG	
	52				3				
	82								
4-10.3	85	1.1	0		4				
	46								
	85				5.1		No Recovery		
	100/.2				5.2		Auger Refusal at 5.2'		
					6				
					7				
					8				
					9				
					10				
					11				
					12				
					13				
					14				
					15				
					16				
					17				
					18				
					19				
					20				

NOTES:

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Romulus, New York

LOG OF BORING SB4-

LOG OF BORING NO. SB4-11

Sheet 1 of 1

PROJECT: SEDA
PROJECT LOCATION: Seneca Army Depot, Romulus, New York
ASSOCIATED AREA/UNIT: SEAD 4
PROJECT NO.: 734539
DATE STARTED: 12/17/98
DATE COMPLETED 12/18/98
DRILLING CONTRACTOR: Maxim
DRILLING METHOD: HSA 8"
SAMPLING METHOD: Split Spoon

TOTAL DEPTH: 2.9
DEPTH TO WATER:
BORING LOCATION:

COORDINATE SYSTEM: NAD83
GROUND SURFACE ELEVATION:
ELEVATION DATUM: NAVD88
INSPECTOR: TGH
CHECKED BY:

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Sample Number	Blow Counts (# Blows per 6")	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	Soil Description Macro	DESCRIPTION	USCS Class
43132	3	1.6	0		0	▨	Medium brown CLAY and coarse GRAVEL, little Silt, trace Sand, moist	CL
	12				1	▨		
	24					▨		
					1.6		No Recovery	
43133	31	0.9	0		2 2.0		Olive gray, weathered SHALE and CLAY, little Sand, moist	WSH
	75				2.6		No Recovery	
	100/.4				3 2.9		Auger Refusal at 2.9'	
					4			
					5			
					6			
					7			
					8			
					9			
					10			
					11			
					12			
					13			
					14			
					15			
					16			
					17			
					18			
					19			
					20			

NOTES:

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**UNITED STATES ARMY
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Seneca Army Depot
Romulus, New York**

LOG OF BORING SB4-11

LOG OF BORING NO. SB4-12

Sheet 1 of 1

PROJECT: SEDA
PROJECT LOCATION: Seneca Army Depot, Romulus, New York
ASSOCIATED AREA/UNIT: SEAD 4
PROJECT NO.: 734539
DATE STARTED: 12/16/98
DATE COMPLETED 12/17/98
DRILLING CONTRACTOR: Maxim
DRILLING METHOD: HSA 8"
SAMPLING METHOD: Split Spoon

TOTAL DEPTH: 7.3
DEPTH TO WATER:
BORING LOCATION:

COORDINATE SYSTEM: NAD83
GROUND SURFACE ELEVATION:
ELEVATION DATUM: NAVD88
INSPECTOR: TGH
CHECKED BY:

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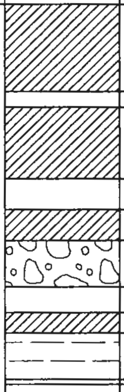
Sample Number	Blow Counts (# Blows per 6")	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)
43113	3	1.7	0	
	8			
	10			
	14	1.4	0	
	10			
	20			
	20			
43114	18	1.5	0	
	16			
	60			
	35			
43115	15	1.4	0	
	60			
	64			
	100/.4			



Depth (ft)	DESCRIPTION	USCS Class
0–1.7	Medium brown and light gray CLAY, some medium Gravel, some Silt, some Sand, moist	CL
1.7–2.0	No Recovery	
2.0–3.4	Medium brown to olive gray CLAY and SILT, some fine to coarse Sand, trace Gravel, moist	CL
3.4–4.0	No Recovery	
4.0–4.6	Medium brown CLAY and SILT, some fine to coarse Sand, moist to wet	CL
4.6–5.5	Medium to dark gray SHALE fragments, some fine to coarse Sand, little Clay, dry	GP
5.5–6.0	No Recovery	
6.0–6.4	Medium brown to light gray CLAY, some fine to medium Gravel, moist to wet	CL
6.4–7.3	Weathered SHALE, dry	WSH
7.3–7.4	No Recovery	
	Auger Refusal at 7.4'	

NOTES:

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Seneca Army Depot
Romulus, New York

LOG OF BORING SB4-12

LOG OF BORING NO. SB4-13

Sheet 1 of 1

PROJECT: SEDA
PROJECT LOCATION: Seneca Army Depot, Romulus, New York
ASSOCIATED AREA/UNIT: SEAD 4
PROJECT NO.: 734539
DATE STARTED: 12/16/98
DATE COMPLETED 12/16/98
DRILLING CONTRACTOR: Maxim
DRILLING METHOD: HSA 8"
SAMPLING METHOD: Split Spoon

TOTAL DEPTH: 3.8
DEPTH TO WATER:
BORING LOCATION:

COORDINATE SYSTEM: NAD83
GROUND SURFACE ELEVATION:
ELEVATION DATUM: NAVD88
INSPECTOR: TGH
CHECKED BY:

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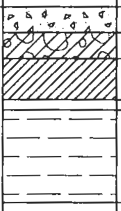

Sample Number	Blow Counts (# Blows per 6")	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	Soil Description Macro	DESCRIPTION	USCS Class
43116	-		0		0		CONCRETE	
	5	1.3			1	0.5 1.0	Dark gray, coarse GRAVEL, some Clay, some fine to coarse Sand, moist	GC
	7							CL
	6				2	1.8 2.0	Light gray, mottled CLAY with trace coarser material, moist	
43117	40	1.8	0				No Recovery	WSH
	65				3		Light gray, weathered SHALE, coarse Gravel and fine to coarse Sand, some Clay, dry	
	65							
	100/.3				4	3.8	Auger Refusal at 3.8'	
					5			
					6			
					7			
					8			
					9			
					10			
					11			
					12			
					13			
					14			
					15			
					16			
					17			
					18			
					19			
					20			

NOTES:

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LOG OF BORING SB4-13

LOG OF BORING NO. SB4-14

Sheet 1 of 1

PROJECT: SEDA
PROJECT LOCATION: Seneca Army Depot, Romulus, New York
ASSOCIATED AREA/UNIT: SEAD 4
PROJECT NO.: 734539
DATE STARTED: 12/16/98
DATE COMPLETED 12/17/98
DRILLING CONTRACTOR: Maxim
DRILLING METHOD: HSA 8"
SAMPLING METHOD: Split Spoon

TOTAL DEPTH: 4.7
DEPTH TO WATER:
BORING LOCATION:

COORDINATE SYSTEM: NAD83
GROUND SURFACE ELEVATION:
ELEVATION DATUM: NAVD88
INSPECTOR: TGH
CHECKED BY:

This log is part of a report prepared by Parsons Engineering-Science, Inc. for the named company and should be read together with the report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations.

Sample Number	Blow Counts (# Blows per 6")	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	Soil Description Macro	DESCRIPTION	USCS Class
43109	3	1.2	0		0	▨	Medium brown to light gray CLAY, SILT and fine to medium GRAVEL, little Sand, moist	CL
	10				1			
	10				1.2		No Recovery	
	17							
43112	10	1			2 2.0		Medium to dark gray, coarse GRAVEL and CLAY, some Silt, some fine to coarse Sand, dry	GC
	20				3 3.0		No Recovery	
	40							
	40	0.7	3.8		4 4.0		Dark gray to bluish, weathered SHALE, dry, smelled vapors	WSH
	40		42.5		4.8		No Recovery	
	100/.3				5			
					6 6.0		No Recovery	
					7			
					8 8.0		Auger Refusal at 8'	
					9			
					10			
					11			
					12			
					13			
					14			
					15			
					16			
					17			
					18			
					19			
					20			

NOTES:

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**UNITED STATES ARMY
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Seneca Army Depot
Romulus, New York**

LOG OF BORING SB4-14

LOG OF BORING NO. SB4-15

Sheet 1 of 1

PROJECT: SEDA
PROJECT LOCATION: Seneca Army Depot, Romulus, New York
ASSOCIATED AREA/UNIT: SEAD 4
PROJECT NO.: 734539
DATE STARTED: 12/17/98
DATE COMPLETED 12/17/98
DRILLING CONTRACTOR: Maxim
DRILLING METHOD: HSA 8"
SAMPLING METHOD: Split Spoon

TOTAL DEPTH: 5.7
DEPTH TO WATER:
BORING LOCATION:

COORDINATE SYSTEM: NAD83
GROUND SURFACE ELEVATION:
ELEVATION DATUM: NAVD88
INSPECTOR: TGH
CHECKED BY:

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Sample Number	Blow Counts (# Blows per 6")	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	Soil Description Macro	DESCRIPTION	USCS Class
43145	2	1.3	0		0	▨	Medium brown CLAY and SILT, little fine to coarse Sand, dry to moist	CL
	5				1	▨		
	11				1.3		No Recovery	
	12				2 2.0	▨		
43146	32	1				▨	Olive gray CLAY, some fine to coarse Sand, little Gravel, little Silt, dry	CL
	38				3 3.0		No Recovery	
	48							
43148	30	1.6	0		4 4.0		Medium gray GRAVEL and CLAY, some fine to coarse Sand, moist	GC
	35				4.5		Weathered SHALE	WSH
	64				5			
	90				5.6			
					5.7		No Recovery	
	100/.2				6		Auger Refusal at 5.7'	
					7			
					8			
					9			
					10			
					11			
					12			
					13			
					14			
					15			
					16			
					17			
					18			
					19			
					20			

NOTES:

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Seneca Army Depot
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LOG OF BORING SB4-15

LOG OF BORING NO. SB4-16

Sheet 1 of 1

PROJECT:	SEDA
PROJECT LOCATION:	Seneca Army Depot, Romulus, New York
ASSOCIATED AREA/UNIT:	SEAD 4
PROJECT NO.:	734539
DATE STARTED:	12/21/98
DATE COMPLETED	12/21/98
DRILLING CONTRACTOR:	Maxim
DRILLING METHOD:	HSA 8"
SAMPLING METHOD:	Split Spoon

TOTAL DEPTH:	3.9
DEPTH TO WATER:	
BORING LOCATION:	
COORDINATE SYSTEM:	NAD83
GROUND SURFACE ELEVATION:	
ELEVATION DATUM:	NAVD88
INSPECTOR:	TGH
CHECKED BY:	

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Sample Number	Blow Counts (# Blows per 6")	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	Soil Description Macro	DESCRIPTION	USCS Class
43122	3	1.2	0		0 0.3	○	Dark gray GRAVEL and coarse SAND, moist	GM
	6 13				1 1.2	▨	Medium brown CLAY and fine GRAVEL, some coarse Sand, trace Cobbles, moist	CL
43124	18	1.3	0		2 2.0		No Recovery	
	25 41				3 3.0	▨	Light gray to light brown, gravelly CLAY, some coarse Sand, dry	CL
	55				3.3		Weathered SHALE, dry	WSH
	100/.4				4 3.9		No Recovery	
							Auger Refusal at 3.9'	

NOTES:

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UNITED STATES ARMY
CORPS OF ENGINEERS
Seneca Army Depot
Romulus, New York

LOG OF BORING SB4-16

LOG OF BORING NO. SB4-17

Sheet 1 of 1

PROJECT: SEDA
PROJECT LOCATION: Seneca Army Depot, Romulus, New York
ASSOCIATED AREA/UNIT: SEAD 4
PROJECT NO.: 734539
DATE STARTED: 12/16/98
DATE COMPLETED 12/16/98
DRILLING CONTRACTOR: Maxim
DRILLING METHOD: HSA 8"
SAMPLING METHOD: Split Spoon

TOTAL DEPTH: 3.8
DEPTH TO WATER:
BORING LOCATION:

COORDINATE SYSTEM: NAD83
GROUND SURFACE ELEVATION:
ELEVATION DATUM: NAVD88
INSPECTOR: TGH
CHECKED BY:

This log is part of a report prepared by Parsons Engineering-Science, Inc. for the named company and should be read together with the report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations.

Sample Number	Blow Counts (# Blows per 6")	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	Soil Description Macro	DESCRIPTION	USCS Class
43119	2 10 10 13	1.5	0		0	▨	Rusty brown to light gray CLAY, some fine to coarse Gravel, some fine to coarse Sand, moist	CL
					1.5		No Recovery	
43121	40 55 80 100/.3	1.2			2.0		Medium to dark gray, weathered SHALE, little Clay and Silt, dry	WSH
					3.2		No Recovery	
					3.8		Auger Refusal at 3.8'	

NOTES:

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Seneca Army Depot
Romulus, New York

LOG OF BORING SB4-17

LOG OF BORING NO. SB4-18

Sheet 1 of 1

PROJECT: SEDA
PROJECT LOCATION: Seneca Army Depot, Romulus, New York
ASSOCIATED AREA/UNIT: SEAD 4
PROJECT NO.: 734539
DATE STARTED: 12/15/98
DATE COMPLETED 12/15/98
DRILLING CONTRACTOR: Maxim
DRILLING METHOD: HSA 8"
SAMPLING METHOD: Split Spoon

TOTAL DEPTH: 7.4
DEPTH TO WATER:
BORING LOCATION:

COORDINATE SYSTEM: NAD83
GROUND SURFACE ELEVATION:
ELEVATION DATUM: NAVD88
INSPECTOR: TGH
CHECKED BY:

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Sample Number	Blow Counts (# Blows per 6")	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)
43080	19	1.5	0	
	14			
	13			
43081	14	1.5	0	
	16			
	14			
	19			
43082	15	1.8		
	10			
	21			
	35			
	80	0.5		
	80			
	100			

Depth (ft)	DESCRIPTION	USCS Class
0–0.4	SHALE fragments, all rock, Fill, moist	GW
0.4–1.5	CLAY and medium to coarse GRAVEL, some Fine to Coarse Sand, moist	GC
1.5–2.0	No Recovery	
2.0–2.2	Rusty brown, medium to coarse SAND, moist	SW
2.2–3.5	Rusty brown CLAY and SILT, some fine Sand, little medium to coarse Gravel, moist, mottled	CL
3.5–4.0	No Recovery	
4.0–5.5	Light gray CLAY, some Silt, little fine Sand, trace Gravel, dry to moist	CL
5.5–5.8	Light gray, weathered SHALE, dry	WSH
5.8–6.0	No Recovery	
6.0–6.5	Olive gray, weathered SHALE	WSH
6.5–7.4	No Recovery	
7.4	Auger Refusal at 7.4'	

NOTES:

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Seneca Army Depot
Romulus, New York

LOG OF BORING SB4-18

LOG OF BORING NO. SB4-19

Sheet 1 of 1

PROJECT: SEDA
PROJECT LOCATION: Seneca Army Depot, Romulus, New York
ASSOCIATED AREA/UNIT: SEAD 4
PROJECT NO.: 734539
DATE STARTED: 12/15/98
DATE COMPLETED 12/15/98
DRILLING CONTRACTOR: Maxim
DRILLING METHOD: HSA 8"
SAMPLING METHOD: Split Spoon

TOTAL DEPTH: 5.2
DEPTH TO WATER:
BORING LOCATION:

COORDINATE SYSTEM: NAD83
GROUND SURFACE ELEVATION:
ELEVATION DATUM: NAVD88
INSPECTOR: TGH
CHECKED BY:

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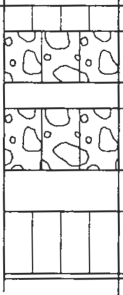

Sample Number	Blow Counts (# Blows per 6")	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	DESCRIPTION	USCS Class
43083	3 21 19	1.5	0		0 – 0.5	Medium brown SILT and fine SAND, little medium to coarse Sand, moist	ML
					0.5 – 1.5	Olive gray, fine to medium SAND and SILT, some fine to coarse Gravel, moist	GM
					1.5 – 2.0	No Recovery	
43084	17 15 18	1.2	0		2.0 – 3.2	Light brown to light gray SILT, some fine to coarse Sand, some Clay, some coarse Gravel, dry to moist	GM
	24				3.2 – 4.0	No Recovery	
43085	35 25 40	1.2	0		4.0 – 5.2	Olive gray SILT, some Clay, little fine to medium Sand, trace Gravel, dry, hard packed	ML
	100/.3				5.2 – 5.3	No Recovery	
						Auger Refusal at 5.3'	

NOTES:

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CORPS OF ENGINEERS
Seneca Army Depot
Romulus, New York

LOG OF BORING SB4-19

LOG OF BORING NO. SB4-20

Sheet 1 of 1

PROJECT: SEDA
PROJECT LOCATION: Seneca Army Depot, Romulus, New York
ASSOCIATED AREA/UNIT: SEAD 4
PROJECT NO.: 734539
DATE STARTED: 12/18/98
DATE COMPLETED 12/18/98
DRILLING CONTRACTOR: Maxim
DRILLING METHOD: HSA 8"
SAMPLING METHOD: Split Spoon

TOTAL DEPTH: 8.7
DEPTH TO WATER:
BORING LOCATION:

COORDINATE SYSTEM: NAD83
GROUND SURFACE ELEVATION:
ELEVATION DATUM: NAVD88
INSPECTOR: TGH
CHECKED BY:

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Sample Number	Blow Counts (# Blows per 6")	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	Soil Description Macro	DESCRIPTION	USCS Class
43135	2 3 8 13	1.2	0		0–1.2	▨	Medium/rusty brown CLAY and SILT, some fine to coarse Sand, little medium Gravel, moist	CL
					1.2–2.0		No Recovery	
43136	12 15 18 18	1.5	0		2.0–3.5	▨	Medium/rusty brown to light gray CLAY, some fine to medium Gravel, little Silt and Sand, dry to moist	CL
					3.5–4.0		No Recovery	
	26 30 38 44	1.6	0		4.0–5.6	▨	Olive gray, sandy CLAY and fine to coarse GRAVEL, some Silt, Sand ranges from fine to coarse, moist	CL
					5.6–6.0		No Recovery	
43149	75 80 60 100	1.9	0		6.0–6.8	▨	Olive gray, sandy CLAY, some fine to medium Gravel, moist	CL
					6.8–7.6		Weathered SHALE, dry	WSH
					7.6–7.9	▨	Olive gray CLAY, some medium to coarse Gravel and Sand, moist	CL
					7.9–8.0		No Recovery	
	65 100/.2	0.6	0		8.0–8.6		Weathered SHALE	WSH
					8.6–8.7		No Recovery	
							Auger Refusal at 8.7'	

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Seneca Army Depot
Romulus, New York

LOG OF BORING SB4-20

LOG OF BORING NO. SB4-21

Sheet 1 of 1

PROJECT: SEDA
PROJECT LOCATION: Seneca Army Depot, Romulus, New York
ASSOCIATED AREA/UNIT: SEAD 4
PROJECT NO.: 734539
DATE STARTED: 12/18/98
DATE COMPLETED 12/18/98
DRILLING CONTRACTOR: Maxim
DRILLING METHOD: HSA 8"
SAMPLING METHOD: Split Spoon

TOTAL DEPTH: 10.3
DEPTH TO WATER:
BORING LOCATION:

COORDINATE SYSTEM: NAD83
GROUND SURFACE ELEVATION:
ELEVATION DATUM: NAVD88
INSPECTOR: TGH
CHECKED BY:

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Sample Number	Blow Counts (# Blows per 6")	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	Soil Description Macro	DESCRIPTION	USCS Class
	2 5 8	1.3	0		0 1.3	▨	Medium brown CLAY and SILT, little Sand coarsens downward with little coarse Gravel, moist	CL
					1.3 2.0		No Recovery	
43137	10 8 15 18	1.4	0		2.0 3.0	▨	Medium brown CLAY and SILT, some medium Gravel, little fine to coarse Sand, moist	CL
					3.0 3.4	▨	Rocky CLAY, more coarse Sand, moist	CL
					3.4 4.0		No Recovery	
	20 40 100/.4	0.4	0		4.0 4.4	▨	Medium brown, rocky CLAY, little Sand, moist	CL
					4.4 6.0		No Recovery	
	65 100/.2	1	0		6.0 7.0	⁙	Medium brown to light gray, fine to coarse SAND and medium to coarse GRAVEL, little Silt and Clay, moist	SW
					7.0 8.0		No Recovery	
43138	85 100/.2	0.7	0		8.0 8.7	⁙	Medium brown to light gray, fine to coarse SAND and fine to coarse GRAVEL, little Silt and Clay, moist	SW
					8.7 10.0		No Recovery	
	100/.3	0.2	0		10.0 10.2	●	Dark gray, fine to coarse SAND and GRAVEL, weathered Shale above hard bedrock, moist to wet	GW
					10.2 10.3		No Recovery	
							Auger Refusal at 10.3'	

NOTES:

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Romulus, New York

LOG OF BORING SB4-21

LOG OF BORING NO. SB4-22

Sheet 1 of 1

PROJECT: SEDA
PROJECT LOCATION: Seneca Army Depot, Romulus, New York
ASSOCIATED AREA/UNIT: SEAD 4
PROJECT NO.: 734539
DATE STARTED: 12/22/98
DATE COMPLETED 12/22/98
DRILLING CONTRACTOR: Maxim
DRILLING METHOD: HSA 8"
SAMPLING METHOD: Split Spoon

TOTAL DEPTH: 10
DEPTH TO WATER:
BORING LOCATION:

COORDINATE SYSTEM: NAD83
GROUND SURFACE ELEVATION:
ELEVATION DATUM: NAVD88
INSPECTOR: TGH
CHECKED BY:

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Sample Number	Blow Counts (# Blows per 6")	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)
	1	1.3	0	
	4			
	6			
	7	1.2	0	
	6			
	9			
	6			
43139	7	1.7	0	
	13			
	20			
	35			
43140	50	1.6	0	
	90			
	84			
	75			
	100/.2			
	100/.3			

Depth (ft)	Soil Description Macro	DESCRIPTION	USCS Class
0–0.8	▥	Medium brown SILT and CLAY, moist	ML
0.8–1.3	▨	Medium brown to light gray CLAY, some Silt, little coarse Sand, moist	CL
1.3–2.0		No Recovery	
2.0–2.6	░	Rusty brown,fine SAND, some medium Sand, moist	SP
2.6–3.2	░	Olive gray, fine SAND, some medium Sand, trace coarse Sand, moist	SP
3.2–4.0		No Recovery	
4.0–4.5	▨	Yellowish-brown to olive gray CLAY, some small Gravel, little Sand, moist	CL
4.5–5.2	⁘	Medium brown to dark gray, fine to coarse Sand and small Gravel, moist	SW
5.2–5.7	▨	Medium brown to light gray CLAY and medium GRAVEL, little Sand, moist	CL
5.7–6.0		No Recovery	
6.0–7.6	▨	Olive gray CLAY and GRAVEL, some fine to coarse Sand, moist (sandy Till with Gravel)	CL
7.6–8.0		No Recovery	
8.0–10.0		No Recovery	
		Auger Refusal at 10'	

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Romulus, New York

LOG OF BORING SB4-22

LOG OF BORING NO. SB4-23

Sheet 1 of 1

PROJECT: SEDA
PROJECT LOCATION: Seneca Army Depot, Romulus, New York
ASSOCIATED AREA/UNIT: SEAD 4
PROJECT NO.: 734539
DATE STARTED: 12/15/98
DATE COMPLETED 12/16/98
DRILLING CONTRACTOR: Maxim
DRILLING METHOD: HSA 8"
SAMPLING METHOD: Split Spoon

TOTAL DEPTH: 6.4
DEPTH TO WATER:
BORING LOCATION:

COORDINATE SYSTEM: NAD83
GROUND SURFACE ELEVATION:
ELEVATION DATUM: NAVD88
INSPECTOR: TGH
CHECKED BY:

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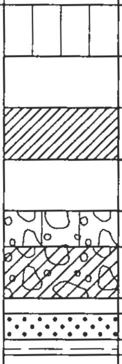
Sample Number	Blow Counts (# Blows per 6")	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	DESCRIPTION	USCS Class
43086	3 6	1			0 – 1.0	Medium brown SILT, some fine to coarse Sand, little medium Gravel, dry to moist	ML
	18 27				1.0 – 2.0	No Recovery	
43087	41	1			2.0 – 3.0	Light gray CLAY and medium GRAVEL, some fine to coarse Sand, some Silt, dry	CL
	45 50				3.0 – 4.0	No Recovery	
43088	40 25	1.6			4.0 – 4.7	Medium gray SILT and coarse GRAVEL, some fine to coarse Sand, Clay, moist, contains brick/clay material	GM
	50				4.7 – 5.7	Dark gray TILL and weathered SHALE, some coarse Gravel and Clay, dry	GC
	75				5.7 – 6.0	No Recovery	
	100/.2	0.8			6.0 – 6.5	Light gray, fine to coarse SAND, some Gravel, dry to moist	SW
	100/.4				6.5 – 6.8	Weathered SHALE	WSH
						Auger Refusal at 6.4'	



NOTES:

UNITED STATES ARMY CORPS OF ENGINEERS
Seneca Army Depot
Romulus, New York

LOG OF BORING SB4-23

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LOG OF BORING NO. SB4-24

Sheet 1 of 1

PROJECT: SEDA
PROJECT LOCATION: Seneca Army Depot, Romulus, New York
ASSOCIATED AREA/UNIT: SEAD 4
PROJECT NO.: 734539
DATE STARTED: 12/22/98
DATE COMPLETED 12/22/98
DRILLING CONTRACTOR: Maxim
DRILLING METHOD: HSA 8"
SAMPLING METHOD: Split Spoon

TOTAL DEPTH: 10.4
DEPTH TO WATER:
BORING LOCATION:

COORDINATE SYSTEM: NAD83
GROUND SURFACE ELEVATION:
ELEVATION DATUM: NAVD88
INSPECTOR: TGH
CHECKED BY:

This log is part of a report prepared by Parsons Engineering-Science, Inc. for the named company and should be read together with the report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations.

Sample Number	Blow Counts (# Blows per 6")	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)
	1	1.3	0	
	3			
	5			
43141	8	1	0	
	16			
	20			
	35			
	24	1.3	0	
	20			
	55			
	50			
	41	1.4		
	54			
	61			
43142	75	0.6		
	100/.3			
	55			
	100/.4			
	100/.4			

Depth (ft)	Soil Description Macro	DESCRIPTION	USCS Class
0	▨	Olive gray CLAY and large GRAVEL, trace Cobbles, little Sand, moist	CL
0.8	▥	Medium brown SILT, some Clay, little Sand, moist	ML
1.3		No Recovery	
2.0	▥	Medium brown to light gray SILT, some fine Sand, little Clay, dry	ML
3.0		No Recovery	
4.0	▨	Olive gray, gravelly CLAY, some fine to coarse Sand, moist	CL
5.3		No Recovery	
6.0	▨	Olive gray, gravelly CLAY and fine to coarse SAND, moist	CL
7.4		No Recovery	
8.0	▨	Olive gray CLAY, GRAVEL, and fine to coarse SAND, moist	CL
8.6		No Recovery	
10.0		No Recovery	
10.4		Auger Refusal at 10.4'	

NOTES:

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LOG OF BORING SB4-24

LOG OF BORING NO. SB4-25

Sheet 1 of 1

PROJECT: SEDA
PROJECT LOCATION: Seneca Army Depot, Romulus, New York
ASSOCIATED AREA/UNIT: SEAD 4
PROJECT NO.: 734539
DATE STARTED: 12/22/99
DATE COMPLETED 12/23/99
DRILLING CONTRACTOR: Maxim
DRILLING METHOD: HSA 8"
SAMPLING METHOD: Split Spoon

TOTAL DEPTH: 8
DEPTH TO WATER:
BORING LOCATION:

COORDINATE SYSTEM: NAD83
GROUND SURFACE ELEVATION:
ELEVATION DATUM: NAVD88
INSPECTOR: TGH
CHECKED BY:

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Sample Number	Blow Counts (# Blows per 6")	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	Soil Description Macro	DESCRIPTION	USCS Class
43174	2	0.8	0		0	0.4	ORGANIC material, some Silt and Clay, moist	PT
	3					0.8	Olive gray, gravelly CLAY, some Sand, moist	CL
					1			
	6						No Recovery	
43143	7	1.5	0		2	2.0	Olive gray CLAY, some Gravel, little medium to coarse Sand, moist	CL
	6							
	4				3			
	3					3.5	No Recovery	
	7	1.4	0		4	4.0	Olive gray CLAY and GRAVEL, some Sand, moist	CL
	20					4.5	Medium brown to light gray, fine to coarse SAND, little Gravel, trace Clay/Silt, moist	SW
	18				5	5.4		
	20						No Recovery	
43144	22	1.2	0		6	6.0	Medium brown to light gray, gravelly CLAY and medium to coarse SAND, moist to wet	CL
	55				7			
	100/.4					7.2	No Recovery	
					8	8.0	Auger Refusal at 8'	
					9			
					10			
					11			
					12			
					13			
					14			
					15			
					16			
					17			
					18			
					19			
					20			

NOTES:

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LOG OF BORING SB4-25

LOG OF BORING NO. SB4-26

Sheet 1 of 1

PROJECT: SEDA
PROJECT LOCATION: Seneca Army Depot, Romulus, New York
ASSOCIATED AREA/UNIT: SEAD 4
PROJECT NO.: 734539
DATE STARTED: 12/15/98
DATE COMPLETED 12/15/98
DRILLING CONTRACTOR: Maxim
DRILLING METHOD: HSA 8"
SAMPLING METHOD: Split Spoon

TOTAL DEPTH: 5.2
DEPTH TO WATER:
BORING LOCATION:

COORDINATE SYSTEM: NAD83
GROUND SURFACE ELEVATION:
ELEVATION DATUM: NAVD88
INSPECTOR: TGH
CHECKED BY:

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Sample Number	Blow Counts (# Blows per 6")	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	Soil Description Macro	DESCRIPTION	USCS Class
43090	2	1.6			0	▨	Medium brown SILT and CLAY, some fine Sand, moist	CL
	6				1	0.8 – –	Medium gray, weathered SHALE, dry	WSH
	12					1.6	No Recovery	
43091	16	1.5			2	2.0 ▨	Olive gray, hard CLAY and medium to coarse GRAVEL, some fine to coarse Sand, dry	CL
	40							
	35				3			
	40					3.5	No Recovery	
43092	40	1			4	4.0 ⁙	Olive gray, medium SAND and medium to coarse GRAVEL, moist	SW
	45					4.5 – –	Medium gray, weathered SHALE, dry	WSH
	80				5	5.0	No Recovery	
	100/.2					5.2	Auger Refusal at 5.2'	
					6			
					7			
					8			
					9			
					10			
					11			
					12			
					13			
					14			
					15			
					16			
					17			
					18			
					19			
					20			

NOTES:

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Romulus, New York**

LOG OF BORING SB4-26

LOG OF BORING NO. SB4-27

Sheet 1 of 1

PROJECT: SEDA
PROJECT LOCATION: Seneca Army Depot, Romulus, New York
ASSOCIATED AREA/UNIT: SEAD 4
PROJECT NO.: 734539
DATE STARTED: 12/21/98
DATE COMPLETED 12/21/98
DRILLING CONTRACTOR: Maxim
DRILLING METHOD: HSA 8"
SAMPLING METHOD: Split Spoon

TOTAL DEPTH: 3.7
DEPTH TO WATER:
BORING LOCATION:

COORDINATE SYSTEM: NAD83
GROUND SURFACE ELEVATION:
ELEVATION DATUM: NAVD88
INSPECTOR: TGH
CHECKED BY:

Sample Number	Blow Counts (# Blows per 6")	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	Soil Description Macro	This log is part of a report prepared by Parsons Engineering-Science, Inc. for the named company and should be read together with the report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations. DESCRIPTION	USCS Class
43125	2	1.4	0		0	▨	Medium brown to light gray CLAY, some Silt, little Gravel and Sand, moist	CL
	6				1	▨		
	10				1.4		No Recovery	
43127	14	1.4	0		2 2.0	▨	Light brown to light gray, gravelly CLAY, some coase Sand, little Silt, dry	CL
	25				2.5			WSH
	50				3			
	64				3.4		Weathered SHALE	
	100/.2				3.7		No Recovery	
					4		Auger Refusal at 3.7'	
					5			
					6			
					7			
					8			
					9			
					10			
					11			
					12			
					13			
					14			
					15			
					16			
					17			
					18			
					19			
					20			

NOTES:

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Seneca Army Depot
Romulus, New York

LOG OF BORING SB4-27

LOG OF BORING NO. SB4-28

Sheet 1 of 1

PROJECT: SEDA
PROJECT LOCATION: Seneca Army Depot, Romulus, New York
ASSOCIATED AREA/UNIT: SEAD 4
PROJECT NO.: 734539
DATE STARTED: 12/21/98
DATE COMPLETED 12/21/98
DRILLING CONTRACTOR: Maxim
DRILLING METHOD: HSA 8"
SAMPLING METHOD: Split Spoon

TOTAL DEPTH: 3.8
DEPTH TO WATER:
BORING LOCATION:

COORDINATE SYSTEM: NAD83
GROUND SURFACE ELEVATION:
ELEVATION DATUM: NAVD88
INSPECTOR: TGH
CHECKED BY:

This log is part of a report prepared by Parsons Engineering-Science, Inc. for the named company and should be read together with the report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations.

Sample Number	Blow Counts (# Blows per 6")	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	Soil Description Macro	DESCRIPTION	USCS Class
43128	3 9 10 20	1.6	0		0–0.4	▨	Dark gray GRAVEL and CLAY, some fine to coarse Sand, moist	GC
					0.4–1.6	▨	Medium brown to light gray CLAY, little Gravel and Sand, moist	CL
					1.6–2.0		No Recovery	
43129	15 65 45 100/.3	1.4			2.0–2.6	▨	Light Gray CLAY, little Gravel and Sand, moist	CL
					2.6–3.4	▭	Weathered SHALE	WSH
					3.4–3.8		No Recovery	
					3.8		Auger Refusal at 3.8'	

NOTES:

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UNITED STATES ARMY
CORPS OF ENGINEERS
Seneca Army Depot
Romulus, New York

LOG OF BORING SB4-28

LOG OF BORING NO. MW4-6

Sheet 1 of 1

PROJECT: SEDA
PROJECT LOCATION: Seneca Army Depot, Romulus, New York
ASSOCIATED AREA/UNIT: SEAD 4
PROJECT NO.: 734539
DATE STARTED: 12/19/98
DATE COMPLETED 12/19/98
DRILLING CONTRACTOR: Maxim
DRILLING METHOD: HSA 8"
SAMPLING METHOD: Split Spoon

TOTAL DEPTH: 9.9
DEPTH TO WATER:
BORING LOCATION:

COORDINATE SYSTEM: NAD83
GROUND SURFACE ELEVATION:
ELEVATION DATUM: NAVD88
INSPECTOR: TGH
CHECKED BY:

This log is part of a report prepared by Parsons Engineering-Science, Inc. for the named company and should be read together with the report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations.

Sample Number	Blow Counts (# Blows per 6")	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)
43153	2	1.5	0	
	6			
	10			
43154	14	1.5	0	
	14			
	18			
	20			
	20	1.2	0	
	40			
	35			
	52			
43155	50	0.5	0	
	50			
	100/.4			

Depth (ft)	Soil Description Macro	DESCRIPTION	USCS Class
0–0.8	▥	Medium brown SILT and CLAY, little Sand and Gravel, moist	ML
0.8–1.5	▨	Light gray, more stratified CLAY, some fine to coarse Sand, some fine Gravel, dry	CL
1.5–2.0		No Recovery	
2.0–3.5	▨	Medium brown to light gray, fine to medium SAND and CLAY, some fine to medium Gravel, dry	SC
3.5–4.0		No Recovery	
4.0–5.2	●	Medium gray GRAVEL and CLAY, some fine to coarse Sand, dry, some Gravel is very coarse	GW
5.2–6.0		No Recovery	
6.0–6.5	∴	Olive gray, fine to medium SAND and fine to medium GRAVEL, moist	SW
6.5–8.0		No Recovery	
8.0–9.9		No Recovery	
9.9		Auger Refusal at 9.9'	

NOTES:

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UNITED STATES ARMY CORPS OF ENGINEERS
Seneca Army Depot
Romulus, New York

LOG OF BORING MW4-6

LOG OF BORING NO. MW4-7

Sheet 1 of 1

PROJECT: SEDA
PROJECT LOCATION: Seneca Army Depot, Romulus, New York
ASSOCIATED AREA/UNIT: SEAD 4
PROJECT NO.: 734539
DATE STARTED: 12/20/98
DATE COMPLETED 12/20/98
DRILLING CONTRACTOR: Maxim
DRILLING METHOD: HSA 8"
SAMPLING METHOD: Split Spoon

TOTAL DEPTH: 6
DEPTH TO WATER:
BORING LOCATION:

COORDINATE SYSTEM: NAD83
GROUND SURFACE ELEVATION:
ELEVATION DATUM: NAVD88
INSPECTOR: TGH
CHECKED BY:

This log is part of a report prepared by Parsons Engineering-Science, Inc. for the named company and should be read together with the report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations.

Sample Number	Blow Counts (# Blows per 6")	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	Soil Description Macro	DESCRIPTION	USCS Class
43157	2 7 15 32 100/.3	1.5	0		0	▨	Medium brown CLAY and SILT, little Sand and Gravel	CL
					1 1.1			
					1.5		Weathered SHALE and SILT	WSH
					2 2.0		No Recovery	
							No Recovery	
					3			
					4			
					5			
					6 6.0		Auger Refusal at 6'	
					7			
					8			
					9			
					10			
					11			
					12			
					13			
					14			
					15			
					16			
					17			
					18			
					19			
					20			

NOTES:

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**UNITED STATES ARMY
CORPS OF ENGINEERS
Seneca Army Depot
Romulus, New York**

LOG OF BORING MW4-7

LOG OF BORING NO. MW4-8

Sheet 1 of 1

PROJECT: SEDA
PROJECT LOCATION: Seneca Army Depot, Romulus, New York
ASSOCIATED AREA/UNIT: SEAD 4
PROJECT NO.: 734539
DATE STARTED: 12/18/98
DATE COMPLETED 12/19/98
DRILLING CONTRACTOR: Maxim
DRILLING METHOD: HSA 8"
SAMPLING METHOD: Split Spoon

TOTAL DEPTH: 8.1
DEPTH TO WATER:
BORING LOCATION:

COORDINATE SYSTEM: NAD83
GROUND SURFACE ELEVATION:
ELEVATION DATUM: NAVD88
INSPECTOR: TGH
CHECKED BY:

This log is part of a report prepared by Parsons Engineering-Science, Inc. for the named company and should be read together with the report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations.

Sample Number	Blow Counts (# Blows per 6")	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	Soil Description Macro	DESCRIPTION	USCS Class
43150	2 3 8	1.5	0		0–1.5	▨	Medium brown CLAY and SILT, little Gravel, little Sand, moist	CL
	12				1.5–2.0		No Recovery	
43151	15	1.3	0		2.0–2.4		Medium brown SILT and fine to medium SAND, little Clay, moist	ML
	26				2.4–3.0		Fine to medium SAND and SILT, some Clay, little Gravel, moist	SM
	35				3.0–3.3		Weathered SHALE	WSH
	40				3.3–4.0		No Recovery	
	20	1.4	0		4.0–4.8		Medium brown, fine to medium SAND and SILT, some fine Gravel, little Clay, moist	SM
	18				4.8–5.4	▨	Olive gray, fine to medium SAND and SILT, some Clay, some fine to coarse Gravel, moist	GC
	20				5.4–6.0		No Recovery	
43152	22	0.7	0		6.0–6.7	▨	Olive gray, fine to coarse SAND, CLAY and fine to medium GRAVEL, moist	GC
	40 100/.4 100/.1				6.7–8.0		No Recovery	
					8.0–8.1		No Recovery	
							Auger Refusal at 8.1'	

NOTES:

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UNITED STATES ARMY
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Seneca Army Depot
Romulus, New York

LOG OF BORING MW4-8

LOG OF BORING NO. MW4-9

Sheet 1 of 1

PROJECT: SEDA
PROJECT LOCATION: Seneca Army Depot, Romulus, New York
ASSOCIATED AREA/UNIT: SEAD 4
PROJECT NO.: 734539
DATE STARTED: 12/20/98
DATE COMPLETED 12/20/98
DRILLING CONTRACTOR: Maxim
DRILLING METHOD: HSA 8"
SAMPLING METHOD: Split Spoon

TOTAL DEPTH: 6.2
DEPTH TO WATER:
BORING LOCATION:

COORDINATE SYSTEM: NAD83
GROUND SURFACE ELEVATION:
ELEVATION DATUM: NAVD88
INSPECTOR: TGH
CHECKED BY:

This log is part of a report prepared by Parsons Engineering-Science, Inc. for the named company and should be read together with the report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations.

Sample Number	Blow Counts (# Blows per 6")	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	Soil Description Macro	DESCRIPTION	USCS Class
43164	2	1.6	0		0		Medium brown SILT and fine SAND, some Clay, moist	ML
43166	8				1			
	12				1.2 1.6	▨	Light gray CLAY and SILT, little Sand, dry	CL
	20	1.7			2 2.0		No Recovery Weathered SHALE	WSH
	65							
	80				3			
	95				3.7			
	100/.2				4 4.0		No Recovery No Recovery	
					5			
					6 6.2		Auger Refusal at 6.2'	
					7			
					8			
					9			
					10			
					11			
					12			
					13			
					14			
					15			
					16			
					17			
					18			
					19			
					20			

NOTES:

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Seneca Army Depot
Romulus, New York

LOG OF BORING MW4-9

LOG OF BORING NO. MW4-10

Sheet 1 of 1

PROJECT: SEDA
PROJECT LOCATION: Seneca Army Depot, Romulus, New York
ASSOCIATED AREA/UNIT: SEAD 4
PROJECT NO.: 734539
DATE STARTED: 12/16/98
DATE COMPLETED 12/17/98
DRILLING CONTRACTOR: Maxim
DRILLING METHOD: HSA 8"
SAMPLING METHOD: Split Spoon

TOTAL DEPTH: 8
DEPTH TO WATER:
BORING LOCATION:

COORDINATE SYSTEM: NAD83
GROUND SURFACE ELEVATION:
ELEVATION DATUM: NAVD88
INSPECTOR: TGH
CHECKED BY:

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Sample Number	Blow Counts (# Blows per 6")	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	Soil Description Macro	DESCRIPTION	USCS Class
43109	3 10	1.2	0		0 1 1.2	▨	Medium brown to light gray CLAY, some Silt and fine to medium Gravel, little Sand, moist	CL
	10 17				2.0		No Recovery	
43112	10 20	1	0		2 3 3.0	▨	Medium to dark gray, coarse GRAVEL and CLAY, some Silt, some fine to coarse Sand, dry	GC
	40				4.0		No Recovery	
	40 40	0.8	3.8 42.5		4 4.8	– –	Dark gray to bluish, weathered SHALE, dry, smelled vapors	WSH
	100/.3				5 6.0		No Recovery	
					6 7 8.0		No Recovery	
					8 9 10 11 12 13 14 15 16 17 18 19 20		Auger Refusal at 8'	

NOTES:

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**UNITED STATES ARMY
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Seneca Army Depot
Romulus, New York**

LOG OF BORING MW4-10

LOG OF BORING NO. MW4-11

Sheet 1 of 1

PROJECT: SEDA
PROJECT LOCATION: Seneca Army Depot, Romulus, New York
ASSOCIATED AREA/UNIT: SEAD 4
PROJECT NO.: 734539
DATE STARTED: 12/20/98
DATE COMPLETED 12/20/98
DRILLING CONTRACTOR: Maxim
DRILLING METHOD: HSA 8"
SAMPLING METHOD: Split Spoon

TOTAL DEPTH: 9
DEPTH TO WATER:
BORING LOCATION:

COORDINATE SYSTEM: NAD83
GROUND SURFACE ELEVATION:
ELEVATION DATUM: NAVD88
INSPECTOR: TGH
CHECKED BY:

This log is part of a report prepared by Parsons Engineering-Science, Inc. for the named company and should be read together with the report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations.

Sample Number	Blow Counts (# Blows per 6")	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	Soil Description Macro	DESCRIPTION	USCS Class
43170	5	1.8	0		0	●	Dark gray GRAVEL, some fine to coarse Sand, trace Silt, moist	GW
	8				1			
	13							
43171	21	1.3	0		1.8 2 2.0	▨	No Recovery Light gray CLAY, little fine Gravel, trace Sand and Silt, dry	CL
	22							
	20				3			
	22				3.3		No Recovery	
43172	18	1.3	0		4 4.0	▨	Olive gray CLAY and GRAVEL, little Sand, moist	CL
	55				4.5	- -	Weathered SHALE	WSH
	91				5 5.3		No Recovery	
	100/.3				6 6.0		No Recovery	
					7			
					8			
					9 9.0		Auger Refusal at 9'	
					10			
					11			
					12			
					13			
					14			
					15			
					16			
					17			
					18			
					19			
					20			

NOTES:

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Seneca Army Depot
Romulus, New York

LOG OF BORING MW4-11

LOG OF BORING NO. MW4-12

Sheet 1 of 1

PROJECT: SEDA
PROJECT LOCATION: Seneca Army Depot, Romulus, New York
ASSOCIATED AREA/UNIT: SEAD 4
PROJECT NO.: 734539
DATE STARTED: 12/21/98
DATE COMPLETED 12/21/98
DRILLING CONTRACTOR: Maxim
DRILLING METHOD: HSA 8"
SAMPLING METHOD: Split Spoon

TOTAL DEPTH: 11
DEPTH TO WATER:
BORING LOCATION:

COORDINATE SYSTEM: NAD83
GROUND SURFACE ELEVATION:
ELEVATION DATUM: NAVD88
INSPECTOR: TGH
CHECKED BY:

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Sample Number	Blow Counts (# Blows per 6")	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)
43167	2	1.5	0	
	10			
	16			
	16			
43168	18	1.9	0	
	20			
	15			
	100/.4	0.9	0	
	53			
	14			
	16			
	18	1	0	
	25			
	39			
	44			
43169	40	0.8	0	
	28			
	100/.4			
	100/.3			

Depth (ft)	DESCRIPTION	USCS Class
0	Medium brown SILT and fine SAND, some Clay especially towards bottom, little Gravel, moist	ML
1.5	No Recovery	
2.0	Medium brown SILT and fine SAND, some coarser Sand, little Gravel, dry	ML
3.8	Dark gray GRAVEL (Limestone Fill, trace Asphalt), dry	GW
3.9	No Recovery	GW
4.0	Dark gray, fine to coarse SAND and fine GRAVEL, some coarse Gravel/Cobbles, moist	CL
4.3	Green to olive gray, hard CLAY, trace to little Gravel, moist	CL
4.9	No Recovery	
6.0	Greenish gray CLAY and fine GRAVEL, little coarse Sand, moist	
7.0	No Recovery	
8.0	Dark gray, gravelly CLAY and fine to coarse SAND, moist	CL
8.8	No Recovery	
10.0		
10.3	No Recovery	
11.0	No Recovery Auger Refusal at 11'	

NOTES:

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UNITED STATES ARMY
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Seneca Army Depot
Romulus, New York

LOG OF BORING MW4-12

LOG OF BORING NO. MW4-13

Sheet 1 of 1

PROJECT: SEDA
PROJECT LOCATION: Seneca Army Depot, Romulus, New York
ASSOCIATED AREA/UNIT: SEAD 4
PROJECT NO.: 734539
DATE STARTED: 12/20/98
DATE COMPLETED 12/20/98
DRILLING CONTRACTOR: Maxim
DRILLING METHOD: HSA 8"
SAMPLING METHOD: Split Spoon

TOTAL DEPTH: 6.7
DEPTH TO WATER:
BORING LOCATION:

COORDINATE SYSTEM: NAD83
GROUND SURFACE ELEVATION:
ELEVATION DATUM: NAVD88
INSPECTOR: TGH
CHECKED BY:

This log is part of a report prepared by Parsons Engineering-Science, Inc. for the named company and should be read together with the report for complete interpretation. This summary applies only at the location of this boring and at the time of drilling. Subsurface conditions may differ at other locations.

Sample Number	Blow Counts (# Blows per 6")	Sample Recovery	VOC Screen-PID (ppm)	Rad Screen (cps)	Depth (ft)	Soil Description Macro	DESCRIPTION	USCS Class
43160	3 5 12	1.4	0		0		Medium brown SILT and fine to medium SAND, little Clay, little coarse Sand, moist	ML
	20				1.4		No Recovery	
43163	41	1	0		2.0		Light gray SILT and fine SAND, some Clay, dry	ML
	55				2.6		Weathered SHALE	WSH
	100/.3				3.0		No Recovery	
					4.0		No Recovery	
					6.7		Auger Refusal at 6.7'	

NOTES:

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UNITED STATES ARMY
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Seneca Army Depot
Romulus, New York

LOG OF BORING MW4-13

Appendix C

Monitoring Well Installation Diagrams

OVERBURDEN MONITORING WELL
COMPLETION REPORT & INSTALLATION DETAIL
PROTECTIVE RISER COMPLETION

ENGINEERING-SCIENCE, INC. CLIENT: ACOE WELL #: MW4-5

PROJECT: 10 SWMU
LOCATION: SEAD 4

PROJECT NO: 720477
INSPECTOR: ES/LB
CHECKED BY:

DRILLING CONTRACTOR: Empire
DRILLER: John W.
DRILLING COMPLETED: 12-5-93
BORING DEPTH: 6.0
DRILLING METHOD(S): HSA
BORING DIAMETER(S): 8 1/2"
ASSOCIATED SWMU/AOC: 4

POW DEPTH: 6.0'
INSTALLATION STARTED: 12/5/93
INSTALLATION COMPLETED: 12/5/93
SURFACE COMPLETION DATE: 12/5/93
COMPLETION CONTRACTOR/CREW: Empire
BEDROCK CONFIRMED (Y/N?) Y
ESTIMATED GROUND ELEVATION: 699.182

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

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

SCREEN:
TSC: 3.1 TYPE: PVC - 40 DIAMETER: 2" LENGTH: 2.0' SLOT SIZE: 0.01"

POINT OF WELL: (SILT SUMP)
TYPE: PVC point BSC: 5.1 POW: 6.0'

GROUT:
TG: Ground TYPE: Cement-bentonite LENGTH: 1.3'

SEAL: TBS: 1.3 TYPE: bentonite pellets LENGTH: .7'

SAND PACK: TSP: 2'-#1 2.5'-#3 TYPE: #3 and #1 LENGTH: 4.0'

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

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

COMMENTS:

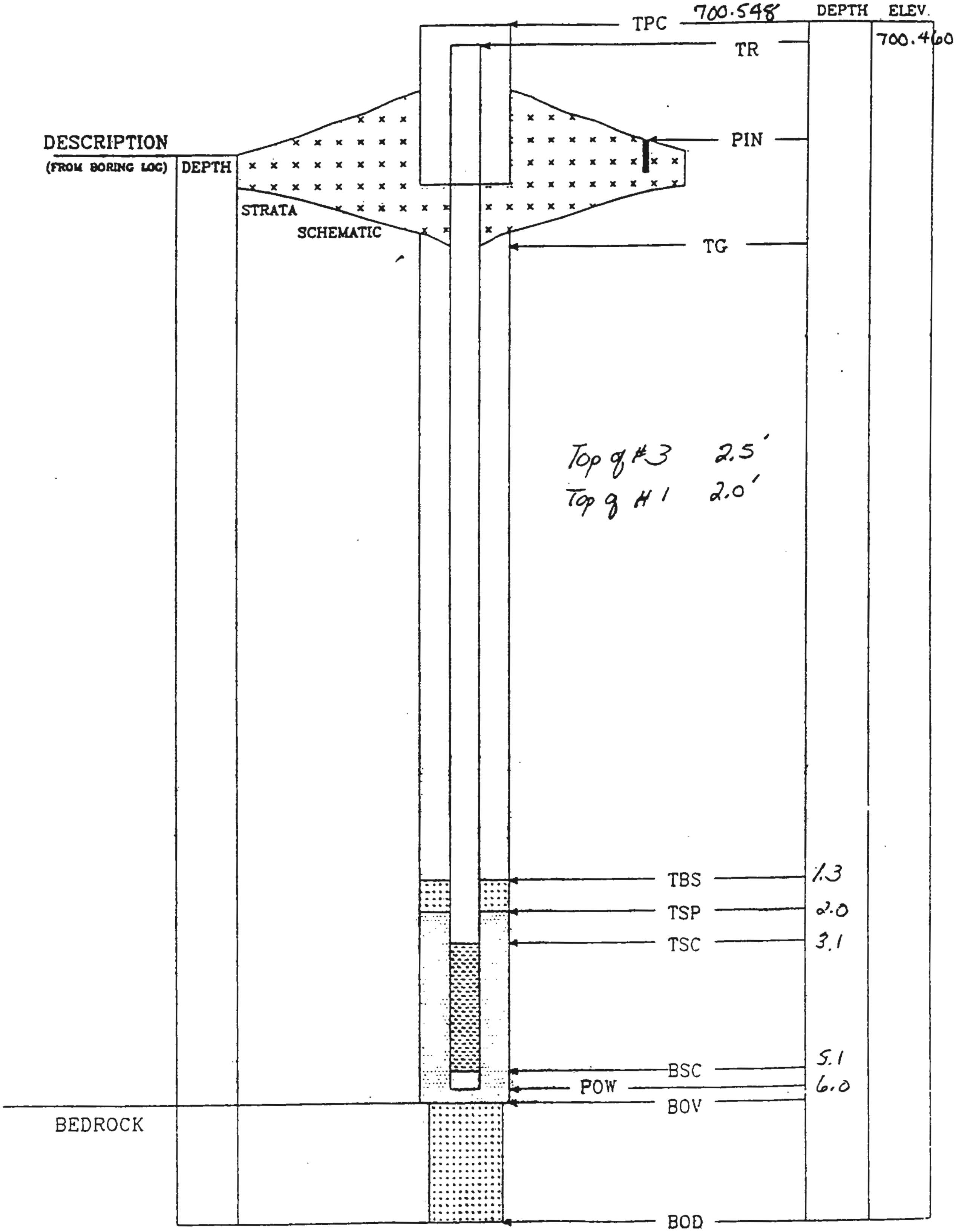
* ALL DEPTH MEASUREMENTS REFERENCED TO GROUND SURFACE

SEE PAGE 2 FOR SCHEMATIC

OVERBURDEN MONITORING WELL
PROTECTIVE RISER INSTALLATION DETAIL

ENGINEERING-SCIENCE, INC.	CLIENT:	WELL #: MW4-5

DATE: 12-5-93



Top of #3 2.5'
Top of #1 2.0'

* NOT TO SCALE

OVERBURDEN MONITORING WELL
COMPLETION REPORT & INSTALLATION DETAIL
PROTECTIVE RISER COMPLETION

ENGINEERING–SCIENCE, INC. CLIENT: ACOE WELL #: MW4-4

PROJECT: 10 SWMU
LOCATION: SEAD 4
PROJECT NO: 720477
INSPECTOR: ES
CHECKED BY:

DRILLING CONTRACTOR: Empire
DRILLER: Scott
DRILLING COMPLETED: 12-5-93
BORING DEPTH: 10'
DRILLING METHOD(S): HSA
BORING DIAMETER(S): 8½"
ASSOCIATED SWMU/AOC: 4

POW DEPTH: 10.0'
INSTALLATION STARTED: 12-5-93
INSTALLATION COMPLETED: 12-5-93
SURFACE COMPLETION DATE: 12-5-93
COMPLETION CONTRACTOR/CREW: Empire
BEDROCK CONFIRMED (Y/N?) Y
ESTIMATED GROUND ELEVATION: 678.217

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

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

SCREEN:
TSC: 4.9' TYPE: PVC-40 DIAMETER: 2" LENGTH: 4.0' SLOT SIZE: 0.01"

POINT OF WELL: (SILT SUMP)
TYPE: PVC point BSC: 8.9' POW: 10.0'

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

SEAL: TBS: 2.5' TYPE: bentonite pelets LENGTH: 1.5'

SAND PACK: TSP: 4.0'-#1 4.5'-#3 TYPE: #3 and #1 LENGTH: 6.0'

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

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

COMMENTS:

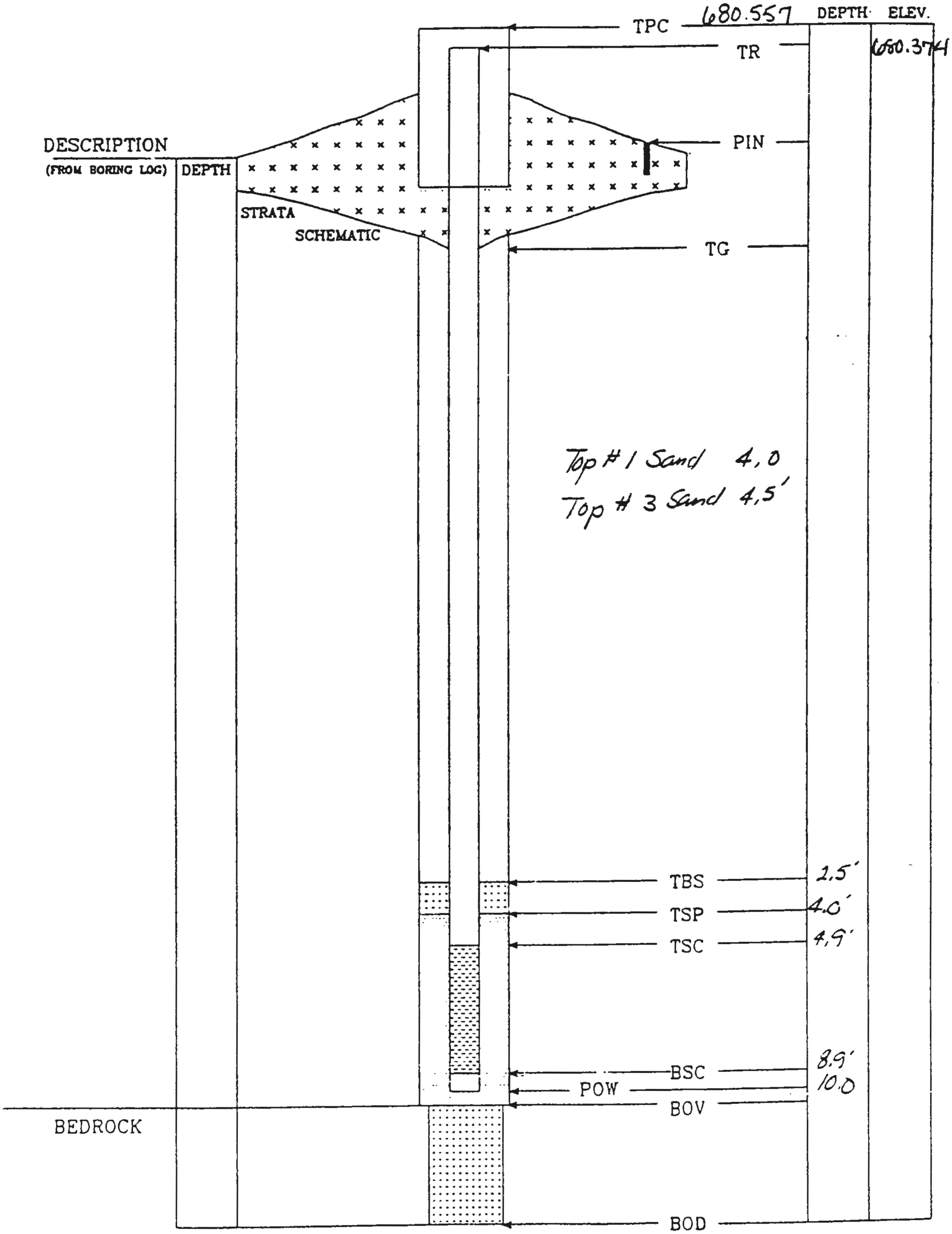
* ALL DEPTH MEASUREMENTS REFERENCED TO GROUND SURFACE

SEE PAGE 2 FOR SCHEMATIC

OVERBURDEN MONITORING WELL
PROTECTIVE RISER INSTALLATION DETAIL

ENGINEERING-SCIENCE, INC.	CLIENT:	WELL #: MW 4-4

DATE: 12-5-93



TPC 680.557

TR 680.374

PIN

TG

Top #1 Sand 4,0
Top #3 Sand 4,5'

TBS 2.5'

TSP 4.0'

TSC 4,9'

BSC 8.9'

POW 10.0

BOV

BOD

* NOT TO SCALE

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

ENGINEERING-SCIENCE, INC.
CLIENT: ACOE
WELL #: MW4-3

PROJECT: 10 SWMU
LOCATION: SEAD 4
PROJECT NO: 720477
INSPECTOR: ES
CHECKED BY:

DRILLING CONTRACTOR: Empire
DRILLER: Bob
DRILLING COMPLETED: 11/10/93
BORING DEPTH: 9.0'
DRILLING METHOD(S): HSA
BORING DIAMETER(S): 8 1/2"
ASSOCIATED SWMU/AOC: 4
POW DEPTH: 9.0'
INSTALLATION STARTED: 11/10/93
INSTALLATION COMPLETED: 11/10/93
SURFACE COMPLETION DATE: 11/10/93
COMPLETION CONTRACTOR/CREW: Empire
BEDROCK CONFIRMED (Y/N?) Y
ESTIMATED GROUND ELEVATION: 697.669

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

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

SCREEN:
TSC: 3.9' TYPE: PVC-40 DIAMETER: " 2" LENGTH: 4.0' SLOT SIZE: .01"

POINT OF WELL: (SILT SUMP)
TYPE: PVC point BSC: 7.9' POW: 9.0'

GROUT:
TG: Ground TYPE: Cem-bentonite LENGTH: 1.4'

SEAL: TBS: 1.4 TYPE: bentonite pellets LENGTH: 1.0'

SAND PACK: TSP: #3-29' #1-2.4' TYPE: #3 + #1 LENGTH: 6.6'

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

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

COMMENTS:

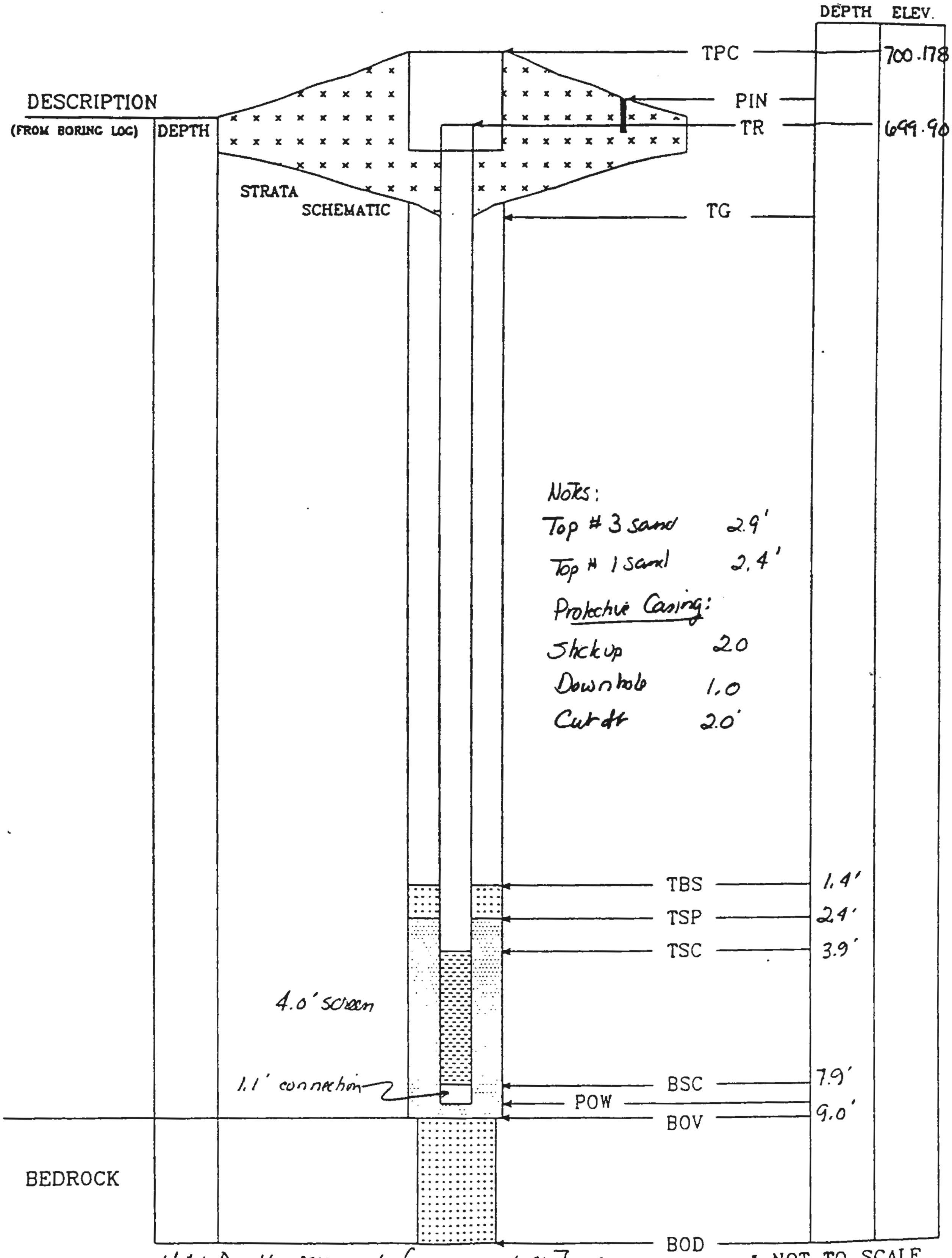
* ALL DEPTH MEASUREMENTS REFERENCED TO GROUND SURFACE

SEE PAGE 2 FOR SCHEMATIC

OVERBURDEN MONITORING WELL
ROADWAY BOX INSTALLATION DETAIL

ENGINEERING-SCIENCE, INC.	CLIENT: ACOE	WELL #: MW4-3

DATE: 11/10/93



Notes:
Top #3 sand 2.9'
Top #1 sand 2.4'

Protective Casing:
Stickup 2.0
Downhole 1.0
Cut off 2.0'

Note: Depths measured from ground surface

• NOT TO SCALE

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

ENGINEERING-SCIENCE, INC.
CLIENT: ACOE
WELL #: MW 4-2

PROJECT: 10 SWMU
LOCATION: SEAD 4
PROJECT NO: 720477
INSPECTOR: ES
CHECKED BY:

DRILLING CONTRACTOR: Empire
DRILLER: Bob
DRILLING COMPLETED: 11/10/93
BORING DEPTH: 4.0'
DRILLING METHOD(S): HSA
BORING DIAMETER(S): 8 1/2"
ASSOCIATED SWMU/AOC: 4

POW DEPTH: 4.0'
INSTALLATION STARTED: 11/10/93
INSTALLATION COMPLETED: 11/10/93
SURFACE COMPLETION DATE: 11/10/93
COMPLETION CONTRACTOR/CREW: Empire
BEDROCK CONFIRMED (Y/N?) Y
ESTIMATED GROUND ELEVATION: 699.448

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

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

SCREEN:
TSC: 2.2
TYPE: PVC-40
DIAMETER: 2"
LENGTH: 1.0'
SLOT SIZE: 0.01"

POINT OF WELL: (SILT SUMP)
TYPE: PVC point
BSC: 3.2'
POW: 4.0'

GROUT:
TG: ground
TYPE: Cem.-bentonite
LENGTH:

SEAL:
TBS: 1.0'
TYPE: bentonite pellets
LENGTH: 0.5'

SAND PACK:
TSP: 1.5'-#1 1.8'-#3
TYPE: #3 + #1
LENGTH: 2.5'

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

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

COMMENTS:

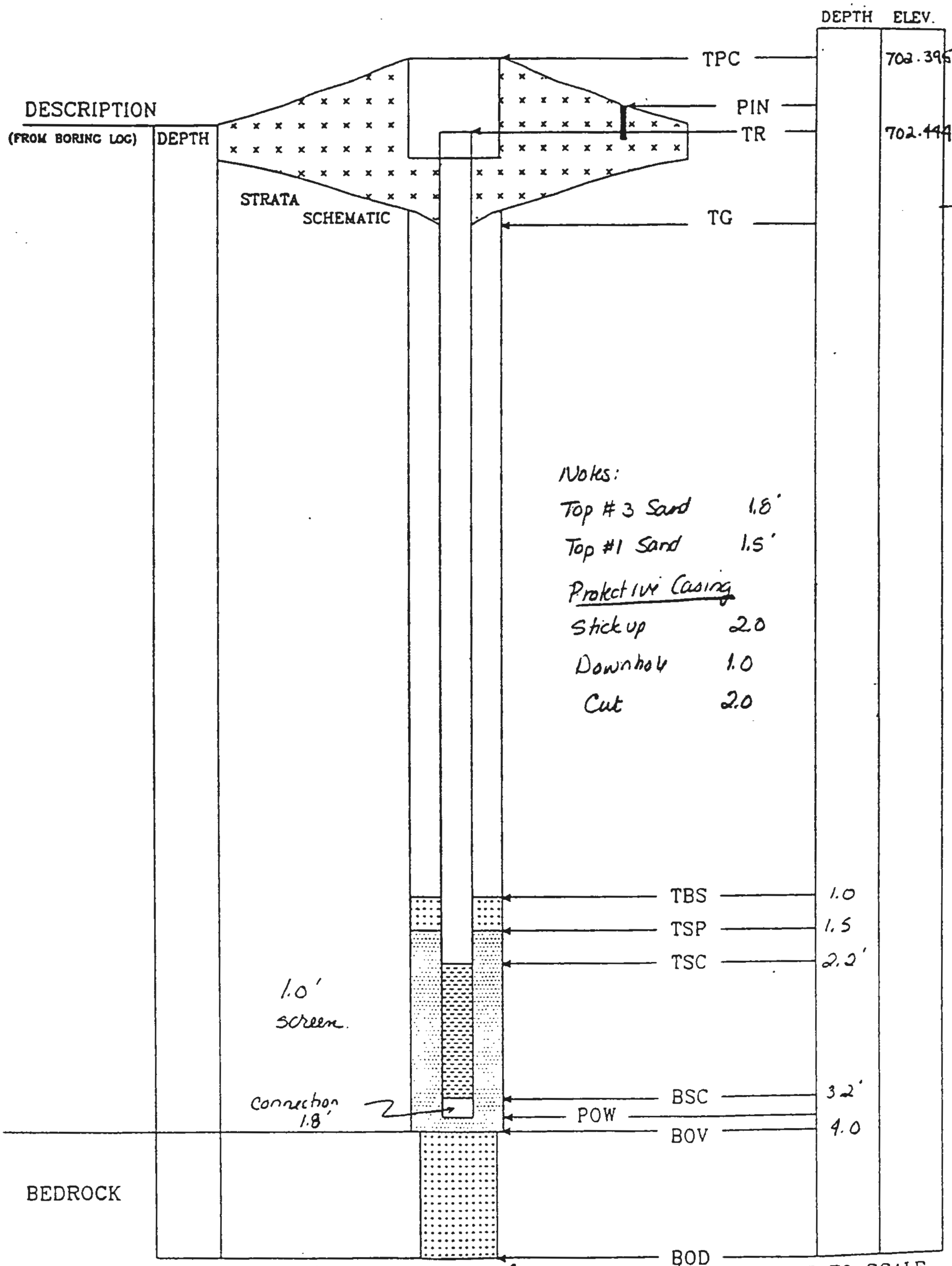
* ALL DEPTH MEASUREMENTS REFERENCED TO GROUND SURFACE

SEE PAGE 2 FOR SCHEMATIC

OVERBURDEN MONITORING WELL
ROADWAY BOX INSTALLATION DETAIL

ENGINEERING-SCIENCE, INC.	CLIENT: ACOE	WELL #: MW4-2

DATE 11/10/93



	DEPTH	ELEV.
TPC		702.395
PIN		
TR		702.444
TG		
TBS	1.0	
TSP	1.5	
TSC	2.2'	
BSC	3.2'	
POW		
BOV	4.0	
BOD		

Notes:

Top #3 Sand	1.8'
Top #1 Sand	1.5'

Protective Casing

Stick up	2.0
Downhole	1.0
Cut	2.0

Note: All depths meas. from ground surface

* NOT TO SCALE

OVERBURDEN MONITORING WELL
COMPLETION REPORT & INSTALLATION DETAIL
PROTECTIVE RISER COMPLETION

ENGINEERING-SCIENCE, INC. CLIENT: ACOE WELL #: MW4-1

PROJECT: 10 SWMU
LOCATION: SEAD 4
PROJECT NO: 720477
INSPECTOR: ES/&B
CHECKED BY:

DRILLING CONTRACTOR: Empire
DRILLER: Scott
DRILLING COMPLETED: 12-6-93
BORING DEPTH: 10.5'
DRILLING METHOD(S): HSA
BORING DIAMETER(S): 8 1/2"
ASSOCIATED SWMU/AOC: 4

POW DEPTH: 10.5'
INSTALLATION STARTED: 12-6-93
INSTALLATION COMPLETED: 12-6-93
SURFACE COMPLETION DATE: 12-6-93
COMPLETION CONTRACTOR/CREW: Empire
BEDROCK CONFIRMED (Y/N?) Y
ESTIMATED GROUND ELEVATION: 698.392

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

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

SCREEN:
TSC: 5.4' TYPE: PVC 40 DIAMETER: 2" LENGTH: 4' SLOT SIZE: 0.01"

POINT OF WELL: (SILT SUMP)
TYPE: PVC point BSC: 9.4' POW: 10.5'

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

SEAL: TBS: 2.5' TYPE: bentonite pellets LENGTH: 2'

SAND PACK: TSP: 4.5' #1 5.0' #1 TYPE: #3 & #1 LENGTH: 6.0'

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

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

COMMENTS:

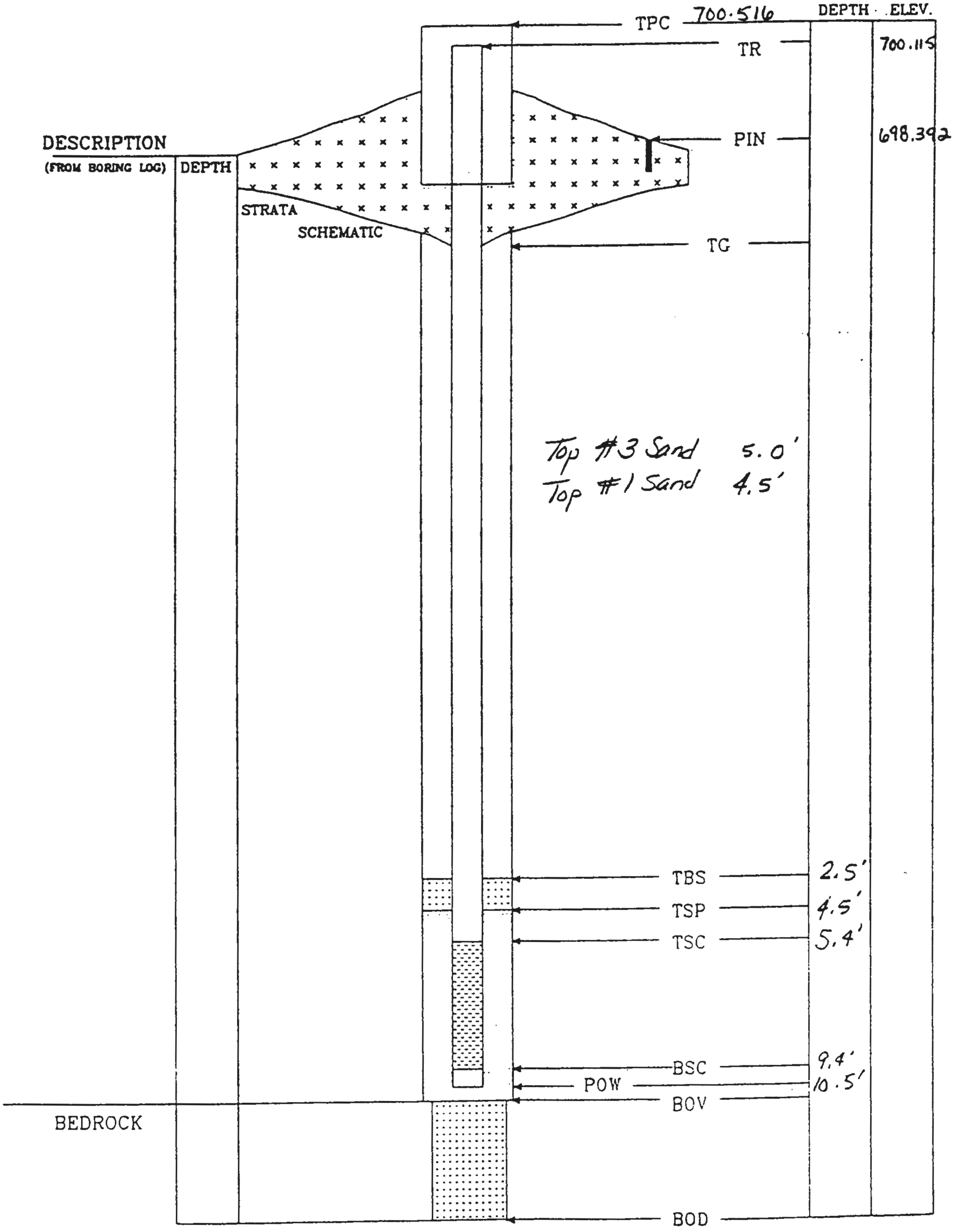
* ALL DEPTH MEASUREMENTS REFERENCED TO GROUND SURFACE

SEE PAGE 2 FOR SCHEMATIC

OVERBURDEN MONITORING WELL
PROTECTIVE RISER INSTALLATION DETAIL

ENGINEERING-SCIENCE, INC.	CLIENT:	WELL #: MW4-1

DATE: 12-6-93



Top #3 Sand 5.0'
Top #1 Sand 4.5'

• NOT TO SCALE

Parsons ES Inc.

WELL NUMBER: MW4-6

OVERBURDEN MONITORING WELL
COMPLETION REPORT & INSTALLATION DETAIL

CLIENT/PROJECT: Seneca Army Depot
LOCATION: Sead 4

PROJECT NO: 734539-01001
INSPECTOR: LLB
CHECKED BY:

DRILLING CONTRACTOR: Maxim
DRILLER: S. Breeds
DRILLING COMPLETED: 12/19/98
BORING DEPTH: 9.9'
DRILLING METHOD(S): 4 1/4" HSA
BORING DIAMETER(S): 8"

POW DEPTH: 9.8'
INSTALLATION STARTED: 12/19/98
INSTALLATION COMPLETED: 12/19/98
SURFACE COMPLETION DATE: 1/7/99
COMPLETION CONTRACTOR/CREW: Maxim/Breeds
BEDROCK CONFIRMED: Y

ASSOCIATED SWMU/AOC: Sead 4
COORDINATE SYSTEM:
NORTHING:
EASTING:
DATUM: NGVD 1929
ELEVATIONS: PIN:
TOC:
TPC:

PROTECTIVE CASING:
TYPE: Steel DIAMETER: 4" LENGTH: 5'

RISER:
TR: -2.3' TYPE: PVC DIAMETER: 2" LENGTH: 6.8'

SCREEN:
TSC: 4.5' TYPE: PVC DIAMETER: 2" LENGTH: 4.9' SLOT SIZE: 10

POINT OF WELL:(SILT SUMP)
TYPE: PVC BSC: 9.4' POW: 9.8'

SURFACE SEAL: TYPE: Grout DIAMETER: 2' THICKNESS: 1'

GROUT: TG: GS TYPE: Sand + ~~Grit~~ Gravel JB LENGTH: 2'

SEAL: TBS: 2' TYPE: Bentonite LENGTH: 2'

SAND PACK: TSP: 4.0', 4.5' TYPE: #00, #0 LENGTH: 5.9'

COMMENTS:

LEGEND (DEPTH TO):

TPC–TOP OF PROTECTIVE CASING:
TR–TOP OF RISER
PIN–SURVEYED GROUND SURFACE
TG–TOP OF GROUT
BD–BOTTOM OF DRILL HOLE
BOV–BASE OF OVERBURDEN

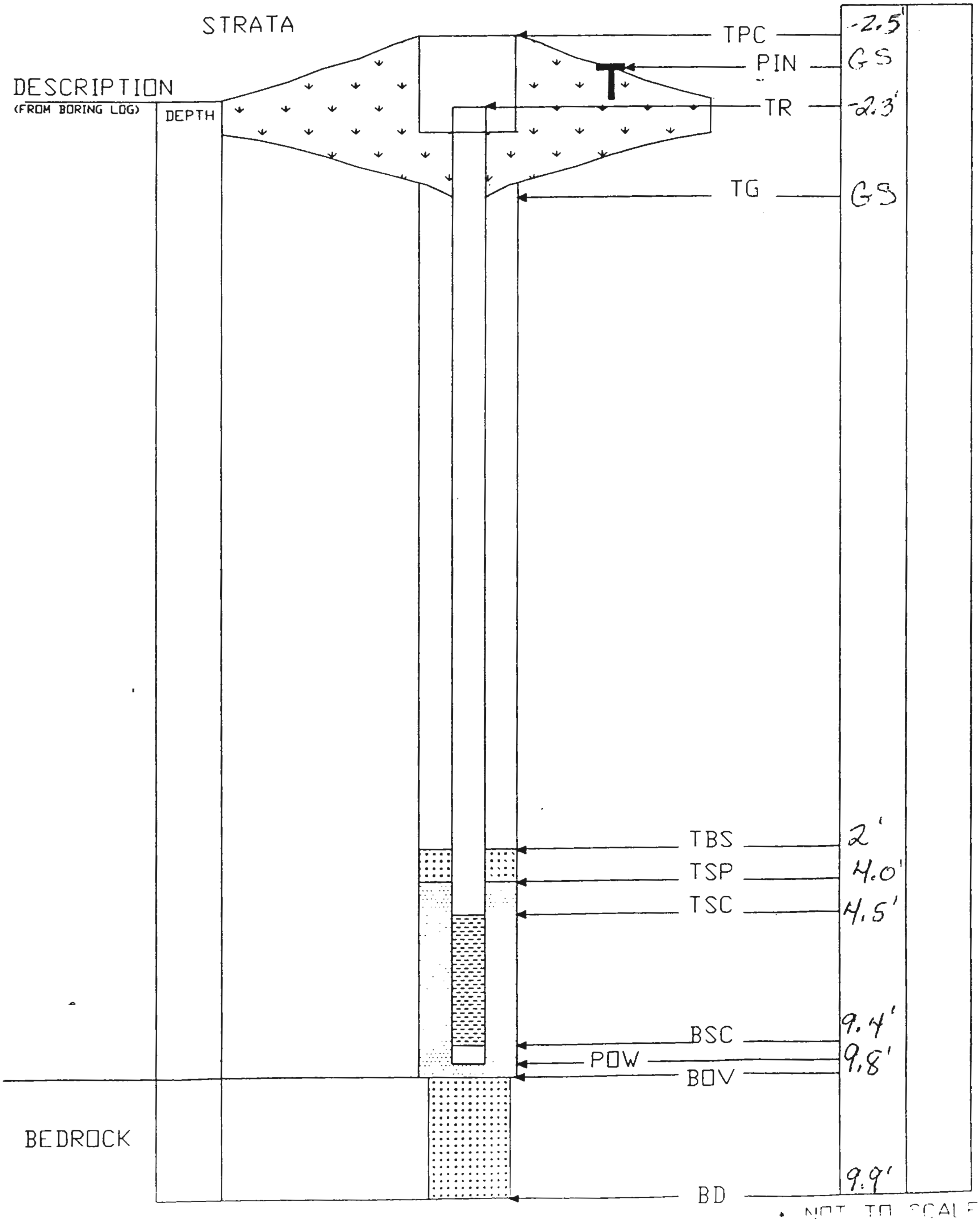
TBS–TOP OF BENTONITE SEAL
TSP–TOP OF SANDPACK
TSC–TOP OF SCREEN
BSC–BOTTOM OF SCREEN
POW–POINT OF WELL

* ALL MEASUREMENTS REFERENCED TO GROUND SURFACE

Parsons ES Inc.	WELL: MW 4-6

OVERBURDEN MONITORING WELL
COMPLETION REPORT & INSTALLATION DETAIL

DATE INSTALLED: 12/19/98
ROADWAY BOX



	DEPTH	ELEV.
TPC	-2.5'	
PIN	GS	
TR	-2.3'	
TG	GS	
TBS	2'	
TSP	4.0'	
TSC	4.5'	
BSC	9.4'	
POW	9.8'	
BOV		
BD	9.9'	

• NOT TO SCALE

Parsons ES Inc.

WELL NUMBER: MW-1-7

OVERBURDEN MONITORING WELL
COMPLETION REPORT & INSTALLATION DETAIL

CLIENT/PROJECT: Seneca Army Depot
LOCATION: Sead 4

PROJECT NO: 734539-01001
INSPECTOR: LLB
CHECKED BY:

DRILLING CONTRACTOR: Maxim
DRILLER: S. Breeds
DRILLING COMPLETED: 12/20/98
BORING DEPTH: 6'
DRILLING METHOD(S): 4¼" HSA
BORING DIAMETER(S): 8"

POW DEPTH: 6.4'
INSTALLATION STARTED: 12/20/98
INSTALLATION COMPLETED: 12/20/98
SURFACE COMPLETION DATE: 1/7/99
COMPLETION CONTRACTOR/CREW: Maxim/Breeds
BEDROCK CONFIRMED: Y

ASSOCIATED SWMU/AOC: Sead
COORDINATE SYSTEM:
NORTHING:
EASTING:
DATUM: NGVD 1929
ELEVATIONS: PIN:
TOC:
TPC:

PROTECTIVE CASING:
TYPE: Steel DIAMETER: 4" LENGTH: 5'

RISER:
TR: -2.1 TYPE: PVC DIAMETER: 2" LENGTH: 5.3'

SCREEN:
TSC: 3.2' TYPE: PVC DIAMETER: 2" LENGTH: 2' SLOT SIZE: 10

POINT OF WELL:(SILT SUMP)
TYPE: PVC BSC: 5.2' POW: 6'

SURFACE SEAL: TYPE: Grout DIAMETER: 2' THICKNESS: 1'

GROUT: TG: GS TYPE: Sand + Gravel LENGTH: ~~8~~ 1' LB

SEAL: TBS: 1' TYPE: Bentonite LENGTH: 1.5'

SAND PACK: TSP: 2.5', 3.0' TYPE: #00, #0 LENGTH: 3.5'

COMMENTS:

LEGEND (DEPTH TO):
TPC–TOP OF PROTECTIVE CASING:
TR–TOP OF RISER
PIN–SURVEYED GROUND SURFACE
TG–TOP OE GROUT
BD–BOTTOM OF DRILL HOLE
BOV–BASE OF OVERBURDEN

TBS–TOPOF BENTONITE SEAL
TSP–TOP OF SANDPACK
TSC–TOP OF SCREEN
BSC–BOTTOM OF SCREEN
POW–POINT OF WELL

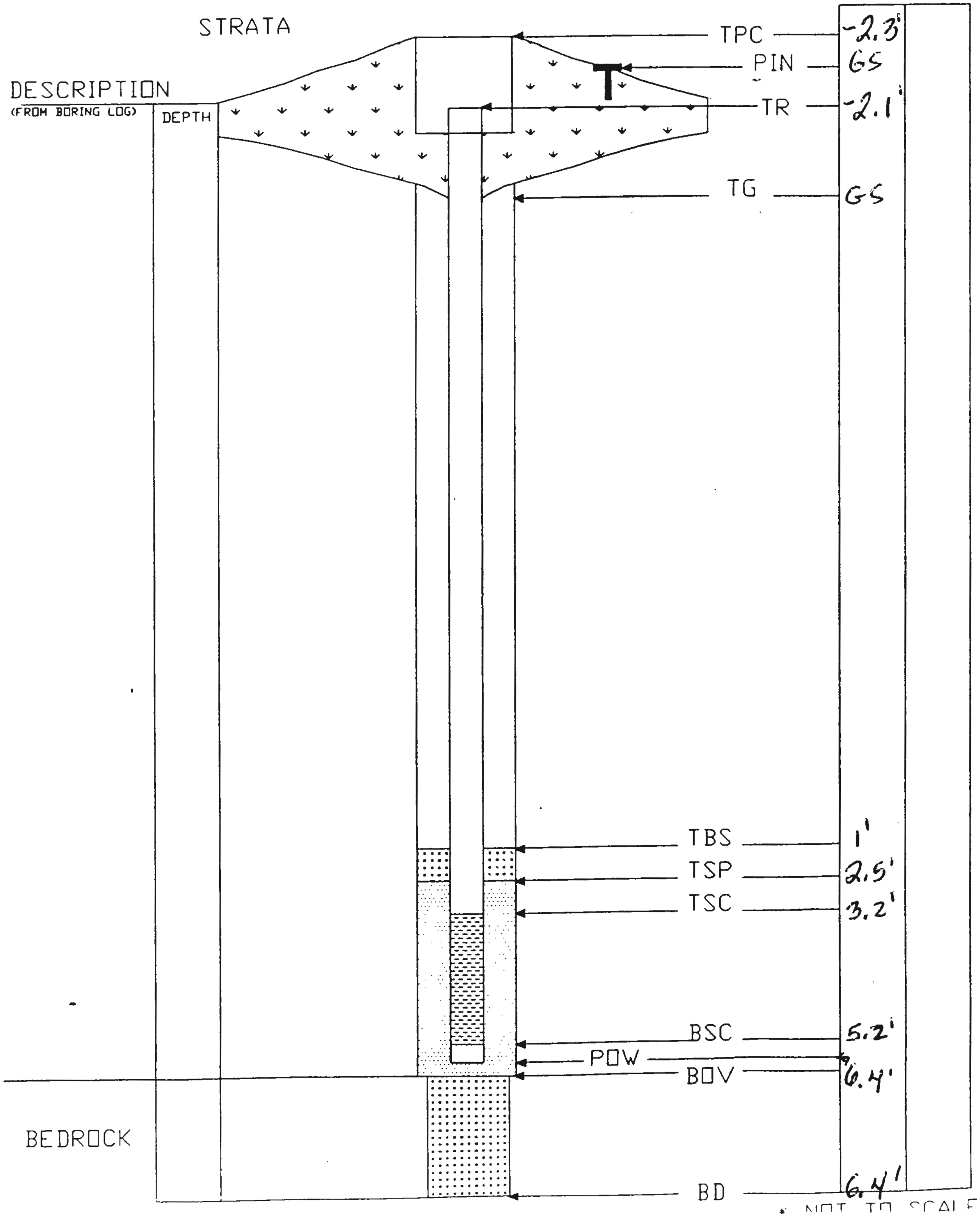
* ALL MEASUREMENTS REFERENCED TO GROUND SURFACE

Parsons ES Inc.

WELL: *MW M-7*

OVERBURDEN MONITORING WELL COMPLETION REPORT & INSTALLATION DETAIL

DATE INSTALLED: *12/20/98*
ROADWAY BOX



	DEPTH	ELEV.
TPC	-2.3'	
PIN	GS	
TR	-2.1'	
TG	GS	
TBS	1'	
TSP	2.5'	
TSC	3.2'	
BSC	5.2'	
POW		
BOV	6.4'	
BD	6.4'	

* NOT TO SCALE

Parsons ES Inc.

WELL NUMBER: MW4-8

OVERBURDEN MONITORING WELL
COMPLETION REPORT & INSTALLATION DETAIL

CLIENT/PROJECT: Seneca Army Depot
LOCATION: Sead 4

PROJECT NO: 734539-01001
INSPECTOR: LLB
CHECKED BY:

DRILLING CONTRACTOR: Maxim
DRILLER: S. Breeds
DRILLING COMPLETED: 12/19/98
BORING DEPTH: 10'
DRILLING METHOD(S): 4¼" HSA
BORING DIAMETER(S): 8"

POW DEPTH: 9.9'
INSTALLATION STARTED: 12/19/98
INSTALLATION COMPLETED: 12/19/98
SURFACE COMPLETION DATE: 1/7/99
COMPLETION CONTRACTOR/CREW: Maxim/Breeds
BEDROCK CONFIRMED: Y

ASSOCIATED SWMU/AOC: Sead
COORDINATE SYSTEM:
NORTHING:
EASTING:
DATUM: NGVD 1929
ELEVATIONS: PIN:
TOC:
TPC:

PROTECTIVE CASING:
TYPE: Steel DIAMETER: 4" LENGTH: 5'

RISER:
TR: -2.3' TYPE: PVC DIAMETER: 2" LENGTH: 6.9'

SCREEN:
TSC: 4.6' TYPE: PVC DIAMETER: 2" LENGTH: 4.9' SLOT SIZE: 10

POINT OF WELL:(SILT SUMP)
TYPE: PVC BSC: 9.5' POW: 10'

SURFACE SEAL: TYPE: Grout DIAMETER: 2' THICKNESS: 1'

GROUT: TG: GS TYPE: Sand + Gravel LENGTH: 2'

SEAL: TBS: 2' TYPE: Bentonite LENGTH: 2'

SAND PACK: TSP: 4.0', 4.6' TYPE: #00, #0 LENGTH: 6.0'

COMMENTS:

LEGEND (DEPTH TO):

TPC–TOP OF PROTECTIVE CASING:
TR–TOP OF RISER
PIN–SURVEYED GROUND SURFACE
TG–TOP OF GROUT
BD–BOTTOM OF DRILL HOLE
BOV–BASE OF OVERBURDEN

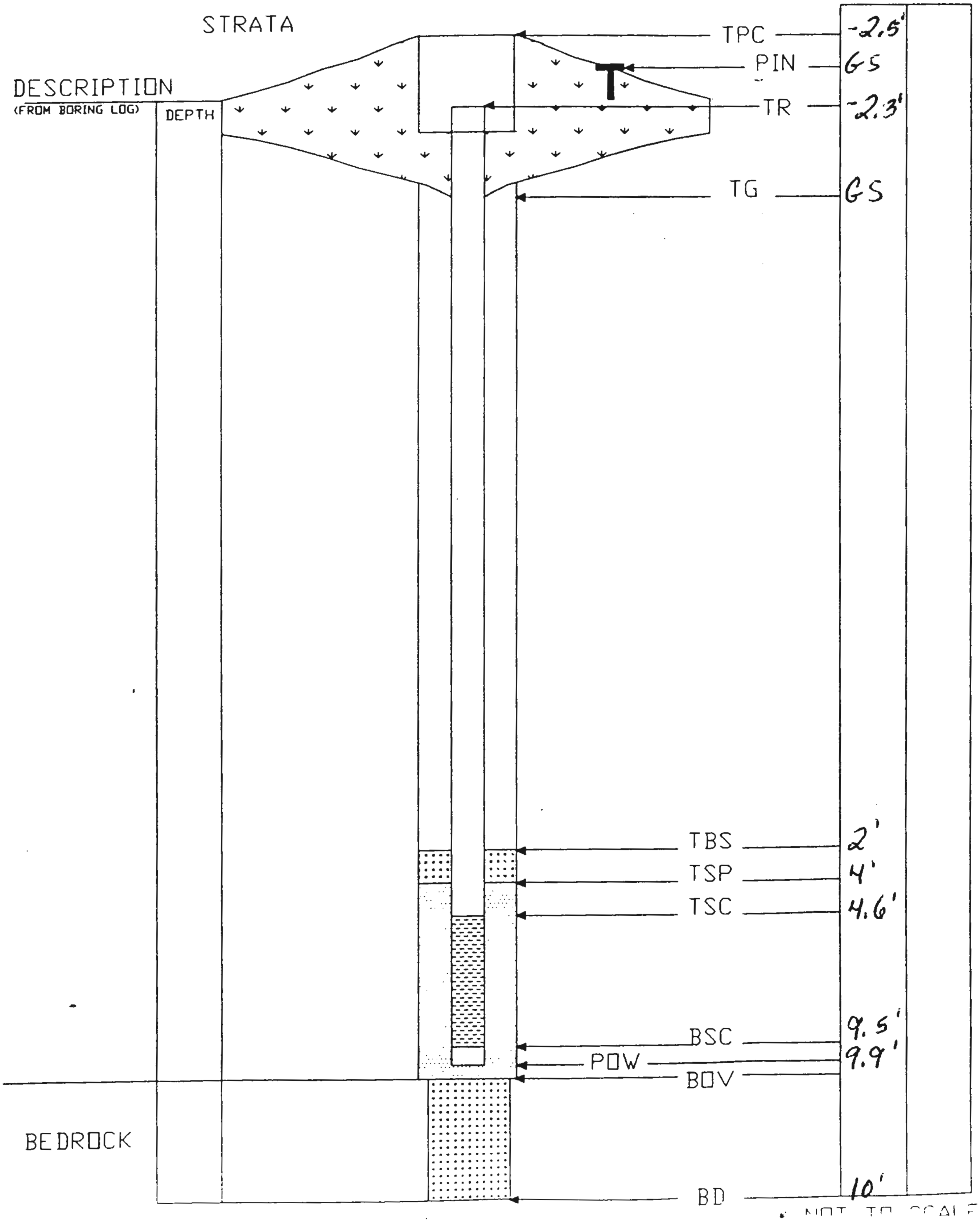
TBS–TOPOF BENTONITE SEAL
TSP–TOP OF SANDPACK
TSC–TOP OF SCREEN
BSC–BOTTOM OF SCREEN
POW–POINT OF WELL

* ALL MEASUREMENTS REFERENCED TO GROUND SURFACE

Parsons ES Inc.	WELL: MW 4-8

OVERBURDEN MONITORING WELL
COMPLETION REPORT & INSTALLATION DETAIL

DATE INSTALLED: 12/19/98
ROADWAY BOX



	DEPTH	ELEV.
TPC	-2.5'	
PIN	GS	
TR	-2.3'	
TG	GS	
TBS	2'	
TSP	4'	
TSC	4.6'	
BSC	9.5'	
POW	9.9'	
BOV		
BD	10'	

* NOT TO SCALE

Parsons ES Inc.

WELL NUMBER: MW4-9

OVERBURDEN MONITORING WELL
COMPLETION REPORT & INSTALLATION DETAIL

CLIENT/PROJECT: Seneca Army Depot
LOCATION: Sead 4

PROJECT NO: 734539-01001
INSPECTOR: LCB
CHECKED BY:

DRILLING CONTRACTOR: Maxim
DRILLER: S. Breeds
DRILLING COMPLETED: 12/20/98
BORING DEPTH: 6.2'
DRILLING METHOD(S): 4 1/4" HSA
BORING DIAMETER(S): 8"

POW DEPTH: 6.5'
INSTALLATION STARTED: 12/20/98
INSTALLATION COMPLETED: 12/20/98
SURFACE COMPLETION DATE: 1/7/99
COMPLETION CONTRACTOR/CREW: Maxim/Breeds
BEDROCK CONFIRMED: Y

ASSOCIATED SWMU/AOC: SEAD
COORDINATE SYSTEM:
NORTHING:
EASTING:
DATUM: NGVD 1929
ELEVATIONS: PIN:
TOC:
TPC:

PROTECTIVE CASING:
TYPE: Steel DIAMETER: 4" LENGTH: 5'

RISER:
TR: -2.3' TYPE: PVC DIAMETER: 2" LENGTH: 5.7'

SCREEN:
TSC: 3.4' TYPE: PVC DIAMETER: 2" LENGTH: 2' SLOT SIZE: 10

POINT OF WELL:(SILT SUMP)
TYPE: PVC BSC: 5.4' POW: 6.2'

SURFACE SEAL: TYPE: Grout DIAMETER: 2' THICKNESS: 1'

GROUT: TG: GS TYPE: Sand + Gravel LENGTH: 1'

SEAL: TBS: 1' TYPE: Bentonite LENGTH: 1.5'

SAND PACK: TSP: 2.5', 3.0' TYPE: #00, #0 LENGTH: 3.8'

COMMENTS:

LEGEND (DEPTH TO):

TPC-TOP OF PROTECTIVE CASING:
TR-TOP OF RISER
PIN-SURVEYED GROUND SURFACE
TG-TOP OF GROUT
BD-BOTTOM OF DRILL HOLE
BOV-BASE OF OVERBURDEN

TBS-TOP OF BENTONITE SEAL
TSP-TOP OF SANDPACK
TSC-TOP OF SCREEN
BSC-BOTTOM OF SCREEN
POW-POINT OF WELL

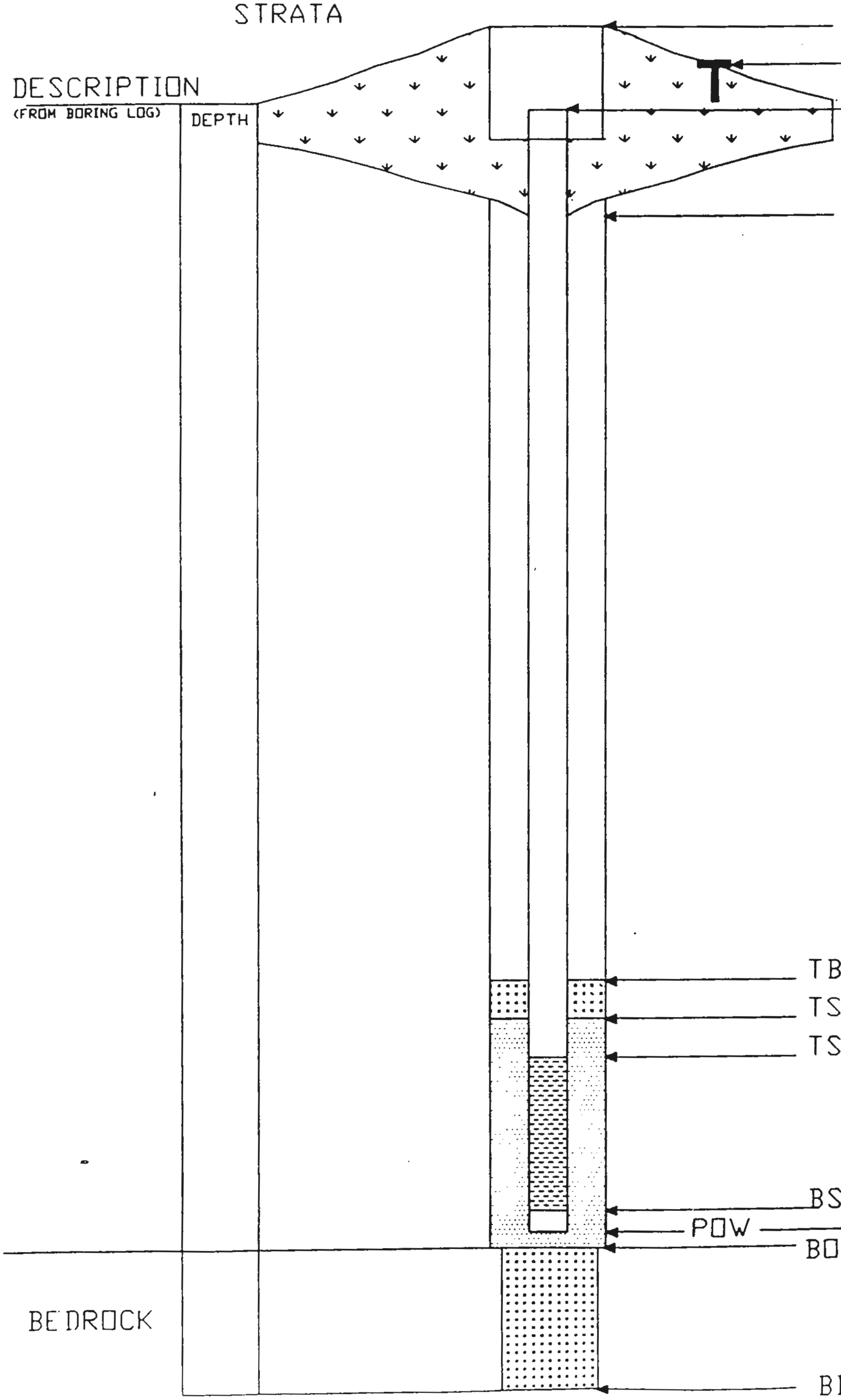
* ALL MEASUREMENTS REFERENCED TO GROUND SURFACE

Parsons ES Inc.

WELL: MW 14-9

OVERBURDEN MONITORING WELL
COMPLETION REPORT & INSTALLATION DETAIL

DATE INSTALLED: 12/20/98
ROADWAY BOX



	DEPTH	ELEV.
TPC	-2.5'	
PIN	GS	
TR	-2.3'	
TG	GS	
TBS	1'	
TSP	2.5'	
TSC	3.4'	
BSC	5.4'	
POW	6.5'	
BOV		
BD	6.2'	

* NOT TO SCALE

Parsons ES Inc.

WELL NUMBER: MW4-10

OVERBURDEN MONITORING WELL COMPLETION REPORT & INSTALLATION DETAIL

CLIENT/PROJECT: Seneca Army Depot
LOCATION: Sead4

PROJECT NO: 734539-01001
INSPECTOR: WB
CHECKED BY:

DRILLING CONTRACTOR: Maxim
DRILLER: S. Breeds
DRILLING COMPLETED: 12/17/98
BORING DEPTH: 8.0'
DRILLING METHOD(S): 4¼" HSA
BORING DIAMETER(S): 8"

POW DEPTH: 8.1"
INSTALLATION STARTED: 12/17/98
INSTALLATION COMPLETED: 12/17/98
SURFACE COMPLETION DATE: 1/7/98
COMPLETION CONTRACTOR/CREW: Maxim/Breeds
BEDROCK CONFIRMED: Y

ASSOCIATED SWMU/AOC: SEAD
COORDINATE SYSTEM:
NORTHING:
EASTING:
DATUM: NGVD 1929
ELEVATIONS: PIN: TOC: TPC:

PROTECTIVE CASING:
TYPE: Steel DIAMETER: 4" LENGTH: 5'

RISER:
TR: -2.1' TYPE: PVC DIAMETER: 2" LENGTH: 4.7'

SCREEN:
TSC: 2.6' TYPE: PVC DIAMETER: 2" LENGTH: 4.9' SLOT SIZE: 10

POINT OF WELL:(SILT SUMP)
TYPE: PVC BSC: 7.5' POW: 8.0'

SURFACE SEAL: TYPE: Grout DIAMETER: 2' THICKNESS: 1'

GROUT: TG: GS TYPE: Sand & Gravel LENGTH: 1.0'

SEAL: TBS: 1.0' TYPE: Bentonite LENGTH: 1.0'

SAND PACK: TSP: 2.0', 2.5' TYPE: #00, #0 LENGTH: 6.0'

COMMENTS:

LEGEND (DEPTH TO):

TPC–TOP OF PROTECTIVE CASING:
TR–TOP OF RISER
PIN–SURVEYED GROUND SURFACE
TG–TOP OE GROUT
BD–BOTTOM OF DRILL HOLE
BOV–BASE OF OVERBURDEN

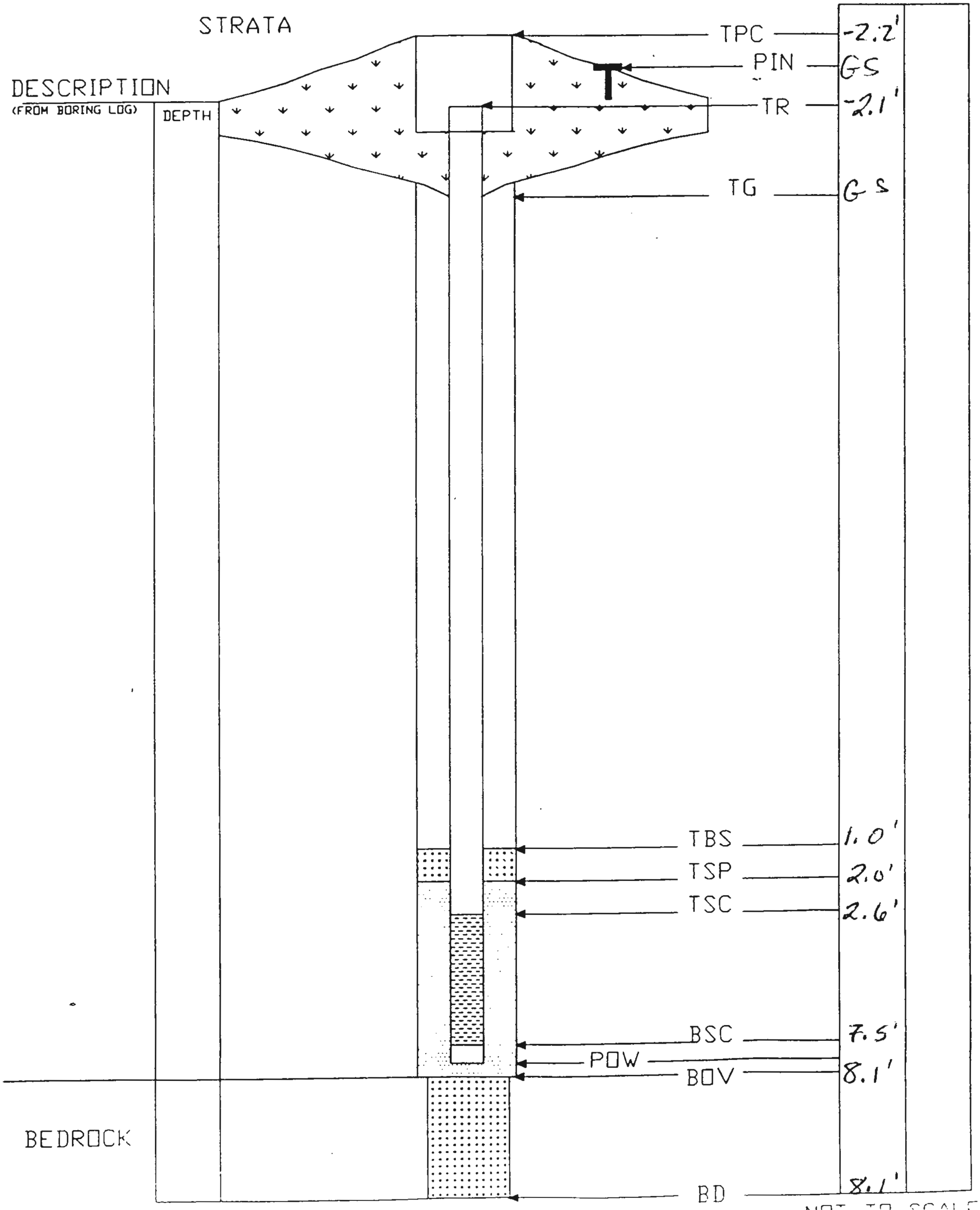
TBS–TOPOF BENTONITE SEAL
TSP–TOP OF SANDPACK
TSC–TOP OF SCREEN
BSC–BOTTOM OF SCREEN
POW–POINT OF WELL

* ALL MEASUREMENTS REFERENCED TO GROUND SURFACE

Parsons ES Inc. | WELL: mw 4-10

OVERBURDEN MONITORING WELL COMPLETION REPORT & INSTALLATION DETAIL

DATE INSTALLED: 12/17/98
ROADWAY BOX



	DEPTH	ELEV.
TPC	-2.2'	
PIN	GS	
TR	-2.1'	
TG	GS	
TBS	1.0'	
TSP	2.0'	
TSC	2.6'	
BSC	7.5'	
POW	8.1'	
BOV	8.1'	
BD	8.1'	

Parsons ES Inc.

WELL NUMBER: MW4-11

OVERBURDEN MONITORING WELL
COMPLETION REPORT & INSTALLATION DETAIL

CLIENT/PROJECT: Seneca Army Depot
LOCATION: Sead 4

PROJECT NO: 734539-01001
INSPECTOR: CCB
CHECKED BY:

DRILLING CONTRACTOR: Maxim
DRILLER: S. Breeds
DRILLING COMPLETED: 12/20/98
BORING DEPTH: 9'
DRILLING METHOD(S): 4 ¼" HSA
BORING DIAMETER(S): 8"

POW DEPTH: 9'
INSTALLATION STARTED: 12/20/98
INSTALLATION COMPLETED: 12/20/98
SURFACE COMPLETION DATE: 1/7/99
COMPLETION CONTRACTOR/CREW: Maxim/Breeds
BEDROCK CONFIRMED: Y

ASSOCIATED SWMU/AOC: SEAD
COORDINATE SYSTEM:
NORTHING:
EASTING:
DATUM: NGVD 1929
ELEVATIONS: PIN:
TOC:
TPC:

PROTECTIVE CASING:
TYPE: Steel
DIAMETER: 4"
LENGTH: 5'

RISER:
TR: -2.5'
TYPE: PVC
DIAMETER: 2"
LENGTH: 6.1'

SCREEN:
TSC: 3.6'
TYPE: PVC
DIAMETER: 2"
LENGTH: 4.6'
SLOT SIZE: 10

POINT OF WELL:(SILT SUMP)
TYPE: PVC
BSC: 8.2'
POW: 9'

SURFACE SEAL:
TYPE: Grout
DIAMETER: 2'
THICKNESS: 1'

GROUT:
TG: GS
TYPE: Sand + Gravel
LENGTH: 1.5'

SEAL:
TBS: 1.5'
TYPE: Bentonite
LENGTH: 1.5'

SAND PACK:
TSP: 3.0', 3.5'
TYPE: #00, #0
LENGTH: 6.0'

COMMENTS:

LEGEND (DEPTH TO):

TPC-TOP OF PROTECTIVE CASING:
TR-TOP OF RISER
PIN-SURVEYED GROUND SURFACE
TG-TOP OF GROUT
BD-BOTTOM OF DRILL HOLE
OV-BASE OF OVERBURDEN

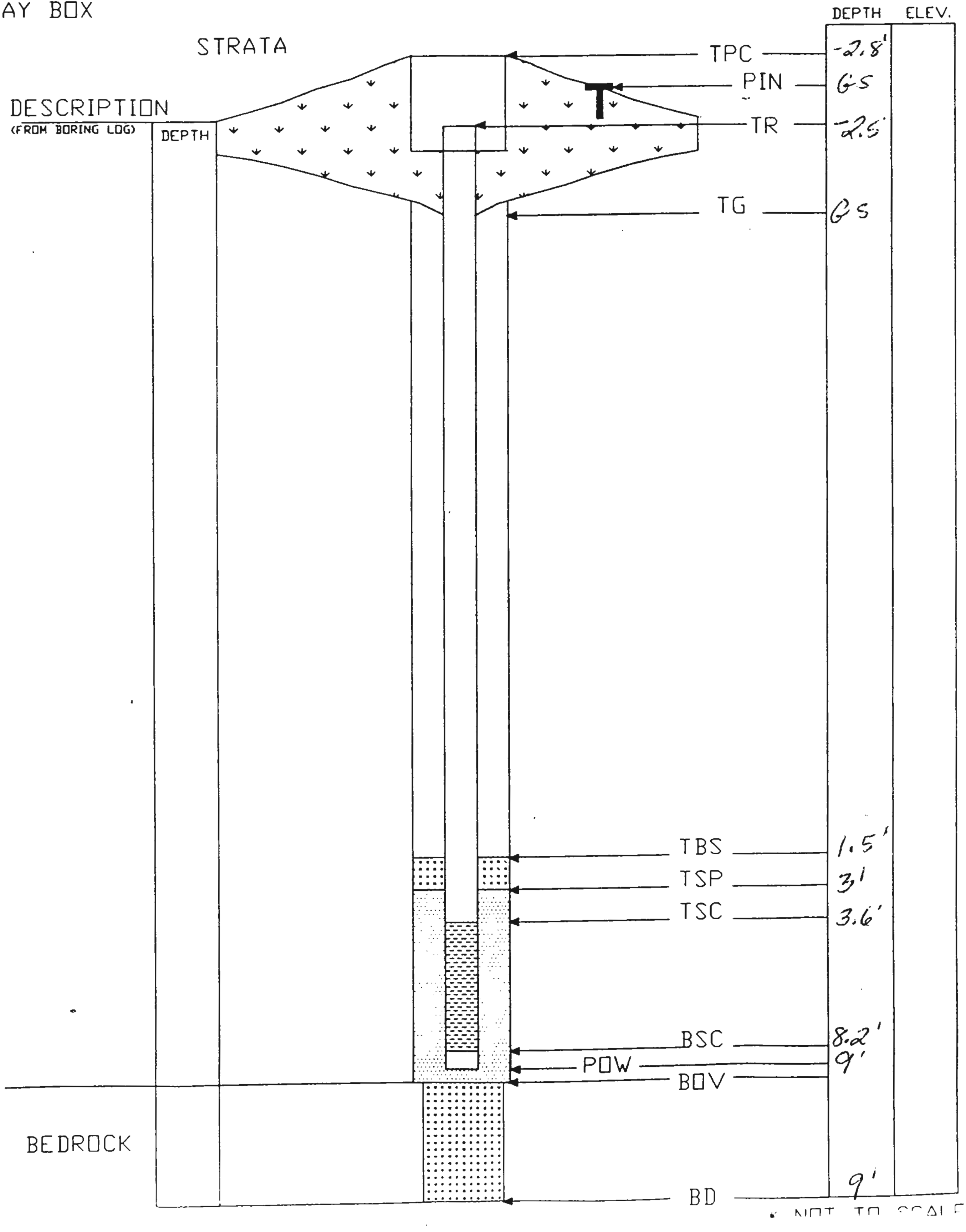
TBS-TOPOF BENTONITE SEAL
TSP-TOP OF SANDPACK
TSC-TOP OF SCREEN
BSC-BOTTOM OF SCREEN
POW-POINT OF WELL

* ALL MEASUREMENTS REFERENCED TO GROUND SURFACE

Parsons ES Inc.	WELL: *MW 4-11*

OVERBURDEN MONITORING WELL COMPLETION REPORT & INSTALLATION DETAIL

DATE INSTALLED: *12/20/98*
ROADWAY BOX



	DEPTH	ELEV.
TPC	-2.8'	
PIN	GS	
TR	-2.5'	
TG	GS	
TBS	1.5'	
TSP	3'	
TSC	3.6'	
BSC	8.2'	
POW	9'	
BOV		
BD	9'	

Parsons ES Inc.	WELL NUMBER: MW4-12

OVERBURDEN MONITORING WELL
COMPLETION REPORT & INSTALLATION DETAIL

CLIENT/PROJECT: Seneca Army Depot
LOCATION: Sead4

PROJECT NO: 734539-01001
INSPECTOR: LLB
CHECKED BY:

DRILLING CONTRACTOR: Maxim
DRILLER: S. Breeds
DRILLING COMPLETED: 12/21/98
BORING DEPTH: 11'
DRILLING METHOD(S): 4¼" HSA
BORING DIAMETER(S): 8"

POW DEPTH: 11'
INSTALLATION STARTED: 12/21/98
INSTALLATION COMPLETED: 12/21/98
SURFACE COMPLETION DATE: 1/7/99
COMPLETION CONTRACTOR/CREW: Maxim/Breeds
BEDROCK CONFIRMED: Y

ASSOCIATED SWMU/AOC: SEAD
COORDINATE SYSTEM:
NORTHING:
EASTING:
DATUM: NGVD 1929
ELEVATIONS: PIN:
TOC:
TPC:

PROTECTIVE CASING:
TYPE: Steel DIAMETER: 4" LENGTH: 5'

RISER:
TR: -2.4' TYPE: PVC DIAMETER: 2" LENGTH: 8.0'

SCREEN:
TSC: 5.6' TYPE: PVC DIAMETER: 2" LENGTH: 4.6' SLOT SIZE: 10

POINT OF WELL:(SILT SUMP)
TYPE: PVC BSC: 10.2' POW: 11'

SURFACE SEAL: TYPE: Grout DIAMETER: 2' THICKNESS: 1'

GROUT: TG: GS TYPE: Sand & Gravel LENGTH: 2.6'

SEAL: TBS: 2.6' TYPE: Bentonite LENGTH: 2.0'

SAND PACK: TSP: 4.6', 5.6' TYPE: #00, #0 LENGTH: 6.4'

COMMENTS:

LEGEND (DEPTH TO):

TPC–TOP OF PROTECTIVE CASING:
TR–TOP OF RISER
PIN–SURVEYED GROUND SURFACE
TG–TOP OE GROUT
BD–BOTTOM OF DRILL HOLE
BOV–BASE OF OVERBURDEN

TBS–TOPOF BENTONITE SEAL
TSP–TOP OF SANDPACK
TSC–TOP OF SCREEN
BSC–BOTTOM OF SCREEN
POW–POINT OF WELL

* ALL MEASUREMENTS REFERENCED TO GROUND SURFACE

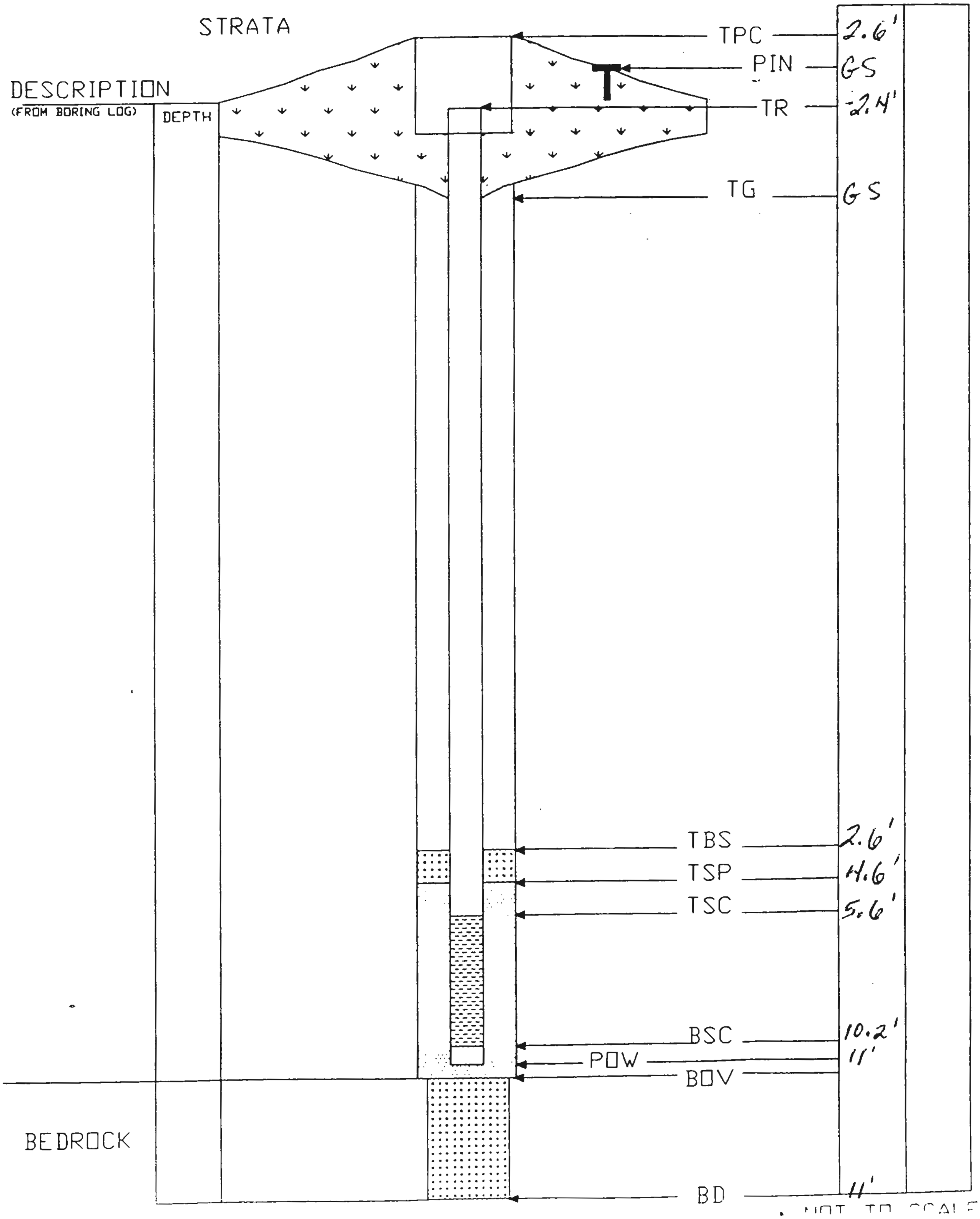
Parsons ES Inc.

WELL: MW 4-12

OVERBURDEN MONITORING WELL COMPLETION REPORT & INSTALLATION DETAIL

DATE INSTALLED: 12/21/98

ROADWAY BOX



	DEPTH	ELEV.
TPC	2.6'	
PIN	GS	
TR	-2.4'	
TG	GS	
TBS	2.6'	
TSP	4.6'	
TSC	5.6'	
BSC	10.2'	
POW	11'	
BOV		
BD	11'	

NOT TO SCALE

Parsons ES Inc.

WELL NUMBER: MW4-13

OVERBURDEN MONITORING WELL
COMPLETION REPORT & INSTALLATION DETAIL

CLIENT/PROJECT: Seneca Army Depot
LOCATION: Sead 4

PROJECT NO: 734539-01001
INSPECTOR:
CHECKED BY:

DRILLING CONTRACTOR: Maxim
DRILLER: S. Breeds
DRILLING COMPLETED: 12/20/98
BORING DEPTH: 6.7'
DRILLING METHOD(S): 4 ¼" HSA
BORING DIAMETER(S): 8"

POW DEPTH: 6.8'
INSTALLATION STARTED: 12/20/98
INSTALLATION COMPLETED: 12/20/98
SURFACE COMPLETION DATE: 1/7/99
COMPLETION CONTRACTOR/CREW: Maxim/Breeds
BEDROCK CONFIRMED: Y

ASSOCIATED SWMU/AOC: SEAD
COORDINATE SYSTEM:
NORTHING:
EASTING:
DATUM: NGVD 1929
ELEVATIONS: PIN:
TOC:
TPC:

PROTECTIVE CASING:
TYPE: Steel
DIAMETER: 4"
LENGTH: 5'

RISER:
TR: -2.3'
TYPE: PVC
DIAMETER: 2"
LENGTH: 6.2'

SCREEN:
TSC: 3.9'
TYPE: PVC
DIAMETER: 2"
LENGTH: 2'
SLOT SIZE: 10

POINT OF WELL:(SILT SUMP)
TYPE: PVC
BSC: 5.9'
POW: 6.7'

SURFACE SEAL:
TYPE: Grout
DIAMETER: 2'
THICKNESS: 1'

GROUT:
TG: GS
TYPE: Sand + Gravel
LENGTH: 1'

SEAL:
TBS: 1'
TYPE: Bentontite
LENGTH: 1.5'

SAND PACK:
TSP: 2.5', 3.0'
TYPE: #00, #0
LENGTH: 4.2'

COMMENTS:

LEGEND (DEPTH TO):

TPC–TOP OF PROTECTIVE CASING:	TBS–TOPOF BENTONITE SEAL
TR–TOP OF RISER	TSP–TOP OF SANDPACK
PIN–SURVEYED GROUND SURFACE	TSC–TOP OF SCREEN
TG–TOP OE GROUT	BSC–BOTTOM OF SCREEN
BD–BOTTOM OF DRILL HOLE	POW–POINT OF WELL
BOV–BASE OF OVERBURDEN	

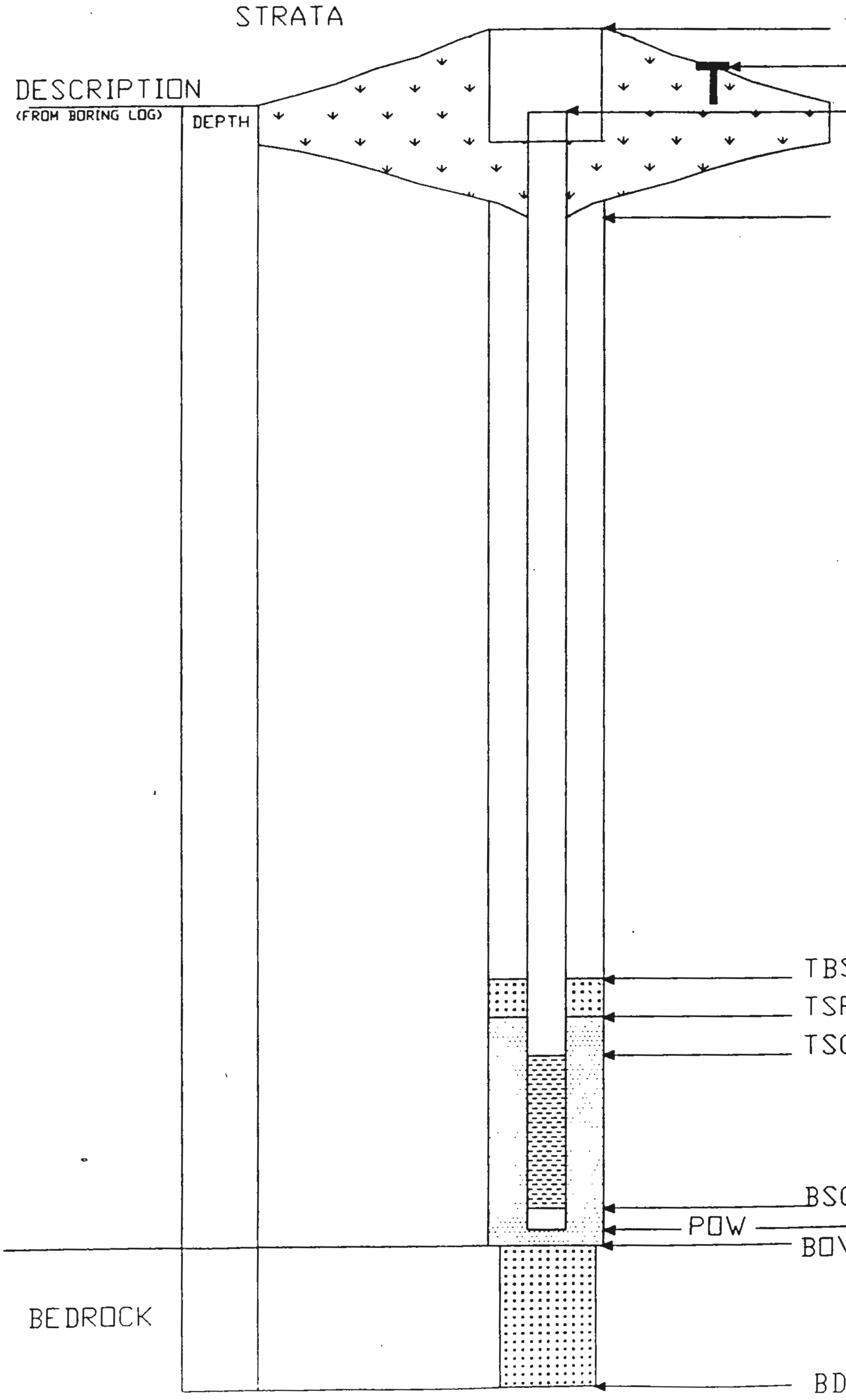
* ALL MEASUREMENTS REFERENCED TO GROUND SURFACE

Parsons ES Inc. | WELL: mw 4-13

OVERBURDEN MONITORING WELL
COMPLETION REPORT & INSTALLATION DETAIL

DATE INSTALLED: 12/20/98

ROADWAY BOX



	DEPTH	ELEV.
TPC	-2.7'	
PIN	GS	
TR	-2.3'	
TG	GS	
TBS	1'	
TSP	2.5'	
TSC	3.9'	
BSC	5.9'	
POW	6.8'	
BOV	6.8'	
BD	6.8'	

* NOT TO SCALE

Appendix D

Slug Test Data and Hydraulic Conductivity Results

Client. **Seneca Army Depot Activity**

Project: **SEAD-4 RI/FS**

Project No.: **734539-01001**

Well No.: **MW4-6**

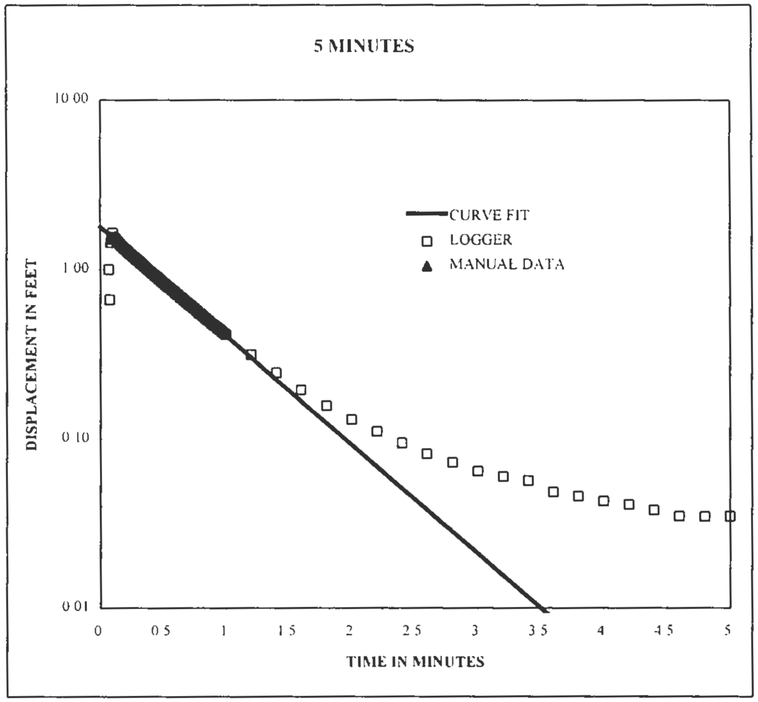
Test Date: **May 9, 1999**

Formation Tested: **Till**

Rising (R) or Falling (F) Head Test: **R**

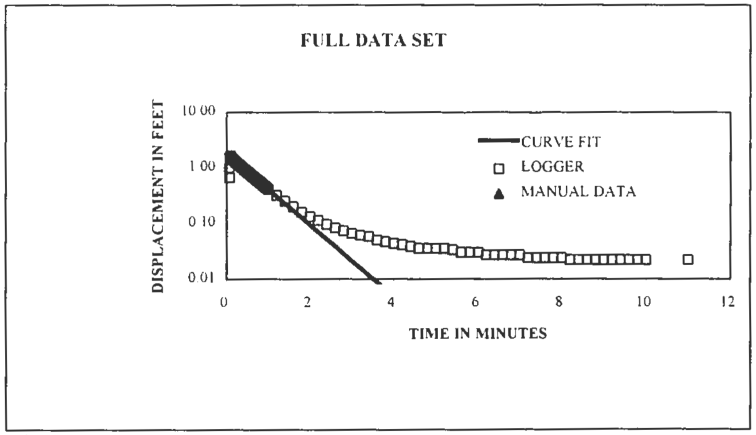
Hydraulic conductivity	**1.84E-03**	**cm/sec**
	3.61E-03	**ft/min**
	5.20	**ft/day**

Casing stickup	**2.30**	feet
Static water level (from top of casing)	**4.04**	feet
Depth to bottom of screen (from ground level)	**9.40**	feet
Boring diameter	**8.00**	inches
Casing diameter	**2.00**	inches
Screen diameter	**2.00**	inches
Screen length	**4.90**	feet
Depth to "impermeable boundary"	**9.90**	feet
Estimated ratio of Kh/Kv	**1.00**	
Porosity of filter pack	**0.30**	
ΔH at time zero (Y_0)	**1.80**	feet
ΔH at time t (Y_t)	**0.01**	feet
Time	**3.50**	minutes



Bouwer-Rice Parameters

feet	cm		cm	
1.74	53.04	*SW*		
7.66	233.48	*H*	58.80	*L/Rw*
4.5	137.16	*Ts*	0.94	*H/D*
0.083	2.54	*Rw*	3.20	*A*
0.083	2.54	*Rc*	0.48	*B*
0.167	5.08	*DS*	2.80	*C*
4.90	149.35	*L*	1.79	*Ln[(D-H)/Rw]'*
8.16	248.72	*D*	1.79	*Ln[(D-H)/Rw]*
1.8	54.86	Y_0	3.20	**equation (8)**
0.01	0.30	Y_t	3.44	**equation (9)**
	210.00	*t (seconds)*	3.44	*Ln(Re/Rw)*
	1.00	*M*	1.8E-03	**equation (5)**
	0.30	*n*		



Bouwer, Herman 1989 "The Bouwer and Rice Slug Test - An Update" Ground Water vol 27, no 3, May-June 1989

Bouwer, H and R C Rice 1976 A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers With Completely or Partially Penetrating Wells" Water Resources Research vol 12, no 3, June 1976

logger data

FILE: GT20.DAT

SE1000C
Environmenta Logger
29-May 16:28

Unit# 0 Test 0

Setups: INPUT 1
-------- ---------
Type Level (F)
Mode TOC
I.D. 30019

Referenc 7.53
Linearit -0.05
Scale factor 49.87
Offset 0
Delay mSEC 50

Step 0 29-May 10:31:59

LOGGER TIME	LOGGER INPUT	ELAPSED TIME (MINUTES)	DELTA S (FEET)	CORRECTED ELAPSED TIME (MINUTES)	CORRECTED DELTA S (FEET)	HEAD RATIO (H/H_0)
0	0	0	0	#N/A	#N/A	#N/A
0.0083	0	0.0083	0	0.0083	#N/A	#N/A
0.0166	0	0.0166	0	0.0166	#N/A	#N/A
0.025	0	0.025	0	0.025	#N/A	#N/A
0.0333	0	0.0333	0	0.0333	#N/A	#N/A
0.0416	0	0.0416	0	0.0416	#N/A	#N/A
0.05	0	0.05	0	0.05	#N/A	#N/A
0.0583	0	0.0583	0	0.0583	#N/A	#N/A
0.0666	0.999	0.0666	0.999	0.0666	0.999	#N/A
0.075	0.664	0.075	0.664	0.075	0.664	#N/A
0.0833	1.445	0.0833	1.445	0.0833	1.445	#N/A
0.0916	1.515	0.0916	1.515	0.0916	1.515	#N/A
0.1	1.649	0.1	1.649	0.1	1.649	#N/A
0.1083	1.564	0.1083	1.564	0.1083	1.564	#N/A
0.1166	1.534	0.1166	1.534	0.1166	1.534	#N/A
0.125	1.507	0.125	1.507	0.125	1.507	#N/A
0.1333	1.48	0.1333	1.48	0.1333	1.48	#N/A
0.1416	1.456	0.1416	1.456	0.1416	1.456	#N/A
0.15	1.434	0.15	1.434	0.15	1.434	#N/A
0.1583	1.412	0.1583	1.412	0.1583	1.412	#N/A
0.1666	1.39	0.1666	1.39	0.1666	1.39	#N/A

logger data

0.175	1.371	0.175	1.371	0.175	1.371	#N/A
0.1833	1.352	0.1833	1.352	0.1833	1.352	#N/A
0.1916	1.333	0.1916	1.333	0.1916	1.333	#N/A
0.2	1.317	0.2	1.317	0.2	1.317	#N/A
0.2083	1.301	0.2083	1.301	0.2083	1.301	#N/A
0.2166	1.281	0.2166	1.281	0.2166	1.281	#N/A
0.225	1.265	0.225	1.265	0.225	1.265	#N/A
0.2333	1.249	0.2333	1.249	0.2333	1.249	#N/A
0.2416	1.233	0.2416	1.233	0.2416	1.233	#N/A
0.25	1.219	0.25	1.219	0.25	1.219	#N/A
0.2583	1.203	0.2583	1.203	0.2583	1.203	#N/A
0.2666	1.186	0.2666	1.186	0.2666	1.186	#N/A
0.275	1.173	0.275	1.173	0.275	1.173	#N/A
0.2833	1.159	0.2833	1.159	0.2833	1.159	#N/A
0.2916	1.143	0.2916	1.143	0.2916	1.143	#N/A
0.3	1.129	0.3	1.129	0.3	1.129	#N/A
0.3083	1.116	0.3083	1.116	0.3083	1.116	#N/A
0.3166	1.102	0.3166	1.102	0.3166	1.102	#N/A
0.325	1.088	0.325	1.088	0.325	1.088	#N/A
0.3333	1.075	0.3333	1.075	0.3333	1.075	#N/A
0.35	1.048	0.35	1.048	0.35	1.048	#N/A
0.3666	1.02	0.3666	1.02	0.3666	1.02	#N/A
0.3833	0.996	0.3833	0.996	0.3833	0.996	#N/A
0.4	0.971	0.4	0.971	0.4	0.971	#N/A
0.4166	0.95	0.4166	0.95	0.4166	0.95	#N/A
0.4333	0.925	0.4333	0.925	0.4333	0.925	#N/A
0.45	0.903	0.45	0.903	0.45	0.903	#N/A
0.4666	0.882	0.4666	0.882	0.4666	0.882	#N/A
0.4833	0.86	0.4833	0.86	0.4833	0.86	#N/A
0.5	0.838	0.5	0.838	0.5	0.838	#N/A
0.5166	0.819	0.5166	0.819	0.5166	0.819	#N/A
0.5333	0.8	0.5333	0.8	0.5333	0.8	#N/A
0.55	0.781	0.55	0.781	0.55	0.781	#N/A
0.5666	0.762	0.5666	0.762	0.5666	0.762	#N/A
0.5833	0.746	0.5833	0.746	0.5833	0.746	#N/A
0.6	0.727	0.6	0.727	0.6	0.727	#N/A
0.6166	0.71	0.6166	0.71	0.6166	0.71	#N/A
0.6333	0.691	0.6333	0.691	0.6333	0.691	#N/A
0.65	0.678	0.65	0.678	0.65	0.678	#N/A
0.6666	0.661	0.6666	0.661	0.6666	0.661	#N/A
0.6833	0.645	0.6833	0.645	0.6833	0.645	#N/A
0.7	0.629	0.7	0.629	0.7	0.629	#N/A
0.7166	0.615	0.7166	0.615	0.7166	0.615	#N/A
0.7333	0.601	0.7333	0.601	0.7333	0.601	#N/A
0.75	0.588	0.75	0.588	0.75	0.588	#N/A
0.7666	0.574	0.7666	0.574	0.7666	0.574	#N/A

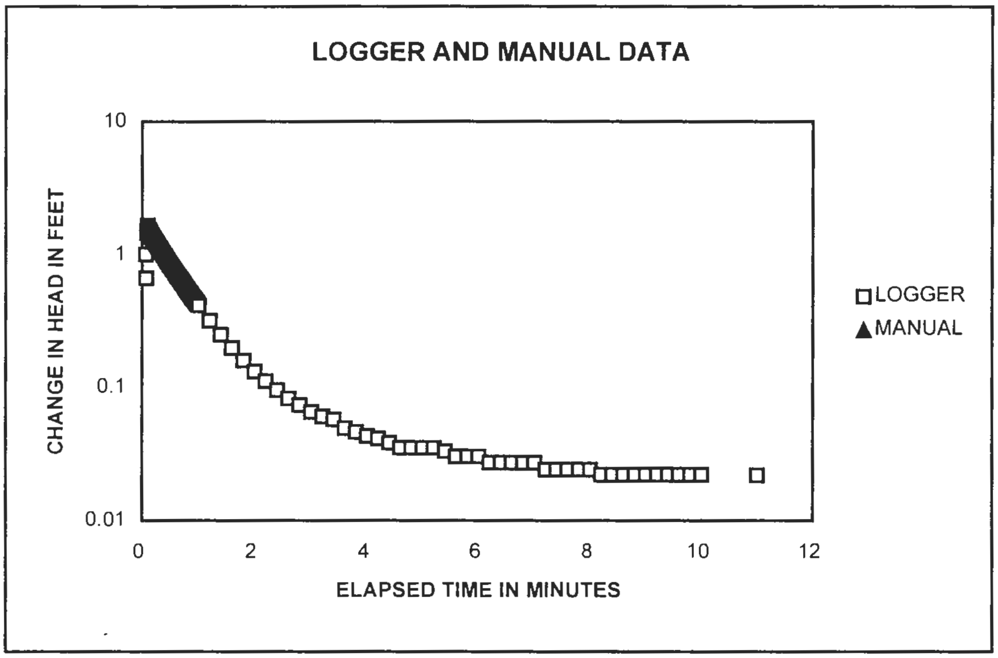
0.7833	0.558	0.7833	0.558	0.7833	0.558	#N/A
0.8	0.547	0.8	0.547	0.8	0.547	#N/A
0.8166	0.533	0.8166	0.533	0.8166	0.533	#N/A
0.8333	0.52	0.8333	0.52	0.8333	0.52	#N/A
0.85	0.509	0.85	0.509	0.85	0.509	#N/A
0.8666	0.498	0.8666	0.498	0.8666	0.498	#N/A
0.8833	0.484	0.8833	0.484	0.8833	0.484	#N/A
0.9	0.473	0.9	0.473	0.9	0.473	#N/A
0.9166	0.465	0.9166	0.465	0.9166	0.465	#N/A
0.9333	0.454	0.9333	0.454	0.9333	0.454	#N/A
0.95	0.444	0.95	0.444	0.95	0.444	#N/A
0.9666	0.433	0.9666	0.433	0.9666	0.433	#N/A
0.9833	0.424	0.9833	0.424	0.9833	0.424	#N/A
1	0.414	1	0.414	1	0.414	#N/A
1.2	0.316	1.2	0.316	1.2	0.316	#N/A
1.4	0.248	1.4	0.248	1.4	0.248	#N/A
1.6	0.196	1.6	0.196	1.6	0.196	#N/A
1.8	0.158	1.8	0.158	1.8	0.158	#N/A
2	0.131	2	0.131	2	0.131	#N/A
2.2	0.111	2.2	0.111	2.2	0.111	#N/A
2.4	0.095	2.4	0.095	2.4	0.095	#N/A
2.6	0.082	2.6	0.082	2.6	0.082	#N/A
2.8	0.073	2.8	0.073	2.8	0.073	#N/A
3	0.065	3	0.065	3	0.065	#N/A
3.2	0.06	3.2	0.06	3.2	0.06	#N/A
3.4	0.057	3.4	0.057	3.4	0.057	#N/A
3.6	0.049	3.6	0.049	3.6	0.049	#N/A
3.8	0.046	3.8	0.046	3.8	0.046	#N/A
4	0.043	4	0.043	4	0.043	#N/A
4.2	0.041	4.2	0.041	4.2	0.041	#N/A
4.4	0.038	4.4	0.038	4.4	0.038	#N/A
4.6	0.035	4.6	0.035	4.6	0.035	#N/A
4.8	0.035	4.8	0.035	4.8	0.035	#N/A
5	0.035	5	0.035	5	0.035	#N/A
5.2	0.035	5.2	0.035	5.2	0.035	#N/A
5.4	0.033	5.4	0.033	5.4	0.033	#N/A
5.6	0.03	5.6	0.03	5.6	0.03	#N/A
5.8	0.03	5.8	0.03	5.8	0.03	#N/A
6	0.03	6	0.03	6	0.03	#N/A
6.2	0.027	6.2	0.027	6.2	0.027	#N/A
6.4	0.027	6.4	0.027	6.4	0.027	#N/A
6.6	0.027	6.6	0.027	6.6	0.027	#N/A
6.8	0.027	6.8	0.027	6.8	0.027	#N/A
7	0.027	7	0.027	7	0.027	#N/A
7.2	0.024	7.2	0.024	7.2	0.024	#N/A
7.4	0.024	7.4	0.024	7.4	0.024	#N/A

logger data

7.6	0.024	7.6	0.024	7.6	0.024	#N/A
7.8	0.024	7.8	0.024	7.8	0.024	#N/A
8	0.024	8	0.024	8	0.024	#N/A
8.2	0.022	8.2	0.022	8.2	0.022	#N/A
8.4	0.022	8.4	0.022	8.4	0.022	#N/A
8.6	0.022	8.6	0.022	8.6	0.022	#N/A
8.8	0.022	8.8	0.022	8.8	0.022	#N/A
9	0.022	9	0.022	9	0.022	#N/A
9.2	0.022	9.2	0.022	9.2	0.022	#N/A
9.4	0.022	9.4	0.022	9.4	0.022	#N/A
9.6	0.022	9.6	0.022	9.6	0.022	#N/A
9.8	0.022	9.8	0.022	9.8	0.022	#N/A
10	0.022	10	0.022	10	0.022	#N/A
11	0.022	11	0.022	11	0.022	#N/A

TIME START ADJUSTMENT	0

LOGGER REFERENCE:	0
LOGGER DATA ADJUSTMENT:	0
LOGGER SIGN ADJUSTMENT:	1



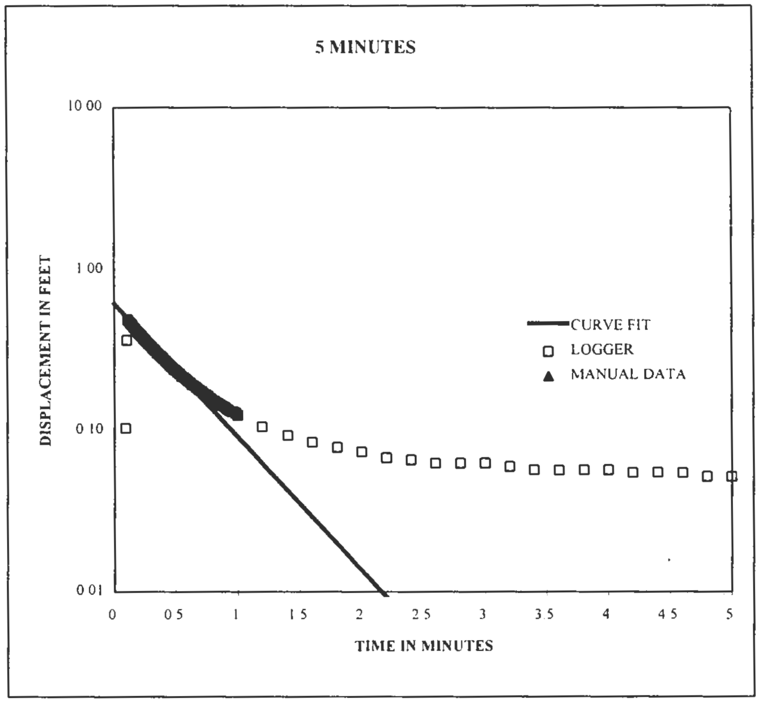
Client: **Seneca Army Depot Activity**
Project: **SEAD-4 RI/FS**
Project No.: **734539-01001**
Well No.: **MW4-7**
Test Date: **May 9, 1999**

Formation Tested: **Till**

Rising (R) or Falling (F) Head Test: **R**

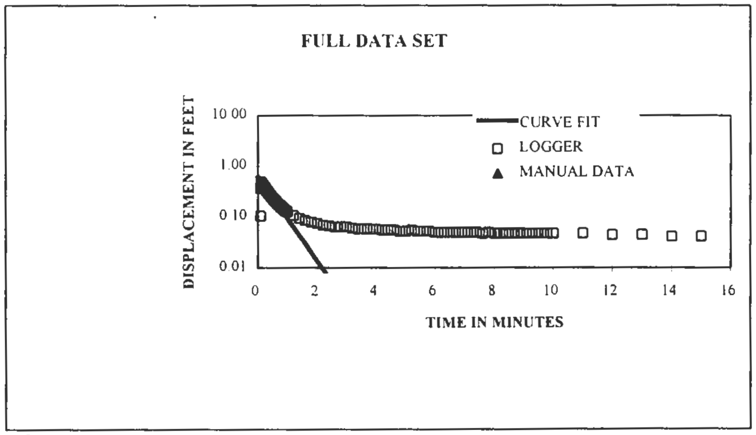
Hydraulic conductivity	**2.00E-02**	**cm/sec**
	3.94E-02	**ft/min**
	56.74	**ft/day**

Casing stickup	**2.10**	feet
Static water level (from top of casing)	**5.05**	feet
Depth to bottom of screen (from ground level)	**5.20**	feet
Boring diameter	**8.00**	inches
Casing diameter	**2.00**	inches
Screen diameter	**2.00**	inches
Screen length	**2.00**	feet
Depth to "impermeable boundary"	**6.40**	feet
Estimated ratio of Kh/Kv	**1.00**	
Porosity of filter pack	**0.30**	
ΔH at time zero (Y_0)	**0.61**	feet
ΔH at time t (Y_t)	**0.01**	feet
Time	**2.16**	minutes



Bouwer-Rice Parameters

feet	cm		cm	
2.95	89.92	***SW***		
2.25	68.58	***H***	24.00	***L/Rw***
3.2	97.54	***Ts***	0.65	***H/D***
0.083	2.54	***Rw***	2.25	***A***
0.195	5.96	***Rc***	0.31	***B***
0.167	5.08	***DS***	1.70	***C***
2.00	60.96	***L***	2.67	***Ln[(D-H)/Rw]'***
3.45	105.16	***D***	2.67	***Ln[(D-H)/Rw]***
0.614	18.71	***Y_0***	2.16	**equation (8)**
0.01	0.30	***Y_t***	2.47	**equation (9)**
	129.60	***t (seconds)***	2.16	***Ln(Re/Rw)***
	1.00	***M***	2.0E-02	**equation (5)**
	0.30	***n***		



Bouwer, Herman 1989 "The Bouwer and Rice Slug Test - An Update" Ground Water vol 27, no 3, May-June 1989

Bouwer, H and R C Rice 1976 A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers With Completely or Partially Penetrating Wells" Water Resources Research vol 12, no 3, June 1976

FILE: GT20.DAT

SE1000C
Environmenta Logger
29-May 16:28

Unit# 0 Test 0

Setups: INPUT 1
-------- ---------
Type Level (F)
Mode TOC
I.D. 30019

Referenc 7.53
Linearit -0.05
Scale factor 49.87
Offset 0
Delay mSEC 50

Step 0 29-May 10:31:59

LOGGER TIME	LOGGER INPUT	ELAPSED TIME (MINUTES)	DELTA S (FEET)	CORRECTED ELAPSED TIME (MINUTES)	CORRECTED DELTA S (FEET)	HEAD RATIO (H/H_0)
0	0	0	0	#N/A	#N/A	#N/A
0.0083	0	0.0083	0	0.0083	#N/A	#N/A
0.0166	0	0.0166	0	0.0166	#N/A	#N/A
0.025	0	0.025	0	0.025	#N/A	#N/A
0.0333	0	0.0333	0	0.0333	#N/A	#N/A
0.0416	0	0.0416	0	0.0416	#N/A	#N/A
0.05	0	0.05	0	0.05	#N/A	#N/A
0.0583	0	0.0583	0	0.0583	#N/A	#N/A
0.0666	0	0.0666	0	0.0666	#N/A	#N/A
0.075	-0.019	0.075	-0.019	0.075	#N/A	#N/A
0.0833	-0.029	0.0833	-0.029	0.0833	#N/A	#N/A
0.0916	0.104	0.0916	0.104	0.0916	0.104	#N/A
0.1	0.364	0.1	0.364	0.1	0.364	#N/A
0.1083	0.489	0.1083	0.489	0.1083	0.489	#N/A
0.1166	0.481	0.1166	0.481	0.1166	0.481	#N/A
0.125	0.473	0.125	0.473	0.125	0.473	#N/A
0.1333	0.462	0.1333	0.462	0.1333	0.462	#N/A
0.1416	0.462	0.1416	0.462	0.1416	0.462	#N/A
0.15	0.448	0.15	0.448	0.15	0.448	#N/A
0.1583	0.437	0.1583	0.437	0.1583	0.437	#N/A
0.1666	0.432	0.1666	0.432	0.1666	0.432	#N/A

0.175	0.424	0.175	0.424	0.175	0.424	#N/A
0.1833	0.416	0.1833	0.416	0.1833	0.416	#N/A
0.1916	0.408	0.1916	0.408	0.1916	0.408	#N/A
0.2	0.402	0.2	0.402	0.2	0.402	#N/A
0.2083	0.397	0.2083	0.397	0.2083	0.397	#N/A
0.2166	0.391	0.2166	0.391	0.2166	0.391	#N/A
0.225	0.383	0.225	0.383	0.225	0.383	#N/A
0.2333	0.378	0.2333	0.378	0.2333	0.378	#N/A
0.2416	0.372	0.2416	0.372	0.2416	0.372	#N/A
0.25	0.367	0.25	0.367	0.25	0.367	#N/A
0.2583	0.361	0.2583	0.361	0.2583	0.361	#N/A
0.2666	0.356	0.2666	0.356	0.2666	0.356	#N/A
0.275	0.348	0.275	0.348	0.275	0.348	#N/A
0.2833	0.345	0.2833	0.345	0.2833	0.345	#N/A
0.2916	0.34	0.2916	0.34	0.2916	0.34	#N/A
0.3	0.334	0.3	0.334	0.3	0.334	#N/A
0.3083	0.329	0.3083	0.329	0.3083	0.329	#N/A
0.3166	0.323	0.3166	0.323	0.3166	0.323	#N/A
0.325	0.318	0.325	0.318	0.325	0.318	#N/A
0.3333	0.315	0.3333	0.315	0.3333	0.315	#N/A
0.35	0.304	0.35	0.304	0.35	0.304	#N/A
0.3666	0.296	0.3666	0.296	0.3666	0.296	#N/A
0.3833	0.288	0.3833	0.288	0.3833	0.288	#N/A
0.4	0.28	0.4	0.28	0.4	0.28	#N/A
0.4166	0.272	0.4166	0.272	0.4166	0.272	#N/A
0.4333	0.264	0.4333	0.264	0.4333	0.264	#N/A
0.45	0.256	0.45	0.256	0.45	0.256	#N/A
0.4666	0.25	0.4666	0.25	0.4666	0.25	#N/A
0.4833	0.242	0.4833	0.242	0.4833	0.242	#N/A
0.5	0.237	0.5	0.237	0.5	0.237	#N/A
0.5166	0.231	0.5166	0.231	0.5166	0.231	#N/A
0.5333	0.226	0.5333	0.226	0.5333	0.226	#N/A
0.55	0.218	0.55	0.218	0.55	0.218	#N/A
0.5666	0.215	0.5666	0.215	0.5666	0.215	#N/A
0.5833	0.209	0.5833	0.209	0.5833	0.209	#N/A
0.6	0.204	0.6	0.204	0.6	0.204	#N/A
0.6166	0.199	0.6166	0.199	0.6166	0.199	#N/A
0.6333	0.193	0.6333	0.193	0.6333	0.193	#N/A
0.65	0.19	0.65	0.19	0.65	0.19	#N/A
0.6666	0.185	0.6666	0.185	0.6666	0.185	#N/A
0.6833	0.18	0.6833	0.18	0.6833	0.18	#N/A
0.7	0.177	0.7	0.177	0.7	0.177	#N/A
0.7166	0.174	0.7166	0.174	0.7166	0.174	#N/A
0.7333	0.169	0.7333	0.169	0.7333	0.169	#N/A
0.75	0.166	0.75	0.166	0.75	0.166	#N/A
0.7666	0.163	0.7666	0.163	0.7666	0.163	#N/A

logger data

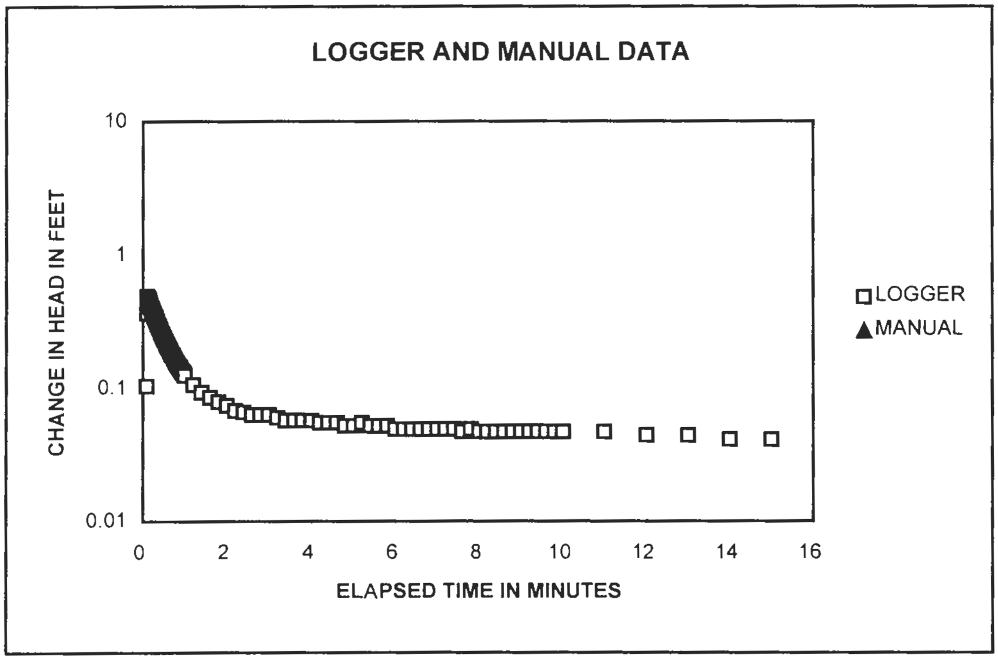
0.7833	0.158	0.7833	0.158	0.7833	0.158	#N/A
0.8	0.155	0.8	0.155	0.8	0.155	#N/A
0.8166	0.152	0.8166	0.152	0.8166	0.152	#N/A
0.8333	0.15	0.8333	0.15	0.8333	0.15	#N/A
0.85	0.147	0.85	0.147	0.85	0.147	#N/A
0.8666	0.144	0.8666	0.144	0.8666	0.144	#N/A
0.8833	0.142	0.8833	0.142	0.8833	0.142	#N/A
0.9	0.139	0.9	0.139	0.9	0.139	#N/A
0.9166	0.136	0.9166	0.136	0.9166	0.136	#N/A
0.9333	0.133	0.9333	0.133	0.9333	0.133	#N/A
0.95	0.131	0.95	0.131	0.95	0.131	#N/A
0.9666	0.131	0.9666	0.131	0.9666	0.131	#N/A
0.9833	0.128	0.9833	0.128	0.9833	0.128	#N/A
1	0.125	1	0.125	1	0.125	#N/A
1.2	0.106	1.2	0.106	1.2	0.106	#N/A
1.4	0.093	1.4	0.093	1.4	0.093	#N/A
1.6	0.085	1.6	0.085	1.6	0.085	#N/A
1.8	0.079	1.8	0.079	1.8	0.079	#N/A
2	0.074	2	0.074	2	0.074	#N/A
2.2	0.068	2.2	0.068	2.2	0.068	#N/A
2.4	0.066	2.4	0.066	2.4	0.066	#N/A
2.6	0.063	2.6	0.063	2.6	0.063	#N/A
2.8	0.063	2.8	0.063	2.8	0.063	#N/A
3	0.063	3	0.063	3	0.063	#N/A
3.2	0.06	3.2	0.06	3.2	0.06	#N/A
3.4	0.057	3.4	0.057	3.4	0.057	#N/A
3.6	0.057	3.6	0.057	3.6	0.057	#N/A
3.8	0.057	3.8	0.057	3.8	0.057	#N/A
4	0.057	4	0.057	4	0.057	#N/A
4.2	0.055	4.2	0.055	4.2	0.055	#N/A
4.4	0.055	4.4	0.055	4.4	0.055	#N/A
4.6	0.055	4.6	0.055	4.6	0.055	#N/A
4.8	0.052	4.8	0.052	4.8	0.052	#N/A
5	0.052	5	0.052	5	0.052	#N/A
5.2	0.055	5.2	0.055	5.2	0.055	#N/A
5.4	0.052	5.4	0.052	5.4	0.052	#N/A
5.6	0.052	5.6	0.052	5.6	0.052	#N/A
5.8	0.052	5.8	0.052	5.8	0.052	#N/A
6	0.049	6	0.049	6	0.049	#N/A
6.2	0.049	6.2	0.049	6.2	0.049	#N/A
6.4	0.049	6.4	0.049	6.4	0.049	#N/A
6.6	0.049	6.6	0.049	6.6	0.049	#N/A
6.8	0.049	6.8	0.049	6.8	0.049	#N/A
7	0.049	7	0.049	7	0.049	#N/A
7.2	0.049	7.2	0.049	7.2	0.049	#N/A
7.4	0.049	7.4	0.049	7.4	0.049	#N/A

logger data

7.6	0.047	7.6	0.047	7.6	0.047	#N/A
7.8	0.049	7.8	0.049	7.8	0.049	#N/A
8	0.047	8	0.047	8	0.047	#N/A
8.2	0.047	8.2	0.047	8.2	0.047	#N/A
8.4	0.047	8.4	0.047	8.4	0.047	#N/A
8.6	0.047	8.6	0.047	8.6	0.047	#N/A
8.8	0.047	8.8	0.047	8.8	0.047	#N/A
9	0.047	9	0.047	9	0.047	#N/A
9.2	0.047	9.2	0.047	9.2	0.047	#N/A
9.4	0.047	9.4	0.047	9.4	0.047	#N/A
9.6	0.047	9.6	0.047	9.6	0.047	#N/A
9.8	0.047	9.8	0.047	9.8	0.047	#N/A
10	0.047	10	0.047	10	0.047	#N/A
11	0.047	11	0.047	11	0.047	#N/A
12	0.044	12	0.044	12	0.044	#N/A
13	0.044	13	0.044	13	0.044	#N/A
14	0.041	14	0.041	14	0.041	#N/A
15	0.041	15	0.041	15	0.041	#N/A

TIME START ADJUSTMENT	0

LOGGER REFERENCE:	0
LOGGER DATA ADJUSTMENT:	0
LOGGER SIGN ADJUSTMENT:	1



Client:	**Seneca Army Depot Activity**
Project:	**SEAD-4 RI/FS**
Project No.:	**734539-01001**
Well No.:	**MW4-8**
Test Date:	**May 9, 1999**

Formation Tested: **Till**

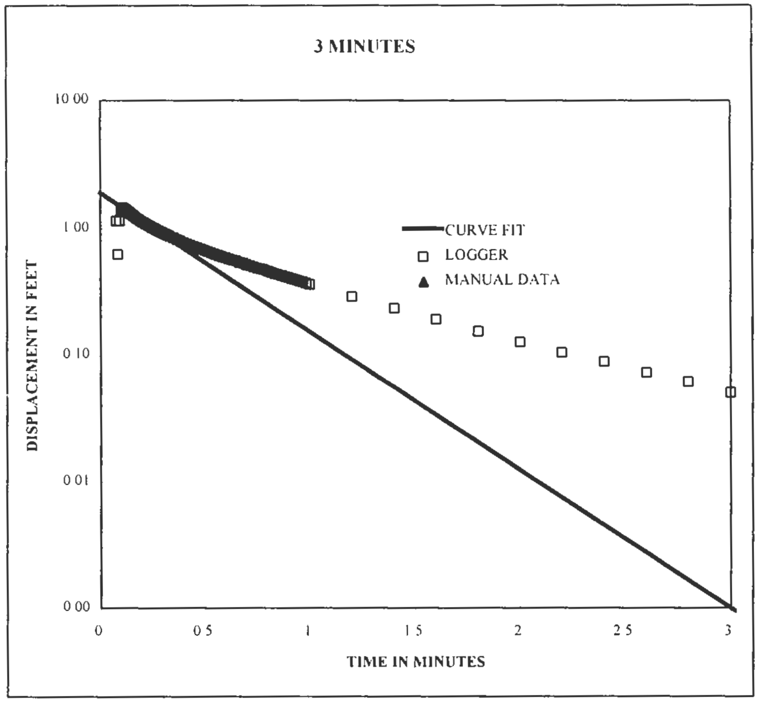
Rising (R) or Falling (F) Head Test: **R**

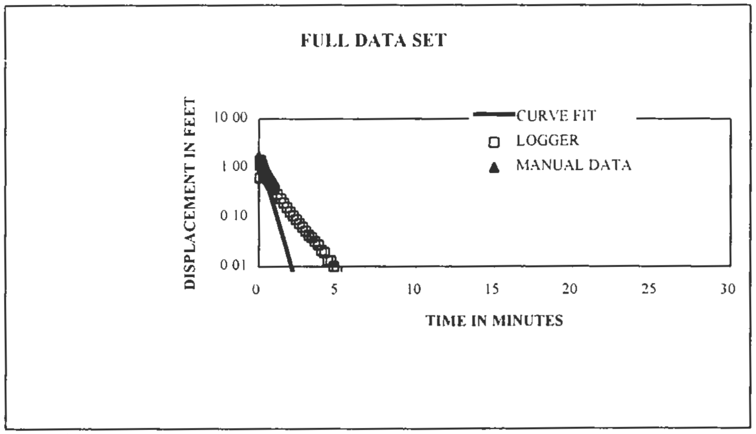
Hydraulic conductivity	**3.05E-03**	**cm/sec**
	6.01E-03	**ft/min**
	8.66	**ft/day**

Casing stickup	**2.30**	feet
Static water level (from top of casing)	**4.90**	feet
Depth to bottom of screen (from ground level)	**9.50**	feet
Boring diameter	**8.00**	inches
Casing diameter	**2.00**	inches
Screen diameter	**2.00**	inches
Screen length	**4.90**	feet
Depth to "impermeable boundary"	**10.00**	feet
Estimated ratio of Kh/Kv	**1.00**	
Porosity of filter pack	**0.30**	
ΔH at time zero (Y_0)	**1.90**	feet
ΔH at time t (Y_t)	**0.00**	feet
Time	**3.00**	minutes

Bouwer-Rice Parameters

feet	cm		cm	
2.6	79.25	*SW*		
6.9	210.31	*H*	58.80	*L/Rw*
4.6	140.21	*Ts*	0.93	*H/D*
0.083	2.54	*Rw*	3.20	*A*
0.083	2.54	*Rc*	0.48	*B*
0.167	5.08	*DS*	2.80	*C*
4.90	149.35	*L*	1.79	*Ln[(D-H)/Rw]'*
7.4	225.55	*D*	1.79	*Ln[(D-H)/Rw]*
1.9	57.91	*Y_0*	3.14	**equation (8)**
0.001	0.03	*Y_t*	3.37	**equation (9)**
	180.00	*t (seconds)*	3.37	*Ln(Re/Rw)*
	1.00	*M*	3.1E-03	**equation (5)**
	0.30	*n*		


3 MINUTES


FULL DATA SET

Bouwer, Herman 1989 "The Bouwer and Rice Slug Test - An Update" Ground Water vol 27, no 3, May-June 1989

Bouwer, H and R C Rice 1976 A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers With Completely or Partially Penetrating Wells" Water Resources Research vol 12, no 3, June 1976

Mw8slug.xls, 5/26/99

logger data

FILE: GT20.DAT

SE1000C
Environmenta Logger
29-May 16:28

Unit# 0 Test 0

Setups: INPUT 1
-------- ---------
Type Level (F)
Mode TOC
I.D. 30019

Referenc 7.53
Linearit -0.05
Scale factor 49.87
Offset 0
Delay mSEC 50

Step 0 29-May 10:31:59

LOGGER TIME	LOGGER INPUT	ELAPSED TIME (MINUTES)	DELTA S (FEET)	CORRECTED ELAPSED TIME (MINUTES)	CORRECTED DELTA S (FEET)	HEAD RATIO (H/H_0)
0	0	0	0	#N/A	#N/A	#N/A
0.0083	0	0.0083	0	0.0083	#N/A	#N/A
0.0166	0	0.0166	0	0.0166	#N/A	#N/A
0.025	0	0.025	0	0.025	#N/A	#N/A
0.0333	0	0.0333	0	0.0333	#N/A	#N/A
0.0416	0	0.0416	0	0.0416	#N/A	#N/A
0.05	-0.003	0.05	-0.003	0.05	#N/A	#N/A
0.0583	0	0.0583	0	0.0583	#N/A	#N/A
0.0666	-0.009	0.0666	-0.009	0.0666	#N/A	#N/A
0.075	1.15	0.075	1.15	0.075	1.15	#N/A
0.0833	0.625	0.0833	0.625	0.0833	0.625	#N/A
0.0916	1.15	0.0916	1.15	0.0916	1.15	#N/A
0.1	1.4	0.1	1.4	0.1	1.4	#N/A
0.1083	1.455	0.1083	1.455	0.1083	1.455	#N/A
0.1166	1.436	0.1166	1.436	0.1166	1.436	#N/A
0.125	1.409	0.125	1.409	0.125	1.409	#N/A
0.1333	1.368	0.1333	1.368	0.1333	1.368	#N/A
0.1416	1.335	0.1416	1.335	0.1416	1.335	#N/A
0.15	1.3	0.15	1.3	0.15	1.3	#N/A
0.1583	1.267	0.1583	1.267	0.1583	1.267	#N/A
0.1666	1.237	0.1666	1.237	0.1666	1.237	#N/A

0.175	1.207	0.175	1.207	0.175	1.207	#N/A
0.1833	1.183	0.1833	1.183	0.1833	1.183	#N/A
0.1916	1.158	0.1916	1.158	0.1916	1.158	#N/A
0.2	1.134	0.2	1.134	0.2	1.134	#N/A
0.2083	1.115	0.2083	1.115	0.2083	1.115	#N/A
0.2166	1.093	0.2166	1.093	0.2166	1.093	#N/A
0.225	1.074	0.225	1.074	0.225	1.074	#N/A
0.2333	1.055	0.2333	1.055	0.2333	1.055	#N/A
0.2416	1.036	0.2416	1.036	0.2416	1.036	#N/A
0.25	1.017	0.25	1.017	0.25	1.017	#N/A
0.2583	1.001	0.2583	1.001	0.2583	1.001	#N/A
0.2666	0.982	0.2666	0.982	0.2666	0.982	#N/A
0.275	0.965	0.275	0.965	0.275	0.965	#N/A
0.2833	0.952	0.2833	0.952	0.2833	0.952	#N/A
0.2916	0.938	0.2916	0.938	0.2916	0.938	#N/A
0.3	0.925	0.3	0.925	0.3	0.925	#N/A
0.3083	0.908	0.3083	0.908	0.3083	0.908	#N/A
0.3166	0.897	0.3166	0.897	0.3166	0.897	#N/A
0.325	0.884	0.325	0.884	0.325	0.884	#N/A
0.3333	0.867	0.3333	0.867	0.3333	0.867	#N/A
0.35	0.843	0.35	0.843	0.35	0.843	#N/A
0.3666	0.821	0.3666	0.821	0.3666	0.821	#N/A
0.3833	0.797	0.3833	0.797	0.3833	0.797	#N/A
0.4	0.775	0.4	0.775	0.4	0.775	#N/A
0.4166	0.753	0.4166	0.753	0.4166	0.753	#N/A
0.4333	0.737	0.4333	0.737	0.4333	0.737	#N/A
0.45	0.721	0.45	0.721	0.45	0.721	#N/A
0.4666	0.702	0.4666	0.702	0.4666	0.702	#N/A
0.4833	0.688	0.4833	0.688	0.4833	0.688	#N/A
0.5	0.672	0.5	0.672	0.5	0.672	#N/A
0.5166	0.658	0.5166	0.658	0.5166	0.658	#N/A
0.5333	0.642	0.5333	0.642	0.5333	0.642	#N/A
0.55	0.628	0.55	0.628	0.55	0.628	#N/A
0.5666	0.614	0.5666	0.614	0.5666	0.614	#N/A
0.5833	0.601	0.5833	0.601	0.5833	0.601	#N/A
0.6	0.59	0.6	0.59	0.6	0.59	#N/A
0.6166	0.576	0.6166	0.576	0.6166	0.576	#N/A
0.6333	0.566	0.6333	0.566	0.6333	0.566	#N/A
0.65	0.555	0.65	0.555	0.65	0.555	#N/A
0.6666	0.541	0.6666	0.541	0.6666	0.541	#N/A
0.6833	0.533	0.6833	0.533	0.6833	0.533	#N/A
0.7	0.519	0.7	0.519	0.7	0.519	#N/A
0.7166	0.511	0.7166	0.511	0.7166	0.511	#N/A
0.7333	0.5	0.7333	0.5	0.7333	0.5	#N/A
0.75	0.489	0.75	0.489	0.75	0.489	#N/A
0.7666	0.481	0.7666	0.481	0.7666	0.481	#N/A

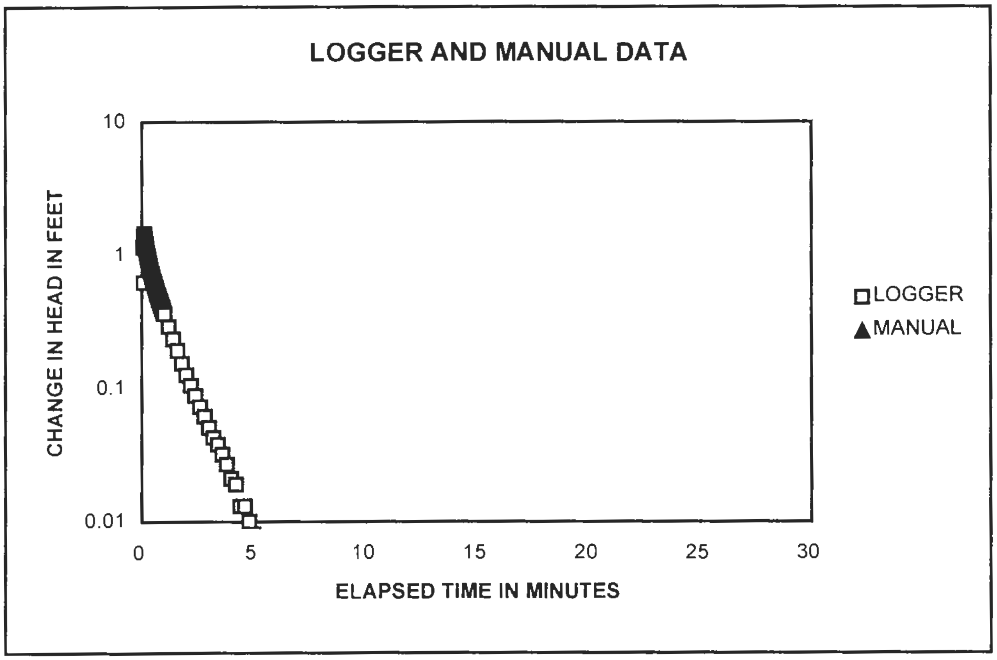
0.7833	0.473	0.7833	0.473	0.7833	0.473	#N/A
0.8	0.462	0.8	0.462	0.8	0.462	#N/A
0.8166	0.454	0.8166	0.454	0.8166	0.454	#N/A
0.8333	0.443	0.8333	0.443	0.8333	0.443	#N/A
0.85	0.435	0.85	0.435	0.85	0.435	#N/A
0.8666	0.427	0.8666	0.427	0.8666	0.427	#N/A
0.8833	0.419	0.8833	0.419	0.8833	0.419	#N/A
0.9	0.41	0.9	0.41	0.9	0.41	#N/A
0.9166	0.402	0.9166	0.402	0.9166	0.402	#N/A
0.9333	0.397	0.9333	0.397	0.9333	0.397	#N/A
0.95	0.389	0.95	0.389	0.95	0.389	#N/A
0.9666	0.381	0.9666	0.381	0.9666	0.381	#N/A
0.9833	0.372	0.9833	0.372	0.9833	0.372	#N/A
1	0.364	1	0.364	1	0.364	#N/A
1.2	0.293	1.2	0.293	1.2	0.293	#N/A
1.4	0.236	1.4	0.236	1.4	0.236	#N/A
1.6	0.193	1.6	0.193	1.6	0.193	#N/A
1.8	0.155	1.8	0.155	1.8	0.155	#N/A
2	0.127	2	0.127	2	0.127	#N/A
2.2	0.106	2.2	0.106	2.2	0.106	#N/A
2.4	0.089	2.4	0.089	2.4	0.089	#N/A
2.6	0.073	2.6	0.073	2.6	0.073	#N/A
2.8	0.062	2.8	0.062	2.8	0.062	#N/A
3	0.051	3	0.051	3	0.051	#N/A
3.2	0.043	3.2	0.043	3.2	0.043	#N/A
3.4	0.038	3.4	0.038	3.4	0.038	#N/A
3.6	0.032	3.6	0.032	3.6	0.032	#N/A
3.8	0.027	3.8	0.027	3.8	0.027	#N/A
4	0.021	4	0.021	4	0.021	#N/A
4.2	0.019	4.2	0.019	4.2	0.019	#N/A
4.4	0.013	4.4	0.013	4.4	0.013	#N/A
4.6	0.013	4.6	0.013	4.6	0.013	#N/A
4.8	0.01	4.8	0.01	4.8	0.01	#N/A
5	0.008	5	0.008	5	0.008	#N/A
5.2	0.005	5.2	0.005	5.2	0.005	#N/A
5.4	0.002	5.4	0.002	5.4	0.002	#N/A
5.6	0.002	5.6	0.002	5.6	0.002	#N/A
5.8	0	5.8	0	5.8	#N/A	#N/A
6	0	6	0	6	#N/A	#N/A
6.2	0	6.2	0	6.2	#N/A	#N/A
6.4	0	6.4	0	6.4	#N/A	#N/A
6.6	0	6.6	0	6.6	#N/A	#N/A
6.8	0	6.8	0	6.8	#N/A	#N/A
7	-0.003	7	-0.003	7	#N/A	#N/A
7.2	-0.003	7.2	-0.003	7.2	#N/A	#N/A
7.4	-0.003	7.4	-0.003	7.4	#N/A	#N/A

logger data

7.6	-0.003	7.6	-0.003	7.6	#N/A	#N/A
7.8	-0.006	7.8	-0.006	7.8	#N/A	#N/A
8	-0.006	8	-0.006	8	#N/A	#N/A
8.2	-0.006	8.2	-0.006	8.2	#N/A	#N/A
8.4	-0.006	8.4	-0.006	8.4	#N/A	#N/A
8.6	-0.009	8.6	-0.009	8.6	#N/A	#N/A
8.8	-0.009	8.8	-0.009	8.8	#N/A	#N/A
9	-0.009	9	-0.009	9	#N/A	#N/A
9.2	-0.009	9.2	-0.009	9.2	#N/A	#N/A
9.4	-0.009	9.4	-0.009	9.4	#N/A	#N/A
9.6	-0.011	9.6	-0.011	9.6	#N/A	#N/A
9.8	-0.009	9.8	-0.009	9.8	#N/A	#N/A
10	-0.011	10	-0.011	10	#N/A	#N/A
11	-0.011	11	-0.011	11	#N/A	#N/A
12	-0.014	12	-0.014	12	#N/A	#N/A
13	-0.011	13	-0.011	13	#N/A	#N/A
14	-0.014	14	-0.014	14	#N/A	#N/A
15	-0.014	15	-0.014	15	#N/A	#N/A
16	-0.014	16	-0.014	16	#N/A	#N/A
17	-0.014	17	-0.014	17	#N/A	#N/A
18	-0.017	18	-0.017	18	#N/A	#N/A
19	-0.017	19	-0.017	19	#N/A	#N/A
20	-0.017	20	-0.017	20	#N/A	#N/A
21	-0.017	21	-0.017	21	#N/A	#N/A
22	-0.017	22	-0.017	22	#N/A	#N/A
23	-0.017	23	-0.017	23	#N/A	#N/A
24	-0.017	24	-0.017	24	#N/A	#N/A
25	-0.017	25	-0.017	25	#N/A	#N/A
26	-0.019	26	-0.019	26	#N/A	#N/A
27	-0.019	27	-0.019	27	#N/A	#N/A
28	-0.019	28	-0.019	28	#N/A	#N/A
29	-0.017	29	-0.017	29	#N/A	#N/A
30	-0.019	30	-0.019	30	#N/A	#N/A

TIME START ADJUSTMENT	0

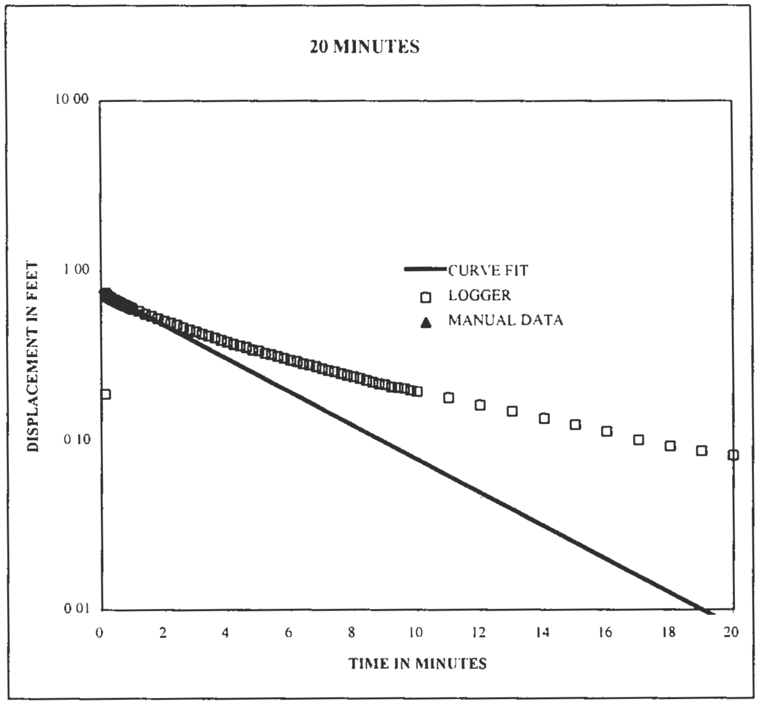
LOGGER REFERENCE:	0
LOGGER DATA ADJUSTMENT:	0
LOGGER SIGN ADJUSTMENT:	1



Client.	**Seneca Army Depot Activity**
Project:	**SEAD-4 RI/FS**
Project No.:	**734539-01001**
Well No.:	**MW4-9**
Test Date:	**May 9, 1999**
Formation Tested:	**Till**
Rising (R) or Falling (F) Head Test:	**R**

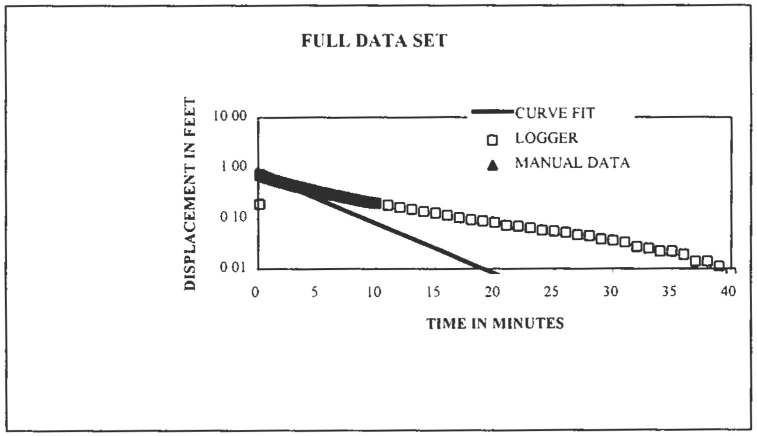
Hydraulic conductivity	**4.76E-04**	**cm/sec**
	9.38E-04	**ft/min**
	1.35	**ft/day**

Casing stickup	**2.30**	feet
Static water level (from top of casing)	**4.39**	feet
Depth to bottom of screen (from ground level)	**5.40**	feet
Boring diameter	**8.00**	inches
Casing diameter	**2.00**	inches
Screen diameter	**2.00**	inches
Screen length	**2.00**	feet
Depth to "impermeable boundary"	**6.20**	feet
Estimated ratio of Kh/Kv	**1.00**	
Porosity of filter pack	**0.30**	
ΔH at time zero (Y_0)	**0.76**	feet
ΔH at time t (Y_t)	**0.01**	feet
Time	**19.00**	minutes



Bouwer-Rice Parameters

feet	cm		cm	
2.09	63.70	*SW*		
3.31	100.89	*H*	24.00	*L/Rw*
3.4	103.63	*Ts*	0.81	*H/D*
0.083	2.54	*Rw*	2.25	*A*
0.083	2.54	*Rc*	0.31	*B*
0.167	5.08	*DS*	1.70	*C*
2.00	60.96	*L*	2.26	*Ln[(D-H)/Rw]'*
4.11	125.27	*D*	2.26	*Ln[(D-H)/Rw]*
0.758	23.10	Y_0	2.37	**equation (8)**
0.01	0.30	Y_t	2.71	**equation (9)**
	1140.00	*t (seconds)*	2.37	*Ln(Re/Rw)*
	1.00	*M*	4.8E-04	**equation (5)**
	0.30	*n*		



Bouwer, Herman 1989 "The Bouwer and Rice Slug Test - An Update" Ground Water vol 27, no 3, May-June 1989

Bouwer, H and R C Rice 1976 A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers With Completely or Partially Penetrating Wells" Water Resources Research vol 12, no 3, June 1976

logger data

```
FILE: GT20.DAT

         SE1000C
         Environmenta  Logger
                29-May    16:28

         Unit#                0  Test              0

Setups:  INPUT                1
-------- ---------
Type     Level          (F)
Mode     TOC
I.D.            30019

Referenc         7.53
Linearit        -0.05
Scale    factor          49.87
Offset              0
Delay    mSEC               50

Step                0     29-May 10:31:59
```

LOGGER TIME	LOGGER INPUT	ELAPSED TIME (MINUTES)	DELTA S (FEET)	CORRECTED ELAPSED TIME (MINUTES)	CORRECTED DELTA S (FEET)	HEAD RATIO (H/H_0)
0	0	0	0	#N/A	#N/A	#N/A
0.0083	0	0.0083	0	0.0083	#N/A	#N/A
0.0166	0	0.0166	0	0.0166	#N/A	#N/A
0.025	0	0.025	0	0.025	#N/A	#N/A
0.0333	0	0.0333	0	0.0333	#N/A	#N/A
0.0416	0	0.0416	0	0.0416	#N/A	#N/A
0.05	0	0.05	0	0.05	#N/A	#N/A
0.0583	0	0.0583	0	0.0583	#N/A	#N/A
0.0666	0	0.0666	0	0.0666	#N/A	#N/A
0.075	0	0.075	0	0.075	#N/A	#N/A
0.0833	0	0.0833	0	0.0833	#N/A	#N/A
0.0916	-0.002	0.0916	-0.002	0.0916	#N/A	#N/A
0.1	-0.002	0.1	-0.002	0.1	#N/A	#N/A
0.1083	-0.002	0.1083	-0.002	0.1083	#N/A	#N/A
0.1166	-0.002	0.1166	-0.002	0.1166	#N/A	#N/A
0.125	-0.019	0.125	-0.019	0.125	#N/A	#N/A
0.1333	0.188	0.1333	0.188	0.1333	0.188	#N/A
0.1416	0.712	0.1416	0.712	0.1416	0.712	#N/A
0.15	0.725	0.15	0.725	0.15	0.725	#N/A
0.1583	0.742	0.1583	0.742	0.1583	0.742	#N/A
0.1666	0.736	0.1666	0.736	0.1666	0.736	#N/A

logger data

0.175	0.731	0.175	0.731	0.175	0.731	#N/A
0.1833	0.725	0.1833	0.725	0.1833	0.725	#N/A
0.1916	0.723	0.1916	0.723	0.1916	0.723	#N/A
0.2	0.72	0.2	0.72	0.2	0.72	#N/A
0.2083	0.717	0.2083	0.717	0.2083	0.717	#N/A
0.2166	0.715	0.2166	0.715	0.2166	0.715	#N/A
0.225	0.712	0.225	0.712	0.225	0.712	#N/A
0.2333	0.709	0.2333	0.709	0.2333	0.709	#N/A
0.2416	0.706	0.2416	0.706	0.2416	0.706	#N/A
0.25	0.706	0.25	0.706	0.25	0.706	#N/A
0.2583	0.704	0.2583	0.704	0.2583	0.704	#N/A
0.2666	0.701	0.2666	0.701	0.2666	0.701	#N/A
0.275	0.701	0.275	0.701	0.275	0.701	#N/A
0.2833	0.698	0.2833	0.698	0.2833	0.698	#N/A
0.2916	0.698	0.2916	0.698	0.2916	0.698	#N/A
0.3	0.696	0.3	0.696	0.3	0.696	#N/A
0.3083	0.693	0.3083	0.693	0.3083	0.693	#N/A
0.3166	0.693	0.3166	0.693	0.3166	0.693	#N/A
0.325	0.69	0.325	0.69	0.325	0.69	#N/A
0.3333	0.69	0.3333	0.69	0.3333	0.69	#N/A
0.35	0.687	0.35	0.687	0.35	0.687	#N/A
0.3666	0.682	0.3666	0.682	0.3666	0.682	#N/A
0.3833	0.679	0.3833	0.679	0.3833	0.679	#N/A
0.4	0.677	0.4	0.677	0.4	0.677	#N/A
0.4166	0.674	0.4166	0.674	0.4166	0.674	#N/A
0.4333	0.674	0.4333	0.674	0.4333	0.674	#N/A
0.45	0.671	0.45	0.671	0.45	0.671	#N/A
0.4666	0.668	0.4666	0.668	0.4666	0.668	#N/A
0.4833	0.666	0.4833	0.666	0.4833	0.666	#N/A
0.5	0.663	0.5	0.663	0.5	0.663	#N/A
0.5166	0.66	0.5166	0.66	0.5166	0.66	#N/A
0.5333	0.658	0.5333	0.658	0.5333	0.658	#N/A
0.55	0.655	0.55	0.655	0.55	0.655	#N/A
0.5666	0.655	0.5666	0.655	0.5666	0.655	#N/A
0.5833	0.652	0.5833	0.652	0.5833	0.652	#N/A
0.6	0.649	0.6	0.649	0.6	0.649	#N/A
0.6166	0.647	0.6166	0.647	0.6166	0.647	#N/A
0.6333	0.644	0.6333	0.644	0.6333	0.644	#N/A
0.65	0.641	0.65	0.641	0.65	0.641	#N/A
0.6666	0.641	0.6666	0.641	0.6666	0.641	#N/A
0.6833	0.639	0.6833	0.639	0.6833	0.639	#N/A
0.7	0.636	0.7	0.636	0.7	0.636	#N/A
0.7166	0.636	0.7166	0.636	0.7166	0.636	#N/A
0.7333	0.633	0.7333	0.633	0.7333	0.633	#N/A
0.75	0.63	0.75	0.63	0.75	0.63	#N/A
0.7666	0.628	0.7666	0.628	0.7666	0.628	#N/A

logger data

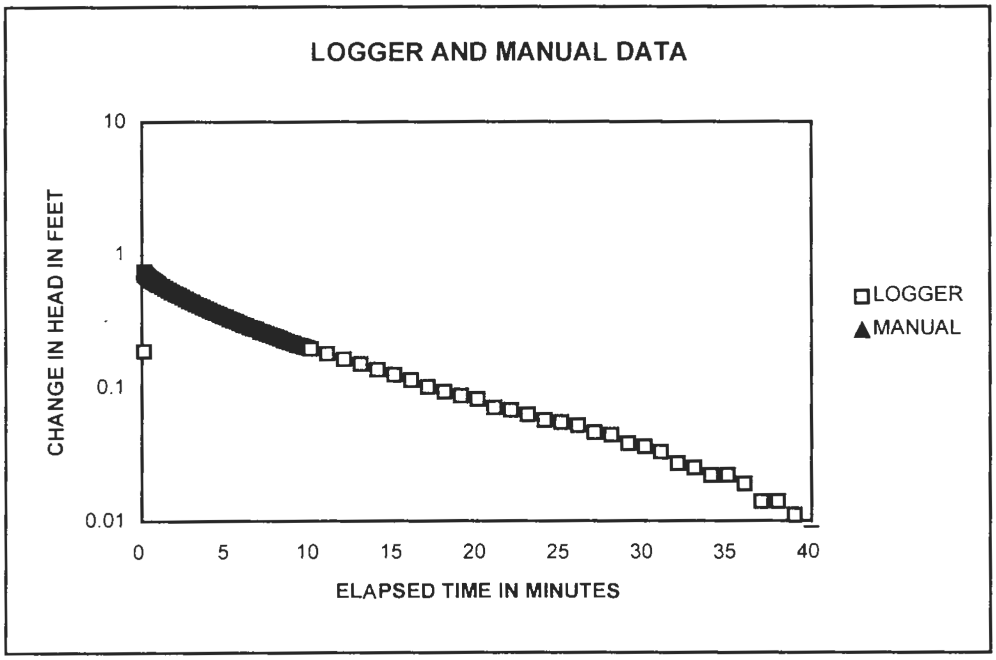
0.7833	0.625	0.7833	0.625	0.7833	0.625	#N/A
0.8	0.625	0.8	0.625	0.8	0.625	#N/A
0.8166	0.622	0.8166	0.622	0.8166	0.622	#N/A
0.8333	0.619	0.8333	0.619	0.8333	0.619	#N/A
0.85	0.619	0.85	0.619	0.85	0.619	#N/A
0.8666	0.617	0.8666	0.617	0.8666	0.617	#N/A
0.8833	0.614	0.8833	0.614	0.8833	0.614	#N/A
0.9	0.611	0.9	0.611	0.9	0.611	#N/A
0.9166	0.609	0.9166	0.609	0.9166	0.609	#N/A
0.9333	0.609	0.9333	0.609	0.9333	0.609	#N/A
0.95	0.606	0.95	0.606	0.95	0.606	#N/A
0.9666	0.606	0.9666	0.606	0.9666	0.606	#N/A
0.9833	0.603	0.9833	0.603	0.9833	0.603	#N/A
1	0.6	1	0.6	1	0.6	#N/A
1.2	0.581	1.2	0.581	1.2	0.581	#N/A
1.4	0.56	1.4	0.56	1.4	0.56	#N/A
1.6	0.543	1.6	0.543	1.6	0.543	#N/A
1.8	0.524	1.8	0.524	1.8	0.524	#N/A
2	0.508	2	0.508	2	0.508	#N/A
2.2	0.495	2.2	0.495	2.2	0.495	#N/A
2.4	0.481	2.4	0.481	2.4	0.481	#N/A
2.6	0.465	2.6	0.465	2.6	0.465	#N/A
2.8	0.451	2.8	0.451	2.8	0.451	#N/A
3	0.44	3	0.44	3	0.44	#N/A
3.2	0.427	3.2	0.427	3.2	0.427	#N/A
3.4	0.416	3.4	0.416	3.4	0.416	#N/A
3.6	0.405	3.6	0.405	3.6	0.405	#N/A
3.8	0.394	3.8	0.394	3.8	0.394	#N/A
4	0.383	4	0.383	4	0.383	#N/A
4.2	0.372	4.2	0.372	4.2	0.372	#N/A
4.4	0.364	4.4	0.364	4.4	0.364	#N/A
4.6	0.356	4.6	0.356	4.6	0.356	#N/A
4.8	0.345	4.8	0.345	4.8	0.345	#N/A
5	0.34	5	0.34	5	0.34	#N/A
5.2	0.329	5.2	0.329	5.2	0.329	#N/A
5.4	0.323	5.4	0.323	5.4	0.323	#N/A
5.6	0.315	5.6	0.315	5.6	0.315	#N/A
5.8	0.307	5.8	0.307	5.8	0.307	#N/A
6	0.299	6	0.299	6	0.299	#N/A
6.2	0.294	6.2	0.294	6.2	0.294	#N/A
6.4	0.285	6.4	0.285	6.4	0.285	#N/A
6.6	0.28	6.6	0.28	6.6	0.28	#N/A
6.8	0.275	6.8	0.275	6.8	0.275	#N/A
7	0.266	7	0.266	7	0.266	#N/A
7.2	0.261	7.2	0.261	7.2	0.261	#N/A
7.4	0.256	7.4	0.256	7.4	0.256	#N/A

logger data

7.6	0.25	7.6	0.25	7.6	0.25	#N/A
7.8	0.245	7.8	0.245	7.8	0.245	#N/A
8	0.239	8	0.239	8	0.239	#N/A
8.2	0.234	8.2	0.234	8.2	0.234	#N/A
8.4	0.228	8.4	0.228	8.4	0.228	#N/A
8.6	0.223	8.6	0.223	8.6	0.223	#N/A
8.8	0.218	8.8	0.218	8.8	0.218	#N/A
9	0.215	9	0.215	9	0.215	#N/A
9.2	0.209	9.2	0.209	9.2	0.209	#N/A
9.4	0.207	9.4	0.207	9.4	0.207	#N/A
9.6	0.204	9.6	0.204	9.6	0.204	#N/A
9.8	0.199	9.8	0.199	9.8	0.199	#N/A
10	0.196	10	0.196	10	0.196	#N/A
11	0.18	11	0.18	11	0.18	#N/A
12	0.163	12	0.163	12	0.163	#N/A
13	0.15	13	0.15	13	0.15	#N/A
14	0.136	14	0.136	14	0.136	#N/A
15	0.125	15	0.125	15	0.125	#N/A
16	0.114	16	0.114	16	0.114	#N/A
17	0.101	17	0.101	17	0.101	#N/A
18	0.093	18	0.093	18	0.093	#N/A
19	0.087	19	0.087	19	0.087	#N/A
20	0.082	20	0.082	20	0.082	#N/A
21	0.071	21	0.071	21	0.071	#N/A
22	0.068	22	0.068	22	0.068	#N/A
23	0.063	23	0.063	23	0.063	#N/A
24	0.057	24	0.057	24	0.057	#N/A
25	0.055	25	0.055	25	0.055	#N/A
26	0.052	26	0.052	26	0.052	#N/A
27	0.046	27	0.046	27	0.046	#N/A
28	0.044	28	0.044	28	0.044	#N/A
29	0.038	29	0.038	29	0.038	#N/A
30	0.036	30	0.036	30	0.036	#N/A
31	0.033	31	0.033	31	0.033	#N/A
32	0.027	32	0.027	32	0.027	#N/A
33	0.025	33	0.025	33	0.025	#N/A
34	0.022	34	0.022	34	0.022	#N/A
35	0.022	35	0.022	35	0.022	#N/A
36	0.019	36	0.019	36	0.019	#N/A
37	0.014	37	0.014	37	0.014	#N/A
38	0.014	38	0.014	38	0.014	#N/A
39	0.011	39	0.011	39	0.011	#N/A
40	0.008	40	0.008	40	0.008	#N/A

TIME START ADJUSTMENT	0

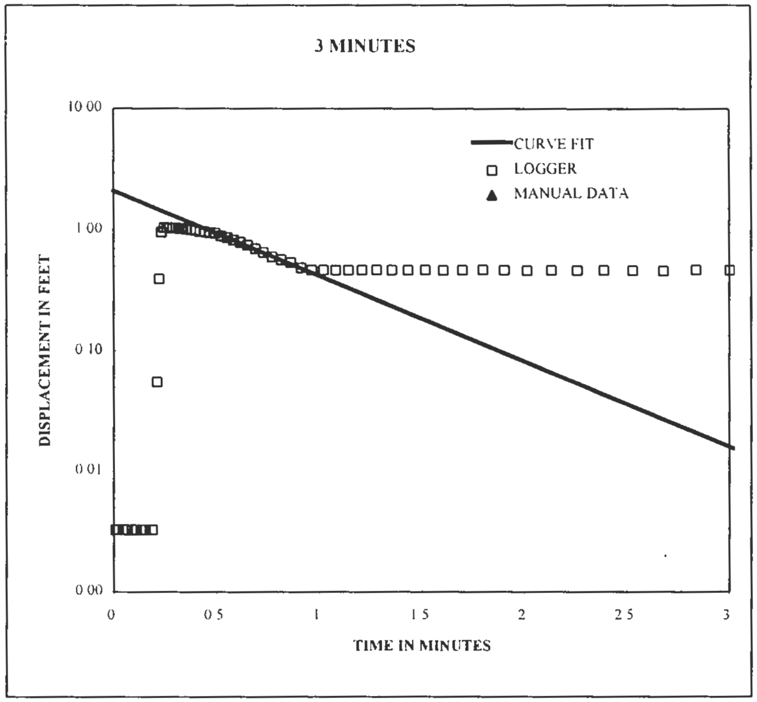
LOGGER REFERENCE:	0
LOGGER DATA ADJUSTMENT:	0
LOGGER SIGN ADJUSTMENT:	1



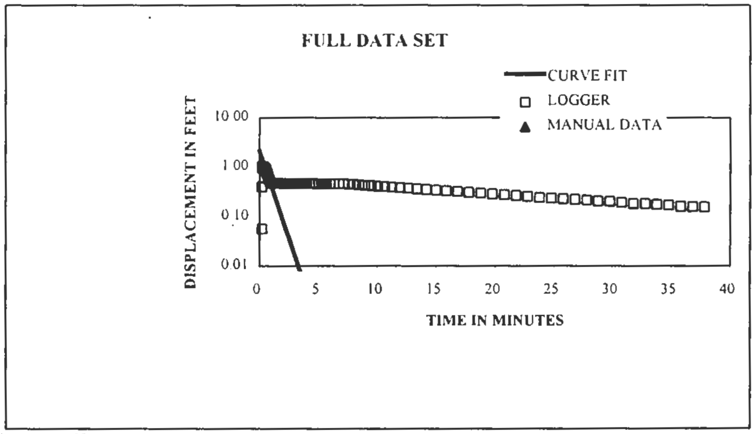
Client.	**Seneca Army Depot Activity**
Project:	**SEAD-4 RI/FS**
Project No.:	**734539-01001**
Well No.:	**MW4-10**
Test Date:	**May 9, 1999**
Formation Tested:	**Till**
Rising (R) or Falling (F) Head Test:	**R**

Hydraulic conductivity	**1.06E-03**	**cm/sec**
	2.09E-03	**ft/min**
	3.01	**ft/day**

Casing stickup	**2.10**	feet
Static water level (from top of casing)	**4.72**	feet
Depth to bottom of screen (from ground level)	**7.50**	feet
Boring diameter	**8.00**	inches
Casing diameter	**2.00**	inches
Screen diameter	**2.00**	inches
Screen length	**4.90**	feet
Depth to "impermeable boundary"	**8.10**	feet
Estimated ratio of Kh/Kv	**1.00**	
Porosity of filter pack	**0.30**	
ΔH at time zero (Y_0)	**2.12**	feet
ΔH at time t (Y_t)	**0.10**	feet
Time	**1.88**	minutes



Bouwer-Rice Parameters				
feet	cm		cm	
2.62	79.86	*SW*		
4.88	148.74	*H*	14.64	*L/Rw*
2.6	79.25	*Ts*	0.89	*H/D*
0.333	10.16	*Rw*	1.93	*A*
0.083	2.54	*Rc*	0.27	*B*
0.167	5.08	*DS*	1.30	*C*
4.88	148.74	*L*	0.59	*Ln[(D-H)/Rw]'*
5.48	167.03	*D*	0.59	*Ln[(D-H)/Rw]*
2.12	64.62	Y_0	1.81	**equation (8)**
0.1	3.05	Y_t	2.01	**equation (9)**
	112.80	*t (seconds)*	1.81	*Ln(Re/Rw)*
	1.00	*M*	1.1E-03	**equation (5)**
	0.30	*n*		



Bouwer, Herman 1989 "The Bouwer and Rice Slug Test - An Update" Ground Water vol 27, no. 3, May-June 1989

Bouwer, H and R C Rice 1976 A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers With Completely or Partially Penetrating Wells" Water Resources Research vol 12, no 3, June 1976

```
FILE: GT20.DAT

         SE1000C
         Environmenta  Logger
                29-May    16:28

         Unit#                 0  Test            0

Setups:  INPUT                 1
-------- ---------
Type     Level          (F)
Mode     TOC
I.D.            30019

Referenc          7.53
Linearit         -0.05
Scale    factor           49.87
Offset               0
Delay    mSEC                50

Step                 0    29-May 10:31:59
```

LOGGER TIME	LOGGER INPUT	ELAPSED TIME (MINUTES)	DELTA S (FEET)	CORRECTED ELAPSED TIME (MINUTES)	CORRECTED DELTA S (FEET)	HEAD RATIO (H/H_0)
0	0	0	0	#N/A	#N/A	#N/A
0.0112	0.0033	0.0112	0.003281	0.0112	0.00328084	1.00
0.0223	0.0033	0.0223	0.003281	0.0223	0.00328084	1.00
0.0335	0.0000	0.0335	0	0.0335	#N/A	#N/A
0.0447	0.0033	0.0447	0.003281	0.0447	0.00328084	1.00
0.0558	0.0033	0.0558	0.003281	0.0558	0.00328084	1.00
0.067	0.0033	0.067	0.003281	0.067	0.00328084	1.00
0.0782	0.0000	0.0782	0	0.0782	#N/A	#N/A
0.0893	0.0000	0.0893	0	0.0893	#N/A	#N/A
0.1005	0.0033	0.1005	0.003281	0.1005	0.00328084	1.00
0.1117	0.0000	0.1117	0	0.1117	#N/A	#N/A
0.1228	0.0000	0.1228	0	0.1228	#N/A	#N/A
0.134	0.0033	0.134	0.003281	0.134	0.00328084	1.00
0.1452	0.0000	0.1452	0	0.1452	#N/A	#N/A
0.1563	0.0033	0.1563	0.003281	0.1563	0.00328084	1.00
0.1675	0.0000	0.1675	0	0.1675	#N/A	#N/A
0.1787	0.0000	0.1787	0	0.1787	#N/A	#N/A
0.1898	0.0033	0.1898	0.003281	0.1898	0.00328084	1.00
0.201	0.0000	0.201	0	0.201	#N/A	#N/A
0.2122	0.0558	0.2122	0.055774	0.2122	0.05577428	17.00
0.2233	0.3937	0.2233	0.393701	0.2233	0.39370079	120.00

logger data

0.235	0.9547	0.235	0.954724	0.235	0.95472441	291.00
0.2475	1.0400	0.2475	1.040026	0.2475	1.04002625	317.00
0.2607	1.0400	0.2607	1.040026	0.2607	1.04002625	317.00
0.2747	1.0400	0.2747	1.040026	0.2747	1.04002625	317.00
0.2895	1.0367	0.2895	1.036745	0.2895	1.03674541	316.00
0.3052	1.0335	0.3052	1.033465	0.3052	1.03346457	315.00
0.3218	1.0269	0.3218	1.026903	0.3218	1.02690289	313.00
0.3395	1.0203	0.3395	1.020341	0.3395	1.02034121	311.00
0.3582	1.0105	0.3582	1.010499	0.3582	1.01049869	308.00
0.378	1.0039	0.378	1.003937	0.378	1.00393701	306.00
0.399	0.9908	0.399	0.990814	0.399	0.99081365	302.00
0.4212	0.9711	0.4212	0.971129	0.4212	0.97112861	296.00
0.4447	0.9613	0.4447	0.961286	0.4447	0.96128609	293.00
0.4695	0.9482	0.4695	0.948163	0.4695	0.94816273	289.00
0.4958	0.9416	0.4958	0.941601	0.4958	0.94160105	287.00
0.5238	0.8924	0.5238	0.892388	0.5238	0.89238845	272.00
0.5535	0.8629	0.5535	0.862861	0.5535	0.86286089	263.00
0.5848	0.8235	0.5848	0.823491	0.5848	0.82349081	251.00
0.618	0.7874	0.618	0.787402	0.618	0.78740157	240.00
0.6532	0.7480	0.6532	0.748031	0.6532	0.7480315	228.00
0.6905	0.7021	0.6905	0.7021	0.6905	0.70209974	214.00
0.73	0.6529	0.73	0.652887	0.73	0.65288714	199.00
0.7718	0.6004	0.7718	0.600394	0.7718	0.6003937	183.00
0.8162	0.5676	0.8162	0.567585	0.8162	0.5675853	173.00
0.8632	0.5381	0.8632	0.538058	0.8632	0.53805774	164.00
0.913	0.4856	0.913	0.485564	0.913	0.4855643	148.00
0.9657	0.4659	0.9657	0.465879	0.9657	0.46587927	142.00
1.0215	0.4659	1.0215	0.465879	1.0215	0.46587927	142.00
1.0807	0.4659	1.0807	0.465879	1.0807	0.46587927	142.00
1.1433	0.4659	1.1433	0.465879	1.1433	0.46587927	142.00
1.2097	0.4659	1.2097	0.465879	1.2097	0.46587927	142.00
1.28	0.4659	1.28	0.465879	1.28	0.46587927	142.00
1.3545	0.4659	1.3545	0.465879	1.3545	0.46587927	142.00
1.4335	0.4659	1.4335	0.465879	1.4335	0.46587927	142.00
1.5172	0.4659	1.5172	0.465879	1.5172	0.46587927	142.00
1.6057	0.4626	1.6057	0.462598	1.6057	0.46259843	141.00
1.6995	0.4626	1.6995	0.462598	1.6995	0.46259843	141.00
1.7988	0.4659	1.7988	0.465879	1.7988	0.46587927	142.00
1.9042	0.4626	1.9042	0.462598	1.9042	0.46259843	141.00
2.0157	0.4626	2.0157	0.462598	2.0157	0.46259843	141.00
2.1338	0.4626	2.1338	0.462598	2.1338	0.46259843	141.00
2.259	0.4626	2.259	0.462598	2.259	0.46259843	141.00
2.3915	0.4626	2.3915	0.462598	2.3915	0.46259843	141.00
2.532	0.4593	2.532	0.459318	2.532	0.45931759	140.00
2.6808	0.4593	2.6808	0.459318	2.6808	0.45931759	140.00
2.8383	0.4659	2.8383	0.465879	2.8383	0.46587927	142.00

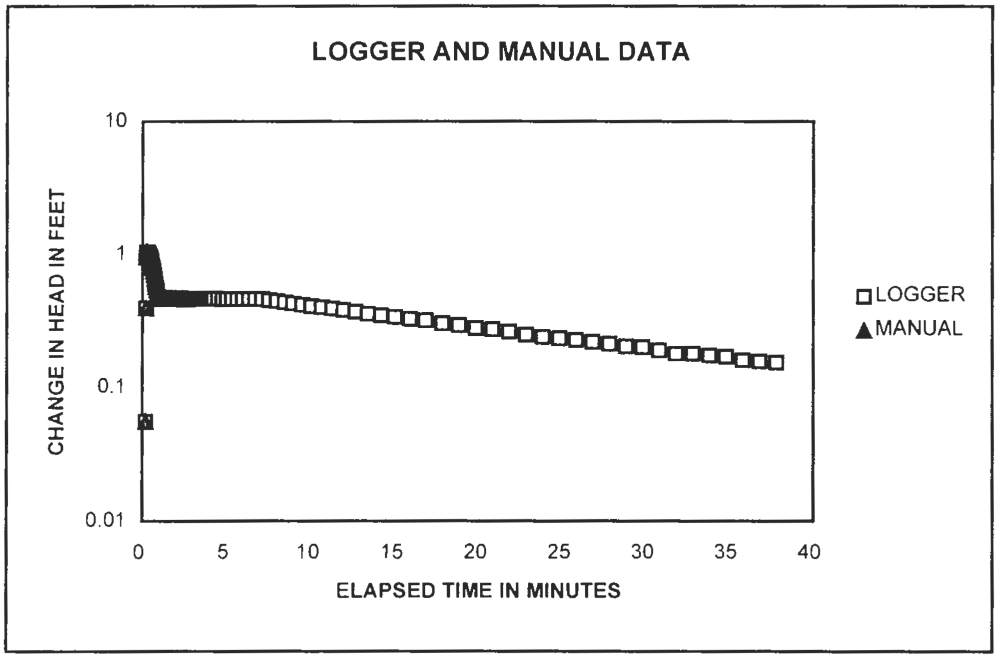
3.0052	0.4659	3.0052	0.465879	3.0052	0.46587927	142.00
3.182	0.4659	3.182	0.465879	3.182	0.46587927	142.00
3.3693	0.4659	3.3693	0.465879	3.3693	0.46587927	142.00
3.5677	0.4659	3.5677	0.465879	3.5677	0.46587927	142.00
3.7778	0.4659	3.7778	0.465879	3.7778	0.46587927	142.00
4.0005	0.4659	4.0005	0.465879	4.0005	0.46587927	142.00
4.2363	0.4626	4.2363	0.462598	4.2363	0.46259843	141.00
4.4862	0.4626	4.4862	0.462598	4.4862	0.46259843	141.00
4.7508	0.4593	4.7508	0.459318	4.7508	0.45931759	140.00
5.0312	0.4593	5.0312	0.459318	5.0312	0.45931759	140.00
5.328	0.4593	5.328	0.459318	5.328	0.45931759	140.00
5.6425	0.4593	5.6425	0.459318	5.6425	0.45931759	140.00
5.9757	0.4593	5.9757	0.459318	5.9757	0.45931759	140.00
6.3285	0.4593	6.3285	0.459318	6.3285	0.45931759	140.00
6.7023	0.4593	6.7023	0.459318	6.7023	0.45931759	140.00
7.0983	0.4593	7.0983	0.459318	7.0983	0.45931759	140.00
7.5177	0.4528	7.5177	0.452756	7.5177	0.45275591	138.00
7.962	0.4462	7.962	0.446194	7.962	0.44619423	136.00
8.4327	0.4364	8.4327	0.436352	8.4327	0.43635171	133.00
8.9312	0.4265	8.9312	0.426509	8.9312	0.42650919	130.00
9.4592	0.4167	9.4592	0.416667	9.4592	0.41666667	127.00
10.0185	0.4068	10.0185	0.406824	10.0185	0.40682415	124.00
10.611	0.4003	10.611	0.400262	10.611	0.40026247	122.00
11.2385	0.3904	11.2385	0.39042	11.2385	0.39041995	119.00
11.9033	0.3806	11.9033	0.380577	11.9033	0.38057743	116.00
12.6075	0.3707	12.6075	0.370735	12.6075	0.37073491	113.00
13.3533	0.3576	13.3533	0.357612	13.3533	0.35761155	109.00
14.1433	0.3478	14.1433	0.347769	14.1433	0.34776903	106.00
14.9802	0.3379	14.9802	0.337927	14.9802	0.33792651	103.00
15.8667	0.3281	15.8667	0.328084	15.8667	0.32808399	100.00
16.8057	0.3182	16.8057	0.318241	16.8057	0.31824147	97.00
17.8003	0.3018	17.8003	0.301837	17.8003	0.30183727	92.00
18.8003	0.2920	18.8003	0.291995	18.8003	0.29199475	89.00
19.8003	0.2789	19.8003	0.278871	19.8003	0.27887139	85.00
20.8003	0.2723	20.8003	0.27231	20.8003	0.27230971	83.00
21.8003	0.2625	21.8003	0.262467	21.8003	0.26246719	80.00
22.8003	0.2493	22.8003	0.249344	22.8003	0.24934383	76.00
23.8003	0.2395	23.8003	0.239501	23.8003	0.23950131	73.00
24.8003	0.2329	24.8003	0.23294	24.8003	0.23293963	71.00
25.8003	0.2264	25.8003	0.226378	25.8003	0.22637795	69.00
26.8003	0.2198	26.8003	0.219816	26.8003	0.21981627	67.00
27.8003	0.2133	27.8003	0.213255	27.8003	0.21325459	65.00
28.8003	0.2034	28.8003	0.203412	28.8003	0.20341207	62.00
29.8003	0.2001	29.8003	0.200131	29.8003	0.20013123	61.00
30.8003	0.1903	30.8003	0.190289	30.8003	0.19028871	58.00
31.8003	0.1804	31.8003	0.180446	31.8003	0.18044619	55.00

32.8003	0.1804	32.8003	0.180446	32.8003	0.18044619	55.00
33.8003	0.1739	33.8003	0.173885	33.8003	0.17388451	53.00
34.8003	0.1706	34.8003	0.170604	34.8003	0.17060367	52.00
35.8003	0.1608	35.8003	0.160761	35.8003	0.16076115	49.00
36.8003	0.1575	36.8003	0.15748	36.8003	0.15748031	48.00
37.8003	0.1542	37.8003	0.154199	37.8003	0.15419948	47.00

logger data

TIME START ADJUSTMENT	0

LOGGER REFERENCE:	0
LOGGER DATA ADJUSTMENT:	0
LOGGER SIGN ADJUSTMENT:	1

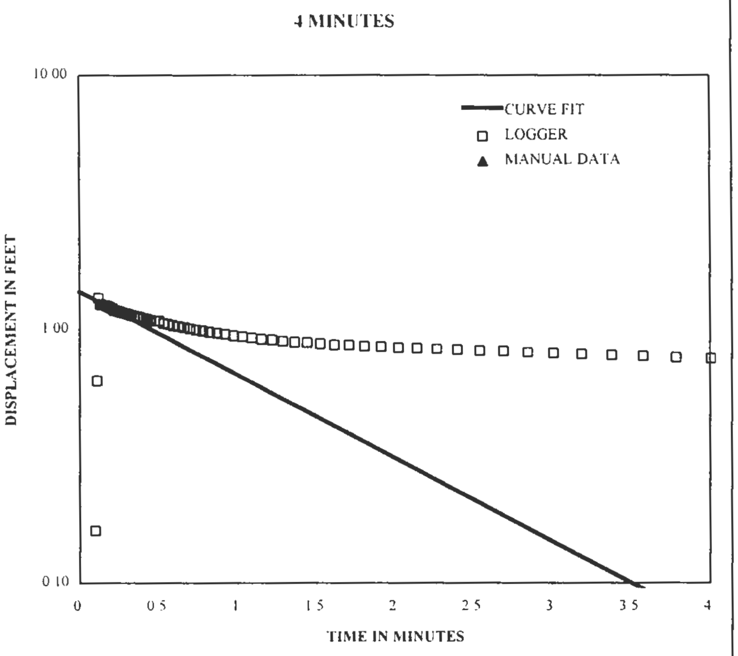


Client **Seneca Army Depot Activity**
Project: **SEAD-4 RI/FS**
Project No.: **734539-01001**
Well No.: **MW4-11**
Test Date: **May 9, 1999**

Formation Tested: **Till**
Rising (R) or Falling (F) Head Test: **R**

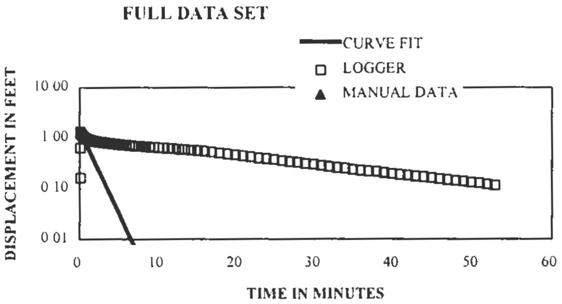
Hydraulic conductivity	**5.07E-04**	**cm/sec**
	9.98E-04	**ft/min**
	1.44	**ft/day**

Casing stickup	**2.50**	feet
Static water level (from top of casing)	**6.17**	feet
Depth to bottom of screen (from ground level)	**8.20**	feet
Boring diameter	**8.00**	inches
Casing diameter	**2.00**	inches
Screen diameter	**2.00**	inches
Screen length	**4.60**	feet
Depth to "impermeable boundary"	**9.00**	feet
Estimated ratio of Kh/Kv	**1.00**	
Porosity of filter pack	**0.30**	
ΔH at time zero (Y_0)	**1.41**	feet
ΔH at time t (Y_t)	**0.10**	feet
Time	**3.50**	minutes



Bouwer-Rice Parameters

feet	cm		cm	
3.67	111.86	***SW***		
4.53	138.07	***H***	13.59	***L/Rw***
3.6	109.73	***Ts***	0.85	***H/D***
0.333	10.16	***Rw***	1.93	***A***
0.083	2.54	***Rc***	0.26	***B***
0.167	5.08	***DS***	1.30	***C***
4.53	138.07	***L***	0.88	***Ln[(D-H)/Rw]'***
5.33	162.46	***D***	0.88	***Ln[(D-H)/Rw]***
1.41	42.98	***Y_0***	1.72	**equation (8)**
0.1	3.05	***Y_t***	1.93	**equation (9)**
	210.00	***t (seconds)***	1.72	***Ln(Re/Rw)***
	1.00	***M***	5.1E-04	**equation (5)**
	0.30	***n***		



Bouwer, Herman 1989 "The Bouwer and Rice Slug Test - An Update" Ground Water vol 27, no 3, May-June 1989
Bouwer, H and R C Rice 1976 A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers With Completely or Partially Penetrating Wells" Water Resources Research vol 12, no 3, June 1976

FILE: GT20.DAT

SE1000C
Environmenta Logger
29-May 16:28

Unit# 0 Test 0

Setups: INPUT 1.
-------- ---------
Type Level (F)
Mode TOC
I.D. 30019

Referenc 7.53
Linearit -0.05
Scale factor 49.87
Offset 0
Delay mSEC 50

Step 0 29-May 10:31:59

LOGGER TIME	LOGGER INPUT	ELAPSED TIME (MINUTES)	DELTA S (FEET)	CORRECTED ELAPSED TIME (MINUTES)	CORRECTED DELTA S (FEET)	HEAD RATIO (H/H_0)
0	0	0	0	#N/A	#N/A	#N/A
0.011	0.003	0.011	0.003281	0.011	0.00328084	1.00
0.022	0.003	0.022	0.003281	0.022	0.00328084	1.00
0.033	0.003	0.033	0.003281	0.033	0.00328084	1.00
0.044	0.003	0.044	0.003281	0.044	0.00328084	1.00
0.055	0.003	0.055	0.003281	0.055	0.00328084	1.00
0.066	0.003	0.066	0.003281	0.066	0.00328084	1.00
0.077	0.003	0.077	0.003281	0.077	0.00328084	1.00
0.088	0.003	0.088	0.003281	0.088	0.00328084	1.00
0.099	0.161	0.099	0.160761	0.099	0.16076115	49.00
0.11	0.630	0.11	0.629921	0.11	0.62992126	192.00
0.121	1.325	0.121	1.325459	0.121	1.32545932	404.00
0.132	1.253	0.132	1.253281	0.132	1.25328084	382.00
0.143	1.253	0.143	1.253281	0.143	1.25328084	382.00
0.154	1.247	0.154	1.246719	0.154	1.24671916	380.00
0.165	1.247	0.165	1.246719	0.165	1.24671916	380.00
0.176	1.240	0.176	1.240157	0.176	1.24015748	378.00
0.187	1.227	0.187	1.227034	0.187	1.22703412	374.00
0.198	1.217	0.198	1.217192	0.198	1.2171916	371.00
0.209	1.207	0.209	1.207349	0.209	1.20734908	368.00
0.22	1.191	0.22	1.190945	0.22	1.19094488	363.00

logger data

0.231	1.188	0.231	1.187664	0.231	1.18766404	362.00
0.2427	1.181	0.2427	1.181102	0.2427	1.18110236	360.00
0.2552	1.178	0.2552	1.177822	0.2552	1.17782152	359.00
0.2683	1.168	0.2683	1.167979	0.2683	1.167979	356.00
0.2823	1.161	0.2823	1.161417	0.2823	1.16141732	354.00
0.2972	1.158	0.2972	1.158136	0.2972	1.15813648	353.00
0.3128	1.148	0.3128	1.148294	0.3128	1.14829396	350.00
0.3295	1.138	0.3295	1.138451	0.3295	1.13845144	347.00
0.3472	1.132	0.3472	1.13189	0.3472	1.13188976	345.00
0.3658	1.125	0.3658	1.125328	0.3658	1.12532808	343.00
0.3857	1.115	0.3857	1.115486	0.3857	1.11548556	340.00
0.4067	1.109	0.4067	1.108924	0.4067	1.10892388	338.00
0.4288	1.099	0.4288	1.099081	0.4288	1.09908136	335.00
0.4523	1.089	0.4523	1.089239	0.4523	1.08923885	332.00
0.4772	1.079	0.4772	1.079396	0.4772	1.07939633	329.00
0.5035	1.079	0.5035	1.079396	0.5035	1.07939633	329.00
0.5315	1.060	0.5315	1.059711	0.5315	1.05971129	323.00
0.5612	1.050	0.5612	1.049869	0.5612	1.04986877	320.00
0.5925	1.037	0.5925	1.036745	0.5925	1.03674541	316.00
0.6257	1.030	0.6257	1.030184	0.6257	1.03018373	314.00
0.6608	1.020	0.6608	1.020341	0.6608	1.02034121	311.00
0.6982	1.007	0.6982	1.007218	0.6982	1.00721785	307.00
0.7377	0.997	0.7377	0.997375	0.7377	0.99737533	304.00
0.7795	0.988	0.7795	0.987533	0.7795	0.98753281	301.00
0.8238	0.978	0.8238	0.97769	0.8238	0.97769029	298.00
0.8708	0.968	0.8708	0.967848	0.8708	0.96784777	295.00
0.9207	0.961	0.9207	0.961286	0.9207	0.96128609	293.00
0.9733	0.948	0.9733	0.948163	0.9733	0.94816273	289.00
1.0292	0.938	1.0292	0.93832	1.0292	0.93832021	286.00
1.0883	0.928	1.0883	0.928478	1.0883	0.92847769	283.00
1.151	0.919	1.151	0.918635	1.151	0.91863517	280.00
1.2173	0.912	1.2173	0.912073	1.2173	0.91207349	278.00
1.2877	0.902	1.2877	0.902231	1.2877	0.90223097	275.00
1.3622	0.896	1.3622	0.895669	1.3622	0.89566929	273.00
1.4412	0.892	1.4412	0.892388	1.4412	0.89238845	272.00
1.5248	0.883	1.5248	0.882546	1.5248	0.88254593	269.00
1.6133	0.873	1.6133	0.872703	1.6133	0.87270341	266.00
1.7072	0.869	1.7072	0.869423	1.7072	0.86942257	265.00
1.8065	0.863	1.8065	0.862861	1.8065	0.86286089	263.00
1.9118	0.856	1.9118	0.856299	1.9118	0.85629921	261.00
2.0233	0.850	2.0233	0.849738	2.0233	0.84973753	259.00
2.1415	0.846	2.1415	0.846457	2.1415	0.84645669	258.00
2.2667	0.840	2.2667	0.839895	2.2667	0.83989501	256.00
2.3992	0.833	2.3992	0.833333	2.3992	0.83333333	254.00
2.5397	0.827	2.5397	0.826772	2.5397	0.82677165	252.00
2.6885	0.823	2.6885	0.823491	2.6885	0.82349081	251.00

logger data

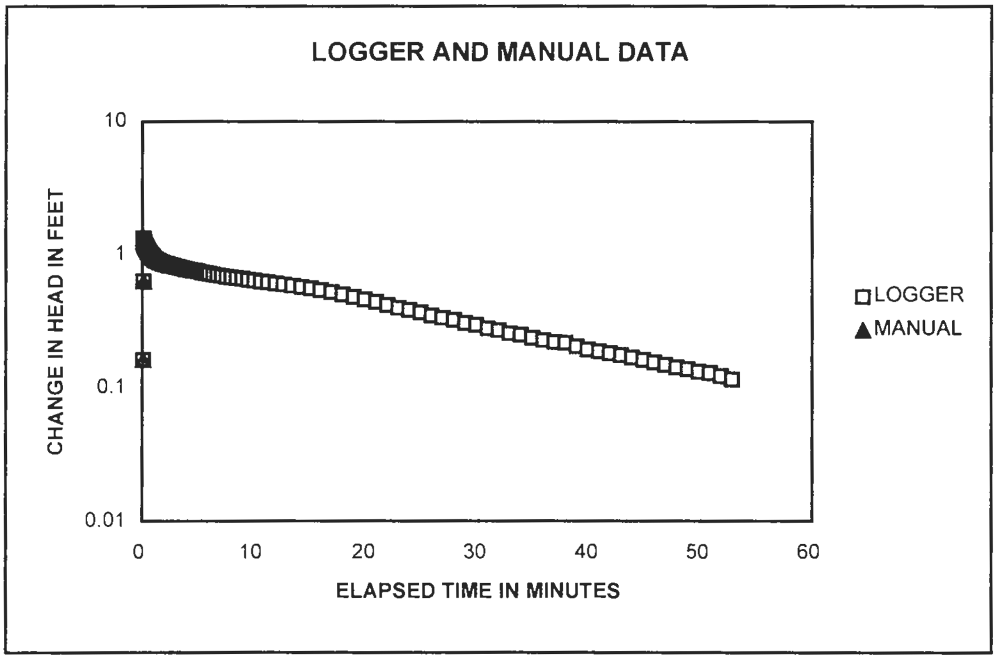
2.846	0.814	2.846	0.813648	2.846	0.81364829	248.00
3.0128	0.807	3.0128	0.807087	3.0128	0.80708661	246.00
3.1897	0.801	3.1897	0.800525	3.1897	0.80052493	244.00
3.377	0.794	3.377	0.793963	3.377	0.79396325	242.00
3.5753	0.787	3.5753	0.787402	3.5753	0.78740157	240.00
3.7855	0.778	3.7855	0.777559	3.7855	0.77755906	237.00
4.0082	0.771	4.0082	0.770997	4.0082	0.77099738	235.00
4.244	0.764	4.244	0.764436	4.244	0.7644357	233.00
4.4938	0.755	4.4938	0.754593	4.4938	0.75459318	230.00
4.7585	0.751	4.7585	0.751312	4.7585	0.75131234	229.00
5.0388	0.741	5.0388	0.74147	5.0388	0.74146982	226.00
5.3357	0.732	5.3357	0.731627	5.3357	0.7316273	223.00
5.6502	0.725	5.6502	0.725066	5.6502	0.72506562	221.00
5.9833	0.715	5.9833	0.715223	5.9833	0.7152231	218.00
6.3362	0.705	6.3362	0.705381	6.3362	0.70538058	215.00
6.71	0.696	6.71	0.695538	6.71	0.69553806	212.00
7.106	0.689	7.106	0.688976	7.106	0.68897638	210.00
7.5253	0.679	7.5253	0.679134	7.5253	0.67913386	207.00
7.9697	0.673	7.9697	0.672572	7.9697	0.67257218	205.00
8.4403	0.663	8.4403	0.66273	8.4403	0.66272966	202.00
8.9388	0.656	8.9388	0.656168	8.9388	0.65616798	200.00
9.4668	0.646	9.4668	0.646325	9.4668	0.64632546	197.00
10.0262	0.636	10.0262	0.636483	10.0262	0.63648294	194.00
10.6187	0.627	10.6187	0.62664	10.6187	0.62664042	191.00
11.2462	0.617	11.2462	0.616798	11.2462	0.6167979	188.00
11.911	0.607	11.911	0.606955	11.911	0.60695538	185.00
12.6152	0.597	12.6152	0.597113	12.6152	0.59711286	182.00
13.361	0.584	13.361	0.58399	13.361	0.5839895	178.00
14.151	0.571	14.151	0.570866	14.151	0.57086614	174.00
14.9878	0.558	14.9878	0.557743	14.9878	0.55774278	170.00
15.8743	0.541	15.8743	0.541339	15.8743	0.54133858	165.00
16.8133	0.522	16.8133	0.521654	16.8133	0.52165354	159.00
17.808	0.502	17.808	0.501969	17.808	0.5019685	153.00
18.808	0.479	18.808	0.479003	18.808	0.47900262	146.00
19.808	0.459	19.808	0.459318	19.808	0.45931759	140.00
20.808	0.440	20.808	0.439633	20.808	0.43963255	134.00
21.808	0.417	21.808	0.416667	21.808	0.41666667	127.00
22.808	0.397	22.808	0.396982	22.808	0.39698163	121.00
23.808	0.384	23.808	0.383858	23.808	0.38385827	117.00
24.808	0.367	24.808	0.367454	24.808	0.36745407	112.00
25.808	0.348	25.808	0.347769	25.808	0.34776903	106.00
26.808	0.335	26.808	0.334646	26.808	0.33464567	102.00
27.808	0.322	27.808	0.321522	27.808	0.32152231	98.00
28.808	0.305	28.808	0.305118	28.808	0.30511811	93.00
29.808	0.295	29.808	0.295276	29.808	0.29527559	90.00
30.808	0.279	30.808	0.278871	30.808	0.27887139	85.00

logger data

31.808	0.269	31.808	0.269029	31.808	0.26902887	82.00
32.808	0.256	32.808	0.255906	32.808	0.25590551	78.00
33.808	0.249	33.808	0.249344	33.808	0.24934383	76.00
34.808	0.236	34.808	0.23622	34.808	0.23622047	72.00
35.808	0.226	35.808	0.226378	35.808	0.22637795	69.00
36.808	0.220	36.808	0.219816	36.808	0.21981627	67.00
37.808	0.217	37.808	0.216535	37.808	0.21653543	66.00
38.808	0.203	38.808	0.203412	38.808	0.20341207	62.00
39.808	0.194	39.808	0.19357	39.808	0.19356955	59.00
40.808	0.187	40.808	0.187008	40.808	0.18700787	57.00
41.808	0.180	41.808	0.180446	41.808	0.18044619	55.00
42.808	0.174	42.808	0.173885	42.808	0.17388451	53.00
43.808	0.167	43.808	0.167323	43.808	0.16732283	51.00
44.808	0.161	44.808	0.160761	44.808	0.16076115	49.00
45.808	0.154	45.808	0.154199	45.808	0.15419948	47.00
46.808	0.148	46.808	0.147638	46.808	0.1476378	45.00
47.808	0.141	47.808	0.141076	47.808	0.14107612	43.00
48.808	0.138	48.808	0.137795	48.808	0.13779528	42.00
49.808	0.131	49.808	0.131234	49.808	0.1312336	40.00
50.808	0.128	50.808	0.127953	50.808	0.12795276	39.00
51.808	0.121	51.808	0.121391	51.808	0.12139108	37.00
52.808	0.115	52.808	0.114829	52.808	0.1148294	35.00

TIME START ADJUSTMENT	0

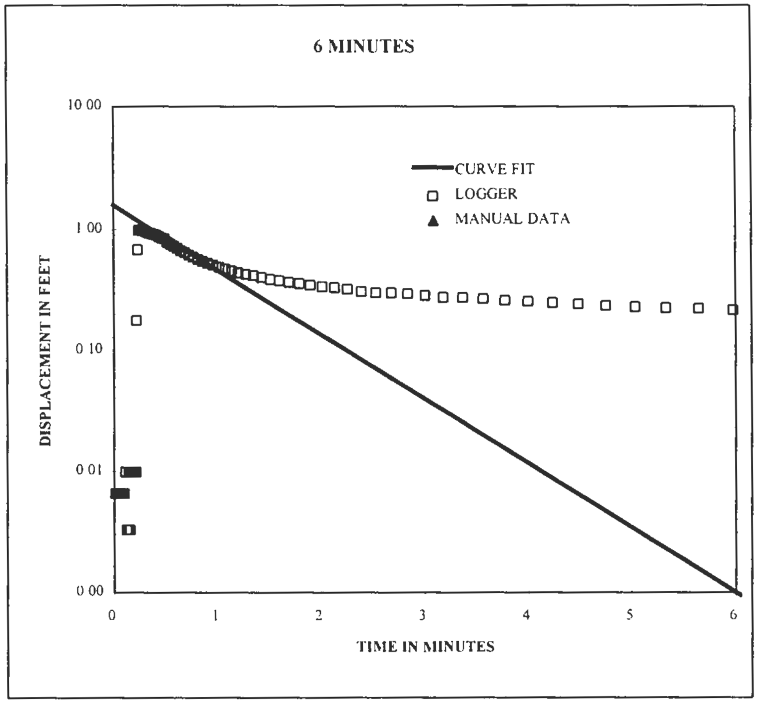
LOGGER REFERENCE:	0
LOGGER DATA ADJUSTMENT:	0
LOGGER SIGN ADJUSTMENT:	1



Client: **Seneca Army Depot Activity**
Project: **SEAD-4 RI/FS**
Project No.: **734539-01001**
Well No.: **MW4-12**
Test Date: **May 9, 1999**
Formation Tested: **Till**
Rising (R) or Falling (F) Head Test: **R**

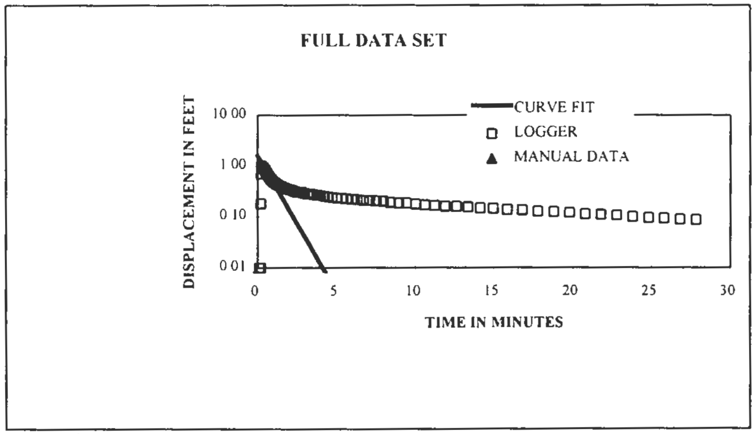
Hydraulic conductivity	**4.68E-03**	**cm/sec**
	9.22E-03	**ft/min**
	13.27	**ft/day**

Casing stickup	**2.40**	feet
Static water level (from top of casing)	**8.36**	feet
Depth to bottom of screen (from ground level)	**10.20**	feet
Boring diameter	**8.00**	inches
Casing diameter	**2.00**	inches
Screen diameter	**2.00**	inches
Screen length	**4.60**	feet
Depth to "impermeable boundary"	**11.00**	feet
Estimated ratio of Kh/Kv	**1.00**	
Porosity of filter pack	**0.30**	
ΔH at time zero (Y_0)	**1.58**	feet
ΔH at time t (Y_t)	**0.00**	feet
Time	**6.00**	minutes



Bouwer-Rice Parameters

feet	cm		cm	
5.96	181.66	***SW***		
4.24	129.24	***H***	12.72	***L/Rw***
5.6	170.69	***Ts***	0.84	***H/D***
0.333	10.16	***Rw***	1.90	***A***
0.195	5.96	***Rc***	0.26	***B***
0.167	5.08	***DS***	1.25	***C***
4.24	129.24	***L***	0.88	***Ln[(D-H)/Rw]'***
5.04	153.62	***D***	0.88	***Ln[(D-H)/Rw]***
1.58	48.16	Y_0	1.67	**equation (8)**
0.001	0.03	Y_t	1.88	**equation (9)**
	360.00	***t (seconds)***	1.67	***Ln(Re/Rw)***
	1.00	***M***	4.7E-03	**equation (5)**
	0.30	***n***		



Bouwer, Herman 1989 "The Bouwer and Rice Slug Test - An Update" Ground Water vol 27, no 3, May-June 1989
Bouwer, H and R C Rice 1976 A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers With Completely or Partially Penetrating Wells" Water Resources Research vol 12, no 3, June 1976

```
FILE: GT20.DAT

          SE1000C
          Environmenta  Logger
                  29-May    16:28

          Unit#                0  Test            0

Setups:   INPUT                1
--------  ---------
Type      Level         (F)
Mode      TOC
I.D.              30019

Referenc           7.53
Linearit          -0.05
Scale     factor            49.87
Offset                0
Delay     mSEC                 50

Step                  0     29-May 10:31:59
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LOGGER TIME	LOGGER INPUT	ELAPSED TIME (MINUTES)	DELTA S (FEET)	CORRECTED ELAPSED TIME (MINUTES)	CORRECTED DELTA S (FEET)	HEAD RATIO (H/H_0)
0	0	0	0	#N/A	#N/A	#N/A
0.0112	0.007	0.0112	0.006562	0.0112	0.00656168	1.00
0.0223	0.007	0.0223	0.006562	0.0223	0.00656168	1.00
0.0335	0.007	0.0335	0.006562	0.0335	0.00656168	1.00
0.0447	0.007	0.0447	0.006562	0.0447	0.00656168	1.00
0.0558	0.007	0.0558	0.006562	0.0558	0.00656168	1.00
0.067	0.007	0.067	0.006562	0.067	0.00656168	1.00
0.0782	0.007	0.0782	0.006562	0.0782	0.00656168	1.00
0.0893	0.007	0.0893	0.006562	0.0893	0.00656168	1.00
0.1005	0.007	0.1005	0.006562	0.1005	0.00656168	1.00
0.1117	0.010	0.1117	0.009843	0.1117	0.00984252	1.50
0.1228	0.003	0.1228	0.003281	0.1228	0.00328084	0.50
0.134	0.003	0.134	0.003281	0.134	0.00328084	0.50
0.1452	0.010	0.1452	0.009843	0.1452	0.00984252	1.50
0.1563	0.003	0.1563	0.003281	0.1563	0.00328084	0.50
0.1675	0.010	0.1675	0.009843	0.1675	0.00984252	1.50
0.1787	0.010	0.1787	0.009843	0.1787	0.00984252	1.50
0.1898	0.010	0.1898	0.009843	0.1898	0.00984252	1.50
0.201	0.010	0.201	0.009843	0.201	0.00984252	1.50
0.2122	0.010	0.2122	0.009843	0.2122	0.00984252	1.50
0.2233	0.177	0.2233	0.177165	0.2233	0.17716535	27.00

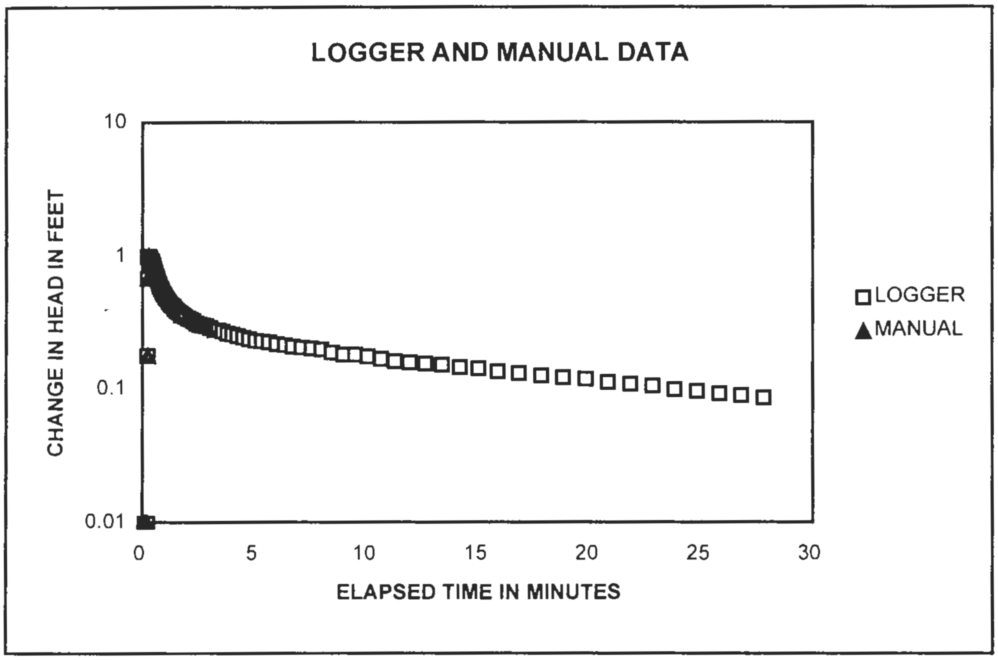
0.235	0.679	0.235	0.679134	0.235	0.67913386	103.50
0.2475	0.988	0.2475	0.987533	0.2475	0.98753281	150.50
0.2607	0.991	0.2607	0.990814	0.2607	0.99081365	151.00
0.2747	0.988	0.2747	0.987533	0.2747	0.98753281	150.50
0.2895	0.978	0.2895	0.97769	0.2895	0.97769029	149.00
0.3052	0.971	0.3052	0.971129	0.3052	0.97112861	148.00
0.3218	0.955	0.3218	0.954724	0.3218	0.95472441	145.50
0.3395	0.942	0.3395	0.941601	0.3395	0.94160105	143.50
0.3582	0.932	0.3582	0.931759	0.3582	0.93175853	142.00
0.378	0.919	0.378	0.918635	0.378	0.91863517	140.00
0.399	0.909	0.399	0.908793	0.399	0.90879265	138.50
0.4212	0.896	0.4212	0.895669	0.4212	0.89566929	136.50
0.4447	0.869	0.4447	0.869423	0.4447	0.86942257	132.50
0.4695	0.846	0.4695	0.846457	0.4695	0.84645669	129.00
0.4958	0.837	0.4958	0.836614	0.4958	0.83661417	127.50
0.5238	0.784	0.5238	0.784121	0.5238	0.78412073	119.50
0.5535	0.758	0.5535	0.757874	0.5535	0.75787402	115.50
0.5848	0.728	0.5848	0.728346	0.5848	0.72834646	111.00
0.618	0.702	0.618	0.7021	0.618	0.70209974	107.00
0.6532	0.669	0.6532	0.669291	0.6532	0.66929134	102.00
0.6905	0.646	0.6905	0.646325	0.6905	0.64632546	98.50
0.73	0.617	0.73	0.616798	0.73	0.6167979	94.00
0.7718	0.591	0.7718	0.590551	0.7718	0.59055118	90.00
0.8162	0.568	0.8162	0.567585	0.8162	0.5675853	86.50
0.8632	0.545	0.8632	0.544619	0.8632	0.54461942	83.00
0.913	0.525	0.913	0.524934	0.913	0.52493438	80.00
0.9657	0.509	0.9657	0.50853	0.9657	0.50853018	77.50
1.0215	0.489	1.0215	0.488845	1.0215	0.48884514	74.50
1.0807	0.472	1.0807	0.472441	1.0807	0.47244094	72.00
1.1433	0.456	1.1433	0.456037	1.1433	0.45603675	69.50
1.2097	0.440	1.2097	0.439633	1.2097	0.43963255	67.00
1.28	0.427	1.28	0.426509	1.28	0.42650919	65.00
1.3545	0.417	1.3545	0.416667	1.3545	0.41666667	63.50
1.4335	0.400	1.4335	0.400262	1.4335	0.40026247	61.00
1.5172	0.387	1.5172	0.387139	1.5172	0.38713911	59.00
1.6057	0.377	1.6057	0.377297	1.6057	0.37729659	57.50
1.6995	0.367	1.6995	0.367454	1.6995	0.36745407	56.00
1.7988	0.358	1.7988	0.357612	1.7988	0.35761155	54.50
1.9042	0.348	1.9042	0.347769	1.9042	0.34776903	53.00
2.0157	0.338	2.0157	0.337927	2.0157	0.33792651	51.50
2.1338	0.331	2.1338	0.331365	2.1338	0.33136483	50.50
2.259	0.322	2.259	0.321522	2.259	0.32152231	49.00
2.3915	0.308	2.3915	0.308399	2.3915	0.30839895	47.00
2.532	0.302	2.532	0.301837	2.532	0.30183727	46.00
2.6808	0.299	2.6808	0.298556	2.6808	0.29855643	45.50
2.8383	0.295	2.8383	0.295276	2.8383	0.29527559	45.00

logger data

3.0052	0.285	3.0052	0.285433	3.0052	0.28543307	43.50
3.182	0.276	3.182	0.275591	3.182	0.27559055	42.00
3.3693	0.276	3.3693	0.275591	3.3693	0.27559055	42.00
3.5677	0.269	3.5677	0.269029	3.5677	0.26902887	41.00
3.7778	0.259	3.7778	0.259186	3.7778	0.25918635	39.50
4.0005	0.256	4.0005	0.255906	4.0005	0.25590551	39.00
4.2363	0.249	4.2363	0.249344	4.2363	0.24934383	38.00
4.4862	0.243	4.4862	0.242782	4.4862	0.24278215	37.00
4.7508	0.236	4.7508	0.23622	4.7508	0.23622047	36.00
5.0312	0.230	5.0312	0.229659	5.0312	0.22965879	35.00
5.328	0.226	5.328	0.226378	5.328	0.22637795	34.50
5.6425	0.223	5.6425	0.223097	5.6425	0.22309711	34.00
5.9757	0.217	5.9757	0.216535	5.9757	0.21653543	33.00
6.3285	0.213	6.3285	0.213255	6.3285	0.21325459	32.50
6.7023	0.207	6.7023	0.206693	6.7023	0.20669291	31.50
7.0983	0.203	7.0983	0.203412	7.0983	0.20341207	31.00
7.5177	0.200	7.5177	0.200131	7.5177	0.20013123	30.50
7.962	0.197	7.962	0.19685	7.962	0.19685039	30.00
8.4327	0.187	8.4327	0.187008	8.4327	0.18700787	28.50
8.9312	0.180	8.9312	0.180446	8.9312	0.18044619	27.50
9.4592	0.180	9.4592	0.180446	9.4592	0.18044619	27.50
10.0185	0.174	10.0185	0.173885	10.0185	0.17388451	26.50
10.611	0.167	10.611	0.167323	10.611	0.16732283	25.50
11.2385	0.161	11.2385	0.160761	11.2385	0.16076115	24.50
11.9033	0.157	11.9033	0.15748	11.9033	0.15748031	24.00
12.6075	0.154	12.6075	0.154199	12.6075	0.15419948	23.50
13.3533	0.151	13.3533	0.150919	13.3533	0.15091864	23.00
14.1433	0.144	14.1433	0.144357	14.1433	0.14435696	22.00
14.9802	0.141	14.9802	0.141076	14.9802	0.14107612	21.50
15.8667	0.135	15.8667	0.134514	15.8667	0.13451444	20.50
16.8057	0.131	16.8057	0.131234	16.8057	0.1312336	20.00
17.8003	0.125	17.8003	0.124672	17.8003	0.12467192	19.00
18.8003	0.121	18.8003	0.121391	18.8003	0.12139108	18.50
19.8003	0.118	19.8003	0.11811	19.8003	0.11811024	18.00
20.8003	0.112	20.8003	0.111549	20.8003	0.11154856	17.00
21.8003	0.108	21.8003	0.108268	21.8003	0.10826772	16.50
22.8003	0.105	22.8003	0.104987	22.8003	0.10498688	16.00
23.8003	0.098	23.8003	0.098425	23.8003	0.0984252	15.00
24.8003	0.095	24.8003	0.095144	24.8003	0.09514436	14.50
25.8003	0.092	25.8003	0.091864	25.8003	0.09186352	14.00
26.8003	0.089	26.8003	0.088583	26.8003	0.08858268	13.50
27.8003	0.085	27.8003	0.085302	27.8003	0.08530184	13.00

TIME START ADJUSTMENT	0

LOGGER REFERENCE:	0
LOGGER DATA ADJUSTMENT:	0
LOGGER SIGN ADJUSTMENT:	1



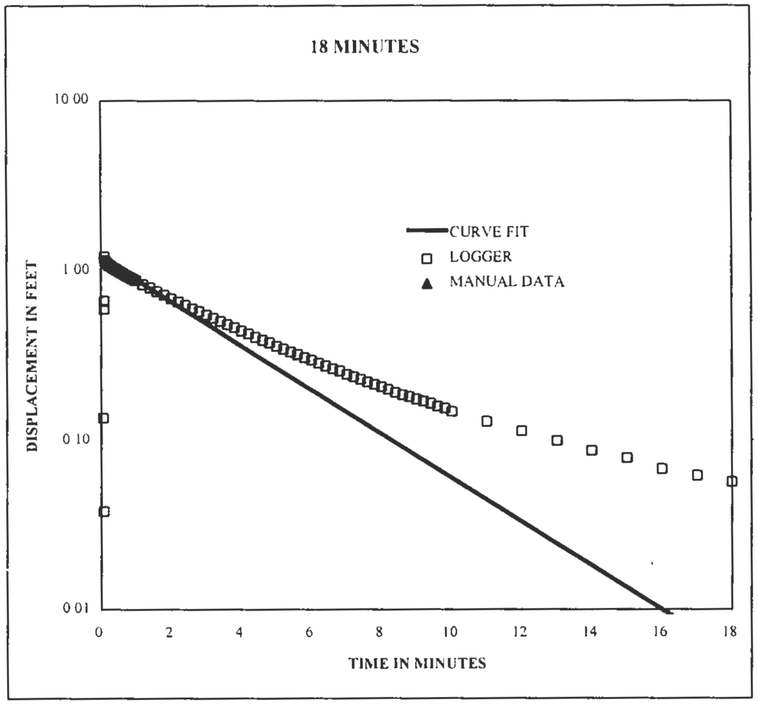
Client: **Seneca Army Depot Activity**
Project: **SEAD-4 RI/FS**
Project No.: **734539-01001**
Well No.: **MW4-13**
Test Date: **May 9, 1999**

Formation Tested: **Till**

Rising (R) or Falling (F) Head Test: **R**

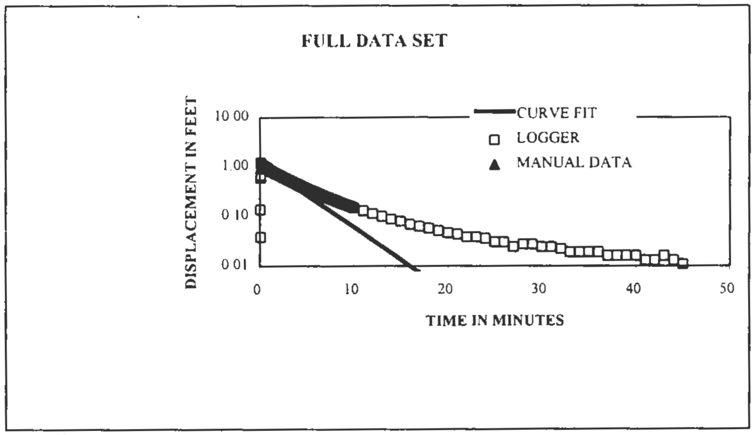
Hydraulic conductivity	**6.62E-04**	**cm/sec**
	1.30E-03	**ft/min**
	1.88	**ft/day**

Casing stickup	**2.30**	feet
Static water level (from top of casing)	**3.61**	feet
Depth to bottom of screen (from ground level)	**5.90**	feet
Boring diameter	**8.00**	inches
Casing diameter	**2.00**	inches
Screen diameter	**2.00**	inches
Screen length	**2.00**	feet
Depth to "impermeable boundary"	**6.80**	feet
Estimated ratio of Kh/Kv	**1.00**	
Porosity of filter pack	**0.30**	
ΔH at time zero (Y_0)	**1.20**	feet
ΔH at time t (Y_t)	**0.01**	feet
Time	**16.00**	minutes



Bouwer-Rice Parameters

feet	cm		cm	
1.31	39.93	*SW*		
4.59	139.90	*H*	24.00	*L/Rw*
3.9	118.87	*Ts*	0.84	*H/D*
0.083	2.54	*Rw*	2.25	*A*
0.083	2.54	*Rc*	0.31	*B*
0.167	5.08	*DS*	1.70	*C*
2.00	60.96	*L*	2.38	*Ln[(D-H)/Rw]'*
5.49	167.34	*D*	2.38	*Ln[(D-H)/Rw]*
1.2	36.58	Y_0	2.51	**equation (8)**
0.01	0.30	Y_t	2.90	**equation (9)**
	960.00	*t (seconds)*	2.51	*Ln(Re/Rw)*
	1.00	*M*	6.6E-04	**equation (5)**
	0.30	*n*		



Bouwer, Herman 1989 "The Bouwer and Rice Slug Test - An Update" Ground Water vol 27, no 3, May-June 1989

Bouwer, H and R C Rice 1976 A Slug Test for Determining Hydraulic Conductivity of Unconfined Aquifers With Completely or Partially Penetrating Wells" Water Resources Research vol 12, no 3, June 1976

logger data

FILE: GT20.DAT

SE1000C
Environmenta Logger
29-May 16:28

Unit# 0 Test 0

Setups: INPUT 1
-------- ---------
Type Level (F)
Mode TOC
I.D. 30019

Referenc 7.53
Linearit -0.05
Scale factor 49.87
Offset 0
Delay mSEC 50

Step 0 29-May 10:31:59

LOGGER TIME	LOGGER INPUT	ELAPSED TIME (MINUTES)	DELTA S (FEET)	CORRECTED ELAPSED TIME (MINUTES)	CORRECTED DELTA S (FEET)	HEAD RATIO (H/H_0)
0	0	0	0	#N/A	#N/A	#N/A
0.0083	0	0.0083	0	0.0083	#N/A	#N/A
0.0166	0	0.0166	0	0.0166	#N/A	#N/A
0.025	0	0.025	0	0.025	#N/A	#N/A
0.0333	0	0.0333	0	0.0333	#N/A	#N/A
0.0416	-0.003	0.0416	-0.003	0.0416	#N/A	#N/A
0.05	-0.003	0.05	-0.003	0.05	#N/A	#N/A
0.0583	-0.003	0.0583	-0.003	0.0583	#N/A	#N/A
0.0666	0.136	0.0666	0.136	0.0666	0.136	#N/A
0.075	-0.144	0.075	-0.144	0.075	#N/A	#N/A
0.0833	0.038	0.0833	0.038	0.0833	0.038	#N/A
0.0916	0.595	0.0916	0.595	0.0916	0.595	#N/A
0.1	0.663	0.1	0.663	0.1	0.663	#N/A
0.1083	1.209	0.1083	1.209	0.1083	1.209	#N/A
0.1166	1.155	0.1166	1.155	0.1166	1.155	#N/A
0.125	1.152	0.125	1.152	0.125	1.152	#N/A
0.1333	1.141	0.1333	1.141	0.1333	1.141	#N/A
0.1416	1.136	0.1416	1.136	0.1416	1.136	#N/A
0.15	1.13	0.15	1.13	0.15	1.13	#N/A
0.1583	1.125	0.1583	1.125	0.1583	1.125	#N/A
0.1666	1.119	0.1666	1.119	0.1666	1.119	#N/A

logger data

0.175	1.117	0.175	1.117	0.175	1.117	#N/A
0.1833	1.111	0.1833	1.111	0.1833	1.111	#N/A
0.1916	1.106	0.1916	1.106	0.1916	1.106	#N/A
0.2	1.103	0.2	1.103	0.2	1.103	#N/A
0.2083	1.1	0.2083	1.1	0.2083	1.1	#N/A
0.2166	1.095	0.2166	1.095	0.2166	1.095	#N/A
0.225	1.092	0.225	1.092	0.225	1.092	#N/A
0.2333	1.089	0.2333	1.089	0.2333	1.089	#N/A
0.2416	1.087	0.2416	1.087	0.2416	1.087	#N/A
0.25	1.081	0.25	1.081	0.25	1.081	#N/A
0.2583	1.079	0.2583	1.079	0.2583	1.079	#N/A
0.2666	1.076	0.2666	1.076	0.2666	1.076	#N/A
0.275	1.073	0.275	1.073	0.275	1.073	#N/A
0.2833	1.07	0.2833	1.07	0.2833	1.07	#N/A
0.2916	1.068	0.2916	1.068	0.2916	1.068	#N/A
0.3	1.065	0.3	1.065	0.3	1.065	#N/A
0.3083	1.06	0.3083	1.06	0.3083	1.06	#N/A
0.3166	1.057	0.3166	1.057	0.3166	1.057	#N/A
0.325	1.054	0.325	1.054	0.325	1.054	#N/A
0.3333	1.051	0.3333	1.051	0.3333	1.051	#N/A
0.35	1.046	0.35	1.046	0.35	1.046	#N/A
0.3666	1.041	0.3666	1.041	0.3666	1.041	#N/A
0.3833	1.035	0.3833	1.035	0.3833	1.035	#N/A
0.4	1.03	0.4	1.03	0.4	1.03	#N/A
0.4166	1.027	0.4166	1.027	0.4166	1.027	#N/A
0.4333	1.022	0.4333	1.022	0.4333	1.022	#N/A
0.45	1.016	0.45	1.016	0.45	1.016	#N/A
0.4666	1.011	0.4666	1.011	0.4666	1.011	#N/A
0.4833	1.005	0.4833	1.005	0.4833	1.005	#N/A
0.5	1	0.5	1	0.5	1	#N/A
0.5166	0.997	0.5166	0.997	0.5166	0.997	#N/A
0.5333	0.992	0.5333	0.992	0.5333	0.992	#N/A
0.55	0.986	0.55	0.986	0.55	0.986	#N/A
0.5666	0.984	0.5666	0.984	0.5666	0.984	#N/A
0.5833	0.978	0.5833	0.978	0.5833	0.978	#N/A
0.6	0.973	0.6	0.973	0.6	0.973	#N/A
0.6166	0.97	0.6166	0.97	0.6166	0.97	#N/A
0.6333	0.964	0.6333	0.964	0.6333	0.964	#N/A
0.65	0.959	0.65	0.959	0.65	0.959	#N/A
0.6666	0.956	0.6666	0.956	0.6666	0.956	#N/A
0.6833	0.951	0.6833	0.951	0.6833	0.951	#N/A
0.7	0.945	0.7	0.945	0.7	0.945	#N/A
0.7166	0.943	0.7166	0.943	0.7166	0.943	#N/A
0.7333	0.94	0.7333	0.94	0.7333	0.94	#N/A
0.75	0.935	0.75	0.935	0.75	0.935	#N/A
0.7666	0.932	0.7666	0.932	0.7666	0.932	#N/A

logger data

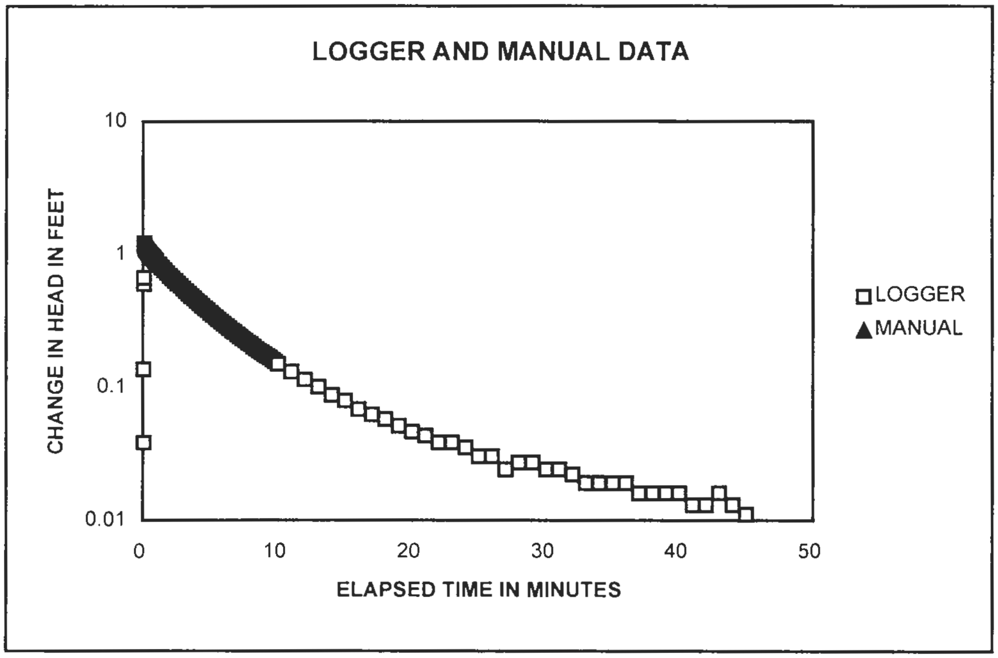
0.7833	0.926	0.7833	0.926	0.7833	0.926	#N/A
0.8	0.921	0.8	0.921	0.8	0.921	#N/A
0.8166	0.918	0.8166	0.918	0.8166	0.918	#N/A
0.8333	0.916	0.8333	0.916	0.8333	0.916	#N/A
0.85	0.91	0.85	0.91	0.85	0.91	#N/A
0.8666	0.905	0.8666	0.905	0.8666	0.905	#N/A
0.8833	0.902	0.8833	0.902	0.8833	0.902	#N/A
0.9	0.899	0.9	0.899	0.9	0.899	#N/A
0.9166	0.894	0.9166	0.894	0.9166	0.894	#N/A
0.9333	0.891	0.9333	0.891	0.9333	0.891	#N/A
0.95	0.888	0.95	0.888	0.95	0.888	#N/A
0.9666	0.883	0.9666	0.883	0.9666	0.883	#N/A
0.9833	0.88	0.9833	0.88	0.9833	0.88	#N/A
1	0.878	1	0.878	1	0.878	#N/A
1.2	0.831	1.2	0.831	1.2	0.831	#N/A
1.4	0.793	1.4	0.793	1.4	0.793	#N/A
1.6	0.755	1.6	0.755	1.6	0.755	#N/A
1.8	0.72	1.8	0.72	1.8	0.72	#N/A
2	0.687	2	0.687	2	0.687	#N/A
2.2	0.657	2.2	0.657	2.2	0.657	#N/A
2.4	0.628	2.4	0.628	2.4	0.628	#N/A
2.6	0.6	2.6	0.6	2.6	0.6	#N/A
2.8	0.576	2.8	0.576	2.8	0.576	#N/A
3	0.549	3	0.549	3	0.549	#N/A
3.2	0.527	3.2	0.527	3.2	0.527	#N/A
3.4	0.505	3.4	0.505	3.4	0.505	#N/A
3.6	0.484	3.6	0.484	3.6	0.484	#N/A
3.8	0.465	3.8	0.465	3.8	0.465	#N/A
4	0.443	4	0.443	4	0.443	#N/A
4.2	0.427	4.2	0.427	4.2	0.427	#N/A
4.4	0.407	4.4	0.407	4.4	0.407	#N/A
4.6	0.391	4.6	0.391	4.6	0.391	#N/A
4.8	0.378	4.8	0.378	4.8	0.378	#N/A
5	0.361	5	0.361	5	0.361	#N/A
5.2	0.348	5.2	0.348	5.2	0.348	#N/A
5.4	0.334	5.4	0.334	5.4	0.334	#N/A
5.6	0.323	5.6	0.323	5.6	0.323	#N/A
5.8	0.31	5.8	0.31	5.8	0.31	#N/A
6	0.299	6	0.299	6	0.299	#N/A
6.2	0.288	6.2	0.288	6.2	0.288	#N/A
6.4	0.277	6.4	0.277	6.4	0.277	#N/A
6.6	0.266	6.6	0.266	6.6	0.266	#N/A
6.8	0.258	6.8	0.258	6.8	0.258	#N/A
7	0.247	7	0.247	7	0.247	#N/A
7.2	0.239	7.2	0.239	7.2	0.239	#N/A
7.4	0.231	7.4	0.231	7.4	0.231	#N/A

7.6	0.223	7.6	0.223	7.6	0.223	#N/A
7.8	0.215	7.8	0.215	7.8	0.215	#N/A
8	0.209	8	0.209	8	0.209	#N/A
8.2	0.201	8.2	0.201	8.2	0.201	#N/A
8.4	0.193	8.4	0.193	8.4	0.193	#N/A
8.6	0.187	8.6	0.187	8.6	0.187	#N/A
8.8	0.182	8.8	0.182	8.8	0.182	#N/A
9	0.176	9	0.176	9	0.176	#N/A
9.2	0.171	9.2	0.171	9.2	0.171	#N/A
9.4	0.166	9.4	0.166	9.4	0.166	#N/A
9.6	0.16	9.6	0.16	9.6	0.16	#N/A
9.8	0.155	9.8	0.155	9.8	0.155	#N/A
10	0.149	10	0.149	10	0.149	#N/A
11	0.13	11	0.13	11	0.13	#N/A
12	0.114	12	0.114	12	0.114	#N/A
13	0.1	13	0.1	13	0.1	#N/A
14	0.087	14	0.087	14	0.087	#N/A
15	0.079	15	0.079	15	0.079	#N/A
16	0.068	16	0.068	16	0.068	#N/A
17	0.062	17	0.062	17	0.062	#N/A
18	0.057	18	0.057	18	0.057	#N/A
19	0.051	19	0.051	19	0.051	#N/A
20	0.046	20	0.046	20	0.046	#N/A
21	0.043	21	0.043	21	0.043	#N/A
22	0.038	22	0.038	22	0.038	#N/A
23	0.038	23	0.038	23	0.038	#N/A
24	0.035	24	0.035	24	0.035	#N/A
25	0.03	25	0.03	25	0.03	#N/A
26	0.03	26	0.03	26	0.03	#N/A
27	0.024	27	0.024	27	0.024	#N/A
28	0.027	28	0.027	28	0.027	#N/A
29	0.027	29	0.027	29	0.027	#N/A
30	0.024	30	0.024	30	0.024	#N/A
31	0.024	31	0.024	31	0.024	#N/A
32	0.022	32	0.022	32	0.022	#N/A
33	0.019	33	0.019	33	0.019	#N/A
34	0.019	34	0.019	34	0.019	#N/A
35	0.019	35	0.019	35	0.019	#N/A
36	0.019	36	0.019	36	0.019	#N/A
37	0.016	37	0.016	37	0.016	#N/A
38	0.016	38	0.016	38	0.016	#N/A
39	0.016	39	0.016	39	0.016	#N/A
40	0.016	40	0.016	40	0.016	#N/A
41	0.013	41	0.013	41	0.013	#N/A
42	0.013	42	0.013	42	0.013	#N/A
43	0.016	43	0.016	43	0.016	#N/A

44	0.013	44	0.013	44	0.013	#N/A
45	0.011	45	0.011	45	0.011	#N/A

TIME START ADJUSTMENT	0

LOGGER REFERENCE:	0
LOGGER DATA ADJUSTMENT:	0
LOGGER SIGN ADJUSTMENT:	1



Appendix E

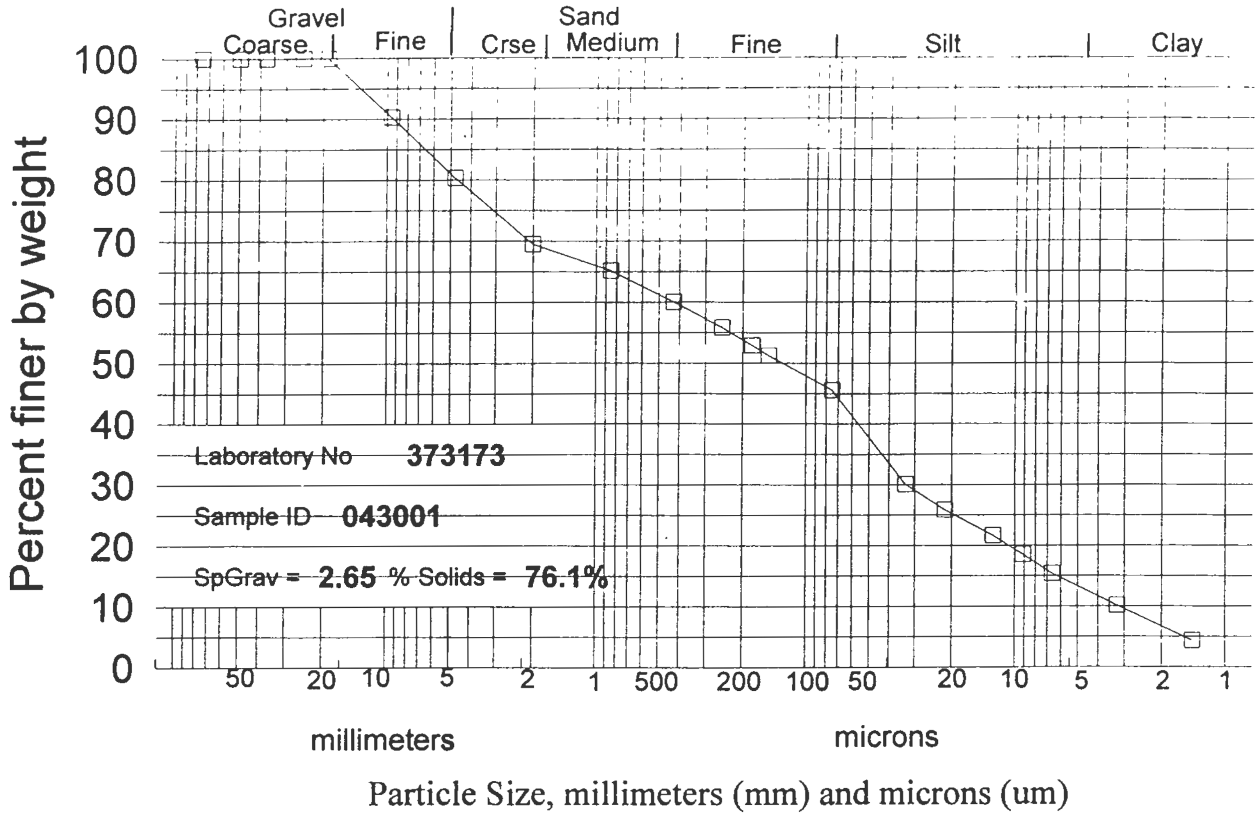
Grain Size Analysis Results

- Surface Soil
- Subsurface Soil
- Sediments

Surface Soil

STL-VT **ASTM D422 Particle Size Analysis** Sample ID **043001**

Sample preparation by: D2217



Maximum particle size: 19 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size		Percent finer	Incremental percent
3 inch	75.00	mm	100.0	0.0
2 inch	50.00		100.0	0.0
1.5 inch	37.50		100.0	0.0
1 inch	25.00		100.0	0.0
3/4 inch	19.00		100.0	0.0
3/8 inch	9.50		90.3	9.7
#4	4.75		80.4	9.9
#10	2.00		69.5	10.8
#20B	850.0	um	65.2	4.4
#40B	425.0		60.1	5.1
#60B	250.0		55.8	4.2
#80B	180.0		52.9	2.9
#100B	150.0		51.2	1.6
#200B	75.0		45.6	5.6
Hydrometer	33.4		30.1	15.5
|	21.6		25.9	4.2
|	12.7		21.7	4.2
|	9.1		18.5	3.1
|	6.6		15.4	3.1
|	3.3		10.1	5.2
V	1.4		4.4	5.8

Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

2568

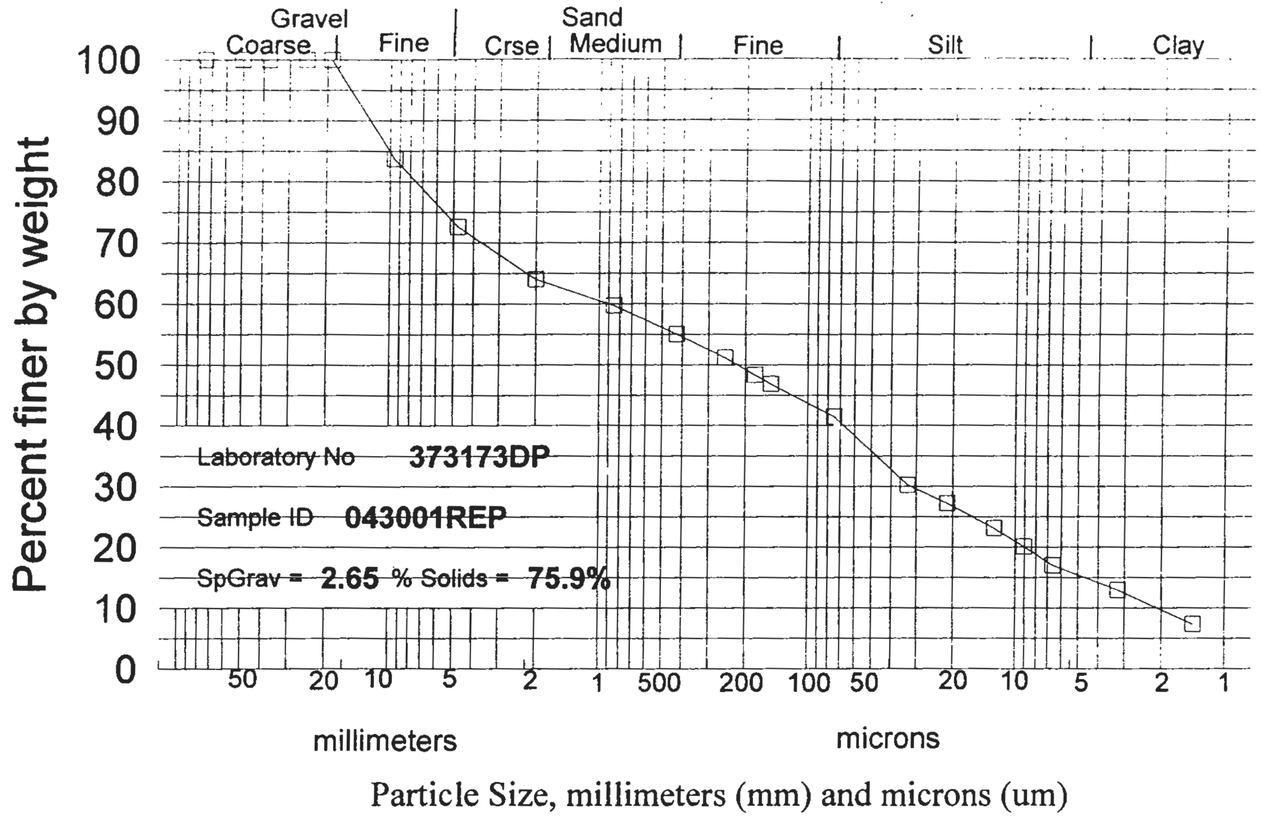
Set 71695

Submitted By: 11:06 on 21-Jan-99

Lab No. 373173

STL-VT ASTM D422 Particle Size Analysis Sample ID **043001REP**

Sample preparation by: D2217



Maximum
particle size: 19 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	83.7	16.3	
#4	4.75	72.6	11.1	
#10	2.00	64.1	8.6	
#20B	850.0 um	59.7	4.4	
#40B	425.0	55.1	4.7	
#60B	250.0	51.2	3.9	
#80B	180.0	48.4	2.8	
#100B	150.0	46.9	1.5	
#200B	75.0	41.5	5.4	
Hydrometer	33.2	30.3	11.2	Dispersion of soil
|	21.4	27.2	3.1	for hydrometer test
|	12.6	23.1	4.1	by mechanical mixer
|	9.0	20.1	3.1	with metal paddle
|	6.6	17.0	3.1	operated for at least
|	3.2	12.9	4.1	one minute within a
V	1.4	7.3	5.6	dispersion cup

2569

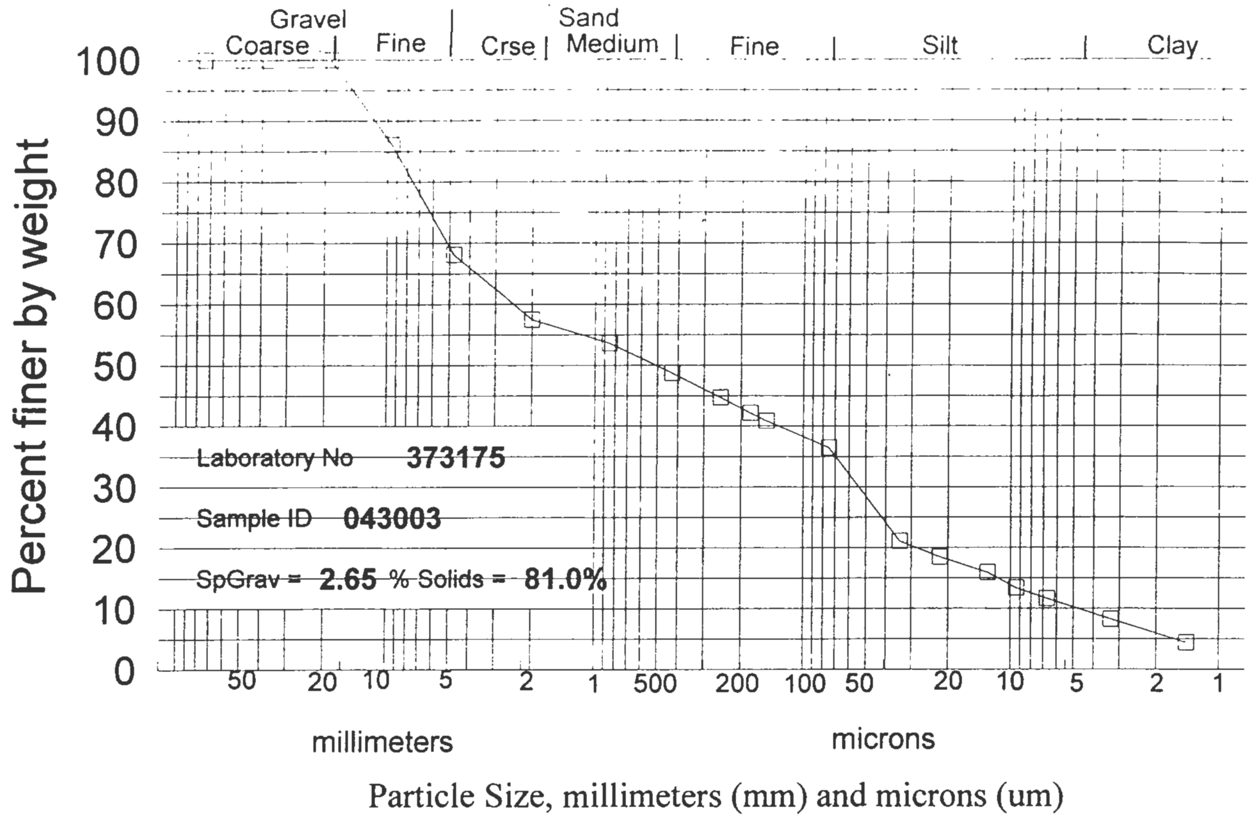
Set 71695

Submitted By: 11:07 on 21-Jan-99

Lab No. 373173DP

STL-VT ASTM D422 Particle Size Analysis Sample ID **043003**

Sample preparation by: D2217



Maximum
particle size: 19 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size		Percent finer	Incremental percent
3 inch	75.00	mm	100.0	0.0
2 inch	50.00		100.0	0.0
1.5 inch	37.50		100.0	0.0
1 inch	25.00		100.0	0.0
3/4 inch	19.00		100.0	0.0
3/8 inch	9.50		86.1	13.9
#4	4.75		68.1	18.0
#10	2.00		57.5	10.7
#20B	850.0	um	53.6	3.9
#40B	425.0		48.7	4.9
#60B	250.0		44.7	4.0
#80B	180.0		42.2	2.6
#100B	150.0		40.9	1.3
#200B	75.0		36.5	4.4
Hydrometer	34.1		21.1	15.4
|	21.9		18.5	2.6
|	12.9		15.9	2.6
|	9.4		13.4	2.6
|	6.7		11.7	1.7
|	3.3		8.3	3.4
V	1.4		4.4	3.8

Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

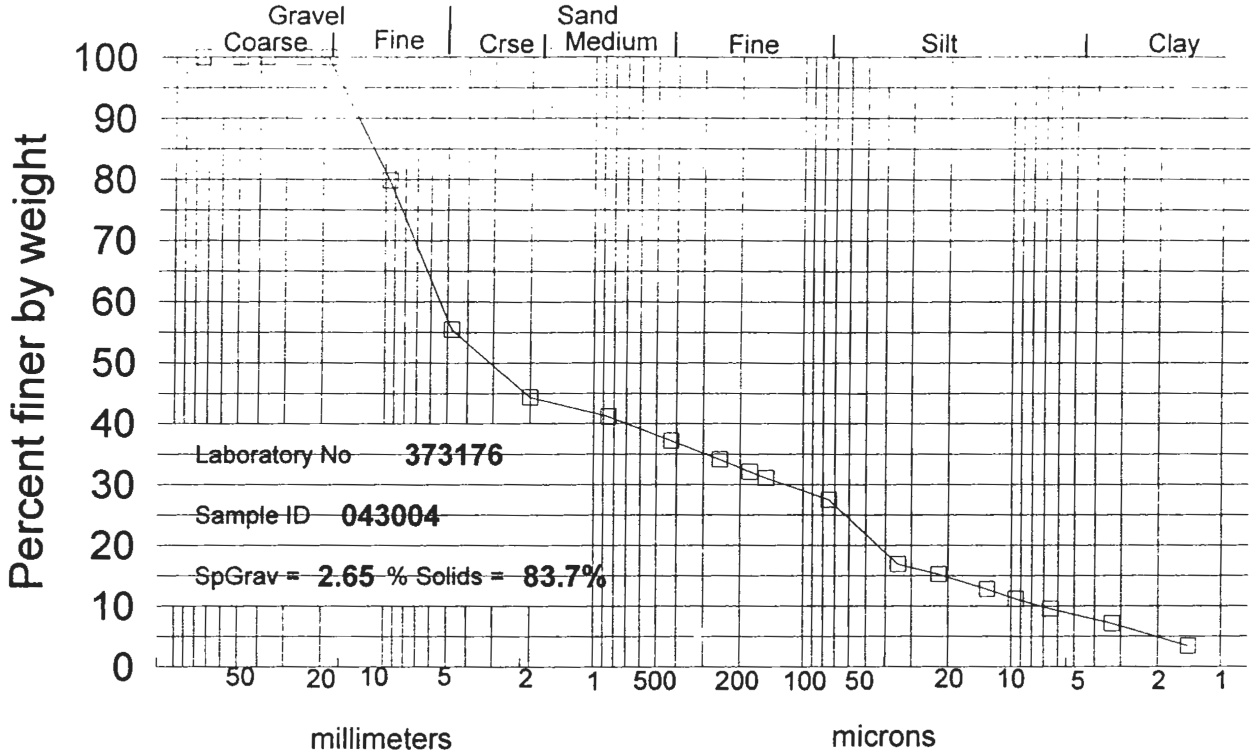
2570

Set 71695

Submitted By: 11:07 on 21-Jan-99 Lab No. 373175

STL-VT ASTM D422 Particle Size Analysis Sample ID 043004

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum
particle size: 19 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	79.8	20.2	
#4	4.75	55.5	24.4	
#10	2.00	44.4	11.1	
#20B	850.0 um	41.2	3.2	
#40B	425.0	37.2	4.0	
#60B	250.0	34.2	3.0	
#80B	180.0	32.1	2.1	
#100B	150.0	31.1	1.0	
#200B	75.0	27.5	3.5	
Hydrometer	34.9	16.9	10.6	Dispersion of soil
|	22.3	15.3	1.6	for hydrometer test
|	13.1	12.8	2.5	by mechanical mixer
|	9.5	11.2	1.6	with metal paddle
|	6.5	9.5	1.6	operated for at least
|	3.3	7.1	2.5	one minute within a
V	1.4	3.4	3.7	dispersion cup

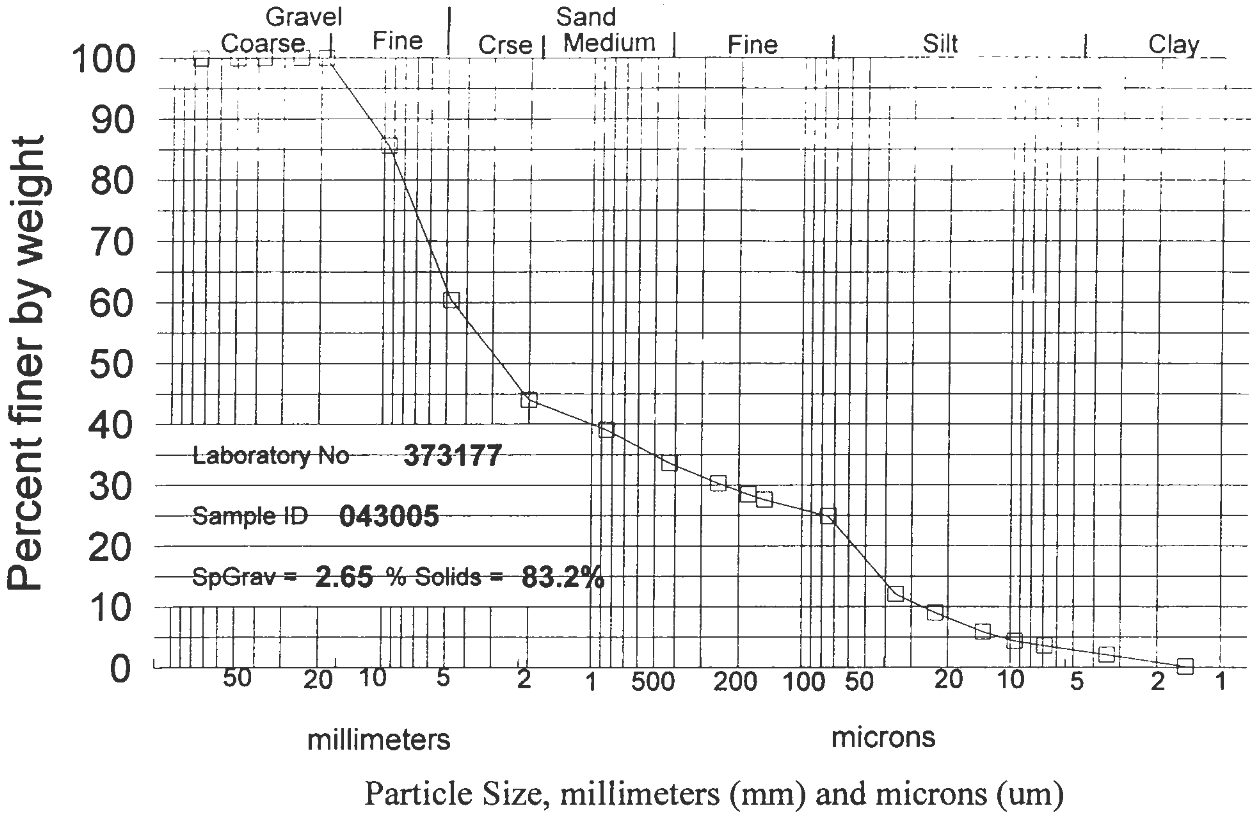
2571

Set 71695

Submitted By: 11:21 on 21-Jan-99 Lab No. 373176

STL-VT ASTM D422 Particle Size Analysis Sample ID **043005**

Sample preparation by: D2217



Maximum
particle size: 19 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	85.6	14.4	
#4	4.75	60.4	25.2	
#10	2.00	44.1	16.3	
#20B	850.0 um	39.1	4.9	
#40B	425.0	33.6	5.5	
#60B	250.0	30.3	3.3	
#80B	180.0	28.5	1.8	
#100B	150.0	27.6	0.9	
#200B	75.0	24.9	2.7	
Hydrometer	35.8	12.1	12.8	Dispersion of soil
|	23.1	9.0	3.1	for hydrometer test
|	13.6	5.9	3.1	by mechanical mixer
|	9.5	4.4	1.5	with metal paddle
|	6.9	3.6	0.8	operated for at least
|	3.5	2.1	1.5	one minute within a
V	1.5	0.1	1.9	dispersion cup

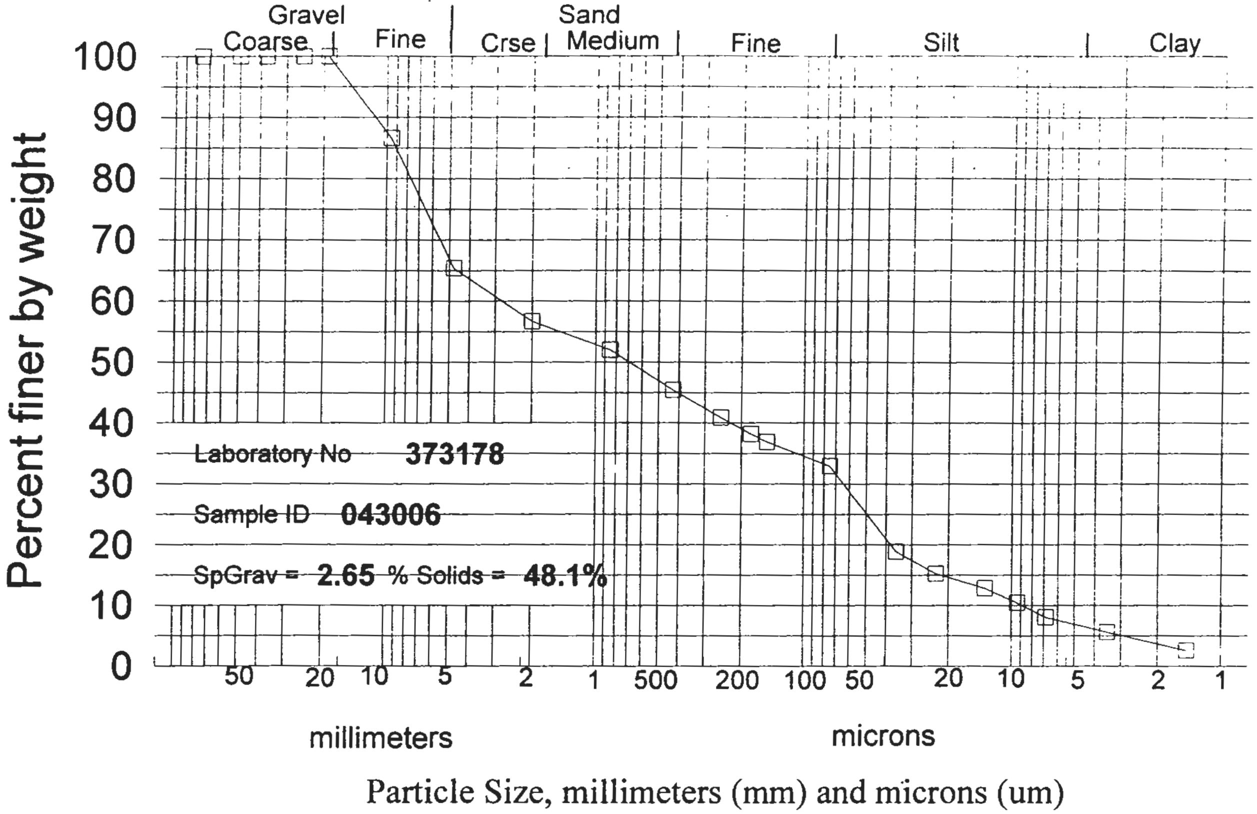
2572

Submitted By: 11:21 on 21-Jan-99

Set 71695
Lab No. 373177

STL-VT ASTM D422 Particle Size Analysis Sample ID **043006**

Sample preparation by: D2217



Maximum
particle size: 19 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size		Percent finer	Incremental percent
3 inch	75.00	mm	100.0	0.0
2 inch	50.00		100.0	0.0
1.5 inch	37.50		100.0	0.0
1 inch	25.00		100.0	0.0
3/4 inch	19.00		100.0	0.0
3/8 inch	9.50		86.6	13.4
#4	4.75		65.4	21.2
#10	2.00		56.7	8.7
#20B	850.0	um	52.0	4.7
#40B	425.0		45.5	6.6
#60B	250.0		40.9	4.5
#80B	180.0		38.2	2.7
#100B	150.0		36.9	1.3
#200B	75.0		32.9	4.0
Hydrometer	35.8		18.9	14.0
|	22.9		15.3	3.6
|	13.4		12.9	2.4
|	9.4		10.4	2.4
|	6.9		8.0	2.4
|	3.5		5.6	2.4
V	1.5		2.6	3.0

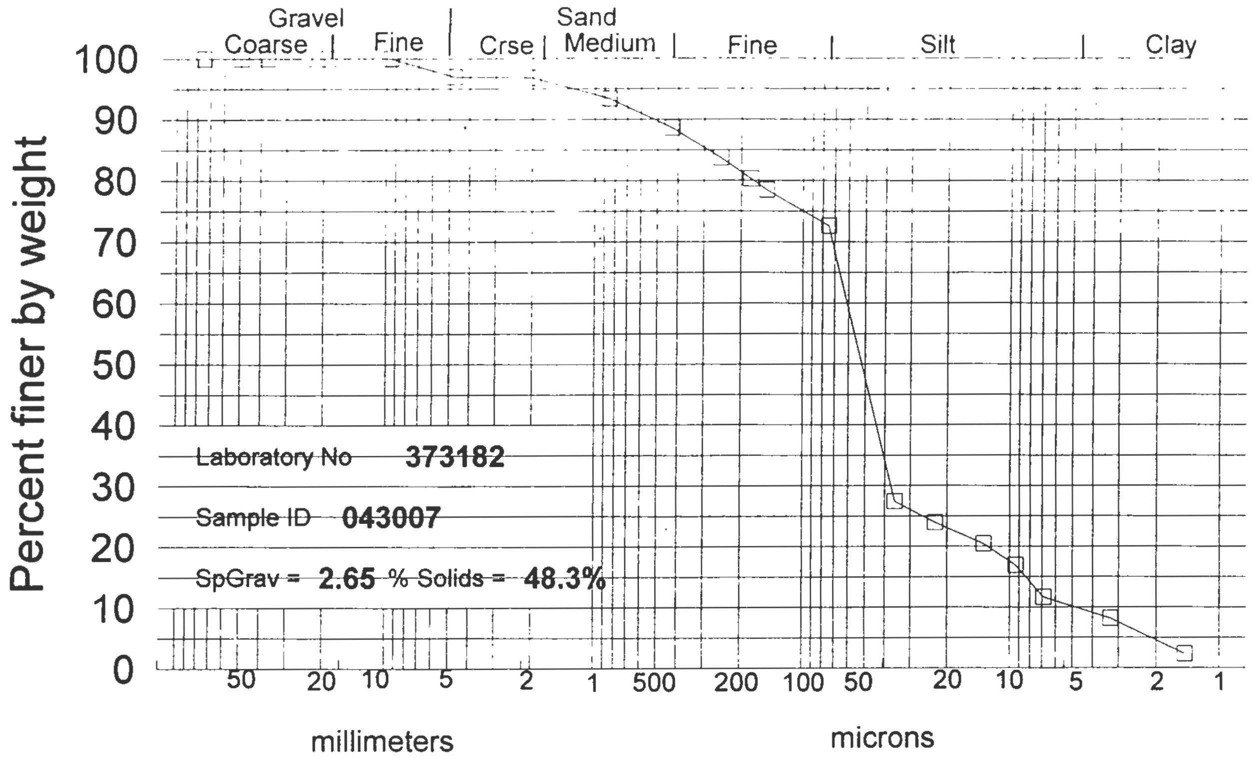
Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

Submitted By: 11:21 on 21-Jan-99

2573
Set 71695
Lab No. 373178

STL-VT ASTM D422 Particle Size Analysis Sample ID **043007**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subrounded Hard

Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	100.0	0.0	
#4	4.75	97.0	3.0	
#10	2.00	96.8	0.2	
#20B	850.0 um	93.4	3.4	
#40B	425.0	88.6	4.8	
#60B	250.0	83.8	4.9	
#80B	180.0	80.3	3.4	
#100B	150.0	78.5	1.8	
#200B	75.0	72.6	5.9	
Hydrometer	35.8	27.4	45.2	Dispersion of soil
|	22.8	23.9	3.5	for hydrometer test
|	13.3	20.4	3.5	by mechanical mixer
|	9.3	16.9	3.5	with metal paddle
|	6.9	11.7	5.3	operated for at least
|	3.3	8.2	3.5	one minute within a
V	1.5	2.3	5.8	dispersion cup

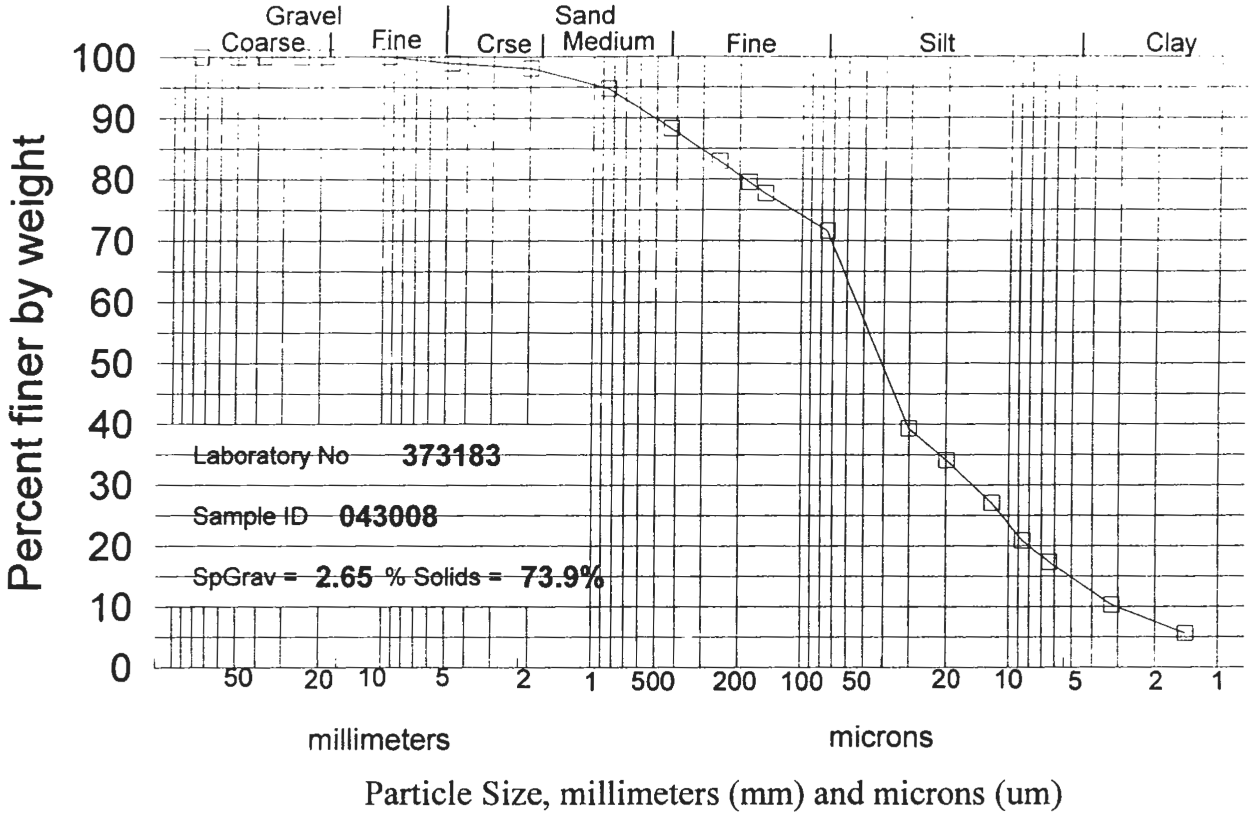
2574

Set 71695

Submitted By: 11:21 on 21-Jan-99 Lab No. 373182

STL-VT ASTM D422 Particle Size Analysis Sample ID **043008**

Sample preparation by: D2217



Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subrounded Hard

Sieve size	Particle Size	Percent finer	Incremental percent
3 inch	75.00 mm	100.0	0.0
2 inch	50.00	100.0	0.0
1.5 inch	37.50	100.0	0.0
1 inch	25.00	100.0	0.0
3/4 inch	19.00	100.0	0.0
3/8 inch	9.50	100.0	0.0
#4	4.75	99.0	1.0
#10	2.00	98.1	0.9
#20B	850.0 um	94.8	3.3
#40B	425.0	88.3	6.4
#60B	250.0	83.0	5.4
#80B	180.0	79.5	3.4
#100B	150.0	77.7	1.8
#200B	75.0	71.6	6.1
Hydrometer	30.2	39.4	32.2
|	19.9	34.1	5.3
|	12.1	27.0	7.1
|	8.6	20.9	6.2
|	6.4	17.3	3.5
|	3.2	10.3	7.1
V	1.4	5.6	4.7

Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

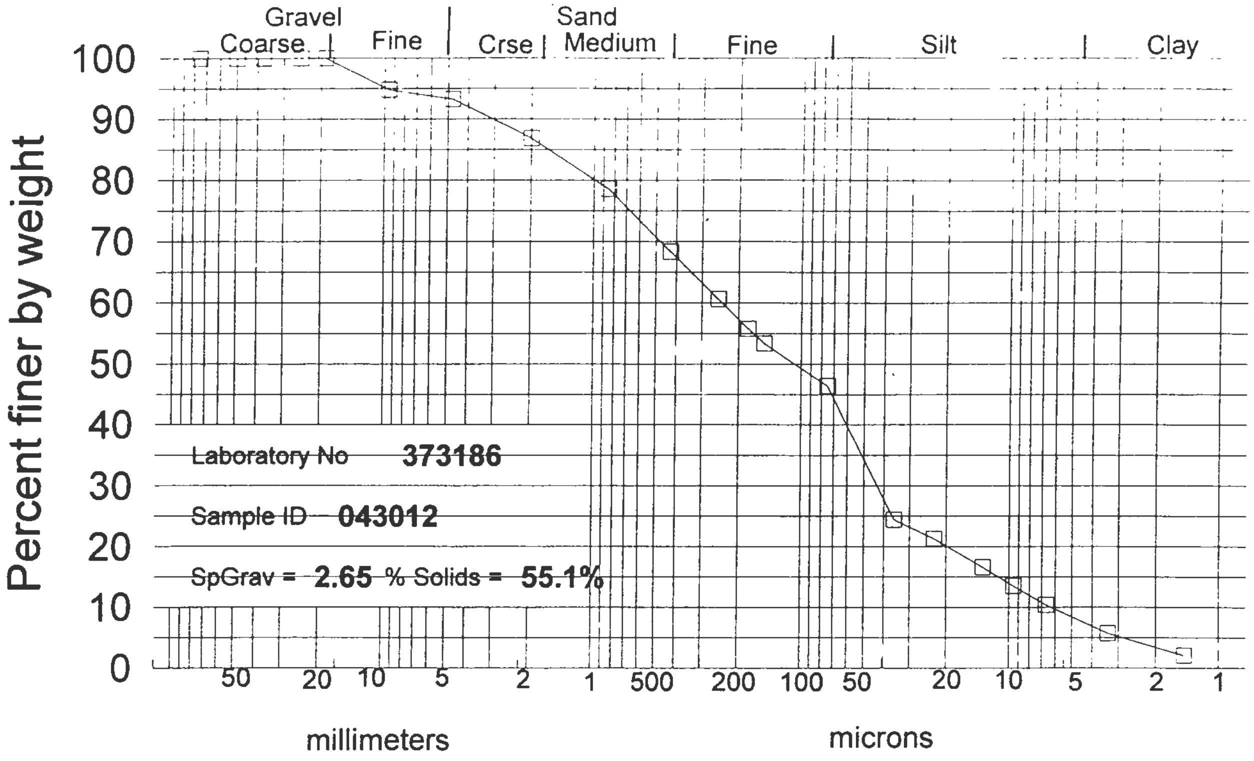
2575

Submitted By: 11:23 on 21-Jan-99

Set 71695
Lab No. 373183

STL-VT ASTM D422 Particle Size Analysis Sample ID **043012**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum
particle size: 19 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	94.8	5.2	
#4	4.75	93.3	1.5	
#10	2.00	86.9	6.4	
#20B	850.0 um	78.6	8.2	
#40B	425.0	68.4	10.2	
#60B	250.0	60.6	7.8	
#80B	180.0	55.7	4.9	
#100B	150.0	53.4	2.4	
#200B	75.0	46.5	6.9	
Hydrometer	35.8	24.4	22.0	Dispersion of soil
|	22.8	21.3	3.1	for hydrometer test
|	13.4	16.6	4.7	by mechanical mixer
|	9.5	13.5	3.1	with metal paddle
|	6.6	10.4	3.1	operated for at least
|	3.4	5.7	4.7	one minute within a
V	1.5	2.1	3.6	dispersion cup

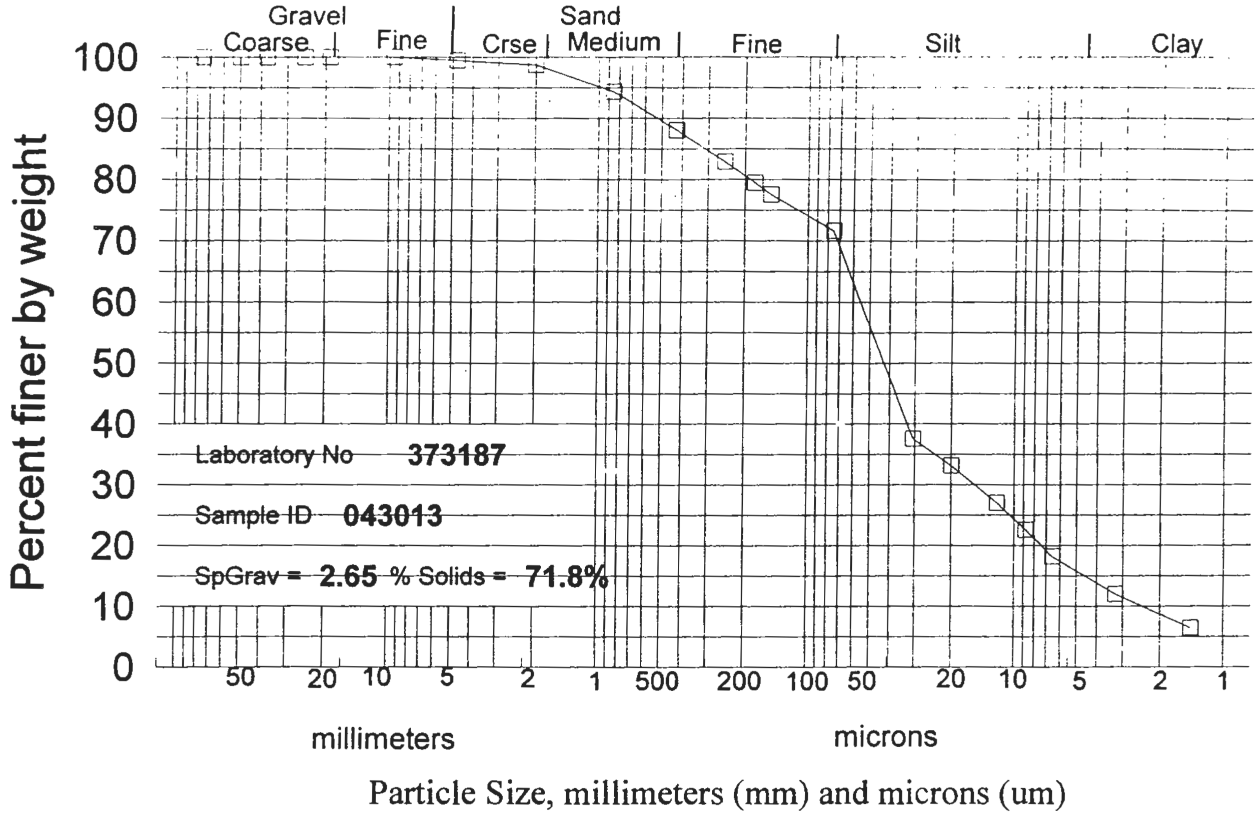
2576

Set 71695

Submitted By: 11:24 on 21-Jan-99 Lab No. 373186

STL-VT ASTM D422 Particle Size Analysis Sample ID **043013**

Sample preparation by: D2217



Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subrounded Hard

Sieve size	Particle Size		Percent finer	Incremental percent	
3 inch	75.00	mm	100.0	0.0	
2 inch	50.00		100.0	0.0	
1.5 inch	37.50		100.0	0.0	
1 inch	25.00		100.0	0.0	
3/4 inch	19.00		100.0	0.0	
3/8 inch	9.50		100.0	0.0	
#4	4.75		99.5	0.5	
#10	2.00		98.7	0.7	
#20B	850.0	um	94.4	4.3	
#40B	425.0		88.1	6.3	
#60B	250.0		82.9	5.2	
#80B	180.0		79.4	3.5	
#100B	150.0		77.5	1.9	
#200B	75.0		71.6	5.9	
Hydrometer	30.6		37.6	34.1	Dispersion of soil
|	20.0		33.2	4.4	for hydrometer test
|	12.1		27.0	6.2	by mechanical mixer
|	8.8		22.6	4.4	with metal paddle
|	6.5		18.2	4.4	operated for at least
|	3.2		12.0	6.2	one minute within a
V	1.4		6.5	5.6	dispersion cup

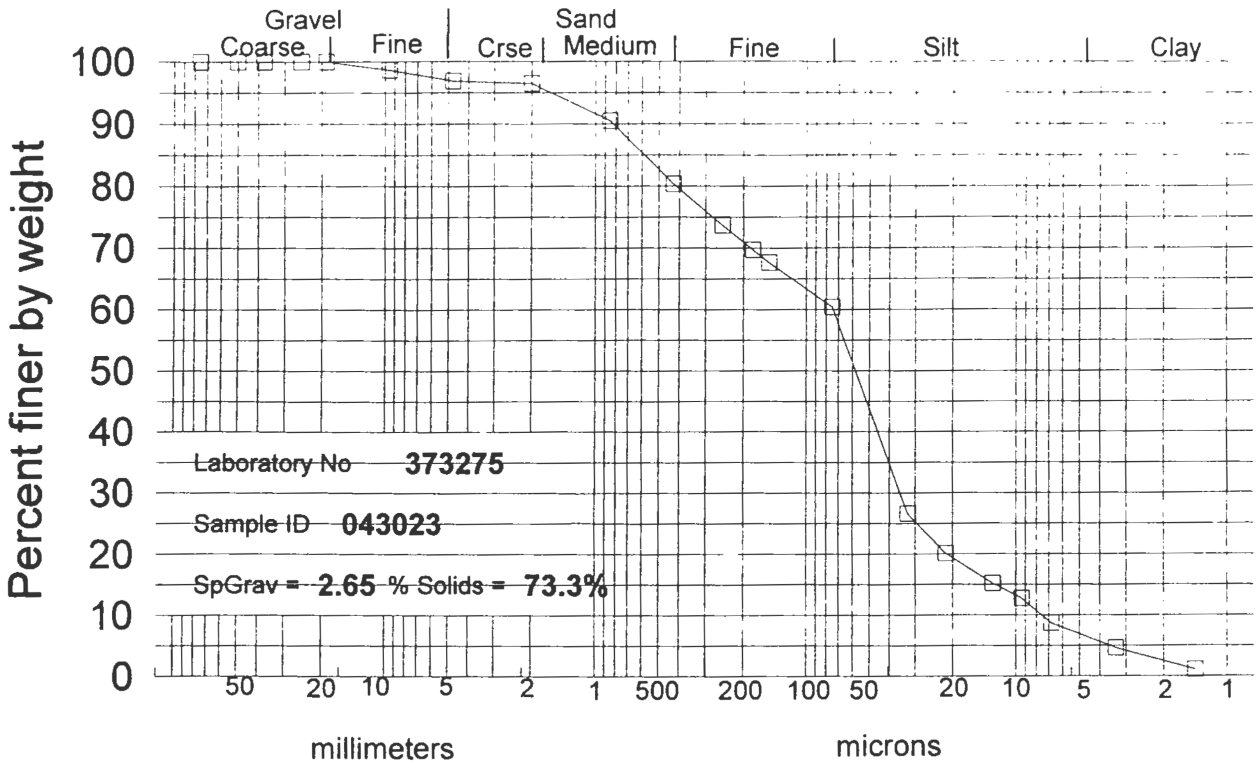
2577

Set 71695

Submitted By: 11:24 on 21-Jan-99 Lab No. 373187

STL-VT ASTM D422 Particle Size Analysis Sample ID **043023**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum
particle size: 19 mm

Shape and hardness (>#10): Subangular Hard

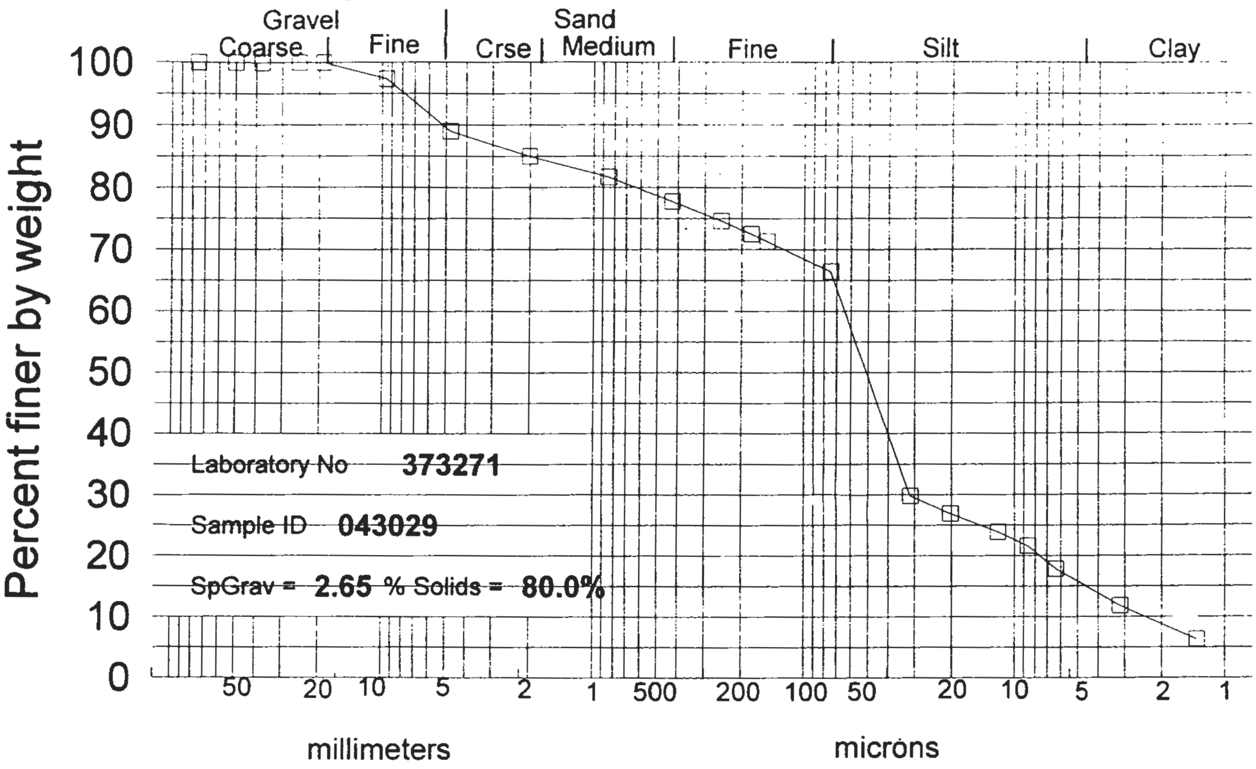
Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	98.6	1.4	
#4	4.75	96.9	1.8	
#10	2.00	96.5	0.4	
#20A	850.0 um	90.5	6.0	
#40A	425.0	80.3	10.2	
#60A	250.0	73.7	6.6	
#80A	180.0	69.7	3.9	
#100A	150.0	67.6	2.1	
#200A	75.0	60.4	7.2	
Hydrometer	32.6	26.6	33.8	Dispersion of soil
|	21.6	20.1	6.5	for hydrometer test
|	12.9	15.2	4.9	by mechanical mixer
|	9.4	12.8	2.4	with metal paddle
|	6.8	8.7	4.1	operated for at least
|	3.4	4.6	4.1	one minute within a
V	1.4	1.1	3.5	dispersion cup

Set 71712

Submitted By:

STL-VT ASTM D422 Particle Size Analysis Sample ID **043029**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum
particle size: 19 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	97.4	2.6	
#4	4.75	89.0	8.3	
#10	2.00	85.0	4.0	
#20A	850.0 um	81.6	3.4	
#40A	425.0	77.8	3.8	
#60A	250.0	74.6	3.1	
#80A	180.0	72.5	2.1	
#100A	150.0	71.3	1.2	
#200A	75.0	66.4	4.9	
Hydrometer	31.4	29.8	36.7	Dispersion of soil
|	20.3	26.9	2.9	for hydrometer test
|	12.0	23.9	3.0	by mechanical mixer
|	8.6	21.6	2.3	with metal paddle
|	6.4	17.8	3.8	operated for at least
|	3.2	11.8	6.0	one minute within a
V	1.4	6.3	5.5	dispersion cup

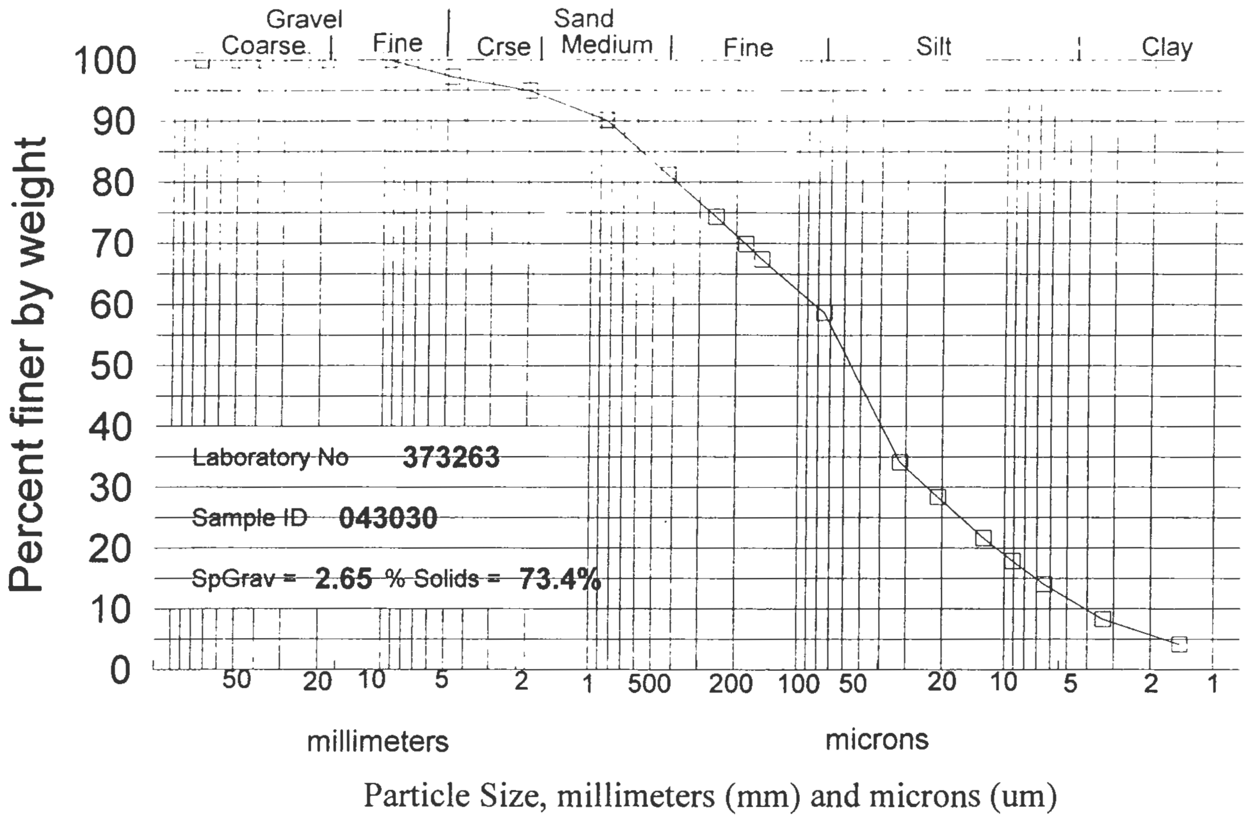
1688

Set 71712

Submitted By: 11:01 on 22 Jan 99 Lab No 373271

STL-VT **ASTM D422 Particle Size Analysis** Sample ID **043030**

Sample preparation by: D2217



Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size		Percent finer	Incremental percent
3 inch	75.00	mm	100.0	0.0
2 inch	50.00		100.0	0.0
1.5 inch	37.50		100.0	0.0
1 inch	25.00		100.0	0.0
3/4 inch	19.00		100.0	0.0
3/8 inch	9.50		100.0	0.0
#4	4.75		97.2	2.8
#10	2.00		95.0	2.2
#20B	850.0	um	90.1	4.8
#40B	425.0		81.2	9.0
#60B	250.0		74.3	6.9
#80B	180.0		69.9	4.4
#100B	150.0		67.4	2.5
#200B	75.0		58.7	8.7
Hydrometer	32.0		34.1	24.6
|	21.0		28.4	5.7
|	12.6		21.7	6.7
|	9.1		17.8	3.8
|	6.4		14.0	3.8
|	3.4		8.3	5.7
V	1.4		4.1	4.1

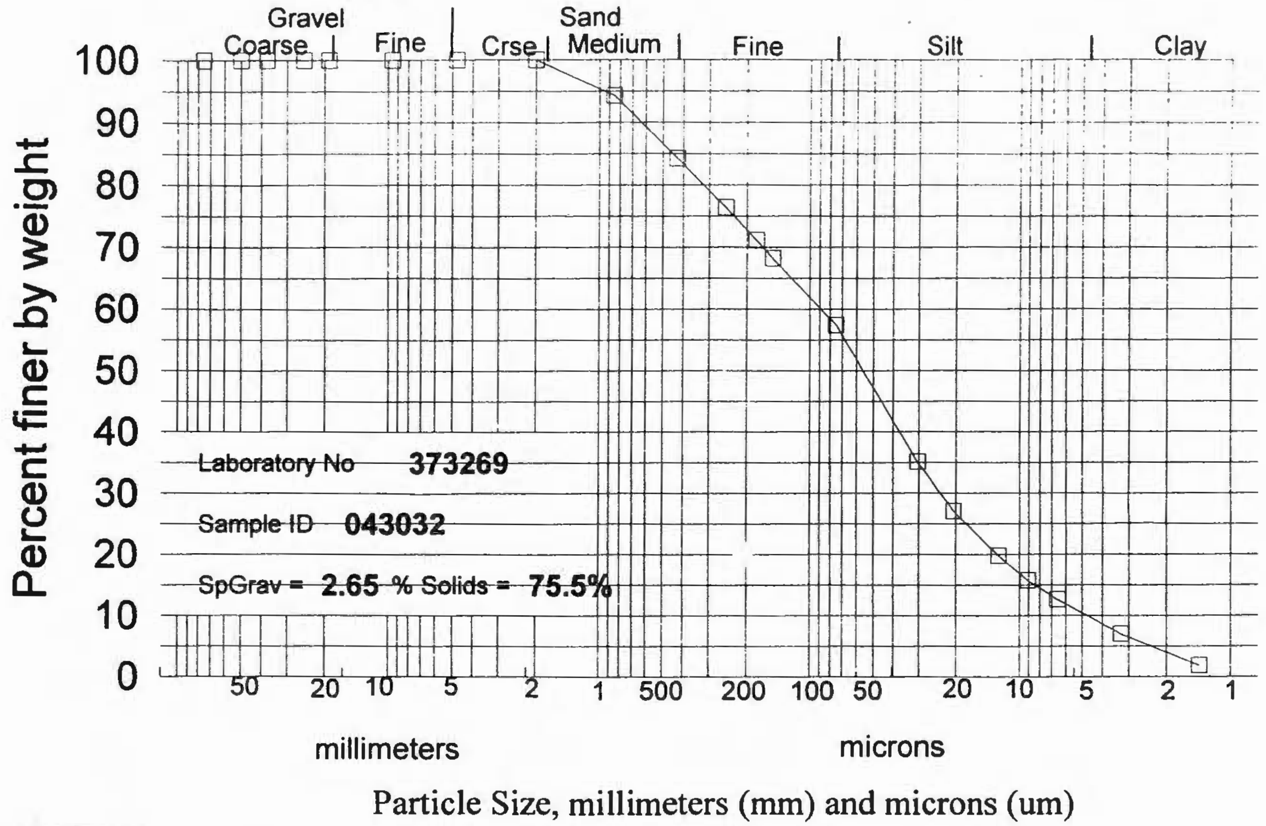
Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

Submitted By: 11:24 on 21-Jan-99

Set 71695
Lab No. 373263

STL-VT ASTM D422 Particle Size Analysis Sample ID **043032**

Sample preparation by: D2217



Maximum particle size: Med sand

Shape and hardness (>#10):

Sieve size	Particle Size		Percent finer	Incremental percent
3 inch	75.00	mm	100.0	0.0
2 inch	50.00		100.0	0.0
1.5 inch	37.50		100.0	0.0
1 inch	25.00		100.0	0.0
3/4 inch	19.00		100.0	0.0
3/8 inch	9.50		100.0	0.0
#4	4.75		100.0	0.0
#10	2.00		100.0	0.0
#20A	850.0	um	94.3	5.7
#40A	425.0		84.3	10.1
#60A	250.0		76.4	7.9
#80A	180.0		71.1	5.2
#100A	150.0		68.2	2.9
#200A	75.0		57.4	10.8
Hydrometer	30.6		35.1	22.3
|	20.6		27.1	8.1
|	12.5		19.8	7.3
|	9.1		15.8	4.0
|	6.6		12.7	3.1
|	3.3		7.0	5.7
V	1.4		1.9	5.1

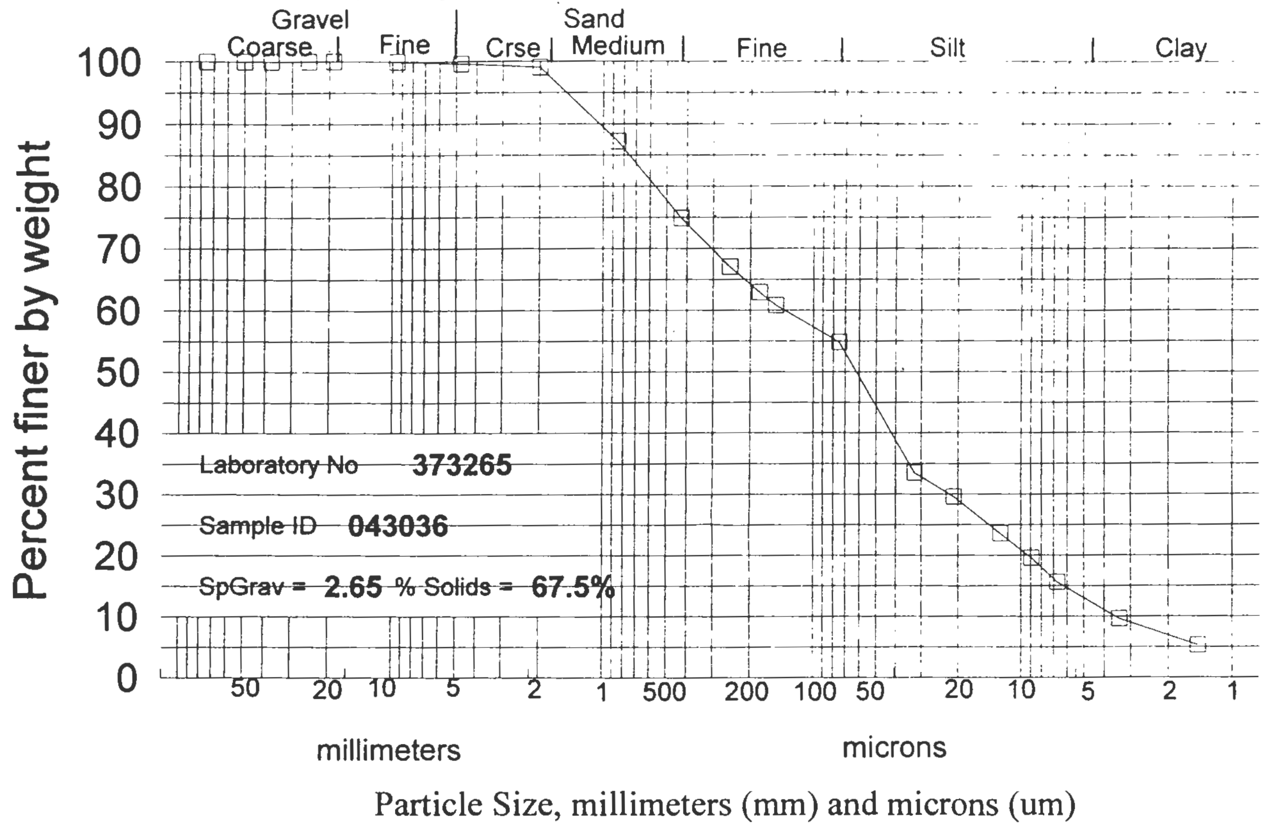
Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

Submitted By: 11:01 on 22-Jan-99

Set 71712
Lab No. 373269

STL-VI ASTM D422 Particle Size Analysis Sample ID 043036

Sample preparation by: D2217



Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subrounded Hard

Sieve size	Particle Size	Percent finer	Incremental percent
3 inch	75.00 mm	100.0	0.0
2 inch	50.00	100.0	0.0
1.5 inch	37.50	100.0	0.0
1 inch	25.00	100.0	0.0
3/4 inch	19.00	100.0	0.0
3/8 inch	9.50	100.0	0.0
#4	4.75	99.6	0.4
#10	2.00	99.0	0.6
#20B	850.0 um	87.2	11.8
#40B	425.0	74.9	12.3
#60B	250.0	67.1	7.8
#80B	180.0	62.9	4.2
#100B	150.0	60.8	2.0
#200B	75.0	54.8	6.0
Hydrometer	32.4	33.5	21.3
|	21.0	29.6	4.0
|	12.5	23.6	6.0
|	8.9	19.6	4.0
|	6.7	15.6	4.0
|	3.4	9.6	6.0
V	1.4	5.3	4.3

Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

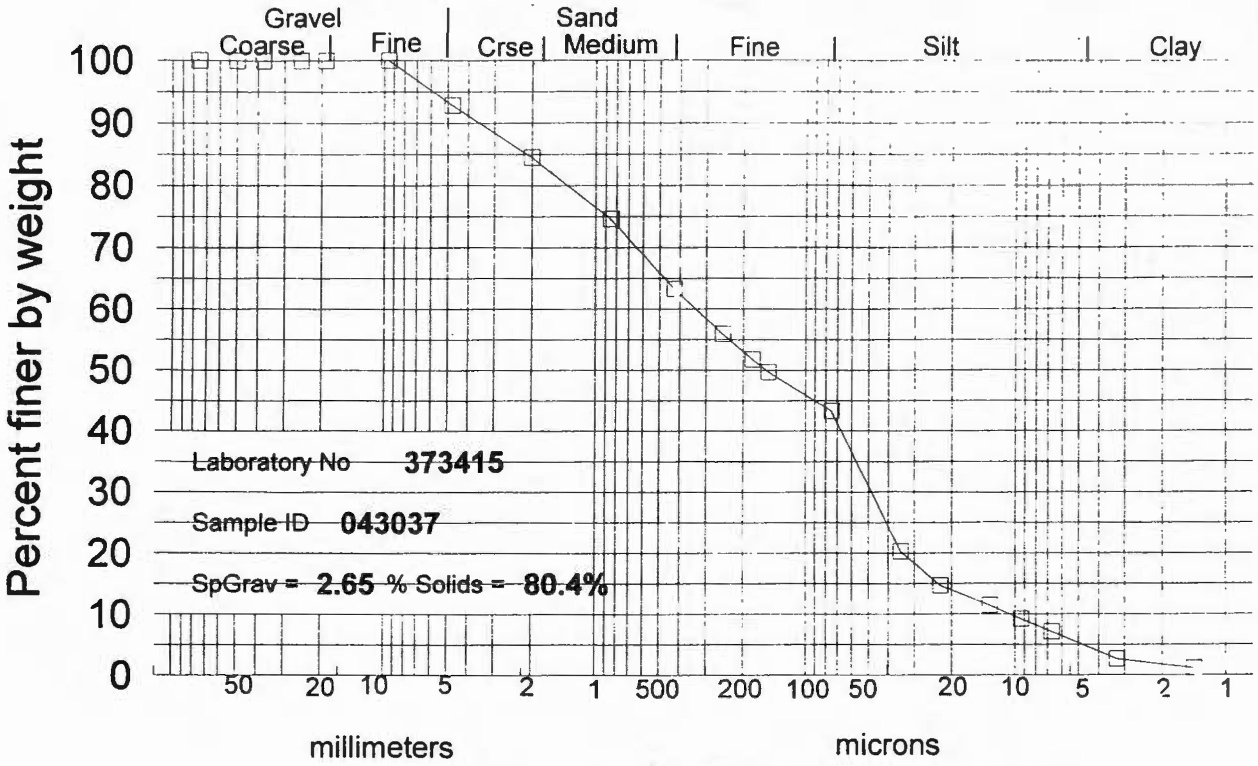
1686

Set 71695
Lab No. 373265

Submitted By: 11:24 on 21-Jan-99

STL-VT **ASTM D422 Particle Size Analysis** Sample ID **043037**

Sample preparation by: D2217



Laboratory No **373415**

Sample ID **043037**

SpGrav = **2.65** % Solids = **80.4%**

Particle Size, millimeters (mm) and microns (um)

Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size	Percent finer	Incremental percent
3 inch	75.00 mm	100.0	0.0
2 inch	50.00	100.0	0.0
1.5 inch	37.50	100.0	0.0
1 inch	25.00	100.0	0.0
3/4 inch	19.00	100.0	0.0
3/8 inch	9.50	100.0	0.0
#4	4.75	92.9	7.1
#10	2.00	84.5	8.4
#20B	850.0 um	74.6	9.9
#40B	425.0	63.2	11.4
#60B	250.0	56.0	7.3
#80B	180.0	51.8	4.1
#100B	150.0	49.7	2.1
#200B	75.0	43.3	6.4
Hydrometer	34.8	20.3	23.1
|	22.6	14.6	5.6
|	13.1	11.5	3.2
|	9.4	9.2	2.3
|	6.7	7.1	2.1
|	3.3	2.6	4.5
V	1.4	1.1	1.5

Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

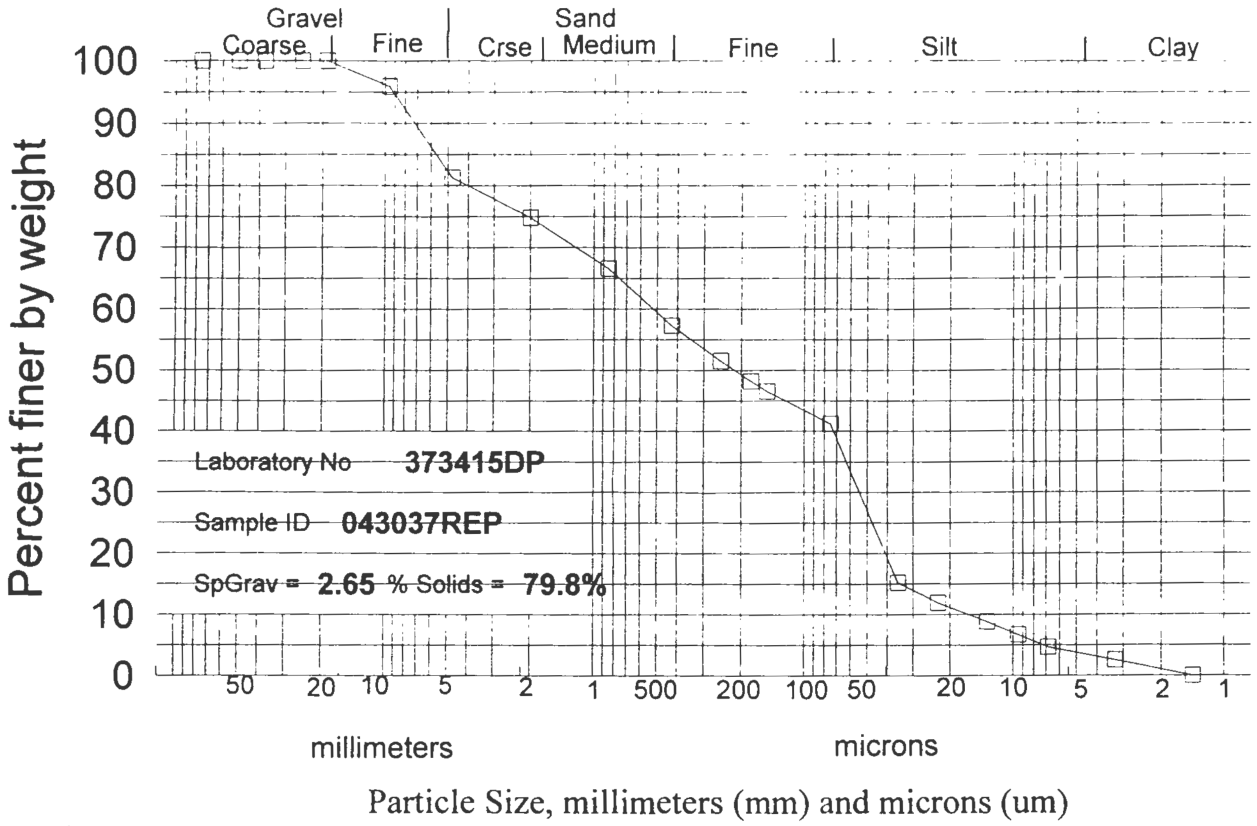
1690

Set 71762

Submitted By:

STL-VT **ASTM D422 Particle Size Analysis** Sample ID **043037REP**

Sample preparation by: D2217



Laboratory No **373415DP**

Sample ID **043037REP**

SpGrav = **2.65** % Solids = **79.8%**

Maximum
particle size: 19 mm

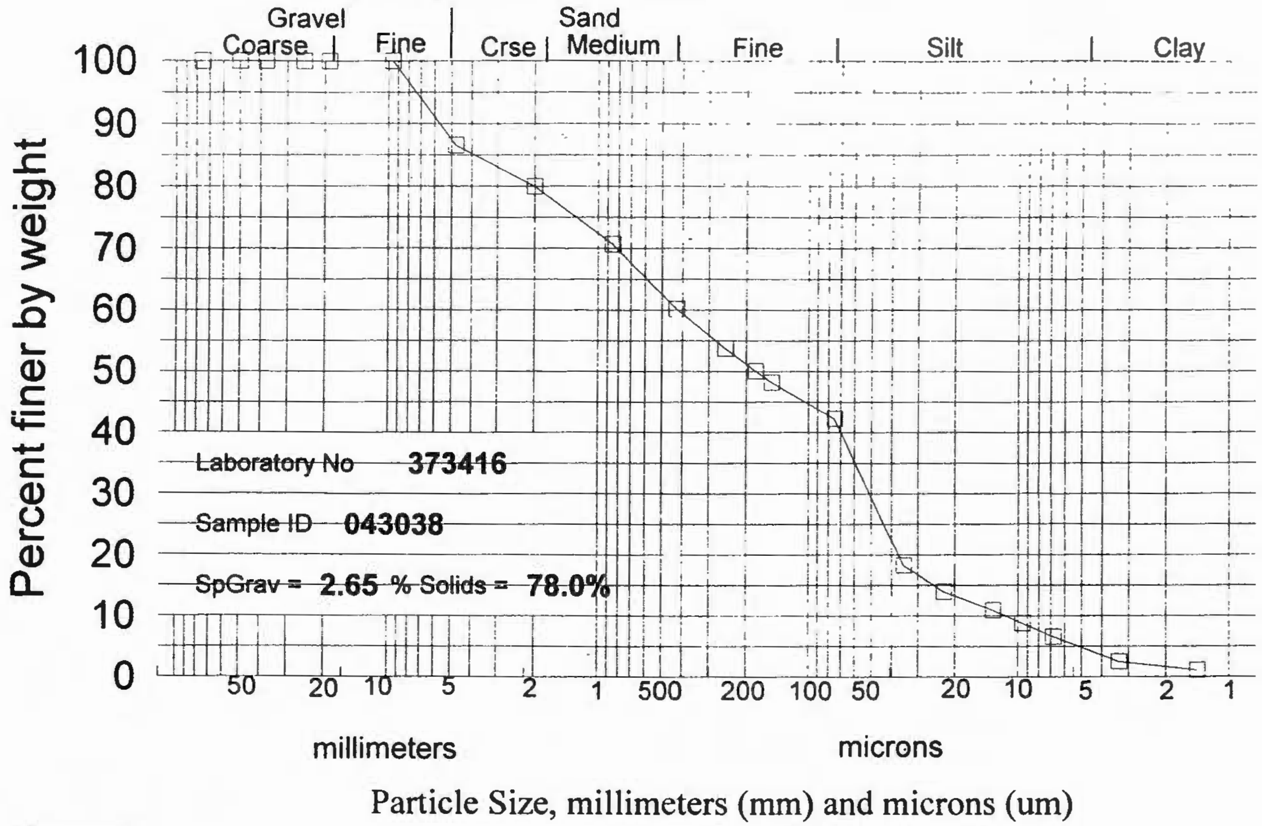
Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size	Percent finer	Incremental percent
3 inch	75.00 mm	100.0	0.0
2 inch	50.00	100.0	0.0
1.5 inch	37.50	100.0	0.0
1 inch	25.00	100.0	0.0
3/4 inch	19.00	100.0	0.0
3/8 inch	9.50	95.9	4.1
#4	4.75	81.3	14.6
#10	2.00	74.8	6.5
#20B	850.0 um	66.6	8.2
#40B	425.0	57.3	9.3
#60B	250.0	51.5	5.8
#80B	180.0	48.2	3.3
#100B	150.0	46.6	1.6
#200B	75.0	41.3	5.3
Hydrometer	35.5	15.2	26.1
|	22.8	11.9	3.2
|	13.3	8.8	3.1
|	9.5	6.7	2.2
|	6.8	4.7	2.0
|	3.3	2.5	2.2
V	1.4	0.0	

Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

STL-VT ASTM D422 Particle Size Analysis Sample ID **043038**

Sample preparation by: D2217



Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size		Percent finer	Incremental percent	
3 inch	75.00	mm	100.0	0.0	
2 inch	50.00		100.0	0.0	
1.5 inch	37.50		100.0	0.0	
1 inch	25.00		100.0	0.0	
3/4 inch	19.00		100.0	0.0	
3/8 inch	9.50		100.0	0.0	
#4	4.75		86.5	13.5	
#10	2.00		80.0	6.5	
#20B	850.0	um	70.7	9.3	
#40B	425.0		60.2	10.5	
#60B	250.0		53.7	6.5	
#80B	180.0		50.0	3.7	
#100B	150.0		48.2	1.8	
#200B	75.0		42.3	5.9	
Hydrometer	35.0		18.2	24.0	Dispersion of soil
|	22.6		14.0	4.3	for hydrometer test
|	13.1		10.9	3.0	by mechanical mixer
|	9.5		8.8	2.1	with metal paddle
|	6.8		6.6	2.1	operated for at least
|	3.3		2.5	4.1	one minute within a
V	1.4		1.1	1.4	dispersion cup

1692

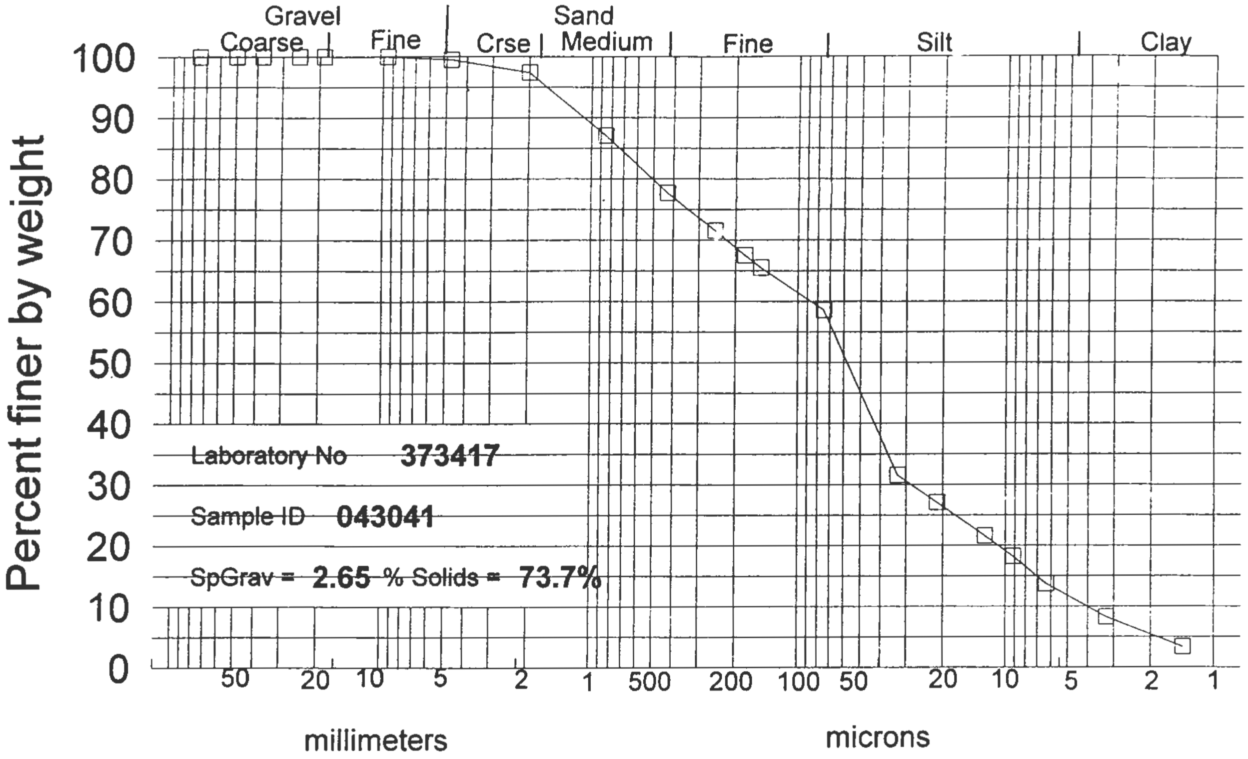
Set 71762

Submitted By: — 09:51 on 25 Jan 00

Lab No

STL-VT **ASTM D422 Particle Size Analysis** Sample ID **043041**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subangular Hard

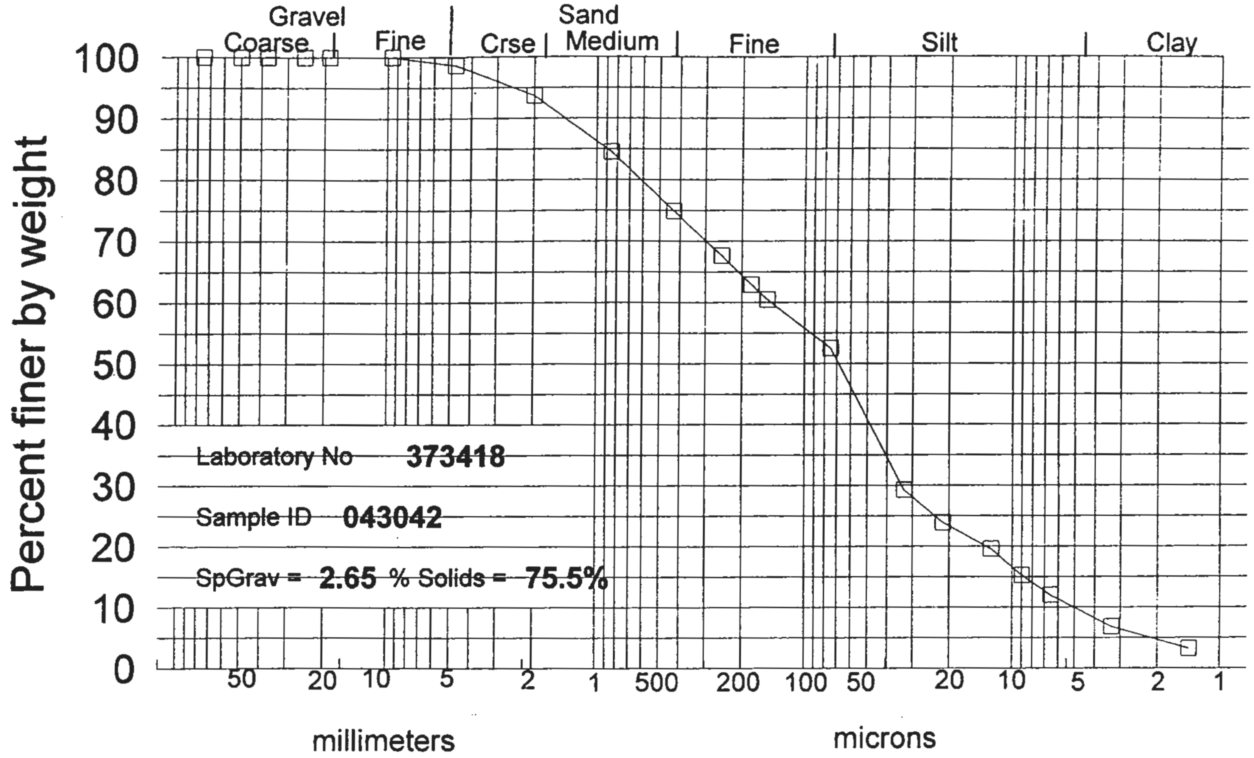
Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	100.0	0.0	
#4	4.75	99.5	0.5	
#10	2.00	97.4	2.1	
#20B	850.0 um	87.1	10.3	
#40B	425.0	77.7	9.4	
#60B	250.0	71.5	6.1	
#80B	180.0	67.6	4.0	
#100B	150.0	65.5	2.0	
#200B	75.0	58.6	7.0	
Hydrometer	33.0	31.6	27.0	Dispersion of soil
|	21.3	27.1	4.5	for hydrometer test
|	12.6	21.6	5.4	by mechanical mixer
|	9.2	18.2	3.4	with metal paddle
|	6.3	13.7	4.5	operated for at least
|	3.2	8.3	5.4	one minute within a
V	1.4	3.4	4.9	dispersion cup

Set 71762 2750

Submitted By: 09:54 on 25-Jan-99 Lab No. 373417

STL-VT **ASTM D422 Particle Size Analysis** Sample ID **043042**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size	Percent finer	Incremental percent
3 inch	75.00 mm	100.0	0.0
2 inch	50.00	100.0	0.0
1.5 inch	37.50	100.0	0.0
1 inch	25.00	100.0	0.0
3/4 inch	19.00	100.0	0.0
3/8 inch	9.50	100.0	0.0
#4	4.75	98.6	1.4
#10	2.00	93.7	4.9
#20B	850.0 um	84.5	9.2
#40B	425.0	74.9	9.6
#60B	250.0	67.7	7.2
#80B	180.0	62.9	4.7
#100B	150.0	60.5	2.5
#200B	75.0	52.6	7.9
Hydrometer	33.0	29.2	23.3
|	21.4	23.9	5.4
|	12.6	19.6	4.3
|	9.0	15.3	4.3
|	6.5	12.0	3.2
|	3.3	6.8	5.2
V	1.4	3.2	3.6

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle operated for at least one minute within a dispersion cup

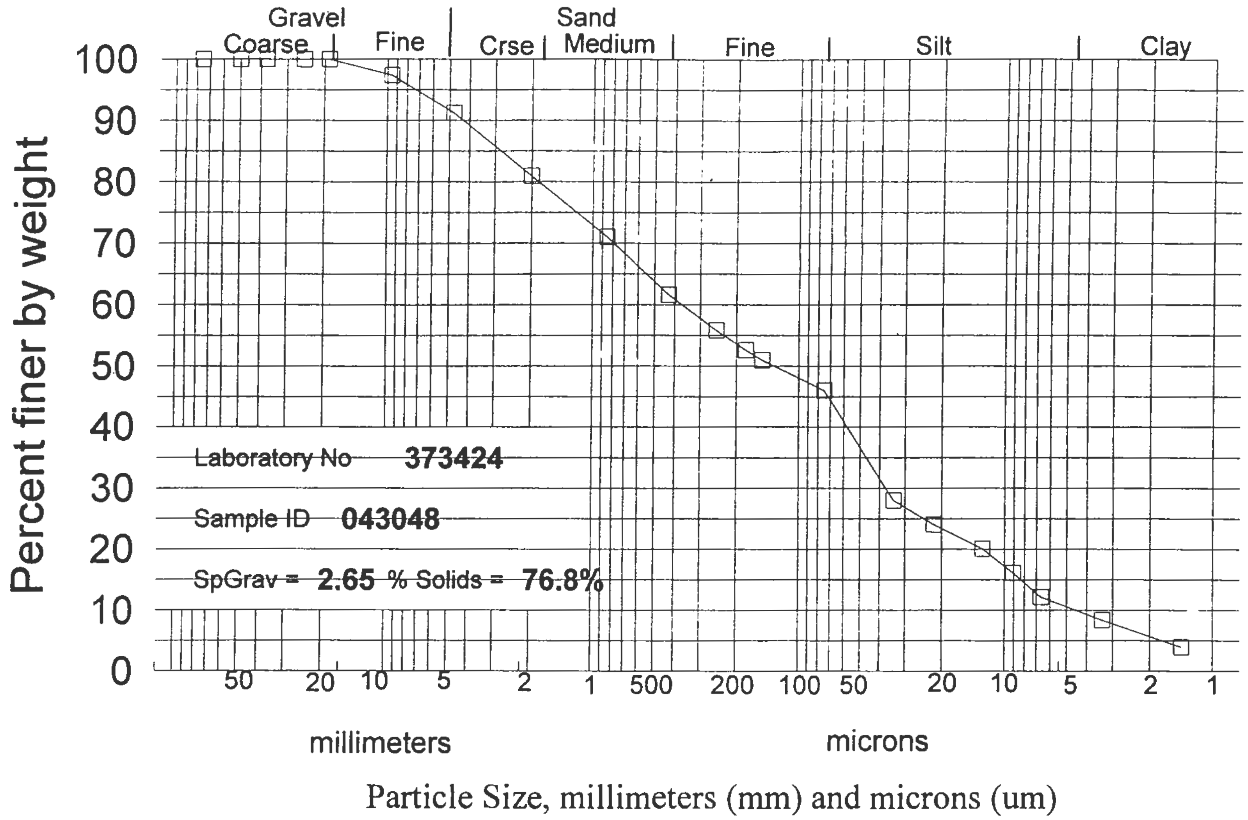
2751

Set 71762
Lab No. 373418

Submitted By: 09:54 on 25-Jan-99

STL-VT ASTM D422 Particle Size Analysis Sample ID **043048**

Sample preparation by: D2217



Maximum
particle size: 19 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size		Percent finer	Incremental percent
3 inch	75.00	mm	100.0	0.0
2 inch	50.00		100.0	0.0
1.5 inch	37.50		100.0	0.0
1 inch	25.00		100.0	0.0
3/4 inch	19.00		100.0	0.0
3/8 inch	9.50		97.4	2.6
#4	4.75		91.2	6.2
#10	2.00		80.9	10.3
#20B	850.0	um	71.0	9.9
#40B	425.0		61.6	9.4
#60B	250.0		55.8	5.8
#80B	180.0		52.6	3.2
#100B	150.0		51.0	1.6
#200B	75.0		46.0	5.0
Hydrometer	34.1		28.0	18.0
|	21.9		24.1	4.0
|	12.8		20.1	4.0
|	9.0		16.1	4.0
|	6.7		12.1	4.0
|	3.4		8.4	3.8
V	1.4		4.0	4.4

Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

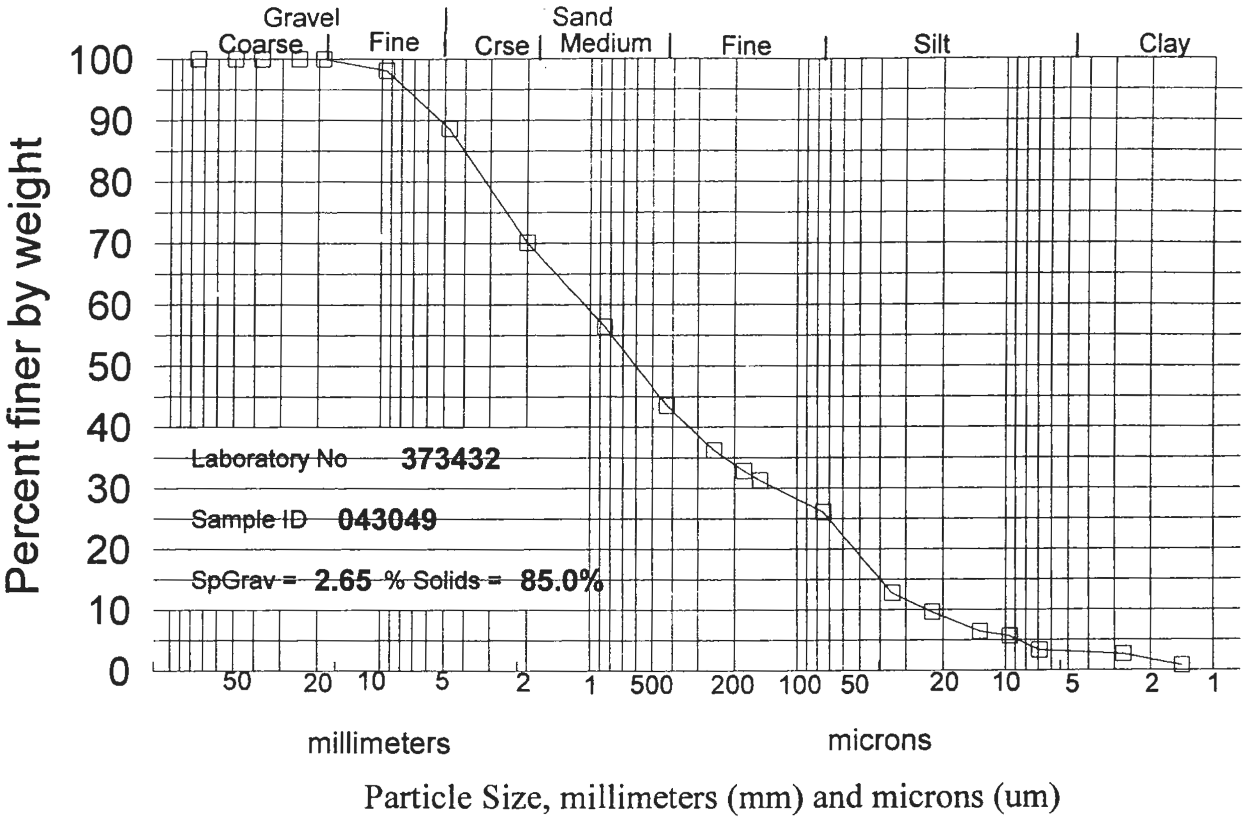
2752

Submitted By: 09:55 on 25-Jan-99

Set 71762
Lab No. 373424

STL-VT ASTM D422 Particle Size Analysis Sample ID **043049**

Sample preparation by: D2217



Maximum particle size: 19 mm

Shape and hardness (>#10): Subrounded Hard

Sieve size	Particle Size		Percent finer	Incremental percent
3 inch	75.00	mm	100.0	0.0
2 inch	50.00		100.0	0.0
1.5 inch	37.50		100.0	0.0
1 inch	25.00		100.0	0.0
3/4 inch	19.00		100.0	0.0
3/8 inch	9.50		98.1	1.9
#4	4.75		88.6	9.5
#10	2.00		70.1	18.5
#20A	850.0	um	56.4	13.7
#40A	425.0		43.5	12.9
#60A	250.0		36.2	7.3
#80A	180.0		32.9	3.4
#100A	150.0		31.3	1.6
#200A	75.0		26.1	5.2
Hydrometer	34.9		12.8	13.3
|	22.5		9.6	3.2
|	13.3		6.4	3.2
|	9.6		5.7	0.8
|	6.9		3.3	2.4
|	2.7		2.6	0.7
V	1.4		0.8	1.8

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle operated for at least one minute within a dispersion cup

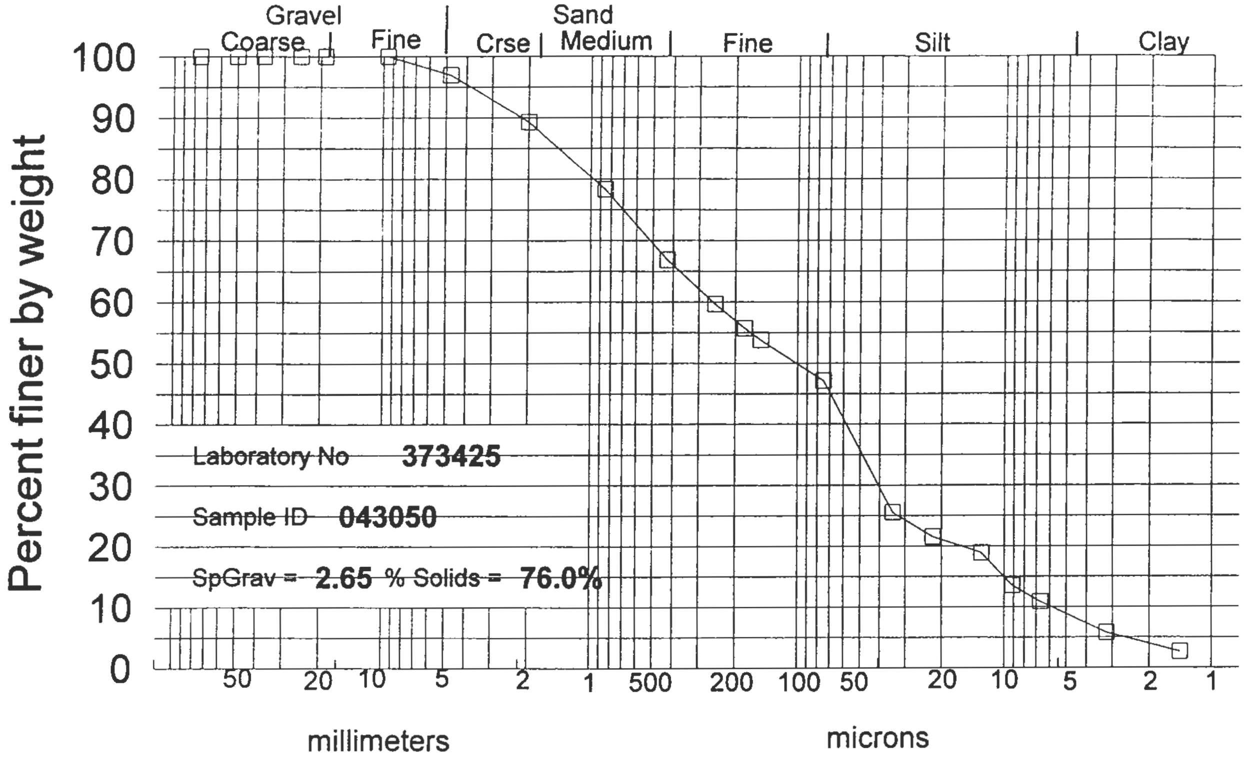
2761

Set 71765
Lab No. 373432

Submitted By: 10:59 on 25-Jan-99

STL-VT ASTM D422 Particle Size Analysis Sample ID **043050**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	100.0	0.0	
#4	4.75	97.0	3.0	
#10	2.00	89.3	7.7	
#20B	850.0 um	78.3	11.0	
#40B	425.0	66.8	11.5	
#60B	250.0	59.7	7.2	
#80B	180.0	55.7	3.9	
#100B	150.0	53.8	2.0	
#200B	75.0	47.2	6.6	
Hydrometer	34.4	25.5	21.6	Dispersion of soil
|	22.1	21.5	4.0	for hydrometer test
|	12.9	18.9	2.7	by mechanical mixer
|	9.1	13.5	5.3	with metal paddle
|	6.7	10.9	2.7	operated for at least
|	3.2	5.8	5.1	one minute within a
V	1.4	2.7	3.1	dispersion cup

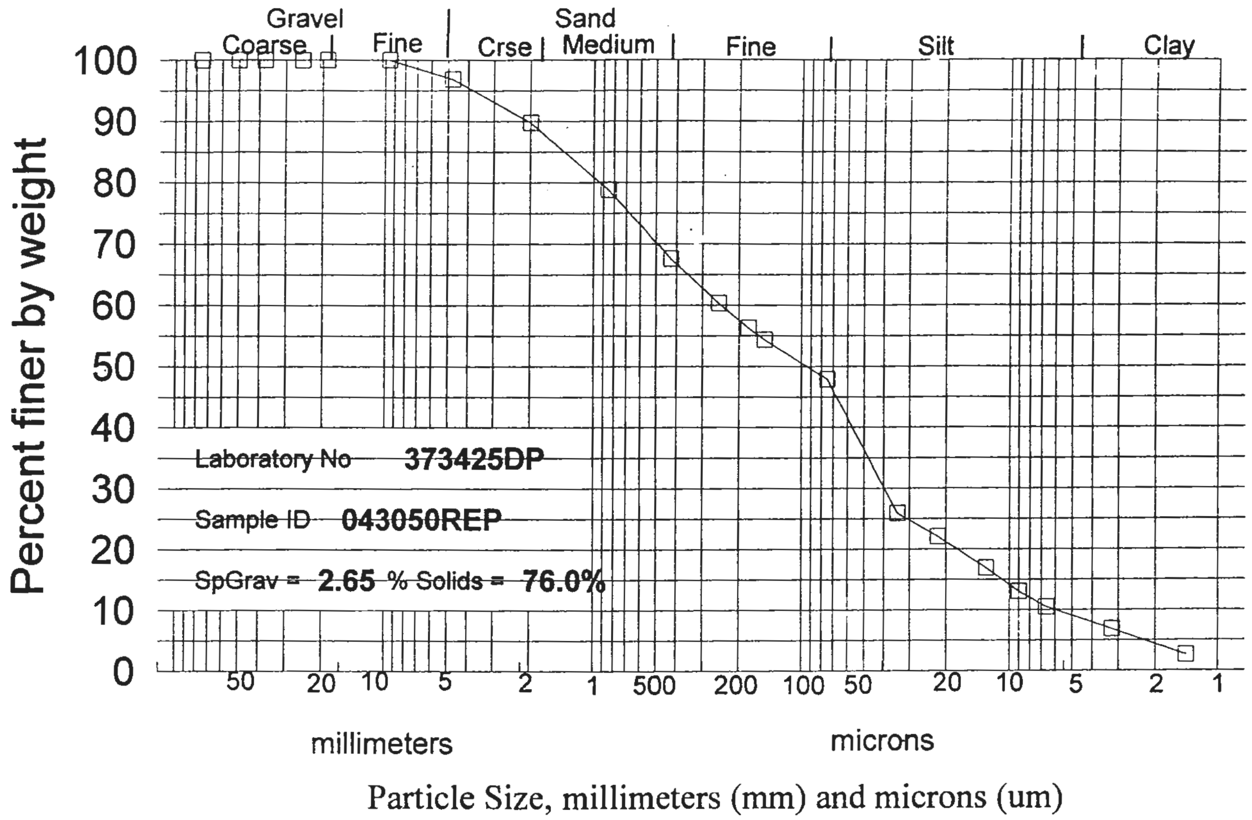
2753

Set 71762

Submitted By: 09:55 on 25-Jan-99 Lab No. 373425

STL-VT ASTM D422 Particle Size Analysis Sample ID **043050REP**

Sample preparation by: D2217



Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size	Percent finer	Incremental percent
3 inch	75.00 mm	100.0	0.0
2 inch	50.00	100.0	0.0
1.5 inch	37.50	100.0	0.0
1 inch	25.00	100.0	0.0
3/4 inch	19.00	100.0	0.0
3/8 inch	9.50	100.0	0.0
#4	4.75	96.8	3.2
#10	2.00	89.8	7.1
#20B	850.0 um	78.8	10.9
#40B	425.0	67.6	11.2
#60B	250.0	60.4	7.2
#80B	180.0	56.3	4.1
#100B	150.0	54.4	1.9
#200B	75.0	47.9	6.5
Hydrometer	34.2	25.9	22.0
|	22.0	22.1	3.9
|	12.9	16.9	5.1
|	9.0	13.1	3.9
|	6.6	10.5	2.6
|	3.2	6.9	3.6
V	1.4	2.6	4.3

Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

2754

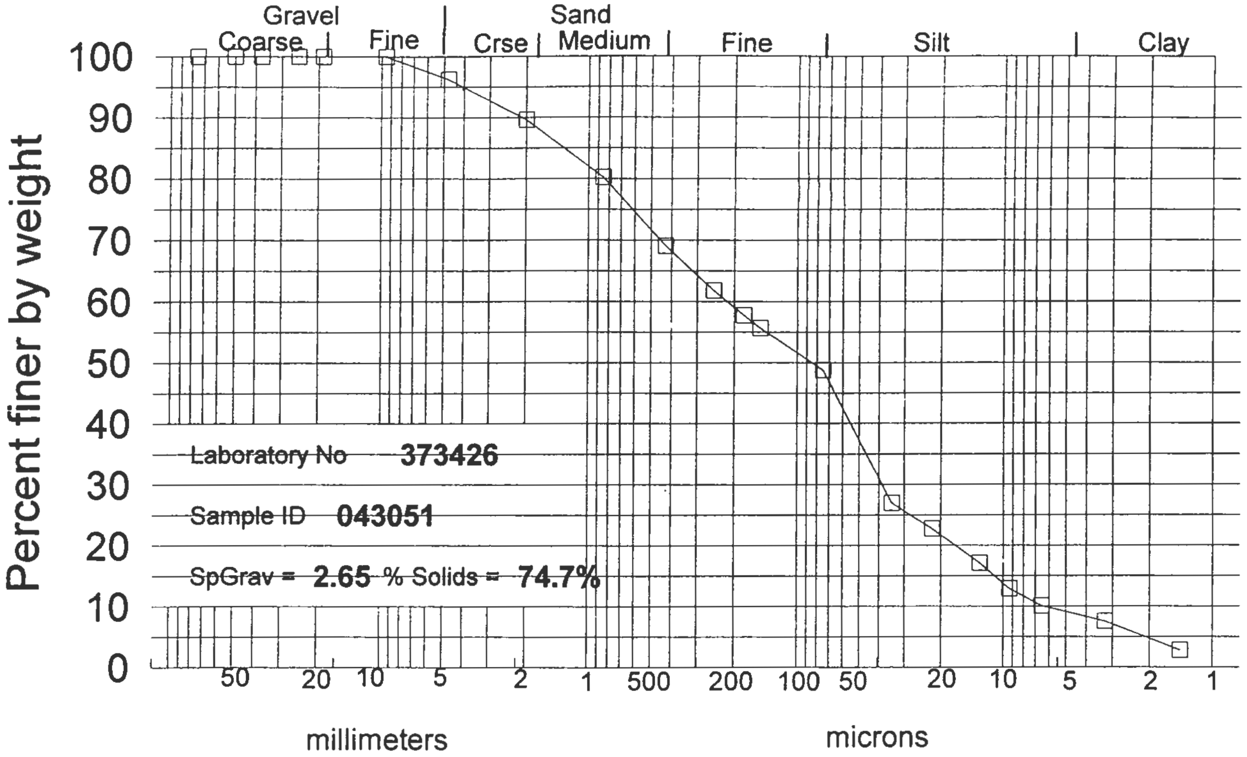
Set 71762

Submitted By: 09:55 on 25-Jan-99

Lab No. 373425DP

STL-VT **ASTM D422 Particle Size Analysis** Sample ID **043051**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	100.0	0.0	
#4	4.75	96.2	3.8	
#10	2.00	89.7	6.6	
#20B	850.0 um	80.2	9.4	
#40B	425.0	69.1	11.1	
#60B	250.0	61.8	7.3	
#80B	180.0	57.8	4.1	
#100B	150.0	55.6	2.1	
#200B	75.0	48.8	6.9	
Hydrometer	34.4	27.0	21.8	Dispersion of soil
|	22.1	22.8	4.2	for hydrometer test
|	13.0	17.1	5.6	by mechanical mixer
|	9.3	12.9	4.2	with metal paddle
|	6.5	10.1	2.8	operated for at least
|	3.3	7.5	2.6	one minute within a
V	1.4	2.8	4.7	dispersion cup

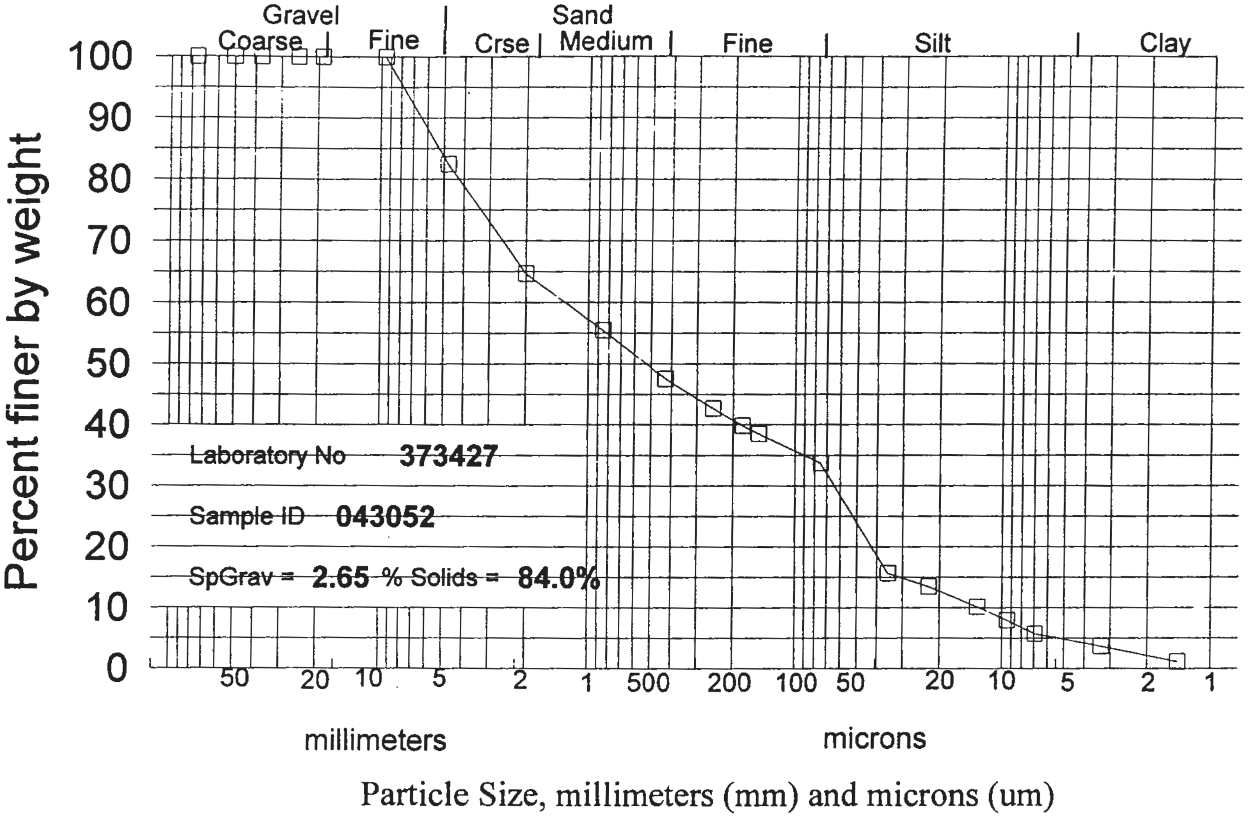
2755

Set 71762

Submitted By: 09:56 on 25-Jan-99 Lab No. 373426

STL-VT ASTM D422 Particle Size Analysis Sample ID **043052**

Sample preparation by: D2217



Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subangular Hard

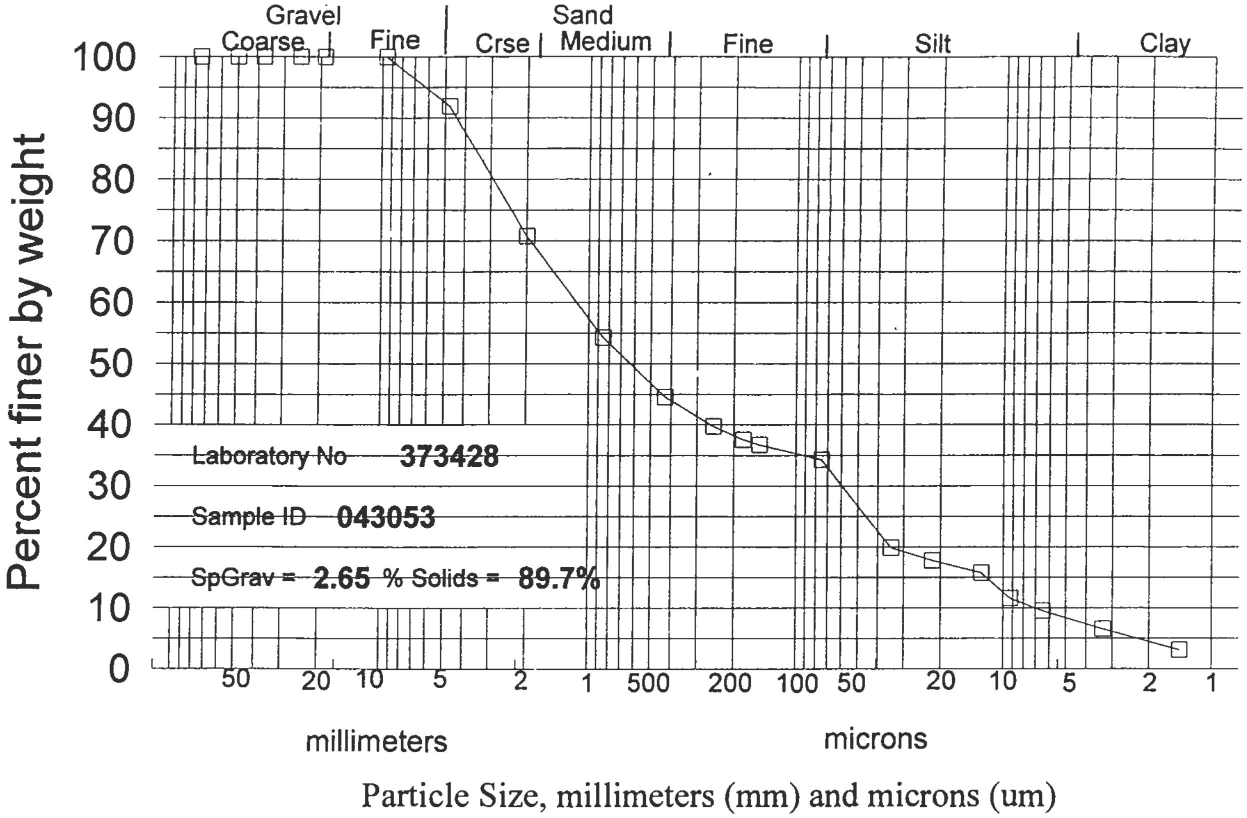
Sieve size	Particle Size		Percent finer	Incremental percent	
3 inch	75.00	mm	100.0	0.0	
2 inch	50.00		100.0	0.0	
1.5 inch	37.50		100.0	0.0	
1 inch	25.00		100.0	0.0	
3/4 inch	19.00		100.0	0.0	
3/8 inch	9.50		100.0	0.0	
#4	4.75		82.4	17.6	
#10	2.00		64.7	17.7	
#20B	850.0	um	55.5	9.2	
#40B	425.0		47.5	7.9	
#60B	250.0		42.7	4.8	
#80B	180.0		39.9	2.8	
#100B	150.0		38.5	1.4	
#200B	75.0		33.8	4.7	
Hydrometer	35.3		15.7	18.1	Dispersion of soil
|	22.5		13.5	2.2	for hydrometer test
|	13.2		10.2	3.3	by mechanical mixer
|	9.4		7.9	2.2	with metal paddle
|	6.9		5.7	2.2	operated for at least
|	3.3		3.7	2.0	one minute within a
V	1.4		1.1	2.6	dispersion cup

2756
Set 71762

Submitted By: 09:56 on 25-Jan-99 Lab No. 373427

STL-VT **ASTM D422 Particle Size Analysis** Sample ID **043053**

Sample preparation by: D2217



Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size	Percent finer	Incremental percent
3 inch	75.00 mm	100.0	0.0
2 inch	50.00	100.0	0.0
1.5 inch	37.50	100.0	0.0
1 inch	25.00	100.0	0.0
3/4 inch	19.00	100.0	0.0
3/8 inch	9.50	100.0	0.0
#4	4.75	91.9	8.1
#10	2.00	70.8	21.2
#20B	850.0 um	54.2	16.5
#40B	425.0	44.6	9.7
#60B	250.0	39.8	4.8
#80B	180.0	37.6	2.2
#100B	150.0	36.7	0.8
#200B	75.0	34.3	2.4
Hydrometer	34.4	19.9	14.4
|	22.0	17.8	2.1
|	12.8	15.7	2.1
|	9.2	11.6	4.1
|	6.4	9.5	2.1
|	3.3	6.6	2.9
V	1.4	3.1	3.5

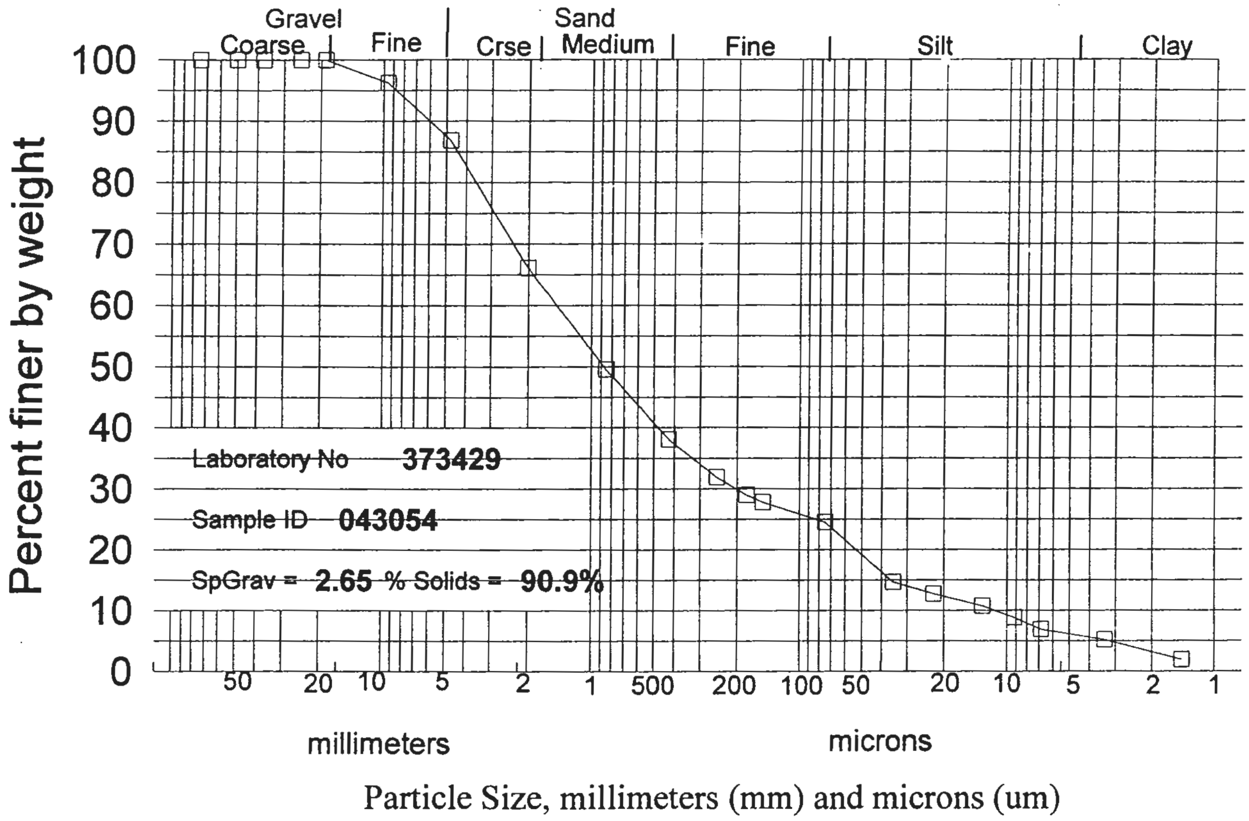
Dispersion of soil for hydrometer test by mechanical mixer with metal paddle operated for at least one minute within a dispersion cup

Set 2757 71762

Submitted By: 09:56 on 25-Jan-99 Lab No. 373428

STL-VT ASTM D422 Particle Size Analysis Sample ID **043054**

Sample preparation by: D2217



Maximum
particle size: 19 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size	Percent finer	Incremental percent
3 inch	75.00 mm	100.0	0.0
2 inch	50.00	100.0	0.0
1.5 inch	37.50	100.0	0.0
1 inch	25.00	100.0	0.0
3/4 inch	19.00	100.0	0.0
3/8 inch	9.50	96.2	3.8
#4	4.75	86.9	9.4
#10	2.00	66.1	20.8
#20B	850.0 um	49.6	16.5
#40B	425.0	38.1	11.5
#60B	250.0	31.9	6.2
#80B	180.0	29.0	2.9
#100B	150.0	27.8	1.2
#200B	75.0	24.5	3.3
Hydrometer	35.1	14.7	9.8
|	22.4	12.7	1.9
|	13.1	10.8	1.9
|	9.2	8.9	1.9
|	6.8	6.9	1.9
|	3.4	5.2	1.8
V	1.4	1.9	3.2

Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

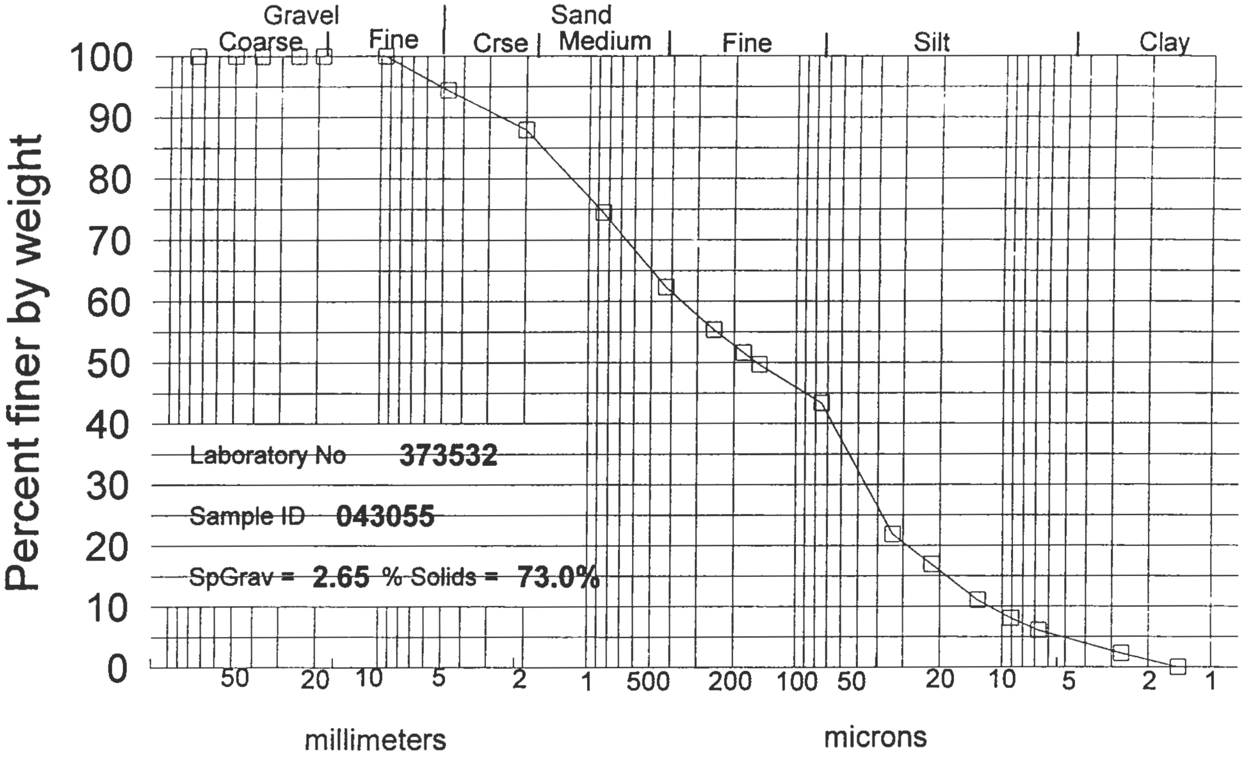
2758

Set 71762

Submitted By: 09:56 on 25-Jan-99 Lab No. 373429

STL-VT ASTM D422 Particle Size Analysis Sample ID **043055**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size		Percent finer	Incremental percent
3 inch	75.00	mm	100.0	0.0
2 inch	50.00		100.0	0.0
1.5 inch	37.50		100.0	0.0
1 inch	25.00		100.0	0.0
3/4 inch	19.00		100.0	0.0
3/8 inch	9.50		100.0	0.0
#4	4.75		94.4	5.6
#10	2.00		87.9	6.5
#20A	850.0	um	74.5	13.5
#40A	425.0		62.3	12.2
#60A	250.0		55.4	7.0
#80A	180.0		51.6	3.8
#100A	150.0		49.7	1.9
#200A	75.0		43.4	6.3
Hydrometer	33.9		21.9	21.5
|	22.0		16.9	4.9
|	13.1		11.0	5.9
|	9.1		8.1	3.0
|	6.7		6.1	2.0
|	2.7		2.3	3.8
V	1.4		0.0	

Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

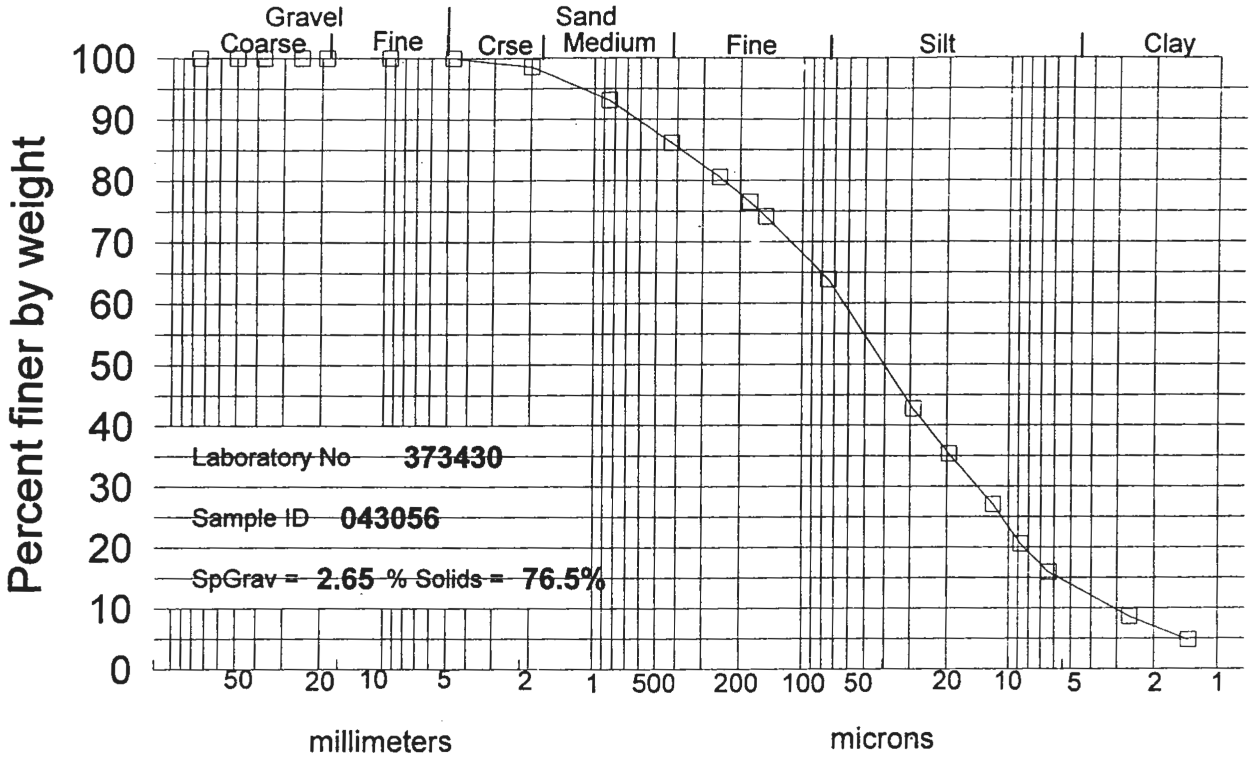
2766

Submitted By: 11:00 on 25-Jan-99

Set 71765
Lab No. 373532

STL-VT ASTM D422 Particle Size Analysis Sample ID **043056**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum particle size: Crs sand Shape and hardness (>#10): Subrounded Hard

Sieve size	Particle Size	Percent finer	Incremental percent
3 inch	75.00 mm	100.0	0.0
2 inch	50.00	100.0	0.0
1.5 inch	37.50	100.0	0.0
1 inch	25.00	100.0	0.0
3/4 inch	19.00	100.0	0.0
3/8 inch	9.50	100.0	0.0
#4	4.75	100.0	0.0
#10	2.00	98.6	1.4
#20A	850.0 um	93.1	5.5
#40A	425.0	86.1	7.0
#60A	250.0	80.5	5.6
#80A	180.0	76.5	4.0
#100A	150.0	74.1	2.4
#200A	75.0	63.9	10.2
Hydrometer	29.2	42.8	21.1
|	19.5	35.4	7.4
|	11.9	27.0	8.3
|	8.7	20.5	6.5
|	6.4	15.9	4.6
|	2.6	8.6	7.3
V	1.4	4.8	3.9

Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

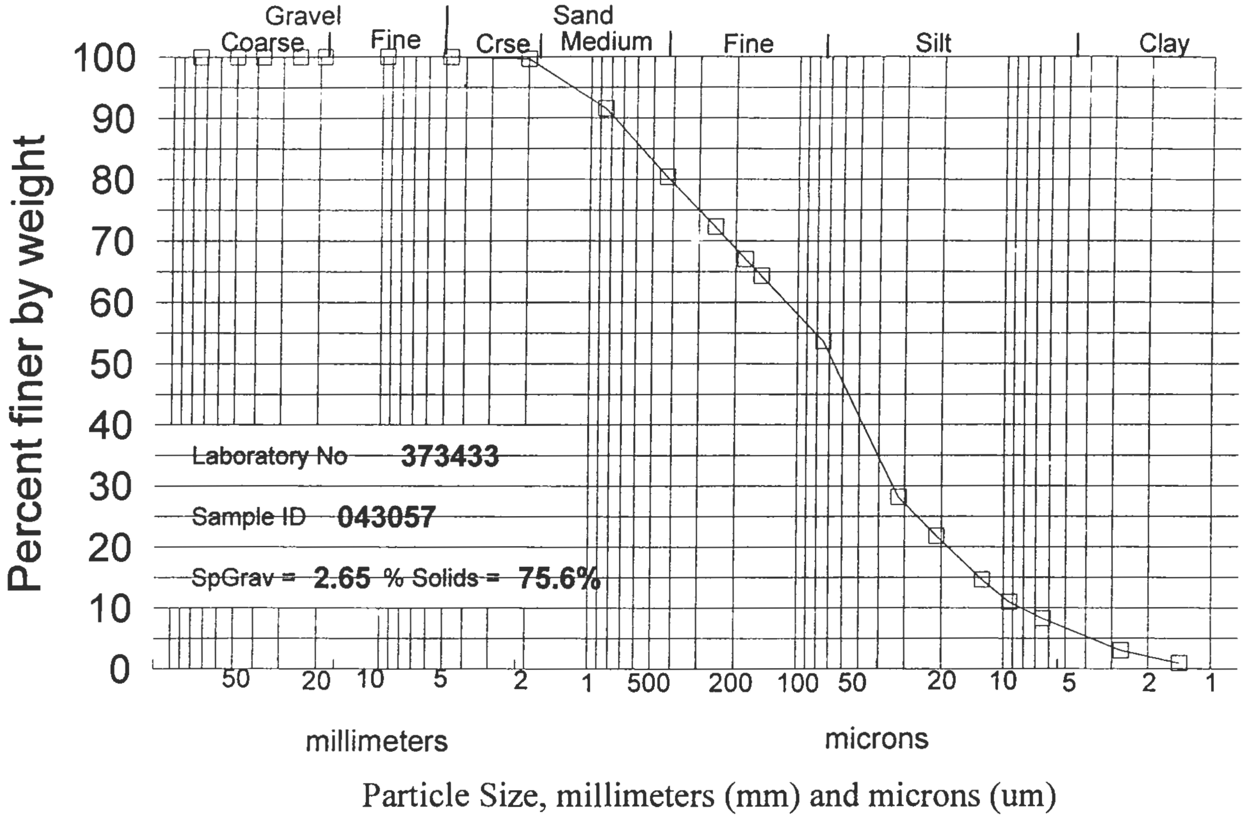
2759

Set 71765

Submitted By: 10:58 on 25-Jan-99 Lab No. 373430

STL-VT ASTM D422 Particle Size Analysis Sample ID **043057**

Sample preparation by: D2217



Maximum
particle size: Crs sand

Shape and hardness (>#10): Subrounded Hard

Sieve size	Particle Size		Percent finer	Incremental percent
3 inch	75.00	mm	100.0	0.0
2 inch	50.00		100.0	0.0
1.5 inch	37.50		100.0	0.0
1 inch	25.00		100.0	0.0
3/4 inch	19.00		100.0	0.0
3/8 inch	9.50		100.0	0.0
#4	4.75		100.0	0.0
#10	2.00		99.7	0.3
#20A	850.0	um	91.5	8.2
#40A	425.0		80.4	11.2
#60A	250.0		72.3	8.1
#80A	180.0		67.1	5.2
#100A	150.0		64.3	2.8
#200A	75.0		53.7	10.6
Hydrometer	32.2		28.1	25.6
|	21.2		21.8	6.3
|	12.8		14.6	7.2
|	9.4		11.0	3.6
|	6.4		8.3	2.7
|	2.7		3.0	5.3
V	1.4		0.9	2.1

Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

2762

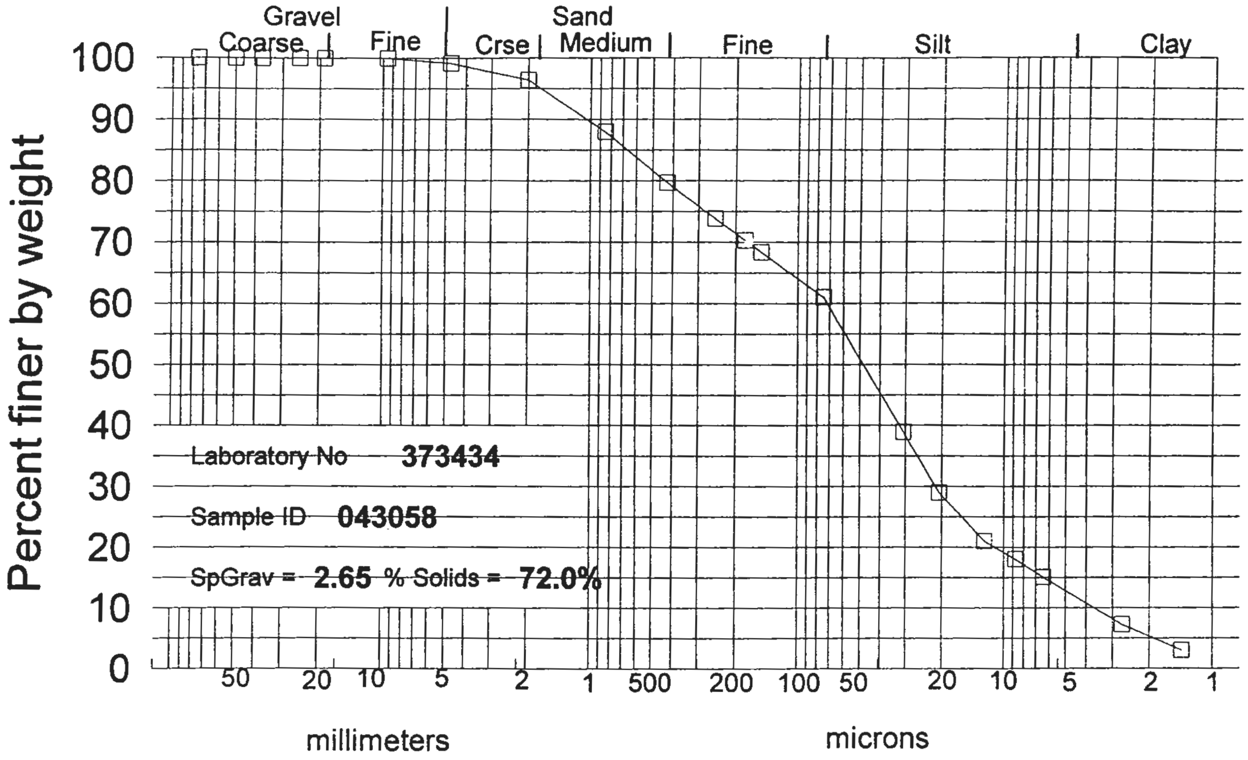
Set 71765

Submitted By: 10:59 on 25-Jan-99

Lab No. 373433

STL-VT ASTM D422 Particle Size Analysis Sample ID **043058**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum particle size: 9.5 mm

Shape and hardness (>#10): Subrounded Hard

Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	100.0	0.0	
#4	4.75	99.1	0.9	
#10	2.00	96.4	2.7	
#20A	850.0 um	88.0	8.5	
#40A	425.0	79.7	8.3	
#60A	250.0	73.8	5.8	
#80A	180.0	70.3	3.6	
#100A	150.0	68.4	1.9	
#200A	75.0	61.0	7.4	
Hydrometer	30.7	38.9	22.1	Dispersion of soil
|	20.6	29.0	9.9	for hydrometer test
|	12.4	21.0	7.9	by mechanical mixer
|	8.8	18.0	3.0	with metal paddle
|	6.4	15.1	3.0	operated for at least
|	2.7	7.3	7.8	one minute within a
V	1.4	3.0	4.3	dispersion cup

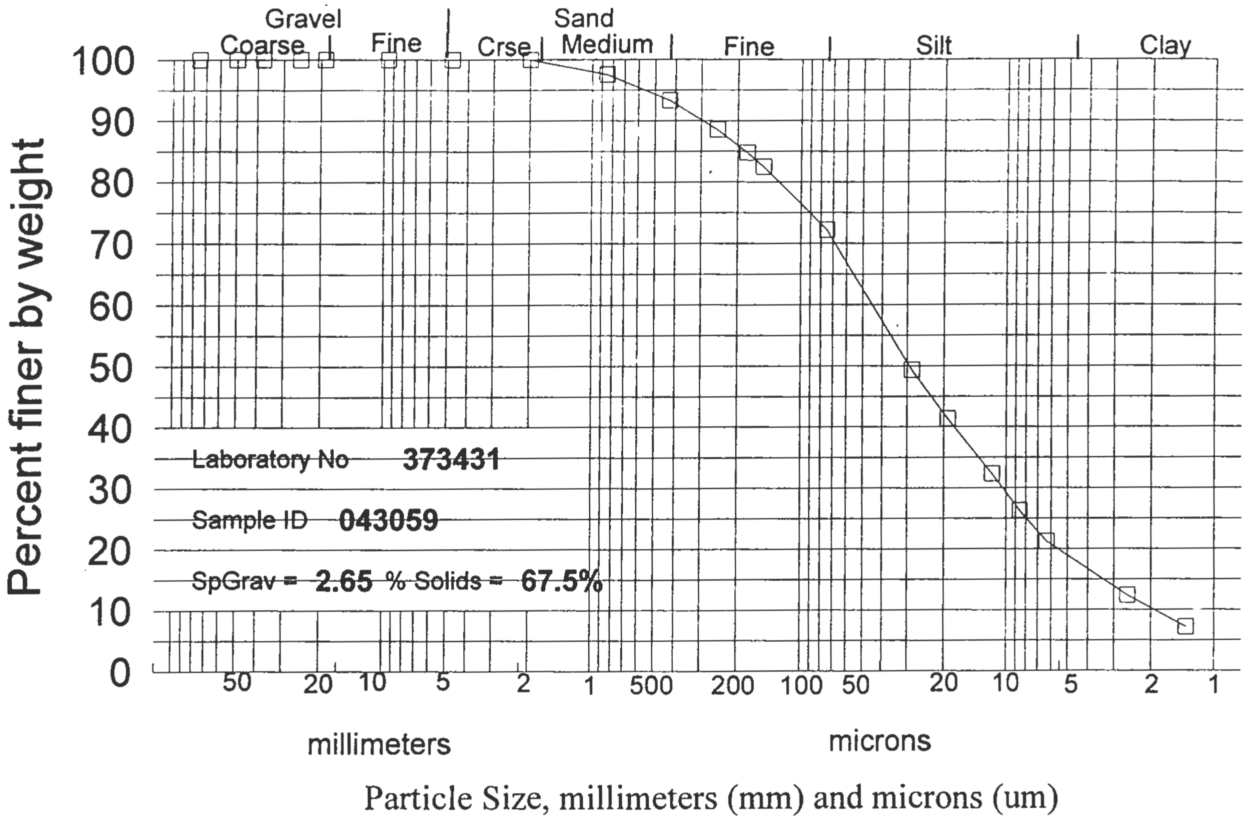
2763

Set 71765

Submitted By: 10:59 on 25-Jan-99 Lab No. 373434

STL-VT ASTM D422 Particle Size Analysis Sample ID **043059**

Sample preparation by: D2217



Maximum
particle size: Med sand

Shape and hardness (>#10):

Sieve size	Particle Size		Percent finer	Incremental percent
3 inch	75.00	mm	100.0	0.0
2 inch	50.00		100.0	0.0
1.5 inch	37.50		100.0	0.0
1 inch	25.00		100.0	0.0
3/4 inch	19.00		100.0	0.0
3/8 inch	9.50		100.0	0.0
#4	4.75		100.0	0.0
#10	2.00		100.0	0.0
#20A	850.0	um	97.5	2.5
#40A	425.0		93.3	4.2
#60A	250.0		88.5	4.8
#80A	180.0		84.8	3.8
#100A	150.0		82.5	2.3
#200A	75.0		72.2	10.3
Hydrometer	28.6		49.4	22.8
|	19.1		41.3	8.0
|	11.7		32.3	9.0
|	8.6		26.3	6.0
|	6.3		21.3	5.0
|	2.6		12.4	8.9
V	1.4		7.2	5.2

Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

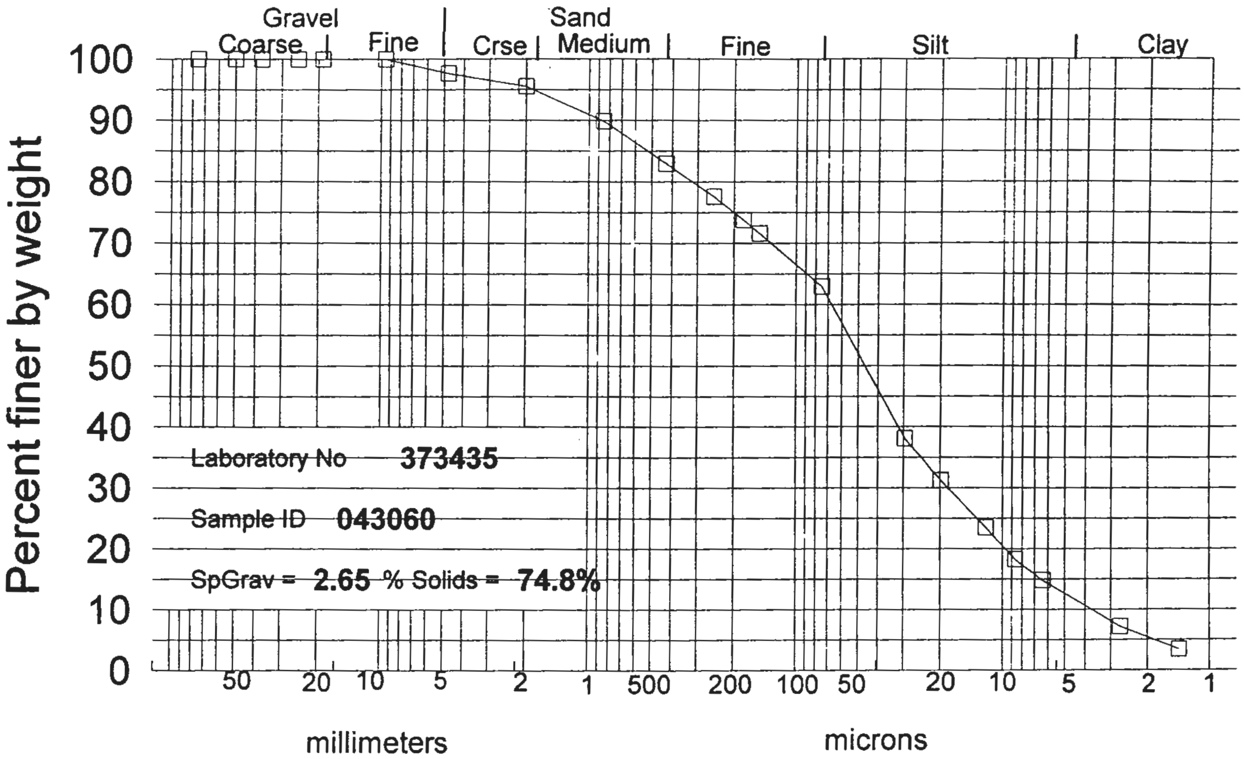
2760

Set 71765

Submitted By: 10:59 on 25-Jan-99 Lab No. 373431

STL-VT ASTM D422 Particle Size Analysis Sample ID **043060**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subrounded Hard

Sieve size	Particle Size	Percent finer	Incremental percent
3 inch	75.00 mm	100.0	0.0
2 inch	50.00	100.0	0.0
1.5 inch	37.50	100.0	0.0
1 inch	25.00	100.0	0.0
3/4 inch	19.00	100.0	0.0
3/8 inch	9.50	100.0	0.0
#4	4.75	97.6	2.4
#10	2.00	95.5	2.1
#20A	850.0 um	89.9	5.6
#40A	425.0	83.0	6.9
#60A	250.0	77.6	5.4
#80A	180.0	73.8	3.8
#100A	150.0	71.6	2.2
#200A	75.0	63.0	8.7
Hydrometer	29.7	38.1	24.9
|	19.8	31.2	6.9
|	12.0	23.4	7.8
|	8.6	18.3	5.2
|	6.4	14.8	3.5
|	2.7	7.2	7.6
V	1.4	3.5	3.7

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle operated for at least one minute within a dispersion cup

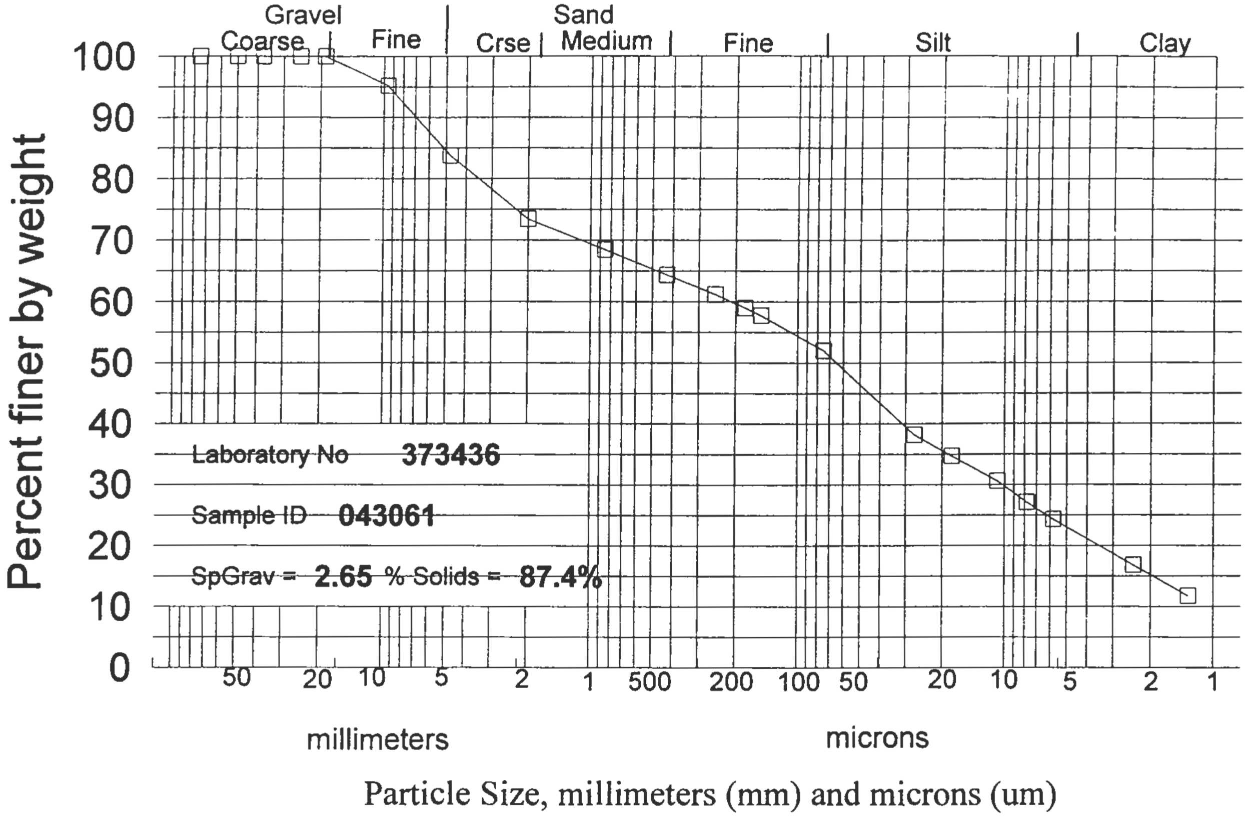
2764

Set 71765

Submitted By: 11:00 on 25-Jan-99 Lab No. 373435

STL-VT ASTM D422 Particle Size Analysis Sample ID **043061**

Sample preparation by: D2217



Maximum particle size: 19 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	95.2	4.8	
#4	4.75	83.8	11.4	
#10	2.00	73.4	10.4	
#20A	850.0 um	68.5	4.9	
#40A	425.0	64.4	4.1	
#60A	250.0	61.2	3.2	
#80A	180.0	59.0	2.2	
#100A	150.0	57.8	1.3	
#200A	75.0	52.0	5.7	
Hydrometer	27.3	38.2	13.8	Dispersion of soil
|	18.0	34.7	3.5	for hydrometer test
|	10.8	30.6	4.2	by mechanical mixer
|	7.8	27.1	3.5	with metal paddle
|	5.8	24.3	2.8	operated for at least
|	2.4	16.8	7.5	one minute within a
V	1.3	11.8	5.1	dispersion cup

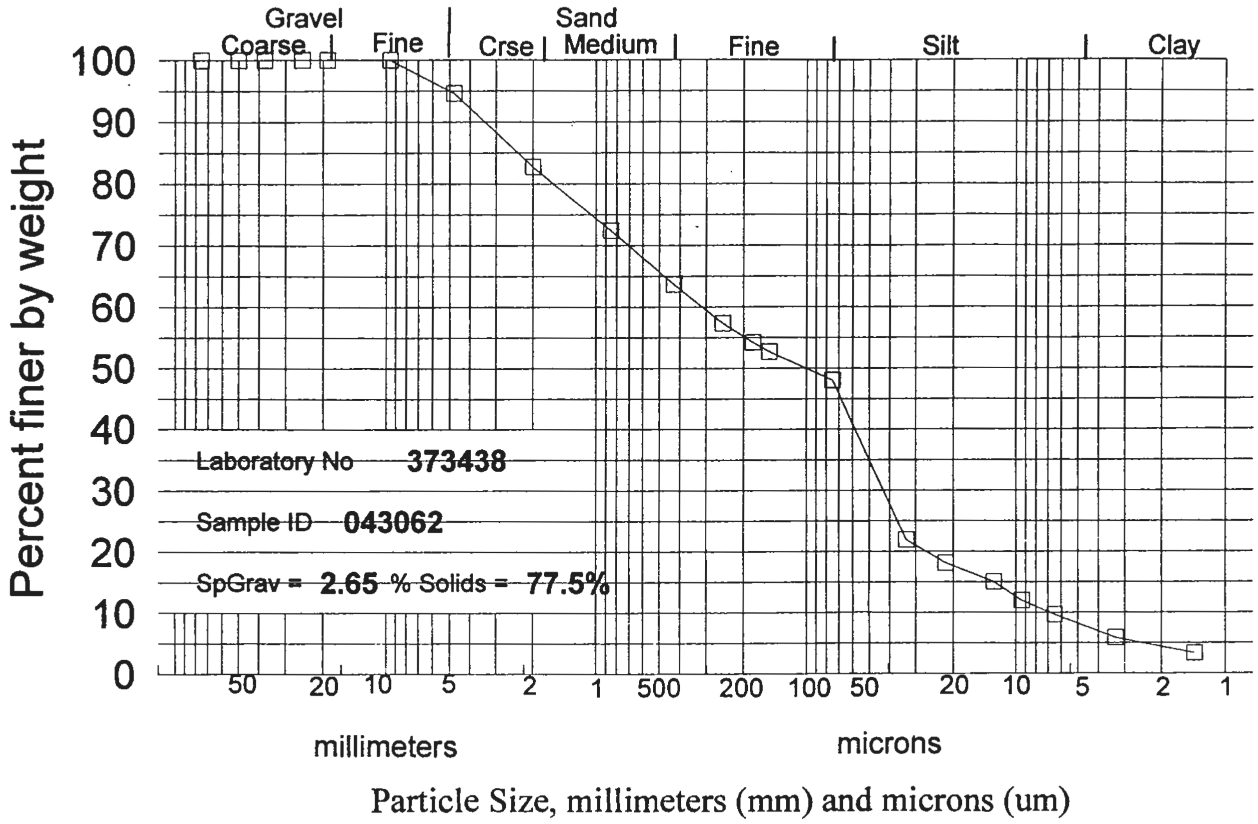
2765

Set 71765

Submitted By: 11:00 on 25-Jan-99 Lab No. 373436

STL-VT **ASTM D422 Particle Size Analysis** Sample ID **043062**

Sample preparation by: D2217



Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size		Percent finer	Incremental percent
3 inch	75.00	mm	100.0	0.0
2 inch	50.00		100.0	0.0
1.5 inch	37.50		100.0	0.0
1 inch	25.00		100.0	0.0
3/4 inch	19.00		100.0	0.0
3/8 inch	9.50		100.0	0.0
#4	4.75		94.6	5.4
#10	2.00		82.8	11.9
#20A	850.0	um	72.4	10.3
#40A	425.0		63.7	8.7
#60A	250.0		57.3	6.4
#80A	180.0		54.2	3.1
#100A	150.0		52.7	1.5
#200A	75.0		48.1	4.7
Hydrometer	33.4		21.9	26.1
|	21.7		18.1	3.8
|	12.8		15.0	3.1
|	9.4		12.0	3.1
|	6.5		9.7	2.3
|	3.3		5.9	3.8
V	1.4		3.3	2.5

Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

3582

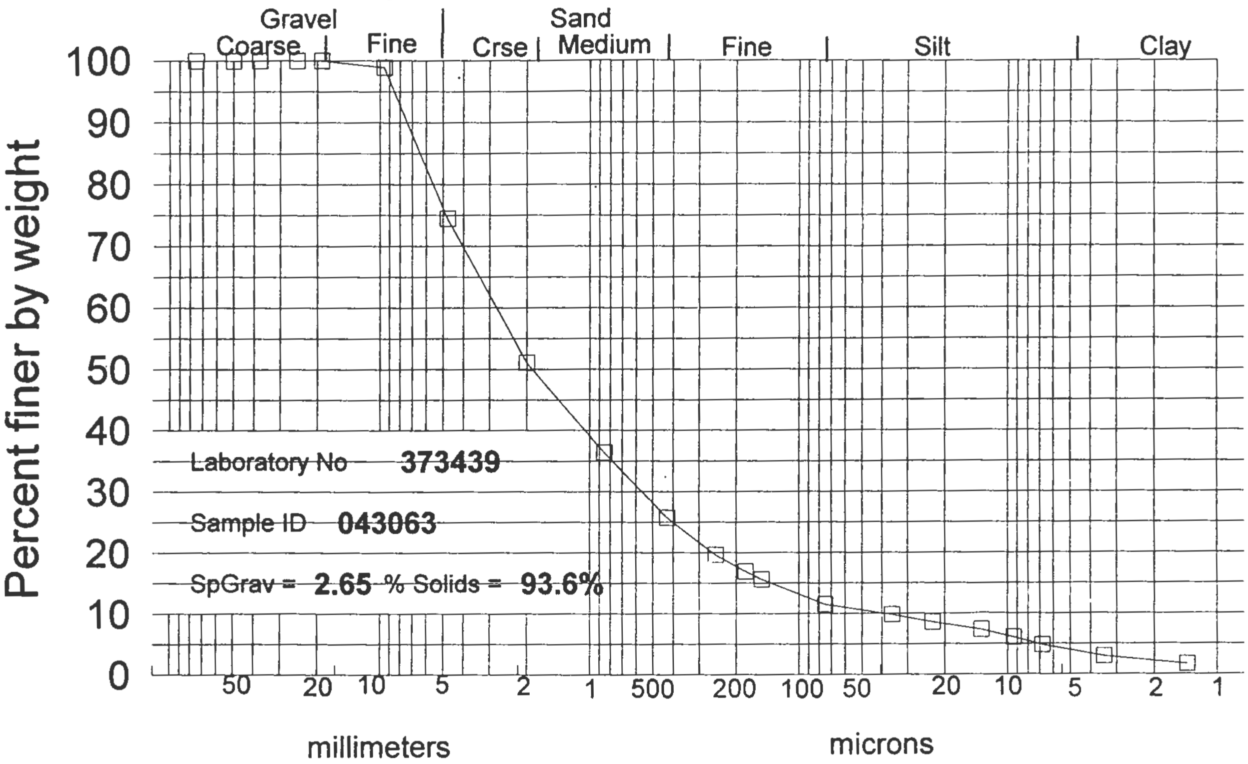
Set 71712

Submitted By: 11:02 on 22-Jan-99

Lab No. 373438

STL-VT **ASTM D422 Particle Size Analysis** Sample ID **043063**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum particle size: 19 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size		Percent finer	Incremental percent
3 inch	75.00	mm	100.0	0.0
2 inch	50.00		100.0	0.0
1.5 inch	37.50		100.0	0.0
1 inch	25.00		100.0	0.0
3/4 inch	19.00		100.0	0.0
3/8 inch	9.50		98.9	1.1
#4	4.75		74.5	24.4
#10	2.00		51.1	23.4
#20A	850.0	um	36.4	14.7
#40A	425.0		25.7	10.7
#60A	250.0		19.6	6.0
#80A	180.0		16.9	2.7
#100A	150.0		15.6	1.3
#200A	75.0		11.5	4.1
Hydrometer	35.8		9.8	1.7
|	22.8		8.6	1.3
|	13.3		7.3	1.3
|	9.3		6.1	1.3
|	6.8		4.8	1.3
|	3.4		2.9	1.9
V	1.4		1.7	1.3

Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

3583

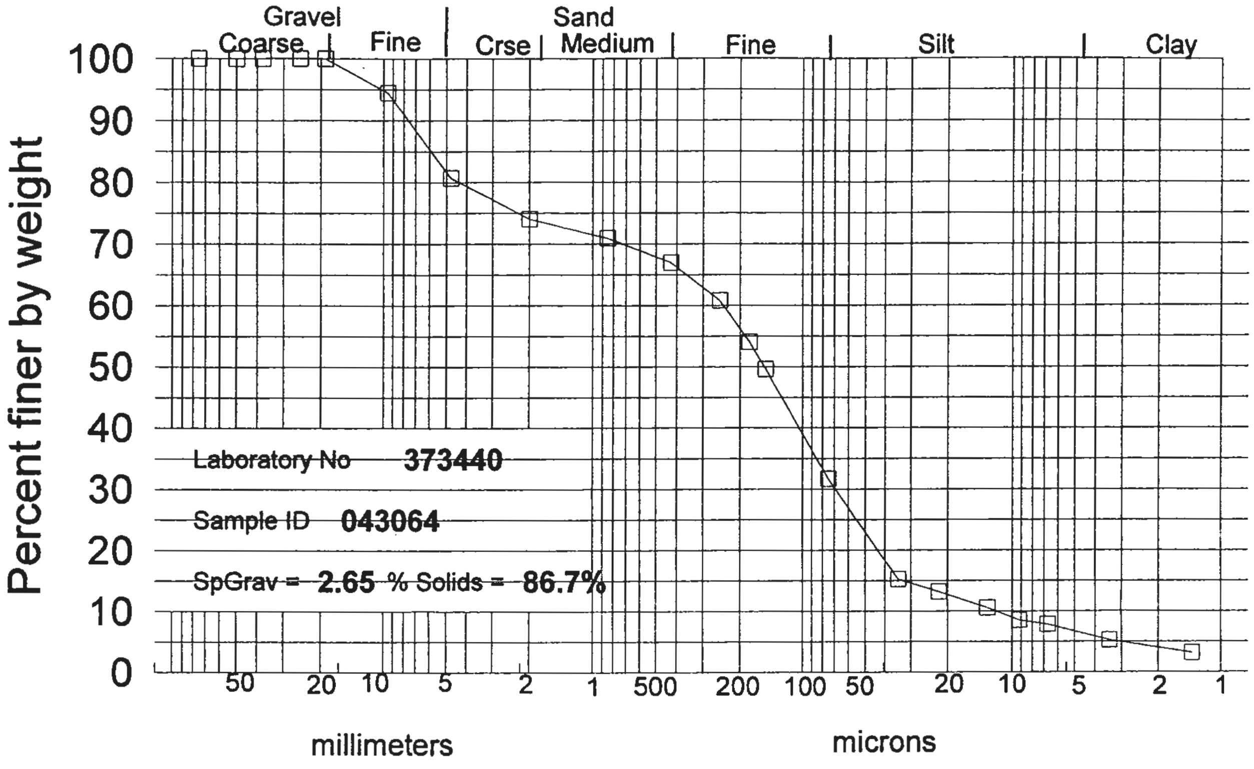
Set 71712

Submitted By: 11:03 on 22-Jan-99

Lab No. 373439

STL-VT **ASTM D422 Particle Size Analysis** Sample ID **043064**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum particle size: 19 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	94.4	5.6	
#4	4.75	80.7	13.7	
#10	2.00	74.0	6.7	
#20A	850.0 um	70.9	3.1	
#40A	425.0	67.0	4.0	
#60A	250.0	60.8	6.2	
#80A	180.0	54.1	6.7	
#100A	150.0	49.6	4.4	
#200A	75.0	31.7	17.9	
Hydrometer	34.5	15.3	16.4	Dispersion of soil
|	22.2	13.2	2.0	for hydrometer test
|	13.1	10.5	2.7	by mechanical mixer
|	9.2	8.5	2.0	with metal paddle
|	6.7	7.9	0.7	operated for at least
|	3.4	5.3	2.6	one minute within a
V	1.4	3.1	2.1	dispersion cup

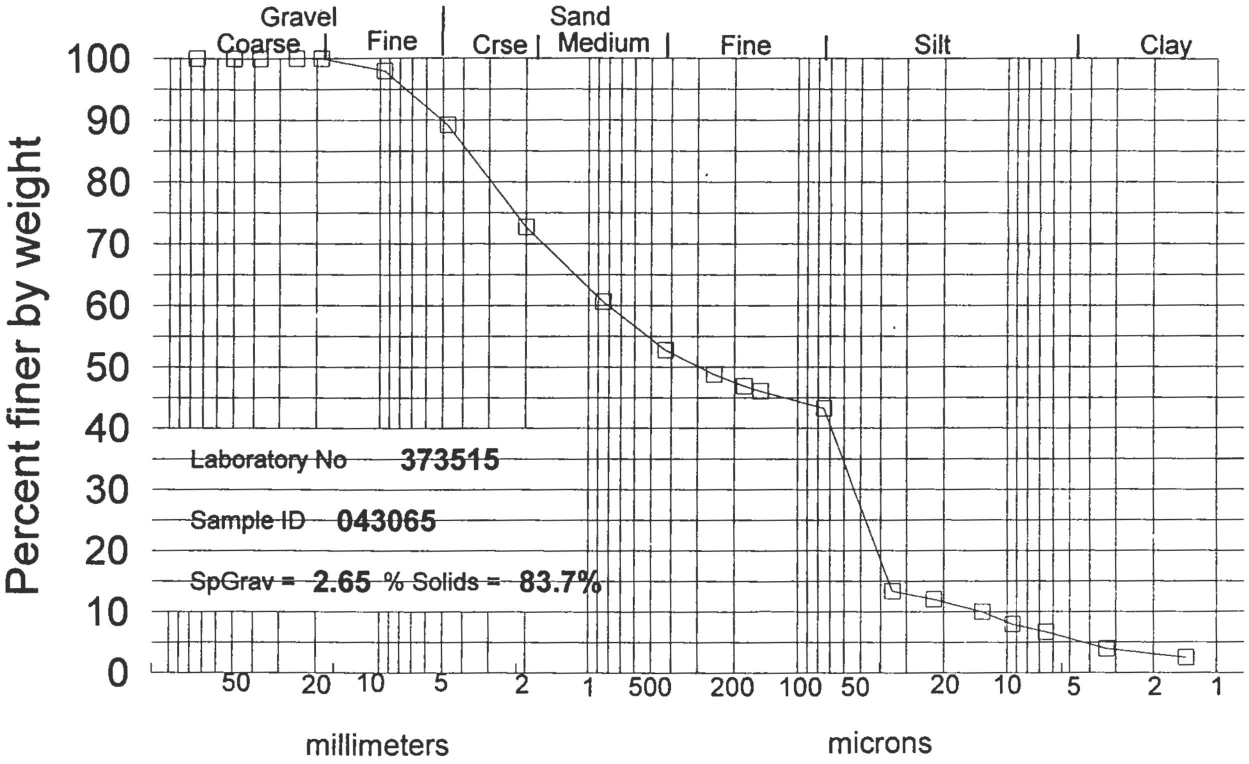
3584

Set 71712

Submitted By: 11:03 on 22-Jan-99 Lab No. 373440

STL-VT **ASTM D422 Particle Size Analysis** Sample ID **043065**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum particle size: 19 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size	Percent finer	Incremental percent
3 inch	75.00 mm	100.0	0.0
2 inch	50.00	100.0	0.0
1.5 inch	37.50	100.0	0.0
1 inch	25.00	100.0	0.0
3/4 inch	19.00	100.0	0.0
3/8 inch	9.50	98.0	2.0
#4	4.75	89.2	8.8
#10	2.00	72.7	16.5
#20A	850.0 um	60.6	12.1
#40A	425.0	52.8	7.8
#60A	250.0	48.8	4.0
#80A	180.0	46.9	1.9
#100A	150.0	46.1	0.8
#200A	75.0	43.3	2.8
Hydrometer	35.0	13.4	29.9
|	22.4	12.0	1.4
|	13.1	10.0	2.0
|	9.4	7.9	2.0
|	6.5	6.7	1.2
|	3.3	4.0	2.7
V	1.4	2.5	1.5

Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

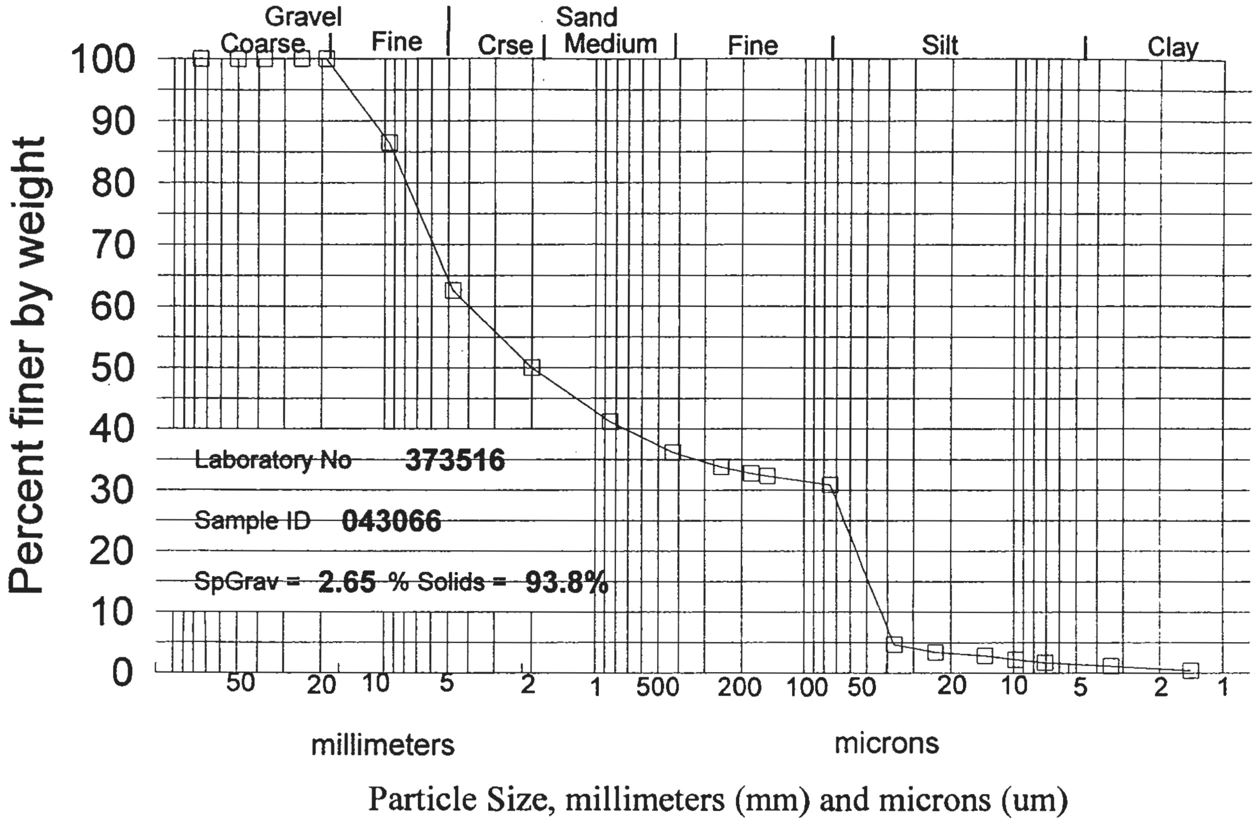
3587

Set 71712

Submitted By: 11:04 on 22-Jan-99 Lab No. 373515

STL-VT   ASTM D422 Particle Size Analysis   Sample ID   **043066**

Sample preparation by: D2217



Maximum
particle size: 19 mm   Shape and hardness (>#10):   Subangular   Hard

Sieve size	Particle Size		Percent finer	Incremental percent	
3 inch	75.00	mm	100.0	0.0	
2 inch	50.00		100.0	0.0	
1.5 inch	37.50		100.0	0.0	
1 inch	25.00		100.0	0.0	
3/4 inch	19.00		100.0	0.0	
3/8 inch	9.50		86.5	13.5	
#4	4.75		62.6	23.9	
#10	2.00		50.0	12.6	
#20A	850.0	um	41.2	8.8	
#40A	425.0		36.2	5.0	
#60A	250.0		33.8	2.4	
#80A	180.0		32.8	1.0	
#100A	150.0		32.3	0.4	
#200A	75.0		30.9	1.4	
Hydrometer	37.1		4.6	26.2	Dispersion of soil
|	23.7		3.4	1.2	for hydrometer test
|	13.7		2.8	0.6	by mechanical mixer
|	9.8		2.2	0.6	with metal paddle
|	7.1		1.7	0.5	operated for at least
|	3.4		1.1	0.6	one minute within a
V	1.4		0.4	0.7	dispersion cup

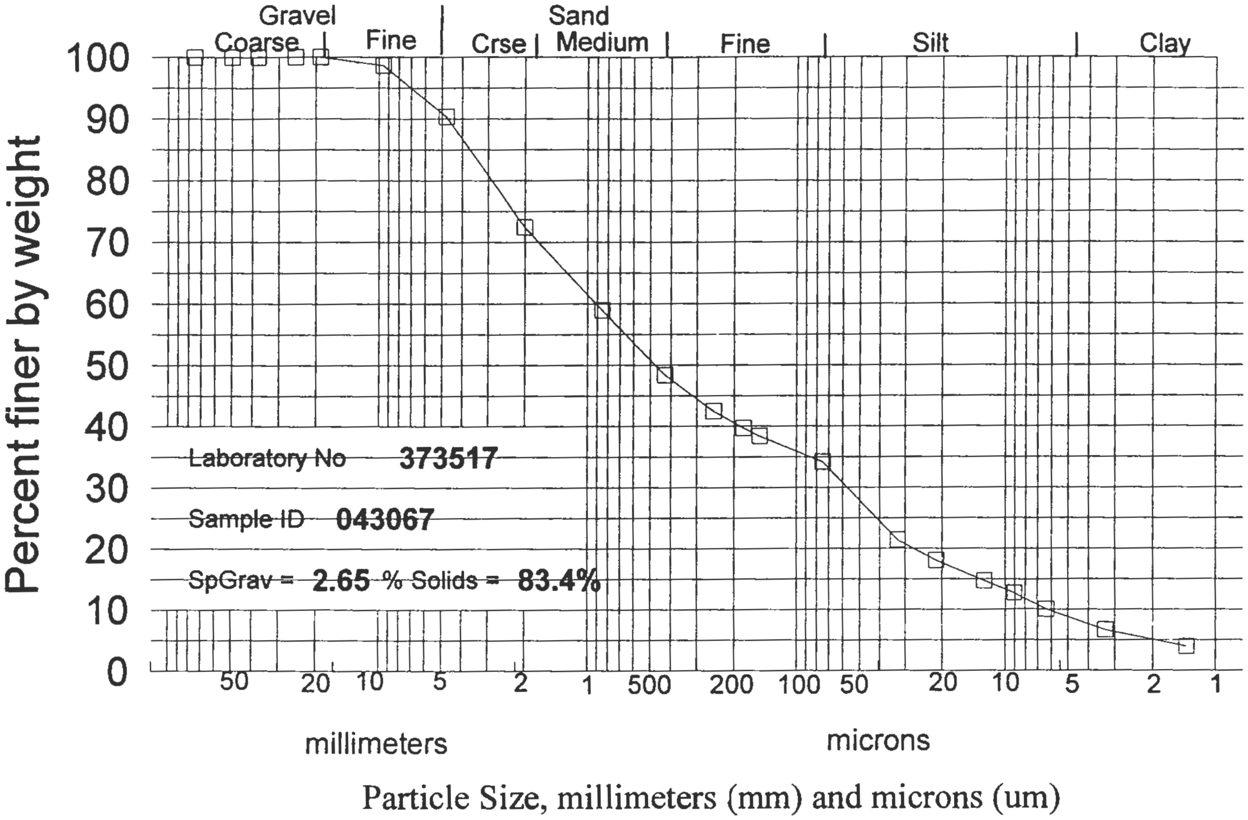
3588

Set   71712

Submitted By: 11:06 on   22-Jan-99   Lab No.   373516

STL-VT ASTM D422 Particle Size Analysis Sample ID **043067**

Sample preparation by: D2217



Maximum
particle size: 19 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size		Percent finer	Incremental percent	
3 inch	75.00	mm	100.0	0.0	
2 inch	50.00		100.0	0.0	
1.5 inch	37.50		100.0	0.0	
1 inch	25.00		100.0	0.0	
3/4 inch	19.00		100.0	0.0	
3/8 inch	9.50		98.6	1.4	
#4	4.75		90.4	8.3	
#10	2.00		72.4	17.9	
#20A	850.0	um	59.0	13.5	
#40A	425.0		48.4	10.6	
#60A	250.0		42.5	5.9	
#80A	180.0		39.7	2.8	
#100A	150.0		38.4	1.3	
#200A	75.0		34.2	4.2	
Hydrometer	32.8		21.4	12.8	Dispersion of soil
|	21.4		18.0	3.4	for hydrometer test
|	12.6		14.8	3.3	by mechanical mixer
|	9.0		12.7	2.0	with metal paddle
|	6.4		10.0	2.7	operated for at least
|	3.3		6.6	3.4	one minute within a
V	1.4		3.9	2.7	dispersion cup

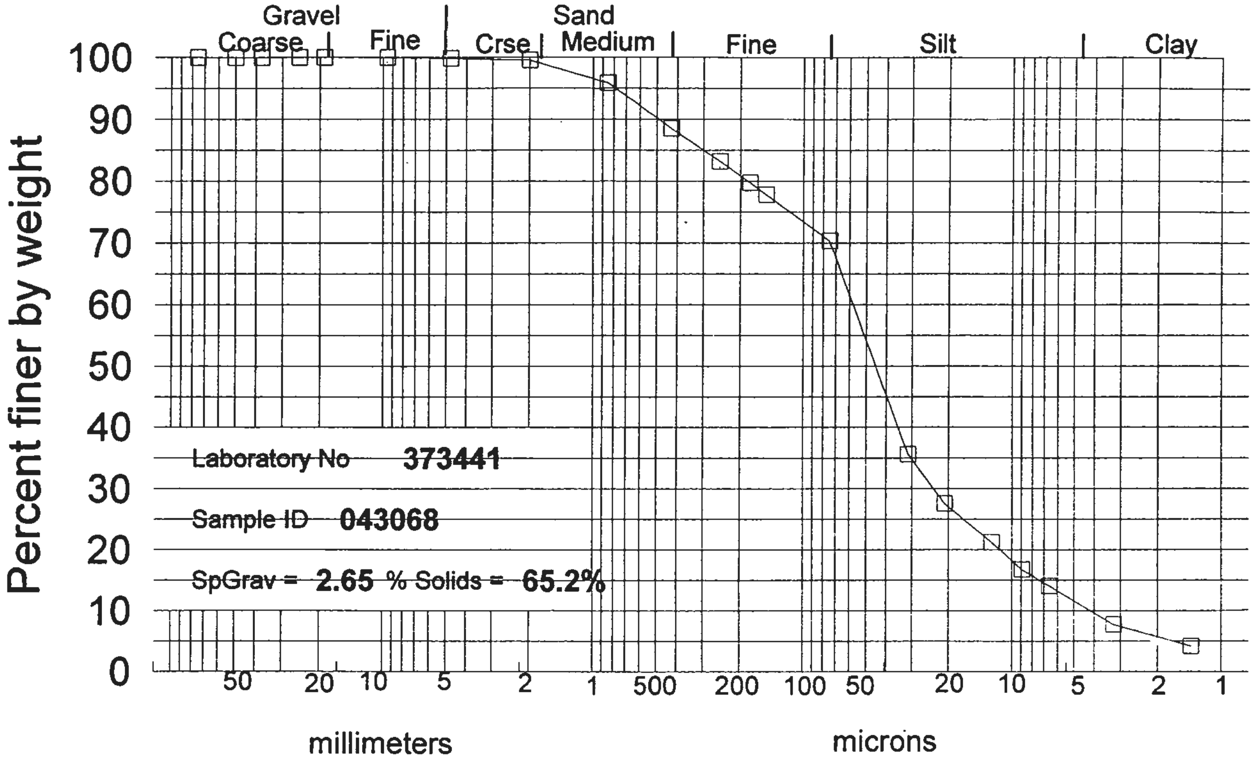
3589

Set 71712

Submitted By: 11:06 on 22-Jan-99 Lab No. 373517

STL-VT **ASTM D422 Particle Size Analysis** Sample ID **043068**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum particle size: 9.5 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size		Percent finer	Incremental percent
3 inch	75.00	mm	100.0	0.0
2 inch	50.00		100.0	0.0
1.5 inch	37.50		100.0	0.0
1 inch	25.00		100.0	0.0
3/4 inch	19.00		100.0	0.0
3/8 inch	9.50		100.0	0.0
#4	4.75		99.9	0.1
#10	2.00		99.5	0.3
#20A	850.0	um	95.9	3.7
#40A	425.0		88.6	7.3
#60A	250.0		83.2	5.4
#80A	180.0		79.7	3.5
#100A	150.0		77.8	1.9
#200A	75.0		70.3	7.5
Hydrometer	31.2		35.6	34.7
|	20.9		27.5	8.1
|	12.5		21.2	6.3
|	8.9		16.8	4.5
|	6.6		14.1	2.7
|	3.2		7.8	6.3
V	1.4		4.2	3.6

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle operated for at least one minute within a dispersion cup

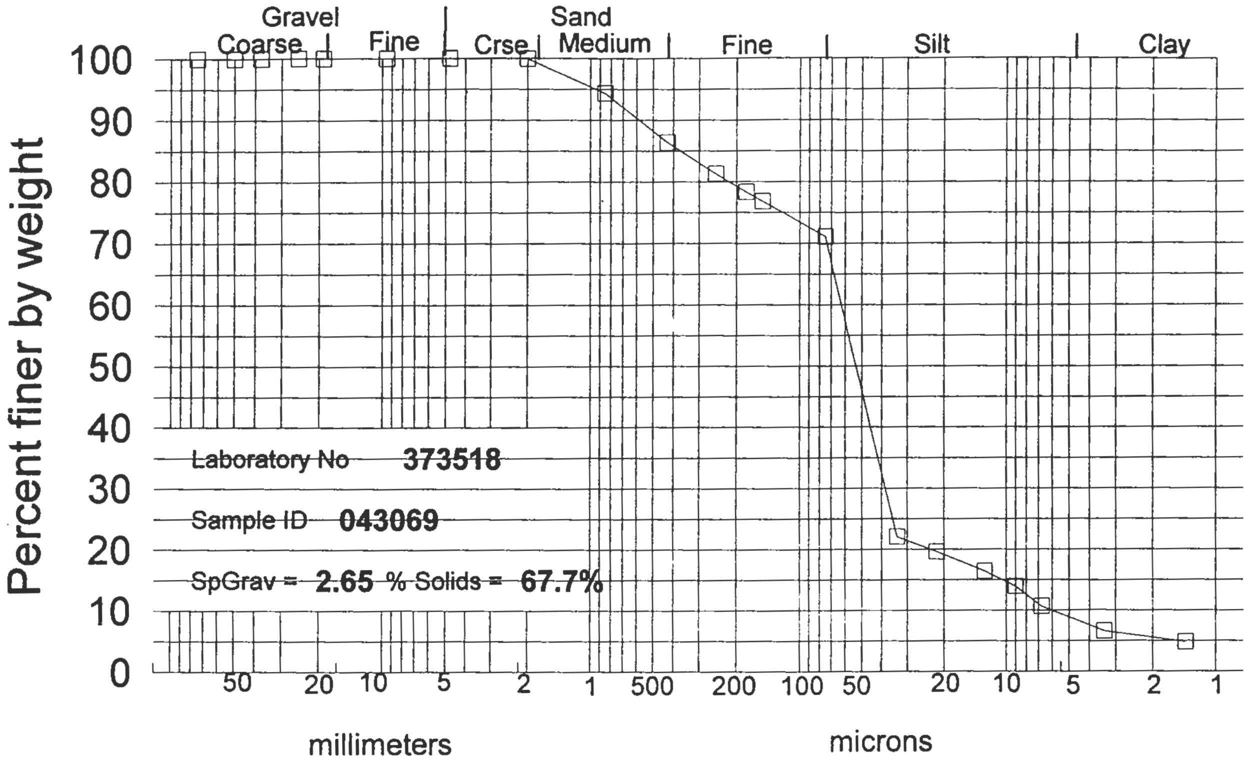
3585

Set 71712

Submitted By: 11:04 on 22-Jan-99 Lab No. 373441

STL-VT **ASTM D422 Particle Size Analysis** Sample ID **043069**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum particle size: Crs sand Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size		Percent finer	Incremental percent	
3 inch	75.00	mm	100.0	0.0	
2 inch	50.00		100.0	0.0	
1.5 inch	37.50		100.0	0.0	
1 inch	25.00		100.0	0.0	
3/4 inch	19.00		100.0	0.0	
3/8 inch	9.50		100.0	0.0	
#4	4.75		100.0	0.0	
#10	2.00		99.9	0.1	
#20A	850.0	um	94.3	5.6	
#40A	425.0		86.4	8.0	
#60A	250.0		81.3	5.1	
#80A	180.0		78.3	3.0	
#100A	150.0		76.8	1.5	
#200A	75.0		71.1	5.7	
Hydrometer	33.8		22.1	49.0	Dispersion of soil
|	21.7		19.6	2.5	for hydrometer test
|	12.7		16.4	3.2	by mechanical mixer
|	9.0		13.9	2.5	with metal paddle
|	6.8		10.6	3.3	operated for at least
|	3.4		6.6	4.0	one minute within a
V	1.4		4.8	1.8	dispersion cup

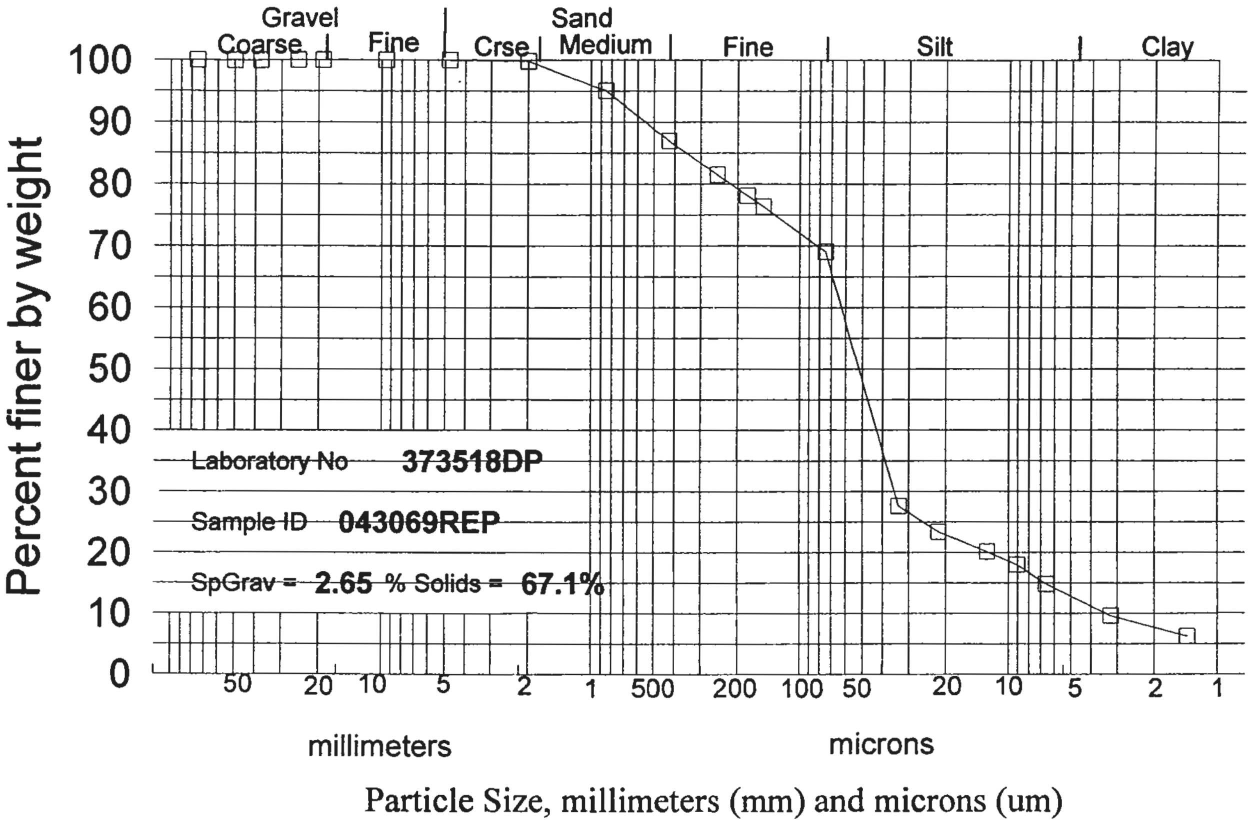
3590

Set 71712

Submitted By: 11:06 on 22-Jan-99 Lab No. 373518

STL-VT **ASTM D422 Particle Size Analysis** Sample ID **043069REP**

Sample preparation by: D2217



Maximum particle size: Crs sand

Shape and hardness (>#10): Subrounded Hard

Sieve size	Particle Size		Percent finer	Incremental percent	
3 inch	75.00	mm	100.0	0.0	
2 inch	50.00		100.0	0.0	
1.5 inch	37.50		100.0	0.0	
1 inch	25.00		100.0	0.0	
3/4 inch	19.00		100.0	0.0	
3/8 inch	9.50		100.0	0.0	
#4	4.75		100.0	0.0	
#10	2.00		99.8	0.2	
#20A	850.0	um	95.1	4.8	
#40A	425.0		87.0	8.1	
#60A	250.0		81.5	5.5	
#80A	180.0		78.1	3.4	
#100A	150.0		76.3	1.8	
#200A	75.0		69.1	7.3	
Hydrometer	33.6		27.6	41.4	Dispersion of soil
|	21.7		23.4	4.3	for hydrometer test
|	12.7		20.2	3.2	by mechanical mixer
|	9.1		18.0	2.1	with metal paddle
|	6.6		14.8	3.2	operated for at least
|	3.2		9.6	5.2	one minute within a
V	1.4		6.2	3.4	dispersion cup

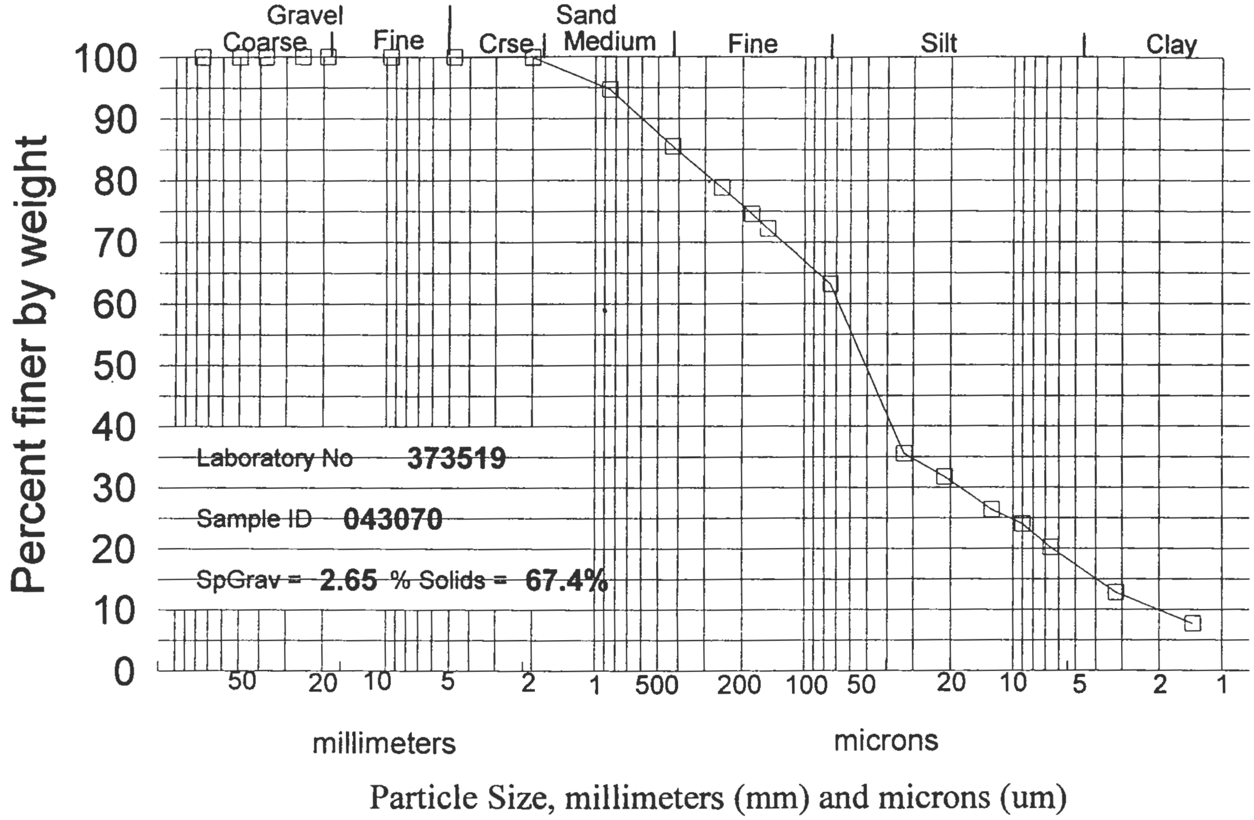
3591

Set 71771

Submitted By: 13:09 on 25-Jan-99 Lab No. 373518DP

STL-VT ASTM D422 Particle Size Analysis Sample ID **043070**

Sample preparation by: D2217



Maximum
particle size: Crs sand

Shape and hardness (>#10): Subrounded Hard

Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	100.0	0.0	
#4	4.75	100.0	0.0	
#10	2.00	99.9	0.1	
#20A	850.0 um	94.7	5.2	
#40A	425.0	85.5	9.1	
#60A	250.0	78.8	6.7	
#80A	180.0	74.6	4.3	
#100A	150.0	72.2	2.3	
#200A	75.0	63.2	9.0	
Hydrometer	33.2	35.6	27.7	Dispersion of soil
|	21.3	31.7	3.8	for hydrometer test
|	12.7	26.4	5.3	by mechanical mixer
|	9.0	24.1	2.3	with metal paddle
|	6.6	20.2	3.8	operated for at least
|	3.2	12.8	7.5	one minute within a
V	1.4	7.7	5.1	dispersion cup

3592

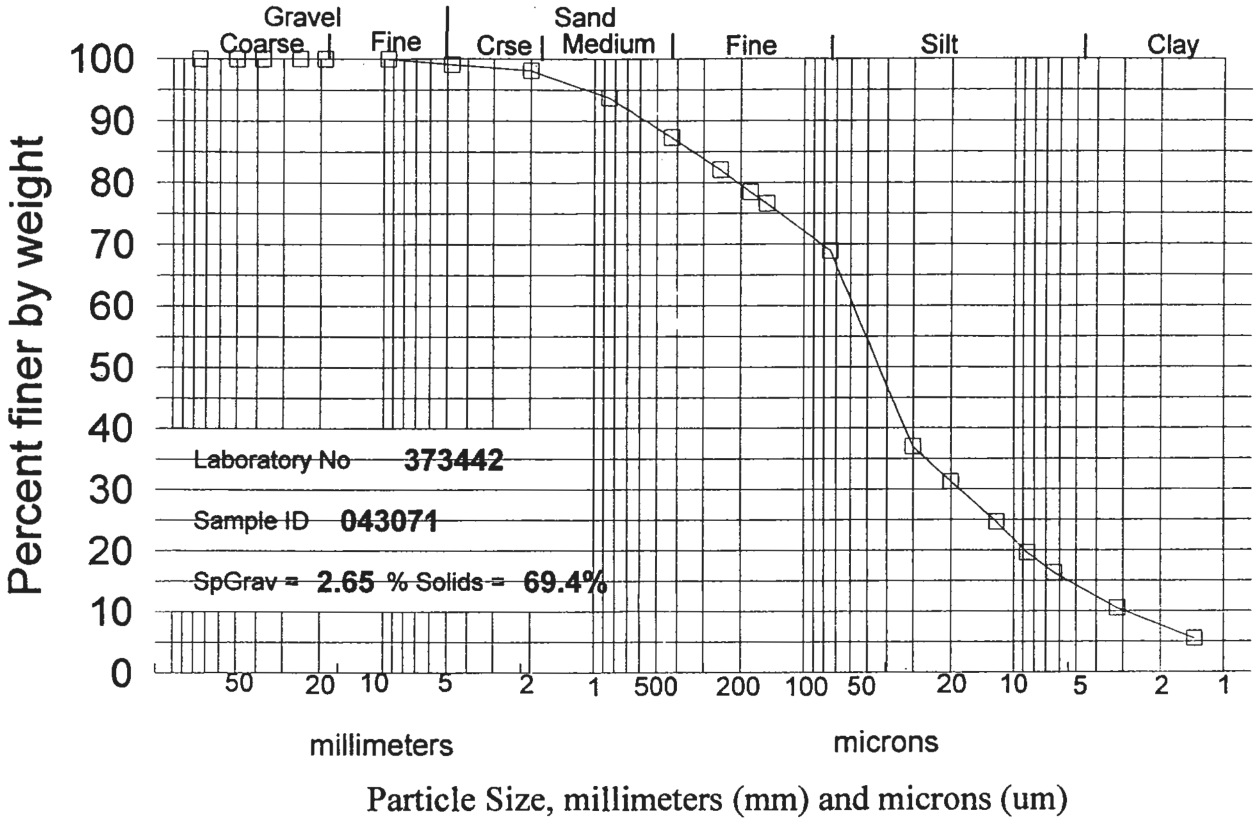
Set 71771

Submitted By: 11:38 on 25-Jan-99

Lab No. 373519

STL-VT ASTM D422 Particle Size Analysis Sample ID **043071**

Sample preparation by: D2217



Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size		Percent finer	Incremental percent	
3 inch	75.00	mm	100.0	0.0	
2 inch	50.00		100.0	0.0	
1.5 inch	37.50		100.0	0.0	
1 inch	25.00		100.0	0.0	
3/4 inch	19.00		100.0	0.0	
3/8 inch	9.50		100.0	0.0	
#4	4.75		99.1	0.9	
#10	2.00		98.1	0.9	
#20A	850.0	um	93.7	4.4	
#40A	425.0		87.3	6.4	
#60A	250.0		82.1	5.2	
#80A	180.0		78.5	3.6	
#100A	150.0		76.6	1.9	
#200A	75.0		69.0	7.6	
Hydrometer	30.2		37.0	31.9	Dispersion of soil
|	20.0		31.2	5.8	for hydrometer test
|	12.1		24.6	6.6	by mechanical mixer
|	8.6		19.6	5.0	with metal paddle
|	6.4		16.3	3.3	operated for at least
|	3.2		10.5	5.8	one minute within a
V	1.4		5.5	5.0	dispersion cup

3586

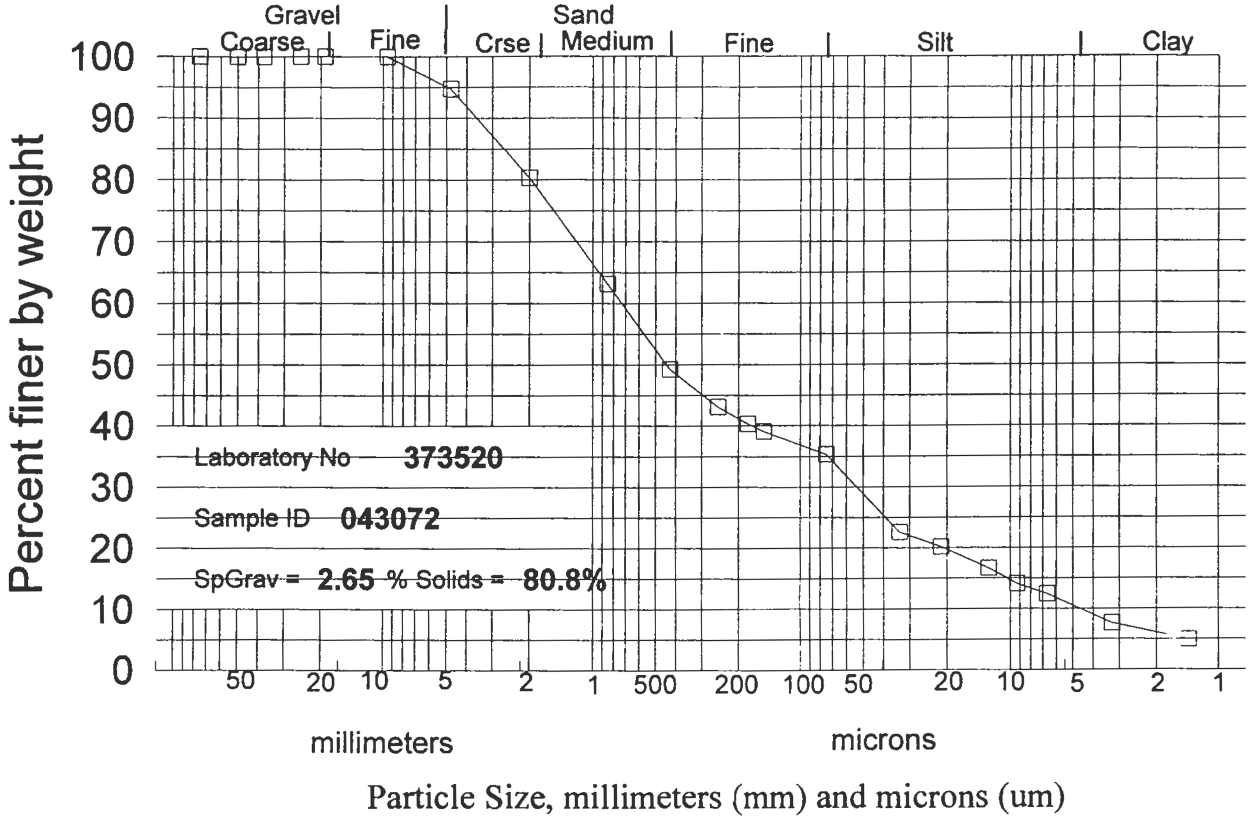
Set 71712

Submitted By: 11:04 on 22-Jan-99

Lab No. 373442

STL-VT ASTM D422 Particle Size Analysis Sample ID **043072**

Sample preparation by: D2217



Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	100.0	0.0	
#4	4.75	94.7	5.3	
#10	2.00	80.3	14.4	
#20A	850.0 um	63.2	17.2	
#40A	425.0	49.2	13.9	
#60A	250.0	43.1	6.1	
#80A	180.0	40.3	2.8	
#100A	150.0	39.1	1.2	
#200A	75.0	35.3	3.8	
Hydrometer	33.6	22.6	12.7	Dispersion of soil
|	21.5	20.2	2.4	for hydrometer test
|	12.7	16.7	3.5	by mechanical mixer
|	9.3	14.1	2.5	with metal paddle
|	6.6	12.4	1.7	operated for at least
|	3.3	7.6	4.8	one minute within a
V	1.4	4.9	2.7	dispersion cup

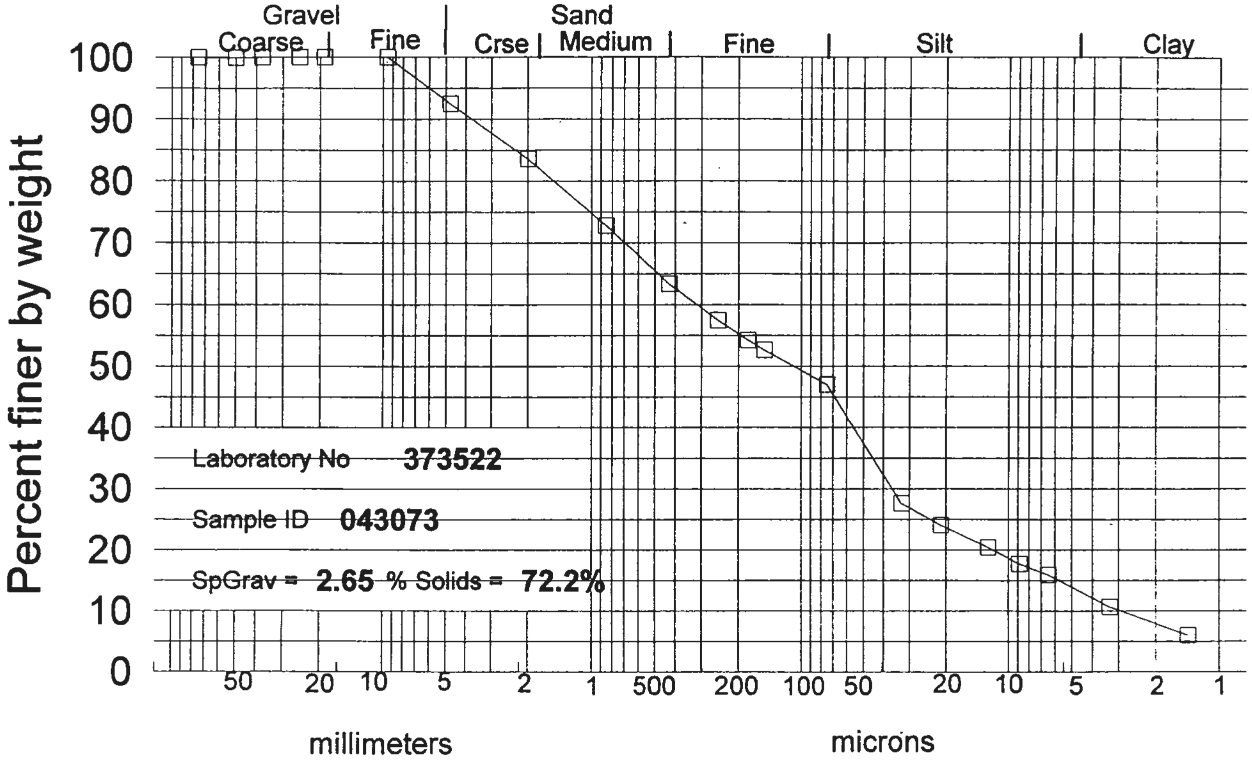
3593

Submitted By: 11:39 on 25-Jan-99

Set 71771
Lab No. 373520

STL-VT **ASTM D422 Particle Size Analysis** Sample ID **043073**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	100.0	0.0	
#4	4.75	92.5	7.5	
#10	2.00	83.6	8.9	
#20A	850.0 um	72.8	10.8	
#40A	425.0	63.4	9.4	
#60A	250.0	57.5	5.9	
#80A	180.0	54.3	3.2	
#100A	150.0	52.6	1.6	
#200A	75.0	47.0	5.6	
Hydrometer	32.8	27.6	19.4	Dispersion of soil
|	21.2	24.0	3.6	for hydrometer test
|	12.5	20.4	3.6	by mechanical mixer
|	8.9	17.7	2.7	with metal paddle
|	6.4	15.9	1.8	operated for at least
|	3.3	10.7	5.3	one minute within a
V	1.4	6.0	4.7	dispersion cup

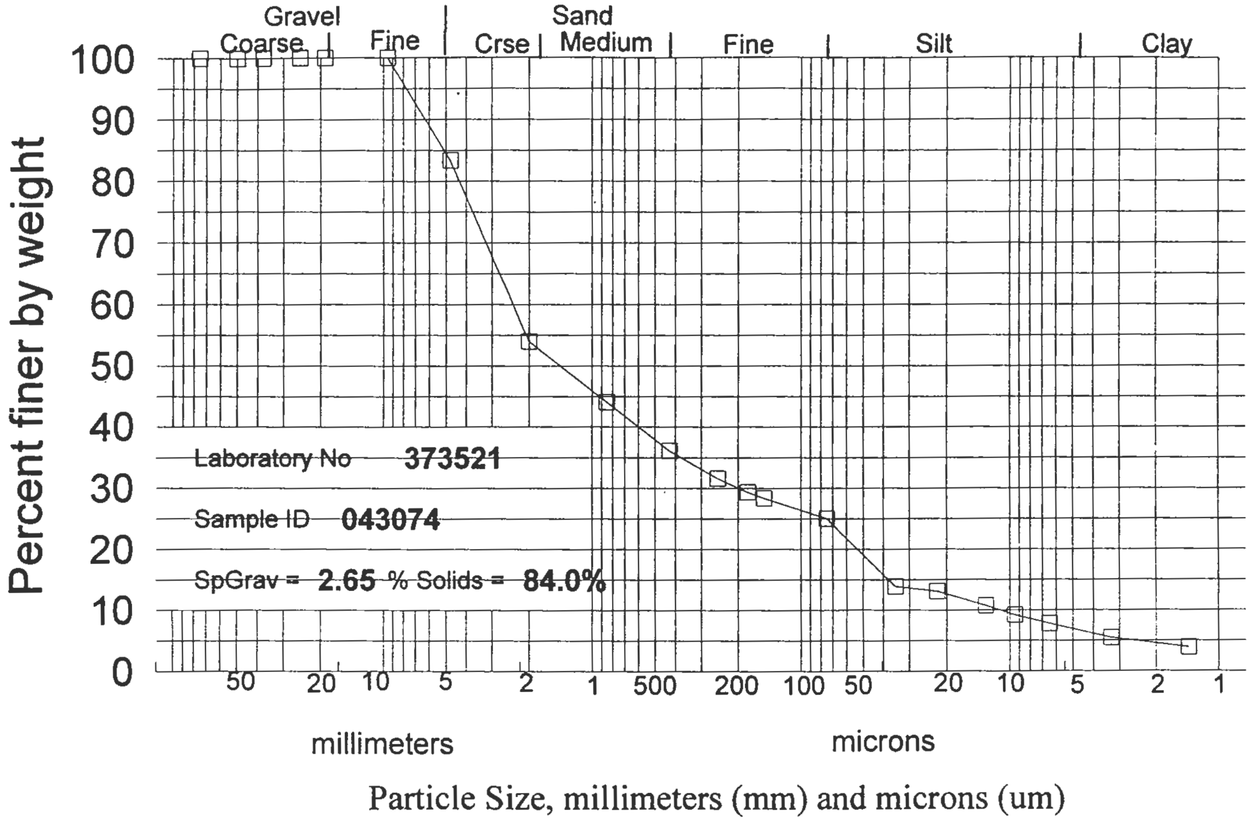
3595

Set 71771

Submitted By: 11:39 on 25-Jan-99 Lab No. 373522

STL-VT **ASTM D422 Particle Size Analysis** Sample ID **043074**

Sample preparation by: D2217



Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size	Percent finer	Incremental percent
3 inch	75.00 mm	100.0	0.0
2 inch	50.00	100.0	0.0
1.5 inch	37.50	100.0	0.0
1 inch	25.00	100.0	0.0
3/4 inch	19.00	100.0	0.0
3/8 inch	9.50	100.0	0.0
#4	4.75	83.3	16.7
#10	2.00	54.0	29.3
#20A	850.0 um	44.1	9.9
#40A	425.0	36.1	8.0
#60A	250.0	31.6	4.5
#80A	180.0	29.4	2.2
#100A	150.0	28.4	1.0
#200A	75.0	25.1	3.3
Hydrometer	35.0	13.9	11.2
|	22.3	13.1	0.8
|	13.0	10.8	2.3
|	9.5	9.2	1.6
|	6.4	7.8	1.4
|	3.3	5.5	2.3
V	1.4	3.9	1.6

Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

3594

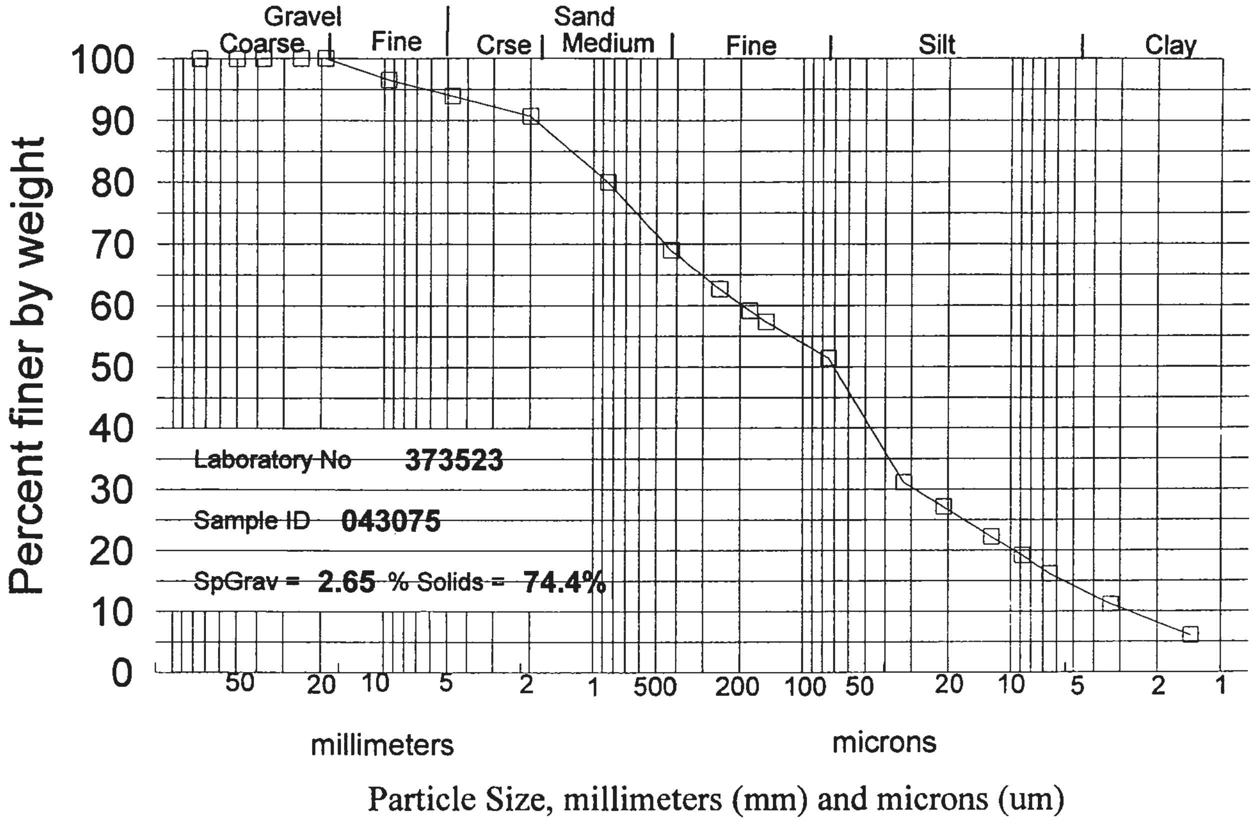
Set 71771

Submitted By: 11:39 on 25-Jan-99

Lab No. 373521

STL-VT **ASTM D422 Particle Size Analysis** Sample ID **043075**

Sample preparation by: D2217



Maximum
particle size: 19 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size		Percent finer	Incremental percent	
3 inch	75.00	mm	100.0	0.0	
2 inch	50.00		100.0	0.0	
1.5 inch	37.50		100.0	0.0	
1 inch	25.00		100.0	0.0	
3/4 inch	19.00		100.0	0.0	
3/8 inch	9.50		96.5	3.5	
#4	4.75		94.0	2.6	
#10	2.00		90.7	3.3	
#20A	850.0	um	80.0	10.7	
#40A	425.0		69.0	11.0	
#60A	250.0		62.7	6.3	
#80A	180.0		59.1	3.6	
#100A	150.0		57.3	1.8	
#200A	75.0		51.5	5.9	
Hydrometer	32.6		31.1	20.3	Dispersion of soil
|	21.1		27.1	4.0	for hydrometer test
|	12.4		22.2	4.9	by mechanical mixer
|	8.8		19.2	3.0	with metal paddle
|	6.5		16.2	3.0	operated for at least
|	3.3		11.1	5.0	one minute within a
V	1.4		6.1	5.0	dispersion cup

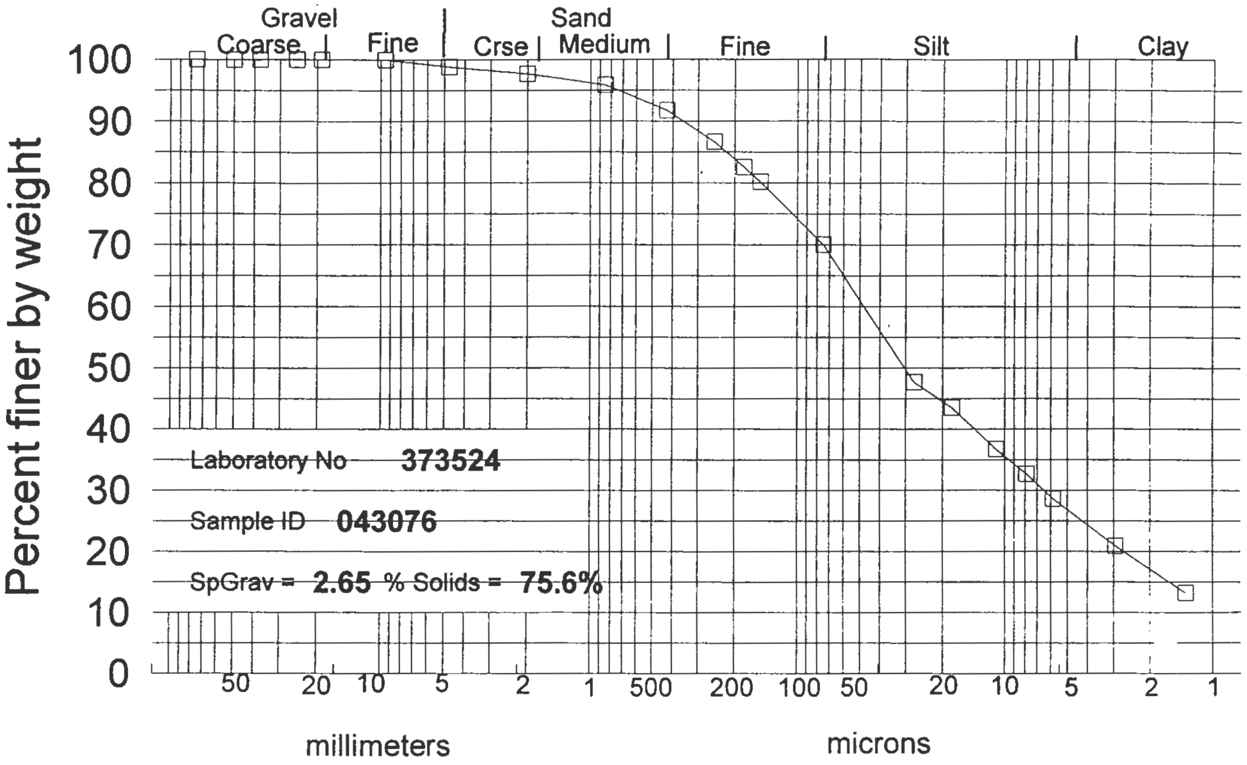
3596

Set 71771

Submitted By: 11:39 on 25-Jan-99 Lab No. 373523

STL-VT ASTM D422 Particle Size Analysis Sample ID **043076**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum particle size: 9.5 mm

Shape and hardness (>#10): Subrounded Hard

Sieve size	Particle Size		Percent finer	Incremental percent	
3 inch	75.00	mm	100.0	0.0	
2 inch	50.00		100.0	0.0	
1.5 inch	37.50		100.0	0.0	
1 inch	25.00		100.0	0.0	
3/4 inch	19.00		100.0	0.0	
3/8 inch	9.50		100.0	0.0	
#4	4.75		98.8	1.2	
#10	2.00		97.7	1.1	
#20A	850.0	um	95.9	1.9	
#40A	425.0		91.8	4.1	
#60A	250.0		86.7	5.1	
#80A	180.0		82.6	4.1	
#100A	150.0		80.2	2.4	
#200A	75.0		70.0	10.2	
Hydrometer	27.3		47.7	22.3	Dispersion of soil
|	18.0		43.5	4.2	for hydrometer test
|	11.0		36.8	6.7	by mechanical mixer
|	7.9		32.7	4.1	with metal paddle
|	5.9		28.6	4.1	operated for at least
|	2.9		20.9	7.7	one minute within a
V	1.3		13.2	7.7	dispersion cup

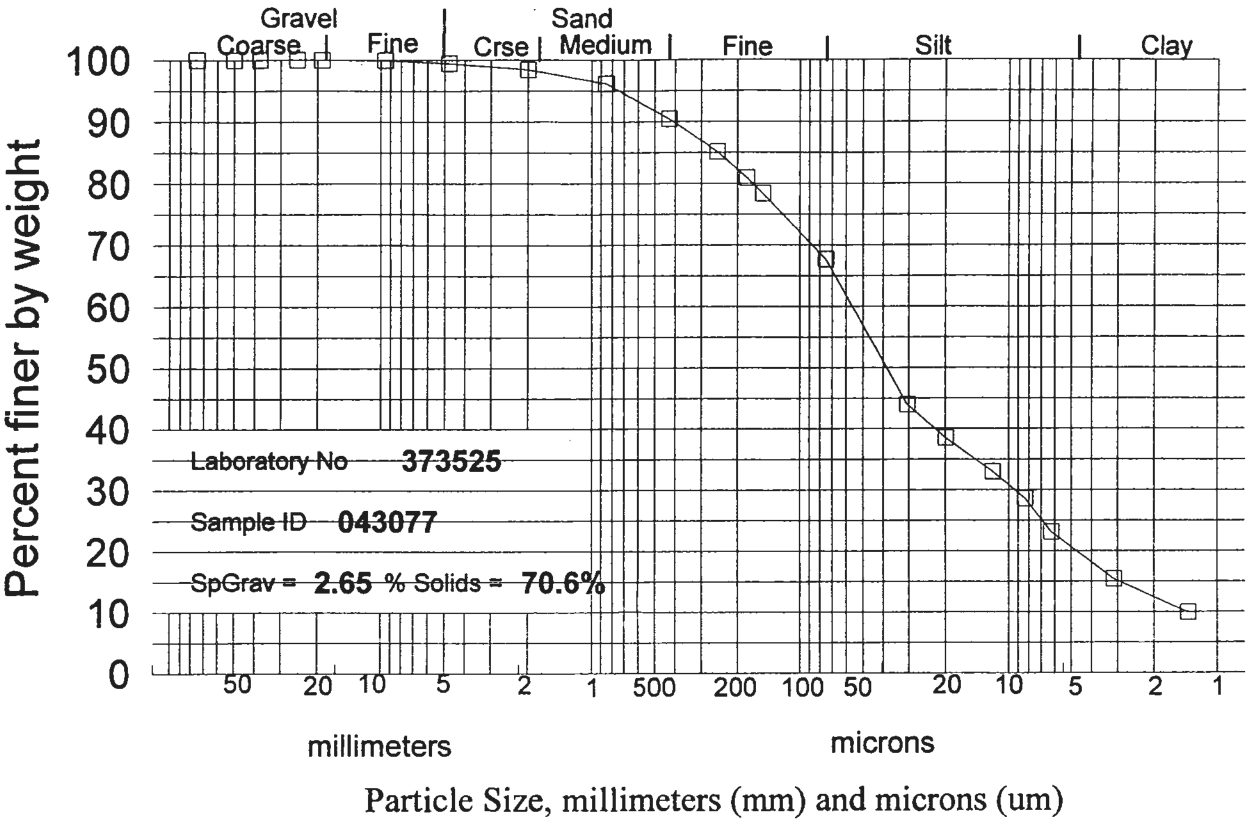
3597

Set 71771

Submitted By: 11:39 on 25-Jan-99 Lab No. 373524

STL-VT **ASTM D422 Particle Size Analysis** Sample ID **043077**

Sample preparation by: D2217



Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	100.0	0.0	
#4	4.75	99.5	0.5	
#10	2.00	98.4	1.1	
#20A	850.0 um	96.2	2.3	
#40A	425.0	90.5	5.7	
#60A	250.0	85.1	5.3	
#80A	180.0	80.9	4.2	
#100A	150.0	78.4	2.6	
#200A	75.0	67.7	10.7	
Hydrometer	30.7	44.0	23.7	Dispersion of soil
|	20.0	38.5	5.5	for hydrometer test
|	11.9	33.0	5.5	by mechanical mixer
|	8.3	28.6	4.4	with metal paddle
|	6.3	23.1	5.5	operated for at least
|	3.1	15.4	7.7	one minute within a
V	1.4	9.9	5.5	dispersion cup

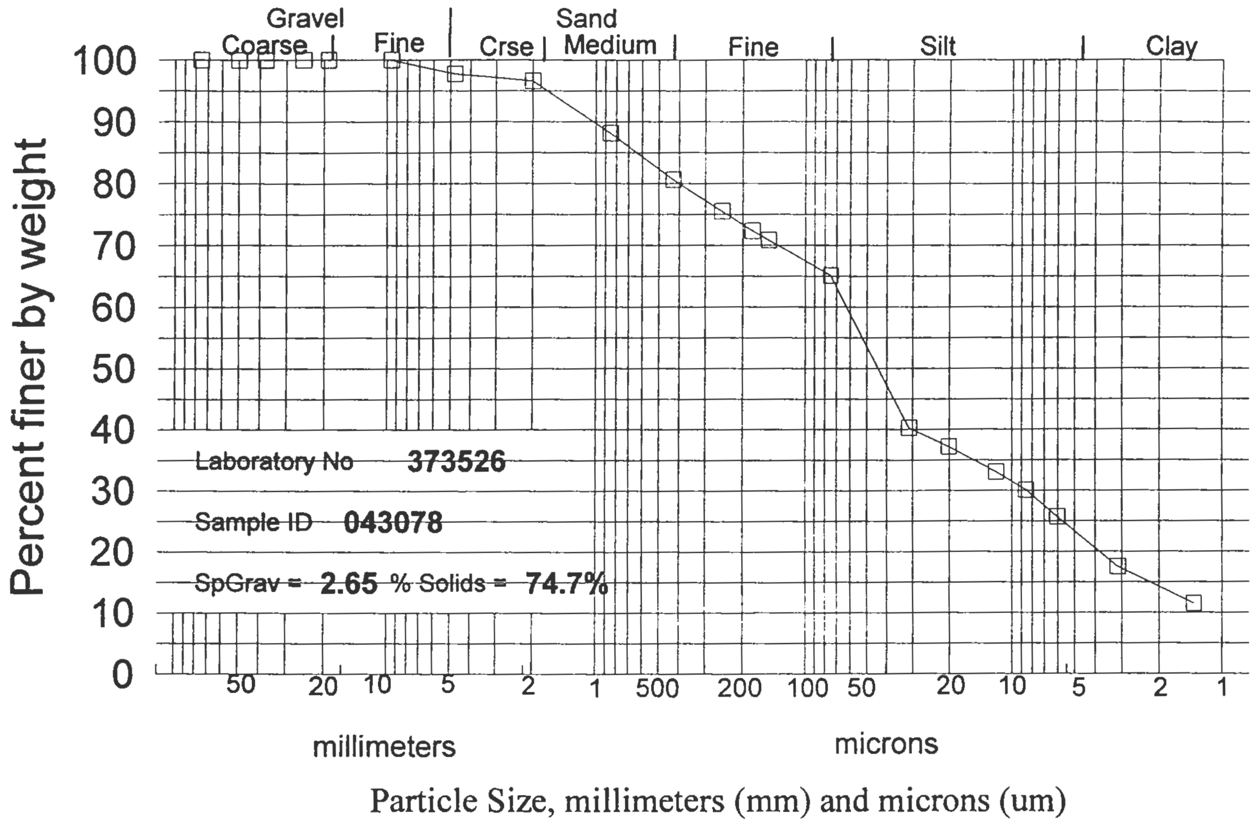
3598

Set 71771

Submitted By: 11:40 on 25-Jan-99 Lab No. 373525

STL-VT **ASTM D422 Particle Size Analysis** Sample ID **043078**

Sample preparation by: D2217



Maximum particle size: 9.5 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size	Percent finer	Incremental percent
3 inch	75.00 mm	100.0	0.0
2 inch	50.00	100.0	0.0
1.5 inch	37.50	100.0	0.0
1 inch	25.00	100.0	0.0
3/4 inch	19.00	100.0	0.0
3/8 inch	9.50	100.0	0.0
#4	4.75	97.7	2.3
#10	2.00	96.6	1.1
#20A	850.0 um	88.2	8.4
#40A	425.0	80.6	7.6
#60A	250.0	75.5	5.1
#80A	180.0	72.3	3.1
#100A	150.0	70.8	1.5
#200A	75.0	65.1	5.7
Hydrometer	31.2	40.3	24.8
|	20.1	37.2	3.1
|	11.9	33.0	4.2
|	8.5	30.1	3.0
|	6.0	25.7	4.3
|	3.1	17.6	8.2
V	1.4	11.5	6.1

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle operated for at least one minute within a dispersion cup

3599

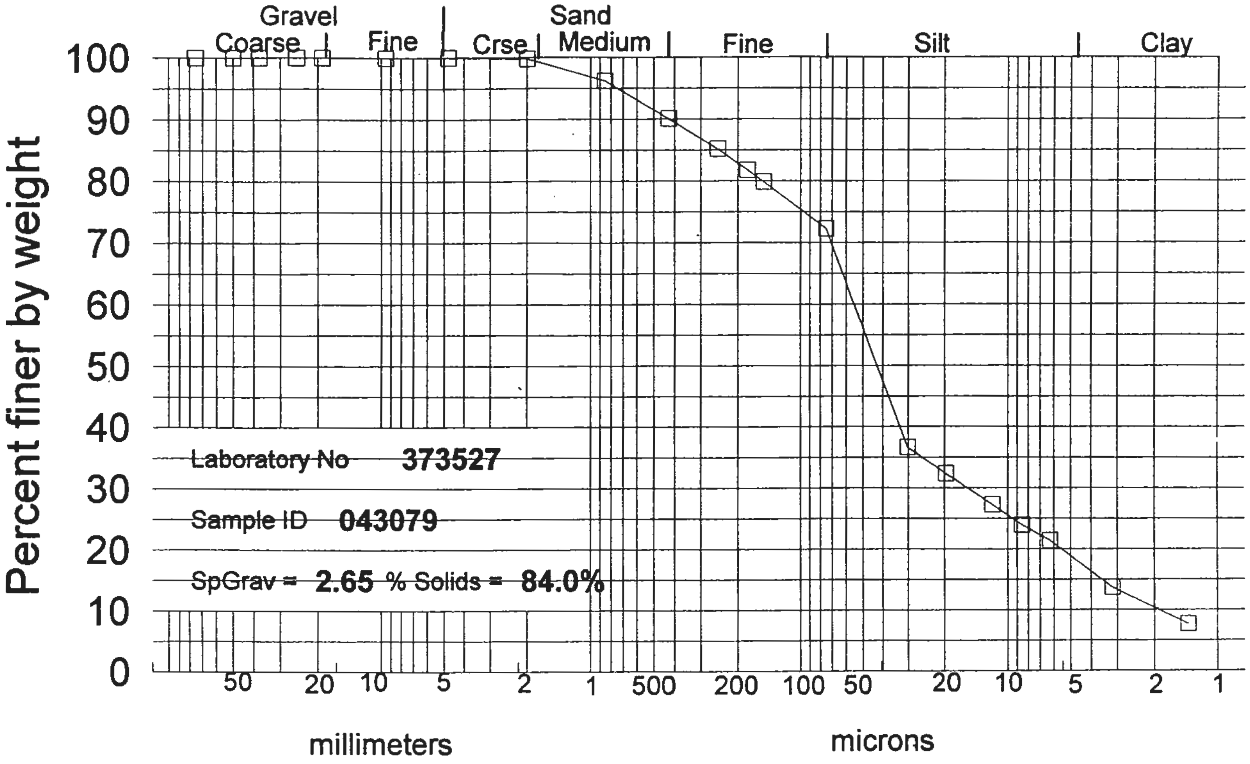
Set 71771

Submitted By: 11:40 on 25-Jan-99

Lab No. 373526

STL-VT ASTM D422 Particle Size Analysis Sample ID **043079**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum particle size: Crs sand

Shape and hardness (>#10): Subrounded Hard

Sieve size	Particle Size	Percent finer	Incremental percent
3 inch	75.00 mm	100.0	0.0
2 inch	50.00	100.0	0.0
1.5 inch	37.50	100.0	0.0
1 inch	25.00	100.0	0.0
3/4 inch	19.00	100.0	0.0
3/8 inch	9.50	100.0	0.0
#4	4.75	100.0	0.0
#10	2.00	99.8	0.2
#20A	850.0 um	96.2	3.6
#40A	425.0	90.1	6.1
#60A	250.0	85.2	4.9
#80A	180.0	81.8	3.4
#100A	150.0	79.8	2.0
#200A	75.0	72.3	7.5
Hydrometer	30.2	36.7	35.6
|	19.8	32.4	4.3
|	11.8	27.2	5.1
|	8.5	24.0	3.3
|	6.3	21.4	2.6
|	3.2	13.7	7.7
V	1.4	7.7	6.0

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle operated for at least one minute within a dispersion cup

3600

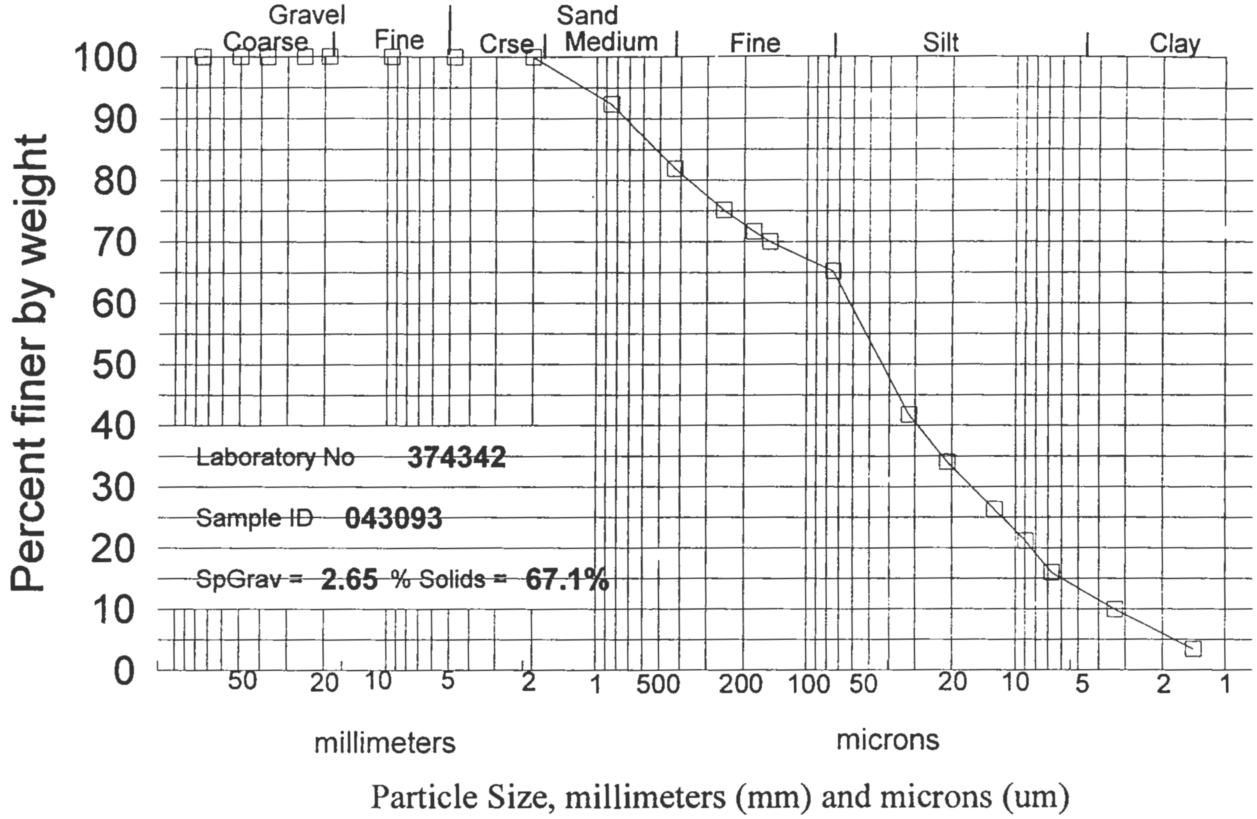
Set 71771

Submitted By: 11:41 on 25-Jan-99

Lab No. 373527

STL-VT ASTM D422 Particle Size Analysis Sample ID **043093**

Sample preparation by: D2217



Maximum
particle size: Med sand

Shape and hardness (>#10):

Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	100.0	0.0	
#4	4.75	100.0	0.0	
#10	2.00	100.0	0.0	
#20B	850.0 um	92.4	7.6	
#40B	425.0	81.9	10.4	
#60B	250.0	75.1	6.8	
#80B	180.0	71.7	3.5	
#100B	150.0	70.0	1.7	
#200B	75.0	65.2	4.8	
Hydrometer	32.2	41.8	23.4	Dispersion of soil
|	21.1	34.1	7.8	for hydrometer test
|	12.6	26.3	7.8	by mechanical mixer
|	8.9	21.1	5.2	with metal paddle
|	6.7	16.0	5.2	operated for at least
|	3.4	9.9	6.0	one minute within a
V	1.4	3.4	6.5	dispersion cup

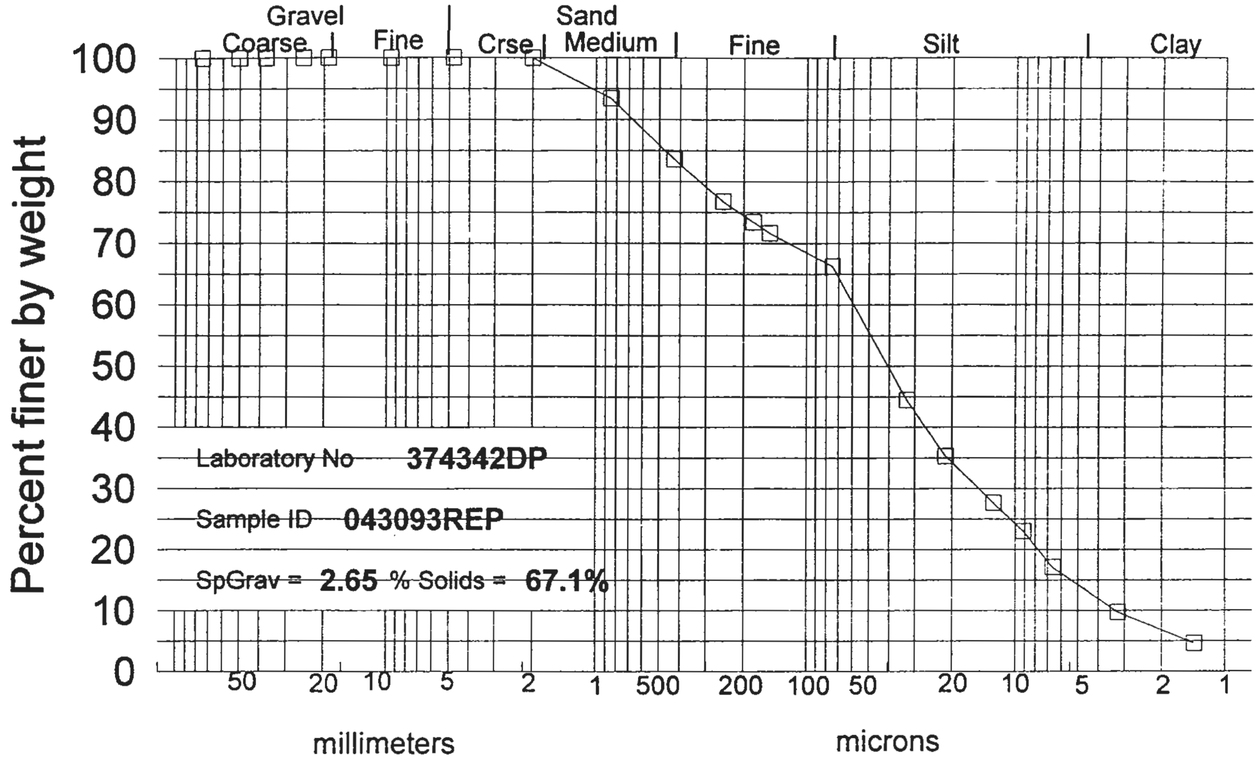
2776

Set 71806

Submitted By: 15:24 on 29-Jan-99 Lab No. 374342

STL-VT **ASTM D422 Particle Size Analysis** Sample ID **043093REP**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum
particle size: Med sand

Shape and hardness (>#10):

Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	100.0	0.0	
#4	4.75	100.0	0.0	
#10	2.00	100.0	0.0	
#20A	850.0 um	93.4	6.6	
#40A	425.0	83.6	9.8	
#60A	250.0	76.7	6.9	
#80A	180.0	73.4	3.3	
#100A	150.0	71.7	1.8	
#200A	75.0	66.3	5.4	
Hydrometer	32.8	44.5	21.8	Dispersion of soil
|	21.4	35.3	9.2	for hydrometer test
|	12.7	27.6	7.7	by mechanical mixer
|	9.1	23.0	4.6	with metal paddle
|	6.6	17.1	5.9	operated for at least
|	3.2	9.7	7.4	one minute within a
V	1.4	4.6	5.1	dispersion cup

2777

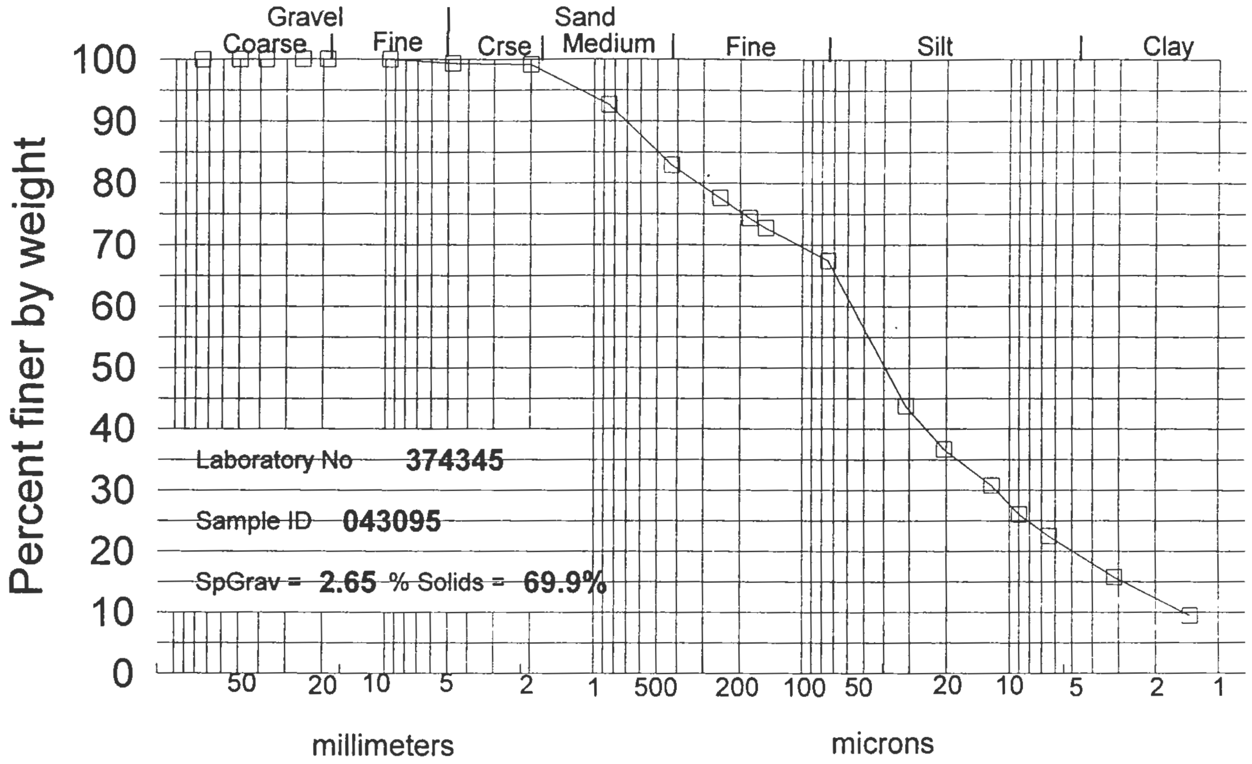
Set 71894

Submitted By: 15:44 on 29-Jan-99

Lab No. 374342DP

STL-VT ASTM D422 Particle Size Analysis Sample ID **043095**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum particle size: 9.5 mm

Shape and hardness (>#10): Subrounded Hard

Sieve size	Particle Size	Percent finer	Incremental percent
3 inch	75.00 mm	100.0	0.0
2 inch	50.00	100.0	0.0
1.5 inch	37.50	100.0	0.0
1 inch	25.00	100.0	0.0
3/4 inch	19.00	100.0	0.0
3/8 inch	9.50	100.0	0.0
#4	4.75	99.4	0.6
#10	2.00	99.1	0.2
#20A	850.0 um	92.6	6.5
#40A	425.0	82.9	9.8
#60A	250.0	77.6	5.3
#80A	180.0	74.3	3.2
#100A	150.0	72.7	1.6
#200A	75.0	67.4	5.3
Hydrometer	31.2	43.8	23.7
|	20.5	36.7	7.1
|	12.2	30.8	5.9
|	9.0	26.0	4.7
|	6.4	22.5	3.5
|	3.2	15.8	6.7
V	1.4	9.5	6.3

Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

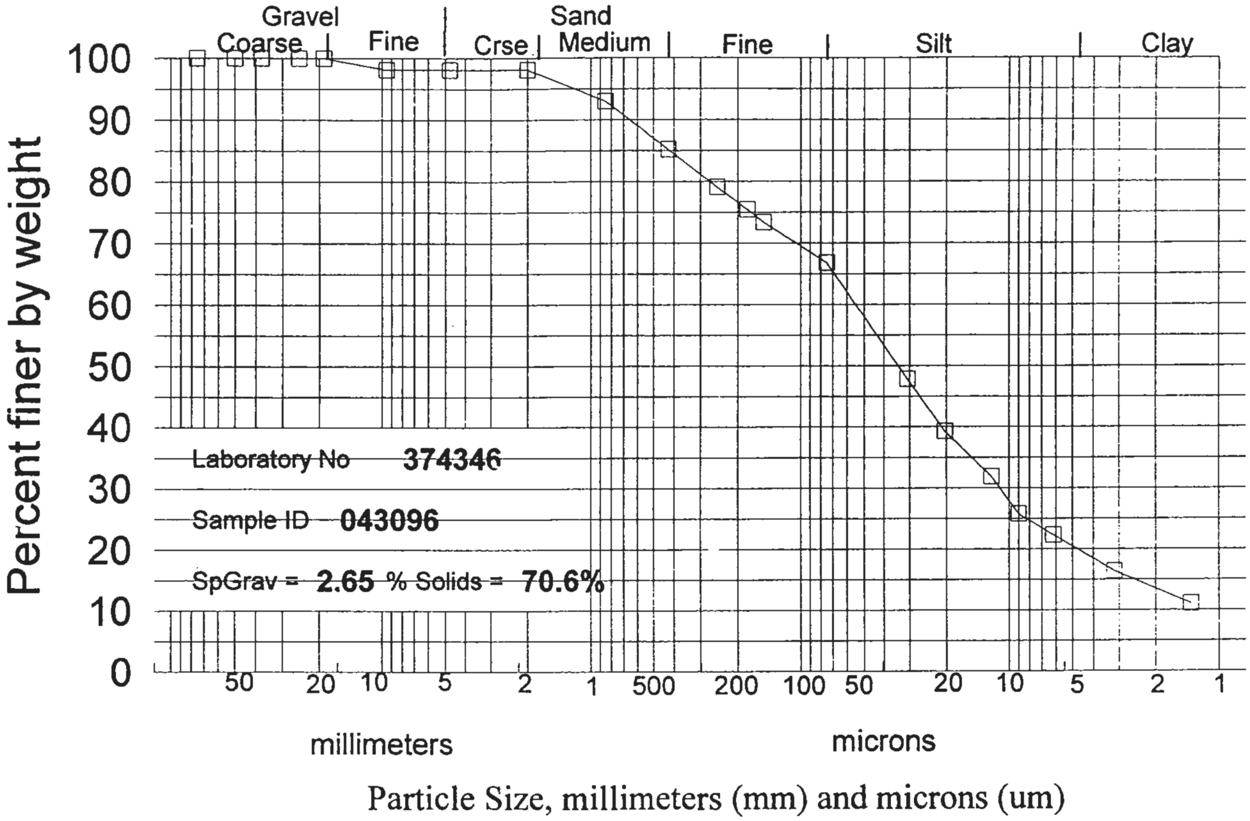
2779

Submitted By: 15:44 on 29-Jan-99

Set 71894
Lab No. 374345

STL-VT ASTM D422 Particle Size Analysis Sample ID **043096**

Sample preparation by: D2217



Maximum particle size: 19 mm

Shape and hardness (>#10): Subrounded Hard

Sieve size	Particle Size	Percent finer	Incremental percent
3 inch	75.00 mm	100.0	0.0
2 inch	50.00	100.0	0.0
1.5 inch	37.50	100.0	0.0
1 inch	25.00	100.0	0.0
3/4 inch	19.00	100.0	0.0
3/8 inch	9.50	98.1	1.9
#4	4.75	98.1	0.0
#10	2.00	98.1	0.0
#20A	850.0 um	93.0	5.1
#40A	425.0	85.2	7.8
#60A	250.0	79.1	6.1
#80A	180.0	75.4	3.7
#100A	150.0	73.4	2.1
#200A	75.0	66.8	6.6
Hydrometer	30.9	47.9	18.9
|	20.4	39.3	8.6
|	12.2	31.9	7.4
|	9.0	25.8	6.1
|	6.2	22.3	3.5
|	3.2	16.4	5.9
V	1.4	11.1	5.3

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle operated for at least one minute within a dispersion cup

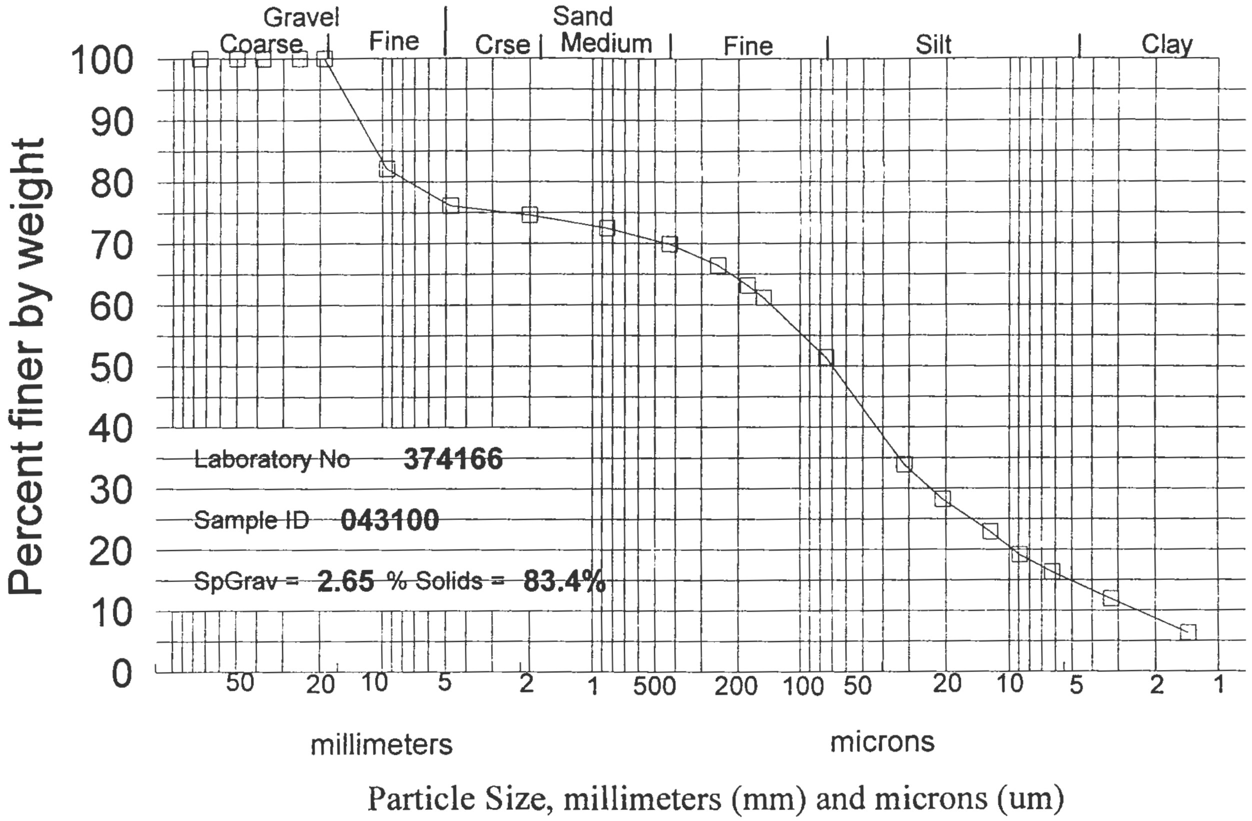
2780

Set 71894

Submitted By: 15:45 on 29-Jan-99 Lab No. 374346

STL-VT ASTM D422 Particle Size Analysis Sample ID **043100**

Sample preparation by: D2217



Maximum
particle size: 19 mm

Shape and hardness (>#10): Rounded Hard

Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	82.1	17.9	
#4	4.75	76.2	6.0	
#10	2.00	74.6	1.6	
#20B	850.0 um	72.4	2.1	
#40B	425.0	69.9	2.5	
#60B	250.0	66.5	3.4	
#80B	180.0	63.2	3.3	
#100B	150.0	61.1	2.1	
#200B	75.0	51.4	9.7	
Hydrometer	31.6	33.9	17.5	Dispersion of soil
|	20.7	28.2	5.6	for hydrometer test
|	12.3	22.9	5.3	by mechanical mixer
|	8.9	19.1	3.8	with metal paddle
|	6.2	16.3	2.8	operated for at least
|	3.2	11.9	4.4	one minute within a
V	1.4	6.3	5.6	dispersion cup

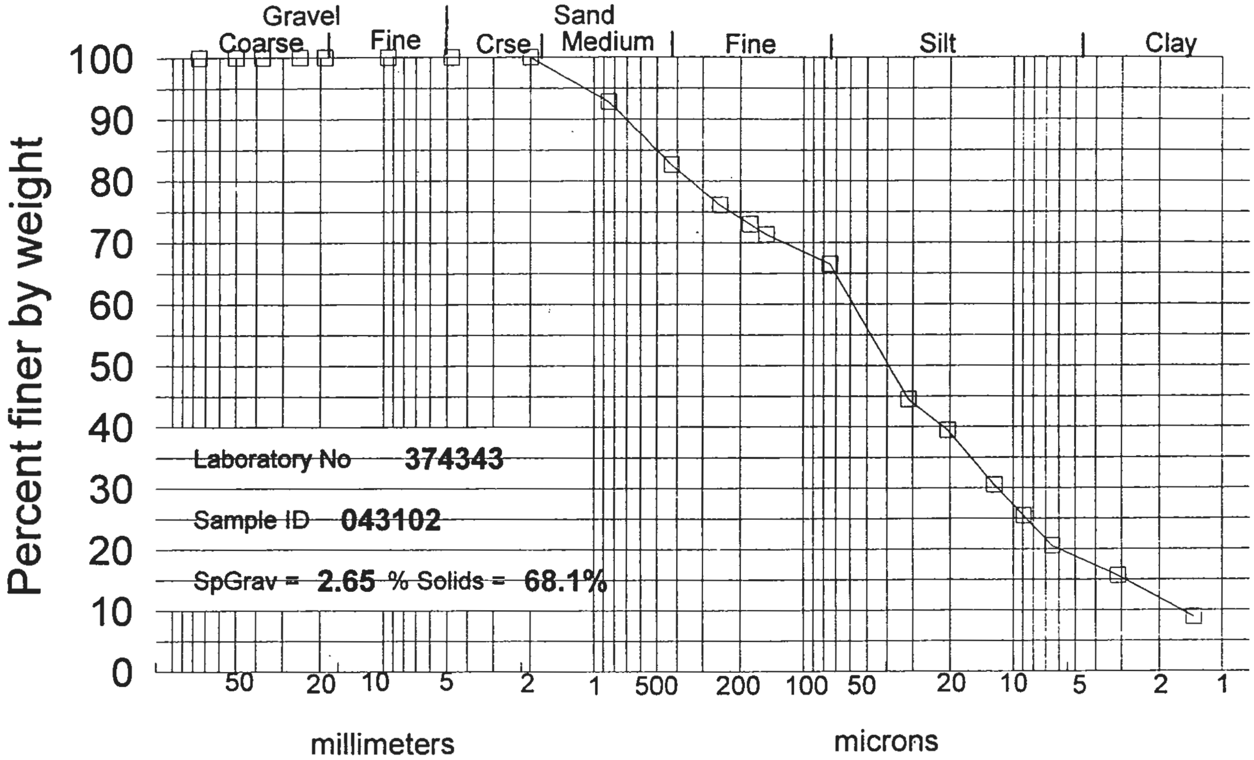
2775

Set 71806

Submitted By: 15:24 on 29-Jan-99 Lab No. 374166

STL-VT ASTM D422 Particle Size Analysis Sample ID **043102**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum
particle size: Med sand

Shape and hardness (>#10):

Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	100.0	0.0	
#4	4.75	100.0	0.0	
#10	2.00	100.0	0.0	
#20A	850.0 um	92.8	7.2	
#40A	425.0	82.7	10.2	
#60A	250.0	76.1	6.5	
#80A	180.0	73.0	3.1	
#100A	150.0	71.3	1.7	
#200A	75.0	66.5	4.8	
Hydrometer	31.6	44.5	22.0	Dispersion of soil
|	20.5	39.4	5.1	for hydrometer test
|	12.3	30.5	8.9	by mechanical mixer
|	8.9	25.4	5.1	with metal paddle
|	6.5	20.6	4.9	operated for at least
|	3.1	15.7	4.9	one minute within a
V	1.4	8.9	6.8	dispersion cup

2778

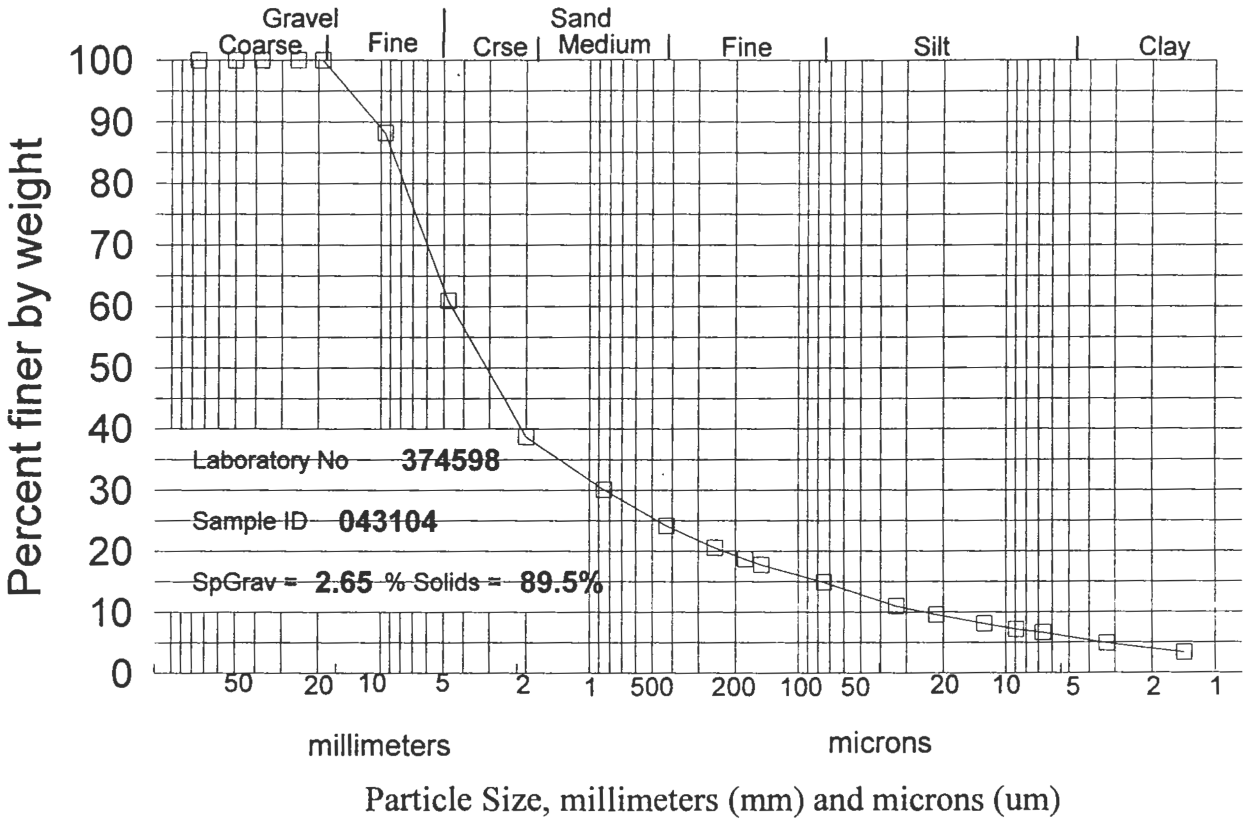
Set 71894

Submitted By: 15:44 on 29-Jan-99

Lab No. 374343

STL-VT ASTM D422 Particle Size Analysis Sample ID **043104**

Sample preparation by: D2217



Maximum particle size: 19 mm

Shape and hardness (>#10): Subangular Brittle

Sieve size	Particle Size		Percent finer	Incremental percent
3 inch	75.00	mm	100.0	0.0
2 inch	50.00		100.0	0.0
1.5 inch	37.50		100.0	0.0
1 inch	25.00		100.0	0.0
3/4 inch	19.00		100.0	0.0
3/8 inch	9.50		88.2	11.8
#4	4.75		60.9	27.3
#10	2.00		38.7	22.2
#20A	850.0	um	30.1	8.7
#40A	425.0		24.2	5.9
#60A	250.0		20.6	3.6
#80A	180.0		18.7	1.9
#100A	150.0		17.8	0.9
#200A	75.0		14.9	2.9
Hydrometer	33.7		11.0	3.9
|	21.6		9.6	1.4
|	12.7		8.1	1.4
|	8.9		7.2	0.9
|	6.6		6.6	0.6
|	3.3		4.9	1.7
V	1.4		3.3	1.6

Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

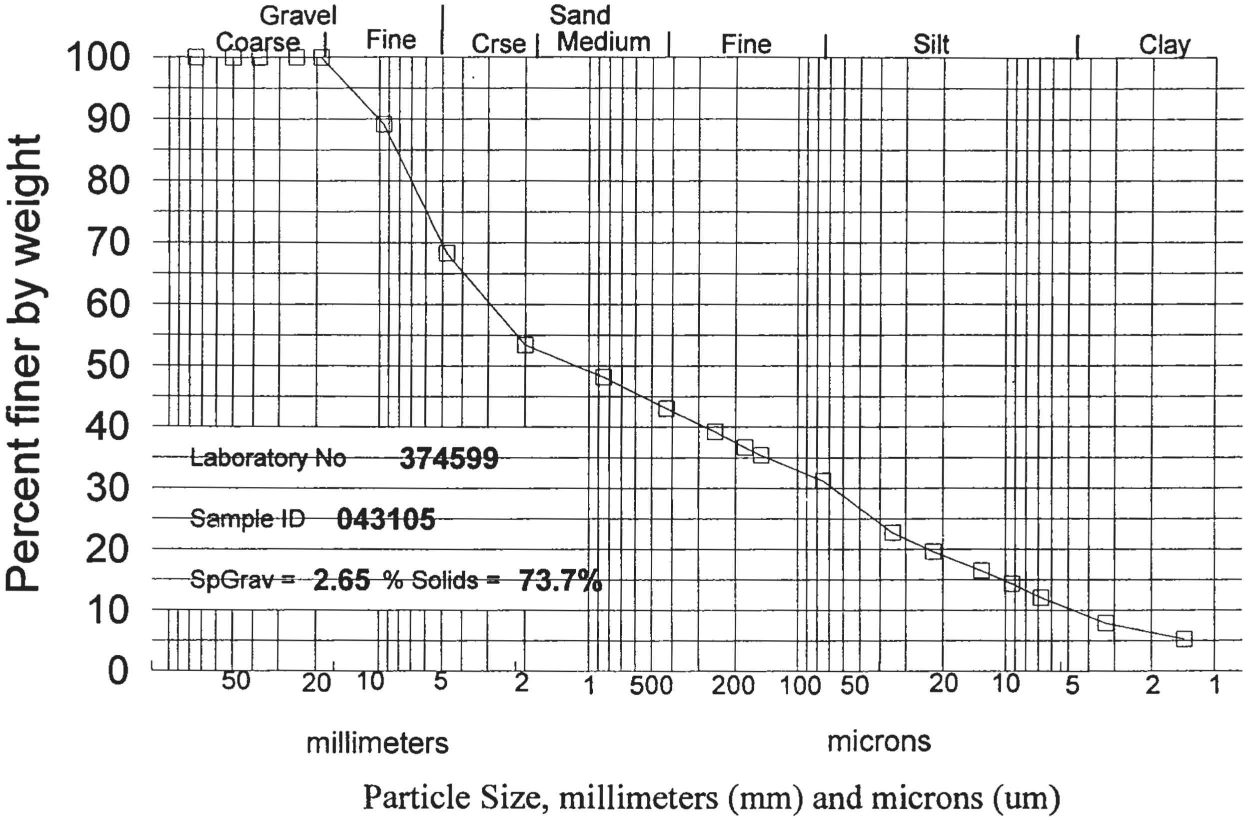
3358

Set 71894

Submitted By: 15:48 on 29-Jan-99 Lab No. 374598

STL-VT ASTM D422 Particle Size Analysis Sample ID **043105**

Sample preparation by: D2217



Maximum particle size: 19 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size	Percent finer	Incremental percent
3 inch	75.00 mm	100.0	0.0
2 inch	50.00	100.0	0.0
1.5 inch	37.50	100.0	0.0
1 inch	25.00	100.0	0.0
3/4 inch	19.00	100.0	0.0
3/8 inch	9.50	89.2	10.8
#4	4.75	68.3	20.8
#10	2.00	53.4	14.9
#20B	850.0 um	48.1	5.3
#40B	425.0	43.1	5.1
#60B	250.0	39.2	3.8
#80B	180.0	36.7	2.6
#100B	150.0	35.4	1.3
#200B	75.0	31.2	4.2
Hydrometer	34.7	22.8	8.5
|	22.3	19.6	3.2
|	13.1	16.5	3.2
|	9.3	14.4	2.1
|	6.8	12.1	2.3
|	3.3	7.9	4.2
V	1.4	5.3	2.6

Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

3359

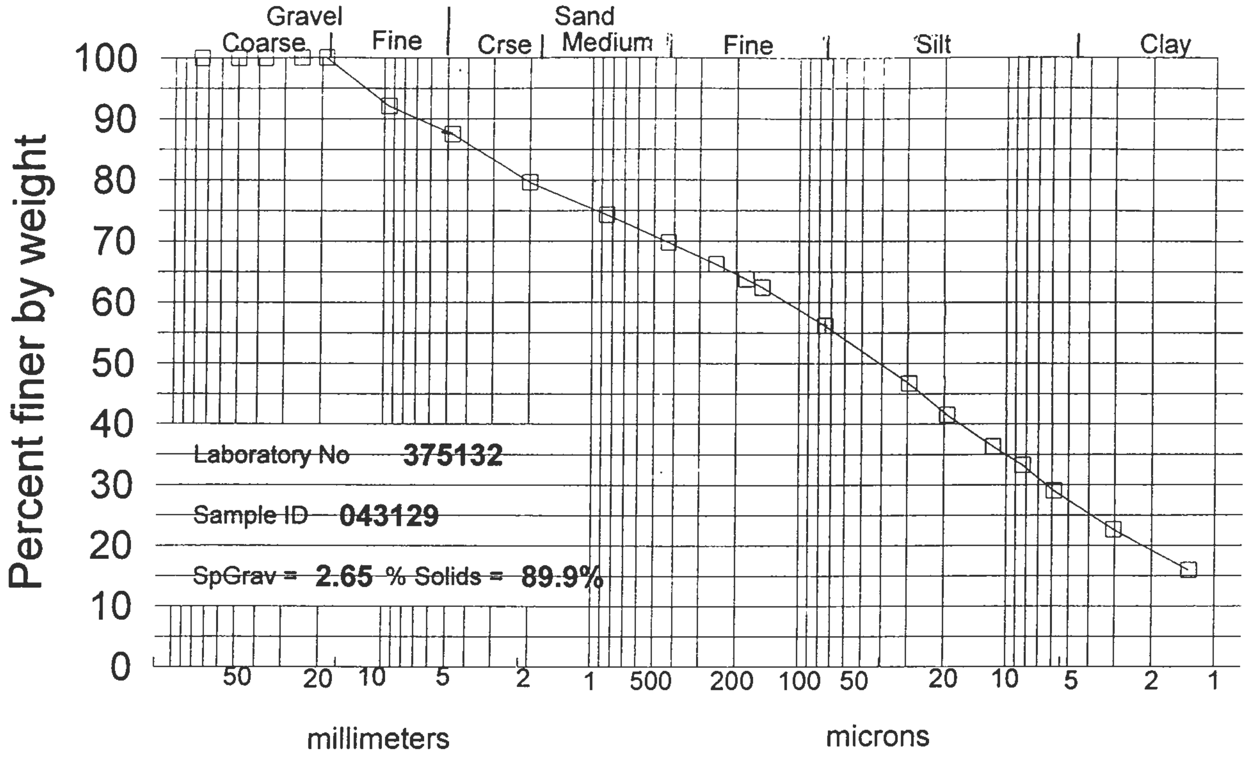
Set 71938

Submitted By: 16:55 on 29-Jan-99 Lab No. 374599

Subsurface Soil

STL-VT ASTM D422 Particle Size Analysis Sample ID **043129**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum particle size: 19 mm

Shape and hardness (>#10): Subangular Hard

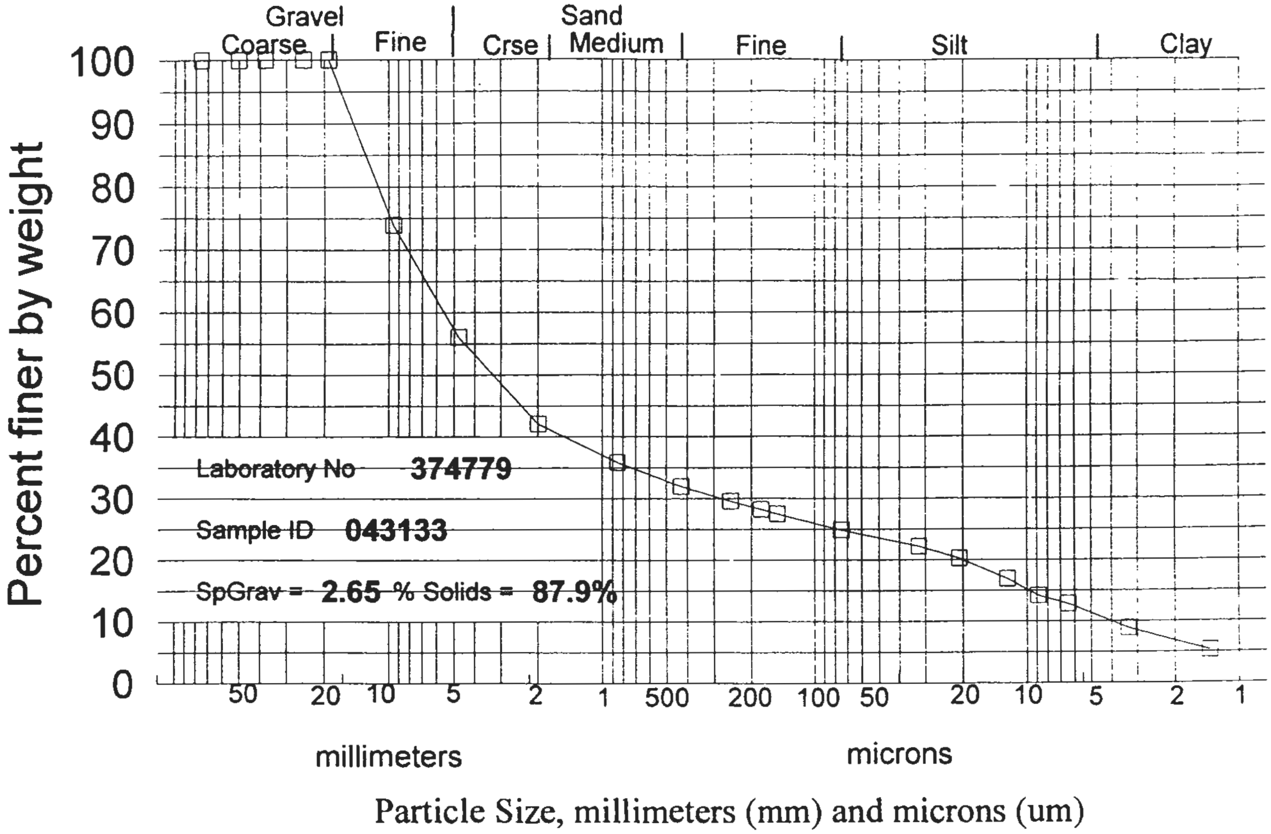
Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	92.1	7.9	
#4	4.75	87.5	4.6	
#10	2.00	79.6	7.9	
#20A	850.0 um	74.3	5.3	
#40A	425.0	69.8	4.5	
#60A	250.0	66.2	3.6	
#80A	180.0	63.8	2.5	
#100A	150.0	62.4	1.3	
#200A	75.0	56.2	6.3	
Hydrometer	29.6	46.7	9.4	Dispersion of soil
|	19.4	41.5	5.2	for hydrometer test
|	11.6	36.3	5.2	by mechanical mixer
|	8.3	33.2	3.1	with metal paddle
|	5.9	29.1	4.2	operated for at least
|	3.0	22.7	6.4	one minute within a
V	1.3	15.9	6.8	dispersion cup

Set 71978

Submitted By: 17:49 on 29-Jan-99 Lab No. 37513263

STL-VT **ASTM D422 Particle Size Analysis** Sample ID **043133**

Sample preparation by: D2217



Maximum particle size: 19 mm

Shape and hardness (>#10): Subangular Hard

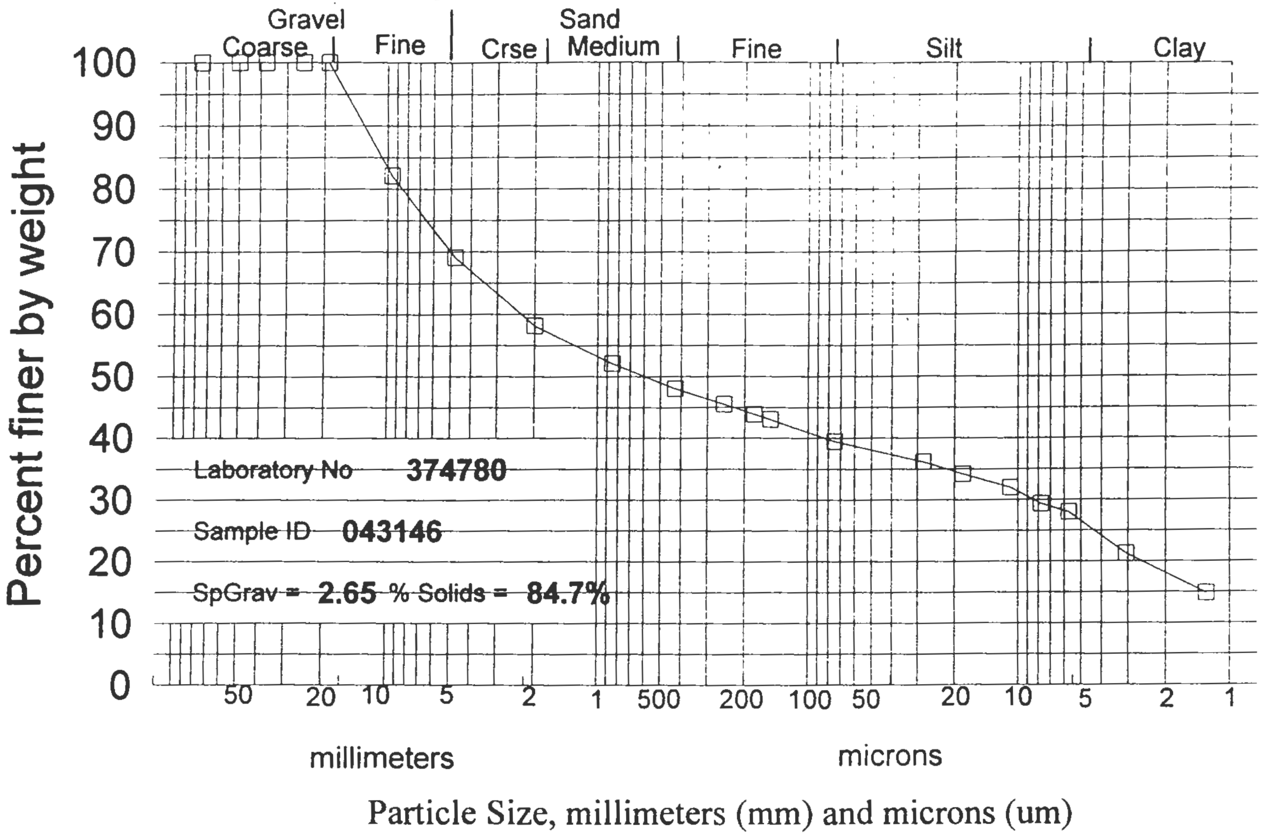
Sieve size	Particle Size	Percent finer	Incremental percent
3 inch	75.00 mm	100.0	0.0
2 inch	50.00	100.0	0.0
1.5 inch	37.50	100.0	0.0
1 inch	25.00	100.0	0.0
3/4 inch	19.00	100.0	0.0
3/8 inch	9.50	74.0	26.0
#4	4.75	56.1	17.9
#10	2.00	42.1	14.0
#20B	850.0 um	35.9	6.2
#40B	425.0	32.0	3.9
#60B	250.0	29.6	2.4
#80B	180.0	28.2	1.4
#100B	150.0	27.5	0.7
#200B	75.0	24.9	2.6
Hydrometer	32.4	22.2	2.7
|	20.9	20.2	2.0
|	12.4	16.9	3.3
|	8.9	14.2	2.7
|	6.4	12.9	1.3
|	3.3	8.9	4.0
V	1.4	5.3	3.6

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle operated for at least one minute within a dispersion cup

Set 71938

STL-VT ASTM D422 Particle Size Analysis Sample ID **043146**

Sample preparation by: D2217



Maximum
particle size: 19 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size	Percent finer	Incremental percent
3 inch	75.00 mm	100.0	0.0
2 inch	50.00	100.0	0.0
1.5 inch	37.50	100.0	0.0
1 inch	25.00	100.0	0.0
3/4 inch	19.00	100.0	0.0
3/8 inch	9.50	82.1	17.9
#4	4.75	69.1	13.0
#10	2.00	58.1	11.0
#20B	850.0 um	52.1	6.0
#40B	425.0	48.1	4.1
#60B	250.0	45.5	2.5
#80B	180.0	43.9	1.6
#100B	150.0	43.0	0.9
#200B	75.0	39.5	3.5
Hydrometer	28.3	36.2	3.3
|	18.3	34.2	2.0
|	10.9	32.0	2.1
|	7.8	29.3	2.7
|	5.7	28.0	1.3
|	3.1	21.3	6.7
V	1.3	14.8	6.4

Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

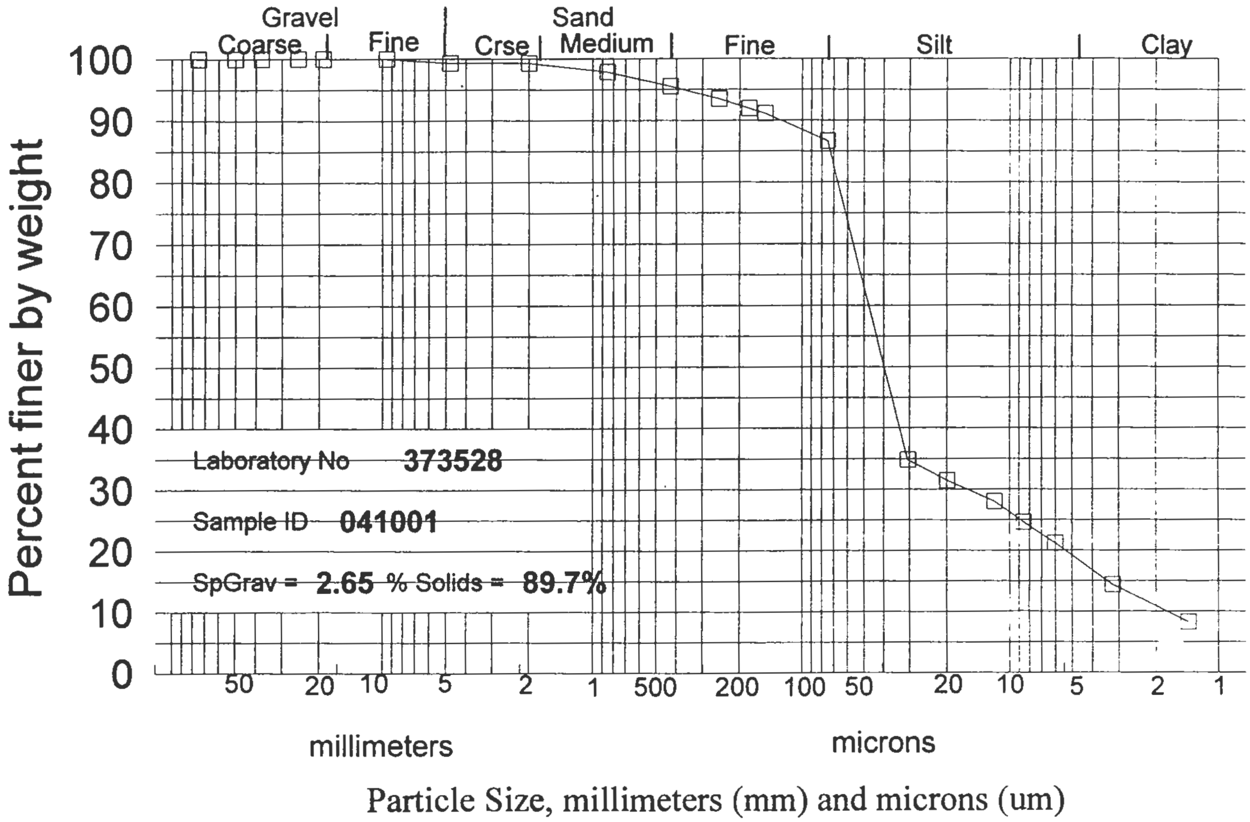
4123

Set 71938

Sediments

STL-VT ASTM D422 Particle Size Analysis Sample ID **041001**

Sample preparation by: D2217



Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	100.0	0.0	
#4	4.75	99.3	0.7	
#10	2.00	99.3	0.0	
#20A	850.0 um	97.9	1.5	
#40A	425.0	95.5	2.3	
#60A	250.0	93.5	2.1	
#80A	180.0	91.9	1.5	
#100A	150.0	91.1	0.9	
#200A	75.0	86.7	4.4	
Hydrometer	30.6	34.9	51.8	Dispersion of soil
|	19.9	31.4	3.4	for hydrometer test
|	11.8	28.0	3.4	by mechanical mixer
|	8.5	24.6	3.4	with metal paddle
|	6.0	21.2	3.4	operated for at least
|	3.2	14.4	6.8	one minute within a
V	1.4	8.3	6.1	dispersion cup

3601

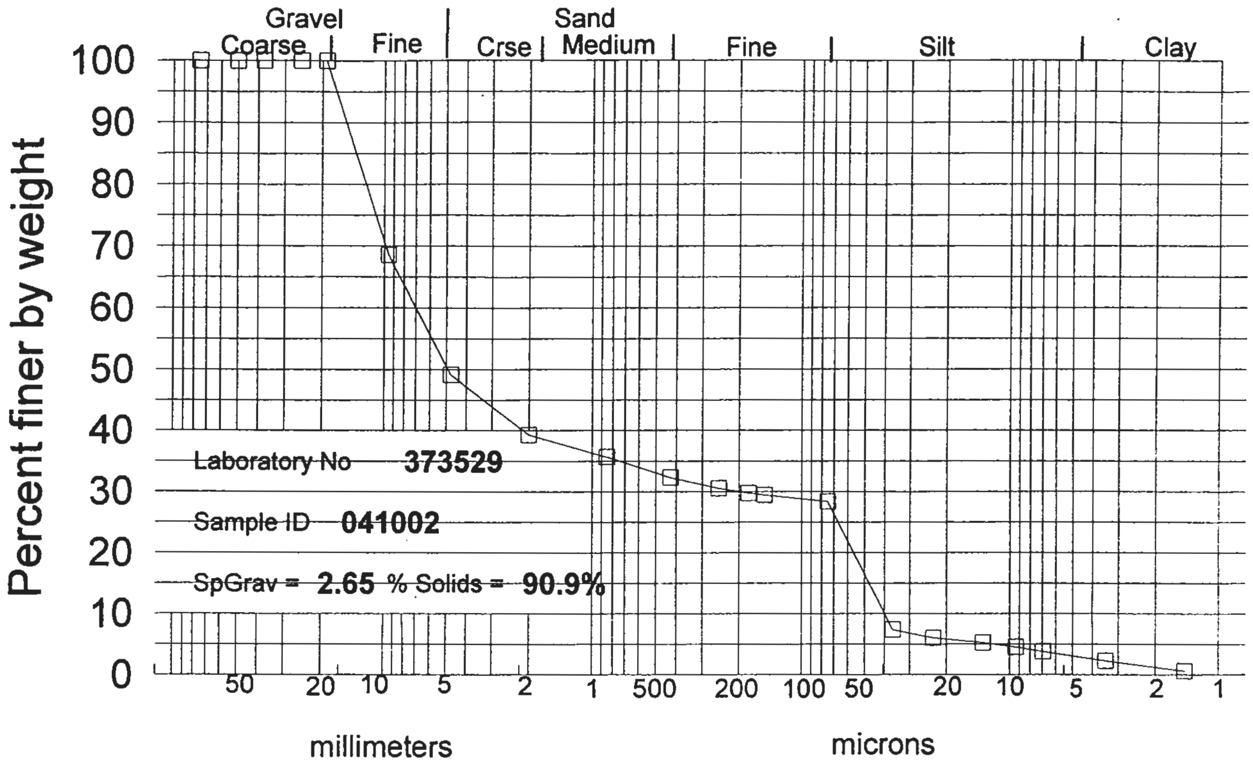
Set 71771

Submitted By: 11:41 on 25-Jan-99

Lab No. 373528

STL-VT ASTM D422 Particle Size Analysis Sample ID **041002**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum particle size: 19 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	68.6	31.4	
#4	4.75	49.1	19.4	
#10	2.00	39.3	9.8	
#20A	850.0 um	35.7	3.6	
#40A	425.0	32.3	3.4	
#60A	250.0	30.5	1.8	
#80A	180.0	29.8	0.8	
#100A	150.0	29.5	0.3	
#200A	75.0	28.3	1.1	
Hydrometer	36.4	7.4	20.9	Dispersion of soil
|	23.1	6.0	1.4	for hydrometer test
|	13.4	5.3	0.8	by mechanical mixer
|	9.4	4.5	0.8	with metal paddle
|	6.9	3.8	0.8	operated for at least
|	3.4	2.3	1.5	one minute within a
V	1.4	0.6	1.6	dispersion cup

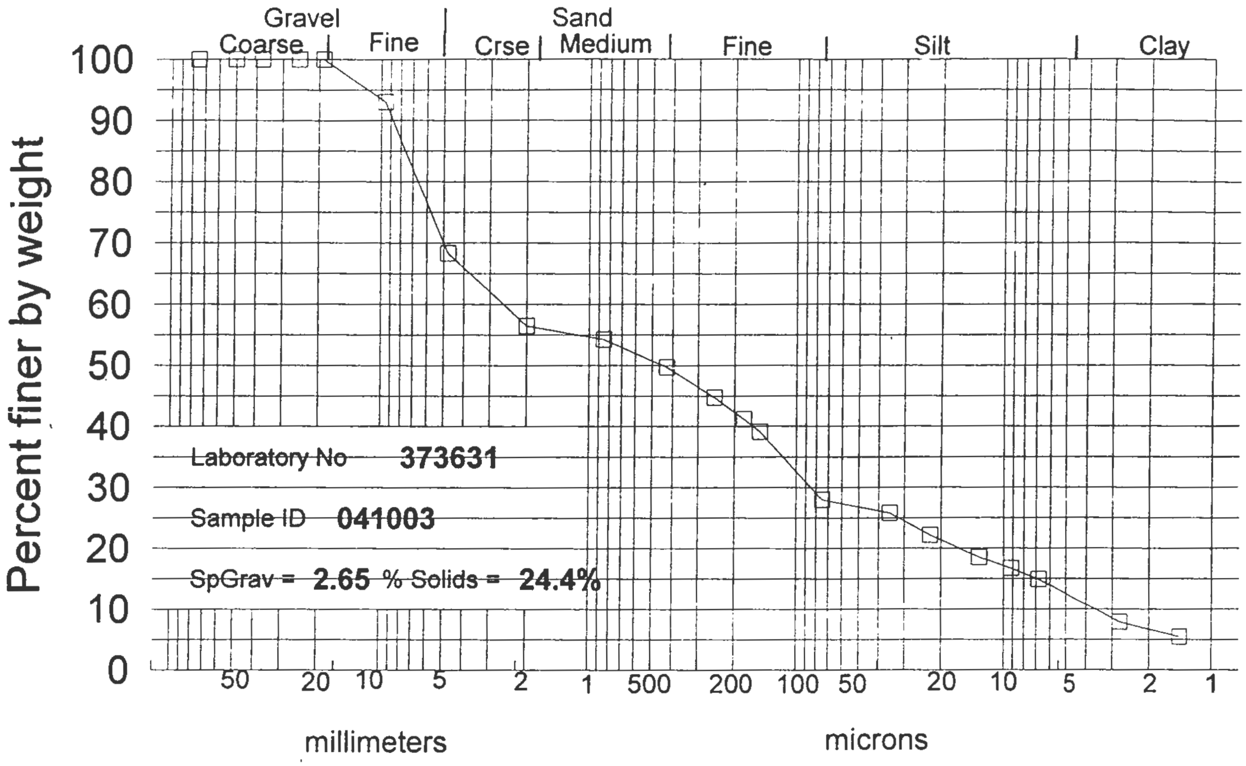
3602

Submitted By: 11:42 on 25-Jan-99

Set 71771
Lab No. 373529

STL-VT ASTM D422 Particle Size Analysis Sample ID **041003**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum particle size: 19 mm

Shape and hardness (>#10): Subrounded Hard

Sieve size	Particle Size	Percent finer	Incremental percent
3 inch	75.00 mm	100.0	0.0
2 inch	50.00	100.0	0.0
1.5 inch	37.50	100.0	0.0
1 inch	25.00	100.0	0.0
3/4 inch	19.00	100.0	0.0
3/8 inch	9.50	93.0	7.0
#4	4.75	68.3	24.7
#10	2.00	56.5	11.8
#20A	850.0 um	54.3	2.2
#40A	425.0	49.7	4.5
#60A	250.0	44.8	5.0
#80A	180.0	41.2	3.5
#100A	150.0	39.2	2.1
#200A	75.0	28.0	11.1
Hydrometer	35.3	25.8	2.2
|	22.5	22.2	3.6
|	13.1	18.5	3.6
|	9.2	16.7	1.8
|	6.8	14.9	1.8
|	2.8	7.9	7.0
V	1.4	5.5	2.4

Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

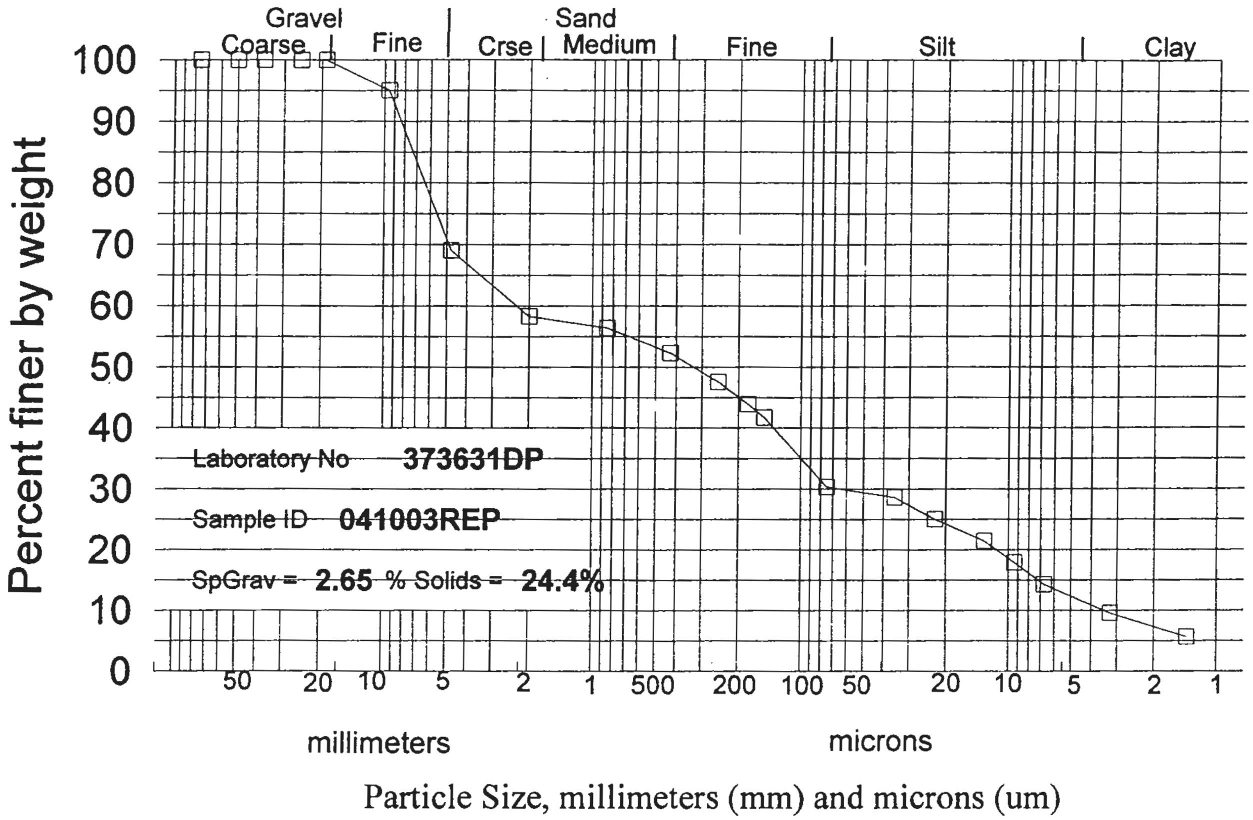
4359

Set 71765

Submitted By: 11:05 on 25-Jan-99 Lab No. 373631

STL-VT ASTM D422 Particle Size Analysis Sample ID **041003REP**

Sample preparation by: D2217



Maximum
particle size: 19 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	95.1	4.9	
#4	4.75	69.1	26.0	
#10	2.00	58.3	10.7	
#20A	850.0 um	56.4	2.0	
#40A	425.0	52.3	4.1	
#60A	250.0	47.6	4.7	
#80A	180.0	43.9	3.6	
#100A	150.0	41.7	2.2	
#200A	75.0	30.3	11.4	
Hydrometer	35.2	28.6	1.7	Dispersion of soil
|	22.5	25.0	3.6	for hydrometer test
|	13.1	21.5	3.6	by mechanical mixer
|	9.3	17.9	3.6	with metal paddle
|	6.7	14.3	3.6	operated for at least
|	3.2	9.5	4.8	one minute within a
V	1.4	5.7	3.9	dispersion cup

4360

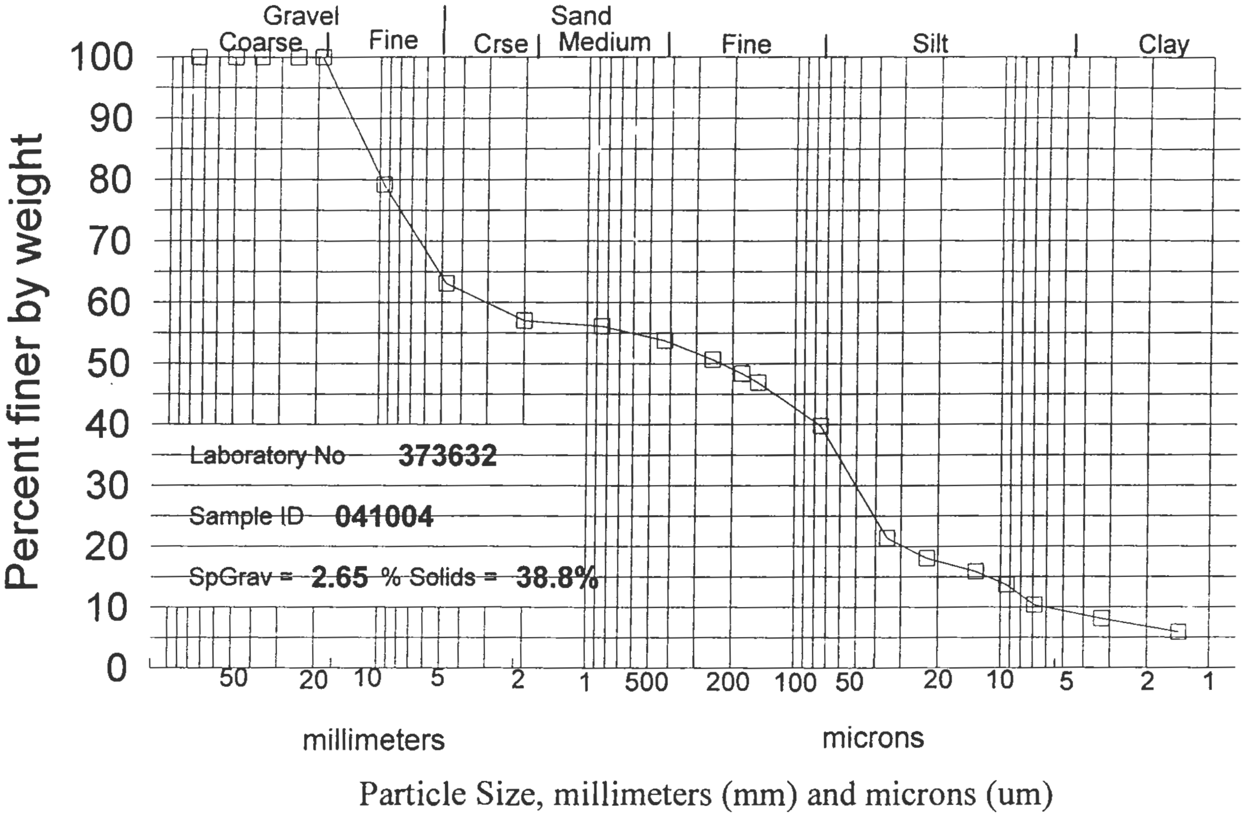
Set 71795

Submitted By: 10:33 on 01-Feb-99

Lab No. 373631DP

STL-VT **ASTM D422 Particle Size Analysis** Sample ID **041004**

Sample preparation by: D2217



Maximum
particle size: 19 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size		Percent finer	Incremental percent
3 inch	75.00	mm	100.0	0.0
2 inch	50.00		100.0	0.0
1.5 inch	37.50		100.0	0.0
1 inch	25.00		100.0	0.0
3/4 inch	19.00		100.0	0.0
3/8 inch	9.50		79.2	20.8
#4	4.75		63.1	16.0
#10	2.00		57.0	6.1
#20A	850.0	um	56.1	0.8
#40A	425.0		53.8	2.3
#60A	250.0		50.7	3.1
#80A	180.0		48.4	2.3
#100A	150.0		46.9	1.4
#200A	75.0		39.8	7.1
Hydrometer	35.0		21.4	18.4
│	22.5		18.1	3.3
│	13.1		15.9	2.2
│	9.4		13.7	2.2
│	6.8		10.3	3.3
│	3.3		8.1	2.2
V	1.4		5.9	2.2

Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

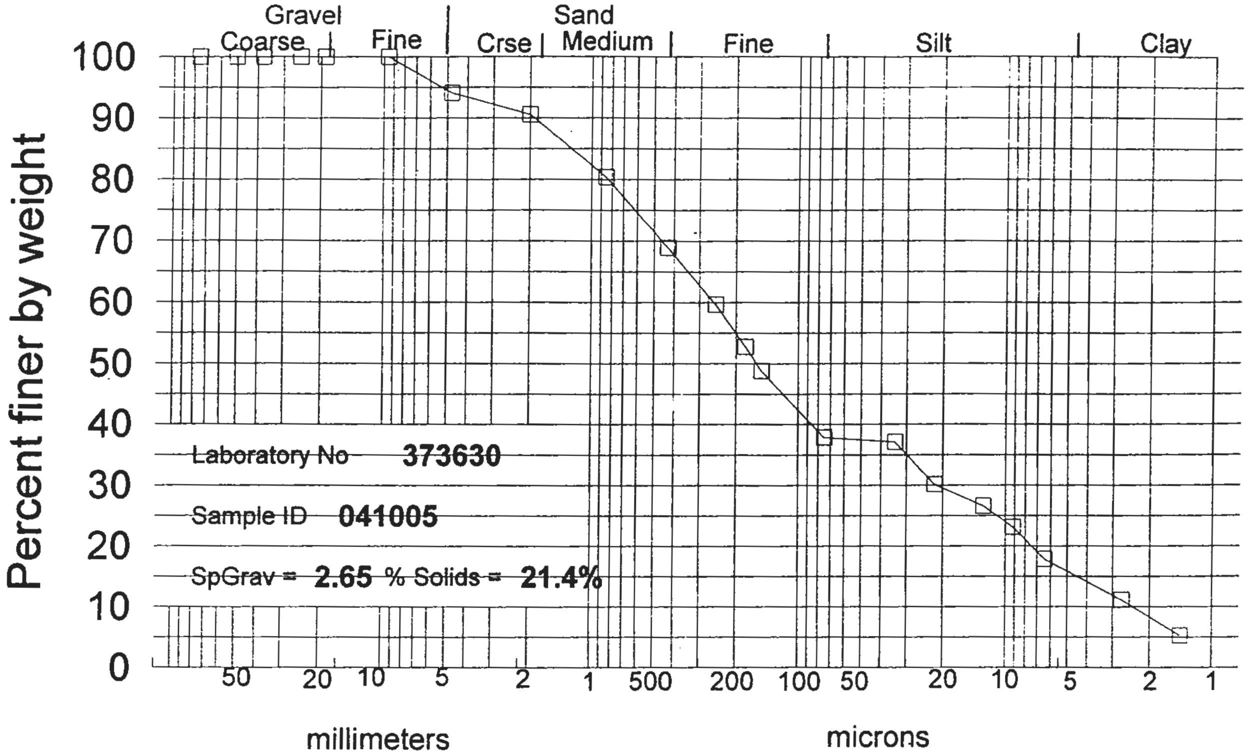
4361

Set 71795

Submitted By: 13:52 on 30-Jan-99 Lab No. 373632

STL-VT **ASTM D422 Particle Size Analysis** Sample ID **041005**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subrounded Hard

Sieve size	Particle Size		Percent finer	Incremental percent
3 inch	75.00	mm	100.0	0.0
2 inch	50.00		100.0	0.0
1.5 inch	37.50		100.0	0.0
1 inch	25.00		100.0	0.0
3/4 inch	19.00		100.0	0.0
3/8 inch	9.50		100.0	0.0
#4	4.75		94.1	5.9
#10	2.00		90.6	3.5
#20A	850.0	um	80.4	10.2
#40A	425.0		68.9	11.5
#60A	250.0		59.7	9.2
#80A	180.0		52.7	7.0
#100A	150.0		48.8	3.9
#200A	75.0		37.9	10.9
Hydrometer	34.1		37.1	0.8
|	22.0		30.1	7.0
|	12.8		26.6	3.5
|	9.2		23.1	3.5
|	6.4		17.8	5.3
|	2.7		11.1	6.7
V	1.4		5.3	5.8

Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

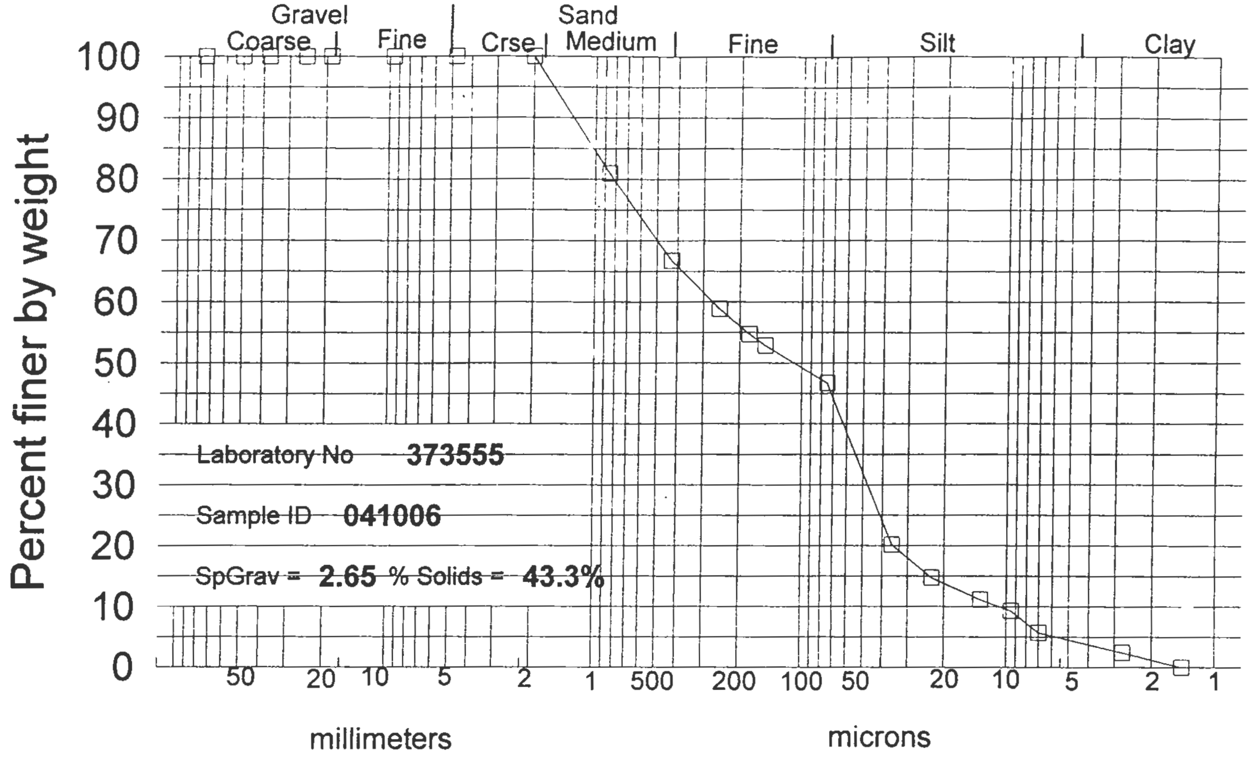
4358

Set 71765

Submitted By: 11:03 on 25-Jan-99 Lab No. 373630

STL-VT ASTM D422 Particle Size Analysis Sample ID **041006**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum particle size: Med sand

Shape and hardness (>#10):

Sieve size	Particle Size		Percent finer	Incremental percent
3 inch	75.00	mm	100.0	0.0
2 inch	50.00		100.0	0.0
1.5 inch	37.50		100.0	0.0
1 inch	25.00		100.0	0.0
3/4 inch	19.00		100.0	0.0
3/8 inch	9.50		100.0	0.0
#4	4.75		100.0	0.0
#10	2.00		100.0	0.0
#20A	850.0	um	81.0	19.0
#40A	425.0		66.7	14.2
#60A	250.0		58.9	7.9
#80A	180.0		54.7	4.2
#100A	150.0		52.9	1.9
#200A	75.0		46.7	6.2
Hydrometer	35.8		20.1	26.6
|	23.0		14.7	5.4
|	13.4		11.1	3.6
|	9.5		9.3	1.8
|	7.0		5.7	3.6
|	2.7		2.4	3.3
V	1.4		0.0	

Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

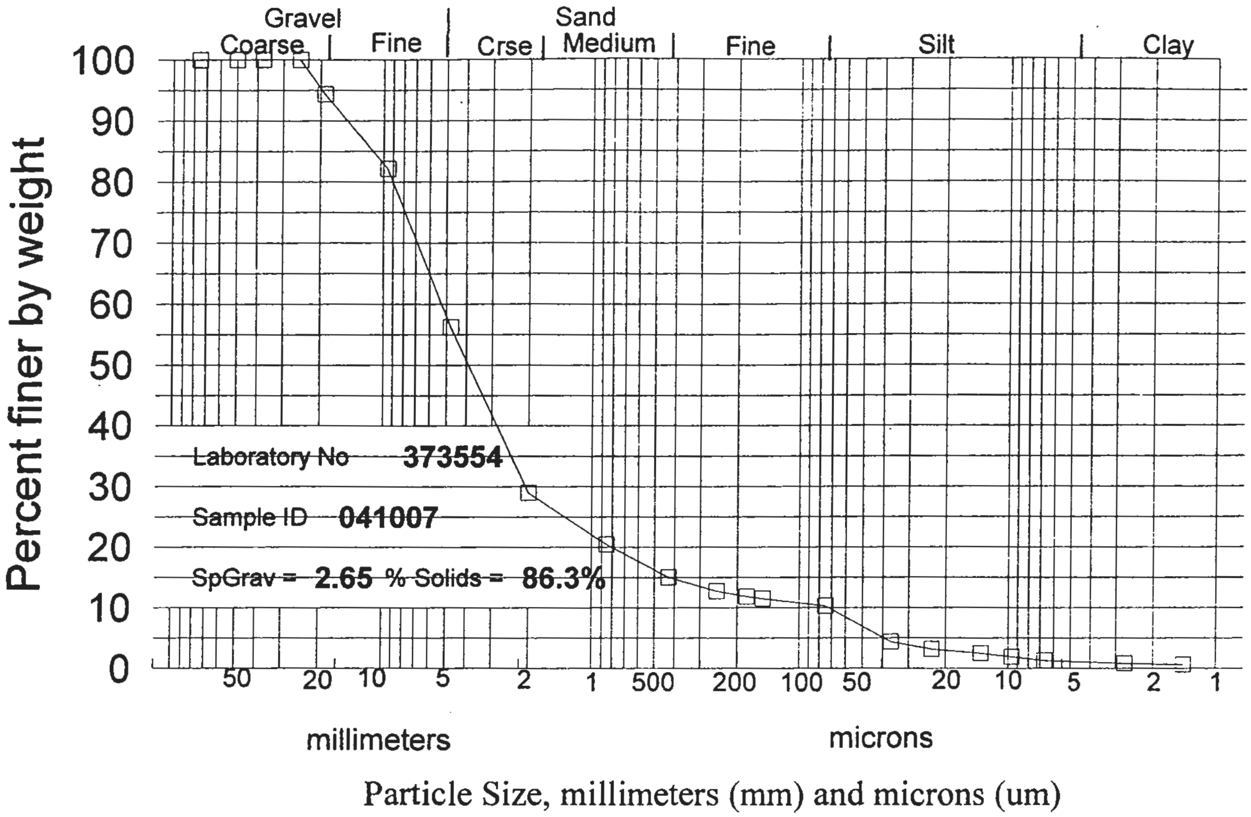
4357

Set 71765

Submitted By: 11:00 on 25-Jan-99 Lab No. 373555

STL-VT ASTM D422 Particle Size Analysis Sample ID **041007**

Sample preparation by: D2217



Maximum
particle size: 25 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	94.4	5.6	
3/8 inch	9.50	82.2	12.2	
#4	4.75	56.2	25.9	
#10	2.00	29.0	27.2	
#20A	850.0 um	20.4	8.6	
#40A	425.0	15.0	5.4	
#60A	250.0	12.8	2.3	
#80A	180.0	11.9	0.9	
#100A	150.0	11.5	0.3	
#200A	75.0	10.3	1.2	
Hydrometer	36.5	4.3	6.0	Dispersion of soil
|	23.3	3.1	1.2	for hydrometer test
|	13.5	2.5	0.6	by mechanical mixer
|	9.6	1.9	0.6	with metal paddle
|	6.6	1.3	0.6	operated for at least
|	2.7	0.8	0.5	one minute within a
V	1.4	0.6	0.2	dispersion cup

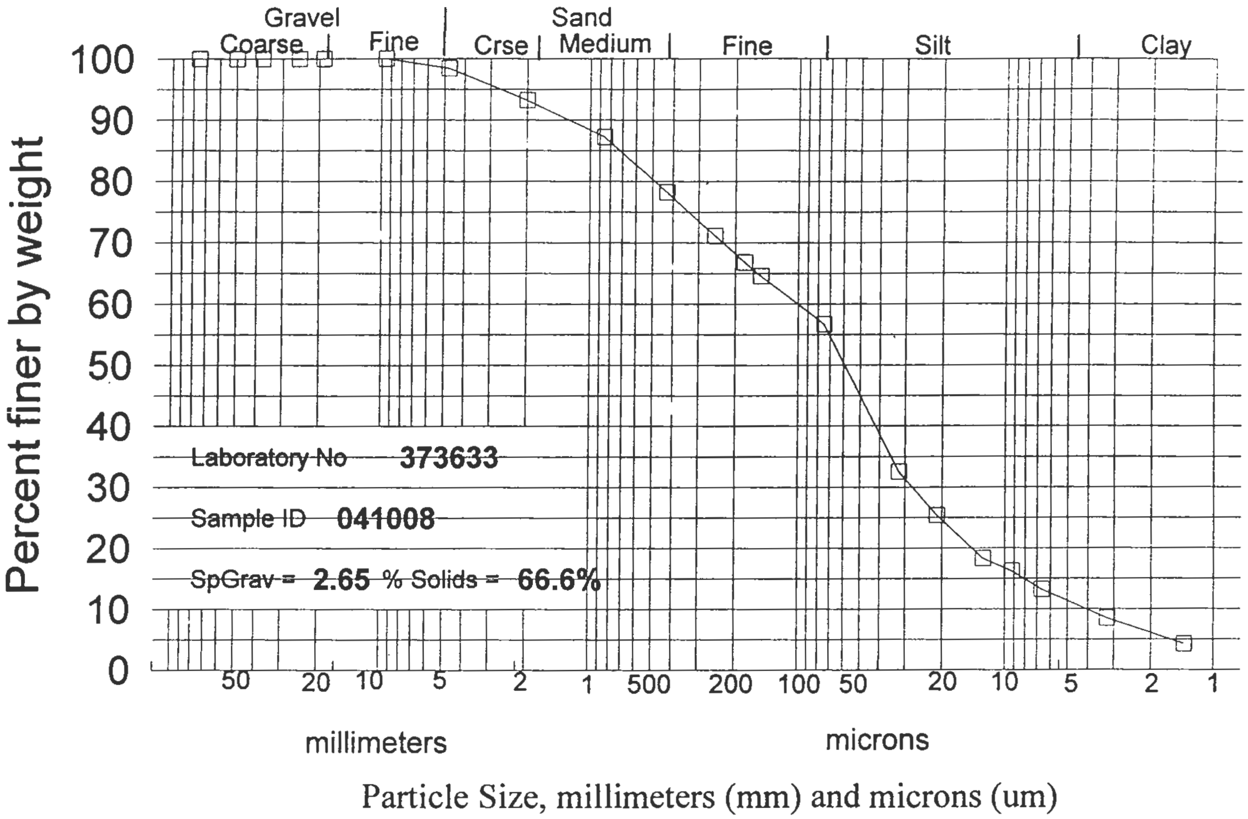
4356

Set 71765

Submitted By: 11:00 on 25-Jan-99 Lab No. 373554

STL-VT **ASTM D422 Particle Size Analysis** Sample ID **041008**

Sample preparation by: D2217



Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subrounded Hard

Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	100.0	0.0	
#4	4.75	98.4	1.6	
#10	2.00	93.2	5.2	
#20A	850.0 um	87.2	6.0	
#40A	425.0	78.2	9.0	
#60A	250.0	71.1	7.1	
#80A	180.0	66.8	4.4	
#100A	150.0	64.6	2.2	
#200A	75.0	56.7	7.9	
Hydrometer	32.2	32.5	24.1	Dispersion of soil
|	21.2	25.4	7.1	for hydrometer test
|	12.7	18.3	7.1	by mechanical mixer
|	9.2	16.3	2.0	with metal paddle
|	6.6	13.2	3.1	operated for at least
|	3.2	8.5	4.7	one minute within a
V	1.4	4.2	4.2	dispersion cup

4362

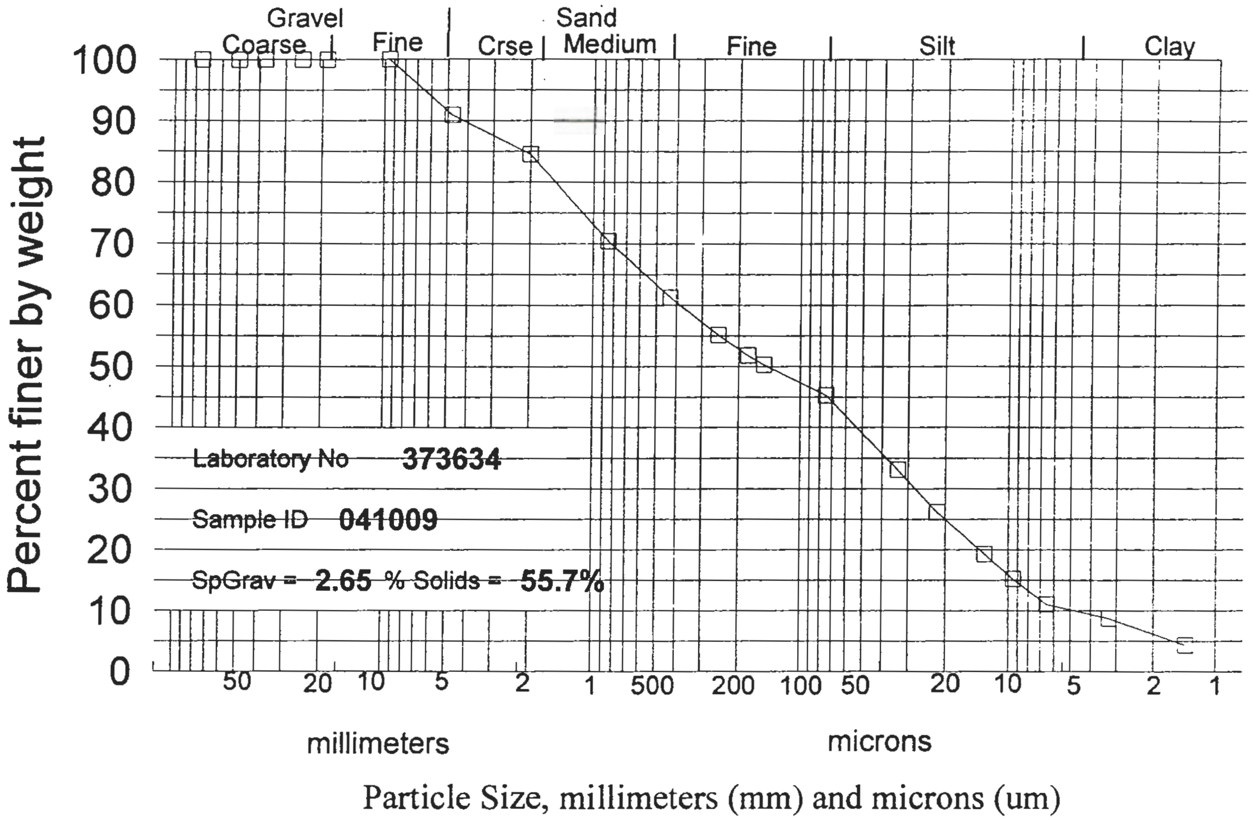
Set 71795

Submitted By: 14:42 on 29-Jan-99

Lab No. 373633

STL-VT ASTM D422 Particle Size Analysis Sample ID **041009**

Sample preparation by: D2217



Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size		Percent finer	Incremental percent	
3 inch	75.00	mm	100.0	0.0	
2 inch	50.00		100.0	0.0	
1.5 inch	37.50		100.0	0.0	
1 inch	25.00		100.0	0.0	
3/4 inch	19.00		100.0	0.0	
3/8 inch	9.50		100.0	0.0	
#4	4.75		90.9	9.1	
#10	2.00		84.5	6.4	
#20A	850.0	um	70.5	14.1	
#40A	425.0		61.3	9.2	
#60A	250.0		55.1	6.1	
#80A	180.0		51.8	3.3	
#100A	150.0		50.3	1.5	
#200A	75.0		45.3	5.0	
Hydrometer	33.7		33.1	12.2	Dispersion of soil
|	21.9		26.2	6.9	for hydrometer test
|	13.0		19.3	6.9	by mechanical mixer
|	9.5		15.2	4.1	with metal paddle
|	6.5		11.0	4.1	operated for at least
|	3.3		8.7	2.3	one minute within a
V	1.4		4.4	4.4	dispersion cup

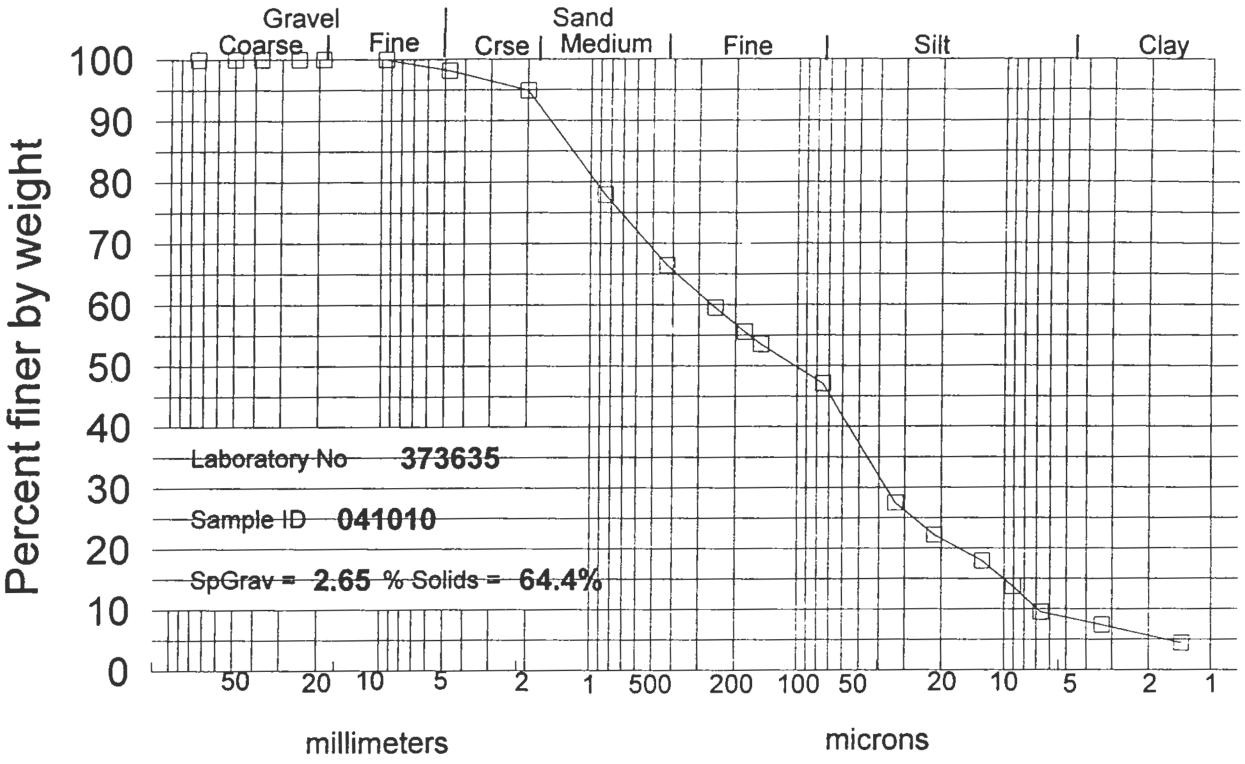
4363

Set 71795

Submitted By: 14:43 on 29-Jan-99 Lab No. 373634

STL-VT ASTM D422 Particle Size Analysis Sample ID **041010**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subrounded Hard

Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	100.0	0.0	
#4	4.75	98.1	1.9	
#10	2.00	94.9	3.2	
#20A	850.0 um	77.9	17.0	
#40A	425.0	66.4	11.5	
#60A	250.0	59.5	6.9	
#80A	180.0	55.6	4.0	
#100A	150.0	53.6	2.0	
#200A	75.0	47.1	6.5	
Hydrometer	33.4	27.5	19.6	Dispersion of soil
|	21.7	22.2	5.3	for hydrometer test
|	12.8	18.0	4.2	by mechanical mixer
|	9.1	13.7	4.2	with metal paddle
|	6.6	9.5	4.2	operated for at least
|	3.3	7.4	2.1	one minute within a
V	1.4	4.4	3.0	dispersion cup

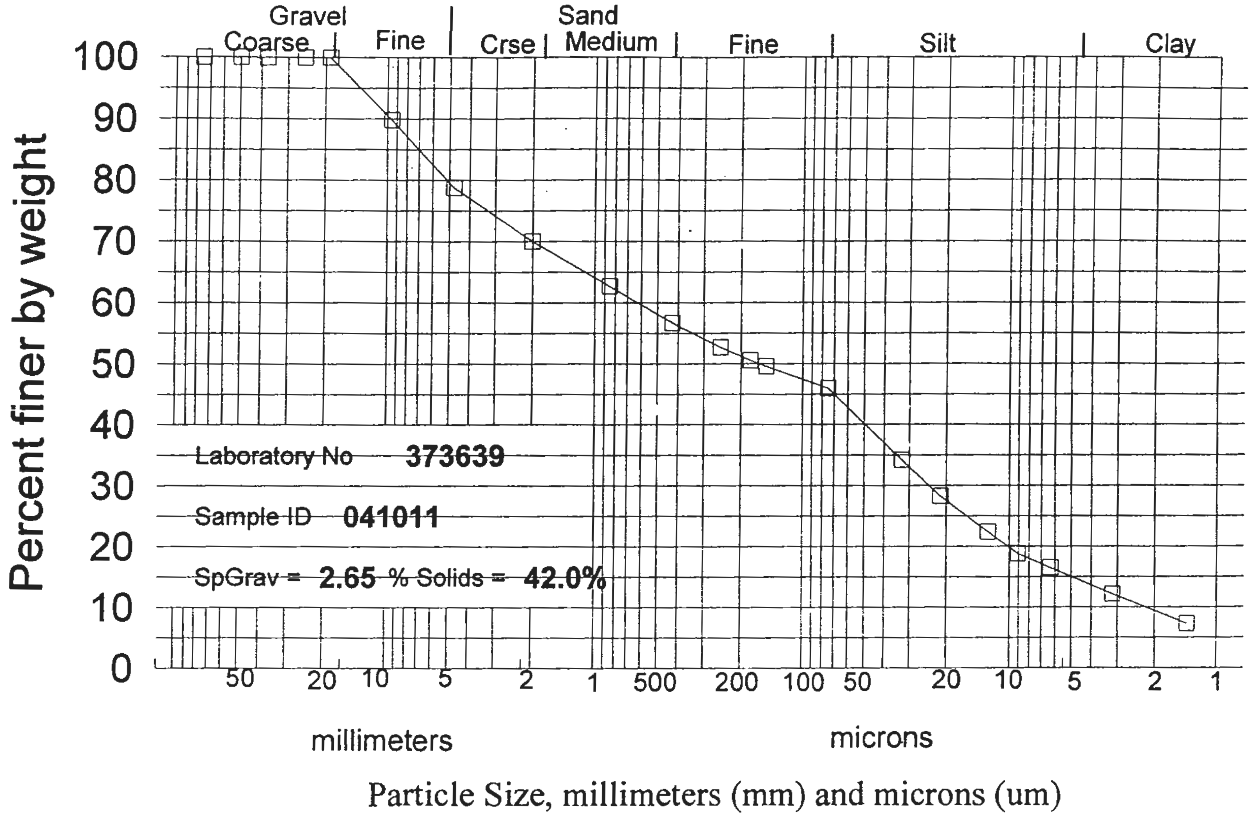
4364

Set 71795

Submitted By: 14:43 on 29-Jan-99 Lab No. 373635

STL-VT ASTM D422 Particle Size Analysis Sample ID **041011**

Sample preparation by: D2217



Maximum
particle size: 19 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	89.9	10.1	
#4	4.75	78.8	11.1	
#10	2.00	70.0	8.8	
#20A	850.0 um	62.7	7.3	
#40A	425.0	56.7	6.0	
#60A	250.0	52.7	4.0	
#80A	180.0	50.6	2.1	
#100A	150.0	49.6	1.0	
#200A	75.0	46.0	3.6	
Hydrometer	32.8	34.2	11.8	Dispersion of soil
|	21.3	28.3	5.9	for hydrometer test
|	12.6	22.4	5.9	by mechanical mixer
|	9.1	18.9	3.5	with metal paddle
|	6.3	16.5	2.4	operated for at least
|	3.2	12.2	4.3	one minute within a
V	1.4	7.3	4.9	dispersion cup

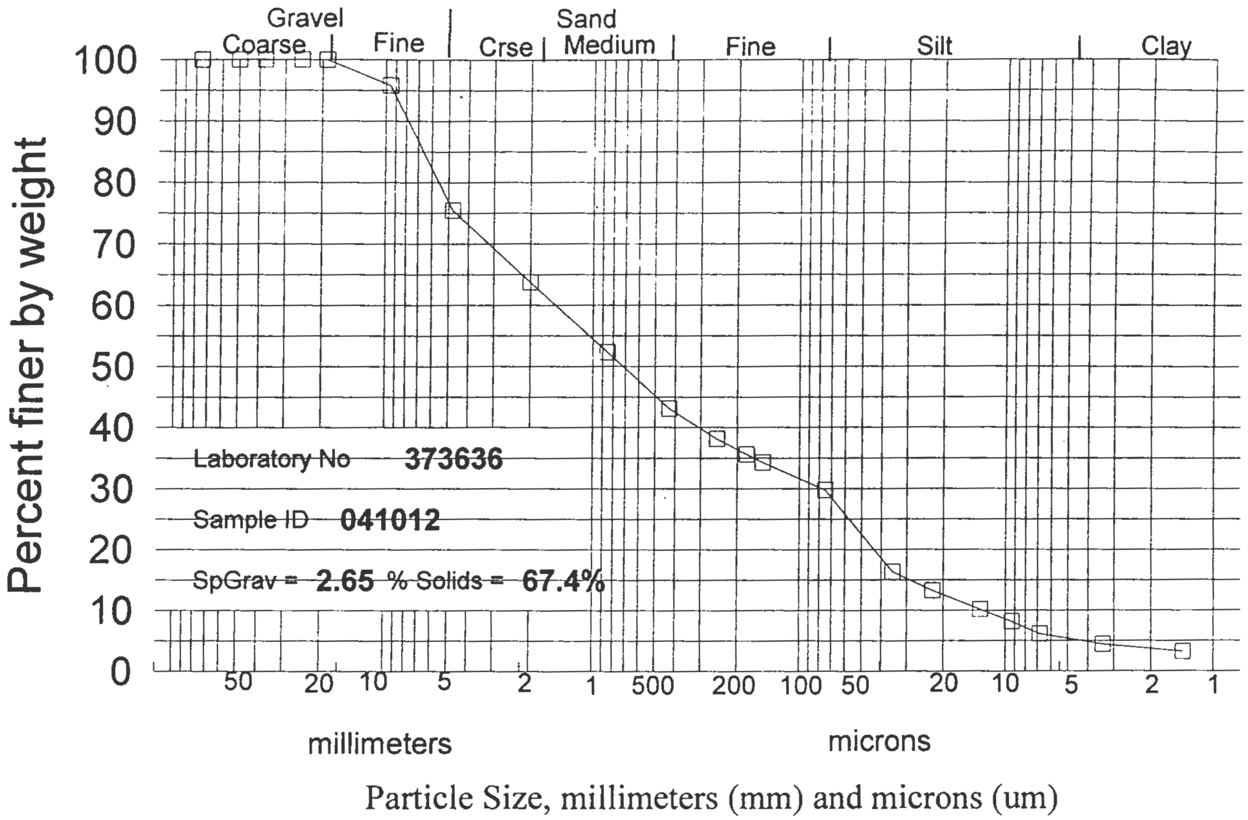
4368

Submitted By: 14:45 on 29-Jan-99

Set 71795
Lab No. 373639

STL-VT ASTM D422 Particle Size Analysis Sample ID **041012**

Sample preparation by: D2217



Maximum
particle size: 19 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size	Percent finer	Incremental percent
3 inch	75.00 mm	100.0	0.0
2 inch	50.00	100.0	0.0
1.5 inch	37.50	100.0	0.0
1 inch	25.00	100.0	0.0
3/4 inch	19.00	100.0	0.0
3/8 inch	9.50	95.8	4.2
#4	4.75	75.4	20.4
#10	2.00	63.7	11.7
#20A	850.0 um	52.3	11.4
#40A	425.0	43.1	9.2
#60A	250.0	38.1	5.0
#80A	180.0	35.6	2.5
#100A	150.0	34.3	1.3
#200A	75.0	29.8	4.5
Hydrometer	35.2	16.3	13.5
|	22.6	13.3	3.1
|	13.2	10.2	3.1
|	9.3	8.2	2.0
|	6.8	6.1	2.0
|	3.4	4.4	1.7
V	1.4	3.2	1.2

Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

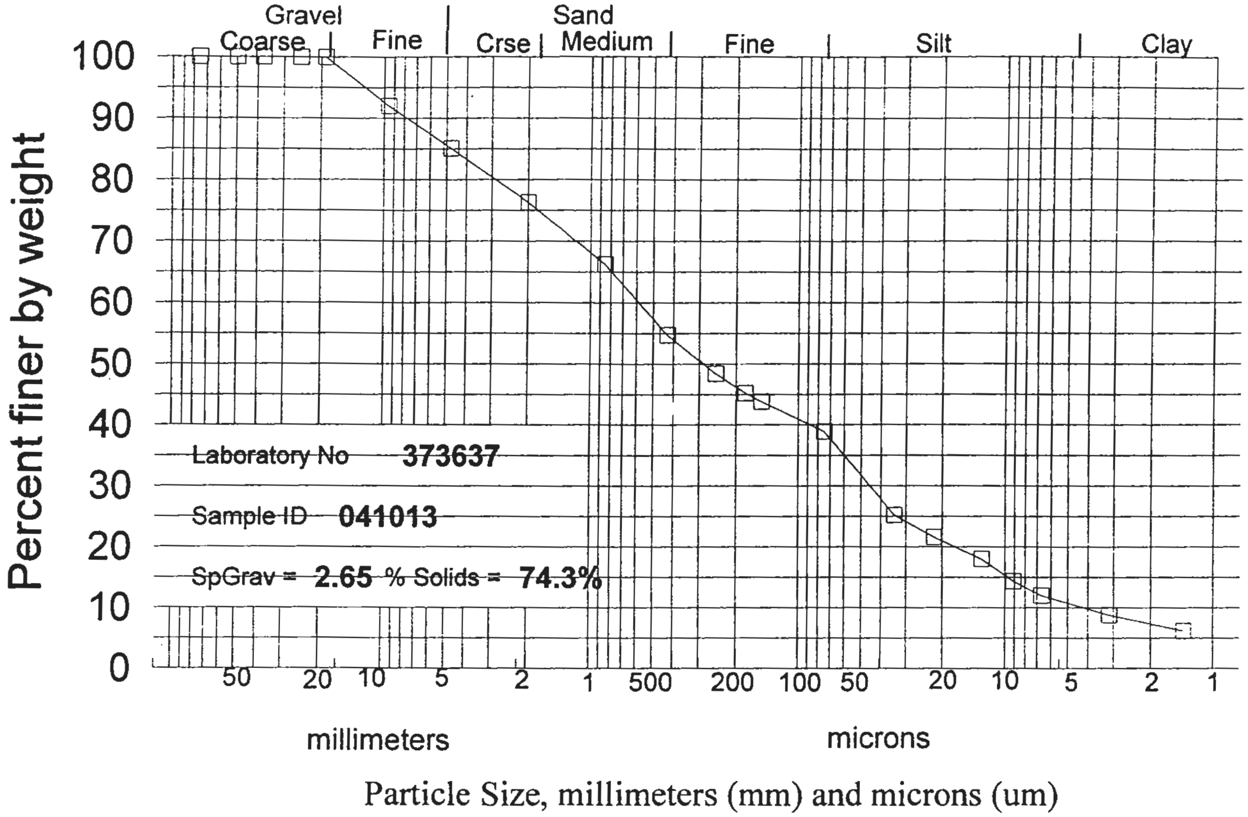
4365

Set 71795

Submitted By: 14:43 on 29-Jan-99 Lab No. 373636

STL-VT ASTM D422 Particle Size Analysis Sample ID **041013**

Sample preparation by: D2217



Maximum particle size: 19 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size	Percent finer	Incremental percent
3 inch	75.00 mm	100.0	0.0
2 inch	50.00	100.0	0.0
1.5 inch	37.50	100.0	0.0
1 inch	25.00	100.0	0.0
3/4 inch	19.00	100.0	0.0
3/8 inch	9.50	92.0	8.0
#4	4.75	85.1	6.9
#10	2.00	76.3	8.8
#20A	850.0 um	66.2	10.0
#40A	425.0	54.7	11.5
#60A	250.0	48.4	6.3
#80A	180.0	45.2	3.2
#100A	150.0	43.8	1.4
#200A	75.0	39.0	4.9
Hydrometer	34.3	25.2	13.8
|	22.0	21.6	3.6
|	12.9	18.0	3.6
|	9.1	14.4	3.6
|	6.7	12.0	2.4
|	3.1	8.8	3.2
V	1.4	6.2	2.6

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle operated for at least one minute within a dispersion cup

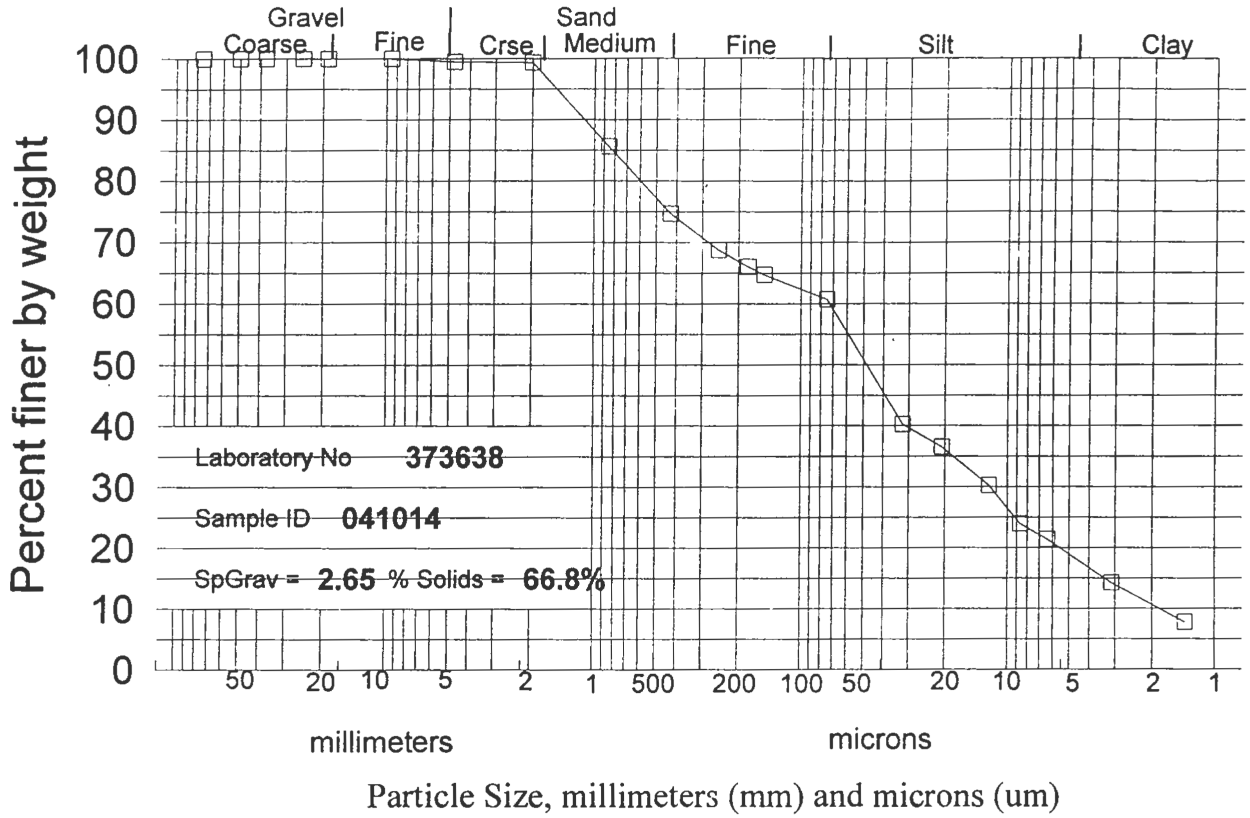
4366

Set 71795

Submitted By: 14:44 on 29-Jan-99 Lab No. 373637

STL-VT ASTM D422 Particle Size Analysis Sample ID **041014**

Sample preparation by: D2217



Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subrounded Hard

Sieve size	Particle Size		Percent finer	Incremental percent
3 inch	75.00	mm	100.0	0.0
2 inch	50.00		100.0	0.0
1.5 inch	37.50		100.0	0.0
1 inch	25.00		100.0	0.0
3/4 inch	19.00		100.0	0.0
3/8 inch	9.50		100.0	0.0
#4	4.75		99.5	0.5
#10	2.00		99.4	0.1
#20A	850.0	um	85.6	13.8
#40A	425.0		74.7	10.9
#60A	250.0		68.8	5.9
#80A	180.0		66.0	2.8
#100A	150.0		64.7	1.3
#200A	75.0		60.7	4.0
Hydrometer	32.2		40.3	20.4
|	20.7		36.5	3.8
|	12.3		30.2	6.3
|	8.7		23.9	6.3
|	6.4		21.4	2.5
|	3.1		14.3	7.1
V	1.4		7.8	6.5

Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

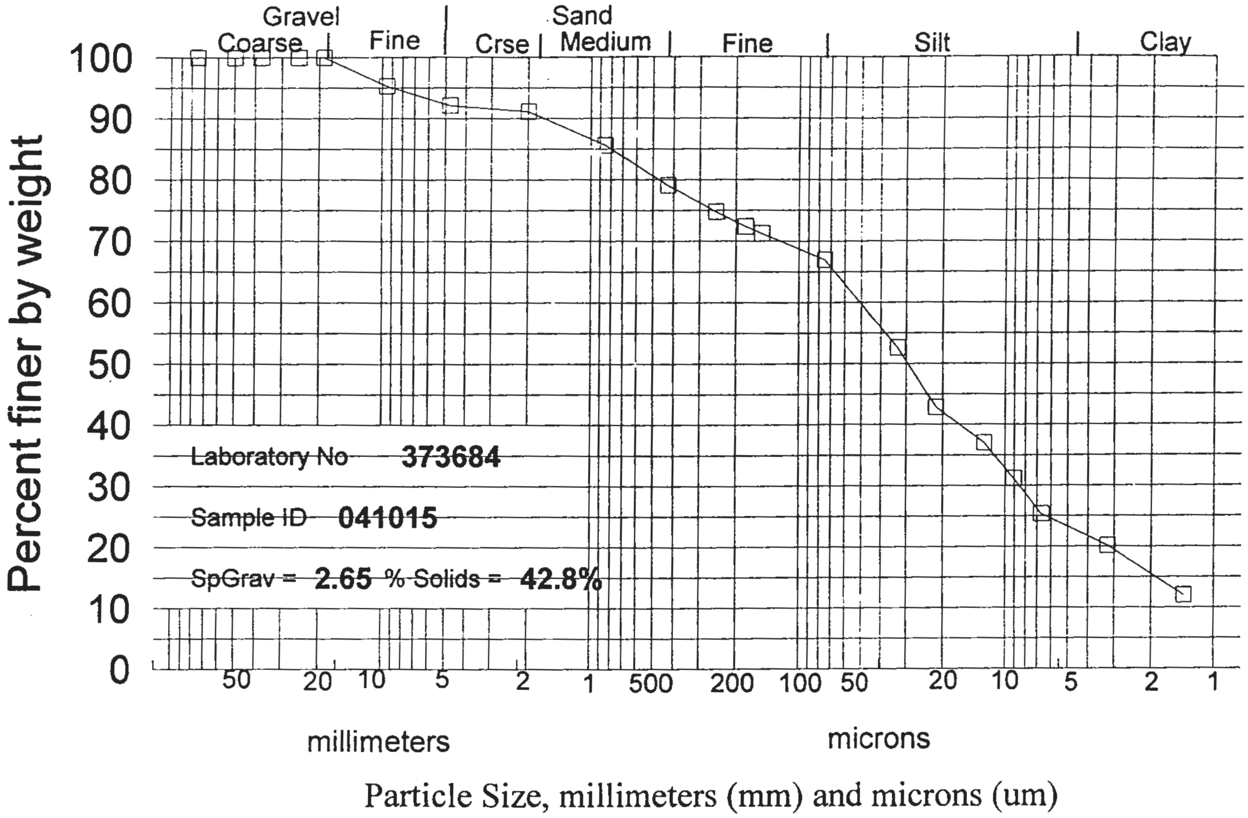
4367

Submitted By: 14:44 on 29-Jan-99

Set 71795
Lab No. 373638

STL-VT ASTM D422 Particle Size Analysis Sample ID **041015**

Sample preparation by: D2217



Maximum particle size: 19 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size		Percent finer	Incremental percent
3 inch	75.00	mm	100.0	0.0
2 inch	50.00		100.0	0.0
1.5 inch	37.50		100.0	0.0
1 inch	25.00		100.0	0.0
3/4 inch	19.00		100.0	0.0
3/8 inch	9.50		95.3	4.7
#4	4.75		92.1	3.2
#10	2.00		91.1	1.0
#20A	850.0	um	85.6	5.6
#40A	425.0		79.1	6.5
#60A	250.0		74.8	4.3
#80A	180.0		72.4	2.4
#100A	150.0		71.2	1.1
#200A	75.0		67.0	4.3
Hydrometer	33.2		52.6	14.4
|	21.6		42.9	9.7
|	12.6		37.0	5.8
|	9.1		31.2	5.8
|	6.7		25.3	5.8
|	3.2		20.1	5.2
V	1.4		12.0	8.1

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle operated for at least one minute within a dispersion cup

4369

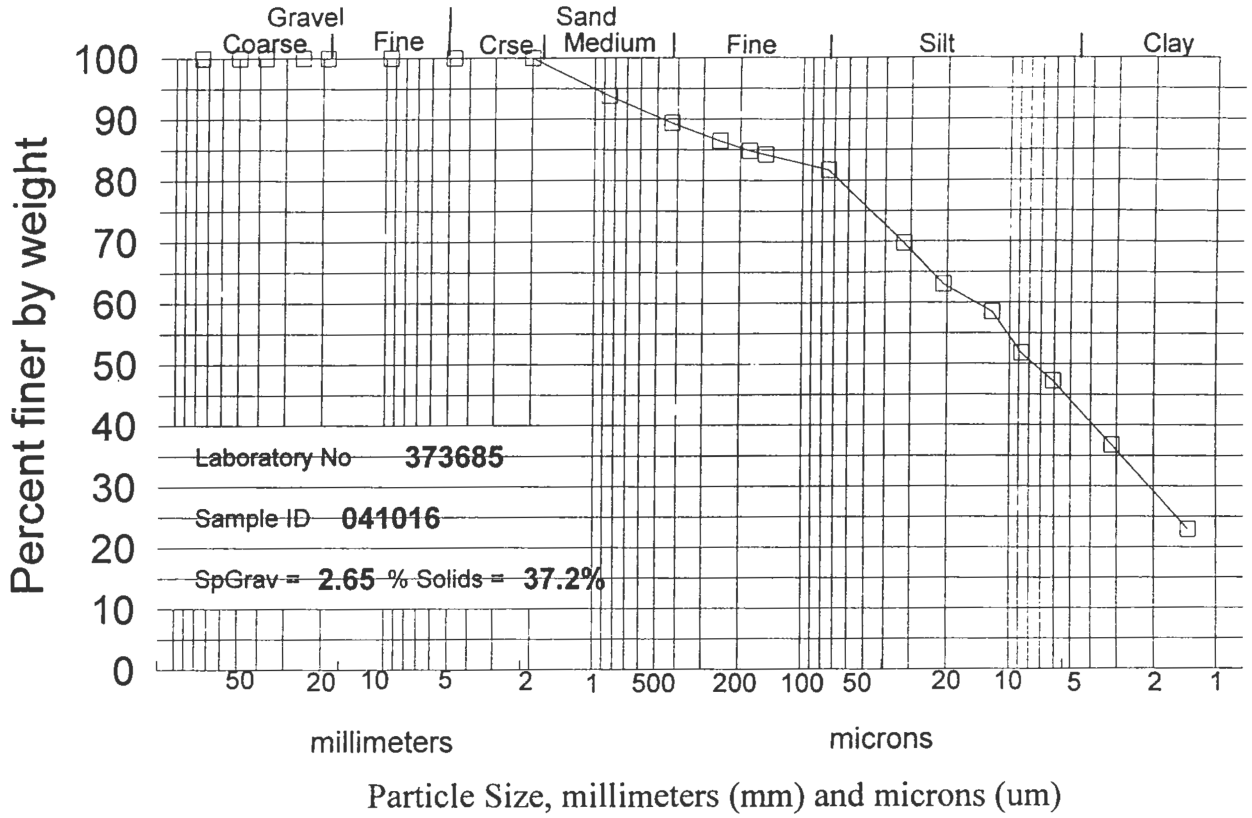
Set 71795

Submitted By: 14:45 on 29-Jan-99

Lab No. 373684

STL-VT **ASTM D422 Particle Size Analysis** Sample ID **041016**

Sample preparation by: D2217



Maximum particle size: Med sand

Shape and hardness (>#10):

Sieve size	Particle Size	Percent finer	Incremental percent
3 inch	75.00 mm	100.0	0.0
2 inch	50.00	100.0	0.0
1.5 inch	37.50	100.0	0.0
1 inch	25.00	100.0	0.0
3/4 inch	19.00	100.0	0.0
3/8 inch	9.50	100.0	0.0
#4	4.75	100.0	0.0
#10	2.00	100.0	0.0
#20A	850.0 um	93.8	6.2
#40A	425.0	89.4	4.4
#60A	250.0	86.4	2.9
#80A	180.0	84.8	1.6
#100A	150.0	84.2	0.6
#200A	75.0	81.7	2.5
Hydrometer	32.4	69.7	12.0
|	20.9	63.0	6.7
|	12.2	58.5	4.5
|	8.8	51.7	6.7
|	6.1	47.2	4.5
|	3.2	36.7	10.5
V	1.4	22.9	13.9

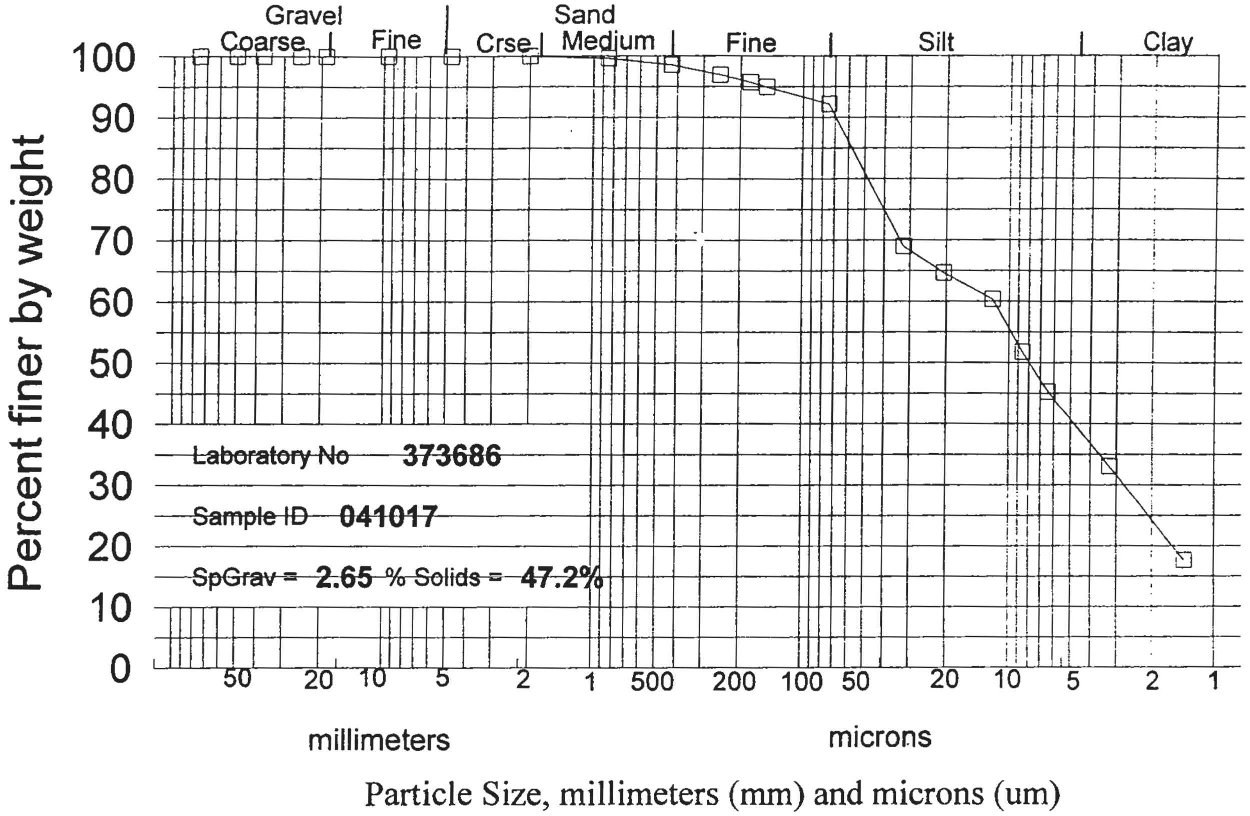
Dispersion of soil for hydrometer test by mechanical mixer with metal paddle operated for at least one minute within a dispersion cup

4370
Set 71795
Lab No. 373685

Submitted By: 14:45 on 29-Jan-99

STL-VT **ASTM D422 Particle Size Analysis** Sample ID **041017**

Sample preparation by: D2217



Maximum
particle size: Med sand

Shape and hardness (>#10):

Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	100.0	0.0	
#4	4.75	100.0	0.0	
#10	2.00	100.0	0.0	
#20A	850.0 um	99.6	0.4	
#40A	425.0	98.6	1.1	
#60A	250.0	96.9	1.7	
#80A	180.0	95.7	1.2	
#100A	150.0	95.0	0.8	
#200A	75.0	92.2	2.8	
Hydrometer	32.2	69.0	23.2	Dispersion of soil
|	20.6	64.7	4.3	for hydrometer test
|	12.0	60.4	4.3	by mechanical mixer
|	8.6	51.7	8.6	with metal paddle
|	6.4	45.3	6.5	operated for at least
|	3.2	33.1	12.2	one minute within a
V	1.4	17.6	15.5	dispersion cup

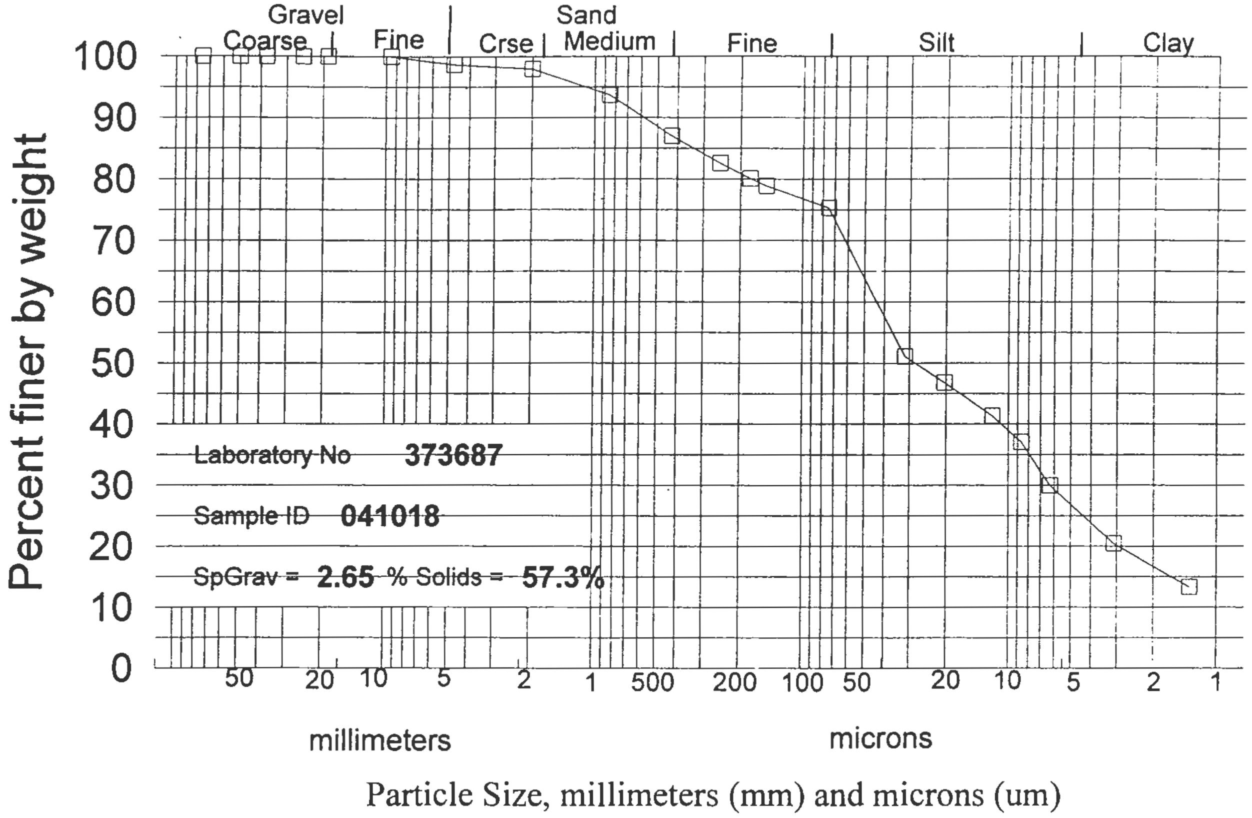
4371

Submitted By: 14:46 on 29-Jan-99

Set 71795
Lab No. 373686

STL-VT **ASTM D422 Particle Size Analysis** Sample ID **041018**

Sample preparation by: D2217



Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subrounded Hard

Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	100.0	0.0	
#4	4.75	98.7	1.3	
#10	2.00	98.0	0.7	
#20B	850.0 um	93.7	4.3	
#40B	425.0	87.0	6.6	
#60B	250.0	82.6	4.4	
#80B	180.0	80.1	2.5	
#100B	150.0	78.9	1.2	
#200B	75.0	75.3	3.6	
Hydrometer	31.6	51.1	24.2	Dispersion of soil
|	20.4	46.8	4.3	for hydrometer test
|	12.0	41.4	5.5	by mechanical mixer
|	8.6	37.1	4.3	with metal paddle
|	6.3	29.9	7.1	operated for at least
|	3.1	20.4	9.5	one minute within a
V	1.3	13.3	7.1	dispersion cup

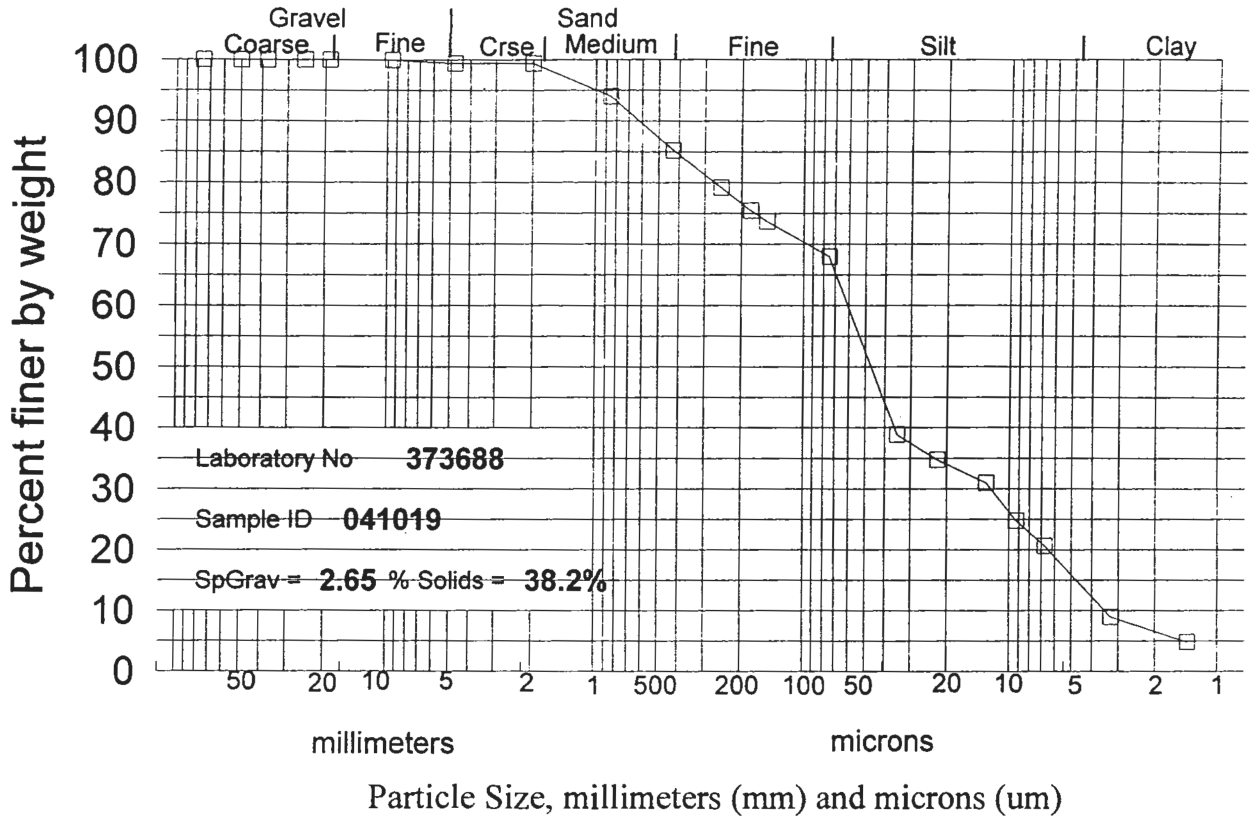
4372

Set 71806

Submitted By: 15:03 on 29-Jan-99 Lab No. 373687

STL-VT ASTM D422 Particle Size Analysis Sample ID **041019**

Sample preparation by: D2217



Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subrounded Hard

Sieve size	Particle Size	Percent finer	Incremental percent
3 inch	75.00 mm	100.0	0.0
2 inch	50.00	100.0	0.0
1.5 inch	37.50	100.0	0.0
1 inch	25.00	100.0	0.0
3/4 inch	19.00	100.0	0.0
3/8 inch	9.50	100.0	0.0
#4	4.75	99.4	0.6
#10	2.00	99.4	0.0
#20B	850.0 um	94.0	5.4
#40B	425.0	85.2	8.8
#60B	250.0	79.2	6.0
#80B	180.0	75.4	3.7
#100B	150.0	73.7	1.7
#200B	75.0	67.9	5.8
Hydrometer	34.8	38.9	29.0
|	22.3	34.8	4.1
|	12.9	31.0	3.8
|	9.3	24.8	6.2
|	6.7	20.7	4.1
|	3.2	8.9	11.7
V	1.4	4.8	4.1

Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

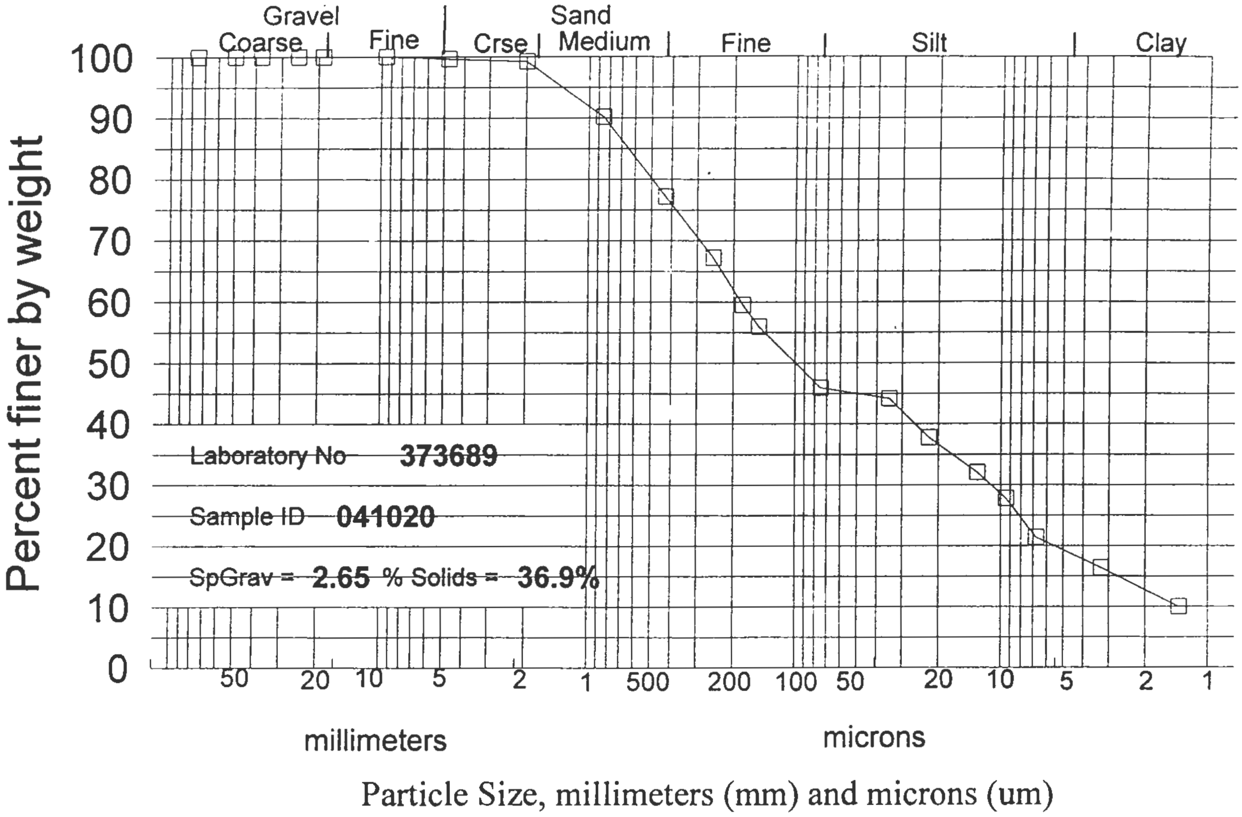
4373

Set 71806

Submitted By: 15:03 on 29-Jan-99 Lab No. 373688

STL-VT **ASTM D422 Particle Size Analysis** Sample ID **041020**

Sample preparation by: D2217



Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subrounded Hard

Sieve size	Particle Size		Percent finer	Incremental percent
3 inch	75.00	mm	100.0	0.0
2 inch	50.00		100.0	0.0
1.5 inch	37.50		100.0	0.0
1 inch	25.00		100.0	0.0
3/4 inch	19.00		100.0	0.0
3/8 inch	9.50		100.0	0.0
#4	4.75		99.6	0.4
#10	2.00		99.2	0.4
#20B	850.0	um	90.2	9.0
#40B	425.0		77.2	13.0
#60B	250.0		67.2	9.9
#80B	180.0		59.5	7.7
#100B	150.0		56.0	3.5
#200B	75.0		46.0	10.0
Hydrometer	34.7		44.2	1.8
|	22.3		37.8	6.4
|	13.0		32.1	5.7
|	9.4		27.8	4.3
|	6.8		21.4	6.4
|	3.3		16.4	5.0
V	1.4		10.0	6.4

Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

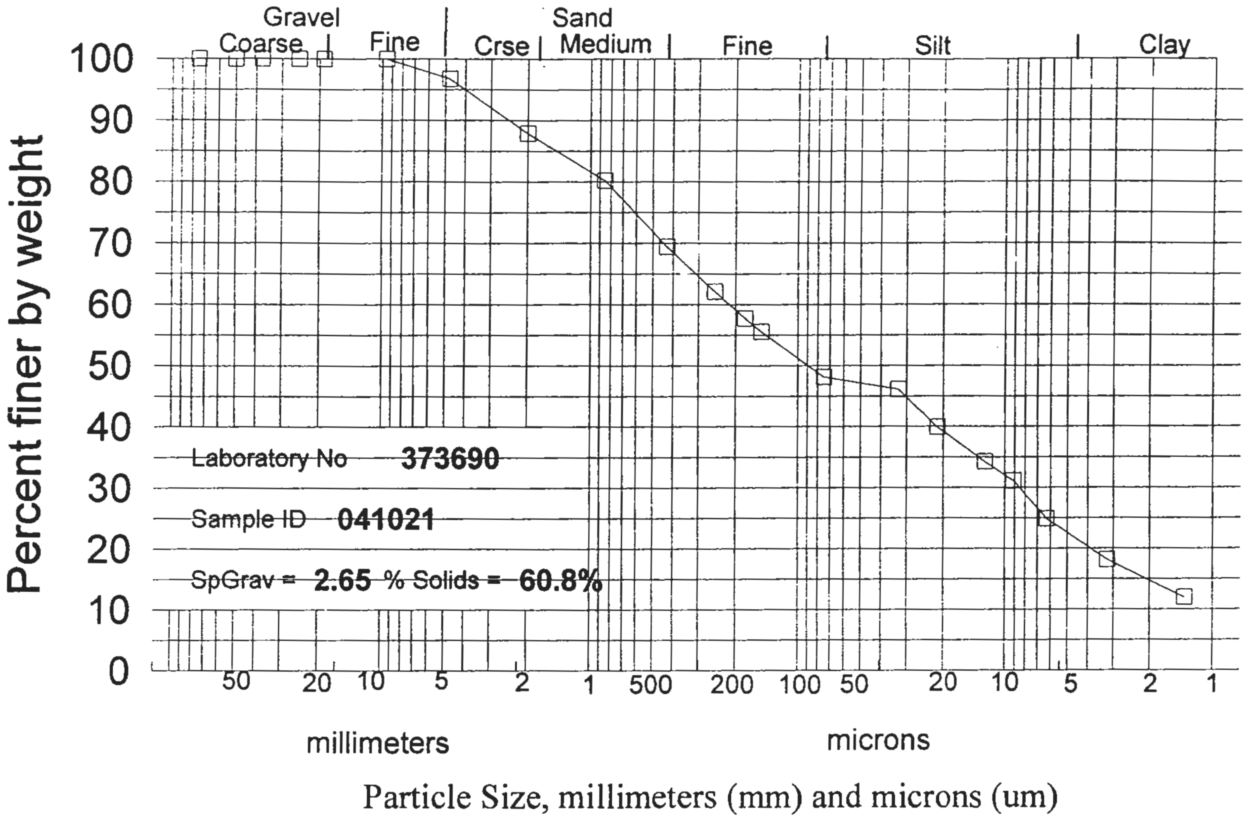
4374

Set 71806

Submitted By: 15:14 on 29-Jan-99 Lab No. 373689

STL-VT ASTM D422 Particle Size Analysis Sample ID **041021**

Sample preparation by: D2217



Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subrounded Hard

Sieve size	Particle Size	Percent finer	Incremental percent
3 inch	75.00 mm	100.0	0.0
2 inch	50.00	100.0	0.0
1.5 inch	37.50	100.0	0.0
1 inch	25.00	100.0	0.0
3/4 inch	19.00	100.0	0.0
3/8 inch	9.50	100.0	0.0
#4	4.75	96.7	3.3
#10	2.00	87.9	8.8
#20B	850.0 um	80.2	7.7
#40B	425.0	69.4	10.8
#60B	250.0	62.1	7.2
#80B	180.0	57.8	4.4
#100B	150.0	55.6	2.2
#200B	75.0	48.2	7.4
Hydrometer	33.0	46.2	2.0
|	21.3	39.9	6.2
|	12.5	34.2	5.7
|	9.1	31.1	3.1
|	6.3	24.9	6.2
|	3.2	18.2	6.7
V	1.4	11.9	6.2

Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

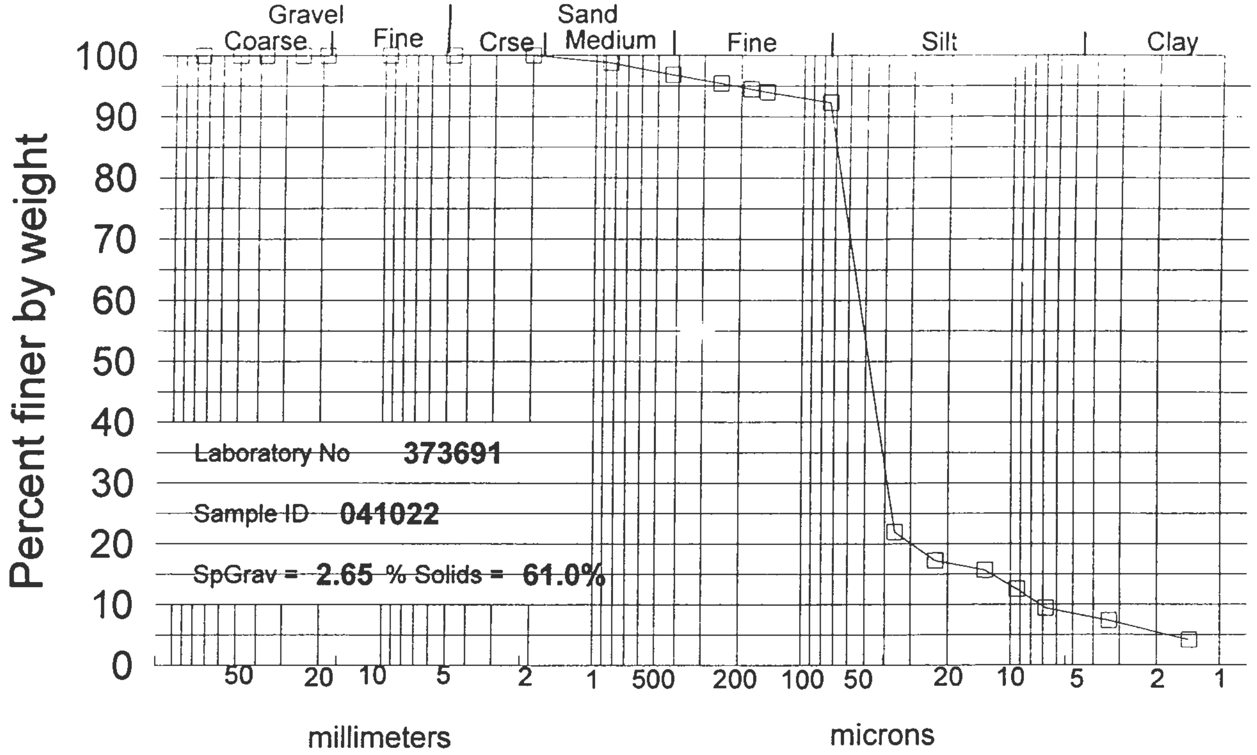
4375

Set 71806

Submitted By: 15:15 on 29-Jan-99 Lab No. 373690

STL-VT ASTM D422 Particle Size Analysis Sample ID **041022**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum
particle size: Med sand

Shape and hardness (>#10):

Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	100.0	0.0	
#4	4.75	100.0	0.0	
#10	2.00	100.0	0.0	
#20B	850.0 um	98.8	1.2	
#40B	425.0	96.8	1.9	
#60B	250.0	95.4	1.4	
#80B	180.0	94.4	1.0	
#100B	150.0	94.0	0.4	
#200B	75.0	92.3	1.7	
Hydrometer	35.7	21.9	70.3	Dispersion of soil
|	22.9	17.2	4.7	for hydrometer test
|	13.3	15.7	1.6	by mechanical mixer
|	9.3	12.5	3.1	with metal paddle
|	6.8	9.4	3.1	operated for at least
|	3.4	7.3	2.1	one minute within a
V	1.4	4.2	3.1	dispersion cup

4376

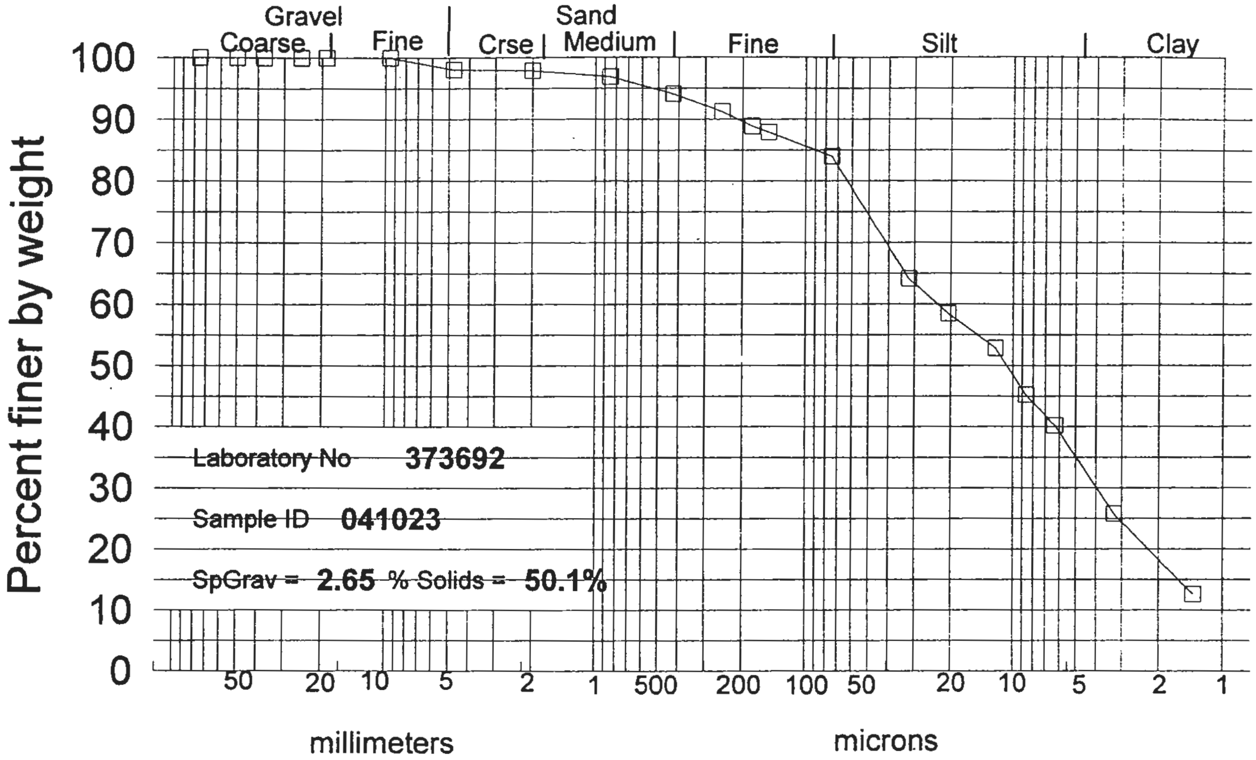
Set 71806

Submitted By: 15:22 on 29-Jan-99

Lab No. 373691

STL-VT **ASTM D422 Particle Size Analysis** Sample ID **041023**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subrounded Hard

Sieve size	Particle Size	Percent finer	Incremental percent
3 inch	75.00 mm	100.0	0.0
2 inch	50.00	100.0	0.0
1.5 inch	37.50	100.0	0.0
1 inch	25.00	100.0	0.0
3/4 inch	19.00	100.0	0.0
3/8 inch	9.50	100.0	0.0
#4	4.75	98.1	1.9
#10	2.00	97.8	0.2
#20B	850.0 um	96.9	1.0
#40B	425.0	94.1	2.7
#60B	250.0	91.2	2.9
#80B	180.0	88.9	2.3
#100B	150.0	87.9	1.0
#200B	75.0	84.0	3.9
Hydrometer	32.0	64.1	19.9
|	20.6	58.5	5.7
|	12.1	52.8	5.7
|	8.6	45.3	7.5
|	6.3	40.2	5.0
|	3.3	25.8	14.5
V	1.4	12.6	13.2

Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

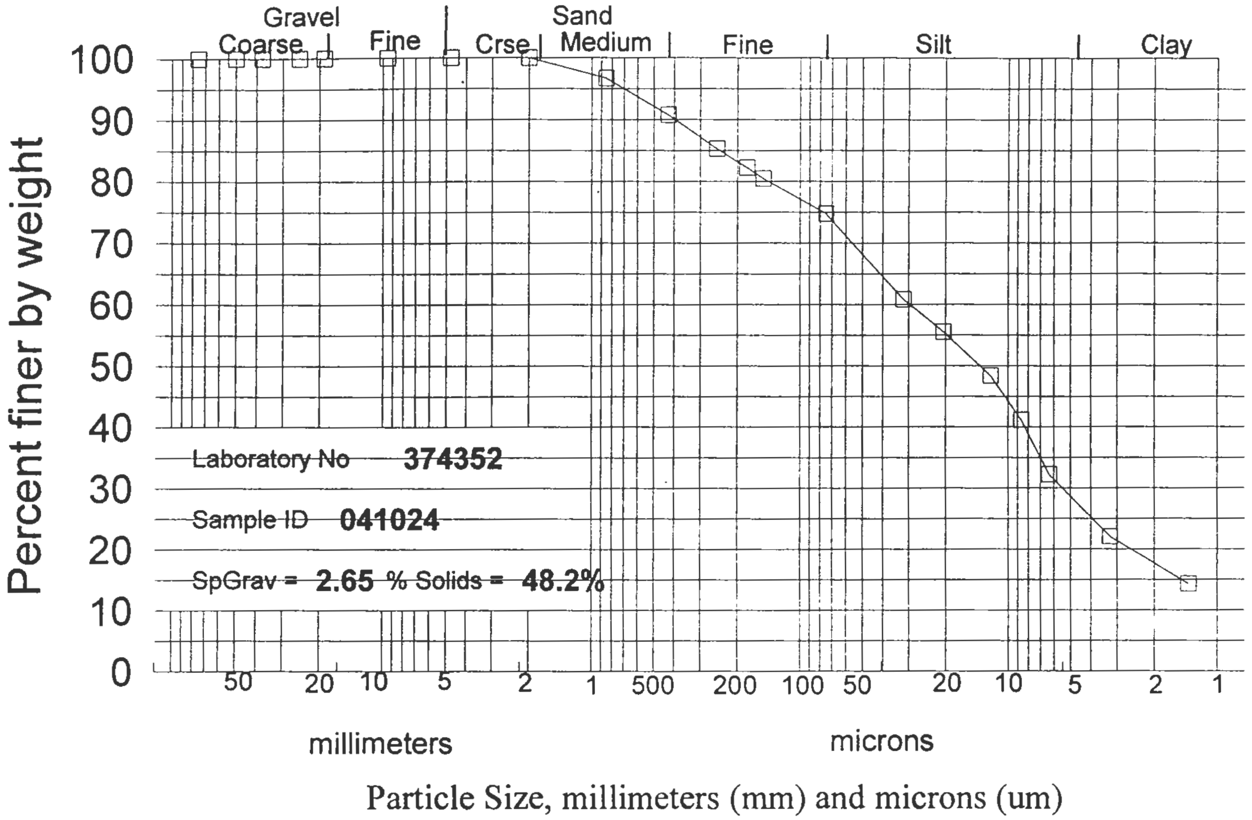
2770

Submitted By: 15:23 on 29-Jan-99

Set 71806
Lab No. 373692

STL-VT **ASTM D422 Particle Size Analysis** Sample ID **041024**

Sample preparation by: D2217



Maximum particle size: Med sand

Shape and hardness (>#10):

Sieve size	Particle Size		Percent finer	Incremental percent	
3 inch	75.00	mm	100.0	0.0	
2 inch	50.00		100.0	0.0	
1.5 inch	37.50		100.0	0.0	
1 inch	25.00		100.0	0.0	
3/4 inch	19.00		100.0	0.0	
3/8 inch	9.50		100.0	0.0	
#4	4.75		100.0	0.0	
#10	2.00		100.0	0.0	
#20A	850.0	um	96.7	3.3	
#40A	425.0		90.8	5.9	
#60A	250.0		85.3	5.5	
#80A	180.0		82.2	3.1	
#100A	150.0		80.5	1.7	
#200A	75.0		74.8	5.6	
Hydrometer	31.8		60.9	13.9	Dispersion of soil
|	20.5		55.5	5.4	for hydrometer test
|	12.1		48.4	7.2	by mechanical mixer
|	8.6		41.2	7.2	with metal paddle
|	6.4		32.2	9.0	operated for at least
|	3.2		22.1	10.2	one minute within a
V	1.4		14.3	7.8	dispersion cup

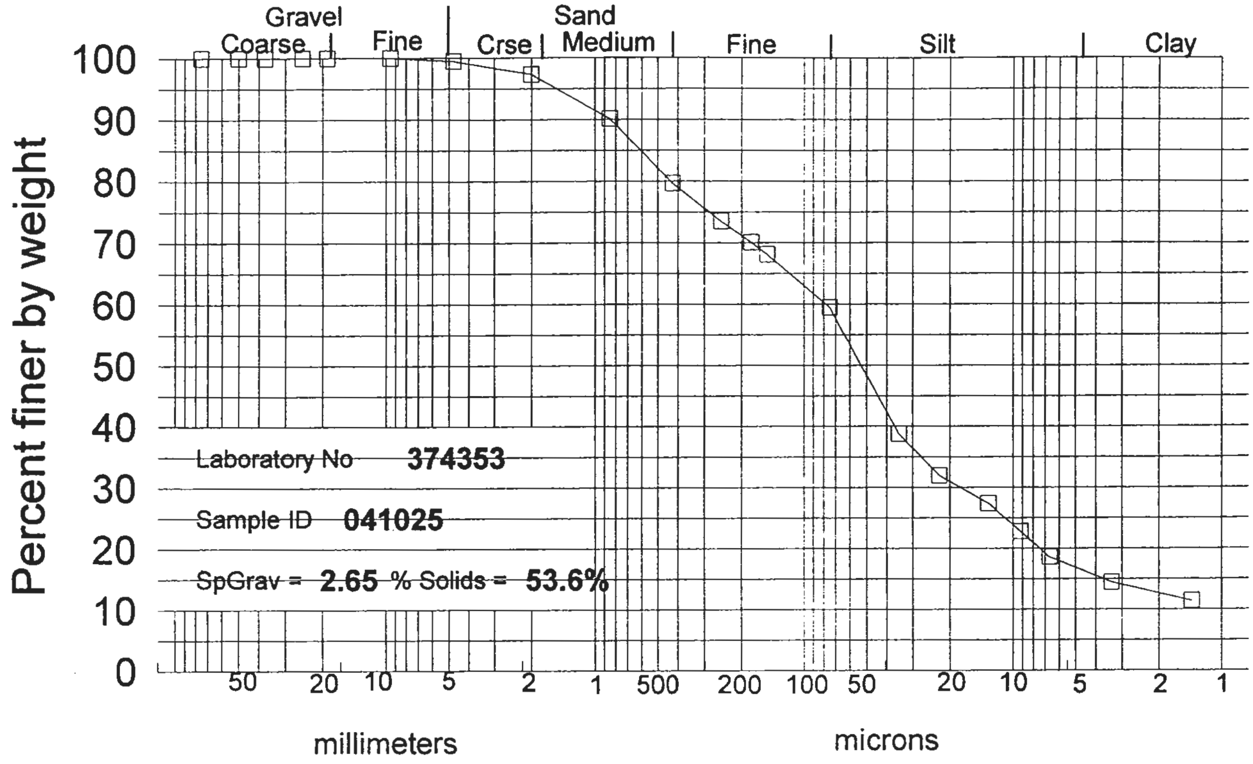
2781

Set 71894

Submitted By: 15:45 on 29-Jan-99 Lab No. 374352

STL-VT ASTM D422 Particle Size Analysis Sample ID **041025**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	100.0	0.0	
#4	4.75	99.5	0.5	
#10	2.00	97.3	2.1	
#20A	850.0 um	90.1	7.2	
#40A	425.0	79.7	10.5	
#60A	250.0	73.5	6.1	
#80A	180.0	70.1	3.4	
#100A	150.0	68.1	2.0	
#200A	75.0	59.5	8.6	
Hydrometer	35.0	38.8	20.7	Dispersion of soil
|	22.5	31.9	6.8	for hydrometer test
|	13.1	27.4	4.6	by mechanical mixer
|	9.2	22.8	4.6	with metal paddle
|	6.7	18.6	4.2	operated for at least
|	3.4	14.5	4.2	one minute within a
V	1.4	11.4	3.0	dispersion cup

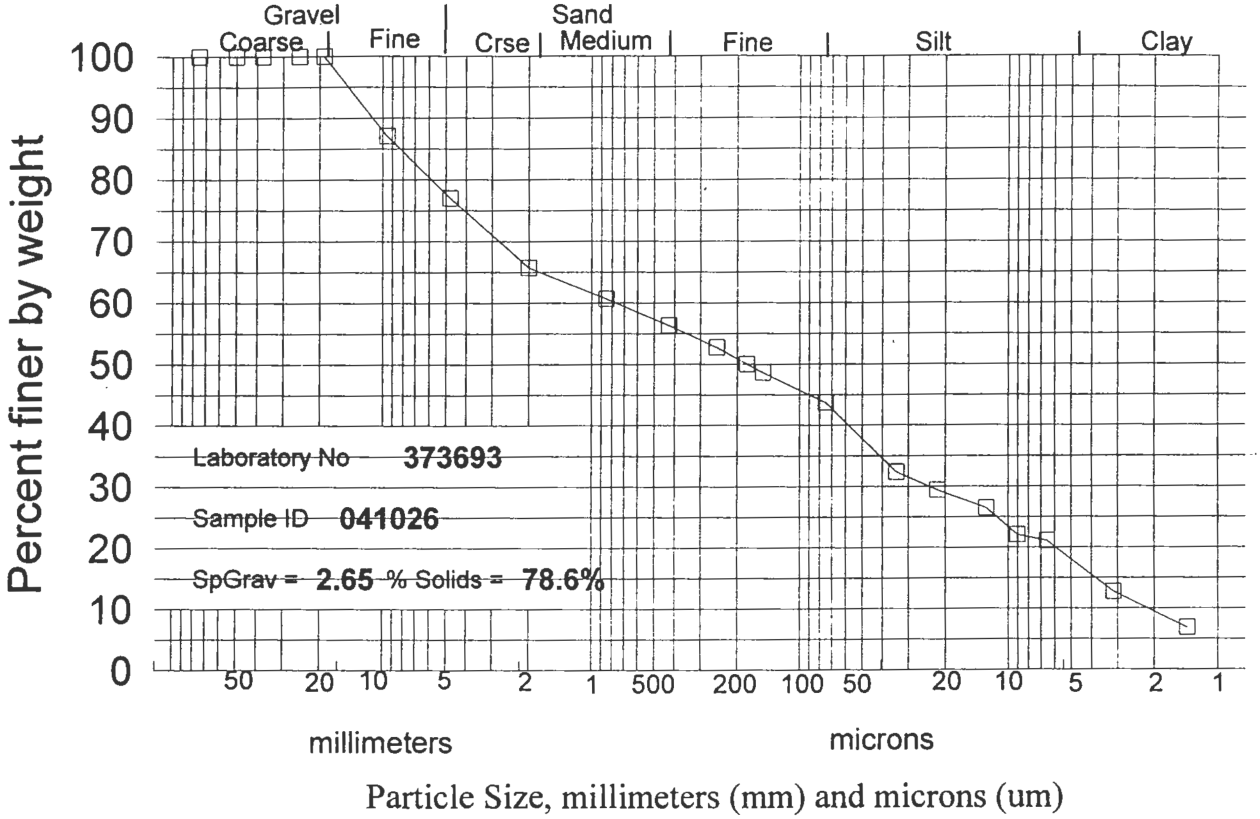
2782

Set 71894

Submitted By: 15:45 on 29-Jan-99 Lab No. 374353

STL-VT ASTM D422 Particle Size Analysis Sample ID **041026**

Sample preparation by: D2217



Maximum
particle size: 19 mm

Shape and hardness (>#10): Subrounded Hard

Sieve size	Particle Size	Percent finer	Incremental percent
3 inch	75.00 mm	100.0	0.0
2 inch	50.00	100.0	0.0
1.5 inch	37.50	100.0	0.0
1 inch	25.00	100.0	0.0
3/4 inch	19.00	100.0	0.0
3/8 inch	9.50	87.1	12.9
#4	4.75	77.0	10.1
#10	2.00	65.8	11.2
#20B	850.0 um	60.7	5.1
#40B	425.0	56.4	4.3
#60B	250.0	52.7	3.6
#80B	180.0	50.0	2.7
#100B	150.0	48.7	1.4
#200B	75.0	43.8	4.9
Hydrometer	34.3	32.4	11.4
|	21.9	29.4	2.9
|	12.8	26.5	2.9
|	9.0	22.1	4.4
|	6.5	21.1	1.0
|	3.1	12.8	8.3
V	1.4	6.9	5.9

Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

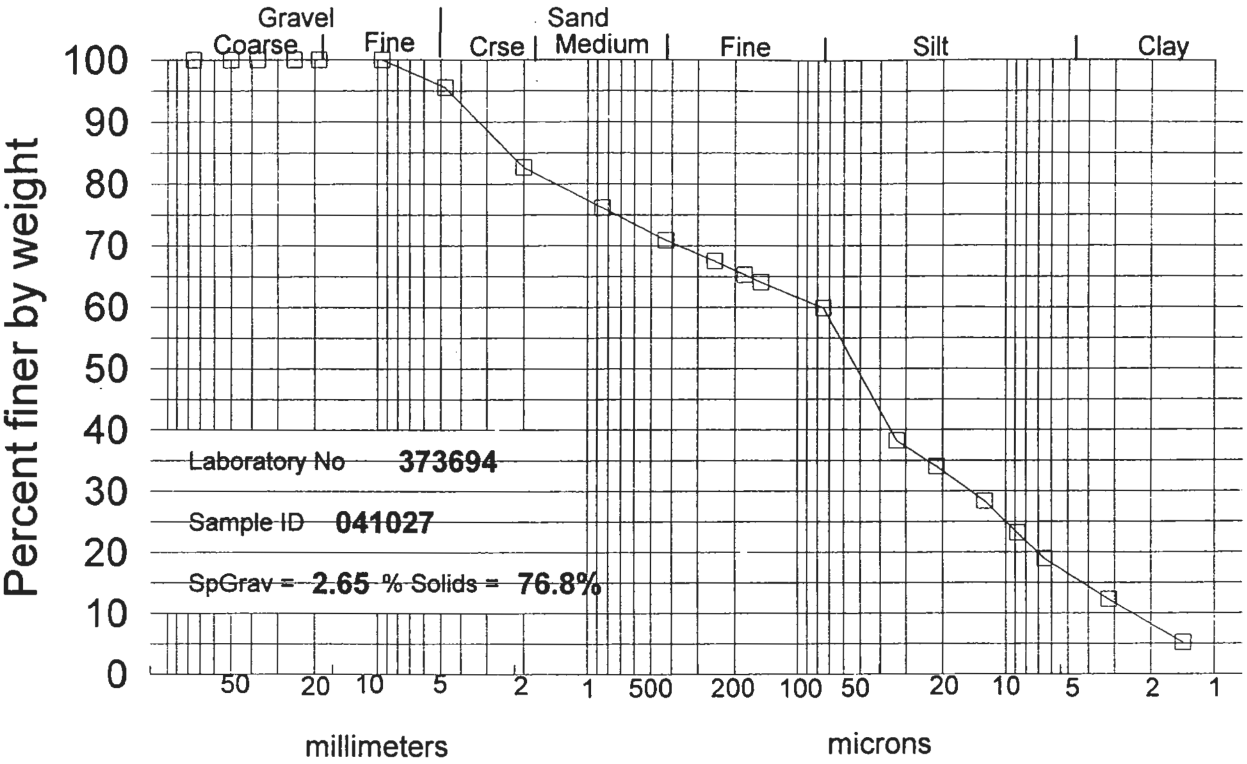
2771

Set 71806

Submitted By: 15:23 on 29-Jan-99 Lab No. 373693

STL-VT ASTM D422 Particle Size Analysis Sample ID **041027**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subrounded Hard

Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	100.0	0.0	
#4	4.75	95.6	4.4	
#10	2.00	82.7	12.9	
#20B	850.0 um	76.2	6.6	
#40B	425.0	70.9	5.3	
#60B	250.0	67.5	3.4	
#80B	180.0	65.3	2.2	
#100B	150.0	64.1	1.2	
#200B	75.0	59.9	4.2	
Hydrometer	33.4	38.3	21.6	Dispersion of soil
|	21.4	34.0	4.3	for hydrometer test
|	12.6	28.4	5.7	by mechanical mixer
|	8.8	23.2	5.2	with metal paddle
|	6.5	18.9	4.3	operated for at least
|	3.2	12.3	6.6	one minute within a
V	1.4	5.2	7.1	dispersion cup

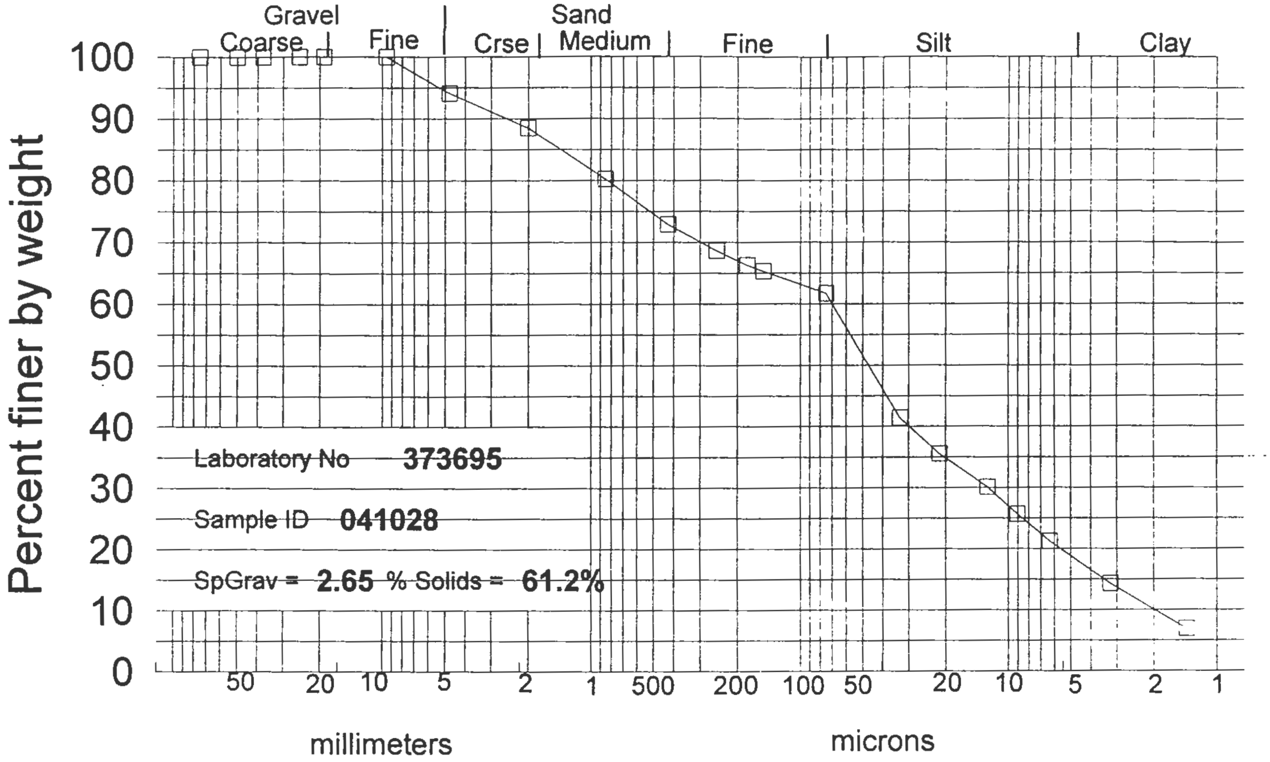
2772

Set 71806

Submitted By: 15:23 on 29-Jan-99 Lab No. 373694

STL-VT ASTM D422 Particle Size Analysis Sample ID **041028**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum particle size: 9.5 mm

Shape and hardness (>#10): Subrounded Hard

Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	100.0	0.0	
#4	4.75	94.1	5.9	
#10	2.00	88.5	5.6	
#20B	850.0 um	80.3	8.2	
#40B	425.0	72.9	7.4	
#60B	250.0	68.6	4.3	
#80B	180.0	66.3	2.3	
#100B	150.0	65.3	1.0	
#200B	75.0	61.7	3.6	
Hydrometer	33.2	41.5	20.2	Dispersion of soil
|	21.4	35.5	5.9	for hydrometer test
|	12.6	30.1	5.4	by mechanical mixer
|	9.0	25.7	4.4	with metal paddle
|	6.3	21.2	4.4	operated for at least
|	3.2	14.3	6.9	one minute within a
V	1.4	6.9	7.4	dispersion cup

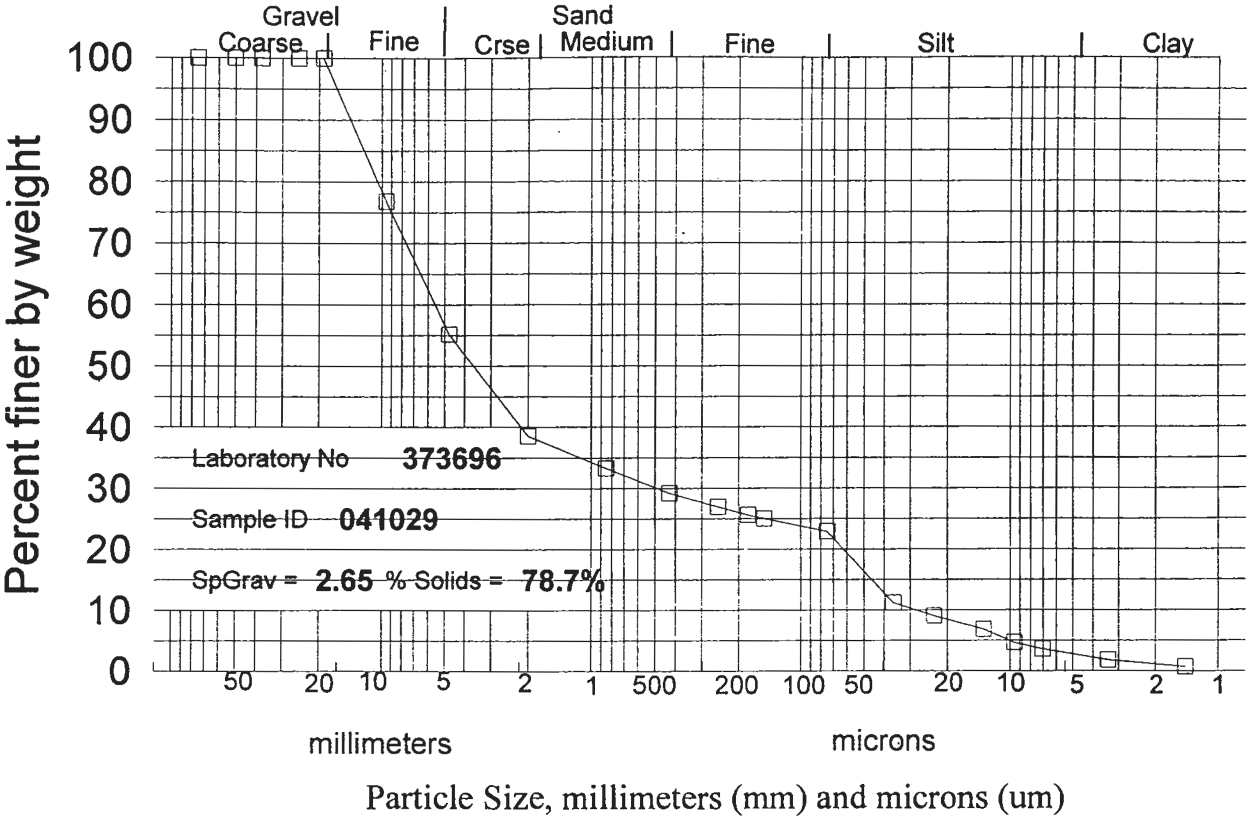
2773

Set 71806

Submitted By: 15:23 on 29-Jan-99 Lab No. 373695

STL-VT **ASTM D422 Particle Size Analysis** Sample ID **041029**

Sample preparation by: D2217



Maximum
particle size: 19 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size	Percent finer	Incremental percent
3 inch	75.00 mm	100.0	0.0
2 inch	50.00	100.0	0.0
1.5 inch	37.50	100.0	0.0
1 inch	25.00	100.0	0.0
3/4 inch	19.00	100.0	0.0
3/8 inch	9.50	76.8	23.2
#4	4.75	55.2	21.6
#10	2.00	38.6	16.6
#20B	850.0 um	33.3	5.2
#40B	425.0	29.2	4.1
#60B	250.0	26.9	2.3
#80B	180.0	25.6	1.3
#100B	150.0	25.0	0.6
#200B	75.0	22.9	2.2
Hydrometer	36.1	11.2	11.7
|	23.1	9.0	2.2
|	13.4	6.9	2.2
|	9.6	4.7	2.2
|	7.0	3.6	1.1
|	3.4	1.8	1.8
V	1.4	0.7	1.1

Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

2774

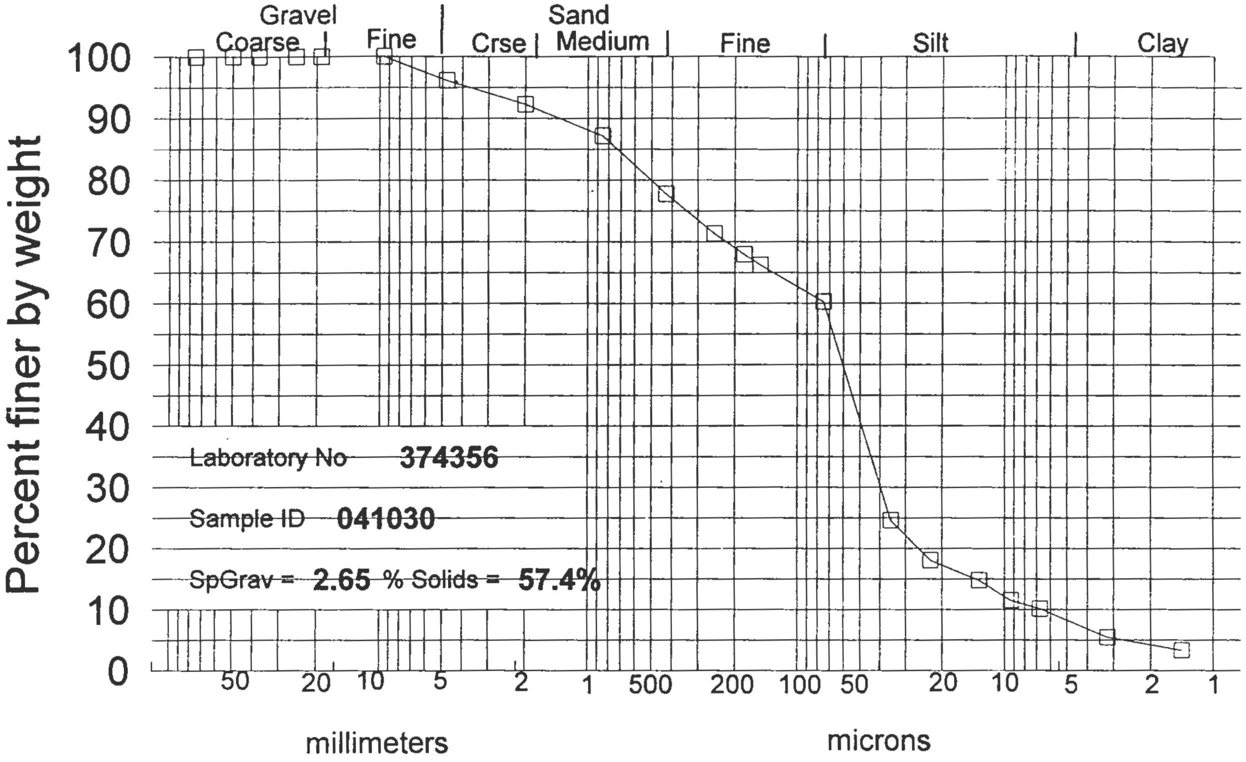
Set 71806

Submitted By: 15:23 on 29-Jan-99

Lab No. 373696

STL-VT **ASTM D422 Particle Size Analysis** Sample ID **041030**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	100.0	0.0	
#4	4.75	96.1	3.9	
#10	2.00	92.3	3.8	
#20A	850.0 um	87.2	5.1	
#40A	425.0	77.7	9.4	
#60A	250.0	71.3	6.4	
#80A	180.0	67.9	3.4	
#100A	150.0	66.2	1.7	
#200A	75.0	60.2	6.0	
Hydrometer	35.3	24.6	35.6	Dispersion of soil
|	22.8	18.1	6.6	for hydrometer test
|	13.3	14.8	3.3	by mechanical mixer
|	9.3	11.5	3.3	with metal paddle
|	6.7	10.1	1.4	operated for at least
|	3.2	5.5	4.7	one minute within a
V	1.4	3.3	2.2	dispersion cup

3353

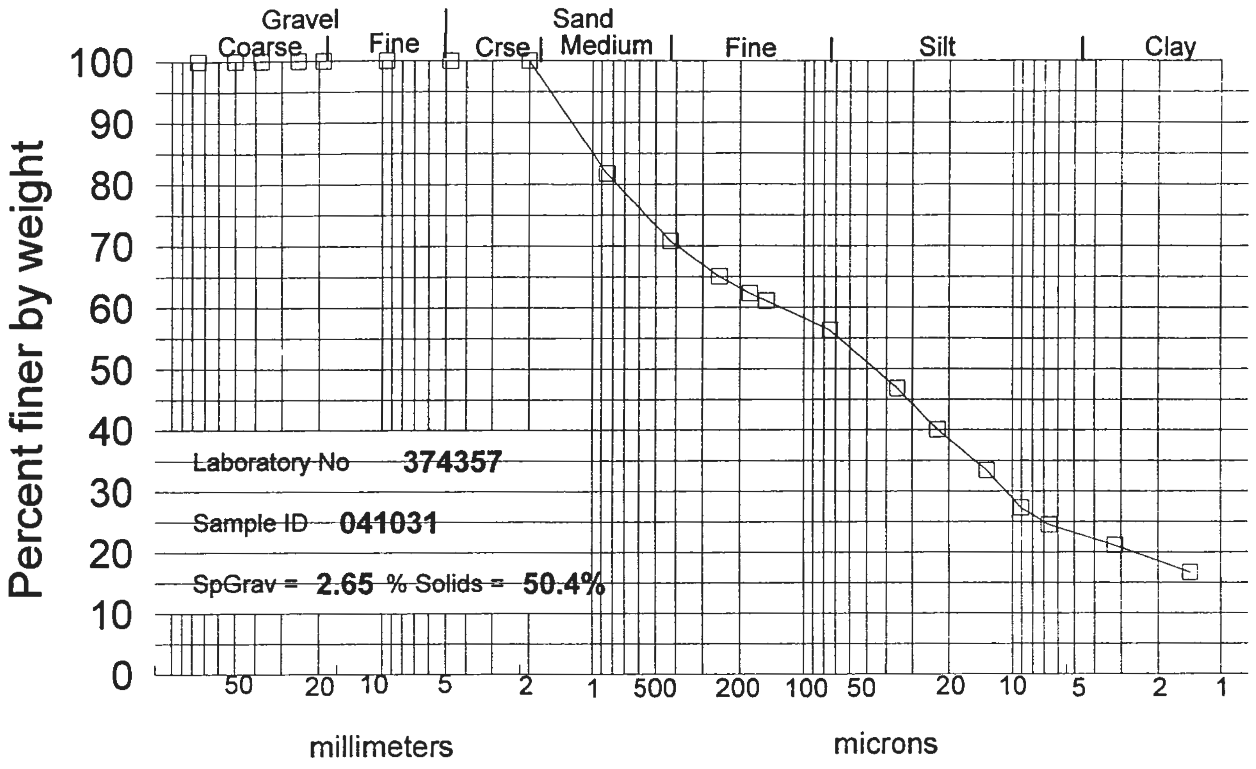
Set 71894

Submitted By: 15:45 on 29-Jan-99 Lab No. 374356

STL-VT ASTM D422 Particle Size Analysis

Sample ID **041031**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum
particle size: Med sand

Shape and hardness (>#10):

Sieve size	Particle Size	Percent finer	Incremental percent
3 inch	75.00 mm	100.0	0.0
2 inch	50.00	100.0	0.0
1.5 inch	37.50	100.0	0.0
1 inch	25.00	100.0	0.0
3/4 inch	19.00	100.0	0.0
3/8 inch	9.50	100.0	0.0
#4	4.75	100.0	0.0
#10	2.00	100.0	0.0
#20A	850.0 um	81.8	18.2
#40A	425.0	70.8	10.9
#60A	250.0	65.0	5.8
#80A	180.0	62.3	2.8
#100A	150.0	61.1	1.2
#200A	75.0	56.3	4.8
Hydrometer	35.5	46.8	9.5
|	22.7	40.1	6.7
|	13.2	33.4	6.7
|	9.1	27.3	6.1
|	6.6	24.5	2.8
|	3.2	21.2	3.3
V	1.4	16.7	4.5

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle operated for at least one minute within a dispersion cup

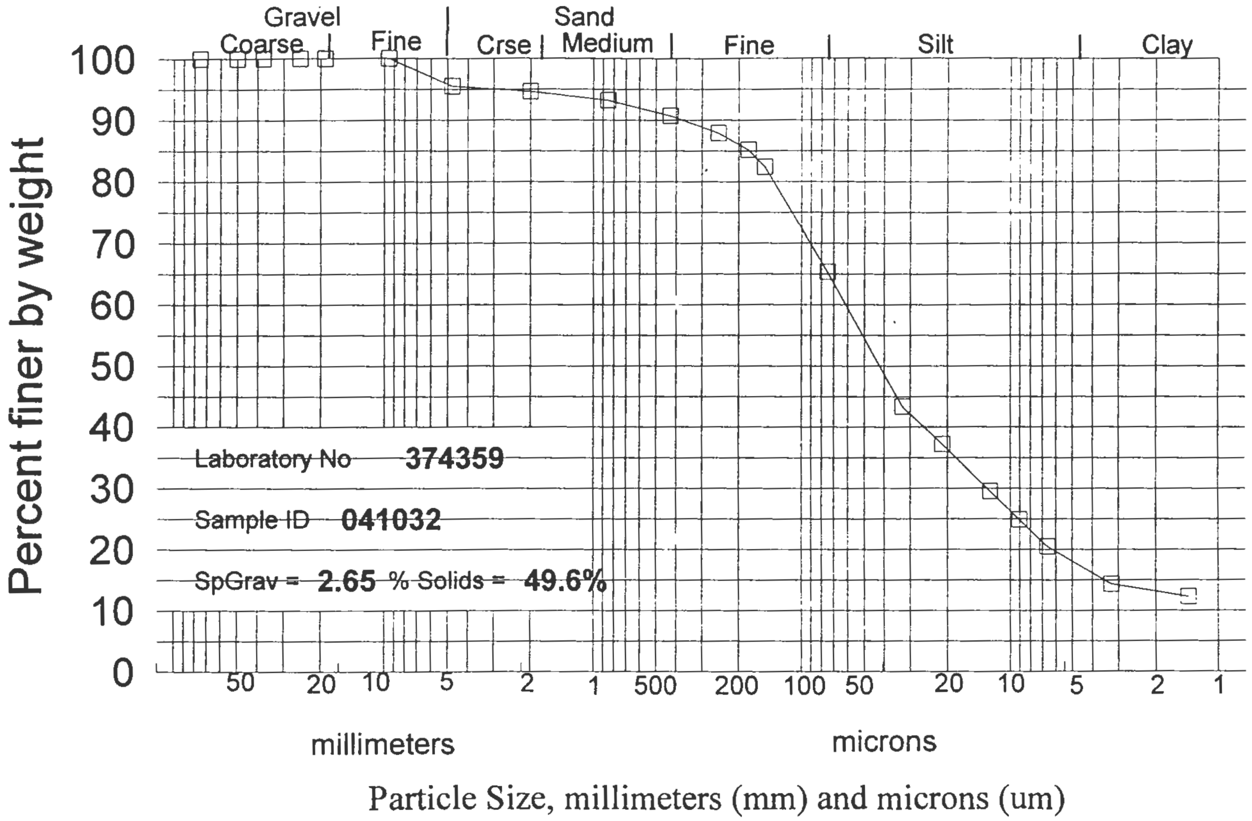
3354

Set 71894
Lab No. 374357

Submitted By: 15:46 on 29-Jan-99

STL-VT **ASTM D422 Particle Size Analysis** Sample ID **041032**

Sample preparation by: D2217



Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subrounded Hard

Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	100.0	0.0	
#4	4.75	95.5	4.5	
#10	2.00	94.6	0.9	
#20A	850.0 um	93.2	1.4	
#40A	425.0	90.7	2.5	
#60A	250.0	87.9	2.8	
#80A	180.0	85.2	2.7	
#100A	150.0	82.5	2.7	
#200A	75.0	65.3	17.1	
Hydrometer	32.8	43.4	22.0	Dispersion of soil
|	21.2	37.2	6.2	for hydrometer test
|	12.6	29.5	7.7	by mechanical mixer
|	9.0	24.9	4.6	with metal paddle
|	6.6	20.5	4.4	operated for at least
|	3.2	14.4	6.2	one minute within a
V	1.4	12.3	2.1	dispersion cup

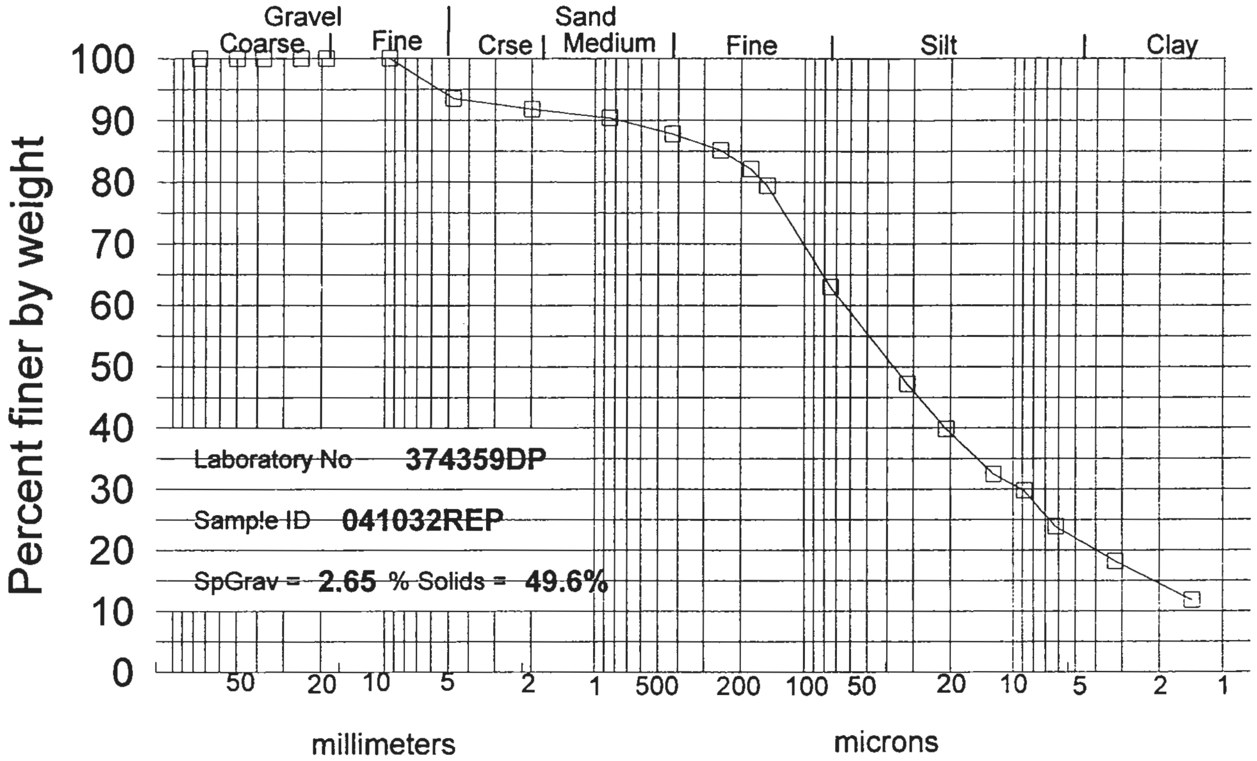
3356

Set 71894

Submitted By: 15:46 on 29-Jan-99 Lab No. 374359

STL-VT ASTM D422 Particle Size Analysis Sample ID **041032REP**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum particle size: 9.5 mm

Shape and hardness (>#10): Subrounded Hard

Sieve size	Particle Size		Percent finer	Incremental percent
3 inch	75.00	mm	100.0	0.0
2 inch	50.00		100.0	0.0
1.5 inch	37.50		100.0	0.0
1 inch	25.00		100.0	0.0
3/4 inch	19.00		100.0	0.0
3/8 inch	9.50		100.0	0.0
#4	4.75		93.5	6.5
#10	2.00		91.8	1.7
#20A	850.0	um	90.4	1.4
#40A	425.0		87.8	2.6
#60A	250.0		85.1	2.7
#80A	180.0		82.1	3.0
#100A	150.0		79.4	2.7
#200A	75.0		63.0	16.4
Hydrometer	32.2		47.2	15.8
|	21.0		39.9	7.4
|	12.4		32.5	7.4
|	8.8		29.8	2.7
|	6.2		23.9	5.9
|	3.2		18.2	5.7
V	1.4		11.8	6.4

Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

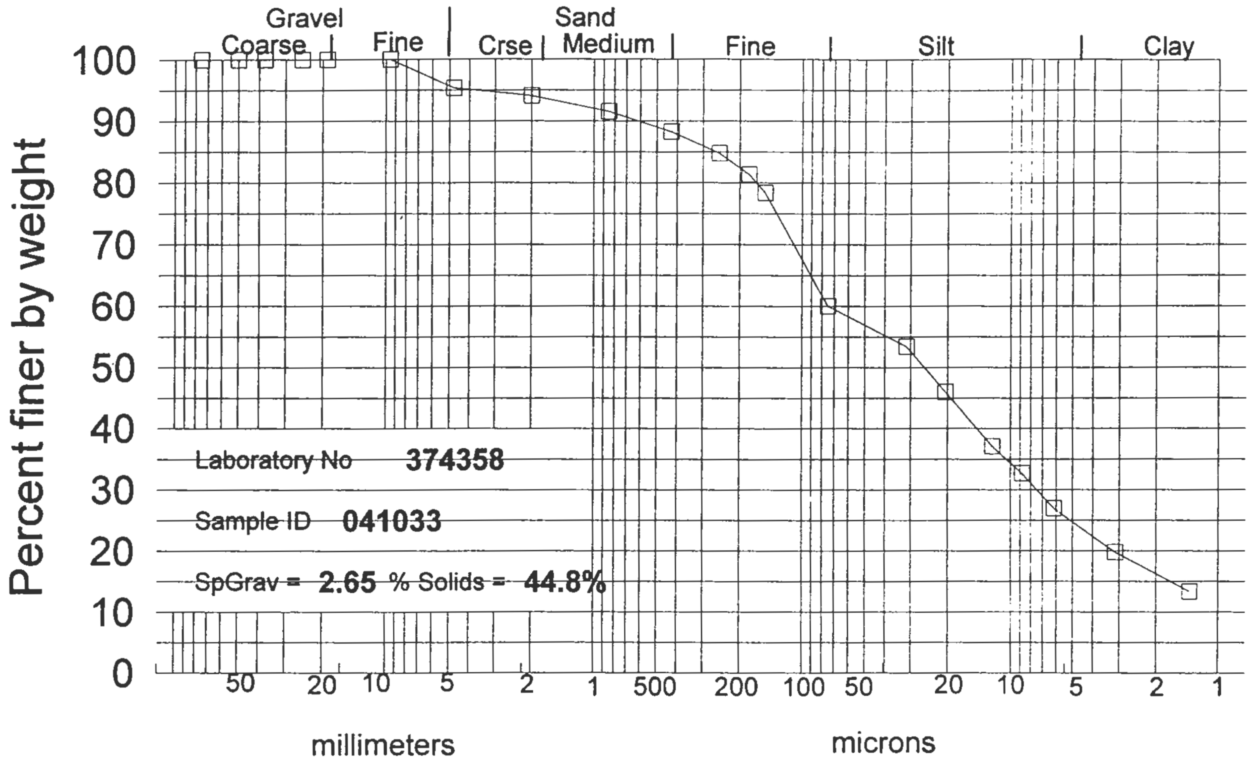
3357

Submitted By: 16:42 on 29-Jan-99

Set 71894
Lab No. 374359DP

STL-VT **ASTM D422 Particle Size Analysis** Sample ID **041033**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size		Percent finer	Incremental percent	
3 inch	75.00	mm	100.0	0.0	
2 inch	50.00		100.0	0.0	
1.5 inch	37.50		100.0	0.0	
1 inch	25.00		100.0	0.0	
3/4 inch	19.00		100.0	0.0	
3/8 inch	9.50		100.0	0.0	
#4	4.75		95.3	4.7	
#10	2.00		94.1	1.3	
#20A	850.0	um	91.6	2.5	
#40A	425.0		88.3	3.3	
#60A	250.0		84.8	3.5	
#80A	180.0		81.3	3.5	
#100A	150.0		78.4	3.0	
#200A	75.0		60.1	18.3	
Hydrometer	31.4		53.4	6.6	Dispersion of soil
	20.5		46.0	7.4	for hydrometer test
	12.2		37.1	8.9	by mechanical mixer
	8.8		32.7	4.5	with metal paddle
	6.2		27.0	5.7	operated for at least
	3.1		19.8	7.2	one minute within a
V	1.4		13.4	6.4	dispersion cup

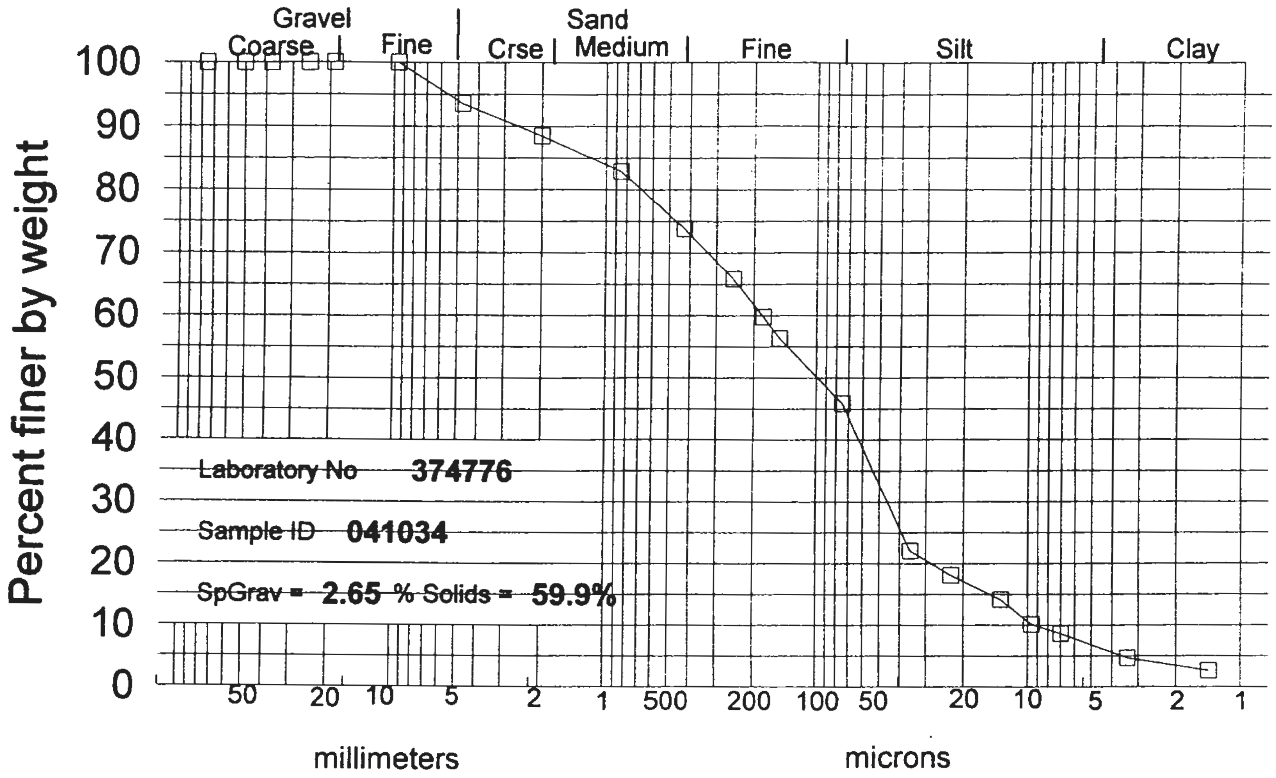
3355

Set 71894

Submitted By: ____ 15:46 on 29-Jan-99 Lab No. 374358

STL-VT ASTM D422 Particle Size Analysis Sample ID **041034**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subrounded Hard

Sieve size	Particle Size	Percent finer	Incremental percent
3 inch	75.00 mm	100.0	0.0
2 inch	50.00	100.0	0.0
1.5 inch	37.50	100.0	0.0
1 inch	25.00	100.0	0.0
3/4 inch	19.00	100.0	0.0
3/8 inch	9.50	100.0	0.0
#4	4.75	93.6	6.4
#10	2.00	88.5	5.1
#20B	850.0 um	82.9	5.6
#40B	425.0	73.9	9.0
#60B	250.0	65.8	8.0
#80B	180.0	59.8	6.1
#100B	150.0	56.3	3.4
#200B	75.0	45.8	10.5
Hydrometer	35.6	22.1	23.7
|	22.8	18.1	4.0
|	13.4	14.1	4.0
|	9.6	10.2	4.0
|	7.0	8.6	1.5
|	3.4	4.6	4.0
V	1.4	2.7	2.0

Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

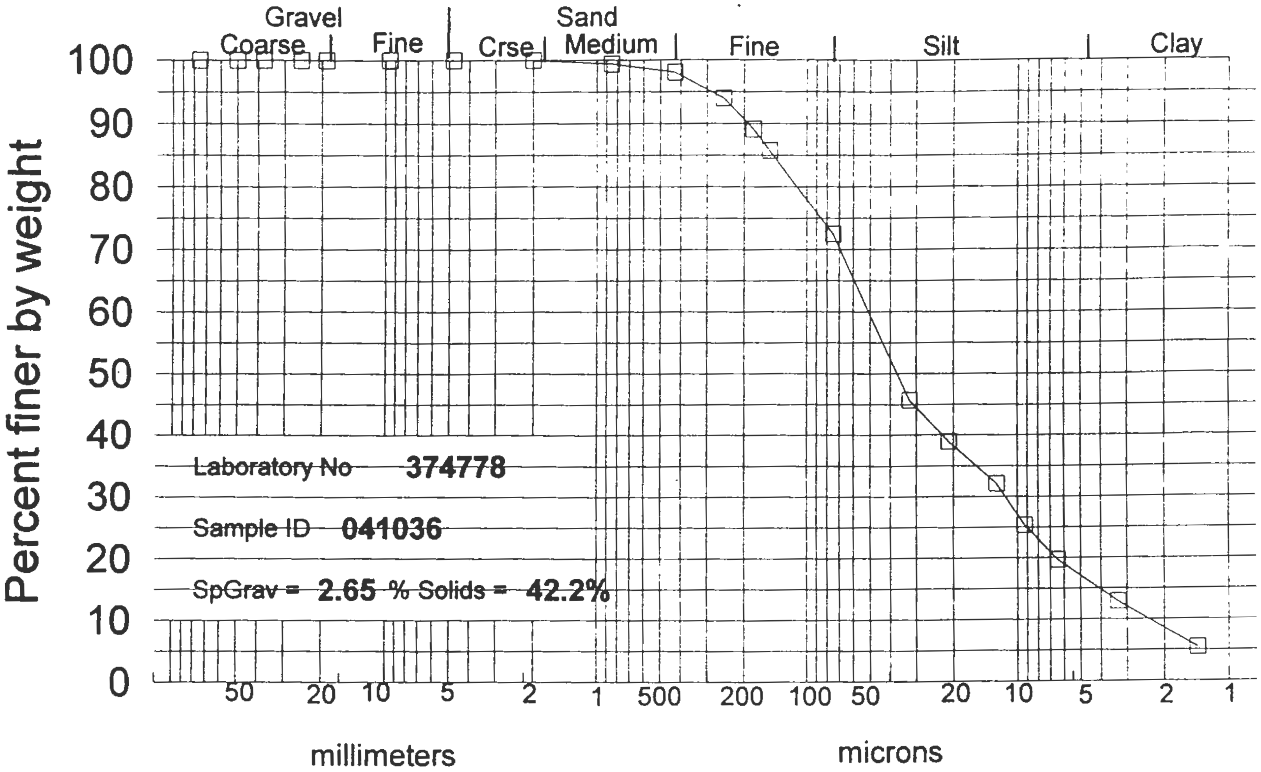
4119

Set 71938

Submitted By: 16:55 29 Jan 99 Lab No 374776

STL-VT **ASTM D422 Particle Size Analysis** Sample ID **041036**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum
particle size: Med sand

Shape and hardness (>#10):

Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	100.0	0.0	
#4	4.75	100.0	0.0	
#10	2.00	100.0	0.0	
#20B	850.0 um	99.4	0.6	
#40B	425.0	98.1	1.3	
#60B	250.0	94.0	4.1	
#80B	180.0	89.1	4.9	
#100B	150.0	85.8	3.3	
#200B	75.0	72.5	13.3	
Hydrometer	32.4	45.7	26.8	Dispersion of soil
|	21.1	38.9	6.8	for hydrometer test
|	12.5	32.1	6.8	by mechanical mixer
|	9.3	25.3	6.8	with metal paddle
|	6.4	19.7	5.7	operated for at least
|	3.3	12.9	6.8	one minute within a
V	1.4	5.4	7.5	dispersion cup

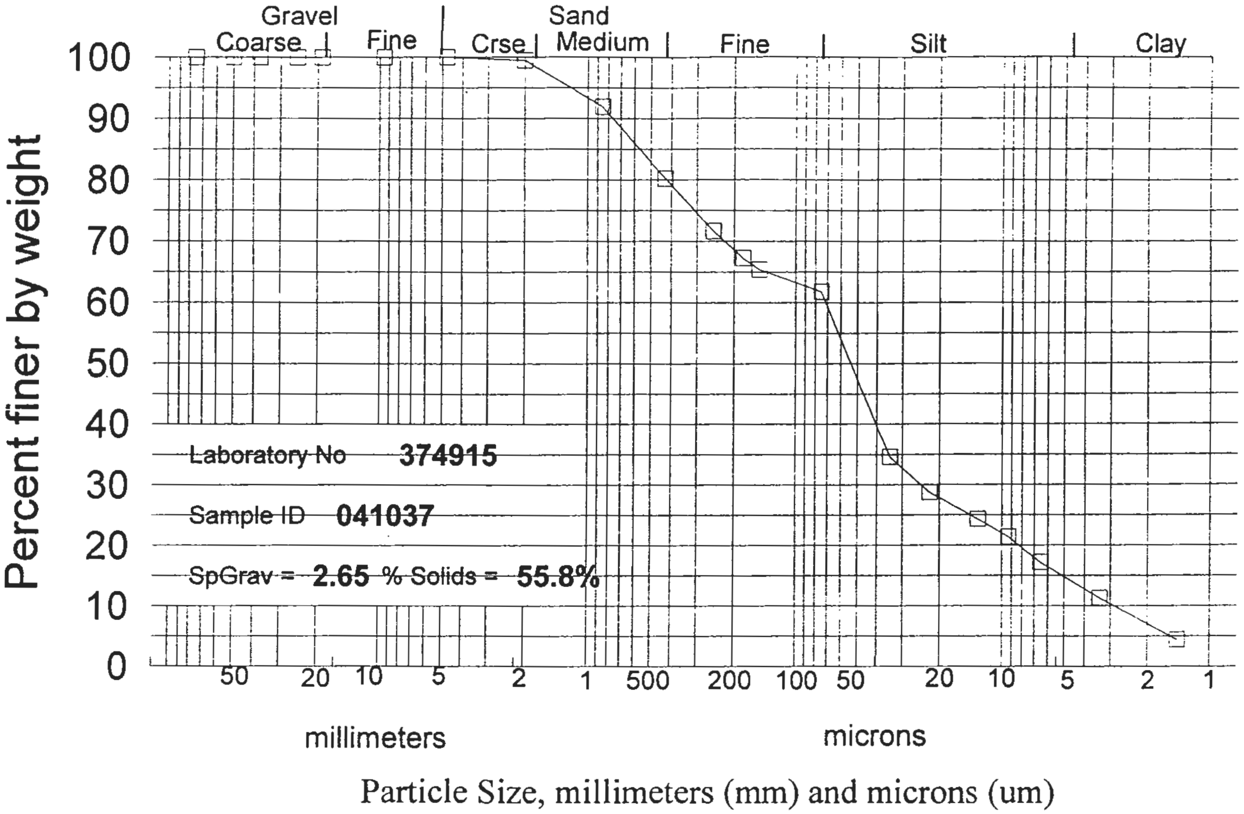
4121

Set 71938

Submitted By:

STL-VT ASTM D422 Particle Size Analysis Sample ID **041037**

Sample preparation by: D2217



Maximum
particle size: Crs sand

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	100.0	0.0	
#4	4.75	100.0	0.0	
#10	2.00	99.5	0.5	
#20B	850.0 um	91.9	7.6	
#40B	425.0	80.2	11.7	
#60B	250.0	71.7	8.6	
#80B	180.0	67.3	4.3	
#100B	150.0	65.4	1.9	
#200B	75.0	61.8	3.6	
Hydrometer	34.5	34.6	27.1	Dispersion of soil
|	22.3	28.8	5.9	for hydrometer test
|	13.1	24.3	4.4	by mechanical mixer
|	9.3	21.4	2.9	with metal paddle
|	6.5	17.2	4.2	operated for at least
|	3.4	11.3	5.9	one minute within a
V	1.4	4.4	6.9	dispersion cup

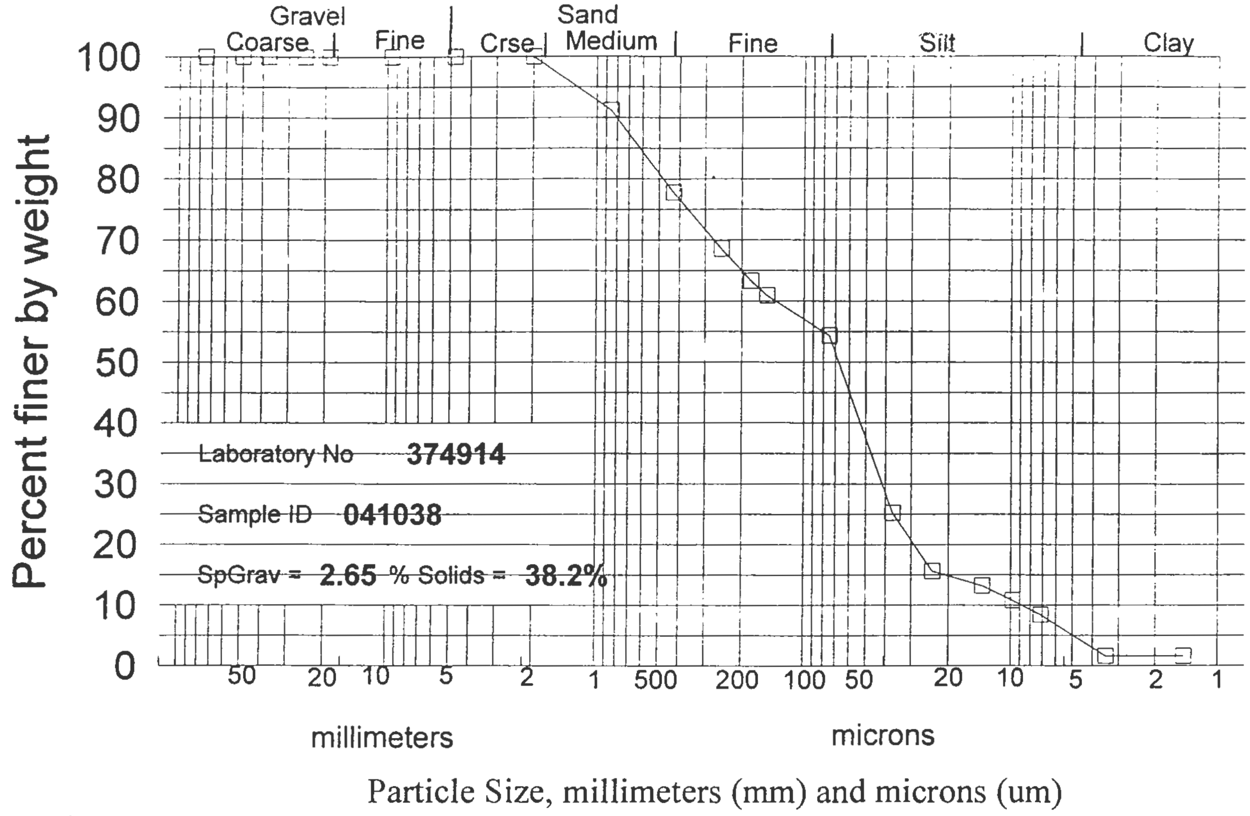
0565

Set 71938

Submitted By: 17:03 on 29-Jan-99 Lab No. 374915

STL-VT ASTM D422 Particle Size Analysis Sample ID **041038**

Sample preparation by: D2217



Maximum particle size: Med sand

Shape and hardness (>#10):

Sieve size	Particle Size	Percent finer	Incremental percent
3 inch	75.00 mm	100.0	0.0
2 inch	50.00	100.0	0.0
1.5 inch	37.50	100.0	0.0
1 inch	25.00	100.0	0.0
3/4 inch	19.00	100.0	0.0
3/8 inch	9.50	100.0	0.0
#4	4.75	100.0	0.0
#10	2.00	100.0	0.0
#20B	850.0 um	91.2	8.8
#40B	425.0	77.8	13.4
#60B	250.0	68.6	9.2
#80B	180.0	63.3	5.3
#100B	150.0	60.9	2.4
#200B	75.0	54.3	6.6
Hydrometer	36.8	25.3	29.1
|	23.7	15.6	9.6
|	13.8	13.2	2.4
|	9.8	10.8	2.4
|	7.1	8.4	2.4
|	3.4	1.6	6.8
V	1.5	1.6	0.0

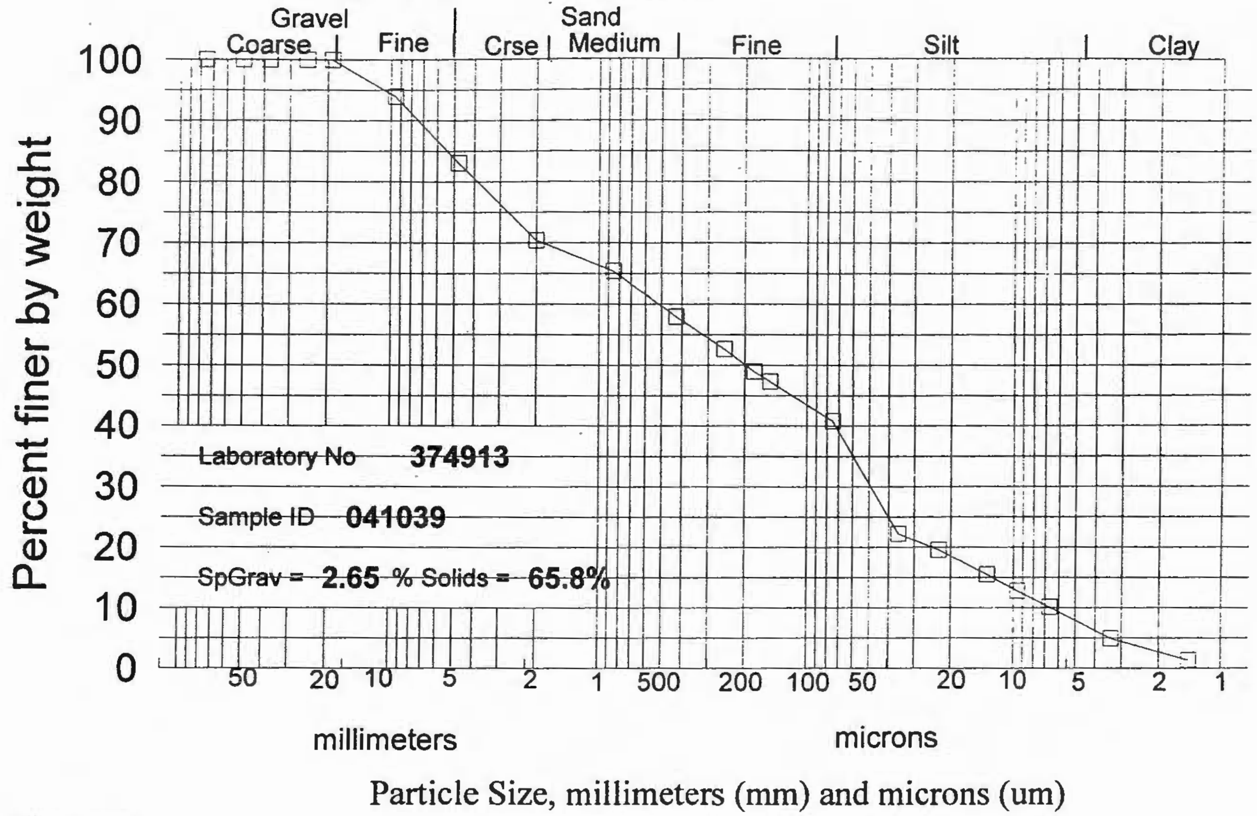
Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

Submitted By: 17:03 on 29-Jan-99

Set 71938
Lab No. 374914

STL-VT ASTM D422 Particle Size Analysis Sample ID 041039

Sample preparation by: D2217



Maximum particle size: 19 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size		Percent finer	Incremental percent
3 inch	75.00	mm	100.0	0.0
2 inch	50.00		100.0	0.0
1.5 inch	37.50		100.0	0.0
1 inch	25.00		100.0	0.0
3/4 inch	19.00		100.0	0.0
3/8 inch	9.50		94.0	6.0
#4	4.75		83.1	10.9
#10	2.00		70.4	12.6
#20B	850.0	um	65.4	5.0
#40B	425.0		58.0	7.4
#60B	250.0		52.6	5.3
#80B	180.0		49.0	3.6
#100B	150.0		47.3	1.7
#200B	75.0		40.8	6.5
Hydrometer	35.8		22.3	18.6
|	22.9		19.6	2.7
|	13.4		15.5	4.0
|	9.6		12.8	2.7
|	6.7		10.1	2.7
|	3.4		4.9	5.2
V	1.4		1.3	3.6

Dispersion of soil for hydrometer test by mechanical mixer with metal paddle operated for at least one minute within a dispersion cup

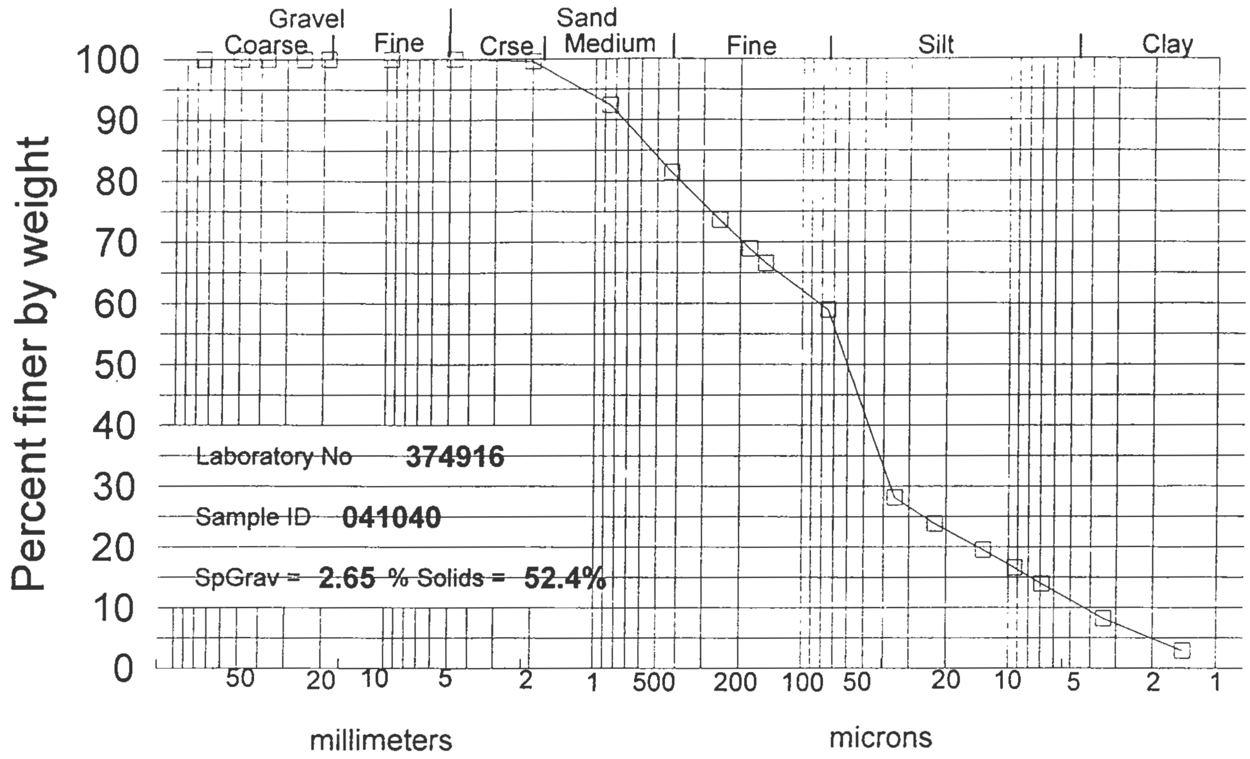
0563

Set 71938

Submitted By: 17:03 on 29-Jan-99 Lab No. 374913

STL-VT ASTM D422 Particle Size Analysis Sample ID **041040**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum
particle size: Crs sand

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	100.0	0.0	
#4	4.75	100.0	0.0	
#10	2.00	99.6	0.4	
#20B	850.0 um	92.4	7.2	
#40B	425.0	81.4	11.0	
#60B	250.0	73.7	7.8	
#80B	180.0	68.9	4.7	
#100B	150.0	66.5	2.4	
#200B	75.0	59.0	7.6	
Hydrometer	35.3	28.2	30.8	Dispersion of soil
|	22.6	23.8	4.3	for hydrometer test
|	13.3	19.5	4.3	by mechanical mixer
|	9.3	16.6	2.9	with metal paddle
|	6.9	14.0	2.6	operated for at least
|	3.5	8.2	5.8	one minute within a
V	1.4	2.9	5.3	dispersion cup

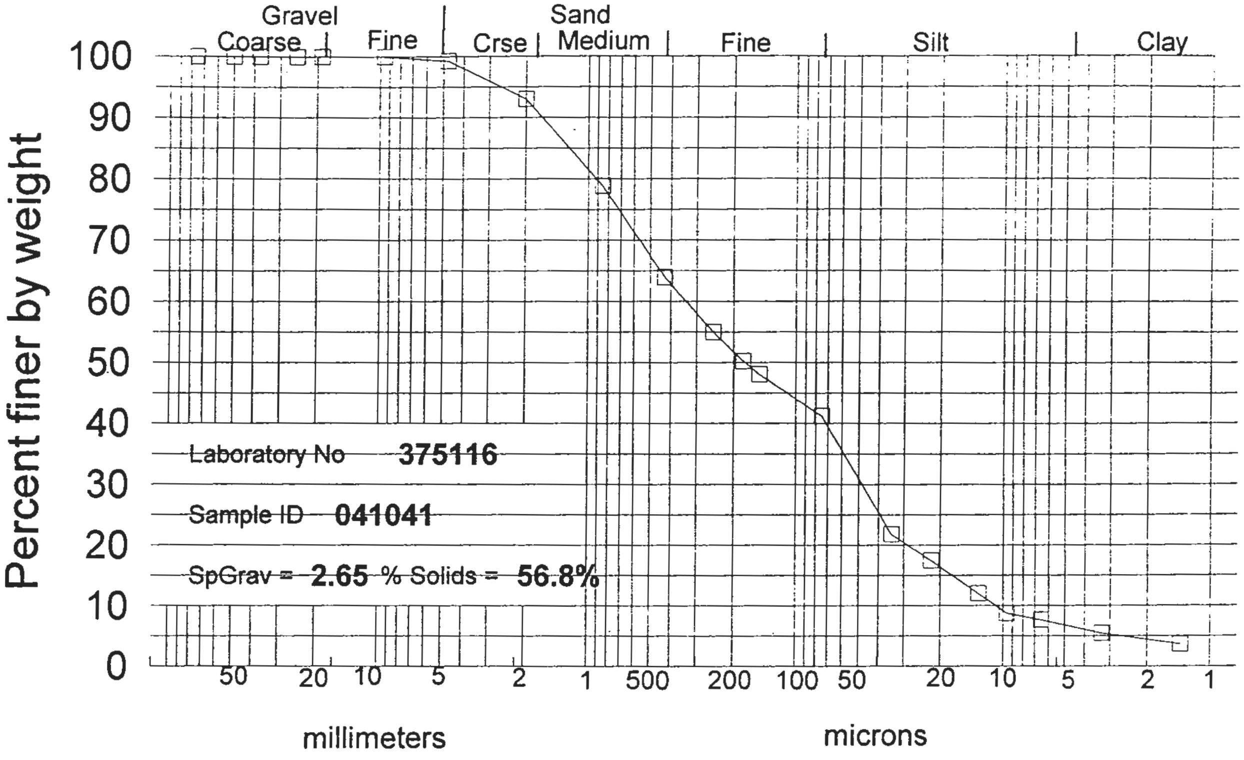
0566

Set 71938

Submitted By: 17:03 on 29-Jan-99 Lab No. 374916

STL-VT **ASTM D422 Particle Size Analysis** Sample ID **041041**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subrounded Hard

Sieve size	Particle Size	Percent finer	Incremental percent
3 inch	75.00 mm	100.0	0.0
2 inch	50.00	100.0	0.0
1.5 inch	37.50	100.0	0.0
1 inch	25.00	100.0	0.0
3/4 inch	19.00	100.0	0.0
3/8 inch	9.50	100.0	0.0
#4	4.75	99.3	0.7
#10	2.00	93.0	6.3
#20A	850.0 um	78.8	14.2
#40A	425.0	64.0	14.9
#60A	250.0	55.0	9.0
#80A	180.0	50.2	4.7
#100A	150.0	48.1	2.2
#200A	75.0	41.2	6.8
Hydrometer	34.4	21.8	19.4
|	22.2	17.5	4.4
|	13.2	12.0	5.5
|	9.6	8.7	3.3
|	6.5	7.6	1.1
|	3.3	5.5	2.2
V	1.4	3.6	1.8

Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

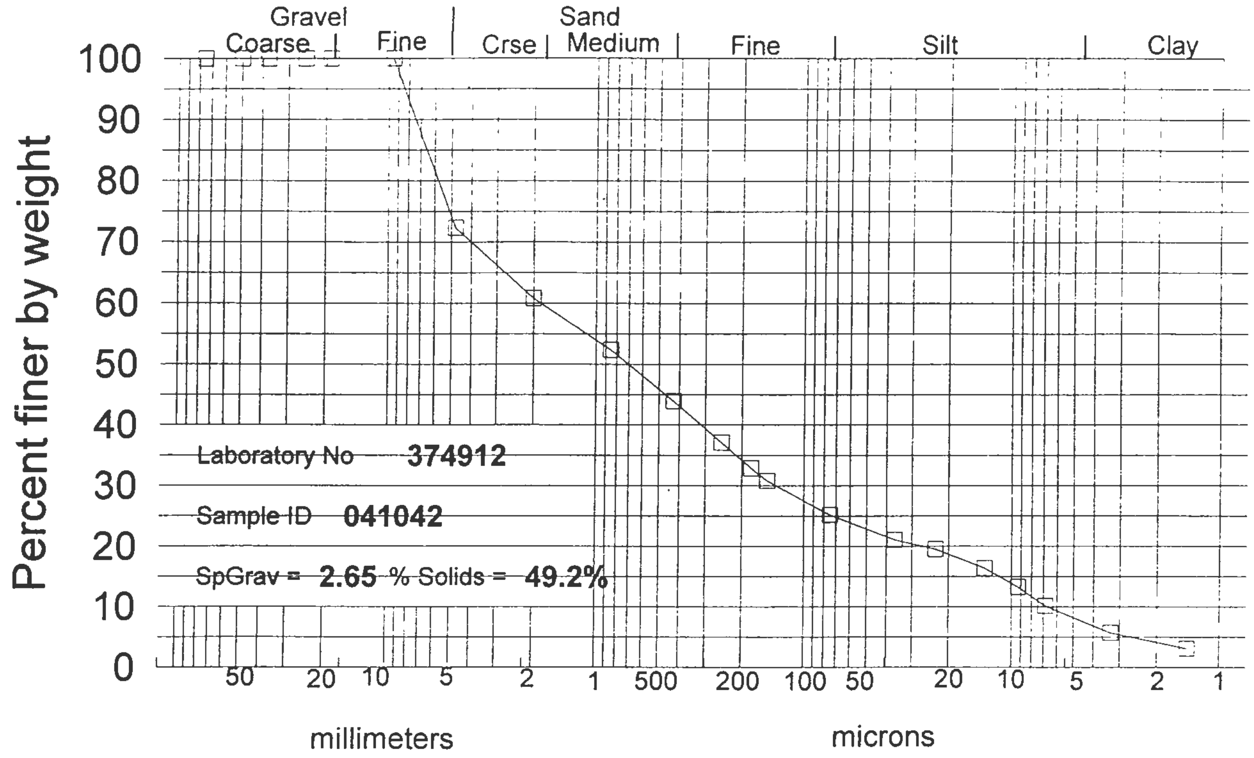
0570

Set 71978

Submitted By: 17:44 on 29-Jan-99 Lab No. 375116

STL-VT ASTM D422* Particle Size Analysis Sample ID **041042**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	100.0	0.0	
#4	4.75	72.3	27.7	
#10	2.00	60.8	11.5	
#20B	850.0 um	52.4	8.4	
#40B	425.0	43.9	8.5	
#60B	250.0	37.1	6.8	
#80B	180.0	32.9	4.2	
#100B	150.0	30.8	2.1	
#200B	75.0	25.2	5.6	
Hydrometer	36.3	21.1	4.1	Dispersion of soil
|	23.1	19.5	1.6	for hydrometer test
|	13.5	16.4	3.1	by mechanical mixer
|	9.3	13.3	3.1	with metal paddle
|	6.9	10.2	3.1	operated for at least
|	3.3	5.7	4.4	one minute within a
V	1.4	3.1	2.6	dispersion cup

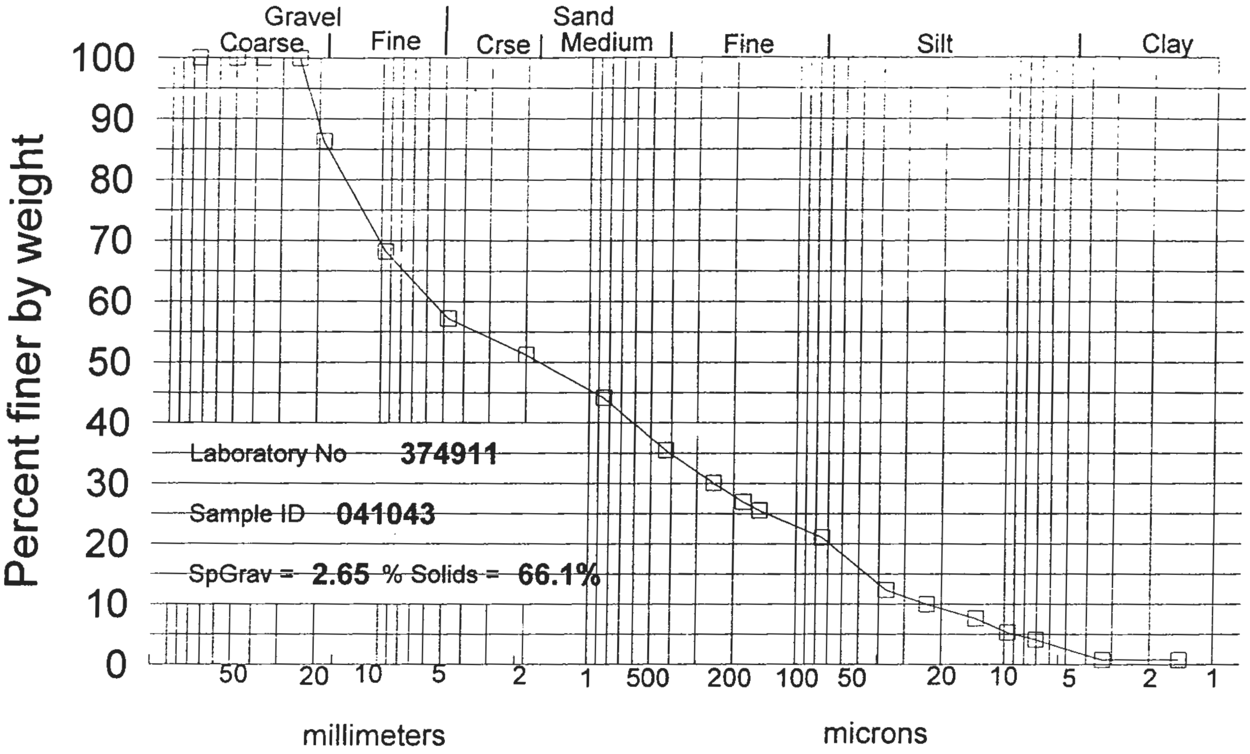
Set 71938

Submitted By: 17:02 on 29-Jan-99 Lab No. 374912

7 1948

STL-VT ASTM D422 Particle Size Analysis Sample ID **041043**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum
particle size: 25 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size		Percent finer	Incremental percent
3 inch	75.00	mm	100.0	0.0
2 inch	50.00		100.0	0.0
1.5 inch	37.50		100.0	0.0
1 inch	25.00		100.0	0.0
3/4 inch	19.00		86.4	13.6
3/8 inch	9.50		68.2	18.2
#4	4.75		57.2	11.0
#10	2.00		51.2	6.0
#20B	850.0	um	44.1	7.1
#40B	425.0		35.5	8.6
#60B	250.0		30.1	5.4
#80B	180.0		27.0	3.1
#100B	150.0		25.5	1.4
#200B	75.0		21.1	4.5
Hydrometer	36.8		12.3	8.8
|	23.5		10.0	2.3
|	13.7		7.6	2.3
|	9.6		5.3	2.3
|	7.0		4.1	1.2
|	3.3		0.8	3.3
V	1.4		0.8	0.0

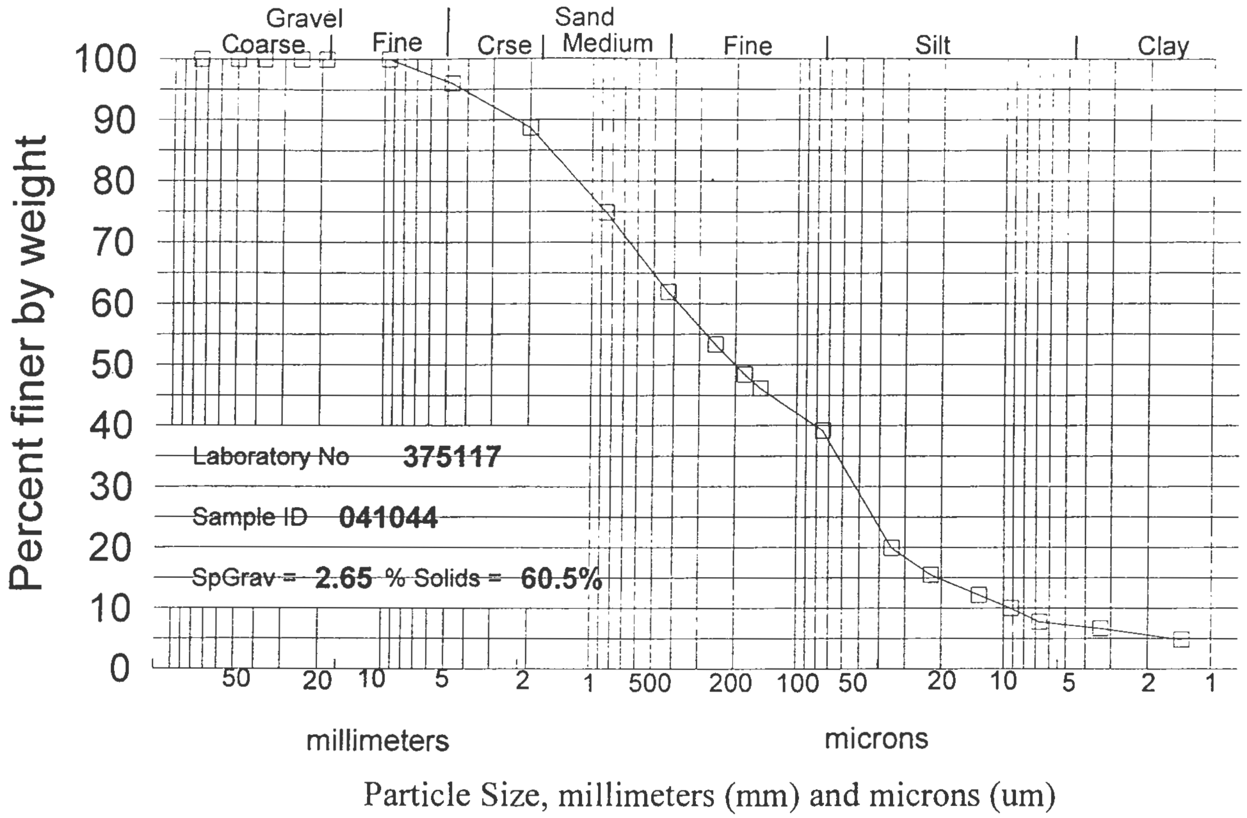
Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

Submitted By: 16:59 on 29-Jan-99

Set 71938
Lab No. 374911

STL-VT ASTM D422 Particle Size Analysis Sample ID **041044**

Sample preparation by: D2217



Maximum
particle size: 9.5 mm

Shape and hardness (>#10): Subrounded Hard

Sieve size	Particle Size	Percent finer	Incremental percent
3 inch	75.00 mm	100.0	0.0
2 inch	50.00	100.0	0.0
1.5 inch	37.50	100.0	0.0
1 inch	25.00	100.0	0.0
3/4 inch	19.00	100.0	0.0
3/8 inch	9.50	100.0	0.0
#4	4.75	96.0	4.0
#10	2.00	88.7	7.3
#20A	850.0 um	74.9	13.8
#40A	425.0	61.9	13.0
#60A	250.0	53.3	8.6
#80A	180.0	48.5	4.9
#100A	150.0	46.2	2.3
#200A	75.0	39.2	7.0
Hydrometer	34.8	19.9	19.3
|	22.5	15.5	4.4
|	13.2	12.2	3.3
|	9.2	10.0	2.2
|	6.7	7.7	2.2
|	3.4	6.6	1.1
V	1.4	4.8	1.8

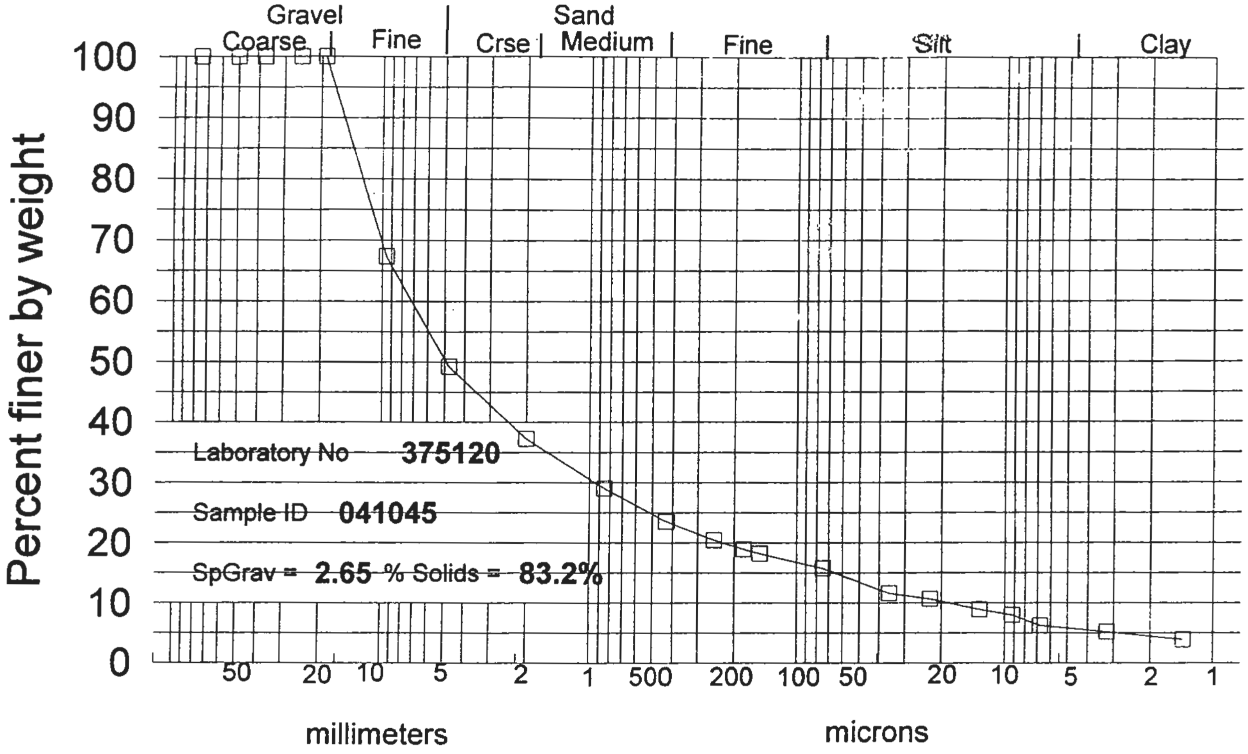
Dispersion of soil for hydrometer test by mechanical mixer with metal paddle operated for at least one minute within a dispersion cup

Set 71978

Submitted By: 17:46 on 29-Jan-99 Lab No. 375117

STL-VT ASTM D422 Particle Size Analysis Sample ID 041045

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum
particle size: 19 mm

Shape and hardness (>#10): Subangular Hard

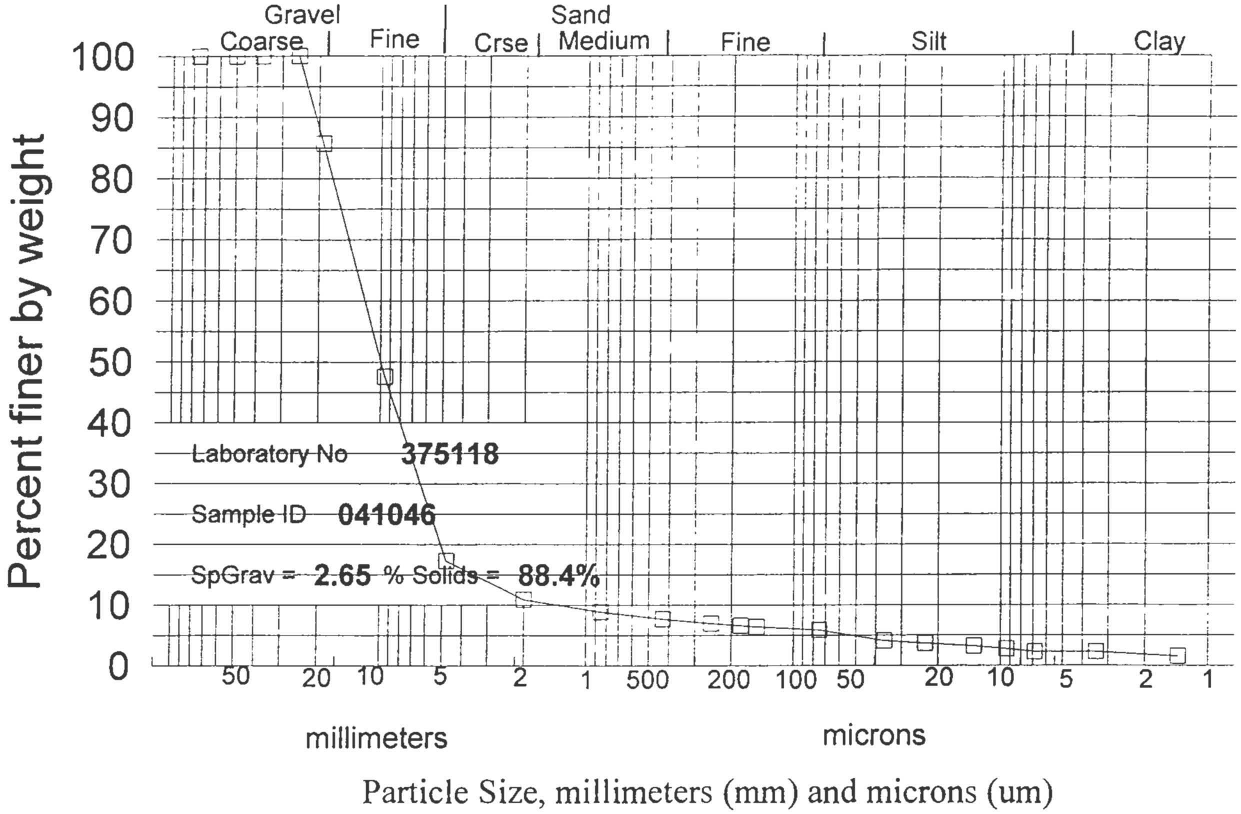
Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	67.4	32.6	
#4	4.75	49.3	18.1	
#10	2.00	37.3	12.0	
#20A	850.0 um	29.1	8.2	
#40A	425.0	23.6	5.5	
#60A	250.0	20.4	3.1	
#80A	180.0	18.9	1.5	
#100A	150.0	18.2	0.7	
#200A	75.0	15.7	2.5	
Hydrometer	35.7	11.6	4.2	Dispersion of soil
|	22.7	10.7	0.9	for hydrometer test
|	13.2	8.9	1.8	by mechanical mixer
|	9.2	8.0	0.9	with metal paddle
|	6.8	6.2	1.8	operated for at least
|	3.2	5.2	1.0	one minute within a
V	1.4	3.9	1.3	dispersion cup

Submitted By: 17:48 on 29-Jan-99

Set 71978
Lab No. 375120

STL-VT ASTM D422 Particle Size Analysis Sample ID **041046**

Sample preparation by: D2217



Maximum particle size: 25 mm

Shape and hardness (>#10): Subangular Hard

Sieve size	Particle Size	Percent finer	Incremental percent
3 inch	75.00 mm	100.0	0.0
2 inch	50.00	100.0	0.0
1.5 inch	37.50	100.0	0.0
1 inch	25.00	100.0	0.0
3/4 inch	19.00	85.7	14.3
3/8 inch	9.50	47.6	38.1
#4	4.75	17.3	30.3
#10	2.00	10.9	6.4
#20A	850.0 um	8.9	2.0
#40A	425.0	7.7	1.3
#60A	250.0	7.0	0.7
#80A	180.0	6.6	0.4
#100A	150.0	6.4	0.2
#200A	75.0	5.9	0.5
Hydrometer	36.4	4.1	1.7
|	23.1	3.7	0.5
|	13.4	3.2	0.5
|	9.4	2.7	0.5
|	6.8	2.3	0.5
|	3.4	2.3	0.0
V	1.4	1.5	0.8

Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

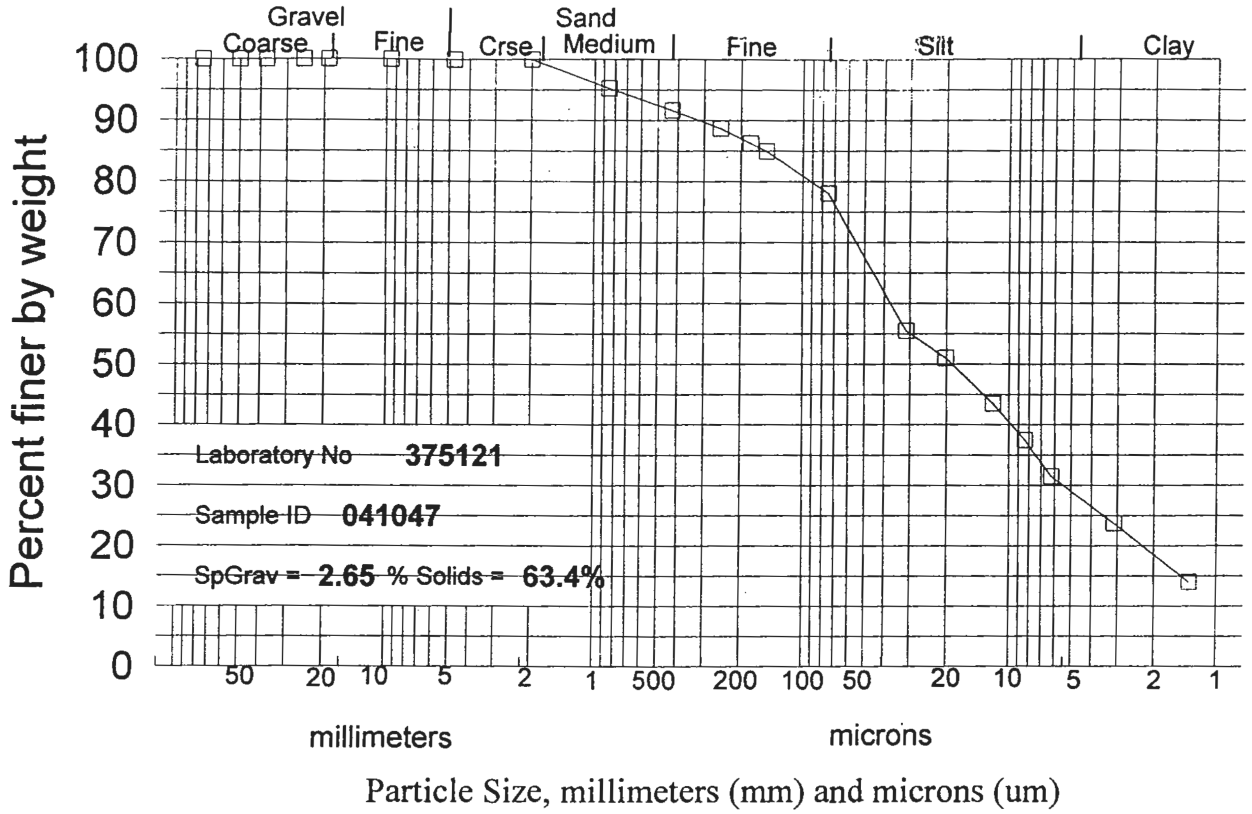
0572

Submitted By: 17:48 on 29-Jan-99

Set 71978
Lab No. 375118

STL-VT ASTM D422 Particle Size Analysis Sample ID 041047

Sample preparation by: D2217



Maximum
particle size: Med sand

Shape and hardness (>#10):

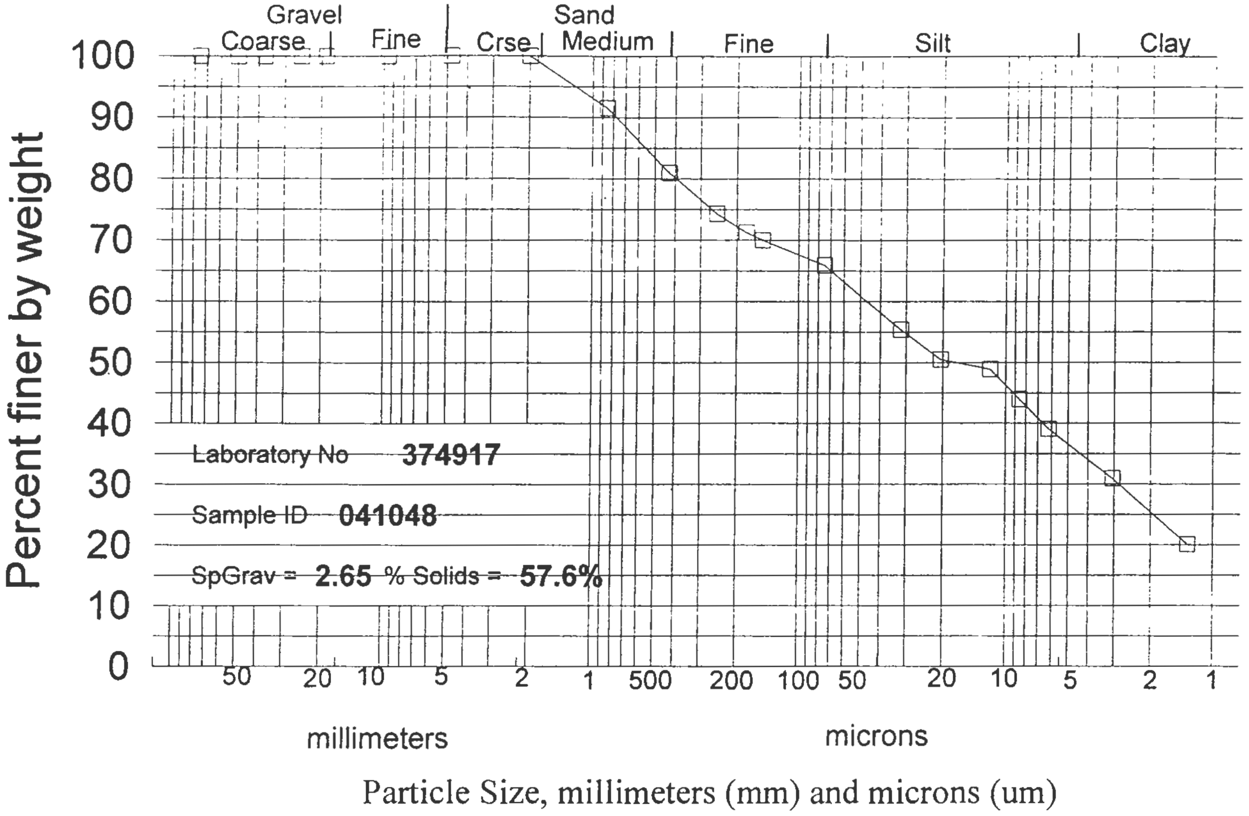
Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	100.0	0.0	
#4	4.75	100.0	0.0	
#10	2.00	100.0	0.0	
#20A	850.0 um	95.3	4.7	
#40A	425.0	91.7	3.6	
#60A	250.0	88.7	3.0	
#80A	180.0	86.3	2.4	
#100A	150.0	84.9	1.3	
#200A	75.0	78.1	6.9	
Hydrometer	31.2	55.5	22.6	Dispersion of soil
|	20.1	51.0	4.5	for hydrometer test
|	12.0	43.5	7.5	by mechanical mixer
|	8.4	37.5	6.0	with metal paddle
|	6.3	31.5	6.0	operated for at least
|	3.1	23.8	7.8	one minute within a
V	1.4	14.0	9.8	dispersion cup

Submitted By: 17:49 on 29-Jan-99

Set 71978
Lab No. 375121

STL-VT **ASTM D422 Particle Size Analysis** Sample ID **041048**

Sample preparation by: D2217



Maximum
particle size: Med sand

Shape and hardness (>#10):

Sieve size	Particle Size	Percent finer	Incremental percent
3 inch	75.00 mm	100.0	0.0
2 inch	50.00	100.0	0.0
1.5 inch	37.50	100.0	0.0
1 inch	25.00	100.0	0.0
3/4 inch	19.00	100.0	0.0
3/8 inch	9.50	100.0	0.0
#4	4.75	100.0	0.0
#10	2.00	100.0	0.0
#20A	850.0 um	91.5	8.5
#40A	425.0	81.0	10.5
#60A	250.0	74.3	6.7
#80A	180.0	71.3	3.0
#100A	150.0	70.0	1.3
#200A	75.0	66.0	4.0
Hydrometer	31.8	55.4	10.6
|	20.5	50.5	4.9
|	11.9	48.9	1.6
|	8.6	44.0	4.9
|	6.2	39.1	4.9
|	3.1	31.0	8.1
V	1.3	20.1	10.9

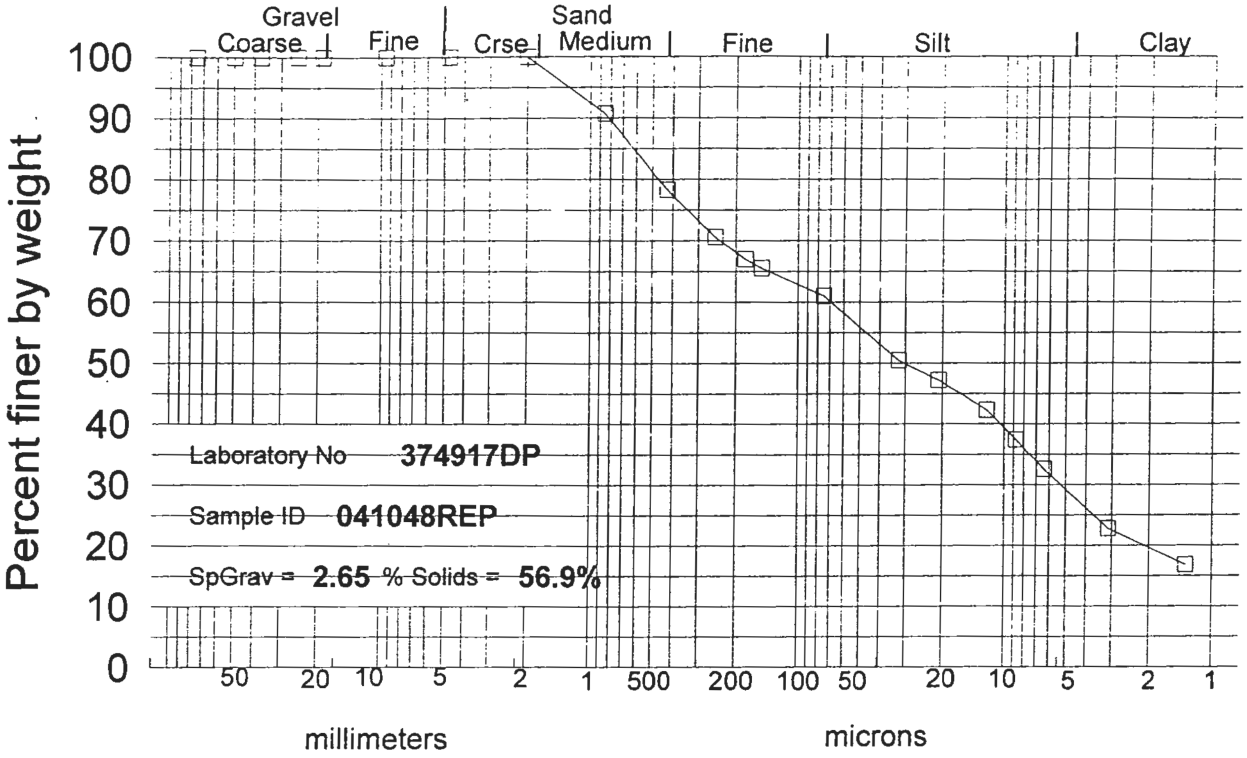
Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

Submitted By: 17:43 on 29-Jan-99

Set 71978
Lab No. 374917

STL-VT **ASTM D422 Particle Size Analysis** Sample ID **041048REP**

Sample preparation by: D2217



Particle Size, millimeters (mm) and microns (um)

Maximum
particle size: Med sand

Shape and hardness (>#10):

Sieve size	Particle Size	Percent finer	Incremental percent
3 inch	75.00 mm	100.0	0.0
2 inch	50.00	100.0	0.0
1.5 inch	37.50	100.0	0.0
1 inch	25.00	100.0	0.0
3/4 inch	19.00	100.0	0.0
3/8 inch	9.50	100.0	0.0
#4	4.75	100.0	0.0
#10	2.00	100.0	0.0
#20A	850.0 um	90.7	9.3
#40A	425.0	78.2	12.4
#60A	250.0	70.6	7.6
#80A	180.0	67.0	3.6
#100A	150.0	65.5	1.5
#200A	75.0	61.0	4.5
Hydrometer	32.4	50.5	10.6
|	20.7	47.2	3.3
|	12.2	42.3	4.9
|	8.8	37.5	4.9
|	6.4	32.6	4.9
|	3.1	22.8	9.8
V	1.3	16.8	6.0

Dispersion of soil
for hydrometer test
by mechanical mixer
with metal paddle
operated for at least
one minute within a
dispersion cup

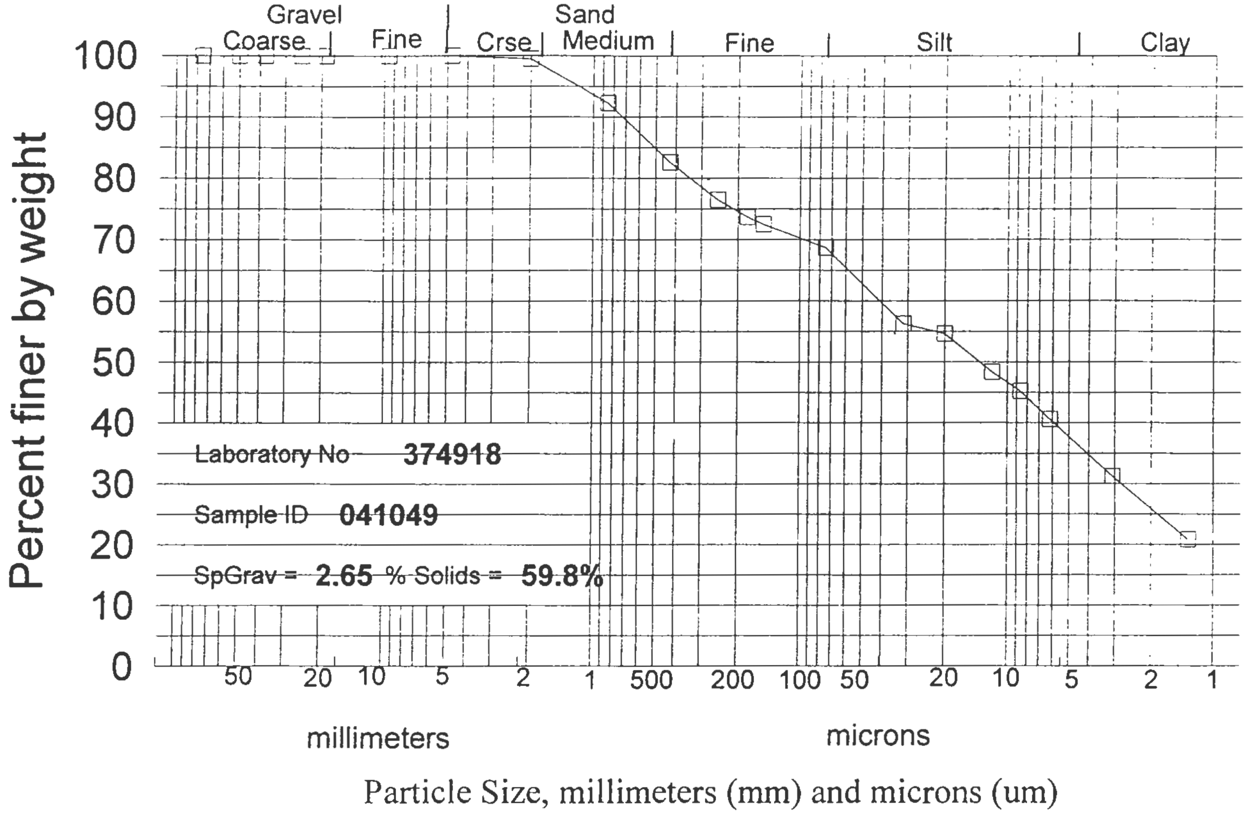
0568

Set 71978
Lab No. 374917DP

Submitted By: 17:44 on 29-Jan-99

STL-VT ASTM D422 Particle Size Analysis Sample ID **041049**

Sample preparation by: D2217



Maximum
particle size: Crs sand

Shape and hardness (>#10): Subrounded Hard

Sieve size	Particle Size	Percent finer	Incremental percent	
3 inch	75.00 mm	100.0	0.0	
2 inch	50.00	100.0	0.0	
1.5 inch	37.50	100.0	0.0	
1 inch	25.00	100.0	0.0	
3/4 inch	19.00	100.0	0.0	
3/8 inch	9.50	100.0	0.0	
#4	4.75	100.0	0.0	
#10	2.00	99.5	0.5	
#20A	850.0 um	92.3	7.2	
#40A	425.0	82.6	9.7	
#60A	250.0	76.5	6.1	
#80A	180.0	73.7	2.8	
#100A	150.0	72.5	1.2	
#200A	75.0	68.7	3.8	
Hydrometer	31.4	56.2	12.5	Dispersion of soil
|	20.0	54.6	1.6	for hydrometer test
|	11.8	48.4	6.2	by mechanical mixer
|	8.6	45.3	3.1	with metal paddle
|	6.2	40.6	4.7	operated for at least
|	3.1	31.2	9.4	one minute within a
V	1.3	20.8	10.4	dispersion cup

Set 71978

Submitted By: 17:44 on 29-Jan-99 Lab No. 374918

Appendix F

Analytical Results

- Building Materials/Debris
- Surface Soil
- Subsurface Soil
- Groundwater
- Surface Water
- Sediment
- Soil Results from Pond Area - June 28, 1990
- SEDA Background Soil Data
- SEDA Background Groundwater Data
- Statistical Comparison of SEAD-4 Inorganics in Soil
- Statistical Comparison of SEAD-4 Inorganics in Groundwater

INTRODUCTION

All data in this appendix have been validated using EPA Region II data validation guidelines. These guidelines prescribe the use of the following qualifiers:

U	The analyte was not detected.
UJ	The analyte was not detected; however, the associated reporting limit is approximate.
J	The analyte was positively identified; however, QC results indicate that the reported concentration may not be accurate and is therefore an estimate.
R	The analyte was rejected due to laboratory QC deficiencies, sample preservation problems, or holding time exceedance. The presence or absence of the analyte cannot be determined.

The following Qualifiers may be used when reporting any Organic Parameters analyzed by Gas Chromatography (GC) or High Pressure Liquid Chromatography (HPLC). Any additional qualifiers used in the reports will be described in the case narrative. These flags are based on the EPA Contract Laboratory Program statement of work.

GC/HPLC Qualifiers

U- Indicated compound was analyzed for but not detected above the reporting limit.

J- Indicates an estimated value. This flag is used when the result is less than the reporting limit, but > ½ reporting limit.

P- This flag is used for a pesticide/Arochlor target analyte when there is greater than 25.0% difference for detected concentrations between the two analytical columns. The lower of the two values is reported on the Form I and flagged in a "P".

C- This flag applies to pesticide results where the identification has been confirmed by GC/MS.

B- This flag is used when the analyte is found in the associated blank as well as in the sample. It indicated possible/probable blank contamination and warns the data user to take appropriate action. Only the samples get a "B" flag. The method blank does not.

D- This flag identifies all compounds identified in an analysis at a secondary dilution factor. This flag alerts data users that any discrepancies between the concentrations reported for the dilutions may be due to dilution of the sample or extract. It additionally indicates that spike recoveries may have been diluted below quantifiable levels.

E- This flag identifies compounds whose concentrations exceed the upper level of the calibration range of the instrument for that specific analysis. If one or more compounds have a response greater than the upper level of calibration range, the extract shall be diluted and re-analyzed.

X,Y,Z- Laboratory defined flags. These flags must be fully described, and such description attached to the Sample Data Summary Package and the case Narrative. Begin by using "X" and go on to "Y" as necessary. These flags may also be used to combine several flags, as needed.

Metals Qualifiers

E(furnace)-	Analytical spike recovery is less than 40%. An explanatory note is included on the specific form to which applies.
E(ICP)-	The reported value is estimated because of the presence of the interference.
M-	Duplicate injection precision is not met.
N-	Matrix spiked sample recovery not within control limits.
S-	The reported value was determined by the Method of Standards Additions.
+-	Correlation coefficient for the MSA is less than 0.995.
W-	Post digestion for furnace AA analysis is out of control limits (85-115%), while sample concentration is less than 50% of spike concentration.
*-	Duplicated analysis not within control limits.

Concentration Qualifiers

B-	Entered if the report is less than the Contract Required Detection Limit (CRDL) but greater than the Instrument Detection Limit (IDL).
U-	Entered if the analyte was analyzed for but not detected, less than IDL.

Method Qualifiers

P-	for ICP
F-	for furnace AA
CV-	for Manual Cold Vapor AA
AS-	for Semi-automated Spectrophotometric
NR-	if the analyte is not required to be analyzed

The following Qualifiers may be used when reporting any Organic parameters analyzed by Gas Chromatography/mass Spectometry (GCMS). Any additional qualifiers used in the reports will be described in the case narrative. These flags are based on the EPA Contract Laboratory Program statement of work.

GC/MS Qualifiers

A- The reported Tentatively Identified Compound (TIC) is a suspected Aldol-condensation product.

B- The reported analyte was detected in the associated method blank as well as the sample.

C- Compound identified in an analysis which occurred at a dilution.

E- Compound quantitation is above the instrument's calibration range for this analysis.

J- Indicated an estimated quantitation value below reporting limit.

U- Compound was analyzed for but not detected.

X- The reported compound is a suspected laboratory contaminant.

Y- An additional qualifier which will be defined at the time of use by the data reviewer.

Z- The reported result is based on the combined responses from coeluting compounds.

SEAD-4 - Surface Soil Sampling Summary

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

LOCATION ID	STUDY (2)	SAMPLE NUMBER	DEPTH (1)	AREA	CHROMIUM (3) SCREENING (Y/N)
SS4-1	ESI	206836	0-6"	NA	N
SS4-2	ESI	206837	0-6"	NA	N
SS4-3	ESI	206838/043201 **	0-6"	NA	N
SS4-4	ESI	206839/043181**	0-6"	NA	N
SS4-5	ESI	206840/043188 **	0-6"	NA	N
SS4-6	ESI	206841	0-6"	NA	N
SS4-7	ESI	206842	0-6"	NA	N
SS4-8	RI	043001/043183 **	0-2"	1	Y
SS4-8 *	RI	043002	0-2"	1	Y (only)
SS4-9	RI	043003/043180 **	0-2"	1	Y
SS4-10	RI	043004/043197 **	0-2"	1	Y
SS4-11	RI	043005	0-2"	1	Y
SS4-12	RI	043006/043190 **	0-2"	1	Y
SS4-13	RI	043007/043200 **	0-2"	1	Y
SS4-13	RI	043185 ***	0-2"	1	Y
SS4-14	RI	043008	0-2"	1	Y
SS4-15	RI	043009	0-2"	1	Y (only)
SS4-16	RI	043010	0-2"	1	Y (only)
SS4-17	RI	043011	0-2"	1	Y (only)
SS4-18	RI	043012/043186 **	0-2"	1	Y
SS4-19	RI	043013	0-2"	1	Y
SS4-20	RI	043014	0-2"	1	Y (only)

Note:

NA = Not Applicable

* This is a duplicate sample.

** Sample also analyzed for hexavalent chromium.

*** Duplicate sample for hexavalent chromium only.

All samples were analyzed for volatile organic compounds, semi-volatile organic compounds, pesticides, PCBs, nitroaromatics, metals, cyanide, nitrates and grain size.

(1) Depth in inches below ground surface.

(2) ESI - Samples collected during Expanded Site Inspection conducted in 1993.
RI - Samples collected during Remedial Investigation conducted in 1998.

(3) Chromium screening was used to determine the sample points with the highest chromium. The samples were sent to the laboratory with a 24 hour turn around so that decisions could be made for further sampling.

SEAD-4 - Surface Soil Sampling Summary

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

LOCATION ID	STUDY (2)	SAMPLE NUMBER	DEPTH (1)	AREA	CHROMIUM (3) SCREENING (Y/N)
SS4-21	RI	043015	0-2"	1	Y (only)
SS4-22	RI	043016	0-2"	1	Y (only)
SS4-23	RI	043017	0-2"	1	Y (only)
SS4-24	RI	043018	0-2"	1	Y (only)
SS4-25	RI	043019	0-2"	1	Y (only)
SS4-26	RI	043020	0-2"	1	Y (only)
SS4-27	RI	043021	0-2"	1	Y (only)
SS4-28	RI	043022	0-2"	1	Y (only)
SS4-29	RI	043023	0-2"	1	Y
SS4-30	RI	043024	0-2"	1	Y (only)
SS4-31	RI	043025	0-2"	1	Y (only)
SS4-32	RI	043026	0-2"	1	Y (only)
SS4-33	RI	043027	0-2"	2	Y (only)
SS4-34	RI	043028	0-2"	2	Y (only)
SS4-35	RI	043029	0-2"	2	Y
SS4-36	RI	043030	0-2"	2	Y
SS4-37	RI	043031	0-2"	2	Y (only)
SS4-38	RI	043032	0-2"	2	Y
SS4-39	RI	043033	0-2"	2	Y (only)
SS4-40	RI	043034	0-2"	2	Y (only)
SS4-41	RI	043035	0-2"	2	Y (only)

Note:

NA = Not Applicable

* This is a duplicate sample.

** Sample also analyzed for hexavalent chromium.

All samples were analyzed for volatile organic compounds, semi-volatile organic compounds, pesticides, PCBs, nitroaromatics, metals, cyanide, nitrates and grain size.

(1) Depth in inches below ground surface.

(2) ESI - Samples collected during Expanded Site Inspection conducted in 1993.
RI - Samples collected during Remedial Investigation conducted in 1998.

(3) Chromium screening was used to determine the sample points with the highest chromium. The samples were sent to the laboratory with a 24 hour turn around so that decisions could be made for further sampling.

SEAD-4 - Surface Soil Sampling Summary

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

LOCATION ID	STUDY (2)	SAMPLE NUMBER	DEPTH (1)	AREA	CHROMIUM (3) SCREENING (Y/N)
SS4-42	RI	043036/043198 **	0-2"	2	Y
SS4-43	RI	043037	0-2"	2	Y
SS4-43 *	RI	043038	0-2"	2	Y
SS4-44	RI	043039	0-2"	2	Y (only)
SS4-45	RI	043040	0-2"	2	Y (only)
SS4-46	RI	043041	0-2"	2	Y
SS4-47	RI	043042	0-2"	2	Y (only)
SS4-48	RI	043043/043193 **	0-2"	2	Y
SS4-49	RI	043044	0-2"	2	Y (only)
SS4-50	RI	043045	0-2"	2	Y (only)
SS4-51	RI	043046	0-2"	2	Y (only)
SS4-52	RI	043047	0-2"	2	Y (only)
SS4-53	RI	043048	0-2"	3	N
SS4-54	RI	043049	0-2"	3	N
SS4-55	RI	043050	0-2"	3	N
SS4-55 *	RI	043051	0-2"	3	N
SS4-56	RI	043052	0-2"	3	N
SS4-57	RI	043053	0-2"	3	N
SS4-58	RI	043054	0-2"	3	N
SS4-59	RI	043055	0-2"	3	N
SS4-60	RI	043056	0-2"	3	N

Note:

NA = Not Applicable

* This is a duplicate sample.

** Sample also analyzed for hexavalent chromium.

All samples were analyzed for volatile organic compounds, semi-volatile organic compounds, pesticides, PCBs, nitroaromatics, metals, cyanide, nitrates and grain size.

(1) Depth in inches below ground surface.

(2) ESI - Samples collected during Expanded Site Inspection conducted in 1993.
RI - Samples collected during Remedial Investigation conducted in 1998.

(3) Chromium screening was used to determine the sample points with the highest chromium. The samples were sent to the laboratory with a 24 hour turn around so that decisions could be made for further sampling.

SEAD-4 - Surface Soil Sampling Summary

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

LOCATION ID	STUDY (2)	SAMPLE NUMBER	DEPTH (1)	AREA	CHROMIUM (3) SCREENING (Y/N)
SS4-61	RI	043057	0-2"	3	N
SS4-62	RI	043058	0-2"	3	N
SS4-63	RI	043059	0-2"	3	N
SS4-64	RI	043060	0-2"	3	N
SS4-65	RI	043065	0-2"	Site Wide	N
SS4-66	RI	043066	0-2"	Site Wide	N
SS4-67	RI	043067	0-2"	Site Wide	N
SS4-68	RI	043061	0-2"	Site Wide	N
SS4-69	RI	043062	0-2"	Site Wide	N
SS4-70	RI	043063	0-2"	Site Wide	N
SS4-71	RI	043064	0-2"	Site Wide	N
SS4-72	RI	043068	0-2"	Site Wide	N
SS4-73	RI	043069	0-2"	Site Wide	N
SS4-73 *	RI	43070	0-2"	Site Wide	N
SS4-74	RI	043071	0-2"	Site Wide	N
SS4-75	RI	043072	0-2"	Site Wide	N
SS4-76	RI	043073	0-2"	Site Wide	N
SS4-77	RI	043074	0-2"	Site Wide	N
SS4-78	RI	043075	0-2"	Site Wide	N
SS4-79	RI	043076	0-2"	Site Wide	N
SS4-80	RI	043077	0-2"	Site Wide	N
SS4-81	RI	043078	0-2"	Site Wide	N

Note:

NA = Not Applicable

* This is a duplicate sample.

** Sample also analyzed for hexavalent chromium.

All samples were analyzed for volatile organic compounds, semi-volatile organic compounds, pesticides, PCBs, nitroaromatics, metals, cyanide, nitrates and grain size.

(1) Depth in inches below ground surface.

(2) ESI - Samples collected during Expanded Site Inspection conducted in 1993.

RI - Samples collected during Remedial Investigation conducted in 1998.

(3) Chromium screening was used to determine the sample points with the highest chromium. The samples were sent to the laboratory with a 24 hour turn around so that decisions could be made for further sampling.

SEAD-4 - Surface Soil Sampling Summary

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

LOCATION ID	STUDY (2)	SAMPLE NUMBER	DEPTH (1)	AREA	CHROMIUM (3) SCREENING (Y/N)
SS4-82	RI	043079	0-2"	Site Wide	N
SS4-83	RI	043093	0-2"	1	N
SS4-83 *	RI	043102	0-2"	1	N
SS4-84	RI	043094	0-2"	1	Y (only)
SS4-85	RI	043095	0-2"	1	Y
SS4-86	RI	043096	0-2"	1	Y
SS4-87	RI	043097	0-2"	1	Y (only)
SS4-88	RI	043098	0-2"	1	Y (only)
SS4-89	RI	043099	0-2"	1	Y (only)
SS4-90	RI	043100/043199 **	0-2"	2	Y
SS4-91	RI	043101	0-2"	2	Y (only)
SS4-93	RI	043103	0-2"	1	Y (only)
SS4-94	RI	043104 **	0-2"	1	Y
SS4-95	RI	043105 **	0-2"	1	Y
SS4-96	RI	043106	0-2"	1	Y (only)
SS4-97	RI	043107	0-2"	1	Y (only)
SS4-98	RI	043108	0-2"	1	Y (only)
SS4-99	RI	043147	0-2"	1	Y (only)
SB4-14	RI	43109/43191 **	0-2"	Bldg 2084	N
SB4-25	RI	43174/43196 **	0-2"	SW Pond	N
MW4-6	RI	43153/43195 **	0-2"	NW Pond	N

Note:

NA = Not Applicable

* This is a duplicate sample.

All samples were analyzed for volatile organic compounds, semi-volatile organic compounds, pesticides. PCBs. nitroaromatics. metals. cyanide. nitrates and grain size.

(1) Depth in inches below ground surface.

** Sample also analyzed for hexavalent chromium.

(2) ESI - Samples collected during Expanded Site Inspection conducted in 1993.

RI - Samples collected during Remedial Investigation conducted in 1998.

(3) Chromium screening was used to determine the sample points with the highest chromium. The samples were sent to the laboratory with a 24 hour turn around so that decisions could be made for further sampling.

SEAD-4 - Soil Boring Sampling Summary

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

LOCATION ID	WELL NUMBER	STUDY (2)	SAMPLE NUMBER	SAMPLE INTERVAL (1)
SB4-1	MW4-1	ESI	SB4-1.1	0-2'
		ESI	SB4-1.2*	4-6'
		ESI	SB4-1.3	4-6'
		ESI	SB4-1.5*	0-2'
		ESI	SB4-1.10*	0-2'
		ESI	SB4-1.6	10-12'
SB4-2	MW4-2	ESI	SB4-2.1	0-2'
		ESI	SB4-2.2	2-4'
SB4-3	MW4-3	ESI	SB4-3.1	0-2'
		ESI	SB4-3.3	4-6'
		ESI	SB4-3.4	6-8'
SB4-4	MW4-4	ESI	SB4-4.1	0-2'
		ESI	SB4-4.2	2-4'
		ESI	SB4-4.3	4-6'
		ESI	Sb4-4.5*	0-2'
SB4-5	MW4-5	ESI	SB4-5.1	0-2'
		ESI	SB4-5.2	2-4'
SB4-6	NA	ESI	SB4-6.1	0-2'
		ESI	SB4-6.2	2-4'
SB4-7	NA	ESI	SB4-7.1	0-2'
		ESI	SB4-7.3	4-6'
		ESI	SB4-7.4	6-8'
SB4-8	NA	ESI	SB4-8.1	0-2'
		ESI	SB4-8.2	2-4'
		ESI	SB4-8.3	4-6'

Notes:

NA = Not Applicable

All soil boring samples were analyzed for volatile organic compounds, semi-volatile organic compounds, pesticides, PCBs, nitroaromatics, metals, cyanide and nitrates.

All monitoring wells were analyzed for volatile organic compounds, semi-volatile organic compounds, nitrates, explosives, metals, cyanide, pesticides and PCB's.

@ Shelby tube: only grain size, density, pH, cation exchange capacity and total organic compounds were analyzed for these samples.

* Duplicate samples taken at the sample site.

(1) Interval represents depth in feet below ground surface.

(2) ESI - Samples collected during Expanded Site Inspection conducted in 1993.
RI - Samples collected during Remedial Investigation conducted in 1998.

SEAD-4 - Soil Boring Sampling Summary

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

LOCATION ID	WELL NUMBER	STUDY (2)	SAMPLE NUMBER	SAMPLE INTERVAL (1)
SB4-9	NA	ESI	SB4-9.1	0-2'
		ESI	SB4-9.2	2-4'
		ESI	SB4-9.3	4-6'
SB4-10	NA	ESI	SB4-10.1	0-2'
		ESI	SB4-10.2	2-4'
		ESI	SB4-10.3	4-6'
SB4-11	NA	RI	043132	0-2"
		RI	043133 @	2-2.9'
SB4-12	NA	RI	043113	0-2"
		RI	043114	4-4.6'
		RI	043115	6-6.4'
SB4-13	NA	RI	043116	0-2"
		RI	043117 @	2-4'
SB4-14	MW4-10	RI	043109	0-2"
		RI	043110 *	0-2"
		RI	043112	2-3'
SB4-15	NA	RI	043145	0-2"
		RI	043146 @	2-4'
		RI	043148	4-6'
SB4-16	NA	RI	043122	0-2"
		RI	043124	2-3'
SB4-17	NA	RI	043119	0-2"
		RI	043121	2-3.2'
SB4-18	NA	RI	043080	0-2"
		RI	043081	2-3.5'
		RI	043082	4-5.8'

Notes:

NA = Not Applicable

All soil boring samples were analyzed for volatile organic compounds, semi-volatile organic compounds, pesticides, PCBs, nitroaromatics, metals, cyanide and nitrates.

All monitoring wells were analyzed for volatile organic compounds, semi-volatile organic compounds, nitrates, explosives, metals, cyanide, pesticides and PCB's.

@ Shelby tube: only grain size, density, pH, cation exchange capacity and total organic compounds were analyzed for these samples. Sample #043117 was not sampled for grain size.

* Duplicate samples taken at the sample site.

(1) Interval represents depth in feet below ground surface.

(2) ESI - Samples collected during Expanded Site Inspection conducted in 1993.
RI - Samples collected during Remedial Investigation conducted in 1998.

SEAD-4 - Soil Boring Sampling Summary

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

LOCATION ID	WELL NUMBER	STUDY (2)	SAMPLE NUMBER	SAMPLE INTERVAL (1)
SB4-19	NA	RI	043083	0-2"
		RI	043084	2-3.2'
		RI	043085	4-5.2'
SB4-20	NA	RI	043135	0-1.2'
		RI	043136	2-3.5'
		RI	043149	6-6.8'
SB4-21	NA	RI	043137	2-3.4'
		RI	043138	8-8.7'
SB4-22	NA	RI	043139	4-5.7'
		RI	043140	6-7.6'
SB4-23	NA	RI	043086 @	0-1'
		RI	043087	2-3'
		RI	043088	4-5.6'
SB4-24	NA	RI	043141	3-4'
		RI	043173 *	3-4'
		RI	043142	8-8.6'
SB4-25	NA	RI	043174	0-2"
		RI	043143	2-3.5'
		RI	043144	6-7.2'
SB4-26	NA	RI	043090	0-2"
		RI	043091	2-3.5'
		RI	043092	4-5'

Notes:

NA = Not Applicable

All soil boring samples were analyzed for volatile organic compounds, semi-volatile organic compounds, pesticides, PCBs, nitroaromatics, metals, cyanide and nitrates.

All monitoring wells were analyzed for volatile organic compounds, semi-volatile organic compounds, nitrates, explosives, metals, cyanide, pesticides and PCB's.

@ Shelby tube: only grain size, density, pH, cation exchange capacity and total organic compounds were analyzed for these samples.

* Duplicate samples taken at the sample site.

(1) Interval represents depth in feet below ground surface.

(2) ESI - Samples collected during Expanded Site Inspection conducted in 1993.
RI - Samples collected during Remedial Investigation conducted in 1998.

SEAD-4 - Soil Boring Sampling Summary

SEAD-4 Remedial Investigation
Seneca Army Depot Activity

LOCATION ID	WELL NUMBER	STUDY (2)	SAMPLE NUMBER	SAMPLE INTERVAL (1)
SB4-27	NA	RI	043125	0-2"
		RI	043127	2-2.5'
SB4-28	NA	RI	043128	0-2"
		RI	043129 @	2-4'
MW4-6	NA	RI	043153	0-2"
		RI	043154	2-3.5'
		RI	043155	6-6.5'
MW4-7	NA	RI	043157	0-2"
		RI	043159	0.5-1.5'
MW4-8	NA	RI	043150	0-2"
		RI	043151	2-3.5'
		RI	043152	6-6.5'
MW4-9	NA	RI	043164	0-2"
		RI	043166	0.6-1.6'
MW4-11	NA	RI	043170	0-2"
		RI	043171	2-3.3'
		RI	043172	4-5.5'
MW4-12	NA	RI	043167	0-2"
		RI	043168	2-3.4'
		RI	043169	8-8.8'
MW4-13	NA	RI	043160	0-2"
		RI	043161 *	0-2"
		RI	043163	2-2.6'

Notes:

NA = Not Applicable

All soil boring samples were analyzed for volatile organic compounds, semi-volatile organic compounds, pesticides, PCBs, nitroaromatics, metals, cyanide and nitrates.

All monitoring wells were analyzed for volatile organic compounds, semi-volatile organic compounds, nitrates, explosives, metals, cyanide, pesticides and PCB's.

@ Shelby tube: only grain size, density, pH, cation exchange capacity and total organic compounds were analyzed for these samples.

* Duplicate samples taken at the sample site.

(1) Interval represents depth in feet below ground surface.

(2) ESI - Samples collected during Expanded Site Inspection conducted in 1993.
RI - Samples collected during Remedial Investigation conducted in 1998.

Building Material

	UNITS	MAXIMUM	FREQUENCY OF DETECTION	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
						B2084		B2085		B2073		B2078		B2076		B2079	
						DEBRIS		DEBRIS		DEBRIS		DEBRIS		DEBRIS		DEBRIS	
						44001		44002		44003		44004		44005		44006	
						0		0		0		0		0		0	
						0.2		0.2		0.2		0.2		0.2		0.2	
						1/8/1999		1/8/1999		1/8/1999		1/8/1999		1/8/1999		1/8/1999	
						SA		SA		SA		SA		SA		SA	
						RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1
VOLATILES																	
1,1,1-Trichloroethane	UG/KG	0	0%	0	6	12	U	10	U	11	U	11	U	10	U	11	U
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	0	6	12	UJ	10	UJ	11	UJ	11	UJ	10	U	11	U
1,1,2-Trichloroethane	UG/KG	0	0%	0	6	12	U	10	U	11	U	11	U	10	U	11	U
1,1-Dichloroethane	UG/KG	0	0%	0	6	12	U	10	U	11	U	11	U	10	U	11	U
1,1-Dichloroethene	UG/KG	0	0%	0	6	12	U	10	U	11	U	11	U	10	U	11	U
1,2-Dichloroethane	UG/KG	0	0%	0	6	12	U	10	U	11	U	11	U	10	U	11	U
1,2-Dichloroethene (total)	UG/KG	0	0%	0	6	12	U	10	U	11	U	11	U	10	U	11	U
1,2-Dichloropropane	UG/KG	0	0%	0	6	12	U	10	U	11	U	11	U	10	U	11	U
Acetone	UG/KG	40	100%	6	6	4	J	40		12		22		10	J	3	J
Benzene	UG/KG	0	0%	0	6	12	U	10	U	11	U	11	U	10	U	11	U
Bromodichloromethane	UG/KG	0	0%	0	6	12	U	10	U	11	U	11	U	10	U	11	U
Bromoform	UG/KG	0	0%	0	6	12	UJ	10	UJ	11	UJ	11	UJ	10	U	11	U
Carbon disulfide	UG/KG	0	0%	0	6	12	U	10	U	11	U	11	U	10	U	11	U
Carbon tetrachloride	UG/KG	0	0%	0	6	12	U	10	U	11	U	11	U	10	U	11	U
Chlorobenzene	UG/KG	0	0%	0	6	12	UJ	10	UJ	11	UJ	11	UJ	10	U	11	U
Chlorodibromomethane	UG/KG	0	0%	0	6	12	U	10	U	11	U	11	U	10	U	11	U
Chloroethane	UG/KG	0	0%	0	6	12	U	10	U	11	U	11	U	10	U	11	U
Chloroform	UG/KG	0	0%	0	6	12	U	10	U	11	U	11	U	10	U	11	U
Cis-1,3-Dichloropropene	UG/KG	0	0%	0	6	12	U	10	U	11	U	11	U	10	U	11	U
Ethyl benzene	UG/KG	0	0%	0	6	12	UJ	10	UJ	11	UJ	11	UJ	10	U	11	U
Methyl bromide	UG/KG	0	0%	0	6	12	U	10	U	11	U	11	U	10	U	11	U
Methyl butyl ketone	UG/KG	0	0%	0	6	12	U	10	U	11	U	11	U	10	U	11	U
Methyl chloride	UG/KG	0	0%	0	6	12	U	10	U	11	U	11	U	10	U	11	U
Methyl ethyl ketone	UG/KG	0	0%	0	6	12	U	10	U	11	U	11	U	10	U	11	U
Methyl isobutyl ketone	UG/KG	0	0%	0	6	12	U	10	U	11	U	11	U	10	U	11	U
Methylene chloride	UG/KG	0	0%	0	6	12	U	10	U	11	U	11	U	10	U	11	U
Styrene	UG/KG	0	0%	0	6	12	UJ	10	UJ	11	UJ	11	UJ	10	U	11	U
Tetrachloroethene	UG/KG	0	0%	0	6	12	U	10	U	11	U	11	U	10	U	11	U
Toluene	UG/KG	0	0%	0	6	12	U	10	U	11	U	11	U	10	U	11	U
Total Xylenes	UG/KG	0	0%	0	6	12	UJ	10	UJ	11	UJ	11	UJ	10	U	11	U
Trans-1,3-Dichloropropene	UG/KG	0	0%	0	6	12	U	10	U	11	U	11	U	10	U	11	U
Trichloroethene	UG/KG	0	0%	0	6	12	U	10	U	11	U	11	U	10	U	11	U
Vinyl chloride	UG/KG	0	0%	0	6	12	U	10	U	11	U	11	U	10	U	11	U
SEMIVOLATILES																	
1,2,4-Trichlorobenzene	UG/KG	0	0%	0	6	350	U	340	U	360	U	6900	U	330	U	340	U
1,2-Dichlorobenzene	UG/KG	0	0%	0	6	350	UJ	340	UJ	360	UJ	6900	UJ	330	UJ	340	UJ
1,3-Dichlorobenzene	UG/KG	0	0%	0	6	350	U	340	U	360	U	6900	U	330	U	340	U
1,4-Dichlorobenzene	UG/KG	0	0%	0	6	350	U	340	U	360	U	6900	U	330	U	340	U
2,4,5-Trichlorophenol	UG/KG	0	0%	0	6	860	U	820	U	870	U	17000	U	800	U	830	U
2,4,6-Trichlorophenol	UG/KG	0	0%	0	6	350	U	340	U	360	U	6900	U	330	U	340	U
2,4-Dichlorophenol	UG/KG	0	0%	0	6	350	U	340	U	360	U	6900	U	330	U	340	U
2,4-Dimethylphenol	UG/KG	0	0%	0	6	350	UJ	340	UJ	360	UJ	6900	UJ	330	UJ	340	UJ
2,4-Dinitrophenol	UG/KG	0	0%	0	6	860	UJ	820	UJ	870	UJ	17000	U	800	UJ	830	UJ
2,4-Dinitrotoluene	UG/KG	360	33%	2	6	350	UJ	360	J	180	J	6900	UJ	330	UJ	340	UJ

Seneca Army Depot
SEAD-4 Remedial Investigation
Building Debris Sample Results

	UNITS	MAXIMUM	FREQUENCY OF DETECTION	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
						B2084		B2085		B2073		B2078		B2076		B2079	
						DEBRIS		DEBRIS		DEBRIS		DEBRIS		DEBRIS		DEBRIS	
						44001		44002		44003		44004		44005		44006	
						0		0		0		0		0		0	
						0.2		0.2		0.2		0.2		0.2		0.2	
						1/8/1999		1/8/1999		1/8/1999		1/8/1999		1/8/1999		1/8/1999	
						SA		SA		SA		SA		SA		SA	
						RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1
2,6-Dinitrotoluene	UG/KG	0	0%	0	6	350	UJ	340	UJ	360	UJ	6900	UJ	330	UJ	340	UJ
2-Chloronaphthalene	UG/KG	0	0%	0	6	350	UJ	340	UJ	360	UJ	6900	UJ	330	UJ	340	UJ
2-Chlorophenol	UG/KG	0	0%	0	6	350	U	340	U	360	U	6900	U	330	U	340	U
2-Methylnaphthalene	UG/KG	1500	33%	2	6	350	U	340	U	190	J	1500	J	330	U	340	U
2-Methylphenol	UG/KG	0	0%	0	6	350	U	340	U	360	U	6900	U	330	U	340	U
2-Nitroaniline	UG/KG	0	0%	0	6	860	U	820	U	870	U	17000	U	800	U	830	U
2-Nitrophenol	UG/KG	0	0%	0	6	350	U	340	U	360	U	6900	U	330	U	340	U
3,3'-Dichlorobenzidine	UG/KG	0	0%	0	6	350	U	340	U	360	U	6900	U	330	U	340	U
3-Nitroaniline	UG/KG	0	0%	0	6	860	U	820	U	870	U	17000	UJ	800	U	830	U
4,6-Dinitro-2-methylphenol	UG/KG	0	0%	0	6	860	UJ	820	UJ	870	UJ	17000	U	800	UJ	830	UJ
4-Bromophenyl phenyl eth	UG/KG	0	0%	0	6	350	UJ	340	UJ	360	UJ	6900	UJ	330	UJ	340	UJ
4-Chloro-3-methylphenol	UG/KG	0	0%	0	6	350	U	340	U	360	U	6900	U	330	U	340	U
4-Chloroaniline	UG/KG	0	0%	0	6	350	U	340	U	360	U	6900	UJ	330	U	340	U
4-Chlorophenyl phenyl eth	UG/KG	0	0%	0	6	350	UJ	340	UJ	360	UJ	6900	UJ	330	UJ	340	UJ
4-Methylphenol	UG/KG	0	0%	0	6	350	U	340	U	360	U	6900	U	330	U	340	U
4-Nitroaniline	UG/KG	0	0%	0	6	860	U	820	U	870	U	17000	U	800	U	830	U
4-Nitrophenol	UG/KG	0	0%	0	6	860	U	820	U	870	U	17000	U	800	U	830	U
Acenaphthene	UG/KG	1400	67%	4	6	33	J	340	UJ	260	J	1400	J	330	UJ	18	J
Acenaphthylene	UG/KG	0	0%	0	6	350	UJ	340	UJ	360	UJ	6900	UJ	330	UJ	340	UJ
Anthracene	UG/KG	690	83%	5	6	21	J	24	J	640	J	690	J	330	UJ	45	J
Benzo(a)anthracene	UG/KG	5200	83%	5	6	260	J	89	J	2300		5200	J	330	U	780	
Benzo(a)pyrene	UG/KG	8500	100%	6	6	290	J	86	J	2000	J	8500	J	17	J	810	J
Benzo(b)fluoranthene	UG/KG	11000	100%	6	6	1800	J	210	J	1800	J	11000		45	J	1000	J
Benzo(ghi)perylene	UG/KG	8700	100%	6	6	480	J	59	J	1500	J	8700		27	J	600	J
Benzo(k)fluoranthene	UG/KG	8300	50%	3	6	350	R	340	R	2400	J	8300		330	R	1100	J
Bis(2-Chloroethoxy)metha	UG/KG	0	0%	0	6	350	U	340	U	360	U	6900	U	330	U	340	U
Bis(2-Chloroethyl)ether	UG/KG	0	0%	0	6	350	U	340	U	360	U	6900	U	330	U	340	U
Bis(2-Chloroisopropyl)ethe	UG/KG	0	0%	0	6	350	U	340	U	360	U	6900	U	330	U	340	U
Bis(2-Ethylhexyl)phthalate	UG/KG	890000	100%	6	6	430000		4700		83000		890000		1200		6600	
Butylbenzylphthalate	UG/KG	1600	50%	3	6	1600		130	J	1300		6900	U	330	U	340	U
Carbazole	UG/KG	5800	67%	4	6	350	U	34	J	440		5800	J	330	U	64	J
Chrysene	UG/KG	13000	100%	6	6	380	J	200	J	2100	J	13000	J	30	J	1300	J
Di-n-butylphthalate	UG/KG	32000	100%	6	6	2500	J	1100	J	590	J	32000	J	100	J	980	J
Di-n-octylphthalate	UG/KG	0	0%	0	6	350	UJ	340	U	360	U	6900	U	330	U	340	U
Dibenz(a,h)anthracene	UG/KG	3000	67%	4	6	150	J	340	UJ	720	J	3000	J	330	UJ	270	J
Dibenzofuran	UG/KG	1500	33%	2	6	350	UJ	340	UJ	140	J	1500	J	330	UJ	340	UJ
Diethyl phthalate	UG/KG	130	33%	2	6	19	J	130	J	360	UJ	6900	UJ	330	UJ	340	UJ
Dimethylphthalate	UG/KG	0	0%	0	6	350	UJ	340	UJ	360	UJ	6900	UJ	330	UJ	340	UJ
Fluoranthene	UG/KG	25000	100%	6	6	590	J	310	J	4800	J	25000	J	42	J	1100	J
Fluorene	UG/KG	760	50%	3	6	24	J	340	UJ	270	J	760	J	330	UJ	340	UJ
Hexachlorobenzene	UG/KG	0	0%	0	6	350	UJ	340	U	360	U	6900	U	330	U	340	U
Hexachlorobutadiene	UG/KG	0	0%	0	6	350	UJ	340	UJ	360	UJ	6900	UJ	330	UJ	340	UJ
Hexachlorocyclopentadien	UG/KG	0	0%	0	6	350	UJ	340	UJ	360	UJ	6900	U	330	UJ	340	UJ
Hexachloroethane	UG/KG	0	0%	0	6	350	UJ	340	UJ	360	UJ	6900	UJ	330	UJ	340	UJ
Indeno(1,2,3-cd)pyrene	UG/KG	7500	83%	5	6	410		340	UJ	1400		7500		18	J	550	

Senec y Depot
SEAD-4 Remedial Investigation
Building Debris Sample Results

	UNITS	MAXIMUM	FREQUENCY OF DETECTION	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4 B2084 DEBRIS 44001 0 0.2 1/8/1999 SA RI Phase 1	Step 1	SEAD-4 B2085 DEBRIS 44002 0 0.2 1/8/1999 SA RI Phase 1	Step 1	SEAD-4 B2073 DEBRIS 44003 0 0.2 1/8/1999 SA RI Phase 1	Step 1	SEAD-4 B2078 DEBRIS 44004 0 0.2 1/8/1999 SA RI Phase 1	Step 1	SEAD-4 B2076 DEBRIS 44005 0 0.2 1/8/1999 SA RI Phase 1	Step 1	SEAD-4 B2079 DEBRIS 44006 0 0.2 1/8/1999 SA RI Phase 1	Step 1
Isophorone	UG/KG	0	0%	0	6	350	UJ	340	UJ	360	UJ	6900	UJ	330	U	340	UJ
N-Nitrosodiphenylamine	UG/KG	66	17%	1	6	350	U	66	J	360	U	6900	U	330	U	340	U
N-Nitrosodipropylamine	UG/KG	0	0%	0	6	350	U	340	U	360	U	6900	U	330	U	340	U
Naphthalene	UG/KG	1300	50%	3	6	23	J	340	UJ	140	J	1300	J	330	UJ	340	UJ
Nitrobenzene	UG/KG	0	0%	0	6	350	U	340	U	360	U	6900	U	330	U	340	U
Pentachlorophenol	UG/KG	4900	33%	2	6	860	U	810	J	4900	J	17000	U	800	U	830	U
Phenanthrene	UG/KG	23000	100%	6	6	340	J	240	J	3000	J	23000	J	33	J	410	J
Phenol	UG/KG	0	0%	0	6	350	U	340	U	360	U	6900	U	330	U	340	U
Pyrene	UG/KG	25000	100%	6	6	280	J	180	J	3800	J	25000		38	J	950	
EXPLOSIVES																	
1,3,5-Trinitrobenzene	UG/KG	0	0%	0	6	120	U	120	U	120	U	120	U	120	U	120	U
1,3-Dinitrobenzene	UG/KG	180	33%	2	6	120	U	120	U	140	J	180	J	120	U	120	U
2,4,6-Trinitrotoluene	UG/KG	260	17%	1	6	120	U	260	J	120	U	120	U	120	U	120	U
2,4-Dinitrotoluene	UG/KG	1900	50%	3	6	630	J	1900	J	490	J	120	U	120	U	120	U
2,6-Dinitrotoluene	UG/KG	0	0%	0	6	120	U	120	U	120	U	120	U	120	U	120	U
2-Nitrotoluene	UG/KG	0	0%	0	6	120	U	120	U	120	U	120	U	120	U	120	U
2-amino-4,6-Dinitrotoluene	UG/KG	320	33%	2	6	120	U	320	J	120	U	270	J	120	U	120	U
3-Nitrotoluene	UG/KG	0	0%	0	6	120	U	120	U	120	U	120	U	120	U	120	U
4-Nitrotoluene	UG/KG	0	0%	0	6	120	U	120	U	120	U	120	U	120	U	120	U
4-amino-2,6-Dinitrotoluene	UG/KG	300	17%	1	6	300	J	120	U	120	U	120	U	120	U	120	U
HMX	UG/KG	0	0%	0	6	120	U	120	U	120	U	120	U	120	U	120	U
Nitrobenzene	UG/KG	0	0%	0	6	120	U	120	U	120	U	120	U	120	U	120	U
RDX	UG/KG	200	17%	1	6	120	U	120	U	120	U	200	J	120	U	120	U
Tetryl	UG/KG	820	17%	1	6	820	J	120	U	120	U	120	U	120	U	120	U
PESTICIDES																	
4,4'-DDD	UG/KG	35	67%	4	6	27	J	17	U	72	U	35	J	9.3		32	J
4,4'-DDE	UG/KG	1200	100%	6	6	54		260	J	1200	J	32	J	23		100	
4,4'-DDT	UG/KG	5600	100%	6	6	420		1000	J	5600		2900		32	J	770	J
Aldrin	UG/KG	0	0%	0	6	3.6	U	8.8	U	37	U	18	U	1.7	U	5.3	U
Alpha-BHC	UG/KG	0	0%	0	6	3.6	U	8.8	U	37	U	18	U	1.7	U	5.3	U
Alpha-Chlordane	UG/KG	780	67%	4	6	2.2	J	780		37	U	19	J	1.7	U	4.2	J
Aroclor-1016	UG/KG	0	0%	0	6	71	U	170	U	720	U	350	U	33	U	100	U
Aroclor-1221	UG/KG	0	0%	0	6	140	U	340	U	1400	U	700	U	67	U	210	U
Aroclor-1232	UG/KG	0	0%	0	6	71	U	170	U	720	U	350	U	33	U	100	U
Aroclor-1242	UG/KG	0	0%	0	6	71	U	170	U	720	U	350	U	33	U	100	U
Aroclor-1248	UG/KG	0	0%	0	6	71	U	170	U	720	U	350	U	33	U	100	U
Aroclor-1254	UG/KG	91000	83%	5	6	190		6400	J	91000		350	U	110		3500	
Aroclor-1260	UG/KG	3100	67%	4	6	640	J	1600		720	U	350	U	57		3100	
Beta-BHC	UG/KG	31	17%	1	6	3.6	U	8.8	U	31	J	18	U	1.7	U	5.3	U
Delta-BHC	UG/KG	0	0%	0	6	3.6	U	8.8	U	37	U	18	U	1.7	U	5.3	U
Dieldrin	UG/KG	1100	83%	5	6	34		560	J	1100	J	35	U	3.8	J	120	J
Endosulfan I	UG/KG	160	33%	2	6	3.6	U	8.8	U	160	J	18	U	1.7	U	11	J
Endosulfan II	UG/KG	30	33%	2	6	18	J	30	J	72	U	35	U	3.3	U	10	U
Endosulfan sulfate	UG/KG	200	33%	2	6	200		15	J	72	U	35	U	3.3	U	10	U
Endrin	UG/KG	320	50%	3	6	7.1	U	44	J	320	J	35	U	3.3	U	29	J

Seneca Army Depot
SEAD-4 Remedial Investigation
Building Debris Sample Results

						SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
						B2084		B2085		B2073		B2078		B2076		B2079	
						DEBRIS		DEBRIS		DEBRIS		DEBRIS		DEBRIS		DEBRIS	
						44001		44002		44003		44004		44005		44006	
						0		0		0		0		0		0	
						0.2		0.2		0.2		0.2		0.2		0.2	
						1/8/1999		1/8/1999		1/8/1999		1/8/1999		1/8/1999		1/8/1999	
						SA		SA		SA		SA		SA		SA	
	UNITS	MAXIMUM	FREQUENCY OF DETECTION	NUMBER OF DETECTS	NUMBER OF ANALYSES	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1
Endrin aldehyde	UG/KG	390	83%	5	6	17	J	150	J	390	J	42	J	3.3	U	32	J
Endrin ketone	UG/KG	370	50%	3	6	34	J	24	J	72	U	370		3.3	U	10	U
Gamma-BHC/Lindane	UG/KG	0	0%	0	6	3.6	U	8.8	U	37	U	18	U	1.7	U	5.3	U
Gamma-Chlordane	UG/KG	95	83%	5	6	2.2	J	95	J	37	U	20	J	1.9	J	45	J
Heptachlor	UG/KG	34	17%	1	6	3.6	U	34	J	37	U	18	U	1.7	U	5.3	U
Heptachlor epoxide	UG/KG	360	83%	5	6	3.2	J	49	J	360	J	18	U	1.8	J	27	J
Methoxychlor	UG/KG	390	50%	3	6	36	U	76	J	390	J	200	J	17	U	53	U
Toxaphene	UG/KG	0	0%	0	6	360	U	880	U	3700	U	1800	U	170	U	530	U
METALS																	
Aluminum	MG/KG	6110	100%	6	6	6110		3850		4000		1980		3560		4760	
Antimony	MG/KG	26.1	100%	6	6	26.1		6.4	J	18.4		13.5		10.6		0.54	J
Arsenic	MG/KG	33.6	100%	6	6	15.8		22.1		21.3		33.6		5.5		15	
Barium	MG/KG	3560	100%	6	6	3560		2350		211		159		1870		1290	
Beryllium	MG/KG	0.46	33%	2	6	0.02	U	0.02	U	0.02	U	0.02	U	0.22	J	0.46	J
Cadmium	MG/KG	132	83%	5	6	37.2		132		55.1		28.7		22		0.03	U
Calcium	MG/KG	253000	100%	6	6	24100		49300		50500		18700		253000		70200	
Chromium	MG/KG	1840	100%	6	6	1840		150		199		493		35		136	
Cobalt	MG/KG	37.1	100%	6	6	37.1		17		16.5		25.5		32		27.9	
Copper	MG/KG	1220	100%	6	6	390		393		776		392		355		1220	
Cyanide	MG/KG	28.7	67%	4	6	28.7		0.55	U	1.5		1.7		0.6	U	1.4	
Iron	MG/KG	362000	100%	6	6	153000	J	155000	J	145000	J	362000	J	14100	J	252000	J
Lead	MG/KG	12000	100%	6	6	12000		4800		1050		2660		1260		993	
Magnesium	MG/KG	17600	100%	6	6	11100		17600		8360		2380		14900		8500	
Manganese	MG/KG	1630	100%	6	6	836		710		947		1630		356		1320	
Mercury	MG/KG	62.8	100%	6	6	0.34	J	0.28	J	0.16	J	0.61	J	1.1	J	62.8	J
Nickel	MG/KG	1330	100%	6	6	71.1		71.4		70.4		171		26.8		1330	
Potassium	MG/KG	3750	100%	6	6	1150		1790		1650		3750		2180		808	
Selenium	MG/KG	0	0%	0	6	0.75	U	0.6	U	0.67	U	0.69	U	0.56	U	0.56	U
Silver	MG/KG	0.57	100%	6	6	0.57	J	0.42	J	0.48	J	0.5	J	0.49	J	0.5	J
Sodium	MG/KG	1530	100%	6	6	195	J	505	J	556	J	1530		1260		860	
Thallium	MG/KG	7	83%	5	6	2.9		3.3		0.7	J	7		0.56	U	2.1	
Vanadium	MG/KG	948	100%	6	6	25.5		23.8		42.5		29		10.4		948	
Zinc	MG/KG	6100	100%	6	6	5670		3180		4940		6100		1510		2680	

Surface Soil

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Surface Soil Sample Results

								SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								MW4-11		MW4-12		MW4-13		MW4-13		MW4-6		MW4-6		MW4-7		MW4-8	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								43170		43167		43161		43160		43153		43195		43157		43150	
								0		0		0		0		0		0		0		0	
								0.2		0.2		0.2		0.2		0.2		0.2		0.2		0.2	
								12/20/1998		12/21/1998		12/20/1998		12/20/1998		12/19/1998		7/11/1999		12/20/1998		12/18/1998	
ANALYTE	UNITS	MAXIMUM	FREQ OF DETCTION	NYSDEC TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SA		SA		DU		SA		SA		SA		SA		SA	
								RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		HEX CHROME		RI Phase 1 Step 1		RI Phase 1 Step 1	
								N		N		N		N		N		N		N		N	
VOLATILES																							
1,1,1-Trichloroethane	UG/KG	0	0%	800	0	0	86	11	UJ	14	U	12	U	12	U	12	U			12	U	12	U
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	600	0	0	86	11	UJ	14	U	12	U	12	U	12	U			12	UJ	12	U
1,1,2-Trichloroethane	UG/KG	0	0%		0	0	86	11	UJ	14	U	12	U	12	U	12	U			12	U	12	U
1,1-Dichloroethane	UG/KG	2	2%	200	0	2	86	11	UJ	14	U	12	U	12	U	12	U			12	U	12	U
1,1-Dichloroethene	UG/KG	0	0%	400	0	0	86	11	UJ	14	U	12	U	12	U	12	U			12	U	12	U
1,2-Dichloroethane	UG/KG	0	0%	100	0	0	86	11	UJ	14	U	12	U	12	U	12	U			12	U	12	U
1,2-Dichloroethene (total)	UG/KG	4	3%		0	3	86	11	UJ	14	U	12	U	12	U	12	U			12	U	12	U
1,2-Dichloropropane	UG/KG	0	0%		0	0	86	11	UJ	14	U	12	U	12	U	12	U			12	U	12	U
Acetone	UG/KG	140	31%	200	0	27	86	11	J	14	U	12	U	12	U	14	U			12	U	12	U
Benzene	UG/KG	1	1%	60	0	1	86	1	J	14	U	12	U	12	U	12	U			12	U	12	U
Bromodichloromethane	UG/KG	0	0%		0	0	86	11	UJ	14	U	12	U	12	U	12	U			12	U	12	U
Bromoform	UG/KG	0	0%		0	0	86	11	UJ	14	U	12	U	12	U	12	U			12	UJ	12	U
Carbon disulfide	UG/KG	0	0%	2700	0	0	86	11	UJ	14	U	12	U	12	U	12	U			12	U	12	U
Carbon tetrachloride	UG/KG	0	0%	600	0	0	86	11	UJ	14	U	12	U	12	U	12	U			12	U	12	U
Chlorobenzene	UG/KG	0	0%	1700	0	0	86	11	UJ	14	U	12	U	12	U	12	U			12	UJ	12	U
Chlorodibromomethane	UG/KG	0	0%		0	0	86	11	UJ	14	U	12	U	12	U	12	U			12	U	12	U
Chloroethane	UG/KG	0	0%	1900	0	0	86	11	UJ	14	U	12	U	12	U	12	U			12	U	12	U
Chloroform	UG/KG	0	0%	300	0	0	86	11	UJ	14	U	12	U	12	U	12	U			12	U	12	U
Cis-1,3-Dichloropropene	UG/KG	0	0%		0	0	86	11	UJ	14	U	12	U	12	U	12	U			12	U	12	U
Ethyl benzene	UG/KG	0	0%	5500	0	0	86	11	UJ	14	U	12	U	12	U	12	U			12	UJ	12	U
Methyl bromide	UG/KG	0	0%		0	0	86	11	UJ	14	U	12	U	12	U	12	U			12	U	12	U
Methyl butyl ketone	UG/KG	9	1%		0	1	86	11	UJ	14	U	12	U	12	U	12	U			12	U	12	U
Methyl chloride	UG/KG	0	0%		0	0	86	11	UJ	14	U	12	U	12	U	12	U			12	U	12	U
Methyl ethyl ketone	UG/KG	0	0%	300	0	0	86	11	UJ	14	U	12	U	12	U	12	U			12	U	12	U
Methyl isobutyl ketone	UG/KG	0	0%	1000	0	0	86	11	UJ	14	U	12	U	12	U	12	U			12	U	12	U
Methylene chloride	UG/KG	3	1%	100	0	1	86	3	J	14	U	12	U	12	U	12	U			12	U	12	U
Styrene	UG/KG	0	0%		0	0	86	11	UJ	14	U	12	U	12	U	12	U			12	UJ	12	U
Tetrachloroethene	UG/KG	0	0%	1400	0	0	86	11	UJ	14	U	12	U	12	U	12	U			12	U	12	U
Toluene	UG/KG	14	29%	1500	0	25	86	6	J	14	U	1	J	2	J	3	J			1	J	3	J
Total Xylenes	UG/KG	0	0%	1200	0	0	86	11	UJ	14	U	12	U	12	U	12	U			12	UJ	12	U
Trans-1,3-Dichloropropene	UG/KG	0	0%		0	0	86	11	UJ	14	U	12	U	12	U	12	U			12	U	12	U
Trichloroethene	UG/KG	3	3%	700	0	3	86	11	UJ	14	U	12	U	12	U	12	U			12	U	12	U
Vinyl chloride	UG/KG	0	0%	200	0	0	86	11	UJ	14	U	12	U	12	U	12	U			12	U	12	U
SEMIVOLATILES																							
1,2,4-Trichlorobenzene	UG/KG	0	0%	3400	0	0	86	73	U	72	UJ	90	U	91	U	92	U			84	U	92	U
1,2-Dichlorobenzene	UG/KG	0	0%	7900	0	0	86	73	U	72	UJ	90	U	91	U	92	U			84	U	92	U
1,3-Dichlorobenzene	UG/KG	0	0%	1600	0	0	86	73	U	72	UJ	90	U	91	U	92	U			84	U	92	U
1,4-Dichlorobenzene	UG/KG	0	0%	8500	0	0	86	73	U	72	UJ	90	U	91	U	92	U			84	U	92	U
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%		0	0	7																
2,4,5-Trichlorophenol	UG/KG	0	0%	100	0	0	86	180	U	180	UJ	220	U	220	U	220	U			200	U	220	U
2,4,6-Trichlorophenol	UG/KG	0	0%		0	0	86	73	U	72	UJ	90	U	91	U	92	U			84	U	92	U
2,4-Dichlorophenol	UG/KG	0	0%	400	0	0	86	73	U	72	UJ	90	U	91	U	92	U			84	U	92	U
2,4-Dimethylphenol	UG/KG	0	0%		0	0	86	73	UJ	72	UJ	90	UJ	91	UJ	92	U			84	UJ	92	UJ
2,4-Dinitrophenol	UG/KG	0	0%	200	0	0	86	180	UJ	180	R	220	R	220	R	220	U			200	R	220	U
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	86	73	U	72	UJ	90	U	91	U	92	U			84	U	92	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	86	73	U	72	UJ	90	U	91	U	92	U			84	U	92	U
2-Chloronaphthalene	UG/KG	0	0%		0	0	86	73	U	72	UJ	90	U	91	U	92	U			84	U	92	U
2-Chlorophenol	UG/KG	0	0%	800	0	0	86	73	U	72	UJ	90	U	91	U	92	U			84	U	92	U
2-Methylnaphthalene	UG/KG	35	16%	36400	0	14	86	12	J	72	UJ	90	U	91	U	92	U			84	U	92	U
2-Methylphenol	UG/KG	0	0%	100	0	0	86	73	U	72	UJ	90	U	91	U	92	U			84	U	92	U
2-Nitroaniline	UG/KG	0	0%	430	0	0	86	180	U	180	UJ	220	U	220	U	220	U			200	U	220	U
2-Nitrophenol	UG/KG	0	0%	330	0	0	86	73	U	72	UJ	90	U	91	U	92	U			84	U	92	U
3,3'-Dichlorobenzidine	UG/KG	0	0%		0	0	86	73	U	72	UJ	90	U	91	U	92	U			84	U	92	U
3-Nitroaniline	UG/KG	0	0%	500	0	0	86	180	U	180	UJ	220	U	220	U	220	U			200	U	220	U
4,6-Dinitro-2-methylphenol	UG/KG	0	0%		0	0	86	180	U	180	UJ	220	UJ	220	UJ	220	U			200	UJ	220	U
4-Bromophenyl phenyl ether	UG/KG	0	0%		0	0	86	73	U	72	UJ	90	U	91	U	92	U			84	U	92	U
4-Chloro-3-methylphenol	UG/KG	0	0%	240	0	0	86	73	U	72	UJ	90	U	91	U	92	U			84	U	92	U
4-Chloroaniline	UG/KG	0	0%	220	0	0	86	73	U	72	UJ	90	U	91	U	92	U			84	U	92	U
4-Chlorophenyl phenyl ether	UG/KG	0	0%		0	0	86	73	U	72	UJ	90	U	91	U	92	U			84	U	92	U
4-Methylphenol	UG/KG	0	0%	900	0	0	86	73	U	72	UJ	90	U	91	U	92	U			84	U	92	U
4-Nitroaniline	UG/KG	0	0%		0	0	86	180	U	180	UJ	220	U	220	U	220	U			200	U	220	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Surface Soil Sample Results

ANALYTE	UNITS	MAXIMUM	FREQ OF DETCTION	NYSDEC TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								MW4-11		MW4-12		MW4-13		MW4-13		MW4-6		MW4-6		MW4-7		MW4-8	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								43170		43167		43161		43160		43153		43195		43157		43150	
								0		0		0		0		0		0		0		0	
								0.2		0.2		0.2		0.2		0.2		0.2		0.2		0.2	
								12/20/1998		12/21/1998		12/20/1998		12/20/1998		12/19/1998		7/11/1999		12/20/1998		12/18/1998	
								SA		SA		DU		SA		SA		SA		SA		SA	
								RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		HEX CHROME		RI Phase 1 Step 1		RI Phase 1 Step 1	
								N		N		N		N		N		N		N		N	
4-Nitrophenol	UG/KG	0	0%	100	0	0	86	180	U	180	UJ	220	U	220	U	220	U			200	U	220	U
Acenaphthene	UG/KG	78	9%	50000	0	8	86	4	J	72	UJ	90	U	91	U	92	U			84	U	92	U
Acenaphthylene	UG/KG	32	9%	41000	0	8	86	73	U	72	UJ	90	U	91	U	92	U			84	U	92	U
Anthracene	UG/KG	110	17%	50000	0	15	86	73	U	72	UJ	90	U	91	U	92	U			84	U	92	U
Benzo(a)anthracene	UG/KG	560	83%	224	5	71	86	17	J	4.6	J	12	J	16	J	5.2	J			21	J	10	J
Benzo(a)pyrene	UG/KG	450	80%	61	11	69	86	18	J	6.9	J	15	J	20	J	92	U			24	J	12	J
Benzo(b)fluoranthene	UG/KG	890	80%	1100	0	69	86	32	J	14	J	25	J	27	J	92	U			33	J	18	J
Benzo(ghi)perylene	UG/KG	310	55%	50000	0	47	86	16	J	72	UJ	90	U	10	J	92	U			84	U	92	U
Benzo(k)fluoranthene	UG/KG	510	50%	1100	0	43	86	24	J	72	R	16	J	22	J	92	U			26	J	14	J
Bis(2-Chloroethoxy)methane	UG/KG	0	0%		0	0	86	73	U	72	UJ	90	U	91	U	92	U			84	U	92	U
Bis(2-Chloroethyl)ether	UG/KG	0	0%		0	0	86	73	U	72	UJ	90	U	91	U	92	U			84	U	92	U
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%		0	0	79	73	U	72	UJ	90	U	91	U	92	U			84	U	92	U
Bis(2-Ethylhexyl)phthalate	UG/KG	13000	59%	50000	0	51	86	170		17	J	90	U	91	U	92	U			84	U	19	J
Butylbenzylphthalate	UG/KG	12000	12%	50000	0	10	86	11	J	72	UJ	90	U	91	U	92	U			84	U	92	U
Carbazole	UG/KG	120	22%		0	19	86	73	U	72	UJ	90	U	91	U	92	U			84	U	92	U
Chrysene	UG/KG	570	86%	400	4	74	86	41	J	7.3	J	20	J	24	J	8.7	J			28	J	16	J
Di-n-butylphthalate	UG/KG	220	44%	8100	0	38	86	11	J	72	UJ	4.8	J	91	U	92	U			84	U	6.2	J
Di-n-octylphthalate	UG/KG	44	8%	50000	0	7	86	73	U	72	UJ	90	U	91	U	92	U			84	U	92	U
Dibenz(a,h)anthracene	UG/KG	130	22%	14	12	19	86	73	U	72	UJ	90	U	91	U	92	U			84	U	92	U
Dibenzofuran	UG/KG	58	16%	6200	0	14	86	18	J	72	UJ	90	U	91	U	92	U			84	U	92	U
Diethyl phthalate	UG/KG	22	16%	7100	0	14	86	7.7	J	72	UJ	90	U	91	U	92	U			84	U	92	U
Dimethylphthalate	UG/KG	0	0%	2000	0	0	86	73	U	72	UJ	90	U	91	U	92	U			84	U	92	U
Fluoranthene	UG/KG	1100	93%	50000	0	80	86	61	J	14	J	32	J	41	J	15	J			51	J	26	J
Fluorene	UG/KG	74	6%	50000	0	5	86	73	U	72	UJ	90	U	91	U	92	U			84	U	92	U
Hexachlorobenzene	UG/KG	0	0%	410	0	0	86	73	U	72	UJ	90	U	91	U	92	U			84	U	92	U
Hexachlorobutadiene	UG/KG	0	0%		0	0	86	73	U	72	UJ	90	U	91	U	92	U			84	U	92	U
Hexachlorocyclopentadiene	UG/KG	0	0%		0	0	86	73	U	72	UJ	90	UJ	91	UJ	92	U			84	UJ	92	UJ
Hexachloroethane	UG/KG	0	0%		0	0	86	73	U	72	UJ	90	U	91	U	92	U			84	U	92	U
Indeno(1,2,3-cd)pyrene	UG/KG	320	53%	3200	0	46	86	14	J	72	UJ	90	U	11	J	92	U			12	J	92	U
Isophorone	UG/KG	0	0%	4400	0	0	86	73	U	72	UJ	90	U	91	U	92	U			84	U	92	U
N-Nitrosodiphenylamine	UG/KG	19	1%		0	1	86	73	U	72	UJ	90	U	91	U	92	U			84	U	92	U
N-Nitrosodipropylamine	UG/KG	0	0%		0	0	86	73	U	72	UJ	90	U	91	U	92	U			84	U	92	U
Naphthalene	UG/KG	74	13%	13000	0	11	86	13	J	72	UJ	90	U	91	U	92	U			84	U	92	U
Nitrobenzene	UG/KG	0	0%	200	0	0	86	73	U	72	UJ	90	U	91	U	92	U			84	U	92	U
Pentachlorophenol	UG/KG	0	0%	1000	0	0	86	180	U	180	UJ	220	U	220	U	220	U			200	U	220	U
Phenanthrene	UG/KG	640	87%	50000	0	75	86	41	J	7	J	17	J	22	J	9.6	J			26	J	16	J
Phenol	UG/KG	17	2%	30	0	2	86	73	U	72	UJ	90	U	91	U	92	U			84	U	92	U
Pyrene	UG/KG	990	88%	50000	0	76	86	51	J	11	J	26	J	31	J	11	J			39	J	20	J
EXPLOSIVES																							
1,3,5-Trinitrobenzene	UG/KG	120	1%		0	1	86	120	U	120	UJ	120	U	120	U	120	U			120	U	120	U
1,3-Dinitrobenzene	UG/KG	0	0%		0	0	86	120	U	120	UJ	120	U	120	U	120	U			120	U	120	U
2,4,6-Trinitrotoluene	UG/KG	72	1%		0	1	86	120	U	120	UJ	120	U	120	U	120	U			120	U	120	U
2,4-Dinitrotoluene	UG/KG	330	2%		0	2	86	120	U	120	UJ	120	U	120	U	120	U			120	U	120	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	86	120	U	120	UJ	120	U	120	U	120	U			120	U	120	U
2-Nitrotoluene	UG/KG	0	0%		0	0	79	120	U	120	UJ	120	U	120	U	120	U			120	U	120	U
2-amino-4,6-Dinitrotoluene	UG/KG	90	1%		0	1	86	120	U	120	UJ	120	U	120	U	120	U			120	U	120	U
3-Nitrotoluene	UG/KG	0	0%		0	0	79	120	U	120	UJ	120	U	120	U	120	U			120	U	120	U
4-Nitrotoluene	UG/KG	390	1%		0	1	79	120	U	120	UJ	120	U	120	U	120	U			120	U	120	U
4-amino-2,6-Dinitrotoluene	UG/KG	0	0%		0	0	86	120	U	120	UJ	120	U	120	U	120	U			120	U	120	U
HMX	UG/KG	0	0%		0	0	86	120	U	120	UJ	120	U	120	U	120	U			120	U	120	U
Nitrobenzene	UG/KG	0	0%	200	0	0	79	120	U	120	UJ	120	U	120	U	120	U			120	U	120	U
RDX	UG/KG	0	0%		0	0	86	120	U	120	UJ	120	U	120	U	120	U			120	U	120	U
Tetryl	UG/KG	0	0%		0	0	86	120	U	120	UJ	120	U	120	U	120	U			120	U	120	U
PESTICIDES/PCBs																							
4,4'-DDD	UG/KG	190	23%	2900	0	20	86	3.6	U	4.3	U	9.9	J	4.6	UJ	4.6	U			4.2	U	4.6	U
4,4'-DDE	UG/KG	160	31%	2100	0	27	86	9.9		4.3	U	4.5	U	4.6	U	4.6	U			4.2	U	4.6	U
4,4'-DDT	UG/KG	760	34%	2100	0	29	86	3.6	U	4.3	U	4.5	U	4.6	U	4.6	U			4.2	U	4.6	U
Aldrin	UG/KG	2.2	1%	41	0	1	86	1.9	U	2.2	U	2.3	U	2.4	U	2.4	U			2.2	U	2.4	U
Alpha-BHC	UG/KG	2.4	6%	110	0	5	86	2.4	J	2.2	U	2.3	U	2.4	U	2.4	U			2.2	U	2.4	U
Alpha-Chlordane	UG/KG	4.9	9%		0	8	86	1.6	J	2.2	U	2.3	U	2.4	U	2.4	U			2.2	U	2.4	U
Aroclor-1016	UG/KG	0	0%		0	0	86	36	U	43	U	45	U	46	U	46	U			42	U	46	U
Aroclor-1221	UG/KG	0	0%		0	0	86	74	U	87	U	92	U	93	U	93	U			86	U	93	U

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ANALYTE	UNITS	MAXIMUM	FREQ OF DETCTION	NYSDEC TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								MW4-11		MW4-12		MW4-13		MW4-13		MW4-6		MW4-6		MW4-7		MW4-8	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								43170		43167		43161		43160		43153		43195		43157		43150	
								0		0		0		0		0		0		0		0	
								0.2		0.2		0.2		0.2		0.2		0.2		0.2		0.2	
								12/20/1998		12/21/1998		12/20/1998		12/20/1998		12/19/1998		7/11/1999		12/20/1998		12/18/1998	
								SA		SA		DU		SA		SA		SA		SA		SA	
								RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		HEX CHROME		RI Phase 1 Step 1		RI Phase 1 Step 1	
								N		N		N		N		N		N		N		N	
Aroclor-1232	UG/KG	0	0%		0	0	86	36	U	43	U	45	U	46	U	46	U			42	U	46	U
Aroclor-1242	UG/KG	0	0%		0	0	86	36	U	43	U	45	U	46	U	46	U			42	U	46	U
Aroclor-1248	UG/KG	0	0%		0	0	86	36	U	43	U	45	U	46	U	46	U			42	U	46	U
Aroclor-1254	UG/KG	310	26%	10000	0	22	86	310		43	U	45	U	46	U	46	U			42	U	46	U
Aroclor-1260	UG/KG	110	3%	10000	0	3	86	36	U	43	U	45	U	46	U	46	U			42	U	46	U
Beta-BHC	UG/KG	7.6	12%	200	0	10	86	3	J	2.2	U	2.3	U	2.4	U	2.4	U			2.2	U	2.4	U
Delta-BHC	UG/KG	0	0%	300	0	0	86	1.9	U	2.2	U	2.3	U	2.4	U	2.4	U			2.2	U	2.4	U
Dieldrin	UG/KG	7.4	6%	44	0	5	86	7.4	J	4.3	U	4.5	U	4.6	U	4.6	U			4.2	U	4.6	U
Endosulfan I	UG/KG	1.7	5%	900	0	4	86	1.2	J	2.2	U	2.3	U	2.4	U	2.4	U			2.2	U	2.4	U
Endosulfan II	UG/KG	5.2	3%	900	0	3	86	3.6	U	4.3	U	4.5	U	4.6	U	4.6	U			4.2	U	4.6	U
Endosulfan sulfate	UG/KG	3.8	1%	1000	0	1	86	3.6	U	4.3	U	4.5	U	4.6	U	4.6	U			4.2	U	4.6	U
Endrin	UG/KG	27	3%	100	0	3	86	2.3	J	4.3	U	4.5	U	4.6	U	4.6	U			4.2	U	4.6	U
Endrin aldehyde	UG/KG	20	12%		0	10	86	2.6	J	4.3	U	4.5	U	4.6	U	4.6	U			4.2	U	4.6	U
Endrin ketone	UG/KG	4.2	3%		0	3	86	3.6	U	4.3	U	4.5	U	4.6	U	4.6	U			4.2	U	4.6	U
Gamma-BHC/Lindane	UG/KG	0	0%	60	0	0	86	1.9	U	2.2	U	2.3	U	2.4	U	2.4	U			2.2	U	2.4	U
Gamma-Chlordane	UG/KG	7.4	9%	540	0	8	86	1.8	J	2.2	U	2.3	U	2.4	U	2.4	U			2.2	U	2.4	U
Heptachlor	UG/KG	4.2	3%	100	0	3	86	1.9	U	2.2	U	2.3	U	2.4	U	2.4	U			2.2	U	2.4	U
Heptachlor epoxide	UG/KG	3.6	5%	20	0	4	86	2.7	J	2.2	U	2.3	U	2.4	U	2.4	U			2.2	U	2.4	U
Methoxychlor	UG/KG	0	0%		0	0	86	19	U	22	U	23	U	24	U	24	U			22	U	24	U
Toxaphene	UG/KG	0	0%		0	0	86	190	U	220	U	230	U	240	U	240	U			220	U	240	U
HERBICIDES																							
2,4,5-T	UG/KG	0	0%	1900	0	0	7																
2,4,5-TP/Silvex	UG/KG	0	0%	700	0	0	7																
2,4-D	UG/KG	0	0%	500	0	0	7																
2,4-DB	UG/KG	0	0%		0	0	7																
Dalapon	UG/KG	0	0%		0	0	7																
Dicamba	UG/KG	0	0%		0	0	7																
Dichloroprop	UG/KG	0	0%		0	0	7																
Dinoseb	UG/KG	0	0%		0	0	7																
MCPA	UG/KG	0	0%		0	0	7																
MCPP	UG/KG	0	0%		0	0	7																
METALS																							
Aluminum	MG/KG	18800	100%	19520 *	0	86	86	12100		13200		14700		14700		7630				13400		12100	
Antimony	MG/KG	148	40%	6 *	15	34	86	1.1	J	0.8	J	0.89	R	1	R	[illegible]	J			0.99	R	0.93	J
Arsenic	MG/KG	14.6	100%	8.9 *	4	86	86	3.7		4.9		4.5		5.9		3.1				4.7		4.6	
Barium	MG/KG	278	100%	300	0	86	86	35.2	J	81.9		99.6		100		77.8				91		95	
Beryllium	MG/KG	1.8	100%	1.13 *	1	86	86	0.51	J	0.49	J	0.68	J	0.73	J	0.5	J			0.53	J	0.72	J
Cadmium	MG/KG	2.3	13%	2.46 *	0	11	86	0.09	U	0.05	U	0.11	U	0.13	U	0.11	U			0.13	U	0.12	U
Calcium	MG/KG	196000	100%	125300 *	3	86	86	54500		3780		2550		2460		8260				4610		3860	
Chromium	MG/KG	18600	100%	30 *	37	86	86	29.7		19.5	J	19.8		20.1		[illegible]				18.9		[illegible]	
Cobalt	MG/KG	19.9	100%	30	0	86	86	11.3		9.1	J	8.1	J	8.7	J	6.9	J			10.2	J	10.1	J
Copper	MG/KG	7330	100%	33 *	30	86	86	[illegible]		19		16.6		17.1		[illegible]				15.6		24.1	
Cyanide	MG/KG	0.87	2%	0.35	2	2	86	0.64	U	0.73	U	0.82	U	0.78	U	0.78	U			0.71	U	0.8	U
Iron	MG/KG	64600	100%	37410 *	2	86	86	27300		22400		23100		25900	J	16000				22500		22200	
Lead	MG/KG	11200	92%	24.4 *	38	79	86	[illegible]	J	[illegible]		19.4	J	22.3	J	22.8				17.3	J	15.3	
Magnesium	MG/KG	35300	100%	21700 *	1	86	86	12900		3930		3240		3250		2780				3660		3430	
Manganese	MG/KG	1540	100%	1100 *	3	86	86	337		509		560		627		579	J			645		625	J
Mercury	MG/KG	1.2	52%	0.1	16	45	86	0.05	J	0.09	J	0.1	J	0.1	J	0.06	UJ			0.07	J	0.06	UJ
Nickel	MG/KG	228	100%	50 *	1	86	86	41		23.9		23.8		24.4		18.1				24.2		22.5	
Potassium	MG/KG	2340	100%	2623 *	0	86	86	1880		2010		1530		1570		1040	J			1660		1950	
Selenium	MG/KG	3.4	23%	2	1	20	86	0.67	U	0.93	UJ	0.82	U	0.96	U	0.8	U			0.91	U	0.84	U
Silver	MG/KG	1.7	6%	0.8 *	1	5	86	0.19	U	0.26	U	0.23	U	0.27	U	0.22	U			0.25	U	0.23	U
Sodium	MG/KG	1270	34%	188 *	2	29	86	48.9	U	68.4	J	59.7	U	69.7	U	75.2	U			66.3	U	97	J
Thallium	MG/KG	5.4	22%	0.855 *	16	19	86	0.58	U	9.3	R	0.71	U	0.82	U	0.69	U			0.78	U	0.72	U
Vanadium	MG/KG	1250	100%	150	1	86	86	21.5		26.3		27.9		28.8		11.8				23.1		20	
Zinc	MG/KG	2020	100%	115 *	29	86	86	77.2	J	78.1	J	79	J	81.1	J	[illegible]				67.5	J	86.6	
Chromium, Hexavalent	MG/KG	14.7	27%		0	4	15											5.8	U				
Nitrate/Nitrite	MG/KG						66	0.39	J	3.52	J	0.21	J	0.18	J	0.04	J			0.1	J	0.04	J

* Soil criteria for these inorganics are site background values.

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								SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								MW4-9		SB4-11		SB4-12		SB4-13		SB4-14		SB4-14		SB4-14		SB4-15	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								43164		43132		43113		43116		43110		43109		43191		43145	
								0		0		0		0		0		0		0		0	
								0.2		0.2		0.2		0.2		0.2		0.2		0.2		0.2	
								12/20/1998		12/17/1998		12/16/1998		12/16/1998		12/16/1998		12/16/1998		7/11/1999		12/17/1998	
								SA		SA		SA		SA		DU		SA		SA		SA	
ANALYTE	UNITS	MAXIMUM	FREQ OF DETCTION	NYSDEC TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		HEX CHROME		RI Phase 1 Step 1	
								N		N		N		N		N		N		N		N	
VOLATILES																							
1,1,1-Trichloroethane	UG/KG	0	0%	800	0	0	86	13	U	12	U	12	U	12	U	12	U	12	U			13	U
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	600	0	0	86	13	U	12	U	12	U	12	U	12	U	12	UJ			13	U
1,1,2-Trichloroethane	UG/KG	0	0%		0	0	86	13	U	12	U	12	U	12	U	12	U	12	U			13	U
1,1-Dichloroethane	UG/KG	2	2%	200	0	2	86	13	U	12	U	12	U	12	U	12	U	12	U			13	U
1,1-Dichloroethene	UG/KG	0	0%	400	0	0	86	13	U	12	U	12	U	12	U	12	U	12	U			13	U
1,2-Dichloroethane	UG/KG	0	0%	100	0	0	86	13	U	12	U	12	U	12	U	12	U	12	U			13	U
1,2-Dichloroethene (total)	UG/KG	4	3%		0	3	86	13	U	12	U	12	U	12	U	12	U	12	U			13	U
1,2-Dichloropropane	UG/KG	0	0%		0	0	86	13	U	12	U	12	U	12	U	12	U	12	U			13	U
Acetone	UG/KG	140	31%	200	0	27	86	6	J	12	UJ	12	U	12	U	12	U	12	U			13	U
Benzene	UG/KG	1	1%	60	0	1	86	13	U	12	U	12	U	12	U	12	U	12	U			13	U
Bromodichloromethane	UG/KG	0	0%		0	0	86	13	U	12	U	12	U	12	U	12	U	12	U			13	U
Bromoform	UG/KG	0	0%		0	0	86	13	U	12	U	12	U	12	U	12	U	12	UJ			13	U
Carbon disulfide	UG/KG	0	0%	2700	0	0	86	13	U	12	U	12	U	12	U	12	U	12	U			13	U
Carbon tetrachloride	UG/KG	0	0%	600	0	0	86	13	U	12	U	12	U	12	U	12	U	12	U			13	U
Chlorobenzene	UG/KG	0	0%	1700	0	0	86	13	U	12	U	12	U	12	U	12	U	12	UJ			13	U
Chlorodibromomethane	UG/KG	0	0%		0	0	86	13	U	12	U	12	U	12	U	12	U	12	U			13	U
Chloroethane	UG/KG	0	0%	1900	0	0	86	13	U	12	U	12	U	12	U	12	U	12	U			13	U
Chloroform	UG/KG	0	0%	300	0	0	86	13	U	12	U	12	U	12	U	12	U	12	U			13	U
Cis-1,3-Dichloropropene	UG/KG	0	0%		0	0	86	13	U	12	U	12	U	12	U	12	U	12	U			13	U
Ethyl benzene	UG/KG	0	0%	5500	0	0	86	13	U	12	U	12	U	12	U	12	U	12	UJ			13	U
Methyl bromide	UG/KG	0	0%		0	0	86	13	U	12	U	12	UJ	12	UJ	12	UJ	12	UJ			13	U
Methyl butyl ketone	UG/KG	9	1%		0	1	86	13	U	12	UJ	12	U	12	U	12	U	12	U			13	U
Methyl chloride	UG/KG	0	0%		0	0	86	13	U	12	U	12	U	12	U	12	U	12	U			13	U
Methyl ethyl ketone	UG/KG	0	0%	300	0	0	86	13	U	12	UJ	12	U	12	U	12	U	12	U			13	U
Methyl isobutyl ketone	UG/KG	0	0%	1000	0	0	86	13	U	12	U	12	U	12	U	12	U	12	U			13	U
Methylene chloride	UG/KG	3	1%	100	0	1	86	13	U	12	U	12	U	12	U	12	U	12	U			13	U
Styrene	UG/KG	0	0%		0	0	86	13	U	12	U	12	U	12	U	12	U	12	UJ			13	U
Tetrachloroethene	UG/KG	0	0%	1400	0	0	86	13	U	12	U	12	U	12	U	12	U	12	U			13	U
Toluene	UG/KG	14	29%	1500	0	25	86	13	U	2	J	12	U	3	J	3	J	5	J			13	U
Total Xylenes	UG/KG	0	0%	1200	0	0	86	13	U	12	U	12	U	12	U	12	U	12	UJ			13	U
Trans-1,3-Dichloropropene	UG/KG	0	0%		0	0	86	13	U	12	U	12	U	12	U	12	U	12	U			13	U
Trichloroethene	UG/KG	3	3%	700	0	3	86	13	U	12	U	12	U	12	U	12	U	12	U			13	U
Vinyl chloride	UG/KG	0	0%	200	0	0	86	13	U	12	U	12	U	12	U	12	U	12	U			13	U
SEMIVOLATILES																							
1,2,4-Trichlorobenzene	UG/KG	0	0%	3400	0	0	86	89	U	87	U	82	U	73	U	320	U	320	U			90	U
1,2-Dichlorobenzene	UG/KG	0	0%	7900	0	0	86	89	U	87	U	82	U	73	U	320	U	320	U			90	U
1,3-Dichlorobenzene	UG/KG	0	0%	1600	0	0	86	89	U	87	U	82	U	73	U	320	U	320	U			90	U
1,4-Dichlorobenzene	UG/KG	0	0%	8500	0	0	86	89	U	87	U	82	U	73	U	320	U	320	U			90	U
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%		0	0	7																
2,4,5-Trichlorophenol	UG/KG	0	0%	100	0	0	86	220	U	210	U	200	U	180	U	770	U	770	U			220	U
2,4,6-Trichlorophenol	UG/KG	0	0%		0	0	86	89	U	87	U	82	U	73	U	320	U	320	U			90	U
2,4-Dichlorophenol	UG/KG	0	0%	400	0	0	86	89	U	87	U	82	U	73	U	320	U	320	U			90	U
2,4-Dimethylphenol	UG/KG	0	0%		0	0	86	89	UJ	87	UJ	82	UJ	73	UJ	320	UJ	320	UJ			90	UJ
2,4-Dinitrophenol	UG/KG	0	0%	200	0	0	86	220	UJ	210	UJ	200	UJ	180	UJ	770	UJ	770	UJ			220	U
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	86	89	U	87	U	82	U	73	U	320	U	320	U			90	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	86	89	U	87	U	82	U	73	U	320	U	320	U			90	U
2-Chloronaphthalene	UG/KG	0	0%		0	0	86	89	U	87	U	82	U	73	U	320	U	320	U			90	U
2-Chlorophenol	UG/KG	0	0%	800	0	0	86	89	U	87	U	82	U	73	U	320	U	320	U			90	U
2-Methylnaphthalene	UG/KG	35	16%	36400	0	14	86	89	U	87	U	82	U	73	U	320	U	320	U			90	U
2-Methylphenol	UG/KG	0	0%	100	0	0	86	89	U	87	U	82	U	73	U	320	U	320	U			90	U
2-Nitroaniline	UG/KG	0	0%	430	0	0	86	220	U	210	U	200	U	180	U	770	U	770	UJ			220	U
2-Nitrophenol	UG/KG	0	0%	330	0	0	86	89	U	87	U	82	U	73	U	320	U	320	U			90	U
3,3'-Dichlorobenzidine	UG/KG	0	0%		0	0	86	89	U	87	UJ	82	U	73	U	320	U	320	U			90	U
3-Nitroaniline	UG/KG	0	0%	500	0	0	86	220	U	210	UJ	200	U	180	UJ	770	UJ	770	U			220	U
4,6-Dinitro-2-methylphenol	UG/KG	0	0%		0	0	86	220	U	210	UJ	200	U	180	U	770	U	770	U			220	U
4-Bromophenyl phenyl ether	UG/KG	0	0%		0	0	86	89	U	87	U	82	U	73	U	320	U	320	U			90	U
4-Chloro-3-methylphenol	UG/KG	0	0%	240	0	0	86	89	U	87	U	82	U	73	U	320	U	320	U			90	U
4-Chloroaniline	UG/KG	0	0%	220	0	0	86	89	U	87	U	82	U	73	U	320	U	320	U			90	U
4-Chlorophenyl phenyl ether	UG/KG	0	0%		0	0	86	89	U	87	U	82	U	73	U	320	U	320	U			90	U
4-Methylphenol	UG/KG	0	0%	900	0	0	86	89	U	87	U	82	U	73	U	320	U	320	U			90	U
4-Nitroaniline	UG/KG	0	0%		0	0	86	220	U	210	U	200	U	180	U	770	U	770	U			220	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Surface Soil Sample Results

ANALYTE	UNITS	MAXIMUM	FREQ OF DETCTION	NYSDEC TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								MW4-9		SB4-11		SB4-12		SB4-13		SB4-14		SB4-14		SB4-14		SB4-15	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								43164		43132		43113		43116		43110		43109		43191		43145	
								0		0		0		0		0		0		0		0	
								0.2		0.2		0.2		0.2		0.2		0.2		0.2		0.2	
								12/20/1998		12/17/1998		12/16/1998		12/16/1998		12/16/1998		12/16/1998		7/11/1999		12/17/1998	
								SA		SA		SA		SA		DU		SA		SA		SA	
								RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		HEX CHROME		RI Phase 1 Step 1	
								N		N		N		N		N		N		N		N	
4-Nitrophenol	UG/KG	0	0%	100	0	0	86	220	U	210	U	200	U	180	U	770	U	770	U			220	U
Acenaphthene	UG/KG	78	9%	50000	0	8	86	89	U	87	U	82	U	73	U	320	U	320	U			90	U
Acenaphthylene	UG/KG	32	9%	41000	0	8	86	89	U	87	U	82	U	73	U	320	U	320	U			90	U
Anthracene	UG/KG	110	17%	50000	0	15	86	89	U	87	U	82	U	73	U	320	U	320	U			90	U
Benzo(a)anthracene	UG/KG	560	83%	224	5	71	86	8.6	J	7.9	J	82	U	6.6	J	320	U	320	U			8.8	J
Benzo(a)pyrene	UG/KG	450	80%	61	11	69	86	8.5	J	11	J	6.5	J	10	J	320	U	320	U			10	J
Benzo(b)fluoranthene	UG/KG	890	80%	1100	0	69	86	27	J	15	J	14	J	35	J	320	U	320	U			13	J
Benzo(ghi)perylene	UG/KG	310	55%	50000	0	47	86	89	U	87	UJ	82	U	73	U	320	U	320	U			90	U
Benzo(k)fluoranthene	UG/KG	510	50%	1100	0	43	86	89	U	15	J	82	R	73	R	320	U	320	U			12	J
Bis(2-Chloroethoxy)methane	UG/KG	0	0%		0	0	86	89	U	87	U	82	U	73	U	320	U	320	U			90	U
Bis(2-Chloroethyl)ether	UG/KG	0	0%		0	0	86	89	U	87	U	82	U	73	U	320	U	320	U			90	U
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%		0	0	79	89	U	87	U	82	U	73	U	320	U	320	U			90	U
Bis(2-Ethylhexyl)phthalate	UG/KG	13000	59%	50000	0	51	86	89	U	87	U	82	U	73	U	9700		8700				94	
Butylbenzylphthalate	UG/KG	12000	12%	50000	0	10	86	89	U	87	U	82	U	73	U	2200	J	12000	J			90	U
Carbazole	UG/KG	120	22%		0	19	86	89	U	87	U	82	U	73	U	320	U	320	U			90	U
Chrysene	UG/KG	570	86%	400	4	74	86	16	J	14	J	7.6	J	14	J	320	U	320	U			13	J
Di-n-butylphthalate	UG/KG	220	44%	8100	0	38	86	89	U	87	U	82	U	73	U	320	U	220	J			90	U
Di-n-octylphthalate	UG/KG	44	8%	50000	0	7	86	89	U	87	U	82	U	44	J	320	U	320	U			90	U
Dibenz(a,h)anthracene	UG/KG	130	22%	14	12	19	86	89	U	87	U	82	U	73	U	320	U	320	U			90	U
Dibenzofuran	UG/KG	58	16%	6200	0	14	86	89	U	87	U	82	U	73	U	320	U	320	U			90	U
Diethyl phthalate	UG/KG	22	16%	7100	0	14	86	89	U	87	U	82	U	73	U	320	U	320	U			90	U
Dimethylphthalate	UG/KG	0	0%	2000	0	0	86	89	U	87	U	82	U	73	U	320	U	320	U			90	U
Fluoranthene	UG/KG	1100	93%	50000	0	80	86	24	J	19	J	9	J	10	J	320	U	320	U			20	J
Fluorene	UG/KG	74	6%	50000	0	5	86	89	U	87	U	82	U	73	U	320	U	320	U			90	U
Hexachlorobenzene	UG/KG	0	0%	410	0	0	86	89	U	87	U	82	U	73	U	320	U	320	U			90	U
Hexachlorobutadiene	UG/KG	0	0%		0	0	86	89	U	87	U	82	U	73	U	320	U	320	U			90	U
Hexachlorocyclopentadiene	UG/KG	0	0%		0	0	86	89	U	87	UJ	82	U	73	UJ	320	UJ	320	UJ			90	UJ
Hexachloroethane	UG/KG	0	0%		0	0	86	89	U	87	U	82	U	73	U	320	U	320	U			90	U
Indeno(1,2,3-cd)pyrene	UG/KG	320	53%	3200	0	46	86	89	U	87	U	82	U	73	U	320	U	320	U			90	U
Isophorone	UG/KG	0	0%	4400	0	0	86	89	U	87	U	82	U	73	U	320	U	320	U			90	U
N-Nitrosodiphenylamine	UG/KG	19	1%		0	1	86	89	U	87	U	82	U	73	U	320	U	320	U			90	U
N-Nitrosodipropylamine	UG/KG	0	0%		0	0	86	89	U	87	U	82	U	73	U	320	U	320	U			90	U
Naphthalene	UG/KG	74	13%	13000	0	11	86	89	U	87	U	82	U	73	U	320	U	320	U			90	U
Nitrobenzene	UG/KG	0	0%	200	0	0	86	89	U	87	U	82	U	73	U	320	U	320	U			90	U
Pentachlorophenol	UG/KG	0	0%	1000	0	0	86	220	U	210	U	200	U	180	U	770	U	770	U			220	U
Phenanthrene	UG/KG	640	87%	50000	0	75	86	13	J	13	J	4.8	J	7.5	J	320	U	320	U			10	J
Phenol	UG/KG	17	2%	30	0	2	86	89	U	87	U	82	U	73	U	320	U	320	U			90	U
Pyrene	UG/KG	990	88%	50000	0	76	86	19	J	17	J	7.6	J	9.5	J	320	U	320	U			17	J
EXPLOSIVES																							
1,3,5-Trinitrobenzene	UG/KG	120	1%		0	1	86	120	U	120	U	120	U	120	U	120	U	120	U			120	U
1,3-Dinitrobenzene	UG/KG	0	0%		0	0	86	120	U	120	U	120	U	120	U	120	U	120	U			120	U
2,4,6-Trinitrotoluene	UG/KG	72	1%		0	1	86	120	U	120	U	120	U	120	U	120	U	120	U			120	U
2,4-Dinitrotoluene	UG/KG	330	2%		0	2	86	120	U	120	U	120	U	120	U	120	U	120	U			120	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	86	120	U	120	U	120	U	120	U	120	U	120	U			120	U
2-Nitrotoluene	UG/KG	0	0%		0	0	79	120	U	120	U	120	U	120	U	120	U	120	U			120	U
2-amino-4,6-Dinitrotoluene	UG/KG	90	1%		0	1	86	120	U	120	U	120	U	120	U	120	U	120	U			120	U
3-Nitrotoluene	UG/KG	0	0%		0	0	79	120	U	120	U	120	U	120	U	120	U	120	U			120	U
4-Nitrotoluene	UG/KG	390	1%		0	1	79	120	U	120	U	120	U	120	U	120	U	120	U			120	U
4-amino-2,6-Dinitrotoluene	UG/KG	0	0%		0	0	86	120	U	120	U	120	U	120	U	120	U	120	U			120	U
HMX	UG/KG	0	0%		0	0	86	120	U	120	U	120	U	120	U	120	U	120	U			120	U
Nitrobenzene	UG/KG	0	0%	200	0	0	79	120	U	120	U	120	U	120	U	120	U	120	U			120	U
RDX	UG/KG	0	0%		0	0	86	120	U	120	U	120	U	120	U	120	U	120	U			120	U
Tetryl	UG/KG	0	0%		0	0	86	120	U	120	U	120	U	120	U	120	U	120	U			120	U
PESTICIDES/PCBs																							
4,4'-DDD	UG/KG	190	23%	2900	0	20	86	4.4	U	12		4.1	U	3.7	U	4	U	2	J			6.6	
4,4'-DDE	UG/KG	160	31%	2100	0	27	86	4.4	U	4.3	U	4.1	U	10		4	U	2.9	J			4.5	U
4,4'-DDT	UG/KG	760	34%	2100	0	29	86	4.4	U	4.3	U	4.1	U	44		17		20				4.5	U
Aldrin	UG/KG	2.2	1%	41	0	1	86	2.3	U	2.2	U	2.1	U	1.9	U	2	U	2	U			2.3	U
Alpha-BHC	UG/KG	2.4	6%	110	0	5	86	2.3	U	2.2	U	2.1	U	1.9	U	2	U	2	U			2.3	U
Alpha-Chlordane	UG/KG	4.9	9%		0	8	86	2.3	U	2.2	U	2.1	U	1.9	U	2	U	2	U			2.3	U
Aroclor-1016	UG/KG	0	0%		0	0	86	44	U	43	U	41	U	37	U	40	U	40	U			45	U
Aroclor-1221	UG/KG	0	0%		0	0	86	90	U	88	U	84	U	74	U	81	U	81	U			92	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Surface Soil Sample Results

ANALYTE	UNITS	MAXIMUM	FREQ OF DETCTION	NYSDEC TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								MW4-9		SB4-11		SB4-12		SB4-13		SB4-14		SB4-14		SB4-14		SB4-15	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								43164		43132		43113		43116		43110		43109		43191		43145	
								0		0		0		0		0		0		0		0	
								0.2		0.2		0.2		0.2		0.2		0.2		0.2		0.2	
								12/20/1998		12/17/1998		12/16/1998		12/16/1998		12/16/1998		12/16/1998		7/11/1999		12/17/1998	
								SA		SA		SA		SA		DU		SA		SA		SA	
								RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	HEX CHROME		RI Phase 1	Step 1
								N		N		N		N		N		N		N		N	
Aroclor-1232	UG/KG	0	0%		0	0	86	44	U	43	U	41	U	37	U	40	U	40	U			45	U
Aroclor-1242	UG/KG	0	0%		0	0	86	44	U	43	U	41	U	37	U	40	U	40	U			45	U
Aroclor-1248	UG/KG	0	0%		0	0	86	44	U	43	U	41	U	37	U	40	U	40	U			45	U
Aroclor-1254	UG/KG	310	26%	10000	0	22	86	44	U	43	U	41	U	25	J	22	J	27	J			45	U
Aroclor-1260	UG/KG	110	3%	10000	0	3	86	44	U	43	U	41	U	37	U	40	U	40	U			45	U
Beta-BHC	UG/KG	7.6	12%	200	0	10	86	2.3	U	2.2	U	2.1	U	1.9	U	2	U	2	U			2.3	U
Delta-BHC	UG/KG	0	0%	300	0	0	86	2.3	U	2.2	U	2.1	U	1.9	U	2	U	2	U			2.3	U
Dieldrin	UG/KG	7.4	6%	44	0	5	86	4.4	U	4.3	U	4.1	U	3.7	U	4	U	4	U			4.5	U
Endosulfan I	UG/KG	1.7	5%	900	0	4	86	2.3	U	1.2	J	2.1	U	1.9	U	2	U	2	U			2.3	U
Endosulfan II	UG/KG	5.2	3%	900	0	3	86	4.4	U	4.3	U	4.1	U	3.7	U	4	U	4	U			4.5	U
Endosulfan sulfate	UG/KG	3.8	1%	1000	0	1	86	4.4	U	4.3	U	4.1	U	3.7	U	4	U	4	U			4.5	U
Endrin	UG/KG	27	3%	100	0	3	86	4.4	U	4.3	U	4.1	U	3.7	U	4	U	4	U			4.5	U
Endrin aldehyde	UG/KG	20	12%		0	10	86	4.4	U	4.3	U	4.1	U	3.7	U	4	U	4	U			4.5	U
Endrin ketone	UG/KG	4.2	3%		0	3	86	4.4	U	4.3	U	4.1	U	3.7	U	4	U	4	U			4.5	U
Gamma-BHC/Lindane	UG/KG	0	0%	60	0	0	86	2.3	U	2.2	U	2.1	U	1.9	U	2	U	2	U			2.3	U
Gamma-Chlordane	UG/KG	7.4	9%	540	0	8	86	2.3	U	2.2	U	4.3	J	1.9	U	2	U	2	U			2.3	U
Heptachlor	UG/KG	4.2	3%	100	0	3	86	2.3	U	2.2	U	2.1	U	1.9	U	2	U	2	U			2.3	U
Heptachlor epoxide	UG/KG	3.6	5%	20	0	4	86	2.3	U	2.2	U	2.1	U	1.9	U	2	U	2	U			2.3	U
Methoxychlor	UG/KG	0	0%		0	0	86	23	U	22	U	21	U	19	U	20	U	20	U			23	U
Toxaphene	UG/KG	0	0%		0	0	86	230	U	220	U	210	U	190	U	200	U	200	U			230	U
HERBICIDES																							
2,4,5-T	UG/KG	0	0%	1900	0	0	7																
2,4,5-TP/Silvex	UG/KG	0	0%	700	0	0	7																
2,4-D	UG/KG	0	0%	500	0	0	7																
2,4-DB	UG/KG	0	0%		0	0	7																
Dalapon	UG/KG	0	0%		0	0	7																
Dicamba	UG/KG	0	0%		0	0	7																
Dichloroprop	UG/KG	0	0%		0	0	7																
Dinoseb	UG/KG	0	0%		0	0	7																
MCPA	UG/KG	0	0%		0	0	7																
MCPP	UG/KG	0	0%		0	0	7																
METALS																							
Aluminum	MG/KG	18800	100%	19520 *	0	86	86	13600		12100		12700		11700		11400		12900				13400	
Antimony	MG/KG	148	40%	6 *	15	34	86	1	R	0.65	UJ	4.1	J	0.98	J	11.4	J	13.7	J			0.74	R
Arsenic	MG/KG	14.6	100%	8.9 *	4	86	86	3.9		5.7		5.1		5.1		10.6		7.5				4.2	
Barium	MG/KG	278	100%	300	0	86	86	92.8		89.4		79.5		57.3		145		156				83.8	
Beryllium	MG/KG	1.8	100%	1.13 *	1	86	86	0.57	J	0.5	J	0.49	J	0.42	J	0.47	J	0.54	J			0.78	J
Cadmium	MG/KG	2.3	13%	2.46 *	0	11	86	0.13	U	0.04	U	0.05	U	0.03	U	1.4		1.6				0.09	U
Calcium	MG/KG	196000	100%	125300 *	3	86	86	2010		2450		3860		70800		9530		8640				2960	
Chromium	MG/KG	18600	100%	30 *	37	86	86	31.9		19.3		540		96.3		1770		1140				19.1	
Cobalt	MG/KG	19.9	100%	30	0	86	86	8.6	J	10	J	10.9	J	11.9		19.9		18.3				8.2	J
Copper	MG/KG	7330	100%	33 *	30	86	86	14.3		18.4		346		61.4		52.7		33.1				14.6	
Cyanide	MG/KG	0.87	2%	0.35	2	2	86	0.83	U	0.67	U	0.71	U	0.6	U	0.61	U	0.7	J			0.8	U
Iron	MG/KG	64600	100%	37410 *	2	86	86	19600	J	22700		27100		25400		29600		30800				20500	
Lead	MG/KG	11200	92%	24.4 *	36	79	86	16.7	J	16.9		14.2		15.7		1120		[illegible]				20.4	
Magnesium	MG/KG	35300	100%	21700 *	1	86	86	3020		3430		4550		35300		5800		6020				3370	
Manganese	MG/KG	1540	100%	1100 *	3	86	86	740		626	J	624	J	478	J	384	J	403	J			471	J
Mercury	MG/KG	1.2	52%	0.1	16	45	86	0.09	J	0.06	UJ	0.11	J	0.05	UJ	0.06	UJ	0.06	J			0.06	UJ
Nickel	MG/KG	228	100%	50 *	1	86	86	19.1		23.8		31.4		31.9		34.7		38.1				21	
Potassium	MG/KG	2340	100%	2623 *	0	86	86	1520		1980		1290		1150		1090	J	1330				1630	
Selenium	MG/KG	3.4	23%	2	1	20	86	0.96	U	0.7	J	0.46	U	0.34	U	0.44	U	0.46	U			0.68	U
Silver	MG/KG	1.7	6%	0.8 *	1	5	86	0.27	U	0.21	U	0.23	U	0.17	U	0.22	U	0.23	U			0.19	U
Sodium	MG/KG	1270	34%	188 *	2	29	86	69.9	U	54.9	U	60.6	U	52.2	J	57.6	U	60.6	U			64.1	U
Thallium	MG/KG	5.4	22%	0.855 *	16	19	86	0.83	U	7.5	UJ	8.3	UJ	6.1	UJ	0.79	UJ	0.83	UJ			0.59	U
Vanadium	MG/KG	1250	100%	150	1	86	86	24.8		21.3		20.8		18.9		23.8		24.8				24.2	
Zinc	MG/KG	2020	100%	115 *	29	86	86	68.4	J	91.1		169		93.2		1600		1240				67.2	
Chromium, Hexavalent	MG/KG	14.7	27%		0	4	15													12.2	U		
Nitrate/Nitrite	MG/KG						66	0.08	J	0.12		0.39		0.32		0.67		0.91				0.45	J

* Soil criteria for these inorganics are site background values.

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Surface Soil Sample Results

ANALYTE	UNITS	MAXIMUM	FREQ OF DETCTION	NYSDEC TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								SB4-16		SB4-17		SB4-18		SB4-19		SB4-25		SB4-25		SB4-26		SB4-27	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								43122		43119		43080		43083		43174		43196		43090		43125	
								0		0		0		0		0		0		0		0	
								0.2		0.2		0.2		0.2		0.2		0.2		0.2		0.2	
								12/21/1998		12/16/1998		12/15/1998		12/15/1998		12/22/1998		7/11/1999		12/15/1998		12/21/1998	
								SA		SA		SA		SA		SA		SA		SA		SA	
								RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	HEX CHROME		RI Phase 1	Step 1	RI Phase 1	Step 1
								N		N		N		N		N		N		N		N	
VOLATILES																							
1,1,1-Trichloroethane	UG/KG	0	0%	800	0	0	86	12	U	11	U	11	U	12	U	20	U			12	U	13	U
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	600	0	0	86	12	UJ	11	U	11	U	12	U	20	UJ			12	U	13	UJ
1,1,2-Trichloroethane	UG/KG	0	0%		0	0	86	12	UJ	11	U	11	U	12	U	20	U			12	U	13	U
1,1-Dichloroethane	UG/KG	2	2%	200	0	2	86	12	U	11	U	11	U	12	U	20	U			12	U	13	U
1,1-Dichloroethene	UG/KG	0	0%	400	0	0	86	12	U	11	U	11	U	12	U	20	U			12	U	13	U
1,2-Dichloroethane	UG/KG	0	0%	100	0	0	86	12	U	11	U	11	U	12	U	20	U			12	U	13	U
1,2-Dichloroethene (total)	UG/KG	4	3%		0	3	86	12	U	11	U	11	U	12	U	20	U			12	U	13	U
1,2-Dichloropropane	UG/KG	0	0%		0	0	86	12	UJ	11	U	11	U	12	U	20	U			12	U	13	U
Acetone	UG/KG	140	31%	200	0	27	86	12	U	11	U	6	J	12	U	28	U			12	UJ	13	U
Benzene	UG/KG	1	1%	60	0	1	86	12	UJ	11	U	11	U	12	U	20	U			12	U	13	U
Bromodichloromethane	UG/KG	0	0%		0	0	86	12	UJ	11	U	11	U	12	U	20	U			12	U	13	U
Bromoform	UG/KG	0	0%		0	0	86	12	UJ	11	U	11	U	12	U	20	UJ			12	U	13	UJ
Carbon disulfide	UG/KG	0	0%	2700	0	0	86	12	U	11	U	11	U	12	U	20	U			12	U	13	U
Carbon tetrachloride	UG/KG	0	0%	600	0	0	86	12	U	11	U	11	U	12	U	20	U			12	U	13	U
Chlorobenzene	UG/KG	0	0%	1700	0	0	86	12	UJ	11	U	11	U	12	U	20	UJ			12	U	13	UJ
Chlorodibromomethane	UG/KG	0	0%		0	0	86	12	UJ	11	U	11	U	12	U	20	U			12	U	13	U
Chloroethane	UG/KG	0	0%	1900	0	0	86	12	U	11	U	11	U	12	UJ	20	U			12	U	13	U
Chloroform	UG/KG	0	0%	300	0	0	86	12	U	11	U	11	U	12	U	20	U			12	U	13	U
Cis-1,3-Dichloropropene	UG/KG	0	0%		0	0	86	12	UJ	11	U	11	U	12	U	20	U			12	U	13	U
Ethyl benzene	UG/KG	0	0%	5500	0	0	86	12	UJ	11	U	11	U	12	U	20	UJ			12	U	13	UJ
Methyl bromide	UG/KG	0	0%		0	0	86	12	U	11	UJ	11	UJ	12	U	20	U			12	U	13	U
Methyl butyl ketone	UG/KG	9	1%		0	1	86	12	U	11	U	11	UJ	12	U	20	U			12	UJ	13	U
Methyl chloride	UG/KG	0	0%		0	0	86	12	U	11	U	11	U	12	U	20	U			12	U	13	U
Methyl ethyl ketone	UG/KG	0	0%	300	0	0	86	12	U	11	U	11	UJ	12	UJ	20	U			12	UJ	13	U
Methyl isobutyl ketone	UG/KG	0	0%	1000	0	0	86	12	U	11	U	11	U	12	U	20	U			12	U	13	U
Methylene chloride	UG/KG	3	1%	100	0	1	86	12	U	11	U	11	U	12	U	20	U			12	U	13	U
Styrene	UG/KG	0	0%		0	0	86	12	UJ	11	U	11	U	12	U	20	UJ			12	U	13	UJ
Tetrachloroethene	UG/KG	0	0%	1400	0	0	86	12	U	11	U	11	U	12	U	20	U			12	U	13	U
Toluene	UG/KG	14	29%	1500	0	25	86	12	U	11	U	11	U	12	U	20	U			12	U	13	U
Total Xylenes	UG/KG	0	0%	1200	0	0	86	12	UJ	11	U	11	U	12	U	20	UJ			12	U	13	UJ
Trans-1,3-Dichloropropene	UG/KG	0	0%		0	0	86	12	UJ	11	U	11	U	12	U	20	U			12	U	13	U
Trichloroethene	UG/KG	3	3%	700	0	3	86	12	UJ	11	U	11	U	12	U	20	U			12	U	13	U
Vinyl chloride	UG/KG	0	0%	200	0	0	86	12	U	11	U	11	U	12	U	20	U			12	U	13	U
SEMIVOLATILES																							
1,2,4-Trichlorobenzene	UG/KG	0	0%	3400	0	0	86	74	U	140	U	72	U	82	U	170	UJ			92	U	84	U
1,2-Dichlorobenzene	UG/KG	0	0%	7900	0	0	86	74	U	140	U	72	U	82	U	170	UJ			92	U	84	U
1,3-Dichlorobenzene	UG/KG	0	0%	1600	0	0	86	74	U	140	U	72	U	82	U	170	UJ			92	U	84	U
1,4-Dichlorobenzene	UG/KG	0	0%	8500	0	0	86	74	U	140	U	72	U	82	U	170	UJ			92	U	84	U
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%		0	0	7																
2,4,5-Trichlorophenol	UG/KG	0	0%	100	0	0	86	180	U	350	U	170	U	200	U	420	UJ			220	U	200	U
2,4,6-Trichlorophenol	UG/KG	0	0%		0	0	86	74	U	140	U	72	U	82	U	170	UJ			92	U	84	U
2,4-Dichlorophenol	UG/KG	0	0%	400	0	0	86	74	U	140	U	72	U	82	U	170	UJ			92	U	84	U
2,4-Dimethylphenol	UG/KG	0	0%		0	0	86	74	UJ	140	UJ	72	UJ	82	UJ	170	UJ			92	U	84	UJ
2,4-Dinitrophenol	UG/KG	0	0%	200	0	0	86	180	UJ	350	UJ	170	R	200	R	420	UJ			220	UJ	200	UJ
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	86	74	U	140	U	72	U	82	U	170	UJ			92	U	84	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	86	74	U	140	U	72	U	82	U	170	UJ			92	U	84	U
2-Chloronaphthalene	UG/KG	0	0%		0	0	86	74	U	140	U	72	U	82	U	170	UJ			92	U	84	U
2-Chlorophenol	UG/KG	0	0%	800	0	0	86	74	U	140	U	72	U	82	U	170	UJ			92	U	84	U
2-Methylnaphthalene	UG/KG	35	16%	36400	0	14	86	4.8	J	140	U	6.6	J	82	U	170	UJ			92	U	35	J
2-Methylphenol	UG/KG	0	0%	100	0	0	86	74	U	140	U	72	U	82	U	170	UJ			92	U	84	U
2-Nitroaniline	UG/KG	0	0%	430	0	0	86	180	U	350	U	170	U	200	U	420	UJ			220	U	200	U
2-Nitrophenol	UG/KG	0	0%	330	0	0	86	74	U	140	U	72	U	82	U	170	UJ			92	U	84	U
3,3'-Dichlorobenzidine	UG/KG	0	0%		0	0	86	74	U	140	U	72	U	82	U	170	UJ			92	U	84	U
3-Nitroaniline	UG/KG	0	0%	500	0	0	86	180	U	350	UJ	170	U	200	U	420	UJ			220	U	200	U
4,6-Dinitro-2-methylphenol	UG/KG	0	0%		0	0	86	180	U	350	U	170	UJ	200	UJ	420	UJ			220	U	200	U
4-Bromophenyl phenyl ether	UG/KG	0	0%		0	0	86	74	U	140	U	72	U	82	U	170	UJ			92	U	84	U
4-Chloro-3-methylphenol	UG/KG	0	0%	240	0	0	86	74	U	140	U	72	U	82	U	170	UJ			92	U	84	U
4-Chloroaniline	UG/KG	0	0%	220	0	0	86	74	U	140	U	72	U	82	U	170	UJ			92	U	84	U
4-Chlorophenyl phenyl ether	UG/KG	0	0%		0	0	86	74	U	140	U	72	U	82	U	170	UJ			92	U	84	U
4-Methylphenol	UG/KG	0	0%	900	0	0	86	74	U	140	U	72	U	82	U	170	UJ			92	U	84	U
4-Nitroaniline	UG/KG	0	0%		0	0	86	180	U	350	U	170	U	200	U	420	UJ			220	U	200	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Surface Soil Sample Results

ANALYTE	UNITS	MAXIMUM	FREQ OF DETCTION	NYSDEC TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								SB4-16		SB4-17		SB4-18		SB4-19		SB4-25		SB4-25		SB4-26		SB4-27	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								43122		43119		43080		43083		43174		43196		43090		43125	
								0		0		0		0		0		0		0		0	
								0.2		0.2		0.2		0.2		0.2		0.2		0.2		0.2	
								12/21/1998		12/16/1998		12/15/1998		12/15/1998		12/22/1998		7/11/1999		12/15/1998		12/21/1998	
								SA		SA		SA		SA		SA		SA		SA		SA	
								RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		HEX CHROME		RI Phase 1 Step 1		RI Phase 1 Step 1	
								N		N		N		N		N		N		N		N	
4-Nitrophenol	UG/KG	0	0%	100	0	0	86	180	U	350	U	170	U	200	U	420	UJ			220	U	200	U
Acenaphthene	UG/KG	78	9%	50000	0	8	86	4	J	11	J	72	U	82	U	170	UJ			92	U	78	J
Acenaphthylene	UG/KG	32	9%	41000	0	8	86	4.5	J	21	J	72	U	82	U	13	J			92	UJ	84	U
Anthracene	UG/KG	110	17%	50000	0	15	86	11	J	54	J	72	U	82	U	26	J			92	U	100	
Benzo(a)anthracene	UG/KG	560	83%	224	5	71	86	81		[illegible]		14	J	21	J	180	J			13	J	190	
Benzo(a)pyrene	UG/KG	450	80%	61	11	69	86	[illegible]		[illegible]		14	J	44	J	240	J			16	J	[illegible]	
Benzo(b)fluoranthene	UG/KG	890	80%	1100	0	69	86	170		830	J	26	J	93		420	J			17	J	200	
Benzo(ghi)perylene	UG/KG	310	55%	50000	0	47	86	36	J	200		72	R	65	J	130	J			16	J	72	J
Benzo(k)fluoranthene	UG/KG	510	50%	1100	0	43	86	82		140	R	35	J	66	J	220	J			20	J	120	
Bis(2-Chloroethoxy)methane	UG/KG	0	0%		0	0	86	74	U	140	U	72	U	82	U	170	UJ			92	U	84	U
Bis(2-Chloroethyl)ether	UG/KG	0	0%		0	0	86	74	U	140	U	72	U	82	U	170	UJ			92	U	84	U
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%		0	0	79	74	U	140	U	72	U	82	U	170	UJ			92	U	84	U
Bis(2-Ethylhexyl)phthalate	UG/KG	13000	59%	50000	0	51	86	74	U	140	U	72	U	72	U	60	J			92	U	84	U
Butylbenzylphthalate	UG/KG	12000	12%	50000	0	10	86	74	U	140	U	72	U	82	U	170	UJ			92	U	84	U
Carbazole	UG/KG	120	22%		0	19	86	12	J	28	J	72	U	82	U	33	J			92	U	70	J
Chrysene	UG/KG	570	86%	400	4	74	86	120		[illegible]		30	J	43	J	240	J			22	J	200	
Di-n-butylphthalate	UG/KG	220	44%	8100	0	38	86	11	J	140	U	72	U	82	U	68	J			12	J	4.7	J
Di-n-octylphthalate	UG/KG	44	8%	50000	0	7	86	74	U	140	U	72	R	82	U	170	UJ			92	U	84	U
Dibenz(a,h)anthracene	UG/KG	130	22%	14	12	19	86	74	U	[illegible]	J	72	R	22	J	35	J			9.2	J	34	J
Dibenzofuran	UG/KG	58	16%	6200	0	14	86	5.8	J	140	U	6.6	J	82	U	170	UJ			92	U	58	J
Diethyl phthalate	UG/KG	22	16%	7100	0	14	86	74	U	140	U	72	U	82	U	170	UJ			92	U	5.4	J
Dimethylphthalate	UG/KG	0	0%	2000	0	0	86	74	U	140	U	72	U	82	U	170	UJ			92	U	84	U
Fluoranthene	UG/KG	1100	93%	50000	0	80	86	190		730		30	J	34	J	340	J			31	J	380	
Fluorene	UG/KG	74	6%	50000	0	5	86	74	U	140	U	72	U	82	U	10	J			92	U	74	J
Hexachlorobenzene	UG/KG	0	0%	410	0	0	86	74	U	140	U	72	U	82	U	170	UJ			92	U	84	U
Hexachlorobutadiene	UG/KG	0	0%		0	0	86	74	U	140	U	72	U	82	U	170	UJ			92	U	84	U
Hexachlorocyclopentadiene	UG/KG	0	0%		0	0	86	74	U	140	UJ	72	UJ	82	UJ	170	UJ			92	U	84	U
Hexachloroethane	UG/KG	0	0%		0	0	86	74	U	140	U	72	U	82	U	170	UJ			92	U	84	U
Indeno(1,2,3-cd)pyrene	UG/KG	320	53%	3200	0	46	86	40	J	190		72	U	49	J	120	J			15	J	73	J
Isophorone	UG/KG	0	0%	4400	0	0	86	74	U	140	U	72	U	82	U	170	UJ			92	U	84	U
N-Nitrosodiphenylamine	UG/KG	19	1%		0	1	86	74	U	140	U	19	J	82	U	170	UJ			92	U	84	U
N-Nitrosodipropylamine	UG/KG	0	0%		0	0	86	74	U	140	U	72	U	82	U	170	UJ			92	U	84	U
Naphthalene	UG/KG	74	13%	13000	0	11	86	3.9	J	140	U	5.7	J	82	U	170	UJ			92	U	74	J
Nitrobenzene	UG/KG	0	0%	200	0	0	86	74	U	140	U	72	U	82	U	170	UJ			92	U	84	U
Pentachlorophenol	UG/KG	0	0%	1000	0	0	86	180	U	350	U	170	U	200	U	420	UJ			220	U	200	U
Phenanthrene	UG/KG	640	87%	50000	0	75	86	85		270		26	J	16	J	140	J			18	J	450	
Phenol	UG/KG	17	2%	30	0	2	86	74	U	140	U	72	U	82	U	170	UJ			92	U	84	U
Pyrene	UG/KG	990	88%	50000	0	76	86	140		570		25	J	32	J	280	J			23	J	300	
EXPLOSIVES																							
1,3,5-Trinitrobenzene	UG/KG	120	1%		0	1	86	120	U	120	U	120	U	120	UJ	120	U			120	U	120	U
1,3-Dinitrobenzene	UG/KG	0	0%		0	0	86	120	U	120	U	120	U	120	UJ	120	U			120	U	120	U
2,4,6-Trinitrotoluene	UG/KG	72	1%		0	1	86	120	U	120	U	120	U	120	UJ	120	U			120	U	120	U
2,4-Dinitrotoluene	UG/KG	330	2%		0	2	86	120	U	120	U	120	U	120	UJ	120	U			120	U	120	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	86	120	U	120	U	120	U	120	UJ	120	U			120	U	120	U
2-Nitrotoluene	UG/KG	0	0%		0	0	79	120	U	120	U	120	U	120	UJ	120	U			120	U	120	U
2-amino-4,6-Dinitrotoluene	UG/KG	90	1%		0	1	86	120	U	120	U	120	U	120	UJ	120	U			120	U	120	U
3-Nitrotoluene	UG/KG	0	0%		0	0	79	120	U	120	U	120	U	120	UJ	120	U			120	U	120	U
4-Nitrotoluene	UG/KG	390	1%		0	1	79	120	U	120	U	390	J	120	UJ	120	U			120	U	120	U
4-amino-2,6-Dinitrotoluene	UG/KG	0	0%		0	0	86	120	U	120	U	120	U	120	UJ	120	U			120	U	120	U
HMX	UG/KG	0	0%		0	0	86	120	U	120	U	120	U	120	UJ	120	U			120	U	120	U
Nitrobenzene	UG/KG	0	0%	200	0	0	79	120	U	120	U	120	U	120	UJ	120	U			120	U	120	U
RDX	UG/KG	0	0%		0	0	86	120	U	120	U	120	U	120	UJ	120	U			120	U	120	U
Tetryl	UG/KG	0	0%		0	0	86	120	U	120	U	120	U	120	UJ	120	U			120	U	120	U
PESTICIDES/PCBs																							
4,4'-DDD	UG/KG	190	23%	2900	0	20	86	3.7	U	3.6	U	3.6	U	4.1	U	8.6	U			4.6	U	4.2	U
4,4'-DDE	UG/KG	160	31%	2100	0	27	86	26		4.6		3.8		4.1	U	8.6	U			4.6	U	2.8	J
4,4'-DDT	UG/KG	760	34%	2100	0	29	86	2.2	J	2.5	J	3.6	U	4.1	U	8.6	U			4.6	U	4.2	U
Aldrin	UG/KG	2.2	1%	41	0	1	86	1.9	U	1.9	U	1.8	U	2.1	U	4.4	U			2.4	U	2.2	U
Alpha-BHC	UG/KG	2.4	6%	110	0	5	86	1.9	U	1.9	U	1.2	J	2.1	U	4.4	U			2.4	U	2.2	U
Alpha-Chlordane	UG/KG	4.9	9%		0	8	86	1.9	U	1.9	U	1.8	U	2.1	U	4.4	U			2.4	U	2.2	U
Aroclor-1016	UG/KG	0	0%		0	0	86	37	U	36	U	36	U	41	U	86	U			46	U	42	U
Aroclor-1221	UG/KG	0	0%		0	0	86	75	U	74	U	73	U	84	U	180	U			93	U	86	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Surface Soil Sample Results

								SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								SB4-16		SB4-17		SB4-18		SB4-19		SB4-25		SB4-25		SB4-26		SB4-27	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								43122		**43119**		**43080**		**43083**		**43174**		**43196**		**43090**		**43125**	
								0		0		0		0		0		0		0		0	
								0.2		0.2		0.2		0.2		0.2		0.2		0.2		0.2	
								12/21/1998		12/16/1998		12/15/1998		12/15/1998		12/22/1998		7/11/1999		12/15/1998		12/21/1998	
								SA		SA		SA		SA		SA		SA		SA		SA	
ANALYTE	UNITS	MAXIMUM	FREQ OF DETCTION	NYSDEC TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		HEX CHROME		RI Phase 1 Step 1		RI Phase 1 Step 1	
								N		N		N		N		N		N		N		N	
Aroclor-1232	UG/KG	0	0%		0	0	86	37	U	36	U	36	U	41	U	86	U			46	U	42	U
Aroclor-1242	UG/KG	0	0%		0	0	86	37	U	36	U	36	U	41	U	86	U			46	U	42	U
Aroclor-1248	UG/KG	0	0%		0	0	86	37	U	36	U	36	U	41	U	86	U			46	U	42	U
Aroclor-1254	UG/KG	310	26%	10000	0	22	86	37	U	36	U	36	U	41	U	110				46	U	42	U
Aroclor-1260	UG/KG	110	3%	10000	0	3	86	37	U	36	U	36	U	41	U	86	U			46	U	42	U
Beta-BHC	UG/KG	7.6	12%	200	0	10	86	3		1.9	U	1.8	U	2.1	U	4.4	U			2.4	U	2.2	U
Delta-BHC	UG/KG	0	0%	300	0	0	86	1.9	U	1.9	U	1.8	U	2.1	U	4.4	U			2.4	U	2.2	U
Dieldrin	UG/KG	7.4	6%	44	0	5	86	3.7	U	3.6	U	3.6	U	4.1	U	8.6	U			4.6	U	4.2	U
Endosulfan I	UG/KG	1.7	5%	900	0	4	86	1.9	U	1.9	U	1.8	U	2.1	U	4.4	U			2.4	U	2.2	U
Endosulfan II	UG/KG	5.2	3%	900	0	3	86	3.7	U	3.6	U	3.6	U	4.1	U	8.6	U			4.6	U	4.2	U
Endosulfan sulfate	UG/KG	3.8	1%	1000	0	1	86	3.7	U	3.6	U	3.6	U	4.1	U	8.6	U			4.6	U	4.2	U
Endrin	UG/KG	27	3%	100	0	3	86	3.7	U	3.6	U	3.6	U	4.1	U	8.6	U			4.6	U	4.2	U
Endrin aldehyde	UG/KG	20	12%		0	10	86	3.7	U	3.6	U	3.6	U	4.1	U	8.6	U			4.6	U	4.2	U
Endrin ketone	UG/KG	4.2	3%		0	3	86	3.7	U	3.6	U	3.6	U	4.1	U	8.6	U			4.6	U	4.2	U
Gamma-BHC/Lindane	UG/KG	0	0%	60	0	0	86	1.9	U	1.9	U	1.8	U	2.1	U	4.4	U			2.4	U	2.2	U
Gamma-Chlordane	UG/KG	7.4	9%	540	0	8	86	1.9	U	1.9	U	1.8	U	2.1	U	4.4	U			2.4	U	2.2	U
Heptachlor	UG/KG	4.2	3%	100	0	3	86	1.9	U	1.9	U	1.8	U	2.1	U	4.4	U			2.4	U	2.2	U
Heptachlor epoxide	UG/KG	3.6	5%	20	0	4	86	1.9	U	1.9	U	1.8	U	2.1	U	4.4	U			2.4	U	2.2	U
Methoxychlor	UG/KG	0	0%		0	0	86	19	U	19	U	18	U	21	U	44	U			24	U	22	U
Toxaphene	UG/KG	0	0%		0	0	86	190	U	190	U	180	U	210	U	440	U			240	U	220	U
HERBICIDES																							
2,4,5-T	UG/KG	0	0%	1900	0	0	7																
2,4,5-TP/Silvex	UG/KG	0	0%	700	0	0	7																
2,4-D	UG/KG	0	0%	500	0	0	7																
2,4-DB	UG/KG	0	0%		0	0	7																
Dalapon	UG/KG	0	0%		0	0	7																
Dicamba	UG/KG	0	0%		0	0	7																
Dichloroprop	UG/KG	0	0%		0	0	7																
Dinoseb	UG/KG	0	0%		0	0	7																
MCPA	UG/KG	0	0%		0	0	7																
MCPP	UG/KG	0	0%		0	0	7																
METALS																							
Aluminum	MG/KG	18800	100%	19520 *	0	86	86	12700		6430		5860		11900		17300				12700		12600	
Antimony	MG/KG	148	40%	6 *	15	34	86	0.72	R	0.67	UJ	0.64	UJ	0.65	UJ	[illegible]	J			0.76	UJ	1.1	J
Arsenic	MG/KG	14.6	100%	8.9 *	4	86	86	3.7		3.2		3.1		4.6		14.6				4.2		4.1	
Barium	MG/KG	278	100%	300	0	86	86	50.1		32.2	J	32.4	J	68.8		278				85.2		75.3	
Beryllium	MG/KG	1.8	100%	1.13 *	1	86	86	0.54	J	0.3	J	0.33	J	0.42	J	0.63	J			0.6	J	0.53	J
Cadmium	MG/KG	2.3	13%	2.46 *	0	11	86	0.09	U	0.04	U	0.04	U	0.04	U	0.1	U			0.05	U	0.12	U
Calcium	MG/KG	196000	100%	125300 *	3	86	86	23300		123000		[illegible]		2130		17200				3180		8580	
Chromium	MG/KG	18600	100%	30 *	37	86	86	23.7		12.8		12.6		15.7		[illegible]	J			19.3		19 6	
Cobalt	MG/KG	19.9	100%	30	0	86	86	13.2		7.4	J	6.1	J	8.9	J	11.6	J			7.5	J	9.9	J
Copper	MG/KG	7330	100%	33 *	30	86	86	32.1		18.4		18.6		13.5		[illegible]				12.8		21.9	
Cyanide	MG/KG	0.87	2%	0.35	2	2	86	0.67	U	0.61	U	0.65	U	0.65	U	1.6	U			0.69	U	0.76	U
Iron	MG/KG	64800	100%	37410 *	2	86	86	27600		15500		13900		20100		34300	J			21400		24000	
Lead	MG/KG	11200	92%	24.4 *	36	79	86	[illegible]	J	22.3		17.2		[illegible]		[illegible]				18.4		[illegible]	J
Magnesium	MG/KG	35300	100%	21700 *	1	86	86	7330		9690		6080		2840		6810				3360		5190	
Manganese	MG/KG	1540	100%	1100 *	3	86	86	395		339	J	252		531		340				323		429	
Mercury	MG/KG	1.2	52%	0.1	16	45	86	0.06	J	0.05	UJ	0.05	UJ	0.06	UJ	[illegible]				0.07	UJ	0.07	J
Nickel	MG/KG	228	100%	50 *	1	86	86	42		24.2		23.2		17.3		47.4				20.6		27.9	
Potassium	MG/KG	2340	100%	2623 *	0	86	86	1650		1150		1260		1200		2340	J			1430		1710	
Selenium	MG/KG	3.4	23%	2	1	20	86	0.66	U	0.43	U	0.41	U	0.42	U	1.8	UJ			0.49	U	0.89	U
Silver	MG/KG	1.7	6%	0.8 *	1	5	86	0.18	U	0.22	U	0.21	U	0.21	U	[illegible]	J			0.25	U	0.25	U
Sodium	MG/KG	1270	34%	188 *	2	29	86	48	U	73	J	64.7	J	54.8	U	128	U			64.2	U	64.5	U
Thallium	MG/KG	5.4	22%	0.855 *	16	19	86	0.57	U	0.77	UJ	0.74	U	7.5	U	[illegible]	J			0.88	U	0.76	U
Vanadium	MG/KG	1250	100%	150	1	86	86	24.7		14.6		13		30.6		36.4				25.9		24.4	
Zinc	MG/KG	2020	100%	115 *	29	86	86	85.7	J	56.6		56.4		65.2		[illegible]	J			64.3		81.4	J
Chromium, Hexavalent	MG/KG	14.7	27%		0	4	15											12.1	U				
Nitrate/Nitrite	MG/KG						66	0.01	R	0.09		0.07	J	0.26	J	2.16	J			0.55	J	0.9	J

* Soil criteria for these inorganics are site background values.

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Surface Soil Sample Results

								SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								SB4-28		SD4-6		SS4-1		SS4-10		SS4-10		SS4-11		SS4-12		SS4-12	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								43128		43187		SS4-1		43004		43197		43005		43006		43190	
								0		0		0		0		0		0		0		0	
								0.2		0.2		0.5		0.2		0.2		0.2		0.2		0.2	
								12/21/1998		7/11/1999		12/13/1993		12/1/1998		7/11/1999		12/1/1998		12/1/1998		7/11/1999	
								SA		SA		SA		SA		SA		SA		SA		SA	
ANALYTE	UNITS	MAXIMUM	FREQ OF DETCTION	NYSDEC TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	RI Phase 1 Step 1		HEX CHROME		ESI		RI Phase 1 Step 1		HEX CHROME		RI Phase 1 Step 1		RI Phase 1 Step 1		HEX CHROME	
								N		N		N		N		N		N		N		N	
VOLATILES																							
1,1,1-Trichloroethane	UG/KG	0	0%	800	0	0	86	12	U			14	U	150	U			12	U	14	UJ		
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	600	0	0	86	12	U			14	U	150	U			12	U	14	UJ		
1,1,2-Trichloroethane	UG/KG	0	0%		0	0	86	12	U			14	U	150	U			12	U	14	UJ		
1,1-Dichloroethane	UG/KG	2	2%	200	0	2	86	12	U			14	U	150	U			12	U	14	UJ		
1,1-Dichloroethene	UG/KG	0	0%	400	0	0	86	12	U			14	U	150	U			12	U	14	UJ		
1,2-Dichloroethane	UG/KG	0	0%	100	0	0	86	12	U			14	U	150	U			12	U	14	UJ		
1,2-Dichloroethene (total)	UG/KG	4	3%		0	3	86	12	U			14	U	150	U			12	U	14	UJ		
1,2-Dichloropropane	UG/KG	0	0%		0	0	86	12	U			14	U	150	U			12	U	14	UJ		
Acetone	UG/KG	140	31%	200	0	27	86	12	U			14	U	150	U			27		14	UJ		
Benzene	UG/KG	1	1%	60	0	1	86	12	U			14	U	150	U			12	U	14	UJ		
Bromodichloromethane	UG/KG	0	0%		0	0	86	12	U			14	U	150	U			12	U	14	UJ		
Bromoform	UG/KG	0	0%		0	0	86	12	U			14	U	150	U			12	U	14	UJ		
Carbon disulfide	UG/KG	0	0%	2700	0	0	86	12	U			14	U	150	U			12	U	14	UJ		
Carbon tetrachloride	UG/KG	0	0%	600	0	0	86	12	U			14	U	150	U			12	U	14	UJ		
Chlorobenzene	UG/KG	0	0%	1700	0	0	86	12	U			14	U	150	U			12	U	14	UJ		
Chlorodibromomethane	UG/KG	0	0%		0	0	86	12	U			14	U	150	U			12	U	14	UJ		
Chloroethane	UG/KG	0	0%	1900	0	0	86	12	U			14	U	150	U			12	U	14	UJ		
Chloroform	UG/KG	0	0%	300	0	0	86	12	U			14	U	150	U			12	U	14	UJ		
Cis-1,3-Dichloropropene	UG/KG	0	0%		0	0	86	12	U			14	U	150	U			12	U	14	UJ		
Ethyl benzene	UG/KG	0	0%	5500	0	0	86	12	U			14	U	150	U			12	U	14	UJ		
Methyl bromide	UG/KG	0	0%		0	0	86	12	U			14	U	150	U			12	U	14	UJ		
Methyl butyl ketone	UG/KG	9	1%		0	1	86	12	U			14	U	150	U			12	U	14	UJ		
Methyl chloride	UG/KG	0	0%		0	0	86	12	U			14	U	150	U			12	U	14	UJ		
Methyl ethyl ketone	UG/KG	0	0%	300	0	0	86	12	U			14	U	150	U			12	U	14	UJ		
Methyl isobutyl ketone	UG/KG	0	0%	1000	0	0	86	12	U			14	U	150	U			12	U	14	UJ		
Methylene chloride	UG/KG	3	1%	100	0	1	86	12	U			14	U	150	U			12	U	14	UJ		
Styrene	UG/KG	0	0%		0	0	86	12	U			14	U	150	U			12	U	14	UJ		
Tetrachloroethene	UG/KG	0	0%	1400	0	0	86	12	U			14	U	150	U			12	U	14	UJ		
Toluene	UG/KG	14	29%	1500	0	25	86	12	U			14	U	150	U			12	U	3	J		
Total Xylenes	UG/KG	0	0%	1200	0	0	86	12	U			14	U	150	U			12	U	14	UJ		
Trans-1,3-Dichloropropene	UG/KG	0	0%		0	0	86	12	U			14	U	150	U			12	U	14	UJ		
Trichloroethene	UG/KG	3	3%	700	0	3	86	12	U			14	U	150	U			12	U	14	UJ		
Vinyl chloride	UG/KG	0	0%	200	0	0	86	12	U			14	U	150	U			12	U	14	UJ		
SEMIVOLATILES																							
1,2,4-Trichlorobenzene	UG/KG	0	0%	3400	0	0	86	77	U			400	U	78	U			80	U	140	UJ		
1,2-Dichlorobenzene	UG/KG	0	0%	7900	0	0	86	77	U			400	U	78	U			80	U	140	UJ		
1,3-Dichlorobenzene	UG/KG	0	0%	1600	0	0	86	77	U			400	U	78	U			80	U	140	UJ		
1,4-Dichlorobenzene	UG/KG	0	0%	8500	0	0	86	77	U			400	U	78	U			80	U	140	UJ		
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%		0	0	7					400	U										
2,4,5-Trichlorophenol	UG/KG	0	0%	100	0	0	86	190	U			980	U	190	U			190	U	330	UJ		
2,4,6-Trichlorophenol	UG/KG	0	0%		0	0	86	77	U			400	U	78	U			80	U	140	UJ		
2,4-Dichlorophenol	UG/KG	0	0%	400	0	0	86	77	U			400	U	78	U			80	U	140	UJ		
2,4-Dimethylphenol	UG/KG	0	0%		0	0	86	77	UJ			400	U	78	UJ			80	UJ	140	UJ		
2,4-Dinitrophenol	UG/KG	0	0%	200	0	0	86	190	UJ			980	U	190	UJ			190	UJ	330	UJ		
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	86	77	U			400	U	78	U			80	U	140	UJ		
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	86	77	U			400	U	78	U			80	U	140	UJ		
2-Chloronaphthalene	UG/KG	0	0%		0	0	86	77	U			400	U	78	U			80	U	140	UJ		
2-Chlorophenol	UG/KG	0	0%	800	0	0	86	77	U			400	U	78	U			80	U	140	UJ		
2-Methylnaphthalene	UG/KG	35	16%	36400	0	14	86	5.2	J			400	U	78	U			80	U	140	UJ		
2-Methylphenol	UG/KG	0	0%	100	0	0	86	77	U			400	U	78	U			80	U	140	UJ		
2-Nitroaniline	UG/KG	0	0%	430	0	0	86	190	U			980	U	190	U			190	U	330	UJ		
2-Nitrophenol	UG/KG	0	0%	330	0	0	86	77	U			400	U	78	U			80	U	140	UJ		
3,3'-Dichlorobenzidine	UG/KG	0	0%		0	0	86	77	U			400	U	78	U			80	U	140	UJ		
3-Nitroaniline	UG/KG	0	0%	500	0	0	86	190	U			980	U	190	UJ			190	UJ	330	UJ		
4,6-Dinitro-2-methylphenol	UG/KG	0	0%		0	0	86	190	U			980	U	190	UJ			190	UJ	330	UJ		
4-Bromophenyl phenyl ether	UG/KG	0	0%		0	0	86	77	U			400	U	78	U			80	U	140	UJ		
4-Chloro-3-methylphenol	UG/KG	0	0%	240	0	0	86	77	U			400	U	78	U			80	U	140	UJ		
4-Chloroaniline	UG/KG	0	0%	220	0	0	86	77	U			400	U	78	U			80	U	140	UJ		
4-Chlorophenyl phenyl ether	UG/KG	0	0%		0	0	86	77	U			400	U	78	U			80	U	140	UJ		
4-Methylphenol	UG/KG	0	0%	900	0	0	86	77	U			400	U	78	U			80	U	140	UJ		
4-Nitroaniline	UG/KG	0	0%		0	0	86	190	U			980	U	190	U			190	U	330	UJ		

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Surface Soil Sample Results

ANALYTE	UNITS	MAXIMUM	FREQ OF DETCTION	NYSDEC TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								SB4-28		SD4-6		SS4-1		SS4-10		SS4-10		SS4-11		SS4-12		SS4-12	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								43128		43187		SS4-1		43004		43197		43005		43006		43190	
								0		0		0		0		0		0		0		0	
								0.2		0.2		0.5		0.2		0.2		0.2		0.2		0.2	
								12/21/1998		7/11/1999		12/13/1993		12/1/1998		7/11/1999		12/1/1998		12/1/1998		7/11/1999	
								SA		SA		SA		SA		SA		SA		SA		SA	
								RI Phase 1 Step 1		HEX CHROME		ESI		RI Phase 1 Step 1		HEX CHROME		RI Phase 1 Step 1		RI Phase 1 Step 1		HEX CHROME	
								N		N		N		N		N		N		N		N	
4-Nitrophenol	UG/KG	0	0%	100	0	0	86	190	U			980	U	190	U			190	U	330	UJ		
Acenaphthene	UG/KG	78	9%	50000	0	8	86	77	U			400	U	78	U			80	U	140	UJ		
Acenaphthylene	UG/KG	32	9%	41000	0	8	86	77	U			400	U	78	U			80	U	140	UJ		
Anthracene	UG/KG	110	17%	50000	0	15	86	77	U			25	J	78	U			80	U	140	UJ		
Benzo(a)anthracene	UG/KG	560	83%	224	5	71	86	35	J			110	J	8.4	J			17	J	29	J		
Benzo(a)pyrene	UG/KG	450	80%	61	11	69	86	32	J			[illegible]	J	10	J			21	J	43	J		
Benzo(b)fluoranthene	UG/KG	890	80%	1100	0	69	86	120				150	J	15	J			26	J	51	J		
Benzo(ghi)perylene	UG/KG	310	55%	50000	0	47	86	17	J			66	J	9.9	J			20	J	38	J		
Benzo(k)fluoranthene	UG/KG	510	50%	1100	0	43	86	77	U			65	J	10	J			22	J	42	J		
Bis(2-Chloroethoxy)methane	UG/KG	0	0%		0	0	86	77	U			400	U	78	U			80	U	140	UJ		
Bis(2-Chloroethyl)ether	UG/KG	0	0%		0	0	86	77	U			400	U	78	U			80	U	140	UJ		
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%		0	0	79	77	U					78	U			80	U	140	UJ		
Bis(2-Ethylhexyl)phthalate	UG/KG	13000	59%	50000	0	51	86	77	U			45	J	78	UJ			80	UJ	140	UJ		
Butylbenzylphthalate	UG/KG	12000	12%	50000	0	10	86	77	U			400	U	78	UJ			80	UJ	140	UJ		
Carbazole	UG/KG	120	22%		0	19	86	77	U			400	U	78	U			5.3	J	11	J		
Chrysene	UG/KG	570	86%	400	4	74	86	63	J			140	J	13	J			24	J	43	J		
Di-n-butylphthalate	UG/KG	220	44%	8100	0	38	86	8.6	J			85	J	78	UJ			80	UJ	140	UJ		
Di-n-octylphthalate	UG/KG	44	8%	50000	0	7	86	77	U			400	U	78	UJ			80	UJ	140	UJ		
Dibenz(a,h)anthracene	UG/KG	130	22%	14	12	19	86	77	U			400	U	78	U			80	U	140	UJ		
Dibenzofuran	UG/KG	58	16%	6200	0	14	86	77	U			400	U	78	U			80	U	140	UJ		
Diethyl phthalate	UG/KG	22	16%	7100	0	14	86	77	U			400	U	78	U			80	U	140	UJ		
Dimethylphthalate	UG/KG	0	0%	2000	0	0	86	77	U			400	U	78	U			80	U	140	UJ		
Fluoranthene	UG/KG	1100	93%	50000	0	80	66	86				230	J	25	J			40	J	77	J		
Fluorene	UG/KG	74	6%	50000	0	5	86	77	U			400	U	78	U			80	U	140	UJ		
Hexachlorobenzene	UG/KG	0	0%	410	0	0	86	77	U			400	U	78	U			80	U	140	UJ		
Hexachlorobutadiene	UG/KG	0	0%		0	0	86	77	U			400	U	78	U			80	U	140	UJ		
Hexachlorocyclopentadiene	UG/KG	0	0%		0	0	86	77	U			400	U	78	UJ			80	UJ	140	UJ		
Hexachloroethane	UG/KG	0	0%		0	0	86	77	U			400	U	78	UJ			80	UJ	140	UJ		
Indeno(1,2,3-cd)pyrene	UG/KG	320	53%	3200	0	46	86	14	J			75	J	10	J			20	J	37	J		
Isophorone	UG/KG	0	0%	4400	0	0	86	77	U			400	U	78	U			80	U	140	UJ		
N-Nitrosodiphenylamine	UG/KG	19	1%		0	1	86	77	U			400	U	78	U			80	U	140	UJ		
N-Nitrosodipropylamine	UG/KG	0	0%		0	0	86	77	U			400	U	78	U			80	U	140	UJ		
Naphthalene	UG/KG	74	13%	13000	0	11	86	77	U			400	U	78	U			80	U	140	UJ		
Nitrobenzene	UG/KG	0	0%	200	0	0	86	77	U			400	U	78	U			80	U	140	UJ		
Pentachlorophenol	UG/KG	0	0%	1000	0	0	86	190	U			980	U	190	U			190	U	330	UJ		
Phenanthrene	UG/KG	640	87%	50000	0	75	86	38	J			110	J	9.8	J			13	J	23	J		
Phenol	UG/KG	17	2%	30	0	2	86	77	U			400	U	78	U			7.1	J	140	UJ		
Pyrene	UG/KG	990	88%	50000	0	76	86	64	J			210	J	15	J			34	J	61	J		
EXPLOSIVES																							
1,3,5-Trinitrobenzene	UG/KG	120	1%		0	1	86	120	U			120	J	120	U			120	U	120	UJ		
1,3-Dinitrobenzene	UG/KG	0	0%		0	0	86	120	U			130	U	120	U			120	U	120	UJ		
2,4,6-Trinitrotoluene	UG/KG	72	1%		0	1	86	120	U			72	J	120	U			120	U	120	UJ		
2,4-Dinitrotoluene	UG/KG	330	2%		0	2	86	120	U			130	U	120	U			120	U	120	UJ		
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	86	120	U			130	U	120	U			120	U	120	UJ		
2-Nitrotoluene	UG/KG	0	0%		0	0	79	120	U					120	U			120	U	120	UJ		
2-amino-4,6-Dinitrotoluene	UG/KG	90	1%		0	1	86	120	U			90	J	120	U			120	U	120	UJ		
3-Nitrotoluene	UG/KG	0	0%		0	0	79	120	U					120	U			120	U	120	UJ		
4-Nitrotoluene	UG/KG	390	1%		0	1	79	120	U					120	U			120	U	120	UJ		
4-amino-2,6-Dinitrotoluene	UG/KG	0	0%		0	0	86	120	U			130	U	120	U			120	U	120	UJ		
HMX	UG/KG	0	0%		0	0	86	120	U			130	U	120	U			120	U	120	UJ		
Nitrobenzene	UG/KG	0	0%	200	0	0	79	120	U					120	U			120	U	120	UJ		
RDX	UG/KG	0	0%		0	0	86	120	U			130	U	120	U			120	U	120	UJ		
Tetryl	UG/KG	0	0%		0	0	86	120	U			130	U	120	U			120	U	120	UJ		
PESTICIDES/PCBs																							
4,4'-DDD	UG/KG	190	23%	2900	0	20	86	3.9	U			2.5	J	12				4	U	6.9	UJ		
4,4'-DDE	UG/KG	160	31%	2100	0	27	86	9.5				8.5	J	3.9	U			4	U	6.9	UJ		
4,4'-DDT	UG/KG	760	34%	2100	0	29	86	3.2	J			6.2	J	2.4	J			4	U	6.9	UJ		
Aldrin	UG/KG	2.2	1%	41	0	1	86	2	U			2.2	J	2	U			2	U	3.5	UJ		
Alpha-BHC	UG/KG	2.4	6%	110	0	5	86	2	U			2.1	U	2	U			2	U	3.5	UJ		
Alpha-Chlordane	UG/KG	4.9	9%		0	8	86	2	U			4.9	J	2	U			2	U	3.5	UJ		
Aroclor-1016	UG/KG	0	0%		0	0	86	39	U			40	U	39	U			40	U	69	UJ		
Aroclor-1221	UG/KG	0	0%		0	0	86	78	U			82	U	80	U			81	U	140	UJ		

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Surface Soil Sample Results

ANALYTE	UNITS	MAXIMUM	FREQ OF DETCTION	NYSDEC TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4 SB4-28 SOIL 43128 0 0.2 12/21/1998 SA RI Phase 1 Step 1 N		SEAD-4 SD4-6 SOIL 43187 0 0.2 7/11/1999 SA HEX CHROME N		SEAD-4 SS4-1 SOIL SS4-1 0 0.5 12/13/1993 SA ESI N		SEAD-4 SS4-10 SOIL 43004 0 0.2 12/1/1998 SA RI Phase 1 Step 1 N		SEAD-4 SS4-10 SOIL 43197 0 0.2 7/11/1999 SA HEX CHROME N		SEAD-4 SS4-11 SOIL 43005 0 0.2 12/1/1998 SA RI Phase 1 Step 1 N		SEAD-4 SS4-12 SOIL 43006 0 0.2 12/1/1998 SA RI Phase 1 Step 1 N		SEAD-4 SS4-12 SOIL 43190 0 0.2 7/11/1999 SA HEX CHROME N	
Aroclor-1232	UG/KG	0	0%		0	0	86	39	U			40	U	39	U			40	U	69	UJ		
Aroclor-1242	UG/KG	0	0%		0	0	86	39	U			40	U	39	U			40	U	69	UJ		
Aroclor-1248	UG/KG	0	0%		0	0	86	39	U			40	U	39	U			40	U	69	UJ		
Aroclor-1254	UG/KG	310	26%	10000	0	22	86	24	J			250	J	16	J			40	U	69	UJ		
Aroclor-1260	UG/KG	110	3%	10000	0	3	86	39	U			40	U	39	U			40	U	69	UJ		
Beta-BHC	UG/KG	7.6	12%	200	0	10	86	2.8	J			2.1	U	2	U			2	U	3.5	UJ		
Delta-BHC	UG/KG	0	0%	300	0	0	86	2	U			2.1	U	2	U			2	U	3.5	UJ		
Dieldrin	UG/KG	7.4	6%	44	0	5	86	3.9	U			4	U	3.9	U			4	U	6.9	UJ		
Endosulfan I	UG/KG	1.7	5%	900	0	4	86	2	U			2.1	U	1.7	J			2	U	3.5	UJ		
Endosulfan II	UG/KG	5.2	3%	900	0	3	86	3.9	U			3.1	J	3.9	U			4	U	6.9	UJ		
Endosulfan sulfate	UG/KG	3.8	1%	1000	0	1	86	3.9	U			3.8	J	3.9	U			4	U	6.9	UJ		
Endrin	UG/KG	27	3%	100	0	3	86	3.9	U			4	U	3.9	U			4	U	6.9	UJ		
Endrin aldehyde	UG/KG	20	12%		0	10	86	3.9	U			4	U	3.9	U			4	U	6.9	UJ		
Endrin ketone	UG/KG	4.2	3%		0	3	86	3.9	U			4	U	3.9	U			4	U	6.9	UJ		
Gamma-BHC/Lindane	UG/KG	0	0%	60	0	0	86	2	U			2.1	U	2	U			2	U	3.5	UJ		
Gamma-Chlordane	UG/KG	7.4	9%	540	0	8	86	2	U			1.1	J	2	U			2	U	3.5	UJ		
Heptachlor	UG/KG	4.2	3%	100	0	3	86	2	U			2.1	U	2	U			2	U	3.5	UJ		
Heptachlor epoxide	UG/KG	3.6	5%	20	0	4	86	2	U			2.1	U	2	U			2	U	3.5	UJ		
Methoxychlor	UG/KG	0	0%		0	0	86	20	U			21	U	20	U			20	U	35	UJ		
Toxaphene	UG/KG	0	0%		0	0	86	200	U			210	U	200	U			200	U	350	UJ		
HERBICIDES																							
2,4,5-T	UG/KG	0	0%	1900	0	0	7					6.1	U										
2,4,5-TP/Silvex	UG/KG	0	0%	700	0	0	7					6.1	U										
2,4-D	UG/KG	0	0%	500	0	0	7					61	U										
2,4-DB	UG/KG	0	0%		0	0	7					61	U										
Dalapon	UG/KG	0	0%		0	0	7					150	U										
Dicamba	UG/KG	0	0%		0	0	7					6.1	U										
Dichloroprop	UG/KG	0	0%		0	0	7					61	U										
Dinoseb	UG/KG	0	0%		0	0	7					31	U										
MCPA	UG/KG	0	0%		0	0	7					6100	U										
MCPP	UG/KG	0	0%		0	0	7					6100	U										
METALS																							
Aluminum	MG/KG	18800	100%	19520 *	0	86	86	12100				15600		12000	J			11900	J	10800	J		
Antimony	MG/KG	148	40%	6 *	15	34	86	1.1	J			3.9	UJ	34	J			2.3	J	[illegible]	J		
Arsenic	MG/KG	14.6	100%	8.9 *	4	86	86	3				5.9		5				5.2		3.8	J		
Barium	MG/KG	278	100%	300	0	86	86	53.1				62		84.3	J			64	J	125	J		
Beryllium	MG/KG	1.8	100%	1.13 *	1	86	86	0.5	J			0.69	J	0.27	J			0.43	J	0.23	J		
Cadmium	MG/KG	2.3	13%	2.46 *	0	11	86	0.1	U			0.38	U	0.04	U			0.04	U	0.08	UJ		
Calcium	MG/KG	196000	100%	125300 *	3	86	86	18400				14300		5640	J			3480	J	12200	J		
Chromium	MG/KG	18600	100%	30 *	37	86	86	22.6				25.3	J	[illegible]	J			[illegible]	J	[illegible]	J		
Cobalt	MG/KG	19.9	100%	30	0	86	86	13.2				12.7		11.2				11.5		10.1	J		
Copper	MG/KG	7330	100%	33 *	30	86	86	30.3				20	J	[illegible]	J			[illegible]	J	[illegible]	J		
Cyanide	MG/KG	0.87	2%	0.35	2	2	86	0.7	U			0.55	U	0.69	U			0.69	U	1.3	UJ		
Iron	MG/KG	64600	100%	37410 *	2	86	86	26600				29800		25700	J			25400	J	21500	J		
Lead	MG/KG	11200	92%	24.4 *	36	79	86	[illegible]	J			23.7	R	23.1	J			18.1	J	[illegible]	J		
Magnesium	MG/KG	35300	100%	21700 *	1	86	86	6360				6850		4700	J			4210	J	4170	J		
Manganese	MG/KG	1540	100%	1100 *	3	86	86	420				708		850	J			568	J	833	J		
Mercury	MG/KG	1.2	52%	0.1	16	45	86	0.06	J			0.02	J	[illegible]	J			[illegible]	J	[illegible]	J		
Nickel	MG/KG	228	100%	50 *	1	86	86	42.6				36.8		28.3	J			27	J	30.6	J		
Potassium	MG/KG	2340	100%	2623 *	0	86	86	1460				1650		1160				1160		1410	J		
Selenium	MG/KG	3.4	23%	2	1	20	86	0.7	U			0.27	J	0.8	U			0.72	U	1.4	UJ		
Silver	MG/KG	1.7	6%	0.8 *	1	5	86	0.19	U			0.76	U	0.22	U			0.2	U	0.65	J		
Sodium	MG/KG	1270	34%	188 *	2	29	86	50.6	U			61.8	J	108	J			52.1	U	133	J		
Thallium	MG/KG	5.4	22%	0.855 *	16	19	86	0.6	U			0.21	U	0.8	U			[illegible]	J	[illegible]	J		
Vanadium	MG/KG	1250	100%	150	1	86	86	20.8				22.9		19.8	J			18.8	J	20.4	J		
Zinc	MG/KG	2020	100%	115 *	29	86	86	81.1	J			65.9		[illegible]	J			[illegible]	J	[illegible]	J		
Chromium, Hexavalent	MG/KG	14.7	27%		0	4	15			13.4	U					7.4						11.1	
Nitrate/Nitrite	MG/KG						66	0.01	J					0.04	J			2.78	J	0.17	J		

* Soil criteria for these inorganics are site background values.

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Surface Soil Sample Results

ANALYTE	UNITS	MAXIMUM	FREQ OF DETCTION	NYSDEC TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								SS4-13		SS4-13		SS4-14		SS4-18		SS4-18		SS4-19		SS4-2		SS4-29	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								43007		43200		43008		43012		43186		43013		SS4-2		43023	
								0		0		0		0		0		0		0		0	
								0.2		0.2		0.2		0.2		0.2		0.2		0.5		0.2	
								12/2/1998		7/11/1999		12/2/1998		12/2/1998		7/11/1999		12/2/1998		12/13/1993		12/2/1998	
								SA		SA		SA		SA		SA		SA		SA		SA	
								RI Phase 1 Step 1		HEX CHROME		RI Phase 1 Step 1		RI Phase 1 Step 1		HEX CHROME		RI Phase 1 Step 1		ESI		RI Phase 1 Step 1	
								N		N		N		N		N		N		N		N	
VOLATILES																							
1,1,1-Trichloroethane	UG/KG	0	0%	800	0	0	86	15	UJ			14	U	16	U			14	U	12	U	14	U
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	600	0	0	86	15	UJ			14	UJ	16	UJ			14	UJ	12	U	14	UJ
1,1,2-Trichloroethane	UG/KG	0	0%		0	0	86	15	UJ			14	U	16	U			14	U	12	U	14	U
1,1-Dichloroethane	UG/KG	2	2%	200	0	2	86	15	UJ			14	U	16	U			14	U	12	U	14	U
1,1-Dichloroethene	UG/KG	0	0%	400	0	0	86	15	UJ			14	U	16	U			14	U	12	U	14	U
1,2-Dichloroethane	UG/KG	0	0%	100	0	0	86	15	UJ			14	U	16	U			14	U	12	U	14	U
1,2-Dichloroethene (total)	UG/KG	4	3%		0	3	86	15	UJ			14	U	16	U			14	U	12	U	14	U
1,2-Dichloropropane	UG/KG	0	0%		0	0	86	15	UJ			14	U	16	U			14	U	12	U	14	U
Acetone	UG/KG	140	31%	200	0	27	86	15	UJ			14		16	U			14	U	12	U	14	U
Benzene	UG/KG	1	1%	60	0	1	86	15	UJ			14	U	16	U			14	U	12	U	14	U
Bromodichloromethane	UG/KG	0	0%		0	0	86	15	UJ			14	U	16	U			14	U	12	U	14	U
Bromoform	UG/KG	0	0%		0	0	86	15	UJ			14	UJ	16	UJ			14	UJ	12	U	14	UJ
Carbon disulfide	UG/KG	0	0%	2700	0	0	86	15	UJ			14	U	16	U			14	U	12	U	14	U
Carbon tetrachloride	UG/KG	0	0%	600	0	0	86	15	UJ			14	U	16	U			14	U	12	U	14	U
Chlorobenzene	UG/KG	0	0%	1700	0	0	86	15	UJ			14	UJ	16	UJ			14	UJ	12	U	14	UJ
Chlorodibromomethane	UG/KG	0	0%		0	0	86	15	UJ			14	U	16	U			14	U	12	U	14	U
Chloroethane	UG/KG	0	0%	1900	0	0	86	15	UJ			14	U	16	U			14	U	12	U	14	U
Chloroform	UG/KG	0	0%	300	0	0	86	15	UJ			14	U	16	U			14	U	12	U	14	U
Cis-1,3-Dichloropropene	UG/KG	0	0%		0	0	86	15	UJ			14	U	16	U			14	U	12	U	14	U
Ethyl benzene	UG/KG	0	0%	5500	0	0	86	15	UJ			14	UJ	16	UJ			14	UJ	12	U	14	UJ
Methyl bromide	UG/KG	0	0%		0	0	86	15	UJ			14	U	16	U			14	U	12	U	14	U
Methyl butyl ketone	UG/KG	9	1%		0	1	86	15	UJ			14	U	16	U			14	U	12	U	14	U
Methyl chloride	UG/KG	0	0%		0	0	86	15	UJ			14	U	16	U			14	U	12	U	14	U
Methyl ethyl ketone	UG/KG	0	0%	300	0	0	86	15	UJ			14	U	16	U			14	U	12	U	14	U
Methyl isobutyl ketone	UG/KG	0	0%	1000	0	0	86	15	UJ			14	U	16	U			14	U	12	U	14	U
Methylene chloride	UG/KG	3	1%	100	0	1	86	15	UJ			14	U	16	U			14	U	12	U	14	U
Styrene	UG/KG	0	0%		0	0	86	15	UJ			14	UJ	16	UJ			14	UJ	12	U	14	UJ
Tetrachloroethene	UG/KG	0	0%	1400	0	0	86	15	UJ			14	U	16	U			14	U	12	U	14	U
Toluene	UG/KG	14	29%	1500	0	25	86	15	UJ			6	J	16	U			14	J	12	U	14	U
Total Xylenes	UG/KG	0	0%	1200	0	0	86	15	UJ			14	UJ	16	UJ			14	UJ	12	U	14	UJ
Trans-1,3-Dichloropropene	UG/KG	0	0%		0	0	86	15	UJ			14	U	16	U			14	U	12	U	14	U
Trichloroethene	UG/KG	3	3%	700	0	3	86	15	UJ			14	U	16	U			14	U	12	U	14	U
Vinyl chloride	UG/KG	0	0%	200	0	0	86	15	UJ			14	U	16	U			14	U	12	U	14	U
SEMIVOLATILES																							
1,2,4-Trichlorobenzene	UG/KG	0	0%	3400	0	0	86	140	UJ			89	U	120	U			92	U	400	U	90	U
1,2-Dichlorobenzene	UG/KG	0	0%	7900	0	0	86	140	UJ			89	U	120	U			92	U	400	U	90	U
1,3-Dichlorobenzene	UG/KG	0	0%	1600	0	0	86	140	UJ			89	U	120	U			92	U	400	U	90	U
1,4-Dichlorobenzene	UG/KG	0	0%	8500	0	0	86	140	UJ			89	U	120	U			92	U	400	U	90	U
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%		0	0	7													400	U		
2,4,5-Trichlorophenol	UG/KG	0	0%	100	0	0	86	330	UJ			220	U	290	U			220	U	960	U	220	U
2,4,6-Trichlorophenol	UG/KG	0	0%		0	0	86	140	UJ			89	U	120	U			92	U	400	U	90	U
2,4-Dichlorophenol	UG/KG	0	0%	400	0	0	86	140	UJ			89	U	120	U			92	U	400	U	90	U
2,4-Dimethylphenol	UG/KG	0	0%		0	0	86	140	UJ			89	UJ	120	UJ			92	UJ	400	U	90	U
2,4-Dinitrophenol	UG/KG	0	0%	200	0	0	86	330	UJ			220	UJ	290	UJ			220	UJ	960	U	220	UJ
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	86	140	UJ			89	U	120	U			92	U	400	U	90	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	86	140	UJ			89	U	120	U			92	U	400	U	90	U
2-Chloronaphthalene	UG/KG	0	0%		0	0	86	140	UJ			89	U	120	U			92	U	400	U	90	U
2-Chlorophenol	UG/KG	0	0%	800	0	0	86	140	UJ			89	U	120	U			92	U	400	U	90	U
2-Methylnaphthalene	UG/KG	35	16%	36400	0	14	86	140	UJ			89	U	120	U			92	U	400	U	90	U
2-Methylphenol	UG/KG	0	0%	100	0	0	86	140	UJ			89	U	120	U			92	U	400	U	90	U
2-Nitroaniline	UG/KG	0	0%	430	0	0	86	330	UJ			220	U	290	U			220	U	960	U	220	U
2-Nitrophenol	UG/KG	0	0%	330	0	0	86	140	UJ			89	U	120	U			92	U	400	U	90	U
3,3'-Dichlorobenzidine	UG/KG	0	0%		0	0	86	140	UJ			89	U	120	U			92	U	400	U	90	U
3-Nitroaniline	UG/KG	0	0%	500	0	0	86	330	UJ			220	UJ	290	UJ			220	U	960	U	220	UJ
4,6-Dinitro-2-methylphenol	UG/KG	0	0%		0	0	86	330	UJ			220	UJ	290	UJ			220	U	960	U	220	UJ
4-Bromophenyl phenyl ether	UG/KG	0	0%		0	0	86	140	UJ			89	U	120	U			92	U	400	U	90	U
4-Chloro-3-methylphenol	UG/KG	0	0%	240	0	0	86	140	UJ			89	U	120	U			92	U	400	U	90	U
4-Chloroaniline	UG/KG	0	0%	220	0	0	86	140	UJ			89	U	120	U			92	U	400	U	90	U
4-Chlorophenyl phenyl ether	UG/KG	0	0%		0	0	86	140	UJ			89	U	120	U			92	U	400	U	90	U
4-Methylphenol	UG/KG	0	0%	900	0	0	86	140	UJ			89	U	120	U			92	U	400	U	90	U
4-Nitroaniline	UG/KG	0	0%		0	0	86	330	UJ			220	U	290	U			220	U	960	U	220	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Surface Soil Sample Results

ANALYTE	UNITS	MAXIMUM	FREQ OF DETCTION	NYSDEC TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								SS4-13		SS4-13		SS4-14		SS4-18		SS4-18		SS4-19		SS4-2		SS4-29	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								43007		43200		43008		43012		43186		43013		SS4-2		43023	
								0		0		0		0		0		0		0		0	
								0.2		0.2		0.2		0.2		0.2		0.2		0.5		0.2	
								12/2/1998		7/11/1999		12/2/1998		12/2/1998		7/11/1999		12/2/1998		12/13/1993		12/2/1998	
								SA		SA		SA		SA		SA		SA		SA		SA	
								RI Phase 1	Step 1	HEX CHROME		RI Phase 1	Step 1	RI Phase 1	Step 1	HEX CHROME		RI Phase 1	Step 1	ESI		RI Phase 1	Step 1
								N		N		N		N		N		N		N		N	
4-Nitrophenol	UG/KG	0	0%	100	0	0	86	330	UJ			220	U	290	U			220	U	960	U	220	U
Acenaphthene	UG/KG	78	9%	50000	0	8	86	140	UJ			89	U	120	U			92	U	400	U	90	U
Acenaphthylene	UG/KG	32	9%	41000	0	8	86	140	UJ			89	U	120	U			92	U	400	U	90	U
Anthracene	UG/KG	110	17%	50000	0	15	86	140	UJ			89	U	120	U			92	U	400	U	90	U
Benzo(a)anthracene	UG/KG	560	83%	224	5	71	86	27	J			6.9	J	16	J			92	U	400	U	9.8	J
Benzo(a)pyrene	UG/KG	450	80%	61	11	69	86	39	J			8.8	J	20	J			92	U	400	U	10	J
Benzo(b)fluoranthene	UG/KG	890	80%	1100	0	69	86	57	J			9	J	25	J			92	U	400	U	12	J
Benzo(ghi)perylene	UG/KG	310	55%	50000	0	47	86	40	J			7.7	J	120	U			92	U	400	U	11	J
Benzo(k)fluoranthene	UG/KG	510	50%	1100	0	43	86	37	J			8.1	J	20	J			92	U	400	U	11	J
Bis(2-Chloroethoxy)methane	UG/KG	0	0%		0	0	86	140	UJ			89	U	120	U			92	U	400	U	90	U
Bis(2-Chloroethyl)ether	UG/KG	0	0%		0	0	86	140	UJ			89	U	120	U			92	U	400	U	90	U
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%		0	0	79	140	UJ			89	U	120	U			92	U			80	U
Bis(2-Ethylhexyl)phthalate	UG/KG	13000	59%	50000	0	51	86	140	UJ			89	UJ	120	UJ			92	U	400	U	26	J
Butylbenzylphthalate	UG/KG	12000	12%	50000	0	10	86	140	UJ			89	UJ	120	UJ			92	U	400	U	90	UJ
Carbazole	UG/KG	120	22%		0	19	86	11	J			89	U	6.5	J			92	U	400	U	90	U
Chrysene	UG/KG	570	86%	400	4	74	86	47	J			9.4	J	24	J			6.1	J	400	U	14	J
Di-n-butylphthalate	UG/KG	220	44%	8100	0	38	86	140	UJ			89	UJ	120	UJ			92	U	400	U	5	J
Di-n-octylphthalate	UG/KG	44	8%	50000	0	7	86	140	UJ			89	UJ	120	UJ			92	U	400	U	90	UJ
Dibenz(a,h)anthracene	UG/KG	130	22%	14	12	19	86	140	UJ			89	U	120	U			92	U	400	U	90	U
Dibenzofuran	UG/KG	58	16%	6200	0	14	86	140	UJ			89	U	120	U			92	U	400	U	90	U
Diethyl phthalate	UG/KG	22	16%	7100	0	14	86	140	UJ			89	U	120	U			92	U	400	U	90	U
Dimethylphthalate	UG/KG	0	0%	2000	0	0	86	140	UJ			89	U	120	U			92	U	400	U	90	U
Fluoranthene	UG/KG	1100	93%	50000	0	80	86	85	J			17	J	46	J			10	J	18	J	25	J
Fluorene	UG/KG	74	6%	50000	0	5	86	140	UJ			89	U	120	U			92	U	400	U	90	U
Hexachlorobenzene	UG/KG	0	0%	410	0	0	86	140	UJ			89	U	120	U			92	U	400	U	90	U
Hexachlorobutadiene	UG/KG	0	0%		0	0	86	140	UJ			89	U	120	U			92	U	400	U	90	U
Hexachlorocyclopentadiene	UG/KG	0	0%		0	0	86	140	UJ			89	UJ	120	UJ			92	U	400	U	90	UJ
Hexachloroethane	UG/KG	0	0%		0	0	86	140	UJ			89	UJ	120	UJ			92	UJ	400	U	90	U
Indeno(1,2,3-cd)pyrene	UG/KG	320	53%	3200	0	46	86	44	J			6.5	J	120	U			92	U	400	U	10	J
Isophorone	UG/KG	0	0%	4400	0	0	86	140	UJ			89	U	120	U			92	U	400	U	90	U
N-Nitrosodiphenylamine	UG/KG	19	1%		0	1	86	140	UJ			89	U	120	U			92	U	400	U	90	U
N-Nitrosodipropylamine	UG/KG	0	0%		0	0	86	140	UJ			89	U	120	U			92	U	400	U	90	U
Naphthalene	UG/KG	74	13%	13000	0	11	86	140	UJ			89	U	120	U			92	U	400	U	90	U
Nitrobenzene	UG/KG	0	0%	200	0	0	86	140	UJ			89	U	120	U			92	U	400	U	90	U
Pentachlorophenol	UG/KG	0	0%	1000	0	0	86	330	UJ			220	U	290	UJ			220	U	960	U	220	UJ
Phenanthrene	UG/KG	640	87%	50000	0	75	86	35	J			11	J	24	J			5.9	J	400	U	13	J
Phenol	UG/KG	17	2%	30	0	2	86	140	UJ			89	U	120	U			92	U	400	U	90	U
Pyrene	UG/KG	990	88%	50000	0	76	86	66	J			15	J	38	J			7.8	J	400	U	18	J
EXPLOSIVES																							
1,3,5-Trinitrobenzene	UG/KG	120	1%		0	1	86	120	UJ			120	U	120	U			120	U	130	U	120	U
1,3-Dinitrobenzene	UG/KG	0	0%		0	0	86	120	UJ			120	U	120	U			120	U	130	U	120	U
2,4,6-Trinitrotoluene	UG/KG	72	1%		0	1	86	120	UJ			120	U	120	U			120	U	130	U	120	U
2,4-Dinitrotoluene	UG/KG	330	2%		0	2	86	120	UJ			120	U	120	U			120	U	130	U	120	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	86	120	UJ			120	U	120	U			120	U	130	U	120	U
2-Nitrotoluene	UG/KG	0	0%		0	0	79	120	UJ			120	U	120	U			120	U			120	U
2-amino-4,6-Dinitrotoluene	UG/KG	90	1%		0	1	86	120	UJ			120	U	120	U			120	U	130	U	120	U
3-Nitrotoluene	UG/KG	0	0%		0	0	79	120	UJ			120	U	120	U			120	U			120	U
4-Nitrotoluene	UG/KG	390	1%		0	1	79	120	UJ			120	U	120	U			120	U			120	U
4-amino-2,6-Dinitrotoluene	UG/KG	0	0%		0	0	86	120	UJ			120	U	120	U			120	U	130	U	120	U
HMX	UG/KG	0	0%		0	0	86	120	UJ			120	U	120	U			120	U	130	U	120	U
Nitrobenzene	UG/KG	0	0%	200	0	0	79	120	UJ			120	U	120	U			120	U			120	U
RDX	UG/KG	0	0%		0	0	86	120	UJ			120	U	120	U			120	U	130	U	120	U
Tetryl	UG/KG	0	0%		0	0	86	120	UJ			120	U	120	U			120	U	130	U	120	U
PESTICIDES/PCBs																							
4,4'-DDD	UG/KG	190	23%	2900	0	20	86	6.9	UJ			4.4	U	7				7		4	U	4.6	U
4,4'-DDE	UG/KG	160	31%	2100	0	27	86	4.2	J			4.4	U	6	U			4.6	U	4	U	4.6	U
4,4'-DDT	UG/KG	760	34%	2100	0	29	86	6.9	UJ			4.4	U	6	U			4.6	U	4	U	4.6	U
Aldrin	UG/KG	2.2	1%	41	0	1	86	3.5	UJ			2.3	U	3.1	U			2.4	U	2	U	2.3	U
Alpha-BHC	UG/KG	2.4	6%	110	0	5	86	3.5	UJ			2.3	U	3.1	U			2.4	U	2	U	2.3	U
Alpha-Chlordane	UG/KG	4.9	9%		0	8	86	3.5	UJ			2.3	U	3.1	U			1.7	J	2	U	2.3	U
Aroclor-1016	UG/KG	0	0%		0	0	86	69	UJ			44	U	60	U			46	U	40	U	46	U
Aroclor-1221	UG/KG	0	0%		0	0	86	140	UJ			90	U	120	U			93	U	81	U	91	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Surface Soil Sample Results

ANALYTE	UNITS	MAXIMUM	FREQ OF DETCTION	NYSDEC TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								SS4-13		SS4-13		SS4-14		SS4-18		SS4-18		SS4-19		SS4-2		SS4-29	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								43007		43200		43008		43012		43186		43013		SS4-2		43023	
								0		0		0		0		0		0		0		0	
								0.2		0.2		0.2		0.2		0.2		0.2		0.5		0.2	
								12/2/1998		7/11/1999		12/2/1998		12/2/1998		7/11/1999		12/2/1998		12/13/1993		12/2/1998	
								SA		SA		SA		SA		SA		SA		SA		SA	
								RI Phase 1 Step 1		HEX CHROME		RI Phase 1 Step 1		RI Phase 1 Step 1		HEX CHROME		RI Phase 1 Step 1		ESI		RI Phase 1 Step 1	
								N		N		N		N		N		N		N		N	
Aroclor-1232	UG/KG	0	0%		0	0	86	69	UJ			44	U	60	U			46	U	40	U	46	U
Aroclor-1242	UG/KG	0	0%		0	0	86	69	UJ			44	U	60	U			46	U	40	U	46	U
Aroclor-1248	UG/KG	0	0%		0	0	86	69	UJ			44	U	60	U			46	U	40	U	46	U
Aroclor-1254	UG/KG	310	26%	10000	0	22	86	69	UJ			44	U	60	U			46	U	40	U	46	U
Aroclor-1260	UG/KG	110	3%	10000	0	3	86	69	UJ			44	U	60	U			46	U	40	U	46	U
Beta-BHC	UG/KG	7.6	12%	200	0	10	86	3.5	UJ			2.3	U	3.1	U			2.4	U	2	U	2.3	U
Delta-BHC	UG/KG	0	0%	300	0	0	86	3.5	UJ			2.3	U	3.1	U			2.4	U	2	U	2.3	U
Dieldrin	UG/KG	7.4	6%	44	0	5	86	6.9	UJ			4.4	U	6	U			4.6	U	4	U	4.6	U
Endosulfan I	UG/KG	1.7	5%	900	0	4	86	3.5	UJ			2.3	U	3.1	U			1.3	J	2	U	2.3	U
Endosulfan II	UG/KG	5.2	3%	900	0	3	86	6.9	UJ			4.4	U	6	U			4.6	U	4	U	4.6	U
Endosulfan sulfate	UG/KG	3.8	1%	1000	0	1	86	6.9	UJ			4.4	U	6	U			4.6	U	4	U	4.6	U
Endrin	UG/KG	27	3%	100	0	3	86	6.9	UJ			4.4	U	27				4.6	U	4	U	4.6	U
Endrin aldehyde	UG/KG	20	12%		0	10	86	6.9	UJ			4.4	U	6	U			4.6	U	4	U	4.6	U
Endrin ketone	UG/KG	4.2	3%		0	3	86	6.9	UJ			4.4	U	6	U			4.6	U	4	U	4.6	U
Gamma-BHC/Lindane	UG/KG	0	0%	60	0	0	86	3.5	UJ			2.3	U	3.1	U			2.4	U	2	U	2.3	U
Gamma-Chlordane	UG/KG	7.4	9%	540	0	8	86	3.5	UJ			2.3	U	3.1	U			2.4	U	2	U	2.3	U
Heptachlor	UG/KG	4.2	3%	100	0	3	86	3.5	UJ			2.3	U	3.1	U			2.4	U	2	U	2.3	U
Heptachlor epoxide	UG/KG	3.6	5%	20	0	4	86	3.5	UJ			2.3	U	3.1	U			2.4	U	2	U	2.3	U
Methoxychlor	UG/KG	0	0%		0	0	86	35	UJ			23	U	31	U			24	U	20	U	23	U
Toxaphene	UG/KG	0	0%		0	0	86	350	UJ			230	U	310	U			240	U	200	U	230	U
HERBICIDES																							
2,4,5-T	UG/KG	0	0%	1900	0	0	7													6	U		
2,4,5-TP/Silvex	UG/KG	0	0%	700	0	0	7													6	U		
2,4-D	UG/KG	0	0%	500	0	0	7													60	U		
2,4-DB	UG/KG	0	0%		0	0	7													60	U		
Dalapon	UG/KG	0	0%		0	0	7													150	U		
Dicamba	UG/KG	0	0%		0	0	7													6	U		
Dichloroprop	UG/KG	0	0%		0	0	7													60	U		
Dinoseb	UG/KG	0	0%		0	0	7													30	U		
MCPA	UG/KG	0	0%		0	0	7													6000	U		
MCPP	UG/KG	0	0%		0	0	7													6000	U		
METALS																							
Aluminum	MG/KG	18800	100%	19520 *	0	86	86	11300	J			10800	J	12000	J			11700	J	18700		12100	J
Antimony	MG/KG	148	40%	6 *	15	34	86	[illegible]	J			0.72	R	[illegible]	J			0.65	R	4.3	UJ	0.79	UJ
Arsenic	MG/KG	14.6	100%	8.9 *	4	86	86	2.5	J			4.4		8.9				4.4		5.9		5.6	
Barium	MG/KG	278	100%	300	0	86	86	174	J			83.4	J	130	J			93.7	J	76.1		97.9	
Beryllium	MG/KG	1.8	100%	1.13 *	1	86	86	0.55	J			0.49	J	0.3	J			0.56	J	0.84	J	0.6	J
Cadmium	MG/KG	2.3	13%	2.46 *	0	11	86	0.07	UJ			0.05	U	0.07	U			0.04	U	0.42	U	0.05	U
Calcium	MG/KG	196000	100%	125300 *	3	86	86	10200	J			3400	J	9500	J			4160	J	3480		4800	
Chromium	MG/KG	18600	100%	30 *	37	86	86	[illegible]	J			20.9	J	[illegible]	J			23.5	J	[illegible]	J	[illegible]	
Cobalt	MG/KG	19.9	100%	30	0	86	86	6	J			8.8	J	11.5	J			8.6	J	15.3		9	J
Copper	MG/KG	7330	100%	33 *	30	86	86	[illegible]	J			18.4	J	[illegible]	J			19.2	J	[illegible]	J	24.9	J
Cyanide	MG/KG	0.87	2%	0.35	2	2	86	1.2	UJ			0.77	U	1	U			0.78	U	0.57	U	0.74	UJ
Iron	MG/KG	64600	100%	37410 *	2	86	86	22400	J			20000	J	21600	J			21900	J	33600		22000	J
Lead	MG/KG	11200	92%	24.4 *	36	79	86	[illegible]	J			15.8	J	[illegible]	J			15.9	J	12	R	18.4	J
Magnesium	MG/KG	35300	100%	21700 *	1	86	86	3880	J			3000	J	3450	J			3180	J	6100		3330	
Manganese	MG/KG	1540	100%	1100 *	3	86	86	256	J			480	J	[illegible]	J			535	J	638		518	J
Mercury	MG/KG	1.2	52%	0.1	16	45	86	[illegible]	J			0.08	J	[illegible]	J			0.09	J	0.04	J	0.08	J
Nickel	MG/KG	228	100%	50 *	1	86	86	21.9	J			17.6	J	21.5	J			19.1	J	40.1		20	J
Potassium	MG/KG	2340	100%	2623 *	0	86	86	1130	J			1500		1580	J			1300		1930		1780	
Selenium	MG/KG	3.4	23%	2	1	20	86	1.5	J			0.84	U	1.2	U			0.75	U	0.15	U	0.92	U
Silver	MG/KG	1.7	6%	0.8 *	1	5	86	0.35	UJ			0.23	U	0.35	U			0.21	U	0.84	U	0.26	U
Sodium	MG/KG	1270	34%	188 *	2	29	86	[illegible]	J			61.1	U	90.6	U			54.9	U	49.2	J	66.8	U
Thallium	MG/KG	5.4	22%	0.855 *	16	19	86	1.3	UJ			[illegible]	J	[illegible]	J			[illegible]	J	0.26	U	[illegible]	J
Vanadium	MG/KG	1250	100%	150	1	86	86	24	J			18	J	20	J			19.3	J	27.2		20.3	
Zinc	MG/KG	2020	100%	115 *	29	86	86	[illegible]	J			67.3	J	[illegible]	J			82.9	J	96.5		88.1	
Chromium, Hexavalent	MG/KG	14.7	27%		0	4	15			14.9	U					33	U						
Nitrate/Nitrite	MG/KG						66	0.83	J			0.01	J	0.04	J			0.08	J			0.04	

* Soil criteria for these inorganics are site background values.

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Surface Soil Sample Results

ANALYTE	UNITS	MAXIMUM	FREQ OF DETCTION	NYSDEC TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								SS4-3		SS4-3		SS4-35		SS4-36		SS4-38		SS4-4		SS4-4		SS4-42	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								43201		SS4-3		43029		43030		43032		43181		SS4-4		43036	
								0		0		0		0		0		0		0		0	
								0.2		0.5		0.2		0.2		0.2		0.2		0.5		0.2	
								7/11/1999		12/13/1993		12/3/1998		12/3/1998		12/3/1998		7/11/1999		12/13/1993		12/3/1998	
								SA		SA		SA		SA		SA		SA		SA		SA	
								HEX CHROME		ESI		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		HEX CHROME		ESI		RI Phase 1 Step 1	
								N		N		N		N		N		N		N		N	
VOLATILES																							
1,1,1-Trichloroethane	UG/KG	0	0%	800	0	0	86			13	U	12	U	14	U	14	U			14	U	15	U
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	600	0	0	86			13	U	12	U	14	UJ	14	U			14	U	15	UJ
1,1,2-Trichloroethane	UG/KG	0	0%		0	0	86			13	U	12	U	14	U	14	U			14	U	15	U
1,1-Dichloroethane	UG/KG	2	2%	200	0	2	86			13	U	12	U	14	U	14	U			14	U	15	U
1,1-Dichloroethene	UG/KG	0	0%	400	0	0	86			13	U	12	U	14	U	14	U			14	U	15	U
1,2-Dichloroethane	UG/KG	0	0%	100	0	0	86			13	U	12	U	14	U	14	U			14	U	15	U
1,2-Dichloroethene (total)	UG/KG	4	3%		0	3	86			13	U	12	U	14	U	14	U			14	U	15	U
1,2-Dichloropropane	UG/KG	0	0%		0	0	86			13	U	12	U	14	U	14	U			14	U	15	U
Acetone	UG/KG	140	31%	200	0	27	86			13	U	6	J	14	U	8	J			14	U	15	U
Benzene	UG/KG	1	1%	60	0	1	86			13	U	12	U	14	U	14	U			14	U	15	U
Bromodichloromethane	UG/KG	0	0%		0	0	86			13	U	12	U	14	U	14	U			14	U	15	U
Bromoform	UG/KG	0	0%		0	0	86			13	U	12	U	14	UJ	14	U			14	U	15	UJ
Carbon disulfide	UG/KG	0	0%	2700	0	0	86			13	U	12	U	14	U	14	U			14	U	15	U
Carbon tetrachloride	UG/KG	0	0%	600	0	0	86			13	U	12	U	14	U	14	U			14	U	15	U
Chlorobenzene	UG/KG	0	0%	1700	0	0	86			13	U	12	U	14	UJ	14	U			14	U	15	UJ
Chlorodibromomethane	UG/KG	0	0%		0	0	86			13	U	12	U	14	U	14	U			14	U	15	U
Chloroethane	UG/KG	0	0%	1900	0	0	86			13	U	12	U	14	U	14	U			14	U	15	U
Chloroform	UG/KG	0	0%	300	0	0	86			13	U	12	U	14	U	14	U			14	U	15	U
Cis-1,3-Dichloropropene	UG/KG	0	0%		0	0	86			13	U	12	U	14	U	14	U			14	U	15	U
Ethyl benzene	UG/KG	0	0%	5500	0	0	86			13	U	12	U	14	UJ	14	U			14	U	15	UJ
Methyl bromide	UG/KG	0	0%		0	0	86			13	U	12	U	14	U	14	U			14	U	15	U
Methyl butyl ketone	UG/KG	9	1%		0	1	86			13	U	12	U	14	U	14	U			14	U	15	U
Methyl chloride	UG/KG	0	0%		0	0	86			13	U	12	U	14	U	14	U			14	U	15	U
Methyl ethyl ketone	UG/KG	0	0%	300	0	0	86			13	U	12	U	14	U	14	U			14	U	15	U
Methyl isobutyl ketone	UG/KG	0	0%	1000	0	0	86			13	U	12	U	14	U	14	U			14	U	15	U
Methylene chloride	UG/KG	3	1%	100	0	1	86			13	U	12	U	14	U	14	U			14	U	15	U
Styrene	UG/KG	0	0%		0	0	86			13	U	12	U	14	UJ	14	U			14	U	15	UJ
Tetrachloroethene	UG/KG	0	0%	1400	0	0	86			13	U	12	U	14	U	14	U			14	U	15	U
Toluene	UG/KG	14	29%	1500	0	25	86			13	U	12	U	4	J	14	U			14	U	15	U
Total Xylenes	UG/KG	0	0%	1200	0	0	86			13	U	12	U	14	UJ	14	U			14	U	15	UJ
Trans-1,3-Dichloropropene	UG/KG	0	0%		0	0	86			13	U	12	U	14	U	14	U			14	U	15	U
Trichloroethene	UG/KG	3	3%	700	0	3	86			13	U	12	U	14	U	14	U			14	U	15	U
Vinyl chloride	UG/KG	0	0%	200	0	0	86			13	U	12	U	14	U	14	U			14	U	15	U
SEMIVOLATILES																							
1,2,4-Trichlorobenzene	UG/KG	0	0%	3400	0	0	86			410	U	82	U	90	U	88	U			410	U	97	U
1,2-Dichlorobenzene	UG/KG	0	0%	7900	0	0	86			410	U	82	U	90	U	88	U			410	U	97	U
1,3-Dichlorobenzene	UG/KG	0	0%	1600	0	0	86			410	U	82	U	90	U	88	U			410	U	97	U
1,4-Dichlorobenzene	UG/KG	0	0%	8500	0	0	86			410	U	82	U	90	U	88	U			410	U	97	U
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%		0	0	7			410	U									410	U		
2,4,5-Trichlorophenol	UG/KG	0	0%	100	0	0	86			1000	U	200	U	220	U	210	U			1000	U	240	UJ
2,4,6-Trichlorophenol	UG/KG	0	0%		0	0	86			410	U	82	U	90	U	88	U			410	U	97	U
2,4-Dichlorophenol	UG/KG	0	0%	400	0	0	86			410	U	82	U	90	U	88	U			410	U	97	U
2,4-Dimethylphenol	UG/KG	0	0%		0	0	86			410	U	82	U	90	U	88	U			410	U	97	U
2,4-Dinitrophenol	UG/KG	0	0%	200	0	0	86			1000	U	200	UJ	220	UJ	210	UJ			1000	U	240	UJ
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	86			410	U	82	U	90	U	88	U			410	U	97	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	86			410	U	82	U	90	U	88	U			410	U	97	U
2-Chloronaphthalene	UG/KG	0	0%		0	0	86			410	U	82	U	90	U	88	U			410	U	97	U
2-Chlorophenol	UG/KG	0	0%	800	0	0	86			410	U	82	U	90	U	88	U			410	U	97	U
2-Methylnaphthalene	UG/KG	35	16%	36400	0	14	86			410	U	82	U	90	U	88	U			410	U	97	U
2-Methylphenol	UG/KG	0	0%	100	0	0	86			410	U	82	U	90	U	88	U			410	U	97	U
2-Nitroaniline	UG/KG	0	0%	430	0	0	86			1000	U	200	U	220	U	210	U			1000	U	240	U
2-Nitrophenol	UG/KG	0	0%	330	0	0	86			410	U	82	U	90	U	88	U			410	U	97	U
3,3'-Dichlorobenzidine	UG/KG	0	0%		0	0	86			410	U	82	U	90	U	88	U			410	U	97	U
3-Nitroaniline	UG/KG	0	0%	500	0	0	86			1000	U	200	UJ	220	UJ	210	UJ			1000	U	240	UJ
4,6-Dinitro-2-methylphenol	UG/KG	0	0%		0	0	86			1000	U	200	UJ	220	UJ	210	UJ			1000	U	240	UJ
4-Bromophenyl phenyl ether	UG/KG	0	0%		0	0	86			410	U	82	U	90	U	88	U			410	U	97	U
4-Chloro-3-methylphenol	UG/KG	0	0%	240	0	0	86			410	U	82	U	90	U	88	U			410	U	97	U
4-Chloroaniline	UG/KG	0	0%	220	0	0	86			410	U	82	U	90	U	88	U			410	U	97	U
4-Chlorophenyl phenyl ether	UG/KG	0	0%		0	0	86			410	U	82	U	90	U	88	U			410	U	97	U
4-Methylphenol	UG/KG	0	0%	900	0	0	86			410	U	82	U	90	U	88	U			410	U	97	U
4-Nitroaniline	UG/KG	0	0%		0	0	86			1000	U	200	U	220	U	210	U			1000	U	240	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Surface Soil Sample Results

ANALYTE	UNITS	MAXIMUM	FREQ OF DETCTION	NYSDEC TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								SS4-3		SS4-3		SS4-35		SS4-36		SS4-38		SS4-4		SS4-4		SS4-42	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								43201		SS4-3		43029		43030		43032		43181		SS4-4		43036	
								0		0		0		0		0		0		0		0	
								0.2		0.5		0.2		0.2		0.2		0.2		0.5		0.2	
								7/11/1999		12/13/1993		12/3/1998		12/3/1998		12/3/1998		7/11/1999		12/13/1993		12/3/1998	
								SA		SA		SA		SA		SA		SA		SA		SA	
								HEX CHROME		ESI		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		HEX CHROME		ESI		RI Phase 1 Step 1	
								N		N		N		N		N		N		N		N	
4-Nitrophenol	UG/KG	0	0%	100	0	0	86			1000	U	200	U	220	U	210	U			1000	U	240	U
Acenaphthene	UG/KG	78	9%	50000	0	8	86			410	U	82	U	90	U	88	U			410	U	97	U
Acenaphthylene	UG/KG	32	9%	41000	0	8	86			410	U	82	U	90	U	88	U			410	U	97	U
Anthracene	UG/KG	110	17%	50000	0	15	86			410	U	82	U	90	U	88	U			410	U	97	U
Benzo(a)anthracene	UG/KG	560	83%	224	5	71	86			410	U	7.3	J	21	J	13	J			410	U	19	J
Benzo(a)pyrene	UG/KG	450	80%	61	11	69	86			410	U	7.8	J	24	J	15	J			410	U	22	J
Benzo(b)fluoranthene	UG/KG	890	80%	1100	0	69	86			410	U	9.6	J	21	J	17	J			24	J	28	J
Benzo(ghi)perylene	UG/KG	310	55%	50000	0	47	86			410	U	6.8	J	19	J	13	J			410	U	18	J
Benzo(k)fluoranthene	UG/KG	510	50%	1100	0	43	86			410	U	7.5	J	24	J	13	J			410	U	23	J
Bis(2-Chloroethoxy)methane	UG/KG	0	0%		0	0	86			410	U	82	U	90	U	88	U			410	U	97	U
Bis(2-Chloroethyl)ether	UG/KG	0	0%		0	0	86			410	U	82	U	90	U	88	U			410	U	97	U
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%		0	0	79					82	U	90	U	88	U					97	U
Bis(2-Ethylhexyl)phthalate	UG/KG	13000	59%	50000	0	51	86			410	U	31	J	90	UJ	24	J			23	J	31	J
Butylbenzylphthalate	UG/KG	12000	12%	50000	0	10	86			410	U	82	UJ	90	UJ	88	UJ			410	U	97	UJ
Carbazole	UG/KG	120	22%		0	19	86			410	U	82	U	90	U	88	U			410	U	97	U
Chrysene	UG/KG	570	86%	400	4	74	86			410	U	9.3	J	28	J	17	J			410	U	28	J
Di-n-butylphthalate	UG/KG	220	44%	8100	0	38	86			410	U	5.2	J	90	UJ	5.4	J			410	U	97	UJ
Di-n-octylphthalate	UG/KG	44	8%	50000	0	7	86			410	U	82	UJ	90	UJ	88	UJ			410	U	97	UJ
Dibenz(a,h)anthracene	UG/KG	130	22%	14	12	19	86			410	U	82	U	90	U	88	U			410	U	97	U
Dibenzofuran	UG/KG	58	16%	6200	0	14	86			410	U	82	U	90	U	88	U			410	U	97	U
Diethyl phthalate	UG/KG	22	16%	7100	0	14	86			410	U	82	U	90	U	88	U			410	U	97	U
Dimethylphthalate	UG/KG	0	0%	2000	0	0	86			410	U	82	U	90	U	88	U			410	U	97	U
Fluoranthene	UG/KG	1100	93%	50000	0	80	86			410	U	15	J	46	J	34	J			19	J	51	J
Fluorene	UG/KG	74	6%	50000	0	5	86			410	U	82	U	90	U	88	U			410	U	97	U
Hexachlorobenzene	UG/KG	0	0%	410	0	0	86			410	U	82	U	90	U	88	U			410	U	97	U
Hexachlorobutadiene	UG/KG	0	0%		0	0	86			410	U	82	U	90	U	88	U			410	U	97	U
Hexachlorocyclopentadiene	UG/KG	0	0%		0	0	86			410	U	82	UJ	90	UJ	88	UJ			410	U	97	UJ
Hexachloroethane	UG/KG	0	0%		0	0	86			410	U	82	U	90	U	88	U			410	U	97	U
Indeno(1,2,3-cd)pyrene	UG/KG	320	53%	3200	0	46	86			410	U	6.6	J	18	J	12	J			410	U	16	J
Isophorone	UG/KG	0	0%	4400	0	0	86			410	U	82	U	90	U	88	U			410	U	97	U
N-Nitrosodiphenylamine	UG/KG	19	1%		0	1	86			410	U	82	U	90	U	88	U			410	U	97	U
N-Nitrosodipropylamine	UG/KG	0	0%		0	0	86			410	U	82	U	90	U	88	U			410	U	97	U
Naphthalene	UG/KG	74	13%	13000	0	11	86			410	U	82	U	90	U	88	U			410	U	97	U
Nitrobenzene	UG/KG	0	0%	200	0	0	86			410	U	82	U	90	U	88	U			410	U	97	U
Pentachlorophenol	UG/KG	0	0%	1000	0	0	86			1000	U	200	UJ	220	UJ	210	UJ			1000	U	240	UJ
Phenanthrene	UG/KG	640	87%	50000	0	75	86			410	U	6.4	J	18	J	14	J			410	U	23	J
Phenol	UG/KG	17	2%	30	0	2	86			410	U	82	U	90	U	88	U			410	U	97	U
Pyrene	UG/KG	990	88%	50000	0	76	86			410	U	11	J	38	J	25	J			410	U	37	J
EXPLOSIVES																							
1,3,5-Trinitrobenzene	UG/KG	120	1%		0	1	86			130	U	120	U	120	U	120	U			130	U	120	U
1,3-Dinitrobenzene	UG/KG	0	0%		0	0	86			130	U	120	U	120	U	120	U			130	U	120	U
2,4,6-Trinitrotoluene	UG/KG	72	1%		0	1	86			130	U	120	U	120	U	120	U			130	U	120	U
2,4-Dinitrotoluene	UG/KG	330	2%		0	2	86			130	U	120	U	120	U	120	U			130	U	120	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	86			130	U	120	U	120	U	120	U			130	U	120	U
2-Nitrotoluene	UG/KG	0	0%		0	0	79					120	U	120	U	120	U					120	U
2-amino-4,6-Dinitrotoluene	UG/KG	90	1%		0	1	86			130	U	120	U	120	U	120	U			130	U	120	U
3-Nitrotoluene	UG/KG	0	0%		0	0	79					120	U	120	U	120	U					120	U
4-Nitrotoluene	UG/KG	390	1%		0	1	79					120	U	120	U	120	U					120	U
4-amino-2,6-Dinitrotoluene	UG/KG	0	0%		0	0	86			130	U	120	U	120	U	120	U			130	U	120	U
HMX	UG/KG	0	0%		0	0	86			130	U	120	U	120	U	120	U			130	U	120	U
Nitrobenzene	UG/KG	0	0%	200	0	0	79					120	U	120	U	120	U					120	U
RDX	UG/KG	0	0%		0	0	86			130	U	120	U	120	U	120	U			130	U	120	U
Tetryl	UG/KG	0	0%		0	0	86			130	U	120	U	120	U	120	U			130	U	120	U
PESTICIDES/PCBs																							
4,4'-DDD	UG/KG	190	23%	2900	0	20	86			4.1	U	4.2	U	2.8	J	4.4	U			4.1	U	4.9	U
4,4'-DDE	UG/KG	160	31%	2100	0	27	86			4.1	U	4.2	U	4.5	U	4.4	U			4.1	U	4.9	U
4,4'-DDT	UG/KG	760	34%	2100	0	29	86			4.1	U	3.1	J	4.5	U	4.4	U			4.1	U	4.9	U
Aldrin	UG/KG	2.2	1%	41	0	1	86			2.1	U	2.1	U	2.3	U	2.2	U			2.1	U	2.4	U
Alpha-BHC	UG/KG	2.4	6%	110	0	5	86			2.1	U	2.1	U	2.3	U	2.2	U			2.1	U	2.4	U
Alpha-Chlordane	UG/KG	4.9	9%		0	8	86			2.1	U	2.1	U	2.3	U	2.2	U			2.1	U	2.4	U
Aroclor-1016	UG/KG	0	0%		0	0	86			41	U	42	U	45	U	44	U			41	U	49	U
Aroclor-1221	UG/KG	0	0%		0	0	86			84	U	83	U	92	U	89	U			84	U	98	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Surface Soil Sample Results

								SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								SS4-3		SS4-3		SS4-35		SS4-36		SS4-38		SS4-4		SS4-4		SS4-42	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								43201		**SS4-3**		**43029**		**43030**		**43032**		**43181**		**SS4-4**		**43036**	
								0		0		0		0		0		0		0		0	
								0.2		0.5		0.2		0.2		0.2		0.2		0.5		0.2	
								7/11/1999		12/13/1993		12/3/1998		12/3/1998		12/3/1998		7/11/1999		12/13/1993		12/3/1998	
ANALYTE	UNITS	MAXIMUM	FREQ OF DETCTION	NYSDEC TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SA		SA		SA		SA		SA		SA		SA		SA	
								HEX CHROME		ESI		RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	HEX CHROME		ESI		RI Phase 1	Step 1
								N		N		N		N		N		N		N		N	
Aroclor-1232	UG/KG	0	0%		0	0	86			41	U	42	U	45	U	44	U			41	U	49	U
Aroclor-1242	UG/KG	0	0%		0	0	86			41	U	42	U	45	U	44	U			41	U	49	U
Aroclor-1248	UG/KG	0	0%		0	0	86			41	U	42	U	45	U	44	U			41	U	49	U
Aroclor-1254	UG/KG	310	26%	10000	0	22	86			41	U	42	U	45	U	44	U			38	J	49	U
Aroclor-1260	UG/KG	110	3%	10000	0	3	86			41	U	42	U	45	U	44	U			41	U	49	U
Beta-BHC	UG/KG	7.6	12%	200	0	10	86			2.1	U	2.1	U	2.3	U	2.2	U			2.1	U	2.4	U
Delta-BHC	UG/KG	0	0%	300	0	0	86			2.1	U	2.1	U	2.3	U	2.2	U			2.1	U	2.4	U
Dieldrin	UG/KG	7.4	6%	44	0	5	86			4.1	U	4.2	U	4.5	U	4.4	U			4.1	U	4.9	U
Endosulfan I	UG/KG	1.7	5%	900	0	4	86			2.1	U	2.1	U	2.3	U	2.2	U			2.1	U	2.4	U
Endosulfan II	UG/KG	5.2	3%	900	0	3	86			4.1	U	4.2	U	4.5	U	4.4	U			4.1	U	4.9	U
Endosulfan sulfate	UG/KG	3.8	1%	1000	0	1	86			4.1	U	4.2	U	4.5	U	4.4	U			4.1	U	4.9	U
Endrin	UG/KG	27	3%	100	0	3	86			4.1	U	4.2	U	4.5	U	4.4	U			4.1	U	4.9	U
Endrin aldehyde	UG/KG	20	12%		0	10	86			4.1	U	4.2	U	4.5	U	4.4	U			4.1	U	4.9	U
Endrin ketone	UG/KG	4.2	3%		0	3	86			4.1	U	4.2	U	4.5	U	4.4	U			4.1	U	4.9	U
Gamma-BHC/Lindane	UG/KG	0	0%	60	0	0	86			2.1	U	2.1	U	2.3	U	2.2	U			2.1	U	2.4	U
Gamma-Chlordane	UG/KG	7.4	9%	540	0	8	86			2.1	U	2.1	U	2.3	U	2.2	U			2.1	U	2.4	U
Heptachlor	UG/KG	4.2	3%	100	0	3	86			2.1	U	2.1	U	2.3	U	2.2	U			2.1	U	2.4	U
Heptachlor epoxide	UG/KG	3.6	5%	20	0	4	86			2.1	U	2.1	U	2.3	U	2.2	U			2.1	U	2.4	U
Methoxychlor	UG/KG	0	0%		0	0	86			21	U	21	U	23	U	22	U			21	U	24	U
Toxaphene	UG/KG	0	0%		0	0	86			210	U	210	U	230	U	220	U			210	U	240	U
HERBICIDES																							
2,4,5-T	UG/KG	0	0%	1900	0	0	7			6.3	U									6.3	U		
2,4,5-TP/Silvex	UG/KG	0	0%	700	0	0	7			6.3	U									6.3	U		
2,4-D	UG/KG	0	0%	500	0	0	7			63	U									63	U		
2,4-DB	UG/KG	0	0%		0	0	7			63	U									63	U		
Dalapon	UG/KG	0	0%		0	0	7			150	U									150	U		
Dicamba	UG/KG	0	0%		0	0	7			6.3	U									6.3	U		
Dichloroprop	UG/KG	0	0%		0	0	7			63	U									63	U		
Dinoseb	UG/KG	0	0%		0	0	7			32	U									32	U		
MCPA	UG/KG	0	0%		0	0	7			6300	U									6300	U		
MCPP	UG/KG	0	0%		0	0	7			6300	U									6300	U		
METALS																							
Aluminum	MG/KG	18800	100%	19520 *	0	86	86			10300		14500	J	11900	J	11700	J			15100		13100	J
Antimony	MG/KG	148	40%	6 *	15	34	86			17.1	J	0.59	UJ	0.84	R	0.8	UJ			[illegible]	J	[illegible]	J
Arsenic	MG/KG	14.6	100%	8.9 *	4	86	86			7		4.4		3.6		3.4				6.1		3.9	
Barium	MG/KG	278	100%	300	0	86	86			34.4		57.7		59.6	J	69.8				58.2		76.2	
Beryllium	MG/KG	1.8	100%	1.13 *	1	86	86			0.53	J	0.64	J	0.51	J	0.5	J			0.7	J	0.7	J
Cadmium	MG/KG	2.3	13%	2.46 *	0	11	86			0.36	U	0.04	U	0.05	U	0.05	U			0.51	U	0.05	U
Calcium	MG/KG	196000	100%	125300 *	3	86	86			11200		2800		3200	J	3710				6930		4820	
Chromium	MG/KG	18600	100%	30 *	37	86	86			[illegible]	J	31.6		19	J	[illegible]				[illegible]	J	[illegible]	
Cobalt	MG/KG	19.9	100%	30	0	86	86			10.2		12.2		9.6	J	7.3	J			12.8		7.5	J
Copper	MG/KG	7330	100%	33 *	30	86	86			[illegible]	J	17.5	J	14.2	J	18.3	J			[illegible]	J	33.9	J
Cyanide	MG/KG	0.87	2%	0.35	2	2	86			0.6	U	0.71	UJ	0.77	U	0.73	UJ			0.62	U	0.84	UJ
Iron	MG/KG	64600	100%	37410 *	2	86	86			21900		27400	J	21900	J	18000	J			31000		20700	J
Lead	MG/KG	11200	92%	24.4 *	36	79	86			27.3	R	15.4	J	25.1	J	15.4	J			19	R	22.4	J
Magnesium	MG/KG	35300	100%	21700 *	1	86	86			4400		4760		3800	J	3080				5950		3770	
Manganese	MG/KG	1540	100%	1100 *	3	86	86			335		381	J	548	J	446	J			339		133	J
Mercury	MG/KG	1.2	52%	0.1	16	45	86			[illegible]		0.08	J	0.06	UJ	0.06	U			[illegible]		0.09	J
Nickel	MG/KG	228	100%	50 *	1	86	86			25.9		30.5	J	24.8	J	17.5	J			34.3		23.1	J
Potassium	MG/KG	2340	100%	2623 *	0	86	86			861		1520		937	J	1440				1310		1490	
Selenium	MG/KG	3.4	23%	2	1	20	86			0.2	J	0.68	U	0.97	U	0.93	U			0.16	J	0.81	U
Silver	MG/KG	1.7	6%	0.8 *	1	5	86			0.72	U	0.19	U	0.27	U	0.26	U			1	U	0.23	U
Sodium	MG/KG	1270	34%	188 *	2	29	86			57.8	J	49.6	U	70.7	U	67.4	U			50.4	J	59.3	U
Thallium	MG/KG	5.4	22%	0.855 *	16	19	86			0.25	U	0.68	U	1.6	J	0.93	U			0.18	U	0.81	U
Vanadium	MG/KG	1250	100%	150	1	86	86			14.7		22.6		21	J	21.1				24.1		23.4	
Zinc	MG/KG	2020	100%	115 *	29	86	86			[illegible]		90.9		57.4	J	70.3				[illegible]		131	
Chromium, Hexavalent	MG/KG	14.7	27%		0	4	15	5.9	U									6	U				
Nitrate/Nitrite	MG/KG						66					0.04		0.12	J	0.05						0.01	

* Soil criteria for these inorganics are site background values.

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Surface Soil Sample Results

								SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								SS4-42		SS4-43		SS4-43		SS4-46		SS4-47		SS4-5		SS4-5		SS4-53	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								43198		43038		43037		43041		43042		43188		SS4-5		43048	
								0		0		0		0		0		0		0		0	
								0.2		0.2		0.2		0.2		0.2		0.2		0.5		0.2	
								7/11/1999		12/2/1998		12/2/1998		12/3/1998		12/3/1998		7/11/1999		12/13/1993		12/3/1998	
								SA		DU		SA		SA		SA		SA		SA		SA	
ANALYTE	UNITS	MAXIMUM	FREQ OF DETCTION	NYSDEC TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	HEX CHROME		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		HEX CHROME		ESI		RI Phase 1 Step 1	
								N		N		N		N		N		N		N		N	
VOLATILES																							
1,1,1-Trichloroethane	UG/KG	0	0%	800	0	0	86			13	U	12	U	14	U	13	U			13	U	15	U
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	600	0	0	86			13	U	12	U	14	U	13	U			13	U	15	UJ
1,1,2-Trichloroethane	UG/KG	0	0%		0	0	86			13	U	12	U	14	U	13	U			13	U	15	U
1,1-Dichloroethane	UG/KG	2	2%	200	0	2	86			13	U	12	U	14	U	13	U			13	U	15	U
1,1-Dichloroethene	UG/KG	0	0%	400	0	0	86			13	U	12	U	14	U	13	U			13	U	15	U
1,2-Dichloroethane	UG/KG	0	0%	100	0	0	86			13	U	12	U	14	U	13	U			13	U	15	U
1,2-Dichloroethene (total)	UG/KG	4	3%		0	3	86			13	U	12	U	14	U	13	U			13	U	15	U
1,2-Dichloropropane	UG/KG	0	0%		0	0	86			13	U	12	U	14	U	13	U			13	U	15	U
Acetone	UG/KG	140	31%	200	0	27	86			12	J	16		14	U	13	U			13	U	15	U
Benzene	UG/KG	1	1%	60	0	1	86			13	U	12	U	14	U	13	U			13	U	15	U
Bromodichloromethane	UG/KG	0	0%		0	0	86			13	U	12	U	14	U	13	U			13	U	15	U
Bromoform	UG/KG	0	0%		0	0	86			13	U	12	U	14	U	13	U			13	U	15	UJ
Carbon disulfide	UG/KG	0	0%	2700	0	0	86			13	U	12	U	14	U	13	U			13	U	15	U
Carbon tetrachloride	UG/KG	0	0%	600	0	0	86			13	U	12	U	14	U	13	U			13	U	15	U
Chlorobenzene	UG/KG	0	0%	1700	0	0	86			13	U	12	U	14	U	13	U			13	U	15	UJ
Chlorodibromomethane	UG/KG	0	0%		0	0	86			13	U	12	U	14	U	13	U			13	U	15	U
Chloroethane	UG/KG	0	0%	1900	0	0	86			13	U	12	U	14	U	13	U			13	U	15	U
Chloroform	UG/KG	0	0%	300	0	0	86			13	U	12	U	14	U	13	U			13	U	15	U
Cis-1,3-Dichloropropene	UG/KG	0	0%		0	0	86			13	U	12	U	14	U	13	U			13	U	15	U
Ethyl benzene	UG/KG	0	0%	5500	0	0	86			13	U	12	U	14	U	13	U			13	U	15	UJ
Methyl bromide	UG/KG	0	0%		0	0	86			13	U	12	U	14	U	13	U			13	U	15	U
Methyl butyl ketone	UG/KG	9	1%		0	1	86			13	U	12	U	14	U	13	U			13	U	15	U
Methyl chloride	UG/KG	0	0%		0	0	86			13	U	12	U	14	U	13	U			13	U	15	U
Methyl ethyl ketone	UG/KG	0	0%	300	0	0	86			13	U	12	U	14	U	13	U			13	U	15	U
Methyl isobutyl ketone	UG/KG	0	0%	1000	0	0	86			13	U	12	U	14	U	13	U			13	U	15	U
Methylene chloride	UG/KG	3	1%	100	0	1	86			13	U	12	U	14	U	13	U			13	U	15	U
Styrene	UG/KG	0	0%		0	0	86			13	U	12	U	14	U	13	U			13	U	15	UJ
Tetrachloroethene	UG/KG	0	0%	1400	0	0	86			13	U	12	U	14	U	13	U			13	U	15	U
Toluene	UG/KG	14	29%	1500	0	25	86			13	U	12	U	14	U	13	U			13	U	15	U
Total Xylenes	UG/KG	0	0%	1200	0	0	86			13	U	12	U	14	U	13	U			13	U	15	UJ
Trans-1,3-Dichloropropene	UG/KG	0	0%		0	0	86			13	U	12	U	14	U	13	U			13	U	15	U
Trichloroethene	UG/KG	3	3%	700	0	3	86			13	U	12	U	14	U	13	U			13	U	15	U
Vinyl chloride	UG/KG	0	0%	200	0	0	86			13	U	12	U	14	U	13	U			13	U	15	U
SEMIVOLATILES																							
1,2,4-Trichlorobenzene	UG/KG	0	0%	3400	0	0	86			85	U	82	U	89	U	87	U			400	U	140	U
1,2-Dichlorobenzene	UG/KG	0	0%	7900	0	0	86			85	U	82	U	89	U	87	U			400	U	140	U
1,3-Dichlorobenzene	UG/KG	0	0%	1600	0	0	86			85	U	82	U	89	U	87	U			400	U	140	U
1,4-Dichlorobenzene	UG/KG	0	0%	8500	0	0	86			85	U	82	U	89	U	87	U			400	U	140	U
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%		0	0	7													400	U		
2,4,5-Trichlorophenol	UG/KG	0	0%	100	0	0	86			200	U	200	U	220	U	210	U			980	U	330	U
2,4,6-Trichlorophenol	UG/KG	0	0%		0	0	86			85	U	82	U	89	U	87	U			400	U	140	U
2,4-Dichlorophenol	UG/KG	0	0%	400	0	0	86			85	U	82	U	89	U	87	U			400	U	140	U
2,4-Dimethylphenol	UG/KG	0	0%		0	0	86			85	UJ	82	UJ	89	UJ	87	UJ			400	U	140	UJ
2,4-Dinitrophenol	UG/KG	0	0%	200	0	0	86			200	U	200	U	220	U	210	U			980	U	330	U
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	86			85	U	82	U	89	U	87	U			400	U	140	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	86			85	U	82	U	89	U	87	U			400	U	140	U
2-Chloronaphthalene	UG/KG	0	0%		0	0	86			85	U	82	U	89	U	87	U			400	U	140	U
2-Chlorophenol	UG/KG	0	0%	800	0	0	86			85	U	82	U	89	U	87	U			400	U	140	U
2-Methylnaphthalene	UG/KG	35	16%	36400	0	14	86			85	U	82	U	89	U	87	U			400	U	140	U
2-Methylphenol	UG/KG	0	0%	100	0	0	86			85	U	82	U	89	U	87	U			400	U	140	U
2-Nitroaniline	UG/KG	0	0%	430	0	0	86			200	U	200	U	220	U	210	U			980	U	330	U
2-Nitrophenol	UG/KG	0	0%	330	0	0	86			85	U	82	U	89	U	87	U			400	U	140	U
3,3'-Dichlorobenzidine	UG/KG	0	0%		0	0	86			85	U	82	U	89	U	87	U			400	U	140	U
3-Nitroaniline	UG/KG	0	0%	500	0	0	86			200	U	200	U	220	U	210	U			980	U	330	U
4,6-Dinitro-2-methylphenol	UG/KG	0	0%		0	0	86			200	U	200	U	220	U	210	U			980	U	330	U
4-Bromophenyl phenyl ether	UG/KG	0	0%		0	0	86			85	U	82	U	89	U	87	U			400	U	140	U
4-Chloro-3-methylphenol	UG/KG	0	0%	240	0	0	86			85	U	82	U	89	U	87	U			400	U	140	U
4-Chloroaniline	UG/KG	0	0%	220	0	0	86			85	U	82	U	89	U	87	U			400	U	140	U
4-Chlorophenyl phenyl ether	UG/KG	0	0%		0	0	86			85	U	82	U	89	U	87	U			400	U	140	U
4-Methylphenol	UG/KG	0	0%	900	0	0	86			85	U	82	U	89	U	87	U			400	U	140	U
4-Nitroaniline	UG/KG	0	0%		0	0	86			200	U	200	U	220	U	210	U			980	U	330	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Surface Soil Sample Results

ANALYTE	UNITS	MAXIMUM	FREQ OF DETCTION	NYSDEC TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								SS4-42		SS4-43		SS4-43		SS4-46		SS4-47		SS4-5		SS4-5		SS4-53	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								43198		43038		43037		43041		43042		43188		SS4-5		43048	
								0		0		0		0		0		0		0		0	
								0.2		0.2		0.2		0.2		0.2		0.2		0.5		0.2	
								7/11/1999		12/2/1998		12/2/1998		12/3/1998		12/3/1998		7/11/1999		12/13/1993		12/3/1998	
								SA		DU		SA		SA		SA		SA		SA		SA	
								HEX CHROME		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		HEX CHROME		ESI		RI Phase 1 Step 1	
								N		N		N		N		N		N		N		N	
4-Nitrophenol	UG/KG	0	0%	100	0	0	86			200	U	200	U	220	U	210	U			980	U	330	U
Acenaphthene	UG/KG	78	9%	50000	0	8	86			85	U	82	U	89	U	87	U			400	U	140	U
Acenaphthylene	UG/KG	32	9%	41000	0	8	86			85	UJ	82	UJ	89	UJ	87	UJ			400	U	140	UJ
Anthracene	UG/KG	110	17%	50000	0	15	86			85	U	82	U	89	U	87	U			400	U	140	U
Benzo(a)anthracene	UG/KG	560	83%	224	5	71	86			85	U	82	U	6.9	J	7.1	J			400	U	66	J
Benzo(a)pyrene	UG/KG	450	80%	61	11	69	86			85	U	82	U	8	J	8.8	J			400	U	[illegible]	J
Benzo(b)fluoranthene	UG/KG	890	80%	1100	0	69	86			85	U	82	U	89	U	26	J			400	U	100	J
Benzo(ghi)perylene	UG/KG	310	55%	50000	0	47	86			85	U	82	U	89	U	87	U			400	U	50	J
Benzo(k)fluoranthene	UG/KG	510	50%	1100	0	43	86			85	U	82	U	89	U	87	R			400	U	83	J
Bis(2-Chloroethoxy)methane	UG/KG	0	0%		0	0	86			85	U	82	U	89	U	87	U			400	U	140	U
Bis(2-Chloroethyl)ether	UG/KG	0	0%		0	0	86			85	U	82	U	89	U	87	U			400	U	140	U
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%		0	0	79			85	U	82	U	89	U	87	U					140	U
Bis(2-Ethylhexyl)phthalate	UG/KG	13000	59%	50000	0	51	86			18	J	14	J	17	J	17	J			33	J	800	
Butylbenzylphthalate	UG/KG	12000	12%	50000	0	10	86			85	U	82	U	89	U	87	U			400	U	8.9	J
Carbazole	UG/KG	120	22%		0	19	86			85	U	82	U	89	U	87	U			400	U	9.4	J
Chrysene	UG/KG	570	86%	400	4	74	86			85	U	82	U	10	J	13	J			400	U	90	J
Di-n-butylphthalate	UG/KG	220	44%	8100	0	38	86			5.5	J	5.5	J	89	U	6	J			400	U	43	J
Di-n-octylphthalate	UG/KG	44	8%	50000	0	7	86			85	U	82	U	89	U	87	U			400	U	140	U
Dibenz(a,h)anthracene	UG/KG	130	22%	14	12	19	86			85	U	82	U	89	U	87	U			400	U	16	J
Dibenzofuran	UG/KG	58	16%	6200	0	14	86			85	U	82	U	89	U	87	U			400	U	140	U
Diethyl phthalate	UG/KG	22	16%	7100	0	14	86			85	U	82	U	89	U	87	U			400	U	12	J
Dimethylphthalate	UG/KG	0	0%	2000	0	0	86			85	U	82	U	89	U	87	U			400	U	140	U
Fluoranthene	UG/KG	1100	93%	50000	0	80	86			20	J	16	J	18	J	23	J			400	U	140	
Fluorene	UG/KG	74	6%	50000	0	5	86			85	U	82	U	89	U	87	U			400	U	140	U
Hexachlorobenzene	UG/KG	0	0%	410	0	0	86			85	U	82	U	89	U	87	U			400	U	140	U
Hexachlorobutadiene	UG/KG	0	0%		0	0	86			85	U	82	U	89	U	87	U			400	U	140	U
Hexachlorocyclopentadiene	UG/KG	0	0%		0	0	86			85	U	82	U	89	U	87	U			400	U	140	U
Hexachloroethane	UG/KG	0	0%		0	0	86			85	U	82	U	89	U	87	U			400	U	140	U
Indeno(1,2,3-cd)pyrene	UG/KG	320	53%	3200	0	46	86			85	U	82	U	89	U	87	U			400	U	45	J
Isophorone	UG/KG	0	0%	4400	0	0	86			85	U	82	U	89	U	87	U			400	U	140	U
N-Nitrosodiphenylamine	UG/KG	19	1%		0	1	86			85	U	82	U	89	U	87	U			400	U	140	U
N-Nitrosodipropylamine	UG/KG	0	0%		0	0	86			85	U	82	U	89	U	87	U			400	U	140	U
Naphthalene	UG/KG	74	13%	13000	0	11	86			85	U	82	U	89	U	87	U			400	U	140	U
Nitrobenzene	UG/KG	0	0%	200	0	0	86			85	U	82	U	89	U	87	U			400	U	140	U
Pentachlorophenol	UG/KG	0	0%	1000	0	0	86			200	U	200	U	220	U	210	U			980	U	330	U
Phenanthrene	UG/KG	640	87%	50000	0	75	86			12	J	9.9	J	10	J	13	J			400	U	62	J
Phenol	UG/KG	17	2%	30	0	2	86			85	U	82	U	89	U	87	U			400	U	140	U
Pyrene	UG/KG	990	88%	50000	0	76	86			12	J	11	J	12	J	15	J			400	U	110	J
EXPLOSIVES																							
1,3,5-Trinitrobenzene	UG/KG	120	1%		0	1	86			120	U	120	U	120	U	120	U			130	U	120	U
1,3-Dinitrobenzene	UG/KG	0	0%		0	0	86			120	U	120	U	120	U	120	U			130	U	120	U
2,4,6-Trinitrotoluene	UG/KG	72	1%		0	1	86			120	U	120	U	120	U	120	U			130	U	120	U
2,4-Dinitrotoluene	UG/KG	330	2%		0	2	86			120	U	120	U	120	U	120	U			130	U	120	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	86			120	U	120	U	120	U	120	U			130	U	120	U
2-Nitrotoluene	UG/KG	0	0%		0	0	79			120	U	120	U	120	U	120	U					120	U
2-amino-4,6-Dinitrotoluene	UG/KG	90	1%		0	1	86			120	U	120	U	120	U	120	U			130	U	120	U
3-Nitrotoluene	UG/KG	0	0%		0	0	79			120	U	120	U	120	U	120	U					120	U
4-Nitrotoluene	UG/KG	390	1%		0	1	79			120	U	120	U	120	U	120	U					120	U
4-amino-2,6-Dinitrotoluene	UG/KG	0	0%		0	0	86			120	U	120	U	120	U	120	U			130	U	120	U
HMX	UG/KG	0	0%		0	0	86			120	U	120	U	120	U	120	U			130	U	120	U
Nitrobenzene	UG/KG	0	0%	200	0	0	79			120	U	120	U	120	U	120	U					120	U
RDX	UG/KG	0	0%		0	0	86			120	U	120	U	120	U	120	U			130	U	120	U
Tetryl	UG/KG	0	0%		0	0	86			120	U	120	U	120	U	120	U			130	U	120	U
PESTICIDES/PCBs																							
4,4'-DDD	UG/KG	190	23%	2900	0	20	86			4.3	U	4.2	U	4.3	J	4.4	U			4	U	4.3	U
4,4'-DDE	UG/KG	160	31%	2100	0	27	86			4.3	U	4.2	U	4.5	U	4.4	U			4	U	5	
4,4'-DDT	UG/KG	760	34%	2100	0	29	86			4.3	U	4.2	U	4.5	U	4.4	U			4	U	7.2	
Aldrin	UG/KG	2.2	1%	41	0	1	86			2.1	U	2.1	U	2.2	U	2.2	U			2.1	U	2.2	U
Alpha-BHC	UG/KG	2.4	6%	110	0	5	86			2.1	U	2.1	U	2.2	U	2.2	U			2.1	U	2.2	U
Alpha-Chlordane	UG/KG	4.9	9%		0	8	86			2.1	U	2.1	U	1.7	J	2.2	U			2.1	U	2.2	U
Aroclor-1016	UG/KG	0	0%		0	0	86			43	U	42	U	45	U	44	U			40	U	43	U
Aroclor-1221	UG/KG	0	0%		0	0	86			85	U	83	U	90	U	89	U			82	U	86	U

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ANALYTE	UNITS	MAXIMUM	FREQ OF DETCTION	NYSDEC TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								SS4-42		SS4-43		SS4-43		SS4-46		SS4-47		SS4-5		SS4-5		SS4-53	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								43198		43038		43037		43041		43042		43188		SS4-5		43048	
								0		0		0		0		0		0		0		0	
								0.2		0.2		0.2		0.2		0.2		0.2		0.5		0.2	
								7/11/1999		12/2/1998		12/2/1998		12/3/1998		12/3/1998		7/11/1999		12/13/1993		12/3/1998	
								SA		DU		SA		SA		SA		SA		SA		SA	
								HEX CHROME		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		HEX CHROME		ESI		RI Phase 1 Step 1	
								N		N		N		N		N		N		N		N	
Aroclor-1232	UG/KG	0	0%		0	0	86			43	U	42	U	45	U	44	U			40	U	43	U
Aroclor-1242	UG/KG	0	0%		0	0	86			43	U	42	U	45	U	44	U			40	U	43	U
Aroclor-1248	UG/KG	0	0%		0	0	86			43	U	42	U	45	U	44	U			40	U	43	U
Aroclor-1254	UG/KG	310	26%	10000	0	22	86			43	U	42	U	45	U	44	U			28	J	43	U
Aroclor-1260	UG/KG	110	3%	10000	0	3	86			43	U	42	U	45	U	44	U			40	U	43	U
Beta-BHC	UG/KG	7.6	12%	200	0	10	86			2.1	U	2.1	U	2.2	U	2.2	U			2.1	U	2.2	U
Delta-BHC	UG/KG	0	0%	300	0	0	86			2.1	U	2.1	U	2.2	U	2.2	U			2.1	U	2.2	U
Dieldrin	UG/KG	7.4	6%	44	0	5	86			4.3	U	4.2	U	4.5	U	4.4	U			4	U	4.3	U
Endosulfan I	UG/KG	1.7	5%	900	0	4	86			2.1	U	2.1	U	2.2	U	2.2	U			2.1	U	2.2	U
Endosulfan II	UG/KG	5.2	3%	900	0	3	86			4.3	U	4.2	U	4.5	U	4.4	U			4	U	4.3	U
Endosulfan sulfate	UG/KG	3.8	1%	1000	0	1	86			4.3	U	4.2	U	4.5	U	4.4	U			4	U	4.3	U
Endrin	UG/KG	27	3%	100	0	3	86			4.3	U	4.2	U	4.5	U	4.4	U			4	U	4.3	U
Endrin aldehyde	UG/KG	20	12%		0	10	86			7.5	J	7	J	4.5	U	4.4	U			4	U	3.2	J
Endrin ketone	UG/KG	4.2	3%		0	3	86			4.3	U	4.2	U	4.5	U	4.4	U			4	U	4.3	U
Gamma-BHC/Lindane	UG/KG	0	0%	60	0	0	86			2.1	U	2.1	U	2.2	U	2.2	U			2.1	U	2.2	U
Gamma-Chlordane	UG/KG	7.4	9%	540	0	8	86			2.1	U	2.1	U	2.2	U	2.2	U			2.1	U	2.2	U
Heptachlor	UG/KG	4.2	3%	100	0	3	86			2.1	U	2.1	U	2.2	U	2.2	U			2.1	U	2.2	U
Heptachlor epoxide	UG/KG	3.6	5%	20	0	4	86			2.1	U	2.1	U	2.2	U	2.2	U			2.1	U	2.2	U
Methoxychlor	UG/KG	0	0%		0	0	86			21	U	21	U	22	U	22	U			21	U	22	U
Toxaphene	UG/KG	0	0%		0	0	86			210	U	210	U	220	U	220	U			210	U	220	U
HERBICIDES																							
2,4,5-T	UG/KG	0	0%	1900	0	0	7													6.1	U		
2,4,5-TP/Silvex	UG/KG	0	0%	700	0	0	7													6.1	U		
2,4-D	UG/KG	0	0%	500	0	0	7													61	U		
2,4-DB	UG/KG	0	0%		0	0	7													61	U		
Dalapon	UG/KG	0	0%		0	0	7													150	U		
Dicamba	UG/KG	0	0%		0	0	7													6.1	U		
Dichloroprop	UG/KG	0	0%		0	0	7													61	U		
Dinoseb	UG/KG	0	0%		0	0	7													31	U		
MCPA	UG/KG	0	0%		0	0	7													6100	U		
MCPP	UG/KG	0	0%		0	0	7													6100	U		
METALS																							
Aluminum	MG/KG	18800	100%	19520 *	0	86	86			12200	J	10900	J	12900	J	12500	J			15900		12600	J
Antimony	MG/KG	148	40%	6 *	15	34	86			0.76	J	0.64	UJ	0.75	R	0.79	R			[illegible]	J	0.94	J
Arsenic	MG/KG	14.6	100%	8.9 *	4	86	86			4.1		4		6.1		6.8				[illegible]		5.5	
Barium	MG/KG	278	100%	300	0	86	86			70.3		57		74.3	J	77.3	J			92.1		70.6	J
Beryllium	MG/KG	1.8	100%	1.13 *	1	86	86			0.54	J	0.47	J	0.57	J	0.41	J			0.73	J	0.58	J
Cadmium	MG/KG	2.3	13%	2.46 *	0	11	86			0.04	U	0.04	U	0.05	U	0.05	U			0.48	U	0.04	U
Calcium	MG/KG	196000	100%	125300 *	3	86	86			4680		5570		3010	J	1970	J			7210		9970	J
Chromium	MG/KG	18600	100%	30 *	37	86	86			23.3		21		18.4		26.8				[illegible]	J	[illegible]	
Cobalt	MG/KG	19.9	100%	30	0	86	86			11		9.7	J	9.2	J	11.9	J			14.9		12.5	
Copper	MG/KG	7330	100%	33 *	30	86	86			15.1	J	26.3	J	17		18				[illegible]	J	[illegible]	
Cyanide	MG/KG	0.87	2%	0.35	2	2	86			0.72	UJ	0.74	UJ	0.81	U	0.69	U			0.58	U	0.73	U
Iron	MG/KG	64600	100%	37410 *	2	86	86			21400	J	20000	J	21900	J	22700	J			31000		27600	J
Lead	MG/KG	11200	92%	24.4 *	36	79	86			17.1	J	18.1	J	16.2	J	18.4	J			27.2	R	[illegible]	J
Magnesium	MG/KG	35300	100%	21700 *	1	86	86			3200		3350		3370	J	3230	J			5470		5850	J
Manganese	MG/KG	1540	100%	1100 *	3	86	86			642	J	515	J	592	J	[illegible]	J			533		370	J
Mercury	MG/KG	1.2	52%	0.1	16	45	86			0.06	U	0.07	J	0.07	U	0.07	J			[illegible]		0.06	U
Nickel	MG/KG	228	100%	50 *	1	86	86			20.4	J	22.7	J	18.1	J	19.6	J			35.3		34.1	J
Potassium	MG/KG	2340	100%	2623 *	0	86	86			1230		1030	J	1650		1260	J			1870		1670	
Selenium	MG/KG	3.4	23%	2	1	20	86			1.1		0.75	UJ	0.67	J	0.83	J			0.21	J	0.54	J
Silver	MG/KG	1.7	6%	0.8 *	1	5	86			0.21	U	0.21	U	0.24	U	0.25	U			0.96	U	0.2	U
Sodium	MG/KG	1270	34%	188 *	2	29	86			56	U	54.3	U	63.5	U	66.7	U			47.7	J	53.3	U
Thallium	MG/KG	5.4	22%	0.855 *	16	19	86			[illegible]	J	0.84	J	0.87	U	0.92	U			0.26	U	0.73	U
Vanadium	MG/KG	1250	100%	150	1	86	86			23		19.2		23.6	J	23.5	J			28.7		25.2	J
Zinc	MG/KG	2020	100%	115 *	29	86	86			68.9		57		69.6	J	71.9	J			[illegible]		[illegible]	J
Chromium, Hexavalent	MG/KG	14.7	27%		0	4	15	29.6	U									12.4	U				
Nitrate/Nitrite	MG/KG						66			0.04		0.04		0.03	J	0.03	J					0.04	J

* Soil criteria for these inorganics are site background values.

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Surface Soil Sample Results

								SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								SS4-54		SS4-55		SS4-55		SS4-56		SS4-57		SS4-58		SS4-59		SS4-6	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								43049		43051		43050		43052		43053		43054		43055		SS4-6	
								0		0		0		0		0		0		0		0	
								0.2		0.2		0.2		0.2		0.2		0.2		0.2		0.5	
								12/4/1998		12/3/1998		12/3/1998		12/3/1998		12/3/1998		12/3/1998		12/3/1998		12/13/1993	
								SA		DU		SA		SA		SA		SA		SA		SA	
ANALYTE	UNITS	MAXIMUM	FREQ OF DETCTION	NYSDEC TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		ESI	
								N		N		N		N		N		N		N		N	
VOLATILES																							
1,1,1-Trichloroethane	UG/KG	0	0%	800	0	0	86	15	U	14	U	14	U	13	UJ	12	U	11	R	13	U	13	U
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	600	0	0	86	15	R	14	UJ	14	UJ	13	R	12	UJ	11	R	13	UJ	13	U
1,1,2-Trichloroethane	UG/KG	0	0%		0	0	86	15	UJ	14	UJ	14	U	13	UJ	12	U	11	R	13	U	13	U
1,1-Dichloroethane	UG/KG	2	2%	200	0	2	86	15	U	14	U	14	U	13	UJ	12	U	11	R	2	J	13	U
1,1-Dichloroethene	UG/KG	0	0%	400	0	0	86	15	U	14	U	14	U	13	UJ	12	U	11	R	13	U	13	U
1,2-Dichloroethane	UG/KG	0	0%	100	0	0	86	15	U	14	U	14	U	13	UJ	12	U	11	R	13	U	13	U
1,2-Dichloroethene (total)	UG/KG	4	3%		0	3	86	15	U	14	U	14	U	13	UJ	12	U	11	R	4	J	13	U
1,2-Dichloropropane	UG/KG	0	0%		0	0	86	15	UJ	14	UJ	14	U	13	UJ	12	U	11	R	13	U	13	U
Acetone	UG/KG	140	31%	200	0	27	86	15	U	14	U	14	U	13	UJ	120	J	12	J	13	U	13	U
Benzene	UG/KG	1	1%	60	0	1	86	15	UJ	14	UJ	14	U	13	UJ	12	U	11	R	13	U	13	U
Bromodichloromethane	UG/KG	0	0%		0	0	86	15	UJ	14	UJ	14	U	13	UJ	12	U	11	R	13	U	13	U
Bromoform	UG/KG	0	0%		0	0	86	15	R	14	UJ	14	UJ	13	R	12	UJ	11	R	13	UJ	13	U
Carbon disulfide	UG/KG	0	0%	2700	0	0	86	15	U	14	U	14	U	13	UJ	12	U	11	R	13	U	13	U
Carbon tetrachloride	UG/KG	0	0%	600	0	0	86	15	U	14	U	14	U	13	UJ	12	U	11	R	13	U	13	U
Chlorobenzene	UG/KG	0	0%	1700	0	0	86	15	R	14	UJ	14	UJ	13	R	12	UJ	11	R	13	UJ	13	U
Chlorodibromomethane	UG/KG	0	0%		0	0	86	15	UJ	14	UJ	14	U	13	UJ	12	U	11	R	13	U	13	U
Chloroethane	UG/KG	0	0%	1900	0	0	86	15	U	14	U	14	U	13	UJ	12	U	11	R	13	U	13	U
Chloroform	UG/KG	0	0%	300	0	0	86	15	U	14	U	14	U	13	UJ	12	U	11	R	13	U	13	U
Cis-1,3-Dichloropropene	UG/KG	0	0%		0	0	86	15	UJ	14	UJ	14	U	13	UJ	12	U	11	R	13	U	13	U
Ethyl benzene	UG/KG	0	0%	5500	0	0	86	15	R	14	UJ	14	UJ	13	R	12	UJ	11	R	13	UJ	13	U
Methyl bromide	UG/KG	0	0%		0	0	86	15	U	14	U	14	U	13	UJ	12	U	11	R	13	U	13	U
Methyl butyl ketone	UG/KG	9	1%		0	1	86	15	U	14	U	14	U	13	UJ	12	U	11	R	13	U	13	U
Methyl chloride	UG/KG	0	0%		0	0	86	15	U	14	U	14	U	13	UJ	12	U	11	R	13	U	13	U
Methyl ethyl ketone	UG/KG	0	0%	300	0	0	86	15	U	14	U	14	U	13	UJ	12	U	11	R	13	U	13	U
Methyl isobutyl ketone	UG/KG	0	0%	1000	0	0	86	15	U	14	U	14	U	13	UJ	12	U	11	R	13	U	13	U
Methylene chloride	UG/KG	3	1%	100	0	1	86	15	U	14	U	14	U	13	UJ	12	U	11	R	13	U	13	U
Styrene	UG/KG	0	0%		0	0	86	15	R	14	UJ	14	UJ	13	R	12	UJ	11	R	13	UJ	13	U
Tetrachloroethene	UG/KG	0	0%	1400	0	0	86	15	U	14	U	14	U	13	UJ	12	U	11	R	13	U	13	U
Toluene	UG/KG	14	29%	1500	0	25	86	15	U	14	U	14	U	3	J	12	U	11	R	2	J	13	U
Total Xylenes	UG/KG	0	0%	1200	0	0	86	15	R	14	UJ	14	UJ	13	R	12	UJ	11	R	13	UJ	13	U
Trans-1,3-Dichloropropene	UG/KG	0	0%		0	0	86	15	UJ	14	UJ	14	U	13	UJ	12	U	11	R	13	U	13	U
Trichloroethene	UG/KG	3	3%	700	0	3	86	15	UJ	14	UJ	14	U	13	UJ	12	U	11	R	3	J	13	U
Vinyl chloride	UG/KG	0	0%	200	0	0	86	15	U	14	U	14	U	13	UJ	12	U	11	R	13	U	13	U
SEMIVOLATILES																							
1,2,4-Trichlorobenzene	UG/KG	0	0%	3400	0	0	86	520	U	88	U	87	U	78	U	120	U	720	U	90	U	440	U
1,2-Dichlorobenzene	UG/KG	0	0%	7900	0	0	86	520	U	88	U	87	U	78	U	120	U	720	U	90	U	440	U
1,3-Dichlorobenzene	UG/KG	0	0%	1600	0	0	86	520	U	88	U	87	U	78	U	120	U	720	U	90	U	440	U
1,4-Dichlorobenzene	UG/KG	0	0%	8500	0	0	66	520	U	88	U	87	U	78	U	120	U	720	U	90	U	440	U
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%		0	0	7															440	U
2,4,5-Trichlorophenol	UG/KG	0	0%	100	0	0	86	1200	U	210	U	210	U	190	U	300	U	1800	U	220	U	1100	U
2,4,6-Trichlorophenol	UG/KG	0	0%		0	0	86	520	U	88	U	87	U	78	U	120	U	720	U	90	U	440	U
2,4-Dichlorophenol	UG/KG	0	0%	400	0	0	86	520	U	88	U	87	U	78	U	120	U	720	U	90	U	440	U
2,4-Dimethylphenol	UG/KG	0	0%		0	0	86	520	UJ	88	UJ	87	UJ	78	UJ	120	UJ	720	UJ	90	UJ	440	U
2,4-Dinitrophenol	UG/KG	0	0%	200	0	0	86	1200	U	210	UJ	210	UJ	190	UJ	300	UJ	1800	UJ	220	UJ	1100	U
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	86	520	U	88	U	87	U	78	U	120	U	720	U	90	U	440	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	86	520	U	88	U	87	U	78	U	120	U	720	U	90	U	440	U
2-Chloronaphthalene	UG/KG	0	0%		0	0	86	520	U	88	U	87	U	78	U	120	U	720	U	90	U	440	U
2-Chlorophenol	UG/KG	0	0%	800	0	0	86	520	U	88	U	87	U	78	U	120	U	720	U	90	U	440	U
2-Methylnaphthalene	UG/KG	35	16%	36400	0	14	86	520	U	13	J	11	J	11	J	13	J	720	U	90	U	440	U
2-Methylphenol	UG/KG	0	0%	100	0	0	86	520	U	88	U	87	U	78	U	120	U	720	U	90	U	440	U
2-Nitroaniline	UG/KG	0	0%	430	0	0	86	1200	U	210	U	210	U	190	U	300	U	1800	U	220	U	1100	U
2-Nitrophenol	UG/KG	0	0%	330	0	0	86	520	U	88	U	87	U	78	U	120	U	720	U	90	U	440	U
3,3'-Dichlorobenzidine	UG/KG	0	0%		0	0	86	520	U	88	U	87	U	78	U	120	U	720	U	90	U	440	U
3-Nitroaniline	UG/KG	0	0%	500	0	0	86	1200	U	210	UJ	210	UJ	190	UJ	300	UJ	1800	UJ	220	UJ	1100	U
4,6-Dinitro-2-methylphenol	UG/KG	0	0%		0	0	86	1200	U	210	U	210	U	190	U	300	U	1800	U	220	U	1100	U
4-Bromophenyl phenyl ether	UG/KG	0	0%		0	0	86	520	U	88	U	87	U	78	U	120	U	720	U	90	U	440	U
4-Chloro-3-methylphenol	UG/KG	0	0%	240	0	0	86	520	U	88	U	87	U	78	U	120	U	720	U	90	U	440	U
4-Chloroaniline	UG/KG	0	0%	220	0	0	86	520	U	88	UJ	87	UJ	78	UJ	120	UJ	720	UJ	90	UJ	440	U
4-Chlorophenyl phenyl ether	UG/KG	0	0%		0	0	86	520	U	88	U	87	U	78	U	120	U	720	U	90	U	440	U
4-Methylphenol	UG/KG	0	0%	900	0	0	86	520	U	88	U	87	U	78	U	120	U	720	U	90	U	440	U
4-Nitroaniline	UG/KG	0	0%		0	0	86	1200	U	210	U	210	U	190	U	300	U	1800	U	220	U	1100	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
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ANALYTE	UNITS	MAXIMUM	FREQ OF DETCTION	NYSDEC TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								SS4-54		SS4-55		SS4-55		SS4-56		SS4-57		SS4-58		SS4-59		SS4-6	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								43049		43051		43050		43052		43053		43054		43055		SS4-6	
								0		0		0		0		0		0		0		0	
								0.2		0.2		0.2		0.2		0.2		0.2		0.2		0.5	
								12/4/1998		12/3/1998		12/3/1998		12/3/1998		12/3/1998		12/3/1998		12/3/1998		12/13/1993	
								SA		DU		SA		SA		SA		SA		SA		SA	
								RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	ESI	
								N		N		N		N		N		N		N		N	
4-Nitrophenol	UG/KG	0	0%	100	0	0	86	1200	U	210	U	210	U	190	U	300	U	1800	U	220	U	1100	U
Acenaphthene	UG/KG	78	9%	50000	0	8	86	64	J	18	J	18	J	7.2	J	120	U	720	U	90	U	440	U
Acenaphthylene	UG/KG	32	9%	41000	0	8	86	520	UJ	32	J	32	J	30	J	120	UJ	720	UJ	90	UJ	440	U
Anthracene	UG/KG	110	17%	50000	0	15	86	110	J	50	J	46	J	25	J	120	U	720	U	90	U	440	U
Benzo(a)anthracene	UG/KG	560	83%	224	5	71	86	[illegible]	J	[illegible]		[illegible]		[illegible]		15	J	720	U	12	J	440	U
Benzo(a)pyrene	UG/KG	450	80%	61	11	69	86	[illegible]	J	[illegible]		[illegible]		[illegible]		16	J	720	U	15	J	440	U
Benzo(b)fluoranthene	UG/KG	890	80%	1100	0	69	86	450	J	890	J	630		520	J	23	J	720	U	18	J	440	U
Benzo(ghi)perylene	UG/KG	310	55%	50000	0	47	86	230	J	290	J	310	J	180	J	120	UJ	720	UJ	12	J	440	U
Benzo(k)fluoranthene	UG/KG	510	50%	1100	0	43	86	510	J	88	R	500		78	R	23	J	720	U	17	J	440	U
Bis(2-Chloroethoxy)methane	UG/KG	0	0%		0	0	86	520	U	88	U	87	U	78	U	120	U	720	U	90	U	440	U
Bis(2-Chloroethyl)ether	UG/KG	0	0%		0	0	86	520	U	88	U	87	U	78	U	120	U	720	U	90	U	440	U
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%		0	0	79	520	U	88	U	87	U	78	U	120	U	720	U	90	U		
Bis(2-Ethylhexyl)phthalate	UG/KG	13000	59%	50000	0	51	86	12000		1800		1600		150		700		4400		4400		440	U
Butylbenzylphthalate	UG/KG	12000	12%	50000	0	10	86	30	J	88	U	87	U	78	U	14	J	75	J	7.6	J	440	U
Carbazole	UG/KG	120	22%		0	19	86	120	J	55	J	53	J	21	J	120	UJ	720	UJ	90	UJ	440	U
Chrysene	UG/KG	570	86%	400	4	74	86	[illegible]	J	[illegible]		[illegible]		370		28	J	720	U	16	J	440	U
Di-n-butylphthalate	UG/KG	220	44%	8100	0	38	86	28	J	26	J	18	J	7	J	7	J	720	U	21	J	440	U
Di-n-octylphthalate	UG/KG	44	8%	50000	0	7	86	42	J	88	U	87	U	78	U	120	U	720	U	90	U	440	U
Dibenz(a,h)anthracene	UG/KG	130	22%	14	12	19	86	[illegible]	J	[illegible]		[illegible]		[illegible]		120	U	720	U	90	U	440	U
Dibenzofuran	UG/KG	58	16%	6200	0	14	86	41	J	14	J	12	J	8.7	J	13	J	720	U	90	U	440	U
Diethyl phthalate	UG/KG	22	16%	7100	0	14	86	520	U	12	J	9.6	J	10	J	19	J	720	U	9.6	J	440	U
Dimethylphthalate	UG/KG	0	0%	2000	0	0	86	520	U	88	U	87	U	78	U	120	U	720	U	90	U	440	U
Fluoranthene	UG/KG	1100	93%	50000	0	80	86	960		1000		1100		490		40	J	39	J	24	J	23	J
Fluorene	UG/KG	74	6%	50000	0	5	86	62	J	30	J	87	U	76	U	120	U	720	U	90	U	440	U
Hexachlorobenzene	UG/KG	0	0%	410	0	0	86	520	U	88	U	87	U	78	U	120	U	720	U	90	U	440	U
Hexachlorobutadiene	UG/KG	0	0%		0	0	86	520	U	88	U	87	U	78	U	120	U	720	U	90	U	440	U
Hexachlorocyclopentadiene	UG/KG	0	0%		0	0	86	520	U	88	UJ	87	UJ	78	UJ	120	UJ	720	UJ	90	UJ	440	U
Hexachloroethane	UG/KG	0	0%		0	0	86	520	U	88	U	87	U	78	U	120	U	720	U	90	U	440	U
Indeno(1,2,3-cd)pyrene	UG/KG	320	53%	3200	0	46	86	210	J	320		220		160		120	U	720	U	90	U	440	U
Isophorone	UG/KG	0	0%	4400	0	0	86	520	U	88	U	87	U	78	U	120	U	720	U	90	U	440	U
N-Nitrosodiphenylamine	UG/KG	19	1%		0	1	86	520	U	88	U	87	U	78	U	120	U	720	U	90	U	440	U
N-Nitrosodipropylamine	UG/KG	0	0%		0	0	86	520	U	88	U	87	U	78	U	120	U	720	U	90	U	440	U
Naphthalene	UG/KG	74	13%	13000	0	11	86	39	J	88	U	9.7	J	78	U	12	J	720	U	90	U	440	U
Nitrobenzene	UG/KG	0	0%	200	0	0	86	520	U	88	U	87	U	78	U	120	U	720	U	90	U	440	U
Pentachlorophenol	UG/KG	0	0%	1000	0	0	86	1200	U	210	U	210	U	190	U	300	U	1800	U	220	U	1100	U
Phenanthrene	UG/KG	640	87%	50000	0	75	86	640		550		490		340		30	J	720	U	11	J	440	U
Phenol	UG/KG	17	2%	30	0	2	86	520	U	88	U	87	U	78	U	120	U	720	U	90	U	440	U
Pyrene	UG/KG	990	88%	50000	0	76	86	670		990		970		540		29	J	720	U	18	J	440	U
EXPLOSIVES																							
1,3,5-Trinitrobenzene	UG/KG	120	1%		0	1	86	120	U	120	U	120	U	120	U	120	U	120	U	120	U	130	U
1,3-Dinitrobenzene	UG/KG	0	0%		0	0	86	120	U	120	U	120	U	120	U	120	U	120	U	120	U	130	U
2,4,6-Trinitrotoluene	UG/KG	72	1%		0	1	86	120	U	120	U	120	U	120	U	120	U	120	U	120	U	130	U
2,4-Dinitrotoluene	UG/KG	330	2%		0	2	86	120	U	330	J	120	UJ	120	U	120	U	120	U	120	U	130	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	86	120	U	120	U	120	U	120	U	120	U	120	U	120	U	130	U
2-Nitrotoluene	UG/KG	0	0%		0	0	79	120	U	120	U	120	U	120	U	120	U	120	U	120	U		
2-amino-4,6-Dinitrotoluene	UG/KG	90	1%		0	1	86	120	U	120	U	120	U	120	U	120	U	120	U	120	U	130	U
3-Nitrotoluene	UG/KG	0	0%		0	0	79	120	U	120	U	120	U	120	U	120	U	120	U	120	U		
4-Nitrotoluene	UG/KG	390	1%		0	1	79	120	U	120	U	120	U	120	U	120	U	120	U	120	U		
4-amino-2,6-Dinitrotoluene	UG/KG	0	0%		0	0	86	120	U	120	U	120	U	120	U	120	U	120	U	120	U	130	U
HMX	UG/KG	0	0%		0	0	86	120	U	120	U	120	U	120	U	120	U	120	U	120	U	130	U
Nitrobenzene	UG/KG	0	0%	200	0	0	79	120	U	120	U	120	U	120	U	120	U	120	U	120	U		
RDX	UG/KG	0	0%		0	0	86	120	U	120	U	120	U	120	U	120	U	120	U	120	U	130	U
Tetryl	UG/KG	0	0%		0	0	86	120	U	120	U	120	U	120	U	120	U	120	U	120	U	130	U
PESTICIDES/PCBs																							
4,4'-DDD	UG/KG	190	23%	2900	0	20	86	190		4.4	U	4.4	U	4	U	3.7	U	3.7	U	4.6	U	4.4	U
4,4'-DDE	UG/KG	160	31%	2100	0	27	86	160		16		15		2.9	J	3.7	U	3.7	U	4.6	U	4.4	U
4,4'-DDT	UG/KG	760	34%	2100	0	29	86	760		29		27		5.1	J	7.5	J	3.7	U	4.6	U	4.4	U
Aldrin	UG/KG	2.2	1%	41	0	1	86	4	U	2.2	U	2.2	U	2	U	1.8	U	1.8	U	2.3	U	2.3	U
Alpha-BHC	UG/KG	2.4	6%	110	0	5	86	4	U	2.2	U	2.2	U	2	U	1.8	U	1.8	U	2.3	U	2.3	U
Alpha-Chlordane	UG/KG	4.9	9%		0	8	86	4	U	2.2	U	2.2	U	2	U	1.8	U	1.8	U	2.3	U	2.3	U
Aroclor-1016	UG/KG	0	0%		0	0	86	78	U	44	U	44	U	40	U	37	U	37	U	46	U	44	U
Aroclor-1221	UG/KG	0	0%		0	0	86	160	U	89	U	88	U	79	U	74	U	73	U	91	U	89	U

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SEAD-4 Remedial Investigation
Surface Soil Sample Results

ANALYTE	UNITS	MAXIMUM	FREQ OF DETCTION	NYSDEC TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4 SS4-54 SOIL 43049 0 0.2 12/4/1998 SA RI Phase 1 Step 1 N		SEAD-4 SS4-55 SOIL 43051 0 0.2 12/3/1998 DU RI Phase 1 Step 1 N		SEAD-4 SS4-55 SOIL 43050 0 0.2 12/3/1998 SA RI Phase 1 Step 1 N		SEAD-4 SS4-56 SOIL 43052 0 0.2 12/3/1998 SA RI Phase 1 Step 1 N		SEAD-4 SS4-57 SOIL 43053 0 0.2 12/3/1998 SA RI Phase 1 Step 1 N		SEAD-4 SS4-58 SOIL 43054 0 0.2 12/3/1998 SA RI Phase 1 Step 1 N		SEAD-4 SS4-59 SOIL 43055 0 0.2 12/3/1998 SA RI Phase 1 Step 1 N		SEAD-4 SS4-6 SOIL SS4-6 0 0.5 12/13/1993 SA ESI N	
Aroclor-1232	UG/KG	0	0%		0	0	86	78	U	44	U	44	U	40	U	37	U	37	U	46	U	44	U
Aroclor-1242	UG/KG	0	0%		0	0	86	78	U	44	U	44	U	40	U	37	U	37	U	46	U	44	U
Aroclor-1248	UG/KG	0	0%		0	0	86	78	U	44	U	44	U	40	U	37	U	37	U	46	U	44	U
Aroclor-1254	UG/KG	310	26%	10000	0	22	86	94		51	J	40	J	40	U	37	U	37	U	46	U	44	U
Aroclor-1260	UG/KG	110	3%	10000	0	3	86	78	U	44	U	44	U	40	U	37	U	37	U	46	U	44	U
Beta-BHC	UG/KG	7.6	12%	200	0	10	86	4	U	2.2	U	2.2	U	2	U	1.4	J	1.6	J	2.3	U	2.3	U
Delta-BHC	UG/KG	0	0%	300	0	0	86	4	U	2.2	U	2.2	U	2	U	1.8	U	1.8	U	2.3	U	2.3	U
Dieldrin	UG/KG	7.4	6%	44	0	5	86	4	J	4.4	U	4.4	U	4	U	3.7	U	3.7	U	4.6	U	5.4	J
Endosulfan I	UG/KG	1.7	5%	900	0	4	86	4	U	2.2	U	2.2	U	2	U	1.8	U	1.8	U	2.3	U	2.3	U
Endosulfan II	UG/KG	5.2	3%	900	0	3	86	7.8	U	4.4	U	4.4	U	4	U	3.7	U	3.7	U	4.6	U	4.4	U
Endosulfan sulfate	UG/KG	3.8	1%	1000	0	1	86	7.8	U	4.4	U	4.4	U	4	U	3.7	U	3.7	U	4.6	U	4.4	U
Endrin	UG/KG	27	3%	100	0	3	86	7.8	U	4.4	U	4.4	U	4	U	3.7	U	3.7	U	4.6	U	4.4	U
Endrin aldehyde	UG/KG	20	12%		0	10	86	7.8	U	4.2	J	5.2		3.8	J	3.7	U	3.7	U	4.6	U	4.4	U
Endrin ketone	UG/KG	4.2	3%		0	3	86	7.8	U	3.4	J	2.8	J	4.2		3.7	U	3.7	U	4.6	U	4.4	U
Gamma-BHC/Lindane	UG/KG	0	0%	60	0	0	86	4	U	2.2	U	2.2	U	2	U	1.8	U	1.8	U	2.3	U	2.3	U
Gamma-Chlordane	UG/KG	7.4	9%	540	0	8	86	4	U	2.2	U	2.2	U	2	U	1.8	U	1.8	U	2.3	U	2.3	U
Heptachlor	UG/KG	4.2	3%	100	0	3	86	4	U	2.2	U	2.2	U	2	U	1.8	U	1.8	U	2.3	U	2.3	U
Heptachlor epoxide	UG/KG	3.6	5%	20	0	4	86	2.2	J	2.2	U	2.2	U	2	U	1.8	U	1.8	U	2.3	U	2.3	U
Methoxychlor	UG/KG	0	0%		0	0	86	40	U	22	U	22	U	20	U	18	U	18	U	23	U	23	U
Toxaphene	UG/KG	0	0%		0	0	86	400	U	220	U	220	U	200	U	180	U	180	U	230	U	230	U
HERBICIDES																							
2,4,5-T	UG/KG	0	0%	1900	0	0	7															6.7	U
2,4,5-TP/Silvex	UG/KG	0	0%	700	0	0	7															6.7	U
2,4-D	UG/KG	0	0%	500	0	0	7															67	U
2,4-DB	UG/KG	0	0%		0	0	7															67	U
Dalapon	UG/KG	0	0%		0	0	7															160	U
Dicamba	UG/KG	0	0%		0	0	7															6.7	U
Dichloroprop	UG/KG	0	0%		0	0	7															67	U
Dinoseb	UG/KG	0	0%		0	0	7															34	U
MCPA	UG/KG	0	0%		0	0	7															6700	U
MCPP	UG/KG	0	0%		0	0	7															6700	U
METALS																							
Aluminum	MG/KG	18800	100%	19520 *	0	86	86	3510	J	8180	J	7980	J	8400	J	10200	J	12800	J	10400	J	18800	
Antimony	MG/KG	148	40%	6 *	15	34	86	0.79	J	1.2	J	0.59	R	0.6	R	0.45	R	0.95	J	0.79	R	5.9	J
Arsenic	MG/KG	14.6	100%	8.9 *	4	86	86	4.3		5		5.5		3.9		2.8		4.2		5		7	
Barium	MG/KG	278	100%	300	0	86	86	81.4	J	78.5	J	79.1	J	48.3	J	30.1	J	67	J	99.4	J	129	
Beryllium	MG/KG	1.8	100%	1.13 *	1	86	86	0.16	J	0.41	J	0.43	J	0.42	J	0.43	J	0.51	J	0.5	J	1	J
Cadmium	MG/KG	2.3	13%	2.46 *	0	11	86	0.99		0.26	J	0.51	J	0.04	U	0.03	U	0.03	U	0.05	U	0.54	U
Calcium	MG/KG	196000	100%	125300 *	3	86	86	[illegible]	J	62800	J	50800	J	29600	J	19300	J	21500	J	5930	J	5410	
Chromium	MG/KG	18600	100%	30 *	37	86	86	[illegible]		34.4		[illegible]		17.1		20.8		[illegible]		29.4		[illegible]	J
Cobalt	MG/KG	19.9	100%	30	0	86	86	6.8	J	8.6	J	7.7	J	8.1	J	10.4		14.2		8.7	J	17.7	
Copper	MG/KG	7330	100%	33 *	30	86	86	[illegible]		30.7		30.9		20.1		27		[illegible]		18.9		[illegible]	J
Cyanide	MG/KG	0.87	2%	0.35	2	2	86	0.65	U	0.72	U	0.7	U	0.66	U	0.6	U	0.57	U	[illegible]		0.58	U
Iron	MG/KG	64600	100%	37410 *	2	86	86	14100	J	18400	J	17100	J	17400	J	23100	J	31300	J	20300	J	34300	
Lead	MG/KG	11200	92%	24.4 *	36	79	86	[illegible]	J	[illegible]	J	[illegible]	J	51.6	J	31.1	J	[illegible]	J	110	J	22.7	R
Magnesium	MG/KG	35300	100%	21700 *	1	86	86	14600	J	12800	J	12300	J	5320	J	5360	J	7020	J	4040	J	5030	
Manganese	MG/KG	1540	100%	1100 *	3	86	86	380	J	470	J	393	J	272	J	283	J	340	J	391	J	1080	
Mercury	MG/KG	1.2	52%	0.1	16	45	86	0.06	U	0.07	U	0.07	U	0.09	J	0.05	U	0.05	U	[illegible]	J	0.04	J
Nickel	MG/KG	228	100%	50 *	1	86	86	18	J	21.7	J	19.5	J	20.4	J	33.3	J	44.6	J	19.8	J	37.2	
Potassium	MG/KG	2340	100%	2623 *	0	86	86	429	J	694	J	814	J	972		1160		1400		1210	J	2080	
Selenium	MG/KG	3.4	23%	2	1	20	86	0.38	J	0.53	J	0.38	U	0.4	J	0.29	U	0.32	U	0.66	J	0.55	J
Silver	MG/KG	1.7	6%	0.8 *	1	5	86	0.18	U	0.26	U	0.19	U	0.19	U	0.15	U	0.16	U	0.26	U	1.1	U
Sodium	MG/KG	1270	34%	188 *	2	29	86	132	J	75.2	J	93.3	J	50.3	U	68.1	J	98.8	J	67.1	U	54.9	J
Thallium	MG/KG	5.4	22%	0.855 *	16	19	86	0.65	U	0.93	U	0.69	U	0.69	U	0.52	U	0.57	U	0.92	U	0.3	U
Vanadium	MG/KG	1250	100%	150	1	86	86	22.6	J	26.4	J	29.6	J	18.5	J	15.4	J	20	J	17.7	J	31.7	
Zinc	MG/KG	2020	100%	115 *	29	86	86	[illegible]	J	[illegible]	J	[illegible]	J	74.4	J	57.8	J	[illegible]	J	87.4	J	[illegible]	
Chromium, Hexavalent	MG/KG	14.7	27%		0	4	15																
Nitrate/Nitrite	MG/KG						66	0.06	J	0.03	J	0.09	J	0.11	J	0.09	J	0.07	J	0.07	J		

* Soil criteria for these inorganics are site background values.

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Surface Soil Sample Results

ANALYTE	UNITS	MAXIMUM	FREQ OF DETCTION	NYSDEC TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								SS4-60		SS4-61		SS4-62		SS4-63		SS4-64		SS4-65		SS4-66		SS4-67	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								43056		**43057**		**43058**		**43059**		**43060**		**43065**		**43066**		**43067**	
								0		0		0		0		0		0		0		0	
								0.2		0.2		0.2		0.2		0.2		0.2		0.2		0.2	
								12/3/1998		12/4/1998		12/4/1998		12/4/1998		12/4/1998		12/6/1998		12/6/1998		12/6/1998	
								SA		SA		SA		SA		SA		SA		SA		SA	
								RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1
								N		N		N		N		N		N		N		N	
VOLATILES																							
1,1,1-Trichloroethane	UG/KG	0	0%	800	0	0	86	13	U	13	U	15	U	14	U	14	U	12	U	11	UJ	14	UJ
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	600	0	0	86	13	U	13	UJ	15	R	14	U	14	UJ	12	UJ	11	R	14	UJ
1,1,2-Trichloroethane	UG/KG	0	0%		0	0	86	13	U	13	U	15	UJ	14	U	14	U	12	U	11	U	14	UJ
1,1-Dichloroethane	UG/KG	2	2%	200	0	2	86	13	U	13	U	15	U	14	U	2	J	12	U	11	UJ	14	UJ
1,1-Dichloroethene	UG/KG	0	0%	400	0	0	86	13	U	13	U	15	U	14	U	14	U	12	U	11	UJ	14	UJ
1,2-Dichloroethane	UG/KG	0	0%	100	0	0	86	13	U	13	U	15	U	14	U	14	U	12	U	11	UJ	14	UJ
1,2-Dichloroethene (total)	UG/KG	4	3%		0	3	86	13	U	13	U	15	U	14	U	4	J	12	U	11	UJ	14	UJ
1,2-Dichloropropane	UG/KG	0	0%		0	0	86	13	U	13	U	15	UJ	14	U	14	U	12	U	11	UJ	14	UJ
Acetone	UG/KG	140	31%	200	0	27	86	13	UJ	5	J	15	U	14	UJ	14	U	8	J	78	J	14	UJ
Benzene	UG/KG	1	1%	60	0	1	86	13	U	13	U	15	UJ	14	U	14	U	12	U	11	UJ	14	UJ
Bromodichloromethane	UG/KG	0	0%		0	0	86	13	U	13	U	15	UJ	14	U	14	U	12	U	11	UJ	14	UJ
Bromoform	UG/KG	0	0%		0	0	86	13	U	13	UJ	15	R	14	U	14	UJ	12	UJ	11	R	14	UJ
Carbon disulfide	UG/KG	0	0%	2700	0	0	86	13	U	13	U	15	U	14	U	14	U	12	U	11	UJ	14	UJ
Carbon tetrachloride	UG/KG	0	0%	600	0	0	86	13	U	13	U	15	U	14	U	14	U	12	U	11	UJ	14	UJ
Chlorobenzene	UG/KG	0	0%	1700	0	0	86	13	U	13	UJ	15	R	14	U	14	UJ	12	UJ	11	R	14	UJ
Chlorodibromomethane	UG/KG	0	0%		0	0	86	13	U	13	U	15	UJ	14	U	14	U	12	U	11	UJ	14	UJ
Chloroethane	UG/KG	0	0%	1900	0	0	86	13	U	13	U	15	U	14	U	14	U	12	U	11	UJ	14	UJ
Chloroform	UG/KG	0	0%	300	0	0	86	13	U	13	U	15	U	14	U	14	U	12	U	11	UJ	14	UJ
Cis-1,3-Dichloropropene	UG/KG	0	0%		0	0	86	13	U	13	U	15	UJ	14	U	14	U	12	U	11	UJ	14	UJ
Ethyl benzene	UG/KG	0	0%	5500	0	0	86	13	U	13	UJ	15	R	14	U	14	UJ	12	UJ	11	R	14	UJ
Methyl bromide	UG/KG	0	0%		0	0	86	13	U	13	U	15	U	14	U	14	U	12	U	11	UJ	14	UJ
Methyl butyl ketone	UG/KG	9	1%		0	1	86	13	U	13	U	15	U	14	U	14	U	12	U	11	UJ	14	UJ
Methyl chloride	UG/KG	0	0%		0	0	86	13	U	13	U	15	U	14	U	14	U	12	U	11	UJ	14	UJ
Methyl ethyl ketone	UG/KG	0	0%	300	0	0	86	13	U	13	U	15	U	14	U	14	U	12	U	11	UJ	14	UJ
Methyl isobutyl ketone	UG/KG	0	0%	1000	0	0	86	13	U	13	U	15	U	14	U	14	U	12	U	11	UJ	14	UJ
Methylene chloride	UG/KG	3	1%	100	0	1	86	13	U	13	U	15	U	14	U	14	U	12	U	11	UJ	14	UJ
Styrene	UG/KG	0	0%		0	0	86	13	U	13	UJ	15	R	14	U	14	UJ	12	UJ	11	R	14	UJ
Tetrachloroethene	UG/KG	0	0%	1400	0	0	86	13	U	13	U	15	U	14	U	14	U	12	U	11	UJ	14	UJ
Toluene	UG/KG	14	29%	1500	0	25	86	13	U	13	U	15	U	14	U	3	J	2	J	11	UJ	12	UJ
Total Xylenes	UG/KG	0	0%	1200	0	0	86	13	U	13	UJ	15	R	14	U	14	UJ	12	UJ	11	R	14	UJ
Trans-1,3-Dichloropropene	UG/KG	0	0%		0	0	86	13	U	13	U	15	UJ	14	U	14	U	12	U	11	UJ	14	UJ
Trichloroethene	UG/KG	3	3%	700	0	3	86	13	U	13	U	15	UJ	14	U	3	J	12	U	11	UJ	14	UJ
Vinyl chloride	UG/KG	0	0%	200	0	0	86	13	U	13	U	15	U	14	U	14	U	12	U	11	UJ	14	UJ
SEMIVOLATILES																							
1,2,4-Trichlorobenzene	UG/KG	0	0%	3400	0	0	86	100	U	87	U	92	U	97	U	88	U	78	UJ	70	UJ	80	UJ
1,2-Dichlorobenzene	UG/KG	0	0%	7900	0	0	86	100	U	87	U	92	U	97	U	88	U	78	UJ	70	UJ	80	UJ
1,3-Dichlorobenzene	UG/KG	0	0%	1600	0	0	86	100	U	87	U	92	U	97	U	88	U	78	UJ	70	UJ	80	UJ
1,4-Dichlorobenzene	UG/KG	0	0%	8500	0	0	86	100	U	87	U	92	U	97	U	88	U	78	UJ	70	UJ	80	UJ
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%		0	0	7																
2,4,5-Trichlorophenol	UG/KG	0	0%	100	0	0	86	240	U	210	U	220	U	240	U	210	U	190	UJ	170	UJ	190	UJ
2,4,6-Trichlorophenol	UG/KG	0	0%		0	0	86	100	U	87	U	92	U	97	U	88	U	78	UJ	70	UJ	80	UJ
2,4-Dichlorophenol	UG/KG	0	0%	400	0	0	86	100	U	87	U	92	U	97	U	88	U	78	UJ	70	UJ	80	UJ
2,4-Dimethylphenol	UG/KG	0	0%		0	0	86	100	UJ	87	UJ	92	UJ	97	UJ	88	UJ	78	UJ	70	UJ	80	UJ
2,4-Dinitrophenol	UG/KG	0	0%	200	0	0	86	240	U	210	U	220	U	240	U	210	U	190	UJ	170	UJ	190	UJ
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	86	100	U	87	U	92	U	97	U	88	U	78	UJ	70	UJ	80	UJ
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	86	100	U	87	U	92	U	97	U	88	U	78	UJ	70	UJ	80	UJ
2-Chloronaphthalene	UG/KG	0	0%		0	0	86	100	U	87	U	92	U	97	U	88	U	78	UJ	70	UJ	80	UJ
2-Chlorophenol	UG/KG	0	0%	800	0	0	86	100	U	87	U	92	U	97	U	88	U	78	UJ	70	UJ	80	UJ
2-Methylnaphthalene	UG/KG	35	16%	36400	0	14	86	100	U	87	U	92	U	97	U	88	U	78	UJ	70	UJ	7.6	J
2-Methylphenol	UG/KG	0	0%	100	0	0	86	100	U	87	U	92	U	97	U	88	U	78	UJ	70	UJ	80	UJ
2-Nitroaniline	UG/KG	0	0%	430	0	0	86	240	U	210	U	220	U	240	U	210	U	190	UJ	170	UJ	190	UJ
2-Nitrophenol	UG/KG	0	0%	330	0	0	86	100	U	87	U	92	U	97	U	88	U	78	UJ	70	UJ	80	UJ
3,3'-Dichlorobenzidine	UG/KG	0	0%		0	0	86	100	U	87	U	92	U	97	U	88	U	78	UJ	70	UJ	80	UJ
3-Nitroaniline	UG/KG	0	0%	500	0	0	86	240	U	210	U	220	U	240	U	210	U	190	UJ	170	UJ	190	UJ
4,6-Dinitro-2-methylphenol	UG/KG	0	0%		0	0	86	240	U	210	U	220	U	240	U	210	U	190	UJ	170	UJ	190	UJ
4-Bromophenyl phenyl ether	UG/KG	0	0%		0	0	86	100	U	87	U	92	U	97	U	88	U	78	UJ	70	UJ	80	UJ
4-Chloro-3-methylphenol	UG/KG	0	0%	240	0	0	86	100	U	87	U	92	U	97	U	88	U	78	UJ	70	UJ	80	UJ
4-Chloroaniline	UG/KG	0	0%	220	0	0	86	100	U	87	U	92	U	97	U	88	U	78	UJ	70	UJ	80	UJ
4-Chlorophenyl phenyl ether	UG/KG	0	0%		0	0	86	100	U	87	U	92	U	97	U	88	U	78	UJ	70	UJ	80	UJ
4-Methylphenol	UG/KG	0	0%	900	0	0	86	100	U	87	U	92	U	97	U	88	U	78	UJ	70	UJ	80	UJ
4-Nitroaniline	UG/KG	0	0%		0	0	86	240	U	210	U	220	U	240	U	210	U	190	UJ	170	UJ	190	UJ

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Surface Soil Sample Results

								SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								SS4-60		SS4-61		SS4-62		SS4-63		SS4-64		SS4-65		SS4-66		SS4-67	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								43056		43057		43058		43059		43060		43065		43066		43067	
								0		0		0		0		0		0		0		0	
								0.2		0.2		0.2		0.2		0.2		0.2		0.2		0.2	
								12/3/1998		12/4/1998		12/4/1998		12/4/1998		12/4/1998		12/6/1998		12/6/1998		12/6/1998	
ANALYTE	UNITS	MAXIMUM	FREQ OF DETCTION	NYSDEC TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SA		SA		SA		SA		SA		SA		SA		SA	
								RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1
								N		N		N		N		N		N		N		N	
4-Nitrophenol	UG/KG	0	0%	100	0	0	86	240	U	210	U	220	U	240	U	210	U	190	UJ	170	UJ	190	UJ
Acenaphthene	UG/KG	78	9%	50000	0	8	86	100	U	87	U	92	U	97	U	88	U	78	UJ	70	UJ	80	UJ
Acenaphthylene	UG/KG	32	9%	41000	0	8	86	100	UJ	87	UJ	92	UJ	97	UJ	88	UJ	78	UJ	70	UJ	13	J
Anthracene	UG/KG	110	17%	50000	0	15	86	100	U	87	U	92	U	97	U	17	J	78	UJ	70	UJ	8.5	J
Benzo(a)anthracene	UG/KG	560	83%	224	5	71	86	7.3	J	8.5	J	4.8	J	10	J	16	J	16	J	12	J	38	J
Benzo(a)pyrene	UG/KG	450	80%	61	11	69	86	8.4	J	9.5	J	6	J	12	J	23	J	18	J	12	J	42	J
Benzo(b)fluoranthene	UG/KG	890	80%	1100	0	69	86	9.7	J	12	J	9	J	14	J	34	J	46	J	36	J	99	J
Benzo(ghi)perylene	UG/KG	310	55%	50000	0	47	86	100	U	87	U	92	U	97	U	22	J	20	J	12	J	54	J
Benzo(k)fluoranthene	UG/KG	510	50%	1100	0	43	86	13	J	16	J	14	J	17	J	28	J	78	R	70	R	80	R
Bis(2-Chloroethoxy)methane	UG/KG	0	0%		0	0	86	100	U	87	U	92	U	97	U	88	U	78	UJ	70	UJ	80	UJ
Bis(2-Chloroethyl)ether	UG/KG	0	0%		0	0	86	100	U	87	U	92	U	97	U	88	U	78	UJ	70	UJ	80	UJ
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%		0	0	79	100	U	87	U	92	U	97	U	88	U	78	UJ	70	UJ	80	UJ
Bis(2-Ethylhexyl)phthalate	UG/KG	13000	59%	50000	0	51	86	54	J	20	J	36	J	46	J	220		68	J	65	J	67	J
Butylbenzylphthalate	UG/KG	12000	12%	50000	0	10	86	100	U	87	U	92	U	97	U	88	U	78	UJ	70	UJ	80	UJ
Carbazole	UG/KG	120	22%		0	19	86	100	U	87	U	92	U	97	U	88	U	78	UJ	70	UJ	6.5	J
Chrysene	UG/KG	570	86%	400	4	74	86	10	J	13	J	8.9	J	15	J	25	J	27	J	17	J	56	J
Di-n-butylphthalate	UG/KG	220	44%	8100	0	38	86	7.5	J	12	J	8.8	J	11	J	10	J	9.4	J	110	J	7.1	J
Di-n-octylphthalate	UG/KG	44	8%	50000	0	7	86	100	U	87	U	92	U	97	U	88	U	78	UJ	4.8	J	80	UJ
Dibenz(a,h)anthracene	UG/KG	130	22%	14	12	19	86	100	U	87	U	92	U	97	U	88	U	78	UJ	70	UJ	[illegible]	J
Dibenzofuran	UG/KG	58	16%	6200	0	14	86	100	U	87	U	92	U	97	U	88	U	4.6	J	70	UJ	5	J
Diethyl phthalate	UG/KG	22	16%	7100	0	14	86	22	J	12	J	14	J	7.1	J	14	J	78	UJ	70	UJ	80	UJ
Dimethylphthalate	UG/KG	0	0%	2000	0	0	86	100	U	87	U	92	U	97	U	88	U	78	UJ	70	UJ	80	UJ
Fluoranthene	UG/KG	1100	93%	50000	0	80	86	17	J	17	J	13	J	24	J	42	J	43	J	28	J	63	J
Fluorene	UG/KG	74	6%	50000	0	5	86	100	U	87	U	92	U	97	U	88	U	78	UJ	70	UJ	80	UJ
Hexachlorobenzene	UG/KG	0	0%	410	0	0	86	100	U	87	U	92	U	97	U	88	U	78	UJ	70	UJ	80	UJ
Hexachlorobutadiene	UG/KG	0	0%		0	0	86	100	U	87	U	92	U	97	U	88	U	78	UJ	70	UJ	80	UJ
Hexachlorocyclopentadiene	UG/KG	0	0%		0	0	86	100	U	87	U	92	U	97	U	88	U	78	UJ	70	UJ	80	UJ
Hexachloroethane	UG/KG	0	0%		0	0	86	100	U	87	U	92	U	97	U	88	U	78	UJ	70	UJ	80	UJ
Indeno(1,2,3-cd)pyrene	UG/KG	320	53%	3200	0	46	86	100	U	87	U	92	U	97	U	17	J	9.3	UJ	10	UJ	39	J
Isophorone	UG/KG	0	0%	4400	0	0	86	100	U	87	U	92	U	97	U	88	U	78	UJ	70	UJ	80	UJ
N-Nitrosodiphenylamine	UG/KG	19	1%		0	1	86	100	U	87	U	92	U	97	U	88	U	78	UJ	70	UJ	80	UJ
N-Nitrosodipropylamine	UG/KG	0	0%		0	0	86	100	U	87	U	92	U	97	U	88	U	78	UJ	70	UJ	80	UJ
Naphthalene	UG/KG	74	13%	13000	0	11	86	100	U	87	U	92	U	97	U	88	U	78	UJ	70	UJ	6.4	J
Nitrobenzene	UG/KG	0	0%	200	0	0	86	100	U	87	U	92	U	97	U	88	U	78	UJ	70	UJ	80	UJ
Pentachlorophenol	UG/KG	0	0%	1000	0	0	86	240	U	210	U	220	U	240	U	210	U	190	UJ	170	UJ	190	UJ
Phenanthrene	UG/KG	640	87%	50000	0	75	86	8.3	J	8.8	J	7.7	J	15	J	17	J	22	J	14	J	34	J
Phenol	UG/KG	17	2%	30	0	2	86	100	U	87	U	92	U	97	U	88	U	78	UJ	70	UJ	80	UJ
Pyrene	UG/KG	990	88%	50000	0	76	86	10	J	13	J	8.5	J	17	J	27	J	32	UJ	20	J	50	J
EXPLOSIVES																							
1,3,5-Trinitrobenzene	UG/KG	120	1%		0	1	86	120	U	120	U	120	U	120	U	120	U	120	U	120	U	120	U
1,3-Dinitrobenzene	UG/KG	0	0%		0	0	86	120	U	120	U	120	U	120	U	120	U	120	U	120	U	120	U
2,4,6-Trinitrotoluene	UG/KG	72	1%		0	1	86	120	U	120	U	120	U	120	U	120	U	120	U	120	U	120	U
2,4-Dinitrotoluene	UG/KG	330	2%		0	2	86	120	U	120	U	120	U	120	U	120	U	120	U	280		120	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	86	120	U	120	U	120	U	120	U	120	U	120	U	120	U	120	U
2-Nitrotoluene	UG/KG	0	0%		0	0	79	120	U	120	U	120	U	120	U	120	U	120	U	120	U	120	U
2-amino-4,6-Dinitrotoluene	UG/KG	90	1%		0	1	86	120	U	120	U	120	U	120	U	120	U	120	U	120	U	120	U
3-Nitrotoluene	UG/KG	0	0%		0	0	79	120	U	120	U	120	U	120	U	120	U	120	U	120	U	120	U
4-Nitrotoluene	UG/KG	390	1%		0	1	79	120	U	120	U	120	U	120	U	120	U	120	U	120	U	120	U
4-amino-2,6-Dinitrotoluene	UG/KG	0	0%		0	0	86	120	U	120	U	120	U	120	U	120	U	120	U	120	U	120	U
HMX	UG/KG	0	0%		0	0	86	120	U	120	U	120	U	120	U	120	U	120	U	120	U	120	U
Nitrobenzene	UG/KG	0	0%	200	0	0	79	120	U	120	U	120	U	120	U	120	U	120	U	120	U	120	U
RDX	UG/KG	0	0%		0	0	86	120	U	120	U	120	U	120	U	120	U	120	U	120	U	120	U
Tetryl	UG/KG	0	0%		0	0	86	120	U	120	U	120	U	120	U	120	U	120	U	120	U	120	U
PESTICIDES/PCBs																							
4,4'-DDD	UG/KG	190	23%	2900	0	20	86	4.4	U	5.2	J	4.6	U	5	U	14		3.9	U	3.5	U	3.9	U
4,4'-DDE	UG/KG	160	31%	2100	0	27	86	4.4	U	4.4	U	14		5	U	4.4	U	3.7	J	4		7.9	
4,4'-DDT	UG/KG	760	34%	2100	0	29	86	4.4	U	4.4	U	23		15	J	3.4	J	2.2	J	3.5	U	4.7	
Aldrin	UG/KG	2.2	1%	41	0	1	86	2.2	U	2.2	U	2.3	U	2.5	U	2.2	U	2	U	1.8	U	2	U
Alpha-BHC	UG/KG	2.4	6%	110	0	5	86	2.2	U	2.2	U	2.3	U	2.5	U	2.2	U	2	U	1.8	U	2.2	J
Alpha-Chlordane	UG/KG	4.9	9%		0	8	86	2.2	U	2.2	U	2.3	U	2.5	U	2.2	U	2	U	1.8	U	2	U
Aroclor-1016	UG/KG	0	0%		0	0	86	44	U	44	U	46	U	50	U	44	U	39	U	35	U	39	U
Aroclor-1221	UG/KG	0	0%		0	0	86	88	U	88	U	92	U	99	U	89	U	79	U	70	U	80	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Surface Soil Sample Results

ANALYTE	UNITS	MAXIMUM	FREQ OF DETCTION	NYSDEC TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								SS4-60		SS4-61		SS4-62		SS4-63		SS4-64		SS4-65		SS4-66		SS4-67	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								43056		43057		43058		43059		43060		43065		43066		43067	
								0		0		0		0		0		0		0		0	
								0.2		0.2		0.2		0.2		0.2		0.2		0.2		0.2	
								12/3/1998		12/4/1998		12/4/1998		12/4/1998		12/4/1998		12/6/1998		12/6/1998		12/6/1998	
								SA		SA		SA		SA		SA		SA		SA		SA	
								RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
								N		N		N		N		N		N		N		N	
Aroclor-1232	UG/KG	0	0%		0	0	86	44	U	44	U	46	U	50	U	44	U	39	U	35	U	39	U
Aroclor-1242	UG/KG	0	0%		0	0	86	44	U	44	U	46	U	50	U	44	U	39	U	35	U	39	U
Aroclor-1248	UG/KG	0	0%		0	0	86	44	U	44	U	46	U	50	U	44	U	39	U	35	U	39	U
Aroclor-1254	UG/KG	310	26%	10000	0	22	86	44	U	44	U	46	U	50	U	44	U	39	U	35	U	38	J
Aroclor-1260	UG/KG	110	3%	10000	0	3	86	44	U	44	U	46	U	50	U	44	U	39	U	35	U	39	U
Beta-BHC	UG/KG	7.6	12%	200	0	10	86	2.2	U	2.2	U	2.3	U	2.5	U	2.2	U	2	U	2.4	J	2	U
Delta-BHC	UG/KG	0	0%	300	0	0	86	2.2	U	2.2	U	2.3	U	2.5	U	2.2	U	2	U	1.8	U	2	U
Dieldrin	UG/KG	7.4	6%	44	0	5	86	4.4	U	4.4	U	4.6	U	5	U	4.4	U	3.9	U	3.5	U	3.9	U
Endosulfan I	UG/KG	1.7	5%	900	0	4	86	2.2	U	2.2	U	2.3	U	2.5	U	2.2	U	2	U	1.8	U	2	U
Endosulfan II	UG/KG	5.2	3%	900	0	3	86	4.4	U	4.4	U	4.6	U	5	U	4.4	U	3.9	U	3.5	U	3.9	U
Endosulfan sulfate	UG/KG	3.8	1%	1000	0	1	86	4.4	U	4.4	U	4.6	U	5	U	4.4	U	3.9	U	3.5	U	3.9	U
Endrin	UG/KG	27	3%	100	0	3	86	4.4	U	4.4	U	4.6	U	5	U	4.4	U	3.9	U	3.5	U	3.9	U
Endrin aldehyde	UG/KG	20	12%		0	10	86	4.4	U	4.4	U	4.6	U	5	U	4.4	U	3.9	U	3.5	U	3.9	U
Endrin ketone	UG/KG	4.2	3%		0	3	86	4.4	U	4.4	U	4.6	U	5	U	4.4	U	3.9	U	3.5	U	3.9	U
Gamma-BHC/Lindane	UG/KG	0	0%	60	0	0	86	2.2	U	2.2	U	2.3	U	2.5	U	2.2	U	2	U	1.8	U	2	U
Gamma-Chlordane	UG/KG	7.4	9%	540	0	8	86	7.4		2.2	U	2.3	U	2.5	U	2.2	U	2	U	1.8	U	2	U
Heptachlor	UG/KG	4.2	3%	100	0	3	86	2.2	U	2.2	U	2.3	U	2.5	U	4.2		2	U	1.8	U	2	U
Heptachlor epoxide	UG/KG	3.6	5%	20	0	4	86	2.2	U	2.2	U	2.3	U	2.5	U	2.2	U	2	U	1.8	U	2	U
Methoxychlor	UG/KG	0	0%		0	0	86	22	U	22	U	23	U	25	U	22	U	20	U	18	U	20	U
Toxaphene	UG/KG	0	0%		0	0	86	220	U	220	U	230	U	250	U	220	U	200	U	180	U	200	U
HERBICIDES																							
2,4,5-T	UG/KG	0	0%	1900	0	0	7																
2,4,5-TP/Silvex	UG/KG	0	0%	700	0	0	7																
2,4-D	UG/KG	0	0%	500	0	0	7																
2,4-DB	UG/KG	0	0%		0	0	7																
Dalapon	UG/KG	0	0%		0	0	7																
Dicamba	UG/KG	0	0%		0	0	7																
Dichloroprop	UG/KG	0	0%		0	0	7																
Dinoseb	UG/KG	0	0%		0	0	7																
MCPA	UG/KG	0	0%		0	0	7																
MCPP	UG/KG	0	0%		0	0	7																
METALS																							
Aluminum	MG/KG	18800	100%	19520 *	0	86	86	10300	J	11200	J	12500	J	12300	J	9930	J	11400	J	9230	J	10700	J
Antimony	MG/KG	148	40%	6 *	15	34	86	0.66	R	0.75	R	0.81	R	0.89	R	0.62	R	0.53	R	0.99	J	0.68	R
Arsenic	MG/KG	14.6	100%	8.9 *	4	86	86	3.5		4.9		4.7		3.8		4.1		3.9		3.9		4.1	
Barium	MG/KG	278	100%	300	0	86	86	80.3	J	78.1	J	59.4	J	82	J	80.3	J	28.4	J	31.3	J	31.8	J
Beryllium	MG/KG	1.8	100%	1.13 *	1	86	86	0.52	J	0.51	J	0.53	J	0.62	J	0.5	J	0.58	J	0.49	J	0.57	J
Cadmium	MG/KG	2.3	13%	2.46 *	0	11	86	0.04	U	0.05	U	0.05	U	0.06	U	0.21	J	0.09	U	1.3		0.11	U
Calcium	MG/KG	196000	100%	125300 *	3	86	86	2850	J	2740	J	6220	J	2700	J	14600	J	21700		40300		43800	
Chromium	MG/KG	18600	100%	30 *	37	86	86	15.5		14		23.5		21.1		[illegible]		22	J	19	J	21.2	J
Cobalt	MG/KG	19.9	100%	30	0	86	86	7.6	J	8.6	J	11	J	7.3	J	8	J	11.8		9.8		10.8	J
Copper	MG/KG	7330	100%	33 *	30	86	86	11.9		12.7		19.2		14.7		18		29.1	J	27.1	J	28.4	J
Cyanide	MG/KG	0.87	2%	0.35	2	2	86	0.71	U	0.79	U	0.8	U	0.86	U	0.72	U	0.63	U	0.6	U	0.65	U
Iron	MG/KG	64600	100%	37410 *	2	86	86	18800	J	18200	J	26200	J	19200	J	18500	J	26100	J	21600	J	24300	J
Lead	MG/KG	11200	92%	24.4 *	36	79	86	17.5	J	17	J	[illegible]	J	[illegible]	J	[illegible]	J	[illegible]		[illegible]		[illegible]	
Magnesium	MG/KG	35300	100%	21700 *	1	86	86	3120	J	2850	J	4610	J	3260	J	7230	J	6590	J	7180	J	8010	J
Manganese	MG/KG	1540	100%	1100 *	3	86	86	371	J	633	J	353	J	284	J	427	J	327		286		346	
Mercury	MG/KG	1.2	52%	0.1	16	45	86	0.07	J	0.07	U	0.06	U	0.09	J	0.08	J	0.05	UJ	0.05	UJ	0.06	UJ
Nickel	MG/KG	228	100%	50 *	1	86	86	15.5	J	12.7	J	27.6	J	15.8	J	16.8	J	44.1		37.3		39.8	
Potassium	MG/KG	2340	100%	2623 *	0	86	86	1130		974	J	1450		1180	J	1560		1250		955		1420	
Selenium	MG/KG	3.4	23%	2	1	20	86	0.71	J	0.48	U	0.52	U	0.58	U	0.45	J	0.62	U	0.51	U	0.79	U
Silver	MG/KG	1.7	6%	0.8 *	1	5	86	0.21	U	0.24	U	0.26	U	0.29	U	0.2	U	0.17	U	0.14	U	0.22	U
Sodium	MG/KG	1270	34%	188 *	2	29	86	56.1	U	63	U	68.7	U	75.4	U	52.7	U	71.1	J	109	J	84.6	J
Thallium	MG/KG	5.4	22%	0.855 *	16	19	86	0.77	U	0.87	U	0.94	U	1	U	0.72	U	0.62	U	0.74	J	[illegible]	J
Vanadium	MG/KG	1250	100%	150	1	86	86	18.1	J	21	J	20.2	J	23	J	18.1	J	26.3	J	27	J	28.9	J
Zinc	MG/KG	2020	100%	115 *	29	86	86	49.6	J	54.6	J	89.1	J	63.9	J	[illegible]	J	77.3		[illegible]		83.4	
Chromium, Hexavalent	MG/KG	14.7	27%		0	4	15																
Nitrate/Nitrite	MG/KG						66	0.03	J	0.12	J	0.14	J	0.09	J	0.01	R						

* Soil criteria for these inorganics are site background values.

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Surface Soil Sample Results

								SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								SS4-68		SS4-69		SS4-7		SS4-70		SS4-71		SS4-72		SS4-73		SS4-73	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								43061		**43062**		**SS4-7**		**43063**		**43064**		**43068**		43070		**43069**	
								0		0		0		0		0		0		0		0	
								0.2		0.2		0.5		0.2		0.2		0.2		0.2		0.2	
								12/4/1998		12/4/1998		12/13/1993		12/4/1998		12/4/1998		12/4/1998		12/6/1998		12/6/1998	
								SA		SA		SA		SA		SA		SA		DU		SA	
ANALYTE	UNITS	MAXIMUM	FREQ OF DETCTION	NYSDEC TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	RI Phase 1	Step 1	RI Phase 1	Step 1	ESI		RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1
								N		N		N		N		N		N		N		N	
VOLATILES																							
1,1,1-Trichloroethane	UG/KG	0	0%	800	0	0	86	12	U	13	U	24	U	11	U	11	U	15	U	15	U	15	U
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	600	0	0	86	12	UJ	13	R	24	U	11	UJ	11	UJ	15	UJ	15	UJ	15	U
1,1,2-Trichloroethane	UG/KG	0	0%		0	0	86	12	U	13	UJ	24	U	11	UJ	11	U	15	UJ	15	U	15	U
1,1-Dichloroethane	UG/KG	2	2%	200	0	2	86	12	U	13	U	24	U	11	U	11	U	15	U	15	U	15	U
1,1-Dichloroethene	UG/KG	0	0%	400	0	0	86	12	U	13	U	24	U	11	U	11	U	15	U	15	U	15	U
1,2-Dichloroethane	UG/KG	0	0%	100	0	0	86	12	U	13	U	24	U	11	U	11	U	15	U	15	U	15	U
1,2-Dichloroethene (total)	UG/KG	4	3%		0	3	86	4	J	13	U	24	U	11	U	11	U	15	U	15	U	15	U
1,2-Dichloropropane	UG/KG	0	0%		0	0	86	12	U	13	UJ	24	U	11	UJ	11	U	15	UJ	15	U	15	U
Acetone	UG/KG	140	31%	200	0	27	86	12	U	13	U	24	U	12		8	J	6	J	15	J	15	UJ
Benzene	UG/KG	1	1%	60	0	1	86	12	U	13	UJ	24	U	11	UJ	11	U	15	UJ	15	U	15	U
Bromodichloromethane	UG/KG	0	0%		0	0	86	12	U	13	UJ	24	U	11	UJ	11	U	15	UJ	15	U	15	U
Bromoform	UG/KG	0	0%		0	0	86	12	UJ	13	R	24	U	11	UJ	11	UJ	15	UJ	15	UJ	15	U
Carbon disulfide	UG/KG	0	0%	2700	0	0	86	12	U	13	U	24	U	11	U	11	U	15	U	15	U	15	U
Carbon tetrachloride	UG/KG	0	0%	600	0	0	86	12	U	13	U	24	U	11	U	11	U	15	U	15	U	15	U
Chlorobenzene	UG/KG	0	0%	1700	0	0	86	12	UJ	13	R	24	U	11	UJ	11	UJ	15	UJ	15	UJ	15	U
Chlorodibromomethane	UG/KG	0	0%		0	0	86	12	U	13	UJ	24	U	11	UJ	11	U	15	UJ	15	U	15	U
Chloroethane	UG/KG	0	0%	1900	0	0	86	12	U	13	U	24	U	11	U	11	U	15	U	15	U	15	U
Chloroform	UG/KG	0	0%	300	0	0	86	12	U	13	U	24	U	11	U	11	U	15	U	15	U	15	U
Cis-1,3-Dichloropropene	UG/KG	0	0%		0	0	86	12	U	13	UJ	24	U	11	UJ	11	U	15	UJ	15	U	15	U
Ethyl benzene	UG/KG	0	0%	5500	0	0	86	12	UJ	13	R	24	U	11	UJ	11	UJ	15	UJ	15	UJ	15	U
Methyl bromide	UG/KG	0	0%		0	0	86	12	U	13	U	24	U	11	U	11	U	15	U	15	U	15	U
Methyl butyl ketone	UG/KG	9	1%		0	1	86	12	U	13	U	24	U	11	U	11	U	15	U	15	U	15	U
Methyl chloride	UG/KG	0	0%		0	0	86	12	U	13	U	24	U	11	U	11	U	15	U	15	U	15	U
Methyl ethyl ketone	UG/KG	0	0%	300	0	0	86	12	U	13	U	24	U	11	U	11	U	15	U	15	U	15	U
Methyl isobutyl ketone	UG/KG	0	0%	1000	0	0	86	12	U	13	U	24	U	11	U	11	U	15	U	15	U	15	U
Methylene chloride	UG/KG	3	1%	100	0	1	86	12	U	13	U	24	U	11	U	11	U	15	U	15	U	15	U
Styrene	UG/KG	0	0%		0	0	86	12	UJ	13	R	24	U	11	UJ	11	UJ	15	UJ	15	UJ	15	U
Tetrachloroethene	UG/KG	0	0%	1400	0	0	86	12	U	13	U	24	U	11	U	11	U	15	U	15	U	15	U
Toluene	UG/KG	14	29%	1500	0	25	86	3	J	13	U	24	U	4	J	5	J	15	U	15	U	15	U
Total Xylenes	UG/KG	0	0%	1200	0	0	86	12	UJ	13	R	24	U	11	UJ	11	UJ	15	UJ	15	UJ	15	U
Trans-1,3-Dichloropropene	UG/KG	0	0%		0	0	86	12	U	13	U	24	U	11	UJ	11	U	15	UJ	15	U	15	U
Trichloroethene	UG/KG	3	3%	700	0	3	86	2	J	13	UJ	24	U	11	UJ	11	U	15	UJ	15	U	15	U
Vinyl chloride	UG/KG	0	0%	200	0	0	86	12	U	13	UJ	24	U	11	U	11	U	15	U	15	U	15	U
SEMIVOLATILES																							
1,2,4-Trichlorobenzene	UG/KG	0	0%	3400	0	0	86	76	U	86	U	720	UJ	120	U	76	U	100	U	98	UJ	97	UJ
1,2-Dichlorobenzene	UG/KG	0	0%	7900	0	0	86	76	U	86	UJ	720	UJ	120	UJ	76	UJ	100	UJ	98	UJ	97	UJ
1,3-Dichlorobenzene	UG/KG	0	0%	1600	0	0	86	76	U	86	U	720	UJ	120	U	76	U	100	U	98	UJ	97	UJ
1,4-Dichlorobenzene	UG/KG	0	0%	8500	0	0	86	76	U	86	U	720	UJ	120	U	76	U	100	U	98	UJ	97	UJ
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%		0	0	7					720	UJ										
2,4,5-Trichlorophenol	UG/KG	0	0%	100	0	0	86	180	U	210	U	1700	UJ	280	U	180	U	250	U	240	UJ	240	UJ
2,4,6-Trichlorophenol	UG/KG	0	0%		0	0	86	76	U	86	U	720	UJ	120	U	76	U	100	U	98	UJ	97	UJ
2,4-Dichlorophenol	UG/KG	0	0%	400	0	0	86	76	U	86	U	720	UJ	120	U	76	U	100	U	98	UJ	97	UJ
2,4-Dimethylphenol	UG/KG	0	0%		0	0	86	76	UJ	86	UJ	720	UJ	120	UJ	76	UJ	100	UJ	98	UJ	97	UJ
2,4-Dinitrophenol	UG/KG	0	0%	200	0	0	86	180	U	210	UJ	1700	UJ	280	U	180	UJ	250	UJ	240	UJ	240	UJ
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	86	76	U	86	U	720	UJ	120	U	76	U	100	U	98	UJ	97	UJ
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	86	76	U	86	U	720	UJ	120	U	76	U	100	U	98	UJ	97	UJ
2-Chloronaphthalene	UG/KG	0	0%		0	0	86	76	U	86	UJ	720	UJ	120	UJ	76	UJ	100	UJ	98	UJ	97	UJ
2-Chlorophenol	UG/KG	0	0%	800	0	0	86	76	U	86	U	720	UJ	120	U	76	U	100	U	98	UJ	97	UJ
2-Methylnaphthalene	UG/KG	35	16%	36400	0	14	86	76	U	6.1	J	720	UJ	14	J	5.3	J	100	U	98	UJ	97	UJ
2-Methylphenol	UG/KG	0	0%	100	0	0	86	76	U	86	U	720	UJ	120	U	76	U	100	U	98	UJ	97	UJ
2-Nitroaniline	UG/KG	0	0%	430	0	0	86	180	U	210	U	1700	UJ	280	U	180	U	250	U	240	UJ	240	UJ
2-Nitrophenol	UG/KG	0	0%	330	0	0	86	76	U	86	U	720	UJ	120	U	76	U	100	U	98	UJ	97	UJ
3,3'-Dichlorobenzidine	UG/KG	0	0%		0	0	86	76	U	86	U	720	UJ	120	U	76	U	100	U	98	UJ	97	UJ
3-Nitroaniline	UG/KG	0	0%	500	0	0	86	180	U	210	U	1700	UJ	280	U	180	U	250	U	240	UJ	240	UJ
4,6-Dinitro-2-methylphenol	UG/KG	0	0%		0	0	86	180	U	210	U	1700	UJ	280	U	180	U	250	U	240	UJ	240	UJ
4-Bromophenyl phenyl ether	UG/KG	0	0%		0	0	86	76	U	86	U	720	UJ	120	U	76	U	100	U	98	UJ	97	UJ
4-Chloro-3-methylphenol	UG/KG	0	0%	240	0	0	86	76	U	86	U	720	UJ	120	U	76	U	100	U	98	UJ	97	UJ
4-Chloroaniline	UG/KG	0	0%	220	0	0	86	76	U	86	U	720	UJ	120	U	76	U	100	U	98	UJ	97	UJ
4-Chlorophenyl phenyl ether	UG/KG	0	0%		0	0	86	76	U	86	U	720	UJ	120	U	76	U	100	U	98	UJ	97	UJ
4-Methylphenol	UG/KG	0	0%	900	0	0	86	76	U	86	U	720	UJ	120	U	76	U	100	U	98	UJ	97	UJ
4-Nitroaniline	UG/KG	0	0%		0	0	86	180	U	210	U	1700	UJ	280	U	180	U	250	U	240	UJ	240	UJ

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Surface Soil Sample Results

ANALYTE	UNITS	MAXIMUM	FREQ OF DETCTION	NYSDEC TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4 SS4-68 SOIL 43061 0 0.2 12/4/1998 SA RI Phase 1 N	Step 1	SEAD-4 SS4-69 SOIL 43062 0 0.2 12/4/1998 SA RI Phase 1 N	Step 1	SEAD-4 SS4-7 SOIL SS4-7 0 0.5 12/13/1993 SA ESI N		SEAD-4 SS4-70 SOIL 43063 0 0.2 12/4/1998 SA RI Phase 1 N	Step 1	SEAD-4 SS4-71 SOIL 43064 0 0.2 12/4/1998 SA RI Phase 1 N	Step 1	SEAD-4 SS4-72 SOIL 43068 0 0.2 12/4/1998 SA RI Phase 1 N	Step 1	SEAD-4 SS4-73 SOIL 43070 0 0.2 12/6/1998 DU RI Phase 1 N	Step 1	SEAD-4 SS4-73 SOIL 43069 0 0.2 12/6/1998 SA RI Phase 1 N	Step 1
4-Nitrophenol	UG/KG	0	0%	100	0	0	86	180	U	210	U	1700	UJ	280	U	180	U	250	U	240	UJ	240	UJ
Acenaphthene	UG/KG	78	9%	50000	0	8	86	76	U	86	UJ	720	UJ	120	UJ	76	UJ	100	UJ	98	UJ	97	UJ
Acenaphthylene	UG/KG	32	9%	41000	0	8	86	76	UJ	86	UJ	720	UJ	120	UJ	76	UJ	100	UJ	98	UJ	5.7	J
Anthracene	UG/KG	110	17%	50000	0	15	86	76	U	7.8	J	720	UJ	12	J	76	UJ	100	UJ	8.2	J	31	J
Benzo(a)anthracene	UG/KG	560	83%	224	5	71	86	76	U	47	J	48	J	50	J	11	J	31	J	42	J	150	J
Benzo(a)pyrene	UG/KG	450	80%	61	11	69	86	76	U	57	J	56	J	59	J	8.6	J	31	J	41	J	140	J
Benzo(b)fluoranthene	UG/KG	890	80%	1100	0	69	86	76	U	170	J	90	J	110	J	45	J	76	J	44	J	180	J
Benzo(ghi)perylene	UG/KG	310	55%	50000	0	47	86	76	U	57	J	720	UJ	66	J	9.4	J	32	J	38	J	100	J
Benzo(k)fluoranthene	UG/KG	510	50%	1100	0	43	86	76	U	86	R	720	UJ	120	R	76	R	100	R	44	J	120	J
Bis(2-Chloroethoxy)methane	UG/KG	0	0%		0	0	86	76	U	86	U	720	UJ	120	U	76	U	100	U	98	UJ	97	UJ
Bis(2-Chloroethyl)ether	UG/KG	0	0%		0	0	86	76	U	86	U	720	UJ	120	U	76	U	100	U	98	UJ	97	UJ
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%		0	0	79	76	U	86	U			120	U	76	U	100	U	98	UJ	97	UJ
Bis(2-Ethylhexyl)phthalate	UG/KG	13000	59%	50000	0	51	86	120		13000	J	86	J	630		90		31	J	16	J	16	J
Butylbenzylphthalate	UG/KG	12000	12%	50000	0	10	86	76	U	46	J	720	UJ	120	U	76	U	100	U	98	UJ	97	UJ
Carbazole	UG/KG	120	22%		0	19	86	76	U	86	U	720	UJ	7.6	J	7.1	J	100	U	8.4	J	24	J
Chrysene	UG/KG	570	86%	400	4	74	86	7	J	74	J	67	J	73	J	36	J	41	J	50	J	150	J
Di-n-butylphthalate	UG/KG	220	44%	8100	0	38	86	15	J	86	UJ	720	UJ	120	UJ	76	UJ	100	UJ	5	J	5.6	J
Di-n-octylphthalate	UG/KG	44	8%	50000	0	7	86	76	U	86	U	720	UJ	120	U	6.5	J	5.5	J	98	UJ	97	UJ
Dibenz(a,h)anthracene	UG/KG	130	22%	14	12	19	86	76	U	86	U	720	UJ	[illegible]	J	76	U	100	U	9.8	J	38	J
Dibenzofuran	UG/KG	58	16%	6200	0	14	86	76	U	4.6	J	720	UJ	120	U	6.2	J	100	U	98	UJ	97	UJ
Diethyl phthalate	UG/KG	22	16%	7100	0	14	86	6.1	J	86	UJ	720	UJ	120	UJ	76	UJ	100	UJ	98	UJ	97	UJ
Dimethylphthalate	UG/KG	0	0%	2000	0	0	86	76	U	86	U	720	UJ	120	U	76	U	100	U	98	UJ	97	UJ
Fluoranthene	UG/KG	1100	93%	50000	0	80	86	7	J	130		64	J	130		120		68	J	110	J	390	J
Fluorene	UG/KG	74	6%	50000	0	5	86	76	U	86	U	720	UJ	120	U	76	U	100	U	98	UJ	9.9	J
Hexachlorobenzene	UG/KG	0	0%	410	0	0	86	76	U	86	U	720	UJ	120	U	76	U	100	U	98	UJ	97	UJ
Hexachlorobutadiene	UG/KG	0	0%		0	0	86	76	U	86	UJ	720	UJ	120	UJ	76	UJ	100	UJ	98	UJ	97	UJ
Hexachlorocyclopentadiene	UG/KG	0	0%		0	0	86	76	U	86	U	720	UJ	120	U	76	U	100	U	98	UJ	97	UJ
Hexachloroethane	UG/KG	0	0%		0	0	86	76	U	86	UJ	720	UJ	120	UJ	76	UJ	100	UJ	98	UJ	97	UJ
Indeno(1,2,3-cd)pyrene	UG/KG	320	53%	3200	0	46	86	76	U	50	J	720	UJ	51	J	9.2	J	21	J	35	J	93	UJ
Isophorone	UG/KG	0	0%	4400	0	0	86	76	U	86	UJ	720	UJ	120	UJ	76	UJ	100	UJ	98	UJ	97	UJ
N-Nitrosodiphenylamine	UG/KG	19	1%		0	1	86	76	U	86	U	720	UJ	120	U	76	U	100	U	98	UJ	97	UJ
N-Nitrosodipropylamine	UG/KG	0	0%		0	0	86	76	U	86	U	720	UJ	120	U	76	U	100	U	98	UJ	97	UJ
Naphthalene	UG/KG	74	13%	13000	0	11	86	76	U	4.5	J	720	UJ	8.3	J	76	UJ	100	UJ	98	UJ	97	UJ
Nitrobenzene	UG/KG	0	0%	200	0	0	86	76	U	86	UJ	720	UJ	120	UJ	76	UJ	100	UJ	98	UJ	97	UJ
Pentachlorophenol	UG/KG	0	0%	1000	0	0	86	180	U	210	U	1700	UJ	280	U	180	U	250	U	240	UJ	240	UJ
Phenanthrene	UG/KG	640	87%	50000	0	75	86	6	J	59	J	720	UJ	62	J	97		27	J	62	J	230	J
Phenol	UG/KG	17	2%	30	0	2	86	76	U	86	U	720	UJ	120	U	76	U	100	U	98	UJ	97	UJ
Pyrene	UG/KG	990	88%	50000	0	76	86	5.8	J	90		66	J	90	J	68	J	51	J	84	J	310	J
EXPLOSIVES																							
1,3,5-Trinitrobenzene	UG/KG	120	1%		0	1	86	120	U	120	U	130	UJ	120	U	120	U	120	U	120	U	120	U
1,3-Dinitrobenzene	UG/KG	0	0%		0	0	86	120	U	120	U	130	UJ	120	U	120	U	120	U	120	U	120	U
2,4,6-Trinitrotoluene	UG/KG	72	1%		0	1	86	120	U	120	U	130	UJ	120	U	120	U	120	U	120	U	120	U
2,4-Dinitrotoluene	UG/KG	330	2%		0	2	86	120	U	120	U	130	UJ	120	U	120	U	120	U	120	U	120	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	86	120	U	120	U	130	UJ	120	U	120	U	120	U	120	U	120	U
2-Nitrotoluene	UG/KG	0	0%		0	0	79	120	U	120	U			120	U	120	U	120	U	120	U	120	U
2-amino-4,6-Dinitrotoluene	UG/KG	90	1%		0	1	86	120	U	120	U	130	UJ	120	U	120	U	120	U	120	U	120	U
3-Nitrotoluene	UG/KG	0	0%		0	0	79	120	U	120	U			120	U	120	U	120	U	120	U	120	U
4-Nitrotoluene	UG/KG	390	1%		0	1	79	120	U	120	U			120	U	120	U	120	U	120	U	120	U
4-amino-2,6-Dinitrotoluene	UG/KG	0	0%		0	0	86	120	U	120	U	130	UJ	120	U	120	U	120	U	120	U	120	U
HMX	UG/KG	0	0%		0	0	86	120	U	120	U	130	UJ	120	U	120	U	120	U	120	U	120	U
Nitrobenzene	UG/KG	0	0%	200	0	0	79	120	U	120	U			120	U	120	U	120	U	120	U	120	U
RDX	UG/KG	0	0%		0	0	86	120	U	120	U	130	UJ	120	U	120	U	120	U	120	U	120	U
Tetryl	UG/KG	0	0%		0	0	86	120	U	120	U	130	UJ	120	U	120	U	120	U	120	U	120	U
PESTICIDES/PCBs																							
4,4'-DDD	UG/KG	190	23%	2900	0	20	86	36		3.2	J	7.2	UJ	3.5	U	3.8	U	5.1	U	4.9	U	4.8	U
4,4'-DDE	UG/KG	160	31%	2100	0	27	86	4.1	J	30		7.2	UJ	29		3.8	U	3.6	J	4.9	U	4.8	U
4,4'-DDT	UG/KG	760	34%	2100	0	29	86	8.9	J	30	J	7.2	UJ	37	J	3.8	U	4.5	J	3.3	J	4.8	U
Aldrin	UG/KG	2.2	1%	41	0	1	86	1.9	U	2.2	U	3.7	UJ	1.8	U	2	U	2.6	U	2.5	U	2.5	U
Alpha-BHC	UG/KG	2.4	6%	110	0	5	86	1.9	U	2.2	U	3.7	UJ	1.8	U	2	U	2.6	U	2.5	U	2.5	U
Alpha-Chlordane	UG/KG	4.9	9%		0	8	86	1.9	U	2.2	U	3.7	UJ	1.1	J	2	U	2.6	U	2.5	U	2.5	U
Aroclor-1016	UG/KG	0	0%		0	0	86	38	U	43	U	72	UJ	35	U	38	U	51	U	49	U	48	U
Aroclor-1221	UG/KG	0	0%		0	0	86	77	U	87	U	150	UJ	71	U	77	U	100	U	100	U	98	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Surface Soil Sample Results

								SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								SS4-68		SS4-69		SS4-7		SS4-70		SS4-71		SS4-72		SS4-73		SS4-73	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								43061		**43062**		**SS4-7**		**43063**		**43064**		**43068**		43070		**43069**	
								0		0		0		0		0		0		0		0	
								0.2		0.2		0.5		0.2		0 2		0.2		0 2		0.2	
								12/4/1998		12/4/1998		12/13/1993		12/4/1998		12/4/1998		12/4/1998		12/6/1998		12/6/1998	
			FREQ		NUMBER	NUMBER	NUMBER	SA		SA		SA		SA		SA		SA		DU		SA	
ANALYTE	UNITS	MAXIMUM	OF DETCTION	NYSDEC TAGM	ABOVE TAGM	OF DETECTS	OF ANALYSES	RI Phase 1	Step 1	RI Phase 1	Step 1	ESI		RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1
								N		N		N		N		N		N		N		N	
Aroclor-1232	UG/KG	0	0%		0	0	86	38	U	43	U	72	UJ	35	U	38	U	51	U	49	U	48	U
Aroclor-1242	UG/KG	0	0%		0	0	86	38	U	43	U	72	UJ	35	U	38	U	51	U	49	U	48	U
Aroclor-1248	UG/KG	0	0%		0	0	86	38	U	43	U	72	UJ	35	U	38	U	51	U	49	U	48	U
Aroclor-1254	UG/KG	310	26%	10000	0	22	86	38	U	310	J	70	J	180		38		54		36	J	48	U
Aroclor-1260	UG/KG	110	3%	10000	0	3	86	38	U	50		110	J	29	J	38	U	51	U	49	U	48	U
Beta-BHC	UG/KG	7.8	12%	200	0	10	86	1.9	U	2.2	U	3.7	UJ	3.3	J	2	U	2.6	U	2.5	U	2.5	U
Delta-BHC	UG/KG	0	0%	300	0	0	86	1.9	U	2.2	U	3.7	UJ	1.8	U	2	U	2.6	U	2 5	U	2.5	U
Dieldrin	UG/KG	7.4	6%	44	0	5	86	3.8	U	6.8	J	7.2	UJ	4.4	J	3.8	U	5.1	U	4.9	U	4.8	U
Endosulfan I	UG/KG	1.7	5%	900	0	4	86	1.9	U	2.2	U	3.7	UJ	1 8	U	2	U	2.6	U	2.5	U	2.5	U
Endosulfan II	UG/KG	5.2	3%	900	0	3	86	5.2	J	4 3	U	7.2	UJ	3.5	U	3.8	U	5.1	U	4.9	U	4.8	U
Endosulfan sulfate	UG/KG	3.8	1%	1000	0	1	86	3.8	U	4.3	U	7.2	UJ	3.5	U	3.8	U	5.1	U	4.9	U	4.8	U
Endrin	UG/KG	27	3%	100	0	3	86	2.4	J	4.3	U	7.2	UJ	3.5	U	3.8	U	5.1	U	4.9	U	4.8	U
Endrin aldehyde	UG/KG	20	12%		0	10	86	3.8	U	5.4	J	7.2	UJ	3.9	J	3.8	U	5.1	U	4.9	U	4.8	U
Endrin ketone	UG/KG	4.2	3%		0	3	86	3.8	U	4.3	U	7.2	UJ	3.5	U	3.8	U	5.1	U	4 9	U	4.8	U
Gamma-BHC/Lindane	UG/KG	0	0%	60	0	0	86	1.9	U	2.2	U	3.7	UJ	1.8	U	2	U	2.6	U	2.5	U	2.5	U
Gamma-Chlordane	UG/KG	7.4	9%	540	0	8	86	2.1	J	4	J	3.7	UJ	7.4	J	2	U	2 6	U	2.5	U	2.5	U
Heptachlor	UG/KG	4.2	3%	100	0	3	86	1.9	U	2.2	U	3.7	UJ	1.8	U	2	U	2.6	U	2.5	U	2.5	U
Heptachlor epoxide	UG/KG	3.6	5%	20	0	4	86	1.9	U	2.9	J	3.7	UJ	3.6	J	2	U	2 6	U	2.5	U	2.5	U
Methoxychlor	UG/KG	0	0%		0	0	86	19	U	22	U	37	UJ	18	U	20	U	26	U	25	U	25	U
Toxaphene	UG/KG	0	0%		0	0	86	190	U	220	U	370	UJ	180	U	200	U	260	U	250	U	250	U
HERBICIDES																							
2,4,5-T	UG/KG	0	0%	1900	0	0	7					11	UJ										
2,4,5-TP/Silvex	UG/KG	0	0%	700	0	0	7					11	UJ										
2,4-D	UG/KG	0	0%	500	0	0	7					110	UJ										
2,4-DB	UG/KG	0	0%		0	0	7					110	UJ										
Dalapon	UG/KG	0	0%		0	0	7					260	UJ										
Dicamba	UG/KG	0	0%		0	0	7					11	UJ										
Dichloroprop	UG/KG	0	0%		0	0	7					110	UJ										
Dinoseb	UG/KG	0	0%		0	0	7					54	UJ										
MCPA	UG/KG	0	0%		0	0	7					11000	UJ										
MCPP	UG/KG	0	0%		0	0	7					11000	UJ										
METALS																							
Aluminum	MG/KG	18800	100%	19520 *	0	86	86	9770	J	9970	J	14100	J	5690	J	5060	J	12500	J	11100	J	11500	J
Antimony	MG/KG	148	40%	6 *	15	34	86	0.64	R	5 2	J	7.8	UJ	0.48	R	0.66	R	0.91	R	0.63	R	0.63	R
Arsenic	MG/KG	14.6	100%	8.9 *	4	86	86	4.1		5		13.1	J	4.1		2.6		4.9		3.4		3.9	
Barium	MG/KG	278	100%	300	0	86	86	64.6	J	52.1	J	277	J	32.1	J	26.2	J	97.9	J	74.4	J	75.9	J
Beryllium	MG/KG	1.8	100%	1.13 *	1	86	86	0.47	J	0.57	J	1.8	J	0.36	J	0.31	J	0.66	J	0.61	J	0.62	J
Cadmium	MG/KG	2.3	13%	2.46 *	0	11	86	0.04	U	2.3		1.8	J	1.1		0.11	U	0.15	U	0.1	U	0.1	U
Calcium	MG/KG	196000	100%	125300 *	3	86	86	40300	J	56100		196000	J	90100		51000		6620		3990		4050	
Chromium	MG/KG	18600	100%	30 *	37	86	86	17.5		41.5	J	34.1	J	17.7	J	8.9	J	19.5	J	17.4	J	17.8	J
Cobalt	MG/KG	19.9	100%	30	0	86	86	10.6		10.7	J	12.4	J	7.1	J	5.5	J	10.3	J	8.6	J	8.8	J
Copper	MG/KG	7330	100%	33 *	30	86	86	28		[illegible]	J	[illegible]	J	49.3	J	15	J	24.1	J	19.4	J	19.5	J
Cyanide	MG/KG	0.87	2%	0.35	2	2	86	0.62	U	0.74	U	0.89	UJ	0.62	U	0.66	U	0.85	U	0.79	U	0.78	U
Iron	MG/KG	64600	100%	37410 *	2	86	86	21400	J	22200	J	64600	J	[illegible]	J	11600	J	23100	J	19700	J	20300	J
Lead	MG/KG	11200	92%	24.4 *	36	79	86	20.7	J	181		102	JR	[illegible]		10.4		35.4		24.1	J	27.3	
Magnesium	MG/KG	35300	100%	21700 *	1	86	86	6420	J	10200	J	8550	J	8970	J	8600	J	4920	J	3660	J	3740	J
Manganese	MG/KG	1540	100%	1100 *	3	86	86	381	J	381		1220	J	378		298		481		313		318	
Mercury	MG/KG	1.2	52%	0 1	16	45	86	0.05	U	0.06	UJ	0.27	J	0 05	UJ	0.05	U	0.08	UJ	0.09	J	0.09	J
Nickel	MG/KG	228	100%	50 *	1	86	86	25.8	J	33.5		[illegible]	J	21.7		16.3		29.9		25.9		26.1	
Potassium	MG/KG	2340	100%	2623 *	0	86	86	1070		1470		2340	J	921		997	J	2020		1600		1620	
Selenium	MG/KG	3.4	23%	2	1	20	86	0.41	U	1.1	J	1.6	J	0.56	U	0.76	U	1.1	U	0.73	J	0.73	U
Silver	MG/KG	1.7	6%	0.8 *	1	5	86	0.21	U	0.23	U	1.5	UJ	0.22	J	0.21	U	0.29	U	0.2	U	0.2	U
Sodium	MG/KG	1270	34%	188 *	2	29	86	54	U	93.9	J	1270	J	184	J	66.6	J	76.5	U	53.2	U	53	U
Thallium	MG/KG	5.4	22%	0.855 *	16	19	86	0.74	U	1.1	J	0.49	UJ	0.56	U	0.76	U	1.1	J	0.97	J	[illegible]	J
Vanadium	MG/KG	1250	100%	150	1	86	86	17	J	25.4	J	1250	J	13.9	J	9	J	29.6	J	34	J	34.9	J
Zinc	MG/KG	2020	100%	115 *	29	86	86	58.1	J	[illegible]		[illegible]	J	[illegible]		45.7		95.4		85.5		90.6	
Chromium, Hexavalent	MG/KG	14.7	27%		0	4	15																
Nitrate/Nitrite	MG/KG						66	0.01	R	0.92	J			6.72	J	0.24	J	1.52	J				

* Soil criteria for these inorganics are site background values.

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Surface Soil Sample Results

ANALYTE	UNITS	MAXIMUM	FREQ OF DETCTION	NYSDEC TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4 SS4-74 SOIL 43071 0 0.2 12/4/1998 SA RI Phase 1 Step 1 N		SEAD-4 SS4-75 SOIL 43072 0 0.2 12/6/1998 SA RI Phase 1 Step 1 N		SEAD-4 SS4-76 SOIL 43073 0 0.2 12/6/1998 SA RI Phase 1 Step 1 N		SEAD-4 SS4-77 SOIL 43074 0 0.2 12/6/1998 SA RI Phase 1 Step 1 N		SEAD-4 SS4-78 SOIL 43075 0 0.2 12/6/1998 SA RI Phase 1 Step 1 N		SEAD-4 SS4-79 SOIL 43076 0 0.2 12/6/1998 SA RI Phase 1 Step 1 N		SEAD-4 SS4-8 SOIL 43001 0 0.2 12/1/1998 SA RI Phase 1 Step 1 N		SEAD-4 SS4-8 SOIL 43183 0 0.2 7/11/1999 SA HEX CHROME N	
VOLATILES																							
1,1,1-Trichloroethane	UG/KG	0	0%	800	0	0	86	14	U	12	R	13	U	12	U	14	U	14	U	13	U		
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	600	0	0	86	14	UJ	12	R	13	U	12	UJ	14	U	14	UJ	13	U		
1,1,2-Trichloroethane	UG/KG	0	0%		0	0	86	14	U	12	R	13	U	12	UJ	14	U	14	U	13	U		
1,1-Dichloroethane	UG/KG	2	2%	200	0	2	86	14	U	12	R	13	U	12	U	14	U	14	U	13	U		
1,1-Dichloroethene	UG/KG	0	0%	400	0	0	86	14	U	12	R	13	U	12	U	14	U	14	U	13	U		
1,2-Dichloroethane	UG/KG	0	0%	100	0	0	86	14	U	12	R	13	U	12	U	14	U	14	U	13	U		
1,2-Dichloroethene (total)	UG/KG	4	3%		0	3	86	14	U	12	R	13	U	12	U	14	U	14	U	13	U		
1,2-Dichloropropane	UG/KG	0	0%		0	0	86	14	U	12	R	13	U	12	UJ	14	U	14	U	13	U		
Acetone	UG/KG	140	31%	200	0	27	86	14	U	12	R	13	U	6	J	14	U	13	J	10	J		
Benzene	UG/KG	1	1%	60	0	1	86	14	U	12	R	13	U	12	UJ	14	U	14	U	13	U		
Bromodichloromethane	UG/KG	0	0%		0	0	86	14	U	12	R	13	U	12	UJ	14	U	14	U	13	U		
Bromoform	UG/KG	0	0%		0	0	86	14	UJ	12	R	13	U	12	UJ	14	U	14	UJ	13	U		
Carbon disulfide	UG/KG	0	0%	2700	0	0	86	14	U	12	R	13	U	12	U	14	U	14	U	13	U		
Carbon tetrachloride	UG/KG	0	0%	600	0	0	86	14	U	12	R	13	U	12	U	14	U	14	U	13	U		
Chlorobenzene	UG/KG	0	0%	1700	0	0	86	14	UJ	12	R	13	U	12	UJ	14	U	14	UJ	13	U		
Chlorodibromomethane	UG/KG	0	0%		0	0	86	14	U	12	R	13	U	12	UJ	14	U	14	U	13	U		
Chloroethane	UG/KG	0	0%	1900	0	0	86	14	U	12	R	13	U	12	U	14	U	14	U	13	U		
Chloroform	UG/KG	0	0%	300	0	0	86	14	U	12	R	13	U	12	U	14	U	14	U	13	U		
Cis-1,3-Dichloropropene	UG/KG	0	0%		0	0	86	14	U	12	R	13	U	12	UJ	14	U	14	U	13	U		
Ethyl benzene	UG/KG	0	0%	5500	0	0	86	14	UJ	12	R	13	U	12	UJ	14	U	14	UJ	13	U		
Methyl bromide	UG/KG	0	0%		0	0	86	14	U	12	R	13	U	12	U	14	U	14	U	13	U		
Methyl butyl ketone	UG/KG	9	1%		0	1	86	14	U	12	R	13	U	12	U	14	U	14	U	9	J		
Methyl chloride	UG/KG	0	0%		0	0	86	14	U	12	R	13	U	12	U	14	U	14	U	13	U		
Methyl ethyl ketone	UG/KG	0	0%	300	0	0	86	14	U	12	R	13	U	12	U	14	U	14	U	13	U		
Methyl isobutyl ketone	UG/KG	0	0%	1000	0	0	86	14	U	12	R	13	U	12	U	14	U	14	U	13	U		
Methylene chloride	UG/KG	3	1%	100	0	1	86	14	U	12	R	13	U	12	U	14	U	14	U	13	U		
Styrene	UG/KG	0	0%		0	0	86	14	UJ	12	R	13	U	12	UJ	14	U	14	UJ	13	U		
Tetrachloroethene	UG/KG	0	0%	1400	0	0	86	14	U	12	R	13	U	12	U	14	U	14	U	13	U		
Toluene	UG/KG	14	29%	1500	0	25	86	14	U	6	J	13	U	12	U	14	U	14	U	6	J		
Total Xylenes	UG/KG	0	0%	1200	0	0	86	14	UJ	12	R	13	U	12	UJ	14	U	14	UJ	13	U		
Trans-1,3-Dichloropropene	UG/KG	0	0%		0	0	86	14	U	12	R	13	U	12	UJ	14	U	14	U	13	U		
Trichloroethene	UG/KG	3	3%	700	0	3	86	14	U	12	R	13	U	12	UJ	14	U	14	U	13	U		
Vinyl chloride	UG/KG	0	0%	200	0	0	86	14	U	12	R	13	U	12	U	14	U	14	U	13	U		
SEMIVOLATILES																							
1,2,4-Trichlorobenzene	UG/KG	0	0%	3400	0	0	86	96	UJ	81	UJ	92	UJ	78	UJ	89	UJ	87	UJ	87	U		
1,2-Dichlorobenzene	UG/KG	0	0%	7900	0	0	86	96	UJ	81	UJ	92	UJ	78	UJ	89	UJ	87	UJ	87	U		
1,3-Dichlorobenzene	UG/KG	0	0%	1600	0	0	86	96	UJ	81	UJ	92	UJ	78	UJ	89	UJ	87	UJ	87	U		
1,4-Dichlorobenzene	UG/KG	0	0%	8500	0	0	86	96	UJ	81	UJ	92	UJ	78	UJ	89	UJ	87	UJ	87	U		
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%		0	0	7																
2,4,5-Trichlorophenol	UG/KG	0	0%	100	0	0	86	230	UJ	200	UJ	220	UJ	190	UJ	220	UJ	210	UJ	210	U		
2,4,6-Trichlorophenol	UG/KG	0	0%		0	0	86	96	UJ	81	UJ	92	UJ	78	UJ	89	UJ	87	UJ	87	U		
2,4-Dichlorophenol	UG/KG	0	0%	400	0	0	86	96	UJ	81	UJ	92	UJ	78	UJ	89	UJ	87	UJ	87	U		
2,4-Dimethylphenol	UG/KG	0	0%		0	0	86	96	UJ	81	UJ	92	UJ	78	UJ	89	UJ	87	UJ	87	UJ		
2,4-Dinitrophenol	UG/KG	0	0%	200	0	0	86	230	UJ	200	UJ	220	UJ	190	UJ	220	UJ	210	UJ	210	U		
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	86	96	UJ	81	UJ	92	UJ	78	UJ	89	UJ	87	UJ	87	U		
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	86	96	UJ	81	UJ	92	UJ	78	UJ	89	UJ	87	UJ	87	U		
2-Chloronaphthalene	UG/KG	0	0%		0	0	86	96	UJ	81	UJ	92	UJ	78	UJ	89	UJ	87	UJ	87	U		
2-Chlorophenol	UG/KG	0	0%	800	0	0	86	96	UJ	81	UJ	92	UJ	78	UJ	89	UJ	87	UJ	87	U		
2-Methylnaphthalene	UG/KG	35	16%	36400	0	14	86	96	UJ	5.7	J	92	UJ	78	UJ	89	UJ	87	UJ	87	U		
2-Methylphenol	UG/KG	0	0%	100	0	0	86	96	UJ	81	UJ	92	UJ	78	UJ	89	UJ	87	UJ	87	U		
2-Nitroaniline	UG/KG	0	0%	430	0	0	86	230	UJ	200	UJ	220	UJ	190	UJ	220	UJ	210	UJ	210	U		
2-Nitrophenol	UG/KG	0	0%	330	0	0	86	96	UJ	81	UJ	92	UJ	78	UJ	89	UJ	87	UJ	87	UJ		
3,3'-Dichlorobenzidine	UG/KG	0	0%		0	0	86	96	UJ	81	UJ	92	UJ	78	UJ	89	UJ	87	UJ	87	U		
3-Nitroaniline	UG/KG	0	0%	500	0	0	86	230	UJ	200	UJ	220	UJ	190	UJ	220	UJ	210	UJ	210	U		
4,6-Dinitro-2-methylphenol	UG/KG	0	0%		0	0	86	230	UJ	200	UJ	220	UJ	190	UJ	220	UJ	210	UJ	210	U		
4-Bromophenyl phenyl ether	UG/KG	0	0%		0	0	86	96	UJ	81	UJ	92	UJ	78	UJ	89	UJ	87	UJ	87	U		
4-Chloro-3-methylphenol	UG/KG	0	0%	240	0	0	86	96	UJ	81	UJ	92	UJ	78	UJ	89	UJ	87	UJ	87	U		
4-Chloroaniline	UG/KG	0	0%	220	0	0	86	96	UJ	81	UJ	92	UJ	78	UJ	89	UJ	87	UJ	87	U		
4-Chlorophenyl phenyl ether	UG/KG	0	0%		0	0	86	96	UJ	81	UJ	92	UJ	78	UJ	89	UJ	87	UJ	87	U		
4-Methylphenol	UG/KG	0	0%	900	0	0	86	96	UJ	81	UJ	92	UJ	78	UJ	89	UJ	87	UJ	87	U		
4-Nitroaniline	UG/KG	0	0%		0	0	86	230	UJ	200	UJ	220	UJ	190	UJ	220	UJ	210	UJ	210	U		

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Surface Soil Sample Results

ANALYTE	UNITS	MAXIMUM	FREQ OF DETCTION	NYSDEC TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								SS4-74		SS4-75		SS4-76		SS4-77		SS4-78		SS4-79		SS4-8		SS4-8	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								43071		43072		43073		43074		43075		43076		43001		43183	
								0		0		0		0		0		0		0		0	
								0.2		0.2		0.2		0.2		0.2		0.2		0.2		0.2	
								12/4/1998		12/6/1998		12/6/1998		12/6/1998		12/6/1998		12/6/1998		12/1/1998		7/11/1999	
								SA		SA		SA		SA		SA		SA		SA		SA	
								RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		HEX CHROME	
								N		N		N		N		N		N		N		N	
4-Nitrophenol	UG/KG	0	0%	100	0	0	86	230	UJ	200	UJ	220	UJ	190	UJ	220	UJ	210	UJ	210	U		
Acenaphthene	UG/KG	78	9%	50000	0	8	86	96	UJ	81	UJ	92	UJ	78	UJ	89	UJ	87	UJ	87	U		
Acenaphthylene	UG/KG	32	9%	41000	0	8	86	96	UJ	81	UJ	92	UJ	78	UJ	89	UJ	87	UJ	87	U		
Anthracene	UG/KG	110	17%	50000	0	15	86	96	UJ	81	UJ	92	UJ	78	UJ	89	UJ	87	UJ	87	U		
Benzo(a)anthracene	UG/KG	560	83%	224	5	71	86	24	J	21	J	9.7	J	7.1	J	8.5	J	4.6	J	13	J		
Benzo(a)pyrene	UG/KG	450	80%	61	11	69	86	24	J	26	J	12	J	9.5	J	11	J	6.3	J	17	J		
Benzo(b)fluoranthene	UG/KG	890	80%	1100	0	69	86	59	J	51	J	24	J	21	J	23	J	12	J	25	J		
Benzo(ghi)perylene	UG/KG	310	55%	50000	0	47	86	19	J	25	J	12	J	9.3	J	11	J	87	UJ	16	J		
Benzo(k)fluoranthene	UG/KG	510	50%	1100	0	43	86	96	R	81	UJ	92	R	78	R	89	R	87	R	18	J		
Bis(2-Chloroethoxy)methane	UG/KG	0	0%		0	0	86	96	UJ	81	UJ	92	UJ	78	UJ	89	UJ	87	UJ	87	U		
Bis(2-Chloroethyl)ether	UG/KG	0	0%		0	0	86	96	UJ	81	UJ	92	UJ	78	UJ	89	UJ	87	UJ	87	U		
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%		0	0	79	96	UJ	81	UJ	92	UJ	78	UJ	89	UJ	87	UJ	87	U		
Bis(2-Ethylhexyl)phthalate	UG/KG	13000	59%	50000	0	51	86	35	J	23	J	19	J	17	J	31	J	11	J	87	UJ		
Butylbenzylphthalate	UG/KG	12000	12%	50000	0	10	86	96	UJ	4.9	J	92	UJ	78	UJ	89	UJ	87	UJ	87	UJ		
Carbazole	UG/KG	120	22%		0	19	86	96	UJ	81	UJ	92	UJ	78	UJ	89	UJ	87	UJ	87	UJ		
Chrysene	UG/KG	570	86%	400	4	74	86	34	J	33	J	14	J	15	J	13	J	7.6	J	20	J		
Di-n-butylphthalate	UG/KG	220	44%	8100	0	38	86	96	UJ	4.9	J	21	J	78	UJ	4.6	J	87	UJ	87	U		
Di-n-octylphthalate	UG/KG	44	8%	50000	0	7	86	96	UJ	81	UJ	5.5	J	78	UJ	89	UJ	87	UJ	87	U		
Dibenz(a,h)anthracene	UG/KG	130	22%	14	12	19	86	10	J	11	J	5.1	J	78	UJ	89	UJ	87	UJ	6.2	J		
Dibenzofuran	UG/KG	58	16%	6200	0	14	86	96	UJ	7.8	J	92	UJ	78	UJ	89	UJ	87	UJ	87	U		
Diethyl phthalate	UG/KG	22	16%	7100	0	14	86	96	UJ	81	UJ	92	UJ	78	UJ	89	UJ	87	UJ	87	U		
Dimethylphthalate	UG/KG	0	0%	2000	0	0	86	96	UJ	81	UJ	92	UJ	78	UJ	89	UJ	87	UJ	87	U		
Fluoranthene	UG/KG	1100	93%	50000	0	80	86	54	J	57	J	23	J	23	J	22	J	12	J	28	J		
Fluorene	UG/KG	74	6%	50000	0	5	86	96	UJ	81	UJ	92	UJ	78	UJ	89	UJ	87	UJ	87	U		
Hexachlorobenzene	UG/KG	0	0%	410	0	0	86	96	UJ	81	UJ	92	UJ	78	UJ	89	UJ	87	UJ	87	U		
Hexachlorobutadiene	UG/KG	0	0%		0	0	86	96	UJ	81	UJ	92	UJ	78	UJ	89	UJ	87	UJ	87	U		
Hexachlorocyclopentadiene	UG/KG	0	0%		0	0	86	96	UJ	81	UJ	92	UJ	78	UJ	89	UJ	87	UJ	87	UJ		
Hexachloroethane	UG/KG	0	0%		0	0	86	96	UJ	81	UJ	92	UJ	78	UJ	89	UJ	87	UJ	87	UJ		
Indeno(1,2,3-cd)pyrene	UG/KG	320	53%	3200	0	46	86	20	J	23	J	12	J	9.3	J	9.5	J	87	UJ	14	J		
Isophorone	UG/KG	0	0%	4400	0	0	86	96	UJ	81	UJ	92	UJ	78	UJ	89	UJ	87	UJ	87	U		
N-Nitrosodiphenylamine	UG/KG	18	1%		0	1	86	96	UJ	81	UJ	92	UJ	78	UJ	89	UJ	87	UJ	87	U		
N-Nitrosodipropylamine	UG/KG	0	0%		0	0	86	96	UJ	81	UJ	92	UJ	78	UJ	89	UJ	87	UJ	87	U		
Naphthalene	UG/KG	74	13%	13000	0	11	86	96	UJ	4.3	J	92	UJ	78	UJ	89	UJ	87	UJ	87	U		
Nitrobenzene	UG/KG	0	0%	200	0	0	86	96	UJ	81	UJ	92	UJ	78	UJ	89	UJ	87	UJ	87	U		
Pentachlorophenol	UG/KG	0	0%	1000	0	0	86	230	UJ	200	UJ	220	UJ	190	UJ	220	UJ	210	UJ	210	U		
Phenanthrene	UG/KG	640	87%	50000	0	75	86	24	J	30	J	12	J	12	J	12	J	7.5	J	12	J		
Phenol	UG/KG	17	2%	30	0	2	86	96	UJ	81	UJ	92	UJ	78	UJ	89	UJ	87	UJ	87	U		
Pyrene	UG/KG	990	88%	50000	0	76	86	43	J	43	J	18	J	16	J	17	J	10	J	22	J		
EXPLOSIVES																							
1,3,5-Trinitrobenzene	UG/KG	120	1%		0	1	86	120	U	120	U	120	U	120	U	120	U	120	U	120	U		
1,3-Dinitrobenzene	UG/KG	0	0%		0	0	86	120	U	120	U	120	U	120	U	120	U	120	U	120	U		
2,4,6-Trinitrotoluene	UG/KG	72	1%		0	1	86	120	U	120	U	120	U	120	U	120	U	120	U	120	U		
2,4-Dinitrotoluene	UG/KG	330	2%		0	2	86	120	U	120	U	120	U	120	U	120	U	120	U	120	U		
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	86	120	U	120	U	120	U	120	U	120	U	120	U	120	U		
2-Nitrotoluene	UG/KG	0	0%		0	0	79	120	U	120	U	120	U	120	U	120	U	120	U	120	U		
2-amino-4,6-Dinitrotoluene	UG/KG	90	1%		0	1	86	120	U	120	U	120	U	120	U	120	U	120	U	120	U		
3-Nitrotoluene	UG/KG	0	0%		0	0	79	120	U	120	U	120	U	120	U	120	U	120	U	120	U		
4-Nitrotoluene	UG/KG	390	1%		0	1	79	120	U	120	U	120	U	120	U	120	U	120	U	120	U		
4-amino-2,6-Dinitrotoluene	UG/KG	0	0%		0	0	86	120	U	120	U	120	U	120	U	120	U	120	U	120	U		
HMX	UG/KG	0	0%		0	0	86	120	U	120	U	120	U	120	U	120	U	120	U	120	U		
Nitrobenzene	UG/KG	0	0%	200	0	0	79	120	U	120	U	120	U	120	U	120	U	120	U	120	U		
RDX	UG/KG	0	0%		0	0	86	120	U	120	U	120	U	120	U	120	U	120	U	120	U		
Tetryl	UG/KG	0	0%		0	0	86	120	U	120	U	120	U	120	U	120	U	120	U	120	U		
PESTICIDES/PCBs																							
4,4'-DDD	UG/KG	190	23%	2900	0	20	86	4.8	U	4.1	U	4.6	U	3.9	U	4.4	U	4.3	U	3.4	J		
4,4'-DDE	UG/KG	160	31%	2100	0	27	86	4.8	U	5.3		4.8		5.2		4.4	U	4.3	U	4.3	U		
4,4'-DDT	UG/KG	760	34%	2100	0	29	86	2.6	J	4.1	U	4.5	J	3.9	U	4.4	U	4.3	U	4.6	J		
Aldrin	UG/KG	2.2	1%	41	0	1	86	2.5	U	2.1	U	2.3	U	2	U	2.3	U	2.2	U	2.2	U		
Alpha-BHC	UG/KG	2.4	6%	110	0	5	86	2.5	U	1	J	2.3	U	1.8	J	2.3	U	2.2	U	2.2	U		
Alpha-Chlordane	UG/KG	4.9	9%		0	8	86	2.5	U	2.1	U	2.3	U	2	U	1.7	J	2.2	U	2.2	U		
Aroclor-1016	UG/KG	0	0%		0	0	86	48	U	41	U	46	U	39	U	44	U	43	U	43	U		
Aroclor-1221	UG/KG	0	0%		0	0	86	97	U	83	U	92	U	78	U	90	U	87	U	88	U		

Seneca Army Depot Activity
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ANALYTE	UNITS	MAXIMUM	FREQ OF DETCTION	NYSDEC TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								SS4-74		SS4-75		SS4-76		SS4-77		SS4-78		SS4-79		SS4-8		SS4-8	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								43071		43072		43073		43074		43075		43076		43001		43183	
								0		0		0		0		0		0		0		0	
								0.2		0.2		0.2		0.2		0.2		0.2		0 2		0.2	
								12/4/1998		12/6/1998		12/6/1998		12/6/1998		12/6/1998		12/6/1998		12/1/1998		7/11/1999	
								SA		SA		SA		SA		SA		SA		SA		SA	
								RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	HEX CHROME	
								N		N		N		N		N		N		N		N	
Aroclor-1232	UG/KG	0	0%		0	0	86	48	U	41	U	46	U	39	U	44	U	43	U	43	U		
Aroclor-1242	UG/KG	0	0%		0	0	86	48	U	41	U	46	U	39	U	44	U	43	U	43	U		
Aroclor-1248	UG/KG	0	0%		0	0	86	48	U	41	U	46	U	39	U	44	U	43	U	43	U		
Aroclor-1254	UG/KG	310	26%	10000	0	22	86	48	U	41	U	46	U	39	U	44	U	43	U	35	J		
Aroclor-1260	UG/KG	110	3%	10000	0	3	86	48	U	41	U	46	U	39	U	44	U	43	U	43	U		
Beta-BHC	UG/KG	7.8	12%	200	0	10	86	2.5	U	3.7	J	2.3	U	7.6	J	2.3	U	2.2	U	2.2	U		
Delta-BHC	UG/KG	0	0%	300	0	0	86	2.5	U	2.1	U	2.3	U	2	U	2.3	U	2.2	U	2.2	U		
Dieldrin	UG/KG	7.4	6%	44	0	5	86	4.8	U	4.1	U	4.6	U	3.9	U	4.4	U	4.3	U	4.3	U		
Endosulfan I	UG/KG	1.7	5%	900	0	4	86	2.5	U	2.1	U	2.3	U	2	U	2.3	U	2.2	U	2.2	U		
Endosulfan II	UG/KG	5.2	3%	900	0	3	86	4.8	U	4 1	U	4.6	U	3.9	U	4.4	U	4.3	U	4.3	U		
Endosulfan sulfate	UG/KG	3.8	1%	1000	0	1	86	4.8	U	4.1	U	4.6	U	3.9	U	4.4	U	4.3	U	4.3	U		
Endrin	UG/KG	27	3%	100	0	3	86	4.8	U	4.1	U	4.6	U	3.9	U	4.4	U	4.3	U	4.3	U		
Endrin aldehyde	UG/KG	20	12%		0	10	86	4.8	U	4.1	U	4.6	U	3.9	U	4.4	U	4.3	U	4.3	U		
Endrin ketone	UG/KG	4.2	3%		0	3	86	4.8	U	4.1	U	4.6	U	3.9	U	4.4	U	4.3	U	4.3	U		
Gamma-BHC/Lindane	UG/KG	0	0%	60	0	0	86	2.5	U	2 1	U	2.3	U	2	U	2.3	U	2.2	U	2.2	U		
Gamma-Chlordane	UG/KG	7.4	9%	540	0	8	86	2.5	U	2.1	U	2.3	U	2	U	2.3	U	2.2	U	2.2	U		
Heptachlor	UG/KG	4.2	3%	100	0	3	86	2.5	U	1.1	J	2.3	U	2		2.3	U	2.2	U	2.2	U		
Heptachlor epoxide	UG/KG	3.6	5%	20	0	4	86	2.5	U	2 1	U	2.3	U	2	U	2.3	U	2.2	U	2.2	U		
Methoxychlor	UG/KG	0	0%		0	0	86	25	U	21	U	23	U	20	U	23	U	22	U	22	U		
Toxaphene	UG/KG	0	0%		0	0	86	250	U	210	U	230	U	200	U	230	U	220	U	220	U		
HERBICIDES																							
2,4,5-T	UG/KG	0	0%	1900	0	0	7																
2,4,5-TP/Silvex	UG/KG	0	0%	700	0	0	7																
2,4-D	UG/KG	0	0%	500	0	0	7																
2,4-DB	UG/KG	0	0%		0	0	7																
Dalapon	UG/KG	0	0%		0	0	7																
Dicamba	UG/KG	0	0%		0	0	7																
Dichloroprop	UG/KG	0	0%		0	0	7																
Dinoseb	UG/KG	0	0%		0	0	7																
MCPA	UG/KG	0	0%		0	0	7																
MCPP	UG/KG	0	0%		0	0	7																
METALS																							
Aluminum	MG/KG	18800	100%	19520 *	0	86	86	10100	J	12400	J	11700	J	10200	J	12500	J	9760	J	13200	J		
Antimony	MG/KG	148	40%	6 *	15	34	86	1.4	J	0.64	R	0.79	R	0 7	R	0.81	R	0.5	R	[illegible]	J		
Arsenic	MG/KG	14.6	100%	8.9 *	4	86	86	4.1		4 8		4.7		3.1		4.5		4		5.1			
Barium	MG/KG	278	100%	300	0	86	86	85.5	J	39.5	J	86.3	J	24.4	J	98.7	J	71.3	J	90.4	J		
Beryllium	MG/KG	1.8	100%	1.13 *	1	86	86	0.56	J	0.63	J	0.68	J	0.53	J	0.72	J	0.57	J	0.46	J		
Cadmium	MG/KG	2.3	13%	2.46 *	0	11	86	0.09	U	0.1	U	0.13	U	0.11	U	0.13	U	0 08	U	0.04	U		
Calcium	MG/KG	196000	100%	125300 *	3	86	86	9020		10500		5770		12700		4760		1080		8880	J		
Chromium	MG/KG	18600	100%	30 *	37	86	86	20.6	J	23.7	J	17.8	J	19.3	J	18.4	J	14.4	J	[illegible]	J		
Cobalt	MG/KG	19.9	100%	30	0	86	86	9.3	J	12.6		10.1	J	10.6	J	8	J	6	J	11.6			
Copper	MG/KG	7330	100%	33 *	30	86	86	22	J	28.3	J	23.8	J	24.9	J	21.7	J	13	J	[illegible]	J		
Cyanide	MG/KG	0.87	2%	0.35	2	2	86	0.82	U	0.64	U	0.72	U	0.6	U	0.71	U	0.67	U	0.76	U		
Iron	MG/KG	64600	100%	37410 *	2	86	86	21800	J	28200	J	22500	J	22800	J	20200	J	16600	J	28100	J		
Lead	MG/KG	11200	92%	24.4 *	36	79	86	[illegible]		[illegible]	J	19.9		22.8		16.4	J	13 5	J	[illegible]	J		
Magnesium	MG/KG	35300	100%	21700 *	1	86	86	4610	J	6340	J	4120	J	5210	J	3510	J	2420	J	4720	J		
Manganese	MG/KG	1540	100%	1100 *	3	86	86	555		385		515		304		564		269		497	J		
Mercury	MG/KG	1.2	52%	0.1	16	45	86	0.07	UJ	0.06	UJ	0.06	UJ	0.06	UJ	0.06	UJ	0.06	UJ	[illegible]	J		
Nickel	MG/KG	228	100%	50 *	1	86	86	26.2		44.9		27.7		37.4		25.3		17.4		29.9	J		
Potassium	MG/KG	2340	100%	2623 *	0	86	86	1730		1570		1370		1220		1690		896		1450			
Selenium	MG/KG	3.4	23%	2	1	20	86	0.68	U	0.74	U	0.91	U	0.81	U	0.94	U	0.58	U	0.43	U		
Silver	MG/KG	1.7	6%	0.8 *	1	5	86	0.19	U	0.21	U	0.25	U	0.22	U	0.26	U	0.16	U	0.24	J		
Sodium	MG/KG	1270	34%	188 *	2	29	86	49.7	U	66.2	J	66.6	U	58.8	U	68.4	U	42	U	110	J		
Thallium	MG/KG	5.4	22%	0.855 *	16	19	86	0.68	U	0.74	U	0.91	U	0.81	U	0.94	U	0.76	J	0.77	U		
Vanadium	MG/KG	1250	100%	150	1	86	86	30.7	J	20.8	J	21.4	J	15.5	J	21.6	J	18	J	23.4	J		
Zinc	MG/KG	2020	100%	115 *	29	86	86	92.7		78.9		87.6		62.6		79.6		48.8		[illegible]	J		
Chromium, Hexavalent	MG/KG	14.7	27%		0	4	15															11 7	U
Nitrate/Nitrite	MG/KG						66	3.96	J											0.51	J		

* Soil criteria for these inorganics are site background values.

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Surface Soil Sample Results

ANALYTE	UNITS	MAXIMUM	FREQ OF DETCTION	NYSDEC TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								SS4-80		SS4-81		SS4-82		SS4-83		SS4-83		SS4-85		SS4-86		SS4-9	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								43077		43078		43079		43102		43093		43095		43096		43003	
								0		0		0		0		0		0		0		0	
								0.2		0.2		0.2		0.2		0.2		0.2		0.2		0.2	
								12/6/1998		12/6/1998		12/6/1998		12/16/1998		12/16/1998		12/16/1998		12/16/1998		12/1/1998	
								SA		SA		SA		DU		SA		SA		SA		SA	
								RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1
								N		N		N		N		N		N		N		N	
VOLATILES																							
1,1,1-Trichloroethane	UG/KG	0	0%	800	0	0	86	14	U	15	U	14	U	15	U	15	U	15	U	14	U	13	U
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	600	0	0	86	14	U	15	UJ	14	UJ	15	U	15	U	15	U	14	U	13	U
1,1,2-Trichloroethane	UG/KG	0	0%		0	0	86	14	U	15	UJ	14	U	15	U	15	U	15	U	14	U	13	U
1,1-Dichloroethane	UG/KG	2	2%	200	0	2	86	14	U	15	U	14	U	15	U	15	U	15	U	14	U	13	U
1,1-Dichloroethene	UG/KG	0	0%	400	0	0	86	14	U	15	U	14	U	15	U	15	U	15	U	14	U	13	U
1,2-Dichloroethane	UG/KG	0	0%	100	0	0	86	14	U	15	U	14	U	15	U	15	U	15	U	14	U	13	U
1,2-Dichloroethene (total)	UG/KG	4	3%		0	3	86	14	U	15	U	14	U	15	U	15	U	15	U	14	U	13	U
1,2-Dichloropropane	UG/KG	0	0%		0	0	86	14	U	15	UJ	14	U	15	U	15	U	15	U	14	U	13	U
Acetone	UG/KG	140	31%	200	0	27	86	27		140		14	U	8	J	15	UJ	10	J	14	UJ	13	U
Benzene	UG/KG	1	1%	60	0	1	86	14	U	15	UJ	14	U	15	U	15	U	15	U	14	U	13	U
Bromodichloromethane	UG/KG	0	0%		0	0	86	14	U	15	UJ	14	U	15	U	15	U	15	U	14	U	13	U
Bromoform	UG/KG	0	0%		0	0	86	14	U	15	UJ	14	UJ	15	U	15	U	15	U	14	U	13	U
Carbon disulfide	UG/KG	0	0%	2700	0	0	86	14	U	15	U	14	U	15	U	15	U	15	U	14	U	13	U
Carbon tetrachloride	UG/KG	0	0%	600	0	0	86	14	U	15	U	14	U	15	U	15	U	15	U	14	U	13	U
Chlorobenzene	UG/KG	0	0%	1700	0	0	86	14	U	15	UJ	14	UJ	15	U	15	U	15	U	14	U	13	U
Chlorodibromomethane	UG/KG	0	0%		0	0	86	14	U	15	UJ	14	U	15	U	15	U	15	U	14	U	13	U
Chloroethane	UG/KG	0	0%	1900	0	0	86	14	U	15	U	14	U	15	U	15	U	15	U	14	U	13	U
Chloroform	UG/KG	0	0%	300	0	0	86	14	U	15	U	14	U	15	U	15	U	15	U	14	U	13	U
Cis-1,3-Dichloropropene	UG/KG	0	0%		0	0	86	14	U	15	UJ	14	U	15	U	15	U	15	U	14	U	13	U
Ethyl benzene	UG/KG	0	0%	5500	0	0	86	14	U	15	UJ	14	UJ	15	U	15	U	15	U	14	U	13	U
Methyl bromide	UG/KG	0	0%		0	0	86	14	U	15	U	14	U	15	UJ	15	UJ	15	UJ	14	UJ	13	U
Methyl butyl ketone	UG/KG	9	1%		0	1	86	14	U	15	U	14	U	15	UJ	15	UJ	15	UJ	14	UJ	13	U
Methyl chloride	UG/KG	0	0%		0	0	86	14	U	15	U	14	U	15	U	15	U	15	U	14	U	13	U
Methyl ethyl ketone	UG/KG	0	0%	300	0	0	86	14	U	15	U	14	U	15	UJ	15	UJ	15	UJ	14	UJ	13	U
Methyl isobutyl ketone	UG/KG	0	0%	1000	0	0	86	14	U	15	U	14	U	15	U	15	U	15	U	14	U	13	U
Methylene chloride	UG/KG	3	1%	100	0	1	86	14	U	15	U	14	U	15	U	15	U	15	U	14	U	13	U
Styrene	UG/KG	0	0%		0	0	86	14	U	15	UJ	14	UJ	15	U	15	U	15	U	14	U	13	U
Tetrachloroethene	UG/KG	0	0%	1400	0	0	86	14	U	15	U	14	U	15	U	15	U	15	U	14	U	13	U
Toluene	UG/KG	14	29%	1500	0	25	86	14	U	15	U	14	U	15	U	15	U	15	U	14	U	13	U
Total Xylenes	UG/KG	0	0%	1200	0	0	86	14	U	15	UJ	14	UJ	15	U	15	U	15	U	14	U	4	J
Trans-1,3-Dichloropropene	UG/KG	0	0%		0	0	86	14	U	15	UJ	14	U	15	U	15	U	15	U	14	U	13	U
Trichloroethene	UG/KG	3	3%	700	0	3	86	14	U	15	UJ	14	U	15	U	15	U	15	U	14	U	13	U
Vinyl chloride	UG/KG	0	0%	200	0	0	86	14	U	15	U	14	U	15	U	15	U	15	U	14	U	13	U
SEMIVOLATILES																							
1,2,4-Trichlorobenzene	UG/KG	0	0%	3400	0	0	86	93	UJ	94	UJ	93	UJ	97	U	98	U	94	U	93	U	81	U
1,2-Dichlorobenzene	UG/KG	0	0%	7900	0	0	86	93	UJ	94	UJ	93	UJ	97	U	98	U	94	U	93	U	81	U
1,3-Dichlorobenzene	UG/KG	0	0%	1600	0	0	86	93	UJ	94	UJ	93	UJ	97	U	98	U	94	U	93	U	81	U
1,4-Dichlorobenzene	UG/KG	0	0%	8500	0	0	86	93	UJ	94	UJ	93	UJ	97	U	98	U	94	U	93	U	81	U
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%		0	0	7																
2,4,5-Trichlorophenol	UG/KG	0	0%	100	0	0	86	220	UJ	230	UJ	220	UJ	240	U	240	U	230	U	220	U	200	U
2,4,6-Trichlorophenol	UG/KG	0	0%		0	0	86	93	UJ	94	UJ	93	UJ	97	U	98	U	94	U	93	U	81	U
2,4-Dichlorophenol	UG/KG	0	0%	400	0	0	86	93	UJ	94	UJ	93	UJ	97	U	98	U	94	U	93	U	81	U
2,4-Dimethylphenol	UG/KG	0	0%		0	0	86	93	UJ	94	UJ	93	UJ	97	UJ	98	UJ	94	UJ	93	UJ	81	UJ
2,4-Dinitrophenol	UG/KG	0	0%	200	0	0	86	220	UJ	230	UJ	220	UJ	240	UJ	240	R	230	UJ	220	UJ	200	UJ
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	86	93	UJ	94	UJ	93	UJ	97	U	98	U	94	U	93	U	81	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	86	93	UJ	94	UJ	93	UJ	97	U	98	U	94	U	93	U	81	U
2-Chloronaphthalene	UG/KG	0	0%		0	0	86	93	UJ	94	UJ	93	UJ	97	U	98	U	94	U	93	U	81	U
2-Chlorophenol	UG/KG	0	0%	800	0	0	86	93	UJ	94	UJ	93	UJ	97	U	98	U	94	U	93	U	81	U
2-Methylnaphthalene	UG/KG	35	16%	36400	0	14	86	93	UJ	94	UJ	93	UJ	97	U	98	U	94	U	93	U	81	U
2-Methylphenol	UG/KG	0	0%	100	0	0	86	93	UJ	94	UJ	93	UJ	97	U	98	U	94	U	93	U	81	U
2-Nitroaniline	UG/KG	0	0%	430	0	0	86	220	UJ	230	UJ	220	UJ	240	U	240	U	230	U	220	U	200	U
2-Nitrophenol	UG/KG	0	0%	330	0	0	86	93	UJ	94	UJ	93	UJ	97	U	98	U	94	U	93	U	81	U
3,3'-Dichlorobenzidine	UG/KG	0	0%		0	0	86	93	UJ	94	UJ	93	UJ	97	U	98	U	94	U	93	U	81	U
3-Nitroaniline	UG/KG	0	0%	500	0	0	86	220	UJ	230	UJ	220	UJ	240	U	240	U	230	U	220	U	200	UJ
4,6-Dinitro-2-methylphenol	UG/KG	0	0%		0	0	86	220	UJ	230	UJ	220	UJ	240	U	240	UJ	230	U	220	U	200	UJ
4-Bromophenyl phenyl ether	UG/KG	0	0%		0	0	86	93	UJ	94	UJ	93	UJ	97	U	98	U	94	U	93	U	81	U
4-Chloro-3-methylphenol	UG/KG	0	0%	240	0	0	86	93	UJ	94	UJ	93	UJ	97	U	98	U	94	U	93	U	81	U
4-Chloroaniline	UG/KG	0	0%	220	0	0	86	93	UJ	94	UJ	93	UJ	97	U	98	U	94	U	93	U	81	U
4-Chlorophenyl phenyl ether	UG/KG	0	0%		0	0	86	93	UJ	94	UJ	93	UJ	97	U	98	U	94	U	93	U	81	U
4-Methylphenol	UG/KG	0	0%	900	0	0	86	93	UJ	94	UJ	93	UJ	97	U	98	U	94	U	93	U	81	U
4-Nitroaniline	UG/KG	0	0%		0	0	86	220	UJ	230	UJ	220	UJ	240	U	240	U	230	U	220	U	200	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Surface Soil Sample Results

ANALYTE	UNITS	MAXIMUM	FREQ OF DETCTION	NYSDEC TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								SS4-80		SS4-81		SS4-82		SS4-83		SS4-83		SS4-85		SS4-86		SS4-9	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								43077		43078		43079		43102		43093		43095		43096		43003	
								0		0		0		0		0		0		0		0	
								0.2		0.2		0.2		0.2		0.2		0.2		0.2		0.2	
								12/6/1998		12/6/1998		12/6/1998		12/16/1998		12/16/1998		12/16/1998		12/16/1998		12/1/1998	
								SA		SA		SA		DU		SA		SA		SA		SA	
								RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
								N		N		N		N		N		N		N		N	
4-Nitrophenol	UG/KG	0	0%	100	0	0	86	220	UJ	230	UJ	220	UJ	240	U	240	U	230	U	220	U	200	U
Acenaphthene	UG/KG	78	9%	50000	0	8	86	93	UJ	94	UJ	93	UJ	97	U	98	U	94	U	93	U	81	U
Acenaphthylene	UG/KG	32	9%	41000	0	8	86	93	UJ	94	UJ	93	UJ	97	U	98	U	94	U	93	U	81	U
Anthracene	UG/KG	110	17%	50000	0	15	86	93	UJ	94	UJ	93	UJ	97	U	98	U	94	U	93	U	81	U
Benzo(a)anthracene	UG/KG	560	83%	224	5	71	86	5.2	J	6.6	J	5.1	J	9	J	9.3	J	8.4	J	7.8	J	11	J
Benzo(a)pyrene	UG/KG	450	80%	61	11	69	86	7.7	J	94	UJ	93	UJ	11	J	13	J	11	J	8.2	J	15	J
Benzo(b)fluoranthene	UG/KG	890	80%	1100	0	69	86	14	J	94	UJ	93	UJ	13	J	19	J	12	J	9.1	J	23	J
Benzo(ghi)perylene	UG/KG	310	55%	50000	0	47	86	7.1	J	94	UJ	93	UJ	11	J	98	U	12	J	10	J	17	J
Benzo(k)fluoranthene	UG/KG	510	50%	1100	0	43	86	93	R	94	UJ	93	UJ	12	J	19	J	14	J	13	J	17	J
Bis(2-Chloroethoxy)methane	UG/KG	0	0%		0	0	86	93	UJ	94	UJ	93	UJ	97	U	98	U	94	U	93	U	81	U
Bis(2-Chloroethyl)ether	UG/KG	0	0%		0	0	86	93	UJ	94	UJ	93	UJ	97	U	98	U	94	U	93	U	81	U
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%		0	0	79	93	UJ	94	UJ	93	UJ	97	U	98	U	94	U	93	U	81	U
Bis(2-Ethylhexyl)phthalate	UG/KG	13000	59%	50000	0	51	86	18	J	11	J	9.2	J	97	U	98	U	94	U	93	U	81	UJ
Butylbenzylphthalate	UG/KG	12000	12%	50000	0	10	86	93	UJ	94	UJ	93	UJ	97	U	98	U	94	U	93	U	81	UJ
Carbazole	UG/KG	120	22%		0	19	86	93	UJ	94	UJ	93	UJ	97	U	98	U	94	U	93	U	4.7	J
Chrysene	UG/KG	570	86%	400	4	74	86	8.7	J	9.5	J	8.8	J	14	J	16	J	14	J	13	J	18	J
Di-n-butylphthalate	UG/KG	220	44%	8100	0	38	86	5	J	94	UJ	93	UJ	97	U	98	U	94	U	93	U	81	UJ
Di-n-octylphthalate	UG/KG	44	8%	50000	0	7	86	93	UJ	94	UJ	93	UJ	7.6	J	98	U	94	U	93	U	81	UJ
Dibenz(a,h)anthracene	UG/KG	130	22%	14	12	19	86	93	UJ	94	UJ	93	UJ	7.8	J	98	U	94	U	93	U	81	U
Dibenzofuran	UG/KG	58	16%	6200	0	14	86	93	UJ	94	UJ	93	UJ	97	U	98	U	94	U	93	U	81	U
Diethyl phthalate	UG/KG	22	16%	7100	0	14	86	93	UJ	94	UJ	93	UJ	97	U	98	U	94	U	93	U	81	U
Dimethylphthalate	UG/KG	0	0%	2000	0	0	86	93	UJ	94	UJ	93	UJ	97	U	98	U	94	U	93	U	81	U
Fluoranthene	UG/KG	1100	93%	50000	0	80	86	14	J	15	J	14	J	18	J	23	J	18	J	20	J	25	J
Fluorene	UG/KG	74	6%	50000	0	5	86	93	UJ	94	UJ	93	UJ	97	U	98	U	94	U	93	U	81	U
Hexachlorobenzene	UG/KG	0	0%	410	0	0	86	93	UJ	94	UJ	93	UJ	97	U	98	U	94	U	93	U	81	U
Hexachlorobutadiene	UG/KG	0	0%		0	0	86	93	UJ	94	UJ	93	UJ	97	U	98	U	94	U	93	U	81	U
Hexachlorocyclopentadiene	UG/KG	0	0%		0	0	86	93	UJ	94	UJ	93	UJ	97	U	98	UJ	94	U	93	U	81	UJ
Hexachloroethane	UG/KG	0	0%		0	0	86	93	UJ	94	UJ	93	UJ	97	U	98	U	94	U	93	U	81	UJ
Indeno(1,2,3-cd)pyrene	UG/KG	320	53%	3200	0	46	86	5.6	J	94	UJ	93	UJ	11	J	7.7	J	8.8	J	7.6	J	15	J
Isophorone	UG/KG	0	0%	4400	0	0	86	93	UJ	94	UJ	93	UJ	97	U	98	U	94	U	93	U	81	U
N-Nitrosodiphenylamine	UG/KG	19	1%		0	1	86	93	UJ	94	UJ	93	UJ	97	U	98	U	94	U	93	U	81	U
N-Nitrosodipropylamine	UG/KG	0	0%		0	0	86	93	UJ	94	UJ	93	UJ	97	U	98	U	94	U	93	U	81	U
Naphthalene	UG/KG	74	13%	13000	0	11	86	93	UJ	94	UJ	93	UJ	97	U	98	U	94	U	93	U	81	U
Nitrobenzene	UG/KG	0	0%	200	0	0	86	93	UJ	94	UJ	93	UJ	97	U	98	U	94	U	93	U	81	U
Pentachlorophenol	UG/KG	0	0%	1000	0	0	86	220	UJ	230	UJ	220	UJ	240	U	240	U	230	U	220	U	200	UJ
Phenanthrene	UG/KG	640	87%	50000	0	75	86	9.4	J	9.8	J	8.4	J	14	J	18	J	14	J	12	J	9.9	J
Phenol	UG/KG	17	2%	30	0	2	86	93	UJ	94	UJ	93	UJ	97	U	98	U	94	U	93	U	17	J
Pyrene	UG/KG	990	88%	50000	0	76	86	11	J	9.8	J	10	J	14	J	19	J	15	J	15	J	18	J
EXPLOSIVES																							
1,3,5-Trinitrobenzene	UG/KG	120	1%		0	1	86	120	U	120	U	120	U	120	UJ	120	UJ	120	U	120	UJ	120	U
1,3-Dinitrobenzene	UG/KG	0	0%		0	0	86	120	U	120	U	120	U	120	UJ	120	UJ	120	U	120	UJ	120	U
2,4,6-Trinitrotoluene	UG/KG	72	1%		0	1	86	120	U	120	U	120	U	120	UJ	120	UJ	120	U	120	UJ	120	U
2,4-Dinitrotoluene	UG/KG	330	2%		0	2	86	120	U	120	U	120	U	120	UJ	120	UJ	120	U	120	UJ	120	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	86	120	U	120	U	120	U	120	UJ	120	UJ	120	U	120	UJ	120	U
2-Nitrotoluene	UG/KG	0	0%		0	0	79	120	U	120	U	120	U	120	UJ	120	UJ	120	U	120	UJ	120	U
2-amino-4,6-Dinitrotoluene	UG/KG	90	1%		0	1	86	120	U	120	U	120	U	120	UJ	120	UJ	120	U	120	UJ	120	U
3-Nitrotoluene	UG/KG	0	0%		0	0	79	120	U	120	U	120	U	120	UJ	120	UJ	120	U	120	UJ	120	U
4-Nitrotoluene	UG/KG	390	1%		0	1	79	120	U	120	U	120	U	120	UJ	120	UJ	120	U	120	UJ	120	U
4-amino-2,6-Dinitrotoluene	UG/KG	0	0%		0	0	86	120	U	120	U	120	U	120	UJ	120	UJ	120	U	120	UJ	120	U
HMX	UG/KG	0	0%		0	0	86	120	U	120	U	120	U	120	UJ	120	UJ	120	U	120	UJ	120	U
Nitrobenzene	UG/KG	0	0%	200	0	0	79	120	U	120	U	120	U	120	UJ	120	UJ	120	U	120	UJ	120	U
RDX	UG/KG	0	0%		0	0	86	120	U	120	U	120	U	120	UJ	120	UJ	120	U	120	UJ	120	U
Tetryl	UG/KG	0	0%		0	0	86	120	U	120	U	120	U	120	UJ	120	UJ	120	U	120	UJ	120	U
PESTICIDES/PCBs																							
4,4'-DDD	UG/KG	190	23%	2900	0	20	86	2.5	J	4.7	U	4.6	U	5.6	J	7.8		4.7	U	4.6	U	3.3	J
4,4'-DDE	UG/KG	160	31%	2100	0	27	86	4.6	U	4.7	U	3.9	J	4.8	U	4.9	U	4.7	U	4.6	U	4.1	U
4,4'-DDT	UG/KG	760	34%	2100	0	29	86	4.6	U	4.7	U	4.6	U	4.8	U	4.9	U	4.7	U	4.6	U	3.2	J
Aldrin	UG/KG	2.2	1%	41	0	1	86	2.4	U	2.4	U	2.4	U	2.5	U	2.5	U	2.4	U	2.4	U	2.1	U
Alpha-BHC	UG/KG	2.4	6%	110	0	5	86	2.4	U	2.4	U	2.4	U	2.5	U	2.5	U	2.4	U	2.4	U	2.1	U
Alpha-Chlordane	UG/KG	4.9	9%		0	8	86	2.4	U	2.6	J	1.4	J	2.5	U	2.5	U	2.4	U	2.4	U	2.1	U
Aroclor-1016	UG/KG	0	0%		0	0	86	46	U	47	U	46	U	48	U	49	U	47	U	46	U	41	U
Aroclor-1221	UG/KG	0	0%		0	0	86	94	U	96	U	94	U	98	U	100	U	96	U	94	U	83	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Surface Soil Sample Results

ANALYTE	UNITS	MAXIMUM	FREQ OF DETCTION	NYSDEC TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								SS4-80		SS4-81		SS4-82		SS4-83		SS4-83		SS4-85		SS4-86		SS4-9	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								43077		43078		43079		43102		43093		43095		43096		43003	
								0		0		0		0		0		0		0		0	
								0.2		0.2		0.2		0.2		0.2		0.2		0.2		0.2	
								12/6/1998		12/6/1998		12/6/1998		12/16/1998		12/16/1998		12/16/1998		12/16/1998		12/1/1998	
								SA		SA		SA		DU		SA		SA		SA		SA	
								RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1
								N		N		N		N		N		N		N		N	
Aroclor-1232	UG/KG	0	0%		0	0	86	46	U	47	U	46	U	48	U	49	U	47	U	46	U	41	U
Aroclor-1242	UG/KG	0	0%		0	0	86	46	U	47	U	46	U	48	U	49	U	47	U	46	U	41	U
Aroclor-1248	UG/KG	0	0%		0	0	86	46	U	47	U	46	U	48	U	49	U	47	U	46	U	41	U
Aroclor-1254	UG/KG	310	26%	10000	0	22	86	46	U	47	U	46	U	48	U	49	U	47	U	46	U	29	J
Aroclor-1260	UG/KG	110	3%	10000	0	3	86	46	U	47	U	46	U	48	U	49	U	47	U	46	U	41	U
Beta-BHC	UG/KG	7.6	12%	200	0	10	86	2.4	U	2.4	U	2.4	U	2.5	U	2.5	U	2.4	U	2.4	U	2.2	J
Delta-BHC	UG/KG	0	0%	300	0	0	86	2.4	U	2.4	U	2.4	U	2.5	U	2.5	U	2.4	U	2.4	U	2.1	U
Dieldrin	UG/KG	7.4	6%	44	0	5	86	4.6	U	4.7	U	4.6	U	4.8	U	4.9	U	4.7	U	4.6	U	4.1	U
Endosulfan I	UG/KG	1.7	5%	900	0	4	86	2.4	U	2.4	U	2.4	U	2.5	U	2.5	U	2.4	U	2.4	U	2.1	U
Endosulfan II	UG/KG	5.2	3%	900	0	3	86	4.6	U	2.6	J	4.6	U	4.8	U	4.9	U	4.7	U	4.6	U	4.1	U
Endosulfan sulfate	UG/KG	3.8	1%	1000	0	1	86	4.6	U	4.7	U	4.6	U	4.8	U	4.9	U	4.7	U	4.6	U	4.1	U
Endrin	UG/KG	27	3%	100	0	3	86	4.6	U	4.7	U	4.6	U	4.8	U	4.9	U	4.7	U	4.6	U	4.1	U
Endrin aldehyde	UG/KG	20	12%		0	10	86	4.6	U	20	J	4.6	U	4.8	U	4.9	U	4.7	U	4.6	U	4.1	U
Endrin ketone	UG/KG	4.2	3%		0	3	86	4.6	U	4.7	U	4.6	U	4.8	U	4.9	U	4.7	U	4.6	U	4.1	U
Gamma-BHC/Lindane	UG/KG	0	0%	60	0	0	86	2.4	U	2.4	U	2.4	U	2.5	U	2.5	U	2.4	U	2.4	U	2.1	U
Gamma-Chlordane	UG/KG	7.4	9%	540	0	8	86	2.4	U	2.4	U	2.4	U	2.5	U	2.5	U	2.4	U	2.4	U	2.1	U
Heptachlor	UG/KG	4.2	3%	100	0	3	86	2.4	U	2.4	U	2.4	U	2.5	U	2.5	U	2.4	U	2.4	U	2.1	U
Heptachlor epoxide	UG/KG	3.6	5%	20	0	4	86	2.4	U	2.4	U	2.4	U	2.5	U	2.5	U	2.4	U	2.4	U	2.1	U
Methoxychlor.	UG/KG	0	0%		0	0	86	24	U	24	U	24	U	25	U	25	U	24	U	24	U	21	U
Toxaphene	UG/KG	0	0%		0	0	86	240	U	240	U	240	U	250	U	250	U	240	U	240	U	210	U
HERBICIDES																							
2,4,5-T	UG/KG	0	0%	1900	0	0	7																
2,4,5-TP/Silvex	UG/KG	0	0%	700	0	0	7																
2,4-D	UG/KG	0	0%	500	0	0	7																
2,4-DB	UG/KG	0	0%		0	0	7																
Dalapon	UG/KG	0	0%		0	0	7																
Dicamba	UG/KG	0	0%		0	0	7																
Dichloroprop	UG/KG	0	0%		0	0	7																
Dinoseb	UG/KG	0	0%		0	0	7																
MCPA	UG/KG	0	0%		0	0	7																
MCPP	UG/KG	0	0%		0	0	7																
METALS																							
Aluminum	MG/KG	18800	100%	19520 *	0	86	86	9710	J	14700	J	12600	J	12700		12600		13300		11900		11100	J
Antimony	MG/KG	148	40%	6 *	15	34	86	0.83	R	0.84	R	0.83	R	0.77	R	0.66	R	0.62	R	0.59	R	11.9	J
Arsenic	MG/KG	14.6	100%	8.9 *	4	86	86	4		4.4		4.2		6		6.3		6.6		5.5		5.9	
Barium	MG/KG	278	100%	300	0	86	86	91.1	J	106	J	92	J	94.8		96.2		101		97.5		73.4	J
Beryllium	MG/KG	1.8	100%	1.13 *	1	86	86	0.64	J	0.93	J	0.76	J	0.52	J	0.54	J	0.52	J	0.52	J	0.38	J
Cadmium	MG/KG	2.3	13%	2.46 *	0	11	86	0.13	U	0.14	U	0.13	U	0.12	U	0.11	U	0.1	U	0.1	U	0.04	U
Calcium	MG/KG	196000	100%	125300 *	3	86	86	2160		3090		2830		5760		5580		5770		5510		9360	J
Chromium	MG/KG	18600	100%	30 *	37	86	86	13.7	J	21.5	J	18.4	J	29.4		29.6		129		[illegible]		[illegible]	J
Cobalt	MG/KG	19.9	100%	30	0	86	86	8.2	J	10.3	J	9.6	J	9	J	9.1	J	9.7	J	8.6	J	10.9	
Copper	MG/KG	7330	100%	33 *	30	86	86	15.9	J	17.5	J	20.4	J	23.7		24.4		41		25.9		[illegible]	J
Cyanide	MG/KG	0.87	2%	0.35	2	2	86	0.76	U	0.73	U	0.77	U	0.87	U	0.84	U	0.83	U	0.77	U	0.64	U
Iron	MG/KG	64600	100%	37410 *	2	86	86	16500	J	24900	J	21200	J	25000	J	25200	J	26200	J	23000	J	24300	J
Lead	MG/KG	11200	92%	24.4 *	36	79	86	14.6		14.7		14.4		19.7		19.8		20.3		18.5		[illegible]	J
Magnesium	MG/KG	35300	100%	21700 *	1	86	86	2440	J	4120	J	3480	J	3760		3790		4030		3690		4420	J
Manganese	MG/KG	1540	100%	1100 *	3	86	86	810		760		687		611		627		643		559		478	J
Mercury	MG/KG	1.2	52%	0.1	16	45	86	0.07	UJ	0.07	UJ	0.07	UJ	0.07	J	0.1	J	0.12	J	0.13	J	[illegible]	J
Nickel	MG/KG	228	100%	50 *	1	86	86	19.9		28.8		24.1		23.1		23.4		24.9		22.2		27.8	J
Potassium	MG/KG	2340	100%	2623 *	0	86	86	905	J	2220		1660		2020		1990		1950		1620		957	J
Selenium	MG/KG	3.4	23%	2	1	20	86	0.96	U	0.97	U	0.97	U	0.89	U	0.77	U	0.73	U	0.68	U	0.75	U
Silver	MG/KG	1.7	6%	0.8 *	1	5	86	0.27	U	0.27	U	0.27	U	0.25	U	0.21	U	0.2	U	0.19	U	0.31	J
Sodium	MG/KG	1270	34%	188 *	2	29	86	70	U	70.9	U	70.5	U	64.7	U	55.8	U	52.8	U	49.8	U	95.6	J
Thallium	MG/KG	5.4	22%	0.855 *	16	19	86	0.96	U	1	J	0.97	U	8.9	U	7.7	U	7.3	U	6.8	U	[illegible]	J
Vanadium	MG/KG	1250	100%	150	1	86	86	16.6	J	23.9	J	20.8	J	23		23.1		24.5		21.3		20.2	J
Zinc	MG/KG	2020	100%	115 *	29	86	86	55.6		69.7		74.8		78.6		79.5		103		74.7		[illegible]	J
Chromium, Hexavalent	MG/KG	14.7	27%		0	4	15																
Nitrate/Nitrite	MG/KG						66							0.01	J	0.01	J	0.01	J	0.21	J	0.01	J

* Soil criteria for these inorganics are site background values.

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Surface Soil Sample Results

ANALYTE	UNITS	MAXIMUM	FREQ OF DETCTION	NYSDEC TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4 SS4-9 SOIL 43180 0 0.2 7/11/1999 SA HEX CHROME N		SEAD-4 SS4-90 SOIL 43100 0 0.2 12/15/1998 SA RI Phase 1 Step 1 N		SEAD-4 SS4-90 SOIL 43199 0 0.2 7/11/1999 SA HEX CHROME N		SEAD-4 SS4-94 SOIL 43104 0 0.2 12/16/1998 SA RI Phase 1 Step 1 N		SEAD-4 SS4-95 SOIL 43105 0 0.2 12/17/1998 SA RI Phase 1 Step 1 N	
VOLATILES																	
1,1,1-Trichloroethane	UG/KG	0	0%	800	0	0	86			12	U			11	U	13	U
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	600	0	0	86			12	U			11	U	13	UJ
1,1,2-Trichloroethane	UG/KG	0	0%		0	0	86			12	U			11	U	13	U
1,1-Dichloroethane	UG/KG	2	2%	200	0	2	86			12	U			11	U	13	U
1,1-Dichloroethene	UG/KG	0	0%	400	0	0	86			12	U			11	U	13	U
1,2-Dichloroethane	UG/KG	0	0%	100	0	0	86			12	U			11	U	13	U
1,2-Dichloroethene (total)	UG/KG	4	3%		0	3	86			12	U			11	U	13	U
1,2-Dichloropropane	UG/KG	0	0%		0	0	86			12	U			11	U	13	U
Acetone	UG/KG	140	31%	200	0	27	86			13	U			6	J	52	
Benzene	UG/KG	1	1%	60	0	1	86			12	U			11	U	13	U
Bromodichloromethane	UG/KG	0	0%		0	0	86			12	U			11	U	13	U
Bromoform	UG/KG	0	0%		0	0	86			12	U			11	U	13	UJ
Carbon disulfide	UG/KG	0	0%	2700	0	0	86			12	U			11	U	13	U
Carbon tetrachloride	UG/KG	0	0%	600	0	0	86			12	U			11	U	13	U
Chlorobenzene	UG/KG	0	0%	1700	0	0	86			12	U			11	U	13	UJ
Chlorodibromomethane	UG/KG	0	0%		0	0	86			12	U			11	U	13	U
Chloroethane	UG/KG	0	0%	1900	0	0	86			12	U			11	U	13	UJ
Chloroform	UG/KG	0	0%	300	0	0	86			12	U			11	U	13	U
Cis-1,3-Dichloropropene	UG/KG	0	0%		0	0	86			12	U			11	U	13	U
Ethyl benzene	UG/KG	0	0%	5500	0	0	86			12	U			11	U	13	UJ
Methyl bromide	UG/KG	0	0%		0	0	86			12	UJ			11	U	13	U
Methyl butyl ketone	UG/KG	9	1%		0	1	86			12	U			11	UJ	13	U
Methyl chloride	UG/KG	0	0%		0	0	86			12	U			11	U	13	U
Methyl ethyl ketone	UG/KG	0	0%	300	0	0	86			12	U			11	UJ	13	UJ
Methyl isobutyl ketone	UG/KG	0	0%	1000	0	0	86			12	U			11	U	13	U
Methylene chloride	UG/KG	3	1%	100	0	1	86			12	U			11	U	13	U
Styrene	UG/KG	0	0%		0	0	86			12	U			11	U	13	UJ
Tetrachloroethene	UG/KG	0	0%	1400	0	0	86			12	U			11	U	13	U
Toluene	UG/KG	14	29%	1500	0	25	86			12	U			11	U	7	J
Total Xylenes	UG/KG	0	0%	1200	0	0	86			12	U			11	U	13	UJ
Trans-1,3-Dichloropropene	UG/KG	0	0%		0	0	86			12	U			11	U	13	U
Trichloroethene	UG/KG	3	3%	700	0	3	86			12	U			11	U	13	U
Vinyl chloride	UG/KG	0	0%	200	0	0	86			12	U			11	U	13	U
SEMIVOLATILES																	
1,2,4-Trichlorobenzene	UG/KG	0	0%	3400	0	0	86			80	U			74	U	89	U
1,2-Dichlorobenzene	UG/KG	0	0%	7900	0	0	86			80	U			74	U	89	U
1,3-Dichlorobenzene	UG/KG	0	0%	1600	0	0	86			80	U			74	U	89	U
1,4-Dichlorobenzene	UG/KG	0	0%	8500	0	0	86			80	U			74	U	89	U
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%		0	0	7										
2,4,5-Trichlorophenol	UG/KG	0	0%	100	0	0	86			190	U			180	U	220	U
2,4,6-Trichlorophenol	UG/KG	0	0%		0	0	86			80	U			74	U	89	U
2,4-Dichlorophenol	UG/KG	0	0%	400	0	0	86			80	U			74	U	89	U
2,4-Dimethylphenol	UG/KG	0	0%		0	0	86			80	U			74	UJ	89	UJ
2,4-Dinitrophenol	UG/KG	0	0%	200	0	0	86			190	UJ			180	R	220	R
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	86			80	U			74	U	89	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	86			80	U			74	U	89	U
2-Chloronaphthalene	UG/KG	0	0%		0	0	86			80	U			74	U	89	U
2-Chlorophenol	UG/KG	0	0%	800	0	0	86			80	U			74	U	89	U
2-Methylnaphthalene	UG/KG	35	16%	36400	0	14	86			80	U			74	U	89	U
2-Methylphenol	UG/KG	0	0%	100	0	0	86			80	U			74	U	89	U
2-Nitroaniline	UG/KG	0	0%	430	0	0	86			190	U			180	U	220	U
2-Nitrophenol	UG/KG	0	0%	330	0	0	86			80	U			74	U	89	U
3,3'-Dichlorobenzidine	UG/KG	0	0%		0	0	86			80	U			74	U	89	U
3-Nitroaniline	UG/KG	0	0%	500	0	0	86			190	U			180	U	220	U
4,6-Dinitro-2-methylphenol	UG/KG	0	0%		0	0	86			190	U			180	UJ	220	UJ
4-Bromophenyl phenyl ether	UG/KG	0	0%		0	0	86			80	U			74	U	89	U
4-Chloro-3-methylphenol	UG/KG	0	0%	240	0	0	86			80	U			74	U	89	U
4-Chloroaniline	UG/KG	0	0%	220	0	0	86			80	U			74	U	89	U
4-Chlorophenyl phenyl ether	UG/KG	0	0%		0	0	86			80	U			74	U	89	U
4-Methylphenol	UG/KG	0	0%	900	0	0	86			80	U			74	U	89	U
4-Nitroaniline	UG/KG	0	0%		0	0	86			190	U			180	U	220	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Surface Soil Sample Results

ANALYTE	UNITS	MAXIMUM	FREQ OF DETCTION	NYSDEC TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								SS4-9		SS4-90		SS4-90		SS4-94		SS4-95	
								SOIL		SOIL		SOIL		SOIL		SOIL	
								43180		43100		43199		43104		43105	
								0		0		0		0		0	
								0.2		0.2		0.2		0.2		0.2	
								7/11/1999		12/15/1998		7/11/1999		12/16/1998		12/17/1998	
								SA		SA		SA		SA		SA	
								HEX CHROME		RI Phase 1	Step 1	HEX CHROME		RI Phase 1	Step 1	RI Phase 1	Step 1
								N		N		N		N		N	
4-Nitrophenol	UG/KG	0	0%	100	0	0	86			190	U			180	U	220	U
Acenaphthene	UG/KG	78	9%	50000	0	8	86			80	U			74	U	89	U
Acenaphthylene	UG/KG	32	9%	41000	0	8	86			80	U			74	U	89	U
Anthracene	UG/KG	110	17%	50000	0	15	86			80	U			74	U	89	U
Benzo(a)anthracene	UG/KG	560	83%	224	5	71	86			4.3	J			74	U	89	U
Benzo(a)pyrene	UG/KG	450	80%	61	11	69	86			8.7	J			74	U	89	U
Benzo(b)fluoranthene	UG/KG	890	80%	1100	0	69	86			31	J			74	U	89	U
Benzo(ghi)perylene	UG/KG	310	55%	50000	0	47	86			80	UJ			74	U	89	U
Benzo(k)fluoranthene	UG/KG	510	50%	1100	0	43	86			80	U			74	U	89	U
Bis(2-Chloroethoxy)methane	UG/KG	0	0%		0	0	86			80	U			74	U	89	U
Bis(2-Chloroethyl)ether	UG/KG	0	0%		0	0	86			80	U			74	U	89	U
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%		0	0	79			80	U			74	U	89	U
Bis(2-Ethylhexyl)phthalate	UG/KG	13000	59%	50000	0	51	86			80	U			74	U	89	U
Butylbenzylphthalate	UG/KG	12000	12%	50000	0	10	86			80	U			74	U	89	U
Carbazole	UG/KG	120	22%		0	19	86			80	U			74	U	89	U
Chrysene	UG/KG	570	86%	400	4	74	86			7.6	J			74	U	89	U
Di-n-butylphthalate	UG/KG	220	44%	8100	0	38	86			80	U			74	U	89	U
Di-n-octylphthalate	UG/KG	44	8%	50000	0	7	86			80	U			74	U	89	U
Dibenz(a,h)anthracene	UG/KG	130	22%	14	12	19	86			80	U			74	U	89	U
Dibenzofuran	UG/KG	58	16%	6200	0	14	86			80	U			74	U	89	U
Diethyl phthalate	UG/KG	22	16%	7100	0	14	86			80	U			74	U	89	U
Dimethylphthalate	UG/KG	0	0%	2000	0	0	86			80	U			74	U	89	U
Fluoranthene	UG/KG	1100	93%	50000	0	80	86			10	J			74	U	89	U
Fluorene	UG/KG	74	6%	50000	0	5	86			80	U			74	U	89	U
Hexachlorobenzene	UG/KG	0	0%	410	0	0	86			80	U			74	U	89	U
Hexachlorobutadiene	UG/KG	0	0%		0	0	86			80	U			74	U	89	U
Hexachlorocyclopentadiene	UG/KG	0	0%		0	0	86			80	UJ			74	UJ	89	UJ
Hexachloroethane	UG/KG	0	0%		0	0	86			80	U			74	U	89	U
Indeno(1,2,3-cd)pyrene	UG/KG	320	53%	3200	0	46	86			8.2	J			74	U	89	U
Isophorone	UG/KG	0	0%	4400	0	0	86			80	U			74	U	89	U
N-Nitrosodiphenylamine	UG/KG	19	1%		0	1	86			80	U			74	U	89	U
N-Nitrosodipropylamine	UG/KG	0	0%		0	0	86			80	U			74	U	89	U
Naphthalene	UG/KG	74	13%	13000	0	11	86			80	U			74	U	89	U
Nitrobenzene	UG/KG	0	0%	200	0	0	86			80	U			74	U	89	U
Pentachlorophenol	UG/KG	0	0%	1000	0	0	86			190	U			180	U	220	U
Phenanthrene	UG/KG	640	87%	50000	0	75	86			4.6	J			74	U	89	U
Phenol	UG/KG	17	2%	30	0	2	86			80	U			74	U	89	U
Pyrene	UG/KG	990	88%	50000	0	76	86			7.5	J			6.7	J	89	U
EXPLOSIVES																	
1,3,5-Trinitrobenzene	UG/KG	120	1%		0	1	86			120	U			120	U	120	U
1,3-Dinitrobenzene	UG/KG	0	0%		0	0	86			120	U			120	U	120	U
2,4,6-Trinitrotoluene	UG/KG	72	1%		0	1	86			120	U			120	U	120	U
2,4-Dinitrotoluene	UG/KG	330	2%		0	2	86			120	U			120	U	120	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	86			120	U			120	U	120	U
2-Nitrotoluene	UG/KG	0	0%		0	0	79			120	U			120	U	120	U
2-amino-4,6-Dinitrotoluene	UG/KG	90	1%		0	1	86			120	U			120	U	120	U
3-Nitrotoluene	UG/KG	0	0%		0	0	79			120	U			120	U	120	U
4-Nitrotoluene	UG/KG	390	1%		0	1	79			120	U			120	U	120	U
4-amino-2,6-Dinitrotoluene	UG/KG	0	0%		0	0	86			120	U			120	U	120	U
HMX	UG/KG	0	0%		0	0	86			120	U			120	U	120	U
Nitrobenzene	UG/KG	0	0%	200	0	0	79			120	U			120	U	120	U
RDX	UG/KG	0	0%		0	0	86			120	U			120	U	120	U
Tetryl	UG/KG	0	0%		0	0	86			120	U			120	U	120	U
PESTICIDES/PCBs																	
4,4'-DDD	UG/KG	190	23%	2900	0	20	86			4	U			3.7	U	4.4	U
4,4'-DDE	UG/KG	160	31%	2100	0	27	86			4	U			3.7	U	4.4	U
4,4'-DDT	UG/KG	760	34%	2100	0	29	86			4	U			3.7	U	4.4	U
Aldrin	UG/KG	2.2	1%	41	0	1	86			2	U			1.9	U	2.3	U
Alpha-BHC	UG/KG	2.4	6%	110	0	5	86			2	U			1.9	U	2.3	U
Alpha-Chlordane	UG/KG	4.9	9%		0	8	86			2	U			1.9	U	2.3	U
Aroclor-1016	UG/KG	0	0%		0	0	86			40	U			37	U	44	U
Aroclor-1221	UG/KG	0	0%		0	0	86			81	U			75	U	90	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Surface Soil Sample Results

ANALYTE	UNITS	MAXIMUM	FREQ OF DETCTION	NYSDEC TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4 SS4-9 SOIL 43180 0 0.2 7/11/1999 SA HEX CHROME N		SEAD-4 SS4-90 SOIL 43100 0 0.2 12/15/1998 SA RI Phase 1 Step 1 N		SEAD-4 SS4-90 SOIL 43199 0 0.2 7/11/1999 SA HEX CHROME N		SEAD-4 SS4-94 SOIL 43104 0 0.2 12/16/1998 SA RI Phase 1 Step 1 N		SEAD-4 SS4-95 SOIL 43105 0 0 2 12/17/1998 SA RI Phase 1 Step 1 N	
VOLATILES Aroclor-1232	UG/KG	0	0%		0	0	86			40	U			37	U	44	U
Aroclor-1242	UG/KG	0	0%		0	0	86			40	U			37	U	44	U
Aroclor-1248	UG/KG	0	0%		0	0	86			40	U			37	U	44	U
Aroclor-1254	UG/KG	310	26%	10000	0	22	86			40	U			37	U	44	U
Aroclor-1260	UG/KG	110	3%	10000	0	3	86			40	U			37	U	44	U
Beta-BHC	UG/KG	7.6	12%	200	0	10	86			2	U			1.9	U	2.3	U
Delta-BHC	UG/KG	0	0%	300	0	0	86			2	U			1.9	U	2.3	U
Dieldrin	UG/KG	7.4	6%	44	0	5	86			4	U			3.7	U	4.4	U
Endosulfan I	UG/KG	1.7	5%	900	0	4	86			2	U			1.9	U	2.3	U
Endosulfan II	UG/KG	5.2	3%	900	0	3	86			4	U			3.7	U	4.4	U
Endosulfan sulfate	UG/KG	3.8	1%	1000	0	1	86			4	U			3.7	U	4.4	U
Endrin	UG/KG	27	3%	100	0	3	86			4	U			3.7	U	4 4	U
Endrin aldehyde	UG/KG	20	12%		0	10	86			4	U			3.7	U	4.4	U
Endrin ketone	UG/KG	4.2	3%		0	3	86			4	U			3.7	U	4.4	U
Gamma-BHC/Lindane	UG/KG	0	0%	60	0	0	86			2	U			1 9	U	2.3	U
Gamma-Chlordane	UG/KG	7.4	9%	540	0	8	86			2	U			1.9	U	0.16	J
Heptachlor	UG/KG	4.2	3%	100	0	3	86			2	U			1.9	U	2.3	U
Heptachlor epoxide	UG/KG	3.6	5%	20	0	4	86			2	U			1.9	U	2.3	U
Methoxychlor	UG/KG	0	0%		0	0	86			20	U			19	U	23	U
Toxaphene	UG/KG	0	0%		0	0	86			200	U			190	U	230	U
HERBICIDES																	
2,4,5-T	UG/KG	0	0%	1900	0	0	7										
2,4,5-TP/Silvex	UG/KG	0	0%	700	0	0	7										
2,4-D	UG/KG	0	0%	500	0	0	7										
2,4-DB	UG/KG	0	0%		0	0	7										
Dalapon	UG/KG	0	0%		0	0	7										
Dicamba	UG/KG	0	0%		0	0	7										
Dichloroprop	UG/KG	0	0%		0	0	7										
Dinoseb	UG/KG	0	0%		0	0	7										
MCPA	UG/KG	0	0%		0	0	7										
MCPP	UG/KG	0	0%		0	0	7										
METALS																	
Aluminum	MG/KG	18800	100%	19520 *	0	86	86			8410				11600		8880	
Antimony	MG/KG	148	40%	6 *	15	34	86			11.6	J			0.62	J	3.1	J
Arsenic	MG/KG	14.6	100%	8.9 *	4	86	86			3.5				7.2		4.1	
Barium	MG/KG	278	100%	300	0	86	86			60.4				45.2		54 5	
Beryllium	MG/KG	1.8	100%	1.13 *	1	86	86			0.32	J			0.37	J	0.3	J
Cadmium	MG/KG	2.3	13%	2.46 *	0	11	86			0.15	J			0.03	U	0.04	U
Calcium	MG/KG	196000	100%	125300 *	3	86	86			3290				4250		8550	
Chromium	MG/KG	18600	100%	30 *	37	86	86			1730				[illegible]		160	
Cobalt	MG/KG	19.9	100%	30	0	86	86			6.4	J			19.1		9.4	J
Copper	MG/KG	7330	100%	33 *	30	86	86			[illegible]				[illegible]		280	
Cyanide	MG/KG	0.87	2%	0.35	2	2	86			0.65	U			0.65	U	0.72	U
Iron	MG/KG	84600	100%	37410 *	2	86	86			16600	J			30700		20800	
Lead	MG/KG	11200	92%	24.4 *	36	79	86			11.3				10.4		9.5	
Magnesium	MG/KG	35300	100%	21700 *	1	86	86			2490				5210		4420	
Manganese	MG/KG	1540	100%	1100 *	3	86	86			502				440		438	
Mercury	MG/KG	1.2	52%	0.1	16	45	86			0.07	J			0.05	UJ	0.07	UJ
Nickel	MG/KG	228	100%	50 *	1	86	86			19				42		23.5	
Potassium	MG/KG	2340	100%	2623 *	0	86	86			878	J			890		1610	
Selenium	MG/KG	3.4	23%	2	1	20	86			0.74	U			0.32	U	0.41	U
Silver	MG/KG	1.7	6%	0.8 *	1	5	86			0.21	U			0.16	U	0.2	U
Sodium	MG/KG	1270	34%	188 *	2	29	86			54.2	U			42.4	U	53.1	U
Thallium	MG/KG	5.4	22%	0.855 *	16	19	86			7.4	U			5.8	U	7.3	U
Vanadium	MG/KG	1250	100%	150	1	86	86			16.4				16.7		15	
Zinc	MG/KG	2020	100%	115 *	29	86	86			140				95.2	J	134	J
Chromium, Hexavalent	MG/KG	14.7	27%		0	4	15	14.7				10.5					
Nitrate/Nitrite	MG/KG						66			8.06	J			0.97	J	0.03	J

* Soil criteria for these inorganics are site background values.

Subsurface Soil

	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	ESI		ESI		ESI		ESI		RI Phase 1 Step 1	
								MW4-1		MW4-1		MW4-1		MW4-1		MW4-11	
								SOIL		SOIL		SOIL		SOIL		SOIL	
								0		0		4		8		2	
								2		2		6		10		3.3	
								12/6/1993		12/6/1993		12/6/1993		12/6/1993		12/20/1998	
								SB4-1-5		**SB4-1-1**		**SB4-1-3**		**SB4-1-6**		**43171**	
								DU		SA		SA		SA		SA	
								N		N		N		N		N	
Volatiles																	
1,1,1-Trichloroethane	UG/KG	0	0%	800	0	0	76	12	U	12	U	12	U	11	U	11	U
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	600	0	0	76	12	U	12	U	12	U	11	U	11	U
1,1,2-Trichloroethane	UG/KG	0	0%		0	0	76	12	U	12	U	12	U	11	U	11	U
1,1-Dichloroethane	UG/KG	0	0%	200	0	0	76	12	U	12	U	12	U	11	U	11	U
1,1-Dichloroethene	UG/KG	0	0%	400	0	0	76	12	U	12	U	12	U	11	U	11	U
1,2-Dichloroethane	UG/KG	0	0%	100	0	0	76	12	U	12	U	12	U	11	U	11	U
1,2-Dichloroethene (total)	UG/KG	0	0%		0	0	76	12	U	12	U	12	U	11	U	11	U
1,2-Dichloropropane	UG/KG	0	0%		0	0	76	12	U	12	U	12	U	11	U	11	U
Acetone	UG/KG	31	9%	200	0	7	76	12	U	12	U	12	U	11	U	31	
Benzene	UG/KG	0	0%	60	0	0	76	12	U	12	U	12	U	11	U	11	U
Bromodichloromethane	UG/KG	0	0%		0	0	76	12	U	12	U	12	U	11	U	11	U
Bromoform	UG/KG	0	0%		0	0	76	12	U	12	U	12	U	11	U	11	U
Carbon disulfide	UG/KG	0	0%	2700	0	0	76	12	U	12	U	12	U	11	U	11	U
Carbon tetrachloride	UG/KG	0	0%	600	0	0	76	12	U	12	U	12	U	11	U	11	U
Chlorobenzene	UG/KG	0	0%	1700	0	0	76	12	U	12	U	12	U	11	U	11	U
Chlorodibromomethane	UG/KG	0	0%		0	0	76	12	U	12	U	12	U	11	U	11	U
Chloroethane	UG/KG	0	0%	1900	0	0	76	12	U	12	U	12	U	11	U	11	U
Chloroform	UG/KG	15	8%	300	0	6	76	12	U	12	U	12	U	11	U	11	U
Cis-1,3-Dichloropropene	UG/KG	0	0%		0	0	76	12	U	12	U	12	U	11	U	11	U
Ethyl benzene	UG/KG	1	1%	5500	0	1	76	12	U	12	U	12	U	11	U	11	U
Methyl bromide	UG/KG	0	0%		0	0	76	12	U	12	U	12	U	11	U	11	U
Methyl butyl ketone	UG/KG	0	0%		0	0	76	12	U	12	U	12	U	11	U	11	U
Methyl chloride	UG/KG	0	0%		0	0	76	12	U	12	U	12	U	11	U	11	U
Methyl ethyl ketone	UG/KG	0	0%	300	0	0	76	12	U	12	U	12	U	11	U	11	U
Methyl isobutyl ketone	UG/KG	0	0%	1000	0	0	76	12	U	12	U	12	U	11	U	11	U
Methylene chloride	UG/KG	2	3%	100	0	2	76	12	U	12	U	12	U	11	U	11	U
Styrene	UG/KG	0	0%		0	0	76	12	U	12	U	12	U	11	U	11	U
Tetrachloroethene	UG/KG	0	0%	1400	0	0	76	12	U	12	U	12	U	11	U	11	U
Toluene	UG/KG	13	28%	1500	0	21	76	12	U	12	U	12	U	11	U	11	U
Total Xylenes	UG/KG	8	4%	1200	0	3	76	12	U	12	U	12	U	11	U	11	U
Trans-1,3-Dichloropropene	UG/KG	0	0%		0	0	76	12	U	12	U	12	U	11	U	11	U
Trichloroethene	UG/KG	0	0%	700	0	0	76	12	U	12	U	12	U	11	U	11	U
Vinyl chloride	UG/KG	0	0%	200	0	0	76	12	U	12	U	12	U	11	U	11	U
Semivolatile Organics																	
1,2,4-Trichlorobenzene	UG/KG	0	0%	3400	0	0	76	390	U	390	U	390	U	360	U	76	U
1,2-Dichlorobenzene	UG/KG	0	0%	7900	0	0	76	390	U	390	U	390	U	360	U	76	U
1,3-Dichlorobenzene	UG/KG	0	0%	1600	0	0	76	390	U	390	U	390	U	360	U	76	U
1,4-Dichlorobenzene	UG/KG	0	0%	8500	0	0	76	390	U	390	U	390	U	360	U	76	U
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%		0	0	39	390	U	390	U	390	U	360	U		
2,4,5-Trichlorophenol	UG/KG	0	0%	100	0	0	76	950	U	940	U	940	U	880	U	180	U
2,4,6-Trichlorophenol	UG/KG	0	0%		0	0	76	390	U	390	U	390	U	360	U	76	U
2,4-Dichlorophenol	UG/KG	0	0%	400	0	0	76	390	U	390	U	390	U	360	U	76	U
2,4-Dimethylphenol	UG/KG	0	0%		0	0	76	390	U	390	U	390	U	360	U	76	UJ
2,4-Dinitrophenol	UG/KG	0	0%	200	0	0	76	950	U	940	U	940	U	880	U	180	UJ
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	76	390	U	390	U	390	U	360	U	76	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	76	390	U	390	U	390	U	360	U	76	U
2-Chloronaphthalene	UG/KG	0	0%		0	0	76	390	U	390	U	390	U	360	U	76	U
2-Chlorophenol	UG/KG	0	0%	800	0	0	76	390	U	390	U	390	U	360	U	76	U
2-Methylnaphthalene	UG/KG	260	4%	36400	0	3	76	390	U	390	U	390	U	360	U	76	U

Seneca Army Depot
SEAD-4 Remedial Investigation
Subsurface Soil Sample Results
1

	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	ESI		ESI		ESI		ESI		RI Phase 1 Step 1	
								MW4-1		MW4-1		MW4-1		MW4-1		MW4-11	
								SOIL		SOIL		SOIL		SOIL		SOIL	
								0		0		4		8		2	
								2		2		6		10		3.3	
								12/6/1993		12/6/1993		12/6/1993		12/6/1993		12/20/1998	
								SB4-1-5		**SB4-1-1**		**SB4-1-3**		**SB4-1-6**		**43171**	
								DU		SA		SA		SA		SA	
								N		N		N		N		N	
2-Methylphenol	UG/KG	0	0%	100	0	0	76	390	U	390	U	390	U	360	U	76	U
2-Nitroaniline	UG/KG	0	0%	430	0	0	76	950	U	940	U	940	U	880	U	180	U
2-Nitrophenol	UG/KG	0	0%	330	0	0	76	390	U	390	U	390	U	360	U	76	U
3,3'-Dichlorobenzidine	UG/KG	0	0%		0	0	76	390	U	390	U	390	U	360	U	76	U
3-Nitroaniline	UG/KG	0	0%	500	0	0	76	950	U	940	U	940	U	880	U	180	U
4,6-Dinitro-2-methylphenol	UG/KG	0	0%		0	0	76	950	U	940	U	940	U	880	U	180	U
4-Bromophenyl phenyl ether	UG/KG	0	0%		0	0	76	390	U	390	U	390	U	360	U	76	U
4-Chloro-3-methylphenol	UG/KG	0	0%	240	0	0	76	390	U	390	U	390	U	360	U	76	U
4-Chloroaniline	UG/KG	0	0%	220	0	0	76	390	U	390	U	390	U	360	U	76	U
4-Chlorophenyl phenyl ether	UG/KG	0	0%		0	0	76	390	U	390	U	390	U	360	U	76	U
4-Methylphenol	UG/KG	0	0%	900	0	0	76	390	U	390	U	390	U	360	U	76	U
4-Nitroaniline	UG/KG	0	0%		0	0	76	950	U	940	U	940	U	880	U	180	U
4-Nitrophenol	UG/KG	0	0%	100	0	0	76	950	U	940	U	940	U	880	U	180	U
Acenaphthene	UG/KG	88	3%	50000	0	2	76	390	U	390	U	390	U	360	U	76	U
Acenaphthylene	UG/KG	170	4%	41000	0	3	76	390	U	390	U	390	U	360	U	76	U
Anthracene	UG/KG	340	4%	50000	0	3	76	390	U	390	U	390	U	360	U	76	U
Benzo(a)anthracene	UG/KG	1100	7%	224	2	5	76	390	U	390	U	390	U	360	U	76	U
Benzo(a)pyrene	UG/KG	880	8%	61	2	6	76	390	U	390	U	390	U	360	U	76	U
Benzo(b)fluoranthene	UG/KG	730	9%	1100	0	7	76	390	U	390	U	390	U	360	U	76	U
Benzo(ghi)perylene	UG/KG	270	3%	50000	0	2	76	390	U	390	U	390	U	360	U	76	U
Benzo(k)fluoranthene	UG/KG	890	5%	1100	0	4	76	390	U	390	U	390	U	360	U	76	U
Bis(2-Chloroethoxy)methane	UG/KG	0	0%		0	0	76	390	U	390	U	390	U	360	U	76	U
Bis(2-Chloroethyl)ether	UG/KG	0	0%		0	0	76	390	U	390	U	390	U	360	U	76	U
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%		0	0	37									76	U
Bis(2-Ethylhexyl)phthalate	UG/KG	2000	11%	50000	0	8	76	390	U	390	U	390	U	360	U	76	U
Butylbenzylphthalate	UG/KG	120	1%	50000	0	1	76	390	U	390	U	390	U	360	U	76	U
Carbazole	UG/KG	160	1%		0	1	76	390	U	390	U	390	U	360	U	76	U
Chrysene	UG/KG	1000	11%	400	2	8	76	390	U	390	U	390	U	360	U	76	U
Di-n-butylphthalate	UG/KG	63	24%	8100	0	18	76	50	J	56	J	52	J	48	J	76	U
Di-n-octylphthalate	UG/KG	37	21%	50000	0	16	76	390	U	390	U	390	U	360	U	76	U
Dibenz(a,h)anthracene	UG/KG	48	1%	14	1	1	76	390	U	390	U	390	U	360	U	76	U
Dibenzofuran	UG/KG	33	1%	6200	0	1	76	390	U	390	U	390	U	360	U	76	U
Diethyl phthalate	UG/KG	0	0%	7100	0	0	76	390	U	390	U	390	U	360	U	76	U
Dimethylphthalate	UG/KG	0	0%	2000	0	0	76	390	U	390	U	390	U	360	U	76	U
Fluoranthene	UG/KG	2400	11%	50000	0	8	76	390	U	390	U	390	U	360	U	76	U
Fluorene	UG/KG	330	4%	50000	0	3	76	390	U	390	U	390	U	360	U	76	U
Hexachlorobenzene	UG/KG	0	0%	410	0	0	76	390	U	390	U	390	U	360	U	76	U
Hexachlorobutadiene	UG/KG	0	0%		0	0	76	390	U	390	U	390	U	360	U	76	U
Hexachlorocyclopentadiene	UG/KG	0	0%		0	0	76	390	U	390	U	390	U	360	U	76	U
Hexachloroethane	UG/KG	0	0%		0	0	76	390	U	390	U	390	U	360	U	76	U
Indeno(1,2,3-cd)pyrene	UG/KG	260	3%	3200	0	2	76	390	U	390	U	390	U	360	U	76	U
Isophorone	UG/KG	0	0%	4400	0	0	76	390	U	390	U	390	U	360	U	76	U
N-Nitrosodiphenylamine	UG/KG	0	0%		0	0	76	390	U	390	U	390	U	360	U	76	U
N-Nitrosodipropylamine	UG/KG	0	0%		0	0	76	390	U	390	U	390	U	360	U	76	U
Naphthalene	UG/KG	130	3%	13000	0	2	76	390	U	390	U	390	U	360	U	76	U
Nitrobenzene	UG/KG	0	0%	200	0	0	76	390	U	390	U	390	U	360	U	76	U
Pentachlorophenol	UG/KG	0	0%	1000	0	0	76	950	U	940	U	940	U	880	U	180	U
Phenanthrene	UG/KG	1400	8%	50000	0	6	76	390	U	390	U	390	U	360	U	76	U
Phenol	UG/KG	0	0%	30	0	0	76	390	U	390	U	390	U	360	U	76	U
Pyrene	UG/KG	1800	9%	50000	0	7	76	390	U	390	U	390	U	360	U	76	U

Seneca Depot
SEAD-4 Remedial Investigation
Subsurface Soil Sample Results
1

	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	ESI		ESI		ESI		ESI		RI Phase 1 Step 1	
								MW4-1		MW4-1		MW4-1		MW4-1		MW4-11	
								SOIL		SOIL		SOIL		SOIL		SOIL	
								0		0		4		8		2	
								2		2		6		10		3.3	
								12/6/1993		12/6/1993		12/6/1993		12/6/1993		12/20/1998	
								SB4-1-5		SB4-1-1		SB4-1-3		SB4-1-6		43171	
								DU		SA		SA		SA		SA	
								N		N		N		N		N	
Nitroaromatics																	
1,3-Dinitrobenzene	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	120	U
2,4,6-Trinitrotoluene	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	120	U
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	120	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	76	130	U	130	U	130	U	130	U	120	U
2-Nitrotoluene	UG/KG	0	0%		0	0	37									120	U
2-amino-4,6-Dinitrotoluene	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	120	U
3-Nitrotoluene	UG/KG	0	0%		0	0	37									120	U
4-Nitrotoluene	UG/KG	0	0%		0	0	37									120	U
4-amino-2,6-Dinitrotoluene	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	120	U
HMX	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	120	U
Nitrobenzene	UG/KG	0	0%	200	0	0	37									120	U
RDX	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	120	U
Tetryl	UG/KG	67	1%		0	1	76	130	U	130	U	130	U	130	U	120	U
Pesticides/PCBs																	
4,4'-DDD	UG/KG	0	0%	2900	0	0	76	3.9	U	3.9	UJ	3.9	U	3.6	UJ	3.8	U
4,4'-DDE	UG/KG	21	4%	2100	0	3	76	3.9	U	3.9	UJ	3.9	U	3.6	UJ	3.8	U
4,4'-DDT	UG/KG	2.9	1%	2100	0	1	76	3.9	U	3.9	UJ	3.9	U	3.6	UJ	3.8	U
Aldrin	UG/KG	8.2	1%	41	0	1	76	2	U	2	UJ	2	U	1.9	UJ	2	U
Alpha-BHC	UG/KG	0	0%	110	0	0	76	2	U	2	UJ	2	U	1.9	UJ	2	U
Alpha-Chlordane	UG/KG	10	1%		0	1	76	2	U	2	UJ	2	U	1.9	UJ	2	U
Aroclor-1016	UG/KG	0	0%		0	0	76	39	U	39	UJ	39	U	36	UJ	38	U
Aroclor-1221	UG/KG	0	0%		0	0	76	80	U	79	UJ	79	U	74	UJ	78	U
Aroclor-1232	UG/KG	0	0%		0	0	76	39	U	39	UJ	39	U	36	UJ	38	U
Aroclor-1242	UG/KG	0	0%		0	0	76	39	U	39	UJ	39	U	36	UJ	38	U
Aroclor-1248	UG/KG	27	1%		0	1	76	39	U	39	UJ	39	U	36	UJ	38	U
Aroclor-1254	UG/KG	1600	5%	10000	0	4	76	39	U	39	UJ	39	U	36	UJ	38	U
Aroclor-1260	UG/KG	0	0%	10000	0	0	76	39	U	39	UJ	39	U	36	UJ	38	U
Beta-BHC	UG/KG	1.4	1%	200	0	1	76	2	U	2	UJ	2	U	1.9	UJ	2	U
Delta-BHC	UG/KG	5.9	1%	300	0	1	76	2	U	2	UJ	2	U	1.9	UJ	2	U
Dieldrin	UG/KG	0	0%	44	0	0	76	3.9	U	3.9	UJ	3.9	U	3.6	UJ	3.8	U
Endosulfan I	UG/KG	11	1%	900	0	1	76	2	U	2	UJ	2	U	1.9	UJ	2	U
Endosulfan II	UG/KG	0	0%	900	0	0	76	3.9	U	3.9	UJ	3.9	U	3.6	UJ	3.8	U
Endosulfan sulfate	UG/KG	0	0%	1000	0	0	76	3.9	U	3.9	UJ	3.9	U	3.6	UJ	3.8	U
Endrin	UG/KG	34	1%	100	0	1	76	3.9	U	3.9	UJ	3.9	U	3.6	UJ	3.8	U
Endrin aldehyde	UG/KG	3.7	1%		0	1	76	3.9	U	3.9	UJ	3.9	U	3.6	UJ	3.8	U
Endrin ketone	UG/KG	0	0%		0	0	76	3.9	U	3.9	UJ	3.9	U	3.6	UJ	3.8	U
Gamma-BHC/Lindane	UG/KG	0	0%	60	0	0	76	2	U	2	UJ	2	U	1.9	UJ	2	U
Gamma-Chlordane	UG/KG	0	0%	540	0	0	76	2	U	2	UJ	2	U	1.9	UJ	2	U
Heptachlor	UG/KG	0	0%	100	0	0	76	2	U	2	UJ	2	U	1.9	UJ	2	U
Heptachlor epoxide	UG/KG	0	0%	20	0	0	76	2	U	2	UJ	2	U	1.9	UJ	2	U
Methoxychlor	UG/KG	0	0%		0	0	76	20	U	20	UJ	20	U	19	UJ	20	U
Toxaphene	UG/KG	0	0%		0	0	76	200	U	200	UJ	200	U	190	UJ	200	U
Herbicides																	
2,4,5-T	UG/KG	0	0%	1900	0	0	39	6	U	5.9	U	5.9	U	5.5	U		
2,4,5-TP/Silvex	UG/KG	0	0%	700	0	0	39	6	U	5.9	U	5.9	U	5.5	U		
2,4-D	UG/KG	0	0%	500	0	0	39	60	U	59	U	59	U	55	U		
2,4-DB	UG/KG	0	0%		0	0	39	60	U	59	U	59	U	55	U		
Dalapon	UG/KG	0	0%		0	0	39	150	U	150	U	150	U	140	U		

								ESI		ESI		ESI		ESI		RI Phase 1 Step 1	
								MW4-1		MW4-1		MW4-1		MW4-1		MW4-11	
								SOIL		SOIL		SOIL		SOIL		SOIL	
								0		0		4		8		2	
								2		2		6		10		3.3	
								12/6/1993		12/6/1993		12/6/1993		12/6/1993		12/20/1998	
								SB4-1-5		**SB4-1-1**		**SB4-1-3**		**SB4-1-6**		**43171**	
	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	DU		SA		SA		SA		SA	
								N		N		N		N		N	
Dicamba	UG/KG	23	3%		0	1	39	6	U	5.9	U	5.9	U	5.5	U		
Dichloroprop	UG/KG	0	0%		0	0	39	60	U	59	U	59	U	55	U		
Dinoseb	UG/KG	0	0%		0	0	39	30	U	30	U	30	U	28	U		
MCPA	UG/KG	0	0%		0	0	39	6000	U	5900	U	5900	U	5500	U		
MCPP	UG/KG	0	0%		0	0	39	6000	U	5900	U	5900	U	5500	U		
Metals																	
Aluminum	MG/KG	21000	100%	19520 *	3	76	76	21000		14800		15300		19200		10500	
Antimony	MG/KG	57.8	28%	6 *	10	21	76	3.8	UJ	4.8	UJ	5	UJ	2.8	UJ	0.83	R
Arsenic	MG/KG	21.5	100%	8.9 *	4	76	76	4.2		6.2		3.9		21.5		3.3	
Barium	MG/KG	133	100%	300	0	76	76	97.7		72		40.4	J	81.2		75.4	
Beryllium	MG/KG	1	99%	1.13 *	0	75	76	0.64	J	0.73	J	0.74	J	1		0.41	J
Cadmium	MG/KG	1.5	4%	2.46 *	0	3	76	0.37	U	0.47	U	0.49	U	0.27	U	0.11	U
Calcium	MG/KG	102000	100%	125300 *	0	76	76	2460		4280		30900		14400		86500	
Chromium	MG/KG	3820	80%	30 *	17	61	76	27.9		23.2		27.6		33.7		18.1	
Cobalt	MG/KG	29.1	100%	30	0	76	76	5.9	J	11.3		16.5		29.1		9.8	J
Copper	MG/KG	2250	100%	33 *	14	76	76	15.1		14.1		62.1		21.6		57.1	
Cyanide	MG/KG	0	0%	0.35	0	0	76	0.53	U	0.52	U	0.53	U	0.47	U	0.59	U
Iron	MG/KG	40900	100%	37410 *	6	76	76	19500		27500		34300		17900		22000	
Lead	MG/KG	251	100%	24.4 *	6	76	76	9.8	J	17.7	J	7.5	J	9.1	J	11.1	J
Magnesium	MG/KG	32000	100%	21700 *	3	76	76	4460		4270		7130		8040		10400	
Manganese	MG/KG	2100	78%	1100 *	5	59	76	119	JR	615	JR	337	R	795	R	455	
Mercury	MG/KG	0.12	45%	0.1	1	34	76	0.04	J	0.05	J	0.04	J	0.04	J	0.06	J
Nickel	MG/KG	62.3	100%	50 *	8	76	76	25.1		27.8		47.6		62.3		29.4	
Potassium	MG/KG	2490	100%	2623 *	0	76	76	2490		1250		1300		2030		1110	
Selenium	MG/KG	0.86	33%	2	0	25	76	0.23	J	0.4	J	0.09	U	0.14	U	0.76	U
Silver	MG/KG	1.2	8%	0.8 *	4	6	76	0.74	U	0.93	U	0.98	U	0.64	J	0.21	U
Sodium	MG/KG	134	61%	188 *	0	46	76	39.2	J	43.8	U	105	J	91.6	J	55.6	U
Thallium	MG/KG	0	0%	0.855 *	0	0	76	0.23	U	0.23	U	0.16	U	0.24	U	0.66	U
Vanadium	MG/KG	31	100%	150	0	76	76	31		28.6		22.2		29.3		17.1	
Zinc	MG/KG	1010	100%	115 *	12	76	76	72.1		79.6		102		115		56.7	J
Nitrate/Nitrite	MG/KG	2.7	100%			37	37									0.06	J

* Soil criteria for these inorganics are site background values.

Seneca [illegible] Depot
SEAD-4 Remedial Investigation
Subsurface Soil Sample Results
1

	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		ESI	
								MW4-11		MW4-12		MW4-12		MW4-13		MW4-2	
								SOIL		SOIL		SOIL		SOIL		SOIL	
								4		2		2		2		0	
								5.5		3.4		3.4		2.6		2	
								12/20/1998		12/21/1998		12/21/1998		12/20/1998		11/10/1993	
								43172		**43168**		**43169**		**43163**		**SB4-2-1**	
								SA		SA		SA		SA		SA	
								N		N		N		N		N	
Volatiles																	
1,1,1-Trichloroethane	UG/KG	0	0%	800	0	0	76	11	U	11	U	11	U	11	U	12	U
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	600	0	0	76	11	U	11	U	11	U	11	U	12	U
1,1,2-Trichloroethane	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	11	U	12	U
1,1-Dichloroethane	UG/KG	0	0%	200	0	0	76	11	U	11	U	11	U	11	U	12	U
1,1-Dichloroethene	UG/KG	0	0%	400	0	0	76	11	U	11	U	11	U	11	U	12	U
1,2-Dichloroethane	UG/KG	0	0%	100	0	0	76	11	U	11	U	11	U	11	U	12	U
1,2-Dichloroethene (total)	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	11	U	12	U
1,2-Dichloropropane	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	11	U	12	U
Acetone	UG/KG	31	9%	200	0	7	76	13		11	U	13	U	11	U	19	U
Benzene	UG/KG	0	0%	60	0	0	76	11	U	11	U	11	U	11	U	12	U
Bromodichloromethane	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	11	U	12	U
Bromoform	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	11	U	12	U
Carbon disulfide	UG/KG	0	0%	2700	0	0	76	11	U	11	U	11	U	11	U	12	U
Carbon tetrachloride	UG/KG	0	0%	600	0	0	76	11	U	11	U	11	U	11	U	12	U
Chlorobenzene	UG/KG	0	0%	1700	0	0	76	11	U	11	U	11	U	11	U	12	U
Chlorodibromomethane	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	11	U	12	U
Chloroethane	UG/KG	0	0%	1900	0	0	76	11	U	11	U	11	U	11	U	12	U
Chloroform	UG/KG	15	8%	300	0	6	76	11	U	11	U	11	U	11	U	12	U
Cis-1,3-Dichloropropene	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	11	U	12	U
Ethyl benzene	UG/KG	1	1%	5500	0	1	76	11	U	11	U	11	U	11	U	12	U
Methyl bromide	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	11	U	12	U
Methyl butyl ketone	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	11	U	12	U
Methyl chloride	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	11	U	12	U
Methyl ethyl ketone	UG/KG	0	0%	300	0	0	76	11	U	11	U	11	U	11	U	12	U
Methyl isobutyl ketone	UG/KG	0	0%	1000	0	0	76	11	U	11	U	11	U	11	U	12	U
Methylene chloride	UG/KG	2	3%	100	0	2	76	2	J	11	U	11	U	11	U	12	U
Styrene	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	11	U	12	U
Tetrachloroethene	UG/KG	0	0%	1400	0	0	76	11	U	11	U	11	U	11	U	12	U
Toluene	UG/KG	13	28%	1500	0	21	76	3	J	11	U	5	J	3	J	12	U
Total Xylenes	UG/KG	8	4%	1200	0	3	76	11	U	11	U	11	U	11	U	12	U
Trans-1,3-Dichloropropene	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	11	U	12	U
Trichloroethene	UG/KG	0	0%	700	0	0	76	11	U	11	U	11	U	11	U	12	U
Vinyl chloride	UG/KG	0	0%	200	0	0	76	11	U	11	U	11	U	11	U	12	U
Semivolatile Organics																	
1,2,4-Trichlorobenzene	UG/KG	0	0%	3400	0	0	76	72	U	240	UJ	72	UJ	72	U	400	U
1,2-Dichlorobenzene	UG/KG	0	0%	7900	0	0	76	72	U	240	UJ	72	UJ	72	U	400	U
1,3-Dichlorobenzene	UG/KG	0	0%	1600	0	0	76	72	U	240	UJ	72	UJ	72	U	400	U
1,4-Dichlorobenzene	UG/KG	0	0%	8500	0	0	76	72	U	240	UJ	72	UJ	72	U	400	U
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%		0	0	39									400	U
2,4,5-Trichlorophenol	UG/KG	0	0%	100	0	0	76	170	U	580	UJ	170	UJ	180	U	970	U
2,4,6-Trichlorophenol	UG/KG	0	0%		0	0	76	72	U	240	UJ	72	UJ	72	U	400	U
2,4-Dichlorophenol	UG/KG	0	0%	400	0	0	76	72	U	240	UJ	72	UJ	72	U	400	U
2,4-Dimethylphenol	UG/KG	0	0%		0	0	76	72	UJ	240	UJ	72	UJ	72	UJ	400	U
2,4-Dinitrophenol	UG/KG	0	0%	200	0	0	76	170	R	580	UJ	170	R	180	UJ	970	U
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	76	72	U	240	UJ	72	UJ	72	U	400	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	76	72	U	240	UJ	72	UJ	72	U	400	U
2-Chloronaphthalene	UG/KG	0	0%		0	0	76	72	U	240	UJ	72	UJ	72	U	400	U
2-Chlorophenol	UG/KG	0	0%	800	0	0	76	72	U	240	UJ	72	UJ	72	U	400	U
2-Methylnaphthalene	UG/KG	260	4%	36400	0	3	76	72	U	260	J	12	J	72	U	400	U

								RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		ESI	
								MW4-11		MW4-12		MW4-12		MW4-13		MW4-2	
								SOIL		SOIL		SOIL		SOIL		SOIL	
								4		2		2		2		0	
								5.5		3.4		3.4		2.6		2	
								12/20/1998		12/21/1998		12/21/1998		12/20/1998		11/10/1993	
								43172		**43168**		**43169**		**43163**		**SB4-2-1**	
	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SA		SA		SA		SA		SA	
								N		N		N		N		N	
2-Methylphenol	UG/KG	0	0%	100	0	0	76	72	U	240	UJ	72	UJ	72	U	400	U
2-Nitroaniline	UG/KG	0	0%	430	0	0	76	170	U	580	UJ	170	UJ	180	U	970	U
2-Nitrophenol	UG/KG	0	0%	330	0	0	76	72	U	240	UJ	72	UJ	72	U	400	U
3,3'-Dichlorobenzidine	UG/KG	0	0%		0	0	76	72	U	240	UJ	72	UJ	72	U	400	U
3-Nitroaniline	UG/KG	0	0%	500	0	0	76	170	U	580	UJ	170	UJ	180	U	970	U
4,6-Dinitro-2-methylphenol	UG/KG	0	0%		0	0	76	170	UJ	580	UJ	170	UJ	180	U	970	U
4-Bromophenyl phenyl ether	UG/KG	0	0%		0	0	76	72	U	240	UJ	72	UJ	72	U	400	U
4-Chloro-3-methylphenol	UG/KG	0	0%	240	0	0	76	72	U	240	UJ	72	UJ	72	U	400	U
4-Chloroaniline	UG/KG	0	0%	220	0	0	76	72	U	240	UJ	72	UJ	72	U	400	U
4-Chlorophenyl phenyl ether	UG/KG	0	0%		0	0	76	72	U	240	UJ	72	UJ	72	U	400	U
4-Methylphenol	UG/KG	0	0%	900	0	0	76	72	U	240	UJ	72	UJ	72	U	400	U
4-Nitroaniline	UG/KG	0	0%		0	0	76	170	U	580	UJ	170	UJ	180	U	970	U
4-Nitrophenol	UG/KG	0	0%	100	0	0	76	170	U	580	UJ	170	UJ	180	U	970	U
Acenaphthene	UG/KG	88	3%	50000	0	2	76	72	U	88	J	72	UJ	72	U	400	U
Acenaphthylene	UG/KG	170	4%	41000	0	3	76	72	U	170	J	5.9	J	72	U	400	U
Anthracene	UG/KG	340	4%	50000	0	3	76	72	U	290	J	8.4	J	72	U	400	U
Benzo(a)anthracene	UG/KG	1100	7%	224	2	5	76	72	U	320	J	9.4	J	72	U	400	U
Benzo(a)pyrene	UG/KG	880	8%	61	2	6	76	72	U	260	J	7.6	J	72	U	400	U
Benzo(b)fluoranthene	UG/KG	730	9%	1100	0	7	76	72	U	320	J	72	UJ	72	U	400	U
Benzo(ghi)perylene	UG/KG	270	3%	50000	0	2	76	72	U	150	J	72	UJ	72	U	400	U
Benzo(k)fluoranthene	UG/KG	890	5%	1100	0	4	76	72	U	240	R	72	UJ	72	U	400	U
Bis(2-Chloroethoxy)methane	UG/KG	0	0%		0	0	76	72	U	240	UJ	72	UJ	72	U	400	U
Bis(2-Chloroethyl)ether	UG/KG	0	0%		0	0	76	72	U	240	UJ	72	UJ	72	U	400	U
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%		0	0	37	72	U	240	UJ	72	UJ	72	U		
Bis(2-Ethylhexyl)phthalate	UG/KG	2000	11%	50000	0	8	76	72	U	240	UJ	72	UJ	72	U	1900	
Butylbenzylphthalate	UG/KG	120	1%	50000	0	1	76	72	U	240	UJ	72	UJ	72	U	400	U
Carbazole	UG/KG	160	1%		0	1	76	72	U	240	UJ	72	UJ	72	U	400	U
Chrysene	UG/KG	1000	11%	400	2	8	76	72	U	470	J	15	J	72	U	400	U
Di-n-butylphthalate	UG/KG	63	24%	8100	0	18	76	72	U	240	UJ	72	UJ	72	U	28	J
Di-n-octylphthalate	UG/KG	37	21%	50000	0	16	76	5.6	J	240	UJ	6.1	J	13	J	400	U
Dibenz(a,h)anthracene	UG/KG	48	1%	14	1	1	76	72	U	48	J	72	UJ	72	U	400	U
Dibenzofuran	UG/KG	33	1%	6200	0	1	76	72	U	240	UJ	72	UJ	72	U	400	U
Diethyl phthalate	UG/KG	0	0%	7100	0	0	76	72	U	240	UJ	72	UJ	72	U	400	U
Dimethylphthalate	UG/KG	0	0%	2000	0	0	76	72	U	240	UJ	72	UJ	72	U	400	U
Fluoranthene	UG/KG	2400	11%	50000	0	8	76	72	U	480	J	15	J	72	U	400	U
Fluorene	UG/KG	330	4%	50000	0	3	76	72	U	330	J	12	J	72	U	400	U
Hexachlorobenzene	UG/KG	0	0%	410	0	0	76	72	U	240	UJ	72	UJ	72	U	400	U
Hexachlorobutadiene	UG/KG	0	0%		0	0	76	72	U	240	UJ	72	UJ	72	U	400	U
Hexachlorocyclopentadiene	UG/KG	0	0%		0	0	76	72	UJ	240	UJ	72	UJ	72	U	400	U
Hexachloroethane	UG/KG	0	0%		0	0	76	72	U	240	UJ	72	UJ	72	U	400	U
Indeno(1,2,3-cd)pyrene	UG/KG	260	3%	3200	0	2	76	72	U	100	J	72	UJ	72	U	400	U
Isophorone	UG/KG	0	0%	4400	0	0	76	72	U	240	UJ	72	UJ	72	U	400	U
N-Nitrosodiphenylamine	UG/KG	0	0%		0	0	76	72	U	240	UJ	72	UJ	72	U	400	U
N-Nitrosodipropylamine	UG/KG	0	0%		0	0	76	72	U	240	UJ	72	UJ	72	U	400	U
Naphthalene	UG/KG	130	3%	13000	0	2	76	72	U	130	J	72	UJ	72	U	400	U
Nitrobenzene	UG/KG	0	0%	200	0	0	76	72	U	240	UJ	72	UJ	72	U	400	U
Pentachlorophenol	UG/KG	0	0%	1000	0	0	76	170	U	580	UJ	170	UJ	180	U	970	U
Phenanthrene	UG/KG	1400	8%	50000	0	6	76	72	U	1400	J	43	J	72	U	400	U
Phenol	UG/KG	0	0%	30	0	0	76	72	U	240	UJ	72	UJ	72	U	400	U
Pyrene	UG/KG	1800	9%	50000	0	7	76	72	U	1000	J	30	J	72	U	400	U

								RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		ESI	
								MW4-11		MW4-12		MW4-12		MW4-13		MW4-2	
								SOIL		SOIL		SOIL		SOIL		SOIL	
								4		2		2		2		0	
								5.5		3.4		3.4		2.6		2	
								12/20/1998		12/21/1998		12/21/1998		12/20/1998		11/10/1993	
								43172		**43168**		**43169**		**43163**		**SB4-2-1**	
	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SA		SA		SA		SA		SA	
								N		N		N		N		N	
Nitroaromatics																	
1,3-Dinitrobenzene	UG/KG	0	0%		0	0	76	120	U	120	U	120	U	120	U	130	U
2,4,6-Trinitrotoluene	UG/KG	0	0%		0	0	76	120	U	120	U	120	U	120	U	130	U
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	76	120	U	120	U	120	U	120	U	130	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	76	120	U	120	U	120	U	120	U	130	U
2-Nitrotoluene	UG/KG	0	0%		0	0	37	120	U	120	U	120	U	120	U		
2-amino-4,6-Dinitrotoluene	UG/KG	0	0%		0	0	76	120	U	120	U	120	U	120	U	130	U
3-Nitrotoluene	UG/KG	0	0%		0	0	37	120	U	120	U	120	U	120	U		
4-Nitrotoluene	UG/KG	0	0%		0	0	37	120	U	120	U	120	U	120	U		
4-amino-2,6-Dinitrotoluene	UG/KG	0	0%		0	0	76	120	U	120	U	120	U	120	U	130	U
HMX	UG/KG	0	0%		0	0	76	120	U	120	U	120	U	120	U	130	U
Nitrobenzene	UG/KG	0	0%	200	0	0	37	120	U	120	U	120	U	120	U		
RDX	UG/KG	0	0%		0	0	76	120	U	120	U	120	U	120	U	130	U
Tetryl	UG/KG	67	1%		0	1	76	120	U	120	U	120	U	120	U	130	U
Pesticides/PCBs																	
4,4'-DDD	UG/KG	0	0%	2900	0	0	76	3.6	U	3.6	U	3.6	U	3.6	U	4.1	U
4,4'-DDE	UG/KG	21	4%	2100	0	3	76	3.6	U	3.6	U	3.6	U	3.6	U	4.1	U
4,4'-DDT	UG/KG	2.9	1%	2100	0	1	76	3.6	U	2.9	J	3.6	U	3.6	U	4.1	U
Aldrin	UG/KG	8.2	1%	41	0	1	76	1.8	U	1.9	U	1.8	U	1.9	U	2.1	U
Alpha-BHC	UG/KG	0	0%	110	0	0	76	1.8	U	1.9	U	1.8	U	1.9	U	2.1	U
Alpha-Chlordane	UG/KG	10	1%		0	1	76	1.8	U	1.9	U	1.8	U	1.9	U	2.1	U
Aroclor-1016	UG/KG	0	0%		0	0	76	36	U	36	U	36	U	36	U	41	U
Aroclor-1221	UG/KG	0	0%		0	0	76	73	U	74	U	73	U	74	U	83	U
Aroclor-1232	UG/KG	0	0%		0	0	76	36	U	36	U	36	U	36	U	41	U
Aroclor-1242	UG/KG	0	0%		0	0	76	36	U	36	U	36	U	36	U	41	U
Aroclor-1248	UG/KG	27	1%		0	1	76	36	U	36	U	36	U	36	U	41	U
Aroclor-1254	UG/KG	1600	5%	10000	0	4	76	36	U	36	U	36	U	36	U	41	U
Aroclor-1260	UG/KG	0	0%	10000	0	0	76	36	U	36	U	36	U	36	U	41	U
Beta-BHC	UG/KG	1.4	1%	200	0	1	76	1.8	U	1.9	U	1.8	U	1.9	U	2.1	U
Delta-BHC	UG/KG	5.9	1%	300	0	1	76	1.8	U	1.9	U	1.8	U	1.9	U	2.1	U
Dieldrin	UG/KG	0	0%	44	0	0	76	3.6	U	3.6	U	3.6	U	3.6	U	4.1	U
Endosulfan I	UG/KG	11	1%	900	0	1	76	1.8	U	1.9	U	1.8	U	1.9	U	2.1	U
Endosulfan II	UG/KG	0	0%	900	0	0	76	3.6	U	3.6	U	3.6	U	3.6	U	4.1	U
Endosulfan sulfate	UG/KG	0	0%	1000	0	0	76	3.6	U	3.6	U	3.6	U	3.6	U	4.1	U
Endrin	UG/KG	34	1%	100	0	1	76	3.6	U	3.6	U	3.6	U	3.6	U	4.1	U
Endrin aldehyde	UG/KG	3.7	1%		0	1	76	3.6	U	3.7	J	3.6	U	3.6	U	4.1	U
Endrin ketone	UG/KG	0	0%		0	0	76	3.6	U	3.6	U	3.6	U	3.6	U	4.1	U
Gamma-BHC/Lindane	UG/KG	0	0%	60	0	0	76	1.8	U	1.9	U	1.8	U	1.9	U	2.1	U
Gamma-Chlordane	UG/KG	0	0%	540	0	0	76	1.8	U	1.9	U	1.8	U	1.9	U	2.1	U
Heptachlor	UG/KG	0	0%	100	0	0	76	1.8	U	1.9	U	1.8	U	1.9	U	2.1	U
Heptachlor epoxide	UG/KG	0	0%	20	0	0	76	1.8	U	1.9	U	1.8	U	1.9	U	2.1	U
Methoxychlor	UG/KG	0	0%		0	0	76	18	U	19	U	18	U	19	U	21	U
Toxaphene	UG/KG	0	0%		0	0	76	180	U	190	U	180	U	190	U	210	U
Herbicides																	
2,4,5-T	UG/KG	0	0%	1900	0	0	39									6.2	U
2,4,5-TP/Silvex	UG/KG	0	0%	700	0	0	39									6.2	U
2,4-D	UG/KG	0	0%	500	0	0	39									62	U
2,4-DB	UG/KG	0	0%		0	0	39									62	U
Dalapon	UG/KG	0	0%		0	0	39									150	U

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	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		ESI	
								MW4-11		MW4-12		MW4-12		MW4-13		MW4-2	
								SOIL		SOIL		SOIL		SOIL		SOIL	
								4		2		2		2		0	
								5.5		3.4		3.4		2.6		2	
								12/20/1998		12/21/1998		12/21/1998		12/20/1998		11/10/1993	
								43172		**43168**		**43169**		**43163**		**SB4-2-1**	
								SA		SA		SA		SA		SA	
								N		N		N		N		N	
Dicamba	UG/KG	23	3%		0	1	39									6.2	U
Dichloroprop	UG/KG	0	0%		0	0	39									62	U
Dinoseb	UG/KG	0	0%		0	0	39									31	U
MCPA	UG/KG	0	0%		0	0	39									6200	U
MCPP	UG/KG	0	0%		0	0	39									6200	U
Metals																	
Aluminum	MG/KG	21000	100%	19520 *	3	76	76	13300		11700		16100		13900		16300	
Antimony	MG/KG	57.8	28%	6 *	10	21	76	1.2	J	0.63	J	0.67	J	0.68	R	10.5	U
Arsenic	MG/KG	21.5	100%	8.9 *	4	76	76	5		3.8		3.6		4.9		5.8	J
Barium	MG/KG	133	100%	300	0	76	76	49.1		87.3		47		56.4		133	
Beryllium	MG/KG	1	99%	1.13 *	0	75	76	0.6	J	0.43	J	0.69	J	0.55	J	1	
Cadmium	MG/KG	1.5	4%	2.46 *	0	3	76	0.1	U	0.04	U	0.04	U	0.09	U	0.66	UR
Calcium	MG/KG	102000	100%	125300 *	0	76	76	21600		37500		3220		2790		2900	
Chromium	MG/KG	3820	80%	30 *	17	61	76	23.2		16.5	J	27.6	J	22.5		22.9	
Cobalt	MG/KG	29.1	100%	30	0	76	76	11.8		8.4	J	14.6		12.5		12.5	
Copper	MG/KG	2250	100%	33 *	14	76	76	22.8		15.3		24		17		17	J
Cyanide	MG/KG	0	0%	0.35	0	0	76	0.62	U	0.64	U	0.65	U	0.63	U	0.61	U
Iron	MG/KG	40900	100%	37410 *	6	76	76	28300		20300		33700		28800	J	28600	
Lead	MG/KG	251	100%	24.4 *	6	76	76	10.1	J	18.8		7.8		12.4	J	14.4	
Magnesium	MG/KG	32000	100%	21700 *	3	76	76	7720		4030		7330		5180		3770	
Manganese	MG/KG	2100	78%	1100 *	5	59	76	285		566		340		426		1140	
Mercury	MG/KG	0.12	45%	0.1	1	34	76	0.05	U	0.06	J	0.05	U	0.07	J	0.03	U
Nickel	MG/KG	62.3	100%	50 *	8	76	76	40.4		20		47.1		33.2		27.3	
Potassium	MG/KG	2490	100%	2623 *	0	76	76	1500		1090		1430		1210		1270	
Selenium	MG/KG	0.86	33%	2	0	25	76	0.73	U	0.73	UJ	0.78	UJ	0.63	U	0.32	J
Silver	MG/KG	1.2	8%	0.8 *	4	6	76	0.2	U	0.2	U	0.22	U	0.18	U	1.3	UJ
Sodium	MG/KG	134	61%	188 *	0	46	76	53.2	U	53.2	U	56.5	U	45.9	U	39.3	J
Thallium	MG/KG	0	0%	0.855 *	0	0	76	0.63	U	7.3	R	0.78	R	0.54	U	0.23	UJ
Vanadium	MG/KG	31	100%	150	0	76	76	19.8		21.6		22.5		20.2		29.3	
Zinc	MG/KG	1010	100%	115 *	12	76	76	94.1	J	62.5	J	99.1	J	94.9	J	61.3	J
Nitrate/Nitrite	MG/KG	2.7	100%			37	37	0.14	J	2.7	J	0.2	J	0.45	J		

* Soil criteria for these inorganics are site background values.

	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	ESI		ESI		ESI		ESI		ESI		ESI	
								MW4-2		MW4-3		MW4-3		MW4-3		MW4-4		MW4-4	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								2		0		4		6		0		0	
								4		2		6		8		2		2	
								11/10/1993		11/10/1993		11/10/1993		11/10/1993		12/5/1993		12/5/1993	
								SB4-2-2		**SB4-3-1**		**SB4-3-3**		**SB4-3-4**		**SB4-4-5**		**SB4-4-1**	
								SA		SA		SA		SA		DU		SA	
								N		N		N		N		N		N	
Volatiles																			
1,1,1-Trichloroethane	UG/KG	0	0%	800	0	0	76	11	U	11	U	11	U	10	U	13	U	13	U
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	600	0	0	76	11	U	11	U	11	U	10	U	13	U	13	U
1,1,2-Trichloroethane	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	10	U	13	U	13	U
1,1-Dichloroethane	UG/KG	0	0%	200	0	0	76	11	U	11	U	11	U	10	U	13	U	13	U
1,1-Dichloroethene	UG/KG	0	0%	400	0	0	76	11	U	11	U	11	U	10	U	13	U	13	U
1,2-Dichloroethane	UG/KG	0	0%	100	0	0	76	11	U	11	U	11	U	10	U	13	U	13	U
1,2-Dichloroethene (total)	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	10	U	13	U	13	U
1,2-Dichloropropane	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	10	U	13	U	13	U
Acetone	UG/KG	31	9%	200	0	7	76	11	U	11	U	11	U	10	U	13	U	2	J
Benzene	UG/KG	0	0%	60	0	0	76	11	U	11	U	11	U	10	U	13	U	13	U
Bromodichloromethane	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	10	U	13	U	13	U
Bromoform	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	10	U	13	U	13	U
Carbon disulfide	UG/KG	0	0%	2700	0	0	76	11	U	11	U	11	U	10	U	13	U	13	U
Carbon tetrachloride	UG/KG	0	0%	600	0	0	76	11	U	11	U	11	U	10	U	13	U	13	U
Chlorobenzene	UG/KG	0	0%	1700	0	0	76	11	U	11	U	11	U	10	U	13	U	13	U
Chlorodibromomethane	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	10	U	13	U	13	U
Chloroethane	UG/KG	0	0%	1900	0	0	76	11	U	11	U	11	U	10	U	13	U	13	U
Chloroform	UG/KG	15	8%	300	0	6	76	11	U	11	U	11	U	10	U	13	U	13	U
Cis-1,3-Dichloropropene	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	10	U	13	U	13	U
Ethyl benzene	UG/KG	1	1%	5500	0	1	76	11	U	11	U	11	U	10	U	13	U	13	U
Methyl bromide	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	10	U	13	U	13	U
Methyl butyl ketone	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	10	U	13	U	13	U
Methyl chloride	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	10	U	13	U	13	U
Methyl ethyl ketone	UG/KG	0	0%	300	0	0	76	11	U	11	U	11	U	10	U	13	U	13	U
Methyl isobutyl ketone	UG/KG	0	0%	1000	0	0	76	11	U	11	U	11	U	10	U	13	U	13	U
Methylene chloride	UG/KG	2	3%	100	0	2	76	11	U	11	U	11	U	10	U	13	U	13	U
Styrene	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	10	U	13	U	13	U
Tetrachloroethene	UG/KG	0	0%	1400	0	0	76	11	U	11	U	11	U	10	U	13	U	13	U
Toluene	UG/KG	13	28%	1500	0	21	76	11	U	11	U	11	U	10	U	13	U	13	U
Total Xylenes	UG/KG	8	4%	1200	0	3	76	11	U	11	U	11	U	10	U	13	U	13	U
Trans-1,3-Dichloropropene	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	10	U	13	U	13	U
Trichloroethene	UG/KG	0	0%	700	0	0	76	11	U	11	U	11	U	10	U	13	U	13	U
Vinyl chloride	UG/KG	0	0%	200	0	0	76	11	U	11	U	11	U	10	U	13	U	13	U
Semivolatile Organics																			
1,2,4-Trichlorobenzene	UG/KG	0	0%	3400	0	0	76	340	U	360	U	350	U	350	U	850	U	450	U
1,2-Dichlorobenzene	UG/KG	0	0%	7900	0	0	76	340	U	360	U	350	U	350	U	850	U	450	U
1,3-Dichlorobenzene	UG/KG	0	0%	1600	0	0	76	340	U	360	U	350	U	350	U	850	U	450	U
1,4-Dichlorobenzene	UG/KG	0	0%	8500	0	0	76	340	U	360	U	350	U	350	U	850	U	450	U
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%		0	0	39	340	U	360	U	350	U	350	U	850	U	450	U
2,4,5-Trichlorophenol	UG/KG	0	0%	100	0	0	76	830	U	870	U	860	U	850	U	2000	U	1100	U
2,4,6-Trichlorophenol	UG/KG	0	0%		0	0	76	340	U	360	U	350	U	350	U	850	U	450	U
2,4-Dichlorophenol	UG/KG	0	0%	400	0	0	76	340	U	360	U	350	U	350	U	850	U	450	U
2,4-Dimethylphenol	UG/KG	0	0%		0	0	76	340	U	360	U	350	U	350	U	850	U	450	U
2,4-Dinitrophenol	UG/KG	0	0%	200	0	0	76	830	U	870	U	880	U	850	U	2000	U	1100	U
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	76	340	U	380	U	350	U	350	U	850	U	450	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	76	340	U	360	U	350	U	350	U	850	U	450	U
2-Chloronaphthalene	UG/KG	0	0%		0	0	76	340	U	360	U	350	U	350	U	850	U	450	U
2-Chlorophenol	UG/KG	0	0%	800	0	0	76	340	U	360	U	350	U	350	U	850	U	450	U
2-Methylnaphthalene	UG/KG	260	4%	36400	0	3	76	340	U	360	U	350	U	350	U	850	U	450	U

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Subsurface Soil Sample Results
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								ESI		ESI		ESI		ESI		ESI		ESI	
								MW4-2		MW4-3		MW4-3		MW4-3		MW4-4		MW4-4	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								2		0		4		6		0		0	
								4		2		6		8		2		2	
	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	11/10/1993		11/10/1993		11/10/1993		11/10/1993		12/5/1993		12/5/1993	
								SB4-2-2		**SB4-3-1**		**SB4-3-3**		**SB4-3-4**		**SB4-4-5**		**SB4-4-1**	
								SA		SA		SA		SA		DU		SA	
								N		N		N		N		N		N	
2-Methylphenol	UG/KG	0	0%	100	0	0	76	340	U	360	U	350	U	350	U	850	U	450	U
2-Nitroaniline	UG/KG	0	0%	430	0	0	76	830	U	870	U	860	U	850	U	2000	U	1100	U
2-Nitrophenol	UG/KG	0	0%	330	0	0	76	340	U	360	U	350	U	350	U	850	U	450	U
3,3'-Dichlorobenzidine	UG/KG	0	0%		0	0	76	340	U	360	U	350	U	350	U	850	U	450	U
3-Nitroaniline	UG/KG	0	0%	500	0	0	76	630	U	870	U	860	U	850	U	2000	U	1100	U
4,6-Dinitro-2-methylphenol	UG/KG	0	0%		0	0	76	830	U	870	U	860	U	850	U	2000	U	1100	U
4-Bromophenyl phenyl ether	UG/KG	0	0%		0	0	76	340	U	360	U	350	U	350	U	850	U	450	U
4-Chloro-3-methylphenol	UG/KG	0	0%	240	0	0	76	340	U	360	U	350	U	350	U	850	U	450	U
4-Chloroaniline	UG/KG	0	0%	220	0	0	76	340	U	360	U	350	U	350	U	850	U	450	U
4-Chlorophenyl phenyl ether	UG/KG	0	0%		0	0	76	340	U	360	U	350	U	350	U	850	U	450	U
4-Methylphenol	UG/KG	0	0%	900	0	0	76	340	U	360	U	350	U	350	U	850	U	450	U
4-Nitroaniline	UG/KG	0	0%		0	0	76	830	U	870	U	860	U	850	U	2000	U	1100	U
4-Nitrophenol	UG/KG	0	0%	100	0	0	76	830	U	870	U	860	U	850	U	2000	U	1100	U
Acenaphthene	UG/KG	68	3%	50000	0	2	76	340	U	360	U	350	U	350	U	850	U	450	U
Acenaphthylene	UG/KG	170	4%	41000	0	3	76	340	U	360	U	350	U	350	U	850	U	450	U
Anthracene	UG/KG	340	4%	50000	0	3	76	340	U	360	U	350	U	350	U	850	U	450	U
Benzo(a)anthracene	UG/KG	1100	7%	224	2	5	76	340	U	26	J	350	U	350	U	850	U	450	U
Benzo(a)pyrene	UG/KG	880	8%	61	2	6	76	340	U	27	J	350	U	350	U	850	U	450	U
Benzo(b)fluoranthene	UG/KG	730	9%	1100	0	7	76	340	U	32	J	350	U	350	U	850	U	450	U
Benzo(ghi)perylene	UG/KG	270	3%	50000	0	2	76	340	U	360	U	350	U	350	U	850	U	450	U
Benzo(k)fluoranthene	UG/KG	890	5%	1100	0	4	76	340	U	31	J	350	U	350	U	850	U	450	U
Bis(2-Chloroethoxy)methane	UG/KG	0	0%		0	0	76	340	U	360	U	350	U	350	U	850	U	450	U
Bis(2-Chloroethyl)ether	UG/KG	0	0%		0	0	76	340	U	360	U	350	U	350	U	850	U	450	U
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%		0	0	37												
Bis(2-Ethylhexyl)phthalate	UG/KG	2000	11%	50000	0	8	76	1100		2000		1500		1400		31	JR	180	JR
Butylbenzylphthalate	UG/KG	120	1%	50000	0	1	76	340	U	360	U	350	U	350	U	390	UR	450	UR
Carbazole	UG/KG	160	1%		0	1	76	340	U	360	U	350	U	350	U	850	U	450	U
Chrysene	UG/KG	1000	11%	400	2	8	76	340	U	39	J	350	U	350	U	850	U	450	U
Di-n-butylphthalate	UG/KG	63	24%	8100	0	18	76	18	J	29	J	19	J	19	J	390	UR	450	UR
Di-n-octylphthalate	UG/KG	37	21%	50000	0	16	76	340	U	360	U	350	U	350	U	850	U	450	U
Dibenz(a,h)anthracene	UG/KG	48	1%	14	1	1	76	340	U	360	U	350	U	350	U	850	U	450	U
Dibenzofuran	UG/KG	33	1%	6200	0	1	76	340	U	360	U	350	U	350	U	850	U	450	U
Diethyl phthalate	UG/KG	0	0%	7100	0	0	76	340	U	360	U	350	U	350	U	850	U	450	U
Dimethylphthalate	UG/KG	0	0%	2000	0	0	76	340	U	360	U	350	U	350	U	850	U	450	U
Fluoranthene	UG/KG	2400	11%	50000	0	8	76	340	U	62	J	350	U	350	U	850	U	450	U
Fluorene	UG/KG	330	4%	50000	0	3	76	340	U	360	U	350	U	350	U	850	U	450	U
Hexachlorobenzene	UG/KG	0	0%	410	0	0	76	340	U	360	U	350	U	350	U	850	U	450	U
Hexachlorobutadiene	UG/KG	0	0%		0	0	76	340	U	360	U	350	U	350	U	850	U	450	U
Hexachlorocyclopentadiene	UG/KG	0	0%		0	0	76	340	U	360	U	350	U	350	U	850	U	450	U
Hexachloroethane	UG/KG	0	0%		0	0	76	340	U	360	U	350	U	350	U	850	U	450	U
Indeno(1,2,3-cd)pyrene	UG/KG	260	3%	3200	0	2	76	340	U	360	U	350	U	350	U	850	U	450	U
Isophorone	UG/KG	0	0%	4400	0	0	76	340	U	360	U	350	U	350	U	850	U	450	U
N-Nitrosodiphenylamine	UG/KG	0	0%		0	0	76	340	U	360	U	350	U	350	U	850	U	450	U
N-Nitrosodipropylamine	UG/KG	0	0%		0	0	76	340	U	360	U	350	U	350	U	850	U	450	U
Naphthalene	UG/KG	130	3%	13000	0	2	76	340	U	360	U	350	U	350	U	850	U	450	U
Nitrobenzene	UG/KG	0	0%	200	0	0	76	340	U	360	U	350	U	350	U	850	U	450	U
Pentachlorophenol	UG/KG	0	0%	1000	0	0	76	830	U	870	U	860	U	850	U	2000	U	1100	U
Phenanthrene	UG/KG	1400	8%	50000	0	6	76	340	U	26	J	350	U	350	U	850	U	450	U
Phenol	UG/KG	0	0%	30	0	0	76	340	U	360	U	350	U	350	U	850	U	450	U
Pyrene	UG/KG	1800	9%	50000	0	7	76	340	U	52	J	350	U	350	U	850	U	450	U

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	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	ESI		ESI		ESI		ESI		ESI		ESI	
								MW4-2		MW4-3		MW4-3		MW4-3		MW4-4		MW4-4	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								2		0		4		6		0		0	
								4		2		6		8		2		2	
								11/10/1993		11/10/1993		11/10/1993		11/10/1993		12/5/1993		12/5/1993	
								SB4-2-2		SB4-3-1		SB4-3-3		SB4-3-4		SB4-4-5		SB4-4-1	
								SA		SA		SA		SA		DU		SA	
								N		N		N		N		N		N	
Nitroaromatics																			
1,3-Dinitrobenzene	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	130	U	130	U
2,4,6-Trinitrotoluene	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	130	U	130	U
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	130	U	130	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	76	130	U	130	U	130	U	130	U	130	U	130	U
2-Nitrotoluene	UG/KG	0	0%		0	0	37												
2-amino-4,6-Dinitrotoluene	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	130	U	130	U
3-Nitrotoluene	UG/KG	0	0%		0	0	37												
4-Nitrotoluene	UG/KG	0	0%		0	0	37												
4-amino-2,6-Dinitrotoluene	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	130	U	130	U
HMX	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	130	U	130	U
Nitrobenzene	UG/KG	0	0%	200	0	0	37												
RDX	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	130	U	130	U
Tetryl	UG/KG	67	1%		0	1	76	130	U	130	U	130	U	130	U	130	U	130	U
Pesticides/PCBs																			
4,4'-DDD	UG/KG	0	0%	2900	0	0	76	3.5	U	3.6	U	3.6	U	3.5	U	4.2	UJ	4.5	U
4,4'-DDE	UG/KG	21	4%	2100	0	3	76	3.5	U	3.2	J	3.6	U	3.5	U	4.2	UJ	4.5	U
4,4'-DDT	UG/KG	2.9	1%	2100	0	1	76	3.5	U	3.6	U	3.6	U	3.5	U	4.2	UJ	4.5	U
Aldrin	UG/KG	8.2	1%	41	0	1	76	1.8	U	1.9	U	1.8	U	1.8	U	2.2	UJ	2.3	U
Alpha-BHC	UG/KG	0	0%	110	0	0	76	1.8	U	1.9	U	1.8	U	1.8	U	2.2	UJ	2.3	U
Alpha-Chlordane	UG/KG	10	1%		0	1	76	1.8	U	1.9	U	1.8	U	1.8	U	2.2	UJ	2.3	U
Aroclor-1016	UG/KG	0	0%		0	0	76	35	U	36	U	36	U	35	U	42	UJ	45	U
Aroclor-1221	UG/KG	0	0%		0	0	76	71	U	74	U	73	U	71	U	85	UJ	91	U
Arcclor-1232	UG/KG	0	0%		0	0	76	35	U	36	U	36	U	35	U	42	UJ	45	U
Aroclor-1242	UG/KG	0	0%		0	0	76	35	U	36	U	36	U	35	U	42	UJ	45	U
Aroclor-1248	UG/KG	27	1%		0	1	76	27	J	36	U	36	U	35	U	42	UJ	45	U
Aroclor-1254	UG/KG	1600	5%	10000	0	4	76	35	U	28	J	36	U	35	U	42	UJ	29	J
Aroclor-1260	UG/KG	0	0%	10000	0	0	76	35	U	36	U	36	U	35	U	42	UJ	45	U
Beta-BHC	UG/KG	1.4	1%	200	0	1	76	1.8	U	1.9	U	1.8	U	1.8	U	2.2	UJ	2.3	U
Delta-BHC	UG/KG	5.9	1%	300	0	1	76	1.8	U	1.9	U	1.8	U	1.8	U	2.2	UJ	2.3	U
Dieldrin	UG/KG	0	0%	44	0	0	76	3.5	U	3.6	U	3.6	U	3.5	U	4.2	UJ	4.5	U
Endosulfan I	UG/KG	11	1%	900	0	1	76	1.8	U	1.9	U	1.8	U	1.8	U	2.2	UJ	2.3	U
Endosulfan II	UG/KG	0	0%	900	0	0	76	3.5	U	3.6	U	3.6	U	3.5	U	4.2	UJ	4.5	U
Endosulfan sulfate	UG/KG	0	0%	1000	0	0	76	3.5	U	3.6	U	3.6	U	3.5	U	4.2	UJ	4.5	U
Endrin	UG/KG	34	1%	100	0	1	76	3.5	U	3.6	U	3.6	U	3.5	U	4.2	UJ	4.5	U
Endrin aldehyde	UG/KG	3.7	1%		0	1	76	3.5	U	3.6	U	3.6	U	3.5	U	4.2	UJ	4.5	U
Endrin ketone	UG/KG	0	0%		0	0	76	3.5	U	3.6	U	3.6	U	3.5	U	4.2	UJ	4.5	U
Gamma-BHC/Lindane	UG/KG	0	0%	60	0	0	76	1.8	U	1.9	U	1.8	U	1.8	U	2.2	UJ	2.3	U
Gamma-Chlordane	UG/KG	0	0%	540	0	0	76	1.8	U	1.9	U	1.8	U	1.8	U	2.2	UJ	2.3	U
Heptachlor	UG/KG	0	0%	100	0	0	76	1.8	U	1.9	U	1.8	U	1.8	U	2.2	UJ	2.3	U
Heptachlor epoxide	UG/KG	0	0%	20	0	0	76	1.8	U	1.9	U	1.8	U	1.8	U	2.2	UJ	2.3	U
Methoxychlor	UG/KG	0	0%		0	0	76	18	U	19	U	18	U	18	U	22	UJ	23	U
Toxaphene	UG/KG	0	0%		0	0	76	180	U	190	U	180	U	180	U	220	UJ	230	U
Herbicides																			
2,4,5-T	UG/KG	0	0%	1900	0	0	39	5.3	U	5.5	U	5.5	UJ	5.4	U	6.4	U	6.9	U
2,4,5-TP/Silvex	UG/KG	0	0%	700	0	0	39	5.3	U	5.5	U	5.5	UJ	5.4	U	6.4	U	6.9	U
2,4-D	UG/KG	0	0%	500	0	0	39	53	U	55	U	55	UJ	54	U	64	U	69	U
2,4-DB	UG/KG	0	0%		0	0	39	53	U	55	U	55	UJ	54	U	64	U	69	U
Dalapon	UG/KG	0	0%		0	0	39	130	U	140	U	130	UJ	130	U	160	U	170	U

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								ESI		ESI		ESI		ESI		ESI		ESI	
								MW4-2		MW4-3		MW4-3		MW4-3		MW4-4		MW4-4	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								2		0		4		6		0		0	
								4		2		6		8		2		2	
			FREQUENCY OF		NUMBER ABOVE	NUMBER OF	NUMBER OF	11/10/1993		11/10/1993		11/10/1993		11/10/1993		12/5/1993		12/5/1993	
								SB4-2-2		**SB4-3-1**		**SB4-3-3**		**SB4-3-4**		**SB4-4-5**		**SB4-4-1**	
	UNIT	MAXIMUM	DETECTION	TAGM	TAGM	DETECTS	ANALYSES	SA		SA		SA		SA		DU		SA	
								N		N		N		N		N		N	
Dicamba	UG/KG	23	3%		0	1	39	5.3	U	5.5	U	5.5	UJ	5.4	U	6.4	U	23	
Dichloroprop	UG/KG	0	0%		0	0	39	53	U	55	U	55	UJ	54	U	64	U	69	U
Dinoseb	UG/KG	0	0%		0	0	39	27	U	28	U	28	UJ	27	U	32	U	35	U
MCPA	UG/KG	0	0%		0	0	39	5300	U	5500	U	5500	UJ	5400	U	6400	U	6900	U
MCPP	UG/KG	0	0%		0	0	39	5300	U	5500	U	5500	UJ	5400	U	6400	U	6900	U
Metals																			
Aluminum	MG/KG	21000	100%	19520 *	3	76	76	15600		9590		9680		9730		16200		16100	
Antimony	MG/KG	57.8	28%	6 *	10	21	76	7.6	U	5.8	U	10.1	U	5.8	U	[illegible]	J	16.1	J
Arsenic	MG/KG	21.5	100%	8.9 *	4	76	76	4.2	J	4.9	J	6.8	J	9.5	J	7.1		6.9	
Barium	MG/KG	133	100%	300	0	76	76	46		29.8		49.6		39.7		122		107	
Beryllium	MG/KG	1	99%	1.13 *	0	75	76	0.72	J	0.48	J	0.43	J	0.52	J	0.8	J	0.8	J
Cadmium	MG/KG	1.5	4%	2.46 *	0	3	76	0.48	UR	0.37	UR	0.63	UR	0.36	UR	0.34	U	0.51	U
Calcium	MG/KG	102000	100%	125300 *	0	76	76	12700		24700		59600		31400		6840		4500	
Chromium	MG/KG	3820	80%	30 *	17	61	76	27.5		19.1		17.3		17.2		2670	R	936	R
Cobalt	MG/KG	29.1	100%	30	0	76	76	14.3		11.1		9.9		12.5		15.2		11.8	J
Copper	MG/KG	2250	100%	33 *	14	76	76	27.5	J	27.8	J	19.1	J	17.5	J	1520	J	1290	J
Cyanide	MG/KG	0	0%	0.35	0	0	76	0.49	U	0.52	U	0.51	U	0.52	U	0.63	U	0.73	U
Iron	MG/KG	40900	100%	37410 *	6	76	78	33900		21900		22300		21200		33700		28400	
Lead	MG/KG	251	100%	24.4 *	6	76	76	8.3		19.7		5.4		10.1		19.1	J	20.9	J
Magnesium	MG/KG	32000	100%	21700 *	3	76	76	7160		4920		12100		5610		5110		4380	
Manganese	MG/KG	2100	78%	1100 *	5	59	76	436		338		388		373		917		564	
Mercury	MG/KG	0.12	45%	0.1	1	34	76	0.02	U	0.03	J	0.02	U	0.04	U	0.04	J	0.03	U
Nickel	MG/KG	62.3	100%	50 *	8	76	76	42.7		36.6		28.6		28.5		35.4		39.6	
Potassium	MG/KG	2490	100%	2623 *	0	76	76	1210		923		1090		1050		1430		1510	
Selenium	MG/KG	0.86	33%	2	0	25	76	0.21	UJ	0.36	J	0.2	UJ	0.22	UJ	0.76	J	0.73	J
Silver	MG/KG	1.2	8%	0.8 *	4	6	76	0.97	UJ	0.74	UJ	1.3	UJ	0.73	UJ	0.68	U	1	U
Sodium	MG/KG	134	61%	188 *	0	46	76	71.1	J	78.8	J	126	J	96	J	49.2	J	51.3	J
Thallium	MG/KG	0	0%	0.855 *	0	0	76	0.22	UJ	0.24	UJ	0.21	UJ	0.24	UJ	0.24	U	0.18	U
Vanadium	MG/KG	31	100%	150	0	76	76	22.5		15		15.5		13.8		27.7		25.3	
Zinc	MG/KG	1010	100%	115 *	12	76	76	95	J	45.5	J	87.3	J	69.4	J	423		1010	
Nitrate/Nitrite	MG/KG	2.7	100%			37	37												

* Soil criteria for these inorganics are site background values.

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	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	ESI		ESI		ESI		ESI		RI Phase 1 Step 1		RI Phase 1 Step 1	
								MW4-4		MW4-4		MW4-5		MW4-5		MW4-6		MW4-6	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								4		6		0		2		2		6	
								6		8		2		4		3.5		6.5	
								12/5/1993		12/5/1993		12/5/1993		12/5/1993		12/19/1998		12/19/1998	
								SB4-4-2		**SB4-4-3**		**SB4-5-1**		**SB4-5-2**		**43154**		**43155**	
								SA		SA		SA		SA		SA		SA	
								N		N		N		N		N		N	
Volatiles																			
1,1,1-Trichloroethane	UG/KG	0	0%	800	0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	600	0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
1,1,2-Trichloroethane	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
1,1-Dichloroethane	UG/KG	0	0%	200	0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
1,1-Dichloroethene	UG/KG	0	0%	400	0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
1,2-Dichloroethane	UG/KG	0	0%	100	0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
1,2-Dichloroethene (total)	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
1,2-Dichloropropane	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
Acetone	UG/KG	31	9%	200	0	7	76	11	U	11	U	11	U	11	U	24	U	20	U
Benzene	UG/KG	0	0%	60	0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
Bromodichloromethane	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
Bromoform	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
Carbon disulfide	UG/KG	0	0%	2700	0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
Carbon tetrachloride	UG/KG	0	0%	600	0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
Chlorobenzene	UG/KG	0	0%	1700	0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
Chlorodibromomethane	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
Chloroethane	UG/KG	0	0%	1900	0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
Chloroform	UG/KG	15	8%	300	0	6	76	11	U	11	U	11	U	11	U	11	U	11	U
Cis-1,3-Dichloropropene	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
Ethyl benzene	UG/KG	1	1%	5500	0	1	76	11	U	11	U	11	U	11	U	11	U	11	U
Methyl bromide	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
Methyl butyl ketone	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
Methyl chloride	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
Methyl ethyl ketone	UG/KG	0	0%	300	0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
Methyl isobutyl ketone	UG/KG	0	0%	1000	0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
Methylene chloride	UG/KG	2	3%	100	0	2	76	11	U	11	U	11	U	11	U	11	U	2	J
Styrene	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
Tetrachloroethene	UG/KG	0	0%	1400	0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
Toluene	UG/KG	13	28%	1500	0	21	76	11	U	11	U	11	U	11	U	2	J	13	
Total Xylenes	UG/KG	8	4%	1200	0	3	76	11	U	11	U	11	U	11	U	11	U	11	U
Trans-1,3-Dichloropropene	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
Trichloroethene	UG/KG	0	0%	700	0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
Vinyl chloride	UG/KG	0	0%	200	0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
Semivolatile Organics																			
1,2,4-Trichlorobenzene	UG/KG	0	0%	3400	0	0	76	360	U	370	U	390	U	380	U	72	U	71	U
1,2-Dichlorobenzene	UG/KG	0	0%	7900	0	0	76	360	U	370	U	390	U	380	U	72	U	71	U
1,3-Dichlorobenzene	UG/KG	0	0%	1600	0	0	76	360	U	370	U	390	U	380	U	72	U	71	U
1,4-Dichlorobenzene	UG/KG	0	0%	8500	0	0	76	360	U	370	U	390	U	380	U	72	U	71	U
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%		0	0	39	360	U	370	U	390	U	380	U				
2,4,5-Trichlorophenol	UG/KG	0	0%	100	0	0	76	870	U	890	U	940	U	930	U	170	U	170	U
2,4,6-Trichlorophenol	UG/KG	0	0%		0	0	76	360	U	370	U	390	U	380	U	72	U	71	U
2,4-Dichlorophenol	UG/KG	0	0%	400	0	0	76	360	U	370	U	390	U	380	U	72	U	71	U
2,4-Dimethylphenol	UG/KG	0	0%		0	0	76	360	U	370	U	390	U	380	U	72	U	71	U
2,4-Dinitrophenol	UG/KG	0	0%	200	0	0	76	870	U	890	U	940	U	930	U	170	U	170	U
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	76	360	U	370	U	390	U	380	U	72	U	71	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	76	360	U	370	U	390	U	380	U	72	U	71	U
2-Chloronaphthalene	UG/KG	0	0%		0	0	76	360	U	370	U	390	U	380	U	72	U	71	U
2-Chlorophenol	UG/KG	0	0%	800	0	0	76	360	U	370	U	390	U	380	U	72	U	71	U
2-Methylnaphthalene	UG/KG	260	4%	36400	0	3	76	360	U	370	U	390	U	380	U	72	U	71	U

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Subsurface Soil Sample Results
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	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	ESI		ESI		ESI		ESI		RI Phase 1 Step 1		RI Phase 1 Step 1	
								MW4-4		MW4-4		MW4-5		MW4-5		MW4-6		MW4-6	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								4		6		0		2		2		6	
								6		8		2		4		3.5		6.5	
								12/5/1993		12/5/1993		12/5/1993		12/5/1993		12/19/1998		12/19/1998	
								SB4-4-2		**SB4-4-3**		**SB4-5-1**		**SB4-5-2**		**43154**		**43155**	
								SA		SA		SA		SA		SA		SA	
								N		N		N		N		N		N	
2-Methylphenol	UG/KG	0	0%	100	0	0	76	360	U	370	U	390	U	380	U	72	U	71	U
2-Nitroaniline	UG/KG	0	0%	430	0	0	76	870	U	890	U	940	U	930	U	170	U	170	U
2-Nitrophenol	UG/KG	0	0%	330	0	0	76	360	U	370	U	390	U	380	U	72	U	71	U
3,3'-Dichlorobenzidine	UG/KG	0	0%		0	0	76	360	U	370	U	390	U	380	U	72	U	71	U
3-Nitroaniline	UG/KG	0	0%	500	0	0	76	870	U	890	U	940	U	930	U	170	U	170	U
4,6-Dinitro-2-methylphenol	UG/KG	0	0%		0	0	76	870	U	890	U	940	U	930	U	170	U	170	U
4-Bromophenyl phenyl ether	UG/KG	0	0%		0	0	76	360	U	370	U	390	U	380	U	72	U	71	U
4-Chloro-3-methylphenol	UG/KG	0	0%	240	0	0	76	360	U	370	U	390	U	380	U	72	U	71	U
4-Chloroaniline	UG/KG	0	0%	220	0	0	76	360	U	370	U	390	U	380	U	72	U	71	U
4-Chlorophenyl phenyl ether	UG/KG	0	0%		0	0	76	360	U	370	U	390	U	380	U	72	U	71	U
4-Methylphenol	UG/KG	0	0%	900	0	0	76	360	U	370	U	390	U	380	U	72	U	71	U
4-Nitroaniline	UG/KG	0	0%		0	0	76	870	U	890	U	940	U	930	U	170	U	170	U
4-Nitrophenol	UG/KG	0	0%	100	0	0	76	870	U	890	U	940	U	930	U	170	U	170	U
Acenaphthene	UG/KG	88	3%	50000	0	2	76	360	U	370	U	390	U	380	U	72	U	71	U
Acenaphthylene	UG/KG	170	4%	41000	0	3	76	360	U	370	U	390	U	380	U	72	U	71	U
Anthracene	UG/KG	340	4%	50000	0	3	78	360	U	370	U	390	U	380	U	72	U	71	U
Benzo(a)anthracene	UG/KG	1100	7%	224	2	5	76	360	U	370	U	53	J	380	U	72	U	71	U
Benzo(a)pyrene	UG/KG	880	8%	61	2	6	76	360	U	370	U	53	J	380	U	72	U	71	U
Benzo(b)fluoranthene	UG/KG	730	9%	1100	0	7	76	360	U	370	U	41	J	380	U	72	U	71	U
Benzo(ghi)perylene	UG/KG	270	3%	50000	0	2	76	360	U	370	U	390	U	380	U	72	U	71	U
Benzo(k)fluoranthene	UG/KG	890	5%	1100	0	4	76	360	U	370	U	52	J	380	U	72	U	71	U
Bis(2-Chloroethoxy)methane	UG/KG	0	0%		0	0	76	360	U	370	U	390	U	380	U	72	U	71	U
Bis(2-Chloroethyl)ether	UG/KG	0	0%		0	0	76	360	U	370	U	390	U	380	U	72	U	71	U
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%		0	0	37									72	U	71	U
Bis(2-Ethylhexyl)phthalate	UG/KG	2000	11%	50000	0	8	76	66	JR	130	JR	31	JR	380	UR	72	U	71	U
Butylbenzylphthalate	UG/KG	120	1%	50000	0	1	76	360	UR	370	UR	390	UR	380	UR	72	U	71	U
Carbazole	UG/KG	160	1%		0	1	76	360	U	370	U	390	U	380	U	72	U	71	U
Chrysene	UG/KG	1000	11%	400	2	8	76	360	U	370	U	74	J	380	U	72	U	71	U
Di-n-butylphthalate	UG/KG	63	24%	8100	0	18	76	360	UR	370	UR	390	UR	380	UR	72	U	71	U
Di-n-octylphthalate	UG/KG	37	21%	50000	0	16	76	360	U	370	U	390	U	380	U	72	U	37	J
Dibenz(a,h)anthracene	UG/KG	48	1%	14	1	1	76	360	U	370	U	390	U	380	U	72	U	71	U
Dibenzofuran	UG/KG	33	1%	6200	0	1	76	360	U	370	U	390	U	380	U	72	U	71	U
Diethyl phthalate	UG/KG	0	0%	7100	0	0	76	360	U	370	U	390	U	380	U	72	U	71	U
Dimethylphthalate	UG/KG	0	0%	2000	0	0	76	360	U	370	U	390	U	380	U	72	U	71	U
Fluoranthene	UG/KG	2400	11%	50000	0	8	76	360	U	370	U	60	J	380	U	72	U	71	U
Fluorene	UG/KG	330	4%	50000	0	3	76	360	U	370	U	390	U	380	U	72	U	71	U
Hexachlorobenzene	UG/KG	0	0%	410	0	0	76	360	U	370	U	390	U	380	U	72	U	71	U
Hexachlorobutadiene	UG/KG	0	0%		0	0	76	360	U	370	U	390	U	380	U	72	U	71	U
Hexachlorocyclopentadiene	UG/KG	0	0%		0	0	76	360	U	370	U	390	U	380	U	72	U	71	U
Hexachloroethane	UG/KG	0	0%		0	0	76	360	U	370	U	390	U	380	U	72	U	71	U
Indeno(1,2,3-cd)pyrene	UG/KG	260	3%	3200	0	2	76	360	U	370	U	390	U	380	U	72	U	71	U
Isophorone	UG/KG	0	0%	4400	0	0	76	360	U	370	U	390	U	380	U	72	U	71	U
N-Nitrosodiphenylamine	UG/KG	0	0%		0	0	76	360	U	370	U	390	U	380	U	72	U	71	U
N-Nitrosodipropylamine	UG/KG	0	0%		0	0	76	360	U	370	U	390	U	380	U	72	U	71	U
Naphthalene	UG/KG	130	3%	13000	0	2	76	360	U	370	U	390	U	380	U	72	U	71	U
Nitrobenzene	UG/KG	0	0%	200	0	0	76	360	U	370	U	390	U	380	U	72	U	71	U
Pentachlorophenol	UG/KG	0	0%	1000	0	0	76	870	U	890	U	940	U	930	U	170	U	170	U
Phenanthrene	UG/KG	1400	8%	50000	0	6	76	360	U	370	U	45	J	380	U	72	U	71	U
Phenol	UG/KG	0	0%	30	0	0	76	360	U	370	U	390	U	380	U	72	U	71	U
Pyrene	UG/KG	1800	9%	50000	0	7	76	360	U	370	U	140	J	380	U	72	U	71	U

Senec Depot
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Subsurface Soil Sample Results
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	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	ESI		ESI		ESI		ESI		RI Phase 1 Step 1		RI Phase 1 Step 1	
								MW4-4		MW4-4		MW4-5		MW4-5		MW4-6		MW4-6	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								4		6		0		2		2		6	
								6		8		2		4		3.5		6.5	
								12/5/1993		12/5/1993		12/5/1993		12/5/1993		12/19/1998		12/19/1998	
								SB4-4-2		**SB4-4-3**		**SB4-5-1**		**SB4-5-2**		**43154**		**43155**	
								SA		SA		SA		SA		SA		SA	
								N		N		N		N		N		N	
Nitroaromatics																			
1,3-Dinitrobenzene	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	120	U	120	U
2,4,6-Trinitrotoluene	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	120	U	120	U
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	120	U	120	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	78	130	U	130	U	130	U	130	U	120	U	120	U
2-Nitrotoluene	UG/KG	0	0%		0	0	37									120	U	120	U
2-amino-4,6-Dinitrotoluene	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	120	U	120	U
3-Nitrotoluene	UG/KG	0	0%		0	0	37									120	U	120	U
4-Nitrotoluene	UG/KG	0	0%		0	0	37									120	U	120	U
4-amino-2,6-Dinitrotoluene	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	120	U	120	U
HMX	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	120	U	120	U
Nitrobenzene	UG/KG	0	0%	200	0	0	37									120	U	120	U
RDX	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	120	U	120	U
Tetryl	UG/KG	67	1%		0	1	76	130	U	130	U	130	U	130	U	120	U	120	U
Pesticides/PCBs																			
4,4'-DDD	UG/KG	0	0%	2900	0	0	76	3.6	U	3.7	U	19	U	3.8	U	3.6	U	3.5	U
4,4'-DDE	UG/KG	21	4%	2100	0	3	76	3.6	U	3.7	U	21	J	3.8	U	3.6	U	3.5	U
4,4'-DDT	UG/KG	2.9	1%	2100	0	1	76	3.6	U	3.7	U	19	U	3.8	U	3.6	U	3.5	U
Aldrin	UG/KG	8.2	1%	41	0	1	78	1.8	U	1.9	U	8.2	J	2	U	1.8	U	1.8	U
Alpha-BHC	UG/KG	0	0%	110	0	0	76	1.8	U	1.9	U	9.8	U	2	U	1.8	U	1.8	U
Alpha-Chlordane	UG/KG	10	1%		0	1	76	1.8	U	1.9	U	10	J	2	U	1.8	U	1.8	U
Aroclor-1016	UG/KG	0	0%		0	0	78	36	U	37	U	190	U	38	U	36	U	35	U
Aroclor-1221	UG/KG	0	0%		0	0	78	73	U	74	U	390	U	77	U	73	U	72	U
Aroclor-1232	UG/KG	0	0%		0	0	76	36	U	37	U	190	U	38	U	36	U	35	U
Aroclor-1242	UG/KG	0	0%		0	0	76	36	U	37	U	190	U	38	U	36	U	35	U
Aroclor-1248	UG/KG	27	1%		0	1	76	38	U	37	U	190	U	38	U	36	U	35	U
Aroclor-1254	UG/KG	1600	5%	10000	0	4	76	36	U	37	U	1600		38	U	36	U	35	U
Aroclor-1260	UG/KG	0	0%	10000	0	0	76	36	U	37	U	190	U	38	U	36	U	35	U
Beta-BHC	UG/KG	1.4	1%	200	0	1	76	1.8	U	1.9	U	9.8	U	2	U	1.8	U	1.8	U
Delta-BHC	UG/KG	5.9	1%	300	0	1	76	1.8	U	1.9	U	5.9	J	2	U	1.8	U	1.8	U
Dieldrin	UG/KG	0	0%	44	0	0	76	3.6	U	3.7	U	19	U	3.8	U	3.6	U	3.5	U
Endosulfan I	UG/KG	11	1%	900	0	1	76	1.8	U	1.9	U	11		2	U	1.8	U	1.8	U
Endosulfan II	UG/KG	0	0%	900	0	0	76	3.6	U	3.7	U	19	U	3.8	U	3.6	U	3.5	U
Endosulfan sulfate	UG/KG	0	0%	1000	0	0	76	3.6	U	3.7	U	19	U	3.8	U	3.6	U	3.5	U
Endrin	UG/KG	34	1%	100	0	1	76	3.6	U	3.7	U	34	J	3.8	U	3.6	U	3.5	U
Endrin aldehyde	UG/KG	3.7	1%		0	1	78	3.6	U	3.7	U	19	U	3.8	U	3.6	U	3.5	U
Endrin ketone	UG/KG	0	0%		0	0	76	3.6	U	3.7	U	19	U	3.8	U	3.6	U	3.5	U
Gamma-BHC/Lindane	UG/KG	0	0%	60	0	0	76	1.8	U	1.9	U	9.8	U	2	U	1.8	U	1.8	U
Gamma-Chlordane	UG/KG	0	0%	540	0	0	76	1.8	U	1.9	U	9.8	U	2	U	1.8	U	1.8	U
Heptachlor	UG/KG	0	0%	100	0	0	76	1.8	U	1.9	U	9.8	U	2	U	1.8	U	1.8	U
Heptachlor epoxide	UG/KG	0	0%	20	0	0	78	1.8	U	1.9	U	9.8	U	2	U	1.8	U	1.8	U
Methoxychlor	UG/KG	0	0%		0	0	76	18	U	19	U	98	U	20	U	18	U	18	U
Toxaphene	UG/KG	0	0%		0	0	76	180	U	190	U	980	U	200	U	180	U	180	U
Herbicides																			
2,4,5-T	UG/KG	0	0%	1900	0	0	39	5.4	U	5.5	U	5.9	U	5.8	U				
2,4,5-TP/Silvex	UG/KG	0	0%	700	0	0	39	5.4	U	5.5	U	5.9	U	5.8	U				
2,4-D	UG/KG	0	0%	500	0	0	39	54	U	55	U	59	U	58	U				
2,4-DB	UG/KG	0	0%		0	0	39	54	U	55	U	59	U	58	U				
Dalapon	UG/KG	0	0%		0	0	39	130	U	140	U	150	U	140	U				

	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	ESI		ESI		ESI		ESI		RI Phase 1 Step 1		RI Phase 1 Step 1	
								MW4-4		MW4-4		MW4-5		MW4-5		MW4-6		MW4-6	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								4		6		0		2		2		6	
								6		8		2		4		3.5		6.5	
								12/5/1993		12/5/1993		12/5/1993		12/5/1993		12/19/1998		12/19/1998	
								SB4-4-2		**SB4-4-3**		**SB4-5-1**		**SB4-5-2**		**43154**		**43155**	
								SA		SA		SA		SA		SA		SA	
								N		N		N		N		N		N	
Dicamba	UG/KG	23	3%		0	1	39	5.4	U	5.5	U	5.9	U	5.8	U				
Dichloroprop	UG/KG	0	0%		0	0	39	54	U	55	U	59	U	58	U				
Dinoseb	UG/KG	0	0%		0	0	39	27	UJ	28	U	30	U	29	U				
MCPA	UG/KG	0	0%		0	0	39	5400	U	5500	U	5900	U	5800	U				
MCPP	UG/KG	0	0%		0	0	39	5400	U	5500	U	5900	U	5800	U				
Metals																			
Aluminum	MG/KG	21000	100%	19520 *	3	76	76	9500		10200		15000		15700		7600		8160	
Antimony	MG/KG	57.8	28%	6 *	10	21	76	3.4	UJ	4.4	UJ	6.3	J	3.5	J	6.1	J	0.64	R
Arsenic	MG/KG	21.5	100%	8.9 *	4	76	76	4.5		5		3.3		6.9		4		3.7	
Barium	MG/KG	133	100%	300	0	76	76	45.4		50.5		92.7		99.8		51.9		37.7	
Beryllium	MG/KG	1	99%	1.13 *	0	75	76	0.37	J	0.38	J	0.65	J	0.65	J	0.36	J	0.39	J
Cadmium	MG/KG	1.5	4%	2.46 *	0	3	76	0.33	U	0.42	U	0.66	J	0.3	U	0.08	U	0.08	U
Calcium	MG/KG	102000	100%	125300 *	0	76	76	65300		61300		42800		55000		7590		29100	
Chromium	MG/KG	3820	80%	30 *	17	61	76	21.8	R	75.8	R	23.5	R	26.5	R	541		14.3	
Cobalt	MG/KG	29.1	100%	30	0	76	76	10.5		9.8	J	12.3		9.5		11		8.9	
Copper	MG/KG	2250	100%	33 *	14	76	76	19.6	J	52.8	J	26.2	J	28.1	J	319		15.5	
Cyanide	MG/KG	0	0%	0.35	0	0	76	0.62	U	0.54	U	0.59	U	0.58	U	0.64	U	0.57	U
Iron	MG/KG	40900	100%	37410 *	6	76	76	20500		24400		27900		26700		17900		20400	
Lead	MG/KG	251	100%	24.4 *	6	76	76	8.7	J	6.8	J	118		11.8	J	11.7		6.3	
Magnesium	MG/KG	32000	100%	21700 *	3	76	76	11700		8390		10200		11800		3430		4910	
Manganese	MG/KG	2100	78%	1100 *	5	59	76	543		540		648		436		881	J	329	J
Mercury	MG/KG	0.12	45%	0.1	1	34	76	0.03	J	0.04	U	0.03	J	0.04	U	0.05	UJ	0.04	UJ
Nickel	MG/KG	62.3	100%	50 *	8	76	76	24.6		27.2		34.9		32.4		24.7		23.8	
Potassium	MG/KG	2490	100%	2623 *	0	76	76	1040		1090		1720		1400		535	J	692	J
Selenium	MG/KG	0.86	33%	2	0	25	76	0.1	UJ	0.23	J	0.32	J	0.45	J	0.56	U	0.59	U
Silver	MG/KG	1.2	8%	0.8 *	4	6	76	0.67	U	0.85	U	0.75	U	0.6	U	0.16	U	0.17	U
Sodium	MG/KG	134	61%	188 *	0	46	76	116	J	132	J	90.1	J	106	J	52.9	U	56	U
Thallium	MG/KG	0	0%	0.855 *	0	0	76	0.16	U	0.2	U	0.23	U	0.22	U	0.48	U	0.51	U
Vanadium	MG/KG	31	100%	150	0	76	76	13.1		14.4		23.8		24.4		10.6		12	
Zinc	MG/KG	1010	100%	115 *	12	76	76	61.6		112		238		67.3		197		84.8	
Nitrate/Nitrite	MG/KG	2.7	100%			37	37									0.2	J	0.17	J

* Soil criteria for these inorganics are site background values.

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	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		ESI		ESI	
								MW4-7		MW4-8		MW4-8		MW4-9		SB4-1		SB4-1	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								0.5		2		6		0.6		0		4	
								1.5		3.5		6.5		1.6		2		6	
								12/20/1998		12/19/1998		12/19/1998		12/20/1998		12/6/1993		12/6/1993	
								43159		**43151**		**43152**		**43166**		**SB4-1-10**		**SB4-1-2**	
								SA		SA		SA		SA		DU		SA	
								N		N		N		N		N		N	
Volatiles																			
1,1,1-Trichloroethane	UG/KG	0	0%	800	0	0	76	11	U	11	U	11	U	12	U	12	U	12	U
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	600	0	0	76	11	U	11	U	11	U	12	U	12	U	12	U
1,1,2-Trichloroethane	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	12	U	12	U	12	U
1,1-Dichloroethane	UG/KG	0	0%	200	0	0	76	11	U	11	U	11	U	12	U	12	U	12	U
1,1-Dichloroethene	UG/KG	0	0%	400	0	0	76	11	U	11	U	11	U	12	U	12	U	12	U
1,2-Dichloroethane	UG/KG	0	0%	100	0	0	76	11	U	11	U	11	U	12	U	12	U	12	U
1,2-Dichloroethene (total)	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	12	U	12	U	12	U
1,2-Dichloropropane	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	12	U	12	U	12	U
Acetone	UG/KG	31	9%	200	0	7	76	16	U	18	U	24	U	12	U	12	U	12	U
Benzene	UG/KG	0	0%	60	0	0	76	11	U	11	U	11	U	12	U	12	U	12	U
Bromodichloromethane	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	12	U	12	U	12	U
Bromoform	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	12	U	12	U	12	U
Carbon disulfide	UG/KG	0	0%	2700	0	0	76	11	U	11	U	11	U	12	U	12	U	12	U
Carbon tetrachloride	UG/KG	0	0%	600	0	0	76	11	U	11	U	11	U	12	U	12	U	12	U
Chlorobenzene	UG/KG	0	0%	1700	0	0	76	11	U	11	U	11	U	12	U	12	U	12	U
Chlorodibromomethane	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	12	U	12	U	12	U
Chloroethane	UG/KG	0	0%	1900	0	0	76	11	U	11	U	11	U	12	U	12	U	12	U
Chloroform	UG/KG	15	8%	300	0	6	76	11	U	11	U	11	U	12	U	12	U	12	U
Cis-1,3-Dichloropropene	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	12	U	12	U	12	U
Ethyl benzene	UG/KG	1	1%	5500	0	1	76	11	U	11	U	11	U	12	U	12	U	12	U
Methyl bromide	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	12	U	12	U	12	U
Methyl butyl ketone	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	12	U	12	U	12	U
Methyl chloride	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	12	U	12	U	12	U
Methyl ethyl ketone	UG/KG	0	0%	300	0	0	76	11	U	11	U	11	U	12	U	12	U	12	U
Methyl isobutyl ketone	UG/KG	0	0%	1000	0	0	76	11	U	11	U	11	U	12	U	12	U	12	U
Methylene chloride	UG/KG	2	3%	100	0	2	76	11	U	11	U	11	U	12	U	12	U	12	U
Styrene	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	12	U	12	U	12	U
Tetrachloroethene	UG/KG	0	0%	1400	0	0	76	11	U	11	U	11	U	12	U	12	U	12	U
Toluene	UG/KG	13	28%	1500	0	21	76	1	J	1	J	11		12	U	12	U	12	U
Total Xylenes	UG/KG	8	4%	1200	0	3	76	11	U	11	U	6	J	12	U	12	U	12	U
Trans-1,3-Dichloropropene	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	12	U	12	U	12	U
Trichloroethene	UG/KG	0	0%	700	0	0	76	11	U	11	U	11	U	12	U	12	U	12	U
Vinyl chloride	UG/KG	0	0%	200	0	0	76	11	U	11	U	11	U	12	U	12	U	12	U
Semivolatile Organics																			
1,2,4-Trichlorobenzene	UG/KG	0	0%	3400	0	0	76	76	U	72	U	72	U	76	U	390	U	390	U
1,2-Dichlorobenzene	UG/KG	0	0%	7900	0	0	76	76	U	72	U	72	U	76	U	390	U	390	U
1,3-Dichlorobenzene	UG/KG	0	0%	1600	0	0	76	76	U	72	U	72	U	76	U	390	U	390	U
1,4-Dichlorobenzene	UG/KG	0	0%	8500	0	0	76	76	U	72	U	72	U	76	U	390	U	390	U
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%		0	0	39									390	U	390	U
2,4,5-Trichlorophenol	UG/KG	0	0%	100	0	0	76	180	U	170	U	180	U	180	U	950	U	940	U
2,4,6-Trichlorophenol	UG/KG	0	0%		0	0	76	76	U	72	U	72	U	76	U	390	U	390	U
2,4-Dichlorophenol	UG/KG	0	0%	400	0	0	76	76	U	72	U	72	U	76	U	390	U	390	U
2,4-Dimethylphenol	UG/KG	0	0%		0	0	76	76	UJ	72	U	72	U	76	UJ	390	U	390	U
2,4-Dinitrophenol	UG/KG	0	0%	200	0	0	76	180	R	170	U	180	U	180	R	950	U	940	U
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	76	76	U	72	U	72	U	76	U	390	U	390	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	76	76	U	72	U	72	U	76	U	390	U	390	U
2-Chloronaphthalene	UG/KG	0	0%		0	0	76	76	U	72	U	72	U	76	U	390	U	390	U
2-Chlorophenol	UG/KG	0	0%	800	0	0	76	76	U	72	U	72	U	76	U	390	U	390	U
2-Methylnaphthalene	UG/KG	260	4%	36400	0	3	76	76	U	72	U	72	U	76	U	390	U	390	U

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Subsurface Soil Sample Results
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	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		ESI		ESI	
								MW4-7		MW4-8		MW4-8		MW4-9		SB4-1		SB4-1	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								0.5		2		6		0.6		0		4	
								1.5		3.5		6.5		1.6		2		6	
								12/20/1998		12/19/1998		12/19/1998		12/20/1998		12/6/1993		12/6/1993	
								43159		43151		43152		43166		SB4-1-10		SB4-1-2	
								SA		SA		SA		SA		DU		SA	
								N		N		N		N		N		N	
2-Methylphenol	UG/KG	0	0%	100	0	0	76	76	U	72	U	72	U	76	U	390	U	390	U
2-Nitroaniline	UG/KG	0	0%	430	0	0	76	180	U	170	U	180	U	160	U	950	U	940	U
2-Nitrophenol	UG/KG	0	0%	330	0	0	76	76	U	72	U	72	U	76	U	390	U	390	U
3,3'-Dichlorobenzidine	UG/KG	0	0%		0	0	76	76	U	72	U	72	U	76	U	390	U	390	U
3-Nitroaniline	UG/KG	0	0%	500	0	0	76	180	U	170	U	180	U	180	U	950	U	940	U
4,6-Dinitro-2-methylphenol	UG/KG	0	0%		0	0	76	180	UJ	170	U	180	U	180	UJ	950	U	940	U
4-Bromophenyl phenyl ether	UG/KG	0	0%		0	0	76	76	U	72	U	72	U	76	U	390	U	390	U
4-Chloro-3-methylphenol	UG/KG	0	0%	240	0	0	76	76	U	72	U	72	U	76	U	390	U	390	U
4-Chloroaniline	UG/KG	0	0%	220	0	0	76	76	U	72	U	72	U	76	U	390	U	390	U
4-Chlorophenyl phenyl ether	UG/KG	0	0%		0	0	76	76	U	72	U	72	U	76	U	390	U	390	U
4-Methylphenol	UG/KG	0	0%	900	0	0	76	76	U	72	U	72	U	76	U	390	U	390	U
4-Nitroaniline	UG/KG	0	0%		0	0	76	180	U	170	U	180	U	180	U	950	U	940	U
4-Nitrophenol	UG/KG	0	0%	100	0	0	76	180	U	170	U	180	U	180	U	950	U	940	U
Acenaphthene	UG/KG	88	3%	50000	0	2	76	76	U	72	U	72	U	76	U	390	U	390	U
Acenaphthylene	UG/KG	170	4%	41000	0	3	76	76	U	72	U	72	U	76	U	390	U	390	U
Anthracene	UG/KG	340	4%	50000	0	3	76	76	U	72	U	72	U	76	U	390	U	390	U
Benzo(a)anthracene	UG/KG	1100	7%	224	2	5	76	76	U	72	U	72	U	76	U	390	U	390	U
Benzo(a)pyrene	UG/KG	880	8%	61	2	6	76	76	U	72	U	72	U	76	U	390	U	390	U
Benzo(b)fluoranthene	UG/KG	730	9%	1100	0	7	76	76	U	72	U	72	U	76	U	390	U	390	U
Benzo(ghi)perylene	UG/KG	270	3%	50000	0	2	76	76	U	72	U	72	U	76	U	390	U	390	U
Benzo(k)fluoranthene	UG/KG	890	5%	1100	0	4	76	76	U	72	U	72	U	76	U	390	U	390	U
Bis(2-Chloroethoxy)methane	UG/KG	0	0%		0	0	76	76	U	72	U	72	U	76	U	390	U	390	U
Bis(2-Chloroethyl)ether	UG/KG	0	0%		0	0	76	76	U	72	U	72	U	76	U	390	U	390	U
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%		0	0	37	76	U	72	U	72	U	76	U				
Bis(2-Ethylhexyl)phthalate	UG/KG	2000	11%	50000	0	8	76	76	U	72	U	72	U	76	U	390	U	390	U
Butylbenzylphthalate	UG/KG	120	1%	50000	0	1	76	76	U	72	U	72	U	76	U	390	U	390	U
Carbazole	UG/KG	160	1%		0	1	76	76	U	72	U	72	U	76	U	390	U	390	U
Chrysene	UG/KG	1000	11%	400	2	8	76	76	U	72	U	72	U	76	U	390	U	390	U
Di-n-butylphthalate	UG/KG	63	24%	8100	0	18	76	76	U	72	U	72	U	76	U	50	J	52	J
Di-n-octylphthalate	UG/KG	37	21%	50000	0	16	76	76	U	10	J	26	J	76	U	390	U	390	U
Dibenz(a,h)anthracene	UG/KG	48	1%	14	1	1	76	76	U	72	U	72	U	76	U	390	U	390	U
Dibenzofuran	UG/KG	33	1%	6200	0	1	76	76	U	72	U	72	U	76	U	390	U	390	U
Diethyl phthalate	UG/KG	0	0%	7100	0	0	76	76	U	72	U	72	U	76	U	390	U	390	U
Dimethylphthalate	UG/KG	0	0%	2000	0	0	76	76	U	72	U	72	U	76	U	390	U	390	U
Fluoranthene	UG/KG	2400	11%	50000	0	8	76	76	U	72	U	72	U	76	U	390	U	390	U
Fluorene	UG/KG	330	4%	50000	0	3	76	76	U	72	U	72	U	76	U	390	U	390	U
Hexachlorobenzene	UG/KG	0	0%	410	0	0	76	76	U	72	U	72	U	76	U	390	U	390	U
Hexachlorobutadiene	UG/KG	0	0%		0	0	76	76	U	72	U	72	U	76	U	390	U	390	U
Hexachlorocyclopentadiene	UG/KG	0	0%		0	0	76	76	UJ	72	U	72	U	76	UJ	390	U	390	U
Hexachloroethane	UG/KG	0	0%		0	0	76	76	U	72	U	72	U	76	U	390	U	390	U
Indeno(1,2,3-cd)pyrene	UG/KG	260	3%	3200	0	2	76	76	U	72	U	72	U	76	U	390	U	390	U
Isophorone	UG/KG	0	0%	4400	0	0	76	76	U	72	U	72	U	76	U	390	U	390	U
N-Nitrosodiphenylamine	UG/KG	0	0%		0	0	76	76	U	72	U	72	U	76	U	390	U	390	U
N-Nitrosodipropylamine	UG/KG	0	0%		0	0	76	76	U	72	U	72	U	76	U	390	U	390	U
Naphthalene	UG/KG	130	3%	13000	0	2	76	76	U	72	U	72	U	76	U	390	U	390	U
Nitrobenzene	UG/KG	0	0%	200	0	0	76	76	U	72	U	72	U	76	U	390	U	390	U
Pentachlorophenol	UG/KG	0	0%	1000	0	0	76	180	U	170	U	180	U	180	U	950	U	940	U
Phenanthrene	UG/KG	1400	8%	50000	0	6	76	76	U	72	U	72	U	76	U	390	U	390	U
Phenol	UG/KG	0	0%	30	0	0	76	76	U	72	U	72	U	76	U	390	U	390	U
Pyrene	UG/KG	1800	9%	50000	0	7	76	76	U	72	U	72	U	76	U	390	U	390	U

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	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		ESI		ESI	
								MW4-7		MW4-8		MW4-8		MW4-9		SB4-1		SB4-1	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								0.5		2		6		0.6		0		4	
								1.5		3.5		6.5		1.6		2		6	
								12/20/1998		12/19/1998		12/19/1998		12/20/1998		12/6/1993		12/6/1993	
								43159		**43151**		**43152**		**43166**		**SB4-1-10**		**SB4-1-2**	
								SA		SA		SA		SA		DU		SA	
								N		N		N		N		N		N	
Nitroaromatics																			
1,3-Dinitrobenzene	UG/KG	0	0%		0	0	76	120	U	120	U	120	U	120	U	130	U	130	U
2,4,6-Trinitrotoluene	UG/KG	0	0%		0	0	76	120	U	120	U	120	U	120	U	130	U	130	U
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	76	120	U	120	U	120	U	120	U	130	U	130	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	76	120	U	120	U	120	U	120	U	130	U	130	U
2-Nitrotoluene	UG/KG	0	0%		0	0	37	120	U	120	U	120	U	120	U				
2-amino-4,6-Dinitrotoluene	UG/KG	0	0%		0	0	76	120	U	120	U	120	U	120	U	130	U	130	U
3-Nitrotoluene	UG/KG	0	0%		0	0	37	120	U	120	U	120	U	120	U				
4-Nitrotoluene	UG/KG	0	0%		0	0	37	120	U	120	U	120	U	120	U				
4-amino-2,6-Dinitrotoluene	UG/KG	0	0%		0	0	76	120	U	120	U	120	U	120	U	130	U	130	U
HMX	UG/KG	0	0%		0	0	76	120	U	120	U	120	U	120	U	130	U	130	U
Nitrobenzene	UG/KG	0	0%	200	0	0	37	120	U	120	U	120	U	120	U				
RDX	UG/KG	0	0%		0	0	76	120	U	120	U	120	U	120	U	130	U	130	U
Tetryl	UG/KG	67	1%		0	1	76	120	U	120	U	120	U	120	U	130	U	130	U
Pesticides/PCBs																			
4,4'-DDD	UG/KG	0	0%	2900	0	0	76	3.8	U	3.6	U	3.6	U	3.8	U	3.9	U	3.9	U
4,4'-DDE	UG/KG	21	4%	2100	0	3	76	3.8	U	3.6	U	3.6	U	3.8	U	3.9	U	3.9	U
4,4'-DDT	UG/KG	2.9	1%	2100	0	1	76	3.8	U	3.6	U	3.6	U	3.8	U	3.9	U	3.9	U
Aldrin	UG/KG	8.2	1%	41	0	1	76	2	U	1.8	U	1.9	U	2	U	2	U	2	U
Alpha-BHC	UG/KG	0	0%	110	0	0	76	2	U	1.8	U	1.9	U	2	U	2	U	2	U
Alpha-Chlordane	UG/KG	10	1%		0	1	76	2	U	1.8	U	1.9	U	2	U	2	U	2	U
Aroclor-1016	UG/KG	0	0%		0	0	76	38	U	36	U	36	U	38	U	39	U	39	U
Aroclor-1221	UG/KG	0	0%		0	0	76	78	U	73	U	74	U	78	U	80	U	79	U
Aroclor-1232	UG/KG	0	0%		0	0	76	38	U	36	U	36	U	38	U	39	U	39	U
Aroclor-1242	UG/KG	0	0%		0	0	76	38	U	36	U	36	U	38	U	39	U	39	U
Aroclor-1248	UG/KG	27	1%		0	1	76	38	U	36	U	36	U	38	U	39	U	39	U
Aroclor-1254	UG/KG	1600	5%	10000	0	4	76	38	U	36	U	36	U	38	U	39	U	39	U
Aroclor-1260	UG/KG	0	0%	10000	0	0	76	38	U	36	U	36	U	38	U	39	U	39	U
Beta-BHC	UG/KG	1.4	1%	200	0	1	76	2	U	1.8	U	1.9	U	2	U	2	U	2	U
Delta-BHC	UG/KG	5.9	1%	300	0	1	76	2	U	1.8	U	1.9	U	2	U	2	U	2	U
Dieldrin	UG/KG	0	0%	44	0	0	76	3.8	U	3.6	U	3.6	U	3.8	U	3.9	U	3.9	U
Endosulfan I	UG/KG	11	1%	900	0	1	76	2	U	1.8	U	1.9	U	2	U	2	U	2	U
Endosulfan II	UG/KG	0	0%	900	0	0	76	3.8	U	3.6	U	3.6	U	3.8	U	3.9	U	3.9	U
Endosulfan sulfate	UG/KG	0	0%	1000	0	0	76	3.8	U	3.6	U	3.6	U	3.8	U	3.9	U	3.9	U
Endrin	UG/KG	34	1%	100	0	1	76	3.8	U	3.6	U	3.6	U	3.8	U	3.9	U	3.9	U
Endrin aldehyde	UG/KG	3.7	1%		0	1	76	3.8	U	3.6	U	3.6	U	3.8	U	3.9	U	3.9	U
Endrin ketone	UG/KG	0	0%		0	0	76	3.8	U	3.6	U	3.6	U	3.8	U	3.9	U	3.9	U
Gamma-BHC/Lindane	UG/KG	0	0%	60	0	0	76	2	U	1.8	U	1.9	U	2	U	2	U	2	U
Gamma-Chlordane	UG/KG	0	0%	540	0	0	76	2	U	1.8	U	1.9	U	2	U	2	U	2	U
Heptachlor	UG/KG	0	0%	100	0	0	76	2	U	1.8	U	1.9	U	2	U	2	U	2	U
Heptachlor epoxide	UG/KG	0	0%	20	0	0	76	2	U	1.8	U	1.9	U	2	U	2	U	2	U
Methoxychlor	UG/KG	0	0%		0	0	76	20	U	18	U	19	U	20	U	20	U	20	U
Toxaphene	UG/KG	0	0%		0	0	76	200	U	180	U	190	U	200	U	200	U	200	U
Herbicides																			
2,4,5-T	UG/KG	0	0%	1900	0	0	39									6	U	5.9	U
2,4,5-TP/Silvex	UG/KG	0	0%	700	0	0	39									6	U	5.9	U
2,4-D	UG/KG	0	0%	500	0	0	39									60	U	59	U
2,4-DB	UG/KG	0	0%		0	0	39									60	U	59	U
Dalapon	UG/KG	0	0%		0	0	39									150	U	150	U

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	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		ESI		ESI	
								MW4-7		MW4-6		MW4-8		MW4-9		SB4-1		SB4-1	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								0.5		2		6		0.6		0		4	
								1.5		3.5		6.5		1.6		2		6	
								12/20/1998		12/19/1998		12/19/1998		12/20/1998		12/6/1993		12/6/1993	
								43159		**43151**		**43152**		**43166**		**SB4-1-10**		**SB4-1-2**	
								SA		SA		SA		SA		DU		SA	
								N		N		N		N		N		N	
Dicamba	UG/KG	23	3%		0	1	39									6	U	5.9	U
Dichloroprop	UG/KG	0	0%		0	0	39									60	U	59	U
Dinoseb	UG/KG	0	0%		0	0	39									30	U	30	U
MCPA	UG/KG	0	0%		0	0	39									6000	U	5900	U
MCPP	UG/KG	0	0%		0	0	39									6000	U	5900	U
Metals																			
Aluminum	MG/KG	21000	100%	19520 *	3	76	76	12000		13000		5340		13300		21000		15300	
Antimony	MG/KG	57.8	28%	6 *	10	21	76	0.8	R	0.81	R	22.5	J	1.7	J	3.8	UJ	5	UJ
Arsenic	MG/KG	21.5	100%	8.9 *	4	76	76	5.7		5		2.6		4.5		4.2		3.9	
Barium	MG/KG	133	100%	300	0	76	76	90.6		45.9		44.4		68.6		97.7		40.4	J
Beryllium	MG/KG	1	99%	1.13 *	0	75	76	0.37	J	0.63	J	0.29	J	0.54	J	0.64	J	0.74	J
Cadmium	MG/KG	1.5	4%	2.46 *	0	3	76	0.1	U	0.1	U	0.09	U	0.11	U	0.37	U	0.49	U
Calcium	MG/KG	102000	100%	125300 *	0	76	76	2730		12100		4020		1050	J	2460		30900	
Chromium	MG/KG	3820	60%	30 *	17	61	76	17.5		22.7		2000		21.5		27.9		27.6	
Cobalt	MG/KG	29.1	100%	30	0	76	76	13.8		12.7		3.4	J	6.7	J	5.9	J	16.5	
Copper	MG/KG	2250	100%	33 *	14	76	76	19		17.7		210		22.3		15.1		62.8	
Cyanide	MG/KG	0	0%	0.35	0	0	76	0.58	U	0.57	U	0.64	U	0.59	U	0.53	U	0.53	U
Iron	MG/KG	40900	100%	37410 *	6	76	76	25500		30100		9900		30500		19500		34300	
Lead	MG/KG	251	100%	24.4 *	6	76	76	12.9	J	6.6		14.9		13	J	9.8	J	7.5	J
Magnesium	MG/KG	32000	100%	21700 *	3	76	76	3670		6360		1750		3400		4460		7130	
Manganese	MG/KG	2100	78%	1100 *	5	59	76	1120		484	J	148	J	309		119	JR	337	R
Mercury	MG/KG	0.12	45%	0.1	1	34	76	0.06	J	0.05	UJ	0.05	UJ	0.07	J	0.04	J	0.04	J
Nickel	MG/KG	62.3	100%	50 *	8	76	76	31		34.4		11.6		21.1		25.1		47.6	
Potassium	MG/KG	2490	100%	2623 *	0	76	76	1280		1000	J	824	J	1220		2490		1300	
Selenium	MG/KG	0.86	33%	2	0	25	76	0.74	U	0.75	U	0.84	J	0.76	U	0.23	J	0.09	U
Silver	MG/KG	1.2	8%	0.8 *	4	6	76	0.2	U	0.21	U	0.17	U	0.21	U	0.74	U	0.98	U
Sodium	MG/KG	134	61%	188 *	0	46	76	53.6	U	70.7	U	57.8	U	55.5	U	39.2	J	105	J
Thallium	MG/KG	0	0%	0.855 *	0	0	76	0.63	U	0.65	U	0.53	U	0.66	U	0.23	U	0.16	U
Vanadium	MG/KG	31	100%	150	0	76	76	23.5		17.7		9.5		26.9		31		22.2	
Zinc	MG/KG	1010	100%	115 *	12	76	76	62.9	J	67.2		89.8		50	J	72.1		102	
Nitrate/Nitrite	MG/KG	2.7	100%			37	37	0.16	J	0.01	J	0.34	J	0.47	J				

* Soil criteria for these inorganics are site background values.

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								ESI		ESI		ESI		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
								SB4-10		SB4-10		SB4-10		SB4-12		SB4-12		SB4-14	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								0		2		4		4		6		2	
								2		4		6		4.6		6.4		3	
			FREQUENCY OF DETECTION		NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	12/6/1993		12/6/1993		12/6/1993		12/16/1998		12/16/1998		12/16/1998	
								SB4-10-1		SB4-10-2		SB4-10-3		43114		43115		43112	
	UNIT	MAXIMUM		TAGM				SA		SA		SA		SA		SA		SA	
								N		N		N		N		N		N	
Volatiles																			
1,1,1-Trichloroethane	UG/KG	0	0%	800	0	0	76	12	U	11	U	11	U	12	U	11	U	11	U
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	600	0	0	76	12	U	11	U	11	U	12	U	11	U	11	U
1,1,2-Trichloroethane	UG/KG	0	0%		0	0	76	12	U	11	U	11	U	12	U	11	U	11	U
1,1-Dichloroethane	UG/KG	0	0%	200	0	0	76	12	U	11	U	11	U	12	U	11	U	11	U
1,1-Dichloroethene	UG/KG	0	0%	400	0	0	76	12	U	11	U	11	U	12	U	11	U	11	U
1,2-Dichloroethane	UG/KG	0	0%	100	0	0	76	12	U	11	U	11	U	12	U	11	U	11	U
1,2-Dichloroethene (total)	UG/KG	0	0%		0	0	76	12	U	11	U	11	U	12	U	11	U	11	U
1,2-Dichloropropane	UG/KG	0	0%		0	0	76	12	U	11	U	11	U	12	U	11	U	11	U
Acetone	UG/KG	31	9%	200	0	7	76	12	U	11	U	11	U	12	UJ	11	UJ	11	U
Benzene	UG/KG	0	0%	60	0	0	76	12	U	11	U	11	U	12	U	11	U	11	U
Bromodichloromethane	UG/KG	0	0%		0	0	76	12	U	11	U	11	U	12	U	11	U	11	U
Bromoform	UG/KG	0	0%		0	0	76	12	U	11	U	11	U	12	U	11	U	11	U
Carbon disulfide	UG/KG	0	0%	2700	0	0	76	12	U	11	U	11	U	12	U	11	U	11	U
Carbon tetrachloride	UG/KG	0	0%	600	0	0	76	12	U	11	U	11	U	12	U	11	U	11	U
Chlorobenzene	UG/KG	0	0%	1700	0	0	76	12	U	11	U	11	U	12	U	11	U	11	U
Chlorodibromomethane	UG/KG	0	0%		0	0	76	12	U	11	U	11	U	12	U	11	U	11	U
Chloroethane	UG/KG	0	0%	1900	0	0	76	12	U	11	U	11	U	12	U	11	U	11	U
Chloroform	UG/KG	15	8%	300	0	6	76	12	U	11	U	11	U	12	U	11	U	11	U
Cis-1,3-Dichloropropene	UG/KG	0	0%		0	0	76	12	U	11	U	11	U	12	U	11	U	11	U
Ethyl benzene	UG/KG	1	1%	5500	0	1	76	12	U	11	U	11	U	12	U	11	U	1	J
Methyl bromide	UG/KG	0	0%		0	0	76	12	U	11	U	11	U	12	U	11	U	11	UJ
Methyl butyl ketone	UG/KG	0	0%		0	0	76	12	U	11	U	11	U	12	UJ	11	UJ	11	U
Methyl chloride	UG/KG	0	0%		0	0	76	12	U	11	U	11	U	12	U	11	U	11	U
Methyl ethyl ketone	UG/KG	0	0%	300	0	0	76	12	U	11	U	11	U	12	UJ	11	UJ	11	U
Methyl isobutyl ketone	UG/KG	0	0%	1000	0	0	76	12	U	11	U	11	U	12	U	11	U	11	U
Methylene chloride	UG/KG	2	3%	100	0	2	76	12	U	11	U	11	U	12	U	11	U	11	U
Styrene	UG/KG	0	0%		0	0	76	12	U	11	U	11	U	12	U	11	U	11	U
Tetrachloroethene	UG/KG	0	0%	1400	0	0	76	12	U	11	U	11	U	12	U	11	U	11	U
Toluene	UG/KG	13	28%	1500	0	21	76	12	U	11	U	11	U	12	U	5	J	5	J
Total Xylenes	UG/KG	8	4%	1200	0	3	76	12	U	11	U	11	U	12	U	11	U	8	J
Trans-1,3-Dichloropropene	UG/KG	0	0%		0	0	76	12	U	11	U	11	U	12	U	11	U	11	U
Trichloroethene	UG/KG	0	0%	700	0	0	76	12	U	11	U	11	U	12	U	11	U	11	U
Vinyl chloride	UG/KG	0	0%	200	0	0	76	12	U	11	U	11	U	12	U	11	U	11	U
Semivolatile Organics																			
1,2,4-Trichlorobenzene	UG/KG	0	0%	3400	0	0	76	390	U	350	U	350	U	77	U	73	U	71	U
1,2-Dichlorobenzene	UG/KG	0	0%	7900	0	0	76	390	U	350	U	350	U	77	U	73	U	71	U
1,3-Dichlorobenzene	UG/KG	0	0%	1600	0	0	76	390	U	350	U	350	U	77	U	73	U	71	U
1,4-Dichlorobenzene	UG/KG	0	0%	8500	0	0	76	390	U	350	U	350	U	77	U	73	U	71	U
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%		0	0	39	390	U	350	U	350	U						
2,4,5-Trichlorophenol	UG/KG	0	0%	100	0	0	76	940	U	860	U	860	U	190	U	180	U	170	U
2,4,6-Trichlorophenol	UG/KG	0	0%		0	0	76	390	U	350	U	350	U	77	U	73	U	71	U
2,4-Dichlorophenol	UG/KG	0	0%	400	0	0	76	390	U	350	U	350	U	77	U	73	U	71	U
2,4-Dimethylphenol	UG/KG	0	0%		0	0	76	390	U	350	U	350	U	77	UJ	73	UJ	71	UJ
2,4-Dinitrophenol	UG/KG	0	0%	200	0	0	76	940	U	860	U	860	U	190	UJ	180	UJ	170	UJ
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	76	390	U	350	U	350	U	77	U	73	U	71	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	76	390	U	350	U	350	U	77	U	73	U	71	U
2-Chloronaphthalene	UG/KG	0	0%		0	0	76	390	U	350	U	350	U	77	U	73	U	71	U
2-Chlorophenol	UG/KG	0	0%	800	0	0	76	390	U	350	U	350	U	77	U	73	U	71	U
2-Methylnaphthalene	UG/KG	260	4%	36400	0	3	76	390	U	350	U	350	U	77	U	73	U	20	J

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								ESI		ESI		ESI		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
								SB4-10		SB4-10		SB4-10		SB4-12		SB4-12		SB4-14	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								0		2		4		4		6		2	
								2		4		6		4.6		6.4		3	
			FREQUENCY		NUMBER	NUMBER	NUMBER	12/6/1993		12/6/1993		12/6/1993		12/16/1998		12/16/1998		12/16/1998	
			OF		ABOVE	OF	OF	SB4-10-1		SB4-10-2		SB4-10-3		43114		43115		43112	
	UNIT	MAXIMUM	DETECTION	TAGM	TAGM	DETECTS	ANALYSES	SA		SA		SA		SA		SA		SA	
								N		N		N		N		N		N	
2-Methylphenol	UG/KG	0	0%	100	0	0	76	390	U	350	U	350	U	77	U	73	U	71	U
2-Nitroaniline	UG/KG	0	0%	430	0	0	76	940	U	860	U	860	U	190	U	180	U	170	U
2-Nitrophenol	UG/KG	0	0%	330	0	0	76	390	U	350	U	350	U	77	U	73	U	71	U
3,3'-Dichlorobenzidine	UG/KG	0	0%		0	0	76	390	U	350	U	350	U	77	UJ	73	UJ	71	U
3-Nitroaniline	UG/KG	0	0%	500	0	0	76	940	U	860	U	860	U	190	UJ	180	UJ	170	U
4,6-Dinitro-2-methylphenol	UG/KG	0	0%		0	0	76	940	U	860	U	860	U	190	UJ	180	UJ	170	U
4-Bromophenyl phenyl ether	UG/KG	0	0%		0	0	76	390	U	350	U	350	U	77	U	73	U	71	U
4-Chloro-3-methylphenol	UG/KG	0	0%	240	0	0	76	390	U	350	U	350	U	77	U	73	U	71	U
4-Chloroaniline	UG/KG	0	0%	220	0	0	76	390	U	350	U	350	U	77	U	73	U	71	U
4-Chlorophenyl phenyl ether	UG/KG	0	0%		0	0	76	390	U	350	U	350	U	77	U	73	U	71	U
4-Methylphenol	UG/KG	0	0%	900	0	0	76	390	U	350	U	350	U	77	U	73	U	71	U
4-Nitroaniline	UG/KG	0	0%		0	0	76	940	U	860	U	860	U	190	U	180	U	170	U
4-Nitrophenol	UG/KG	0	0%	100	0	0	76	940	U	860	U	860	U	190	U	180	U	170	U
Acenaphthene	UG/KG	88	3%	50000	0	2	76	390	U	350	U	350	U	77	U	73	U	71	U
Acenaphthylene	UG/KG	170	4%	41000	0	3	76	390	U	350	U	350	U	77	U	73	U	71	U
Anthracene	UG/KG	340	4%	50000	0	3	76	390	U	350	U	350	U	77	U	73	U	71	U
Benzo(a)anthracene	UG/KG	1100	7%	224	2	5	76	390	U	350	U	350	U	77	U	73	U	71	U
Benzo(a)pyrene	UG/KG	880	8%	61	2	6	76	390	U	350	U	350	U	77	U	73	U	71	UJ
Benzo(b)fluoranthene	UG/KG	730	9%	1100	0	7	76	390	U	350	U	350	U	77	U	73	U	71	UJ
Benzo(ghi)perylene	UG/KG	270	3%	50000	0	2	76	390	U	350	U	350	U	77	UJ	73	UJ	71	UJ
Benzo(k)fluoranthene	UG/KG	890	5%	1100	0	4	76	390	U	350	U	350	U	77	U	73	U	71	UJ
Bis(2-Chloroethoxy)methane	UG/KG	0	0%		0	0	76	390	U	350	U	350	U	77	U	73	U	71	U
Bis(2-Chloroethyl)ether	UG/KG	0	0%		0	0	76	390	U	350	U	350	U	77	U	73	U	71	U
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%		0	0	37							77	U	73	U	71	U
Bis(2-Ethylhexyl)phthalate	UG/KG	2000	11%	50000	0	8	76	390	U	350	U	350	U	77	U	73	U	370	
Butylbenzylphthalate	UG/KG	120	1%	50000	0	1	76	390	U	350	U	350	U	77	U	73	U	120	
Carbazole	UG/KG	160	1%		0	1	76	390	U	350	U	350	U	77	U	73	U	71	U
Chrysene	UG/KG	1000	11%	400	2	6	76	390	U	350	U	350	U	77	U	73	U	4.7	J
Di-n-butylphthalate	UG/KG	63	24%	8100	0	18	76	58	J	41	J	63	J	77	U	73	U	71	U
Di-n-octylphthalate	UG/KG	37	21%	50000	0	16	76	390	U	350	U	350	U	11	J	17	J	19	J
Dibenz(a,h)anthracene	UG/KG	48	1%	14	1	1	76	390	U	350	U	350	U	77	U	73	U	71	UJ
Dibenzofuran	UG/KG	33	1%	6200	0	1	76	390	U	350	U	350	U	77	U	73	U	71	U
Diethyl phthalate	UG/KG	0	0%	7100	0	0	76	390	U	350	U	350	U	77	U	73	U	71	U
Dimethylphthalate	UG/KG	0	0%	2000	0	0	76	390	U	350	U	350	U	77	U	73	U	71	U
Fluoranthene	UG/KG	2400	11%	50000	0	6	76	390	U	350	U	350	U	77	U	73	U	71	U
Fluorene	UG/KG	330	4%	50000	0	3	76	390	U	350	U	350	U	77	U	73	U	71	U
Hexachlorobenzene	UG/KG	0	0%	410	0	0	76	390	U	350	U	350	U	77	U	73	U	71	U
Hexachlorobutadiene	UG/KG	0	0%		0	0	76	390	U	350	U	350	U	77	U	73	U	71	U
Hexachlorocyclopentadiene	UG/KG	0	0%		0	0	76	390	U	350	U	350	U	77	UJ	73	UJ	71	U
Hexachloroethane	UG/KG	0	0%		0	0	76	390	U	350	U	350	U	77	U	73	U	71	U
Indeno(1,2,3-cd)pyrene	UG/KG	260	3%	3200	0	2	76	390	U	350	U	350	U	77	U	73	U	71	U
Isophorone	UG/KG	0	0%	4400	0	0	76	390	U	350	U	350	U	77	U	73	U	71	U
N-Nitrosodiphenylamine	UG/KG	0	0%		0	0	76	390	U	350	U	350	U	77	U	73	U	71	U
N-Nitrosodipropylamine	UG/KG	0	0%		0	0	76	390	U	350	U	350	U	77	U	73	U	71	U
Naphthalene	UG/KG	130	3%	13000	0	2	76	390	U	350	U	350	U	77	U	73	U	69	J
Nitrobenzene	UG/KG	0	0%	200	0	0	76	390	U	350	U	350	U	77	U	73	U	71	U
Pentachlorophenol	UG/KG	0	0%	1000	0	0	76	940	U	860	U	860	U	190	U	180	U	170	U
Phenanthrene	UG/KG	1400	8%	50000	0	6	76	390	U	350	U	350	U	77	U	73	U	4.8	J
Phenol	UG/KG	0	0%	30	0	0	76	390	U	350	U	350	U	77	U	73	U	71	U
Pyrene	UG/KG	1800	9%	50000	0	7	76	390	U	350	U	350	U	77	U	73	U	71	U

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	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	ESI		ESI		ESI		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
								SB4-10		SB4-10		SB4-10		SB4-12		SB4-12		SB4-14	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								0		2		4		4		6		2	
								2		4		6		4.6		6.4		3	
								12/6/1993		12/6/1993		12/6/1993		12/16/1998		12/16/1998		12/16/1998	
								SB4-10-1		**SB4-10-2**		**SB4-10-3**		**43114**		**43115**		**43112**	
								SA		SA		SA		SA		SA		SA	
								N		N		N		N		N		N	
Nitroaromatics																			
1,3-Dinitrobenzene	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	120	U	120	U	120	U
2,4,6-Trinitrotoluene	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	120	U	120	U	120	U
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	120	U	120	U	120	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	76	130	U	130	U	130	U	120	U	120	U	120	U
2-Nitrotoluene	UG/KG	0	0%		0	0	37							120	U	120	U	120	U
2-amino-4,6-Dinitrotoluene	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	120	U	120	U	120	U
3-Nitrotoluene	UG/KG	0	0%		0	0	37							120	U	120	U	120	U
4-Nitrotoluene	UG/KG	0	0%		0	0	37							120	U	120	U	120	U
4-amino-2,6-Dinitrotoluene	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	120	U	120	U	120	U
HMX	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	120	U	120	U	120	U
Nitrobenzene	UG/KG	0	0%	200	0	0	37							120	U	120	U	120	U
RDX	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	120	U	120	U	120	U
Tetryl	UG/KG	67	1%		0	1	76	130	U	130	U	130	U	120	U	120	U	120	U
Pesticides/PCBs																			
4,4'-DDD	UG/KG	0	0%	2900	0	0	76	3.9	U	3.5	U	3.5	U	3.8	U	3.7	U	3.5	U
4,4'-DDE	UG/KG	21	4%	2100	0	3	76	3.9	U	3.5	U	3.5	U	3.8	U	3.7	U	3.5	U
4,4'-DDT	UG/KG	2.9	1%	2100	0	1	76	3.9	U	3.5	U	3.5	U	3.8	U	3.7	U	3.5	U
Aldrin	UG/KG	8.2	1%	41	0	1	76	2	U	1.8	U	1.8	U	2	U	1.9	U	1.8	U
Alpha-BHC	UG/KG	0	0%	110	0	0	76	2	U	1.8	U	1.8	U	2	U	1.9	U	1.8	U
Alpha-Chlordane	UG/KG	10	1%		0	1	76	2	U	1.8	U	1.8	U	2	U	1.9	U	1.8	U
Aroclor-1016	UG/KG	0	0%		0	0	76	39	U	35	U	35	U	38	U	37	U	35	U
Aroclor-1221	UG/KG	0	0%		0	0	76	79	U	72	U	72	U	78	U	74	U	72	U
Aroclor-1232	UG/KG	0	0%		0	0	76	39	U	35	U	35	U	38	U	37	U	35	U
Aroclor-1242	UG/KG	0	0%		0	0	76	39	U	35	U	35	U	38	U	37	U	35	U
Aroclor-1248	UG/KG	27	1%		0	1	76	39	U	35	U	35	U	38	U	37	U	35	U
Aroclor-1254	UG/KG	1600	5%	10000	0	4	76	39	U	35	U	35	U	38	U	37	U	35	U
Aroclor-1260	UG/KG	0	0%	10000	0	0	76	39	U	35	U	35	U	38	U	37	U	35	U
Beta-BHC	UG/KG	1.4	1%	200	0	1	76	2	U	1.8	U	1.8	U	2	U	1.4	J	1.8	U
Delta-BHC	UG/KG	5.9	1%	300	0	1	76	2	U	1.8	U	1.8	U	2	U	1.9	U	1.8	U
Dieldrin	UG/KG	0	0%	44	0	0	76	3.9	U	3.5	U	3.5	U	3.8	U	3.7	U	3.5	U
Endosulfan I	UG/KG	11	1%	900	0	1	76	2	U	1.8	U	1.8	U	2	U	1.9	U	1.8	U
Endosulfan II	UG/KG	0	0%	900	0	0	76	3.9	U	3.5	U	3.5	U	3.8	U	3.7	U	3.5	U
Endosulfan sulfate	UG/KG	0	0%	1000	0	0	76	3.9	U	3.5	U	3.5	U	3.8	U	3.7	U	3.5	U
Endrin	UG/KG	34	1%	100	0	1	76	3.9	U	3.5	U	3.5	U	3.8	U	3.7	U	3.5	U
Endrin aldehyde	UG/KG	3.7	1%		0	1	76	3.9	U	3.5	U	3.5	U	3.8	U	3.7	U	3.5	U
Endrin ketone	UG/KG	0	0%		0	0	76	3.9	U	3.5	U	3.5	U	3.8	U	3.7	U	3.5	U
Gamma-BHC/Lindane	UG/KG	0	0%	60	0	0	76	2	U	1.8	U	1.8	U	2	U	1.9	U	1.8	U
Gamma-Chlordane	UG/KG	0	0%	540	0	0	76	2	U	1.8	U	1.8	U	2	U	1.9	U	1.8	U
Heptachlor	UG/KG	0	0%	100	0	0	76	2	U	1.8	U	1.8	U	2	U	1.9	U	1.8	U
Heptachlor epoxide	UG/KG	0	0%	20	0	0	76	2	U	1.8	U	1.8	U	2	U	1.9	U	1.8	U
Methoxychlor	UG/KG	0	0%		0	0	76	20	U	18	U	18	U	20	U	19	U	18	U
Toxaphene	UG/KG	0	0%		0	0	76	200	U	180	U	180	U	200	U	190	U	180	U
Herbicides																			
2,4,5-T	UG/KG	0	0%	1900	0	0	39	5.8	U	5.3	U	5.4	U						
2,4,5-TP/Silvex	UG/KG	0	0%	700	0	0	39	5.8	U	5.3	U	5.4	U						
2,4-D	UG/KG	0	0%	500	0	0	39	58	U	53	U	54	U						
2,4-DB	UG/KG	0	0%		0	0	39	58	U	53	U	54	U						
Dalapon	UG/KG	0	0%		0	0	39	140	U	130	U	130	U						

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	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	ESI		ESI		ESI		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
								SB4-10		SB4-10		SB4-10		SB4-12		SB4-12		SB4-14	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								0		2		4		4		6		2	
								2		4		6		4.6		6.4		3	
								12/6/1993		12/6/1993		12/6/1993		12/16/1998		12/16/1998		12/16/1998	
								SB4-10-1		**SB4-10-2**		**SB4-10-3**		**43114**		**43115**		**43112**	
								SA		SA		SA		SA		SA		SA	
								N		N		N		N		N		N	
Dicamba	UG/KG	23	3%		0	1	39	5.8	U	5.3	U	5.4	U						
Dichloroprop	UG/KG	0	0%		0	0	39	58	U	53	U	54	U						
Dinoseb	UG/KG	0	0%		0	0	39	29	U	27	U	27	U						
MCPA	UG/KG	0	0%		0	0	39	5800	U	5300	U	5400	U						
MCPP	UG/KG	0	0%		0	0	39	5800	U	5300	U	5400	U						
Metals																			
Aluminum	MG/KG	21000	100%	19520 *	3	76	76	15600		17000		17200		13800		10200		19400	
Antimony	MG/KG	57.8	28%	6 *	10	21	76	4.7	UJ	43.8	J	40.9	J	0.57	UJ	0.55	UJ	0.66	UJ
Arsenic	MG/KG	21.5	100%	8.9 *	4	76	76	6.5		5.8		6.4		6.5		2.8		7.8	
Barium	MG/KG	133	100%	300	0	76	76	126		58.4		54.3		67.7		35.8		67.8	
Beryllium	MG/KG	1	99%	1.13 *	0	75	76	0.82	J	0.87	J	0.83		0.34	J	0.31	J	0.94	J
Cadmium	MG/KG	1.5	4%	2.46 *	0	3	76	0.46	U	0.37	U	0.34	U	0.04	U	0.04	U	0.04	U
Calcium	MG/KG	102000	100%	125300 *	0	76	76	3250		6540		2140		1890		4580		2860	
Chromium	MG/KG	3820	80%	30 *	17	61	76	178		2560		2470		25.3		27.3		74.4	
Cobalt	MG/KG	29.1	100%	30	0	76	76	19.5		18.7		14.7		17.8		11		20.1	
Copper	MG/KG	2250	100%	33 *	14	76	76	28		1790		2030		25.8		9.8		22.7	
Cyanide	MG/KG	0	0%	0.35	0	0	76	0.57	U	0.45	U	0.52	U	0.59	U	0.59	U	0.55	U
Iron	MG/KG	40900	100%	37410 *	6	76	76	34700		37200		35100		31800		23200		40900	
Lead	MG/KG	251	100%	24.4 *	6	76	76	12.8	J	9	J	5.2	J	14.7		6.2		251	
Magnesium	MG/KG	32000	100%	21700 *	3	76	76	5370		7870		7530		5370		4760		8390	
Manganese	MG/KG	2100	78%	1100 *	5	59	76	1390	R	299	R	267	R	1150	J	519	J	337	J
Mercury	MG/KG	0.12	45%	0.1	1	34	76	0.06	J	0.03	J	0.02	J	0.05	UJ	0.06	UJ	0.05	UJ
Nickel	MG/KG	62.3	100%	50 *	8	76	76	51.3		56		49.8		38.1		28		59.2	
Potassium	MG/KG	2490	100%	2623 *	0	76	76	1170		1090		1320		1460		958		1620	
Selenium	MG/KG	0.86	33%	2	0	25	76	0.23	J	0.31	J	0.21	J	0.39	J	0.4	J	0.43	U
Silver	MG/KG	1.2	8%	0.8 *	4	6	76	0.91	U	0.73	U	0.92	J	0.18	U	0.18	U	0.21	U
Sodium	MG/KG	134	61%	188 *	0	46	76	42.9	U	55.7	J	57.6	J	48.3	U	46.7	U	56	U
Thallium	MG/KG	0	0%	0.855 *	0	0	76	0.27	U	0.14	U	0.24	U	6.6	UJ	6.4	UJ	0.77	UJ
Vanadium	MG/KG	31	100%	150	0	76	76	26.9		24.6		25.1		23.4		14.3		27.5	
Zinc	MG/KG	1010	100%	115 *	12	76	76	89.8		574		440		91.5		49.1		149	
Nitrate/Nitrite	MG/KG	2.7	100%			37	37							1.94		0.45		0.15	

* Soil criteria for these inorganics are site background values.

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	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
								SB4-15		SB4-16		SB4-17		SB4-18		SB4-18		SB4-19	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								4		2		2		2		4		2	
								6		3		3.2		3.5		5.8		3.2	
								12/17/1998		12/21/1998		12/16/1998		12/15/1998		12/15/1998		12/15/1998	
								43148		**43124**		**43121**		**43081**		**43082**		**43084**	
								SA		SA		SA		SA		SA		SA	
								N		N		N		N		N		N	
Volatiles																			
1,1,1-Trichloroethane	UG/KG	0	0%	800	0	0	76	11	U	11	U	11	U	12	U	12	U	11	U
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	600	0	0	76	11	U	11	U	11	U	12	U	12	U	11	U
1,1,2-Trichloroethane	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	12	U	12	U	11	U
1,1-Dichloroethane	UG/KG	0	0%	200	0	0	76	11	U	11	U	11	U	12	U	12	U	11	U
1,1-Dichloroethene	UG/KG	0	0%	400	0	0	76	11	U	11	U	11	U	12	U	12	U	11	U
1,2-Dichloroethane	UG/KG	0	0%	100	0	0	76	11	U	11	U	11	U	12	U	12	U	11	U
1,2-Dichloroethene (total)	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	12	U	12	U	11	U
1,2-Dichloropropane	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	12	U	12	U	11	U
Acetone	UG/KG	31	9%	200	0	7	76	11	U	6	J	11	UJ	10	J	10	J	11	U
Benzene	UG/KG	0	0%	60	0	0	76	11	U	11	U	11	U	12	U	12	U	11	U
Bromodichloromethane	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	12	U	12	U	11	U
Bromoform	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	12	U	12	U	11	U
Carbon disulfide	UG/KG	0	0%	2700	0	0	76	11	U	11	U	11	U	12	U	12	U	11	U
Carbon tetrachloride	UG/KG	0	0%	600	0	0	76	11	U	11	U	11	U	12	U	12	U	11	U
Chlorobenzene	UG/KG	0	0%	1700	0	0	76	11	U	11	U	11	U	12	U	12	U	11	U
Chlorodibromomethane	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	12	U	12	U	11	U
Chloroethane	UG/KG	0	0%	1900	0	0	76	11	U	11	U	11	U	12	U	12	U	11	UJ
Chloroform	UG/KG	15	8%	300	0	6	76	11	U	11	U	11	U	12	U	12	U	11	U
Cis-1,3-Dichloropropene	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	12	U	12	U	11	U
Ethyl benzene	UG/KG	1	1%	5500	0	1	76	11	U	11	U	11	U	12	U	12	U	11	U
Methyl bromide	UG/KG	0	0%		0	0	76	11	U	11	U	11	UJ	12	UJ	12	UJ	11	U
Methyl butyl ketone	UG/KG	0	0%		0	0	76	11	U	11	U	11	UJ	12	UJ	12	UJ	11	U
Methyl chloride	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	12	U	12	U	11	U
Methyl ethyl ketone	UG/KG	0	0%	300	0	0	76	11	U	11	U	11	UJ	12	UJ	12	UJ	11	UJ
Methyl isobutyl ketone	UG/KG	0	0%	1000	0	0	76	11	U	11	U	11	U	12	U	12	U	11	U
Methylene chloride	UG/KG	2	3%	100	0	2	76	11	U	11	U	11	U	12	U	12	U	11	U
Styrene	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	12	U	12	U	11	U
Tetrachloroethene	UG/KG	0	0%	1400	0	0	76	11	U	11	U	11	U	12	U	12	U	11	U
Toluene	UG/KG	13	28%	1500	0	21	76	2	J	2	J	2	J	12	U	12	U	11	U
Total Xylenes	UG/KG	8	4%	1200	0	3	76	11	U	11	U	11	U	12	U	12	U	11	U
Trans-1,3-Dichloropropene	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	12	U	12	U	11	U
Trichloroethene	UG/KG	0	0%	700	0	0	76	11	U	11	U	11	U	12	U	12	U	11	U
Vinyl chloride	UG/KG	0	0%	200	0	0	76	11	U	11	U	11	U	12	U	12	U	11	U
Semivolatile Organics																			
1,2,4-Trichlorobenzene	UG/KG	0	0%	3400	0	0	76	75	U	72	U	72	U	77	U	74	U	72	U
1,2-Dichlorobenzene	UG/KG	0	0%	7900	0	0	76	75	U	72	U	72	U	77	U	74	U	72	U
1,3-Dichlorobenzene	UG/KG	0	0%	1600	0	0	76	75	U	72	U	72	U	77	U	74	U	72	U
1,4-Dichlorobenzene	UG/KG	0	0%	6500	0	0	76	75	U	72	U	72	U	77	U	74	U	72	U
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%		0	0	39												
2,4,5-Trichlorophenol	UG/KG	0	0%	100	0	0	76	180	U	170	U	170	U	190	U	180	U	180	U
2,4,6-Trichlorophenol	UG/KG	0	0%		0	0	76	75	U	72	U	72	U	77	U	74	U	72	U
2,4-Dichlorophenol	UG/KG	0	0%	400	0	0	76	75	U	72	U	72	U	77	U	74	U	72	U
2,4-Dimethylphenol	UG/KG	0	0%		0	0	76	75	UJ	72	UJ	72	UJ	77	UJ	74	UJ	72	UJ
2,4-Dinitrophenol	UG/KG	0	0%	200	0	0	76	180	U	170	UJ	170	UJ	190	R	180	R	180	R
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	76	75	U	72	U	72	U	77	U	74	U	72	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	76	75	U	72	U	72	U	77	U	74	U	72	U
2-Chloronaphthalene	UG/KG	0	0%		0	0	76	75	U	72	U	72	U	77	U	74	U	72	U
2-Chlorophenol	UG/KG	0	0%	800	0	0	76	75	U	72	U	72	U	77	U	74	U	72	U
2-Methylnaphthalene	UG/KG	260	4%	36400	0	3	76	75	U	72	U	72	U	77	U	74	U	72	U

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	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
								SB4-15		SB4-16		SB4-17		SB4-18		SB4-18		SB4-19	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								4		2		2		2		4		2	
								6		3		3.2		3.5		5.8		3.2	
								12/17/1998		12/21/1998		12/16/1998		12/15/1998		12/15/1998		12/15/1998	
								43148		**43124**		**43121**		**43081**		**43082**		**43084**	
								SA		SA		SA		SA		SA		SA	
								N		N		N		N		N		N	
2-Methylphenol	UG/KG	0	0%	100	0	0	76	75	U	72	U	72	U	77	U	74	U	72	U
2-Nitroaniline	UG/KG	0	0%	430	0	0	76	180	U	170	U	170	U	190	U	180	U	180	U
2-Nitrophenol	UG/KG	0	0%	330	0	0	76	75	U	72	U	72	U	77	U	74	U	72	U
3,3'-Dichlorobenzidine	UG/KG	0	0%		0	0	76	75	U	72	U	72	U	77	U	74	U	72	U
3-Nitroaniline	UG/KG	0	0%	500	0	0	76	180	U	170	U	170	UJ	190	U	180	U	180	U
4,6-Dinitro-2-methylphenol	UG/KG	0	0%		0	0	76	180	U	170	U	170	U	190	UJ	180	UJ	180	UJ
4-Bromophenyl phenyl ether	UG/KG	0	0%		0	0	76	75	U	72	U	72	U	77	U	74	U	72	U
4-Chloro-3-methylphenol	UG/KG	0	0%	240	0	0	76	75	U	72	U	72	U	77	U	74	U	72	U
4-Chloroaniline	UG/KG	0	0%	220	0	0	76	75	U	72	U	72	U	77	U	74	U	72	U
4-Chlorophenyl phenyl ether	UG/KG	0	0%		0	0	76	75	U	72	U	72	U	77	U	74	U	72	U
4-Methylphenol	UG/KG	0	0%	900	0	0	76	75	U	72	U	72	U	77	U	74	U	72	U
4-Nitroaniline	UG/KG	0	0%		0	0	76	180	U	170	U	170	U	190	U	180	U	180	U
4-Nitrophenol	UG/KG	0	0%	100	0	0	76	180	U	170	U	170	U	190	U	180	U	180	U
Acenaphthene	UG/KG	88	3%	50000	0	2	76	75	U	72	U	72	U	77	U	74	U	72	U
Acenaphthylene	UG/KG	170	4%	41000	0	3	76	75	U	72	U	72	U	77	U	74	U	72	U
Anthracene	UG/KG	340	4%	50000	0	3	76	75	U	72	U	72	U	77	U	74	U	72	U
Benzo(a)anthracene	UG/KG	1100	7%	224	2	5	76	75	U	72	U	72	U	77	U	74	U	72	U
Benzo(a)pyrene	UG/KG	880	8%	61	2	6	76	75	U	72	U	72	U	77	U	74	U	72	U
Benzo(b)fluoranthene	UG/KG	730	9%	1100	0	7	76	75	U	72	U	6.4	J	77	U	74	U	72	U
Benzo(ghi)perylene	UG/KG	270	3%	50000	0	2	76	75	U	72	U	72	U	77	U	74	U	72	U
Benzo(k)fluoranthene	UG/KG	890	5%	1100	0	4	76	75	U	72	U	72	R	77	U	74	U	72	U
Bis(2-Chloroethoxy)methane	UG/KG	0	0%		0	0	76	75	U	72	U	72	U	77	U	74	U	72	U
Bis(2-Chloroethyl)ether	UG/KG	0	0%		0	0	76	75	U	72	U	72	U	77	U	74	U	72	U
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%		0	0	37	75	U	72	U	72	U	77	U	74	U	72	U
Bis(2-Ethylhexyl)phthalate	UG/KG	2000	11%	50000	0	8	76	22	J	72	U	72	U	77	U	74	U	72	U
Butylbenzylphthalate	UG/KG	120	1%	50000	0	1	76	75	U	72	U	72	U	77	U	74	U	72	U
Carbazole	UG/KG	160	1%		0	1	76	75	U	72	U	72	U	77	U	74	U	72	U
Chrysene	UG/KG	1000	11%	400	2	8	76	75	U	72	U	6.3	J	77	U	74	U	72	U
Di-n-butylphthalate	UG/KG	63	24%	8100	0	18	76	75	U	72	U	72	U	77	U	74	U	72	U
Di-n-octylphthalate	UG/KG	37	21%	50000	0	16	76	7.3	J	72	U	29	J	77	U	74	U	72	U
Dibenz(a,h)anthracene	UG/KG	48	1%	14	1	1	76	75	U	72	U	72	U	77	U	74	U	72	U
Dibenzofuran	UG/KG	33	1%	6200	0	1	76	75	U	72	U	72	U	77	U	74	U	72	U
Diethyl phthalate	UG/KG	0	0%	7100	0	0	76	75	U	72	U	72	U	77	U	74	U	72	U
Dimethylphthalate	UG/KG	0	0%	2000	0	0	76	75	U	72	U	72	U	77	U	74	U	72	U
Fluoranthene	UG/KG	2400	11%	50000	0	8	76	75	U	72	U	72	U	77	U	74	U	72	U
Fluorene	UG/KG	330	4%	50000	0	3	76	75	U	72	U	72	U	77	U	74	U	72	U
Hexachlorobenzene	UG/KG	0	0%	410	0	0	76	75	U	72	U	72	U	77	U	74	U	72	U
Hexachlorobutadiene	UG/KG	0	0%		0	0	76	75	U	72	U	72	U	77	U	74	U	72	U
Hexachlorocyclopentadiene	UG/KG	0	0%		0	0	76	75	UJ	72	U	72	UJ	77	UJ	74	UJ	72	UJ
Hexachloroethane	UG/KG	0	0%		0	0	76	75	U	72	U	72	U	77	U	74	U	72	U
Indeno(1,2,3-cd)pyrene	UG/KG	260	3%	3200	0	2	76	75	U	72	U	72	U	77	U	74	U	72	U
Isophorone	UG/KG	0	0%	4400	0	0	76	75	U	72	U	72	U	77	U	74	U	72	U
N-Nitrosodiphenylamine	UG/KG	0	0%		0	0	76	75	U	72	U	72	U	77	U	74	U	72	U
N-Nitrosodipropylamine	UG/KG	0	0%		0	0	76	75	U	72	U	72	U	77	U	74	U	72	U
Naphthalene	UG/KG	130	3%	13000	0	2	76	75	U	72	U	72	U	77	U	74	U	72	U
Nitrobenzene	UG/KG	0	0%	200	0	0	76	75	U	72	U	72	U	77	U	74	U	72	U
Pentachlorophenol	UG/KG	0	0%	1000	0	0	76	180	U	170	U	170	U	190	U	180	U	180	U
Phenanthrene	UG/KG	1400	8%	50000	0	6	76	75	U	72	U	72	U	77	U	74	U	72	U
Phenol	UG/KG	0	0%	30	0	0	76	75	U	72	U	72	U	77	U	74	U	72	U
Pyrene	UG/KG	1800	9%	50000	0	7	76	75	U	72	U	72	U	77	U	74	U	72	U

	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
								SB4-15		SB4-16		SB4-17		SB4-18		SB4-18		SB4-19	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								4		2		2		2		4		2	
								6		3		3.2		3.5		5.8		3.2	
								12/17/1998		12/21/1998		12/16/1998		12/15/1998		12/15/1998		12/15/1998	
								43148		**43124**		**43121**		**43081**		**43082**		**43084**	
								SA		SA		SA		SA		SA		SA	
								N		N		N		N		N		N	
Nitroaromatics																			
1,3-Dinitrobenzene	UG/KG	0	0%		0	0	76	120	U	120	U	120	U	120	U	120	UJ	120	UJ
2,4,6-Trinitrotoluene	UG/KG	0	0%		0	0	76	120	U	120	U	120	U	120	U	120	UJ	120	UJ
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	76	120	U	120	U	120	U	120	U	120	UJ	120	UJ
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	76	120	U	120	U	120	U	120	U	120	UJ	120	UJ
2-Nitrotoluene	UG/KG	0	0%		0	0	37	120	U	120	U	120	U	120	U	120	UJ	120	UJ
2-amino-4,6-Dinitrotoluene	UG/KG	0	0%		0	0	76	120	U	120	U	120	U	120	U	120	UJ	120	UJ
3-Nitrotoluene	UG/KG	0	0%		0	0	37	120	U	120	U	120	U	120	U	120	UJ	120	UJ
4-Nitrotoluene	UG/KG	0	0%		0	0	37	120	U	120	U	120	U	120	U	120	UJ	120	UJ
4-amino-2,6-Dinitrotoluene	UG/KG	0	0%		0	0	76	120	U	120	U	120	U	120	U	120	UJ	120	UJ
HMX	UG/KG	0	0%		0	0	76	120	U	120	U	120	U	120	U	120	UJ	120	UJ
Nitrobenzene	UG/KG	0	0%	200	0	0	37	120	U	120	U	120	U	120	U	120	UJ	120	UJ
RDX	UG/KG	0	0%		0	0	76	120	U	120	U	120	U	120	U	120	UJ	120	UJ
Tetryl	UG/KG	67	1%		0	1	76	120	U	120	U	120	U	120	U	120	UJ	120	UJ
Pesticides/PCBs																			
4,4'-DDD	UG/KG	0	0%	2900	0	0	76	3.8	U	3.6	U	3.6	U	3.8	U	3.7	U	3.6	U
4,4'-DDE	UG/KG	21	4%	2100	0	3	76	3.8	U	3.6	U	3.6	U	3.8	U	3.7	U	3.6	U
4,4'-DDT	UG/KG	2.9	1%	2100	0	1	76	3.8	U	3.6	U	3.6	U	3.8	U	3.7	U	3.6	U
Aldrin	UG/KG	8.2	1%	41	0	1	76	1.9	U	1.8	U	1.8	U	2	U	1.9	U	1.9	U
Alpha-BHC	UG/KG	0	0%	110	0	0	76	1.9	U	1.8	U	1.8	U	2	U	1.9	U	1.9	U
Alpha-Chlordane	UG/KG	10	1%		0	1	76	1.9	U	1.8	U	1.8	U	2	U	1.9	U	1.9	U
Aroclor-1016	UG/KG	0	0%		0	0	76	38	U	36	U	36	U	38	U	37	U	36	U
Aroclor-1221	UG/KG	0	0%		0	0	76	76	U	73	U	73	U	78	U	75	U	74	U
Aroclor-1232	UG/KG	0	0%		0	0	76	38	U	36	U	36	U	38	U	37	U	36	U
Aroclor-1242	UG/KG	0	0%		0	0	76	38	U	36	U	36	U	38	U	37	U	36	U
Aroclor-1248	UG/KG	27	1%		0	1	76	38	U	36	U	36	U	38	U	37	U	36	U
Aroclor-1254	UG/KG	1600	5%	10000	0	4	76	38	U	36	U	36	U	38	U	37	U	36	U
Aroclor-1260	UG/KG	0	0%	10000	0	0	76	38	U	36	U	36	U	38	U	37	U	36	U
Beta-BHC	UG/KG	1.4	1%	200	0	1	76	1.9	U	1.8	U	1.8	U	2	U	1.9	U	1.9	U
Delta-BHC	UG/KG	5.9	1%	300	0	1	76	1.9	U	1.8	U	1.8	U	2	U	1.9	U	1.9	U
Dieldrin	UG/KG	0	0%	44	0	0	76	3.8	U	3.6	U	3.6	U	3.8	U	3.7	U	3.6	U
Endosulfan I	UG/KG	11	1%	900	0	1	76	1.9	U	1.8	U	1.8	U	2	U	1.9	U	1.9	U
Endosulfan II	UG/KG	0	0%	900	0	0	76	3.8	U	3.6	U	3.6	U	3.8	U	3.7	U	3.6	U
Endosulfan sulfate	UG/KG	0	0%	1000	0	0	76	3.8	U	3.6	U	3.6	U	3.8	U	3.7	U	3.6	U
Endrin	UG/KG	34	1%	100	0	1	76	3.8	U	3.6	U	3.6	U	3.8	U	3.7	U	3.6	U
Endrin aldehyde	UG/KG	3.7	1%		0	1	76	3.8	U	3.6	U	3.6	U	3.8	U	3.7	U	3.6	U
Endrin ketone	UG/KG	0	0%		0	0	76	3.8	U	3.6	U	3.6	U	3.8	U	3.7	U	3.6	U
Gamma-BHC/Lindane	UG/KG	0	0%	60	0	0	76	1.9	U	1.8	U	1.8	U	2	U	1.9	U	1.9	U
Gamma-Chlordane	UG/KG	0	0%	540	0	0	76	1.9	U	1.8	U	1.8	U	2	U	1.9	U	1.9	U
Heptachlor	UG/KG	0	0%	100	0	0	76	1.9	U	1.8	U	1.8	U	2	U	1.9	U	1.9	U
Heptachlor epoxide	UG/KG	0	0%	20	0	0	76	1.9	U	1.8	U	1.8	U	2	U	1.9	U	1.9	U
Methoxychlor	UG/KG	0	0%		0	0	76	19	U	18	U	18	U	20	U	19	U	19	U
Toxaphene	UG/KG	0	0%		0	0	76	190	U	180	U	180	U	200	U	190	U	190	U
Herbicides																			
2,4,5-T	UG/KG	0	0%	1900	0	0	39												
2,4,5-TP/Silvex	UG/KG	0	0%	700	0	0	39												
2,4-D	UG/KG	0	0%	500	0	0	39												
2,4-DB	UG/KG	0	0%		0	0	39												
Dalapon	UG/KG	0	0%		0	0	39												

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								RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
								SB4-15		SB4-16		SB4-17		SB4-18		SB4-18		SB4-19	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								4		2		2		2		4		2	
								6		3		3.2		3.5		5.8		3.2	
			FREQUENCY		NUMBER	NUMBER	NUMBER	12/17/1998		12/21/1998		12/16/1998		12/15/1998		12/15/1998		12/15/1998	
			OF		ABOVE	OF	OF	**43148**		**43124**		**43121**		**43081**		**43082**		**43084**	
	UNIT	MAXIMUM	DETECTION	TAGM	TAGM	DETECTS	ANALYSES	SA		SA		SA		SA		SA		SA	
								N		N		N		N		N		N	
Dicamba	UG/KG	23	3%		0	1	39												
Dichloroprop	UG/KG	0	0%		0	0	39												
Dinoseb	UG/KG	0	0%		0	0	39												
MCPA	UG/KG	0	0%		0	0	39												
MCPP	UG/KG	0	0%		0	0	39												
Metals																			
Aluminum	MG/KG	21000	100%	19520 *	3	76	76	11400		11600		15300		11900		12800		12600	
Antimony	MG/KG	57.8	28%	6 *	10	21	76	0.67	R	0.72	R	0.55	UJ	0.49	UJ	0.58	UJ	0.65	UJ
Arsenic	MG/KG	21.5	100%	8.9 *	4	76	76	4.1		4		7.3		6.2		6.9		4.6	
Barium	MG/KG	133	100%	300	0	76	76	39.6		55		54.1		101		65.9		103	
Beryllium	MG/KG	1	99%	1.13 *	0	75	76	0.61	J	0.45	J	0.66	J	0.48	J	0.58	J	0.6	J
Cadmium	MG/KG	1.5	4%	2.46 *	0	3	76	0.09	U	0.09	U	0.04	U	0.03	U	0.04	U	0.04	U
Calcium	MG/KG	102000	100%	125300 *	0	76	76	1720		61900		22300		12200		66400		74200	
Chromium	MG/KG	3820	80%	30 *	17	61	76	20		20.5		27.5		20		24.6		21.1	
Cobalt	MG/KG	29.1	100%	30	0	76	76	11.7		11.7		16.9		14.8		12.4		10.3	J
Copper	MG/KG	2250	100%	33 *	14	76	76	12.6		23.2		27		26.1		17.1		23.7	
Cyanide	MG/KG	0	0%	0.35	0	0	76	0.58	U	0.59	U	0.58	U	0.67	U	0.64	U	0.6	U
Iron	MG/KG	40900	100%	37410 *	8	76	76	23900		26100		35200		28400		30100		24600	
Lead	MG/KG	251	100%	24.4 *	6	76	76	4.7		12.9	J	18.1		14		10.1		14.2	
Magnesium	MG/KG	32000	100%	21700 *	3	76	76	5040		11600		7200		6420		6660		8430	
Manganese	MG/KG	2100	78%	1100 *	5	59	76	241	J	450		432	J	910		527		438	
Mercury	MG/KG	0.12	45%	0.1	1	34	76	0.05	UJ	0.05	U	0.05	UJ	0.05	UJ	0.06	UJ	0.05	UJ
Nickel	MG/KG	62.3	100%	50 *	8	76	76	36		31.6		47.2		36.2		41.4		32.3	
Potassium	MG/KG	2490	100%	2623 *	0	76	76	1050		1270		1490		712	J	1290		1220	
Selenium	MG/KG	0.86	33%	2	0	25	76	0.62	U	0.66	U	0.35	U	0.31	U	0.38	U	0.42	U
Silver	MG/KG	1.2	6%	0.8 *	4	6	76	0.17	U	0.18	U	0.18	U	0.16	U	0.19	U	0.21	U
Sodium	MG/KG	134	61%	188 *	0	46	76	58.4	U	50.5	J	81.7	J	41.2	U	84	J	56.9	J
Thallium	MG/KG	0	0%	0.855 *	0	0	76	0.53	U	0.57	U	0.64	UJ	5.7	U	6.8	U	7.5	U
Vanadium	MG/KG	31	100%	150	0	76	76	15.4		17.9		22.1		23		20.8		21.2	
Zinc	MG/KG	1010	100%	115 *	12	76	76	68.5		71.7	J	113		65.2		99.7		69.8	
Nitrate/Nitrite	MG/KG	2.7	100%			37	37	0.41	J	0.16	J	0.26		0.36	J	0.41	J	0.2	J

* Soil criteria for these inorganics are site background values.

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								RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
								SB4-19		SB4-20		SB4-20		SB4-21		SB4-21		SB4-22	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								4		2		6		2		8		4	
								5.2		3.5		6.8		3.4		8.7		5.7	
								12/15/1998		12/18/1998		12/18/1998		12/18/1998		12/18/1998		12/22/1998	
								43085		43136		43149		43137		43138		43139	
	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SA		SA		SA		SA		SA		SA	
								N		N		N		N		N		N	
Volatiles																			
1,1,1-Trichloroethane	UG/KG	0	0%	800	0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	600	0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
1,1,2-Trichloroethane	UG/KG	0	0%		0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
1,1-Dichloroethane	UG/KG	0	0%	200	0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
1,1-Dichloroethene	UG/KG	0	0%	400	0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
1,2-Dichloroethane	UG/KG	0	0%	100	0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
1,2-Dichloroethene (total)	UG/KG	0	0%		0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
1,2-Dichloropropane	UG/KG	0	0%		0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
Acetone	UG/KG	31	9%	200	0	7	76	11	U	12	UJ	24	U	11	UJ	11	UJ	12	U
Benzene	UG/KG	0	0%	60	0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
Bromodichloromethane	UG/KG	0	0%		0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
Bromoform	UG/KG	0	0%		0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
Carbon disulfide	UG/KG	0	0%	2700	0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
Carbon tetrachloride	UG/KG	0	0%	600	0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
Chlorobenzene	UG/KG	0	0%	1700	0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
Chlorodibromomethane	UG/KG	0	0%		0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
Chloroethane	UG/KG	0	0%	1900	0	0	76	11	UJ	12	U	11	U	11	U	11	U	12	U
Chloroform	UG/KG	15	8%	300	0	6	76	11	U	12	U	11	U	11	U	11	U	12	U
Cis-1,3-Dichloropropene	UG/KG	0	0%		0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
Ethyl benzene	UG/KG	1	1%	5500	0	1	76	11	U	12	U	11	U	11	U	11	U	12	U
Methyl bromide	UG/KG	0	0%		0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
Methyl butyl ketone	UG/KG	0	0%		0	0	76	11	U	12	UJ	11	U	11	UJ	11	UJ	12	U
Methyl chloride	UG/KG	0	0%		0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
Methyl ethyl ketone	UG/KG	0	0%	300	0	0	76	11	UJ	12	UJ	11	U	11	U	11	UJ	12	U
Methyl isobutyl ketone	UG/KG	0	0%	1000	0	0	76	11	U	12	U	11	U	11	UJ	11	U	12	U
Methylene chloride	UG/KG	2	3%	100	0	2	76	11	U	12	U	11	U	11	U	11	U	12	U
Styrene	UG/KG	0	0%		0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
Tetrachloroethene	UG/KG	0	0%	1400	0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
Toluene	UG/KG	13	28%	1500	0	21	76	11	U	1	J	3	J	3	J	2	J	12	U
Total Xylenes	UG/KG	8	4%	1200	0	3	76	11	U	12	U	11	U	11	U	11	U	12	U
Trans-1,3-Dichloropropene	UG/KG	0	0%		0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
Trichloroethene	UG/KG	0	0%	700	0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
Vinyl chloride	UG/KG	0	0%	200	0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
Semivolatile Organics																			
1,2,4-Trichlorobenzene	UG/KG	0	0%	3400	0	0	76	73	U	72	U	72	U	74	U	71	U	72	UJ
1,2-Dichlorobenzene	UG/KG	0	0%	7900	0	0	76	73	U	72	U	72	U	74	U	71	U	72	UJ
1,3-Dichlorobenzene	UG/KG	0	0%	1600	0	0	76	73	U	72	U	72	U	74	U	71	U	72	UJ
1,4-Dichlorobenzene	UG/KG	0	0%	8500	0	0	76	73	U	72	U	72	U	74	U	71	U	72	UJ
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%		0	0	39												
2,4,5-Trichlorophenol	UG/KG	0	0%	100	0	0	76	180	U	170	U	170	U	180	U	170	U	170	UJ
2,4,6-Trichlorophenol	UG/KG	0	0%		0	0	76	73	U	72	U	72	U	74	U	71	U	72	UJ
2,4-Dichlorophenol	UG/KG	0	0%	400	0	0	76	73	U	72	U	72	U	74	U	71	U	72	UJ
2,4-Dimethylphenol	UG/KG	0	0%		0	0	76	73	UJ	72	UJ	72	UJ	74	UJ	71	UJ	72	UJ
2,4-Dinitrophenol	UG/KG	0	0%	200	0	0	76	180	R	170	UJ	170	U	180	UJ	170	UJ	170	R
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	76	73	U	72	U	72	U	74	U	71	U	72	UJ
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	76	73	U	72	U	72	U	74	U	71	U	72	UJ
2-Chloronaphthalene	UG/KG	0	0%		0	0	76	73	U	72	U	72	U	74	U	71	U	72	UJ
2-Chlorophenol	UG/KG	0	0%	800	0	0	76	73	U	72	U	72	U	74	U	71	U	72	UJ
2-Methylnaphthalene	UG/KG	260	4%	36400	0	3	76	73	U	72	U	72	U	74	U	71	U	72	UJ

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Subsurface Soil Sample Results
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	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
								SB4-19		SB4-20		SB4-20		SB4-21		SB4-21		SB4-22	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								4		2		6		2		8		4	
								5.2		3.5		6.8		3.4		8.7		5.7	
								12/15/1998		12/18/1998		12/18/1998		12/18/1998		12/18/1998		12/22/1998	
								43085		**43136**		**43149**		**43137**		**43138**		**43139**	
								SA		SA		SA		SA		SA		SA	
								N		N		N		N		N		N	
2-Methylphenol	UG/KG	0	0%	100	0	0	76	73	U	72	U	72	U	74	U	71	U	72	UJ
2-Nitroaniline	UG/KG	0	0%	430	0	0	76	180	U	170	U	170	U	180	U	170	U	170	UJ
2-Nitrophenol	UG/KG	0	0%	330	0	0	76	73	U	72	U	72	U	74	U	71	U	72	UJ
3,3'-Dichlorobenzidine	UG/KG	0	0%		0	0	76	73	U	72	UJ	72	U	74	UJ	71	UJ	72	UJ
3-Nitroaniline	UG/KG	0	0%	500	0	0	76	180	U	170	UJ	170	U	180	UJ	170	UJ	170	UJ
4,6-Dinitro-2-methylphenol	UG/KG	0	0%		0	0	76	180	UJ	170	UJ	170	U	180	UJ	170	UJ	170	UJ
4-Bromophenyl phenyl ether	UG/KG	0	0%		0	0	76	73	U	72	U	72	U	74	U	71	U	72	UJ
4-Chloro-3-methylphenol	UG/KG	0	0%	240	0	0	76	73	U	72	U	72	U	74	U	71	U	72	UJ
4-Chloroaniline	UG/KG	0	0%	220	0	0	76	73	U	72	U	72	U	74	U	71	U	72	UJ
4-Chlorophenyl phenyl ether	UG/KG	0	0%		0	0	76	73	U	72	U	72	U	74	U	71	U	72	UJ
4-Methylphenol	UG/KG	0	0%	900	0	0	76	73	U	72	U	72	U	74	U	71	U	72	UJ
4-Nitroaniline	UG/KG	0	0%		0	0	76	180	U	170	U	170	U	180	U	170	U	170	UJ
4-Nitrophenol	UG/KG	0	0%	100	0	0	76	180	U	170	U	170	U	180	U	170	U	170	UJ
Acenaphthene	UG/KG	88	3%	50000	0	2	76	73	U	72	U	72	U	74	U	71	U	72	UJ
Acenaphthylene	UG/KG	170	4%	41000	0	3	76	73	U	72	U	72	U	74	U	71	U	72	UJ
Anthracene	UG/KG	340	4%	50000	0	3	76	73	U	72	U	72	U	74	U	71	U	72	UJ
Benzo(a)anthracene	UG/KG	1100	7%	224	2	5	76	73	U	72	U	72	U	74	U	71	U	72	UJ
Benzo(a)pyrene	UG/KG	880	8%	61	2	6	76	73	U	72	U	72	U	74	U	71	U	72	UJ
Benzo(b)fluoranthene	UG/KG	730	9%	1100	0	7	76	73	U	72	U	72	U	74	U	71	U	72	UJ
Benzo(ghi)perylene	UG/KG	270	3%	50000	0	2	76	73	U	72	UJ	72	U	74	UJ	71	UJ	72	UJ
Benzo(k)fluoranthene	UG/KG	890	5%	1100	0	4	76	73	U	72	U	72	U	74	U	71	U	72	UJ
Bis(2-Chloroethoxy)methane	UG/KG	0	0%		0	0	76	73	U	72	U	72	U	74	U	71	U	72	UJ
Bis(2-Chloroethyl)ether	UG/KG	0	0%		0	0	76	73	U	72	U	72	U	74	U	71	U	72	UJ
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%		0	0	37	73	U	72	U	72	U	74	U	71	U	72	UJ
Bis(2-Ethylhexyl)phthalate	UG/KG	2000	11%	50000	0	8	76	73	U	72	U	17	J	74	U	71	U	72	UJ
Butylbenzylphthalate	UG/KG	120	1%	50000	0	1	76	73	U	72	U	72	U	74	U	71	U	72	UJ
Carbazole	UG/KG	160	1%		0	1	76	73	U	72	U	72	U	74	U	71	U	72	UJ
Chrysene	UG/KG	1000	11%	400	2	8	76	73	U	72	U	72	U	74	U	71	U	72	UJ
Di-n-butylphthalate	UG/KG	63	24%	8100	0	16	76	73	U	72	U	72	U	74	U	71	U	72	UJ
Di-n-octylphthalate	UG/KG	37	21%	50000	0	16	76	73	U	72	U	6.5	J	16	J	19	J	72	UJ
Dibenz(a,h)anthracene	UG/KG	48	1%	14	1	1	76	73	U	72	U	72	U	74	U	71	U	72	UJ
Dibenzofuran	UG/KG	33	1%	6200	0	1	76	73	U	72	U	72	U	74	U	71	U	72	UJ
Diethyl phthalate	UG/KG	0	0%	7100	0	0	76	73	U	72	U	72	U	74	U	71	U	72	UJ
Dimethylphthalate	UG/KG	0	0%	2000	0	0	76	73	U	72	U	72	U	74	U	71	U	72	UJ
Fluoranthene	UG/KG	2400	11%	50000	0	8	76	73	U	72	U	72	U	74	U	71	U	72	UJ
Fluorene	UG/KG	330	4%	50000	0	3	76	73	U	72	U	72	U	74	U	71	U	72	UJ
Hexachlorobenzene	UG/KG	0	0%	410	0	0	76	73	U	72	U	72	U	74	U	71	U	72	UJ
Hexachlorobutadiene	UG/KG	0	0%		0	0	76	73	U	72	U	72	U	74	U	71	U	72	UJ
Hexachlorocyclopentadiene	UG/KG	0	0%		0	0	76	73	UJ	72	UJ	72	UJ	74	UJ	71	UJ	72	UJ
Hexachloroethane	UG/KG	0	0%		0	0	76	73	U	72	U	72	U	74	U	71	U	72	UJ
Indeno(1,2,3-cd)pyrene	UG/KG	260	3%	3200	0	2	76	73	U	72	U	72	U	74	U	71	U	72	UJ
Isophorone	UG/KG	0	0%	4400	0	0	76	73	U	72	U	72	U	74	U	71	U	72	UJ
N-Nitrosodiphenylamine	UG/KG	0	0%		0	0	76	73	U	72	U	72	U	74	U	71	U	72	UJ
N-Nitrosodipropylamine	UG/KG	0	0%		0	0	76	73	U	72	U	72	U	74	U	71	U	72	UJ
Naphthalene	UG/KG	130	3%	13000	0	2	76	73	U	72	U	72	U	74	U	71	U	72	UJ
Nitrobenzene	UG/KG	0	0%	200	0	0	76	73	U	72	U	72	U	74	U	71	U	72	UJ
Pentachlorophenol	UG/KG	0	0%	1000	0	0	76	180	U	170	U	170	U	180	U	170	U	170	UJ
Phenanthrene	UG/KG	1400	8%	50000	0	6	76	73	U	72	U	72	U	74	U	71	U	72	UJ
Phenol	UG/KG	0	0%	30	0	0	76	73	U	72	U	72	U	74	U	71	U	72	UJ
Pyrene	UG/KG	1800	9%	50000	0	7	76	73	U	72	U	72	U	74	U	71	U	72	UJ

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	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
								SB4-19		SB4-20		SB4-20		SB4-21		SB4-21		SB4-22	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								4		2		6		2		8		4	
								5.2		3.5		6.8		3.4		8.7		5.7	
								12/15/1998		12/18/1998		12/18/1998		12/18/1998		12/18/1998		12/22/1998	
								43085		**43136**		**43149**		**43137**		**43138**		**43139**	
								SA		SA		SA		SA		SA		SA	
								N		N		N		N		N		N	
Nitroaromatics																			
1,3-Dinitrobenzene	UG/KG	0	0%		0	0	76	120	U	120	UJ	120	U	120	U	120	U	120	U
2,4,6-Trinitrotoluene	UG/KG	0	0%		0	0	76	120	U	120	UJ	120	U	120	U	120	U	120	U
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	76	120	U	120	UJ	120	U	120	U	120	U	120	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	76	120	U	120	UJ	120	U	120	U	120	U	120	U
2-Nitrotoluene	UG/KG	0	0%		0	0	37	120	U	120	UJ	120	U	120	U	120	U	120	U
2-amino-4,6-Dinitrotoluene	UG/KG	0	0%		0	0	76	120	U	120	UJ	120	U	120	U	120	U	120	U
3-Nitrotoluene	UG/KG	0	0%		0	0	37	120	U	120	UJ	120	U	120	U	120	U	120	U
4-Nitrotoluene	UG/KG	0	0%		0	0	37	120	U	120	UJ	120	U	120	U	120	U	120	U
4-amino-2,6-Dinitrotoluene	UG/KG	0	0%		0	0	76	120	U	120	UJ	120	U	120	U	120	U	120	U
HMX	UG/KG	0	0%		0	0	76	120	U	120	UJ	120	U	120	U	120	U	120	U
Nitrobenzene	UG/KG	0	0%	200	0	0	37	120	U	120	UJ	120	U	120	U	120	U	120	U
RDX	UG/KG	0	0%		0	0	76	120	U	120	UJ	120	U	120	U	120	U	120	U
Tetryl	UG/KG	67	1%		0	1	76	120	U	120	UJ	120	U	120	U	120	U	120	U
Pesticides/PCBs																			
4,4'-DDD	UG/KG	0	0%	2900	0	0	76	3.7	U	3.6	U	3.6	U	3.7	U	3.5	U	3.6	U
4,4'-DDE	UG/KG	21	4%	2100	0	3	76	3.7	U	3.6	U	3.6	U	3.7	U	3.5	U	3.6	U
4,4'-DDT	UG/KG	2.9	1%	2100	0	1	76	3.7	U	3.6	U	3.6	U	3.7	U	3.5	U	3.6	U
Aldrin	UG/KG	8.2	1%	41	0	1	76	1.9	U	1.8	U	1.8	U	1.9	U	1.8	U	1.8	U
Alpha-BHC	UG/KG	0	0%	110	0	0	76	1.9	U	1.8	U	1.8	U	1.9	U	1.8	U	1.8	U
Alpha-Chlordane	UG/KG	10	1%		0	1	76	1.9	U	1.8	U	1.8	U	1.9	U	1.8	U	1.8	U
Aroclor-1016	UG/KG	0	0%		0	0	76	37	U	36	U	36	U	37	U	35	U	36	U
Aroclor-1221	UG/KG	0	0%		0	0	76	74	U	73	U	73	U	75	U	72	U	73	U
Aroclor-1232	UG/KG	0	0%		0	0	76	37	U	36	U	36	U	37	U	35	U	36	U
Aroclor-1242	UG/KG	0	0%		0	0	76	37	U	36	U	36	U	37	U	35	U	36	U
Aroclor-1248	UG/KG	27	1%		0	1	76	37	U	36	U	36	U	37	U	35	U	36	U
Aroclor-1254	UG/KG	1600	5%	10000	0	4	76	37	U	36	U	36	U	37	U	35	U	36	U
Aroclor-1260	UG/KG	0	0%	10000	0	0	76	37	U	36	U	36	U	37	U	35	U	36	U
Beta-BHC	UG/KG	1.4	1%	200	0	1	76	1.9	U	1.8	U	1.8	U	1.9	U	1.8	U	1.8	U
Delta-BHC	UG/KG	5.9	1%	300	0	1	76	1.9	U	1.8	U	1.8	U	1.9	U	1.8	U	1.8	U
Dieldrin	UG/KG	0	0%	44	0	0	76	3.7	U	3.6	U	3.6	U	3.7	U	3.5	U	3.6	U
Endosulfan I	UG/KG	11	1%	900	0	1	76	1.9	U	1.8	U	1.8	U	1.9	U	1.8	U	1.8	U
Endosulfan II	UG/KG	0	0%	900	0	0	76	3.7	U	3.6	U	3.6	U	3.7	U	3.5	U	3.6	U
Endosulfan sulfate	UG/KG	0	0%	1000	0	0	76	3.7	U	3.6	U	3.6	U	3.7	U	3.5	U	3.6	U
Endrin	UG/KG	34	1%	100	0	1	76	3.7	U	3.6	U	3.6	U	3.7	U	3.5	U	3.6	U
Endrin aldehyde	UG/KG	3.7	1%		0	1	76	3.7	U	3.6	U	3.6	U	3.7	U	3.5	U	3.6	U
Endrin ketone	UG/KG	0	0%		0	0	76	3.7	U	3.6	U	3.6	U	3.7	U	3.5	U	3.6	U
Gamma-BHC/Lindane	UG/KG	0	0%	60	0	0	76	1.9	U	1.8	U	1.8	U	1.9	U	1.8	U	1.8	U
Gamma-Chlordane	UG/KG	0	0%	540	0	0	76	1.9	U	1.8	U	1.8	U	1.9	U	1.8	U	1.8	U
Heptachlor	UG/KG	0	0%	100	0	0	76	1.9	U	1.8	U	1.8	U	1.9	U	1.8	U	1.8	U
Heptachlor epoxide	UG/KG	0	0%	20	0	0	76	1.9	U	1.8	U	1.8	U	1.9	U	1.8	U	1.8	U
Methoxychlor	UG/KG	0	0%		0	0	76	19	U	18	U	18	U	19	U	18	U	18	U
Toxaphene	UG/KG	0	0%		0	0	76	190	U	180	U	180	U	190	U	180	U	180	U
Herbicides																			
2,4,5-T	UG/KG	0	0%	1900	0	0	39												
2,4,5-TP/Silvex	UG/KG	0	0%	700	0	0	39												
2,4-D	UG/KG	0	0%	500	0	0	39												
2,4-DB	UG/KG	0	0%		0	0	39												
Dalapon	UG/KG	0	0%		0	0	39												

	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
								SB4-19		SB4-20		SB4-20		SB4-21		SB4-21		SB4-22	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								4		2		6		2		8		4	
								5.2		3.5		6.8		3.4		8.7		5.7	
								12/15/1998		12/18/1998		12/18/1998		12/18/1998		12/18/1998		12/22/1998	
								43085		**43136**		**43149**		**43137**		**43138**		**43139**	
								SA		SA		SA		SA		SA		SA	
								N		N		N		N		N		N	
Dicamba	UG/KG	23	3%		0	1	39												
Dichloroprop	UG/KG	0	0%		0	0	39												
Dinoseb	UG/KG	0	0%		0	0	39												
MCPA	UG/KG	0	0%		0	0	39												
MCPP	UG/KG	0	0%		0	0	39												
Metals																			
Aluminum	MG/KG	21000	100%	19520 *	3	76	76	11400		12500		12000		9450		7670		9230	
Antimony	MG/KG	57.8	28%	6 *	10	21	76	0.65	UJ	0.55	UJ	0.73	R	0.57	UJ	0.64	UJ	0.68	UJ
Arsenic	MG/KG	21.5	100%	8.9 *	4	76	76	7.2		4.9		5.2		3.9		4.9		4.1	
Barium	MG/KG	133	100%	300	0	76	76	117		55.1		43.9		51.9		46.7		63.3	
Beryllium	MG/KG	1	99%	1.13 *	0	75	76	0.51	J	0.39	J	0.56	J	0.35	J	0.24	J	0.26	J
Cadmium	MG/KG	1.5	4%	2.46 *	0	3	76	0.04	U	0.04	U	0.09	U	0.04	U	0.04	U	0.04	U
Calcium	MG/KG	102000	100%	125300 *	0	76	76	90100		3570		36500		62200		58900		53200	
Chromium	MG/KG	3820	80%	30 *	17	61	76	21.4		74.9		32.3		18.6		14.4		20.9	J
Cobalt	MG/KG	29.1	100%	30	0	76	76	12		14.5		10.8		8.2	J	11.1		9.2	J
Copper	MG/KG	2250	100%	33 *	14	76	76	23.7		47.5		23.9		19.5		17.1		22.8	
Cyanide	MG/KG	0	0%	0.35	0	0	76	0.61	U	0.59	U	0.61	U	0.61	U	0.63	U	0.62	U
Iron	MG/KG	40900	100%	37410 *	6	76	76	27100		29100		26200		21300		20100		22700	
Lead	MG/KG	251	100%	24.4 *	6	76	76	10.9		8		6.5		7.9		10.3		48.4	
Magnesium	MG/KG	32000	100%	21700 *	3	76	76	11300		5350		7120		10500		12400		9190	
Manganese	MG/KG	2100	78%	1100 *	5	59	76	501		671	J	368	J	435	J	517	J	560	
Mercury	MG/KG	0.12	45%	0.1	1	34	76	0.05	UJ	0.05	UJ	0.05	UJ	0.06	UJ	0.05	UJ	0.05	U
Nickel	MG/KG	62.3	100%	50 *	8	76	76	36.6		36.9		29.6		25.9		26.4		24.7	
Potassium	MG/KG	2490	100%	2623 *	0	76	76	1330		1150		1230		1480		1130		1090	
Selenium	MG/KG	0.86	33%	2	0	25	76	0.42	U	0.36	U	0.68	U	0.37	U	0.41	U	0.79	UJ
Silver	MG/KG	1.2	8%	0.8 *	4	6	76	0.21	U	0.18	U	0.19	U	0.19	U	0.21	U	0.22	U
Sodium	MG/KG	134	61%	188 *	0	46	76	55.3	U	46.6	U	63.7	U	48.5	U	87.5	J	101	J
Thallium	MG/KG	0	0%	0.855 *	0	0	76	7.6	U	6.4	UJ	0.58	U	0.67	UJ	7.4	UJ	7.9	R
Vanadium	MG/KG	31	100%	150	0	76	76	20.2		18.9		16.5		17.4		13.4		16.3	
Zinc	MG/KG	1010	100%	115 *	12	76	76	106		71.2		74		65.1		76.4		68.1	J
Nitrate/Nitrite	MG/KG	2.7	100%			37	37	0.2	J	0.11		0.14	J	0.28		2.56		0.11	J

* Soil criteria for these inorganics are site background values.

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	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
								SB4-22		SB4-23		SB4-23		SB4-24		SB4-24		SB4-24	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								6		2		4		3		3		8	
								7.6		3		5.6		4		4		8.6	
								12/22/1998		12/15/1998		12/16/1998		12/22/1998		12/22/1998		12/22/1998	
								43140		43087		43088		43173		43141		43142	
								SA		SA		SA		DU		SA		SA	
								N		N		N		N		N		N	
Volatiles																			
1,1,1-Trichloroethane	UG/KG	0	0%	800	0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	600	0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
1,1,2-Trichloroethane	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
1,1-Dichloroethane	UG/KG	0	0%	200	0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
1,1-Dichloroethene	UG/KG	0	0%	400	0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
1,2-Dichloroethane	UG/KG	0	0%	100	0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
1,2-Dichloroethene (total)	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
1,2-Dichloropropane	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
Acetone	UG/KG	31	9%	200	0	7	76	11	U	11	U	11	U	11	U	11	U	14	U
Benzene	UG/KG	0	0%	60	0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
Bromodichloromethane	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
Bromoform	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
Carbon disulfide	UG/KG	0	0%	2700	0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
Carbon tetrachloride	UG/KG	0	0%	600	0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
Chlorobenzene	UG/KG	0	0%	1700	0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
Chlorodibromomethane	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
Chloroethane	UG/KG	0	0%	1900	0	0	76	11	U	11	UJ	11	UJ	11	U	11	U	11	U
Chloroform	UG/KG	15	8%	300	0	6	76	11	U	11	U	11	U	11	U	11	U	11	U
Cis-1,3-Dichloropropene	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
Ethyl benzene	UG/KG	1	1%	5500	0	1	76	11	U	11	U	11	U	11	U	11	U	11	U
Methyl bromide	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
Methyl butyl ketone	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
Methyl chloride	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
Methyl ethyl ketone	UG/KG	0	0%	300	0	0	76	11	U	11	UJ	11	UJ	11	U	11	U	11	U
Methyl isobutyl ketone	UG/KG	0	0%	1000	0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
Methylene chloride	UG/KG	2	3%	100	0	2	76	11	U	11	U	11	U	11	U	11	U	11	U
Styrene	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
Tetrachloroethene	UG/KG	0	0%	1400	0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
Toluene	UG/KG	13	26%	1500	0	21	76	1	J	11	U	11	U	3	J	11	U	4	J
Total Xylenes	UG/KG	6	4%	1200	0	3	76	11	U	11	U	11	U	11	U	11	U	2	J
Trans-1,3-Dichloropropene	UG/KG	0	0%		0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
Trichloroethene	UG/KG	0	0%	700	0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
Vinyl chloride	UG/KG	0	0%	200	0	0	76	11	U	11	U	11	U	11	U	11	U	11	U
Semivolatile Organics																			
1,2,4-Trichlorobenzene	UG/KG	0	0%	3400	0	0	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
1,2-Dichlorobenzene	UG/KG	0	0%	7900	0	0	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
1,3-Dichlorobenzene	UG/KG	0	0%	1600	0	0	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
1,4-Dichlorobenzene	UG/KG	0	0%	8500	0	0	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%		0	0	39												
2,4,5-Trichlorophenol	UG/KG	0	0%	100	0	0	76	170	UJ	170	U	180	U	190	UJ	180	UJ	170	UJ
2,4,6-Trichlorophenol	UG/KG	0	0%		0	0	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
2,4-Dichlorophenol	UG/KG	0	0%	400	0	0	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
2,4-Dimethylphenol	UG/KG	0	0%		0	0	76	71	UJ	71	UJ	73	UJ	77	UJ	75	UJ	70	UJ
2,4-Dinitrophenol	UG/KG	0	0%	200	0	0	76	170	R	170	R	180	R	190	R	180	R	170	R
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
2-Chloronaphthalene	UG/KG	0	0%		0	0	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
2-Chlorophenol	UG/KG	0	0%	800	0	0	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
2-Methylnaphthalene	UG/KG	260	4%	36400	0	3	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ

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								RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
								SB4-22		SB4-23		SB4-23		SB4-24		SB4-24		SB4-24	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								6		2		4		3		3		6	
								7.6		3		5.6		4		4		6.6	
								12/22/1998		12/15/1998		12/16/1998		12/22/1998		12/22/1998		12/22/1998	
								43140		43087		43088		43173		43141		43142	
	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SA		SA		SA		DU		SA		SA	
								N		N		N		N		N		N	
2-Methylphenol	UG/KG	0	0%	100	0	0	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
2-Nitroaniline	UG/KG	0	0%	430	0	0	76	170	UJ	170	U	180	U	190	UJ	180	UJ	170	UJ
2-Nitrophenol	UG/KG	0	0%	330	0	0	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
3,3'-Dichlorobenzidine	UG/KG	0	0%		0	0	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
3-Nitroaniline	UG/KG	0	0%	500	0	0	76	170	UJ	170	U	180	U	190	UJ	180	UJ	170	UJ
4,6-Dinitro-2-methylphenol	UG/KG	0	0%		0	0	76	170	UJ	170	UJ	180	UJ	190	UJ	180	UJ	170	UJ
4-Bromophenyl phenyl ether	UG/KG	0	0%		0	0	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
4-Chloro-3-methylphenol	UG/KG	0	0%	240	0	0	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
4-Chloroaniline	UG/KG	0	0%	220	0	0	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
4-Chlorophenyl phenyl ether	UG/KG	0	0%		0	0	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
4-Methylphenol	UG/KG	0	0%	900	0	0	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
4-Nitroaniline	UG/KG	0	0%		0	0	76	170	UJ	170	U	180	U	190	UJ	180	UJ	170	UJ
4-Nitrophenol	UG/KG	0	0%	100	0	0	76	170	UJ	170	U	180	U	190	UJ	180	UJ	170	UJ
Acenaphthene	UG/KG	88	3%	50000	0	2	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
Acenaphthylene	UG/KG	170	4%	41000	0	3	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
Anthracene	UG/KG	340	4%	50000	0	3	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
Benzo(a)anthracene	UG/KG	1100	7%	224	2	5	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
Benzo(a)pyrene	UG/KG	880	8%	61	2	6	76	71	UJ	71	U	73	U	77	UJ	6.4	J	70	UJ
Benzo(b)fluoranthene	UG/KG	730	9%	1100	0	7	76	71	UJ	71	U	73	U	77	UJ	15	J	70	UJ
Benzo(ghi)perylene	UG/KG	270	3%	50000	0	2	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
Benzo(k)fluoranthene	UG/KG	890	5%	1100	0	4	76	71	UJ	71	U	73	U	77	UJ	75	R	70	UJ
Bis(2-Chloroethoxy)methane	UG/KG	0	0%		0	0	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
Bis(2-Chloroethyl)ether	UG/KG	0	0%		0	0	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%		0	0	37	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
Bis(2-Ethylhexyl)phthalate	UG/KG	2000	11%	50000	0	8	76	71	UJ	200	U	73	U	77	UJ	75	UJ	70	UJ
Butylbenzylphthalate	UG/KG	120	1%	50000	0	1	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
Carbazole	UG/KG	160	1%		0	1	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
Chrysene	UG/KG	1000	11%	400	2	8	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
Di-n-butylphthalate	UG/KG	63	24%	8100	0	18	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
Di-n-octylphthalate	UG/KG	37	21%	50000	0	16	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
Dibenz(a,h)anthracene	UG/KG	48	1%	14	1	1	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
Dibenzofuran	UG/KG	33	1%	6200	0	1	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
Diethyl phthalate	UG/KG	0	0%	7100	0	0	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
Dimethylphthalate	UG/KG	0	0%	2000	0	0	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
Fluoranthene	UG/KG	2400	11%	50000	0	8	76	71	UJ	71	U	73	U	77	UJ	12	J	70	UJ
Fluorene	UG/KG	330	4%	50000	0	3	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
Hexachlorobenzene	UG/KG	0	0%	410	0	0	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
Hexachlorobutadiene	UG/KG	0	0%		0	0	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
Hexachlorocyclopentadiene	UG/KG	0	0%		0	0	76	71	UJ	71	UJ	73	UJ	77	UJ	75	UJ	70	UJ
Hexachloroethane	UG/KG	0	0%		0	0	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
Indeno(1,2,3-cd)pyrene	UG/KG	260	3%	3200	0	2	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
Isophorone	UG/KG	0	0%	4400	0	0	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
N-Nitrosodiphenylamine	UG/KG	0	0%		0	0	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
N-Nitrosodipropylamine	UG/KG	0	0%		0	0	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
Naphthalene	UG/KG	130	3%	13000	0	2	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
Nitrobenzene	UG/KG	0	0%	200	0	0	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
Pentachlorophenol	UG/KG	0	0%	1000	0	0	76	170	UJ	170	U	180	U	190	UJ	180	UJ	170	UJ
Phenanthrene	UG/KG	1400	8%	50000	0	6	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
Phenol	UG/KG	0	0%	30	0	0	76	71	UJ	71	U	73	U	77	UJ	75	UJ	70	UJ
Pyrene	UG/KG	1800	9%	50000	0	7	76	71	UJ	71	U	73	U	77	UJ	9.4	J	70	UJ

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								RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
								SB4-22		SB4-23		SB4-23		SB4-24		SB4-24		SB4-24	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								6		2		4		3		3		8	
								7.6		3		5.6		4		4		8.6	
								12/22/1998		12/15/1998		12/16/1998		12/22/1998		12/22/1998		12/22/1998	
								43140		**43087**		**43088**		**43173**		**43141**		**43142**	
	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SA		SA		SA		DU		SA		SA	
								N		N		N		N		N		N	
Nitroaromatics																			
1,3-Dinitrobenzene	UG/KG	0	0%		0	0	76	120	U	120	UJ	120	U	120	U	120	U	120	U
2,4,6-Trinitrotoluene	UG/KG	0	0%		0	0	76	120	U	120	UJ	120	U	120	U	120	U	120	U
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	76	120	U	120	UJ	120	U	120	U	120	U	120	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	76	120	U	120	UJ	120	U	120	U	120	U	120	U
2-Nitrotoluene	UG/KG	0	0%		0	0	37	120	U	120	UJ	120	U	120	U	120	U	120	U
2-amino-4,6-Dinitrotoluene	UG/KG	0	0%		0	0	76	120	U	120	UJ	120	U	120	U	120	U	120	U
3-Nitrotoluene	UG/KG	0	0%		0	0	37	120	U	120	UJ	120	U	120	U	120	U	120	U
4-Nitrotoluene	UG/KG	0	0%		0	0	37	120	U	120	UJ	120	U	120	U	120	U	120	U
4-amino-2,6-Dinitrotoluene	UG/KG	0	0%		0	0	76	120	U	120	UJ	120	U	120	U	120	U	120	U
HMX	UG/KG	0	0%		0	0	76	120	U	120	UJ	120	U	120	U	120	U	120	U
Nitrobenzene	UG/KG	0	0%	200	0	0	37	120	U	120	UJ	120	U	120	U	120	U	120	U
RDX	UG/KG	0	0%		0	0	76	120	U	120	UJ	120	U	120	U	120	U	120	U
Tetryl	UG/KG	67	1%		0	1	76	120	U	120	UJ	120	U	120	U	120	U	120	U
Pesticides/PCBs																			
4,4'-DDD	UG/KG	0	0%	2900	0	0	76	3.5	U	3.5	U	3.7	U	3.9	U	3.7	U	3.5	U
4,4'-DDE	UG/KG	21	4%	2100	0	3	76	3.5	U	3.5	U	3.7	U	3.9	U	3.7	U	3.5	U
4,4'-DDT	UG/KG	2.9	1%	2100	0	1	76	3.5	U	3.5	U	3.7	U	3.9	U	3.7	U	3.5	U
Aldrin	UG/KG	8.2	1%	41	0	1	76	1.8	U	1.8	U	1.9	U	2	U	1.9	U	1.8	U
Alpha-BHC	UG/KG	0	0%	110	0	0	76	1.8	U	1.8	U	1.9	U	2	U	1.9	U	1.8	U
Alpha-Chlordane	UG/KG	10	1%		0	1	76	1.8	U	1.8	U	1.9	U	2	U	1.9	U	1.8	U
Aroclor-1016	UG/KG	0	0%		0	0	76	35	U	35	U	37	U	39	U	37	U	35	U
Aroclor-1221	UG/KG	0	0%		0	0	76	72	U	72	U	74	U	78	U	76	U	71	U
Aroclor-1232	UG/KG	0	0%		0	0	76	35	U	35	U	37	U	39	U	37	U	35	U
Aroclor-1242	UG/KG	0	0%		0	0	76	35	U	35	U	37	U	39	U	37	U	35	U
Aroclor-1248	UG/KG	27	1%		0	1	76	35	U	35	U	37	U	39	U	37	U	35	U
Aroclor-1254	UG/KG	1600	5%	10000	0	4	76	35	U	35	U	37	U	39	U	37	U	35	U
Aroclor-1260	UG/KG	0	0%	10000	0	0	76	35	U	35	U	37	U	39	U	37	U	35	U
Beta-BHC	UG/KG	1.4	1%	200	0	1	76	1.8	U	1.8	U	1.9	U	2	U	1.9	U	1.8	U
Delta-BHC	UG/KG	5.9	1%	300	0	1	76	1.8	U	1.8	U	1.9	U	2	U	1.9	U	1.8	U
Dieldrin	UG/KG	0	0%	44	0	0	76	3.5	U	3.5	U	3.7	U	3.9	U	3.7	U	3.5	U
Endosulfan I	UG/KG	11	1%	900	0	1	76	1.8	U	1.8	U	1.9	U	2	U	1.9	U	1.8	U
Endosulfan II	UG/KG	0	0%	900	0	0	76	3.5	U	3.5	U	3.7	U	3.9	U	3.7	U	3.5	U
Endosulfan sulfate	UG/KG	0	0%	1000	0	0	76	3.5	U	3.5	U	3.7	U	3.9	U	3.7	U	3.5	U
Endrin	UG/KG	34	1%	100	0	1	76	3.5	U	3.5	U	3.7	U	3.9	U	3.7	U	3.5	U
Endrin aldehyde	UG/KG	3.7	1%		0	1	76	3.5	U	3.5	U	3.7	U	3.9	U	3.7	U	3.5	U
Endrin ketone	UG/KG	0	0%		0	0	76	3.5	U	3.5	U	3.7	U	3.9	U	3.7	U	3.5	U
Gamma-BHC/Lindane	UG/KG	0	0%	60	0	0	76	1.8	U	1.8	U	1.9	U	2	U	1.9	U	1.8	U
Gamma-Chlordane	UG/KG	0	0%	540	0	0	76	1.8	U	1.8	U	1.9	U	2	U	1.9	U	1.8	U
Heptachlor	UG/KG	0	0%	100	0	0	76	1.8	U	1.8	U	1.9	U	2	U	1.9	U	1.8	U
Heptachlor epoxide	UG/KG	0	0%	20	0	0	76	1.8	U	1.8	U	1.9	U	2	U	1.9	U	1.8	U
Methoxychlor	UG/KG	0	0%		0	0	76	18	U	18	U	19	U	20	U	19	U	18	U
Toxaphene	UG/KG	0	0%		0	0	76	180	U	180	U	190	U	200	U	190	U	180	U
Herbicides																			
2,4,5-T	UG/KG	0	0%	1900	0	0	39												
2,4,5-TP/Silvex	UG/KG	0	0%	700	0	0	39												
2,4-D	UG/KG	0	0%	500	0	0	39												
2,4-DB	UG/KG	0	0%		0	0	39												
Dalapon	UG/KG	0	0%		0	0	39												

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								RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
								SB4-22		SB4-23		SB4-23		SB4-24		SB4-24		SB4-24	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								6		2		4		3		3		8	
								7.6		3		5.6		4		4		8.6	
			FREQUENCY		NUMBER	NUMBER	NUMBER	12/22/1998		12/15/1998		12/16/1998		12/22/1998		12/22/1998		12/22/1998	
			OF		ABOVE	OF	OF	**43140**		**43087**		**43088**		**43173**		**43141**		**43142**	
	UNIT	MAXIMUM	DETECTION	TAGM	TAGM	DETECTS	ANALYSES	SA		SA		SA		DU		SA		SA	
								N		N		N		N		N		N	
Dicamba	UG/KG	23	3%		0	1	39												
Dichloroprop	UG/KG	0	0%		0	0	39												
Dinoseb	UG/KG	0	0%		0	0	39												
MCPA	UG/KG	0	0%		0	0	39												
MCPP	UG/KG	0	0%		0	0	39												
Metals																			
Aluminum	MG/KG	21000	100%	19520 *	3	76	76	8060		16900		17000		14400		15500		10700	
Antimony	MG/KG	57.8	28%	6 *	10	21	76	0.62	UJ	0.46	UJ	0.5	UJ	6.7	J	0.78	J	0.66	J
Arsenic	MG/KG	21.5	100%	8.9 *	4	76	76	4.5		5.3		15.8		6		7.4		7.9	
Barium	MG/KG	133	100%	300	0	76	76	31.2	J	65.9		81.5		115		88.7		70.8	
Beryllium	MG/KG	1	99%	1.13 *	0	75	76	0.26	J	0.79		0.82		0.53	J	0.42	J	0.3	J
Cadmium	MG/KG	1.5	4%	2.46 *	0	3	76	0.04	U	0.03	U	0.03	U	0.04	U	0.04	U	0.04	U
Calcium	MG/KG	102000	100%	125300 *	0	76	76	74500		2330		2990		4140		3240		56200	
Chromium	MG/KG	3820	80%	30 *	17	61	76	15.7	J	74.7		42.6		821	J	120	J	87.1	J
Cobalt	MG/KG	29.1	100%	30	0	76	76	9.9		16.2		15.5		11.7		15.4		16.9	
Copper	MG/KG	2250	100%	33 *	14	76	76	17.8		26.9		23		277	J	25.8	J	43.8	
Cyanide	MG/KG	0	0%	0.35	0	0	76	0.61	U	0.61	U	0.66	U	0.69	U	0.65	U	0.58	U
Iron	MG/KG	40900	100%	37410 *	6	76	76	19800		37200		40500		29600	J	33600		27400	J
Lead	MG/KG	251	100%	24.4 *	6	76	76	7.1		10.8		10.6		14.7		10.4		10.6	
Magnesium	MG/KG	32000	100%	21700 *	3	76	76	9060		7440		7500		4490		5980		12500	
Manganese	MG/KG	2100	78%	1100 *	5	59	76	402		320		351		832		977		639	
Mercury	MG/KG	0.12	45%	0.1	1	34	76	0.04	U	0.05	UJ	0.06	UJ	0.09	J	0.05	UJ	0.05	U
Nickel	MG/KG	62.3	100%	50 *	8	76	76	24.5		54.6		53.2		30.4		39.8		33.4	
Potassium	MG/KG	2490	100%	2623 *	0	76	76	973	J	1590		1790		1480		1310		1270	
Selenium	MG/KG	0.86	33%	2	0	25	76	0.71	UJ	0.29	U	0.32	U	0.75	UJ	0.8	UJ	0.67	UJ
Silver	MG/KG	1.2	8%	0.8 *	4	6	76	0.2	U	0.15	U	0.16	U	0.21	U	0.22	U	0.19	U
Sodium	MG/KG	134	61%	188 *	0	46	76	121	J	43.8	J	42.5	U	54.6	UJ	88.5	J	121	J
Thallium	MG/KG	0	0%	0.855 *	0	0	76	7.1	R	0.53	U	0.58	U	7.5	R	8	R	6.7	R
Vanadium	MG/KG	31	100%	150	0	76	76	12.6		24.9		27.1		24		22.4		16.7	
Zinc	MG/KG	1010	100%	115 *	12	76	76	76.4	J	122		133		143	J	78.3	J	87.1	J
Nitrate/Nitrite	MG/KG	2.7	100%			37	37	0.09	J	0.13	J	0.13	J	0.66	J	1.54	J	0.09	

* Soil criteria for these inorganics are site background values.

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								RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		ESI	
								SB4-25		SB4-25		SB4-26		SB4-26		SB4-27		SB4-6	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								2		6		2		4		2		0	
								3.5		7.2		3.5		5		2.5		2	
								12/23/1998		12/23/1998		12/15/1998		12/15/1998		12/21/1998		12/6/1993	
								43143		**43144**		**43091**		**43092**		**43127**		**SB4-6-1**	
	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SA		SA		SA		SA		SA		SA	
								N		N		N		N		N		N	
Volatiles																			
1,1,1-Trichloroethane	UG/KG	0	0%	800	0	0	76	13	U	11	U	12	U	11	U	11	U	13	U
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	600	0	0	76	13	U	11	U	12	U	11	U	11	U	13	U
1,1,2-Trichloroethane	UG/KG	0	0%		0	0	76	13	U	11	U	12	U	11	U	11	U	13	U
1,1-Dichloroethane	UG/KG	0	0%	200	0	0	76	13	U	11	U	12	U	11	U	11	U	13	U
1,1-Dichloroethene	UG/KG	0	0%	400	0	0	76	13	U	11	U	12	U	11	U	11	U	13	U
1,2-Dichloroethane	UG/KG	0	0%	100	0	0	76	13	U	11	U	12	U	11	U	11	U	13	U
1,2-Dichloroethene (total)	UG/KG	0	0%		0	0	76	13	U	11	U	12	U	11	U	11	U	13	U
1,2-Dichloropropane	UG/KG	0	0%		0	0	76	13	U	11	U	12	U	11	U	11	U	13	U
Acetone	UG/KG	31	9%	200	0	7	76	13	U	11	U	12	U	11	U	8	J	13	U
Benzene	UG/KG	0	0%	60	0	0	76	13	U	11	U	12	U	11	U	11	U	13	U
Bromodichloromethane	UG/KG	0	0%		0	0	76	13	U	11	U	12	U	11	U	11	U	13	U
Bromoform	UG/KG	0	0%		0	0	76	13	U	11	U	12	U	11	U	11	U	13	U
Carbon disulfide	UG/KG	0	0%	2700	0	0	76	13	U	11	U	12	U	11	U	11	U	13	U
Carbon tetrachloride	UG/KG	0	0%	600	0	0	76	13	U	11	U	12	U	11	U	11	U	13	U
Chlorobenzene	UG/KG	0	0%	1700	0	0	76	13	U	11	U	12	U	11	U	11	U	13	U
Chlorodibromomethane	UG/KG	0	0%		0	0	76	13	U	11	U	12	U	11	U	11	U	13	U
Chloroethane	UG/KG	0	0%	1900	0	0	76	13	U	11	U	12	UJ	11	UJ	11	U	13	U
Chloroform	UG/KG	15	8%	300	0	6	76	13	U	11	U	12	U	11	U	11	U	13	U
Cis-1,3-Dichloropropene	UG/KG	0	0%		0	0	76	13	U	11	U	12	U	11	U	11	U	13	U
Ethyl benzene	UG/KG	1	1%	5500	0	1	76	13	U	11	U	12	U	11	U	11	U	13	U
Methyl bromide	UG/KG	0	0%		0	0	76	13	U	11	U	12	U	11	U	11	U	13	U
Methyl butyl ketone	UG/KG	0	0%		0	0	76	13	U	11	U	12	U	11	U	11	U	13	U
Methyl chloride	UG/KG	0	0%		0	0	76	13	U	11	U	12	U	11	U	11	U	13	U
Methyl ethyl ketone	UG/KG	0	0%	300	0	0	76	13	U	11	U	12	UJ	11	UJ	11	U	13	U
Methyl isobutyl ketone	UG/KG	0	0%	1000	0	0	76	13	U	11	U	12	U	11	U	11	U	13	U
Methylene chloride	UG/KG	2	3%	100	0	2	76	13	U	11	U	12	U	11	U	11	U	13	U
Styrene	UG/KG	0	0%		0	0	76	13	U	11	U	12	U	11	U	11	U	13	U
Tetrachloroethene	UG/KG	0	0%	1400	0	0	76	13	U	11	U	12	U	11	U	11	U	13	U
Toluene	UG/KG	13	28%	1500	0	21	76	13	U	11	U	12	U	11	U	2	J	13	U
Total Xylenes	UG/KG	8	4%	1200	0	3	76	13	U	11	U	12	U	11	U	11	U	13	U
Trans-1,3-Dichloropropene	UG/KG	0	0%		0	0	76	13	U	11	U	12	U	11	U	11	U	13	U
Trichloroethene	UG/KG	0	0%	700	0	0	76	13	U	11	U	12	U	11	U	11	U	13	U
Vinyl chloride	UG/KG	0	0%	200	0	0	76	13	U	11	U	12	U	11	U	11	U	13	U
Semivolatile Organics																			
1,2,4-Trichlorobenzene	UG/KG	0	0%	3400	0	0	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
1,2-Dichlorobenzene	UG/KG	0	0%	7900	0	0	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
1,3-Dichlorobenzene	UG/KG	0	0%	1600	0	0	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
1,4-Dichlorobenzene	UG/KG	0	0%	8500	0	0	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%		0	0	39											440	U
2,4,5-Trichlorophenol	UG/KG	0	0%	100	0	0	76	200	UJ	180	UJ	170	U	170	U	180	U	1100	U
2,4,6-Trichlorophenol	UG/KG	0	0%		0	0	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
2,4-Dichlorophenol	UG/KG	0	0%	400	0	0	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
2,4-Dimethylphenol	UG/KG	0	0%		0	0	76	82	UJ	75	UJ	72	UJ	70	UJ	73	UJ	440	U
2,4-Dinitrophenol	UG/KG	0	0%	200	0	0	76	200	R	180	R	170	R	170	R	180	UJ	1100	U
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
2-Chloronaphthalene	UG/KG	0	0%		0	0	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
2-Chlorophenol	UG/KG	0	0%	800	0	0	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
2-Methylnaphthalene	UG/KG	260	4%	36400	0	3	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U

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	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		ESI	
								SB4-25		SB4-25		SB4-26		SB4-26		SB4-27		SB4-6	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								2		6		2		4		2		0	
								3.5		7.2		3.5		5		2.5		2	
								12/23/1998		12/23/1998		12/15/1998		12/15/1998		12/21/1998		12/6/1993	
								43143		43144		43091		43092		43127		SB4-6-1	
								SA		SA		SA		SA		SA		SA	
								N		N		N		N		N		N	
2-Methylphenol	UG/KG	0	0%	100	0	0	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
2-Nitroaniline	UG/KG	0	0%	430	0	0	76	200	UJ	180	UJ	170	U	170	U	180	U	1100	U
2-Nitrophenol	UG/KG	0	0%	330	0	0	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
3,3'-Dichlorobenzidine	UG/KG	0	0%		0	0	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
3-Nitroaniline	UG/KG	0	0%	500	0	0	76	200	UJ	180	UJ	170	U	170	U	180	U	1100	U
4,6-Dinitro-2-methylphenol	UG/KG	0	0%		0	0	76	200	UJ	180	UJ	170	UJ	170	UJ	180	U	1100	U
4-Bromophenyl phenyl ether	UG/KG	0	0%		0	0	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
4-Chloro-3-methylphenol	UG/KG	0	0%	240	0	0	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
4-Chloroaniline	UG/KG	0	0%	220	0	0	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
4-Chlorophenyl phenyl ether	UG/KG	0	0%		0	0	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
4-Methylphenol	UG/KG	0	0%	900	0	0	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
4-Nitroaniline	UG/KG	0	0%		0	0	76	200	UJ	180	UJ	170	U	170	U	180	U	1100	U
4-Nitrophenol	UG/KG	0	0%	100	0	0	76	200	UJ	180	UJ	170	U	170	U	180	U	1100	U
Acenaphthene	UG/KG	88	3%	50000	0	2	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
Acenaphthylene	UG/KG	170	4%	41000	0	3	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
Anthracene	UG/KG	340	4%	50000	0	3	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
Benzo(a)anthracene	UG/KG	1100	7%	224	2	5	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
Benzo(a)pyrene	UG/KG	880	8%	61	2	6	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
Benzo(b)fluoranthene	UG/KG	730	9%	1100	0	7	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
Benzo(ghi)perylene	UG/KG	270	3%	50000	0	2	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
Benzo(k)fluoranthene	UG/KG	890	5%	1100	0	4	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
Bis(2-Chloroethoxy)methane	UG/KG	0	0%		0	0	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
Bis(2-Chloroethyl)ether	UG/KG	0	0%		0	0	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%		0	0	37	82	UJ	75	UJ	72	U	70	U	73	U		
Bis(2-Ethylhexyl)phthalate	UG/KG	2000	11%	50000	0	8	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
Butylbenzylphthalate	UG/KG	120	1%	50000	0	1	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
Carbazole	UG/KG	160	1%		0	1	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
Chrysene	UG/KG	1000	11%	400	2	8	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
Di-n-butylphthalate	UG/KG	63	24%	8100	0	18	76	82	UJ	75	UJ	72	U	70	U	73	U	51	J
Di-n-octylphthalate	UG/KG	37	21%	50000	0	16	76	82	UJ	6.6	J	72	U	70	U	11	J	440	U
Dibenz(a,h)anthracene	UG/KG	48	1%	14	1	1	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
Dibenzofuran	UG/KG	33	1%	6200	0	1	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
Diethyl phthalate	UG/KG	0	0%	7100	0	0	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
Dimethylphthalate	UG/KG	0	0%	2000	0	0	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
Fluoranthene	UG/KG	2400	11%	50000	0	8	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
Fluorene	UG/KG	330	4%	50000	0	3	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
Hexachlorobenzene	UG/KG	0	0%	410	0	0	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
Hexachlorobutadiene	UG/KG	0	0%		0	0	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
Hexachlorocyclopentadiene	UG/KG	0	0%		0	0	76	82	UJ	75	UJ	72	UJ	70	UJ	73	U	440	U
Hexachloroethane	UG/KG	0	0%		0	0	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
Indeno(1,2,3-cd)pyrene	UG/KG	260	3%	3200	0	2	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
Isophorone	UG/KG	0	0%	4400	0	0	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
N-Nitrosodiphenylamine	UG/KG	0	0%		0	0	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
N-Nitrosodipropylamine	UG/KG	0	0%		0	0	78	82	UJ	75	UJ	72	U	70	U	73	U	440	U
Naphthalene	UG/KG	130	3%	13000	0	2	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
Nitrobenzene	UG/KG	0	0%	200	0	0	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
Pentachlorophenol	UG/KG	0	0%	1000	0	0	76	200	UJ	180	UJ	170	U	170	U	180	U	1100	U
Phenanthrene	UG/KG	1400	8%	50000	0	6	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
Phenol	UG/KG	0	0%	30	0	0	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U
Pyrene	UG/KG	1800	9%	50000	0	7	76	82	UJ	75	UJ	72	U	70	U	73	U	440	U

	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		ESI	
								SB4-25		SB4-25		SB4-26		SB4-26		SB4-27		SB4-6	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								2		6		2		4		2		0	
								3.5		7.2		3.5		5		2.5		2	
								12/23/1998		12/23/1998		12/15/1998		12/15/1998		12/21/1998		12/6/1993	
								43143		**43144**		**43091**		**43092**		**43127**		**SB4-6-1**	
								SA		SA		SA		SA		SA		SA	
								N		N		N		N		N		N	
Nitroaromatics																			
1,3-Dinitrobenzene	UG/KG	0	0%		0	0	76	120	U	120	U	120	UJ	120	U	120	U	130	U
2,4,6-Trinitrotoluene	UG/KG	0	0%		0	0	76	120	U	120	U	120	UJ	120	U	120	U	130	U
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	76	120	U	120	U	120	UJ	120	U	120	U	130	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	76	120	U	120	U	120	UJ	120	U	120	U	130	U
2-Nitrotoluene	UG/KG	0	0%		0	0	37	120	U	120	U	120	UJ	120	U	120	U		
2-amino-4,6-Dinitrotoluene	UG/KG	0	0%		0	0	76	120	U	120	U	120	UJ	120	U	120	U	130	U
3-Nitrotoluene	UG/KG	0	0%		0	0	37	120	U	120	U	120	UJ	120	U	120	U		
4-Nitrotoluene	UG/KG	0	0%		0	0	37	120	U	120	U	120	UJ	120	U	120	U		
4-amino-2,6-Dinitrotoluene	UG/KG	0	0%		0	0	76	120	U	120	U	120	UJ	120	U	120	U	130	U
HMX	UG/KG	0	0%		0	0	76	120	U	120	U	120	UJ	120	U	120	U	130	U
Nitrobenzene	UG/KG	0	0%	200	0	0	37	120	U	120	U	120	UJ	120	U	120	U		
RDX	UG/KG	0	0%		0	0	76	120	U	120	U	120	UJ	120	U	120	U	130	U
Tetryl	UG/KG	67	1%		0	1	76	120	U	120	U	120	UJ	120	U	120	U	130	U
Pesticides/PCBs																			
4,4'-DDD	UG/KG	0	0%	2900	0	0	76	4.1	U	3.8	U	3.6	U	3.5	U	3.7	U	4.4	UJ
4,4'-DDE	UG/KG	21	4%	2100	0	3	76	4.1	U	3.8	U	3.6	U	3.5	U	3.7	U	4.4	UJ
4,4'-DDT	UG/KG	2.9	1%	2100	0	1	76	4.1	U	3.8	U	3.6	U	3.5	U	3.7	U	4.4	UJ
Aldrin	UG/KG	8.2	1%	41	0	1	76	2.1	U	1.9	U	1.8	U	1.8	U	1.9	U	2.3	UJ
Alpha-BHC	UG/KG	0	0%	110	0	0	76	2.1	U	1.9	U	1.8	U	1.8	U	1.9	U	2.3	UJ
Alpha-Chlordane	UG/KG	10	1%		0	1	76	2.1	U	1.9	U	1.8	U	1.8	U	1.9	U	2.3	UJ
Aroclor-1016	UG/KG	0	0%		0	0	76	41	U	38	U	36	U	35	U	37	U	44	UJ
Aroclor-1221	UG/KG	0	0%		0	0	76	84	U	76	U	73	U	71	U	74	U	89	UJ
Aroclor-1232	UG/KG	0	0%		0	0	76	41	U	38	U	36	U	35	U	37	U	44	UJ
Aroclor-1242	UG/KG	0	0%		0	0	76	41	U	38	U	36	U	35	U	37	U	44	UJ
Aroclor-1248	UG/KG	27	1%		0	1	76	41	U	38	U	36	U	35	U	37	U	44	UJ
Aroclor-1254	UG/KG	1600	5%	10000	0	4	76	20	J	38	U	36	U	35	U	37	U	44	UJ
Aroclor-1260	UG/KG	0	0%	10000	0	0	76	41	U	38	U	36	U	35	U	37	U	44	UJ
Beta-BHC	UG/KG	1.4	1%	200	0	1	76	2.1	U	1.9	U	1.8	U	1.8	U	1.9	U	2.3	UJ
Delta-BHC	UG/KG	5.9	1%	300	0	1	76	2.1	U	1.9	U	1.8	U	1.8	U	1.9	U	2.3	UJ
Dieldrin	UG/KG	0	0%	44	0	0	76	4.1	U	3.8	U	3.6	U	3.5	U	3.7	U	4.4	UJ
Endosulfan I	UG/KG	11	1%	900	0	1	76	2.1	U	1.9	U	1.8	U	1.8	U	1.9	U	2.3	UJ
Endosulfan II	UG/KG	0	0%	900	0	0	76	4.1	U	3.8	U	3.6	U	3.5	U	3.7	U	4.4	UJ
Endosulfan sulfate	UG/KG	0	0%	1000	0	0	76	4.1	U	3.8	U	3.6	U	3.5	U	3.7	U	4.4	UJ
Endrin	UG/KG	34	1%	100	0	1	76	4.1	U	3.8	U	3.6	U	3.5	U	3.7	U	4.4	UJ
Endrin aldehyde	UG/KG	3.7	1%		0	1	76	4.1	U	3.8	U	3.6	U	3.5	U	3.7	U	4.4	UJ
Endrin ketone	UG/KG	0	0%		0	0	76	4.1	U	3.8	U	3.6	U	3.5	U	3.7	U	4.4	UJ
Gamma-BHC/Lindane	UG/KG	0	0%	60	0	0	76	2.1	U	1.9	U	1.8	U	1.8	U	1.9	U	2.3	UJ
Gamma-Chlordane	UG/KG	0	0%	540	0	0	76	2.1	U	1.9	U	1.8	U	1.8	U	1.9	U	2.3	UJ
Heptachlor	UG/KG	0	0%	100	0	0	76	2.1	U	1.9	U	1.8	U	1.8	U	1.9	U	2.3	UJ
Heptachlor epoxide	UG/KG	0	0%	20	0	0	76	2.1	U	1.9	U	1.8	U	1.8	U	1.9	U	2.3	UJ
Methoxychlor	UG/KG	0	0%		0	0	76	21	U	19	U	18	U	18	U	19	U	23	UJ
Toxaphene	UG/KG	0	0%		0	0	76	210	U	190	U	180	U	180	U	190	U	230	UJ
Herbicides																			
2,4,5-T	UG/KG	0	0%	1900	0	0	39											6.7	U
2,4,5-TP/Silvex	UG/KG	0	0%	700	0	0	39											6.7	U
2,4-D	UG/KG	0	0%	500	0	0	39											67	U
2,4-DB	UG/KG	0	0%		0	0	39											67	U
Dalapon	UG/KG	0	0%		0	0	39											160	U

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Subsurface Soil Sample Results
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	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		ESI	
								SB4-25		SB4-25		SB4-26		SB4-26		SB4-27		SB4-6	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								2		6		2		4		2		0	
								3.5		7.2		3.5		5		2.5		2	
								12/23/1998		12/23/1998		12/15/1998		12/15/1998		12/21/1998		12/6/1993	
								43143		**43144**		**43091**		**43092**		**43127**		**SB4-6-1**	
								SA		SA		SA		SA		SA		SA	
								N		N		N		N		N		N	
Dicamba	UG/KG	23	3%		0	1	39											6.7	U
Dichloroprop	UG/KG	0	0%		0	0	39											67	U
Dinoseb	UG/KG	0	0%		0	0	39											34	U
MCPA	UG/KG	0	0%		0	0	39											6700	U
MCPP	UG/KG	0	0%		0	0	39											6700	U
Metals																			
Aluminum	MG/KG	21000	100%	19520 *	3	76	76	11800		10900		9320		16800		12100		17100	
Antimony	MG/KG	57.8	28%	6 *	10	21	76	30.1	J	0.58	J	0.62	UJ	0.51	UJ	0.8	R	4.8	UJ
Arsenic	MG/KG	21.5	100%	8.9 *	4	76	76	9.2		6		3.7		5.7		4.3		7.3	
Barium	MG/KG	133	100%	300	0	76	76	110		60.5		51.8		65		68.4		132	
Beryllium	MG/KG	1	99%	1.13 *	0	75	76	0.37	J	0.02	U	0.4	J	0.76	J	0.54	J	0.96	J
Cadmium	MG/KG	1.5	4%	2.46 *	0	3	76	0.05	U	0.04	U	0.04	U	0.03	U	0.1	U	0.46	U
Calcium	MG/KG	102000	100%	125300 *	0	76	76	18600		19900		102000		10300		47800		3750	
Chromium	MG/KG	3820	80%	30 *	17	61	76	3820	J	34.1	J	17		31.8		19.5		25.7	
Cobalt	MG/KG	29.1	100%	30	0	76	76	15.7		13.2		9	J	18.5		9.1	J	12.5	
Copper	MG/KG	2250	100%	33 *	14	76	76	2250		21.7		16.5		30.4		22.3		25.7	
Cyanide	MG/KG	0	0%	0.35	0	0	76	0.71	U	0.61	U	0.62	U	0.6	U	0.58	U	0.6	U
Iron	MG/KG	40900	100%	37410 *	6	76	76	38100	J	30300	J	21000		[illegible]		24300		28600	
Lead	MG/KG	251	100%	24.4 *	6	76	76	76.5		11.6		8.8		13.6		10.5	J	18.8	J
Magnesium	MG/KG	32000	100%	21700 *	3	76	76	5170		5190		26400		8410		8940		4560	
Manganese	MG/KG	2100	78%	1100 *	5	59	76	565		2100		365		370		288		1260	R
Mercury	MG/KG	0.12	45%	0.1	1	34	76	0.12	J	0.06	U	0.05	UJ	0.05	UJ	0.05	J	0.08	J
Nickel	MG/KG	62.3	100%	50 *	8	76	76	43.8		32.6		29.3		56.9		28.1		35.2	
Potassium	MG/KG	2490	100%	2623 *	0	76	76	1320		873	J	1290		1640		1460		2000	
Selenium	MG/KG	0.86	33%	2	0	25	76	0.83	UJ	0.68	UJ	0.4	U	0.33	U	0.74	U	0.86	J
Silver	MG/KG	1.2	8%	0.8 *	4	6	76	0.35	J	0.19	U	0.2	U	0.16	U	0.21	U	1	J
Sodium	MG/KG	134	61%	188 *	0	46	76	60.3	U	74.1	J	52.5	U	43.2	U	53.7	U	43.7	U
Thallium	MG/KG	0	0%	0.855 *	0	0	76	0.83	R	6.8	R	7.2	U	5.9	U	0.64	U	0.24	U
Vanadium	MG/KG	31	100%	150	0	76	76	21.9		15.2		16.4		25.7		20.3		29	
Zinc	MG/KG	1010	100%	115 *	12	76	76	507	J	64.2	J	75.3	J	127	J	62.9	J	87.4	
Nitrate/Nitrite	MG/KG	2.7	100%			37	37	1.59	J	0.16	J	0.17	J	0.27	J	0.11	J		

* Soil criteria for these inorganics are site background values.

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SEAD-4 Remedial Investigation
Subsurface Soil Sample Results
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	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	ESI		ESI		ESI		ESI		ESI		ESI	
								SB4-6		SB4-7		SB4-7		SB4-7		SB4-8		SB4-8	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								2		0		4		6		0		2	
								4		2		6		8		2		4	
								12/6/1993		12/5/1993		12/5/1993		12/5/1993		12/5/1993		12/5/1993	
								SB4-6-2		**SB4-7-1**		**SB4-7-3**		**SB4-7-4**		**SB4-8-1**		**SB4-8-2**	
								SA		SA		SA		SA		SA		SA	
								N		N		N		N		N		N	
Volatiles																			
1,1,1-Trichloroethane	UG/KG	0	0%	800	0	0	76	11	U	12	U	11	U	11	U	12	U	12	U
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	600	0	0	76	11	U	12	U	11	U	11	U	12	U	12	U
1,1,2-Trichloroethane	UG/KG	0	0%		0	0	76	11	U	12	U	11	U	11	U	12	U	12	U
1,1-Dichloroethane	UG/KG	0	0%	200	0	0	76	11	U	12	U	11	U	11	U	12	U	12	U
1,1-Dichloroethene	UG/KG	0	0%	400	0	0	76	11	U	12	U	11	U	11	U	12	U	12	U
1,2-Dichloroethane	UG/KG	0	0%	100	0	0	76	11	U	12	U	11	U	11	U	12	U	12	U
1,2-Dichloroethene (total)	UG/KG	0	0%		0	0	76	11	U	12	U	11	U	11	U	12	U	12	U
1,2-Dichloropropane	UG/KG	0	0%		0	0	76	11	U	12	U	11	U	11	U	12	U	12	U
Acetone	UG/KG	31	9%	200	0	7	78	11	U	12	U	11	U	11	U	12	U	12	U
Benzene	UG/KG	0	0%	60	0	0	76	11	U	12	U	11	U	11	U	12	U	12	U
Bromodichloromethane	UG/KG	0	0%		0	0	76	11	U	12	U	11	U	11	U	12	U	12	U
Bromoform	UG/KG	0	0%		0	0	76	11	U	12	U	11	U	11	U	12	U	12	U
Carbon disulfide	UG/KG	0	0%	2700	0	0	76	11	U	12	U	11	U	11	U	12	U	12	U
Carbon tetrachloride	UG/KG	0	0%	600	0	0	76	11	U	12	U	11	U	11	U	12	U	12	U
Chlorobenzene	UG/KG	0	0%	1700	0	0	76	11	U	12	U	11	U	11	U	12	U	12	U
Chlorodibromomethane	UG/KG	0	0%		0	0	76	11	U	12	U	11	U	11	U	12	U	12	U
Chloroethane	UG/KG	0	0%	1900	0	0	76	11	U	12	U	11	U	11	U	12	U	12	U
Chloroform	UG/KG	15	8%	300	0	6	76	11	U	12	U	11	U	11	U	12	U	14	
Cis-1,3-Dichloropropene	UG/KG	0	0%		0	0	76	11	U	12	U	11	U	11	U	12	U	12	U
Ethyl benzene	UG/KG	1	1%	5500	0	1	76	11	U	12	U	11	U	11	U	12	U	12	U
Methyl bromide	UG/KG	0	0%		0	0	76	11	U	12	U	11	U	11	U	12	U	12	U
Methyl butyl ketone	UG/KG	0	0%		0	0	76	11	U	12	U	11	U	11	U	12	U	12	U
Methyl chloride	UG/KG	0	0%		0	0	76	11	U	12	U	11	U	11	U	12	U	12	U
Methyl ethyl ketone	UG/KG	0	0%	300	0	0	76	11	U	12	U	11	U	11	U	12	U	12	U
Methyl isobutyl ketone	UG/KG	0	0%	1000	0	0	76	11	U	12	U	11	U	11	U	12	U	12	U
Methylene chloride	UG/KG	2	3%	100	0	2	76	11	U	12	U	11	U	11	U	12	U	12	U
Styrene	UG/KG	0	0%		0	0	78	11	U	12	U	11	U	11	U	12	U	12	U
Tetrachloroethene	UG/KG	0	0%	1400	0	0	76	11	U	12	U	11	U	11	U	12	U	12	U
Toluene	UG/KG	13	28%	1500	0	21	76	11	U	12	U	11	U	11	U	12	U	12	U
Total Xylenes	UG/KG	8	4%	1200	0	3	76	11	U	12	U	11	U	11	U	12	U	12	U
Trans-1,3-Dichloropropene	UG/KG	0	0%		0	0	76	11	U	12	U	11	U	11	U	12	U	12	U
Trichloroethene	UG/KG	0	0%	700	0	0	76	11	U	12	U	11	U	11	U	12	U	12	U
Vinyl chloride	UG/KG	0	0%	200	0	0	76	11	U	12	U	11	U	11	U	12	U	12	U
Semivolatile Organics																			
1,2,4-Trichlorobenzene	UG/KG	0	0%	3400	0	0	76	350	U	370	U	380	U	360	U	380	U	380	U
1,2-Dichlorobenzene	UG/KG	0	0%	7900	0	0	76	350	U	370	U	380	U	360	U	380	U	380	U
1,3-Dichlorobenzene	UG/KG	0	0%	1600	0	0	76	350	U	370	U	380	U	360	U	380	U	380	U
1,4-Dichlorobenzene	UG/KG	0	0%	8500	0	0	76	350	U	370	U	380	U	360	U	380	U	380	U
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%		0	0	39	350	U	370	U	380	U	360	U	380	U	380	U
2,4,5-Trichlorophenol	UG/KG	0	0%	100	0	0	76	860	U	890	U	910	U	870	U	930	U	930	U
2,4,6-Trichlorophenol	UG/KG	0	0%		0	0	76	350	U	370	U	380	U	360	U	380	U	380	U
2,4-Dichlorophenol	UG/KG	0	0%	400	0	0	78	350	U	370	U	380	U	360	U	380	U	380	U
2,4-Dimethylphenol	UG/KG	0	0%		0	0	76	350	U	370	U	380	U	360	U	380	U	380	U
2,4-Dinitrophenol	UG/KG	0	0%	200	0	0	76	860	U	890	U	910	U	870	U	930	U	930	U
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	76	350	U	370	U	380	U	360	U	380	U	380	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	76	350	U	370	U	380	U	360	U	380	U	380	U
2-Chloronaphthalene	UG/KG	0	0%		0	0	76	350	U	370	U	380	U	360	U	380	U	380	U
2-Chlorophenol	UG/KG	0	0%	800	0	0	76	350	U	370	U	380	U	360	U	380	U	380	U
2-Methylnaphthalene	UG/KG	260	4%	36400	0	3	76	350	U	370	U	380	U	360	U	380	U	380	U

Seneca Army Depot
SEAD-4 Remedial Investigation
Subsurface Soil Sample Results
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	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	ESI		ESI		ESI		ESI		ESI		ESI	
								SB4-6		SB4-7		SB4-7		SB4-7		SB4-8		SB4-8	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								2		0		4		6		0		2	
								4		2		6		8		2		4	
								12/6/1993		12/5/1993		12/5/1993		12/5/1993		12/5/1993		12/5/1993	
								SB4-6-2		**SB4-7-1**		**SB4-7-3**		**SB4-7-4**		**SB4-8-1**		**SB4-8-2**	
								SA		SA		SA		SA		SA		SA	
								N		N		N		N		N		N	
2-Methylphenol	UG/KG	0	0%	100	0	0	76	350	U	370	U	380	U	360	U	380	U	380	U
2-Nitroaniline	UG/KG	0	0%	430	0	0	76	860	U	890	U	910	U	870	U	930	U	930	U
2-Nitrophenol	UG/KG	0	0%	330	0	0	76	350	U	370	U	380	U	360	U	380	U	380	U
3,3'-Dichlorobenzidine	UG/KG	0	0%		0	0	76	350	U	370	U	380	U	360	U	380	U	380	U
3-Nitroaniline	UG/KG	0	0%	500	0	0	76	860	U	890	U	910	U	870	U	930	U	930	U
4,6-Dinitro-2-methylphenol	UG/KG	0	0%		0	0	76	860	U	890	U	910	U	870	U	930	U	930	U
4-Bromophenyl phenyl ether	UG/KG	0	0%		0	0	76	350	U	370	U	380	U	360	U	380	U	380	U
4-Chloro-3-methylphenol	UG/KG	0	0%	240	0	0	76	350	U	370	U	380	U	360	U	380	U	380	U
4-Chloroaniline	UG/KG	0	0%	220	0	0	76	350	U	370	U	380	U	360	U	380	U	380	U
4-Chlorophenyl phenyl ether	UG/KG	0	0%		0	0	76	350	U	370	U	380	U	360	U	380	U	380	U
4-Methylphenol	UG/KG	0	0%	900	0	0	76	350	U	370	U	380	U	360	U	380	U	380	U
4-Nitroaniline	UG/KG	0	0%		0	0	76	860	U	890	U	910	U	870	U	930	U	930	U
4-Nitrophenol	UG/KG	0	0%	100	0	0	76	860	U	890	U	910	U	870	U	930	U	930	U
Acenaphthene	UG/KG	88	3%	50000	0	2	76	350	U	370	U	380	U	360	U	380	U	380	U
Acenaphthylene	UG/KG	170	4%	41000	0	3	76	350	U	370	U	380	U	360	U	380	U	380	U
Anthracene	UG/KG	340	4%	50000	0	3	76	350	U	370	U	380	U	360	U	380	U	380	U
Benzo(a)anthracene	UG/KG	1100	7%	224	2	5	76	350	U	370	U	380	U	360	U	380	U	380	U
Benzo(a)pyrene	UG/KG	680	8%	61	2	6	76	350	U	370	U	380	U	360	U	380	U	380	U
Benzo(b)fluoranthene	UG/KG	730	9%	1100	0	7	76	350	U	20	J	380	U	360	U	380	U	380	U
Benzo(ghi)perylene	UG/KG	270	3%	50000	0	2	76	350	U	370	U	380	U	360	U	380	U	380	U
Benzo(k)fluoranthene	UG/KG	890	5%	1100	0	4	76	350	U	19	J	380	U	360	U	380	U	380	U
Bis(2-Chloroethoxy)methane	UG/KG	0	0%		0	0	76	350	U	370	U	380	U	360	U	380	U	380	U
Bis(2-Chloroethyl)ether	UG/KG	0	0%		0	0	76	350	U	370	U	380	U	360	U	380	U	380	U
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%		0	0	37												
Bis(2-Ethylhexyl)phthalate	UG/KG	2000	11%	50000	0	8	76	350	U	19	UR	380	UR	360	UR	380	UR	380	UR
Butylbenzylphthalate	UG/KG	120	1%	50000	0	1	76	350	U	370	UR	380	UR	360	UR	380	UR	380	UR
Carbazole	UG/KG	160	1%		0	1	76	350	U	370	U	380	U	360	U	380	U	380	U
Chrysene	UG/KG	1000	11%	400	2	8	76	350	U	20	J	380	U	360	U	380	U	380	U
Di-n-butylphthalate	UG/KG	63	24%	8100	0	18	76	35	J	370	UR	380	UR	360	UR	380	UR	380	UR
Di-n-octylphthalate	UG/KG	37	21%	50000	0	16	76	350	U	370	U	380	U	360	U	380	U	380	U
Dibenz(a,h)anthracene	UG/KG	48	1%	14	1	1	76	350	U	370	U	380	U	360	U	380	U	380	U
Dibenzofuran	UG/KG	33	1%	6200	0	1	76	350	U	370	U	380	U	360	U	380	U	380	U
Diethyl phthalate	UG/KG	0	0%	7100	0	0	76	350	U	370	U	380	U	360	U	380	U	380	U
Dimethylphthalate	UG/KG	0	0%	2000	0	0	76	350	U	370	U	380	U	360	U	380	U	380	U
Fluoranthene	UG/KG	2400	11%	50000	0	8	76	350	U	22	J	380	U	360	U	380	U	380	U
Fluorene	UG/KG	330	4%	50000	0	3	76	350	U	370	U	380	U	360	U	380	U	380	U
Hexachlorobenzene	UG/KG	0	0%	410	0	0	76	350	U	370	U	380	U	360	U	380	U	380	U
Hexachlorobutadiene	UG/KG	0	0%		0	0	76	350	U	370	U	380	U	360	U	380	U	380	U
Hexachlorocyclopentadiene	UG/KG	0	0%		0	0	76	350	U	370	U	380	U	360	U	380	U	380	U
Hexachloroethane	UG/KG	0	0%		0	0	76	350	U	370	U	380	U	360	U	380	U	380	U
Indeno(1,2,3-cd)pyrene	UG/KG	260	3%	3200	0	2	76	350	U	370	U	380	U	360	U	380	U	380	U
Isophorone	UG/KG	0	0%	4400	0	0	76	350	U	370	U	380	U	360	U	380	U	380	U
N-Nitrosodiphenylamine	UG/KG	0	0%		0	0	76	350	U	370	U	380	U	360	U	380	U	380	U
N-Nitrosodipropylamine	UG/KG	0	0%		0	0	76	350	U	370	U	380	U	360	U	380	U	380	U
Naphthalene	UG/KG	130	3%	13000	0	2	76	350	U	370	U	380	U	360	U	380	U	380	U
Nitrobenzene	UG/KG	0	0%	200	0	0	76	350	U	370	U	380	U	360	U	380	U	380	U
Pentachlorophenol	UG/KG	0	0%	1000	0	0	76	860	U	890	U	910	U	870	U	930	U	930	U
Phenanthrene	UG/KG	1400	8%	50000	0	6	76	350	U	370	U	380	U	360	U	380	U	380	U
Phenol	UG/KG	0	0%	30	0	0	76	350	U	370	U	380	U	360	U	380	U	380	U
Pyrene	UG/KG	1800	9%	50000	0	7	76	350	U	19	J	380	U	360	U	380	U	380	U

Seneca [illegible] Depot
SEAD-4 Remedial Investigation
Subsurface Soil Sample Results
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	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	ESI		ESI		ESI		ESI		ESI		ESI	
								SB4-6		SB4-7		SB4-7		SB4-7		SB4-8		SB4-8	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								2		0		4		6		0		2	
								4		2		6		8		2		4	
								12/6/1993		12/5/1993		12/5/1993		12/5/1993		12/5/1993		12/5/1993	
								SB4-6-2		**SB4-7-1**		**SB4-7-3**		**SB4-7-4**		**SB4-8-1**		**SB4-8-2**	
								SA		SA		SA		SA		SA		SA	
								N		N		N		N		N		N	
Nitroaromatics																			
1,3-Dinitrobenzene	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	130	U	130	U
2,4,6-Trinitrotoluene	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	130	U	130	U
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	130	U	130	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	76	130	U	130	U	130	U	130	U	130	U	130	U
2-Nitrotoluene	UG/KG	0	0%		0	0	37												
2-amino-4,6-Dinitrotoluene	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	130	U	130	U
3-Nitrotoluene	UG/KG	0	0%		0	0	37												
4-Nitrotoluene	UG/KG	0	0%		0	0	37												
4-amino-2,6-Dinitrotoluene	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	130	U	130	U
HMX	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	130	U	130	U
Nitrobenzene	UG/KG	0	0%	200	0	0	37												
RDX	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	130	U	130	U
Tetryl	UG/KG	67	1%		0	1	76	130	U	130	U	130	U	130	U	130	U	130	U
Pesticides/PCBs																			
4,4'-DDD	UG/KG	0	0%	2900	0	0	76	3.5	UJ	3.6	U	3.7	U	3.5	U	3.8	U	3.8	U
4,4'-DDE	UG/KG	21	4%	2100	0	3	76	3.5	UJ	3.6	J	3.7	U	3.5	U	3.8	U	3.8	U
4,4'-DDT	UG/KG	2.9	1%	2100	0	1	76	3.5	UJ	3.6	U	3.7	U	3.5	U	3.8	U	3.8	U
Aldrin	UG/KG	8.2	1%	41	0	1	76	1.8	UJ	1.9	U	1.9	U	1.8	U	2	U	1.9	U
Alpha-BHC	UG/KG	0	0%	110	0	0	76	1.8	UJ	1.9	U	1.9	U	1.8	U	2	U	1.9	U
Alpha-Chlordane	UG/KG	10	1%		0	1	76	1.8	UJ	1.9	U	1.9	U	1.8	U	2	U	1.9	U
Aroclor-1016	UG/KG	0	0%		0	0	76	35	UJ	36	U	37	U	35	U	38	U	38	U
Aroclor-1221	UG/KG	0	0%		0	0	76	72	UJ	73	U	76	U	72	U	77	U	77	U
Aroclor-1232	UG/KG	0	0%		0	0	76	35	UJ	36	U	37	U	35	U	38	U	38	U
Aroclor-1242	UG/KG	0	0%		0	0	76	35	UJ	36	U	37	U	35	U	38	U	38	U
Aroclor-1248	UG/KG	27	1%		0	1	76	35	UJ	36	U	37	U	35	U	38	U	38	U
Aroclor-1254	UG/KG	1600	5%	10000	0	4	76	35	UJ	36	U	37	U	35	U	38	U	38	U
Aroclor-1260	UG/KG	0	0%	10000	0	0	76	35	UJ	36	U	37	U	35	U	38	U	38	U
Beta-BHC	UG/KG	1.4	1%	200	0	1	76	1.8	UJ	1.9	U	1.9	U	1.8	U	2	U	1.9	U
Delta-BHC	UG/KG	5.9	1%	300	0	1	76	1.8	UJ	1.9	U	1.9	U	1.8	U	2	U	1.9	U
Dieldrin	UG/KG	0	0%	44	0	0	76	3.5	UJ	3.6	U	3.7	U	3.5	U	3.8	U	3.8	U
Endosulfan I	UG/KG	11	1%	900	0	1	76	1.8	UJ	1.9	U	1.9	U	1.8	U	2	U	1.9	U
Endosulfan II	UG/KG	0	0%	900	0	0	76	3.5	UJ	3.6	U	3.7	U	3.5	U	3.8	U	3.8	U
Endosulfan sulfate	UG/KG	0	0%	1000	0	0	76	3.5	UJ	3.6	U	3.7	U	3.5	U	3.8	U	3.8	U
Endrin	UG/KG	34	1%	100	0	1	76	3.5	UJ	3.6	U	3.7	U	3.5	U	3.8	U	3.8	U
Endrin aldehyde	UG/KG	3.7	1%		0	1	76	3.5	UJ	3.6	U	3.7	U	3.5	U	3.8	U	3.8	U
Endrin ketone	UG/KG	0	0%		0	0	76	3.5	UJ	3.6	U	3.7	U	3.5	U	3.8	U	3.8	U
Gamma-BHC/Lindane	UG/KG	0	0%	60	0	0	76	1.8	UJ	1.9	U	1.9	U	1.8	U	2	U	1.9	U
Gamma-Chlordane	UG/KG	0	0%	540	0	0	76	1.8	UJ	1.9	U	1.9	U	1.8	U	2	U	1.9	U
Heptachlor	UG/KG	0	0%	100	0	0	76	1.8	UJ	1.9	U	1.9	U	1.8	U	2	U	1.9	U
Heptachlor epoxide	UG/KG	0	0%	20	0	0	76	1.8	UJ	1.9	U	1.9	U	1.8	U	2	U	1.9	U
Methoxychlor	UG/KG	0	0%		0	0	76	18	UJ	19	U	19	U	18	U	20	U	19	U
Toxaphene	UG/KG	0	0%		0	0	76	180	UJ	190	U	190	U	180	U	200	U	190	U
Herbicides																			
2,4,5-T	UG/KG	0	0%	1900	0	0	39	5.4	U	5.5	U	5.7	U	5.5	U	5.8	U	5.8	U
2,4,5-TP/Silvex	UG/KG	0	0%	700	0	0	39	5.4	U	5.5	U	5.7	U	5.5	U	5.8	U	5.8	U
2,4-D	UG/KG	0	0%	500	0	0	39	54	U	55	U	57	U	55	U	58	U	58	U
2,4-DB	UG/KG	0	0%		0	0	39	54	U	55	U	57	U	55	U	58	U	58	U
Dalapon	UG/KG	0	0%		0	0	39	130	U	140	U	140	U	130	U	140	U	140	U

	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	ESI		ESI		ESI		ESI		ESI		ESI	
								SB4-6		SB4-7		SB4-7		SB4-7		SB4-8		SB4-8	
								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
								2		0		4		6		0		2	
								4		2		6		8		2		4	
								12/6/1993		12/5/1993		12/5/1993		12/5/1993		12/5/1993		12/5/1993	
								SB4-6-2		**SB4-7-1**		**SB4-7-3**		**SB4-7-4**		**SB4-8-1**		**SB4-8-2**	
								SA		SA		SA		SA		SA		SA	
								N		N		N		N		N		N	
Dicamba	UG/KG	23	3%		0	1	39	5.4	U	5.5	U	5.7	U	5.5	U	5.8	U	5.8	U
Dichloroprop	UG/KG	0	0%		0	0	39	54	U	55	U	57	U	55	U	58	U	58	U
Dinoseb	UG/KG	0	0%		0	0	39	27	U	28	U	29	U	28	U	29	U	29	U
MCPA	UG/KG	0	0%		0	0	39	5400	U	5500	U	5700	U	5500	U	5800	U	5800	U
MCPP	UG/KG	0	0%		0	0	39	5400	U	5500	U	5700	U	5500	U	5800	U	5800	U
Metals																			
Aluminum	MG/KG	21000	100%	19520 *	3	76	76	12800		14600		11400		8410		13300		16700	
Antimony	MG/KG	57.8	28%	6 *	10	21	76	4	UJ	6.4	J	2.9	J	3	J	2.7	UJ	4.2	UJ
Arsenic	MG/KG	21.5	100%	8.9 *	4	76	76	5.5		5.1		3.4		5.7		5.6		5.1	
Barium	MG/KG	133	100%	300	0	76	76	37.1	J	61.5		77.3		45.4		69.4		116	
Beryllium	MG/KG	1	99%	1.13 *	0	75	76	0.64	J	0.62	J	0.46	J	0.38	J	0.65		0.72	J
Cadmium	MG/KG	1.5	4%	2.46 *	0	3	76	0.39	U	0.39	U	0.27	U	0.29	U	0.27	J	0.41	U
Calcium	MG/KG	102000	100%	125300 *	0	76	76	12400		38600		71600		87500		25200		9320	
Chromium	MG/KG	3820	80%	30 *	17	61	76	24.4		25.4	R	21.4	R	14	R	21.4	R	24.9	R
Cobalt	MG/KG	29.1	100%	30	0	76	76	14.9		12.7		9.1		8.3		11.7		15.3	
Copper	MG/KG	2250	100%	33 *	14	76	76	19.5		27.5	J	21	J	19.5	J	25.6	J	21.6	J
Cyanide	MG/KG	0	0%	0.35	0	0	76	0.52	U	0.5	U	0.5	U	0.51	U	0.57	U	0.58	U
Iron	MG/KG	40900	100%	37410 *	6	76	76	28600		29400		21800		19100		25900		29700	
Lead	MG/KG	251	100%	24.4 *	6	76	76	11	J	16.6	J	9.4	J	16.6	J	19.7	J	10.3	J
Magnesium	MG/KG	32000	100%	21700 *	3	76	76	5820		6650		15200		11900		6380		5870	
Manganese	MG/KG	2100	78%	1100 *	5	59	76	415	R	622		423		383		418		1140	
Mercury	MG/KG	0.12	45%	0.1	1	34	76	0.02	J	0.03	J	0.02	U	0.03	U	0.03	J	0.03	J
Nickel	MG/KG	62.3	100%	50 *	8	76	76	39.3		40.2		29.3		22.3		31.7		37.3	
Potassium	MG/KG	2490	100%	2623 *	0	76	76	1250		1420		1470		1030		1470		2090	
Selenium	MG/KG	0.86	33%	2	0	25	76	0.12	U	0.36	J	0.11	UJ	0.1	UJ	0.42	J	0.53	J
Silver	MG/KG	1.2	8%	0.8 *	4	6	76	0.78	U	0.79	U	0.55	U	0.57	U	0.52	U	0.82	U
Sodium	MG/KG	134	61%	188 *	0	46	76	49.1	J	100	J	120	J	133	J	64.4	J	53.3	J
Thallium	MG/KG	0	0%	0.855 *	0	0	76	0.2	U	0.13	U	0.19	U	0.17	U	0.19	U	0.26	U
Vanadium	MG/KG	31	100%	150	0	76	76	18.5		23.4		18.1		13		22		28.7	
Zinc	MG/KG	1010	100%	115 *	12	76	76	91.5		93.2		72.1		84		71.7		73.9	
Nitrate/Nitrite	MG/KG	2.7	100%			37	37												

* Soil criteria for these inorganics are site background values.

Seneca Jepot
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Subsurface Soil Sample Results
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								ESI		ESI		ESI		ESI		ESI		ESI	
								SB4-8		SB4-9		SB4-9		SB4-9		SEAD-4		SEAD-4	
								SOIL		SOIL		SOIL		SOIL		TP4-1		TP4-2	
								4		0		2		4		3		3	
								6		2		4		6		3		3	
			FREQUENCY		NUMBER	NUMBER	NUMBER	12/5/1993		12/5/1993		12/5/1993		12/5/1993		11/10/1993		11/10/1993	
			OF		ABOVE	OF	OF	**SB4-8-3**		**SB4-9-1**		**SB4-9-2**		**SB4-9-3**		**TP4-1**		**TP4-2**	
	UNIT	MAXIMUM	DETECTION	TAGM	TAGM	DETECTS	ANALYSES	SA		SA		SA		SA		SA		SA	
								N		N		N		N		N		N	
Volatiles																			
1,1,1-Trichloroethane	UG/KG	0	0%	800	0	0	76	11	U	11	U	12	U	11	U	11	U	11	U
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	600	0	0	76	11	U	11	U	12	U	11	U	11	U	11	U
1,1,2-Trichloroethane	UG/KG	0	0%		0	0	76	11	U	11	U	12	U	11	U	11	U	11	U
1,1-Dichloroethane	UG/KG	0	0%	200	0	0	76	11	U	11	U	12	U	11	U	11	U	11	U
1,1-Dichloroethene	UG/KG	0	0%	400	0	0	76	11	U	11	U	12	U	11	U	11	U	11	U
1,2-Dichloroethane	UG/KG	0	0%	100	0	0	76	11	U	11	U	12	U	11	U	11	U	11	U
1,2-Dichloroethene (total)	UG/KG	0	0%		0	0	76	11	U	11	U	12	U	11	U	11	U	11	U
1,2-Dichloropropane	UG/KG	0	0%		0	0	76	11	U	11	U	12	U	11	U	11	U	11	U
Acetone	UG/KG	31	9%	200	0	7	76	11	U	11	U	12	U	11	U	11	U	11	U
Benzene	UG/KG	0	0%	60	0	0	76	11	U	11	U	12	U	11	U	11	U	11	U
Bromodichloromethane	UG/KG	0	0%		0	0	76	11	U	11	U	12	U	11	U	11	U	11	U
Bromoform	UG/KG	0	0%		0	0	76	11	U	11	U	12	U	11	U	11	U	11	U
Carbon disulfide	UG/KG	0	0%	2700	0	0	76	11	U	11	U	12	U	11	U	11	U	11	U
Carbon tetrachloride	UG/KG	0	0%	600	0	0	76	11	U	11	U	12	U	11	U	11	U	11	U
Chlorobenzene	UG/KG	0	0%	1700	0	0	76	11	U	11	U	12	U	11	U	11	U	11	U
Chlorodibromomethane	UG/KG	0	0%		0	0	76	11	U	11	U	12	U	11	U	11	U	11	U
Chloroethane	UG/KG	0	0%	1900	0	0	76	11	U	11	U	12	U	11	U	11	U	11	U
Chloroform	UG/KG	15	8%	300	0	6	76	2	J	11	U	2	J	3	J	11	U	11	U
Cis-1,3-Dichloropropene	UG/KG	0	0%		0	0	76	11	U	11	U	12	U	11	U	11	U	11	U
Ethyl benzene	UG/KG	1	1%	5500	0	1	76	11	U	11	U	12	U	11	U	11	U	11	U
Methyl bromide	UG/KG	0	0%		0	0	76	11	U	11	U	12	U	11	U	11	U	11	U
Methyl butyl ketone	UG/KG	0	0%		0	0	76	11	U	11	U	12	U	11	U	11	U	11	U
Methyl chloride	UG/KG	0	0%		0	0	76	11	U	11	U	12	U	11	U	11	U	11	U
Methyl ethyl ketone	UG/KG	0	0%	300	0	0	76	11	U	11	U	12	U	11	U	11	U	11	U
Methyl isobutyl ketone	UG/KG	0	0%	1000	0	0	76	11	U	11	U	12	U	11	U	11	U	11	U
Methylene chloride	UG/KG	2	3%	100	0	2	76	11	U	11	U	12	U	11	U	11	U	11	U
Styrene	UG/KG	0	0%		0	0	76	11	U	11	U	12	U	11	U	11	U	11	U
Tetrachloroethene	UG/KG	0	0%	1400	0	0	76	11	U	11	U	12	U	11	U	11	U	11	U
Toluene	UG/KG	13	28%	1500	0	21	76	11	U	11	U	12	U	11	U	11	U	11	U
Total Xylenes	UG/KG	8	4%	1200	0	3	76	11	U	11	U	12	U	11	U	11	U	11	U
Trans-1,3-Dichloropropene	UG/KG	0	0%		0	0	76	11	U	11	U	12	U	11	U	11	U	11	U
Trichloroethene	UG/KG	0	0%	700	0	0	76	11	U	11	U	12	U	11	U	11	U	11	U
Vinyl chloride	UG/KG	0	0%	200	0	0	76	11	U	11	U	12	U	11	U	11	U	11	U
Semivolatile Organics																			
1,2,4-Trichlorobenzene	UG/KG	0	0%	3400	0	0	76	360	U	390	U	400	U	350	U	370	U	370	U
1,2-Dichlorobenzene	UG/KG	0	0%	7900	0	0	76	360	U	390	U	400	U	350	U	370	U	370	U
1,3-Dichlorobenzene	UG/KG	0	0%	1600	0	0	76	360	U	390	U	400	U	350	U	370	U	370	U
1,4-Dichlorobenzene	UG/KG	0	0%	8500	0	0	76	360	U	390	U	400	U	350	U	370	U	370	U
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%		0	0	39	360	U	390	U	400	U	350	U	370	U	370	U
2,4,5-Trichlorophenol	UG/KG	0	0%	100	0	0	76	880	U	950	U	980	U	860	U	910	U	890	U
2,4,6-Trichlorophenol	UG/KG	0	0%		0	0	76	360	U	390	U	400	U	350	U	370	U	370	U
2,4-Dichlorophenol	UG/KG	0	0%	400	0	0	76	360	U	390	U	400	U	350	U	370	U	370	U
2,4-Dimethylphenol	UG/KG	0	0%		0	0	76	360	U	390	U	400	U	350	U	370	U	370	U
2,4-Dinitrophenol	UG/KG	0	0%	200	0	0	76	900	U	950	U	980	U	860	U	910	U	890	U
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	76	370	U	390	U	400	U	350	U	370	U	370	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	76	360	U	390	U	400	U	350	U	370	U	370	U
2-Chloronaphthalene	UG/KG	0	0%		0	0	76	360	U	390	U	400	U	350	U	370	U	370	U
2-Chlorophenol	UG/KG	0	0%	800	0	0	76	360	U	390	U	400	U	350	U	370	U	370	U
2-Methylnaphthalene	UG/KG	260	4%	36400	0	3	76	360	U	390	U	400	U	350	U	370	U	370	U

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	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	ESI		ESI		ESI		ESI		ESI		ESI	
								SB4-8		SB4-9		SB4-9		SB4-9		SEAD-4		SEAD-4	
								SOIL		SOIL		SOIL		SOIL		TP4-1		TP4-2	
								4		0		2		4		3		3	
								6		2		4		6		3		3	
								12/5/1993		12/5/1993		12/5/1993		12/5/1993		11/10/1993		11/10/1993	
								SB4-8-3		**SB4-9-1**		**SB4-9-2**		**SB4-9-3**		**TP4-1**		**TP4-2**	
								SA		SA		SA		SA		SA		SA	
								N		N		N		N		N		N	
2-Methylphenol	UG/KG	0	0%	100	0	0	76	360	U	390	U	400	U	350	U	370	U	370	U
2-Nitroaniline	UG/KG	0	0%	430	0	0	76	880	U	950	U	980	U	860	U	910	U	890	U
2-Nitrophenol	UG/KG	0	0%	330	0	0	76	360	U	390	U	400	U	350	U	370	U	370	U
3,3'-Dichlorobenzidine	UG/KG	0	0%		0	0	76	370	U	390	U	400	U	350	U	370	U	370	U
3-Nitroaniline	UG/KG	0	0%	500	0	0	76	880	U	950	U	980	U	860	U	910	U	890	U
4,6-Dinitro-2-methylphenol	UG/KG	0	0%		0	0	76	900	U	950	U	980	U	860	U	910	U	890	U
4-Bromophenyl phenyl ether	UG/KG	0	0%		0	0	76	370	U	390	U	400	U	350	U	370	U	370	U
4-Chloro-3-methylphenol	UG/KG	0	0%	240	0	0	76	360	U	390	U	400	U	350	U	370	U	370	U
4-Chloroaniline	UG/KG	0	0%	220	0	0	76	360	U	390	U	400	U	350	U	370	U	370	U
4-Chlorophenyl phenyl ether	UG/KG	0	0%		0	0	76	370	U	390	U	400	U	350	U	370	U	370	U
4-Methylphenol	UG/KG	0	0%	900	0	0	76	360	U	390	U	400	U	350	U	370	U	370	U
4-Nitroaniline	UG/KG	0	0%		0	0	76	900	U	950	U	980	U	860	U	910	U	890	U
4-Nitrophenol	UG/KG	0	0%	100	0	0	76	900	U	950	U	980	U	860	U	910	U	890	U
Acenaphthene	UG/KG	88	3%	50000	0	2	76	360	U	72	J	400	U	350	U	370	U	370	U
Acenaphthylene	UG/KG	170	4%	41000	0	3	76	360	U	45	J	400	U	350	U	370	U	370	U
Anthracene	UG/KG	340	4%	50000	0	3	76	370	U	340	J	400	U	350	U	370	U	370	U
Benzo(a)anthracene	UG/KG	1100	7%	224	2	5	76	370	U	1100		400	U	350	U	370	U	370	U
Benzo(a)pyrene	UG/KG	880	8%	61	2	6	76	370	U	880		400	U	350	U	370	U	370	U
Benzo(b)fluoranthene	UG/KG	730	9%	1100	0	7	76	370	U	730		400	U	350	U	370	U	370	U
Benzo(ghi)perylene	UG/KG	270	3%	50000	0	2	76	370	U	270	J	400	U	350	U	370	U	370	U
Benzo(k)fluoranthene	UG/KG	890	5%	1100	0	4	76	370	U	890		400	U	350	U	370	U	370	U
Bis(2-Chloroethoxy)methane	UG/KG	0	0%		0	0	76	360	U	390	U	400	U	350	U	370	U	370	U
Bis(2-Chloroethyl)ether	UG/KG	0	0%		0	0	76	360	U	390	U	400	U	350	U	370	U	370	U
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%		0	0	37												
Bis(2-Ethylhexyl)phthalate	UG/KG	2000	11%	50000	0	8	76	18	UR	42	JR	23	UR	19	JR	370	U	370	U
Butylbenzylphthalate	UG/KG	120	1%	50000	0	1	76	370	UR	390	UR	400	UR	350	UR	370	U	370	U
Carbazole	UG/KG	160	1%		0	1	76	370	U	160	J	400	U	350	U	370	U	370	U
Chrysene	UG/KG	1000	11%	400	2	8	76	370	U	1000		400	U	350	U	370	U	370	U
Di-n-butylphthalate	UG/KG	63	24%	8100	0	18	76	370	UR	34	JR	400	U	350	UR	33	J	370	U
Di-n-octylphthalate	UG/KG	37	21%	50000	0	16	76	370	U	390	U	400	U	350	U	370	U	370	U
Dibenz(a,h)anthracene	UG/KG	48	1%	14	1	1	76	370	U	390	U	400	U	350	U	370	U	370	U
Dibenzofuran	UG/KG	33	1%	6200	0	1	76	370	U	33	J	400	U	350	U	370	U	370	U
Diethyl phthalate	UG/KG	0	0%	7100	0	0	76	370	U	390	U	400	U	350	U	370	U	370	U
Dimethylphthalate	UG/KG	0	0%	2000	0	0	76	380	U	390	U	400	U	350	U	370	U	370	U
Fluoranthene	UG/KG	2400	11%	50000	0	8	76	370	U	2400		400	U	350	U	19	J	370	U
Fluorene	UG/KG	330	4%	50000	0	3	76	370	U	110	J	400	U	350	U	370	U	370	U
Hexachlorobenzene	UG/KG	0	0%	410	0	0	76	370	U	390	U	400	U	350	U	370	U	370	U
Hexachlorobutadiene	UG/KG	0	0%		0	0	76	360	U	390	U	400	U	350	U	370	U	370	U
Hexachlorocyclopentadiene	UG/KG	0	0%		0	0	76	360	U	390	U	400	U	350	U	370	U	370	U
Hexachloroethane	UG/KG	0	0%		0	0	76	360	U	390	U	400	U	350	U	370	U	370	U
Indeno(1,2,3-cd)pyrene	UG/KG	260	3%	3200	0	2	76	370	U	260	J	400	U	350	U	370	U	370	U
Isophorone	UG/KG	0	0%	4400	0	0	76	360	U	390	U	400	U	350	U	370	U	370	U
N-Nitrosodiphenylamine	UG/KG	0	0%		0	0	76	370	U	390	U	400	U	350	U	370	U	370	U
N-Nitrosodipropylamine	UG/KG	0	0%		0	0	76	360	U	390	U	400	U	350	U	370	U	370	U
Naphthalene	UG/KG	130	3%	13000	0	2	76	360	U	390	U	400	U	350	U	370	U	370	U
Nitrobenzene	UG/KG	0	0%	200	0	0	76	360	U	390	U	400	U	350	U	370	U	370	U
Pentachlorophenol	UG/KG	0	0%	1000	0	0	76	900	U	950	U	980	U	860	U	910	U	890	U
Phenanthrene	UG/KG	1400	8%	50000	0	6	76	370	U	1400		400	U	350	U	370	U	370	U
Phenol	UG/KG	0	0%	30	0	0	76	360	U	390	U	400	U	350	U	370	U	370	U
Pyrene	UG/KG	1800	9%	50000	0	7	76	370	U	1800		400	U	350	U	370	U	370	U

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								ESI		ESI		ESI		ESI		ESI		ESI	
								SB4-8		SB4-9		SB4-9		SB4-9		SEAD-4		SEAD-4	
								SOIL		SOIL		SOIL		SOIL		TP4-1		TP4-2	
								4		0		2		4		3		3	
								6		2		4		6		3		3	
			FREQUENCY		NUMBER	NUMBER	NUMBER	12/5/1993		12/5/1993		12/5/1993		12/5/1993		11/10/1993		11/10/1993	
			OF		ABOVE	OF	OF	**SB4-8-3**		**SB4-9-1**		**SB4-9-2**		**SB4-9-3**		**TP4-1**		**TP4-2**	
	UNIT	MAXIMUM	DETECTION	TAGM	TAGM	DETECTS	ANALYSES	SA		SA		SA		SA		SA		SA	
								N		N		N		N		N		N	
Nitroaromatics																			
1,3-Dinitrobenzene	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	130	U	130	U
2,4,6-Trinitrotoluene	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	130	U	130	U
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	130	U	130	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	76	130	U	130	U	130	U	130	U	130	U	130	U
2-Nitrotoluene	UG/KG	0	0%		0	0	37												
2-amino-4,6-Dinitrotoluene	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	130	U	130	U
3-Nitrotoluene	UG/KG	0	0%		0	0	37												
4-Nitrotoluene	UG/KG	0	0%		0	0	37												
4-amino-2,6-Dinitrotoluene	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	130	U	130	U
HMX	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	130	U	130	U
Nitrobenzene	UG/KG	0	0%	200	0	0	37												
RDX	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	130	U	130	U
Tetryl	UG/KG	67	1%		0	1	76	130	U	130	U	67	J	130	U	130	U	130	U
Pesticides/PCBs																			
4,4'-DDD	UG/KG	0	0%	2900	0	0	76	3.6	U	3.9	U	4	U	3.5	U	3.7	U	3.7	U
4,4'-DDE	UG/KG	21	4%	2100	0	3	76	3.6	U	3.9	U	4	U	3.5	U	3.7	U	3.7	U
4,4'-DDT	UG/KG	2.9	1%	2100	0	1	76	3.6	U	3.9	U	4	U	3.5	U	3.7	U	3.7	U
Aldrin	UG/KG	8.2	1%	41	0	1	76	1.9	U	2	U	2.1	U	1.8	U	1.9	U	1.9	U
Alpha-BHC	UG/KG	0	0%	110	0	0	76	1.9	U	2	U	2.1	U	1.8	U	1.9	U	1.9	U
Alpha-Chlordane	UG/KG	10	1%		0	1	76	1.9	U	2	U	2.1	U	1.8	U	1.9	U	1.9	U
Aroclor-1016	UG/KG	0	0%		0	0	76	36	U	39	U	40	U	35	U	37	U	37	U
Aroclor-1221	UG/KG	0	0%		0	0	76	74	U	79	U	82	U	71	U	76	U	75	U
Aroclor-1232	UG/KG	0	0%		0	0	76	36	U	39	U	40	U	35	U	37	U	37	U
Aroclor-1242	UG/KG	0	0%		0	0	76	36	U	39	U	40	U	35	U	37	U	37	U
Aroclor-1248	UG/KG	27	1%		0	1	76	36	U	39	U	40	U	35	U	37	U	37	U
Aroclor-1254	UG/KG	1600	5%	10000	0	4	76	36	U	39	U	40	U	35	U	37	U	37	U
Aroclor-1260	UG/KG	0	0%	10000	0	0	76	36	U	39	U	40	U	35	U	37	U	37	U
Beta-BHC	UG/KG	1.4	1%	200	0	1	76	1.9	U	2	U	2.1	U	1.8	U	1.9	U	1.9	U
Delta-BHC	UG/KG	5.9	1%	300	0	1	76	1.9	U	2	U	2.1	U	1.8	U	1.9	U	1.9	U
Dieldrin	UG/KG	0	0%	44	0	0	76	3.6	U	3.9	U	4	U	3.5	U	3.7	U	3.7	U
Endosulfan I	UG/KG	11	1%	900	0	1	76	1.9	U	2	U	2.1	U	1.8	U	1.9	U	1.9	U
Endosulfan II	UG/KG	0	0%	900	0	0	76	3.6	U	3.9	U	4	U	3.5	U	3.7	U	3.7	U
Endosulfan sulfate	UG/KG	0	0%	1000	0	0	76	3.6	U	3.9	U	4	U	3.5	U	3.7	U	3.7	U
Endrin	UG/KG	34	1%	100	0	1	76	3.6	U	3.9	U	4	U	3.5	U	3.7	U	3.7	U
Endrin aldehyde	UG/KG	3.7	1%		0	1	76	3.6	U	3.9	U	4	U	3.5	U	3.7	U	3.7	U
Endrin ketone	UG/KG	0	0%		0	0	76	3.6	U	3.9	U	4	U	3.5	U	3.7	U	3.7	U
Gamma-BHC/Lindane	UG/KG	0	0%	60	0	0	76	1.9	U	2	U	2.1	U	1.8	U	1.9	U	1.9	U
Gamma-Chlordane	UG/KG	0	0%	540	0	0	76	1.9	U	2	U	2.1	U	1.8	U	1.9	U	1.9	U
Heptachlor	UG/KG	0	0%	100	0	0	76	1.9	U	2	U	2.1	U	1.8	U	1.9	U	1.9	U
Heptachlor epoxide	UG/KG	0	0%	20	0	0	76	1.9	U	2	U	2.1	U	1.8	U	1.9	U	1.9	U
Methoxychlor	UG/KG	0	0%		0	0	76	19	U	20	U	21	U	18	U	19	U	19	U
Toxaphene	UG/KG	0	0%		0	0	76	190	U	200	U	210	U	180	U	190	U	190	U
Herbicides																			
2,4,5-T	UG/KG	0	0%	1900	0	0	39	5.6	U	5.9	U	6.1	U	5.4	U	5.7	U	5.6	U
2,4,5-TP/Silvex	UG/KG	0	0%	700	0	0	39	5.6	U	5.9	U	6.1	U	5.4	U	5.7	U	5.6	U
2,4-D	UG/KG	0	0%	500	0	0	39	56	U	59	U	61	U	54	U	57	U	56	U
2,4-DB	UG/KG	0	0%		0	0	39	56	U	59	U	61	U	54	U	57	U	56	U
Dalapon	UG/KG	0	0%		0	0	39	140	U	150	U	150	U	130	U	140	U	140	U

								ESI		ESI		ESI		ESI		ESI		ESI	
								SB4-8		SB4-9		SB4-9		SB4-9		SEAD-4		SEAD-4	
								SOIL		SOIL		SOIL		SOIL		TP4-1		TP4-2	
								4		0		2		4		3		3	
								6		2		4		6		3		3	
			FREQUENCY		NUMBER	NUMBER	NUMBER	12/5/1993		12/5/1993		12/5/1993		12/5/1993		11/10/1993		11/10/1993	
			OF		ABOVE	OF	OF	**SB4-8-3**		**SB4-9-1**		**SB4-9-2**		**SB4-9-3**		**TP4-1**		**TP4-2**	
	UNIT	MAXIMUM	DETECTION	TAGM	TAGM	DETECTS	ANALYSES	SA		SA		SA		SA		SA		SA	
								N		N		N		N		N		N	
Dicamba	UG/KG	23	3%		0	1	39	5.6	U	5.9	U	6.1	U	5.4	U	5.7	U	5.6	U
Dichloroprop	UG/KG	0	0%		0	0	39	56	U	59	U	61	U	54	U	57	U	56	U
Dinoseb	UG/KG	0	0%		0	0	39	28	U	30	U	31	U	27	U	29	U	28	U
MCPA	UG/KG	0	0%		0	0	39	5600	U	5900	U	6100	U	5400	U	5700	U	5600	U
MCPP	UG/KG	0	0%		0	0	39	5600	U	5900	U	6100	U	5400	U	5700	U	5600	U
Metals																			
Aluminum	MG/KG	21000	100%	19520 *	3	76	76	9180		12800		20400		13500		18200		17700	
Antimony	MG/KG	57.8	28%	6 *	10	21	76	2.5	UJ	3.7	J	4.1	UJ	3.3	UJ	11.1	U	11.2	U
Arsenic	MG/KG	21.5	100%	8.9 *	4	76	76	4.9		4.5		6.5		4.6		7.2	J	6.4	J
Barium	MG/KG	133	100%	300	0	76	76	63.5		94.1		102		51.3		91.9		86.3	
Beryllium	MG/KG	1	99%	1.13 *	0	75	76	0.37	J	0.75	J	0.97		0.69	J	0.83	J	0.83	J
Cadmium	MG/KG	1.5	4%	2.46 *	0	3	76	0.24	U	0.35	U	0.4	U	0.32	U	0.69	UR	0.7	UR
Calcium	MG/KG	102000	100%	125300 *	0	76	76	77000		3660		2770		2350		6450		3130	
Chromium	MG/KG	3820	80%	30 *	17	61	76	14.1	R	17.6	R	33.2	R	23.3	R	27.1		27.6	
Cobalt	MG/KG	29.1	100%	30	0	76	76	7.9		9		17.3		14.8		13.5		13.9	
Copper	MG/KG	2250	100%	33 *	14	76	76	21.1	J	13.1	J	24.9	J	11	J	21.3	J	23.8	J
Cyanide	MG/KG	0	0%	0.35	0	0	76	0.52	U	0.56	U	0.59	U	0.5	U	0.52	U	0.52	U
Iron	MG/KG	40900	100%	37410 *	6	76	76	18500		20600		39000		29600		33500		35400	
Lead	MG/KG	251	100%	24.4 *	6	76	76	44.2		26.4	J	12.2	J	6.3	J	11.3		13.4	
Magnesium	MG/KG	32000	100%	21700 *	3	76	76	17700		3090		7870		5950		5920		5500	
Manganese	MG/KG	2100	78%	1100 *	5	59	76	420		794		633		252		687		714	
Mercury	MG/KG	0.12	45%	0.1	1	34	76	0.01	U	0.07	J	0.03	U	0.02	U	0.04	J	0.04	J
Nickel	MG/KG	62.3	100%	50 *	8	76	76	23.1		18.3		57.1		42.2		33.7		36	
Potassium	MG/KG	2490	100%	2623 *	0	76	76	1380		1020		1800		980		1680		1480	
Selenium	MG/KG	0.86	33%	2	0	25	76	0.22	J	0.47	J	0.47	J	0.11	J	0.21	UJ	0.16	UJ
Silver	MG/KG	1.2	8%	0.8 *	4	6	76	0.48	U	0.7	U	0.79	U	0.63	U	1.4	UJ	1.4	UJ
Sodium	MG/KG	134	61%	188 *	0	46	76	134	J	49.1	J	44.1	J	39.3	J	64.7	J	53.8	J
Thallium	MG/KG	0	0%	0.855 *	0	0	76	0.14	U	0.23	U	0.21	U	0.17	U	0.22	UJ	0.18	UJ
Vanadium	MG/KG	31	100%	150	0	76	76	14.8		22.6		28.4		17.8		28.8		27.2	
Zinc	MG/KG	1010	100%	115 *	12	76	76	58.5		56.6		93.6		80.5		73.4	J	72.7	J
Nitrate/Nitrite	MG/KG	2.7	100%			37	37												

* Soil criteria for these inorganics are site background values.

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SEAD-4 Remedial Investigation
Subsurface Soil Sample Results
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								ESI		ESI		ESI		ESI		ESI		ESI	
								SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								TP4-3		TP4-4		TP4-5		TP4-6		TP4-7		TP4-8	
								4		4		4		6		5		3	
								4		4		4		6		5		3	
	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	12/5/1993		12/5/1993		12/5/1993		12/5/1993		12/5/1993		12/5/1993	
								TP4-3		**TP4-4**		**TP4-5**		**TP4-6**		**TP4-7**		**TP4-8**	
								SA		SA		SA		SA		SA		SA	
								N		N		N		N		N		N	
Volatiles																			
1,1,1-Trichloroethane	UG/KG	0	0%	800	0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	600	0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
1,1,2-Trichloroethane	UG/KG	0	0%		0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
1,1-Dichloroethane	UG/KG	0	0%	200	0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
1,1-Dichloroethene	UG/KG	0	0%	400	0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
1,2-Dichloroethane	UG/KG	0	0%	100	0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
1,2-Dichloroethene (total)	UG/KG	0	0%		0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
1,2-Dichloropropane	UG/KG	0	0%		0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
Acetone	UG/KG	31	9%	200	0	7	76	11	U	13	U	11	U	11	U	11	U	12	U
Benzene	UG/KG	0	0%	60	0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
Bromodichloromethane	UG/KG	0	0%		0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
Bromoform	UG/KG	0	0%		0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
Carbon disulfide	UG/KG	0	0%	2700	0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
Carbon tetrachloride	UG/KG	0	0%	600	0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
Chlorobenzene	UG/KG	0	0%	1700	0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
Chlorodibromomethane	UG/KG	0	0%		0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
Chloroethane	UG/KG	0	0%	1900	0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
Chloroform	UG/KG	15	8%	300	0	6	76	15		12	U	11	U	11	U	5	J	12	U
Cis-1,3-Dichloropropene	UG/KG	0	0%		0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
Ethyl benzene	UG/KG	1	1%	5500	0	1	76	11	U	12	U	11	U	11	U	11	U	12	U
Methyl bromide	UG/KG	0	0%		0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
Methyl butyl ketone	UG/KG	0	0%		0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
Methyl chloride	UG/KG	0	0%		0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
Methyl ethyl ketone	UG/KG	0	0%	300	0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
Methyl isobutyl ketone	UG/KG	0	0%	1000	0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
Methylene chloride	UG/KG	2	3%	100	0	2	76	11	U	12	U	11	U	11	U	11	U	12	U
Styrene	UG/KG	0	0%		0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
Tetrachloroethene	UG/KG	0	0%	1400	0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
Toluene	UG/KG	13	28%	1500	0	21	76	11	U	12	U	11	U	11	U	11	U	12	U
Total Xylenes	UG/KG	8	4%	1200	0	3	76	11	U	12	U	11	U	11	U	11	U	12	U
Trans-1,3-Dichloropropene	UG/KG	0	0%		0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
Trichloroethene	UG/KG	0	0%	700	0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
Vinyl chloride	UG/KG	0	0%	200	0	0	76	11	U	12	U	11	U	11	U	11	U	12	U
Semivolatile Organics																			
1,2,4-Trichlorobenzene	UG/KG	0	0%	3400	0	0	76	380	U	380	U	380	U	370	U	380	UJ	390	U
1,2-Dichlorobenzene	UG/KG	0	0%	7900	0	0	76	380	U	380	U	380	U	370	U	380	UJ	390	U
1,3-Dichlorobenzene	UG/KG	0	0%	1600	0	0	76	380	U	380	U	380	U	370	U	380	UJ	390	U
1,4-Dichlorobenzene	UG/KG	0	0%	8500	0	0	76	380	U	380	U	380	U	370	U	380	UJ	390	U
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%		0	0	39	380	U	380	U	380	U	370	U	380	UJ	390	U
2,4,5-Trichlorophenol	UG/KG	0	0%	100	0	0	76	930	U	930	U	930	U	890	U	920	UJ	940	U
2,4,6-Trichlorophenol	UG/KG	0	0%		0	0	76	380	U	380	U	380	U	370	U	380	UJ	390	U
2,4-Dichlorophenol	UG/KG	0	0%	400	0	0	76	380	U	380	U	380	U	370	U	380	UJ	390	U
2,4-Dimethylphenol	UG/KG	0	0%		0	0	76	380	U	380	U	380	U	370	U	380	UJ	390	U
2,4-Dinitrophenol	UG/KG	0	0%	200	0	0	76	930	U	930	U	930	U	890	U	920	UJ	940	U
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	76	380	U	380	U	380	U	370	U	380	UJ	390	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	76	380	U	380	U	380	U	370	U	380	UJ	390	U
2-Chloronaphthalene	UG/KG	0	0%		0	0	76	380	U	380	U	380	U	370	U	380	UJ	390	U
2-Chlorophenol	UG/KG	0	0%	800	0	0	76	380	U	380	U	380	U	370	U	380	UJ	390	U
2-Methylnaphthalene	UG/KG	260	4%	36400	0	3	76	380	U	380	U	380	U	370	U	380	UJ	390	U

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SEAD-4 Remedial Investigation
Subsurface Soil Sample Results
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								ESI		ESI		ESI		ESI		ESI		ESI	
								SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								TP4-3		TP4-4		TP4-5		TP4-6		TP4-7		TP4-8	
								4		4		4		6		5		3	
								4		4		4		6		5		3	
	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	12/5/1993		12/5/1993		12/5/1993		12/5/1993		12/5/1993		12/5/1993	
								TP4-3		TP4-4		TP4-5		TP4-6		TP4-7		TP4-8	
								SA		SA		SA		SA		SA		SA	
								N		N		N		N		N		N	
2-Methylphenol	UG/KG	0	0%	100	0	0	76	380	U	380	U	380	U	370	U	380	UJ	390	U
2-Nitroaniline	UG/KG	0	0%	430	0	0	76	930	U	930	U	930	U	890	U	920	UJ	940	U
2-Nitrophenol	UG/KG	0	0%	330	0	0	76	380	U	380	U	380	U	370	U	380	UJ	390	U
3,3'-Dichlorobenzidine	UG/KG	0	0%		0	0	76	380	U	380	U	380	U	370	U	380	UJ	390	U
3-Nitroaniline	UG/KG	0	0%	500	0	0	76	930	U	930	U	930	U	890	U	920	UJ	940	U
4,6-Dinitro-2-methylphenol	UG/KG	0	0%		0	0	76	930	U	930	U	930	U	890	U	920	UJ	940	U
4-Bromophenyl phenyl ether	UG/KG	0	0%		0	0	76	380	U	380	U	380	U	370	U	380	UJ	390	U
4-Chloro-3-methylphenol	UG/KG	0	0%	240	0	0	76	380	U	380	U	380	U	370	U	380	UJ	390	U
4-Chloroaniline	UG/KG	0	0%	220	0	0	76	380	U	380	U	380	U	370	U	380	UJ	390	U
4-Chlorophenyl phenyl ether	UG/KG	0	0%		0	0	76	380	U	380	U	380	U	370	U	380	UJ	390	U
4-Methylphenol	UG/KG	0	0%	900	0	0	76	380	U	380	U	380	U	370	U	380	UJ	390	U
4-Nitroaniline	UG/KG	0	0%		0	0	76	930	U	930	U	930	U	890	U	920	UJ	940	U
4-Nitrophenol	UG/KG	0	0%	100	0	0	76	930	U	930	U	930	U	890	U	920	UJ	940	U
Acenaphthene	UG/KG	88	3%	50000	0	2	76	380	U	380	U	380	U	370	U	380	UJ	390	U
Acenaphthylene	UG/KG	170	4%	41000	0	3	76	380	U	380	U	380	U	370	U	380	UJ	390	U
Anthracene	UG/KG	340	4%	50000	0	3	76	380	U	380	U	380	U	370	U	380	UJ	390	U
Benzo(a)anthracene	UG/KG	1100	7%	224	2	5	76	380	U	380	U	380	U	370	U	380	UJ	390	U
Benzo(a)pyrene	UG/KG	880	8%	61	2	6	76	380	U	380	U	380	U	370	U	380	UJ	390	U
Benzo(b)fluoranthene	UG/KG	730	9%	1100	0	7	76	380	U	380	U	380	U	370	U	380	UJ	390	U
Benzo(ghi)perylene	UG/KG	270	3%	50000	0	2	76	380	U	380	U	380	U	370	U	380	UJ	390	U
Benzo(k)fluoranthene	UG/KG	890	5%	1100	0	4	76	380	U	380	U	380	U	370	U	380	UJ	390	U
Bis(2-Chloroethoxy)methane	UG/KG	0	0%		0	0	76	380	U	380	U	380	U	370	U	380	UJ	390	U
Bis(2-Chloroethyl)ether	UG/KG	0	0%		0	0	76	380	U	380	U	380	U	370	U	380	UJ	390	U
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%		0	0	37												
Bis(2-Ethylhexyl)phthalate	UG/KG	2000	11%	50000	0	8	76	380	U	380	U	380	U	370	U	380	UJ	390	U
Butylbenzylphthalate	UG/KG	120	1%	50000	0	1	76	380	U	380	U	380	U	370	U	380	UJ	390	U
Carbazole	UG/KG	160	1%		0	1	76	380	U	380	U	380	U	370	U	380	UJ	390	U
Chrysene	UG/KG	1000	11%	400	2	8	76	380	U	380	U	380	U	370	U	380	UJ	390	U
Di-n-butylphthalate	UG/KG	63	24%	8100	0	18	76	380	U	380	U	380	U	55	J	380	UJ	390	U
Di-n-octylphthalate	UG/KG	37	21%	50000	0	16	76	380	U	380	U	380	U	370	U	380	UJ	390	U
Dibenz(a,h)anthracene	UG/KG	48	1%	14	1	1	76	380	U	380	U	380	U	370	U	380	UJ	390	U
Dibenzofuran	UG/KG	33	1%	6200	0	1	76	380	U	380	U	380	U	370	U	380	UJ	390	U
Diethyl phthalate	UG/KG	0	0%	7100	0	0	76	380	U	380	U	380	U	370	U	380	UJ	390	U
Dimethylphthalate	UG/KG	0	0%	2000	0	0	76	380	U	380	U	380	U	370	U	380	UJ	390	U
Fluoranthene	UG/KG	2400	11%	50000	0	6	76	380	U	380	U	380	U	370	U	380	UJ	390	U
Fluorene	UG/KG	330	4%	50000	0	3	76	380	U	380	U	380	U	370	U	380	UJ	390	U
Hexachlorobenzene	UG/KG	0	0%	410	0	0	76	380	U	380	U	380	U	370	U	380	UJ	390	U
Hexachlorobutadiene	UG/KG	0	0%		0	0	76	380	U	380	U	380	U	370	U	380	UJ	390	U
Hexachlorocyclopentadiene	UG/KG	0	0%		0	0	76	380	U	380	U	380	U	370	U	380	UJ	390	U
Hexachloroethane	UG/KG	0	0%		0	0	76	380	U	380	U	380	U	370	U	380	UJ	390	U
Indeno(1,2,3-cd)pyrene	UG/KG	260	3%	3200	0	2	76	380	U	380	U	380	U	370	U	380	UJ	390	U
Isophorone	UG/KG	0	0%	4400	0	0	76	380	U	380	U	380	U	370	U	380	UJ	390	U
N-Nitrosodiphenylamine	UG/KG	0	0%		0	0	76	380	U	380	U	380	U	370	U	380	UJ	390	U
N-Nitrosodipropylamine	UG/KG	0	0%		0	0	76	380	U	380	U	380	U	370	U	380	UJ	390	U
Naphthalene	UG/KG	130	3%	13000	0	2	76	380	U	380	U	380	U	370	U	380	UJ	390	U
Nitrobenzene	UG/KG	0	0%	200	0	0	76	380	U	380	U	380	U	370	U	380	UJ	390	U
Pentachlorophenol	UG/KG	0	0%	1000	0	0	76	930	U	930	U	930	U	890	U	920	UJ	940	U
Phenanthrene	UG/KG	1400	8%	50000	0	6	76	380	U	380	U	380	U	370	U	380	UJ	390	U
Phenol	UG/KG	0	0%	30	0	0	76	380	U	380	U	380	U	370	U	380	UJ	390	U
Pyrene	UG/KG	1800	9%	50000	0	7	76	380	U	380	U	380	U	370	U	380	UJ	390	U

								ESI		ESI		ESI		ESI		ESI		ESI	
								SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								TP4-3		TP4-4		TP4-5		TP4-6		TP4-7		TP4-8	
								4		4		4		6		5		3	
								4		4		4		6		5		3	
	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	12/5/1993		12/5/1993		12/5/1993		12/5/1993		12/5/1993		12/5/1993	
								TP4-3		**TP4-4**		**TP4-5**		**TP4-6**		**TP4-7**		**TP4-8**	
								SA		SA		SA		SA		SA		SA	
								N		N		N		N		N		N	
Nitroaromatics																			
1,3-Dinitrobenzene	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	130	U	130	U
2,4,6-Trinitrotoluene	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	130	U	130	U
2,4-Dinitrotoluene	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	130	U	130	U
2,6-Dinitrotoluene	UG/KG	0	0%	1000	0	0	76	130	U	130	U	130	U	130	U	130	U	130	U
2-Nitrotoluene	UG/KG	0	0%		0	0	37												
2-amino-4,6-Dinitrotoluene	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	130	U	130	U
3-Nitrotoluene	UG/KG	0	0%		0	0	37												
4-Nitrotoluene	UG/KG	0	0%		0	0	37												
4-amino-2,6-Dinitrotoluene	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	130	U	130	U
HMX	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	130	U	130	U
Nitrobenzene	UG/KG	0	0%	200	0	0	37												
RDX	UG/KG	0	0%		0	0	76	130	U	130	U	130	U	130	U	130	U	130	U
Tetryl	UG/KG	87	1%		0	1	76	130	U	130	U	130	U	130	U	130	U	130	U
Pesticides/PCBs																			
4,4'-DDD	UG/KG	0	0%	2900	0	0	76	3.8	U	3.8	U	3.8	U	3.7	U	3.8	U	3.9	U
4,4'-DDE	UG/KG	21	4%	2100	0	3	76	3.8	U	3.8	U	3.8	U	3.7	U	3.8	U	3.9	U
4,4'-DDT	UG/KG	2.9	1%	2100	0	1	76	3.8	U	3.8	U	3.8	U	3.7	U	3.8	U	3.9	U
Aldrin	UG/KG	8.2	1%	41	0	1	76	2	U	2	U	2	U	1.9	U	2	U	2	U
Alpha-BHC	UG/KG	0	0%	110	0	0	76	2	U	2	U	2	U	1.9	U	2	U	2	U
Alpha-Chlordane	UG/KG	10	1%		0	1	76	2	U	2	U	2	U	1.9	U	2	U	2	U
Aroclor-1016	UG/KG	0	0%		0	0	76	38	U	38	U	38	U	37	U	38	U	39	U
Aroclor-1221	UG/KG	0	0%		0	0	76	78	U	78	U	78	U	74	U	77	U	80	U
Aroclor-1232	UG/KG	0	0%		0	0	76	38	U	38	U	38	U	37	U	38	U	39	U
Aroclor-1242	UG/KG	0	0%		0	0	76	38	U	38	U	38	U	37	U	38	U	39	U
Aroclor-1248	UG/KG	27	1%		0	1	76	38	U	38	U	38	U	37	U	38	U	39	U
Aroclor-1254	UG/KG	1600	5%	10000	0	4	76	38	U	38	U	38	U	37	U	38	U	39	U
Aroclor-1260	UG/KG	0	0%	10000	0	0	76	38	U	38	U	38	U	37	U	38	U	39	U
Beta-BHC	UG/KG	1.4	1%	200	0	1	76	2	U	2	U	2	U	1.9	U	2	U	2	U
Delta-BHC	UG/KG	5.9	1%	300	0	1	76	2	U	2	U	2	U	1.9	U	2	U	2	U
Dieldrin	UG/KG	0	0%	44	0	0	76	3.8	U	3.8	U	3.8	U	3.7	U	3.8	U	3.9	U
Endosulfan I	UG/KG	11	1%	900	0	1	76	2	U	2	U	2	U	1.9	U	2	U	2	U
Endosulfan II	UG/KG	0	0%	900	0	0	76	3.8	U	3.8	U	3.8	U	3.7	U	3.8	U	3.9	U
Endosulfan sulfate	UG/KG	0	0%	1000	0	0	76	3.8	U	3.8	U	3.8	U	3.7	U	3.8	U	3.9	U
Endrin	UG/KG	34	1%	100	0	1	76	3.8	U	3.8	U	3.8	U	3.7	U	3.8	U	3.9	U
Endrin aldehyde	UG/KG	3.7	1%		0	1	76	3.8	U	3.8	U	3.8	U	3.7	U	3.8	U	3.9	U
Endrin ketone	UG/KG	0	0%		0	0	76	3.8	U	3.8	U	3.8	U	3.7	U	3.8	U	3.9	U
Gamma-BHC/Lindane	UG/KG	0	0%	60	0	0	76	2	U	2	U	2	U	1.9	U	2	U	2	U
Gamma-Chlordane	UG/KG	0	0%	540	0	0	76	2	U	2	U	2	U	1.9	U	2	U	2	U
Heptachlor	UG/KG	0	0%	100	0	0	76	2	U	2	U	2	U	1.9	U	2	U	2	U
Heptachlor epoxide	UG/KG	0	0%	20	0	0	76	2	U	2	U	2	U	1.9	U	2	U	2	U
Methoxychlor	UG/KG	0	0%		0	0	76	20	U	20	U	20	U	19	U	20	U	20	U
Toxaphene	UG/KG	0	0%		0	0	76	200	U	200	U	200	U	190	U	200	U	200	U
Herbicides																			
2,4,5-T	UG/KG	0	0%	1900	0	0	39	5.9	U	5.9	U	5.8	U	5.5	U	5.8	U	6	U
2,4,5-TP/Silvex	UG/KG	0	0%	700	0	0	39	5.9	U	5.9	U	5.8	U	5.5	U	5.8	U	6	U
2,4-D	UG/KG	0	0%	500	0	0	39	59	U	59	U	58	U	55	U	58	U	60	U
2,4-DB	UG/KG	0	0%		0	0	39	59	U	59	U	58	U	55	U	58	U	60	U
Dalapon	UG/KG	0	0%		0	0	39	140	U	140	U	140	U	140	U	140	U	150	U

	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	ESI		ESI		ESI		ESI		ESI		ESI	
								SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								TP4-3		TP4-4		TP4-5		TP4-6		TP4-7		TP4-8	
								4		4		4		6		5		3	
								4		4		4		6		5		3	
								12/5/1993		12/5/1993		12/5/1993		12/5/1993		12/5/1993		12/5/1993	
								TP4-3		**TP4-4**		**TP4-5**		**TP4-6**		**TP4-7**		**TP4-8**	
								SA		SA		SA		SA		SA		SA	
								N		N		N		N		N		N	
Dicamba	UG/KG	23	3%		0	1	39	5.9	U	5.9	U	5.8	U	5.5	U	5.8	U	6	U
Dichloroprop	UG/KG	0	0%		0	0	39	59	U	59	U	58	U	55	U	58	U	60	U
Dinoseb	UG/KG	0	0%		0	0	39	30	U	30	U	29	U	28	UJ	29	U	30	U
MCPA	UG/KG	0	0%		0	0	39	5900	U	5900	U	5800	U	5500	U	5800	U	6000	U
MCPP	UG/KG	0	0%		0	0	39	5900	U	5900	U	5800	U	5500	U	5800	U	6000	U
Metals																			
Aluminum	MG/KG	21000	100%	19520 *	3	76	76	10200		12100		10800		6100		10500		12500	
Antimony	MG/KG	57.8	28%	6 *	10	21	76	3.5	UJ	4	UJ	4.6	UJ	4.6	UJ	3.5	UJ	3.5	UJ
Arsenic	MG/KG	21.5	100%	8.9 *	4	76	76	5.1		4.3		5.2		5.6		4.2		3.5	
Barium	MG/KG	133	100%	300	0	76	76	65.4		74.9		60.6		37.4	J	64.8		71.8	
Beryllium	MG/KG	1	99%	1.13 *	0	75	76	0.46	J	0.53	J	0.53	J	0.29	J	0.52	J	0.61	J
Cadmium	MG/KG	1.5	4%	2.46 *	0	3	76	0.34	U	0.39	U	1.5		0.45	U	0.34	U	0.34	U
Calcium	MG/KG	102000	100%	125300 *	0	76	76	88300		76800		86400		64300		59500		2130	
Chromium	MG/KG	3820	80%	30 *	17	61	76	15.1		19.4		16.5		10.8		16.3		20.4	
Cobalt	MG/KG	29.1	100%	30	0	76	78	9.1		10.3		6.6	J	5.9	J	8.3		11.9	
Copper	MG/KG	2250	100%	33 *	14	76	76	17.3		23		20		12		21.7		14.9	
Cyanide	MG/KG	0	0%	0.35	0	0	76	0.56	U	0.51	U	0.52	U	0.48	U	0.56	U	0.59	U
Iron	MG/KG	40900	100%	37410 *	6	76	76	18900		24100		20000		13900		21400		27300	
Lead	MG/KG	251	100%	24.4 *	6	76	76	11	J	10.9	J	11.2	J	8	J	13.1	J	10.6	J
Magnesium	MG/KG	32000	100%	21700 *	3	76	76	32000		10700		24600		11400		10000		4170	
Manganese	MG/KG	2100	78%	1100 *	5	59	76	510	R	488	R	349	R	309	R	435	R	658	R
Mercury	MG/KG	0.12	45%	0.1	1	34	76	0.04	J	0.03	J	0.02	U	0.03	J	0.03	J	0.03	J
Nickel	MG/KG	62.3	100%	50 *	8	76	76	22.6		32.1		25.2		17.7		25.5		27.8	
Potassium	MG/KG	2490	100%	2623 *	0	76	76	1130		1470		1130		690	J	1020		807	
Selenium	MG/KG	0.86	33%	2	0	25	76	0.15	U	0.12	U	0.13	U	0.13	U	0.14	U	0.12	J
Silver	MG/KG	1.2	8%	0.8 *	4	6	78	0.68	U	0.92	J	1.2	J	0.89	U	0.67	U	0.68	U
Sodium	MG/KG	134	61%	188 *	0	46	76	126	J	88.3	J	111	J	118	J	107	J	31.8	U
Thallium	MG/KG	0	0%	0.855 *	0	0	76	0.26	U	0.2	U	0.23	U	0.22	U	0.24	U	0.19	U
Vanadium	MG/KG	31	100%	150	0	76	76	17.9		21.4		19.3		10.3	J	18.3		19.9	
Zinc	MG/KG	1010	100%	115 *	12	76	76	46.8		68.4		64.1		46.5		75.4		87.8	
Nitrate/Nitrite	MG/KG	2.7	100%			37	37												

* Soil criteria for these inorganics are site background values.

Groundwater

Appendix F
Groundwater Criteria

ANALYTE	UNIT	NYS GA CRITERIA	EPA MCL	EPA SECONDARY MCL
VOLATILES				
1,1,1,2-Tetrachloroethane	UG/L	5		
1,1,1-Trichloroethane	UG/L	5	200	
1,1,2,2-Tetrachloroethane	UG/L	5		
1,1,2-Trichloroethane	UG/L	1	5	
1,1-Dichloroethane	UG/L	5		
1,1-Dichloroethene	UG/L	5	7	
1,1-Dichloropropene	UG/L	5		
1,2,3-Trichlorobenzene	UG/L	5		
1,2,3-Trichloropropane	UG/L	0.04		
1,2,4-Trichlorobenzene	UG/L	5	70	
1,2,4-Trimethylbenzene	UG/L	5		
1,2-Dibromo-3-chloropropane	UG/L	0.04	0.2	
1,2-Dibromoethane	UG/L	0.0006		
1,2-Dichlorobenzene	UG/L	3	600	
1,2-Dichloroethane	UG/L	0.6	5	
1,2-Dichloroethene (total)	UG/L	5	70	
1,2-Dichloropropane	UG/L	1	5	
1,3,5-Trimethylbenzene	UG/L	5		
1,3-Dichlorobenzene	UG/L	3	600	
1,3-Dichloropropane	UG/L	5		
1,4-Dichlorobenzene	UG/L	3	75	
2,2-Dichloropropane	UG/L			
2-Chlorotoluene	UG/L	5		
2-Nitropropane	UG/L			
Acetone	UG/L			
Acrylonitrile	UG/L	5		
Allyl chloride	UG/L	5		
Benzene	UG/L	1	5	
Bromobenzene	UG/L	5		
Bromochloromethane	UG/L	5		
Bromodichloromethane	UG/L		80	
Bromoform	UG/L		80	
Butyl chloride	UG/L	5		
Carbon disulfide	UG/L			
Carbon tetrachloride	UG/L	5		
Chloracetonitrile	UG/L			
Chlorobenzene	UG/L	5	100	
Chlorodibromomethane	UG/L			
Chloroethane	UG/L	5		
Chloroform	UG/L	7	80	
Cis-1,2-Dichloroethene	UG/L	5	70	
Cis-1,3-Dichloropropene	UG/L	0.4		
Dichlorodifluoromethane	UG/L	5		
Dichloromethyl methyl ketone	UG/L			
Ethyl benzene	UG/L	5	700	
Ethyl ether	UG/L			

Appendix F
Groundwater Criteria

ANALYTE	UNIT	NYS GA CRITERIA	EPA MCL	EPA SECONDARY MCL
Ethyl methacrylate	UG/L			
Hexachlorobutadiene	UG/L	0.5		
Hexachloroethane	UG/L	5		
Isopropylbenzene	UG/L	5		
Methacrylonitrile	UG/L	5		
Methyl 2-propenoate	UG/L			
Methyl Tertbutyl Ether	UG/L			
Methyl bromide	UG/L	5		
Methyl butyl ketone	UG/L			
Methyl chloride	UG/L	5		
Methyl ethyl ketone	UG/L			
Methyl iodide	UG/L	5		
Methyl isobutyl ketone	UG/L			
Methyl methacrylate	UG/L			
Methylene bromide	UG/L	5		
Methylene chloride	UG/L	5	5	
Naphthalene	UG/L			
Nitrobenzene	UG/L	0.4		
Ortho Xylene	UG/L	5		
Pentachloroethane	UG/L	5		
Propionitrile	UG/L			
Propylbenzene	UG/L	5		
Styrene	UG/L	5	100	
Tetrachloroethene	UG/L	5	5	
Tetrahydrofuran	UG/L			
Toluene	UG/L	5	1,000	
Total Xylenes	UG/L	5	10,000	
Trans-1,2-Dichloroethene	UG/L	5	100	
Trans-1,3-Dichloropropene	UG/L	0.4		
Trans-1,4-Dichloro-2-butene	UG/L			
Trichloroethene	UG/L	5	5	
Trichlorofluoromethane	UG/L	5		
Vinyl chloride	UG/L	2	2	
n-Butylbenzene	UG/L	5		
p-Chlorotoluene	UG/L	5		
p-Isopropyltoluene	UG/L	5		
sec-Butylbenzene	UG/L	5		
tert-Butylbenzene	UG/L	5		
SEMIVOLATILES				
1,2,4-Trichlorobenzene	UG/L	5	70	
1,2-Dichlorobenzene	UG/L	3	600	
1,3-Dichlorobenzene	UG/L	3	600	
1,4-Dichlorobenzene	UG/L	3	75	
2,2'-oxybis(1-Chloropropane)	UG/L			
2,4,5-Trichlorophenol	UG/L	1		
2,4,6-Trichlorophenol	UG/L	1		
2,4-Dichlorophenol	UG/L	1		

Appendix F
Groundwater Criteria

ANALYTE	UNIT	NYS GA CRITERIA	EPA MCL	EPA SECONDARY MCL
2,4-Dimethylphenol	UG/L	1		
2,4-Dinitrophenol	UG/L	1		
2,4-Dinitrotoluene	UG/L	5		
2,6-Dinitrotoluene	UG/L	5		
2-Chloronaphthalene	UG/L			
2-Chlorophenol	UG/L	1		
2-Methylnaphthalene	UG/L			
2-Methylphenol	UG/L	1		
2-Nitroaniline	UG/L	5		
2-Nitrophenol	UG/L	1		
3,3'-Dichlorobenzidine	UG/L	5		
3-Nitroaniline	UG/L	5		
4,6-Dinitro-2-methylphenol	UG/L	1		
4-Bromophenyl phenyl ether	UG/L			
4-Chloro-3-methylphenol	UG/L	1		
4-Chloroaniline	UG/L	5		
4-Chlorophenyl phenyl ether	UG/L			
4-Methylphenol	UG/L	1		
4-Nitroaniline	UG/L	5		
4-Nitrophenol	UG/L	1		
Acenaphthene	UG/L			
Acenaphthylene	UG/L			
Anthracene	UG/L			
Benzo(a)anthracene	UG/L			
Benzo(a)pyrene	UG/L	0	0.2	
Benzo(b)fluoranthene	UG/L			
Benzo(ghi)perylene	UG/L			
Benzo(k)fluoranthene	UG/L			
Bis(2-Chloroethoxy)methane	UG/L	5		
Bis(2-Chloroethyl)ether	UG/L	1		
Bis(2-Chloroisopropyl)ether	UG/L	5		
Bis(2-Ethylhexyl)phthalate	UG/L	5		
Butylbenzylphthalate	UG/L			
Carbazole	UG/L			
Chrysene	UG/L			
Di-n-butylphthalate	UG/L	50		
Di-n-octylphthalate	UG/L			
Dibenz(a,h)anthracene	UG/L			
Dibenzofuran	UG/L			
Diethyl phthalate	UG/L			
Dimethylphthalate	UG/L			
Fluoranthene	UG/L			
Fluorene	UG/L			
Hexachlorobenzene	UG/L	0.04	1	
Hexachlorobutadiene	UG/L	0.5		
Hexachlorocyclopentadiene	UG/L	5	50	
Hexachloroethane	UG/L	5		

Appendix F
Groundwater Criteria

ANALYTE	UNIT	NYS GA CRITERIA	EPA MCL	EPA SECONDARY MCL
Indeno(1,2,3-cd)pyrene	UG/L			
Isophorone	UG/L			
N-Nitrosodiphenylamine	UG/L			
N-Nitrosodipropylamine	UG/L			
Naphthalene	UG/L			
Nitrobenzene	UG/L	0.4		
Pentachlorophenol	UG/L	1	1	
Phenanthrene	UG/L			
Phenol	UG/L	1		
Pyrene	UG/L			
EXPLOSIVES				
1,3,5-Trinitrobenzene	UG/L	5		
1,3-Dinitrobenzene	UG/L	5		
2,4,6-Trinitrotoluene	UG/L	5		
2,4-Dinitrotoluene	UG/L	5		
2,6-Dinitrotoluene	UG/L	5		
2-Nitrotoluene	UG/L	5		
2-amino-4,6-Dinitrotoluene	UG/L			
3-Nitrotoluene	UG/L	5		
4-Nitrotoluene	UG/L	5		
4-amino-2,6-Dinitrotoluene	UG/L			
HMX	UG/L			
Nitrobenzene	UG/L	0.4		
RDX	UG/L			
Tetryl	UG/L			
PESTICIDES/PCBS				
4,4'-DDD	UG/L	0.3		
4,4'-DDE	UG/L	0.2		
4,4'-DDT	UG/L	0.2		
Aldrin	UG/L	0		
Alpha-BHC	UG/L	0.01		
Alpha-Chlordane	UG/L			
Aroclor-1016	UG/L	0.09	0.5	
Aroclor-1221	UG/L	0.09	0.5	
Aroclor-1232	UG/L	0.09	0.5	
Aroclor-1242	UG/L	0.09	0.5	
Aroclor-1248	UG/L	0.09	0.5	
Aroclor-1254	UG/L	0.09	0.5	
Aroclor-1260	UG/L	0.09	0.5	
Beta-BHC	UG/L	0.04		
Delta-BHC	UG/L	0.04		
Dieldrin	UG/L	0.004		
Endosulfan I	UG/L			
Endosulfan II	UG/L			
Endosulfan sulfate	UG/L			
Endrin	UG/L	0	2	
Endrin aldehyde	UG/L	5		

Appendix F
Groundwater Criteria

ANALYTE	UNIT	NYS GA CRITERIA	EPA MCL	EPA SECONDARY MCL
Endrin ketone	UG/L	5		
Gamma-BHC/Lindane	UG/L	0.05	0.2	
Gamma-Chlordane	UG/L			
Heptachlor	UG/L	0.04	0.4	
Heptachlor epoxide	UG/L	0.03	0.2	
Hexachlorobenzene	UG/L	0.04	1	
Methoxychlor	UG/L	35	40	
Toxaphene	UG/L	0.06	3	
HERBICIDES				
2,4,5-T	UG/L	35		
2,4,5-TP/Silvex	UG/L	0.26	50	
2,4-D	UG/L	50	70	
2,4-DB	UG/L			
Dalapon	UG/L	50	200	
Dicamba	UG/L	0.44		
Dichloroprop	UG/L			
Dinoseb	UG/L	1	7	
MCPA	UG/L	0.44		
MCPP	UG/L			
METALS				
Aluminum	UG/L			50
Antimony	UG/L	3	6	
Arsenic	UG/L	25	5	
Barium	UG/L	1000	2000	
Beryllium	UG/L		4	
Cadmium	UG/L	5	5	
Calcium	UG/L			
Chromium	UG/L	50	100	
Cobalt	UG/L			
Copper	UG/L	200	1300	
Cyanide	UG/L	200	200	
Iron	UG/L	300		300
Lead	UG/L	25	15	
Magnesium	UG/L			
Manganese	UG/L	300		50
Mercury	UG/L	0.7	2	
Nickel	UG/L	100		
Potassium	UG/L			
Selenium	UG/L	10	50	
Silver	UG/L	50		100
Sodium	UG/L	20,000		
Thallium	UG/L		2	
Vanadium	UG/L			
Zinc	UG/L			5,000
Nitrate/Nitrite	SU	10,000		10,000

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Groundwater Sample Results

								SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								MW4-1		MW4-1		MW4-1		MW4-10		MW4-10		MW4-11	
								GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER	
								MW4-1		42017		42031		42026		42032		42027	
								5.4		11		12.5		8.4		10		9	
								9.4		11		12.5		8.4		10		9	
								1/21/1994		4/1/1999		7/7/1999		3/30/1999		7/7/1999		3/31/1999	
								SA		SA		DU		SA		SA		SA	
ANALYTE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	GW CRITERIA revised 1/01	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	ESI		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
								N		N		N		N		N		N	
VOLATILES																			
1,1,1,2-Tetrachloroethane	UG/L	0	0%	5	0	0	11					0.5	UJ			0.5	U		
1,1,1-Trichloroethane	UG/L	0	0%	5	0	0	30	10	U	1	U	0.5	UJ	1	U	0.5	U	1	U
1,1,2,2-Tetrachloroethane	UG/L	0	0%	5	0	0	30	10	U	1	U	0.5	UJ	1	U	0.5	U	1	U
1,1,2-Trichloroethane	UG/L	0	0%	1	0	0	30	10	U	1	U	0.5	UJ	1	U	0.5	U	1	U
1,1-Dichloroethane	UG/L	0	0%	5	0	0	30	10	U	1	U	0.5	UJ	1	U	0.5	U	1	U
1,1-Dichloroethene	UG/L	0	0%	5	0	0	30	10	U	1	U	0.5	UJ	1	U	0.5	U	1	U
1,1-Dichloropropene	UG/L	0	0%	5	0	0	11					0.5	UJ			0.5	U		
1,2,3-Trichlorobenzene	UG/L	0	0%	5	0	0	11					0.5	UJ			0.5	U		
1,2,3-Trichloropropane	UG/L	0	0%	0.04	0	0	11					0.5	UJ			0.5	U		
1,2,4-Trichlorobenzene	UG/L	0	0%	5	0	0	25			1	U	0.5	UJ	1	U	0.5	U	1	U
1,2,4-Trimethylbenzene	UG/L	0	0%	5	0	0	11					0.5	UJ			0.5	U		
1,2-Dibromo-3-chloropropane	UG/L	0	0%	0.04	0	0	25			1	U	0.5	UJ	1	U	0.5	U	1	U
1,2-Dibromoethane	UG/L	0	0%	0.0006	0	0	25			1	U	0.5	UJ	1	U	0.5	U	1	U
1,2-Dichlorobenzene	UG/L	0	0%	3	0	0	25			1	U	0.5	UJ	1	U	0.5	U	1	U
1,2-Dichloroethane	UG/L	0	0%	0.6	0	0	30	10	U	1	U	0.5	UJ	1	UJ	0.5	U	1	U
1,2-Dichloroethene (total)	UG/L	0	0%	5	0	0	5	10	U										
1,2-Dichloropropane	UG/L	0	0%	1	0	0	30	10	U	1	U	0.5	UJ	1	U	0.5	U	1	U
1,3,5-Trimethylbenzene	UG/L	0	0%	5	0	0	11					0.5	UJ			2.1	U		
1,3-Dichlorobenzene	UG/L	0	0%	3	0	0	25			1	U	0.5	UJ	1	U	0.5	U	1	U
1,3-Dichloropropane	UG/L	0	0%	5	0	0	11					0.5	UJ			0.5	U		
1,4-Dichlorobenzene	UG/L	0	0%	3	0	0	25			1	U	0.5	UJ	1	U	0.5	U	1	U
2,2-Dichloropropane	UG/L	0	0%		0	0	11					0.5	UJ			0.5	U		
2-Chlorotoluene	UG/L	0	0%	5	0	0	11					0.5	UJ			0.5	U		
2-Nitropropane	UG/L	0	0%		0	0	11					25	UJ			25	U		
Acetone	UG/L	8	3%		0	1	30	10	U	5	U	5	UJ	8		5	U	5	U
Acrylonitrile	UG/L	0	0%	5	0	0	11					0.5	UJ			0.5	U		
Allyl chloride	UG/L	0	0%	5	0	0	11					0.5	UJ			0.5	U		
Benzene	UG/L	2	3%	1	1	1	30	10	U	1	U	0.5	UJ	[illegible]		0.5	U	1	U
Bromobenzene	UG/L	0	0%	5	0	0	11					0.5	UJ			0.5	U		
Bromochloromethane	UG/L	0	0%	5	0	0	25			1	U	0.5	UJ	1	U	0.5	U	1	U
Bromodichloromethane	UG/L	0	0%	80	0	0	30	10	U	1	U	0.5	UJ	1	U	0.5	U	1	U
Bromoform	UG/L	0	0%	80	0	0	30	10	U	1	U	0.5	UJ	1	U	0.5	U	1	U
Butyl chloride	UG/L	0	0%	5	0	0	11					0.5	UJ			0.5	U		
Carbon disulfide	UG/L	0	0%		0	0	30	10	U	1	U	0.5	UJ	1	U	0.5	U	1	U
Carbon tetrachloride	UG/L	0	0%	5	0	0	30	10	U	1	U	0.5	UJ	1	U	0.5	U	1	U
Chloracetonitrile	UG/L	0	0%		0	0	11					50	UJ			50	U		
Chlorobenzene	UG/L	0	0%	5	0	0	30	10	U	1	U	0.5	UJ	1	U	0.5	U	1	U
Chlorodibromomethane	UG/L	0	0%		0	0	30	10	U	1	U	0.5	UJ	1	U	0.5	U	1	U
Chloroethane	UG/L	0	0%	5	0	0	30	10	U	1	U	0.5	UJ	1	U	0.5	U	1	U
Chloroform	UG/L	0	0%	7	0	0	30	10	U	1	U	0.5	UJ	1	U	0.5	U	1	U
Cis-1,2-Dichloroethene	UG/L	0	0%	5	0	0	25			1	U	0.5	UJ	1	U	0.5	U	1	U
Cis-1,3-Dichloropropene	UG/L	0	0%	0.4	0	0	30	10	U	1	U	0.5	UJ	1	U	0.5	U	1	U
Dichlorodifluoromethane	UG/L	0	0%	5	0	0	11					0.5	UJ			0.5	U		
Dichloromethyl methyl ketone	UG/L	0	0%		0	0	11					25	UJ			25	U		
Ethyl benzene	UG/L	6	3%	5	1	1	30	10	U	1	U	0.5	UJ	[illegible]		0.5	U	1	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Groundwater Sample Results

								SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								MW4-1		MW4-1		MW4-1		MW4-10		MW4-10		MW4-11	
								GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER	
								MW4-1		42017		42031		42026		42032		42027	
								5.4		11		12.5		8.4		10		9	
								9.4		11		12.5		8.4		10		9	
								1/21/1994		4/1/1999		7/7/1999		3/30/1999		7/7/1999		3/31/1999	
								SA		SA		DU		SA		SA		SA	
ANALYTE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	GW CRITERIA revised 1/01	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	ESI		RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1
								N		N		N		N		N		N	
Ethyl ether	UG/L	0	0%		0	0	11					0.5	UJ			0.5	U		
Ethyl methacrylate	UG/L	0	0%		0	0	11					0.5	UJ			0.5	U		
Hexachlorobutadiene	UG/L	0	0%	0.5	0	0	11					0.5	UJ			0.5	U		
Hexachloroethane	UG/L	0	0%	5	0	0	11					0.5	UJ			0.5	U		
Isopropylbenzene	UG/L	0	0%	5	0	0	11					0.5	UJ			0.5	U		
Methacrylonitrile	UG/L	0	0%	5	0	0	11					0.5	UJ			0.5	UJ		
Methyl 2-propenoate	UG/L	0	0%		0	0	11					0.5	UJ			0.5	U		
Methyl Tertbutyl Ether	UG/L	0	0%		0	0	11					0.5	UJ			0.5	U		
Methyl bromide	UG/L	0	0%	5	0	0	30	10	U	1	U	0.5	UJ	1	UJ	0.5	U	1	U
Methyl butyl ketone	UG/L	0	0%		0	0	30	10	U	5	U	5	UJ	5	U	5	U	5	U
Methyl chloride	UG/L	0	0%	5	0	0	30	10	U	1	U	0.5	UJ	1	U	0.5	U	1	U
Methyl ethyl ketone	UG/L	0	0%		0	0	30	10	U	5	U	5	UJ	5	U	5	R	5	U
Methyl iodide	UG/L	0	0%	5	0	0	11					0.5	UJ			0.5	U		
Methyl isobutyl ketone	UG/L	0	0%		0	0	30	10	U	5	U	2.5	UJ	5	U	2.5	U	5	U
Methyl methacrylate	UG/L	0	0%		0	0	11					0.5	UJ			0.5	U		
Methylene bromide	UG/L	0	0%	5	0	0	11					0.5	UJ			0.5	U		
Methylene chloride	UG/L	0	0%	5	0	0	30	10	U	2	U	0.5	UJ	2	U	0.5	U	2	U
Naphthalene	UG/L	0	0%		0	0	11					0.5	UJ			0.5	U		
Nitrobenzene	UG/L	0	0%	0.4	0	0	11					25	UJ			25	R		
Ortho Xylene	UG/L	0	0%	5	0	0	11					0.5	UJ			0.5	U		
Pentachloroethane	UG/L	0	0%	5	0	0	11					0.5	UJ			0.5	U		
Propionitrile	UG/L	0	0%		0	0	11					25	UJ			25	R		
Propylbenzene	UG/L	0	0%	5	0	0	11					0.5	UJ			0.5	U		
Styrene	UG/L	0	0%	5	0	0	30	10	U	1	U	0.5	UJ	1	U	0.5	U	1	U
Tetrachloroethene	UG/L	0	0%	5	0	0	30	10	U	1	U	0.5	UJ	1	U	0.5	U	1	U
Tetrahydrofuran	UG/L	0	0%		0	0	11					2.5	UJ			2.5	U		
Toluene	UG/L	0.4	3%	5	0	1	30	10	U	1	U	0.5	UJ	0.4	J	0.5	U	1	U
Total Xylenes	UG/L	4	3%	5	0	1	30	10	U	1	U	0.5	UJ	4		0.5	U	1	U
Trans-1,2-Dichloroethene	UG/L	0	0%	5	0	0	25			1	U	0.5	UJ	1	U	0.5	U	1	U
Trans-1,3-Dichloropropene	UG/L	0	0%	0.4	0	0	30	10	U	1	U	0.5	UJ	1	U	0.5	U	1	U
Trans-1,4-Dichloro-2-butene	UG/L	0	0%		0	0	11					0.5	UJ			0.5	U		
Trichloroethene	UG/L	0	0%	5	0	0	30	10	U	1	U	0.5	UJ	1	U	0.5	U	1	U
Trichlorofluoromethane	UG/L	0	0%	5	0	0	11					0.5	UJ			0.5	U		
Vinyl chloride	UG/L	0	0%	2	0	0	30	10	U	1	U	0.5	UJ	1	U	0.5	U	1	U
n-Butylbenzene	UG/L	0	0%	5	0	0	11					0.5	UJ			0.5	U		
p-Chlorotoluene	UG/L	0	0%	5	0	0	11					0.5	UJ			0.5	U		
p-Isopropyltoluene	UG/L	0	0%	5	0	0	11					0.5	UJ			0.5	U		
sec-Butylbenzene	UG/L	0	0%	5	0	0	11					0.5	UJ			0.5	U		
tert-Butylbenzene	UG/L	0	0%	5	0	0	11					0.5	UJ			0.5	U		
SEMIVOLATILES																			
1,2,4-Trichlorobenzene	UG/L	0	0%	5	0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
1,2-Dichlorobenzene	UG/L	0	0%	3	0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
1,3-Dichlorobenzene	UG/L	0	0%	3	0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
1,4-Dichlorobenzene	UG/L	0	0%	3	0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
2,2'-oxybis(1-Chloropropane)	UG/L	0	0%		0	0	5	11	U										
2,4,5-Trichlorophenol	UG/L	0	0%	1	0	0	30	28	U	2.6	U	2.6	U	2.6	U	2.7	U	2.6	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Groundwater Sample Results

								SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								MW4-1		MW4-1		MW4-1		MW4-10		MW4-10		MW4-11	
								GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER	
								MW4-1		42017		42031		42026		42032		42027	
								5.4		11		12.5		8.4		10		9	
								9.4		11		12.5		8.4		10		9	
								1/21/1994		4/1/1999		7/7/1999		3/30/1999		7/7/1999		3/31/1999	
ANALYTE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	GW CRITERIA revised 1/01	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SA		SA		DU		SA		SA		SA	
								ESI		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
								N		N		N		N		N		N	
2,4,6-Trichlorophenol	UG/L	0	0%	1	0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
2,4-Dichlorophenol	UG/L	0	0%	1	0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
2,4-Dimethylphenol	UG/L	0	0%	1	0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
2,4-Dinitrophenol	UG/L	0	0%	1	0	0	30	28	U	2.6	R	2.6	UJ	2.6	UJ	2.7	UJ	2.6	UJ
2,4-Dinitrotoluene	UG/L	0	0%	5	0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
2,6-Dinitrotoluene	UG/L	0	0%	5	0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
2-Chloronaphthalene	UG/L	0	0%		0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
2-Chlorophenol	UG/L	0	0%	1	0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
2-Methylnaphthalene	UG/L	0	0%		0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
2-Methylphenol	UG/L	0	0%	1	0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
2-Nitroaniline	UG/L	0	0%	5	0	0	30	28	U	2.6	U	2.6	U	2.6	U	2.7	U	2.6	U
2-Nitrophenol	UG/L	0	0%	1	0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
3,3'-Dichlorobenzidine	UG/L	0	0%	5	0	0	30	11	U	1	U	1.1	U	1	UJ	1.1	U	1	UJ
3-Nitroaniline	UG/L	0	0%	5	0	0	30	28	U	2.6	R	2.6	U	2.6	UJ	2.7	U	2.6	UJ
4,6-Dinitro-2-methylphenol	UG/L	0	0%	1	0	0	30	28	U	2.6	U	2.6	U	2.6	UJ	2.7	U	2.6	UJ
4-Bromophenyl phenyl ether	UG/L	0	0%		0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
4-Chloro-3-methylphenol	UG/L	0	0%	1	0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
4-Chloroaniline	UG/L	0	0%	5	0	0	30	11	U	1	U	1.1	U	1	UJ	1.1	U	1	UJ
4-Chlorophenyl phenyl ether	UG/L	0	0%		0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
4-Methylphenol	UG/L	2.2	7%	1	1	2	30	11	U	1	U	1.1	U	2.2		0.53	J	1	U
4-Nitroaniline	UG/L	0	0%	5	0	0	30	28	U	2.6	U	2.6	U	2.6	U	2.7	U	2.6	U
4-Nitrophenol	UG/L	0	0%	1	0	0	30	28	U	2.6	U	2.6	R	2.6	U	2.7	R	2.6	U
Acenaphthene	UG/L	0	0%		0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
Acenaphthylene	UG/L	0	0%		0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
Anthracene	UG/L	0	0%		0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
Benzo(a)anthracene	UG/L	0	0%		0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
Benzo(a)pyrene	UG/L	0	0%	0	0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
Benzo(b)fluoranthene	UG/L	0	0%		0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
Benzo(ghi)perylene	UG/L	0	0%		0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
Benzo(k)fluoranthene	UG/L	0	0%		0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
Bis(2-Chloroethoxy)methane	UG/L	0	0%	5	0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
Bis(2-Chloroethyl)ether	UG/L	0	0%	1	0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
Bis(2-Chloroisopropyl)ether	UG/L	0	0%	5	0	0	25			1	U	1.1	U	1	U	1.1	U	1	U
Bis(2-Ethylhexyl)phthalate	UG/L	1.1	3%	5	0	1	30	11	U	1	U	1.1	U	4.1	U	1.1	U	0.51	UJ
Butylbenzylphthalate	UG/L	0	0%		0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
Carbazole	UG/L	0	0%		0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
Chrysene	UG/L	0	0%		0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
Di-n-butylphthalate	UG/L	0.15	3%	50	0	1	30	11	U	0.15	J	1.1	U	1	U	1.1	U	1	U
Di-n-octylphthalate	UG/L	0	0%		0	0	30	11	U	1	U	1.1	UJ	1	U	1.1	UJ	1	U
Dibenz(a,h)anthracene	UG/L	0	0%		0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
Dibenzofuran	UG/L	0	0%		0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
Diethyl phthalate	UG/L	0.9	17%		0	5	30	0.9	J	1	U	1.1	U	1	U	1.1	U	1	U
Dimethylphthalate	UG/L	0	0%		0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
Fluoranthene	UG/L	0	0%		0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
Fluorene	UG/L	0	0%		0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
Hexachlorobenzene	UG/L	0	0%	0.04	0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Groundwater Sample Results

								SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								MW4-1		MW4-1		MW4-1		MW4-10		MW4-10		MW4-11	
								GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER	
								MW4-1		42017		42031		42026		42032		42027	
								5.4		11		12.5		8.4		10		9	
								9.4		11		12.5		8.4		10		9	
								1/21/1994		4/1/1999		7/7/1999		3/30/1999		7/7/1999		3/31/1999	
ANALYTE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	GW CRITERIA revised 1/01	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SA		SA		DU		SA		SA		SA	
								ESI		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
								N		N		N		N		N		N	
Hexachlorobutadiene	UG/L	0	0%	0.5	0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
Hexachlorocyclopentadiene	UG/L	0	0%	5	0	0	30	11	U	1	U	1.1	UJ	1	U	1.1	UJ	1	U
Hexachloroethane	UG/L	0	0%	5	0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
Indeno(1,2,3-cd)pyrene	UG/L	0	0%		0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
Isophorone	UG/L	0	0%		0	0	30	11	U	1	U	1.1	UJ	1	U	1.1	UJ	1	U
N-Nitrosodiphenylamine	UG/L	0	0%		0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
N-Nitrosodipropylamine	UG/L	0	0%		0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
Naphthalene	UG/L	2.2	3%		0	1	30	11	U	1	U	1.1	U	2.2		1.1	U	1	U
Nitrobenzene	UG/L	0	0%	0.4	0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
Pentachlorophenol	UG/L	0	0%	1	0	0	30	28	U	2.6	U	2.6	UJ	2.6	U	2.7	UJ	2.6	U
Phenanthrene	UG/L	0	0%		0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
Phenol	UG/L	0.4	3%	1	0	1	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
Pyrene	UG/L	0	0%		0	0	30	11	U	1	U	1.1	U	1	U	1.1	U	1	U
EXPLOSIVES																			
1,3,5-Trinitrobenzene	UG/L	0	0%	5	0	0	32	0.13	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
1,3-Dinitrobenzene	UG/L	0	0%	5	0	0	32	0.13	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2,4,6-Trinitrotoluene	UG/L	0	0%	5	0	0	32	0.13	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2,4-Dinitrotoluene	UG/L	0	0%	5	0	0	32	0.13	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2,6-Dinitrotoluene	UG/L	0	0%	5	0	0	32	0.13	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2-Nitrotoluene	UG/L	0.87	4%	5	0	1	27			0.25	U	0.25	U	0.87		0.25	U	0.25	U
2-amino-4,6-Dinitrotoluene	UG/L	0	0%		0	0	32	0.13	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
3-Nitrotoluene	UG/L	2.6	4%	5	0	1	27			0.25	U	0.25	U	2.6		0.25	U	0.25	U
4-Nitrotoluene	UG/L	10	4%	5	1	1	27			0.25	U	0.25	U	10		0.25	U	0.25	U
4-amino-2,6-Dinitrotoluene	UG/L	0	0%		0	0	32	0.13	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
HMX	UG/L	0	0%		0	0	32	1.1	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Nitrobenzene	UG/L	0.89	4%	0.4	1	1	27			0.25	U	0.25	U	0.89		0.25	U	0.25	U
RDX	UG/L	0	0%		0	0	32	0.13	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Tetryl	UG/L	0	0%	5	0	0	32	0.13	U	0.25	U	0.25	UJ	0.25	U	0.25	UJ	0.25	U
PESTICIDES/PCBS																			
4,4'-DDD	UG/L	0	0%	0.3	0	0	30	0.11	U	0.013	U	0.012	U	0.01	U	0.01	U	0.01	U
4,4'-DDE	UG/L	0	0%	0.2	0	0	30	0.11	U	0.013	U	0.012	U	0.01	U	0.01	U	0.01	U
4,4'-DDT	UG/L	0	0%	0.2	0	0	30	0.11	U	0.013	U	0.012	U	0.01	U	0.01	U	0.01	U
Aldrin	UG/L	0.0036	3%	0	1	1	30	0.054	U	0.0065	U	0.006	U	0.0051	U	0.005	U	0.0052	U
Alpha-BHC	UG/L	0.0028	3%	0.01	0	1	30	0.054	U	0.0065	U	0.006	U	0.0051	U	0.005	U	0.0052	U
Alpha-Chlordane	UG/L	0	0%		0	0	30	0.054	U	0.0065	U	0.006	U	0.0051	U	0.005	U	0.0052	U
Aroclor-1016	UG/L	0	0%	0.09	0	0	30	1.1	U	0.13	U	0.12	U	0.1	U	0.1	U	0.1	U
Aroclor-1221	UG/L	0	0%	0.09	0	0	30	2.2	U	0.26	U	0.24	U	0.2	U	0.2	U	0.21	U
Aroclor-1232	UG/L	0	0%	0.09	0	0	30	1.1	U	0.13	U	0.12	U	0.1	U	0.1	U	0.1	U
Aroclor-1242	UG/L	0	0%	0.09	0	0	30	1.1	U	0.13	U	0.12	U	0.1	U	0.1	U	0.1	U
Aroclor-1248	UG/L	0	0%	0.09	0	0	30	1.1	U	0.13	U	0.12	U	0.1	U	0.1	U	0.1	U
Aroclor-1254	UG/L	0	0%	0.09	0	0	30	1.1	U	0.13	U	0.12	U	0.1	U	0.1	U	0.1	U
Aroclor-1260	UG/L	0.079	3%	0.09	0	1	30	1.1	U	0.13	U	0.12	U	0.1	U	0.079	J	0.1	U
Beta-BHC	UG/L	0	0%	0.04	0	0	30	0.054	U	0.0065	U	0.006	U	0.0051	U	0.005	U	0.0052	U
Delta-BHC	UG/L	0.0041	3%	0.04	0	1	30	0.054	U	0.0065	U	0.006	U	0.0051	U	0.005	U	0.0052	U
Dieldrin	UG/L	0	0%	0.004	0	0	30	0.11	U	0.013	U	0.012	U	0.01	U	0.01	U	0.01	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Groundwater Sample Results

ANALYTE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	GW CRITERIA revised 1/01	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4 MW4-1 GROUND WATER MW4-1 5.4 9.4 1/21/1994 SA ESI N		SEAD-4 MW4-1 GROUND WATER 42017 11 11 4/1/1999 SA RI Phase 1 Step 1 N		SEAD-4 MW4-1 GROUND WATER 42031 12.5 12.5 7/7/1999 DU RI Phase 1 Step 1 N		SEAD-4 MW4-10 GROUND WATER 42026 8.4 8.4 3/30/1999 SA RI Phase 1 Step 1 N		SEAD-4 MW4-10 GROUND WATER 42032 10 10 7/7/1999 SA RI Phase 1 Step 1 N		SEAD-4 MW4-11 GROUND WATER 42027 9 9 3/31/1999 SA RI Phase 1 Step 1 N	
Endosulfan I	UG/L	0	0%		0	0	30	0.054	U	0.0065	U	0.006	U	0.0051	U	0.005	U	0.0052	U
Endosulfan II	UG/L	0	0%		0	0	30	0.11	U	0.013	U	0.012	U	0.01	U	0.01	U	0.01	U
Endosulfan sulfate	UG/L	0	0%		0	0	30	0.11	U	0.013	U	0.012	U	0.01	U	0.01	U	0.01	U
Endrin	UG/L	0	0%	0	0	0	30	0.11	U	0.013	U	0.012	U	0.01	U	0.01	U	0.01	U
Endrin aldehyde	UG/L	0	0%	5	0	0	30	0.11	U	0.013	U	0.012	U	0.01	U	0.01	U	0.01	U
Endrin ketone	UG/L	0	0%	5	0	0	30	0.11	U	0.013	U	0.012	U	0.01	U	0.01	U	0.01	U
Gamma-BHC/Lindane	UG/L	0	0%	0.05	0	0	30	0.054	U	0.0065	U	0.006	U	0.0051	U	0.005	U	0.0052	U
Gamma-Chlordane	UG/L	0.0054	3%		0	1	30	0.054	U	0.0065	U	0.006	U	0.0051	U	0.005	U	0.0052	U
Heptachlor	UG/L	0.0056	7%	0.04	0	2	30	0.054	U	0.0065	U	0.006	U	0.0051	U	0.005	U	0.0052	U
Heptachlor epoxide	UG/L	0	0%	0.03	0	0	30	0.054	U	0.0065	U	0.006	U	0.0051	U	0.005	U	0.0052	U
Hexachlorobenzene	UG/L	0	0%	0.04	0	0	25			0.013	U	0.012	UJ	0.01	U	0.01	UJ	0.01	U
Methoxychlor	UG/L	0	0%	35	0	0	30	0.54	U	0.065	U	0.06	U	0.051	U	0.05	U	0.052	U
Toxaphene	UG/L	0	0%	0.06	0	0	30	5.4	U	0.65	U	0.6	U	0.51	U	0.5	U	0.52	U
HERBICIDES																			
2,4,5-T	UG/L	0	0%	35	0	0	5	0.11	U										
2,4,5-TP/Silvex	UG/L	0	0%	0.26	0	0	5	0.11	U										
2,4-D	UG/L	0	0%	50	0	0	5	1.1	U										
2,4-DB	UG/L	0	0%		0	0	5	1.1	U										
Dalapon	UG/L	0	0%	50	0	0	5	2.5	U										
Dicamba	UG/L	0	0%	0.44	0	0	5	0.11	U										
Dichloroprop	UG/L	0	0%		0	0	5	1.1	U										
Dinoseb	UG/L	0	0%	1	0	0	5	0.53	U										
MCPA	UG/L	0	0%	0.44	0	0	5	110	U										
MCPP	UG/L	0	0%		0	0	5	110	U										
METALS																			
Aluminum	UG/L	3820	90%	50	25	27	30	41.9	U	3430	J	332		333	J	167	J	347	J
Antimony	UG/L	39.3	23%	3	5	7	30	21.6	U	2.2	U	3.7	U	2.2	U	3.7	U	[illegible]	J
Arsenic	UG/L	6.5	17%	5	3	5	30	2.2	J	1.8	U	5.2	U	1.8	U	6.5	J	1.8	U
Barium	UG/L	121	100%	1,000	0	30	30	19.6	J	30.9	J	22.3	J	27.6	J	33.4	J	35.2	J
Beryllium	UG/L	6.3	10%	4	0	3	30	0.4	U	0.1	U	0.4	U	0.1	U	0.4	U	0.1	U
Cadmium	UG/L	5.6	7%	5	1	2	30	2.1	U	0.3	U	0.9	U	0.3	U	0.9	U	0.3	U
Calcium	UG/L	147000	100%		0	30	30	137000		115000		112000		75800		81800		119000	
Chromium	UG/L	260	60%	50	1	18	30	2.6	U	2.8	J	0.8	U	8.1	J	0.86	J	0.7	U
Cobalt	UG/L	8.2	17%		0	5	30	4.6	J	1.5	U	3.4	U	1.5	U	3.4	U	1.5	U
Copper	UG/L	37.6	30%	200	0	9	30	3.1	U	4.3	J	2.9	U	2.4	U	2.9	U	2.4	U
Cyanide	UG/L	0	0%	200	0	0	28	5	U	5	U	5	U	5	U	5	U	5	U
Iron	UG/L	6900	90%	300	15	27	30	312		2310		320		257		204		1280	
Lead	UG/L	2.2	13%	15	0	4	30	0.5	U	0.9	U	0.8	U	0.9	UJ	0.8	U	0.9	UJ
Magnesium	UG/L	57600	100%		0	30	30	57600		51700		49000		28800		22600		40000	
Manganese	UG/L	855	93%	300	5	28	30	316		42.9		17.8		246		145		288	
Mercury	UG/L	0.04	7%	0.7	0	2	30	0.04	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Nickel	UG/L	9.9	40%	100	0	12	30	4	U	6	J	4	U	1.9	J	4	U	1.4	U
Potassium	UG/L	14400	100%		0	30	30	7380		2900	J	2200	J	2000	J	3350	J	4570	J
Selenium	UG/L	24	37%	10	3	11	30	2.1	J	5.1		2.9	U	10.4		3.9	J	1.8	U
Silver	UG/L	6.7	17%	50	0	5	30	4.2	U	0.9	U	2.5	U	1	J	2.5	U	0.9	U
Sodium	UG/L	82600	100%	20,000	7	30	30	11700		6820		7930		7990		10200		82600	
Thallium	UG/L	4.9	10%	2	0	3	30	1.2	U	1.9	U	3	U	3.3	J	3	U	1.9	U
Vanadium	UG/L	11.4	30%		0	9	30	3.7	U	4.3	J	2.5	U	1.8	J	2.5	U	1.6	U
Zinc	UG/L	95	87%		0	26	30	19.1	J	82.8		7.1	J	27.6		3	U	9	J
Nitrate/Nitrite	SU			10,000								0.15				0.011			

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Groundwater Sample Results

								SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								MW4-11		MW4-12		MW4-12		MW4-13		MW4-13		MW4-2	
								GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER	
								42035		42028		42034		42029		42041		MW4-2	
								10		8.5		12.9		7.9		9		2.2	
								10		8.5		12.9		7.9		9		3.2	
								7/8/1999		3/30/1999		7/8/1999		3/31/1999		7/9/1999		2/4/1994	
								SA		SA		SA		SA		SA		SA	
ANALYTE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	GW CRITERIA revised 1/01	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	ESI	
								N		N		N		N		N		N	
VOLATILES																			
1,1,1,2-Tetrachloroethane	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U						
1,1,1-Trichloroethane	UG/L	0	0%	5	0	0	30	0.5	U	1	U	0.5	U	1	U			10	U
1,1,2,2-Tetrachloroethane	UG/L	0	0%	5	0	0	30	0.5	U	1	U	0.5	U	1	U			10	U
1,1,2-Trichloroethane	UG/L	0	0%	1	0	0	30	0.5	U	1	U	0.5	U	1	U			10	U
1,1-Dichloroethane	UG/L	0	0%	5	0	0	30	0.5	U	1	U	0.5	U	1	U			10	U
1,1-Dichloroethene	UG/L	0	0%	5	0	0	30	0.5	U	1	U	0.5	U	1	U			10	U
1,1-Dichloropropene	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U						
1,2,3-Trichlorobenzene	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U						
1,2,3-Trichloropropane	UG/L	0	0%	0.04	0	0	11	0.5	U			0.5	U						
1,2,4-Trichlorobenzene	UG/L	0	0%	5	0	0	25	0.5	U	1	U	0.5	U	1	U				
1,2,4-Trimethylbenzene	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U						
1,2-Dibromo-3-chloropropane	UG/L	0	0%	0.04	0	0	25	0.5	U	1	U	0.5	U	1	U				
1,2-Dibromoethane	UG/L	0	0%	0.0006	0	0	25	0.5	U	1	U	0.5	U	1	U				
1,2-Dichlorobenzene	UG/L	0	0%	3	0	0	25	0.5	U	1	U	0.5	U	1	U				
1,2-Dichloroethane	UG/L	0	0%	0.6	0	0	30	0.5	U	1	U	0.5	U	1	U			10	U
1,2-Dichloroethene (total)	UG/L	0	0%	5	0	0	5											10	U
1,2-Dichloropropane	UG/L	0	0%	1	0	0	30	0.5	U	1	U	0.5	U	1	U			10	U
1,3,5-Trimethylbenzene	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U						
1,3-Dichlorobenzene	UG/L	0	0%	3	0	0	25	0.5	U	1	U	0.5	U	1	U				
1,3-Dichloropropane	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U						
1,4-Dichlorobenzene	UG/L	0	0%	3	0	0	25	0.5	U	1	U	0.5	U	1	U				
2,2-Dichloropropane	UG/L	0	0%		0	0	11	0.5	UJ			0.5	U						
2-Chlorotoluene	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U						
2-Nitropropane	UG/L	0	0%		0	0	11	25	U			25	U						
Acetone	UG/L	8	3%		0	1	30	5	U	5	U	5	U	5	U			10	U
Acrylonitrile	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U						
Allyl chloride	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U						
Benzene	UG/L	2	3%	1	1	1	30	0.5	U	1	U	0.5	U	1	U			10	U
Bromobenzene	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U						
Bromochloromethane	UG/L	0	0%	5	0	0	25	0.5	U	1	U	0.5	U	1	U				
Bromodichloromethane	UG/L	0	0%	80	0	0	30	0.5	U	1	U	0.5	U	1	U			10	U
Bromoform	UG/L	0	0%	80	0	0	30	0.5	U	1	U	0.5	U	1	U			10	U
Butyl chloride	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U						
Carbon disulfide	UG/L	0	0%		0	0	30	0.5	U	1	U	0.5	U	1	U			10	U
Carbon tetrachloride	UG/L	0	0%	5	0	0	30	0.5	U	1	U	0.5	U	1	U			10	U
Chloracetonitrile	UG/L	0	0%		0	0	11	50	U			50	U						
Chlorobenzene	UG/L	0	0%	5	0	0	30	0.5	U	1	U	0.5	U	1	U			10	U
Chlorodibromomethane	UG/L	0	0%		0	0	30	0.5	U	1	U	0.5	U	1	U			10	U
Chloroethane	UG/L	0	0%	5	0	0	30	0.5	U	1	U	0.5	U	1	U			10	U
Chloroform	UG/L	0	0%	7	0	0	30	0.5	U	1	U	0.5	U	1	U			10	U
Cis-1,2-Dichloroethene	UG/L	0	0%	5	0	0	25	0.5	U	1	U	0.5	U	1	U				
Cis-1,3-Dichloropropene	UG/L	0	0%	0.4	0	0	30	0.5	U	1	U	0.5	U	1	U			10	U
Dichlorodifluoromethane	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U						
Dichloromethyl methyl ketone	UG/L	0	0%		0	0	11	25	U			25	U						
Ethyl benzene	UG/L	6	3%	5	1	1	30	0.5	U	1	U	0.5	U	1	U			10	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Groundwater Sample Results

								SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								MW4-11		MW4-12		MW4-12		MW4-13		MW4-13		MW4-2	
								GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER	
								42035		42028		42034		42029		42041		MW4-2	
								10		8.5		12.9		7.9		9		2.2	
								10		8.5		12.9		7.9		9		3.2	
								7/8/1999		3/30/1999		7/8/1999		3/31/1999		7/9/1999		2/4/1994	
								SA		SA		SA		SA		SA		SA	
ANALYTE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	GW CRITERIA revised 1/01	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		ESI	
								N		N		N		N		N		N	
VOLATILES Ethyl ether	UG/L	0	0%		0	0	11	0.5	U			0.5	U						
Ethyl methacrylate	UG/L	0	0%		0	0	11	0.5	U			0.5	U						
Hexachlorobutadiene	UG/L	0	0%	0.5	0	0	11	0.5	U			0.5	U						
Hexachloroethane	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U						
Isopropylbenzene	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U						
Methacrylonitrile	UG/L	0	0%	5	0	0	11	0.5	U			0.5	UJ						
Methyl 2-propenoate	UG/L	0	0%		0	0	11	0.5	U			0.5	U						
Methyl Tertbutyl Ether	UG/L	0	0%		0	0	11	0.5	U			0.5	U						
Methyl bromide	UG/L	0	0%	5	0	0	30	0.5	UJ	1	U	0.5	U	1	U			10	U
Methyl butyl ketone	UG/L	0	0%		0	0	30	5	UJ	5	U	5	U	5	U			10	U
Methyl chloride	UG/L	0	0%	5	0	0	30	0.5	U	1	U	0.5	U	1	U			10	U
Methyl ethyl ketone	UG/L	0	0%		0	0	30	5	R	5	U	5	R	5	U			10	U
Methyl iodide	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U						
Methyl isobutyl ketone	UG/L	0	0%		0	0	30	2.5	U	5	U	2.5	U	5	U			10	U
Methyl methacrylate	UG/L	0	0%		0	0	11	0.5	U			0.5	U						
Methylene bromide	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U						
Methylene chloride	UG/L	0	0%	5	0	0	30	0.5	U	2	U	0.5	U	2	U			10	U
Naphthalene	UG/L	0	0%		0	0	11	0.5	U			0.5	U						
Nitrobenzene	UG/L	0	0%	0.4	0	0	11	25	R			25	R						
Ortho Xylene	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U						
Pentachloroethane	UG/L	0	0%	5	0	0	11	0.5	UJ			0.5	U						
Propionitrile	UG/L	0	0%		0	0	11	25	R			25	R						
Propylbenzene	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U						
Styrene	UG/L	0	0%	5	0	0	30	0.5	U	1	U	0.5	U	1	U			10	U
Tetrachloroethene	UG/L	0	0%	5	0	0	30	0.5	U	1	U	0.5	U	1	U			10	U
Tetrahydrofuran	UG/L	0	0%		0	0	11	2.5	U			2.5	U						
Toluene	UG/L	0.4	3%	5	0	1	30	0.5	U	1	U	0.5	U	1	U			10	U
Total Xylenes	UG/L	4	3%	5	0	1	30	0.5	U	1	U	0.5	U	1	U			10	U
Trans-1,2-Dichloroethene	UG/L	0	0%	5	0	0	25	0.5	U	1	U	0.5	U	1	U				
Trans-1,3-Dichloropropene	UG/L	0	0%	0.4	0	0	30	0.5	U	1	U	0.5	U	1	U			10	U
Trans-1,4-Dichloro-2-butene	UG/L	0	0%		0	0	11	0.5	U			0.5	U						
Trichloroethene	UG/L	0	0%	5	0	0	30	0.5	U	1	U	0.5	U	1	U			10	U
Trichlorofluoromethane	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U						
Vinyl chloride	UG/L	0	0%	2	0	0	30	0.5	U	1	U	0.5	U	1	U			10	U
n-Butylbenzene	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U						
p-Chlorotoluene	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U						
p-Isopropyltoluene	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U						
sec-Butylbenzene	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U						
tert-Butylbenzene	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U						
SEMIVOLATILES																			
1,2,4-Trichlorobenzene	UG/L	0	0%	5	0	0	30	1	U	1	U	1	U	1	U			10	U
1,2-Dichlorobenzene	UG/L	0	0%	3	0	0	30	1	U	1	U	1	U	1	U			10	U
1,3-Dichlorobenzene	UG/L	0	0%	3	0	0	30	1	U	1	U	1	U	1	U			10	U
1,4-Dichlorobenzene	UG/L	0	0%	3	0	0	30	1	U	1	U	1	U	1	U			10	U
2,2'-oxybis(1-Chloropropane)	UG/L	0	0%		0	0	5											10	U
2,4,5-Trichlorophenol	UG/L	0	0%	1	0	0	30	2.6	U	2.6	U	2.6	U	2.5	U			25	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Groundwater Sample Results

								SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								MW4-11		MW4-12		MW4-12		MW4-13		MW4-13		MW4-2	
								GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER	
								42035		42028		42034		42029		42041		MW4-2	
								10		8.5		12.9		7.9		9		2.2	
								10		8.5		12.9		7.9		9		3.2	
								7/8/1999		3/30/1999		7/8/1999		3/31/1999		7/9/1999		2/4/1994	
			FREQUENCY	GW	NUMBER	NUMBER	NUMBER	SA		SA		SA		SA		SA		SA	
ANALYTE	UNIT	MAXIMUM	OF	CRITERIA	ABOVE	OF	OF	RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		ESI	
			DETECTION	revised 1/01	TAGM	DETECTS	ANALYSES												
								N		N		N		N		N		N	
VOLATILES 2,4,6-Trichlorophenol	UG/L	0	0%	1	0	0	30	1	U	1	U	1	U	1	U			10	U
2,4-Dichlorophenol	UG/L	0	0%	1	0	0	30	1	U	1	U	1	U	1	U			10	U
2,4-Dimethylphenol	UG/L	0	0%	1	0	0	30	1	U	1	U	1	U	1	U			10	U
2,4-Dinitrophenol	UG/L	0	0%	1	0	0	30	2.6	UJ	2.6	UJ	2.6	UJ	2.5	UJ			25	U
2,4-Dinitrotoluene	UG/L	0	0%	5	0	0	30	1	U	1	U	1	U	1	U			10	U
2,6-Dinitrotoluene	UG/L	0	0%	5	0	0	30	1	U	1	U	1	U	1	U			10	U
2-Chloronaphthalene	UG/L	0	0%		0	0	30	1	U	1	U	1	U	1	U			10	U
2-Chlorophenol	UG/L	0	0%	1	0	0	30	1	U	1	U	1	U	1	U			10	U
2-Methylnaphthalene	UG/L	0	0%		0	0	30	1	U	1	U	1	U	1	U			10	U
2-Methylphenol	UG/L	0	0%	1	0	0	30	1	U	1	U	1	U	1	U			10	U
2-Nitroaniline	UG/L	0	0%	5	0	0	30	2.6	U	2.6	U	2.6	U	2.5	U			25	U
2-Nitrophenol	UG/L	0	0%	1	0	0	30	1	U	1	U	1	U	1	U			10	U
3,3'-Dichlorobenzidine	UG/L	0	0%	5	0	0	30	1	U	1	UJ	1	U	1	UJ			10	U
3-Nitroaniline	UG/L	0	0%	5	0	0	30	2.6	U	2.6	UJ	2.6	U	2.5	UJ			25	U
4,6-Dinitro-2-methylphenol	UG/L	0	0%	1	0	0	30	2.6	U	2.6	UJ	2.6	U	2.5	UJ			25	U
4-Bromophenyl phenyl ether	UG/L	0	0%		0	0	30	1	U	1	U	1	U	1	U			10	U
4-Chloro-3-methylphenol	UG/L	0	0%	1	0	0	30	1	U	1	U	1	U	1	U			10	U
4-Chloroaniline	UG/L	0	0%	5	0	0	30	1	U	1	UJ	1	U	1	UJ			10	U
4-Chlorophenyl phenyl ether	UG/L	0	0%		0	0	30	1	U	1	U	1	U	1	U			10	U
4-Methylphenol	UG/L	2.2	7%	1	1	2	30	1	U	1	U	1	U	1	U			10	U
4-Nitroaniline	UG/L	0	0%	5	0	0	30	2.6	U	2.6	U	2.6	U	2.5	U			25	U
4-Nitrophenol	UG/L	0	0%	1	0	0	30	2.6	R	2.6	U	2.6	R	2.5	U			25	U
Acenaphthene	UG/L	0	0%		0	0	30	1	U	1	U	1	U	1	U			10	U
Acenaphthylene	UG/L	0	0%		0	0	30	1	U	1	U	1	U	1	U			10	U
Anthracene	UG/L	0	0%		0	0	30	1	U	1	U	1	U	1	U			10	U
Benzo(a)anthracene	UG/L	0	0%		0	0	30	1	U	1	U	1	U	1	U			10	U
Benzo(a)pyrene	UG/L	0	0%	0	0	0	30	1	U	1	U	1	U	1	U			10	U
Benzo(b)fluoranthene	UG/L	0	0%		0	0	30	1	U	1	U	1	U	1	U			10	U
Benzo(ghi)perylene	UG/L	0	0%		0	0	30	1	U	1	U	1	U	1	U			10	U
Benzo(k)fluoranthene	UG/L	0	0%		0	0	30	1	U	1	U	1	U	1	U			10	U
Bis(2-Chloroethoxy)methane	UG/L	0	0%	5	0	0	30	1	U	1	U	1	U	1	U			10	U
Bis(2-Chloroethyl)ether	UG/L	0	0%	1	0	0	30	1	U	1	U	1	U	1	U			10	U
Bis(2-Chloroisopropyl)ether	UG/L	0	0%	5	0	0	25	1	U	1	U	1	U	1	U				
Bis(2-Ethylhexyl)phthalate	UG/L	1.1	3%	5	0	1	30	1	U	1.5	U	1	U	1.3	U			10	U
Butylbenzylphthalate	UG/L	0	0%		0	0	30	1	U	1	U	1	U	1	U			10	U
Carbazole	UG/L	0	0%		0	0	30	1	U	1	U	1	U	1	U			10	U
Chrysene	UG/L	0	0%		0	0	30	1	U	1	U	1	U	1	U			10	U
Di-n-butylphthalate	UG/L	0.15	3%	50	0	1	30	1	U	1	U	1	U	1	U			10	U
Di-n-octylphthalate	UG/L	0	0%		0	0	30	1	UJ	1	U	1	UJ	1	U			10	U
Dibenz(a,h)anthracene	UG/L	0	0%		0	0	30	1	U	1	U	1	U	1	U			10	U
Dibenzofuran	UG/L	0	0%		0	0	30	1	U	1	U	1	U	1	U			10	U
Diethyl phthalate	UG/L	0.9	17%		0	5	30	1	U	1	U	1	U	1	U			10	U
Dimethylphthalate	UG/L	0	0%		0	0	30	1	U	1	U	1	U	1	U			10	U
Fluoranthene	UG/L	0	0%		0	0	30	1	U	1	U	1	U	1	U			10	U
Fluorene	UG/L	0	0%		0	0	30	1	U	1	U	1	U	1	U			10	U
Hexachlorobenzene	UG/L	0	0%	0.04	0	0	30	1	U	1	U	1	U	1	U			10	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Groundwater Sample Results

ANALYTE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	GW CRITERIA revised 1/01	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								MW4-11		MW4-12		MW4-12		MW4-13		MW4-13		MW4-2	
								GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER	
								42035		42028		42034		42029		42041		MW4-2	
								10		8.5		12.9		7.9		9		2.2	
								10		8.5		12.9		7.9		9		3.2	
								7/8/1999		3/30/1999		7/8/1999		3/31/1999		7/9/1999		2/4/1994	
								SA		SA		SA		SA		SA		SA	
								RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		ESI	
								N		N		N		N		N		N	
Hexachlorobutadiene	UG/L	0	0%	0.5	0	0	30	1	U	1	U	1	U	1	U			10	U
Hexachlorocyclopentadiene	UG/L	0	0%	5	0	0	30	1	UJ	1	U	1	UJ	1	U			10	U
Hexachloroethane	UG/L	0	0%	5	0	0	30	1	U	1	U	1	U	1	U			10	U
Indeno(1,2,3-cd)pyrene	UG/L	0	0%		0	0	30	1	U	1	U	1	U	1	U			10	U
Isophorone	UG/L	0	0%		0	0	30	1	UJ	1	U	1	UJ	1	U			10	U
N-Nitrosodiphenylamine	UG/L	0	0%		0	0	30	1	U	1	U	1	U	1	U			10	U
N-Nitrosodipropylamine	UG/L	0	0%		0	0	30	1	U	1	U	1	U	1	U			10	U
Naphthalene	UG/L	2.2	3%		0	1	30	1	U	1	U	1	U	1	U			10	U
Nitrobenzene	UG/L	0	0%	0.4	0	0	30	1	U	1	U	1	U	1	U			10	U
Pentachlorophenol	UG/L	0	0%	1	0	0	30	2.6	UJ	2.6	U	2.6	UJ	2.5	U			25	U
Phenanthrene	UG/L	0	0%		0	0	30	1	U	1	U	1	U	1	U			10	U
Phenol	UG/L	0.4	3%	1	0	1	30	1	U	1	U	1	U	1	U			10	U
Pyrene	UG/L	0	0%		0	0	30	1	U	1	U	1	U	1	U			10	U
EXPLOSIVES																			
1,3,5-Trinitrobenzene	UG/L	0	0%	5	0	0	32	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.13	U
1,3-Dinitrobenzene	UG/L	0	0%	5	0	0	32	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.13	U
2,4,6-Trinitrotoluene	UG/L	0	0%	5	0	0	32	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.13	U
2,4-Dinitrotoluene	UG/L	0	0%	5	0	0	32	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.13	U
2,6-Dinitrotoluene	UG/L	0	0%	5	0	0	32	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.13	U
2-Nitrotoluene	UG/L	0.87	4%	5	0	1	27	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U		
2-amino-4,6-Dinitrotoluene	UG/L	0	0%		0	0	32	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.13	U
3-Nitrotoluene	UG/L	2.6	4%	5	0	1	27	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U		
4-Nitrotoluene	UG/L	10	4%	5	1	1	27	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U		
4-amino-2,6-Dinitrotoluene	UG/L	0	0%		0	0	32	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.13	U
HMX	UG/L	0	0%		0	0	32	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.13	U
Nitrobenzene	UG/L	0.89	4%	0.4	1	1	27	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U		
RDX	UG/L	0	0%		0	0	32	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.13	U
Tetryl	UG/L	0	0%	5	0	0	32	0.25	UJ	0.25	U	0.25	UJ	0.25	U	0.25	UJ	0.13	U
PESTICIDES/PCBS																			
4,4'-DDD	UG/L	0	0%	0.3	0	0	30	0.011	U	0.01	U	0.011	U	0.011	U			0.13	UJ
4,4'-DDE	UG/L	0	0%	0.2	0	0	30	0.011	U	0.01	U	0.011	U	0.011	U			0.13	UJ
4,4'-DDT	UG/L	0	0%	0.2	0	0	30	0.011	U	0.01	U	0.011	U	0.011	U			0.13	UJ
Aldrin	UG/L	0.0036	3%	0	1	1	30	0.0056	U	0.005	U	0.0056	U	0.0055	U			0.064	UJ
Alpha-BHC	UG/L	0.0028	3%	0.01	0	1	30	0.0056	U	0.0028	J	0.0056	U	0.0055	U			0.064	UJ
Alpha-Chlordane	UG/L	0	0%		0	0	30	0.0056	U	0.005	U	0.0056	U	0.0055	U			0.064	UJ
Aroclor-1016	UG/L	0	0%	0.09	0	0	30	0.11	U	0.1	U	0.11	U	0.11	U			1.3	UJ
Aroclor-1221	UG/L	0	0%	0.09	0	0	30	0.22	U	0.2	U	0.22	U	0.22	U			2.5	UJ
Aroclor-1232	UG/L	0	0%	0.09	0	0	30	0.11	U	0.1	U	0.11	U	0.11	U			1.3	UJ
Aroclor-1242	UG/L	0	0%	0.09	0	0	30	0.11	U	0.1	U	0.11	U	0.11	U			1.3	UJ
Aroclor-1248	UG/L	0	0%	0.09	0	0	30	0.11	U	0.1	U	0.11	U	0.11	U			1.3	UJ
Aroclor-1254	UG/L	0	0%	0.09	0	0	30	0.11	U	0.1	U	0.11	U	0.11	U			1.3	UJ
Aroclor-1260	UG/L	0.079	3%	0.09	0	1	30	0.11	U	0.1	U	0.11	U	0.11	U			1.3	UJ
Beta-BHC	UG/L	0	0%	0.04	0	0	30	0.0056	U	0.005	U	0.0056	U	0.0055	U			0.064	UJ
Delta-BHC	UG/L	0.0041	3%	0.04	0	1	30	0.0056	U	0.005	U	0.0056	U	0.0055	U			0.064	UJ
Dieldrin	UG/L	0	0%	0.004	0	0	30	0.011	U	0.01	U	0.011	U	0.011	U			0.13	UJ

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Groundwater Sample Results

ANALYTE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	GW CRITERIA revised 1/01	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								MW4-11		MW4-12		MW4-12		MW4-13		MW4-13		MW4-2	
								GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER	
								42035		42028		42034		42029		42041		MW4-2	
								10		8.5		12.9		7.9		9		2.2	
								10		8.5		12.9		7.9		9		3.2	
								7/8/1999		3/30/1999		7/8/1999		3/31/1999		7/9/1999		2/4/1994	
								SA		SA		SA		SA		SA		SA	
								RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		ESI	
								N		N		N		N		N		N	
Endosulfan I	UG/L	0	0%		0	0	30	0.0056	U	0.005	U	0.0056	U	0.0055	U			0.064	UJ
Endosulfan II	UG/L	0	0%		0	0	30	0.011	U	0.01	U	0.011	U	0.011	U			0.13	UJ
Endosulfan sulfate	UG/L	0	0%		0	0	30	0.011	U	0.01	U	0.011	U	0.011	U			0.13	UJ
Endrin	UG/L	0	0%	0	0	0	30	0.011	U	0.01	U	0.011	U	0.011	U			0.13	UJ
Endrin aldehyde	UG/L	0	0%	5	0	0	30	0.011	U	0.01	U	0.011	U	0.011	U			0.13	UJ
Endrin ketone	UG/L	0	0%	5	0	0	30	0.011	U	0.01	U	0.011	U	0.011	U			0.13	UJ
Gamma-BHC/Lindane	UG/L	0	0%	0.05	0	0	30	0.0056	U	0.005	U	0.0056	U	0.0055	U			0.064	UJ
Gamma-Chlordane	UG/L	0.0054	3%		0	1	30	0.0056	U	0.005	U	0.0056	U	0.0054	J			0.064	UJ
Heptachlor	UG/L	0.0056	7%	0.04	0	2	30	0.0056	U	0.005	U	0.0056	J	0.0055	U			0.064	UJ
Heptachlor epoxide	UG/L	0	0%	0.03	0	0	30	0.0056	U	0.005	U	0.0056	U	0.0055	U			0.064	UJ
Hexachlorobenzene	UG/L	0	0%	0.04	0	0	25	0.011	UJ	0.01	U	0.011	UJ	0.011	U				
Methoxychlor	UG/L	0	0%	35	0	0	30	0.056	U	0.05	U	0.056	U	0.055	U			0.64	UJ
Toxaphene	UG/L	0	0%	0.06	0	0	30	0.56	U	0.5	U	0.56	U	0.55	U			6.4	UJ
HERBICIDES																			
2,4,5-T	UG/L	0	0%	35	0	0	5											0.12	U
2,4,5-TP/Silvex	UG/L	0	0%	0.26	0	0	5											0.12	U
2,4-D	UG/L	0	0%	50	0	0	5											1.2	U
2,4-DB	UG/L	0	0%		0	0	5											1.2	U
Dalapon	UG/L	0	0%	50	0	0	5											2.6	U
Dicamba	UG/L	0	0%	0.44	0	0	5											0.12	U
Dichloroprop	UG/L	0	0%		0	0	5											1.2	U
Dinoseb	UG/L	0	0%	1	0	0	5											0.57	U
MCPA	UG/L	0	0%	0.44	0	0	5											120	U
MCPP	UG/L	0	0%		0	0	5											120	U
METALS																			
Aluminum	UG/L	3820	90%	50	25	27	30	1390		1260	J	1260		320	J	306		435	
Antimony	UG/L	39.3	23%	3	5	7	30	3.7	U	2.9	J	3.7	U	2.2	U	3.7	U	39.3	J
Arsenic	UG/L	6.5	17%	5	3	5	30	5.2	U	1.8	U	5.2	U	1.8	U	5.9	J	1.4	U
Barium	UG/L	121	100%	1,000	0	30	30	55.1	J	53.8	J	57.3	J	30	J	118	J	19.3	J
Beryllium	UG/L	6.3	10%	4	0	3	30	0.4	U	0.1	U	0.4	U	0.1	U	0.4	U	0.4	U
Cadmium	UG/L	5.6	7%	5	1	2	30	0.9	U	0.3	U	0.9	U	0.3	U	0.9	U	2.1	U
Calcium	UG/L	147000	100%		0	30	30	84100		134000		128000		61900		103000		66300	
Chromium	UG/L	260	60%	50	1	18	30	3.2	J	3.2	J	2.6	J	1.7	J	0.82	J	2.6	U
Cobalt	UG/L	8.2	17%		0	5	30	3.4	U	1.5	J	3.4	U	1.5	U	3.4	U	4.4	U
Copper	UG/L	37.6	30%	200	0	9	30	3.8	J	2.4	U	2.9	U	2.4	U	10.2	J	3.1	U
Cyanide	UG/L	0	0%	200	0	0	28	5	U	5	U	5	U	5	U			5	U
Iron	UG/L	6900	90%	300	15	27	30	1920		1990		1460		297		1150		471	
Lead	UG/L	2.2	13%	15	0	4	30	0.8	U	0.9	UJ	0.8	U	0.9	UJ	0.8	U	1.9	J
Magnesium	UG/L	57600	100%		0	30	30	19800		30100		28100		5590		15600		10100	
Manganese	UG/L	855	93%	300	5	28	30	229		262		137		378		855		60.5	
Mercury	UG/L	0.04	7%	0.7	0	2	30	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.04	U
Nickel	UG/L	9.9	40%	100	0	12	30	4	U	4	J	4	U	3.1	J	5.8	J	4	U
Potassium	UG/L	14400	100%		0	30	30	4520	J	3110	J	1540	J	2990	J	14400		1840	J
Selenium	UG/L	24	37%	10	3	11	30	2.9	U	13.4		2.9	U	1.8	U	2.9	U	0.7	U
Silver	UG/L	6.7	17%	50	0	5	30	2.5	U	0.9	U	2.5	U	1.2	J	2.5	U	4.2	U
Sodium	UG/L	82600	100%	20,000	7	30	30	63100		35200		22700		4650	J	8090		12400	
Thallium	UG/L	4.9	10%	2	0	3	30	3	U	4.9	J	3	U	1.9	U	3	U	1.2	U
Vanadium	UG/L	11.4	30%		0	9	30	4.7	J	3.3	J	2.5	U	1.6	U	2.5	U	3.7	U
Zinc	UG/L	95	87%		0	26	30	10.5	J	7.9	J	5.3	J	9.3	J	16.2	J	15.2	J
Nitrate/Nitrite	SU			10,000								0.01							

Seneca Army Depot Activity
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Groundwater Sample Results

								SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								MW4-2		MW4-3		MW4-3		MW4-3		MW4-4		MW4-4		MW4-4	
								GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER	
								42018		MW4-3		42019		42033		MW4-4		42020		42036	
								5.3		3.9		8.5		10.95		4.9		10		10	
								5.3		7.9		8.5		10.95		8.9		10		10	
								4/1/1999		1/20/1994		3/29/1999		7/7/1999		2/1/1994		4/24/1999		7/8/1999	
								SA		SA		SA		SA		SA		SA		SA	
ANALYTE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	GW CRITERIA revised 1/01	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	RI Phase 1 Step 1		ESI		RI Phase 1 Step 1		RI Phase 1 Step 1		ESI		RI Phase 1 Step 1		RI Phase 1 Step 1	
								N		N		N		N		N		N		N	
VOLATILES																					
1,1,1,2-Tetrachloroethane	UG/L	0	0%	5	0	0	11							0.5	U					0.5	U
1,1,1-Trichloroethane	UG/L	0	0%	5	0	0	30	1	U	10	U	1	U	0.5	U	10	U	1	U	0.5	U
1,1,2,2-Tetrachloroethane	UG/L	0	0%	5	0	0	30	1	U	10	U	1	U	0.5	U	10	U	1	U	0.5	U
1,1,2-Trichloroethane	UG/L	0	0%	1	0	0	30	1	U	10	U	1	U	0.5	U	10	U	1	U	0.5	U
1,1-Dichloroethane	UG/L	0	0%	5	0	0	30	1	U	10	U	1	U	0.5	U	10	U	1	U	0.5	U
1,1-Dichloroethene	UG/L	0	0%	5	0	0	30	1	U	10	U	1	U	0.5	U	10	U	1	U	0.5	U
1,1-Dichloropropene	UG/L	0	0%	5	0	0	11							0.5	U					0.5	U
1,2,3-Trichlorobenzene	UG/L	0	0%	5	0	0	11							0.5	U					0.5	U
1,2,3-Trichloropropane	UG/L	0	0%	0.04	0	0	11							0.5	U					0.5	U
1,2,4-Trichlorobenzene	UG/L	0	0%	5	0	0	25	1	U			1	U	0.5	U			1	U	0.5	U
1,2,4-Trimethylbenzene	UG/L	0	0%	5	0	0	11							0.5	U					0.5	U
1,2-Dibromo-3-chloropropane	UG/L	0	0%	0.04	0	0	25	1	U			1	U	0.5	U			1	U	0.5	U
1,2-Dibromoethane	UG/L	0	0%	0.0006	0	0	25	1	U			1	U	0.5	U			1	U	0.5	U
1,2-Dichlorobenzene	UG/L	0	0%	3	0	0	25	1	U			1	U	0.5	U			1	U	0.5	U
1,2-Dichloroethane	UG/L	0	0%	0.6	0	0	30	1	U	10	U	1	U	0.5	U	10	U	1	U	0.5	U
1,2-Dichloroethene (total)	UG/L	0	0%	5	0	0	5			10	U					10	U				
1,2-Dichloropropane	UG/L	0	0%	1	0	0	30	1	U	10	U	1	U	0.5	U	10	U	1	U	0.5	U
1,3,5-Trimethylbenzene	UG/L	0	0%	5	0	0	11							0.5	U					0.5	U
1,3-Dichlorobenzene	UG/L	0	0%	3	0	0	25	1	U			1	U	0.5	U			1	U	0.5	U
1,3-Dichloropropane	UG/L	0	0%	5	0	0	11							0.5	U					0.5	U
1,4-Dichlorobenzene	UG/L	0	0%	3	0	0	25	1	U			1	U	0.5	U			1	UJ	0.5	U
2,2-Dichloropropane	UG/L	0	0%		0	0	11							0.5	U					0.5	UJ
2-Chlorotoluene	UG/L	0	0%	5	0	0	11							0.5	U					0.5	U
2-Nitropropane	UG/L	0	0%		0	0	11							25	U					25	U
Acetone	UG/L	8	3%		0	1	30	5	U	10	U	5	U	5	U	10	U	5	U	5	U
Acrylonitrile	UG/L	0	0%	5	0	0	11							0.5	U					0.5	U
Allyl chloride	UG/L	0	0%	5	0	0	11							0.5	U					0.5	U
Benzene	UG/L	2	3%	1	1	1	30	1	U	10	U	1	U	0.5	U	10	U	1	U	0.5	U
Bromobenzene	UG/L	0	0%	5	0	0	11							0.5	U					0.5	U
Bromochloromethane	UG/L	0	0%	5	0	0	25	1	U			1	U	0.5	U			1	U	0.5	U
Bromodichloromethane	UG/L	0	0%	80	0	0	30	1	U	10	U	1	U	0.5	U	10	U	1	U	0.5	U
Bromoform	UG/L	0	0%	80	0	0	30	1	U	10	U	1	U	0.5	U	10	U	1	U	0.5	U
Butyl chloride	UG/L	0	0%	5	0	0	11							0.5	U					0.5	U
Carbon disulfide	UG/L	0	0%		0	0	30	1	U	10	U	1	U	0.5	U	10	U	1	U	0.5	U
Carbon tetrachloride	UG/L	0	0%	5	0	0	30	1	U	10	U	1	U	0.5	U	10	U	1	U	0.5	U
Chloracetonitrile	UG/L	0	0%		0	0	11							50	U					50	U
Chlorobenzene	UG/L	0	0%	5	0	0	30	1	U	10	U	1	U	0.5	U	10	U	1	U	0.5	U
Chlorodibromomethane	UG/L	0	0%		0	0	30	1	U	10	U	1	U	0.5	U	10	U	1	U	0.5	U
Chloroethane	UG/L	0	0%	5	0	0	30	1	U	10	U	1	U	0.5	U	10	U	1	UJ	0.5	U
Chloroform	UG/L	0	0%	7	0	0	30	1	U	10	U	1	U	0.5	U	10	U	1	U	0.5	U
Cis-1,2-Dichloroethene	UG/L	0	0%	5	0	0	25	1	U			1	U	0.5	U			1	U	0.5	U
Cis-1,3-Dichloropropene	UG/L	0	0%	0.4	0	0	30	1	U	10	U	1	U	0.5	U	10	U	1	U	0.5	U
Dichlorodifluoromethane	UG/L	0	0%	5	0	0	11							0.5	U					0.5	U
Dichloromethyl methyl ketone	UG/L	0	0%		0	0	11							25	U					25	U
Ethyl benzene	UG/L	6	3%	5	1	1	30	1	U	10	U	1	U	0.5	U	10	U	1	U	0.5	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Groundwater Sample Results

ANALYTE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	GW CRITERIA revised 1/01	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4 MW4-2 GROUND WATER 42018 5.3 5.3 4/1/1999 SA RI Phase 1 Step 1 N		SEAD-4 MW4-3 GROUND WATER MW4-3 3.9 7.9 1/20/1994 SA ESI N		SEAD-4 MW4-3 GROUND WATER 42019 8.5 8.5 3/29/1999 SA RI Phase 1 Step 1 N		SEAD-4 MW4-3 GROUND WATER 42033 10.95 10.95 7/7/1999 SA RI Phase 1 Step 1 N		SEAD-4 MW4-4 GROUND WATER MW4-4 4.9 8.9 2/1/1994 SA ESI N		SEAD-4 MW4-4 GROUND WATER 42020 10 10 4/24/1999 SA RI Phase 1 Step 1 N		SEAD-4 MW4-4 GROUND WATER 42036 10 10 7/8/1999 SA RI Phase 1 Step 1 N	
VOLATILES Ethyl ether	UG/L	0	0%		0	0	11							0.5	U					0.5	U
Ethyl methacrylate	UG/L	0	0%		0	0	11							0.5	U					0.5	U
Hexachlorobutadiene	UG/L	0	0%	0.5	0	0	11							0.5	U					0.5	U
Hexachloroethane	UG/L	0	0%	5	0	0	11							0.5	U					0.5	U
Isopropylbenzene	UG/L	0	0%	5	0	0	11							0.5	U					0.5	U
Methacrylonitrile	UG/L	0	0%	5	0	0	11							0.5	UJ					0.5	U
Methyl 2-propenoate	UG/L	0	0%		0	0	11							0.5	U					0.5	U
Methyl Tertbutyl Ether	UG/L	0	0%		0	0	11							0.5	U					0.5	U
Methyl bromide	UG/L	0	0%	5	0	0	30	1	U	10	U	1	U	0.5	U	10	U	1	U	0.5	UJ
Methyl butyl ketone	UG/L	0	0%		0	0	30	5	U	10	U	5	U	5	U	10	U	5	U	5	UJ
Methyl chloride	UG/L	0	0%	5	0	0	30	1	U	10	U	1	U	0.5	U	10	U	1	UJ	0.5	U
Methyl ethyl ketone	UG/L	0	0%		0	0	30	5	U	10	U	5	U	5	R	10	U	5	U	5	R
Methyl iodide	UG/L	0	0%	5	0	0	11							0.5	U					0.5	U
Methyl isobutyl ketone	UG/L	0	0%		0	0	30	5	U	10	U	5	U	2.5	U	10	U	5	U	2.5	U
Methyl methacrylate	UG/L	0	0%		0	0	11							0.5	U					0.5	U
Methylene bromide	UG/L	0	0%	5	0	0	11							0.5	U					0.5	U
Methylene chloride	UG/L	0	0%	5	0	0	30	2	U	10	U	2	U	0.5	U	10	U	2	U	0.5	U
Naphthalene	UG/L	0	0%		0	0	11							0.5	U					0.5	U
Nitrobenzene	UG/L	0	0%	0.4	0	0	11							25	R					25	R
Ortho Xylene	UG/L	0	0%	5	0	0	11							0.5	U					0.5	U
Pentachloroethane	UG/L	0	0%	5	0	0	11							0.5	U					0.5	UJ
Propionitrile	UG/L	0	0%		0	0	11							25	R					25	R
Propylbenzene	UG/L	0	0%	5	0	0	11							0.5	U					0.5	U
Styrene	UG/L	0	0%	5	0	0	30	1	U	10	U	1	U	0.5	U	10	U	1	U	0.5	U
Tetrachloroethene	UG/L	0	0%	5	0	0	30	1	U	10	U	1	U	0.5	U	10	U	1	U	0.5	U
Tetrahydrofuran	UG/L	0	0%		0	0	11							2.5	U					2.5	U
Toluene	UG/L	0.4	3%	5	0	1	30	1	U	10	U	1	U	0.5	U	10	U	1	U	0.5	U
Total Xylenes	UG/L	4	3%	5	0	1	30	1	U	10	U	1	U	0.5	U	10	U	1	U	0.5	U
Trans-1,2-Dichloroethene	UG/L	0	0%	5	0	0	25	1	U			1	U	0.5	U			1	U	0.5	U
Trans-1,3-Dichloropropene	UG/L	0	0%	0.4	0	0	30	1	U	10	U	1	U	0.5	U	10	U	1	U	0.5	U
Trans-1,4-Dichloro-2-butene	UG/L	0	0%		0	0	11							0.5	U					0.5	U
Trichloroethene	UG/L	0	0%	5	0	0	30	1	U	10	U	1	U	0.5	U	10	U	1	U	0.5	U
Trichlorofluoromethane	UG/L	0	0%	5	0	0	11							0.5	U					0.5	U
Vinyl chloride	UG/L	0	0%	2	0	0	30	1	U	10	U	1	U	0.5	U	10	U	1	U	0.5	U
n-Butylbenzene	UG/L	0	0%	5	0	0	11							0.5	U					0.5	U
p-Chlorotoluene	UG/L	0	0%	5	0	0	11							0.5	U					0.5	U
p-Isopropyltoluene	UG/L	0	0%	5	0	0	11							0.5	U					0.5	U
sec-Butylbenzene	UG/L	0	0%	5	0	0	11							0.5	U					0.5	U
tert-Butylbenzene	UG/L	0	0%	5	0	0	11							0.5	U					0.5	U
SEMIVOLATILES																					
1,2,4-Trichlorobenzene	UG/L	0	0%	5	0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	UJ	1.1	U
1,2-Dichlorobenzene	UG/L	0	0%	3	0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
1,3-Dichlorobenzene	UG/L	0	0%	3	0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
1,4-Dichlorobenzene	UG/L	0	0%	3	0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
2,2'-oxybis(1-Chloropropane)	UG/L	0	0%		0	0	5			10	U					10	U				
2,4,5-Trichlorophenol	UG/L	0	0%	1	0	0	30	2.6	U	26	U	2.7	U	2.5	U	25	U	2.8	U	2.8	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Groundwater Sample Results

ANALYTE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	GW CRITERIA revised 1/01	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								MW4-2		MW4-3		MW4-3		MW4-3		MW4-4		MW4-4		MW4-4	
								GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER	
								42018		MW4-3		42019		42033		MW4-4		42020		42036	
								5.3		3.9		8.5		10.95		4.9		10		10	
								5.3		7.9		8.5		10.95		8.9		10		10	
								4/1/1999		1/20/1994		3/29/1999		7/7/1999		2/1/1994		4/24/1999		7/8/1999	
								SA		SA		SA		SA		SA		SA		SA	
								RI Phase 1	Step 1	ESI		RI Phase 1	Step 1	RI Phase 1	Step 1	ESI		RI Phase 1	Step 1	RI Phase 1	Step 1
								N		N		N		N		N		N		N	
2,4,6-Trichlorophenol	UG/L	0	0%	1	0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
2,4-Dichlorophenol	UG/L	0	0%	1	0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
2,4-Dimethylphenol	UG/L	0	0%	1	0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
2,4-Dinitrophenol	UG/L	0	0%	1	0	0	30	2.6	R	26	U	2.7	UJ	2.5	UJ	25	U	2.8	R	2.8	UJ
2,4-Dinitrotoluene	UG/L	0	0%	5	0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
2,6-Dinitrotoluene	UG/L	0	0%	5	0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
2-Chloronaphthalene	UG/L	0	0%		0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
2-Chlorophenol	UG/L	0	0%	1	0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
2-Methylnaphthalene	UG/L	0	0%		0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
2-Methylphenol	UG/L	0	0%	1	0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
2-Nitroaniline	UG/L	0	0%	5	0	0	30	2.6	U	26	U	2.7	U	2.5	U	25	U	2.8	U	2.8	U
2-Nitrophenol	UG/L	0	0%	1	0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
3,3'-Dichlorobenzidine	UG/L	0	0%	5	0	0	30	1	U	10	U	1.1	UJ	1	U	10	U	1.1	UJ	1.1	U
3-Nitroaniline	UG/L	0	0%	5	0	0	30	2.6	R	26	U	2.7	UJ	2.5	U	25	U	2.8	UJ	2.8	U
4,6-Dinitro-2-methylphenol	UG/L	0	0%	1	0	0	30	2.6	U	26	U	2.7	UJ	2.5	U	25	U	2.8	UJ	2.8	U
4-Bromophenyl phenyl ether	UG/L	0	0%		0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
4-Chloro-3-methylphenol	UG/L	0	0%	1	0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
4-Chloroaniline	UG/L	0	0%	5	0	0	30	1	U	10	U	1.1	UJ	1	U	10	U	1.1	UJ	1.1	U
4-Chlorophenyl phenyl ether	UG/L	0	0%		0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
4-Methylphenol	UG/L	2.2	7%	1	1	2	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
4-Nitroaniline	UG/L	0	0%	5	0	0	30	2.6	U	26	U	2.7	U	2.5	U	25	U	2.8	U	2.8	U
4-Nitrophenol	UG/L	0	0%	1	0	0	30	2.6	U	26	U	2.7	U	2.5	R	25	U	2.8	UJ	2.8	R
Acenaphthene	UG/L	0	0%		0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
Acenaphthylene	UG/L	0	0%		0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
Anthracene	UG/L	0	0%		0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
Benzo(a)anthracene	UG/L	0	0%		0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
Benzo(a)pyrene	UG/L	0	0%	0	0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
Benzo(b)fluoranthene	UG/L	0	0%		0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
Benzo(ghi)perylene	UG/L	0	0%		0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
Benzo(k)fluoranthene	UG/L	0	0%		0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
Bis(2-Chloroethoxy)methane	UG/L	0	0%	5	0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
Bis(2-Chloroethyl)ether	UG/L	0	0%	1	0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
Bis(2-Chloroisopropyl)ether	UG/L	0	0%	5	0	0	25	1	U			1.1	U	1	U			1.1	UJ	1.1	U
Bis(2-Ethylhexyl)phthalate	UG/L	1.1	3%	5	0	1	30	1	U	10	U	1.1	U	1	U	10	U	1.1	J	1.1	U
Butylbenzylphthalate	UG/L	0	0%		0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
Carbazole	UG/L	0	0%		0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
Chrysene	UG/L	0	0%		0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
Di-n-butylphthalate	UG/L	0.15	3%	50	0	1	30	1	U	10	U	1.1	U	1	U	10	U	1.1	UJ	1.1	U
Di-n-octylphthalate	UG/L	0	0%		0	0	30	1	U	10	U	1.1	U	1	UJ	10	U	1.1	UJ	1.1	UJ
Dibenz(a,h)anthracene	UG/L	0	0%		0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
Dibenzofuran	UG/L	0	0%		0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
Diethyl phthalate	UG/L	0.9	17%		0	5	30	1	U	0.5	J	1.1	U	1	U	10	U	0.061	J	1.1	U
Dimethylphthalate	UG/L	0	0%		0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
Fluoranthene	UG/L	0	0%		0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
Fluorene	UG/L	0	0%		0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
Hexachlorobenzene	UG/L	0	0%	0.04	0	0	30	1	U	10	U	1.1	U	1	U	10	U	0.011	UJ	1.1	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Groundwater Sample Results

ANALYTE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	GW CRITERIA revised 1/01	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								MW4-2		MW4-3		MW4-3		MW4-3		MW4-4		MW4-4		MW4-4	
								GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER	
								42018		MW4-3		42019		42033		MW4-4		42020		42036	
								5.3		3.9		8.5		10.95		4.9		10		10	
								5.3		7.9		8.5		10.95		8.9		10		10	
								4/1/1999		1/20/1994		3/29/1999		7/7/1999		2/1/1994		4/24/1999		7/8/1999	
								SA		SA		SA		SA		SA		SA		SA	
								RI Phase 1 Step 1		ESI		RI Phase 1 Step 1		RI Phase 1 Step 1		ESI		RI Phase 1 Step 1		RI Phase 1 Step 1	
								N		N		N		N		N		N		N	
VOLATILES Hexachlorobutadiene	UG/L	0	0%	0.5	0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
Hexachlorocyclopentadiene	UG/L	0	0%	5	0	0	30	1	U	10	U	1.1	U	1	UJ	10	U	1.1	U	1.1	UJ
Hexachloroethane	UG/L	0	0%	5	0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
Indeno(1,2,3-cd)pyrene	UG/L	0	0%		0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
Isophorone	UG/L	0	0%		0	0	30	1	U	10	U	1.1	U	1	UJ	10	U	1.1	U	1.1	UJ
N-Nitrosodiphenylamine	UG/L	0	0%		0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
N-Nitrosodipropylamine	UG/L	0	0%		0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
Naphthalene	UG/L	2.2	3%		0	1	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
Nitrobenzene	UG/L	0	0%	0.4	0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
Pentachlorophenol	UG/L	0	0%	1	0	0	30	2.6	U	26	U	2.7	U	2.5	UJ	25	U	2.8	R	2.8	UJ
Phenanthrene	UG/L	0	0%		0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
Phenol	UG/L	0.4	3%	1	0	1	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
Pyrene	UG/L	0	0%		0	0	30	1	U	10	U	1.1	U	1	U	10	U	1.1	U	1.1	U
EXPLOSIVES																					
1,3,5-Trinitrobenzene	UG/L	0	0%	5	0	0	32	0.25	U	0.13	U	0.25	U	0.25	U	0.13	U	0.25	U	0.25	U
1,3-Dinitrobenzene	UG/L	0	0%	5	0	0	32	0.25	U	0.13	U	0.25	U	0.25	U	0.13	U	0.25	U	0.25	U
2,4,6-Trinitrotoluene	UG/L	0	0%	5	0	0	32	0.25	U	0.13	U	0.25	U	0.25	U	0.13	U	0.25	U	0.25	U
2,4-Dinitrotoluene	UG/L	0	0%	5	0	0	32	0.25	U	0.13	U	0.25	U	0.25	U	0.13	U	0.25	U	0.25	U
2,6-Dinitrotoluene	UG/L	0	0%	5	0	0	32	0.25	U	0.13	U	0.25	U	0.25	U	0.13	U	0.25	U	0.25	U
2-Nitrotoluene	UG/L	0.87	4%	5	0	1	27	0.25	U			0.25	U	0.25	U			0.25	U	0.25	U
2-amino-4,6-Dinitrotoluene	UG/L	0	0%		0	0	32	0.25	U	0.13	U	0.25	U	0.25	U	0.13	U	0.25	U	0.25	U
3-Nitrotoluene	UG/L	2.6	4%	5	0	1	27	0.25	U			0.25	U	0.25	U			0.25	U	0.25	U
4-Nitrotoluene	UG/L	10	4%	5	1	1	27	0.25	U			0.25	U	0.25	U			0.25	U	0.25	U
4-amino-2,6-Dinitrotoluene	UG/L	0	0%		0	0	32	0.25	U	0.13	U	0.25	U	0.25	U	0.13	U	0.25	U	0.25	U
HMX	UG/L	0	0%		0	0	32	0.25	U	0.13	U	0.25	U	0.25	U	0.13	U	0.25	U	0.25	U
Nitrobenzene	UG/L	0.89	4%	0.4	1	1	27	0.25	U			0.25	U	0.25	U			0.25	U	0.25	U
RDX	UG/L	0	0%		0	0	32	0.25	U	0.13	U	0.25	U	0.25	U	0.13	U	0.25	U	0.25	U
Tetryl	UG/L	0	0%	5	0	0	32	0.25	U	0.13	U	0.25	U	0.25	UJ	0.13	U	0.25	U	0.25	UJ
PESTICIDES/PCBS																					
4,4'-DDD	UG/L	0	0%	0.3	0	0	30	0.011	U	0.1	U	0.01	U	0.011	U	0.12	U	0.011	U	0.01	U
4,4'-DDE	UG/L	0	0%	0.2	0	0	30	0.011	U	0.1	U	0.01	U	0.011	U	0.12	U	0.011	U	0.01	U
4,4'-DDT	UG/L	0	0%	0.2	0	0	30	0.011	U	0.1	U	0.01	U	0.011	U	0.12	U	0.011	U	0.01	U
Aldrin	UG/L	0.0036	3%	0	1	1	30	0.0056	U	0.052	U	0.0052	U	0.0056	U	0.062	U	0.0056	U	0.0052	U
Alpha-BHC	UG/L	0.0028	3%	0.01	0	1	30	0.0056	U	0.052	U	0.0052	U	0.0056	U	0.062	U	0.0056	U	0.0052	U
Alpha-Chlordane	UG/L	0	0%		0	0	30	0.0056	U	0.052	U	0.0052	U	0.0056	U	0.062	U	0.0056	U	0.0052	U
Aroclor-1016	UG/L	0	0%	0.09	0	0	30	0.11	U	1	U	0.1	U	0.11	U	1.2	U	0.11	U	0.1	U
Aroclor-1221	UG/L	0	0%	0.09	0	0	30	0.22	U	2.1	U	0.21	U	0.22	U	2.5	U	0.22	U	0.21	U
Aroclor-1232	UG/L	0	0%	0.09	0	0	30	0.11	U	1	U	0.1	U	0.11	U	1.2	U	0.11	U	0.1	U
Aroclor-1242	UG/L	0	0%	0.09	0	0	30	0.11	U	1	U	0.1	U	0.11	U	1.2	U	0.11	U	0.1	U
Aroclor-1248	UG/L	0	0%	0.09	0	0	30	0.11	U	1	U	0.1	U	0.11	U	1.2	U	0.11	U	0.1	U
Aroclor-1254	UG/L	0	0%	0.09	0	0	30	0.11	U	1	U	0.1	U	0.11	U	1.2	U	0.11	U	0.1	U
Aroclor-1260	UG/L	0.079	3%	0.09	0	1	30	0.11	U	1	U	0.1	U	0.11	U	1.2	U	0.11	U	0.1	U
Beta-BHC	UG/L	0	0%	0.04	0	0	30	0.0056	U	0.052	U	0.0052	U	0.0056	U	0.062	U	0.0056	U	0.0052	U
Delta-BHC	UG/L	0.0041	3%	0.04	0	1	30	0.0056	U	0.052	U	0.0052	U	0.0056	U	0.062	U	0.0056	U	0.0052	U
Dieldrin	UG/L	0	0%	0.004	0	0	30	0.011	U	0.1	U	0.01	U	0.011	U	0.12	U	0.011	U	0.01	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Groundwater Sample Results

								SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								MW4-2		MW4-3		MW4-3		MW4-3		MW4-4		MW4-4		MW4-4	
								GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER	
								42018		MW4-3		42019		42033		MW4-4		42020		42036	
								5.3		3.9		8.5		10.95		4.9		10		10	
								5.3		7.9		8.5		10.95		8.9		10		10	
								4/1/1999		1/20/1994		3/29/1999		7/7/1999		2/1/1994		4/24/1999		7/8/1999	
								SA		SA		SA		SA		SA		SA		SA	
ANALYTE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	GW CRITERIA revised 1/01	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	RI Phase 1	Step 1	ESI		RI Phase 1	Step 1	RI Phase 1	Step 1	ESI		RI Phase 1	Step 1	RI Phase 1	Step 1
								N		N		N		N		N		N		N	
VOLATILES Endosulfan I	UG/L	0	0%		0	0	30	0.0056	U	0.052	U	0.0052	U	0.0056	U	0.062	U	0.0056	U	0.0052	U
Endosulfan II	UG/L	0	0%		0	0	30	0.011	U	0.1	U	0.01	U	0.011	U	0.12	U	0.011	U	0.01	U
Endosulfan sulfate	UG/L	0	0%		0	0	30	0.011	U	0.1	U	0.01	U	0.011	U	0.12	U	0.011	U	0.01	U
Endrin	UG/L	0	0%	0	0	0	30	0.011	U	0.1	U	0.01	U	0.011	U	0.12	U	0.011	U	0.01	U
Endrin aldehyde	UG/L	0	0%	5	0	0	30	0.011	U	0.1	U	0.01	U	0.011	U	0.12	U	0.011	U	0.01	U
Endrin ketone	UG/L	0	0%	5	0	0	30	0.011	U	0.1	U	0.01	U	0.011	U	0.12	U	0.011	U	0.01	U
Gamma-BHC/Lindane	UG/L	0	0%	0.05	0	0	30	0.0056	U	0.052	U	0.0052	U	0.0056	U	0.062	U	0.0056	U	0.0052	U
Gamma-Chlordane	UG/L	0.0054	3%		0	1	30	0.0056	U	0.052	U	0.0052	U	0.0056	U	0.062	U	0.0056	U	0.0052	U
Heptachlor	UG/L	0.0056	7%	0.04	0	2	30	0.0056	U	0.052	U	0.0052	U	0.0056	U	0.062	U	0.0056	U	0.0052	U
Heptachlor epoxide	UG/L	0	0%	0.03	0	0	30	0.0056	U	0.052	U	0.0052	U	0.0056	U	0.062	U	0.0056	U	0.0052	U
Hexachlorobenzene	UG/L	0	0%	0.04	0	0	25	0.011	U			0.01	U	0.011	UJ			0.011	U	0.01	UJ
Methoxychlor	UG/L	0	0%	35	0	0	30	0.056	U	0.52	U	0.052	U	0.056	U	0.62	U	0.056	U	0.052	U
Toxaphene	UG/L	0	0%	0.06	0	0	30	0.56	U	5.2	U	0.52	U	0.56	U	6.2	U	0.56	U	0.52	U
HERBICIDES																					
2,4,5-T	UG/L	0	0%	35	0	0	5			0.11	U					0.11	U				
2,4,5-TP/Silvex	UG/L	0	0%	0.26	0	0	5			0.11	U					0.11	U				
2,4-D	UG/L	0	0%	50	0	0	5			1.1	U					1.1	U				
2,4-DB	UG/L	0	0%		0	0	5			1.1	U					1.1	U				
Dalapon	UG/L	0	0%	50	0	0	5			2.4	U					2.5	U				
Dicamba	UG/L	0	0%	0.44	0	0	5			0.11	U					0.11	U				
Dichloroprop	UG/L	0	0%		0	0	5			1.1	U					1.1	U				
Dinoseb	UG/L	0	0%	1	0	0	5			0.53	U					0.54	U				
MCPA	UG/L	0	0%	0.44	0	0	5			110	U					110	U				
MCPP	UG/L	0	0%		0	0	5			110	U					110	U				
METALS																					
Aluminum	UG/L	3820	90%	50	25	27	30			725		22.8	J	445		1240		10.4	U	18.9	U
Antimony	UG/L	39.3	23%	3	5	7	30			21.4	U	2.2	U	3.7	U	[illegible]	J	2.2	U	3.7	U
Arsenic	UG/L	6.5	17%	5	3	5	30			1	J	1.8	U	5.2	U	1.4	U	1.8	U	5.2	U
Barium	UG/L	121	100%	1,000	0	30	30			42.7	J	46.1	J	54	J	46.7	J	37	J	41.1	J
Beryllium	UG/L	6.3	10%	4	0	3	30			6.3		0.1	U	0.4	U	0.4	U	0.22	J	0.4	U
Cadmium	UG/L	5.6	7%	5	1	2	30			5.6		0.3	U	0.9	U	2.1	U	0.3	U	0.9	U
Calcium	UG/L	147000	100%		0	30	30			122000		98400		96300		123000		94200		91900	
Chromium	UG/L	260	60%	50	1	18	30			6.9	J	0.7	U	0.8	U	21.3		1.8	J	2.9	J
Cobalt	UG/L	8.2	17%		0	5	30			8.2	J	1.5	U	3.4	U	4.4	U	1.5	U	3.4	U
Copper	UG/L	37.6	30%	200	0	9	30			6.6	J	2.4	U	2.9	U	37.6		1	U	2.9	U
Cyanide	UG/L	0	0%	200	0	0	28			5	U	5	U	5	U	5	U	5	U	5	U
Iron	UG/L	6900	90%	300	15	27	30			745		14.9	U	415		[illegible]		14.9	U	65.9	J
Lead	UG/L	2.2	13%	15	0	4	30			0.56	J	0.9	UJ	0.8	U	2.2	J	0.9	U	0.8	U
Magnesium	UG/L	57600	100%		0	30	30			32800		25600		25700		19100		13700		13400	
Manganese	UG/L	855	93%	300	5	28	30			229		0.4	U	11.4	J	263		0.4	U	7.4	J
Mercury	UG/L	0.04	7%	0.7	0	2	30			0.04	J	0.1	U	0.1	U	0.04	U	0.1	UJ	0.1	U
Nickel	UG/L	9.9	40%	100	0	12	30			4.4	J	1.4	U	4	U	6.4	J	1.4	U	4	U
Potassium	UG/L	14400	100%		0	30	30			5250		1480	J	1480	J	4540	J	766	J	1110	J
Selenium	UG/L	24	37%	10	3	11	30			1.4	J	1.8	U	2.9	U	0.7	U	1.8	U	2.9	U
Silver	UG/L	6.7	17%	50	0	5	30			6.7	J	0.9	U	2.5	U	4.2	U	0.9	U	2.5	U
Sodium	UG/L	82600	100%	20,000	7	30	30			[illegible]		[illegible]		[illegible]		11200		9270		10500	
Thallium	UG/L	4.9	10%	2	0	3	30			1.2	U	1.9	U	3	U	1.2	U	1.9	U	3	U
Vanadium	UG/L	11.4	30%		0	9	30			7.7	J	1.6	U	2.5	U	4.9	J	1.6	U	2.5	U
Zinc	UG/L	95	87%		0	26	30			17.7	J	3.2	J	4	J	95		6.2	J	4.3	J
Nitrate/Nitrite	SU			10,000								0.09		0.09				0.06		0.04	

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Groundwater Sample Results

ANALYTE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	GW CRITERIA revised 1/01	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								MW4-5		MW4-5		MW4-6		MW4-6		MW4-6		MW4-6		MW4-7	
								GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER	
								MW4-5		42021		42030		42022		42040		42039		42023	
								3.1		7		9		9		11		11		6.1	
								5.1		7		9		9		11		11		6.1	
								1/20/1994		4/24/1999		4/1/1999		4/1/1999		7/10/1999		7/10/1999		3/29/1999	
								SA		SA		DU		SA		DU		SA		SA	
								ESI		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
								N		N		N		N		N		N		N	
VOLATILES																					
1,1,1,2-Tetrachloroethane	UG/L	0	0%	5	0	0	11									0.5	U	0.5	U		
1,1,1-Trichloroethane	UG/L	0	0%	5	0	0	30	10	U	1	U	1	U	1	U	0.5	U	0.5	U	1	U
1,1,2,2-Tetrachloroethane	UG/L	0	0%	5	0	0	30	10	U	1	U	1	U	1	U	0.5	U	0.5	U	1	U
1,1,2-Trichloroethane	UG/L	0	0%	1	0	0	30	10	U	1	U	1	U	1	U	0.5	U	0.5	U	1	U
1,1-Dichloroethane	UG/L	0	0%	5	0	0	30	10	U	1	U	1	U	1	U	0.5	U	0.5	U	1	U
1,1-Dichloroethene	UG/L	0	0%	5	0	0	30	10	U	1	U	1	U	1	U	0.5	U	0.5	U	1	U
1,1-Dichloropropene	UG/L	0	0%	5	0	0	11									0.5	U	0.5	U		
1,2,3-Trichlorobenzene	UG/L	0	0%	5	0	0	11									0.5	U	0.5	U		
1,2,3-Trichloropropane	UG/L	0	0%	0.04	0	0	11									0.5	U	0.5	U		
1,2,4-Trichlorobenzene	UG/L	0	0%	5	0	0	25			1	U	1	U	1	U	0.5	U	0.5	U	1	U
1,2,4-Trimethylbenzene	UG/L	0	0%	5	0	0	11									0.5	U	0.5	U		
1,2-Dibromo-3-chloropropane	UG/L	0	0%	0.04	0	0	25			1	U	1	U	1	U	0.5	U	0.5	U	1	U
1,2-Dibromoethane	UG/L	0	0%	0.0006	0	0	25			1	U	1	U	1	U	0.5	U	0.5	U	1	U
1,2-Dichlorobenzene	UG/L	0	0%	3	0	0	25			1	U	1	U	1	U	0.5	U	0.5	U	1	U
1,2-Dichloroethane	UG/L	0	0%	0.6	0	0	30	10	U	1	U	1	U	1	U	0.5	U	0.5	U	1	U
1,2-Dichloroethene (total)	UG/L	0	0%	5	0	0	5	10	U												
1,2-Dichloropropane	UG/L	0	0%	1	0	0	30	10	U	1	U	1	U	1	U	0.5	U	0.5	U	1	U
1,3,5-Trimethylbenzene	UG/L	0	0%	5	0	0	11									0.5	U	0.5	U		
1,3-Dichlorobenzene	UG/L	0	0%	3	0	0	25			1	U	1	U	1	U	0.5	U	0.5	U	1	U
1,3-Dichloropropane	UG/L	0	0%	5	0	0	11									0.5	U	0.5	U		
1,4-Dichlorobenzene	UG/L	0	0%	3	0	0	25			1	UJ	1	U	1	U	0.5	U	0.5	U	1	U
2,2-Dichloropropane	UG/L	0	0%		0	0	11									0.5	UJ	0.5	UJ		
2-Chlorotoluene	UG/L	0	0%	5	0	0	11									0.5	U	0.5	U		
2-Nitropropane	UG/L	0	0%		0	0	11									25	U	25	U		
Acetone	UG/L	8	3%		0	1	30	10	U	5	U	5	U	5	U	5	U	5	U	5	U
Acrylonitrile	UG/L	0	0%	5	0	0	11									0.5	U	0.5	U		
Allyl chloride	UG/L	0	0%	5	0	0	11									0.5	U	0.5	U		
Benzene	UG/L	2	3%	1	1	1	30	10	U	1	U	1	U	1	U	0.5	U	0.5	U	1	U
Bromobenzene	UG/L	0	0%	5	0	0	11									0.5	U	0.5	U		
Bromochloromethane	UG/L	0	0%	5	0	0	25			1	U	1	U	1	U	0.5	U	0.5	U	1	U
Bromodichloromethane	UG/L	0	0%	80	0	0	30	10	U	1	U	1	U	1	U	0.5	U	0.5	U	1	U
Bromoform	UG/L	0	0%	80	0	0	30	10	U	1	U	1	U	1	U	0.5	U	0.5	U	1	U
Butyl chloride	UG/L	0	0%	5	0	0	11									0.5	U	0.5	U		
Carbon disulfide	UG/L	0	0%		0	0	30	10	U	1	U	1	U	1	U	0.5	U	0.5	U	1	U
Carbon tetrachloride	UG/L	0	0%	5	0	0	30	10	U	1	U	1	U	1	U	0.5	U	0.5	U	1	U
Chloracetonitrile	UG/L	0	0%		0	0	11									50	U	50	U		
Chlorobenzene	UG/L	0	0%	5	0	0	30	10	U	1	U	1	U	1	U	0.5	U	0.5	U	1	U
Chlorodibromomethane	UG/L	0	0%		0	0	30	10	U	1	U	1	U	1	U	0.5	U	0.5	U	1	U
Chloroethane	UG/L	0	0%	5	0	0	30	10	U	1	UJ	1	U	1	U	0.5	U	0.5	U	1	U
Chloroform	UG/L	0	0%	7	0	0	30	10	U	1	U	1	U	1	U	0.5	U	0.5	U	1	U
Cis-1,2-Dichloroethene	UG/L	0	0%	5	0	0	25			1	U	1	U	1	U	0.5	U	0.5	U	1	U
Cis-1,3-Dichloropropene	UG/L	0	0%	0.4	0	0	30	10	U	1	U	1	U	1	U	0.5	U	0.5	U	1	U
Dichlorodifluoromethane	UG/L	0	0%	5	0	0	11									0.5	U	0.5	U		
Dichloromethyl methyl ketone	UG/L	0	0%		0	0	11									25	U	25	U		
Ethyl benzene	UG/L	6	3%	5	1	1	30	10	U	1	U	1	U	1	U	0.5	U	0.5	U	1	U

ANALYTE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	GW CRITERIA revised 1/01	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								MW4-5		MW4-5		MW4-6		MW4-6		MW4-6		MW4-6		MW4-7	
								GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER	
								MW4-5		42021		42030		42022		42040		42039		42023	
								3.1		7		9		9		11		11		6.1	
								5.1		7		9		9		11		11		6.1	
								1/20/1994		4/24/1999		4/1/1999		4/1/1999		7/10/1999		7/10/1999		3/29/1999	
								SA		SA		DU		SA		DU		SA		SA	
								ESI		RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1
								N		N		N		N		N		N		N	
VOLATILES Ethyl ether	UG/L	0	0%		0	0	11									0.5	U	0.5	U		
Ethyl methacrylate	UG/L	0	0%		0	0	11									0.5	U	0.5	U		
Hexachlorobutadiene	UG/L	0	0%	0.5	0	0	11									0.5	U	0.5	U		
Hexachloroethane	UG/L	0	0%	5	0	0	11									0.5	U	0.5	U		
Isopropylbenzene	UG/L	0	0%	5	0	0	11									0.5	U	0.5	U		
Methacrylonitrile	UG/L	0	0%	5	0	0	11									0.5	U	0.5	U		
Methyl 2-propenoate	UG/L	0	0%		0	0	11									0.5	U	0.5	U		
Methyl Tertbutyl Ether	UG/L	0	0%		0	0	11									0.5	U	0.5	U		
Methyl bromide	UG/L	0	0%	5	0	0	30	10	U	1	U	1	U	1	U	0.5	UJ	0.5	UJ	1	U
Methyl butyl ketone	UG/L	0	0%		0	0	30	10	U	5	U	5	U	5	U	5	UJ	5	UJ	5	U
Methyl chloride	UG/L	0	0%	5	0	0	30	10	U	1	UJ	1	U	1	U	0.5	U	0.5	U	1	U
Methyl ethyl ketone	UG/L	0	0%		0	0	30	10	U	5	U	5	U	5	U	5	R	5	R	5	U
Methyl iodide	UG/L	0	0%	5	0	0	11									0.5	U	0.5	U		
Methyl isobutyl ketone	UG/L	0	0%		0	0	30	10	U	5	U	5	U	5	U	2.5	U	2.5	U	5	U
Methyl methacrylate	UG/L	0	0%		0	0	11									0.5	U	0.5	U		
Methylene bromide	UG/L	0	0%	5	0	0	11									0.5	U	0.5	U		
Methylene chloride	UG/L	0	0%	5	0	0	30	10	U	2	U	2	U	2	U	0.5	U	0.5	U	2	U
Naphthalene	UG/L	0	0%		0	0	11									0.5	U	0.5	U		
Nitrobenzene	UG/L	0	0%	0.4	0	0	11									25	R	25	R		
Ortho Xylene	UG/L	0	0%	5	0	0	11									0.5	U	0.5	U		
Pentachloroethane	UG/L	0	0%	5	0	0	11									0.5	UJ	0.5	UJ		
Propionitrile	UG/L	0	0%		0	0	11									25	R	25	R		
Propylbenzene	UG/L	0	0%	5	0	0	11									0.5	U	0.5	U		
Styrene	UG/L	0	0%	5	0	0	30	10	U	1	U	1	U	1	U	0.5	U	0.5	U	1	U
Tetrachloroethene	UG/L	0	0%	5	0	0	30	10	U	1	U	1	U	1	U	0.5	U	0.5	U	1	U
Tetrahydrofuran	UG/L	0	0%		0	0	11									2.5	U	2.5	U		
Toluene	UG/L	0.4	3%	5	0	1	30	10	U	1	U	1	U	1	U	0.5	U	0.5	U	1	U
Total Xylenes	UG/L	4	3%	5	0	1	30	10	U	1	U	1	U	1	U	0.5	U	0.5	U	1	U
Trans-1,2-Dichloroethene	UG/L	0	0%	5	0	0	25			1	U	1	U	1	U	0.5	U	0.5	U	1	U
Trans-1,3-Dichloropropene	UG/L	0	0%	0.4	0	0	30	10	U	1	U	1	U	1	U	0.5	U	0.5	U	1	U
Trans-1,4-Dichloro-2-butene	UG/L	0	0%		0	0	11									0.5	U	0.5	U		
Trichloroethene	UG/L	0	0%	5	0	0	30	10	U	1	U	1	U	1	U	0.5	U	0.5	U	1	U
Trichlorofluoromethane	UG/L	0	0%	5	0	0	11									0.5	U	0.5	U		
Vinyl chloride	UG/L	0	0%	2	0	0	30	10	U	1	U	1	U	1	U	0.5	U	0.5	U	1	U
n-Butylbenzene	UG/L	0	0%	5	0	0	11									0.5	U	0.5	U		
p-Chlorotoluene	UG/L	0	0%	5	0	0	11									0.5	U	0.5	U		
p-Isopropyltoluene	UG/L	0	0%	5	0	0	11									0.5	U	0.5	U		
sec-Butylbenzene	UG/L	0	0%	5	0	0	11									0.5	U	0.5	U		
tert-Butylbenzene	UG/L	0	0%	5	0	0	11									0.5	U	0.5	U		
SEMIVOLATILES																					
1,2,4-Trichlorobenzene	UG/L	0	0%	5	0	0	30	11	U.	1.1	UJ	1.1	U	1	U	1.1	U	1	U	1	U
1,2-Dichlorobenzene	UG/L	0	0%	3	0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
1,3-Dichlorobenzene	UG/L	0	0%	3	0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
1,4-Dichlorobenzene	UG/L	0	0%	3	0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
2,2'-oxybis(1-Chloropropane)	UG/L	0	0%		0	0	5	11	U												
2,4,5-Trichlorophenol	UG/L	0	0%	1	0	0	30	27	U	2.8	U	2.7	U	2.5	U	2.6	U	2.5	U	2.5	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Groundwater Sample Results

								SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								MW4-5		MW4-5		MW4-6		MW4-6		MW4-6		MW4-6		MW4-7	
								GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER	
								MW4-5		42021		42030		42022		42040		42039		42023	
								3.1		7		9		9		11		11		6.1	
								5.1		7		9		9		11		11		6.1	
								1/20/1994		4/24/1999		4/1/1999		4/1/1999		7/10/1999		7/10/1999		3/29/1999	
								SA		SA		DU		SA		DU		SA		SA	
ANALYTE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	GW CRITERIA revised 1/01	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	ESI		RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1
								N		N		N		N		N		N		N	
2,4,5-Trichlorophenol	UG/L	0	0%	1	0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
2,4-Dichlorophenol	UG/L	0	0%	1	0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
2,4-Dimethylphenol	UG/L	0	0%	1	0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
2,4-Dinitrophenol	UG/L	0	0%	1	0	0	30	27	U	2.8	R	2.7	R	2.5	R	2.6	UJ	2.5	UJ	2.5	UJ
2,4-Dinitrotoluene	UG/L	0	0%	5	0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
2,6-Dinitrotoluene	UG/L	0	0%	5	0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
2-Chloronaphthalene	UG/L	0	0%		0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
2-Chlorophenol	UG/L	0	0%	1	0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
2-Methylnaphthalene	UG/L	0	0%		0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
2-Methylphenol	UG/L	0	0%	1	0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
2-Nitroaniline	UG/L	0	0%	5	0	0	30	27	U	2.8	U	2.7	U	2.5	U	2.6	U	2.5	U	2.5	U
2-Nitrophenol	UG/L	0	0%	1	0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
3,3'-Dichlorobenzidine	UG/L	0	0%	5	0	0	30	11	U	1.1	UJ	1.1	U	1	U	1.1	U	1	U	1	UJ
3-Nitroaniline	UG/L	0	0%	5	0	0	30	27	U	2.8	UJ	2.7	R	2.5	R	2.6	U	2.5	U	2.5	UJ
4,6-Dinitro-2-methylphenol	UG/L	0	0%	1	0	0	30	27	U	2.8	UJ	2.7	U	2.5	U	2.6	U	2.5	U	2.5	UJ
4-Bromophenyl phenyl ether	UG/L	0	0%		0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
4-Chloro-3-methylphenol	UG/L	0	0%	1	0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
4-Chloroaniline	UG/L	0	0%	5	0	0	30	11	U	1.1	UJ	1.1	U	1	U	1.1	U	1	U	1	UJ
4-Chlorophenyl phenyl ether	UG/L	0	0%		0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
4-Methylphenol	UG/L	2.2	7%	1	1	2	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
4-Nitroaniline	UG/L	0	0%	5	0	0	30	27	U	2.8	U	2.7	U	2.5	U	2.6	U	2.5	U	2.5	U
4-Nitrophenol	UG/L	0	0%	1	0	0	30	27	U	2.8	UJ	2.7	U	2.5	U	2.6	R	2.5	R	2.5	U
Acenaphthene	UG/L	0	0%		0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
Acenaphthylene	UG/L	0	0%		0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
Anthracene	UG/L	0	0%		0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
Benzo(a)anthracene	UG/L	0	0%		0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
Benzo(a)pyrene	UG/L	0	0%	0	0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
Benzo(b)fluoranthene	UG/L	0	0%		0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
Benzo(ghi)perylene	UG/L	0	0%		0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
Benzo(k)fluoranthene	UG/L	0	0%		0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
Bis(2-Chloroethoxy)methane	UG/L	0	0%	5	0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
Bis(2-Chloroethyl)ether	UG/L	0	0%	1	0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
Bis(2-Chloroisopropyl)ether	UG/L	0	0%	5	0	0	25			1.1	UJ	1.1	U	1	U	1.1	U	1	U	1	U
Bis(2-Ethylhexyl)phthalate	UG/L	1.1	3%	5	0	1	30	14	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
Butylbenzylphthalate	UG/L	0	0%		0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
Carbazole	UG/L	0	0%		0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
Chrysene	UG/L	0	0%		0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
Di-n-butylphthalate	UG/L	0.15	3%	50	0	1	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
Di-n-octylphthalate	UG/L	0	0%		0	0	30	11	U	1.1	UJ	1.1	U	1	U	1.1	UJ	1	UJ	1	U
Dibenz(a,h)anthracene	UG/L	0	0%		0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
Dibenzofuran	UG/L	0	0%		0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
Diethyl phthalate	UG/L	0.9	17%		0	5	30	0.6	J	0.072	J	1.1	U	1	U	1.1	U	1	U	1	U
Dimethylphthalate	UG/L	0	0%		0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
Fluoranthene	UG/L	0	0%		0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
Fluorene	UG/L	0	0%		0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
Hexachlorobenzene	UG/L	0	0%	0.04	0	0	30	11	U	0.011	UJ	1.1	U	1	U	1.1	U	1	U	1	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Groundwater Sample Results

ANALYTE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	GW CRITERIA revised 1/01	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4 MW4-5 GROUND WATER MW4-5 3.1 5.1 1/20/1994 SA ESI N		SEAD-4 MW4-5 GROUND WATER 42021 7 7 4/24/1999 SA RI Phase 1 Step 1 N		SEAD-4 MW4-6 GROUND WATER 42030 9 9 4/1/1999 DU RI Phase 1 Step 1 N		SEAD-4 MW4-6 GROUND WATER 42022 9 9 4/1/1999 SA RI Phase 1 Step 1 N		SEAD-4 MW4-6 GROUND WATER 42040 11 11 7/10/1999 DU RI Phase 1 Step 1 N		SEAD-4 MW4-6 GROUND WATER 42039 11 11 7/10/1999 SA RI Phase 1 Step 1 N		SEAD-4 MW4-7 GROUND WATER 42023 6.1 6.1 3/29/1999 SA RI Phase 1 Step 1 N	
Hexachlorobutadiene	UG/L	0	0%	0.5	0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
Hexachlorocyclopentadiene	UG/L	0	0%	5	0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	UJ	1	UJ	1	U
Hexachloroethane	UG/L	0	0%	5	0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
Indeno(1,2,3-cd)pyrene	UG/L	0	0%		0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
Isophorone	UG/L	0	0%		0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	UJ	1	UJ	1	U
N-Nitrosodiphenylamine	UG/L	0	0%		0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
N-Nitrosodipropylamine	UG/L	0	0%		0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
Naphthalene	UG/L	2.2	3%		0	1	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
Nitrobenzene	UG/L	0	0%	0.4	0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
Pentachlorophenol	UG/L	0	0%	1	0	0	30	27	U	2.8	R	2.7	U	2.5	U	2.6	UJ	2.5	UJ	2.5	U
Phenanthrene	UG/L	0	0%		0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
Phenol	UG/L	0.4	3%	1	0	1	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
Pyrene	UG/L	0	0%		0	0	30	11	U	1.1	U	1.1	U	1	U	1.1	U	1	U	1	U
EXPLOSIVES																					
1,3,5-Trinitrobenzene	UG/L	0	0%	5	0	0	32	0.13	UJ	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
1,3-Dinitrobenzene	UG/L	0	0%	5	0	0	32	0.13	UJ	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2,4,6-Trinitrotoluene	UG/L	0	0%	5	0	0	32	0.13	UJ	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2,4-Dinitrotoluene	UG/L	0	0%	5	0	0	32	0.13	UJ	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2,6-Dinitrotoluene	UG/L	0	0%	5	0	0	32	0.13	UJ	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2-Nitrotoluene	UG/L	0.87	4%	5	0	1	27			0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2-amino-4,6-Dinitrotoluene	UG/L	0	0%		0	0	32	0.13	UJ	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
3-Nitrotoluene	UG/L	2.6	4%	5	0	1	27			0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
4-Nitrotoluene	UG/L	10	4%	5	1	1	27			0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
4-amino-2,6-Dinitrotoluene	UG/L	0	0%		0	0	32	0.13	UJ	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
HMX	UG/L	0	0%		0	0	32	0.13	UJ	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Nitrobenzene	UG/L	0.89	4%	0.4	1	1	27			0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
RDX	UG/L	0	0%		0	0	32	0.13	UJ	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Tetryl	UG/L	0	0%	5	0	0	32	0.13	UJ	0.25	U	0.25	U	0.25	U	0.25	UJ	0.25	UJ	0.25	U
PESTICIDES/PCBS																					
4,4'-DDD	UG/L	0	0%	0.3	0	0	30	0.12	UJ	0.011	U	0.011	U	0.01	U	0.01	U	0.01	U	0.01	U
4,4'-DDE	UG/L	0	0%	0.2	0	0	30	0.12	UJ	0.011	U	0.011	U	0.01	U	0.01	U	0.01	U	0.01	U
4,4'-DDT	UG/L	0	0%	0.2	0	0	30	0.12	UJ	0.011	U	0.011	U	0.01	U	0.01	U	0.01	U	0.01	U
Aldrin	UG/L	0.0036	3%	0	1	1	30	0.058	UJ	0.0056	U	0.0054	U	0.005	U	0.005	U	0.005	U	0.0036	J
Alpha-BHC	UG/L	0.0028	3%	0.01	0	1	30	0.058	UJ	0.0056	U	0.0054	U	0.005	U	0.005	U	0.005	U	0.0052	U
Alpha-Chlordane	UG/L	0	0%		0	0	30	0.058	UJ	0.0056	U	0.0054	U	0.005	U	0.005	U	0.005	U	0.0052	U
Aroclor-1016	UG/L	0	0%	0.09	0	0	30	1.2	UJ	0.11	U	0.11	U	0.1	U	0.1	U	0.1	U	0.1	U
Aroclor-1221	UG/L	0	0%	0.09	0	0	30	2.3	UJ	0.22	U	0.22	U	0.2	U	0.2	U	0.2	U	0.21	U
Aroclor-1232	UG/L	0	0%	0.09	0	0	30	1.2	UJ	0.11	U	0.11	U	0.1	U	0.1	U	0.1	U	0.1	U
Aroclor-1242	UG/L	0	0%	0.09	0	0	30	1.2	UJ	0.11	U	0.11	U	0.1	U	0.1	U	0.1	U	0.1	U
Aroclor-1248	UG/L	0	0%	0.09	0	0	30	1.2	UJ	0.11	U	0.11	U	0.1	U	0.1	U	0.1	U	0.1	U
Aroclor-1254	UG/L	0	0%	0.09	0	0	30	1.2	UJ	0.11	U	0.11	U	0.1	U	0.1	U	0.1	U	0.1	U
Aroclor-1260	UG/L	0.079	3%	0.09	0	1	30	1.2	UJ	0.11	U	0.11	U	0.1	U	0.1	U	0.1	U	0.1	U
Beta-BHC	UG/L	0	0%	0.04	0	0	30	0.058	UJ	0.0056	U	0.0054	U	0.005	U	0.005	U	0.005	U	0.0052	U
Delta-BHC	UG/L	0.0041	3%	0.04	0	1	30	0.058	UJ	0.0056	U	0.0054	U	0.005	U	0.005	U	0.005	U	0.0052	U
Dieldrin	UG/L	0	0%	0.004	0	0	30	0.12	UJ	0.011	U	0.011	U	0.01	U	0.01	U	0.01	U	0.01	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Groundwater Sample Results

ANALYTE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	GW CRITERIA revised 1/01	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								MW4-5		MW4-5		MW4-6		MW4-6		MW4-6		MW4-6		MW4-7	
								GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER	
								MW4-5		42021		42030		42022		42040		42039		42023	
								3.1		7		9		9		11		11		6.1	
								5.1		7		9		9		11		11		6.1	
								1/20/1994		4/24/1999		4/1/1999		4/1/1999		7/10/1999		7/10/1999		3/29/1999	
								SA		SA		DU		SA		DU		SA		SA	
								ESI		RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1
								N		N		N		N		N		N		N	
Endosulfan I	UG/L	0	0%		0	0	30	0.058	UJ	0.0056	U	0.0054	U	0.005	U	0.005	U	0.005	U	0.0052	U
Endosulfan II	UG/L	0	0%		0	0	30	0.12	UJ	0.011	U	0.011	U	0.01	U	0.01	U	0.01	U	0.01	U
Endosulfan sulfate	UG/L	0	0%		0	0	30	0.12	UJ	0.011	U	0.011	U	0.01	U	0.01	U	0.01	U	0.01	U
Endrin	UG/L	0	0%	0	0	0	30	0.12	UJ	0.011	U	0.011	U	0.01	U	0.01	U	0.01	U	0.01	U
Endrin aldehyde	UG/L	0	0%	5	0	0	30	0.12	UJ	0.011	U	0.011	U	0.01	U	0.01	U	0.01	U	0.01	U
Endrin ketone	UG/L	0	0%	5	0	0	30	0.12	UJ	0.011	U	0.011	U	0.01	U	0.01	U	0.01	U	0.01	U
Gamma-BHC/Lindane	UG/L	0	0%	0.05	0	0	30	0.058	UJ	0.0056	U	0.0054	U	0.005	U	0.005	U	0.005	U	0.0052	U
Gamma-Chlordane	UG/L	0.0054	3%		0	1	30	0.058	UJ	0.0056	U	0.0054	U	0.005	U	0.005	U	0.005	U	0.0052	U
Heptachlor	UG/L	0.0056	7%	0.04	0	2	30	0.058	UJ	0.0056	U	0.0054	U	0.005	U	0.005	U	0.005	U	0.0038	J
Heptachlor epoxide	UG/L	0	0%	0.03	0	0	30	0.058	UJ	0.0056	U	0.0054	U	0.005	U	0.005	U	0.005	U	0.0052	U
Hexachlorobenzene	UG/L	0	0%	0.04	0	0	25			0.011	U	0.011	U	0.01	U	0.01	UJ	0.01	UJ	0.01	U
Methoxychlor	UG/L	0	0%	35	0	0	30	0.58	UJ	0.056	U	0.054	U	0.05	U	0.05	U	0.05	U	0.052	U
Toxaphene	UG/L	0	0%	0.06	0	0	30	5.8	UJ	0.56	U	0.54	U	0.5	U	0.5	U	0.5	U	0.52	U
HERBICIDES																					
2,4,5-T	UG/L	0	0%	35	0	0	5	0.12	U												
2,4,5-TP/Silvex	UG/L	0	0%	0.26	0	0	5	0.12	U												
2,4-D	UG/L	0	0%	50	0	0	5	1.2	U												
2,4-DB	UG/L	0	0%		0	0	5	1.2	U												
Dalapon	UG/L	0	0%	50	0	0	5	2.7	U												
Dicamba	UG/L	0	0%	0.44	0	0	5	0.12	U												
Dichloroprop	UG/L	0	0%		0	0	5	1.2	U												
Dinoseb	UG/L	0	0%	1	0	0	5	0.57	U												
MCPA	UG/L	0	0%	0.44	0	0	5	120	U												
MCPP	UG/L	0	0%		0	0	5	120	U												
METALS																					
Aluminum	UG/L	3820	90%	50	25	27	30	108	J	149		115	J	226	J	39.5	J	75.1	J	110	J
Antimony	UG/L	39.3	23%	3	5	7	30	21.4	U	2.2	U	2.2	U	2.8	J	3.7	U	5.2	U	2.2	U
Arsenic	UG/L	6.5	17%	5	3	5	30	0.8	U	1.8	U	1.8	U	1.8	U	5.2	U	5.2	U	1.8	U
Barium	UG/L	121	100%	1,000	0	30	30	36.1	J	38.5	J	18.6	J	19.7	J	28.2	J	99.1	J	19.5	J
Beryllium	UG/L	6.3	10%	4	0	3	30	0.4	U	0.26	J	0.1	U	0.1	U	0.4	U	0.4	U	0.1	U
Cadmium	UG/L	5.6	7%	5	1	2	30	2.1	U	0.3	U	0.3	U	0.3	U	0.9	U	0.55	J	0.3	U
Calcium	UG/L	147000	100%		0	30	30	147000		128000		46300		48900		68100		73000		43800	
Chromium	UG/L	260	60%	50	1	18	30	2.6	U	0.7	U	1	J	0.7	U	0.8	U	0.8	U	0.7	U
Cobalt	UG/L	8.2	17%		0	5	30	5.2	J	1.5	U	1.5	U	1.5	U	3.4	U	2.5	U	1.5	U
Copper	UG/L	37.6	30%	200	0	9	30	3.1	U	1.9	J	2.4	U	2.4	U	2.9	U	4.5	J	2.4	U
Cyanide	UG/L	0	0%	200	0	0	28	5	U	5	U	5	U	5	U	5	U	5	U	5	U
Iron	UG/L	6900	90%	300	15	27	30	143		296		153	J	245	J	20.8	U	76.7	J	196	
Lead	UG/L	2.2	13%	15	0	4	30	0.5	U	0.9	U	0.9	U	0.9	U	0.8	U	0.8	U	0.9	UJ
Magnesium	UG/L	57600	100%		0	30	30	31000		18400		5420		5700		8860		8890		5680	
Manganese	UG/L	855	93%	300	5	28	30	477		8.5	J	27.4		30.2		116		117		42.8	
Mercury	UG/L	0.04	7%	0.7	0	2	30	0.04	J	0.1	UJ	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Nickel	UG/L	9.9	40%	100	0	12	30	4	U	2.2	J	2	J	1.4	U	4	U	2.3	U	1.5	J
Potassium	UG/L	14400	100%		0	30	30	7320		1050	J	260	J	366	J	1110	J	1090	J	1560	J
Selenium	UG/L	24	37%	10	3	11	30	0.9	J	3.2	J	1.8	U	1.8	U	2.9	U	2.9	UJ	2.6	J
Silver	UG/L	6.7	17%	50	0	5	30	4.2	U	0.9	U	0.9	U	0.9	U	2.5	U	2.5	J	0.9	U
Sodium	UG/L	82600	100%	20,000	7	30	30	14100		11200		2030	J	2260	J	6600		5560		5740	
Thallium	UG/L	4.9	10%	2	0	3	30	1.2	U	1.9	U	1.9	U	1.9	U	3	U	2.2	U	3.7	J
Vanadium	UG/L	11.4	30%		0	9	30	3.7	U	1.6	U	1.6	U	1.6	U	2.5	U	2.9	U	1.6	U
Zinc	UG/L	95	87%		0	26	30	42.6		10.8	J	48	J	2.3	J	3	UJ	81.1	J	3.5	J
Nitrate/Nitrite	SU			10,000						0.03										0.02	

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Groundwater Sample Results

ANALYTE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	GW CRITERIA revised 1/01	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4 MW4-7 GROUND WATER 42042 8.1 8.1 7/10/1999 SA RI Phase 1 Step 1 N		SEAD-4 MW4-8 GROUND WATER 42024 8.8 8.8 3/30/1999 SA RI Phase 1 Step 1 N		SEAD-4 MW4-8 GROUND WATER 42037 11 11 7/10/1999 SA RI Phase 1 Step 1 N		SEAD-4 MW4-9 GROUND WATER 42025 6.5 6.5 3/30/1999 SA RI Phase 1 Step 1 N		SEAD-4 MW4-9 GROUND WATER 42038 8 8 7/8/1999 SA RI Phase 1 Step 1 N		SEAD-4 MW4-9 GROUND WATER 042038A 8 8 7/8/1999 SA RI Phase 1 Step 1 N	
VOLATILES																			
1,1,1,2-Tetrachloroethane	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U			0.5	U		
1,1,1-Trichloroethane	UG/L	0	0%	5	0	0	30	0.5	U	1	U	0.5	U	1	U	0.5	U		
1,1,2,2-Tetrachloroethane	UG/L	0	0%	5	0	0	30	0.5	U	1	U	0.5	U	1	U	0.5	U		
1,1,2-Trichloroethane	UG/L	0	0%	1	0	0	30	0.5	U	1	U	0.5	U	1	U	0.5	U		
1,1-Dichloroethane	UG/L	0	0%	5	0	0	30	0.5	U	1	U	0.5	U	1	U	0.5	U		
1,1-Dichloroethene	UG/L	0	0%	5	0	0	30	0.5	U	1	U	0.5	U	1	U	0.5	U		
1,1-Dichloropropene	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U			0.5	U		
1,2,3-Trichlorobenzene	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U			0.5	U		
1,2,3-Trichloropropane	UG/L	0	0%	0.04	0	0	11	0.5	U			0.5	U			0.5	U		
1,2,4-Trichlorobenzene	UG/L	0	0%	5	0	0	25	0.5	U	1	U	0.5	U	1	U	0.5	U		
1,2,4-Trimethylbenzene	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U			0.5	U		
1,2-Dibromo-3-chloropropane	UG/L	0	0%	0.04	0	0	25	0.5	U	1	U	0.5	U	1	U	0.5	U		
1,2-Dibromoethane	UG/L	0	0%	0.0006	0	0	25	0.5	U	1	U	0.5	U	1	U	0.5	U		
1,2-Dichlorobenzene	UG/L	0	0%	3	0	0	25	0.5	U	1	U	0.5	U	1	U	0.5	U		
1,2-Dichloroethane	UG/L	0	0%	0.6	0	0	30	0.5	U	1	U	0.5	U	1	U	0.5	U		
1,2-Dichloroethene (total)	UG/L	0	0%	5	0	0	5												
1,2-Dichloropropane	UG/L	0	0%	1	0	0	30	0.5	U	1	U	0.5	U	1	U	0.5	U		
1,3,5-Trimethylbenzene	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U			0.5	U		
1,3-Dichlorobenzene	UG/L	0	0%	3	0	0	25	0.5	U	1	U	0.5	U	1	U	0.5	U		
1,3-Dichloropropane	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U			0.5	U		
1,4-Dichlorobenzene	UG/L	0	0%	3	0	0	25	0.5	U	1	U	0.5	U	1	U	0.5	U		
2,2-Dichloropropane	UG/L	0	0%		0	0	11	0.5	U			0.5	UJ			0.5	U		
2-Chlorotoluene	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U			0.5	U		
2-Nitropropane	UG/L	0	0%		0	0	11	25	U			25	U			25	U		
Acetone	UG/L	8	3%		0	1	30	5	U	5	U	5	U	5	U	5	U		
Acrylonitrile	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U			0.5	U		
Allyl chloride	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U			0.5	U		
Benzene	UG/L	2	3%	1	1	1	30	0.5	U	1	U	0.5	U	1	U	0.5	U		
Bromobenzene	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U			0.5	U		
Bromochloromethane	UG/L	0	0%	5	0	0	25	0.5	U	1	U	0.5	U	1	U	0.5	U		
Bromodichloromethane	UG/L	0	0%	80	0	0	30	0.5	U	1	U	0.5	U	1	U	0.5	U		
Bromoform	UG/L	0	0%	80	0	0	30	0.5	U	1	U	0.5	U	1	U	0.5	U		
Butyl chloride	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U			0.5	U		
Carbon disulfide	UG/L	0	0%		0	0	30	0.5	U	1	U	0.5	U	1	U	0.5	U		
Carbon tetrachloride	UG/L	0	0%	5	0	0	30	0.5	U	1	U	0.5	U	1	U	0.5	U		
Chloracetonitrile	UG/L	0	0%		0	0	11	50	U			50	U			50	U		
Chlorobenzene	UG/L	0	0%	5	0	0	30	0.5	U	1	U	0.5	U	1	U	0.5	U		
Chlorodibromomethane	UG/L	0	0%		0	0	30	0.5	U	1	U	0.5	U	1	U	0.5	U		
Chloroethane	UG/L	0	0%	5	0	0	30	0.5	UJ	1	U	0.5	U	1	U	0.5	UJ		
Chloroform	UG/L	0	0%	7	0	0	30	0.5	U	1	U	0.5	U	1	U	0.5	U		
Cis-1,2-Dichloroethene	UG/L	0	0%	5	0	0	25	0.5	U	1	U	0.5	U	1	U	0.5	U		
Cis-1,3-Dichloropropene	UG/L	0	0%	0.4	0	0	30	0.5	U	1	U	0.5	U	1	U	0.5	U		
Dichlorodifluoromethane	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U			0.5	U		
Dichloromethyl methyl ketone	UG/L	0	0%		0	0	11	25	U			25	U			25	U		
Ethyl benzene	UG/L	6	3%	5	1	1	30	0.5	U	1	U	0.5	U	1	U	0.5	U		

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Groundwater Sample Results

ANALYTE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	GW CRITERIA revised 1/01	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								MW4-7		MW4-8		MW4-8		MW4-9		MW4-9		MW4-9	
								GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER	
								42042		42024		42037		42025		42038		042038A	
								8.1		8.8		11		6.5		8		8	
								8.1		8.8		11		6.5		8		8	
								7/10/1999		3/30/1999		7/10/1999		3/30/1999		7/8/1999		7/8/1999	
								SA		SA		SA		SA		SA		SA	
								RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
								N		N		N		N		N		N	
VOLATILES Ethyl ether	UG/L	0	0%		0	0	11	0.5	U			0.5	U			0.5	U		
Ethyl methacrylate	UG/L	0	0%		0	0	11	0.5	U			0.5	U			0.5	U		
Hexachlorobutadiene	UG/L	0	0%	0.5	0	0	11	0.5	U			0.5	U			0.5	U		
Hexachloroethane	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U			0.5	U		
Isopropylbenzene	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U			0.5	U		
Methacrylonitrile	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U			0.5	U		
Methyl 2-propenoate	UG/L	0	0%		0	0	11	0.5	U			0.5	U			0.5	U		
Methyl Tertbutyl Ether	UG/L	0	0%		0	0	11	0.5	U			0.5	U			0.5	U		
Methyl bromide	UG/L	0	0%	5	0	0	30	0.5	U	1	U	0.5	UJ	1	U	0.5	U		
Methyl butyl ketone	UG/L	0	0%		0	0	30	5	U	5	U	5	UJ	5	U	5	U		
Methyl chloride	UG/L	0	0%	5	0	0	30	0.5	U	1	U	0.5	U	1	U	0.5	U		
Methyl ethyl ketone	UG/L	0	0%		0	0	30	5	R	5	U	5	R	5	U	5	R		
Methyl iodide	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U			0.5	U		
Methyl isobutyl ketone	UG/L	0	0%		0	0	30	2.5	U	5	U	2.5	U	5	U	2.5	U		
Methyl methacrylate	UG/L	0	0%		0	0	11	0.5	U			0.5	U			0.5	U		
Methylene bromide	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U			0.5	U		
Methylene chloride	UG/L	0	0%	5	0	0	30	0.5	U	2	U	0.5	U	2	U	0.5	U		
Naphthalene	UG/L	0	0%		0	0	11	0.5	U			0.5	U			0.5	U		
Nitrobenzene	UG/L	0	0%	0.4	0	0	11	25	R			25	R			25	R		
Ortho Xylene	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U			0.5	U		
Pentachloroethane	UG/L	0	0%	5	0	0	11	0.5	UJ			0.5	UJ			0.5	UJ		
Propionitrile	UG/L	0	0%		0	0	11	25	R			25	R			25	R		
Propylbenzene	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U			0.5	U		
Styrene	UG/L	0	0%	5	0	0	30	0.5	U	1	U	0.5	U	1	U	0.5	U		
Tetrachloroethene	UG/L	0	0%	5	0	0	30	0.5	U	1	U	0.5	U	1	U	0.5	U		
Tetrahydrofuran	UG/L	0	0%		0	0	11	2.5	U			2.5	U			2.5	U		
Toluene	UG/L	0.4	3%	5	0	1	30	0.5	U	1	U	0.5	U	1	U	0.5	U		
Total Xylenes	UG/L	4	3%	5	0	1	30	0.5	U	1	U	0.5	U	1	U	0.5	U		
Trans-1,2-Dichloroethene	UG/L	0	0%	5	0	0	25	0.5	U	1	U	0.5	U	1	U	0.5	U		
Trans-1,3-Dichloropropene	UG/L	0	0%	0.4	0	0	30	0.5	U	1	U	0.5	U	1	U	0.5	U		
Trans-1,4-Dichloro-2-butene	UG/L	0	0%		0	0	11	0.5	U			0.5	U			0.5	U		
Trichloroethene	UG/L	0	0%	5	0	0	30	0.5	U	1	U	0.5	U	1	U	0.5	U		
Trichlorofluoromethane	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U			0.5	U		
Vinyl chloride	UG/L	0	0%	2	0	0	30	0.5	U	1	U	0.5	U	1	U	0.5	U		
n-Butylbenzene	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U			0.5	U		
p-Chlorotoluene	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U			0.5	U		
p-Isopropyltoluene	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U			0.5	U		
sec-Butylbenzene	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U			0.5	U		
tert-Butylbenzene	UG/L	0	0%	5	0	0	11	0.5	U			0.5	U			0.5	U		
SEMIVOLATILES																			
1,2,4-Trichlorobenzene	UG/L	0	0%	5	0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
1,2-Dichlorobenzene	UG/L	0	0%	3	0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
1,3-Dichlorobenzene	UG/L	0	0%	3	0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
1,4-Dichlorobenzene	UG/L	0	0%	3	0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
2,2'-oxybis(1-Chloropropane)	UG/L	0	0%		0	0	5												
2,4,5-Trichlorophenol	UG/L	0	0%	1	0	0	30	3	U	2.6	U	2.8	U	2.8	U	2.6	U		

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Groundwater Sample Results

ANALYTE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	GW CRITERIA revised 1/01	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								MW4-7		MW4-8		MW4-8		MW4-9		MW4-9		MW4-9	
								GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER	
								42042		42024		42037		42025		42038		042038A	
								8.1		8.8		11		6.5		8		8	
								8.1		8.8		11		6.5		8		8	
								7/10/1999		3/30/1999		7/10/1999		3/30/1999		7/8/1999		7/8/1999	
								SA		SA		SA		SA		SA		SA	
								RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
								N		N		N		N		N		N	
2,4,6-Trichlorophenol	UG/L	0	0%	1	0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
2,4-Dichlorophenol	UG/L	0	0%	1	0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
2,4-Dimethylphenol	UG/L	0	0%	1	0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
2,4-Dinitrophenol	UG/L	0	0%	1	0	0	30	3	UJ	2.6	UJ	2.8	UJ	2.8	R	2.6	UJ		
2,4-Dinitrotoluene	UG/L	0	0%	5	0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
2,6-Dinitrotoluene	UG/L	0	0%	5	0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
2-Chloronaphthalene	UG/L	0	0%		0	0	30	1.2	UJ	1	U	1.1	U	1.1	U	1	UJ		
2-Chlorophenol	UG/L	0	0%	1	0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
2-Methylnaphthalene	UG/L	0	0%		0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
2-Methylphenol	UG/L	0	0%	1	0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
2-Nitroaniline	UG/L	0	0%	5	0	0	30	3	U	2.6	U	2.8	U	2.8	U	2.6	U		
2-Nitrophenol	UG/L	0	0%	1	0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
3,3'-Dichlorobenzidine	UG/L	0	0%	5	0	0	30	1.2	U	1	UJ	1.1	U	1.1	U	1	U		
3-Nitroaniline	UG/L	0	0%	5	0	0	30	3	U	2.6	UJ	2.8	U	2.8	R	2.6	U		
4,6-Dinitro-2-methylphenol	UG/L	0	0%	1	0	0	30	3	U	2.6	UJ	2.8	U	2.8	U	2.6	U		
4-Bromophenyl phenyl ether	UG/L	0	0%		0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
4-Chloro-3-methylphenol	UG/L	0	0%	1	0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
4-Chloroaniline	UG/L	0	0%	5	0	0	30	1.2	U	1	UJ	1.1	U	1.1	U	1	U		
4-Chlorophenyl phenyl ether	UG/L	0	0%		0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
4-Methylphenol	UG/L	2.2	7%	1	1	2	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
4-Nitroaniline	UG/L	0	0%	5	0	0	30	3	UJ	2.6	U	2.8	U	2.8	U	2.6	UJ		
4-Nitrophenol	UG/L	0	0%	1	0	0	30	3	R	2.6	U	2.8	R	2.8	U	2.6	R		
Acenaphthene	UG/L	0	0%		0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
Acenaphthylene	UG/L	0	0%		0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
Anthracene	UG/L	0	0%		0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
Benzo(a)anthracene	UG/L	0	0%		0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
Benzo(a)pyrene	UG/L	0	0%	0	0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
Benzo(b)fluoranthene	UG/L	0	0%		0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
Benzo(ghi)perylene	UG/L	0	0%		0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
Benzo(k)fluoranthene	UG/L	0	0%		0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
Bis(2-Chloroethoxy)methane	UG/L	0	0%	5	0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
Bis(2-Chloroethyl)ether	UG/L	0	0%	1	0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
Bis(2-Chloroisopropyl)ether	UG/L	0	0%	5	0	0	25	1.2	U	1	U	1.1	U	1.1	U	1	U		
Bis(2-Ethylhexyl)phthalate	UG/L	1.1	3%	5	0	1	30	1.2	U	1.3	U	2.2	U	4.2	U	1	U		
Butylbenzylphthalate	UG/L	0	0%		0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
Carbazole	UG/L	0	0%		0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
Chrysene	UG/L	0	0%		0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
Di-n-butylphthalate	UG/L	0.15	3%	50	0	1	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
Di-n-octylphthalate	UG/L	0	0%		0	0	30	1.2	U	1	U	1.1	UJ	1.1	U	1	U		
Dibenz(a,h)anthracene	UG/L	0	0%		0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
Dibenzofuran	UG/L	0	0%		0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
Diethyl phthalate	UG/L	0.9	17%		0	5	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
Dimethylphthalate	UG/L	0	0%		0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
Fluoranthene	UG/L	0	0%		0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
Fluorene	UG/L	0	0%		0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
Hexachlorobenzene	UG/L	0	0%	0.04	0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Groundwater Sample Results

								SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								MW4-7		MW4-8		MW4-8		MW4-9		MW4-9		MW4-9	
								GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER	
								42042		42024		42037		42025		42038		042038A	
								8.1		8.8		11		6.5		8		8	
								8.1		8.8		11		6.5		8		8	
								7/10/1999		3/30/1999		7/10/1999		3/30/1999		7/8/1999		7/8/1999	
ANALYTE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	GW CRITERIA revised 1/01	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SA RI Phase 1 Step 1		SA RI Phase 1 Step 1		SA RI Phase 1 Step 1		SA RI Phase 1 Step 1		SA RI Phase 1 Step 1		SA RI Phase 1 Step 1	
								N		N		N		N		N		N	
VOLATILES Hexachlorobutadiene	UG/L	0	0%	0.5	0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
Hexachlorocyclopentadiene	UG/L	0	0%	5	0	0	30	1.2	U	1	U	1.1	UJ	1.1	U	1	U		
Hexachloroethane	UG/L	0	0%	5	0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
Indeno(1,2,3-cd)pyrene	UG/L	0	0%		0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
Isophorone	UG/L	0	0%		0	0	30	1.2	U	1	U	1.1	UJ	1.1	U	1	U		
N-Nitrosodiphenylamine	UG/L	0	0%		0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
N-Nitrosodipropylamine	UG/L	0	0%		0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
Naphthalene	UG/L	2.2	3%		0	1	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
Nitrobenzene	UG/L	0	0%	0.4	0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
Pentachlorophenol	UG/L	0	0%	1	0	0	30	3	U	2.6	U	2.8	UJ	2.8	U	2.6	U		
Phenanthrene	UG/L	0	0%		0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
Phenol	UG/L	0.4	3%	1	0	1	30	1.2	U	1	U	1.1	U	0.4	J	1	U		
Pyrene	UG/L	0	0%		0	0	30	1.2	U	1	U	1.1	U	1.1	U	1	U		
EXPLOSIVES																			
1,3,5-Trinitrobenzene	UG/L	0	0%	5	0	0	32	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
1,3-Dinitrobenzene	UG/L	0	0%	5	0	0	32	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2,4,6-Trinitrotoluene	UG/L	0	0%	5	0	0	32	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2,4-Dinitrotoluene	UG/L	0	0%	5	0	0	32	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2,6-Dinitrotoluene	UG/L	0	0%	5	0	0	32	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2-Nitrotoluene	UG/L	0.87	4%	5	0	1	27	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
2-amino-4,6-Dinitrotoluene	UG/L	0	0%		0	0	32	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
3-Nitrotoluene	UG/L	2.6	4%	5	0	1	27	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
4-Nitrotoluene	UG/L	10	4%	5	1	1	27	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
4-amino-2,6-Dinitrotoluene	UG/L	0	0%		0	0	32	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
HMX	UG/L	0	0%		0	0	32	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Nitrobenzene	UG/L	0.89	4%	0.4	1	1	27	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
RDX	UG/L	0	0%		0	0	32	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U	0.25	U
Tetryl	UG/L	0	0%	5	0	0	32	0.25	UJ	0.25	U	0.25	UJ	0.25	U	0.25	UJ	0.25	UJ
PESTICIDES/PCBS																			
4,4'-DDD	UG/L	0	0%	0.3	0	0	30	0.011	U	0.01	U	0.01	U	0.01	U	0.011	U		
4,4'-DDE	UG/L	0	0%	0.2	0	0	30	0.011	U	0.01	U	0.01	U	0.01	U	0.011	U		
4,4'-DDT	UG/L	0	0%	0.2	0	0	30	0.011	U	0.01	U	0.01	U	0.01	U	0.011	U		
Aldrin	UG/L	0.0036	3%	0	1	1	30	0.0057	U	0.0051	U	0.005	U	0.005	U	0.0056	U		
Alpha-BHC	UG/L	0.0028	3%	0.01	0	1	30	0.0057	U	0.0051	U	0.005	U	0.005	U	0.0056	U		
Alpha-Chlordane	UG/L	0	0%		0	0	30	0.0057	U	0.0051	U	0.005	U	0.005	U	0.0056	U		
Aroclor-1016	UG/L	0	0%	0.09	0	0	30	0.11	U	0.1	U	0.1	U	0.1	U	0.11	U		
Aroclor-1221	UG/L	0	0%	0.09	0	0	30	0.23	U	0.2	U	0.2	U	0.2	U	0.22	U		
Aroclor-1232	UG/L	0	0%	0.09	0	0	30	0.11	U	0.1	U	0.1	U	0.1	U	0.11	U		
Aroclor-1242	UG/L	0	0%	0.09	0	0	30	0.11	U	0.1	U	0.1	U	0.1	U	0.11	U		
Aroclor-1248	UG/L	0	0%	0.09	0	0	30	0.11	U	0.1	U	0.1	U	0.1	U	0.11	U		
Aroclor-1254	UG/L	0	0%	0.09	0	0	30	0.11	U	0.1	U	0.1	U	0.1	U	0.11	U		
Aroclor-1260	UG/L	0.079	3%	0.09	0	1	30	0.11	U	0.1	U	0.1	U	0.1	U	0.11	U		
Beta-BHC	UG/L	0	0%	0.04	0	0	30	0.0057	U	0.0051	U	0.005	U	0.005	U	0.0056	U		
Delta-BHC	UG/L	0.0041	3%	0.04	0	1	30	0.0057	U	0.0051	U	0.0041	J	0.005	U	0.0056	U		
Dieldrin	UG/L	0	0%	0.004	0	0	30	0.011	U	0.01	U	0.01	U	0.01	U	0.011	U		

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Groundwater Sample Results

ANALYTE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	GW CRITERIA revised 1/01	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								MW4-7		MW4-8		MW4-8		MW4-9		MW4-9		MW4-9	
								GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER	
								42042		42024		42037		42025		42038		042038A	
								8.1		8.8		11		6.5		8		8	
								8.1		8.8		11		6.5		8		8	
								7/10/1999		3/30/1999		7/10/1999		3/30/1999		7/8/1999		7/8/1999	
								SA		SA		SA		SA		SA		SA	
								RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
								N		N		N		N		N		N	
VOLATILES Endosulfan I	UG/L	0	0%		0	0	30	0.0057	U	0.0051	U	0.005	U	0.005	U	0.0056	U		
Endosulfan II	UG/L	0	0%		0	0	30	0.011	U	0.01	U	0.01	U	0.01	U	0.011	U		
Endosulfan sulfate	UG/L	0	0%		0	0	30	0.011	U	0.01	U	0.01	U	0.01	U	0.011	U		
Endrin	UG/L	0	0%	0	0	0	30	0.011	U	0.01	U	0.01	U	0.01	U	0.011	U		
Endrin aldehyde	UG/L	0	0%	5	0	0	30	0.011	U	0.01	U	0.01	U	0.01	U	0.011	U		
Endrin ketone	UG/L	0	0%	5	0	0	30	0.011	U	0.01	U	0.01	U	0.01	U	0.011	U		
Gamma-BHC/Lindane	UG/L	0	0%	0.05	0	0	30	0.0057	U	0.0051	U	0.005	U	0.005	U	0.0056	U		
Gamma-Chlordane	UG/L	0.0054	3%		0	1	30	0.0057	U	0.0051	U	0.005	U	0.005	U	0.0056	U		
Heptachlor	UG/L	0.0056	7%	0.04	0	2	30	0.0057	U	0.0051	U	0.005	U	0.005	U	0.0056	U		
Heptachlor epoxide	UG/L	0	0%	0.03	0	0	30	0.0057	U	0.0051	U	0.005	U	0.005	U	0.0056	U		
Hexachlorobenzene	UG/L	0	0%	0.04	0	0	25	0.011	UJ	0.01	U	0.01	UJ	0.01	U	0.011	UJ		
Methoxychlor	UG/L	0	0%	35	0	0	30	0.057	U	0.051	U	0.05	U	0.05	U	0.056	U		
Toxaphene	UG/L	0	0%	0.06	0	0	30	0.57	U	0.51	U	0.5	U	0.5	U	0.56	U		
HERBICIDES																			
2,4,5-T	UG/L	0	0%	35	0	0	5												
2,4,5-TP/Silvex	UG/L	0	0%	0.26	0	0	5												
2,4-D	UG/L	0	0%	50	0	0	5												
2,4-DB	UG/L	0	0%		0	0	5												
Dalapon	UG/L	0	0%	50	0	0	5												
Dicamba	UG/L	0	0%	0.44	0	0	5												
Dichloroprop	UG/L	0	0%		0	0	5												
Dinoseb	UG/L	0	0%	1	0	0	5												
MCPA	UG/L	0	0%	0.44	0	0	5												
MCPP	UG/L	0	0%		0	0	5												
METALS																			
Aluminum	UG/L	3820	90%	50	25	27	30	3820		176	J	288		2040	J	91.8	J		
Antimony	UG/L	39.3	23%	3	5	7	30	3.7	U	[illegible]	J	3.7	U	[illegible]	J	3.7	U		
Arsenic	UG/L	6.5	17%	5	3	5	30	5.2	U	1.8	U	5.5	J	1.8	U	5.2	U		
Barium	UG/L	121	100%	1,000	0	30	30	121	J	20.3	J	39.2	J	32	J	44.4	J		
Beryllium	UG/L	6.3	10%	4	0	3	30	0.4	U	0.1	U	0.4	U	0.1	U	0.4	U		
Cadmium	UG/L	5.6	7%	5	1	2	30	0.9	U	0.3	U	0.9	U	0.3	U	0.9	U		
Calcium	UG/L	147000	100%		0	30	30	102000		57300		107000		26400		92400			
Chromium	UG/L	260	60%	50	1	18	30	9.3	J	2.3	J	1.8	J	160		21.8			
Cobalt	UG/L	8.2	17%		0	5	30	3.9	J	1.5	U	3.4	U	1.5	U	3.4	U		
Copper	UG/L	37.6	30%	200	0	9	30	6.6	J	2.4	U	3.2	J	2.4	U	2.9	U		
Cyanide	UG/L	0	0%	200	0	0	28			5	U	5	U	5	U	5	U		
Iron	UG/L	6900	90%	300	15	27	30	6900		228		1000		868		86.7	J		
Lead	UG/L	2.2	13%	15	0	4	30	1	J	0.9	UJ	0.8	U	0.9	UJ	0.8	U		
Magnesium	UG/L	57600	100%		0	30	30	20200		6150		20200		6500		20800			
Manganese	UG/L	855	93%	300	5	28	30	187		30.4		110		13.5	J	87.6			
Mercury	UG/L	0.04	7%	0.7	0	2	30	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U		
Nickel	UG/L	9.9	40%	100	0	12	30	9.9	J	1.4	U	4	U	2.1	J	4	U		
Potassium	UG/L	14400	100%		0	30	30	9450		968	J	8580		1130	J	3580	J		
Selenium	UG/L	24	37%	10	3	11	30	2.9	UJ	24		3	J	1.8	U	2.9	U		
Silver	UG/L	6.7	17%	50	0	5	30	2.5	U	1.2	J	2.5	U	0.9	U	2.5	U		
Sodium	UG/L	82600	100%	20,000	7	30	30	9380		3840	J	9930		6760		10500			
Thallium	UG/L	4.9	10%	2	0	3	30	3	U	1.9	U	3	U	1.9	U	3	U		
Vanadium	UG/L	11.4	30%		0	9	30	11.4	J	1.9	J	2.5	U	1.6	J	2.5	U		
Zinc	UG/L	95	87%		0	26	30	29.5		8.8	J	3	U	12.2	J	3	U		
Nitrate/Nitrite	SU			10,000															

Surface Water

S Army Depot
SEAD-4 Remedial Investigation
Surface Water Sample Results

								SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								4PIPE		SW4-1		SW4-1		SW4-12		SW4-12	
								SURFACE WATER		SURFACE WATER		SURFACE WATER		SURFACE WATER		SURFACE WATER	
								4PIPE		**SW4-3**		**SW4-1**		**42004**		**42003**	
								0		0		0		0		0	
								N/A		N/A		N/A		N/A		N/A	
			FREQUENCY OF DETECTION	NYS CLASS C	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	12/17/1993		11/2/1993		11/2/1993		12/7/1998		12/7/1998	
								SA		DU		SA		DU		SA	
ANALYTE	UNIT	MAXIMUM						ESI		ESI		ESI		RI Phase 1	Step 1	RI Phase 1	Step 1
								N		N		N		N		N	
VOLATILES																	
1,1,1-Trichloroethane	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1	U	1	U
1,1,2,2-Tetrachloroethane	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1	U	1	U
1,1,2-Trichloroethane	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1	U	1	U
1,1-Dichloroethane	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1	U	1	U
1,1-Dichloroethene	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1	U	1	U
1,2,4-Trichlorobenzene	UG/L	0	0%	5	0	0	4							1	U	1	U
1,2-Dibromo-3-chloropropane	UG/L	0	0%		0	0	9							1	U	1	U
1,2-Dibromoethane	UG/L	0	0%		0	0	9							1	U	1	U
1,2-Dichlorobenzene	UG/L	0	0%	5	0	0	9							1	U	1	U
1,2-Dichloroethane	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1	U	1	U
1,2-Dichloroethene (total)	UG/L	0	0%		0	0	4	10	U	10	U	10	U				
1,2-Dichloropropane	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1	U	1	U
1,3-Dichlorobenzene	UG/L	0	0%	5	0	0	9							1	U	1	U
1,4-Dichlorobenzene	UG/L	0	0%	5	0	0	9							1	U	1	U
Acetone	UG/L	4	31%		0	4	13	10	U	10	U	10	U	5	U	5	U
Benzene	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1	U	1	U
Bromochloromethane	UG/L	0	0%		0	0	9							1	U	1	U
Bromodichloromethane	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1	U	1	U
Bromoform	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1	U	1	U
Carbon disulfide	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1	U	1	U
Carbon tetrachloride	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1	U	1	U
Chlorobenzene	UG/L	0	0%	5	0	0	13	10	U	10	U	10	U	1	U	1	U
Chlorodibromomethane	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1	U	1	U
Chloroethane	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1	U	1	U
Chloroform	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1	U	1	U
Cis-1,2-Dichloroethene	UG/L	0	0%		0	0	9							1	U	1	U
Cis-1,3-Dichloropropene	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1	U	1	U
Ethyl benzene	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1	U	1	U
Methyl bromide	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1	U	1	U
Methyl butyl ketone	UG/L	0	0%		0	0	13	10	U	10	U	10	U	5	U	5	U
Methyl chloride	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1	U	1	U
Methyl ethyl ketone	UG/L	0	0%		0	0	13	10	U	10	U	10	U	5	U	5	U
Methyl isobutyl ketone	UG/L	0	0%		0	0	13	10	U	10	U	10	U	5	U	5	U
Methylene chloride	UG/L	0	0%	200	0	0	13	10	U	10	U	10	U	2	U	2	U
Styrene	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1	U	1	U
Tetrachloroethene	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1	U	1	U
Toluene	UG/L	0	0%	6000	0	0	13	10	U	10	U	10	U	1	U	1	U
Total Xylenes	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1	U	1	U
Trans-1,2-Dichloroethene	UG/L	0	0%		0	0	9							1	U	1	U
Trans-1,3-Dichloropropene	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1	U	1	U
Trichloroethene	UG/L	0	0%	40	0	0	13	10	U	10	U	10	U	1	U	1	U
Vinyl chloride	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1	U	1	U
SEMIVOLATILES																	
1,2,4-Trichlorobenzene	UG/L	0	0%	5	0	0	13	10	U	10	U	10	U	1.1	U	1	U
1,2-Dichlorobenzene	UG/L	0	0%	5	0	0	13	10	U	10	U	10	U	1.1	U	1	U
1,3-Dichlorobenzene	UG/L	0	0%	5	0	0	13	10	U	10	U	10	U	1.1	U	1	U
1,4-Dichlorobenzene	UG/L	0	0%	5	0	0	13	10	U	10	U	10	U	1.1	U	1	U
2,2'-oxybis(1-Chloropropane)	UG/L	0	0%		0	0	4	10	U	10	U	10	U				

Seneca Army Depot
SEAD-4 Remedial Investigation
Surface Water Sample Results

								SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								4PIPE		SW4-1		SW4-1		SW4-12		SW4-12	
								SURFACE WATER		SURFACE WATER		SURFACE WATER		SURFACE WATER		SURFACE WATER	
								4PIPE		**SW4-3**		**SW4-1**		**42004**		**42003**	
								0		0		0		0		0	
								N/A		N/A		N/A		N/A		N/A	
								12/17/1993		11/2/1993		11/2/1993		12/7/1998		12/7/1998	
								SA		DU		SA		DU		SA	
ANALYTE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYS CLASS C	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	ESI		ESI		ESI		RI Phase 1 Step 1		RI Phase 1 Step 1	
								N		N		N		N		N	
2,4,5-Trichlorophenol	UG/L	0	0%		0	0	13	25	U	26	U	25	U	2.6	U	2.6	U
2,4,6-Trichlorophenol	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1.1	U	1	U
2,4-Dichlorophenol	UG/L	0	0%	1	0	0	13	10	U	10	U	10	U	1.1	U	1	U
2,4-Dimethylphenol	UG/L	0	0%	1000	0	0	13	10	U	10	U	10	U	1.1	U	1	U
2,4-Dinitrophenol	UG/L	0	0%	400	0	0	13	25	U	26	U	25	U	2.6	UJ	2.6	U
2,4-Dinitrotoluene	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1.1	U	1	U
2,6-Dinitrotoluene	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1.1	U	1	U
2-Chloronaphthalene	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1.1	U	1	U
2-Chlorophenol	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1.1	U	1	U
2-Methylnaphthalene	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1.1	U	1	U
2-Methylphenol	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1.1	U	1	U
2-Nitroaniline	UG/L	0	0%		0	0	13	25	U	26	U	25	U	2.6	U	2.6	U
2-Nitrophenol	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1.1	U	1	UJ
3,3'-Dichlorobenzidine	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1.1	UJ	1	U
3-Nitroaniline	UG/L	0	0%		0	0	13	25	U	26	U	25	U	2.6	UJ	2.6	U
4,6-Dinitro-2-methylphenol	UG/L	0	0%		0	0	13	25	U	26	U	25	U	2.6	UJ	2.6	U
4-Bromophenyl phenyl ether	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1.1	U	1	U
4-Chloro-3-methylphenol	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1.1	U	1	U
4-Chloroaniline	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1.1	UJ	1	U
4-Chlorophenyl phenyl ether	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1.1	U	1	U
4-Methylphenol	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1.1	U	1	U
4-Nitroaniline	UG/L	0	0%		0	0	13	25	U	26	U	25	U	2.6	U	2.6	U
4-Nitrophenol	UG/L	0	0%		0	0	13	25	U	26	U	25	U	2.6	U	2.6	U
Acenaphthene	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1.1	U	1	U
Acenaphthylene	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1.1	U	1	U
Anthracene	UG/L	0.068	8%		0	1	13	10	U	10	U	10	U	1.1	U	1	U
Benzo(a)anthracene	UG/L	0.18	8%		0	1	13	10	U	10	U	10	U	1.1	U	1	U
Benzo(a)pyrene	UG/L	0.15	8%		0	1	13	10	U	10	U	10	U	1.1	U	1	U
Benzo(b)fluoranthene	UG/L	0.15	8%		0	1	13	10	U	10	U	10	U	1.1	U	1	U
Benzo(ghi)perylene	UG/L	0.073	8%		0	1	13	10	U	10	U	10	U	1.1	U	1	UJ
Benzo(k)fluoranthene	UG/L	0.16	8%		0	1	13	10	U	10	U	10	U	1.1	U	1	U
Bis(2-Chloroethoxy)methane	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1.1	U	1	U
Bis(2-Chloroethyl)ether	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1.1	U	1	U
Bis(2-Chloroisopropyl)ether	UG/L	0	0%		0	0	9							1.1	U	1	U
Bis(2-Ethylhexyl)phthalate	UG/L	0.22	23%	0.6	0	3	13	10	U	10	U	10	U	1.1	UJ	1	UJ
Butylbenzylphthalate	UG/L	0.076	8%		0	1	13	10	U	10	U	10	U	1.1	UJ	1	UJ
Carbazole	UG/L	0.054	8%		0	1	13	10	U	10	U	10	U	1.1	UJ	1	UJ
Chrysene	UG/L	0.18	8%		0	1	13	10	U	10	U	10	U	1.1	U	1	U
Di-n-butylphthalate	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1.1	U	1	U
Di-n-octylphthalate	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1.1	U	1	U
Dibenz(a,h)anthracene	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1.1	U	1	U
Dibenzofuran	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1.1	U	1	U
Diethyl phthalate	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1.1	U	1	U
Dimethylphthalate	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1.1	U	1	U
Fluoranthene	UG/L	0.41	15%		0	2	13	10	U	10	U	10	U	0.066	J	1	U
Fluorene	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1.1	U	1	U
Hexachlorobenzene	UG/L	0	0%	0.00003	0	0	13	10	U	10	U	10	U	1.1	U	1	U
Hexachlorobutadiene	UG/L	0	0%	0.01	0	0	13	10	U	10	U	10	U	1.1	U	1	U
Hexachlorocyclopentadiene	UG/L	0	0%	0.45	0	0	13	10	U	10	U	10	U	1.1	UJ	1	UJ

Senec Depot
SEAD-4 Remedial Investigation
Surface Water Sample Results

								SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								4PIPE		SW4-1		SW4-1		SW4-12		SW4-12	
								SURFACE WATER		SURFACE WATER		SURFACE WATER		SURFACE WATER		SURFACE WATER	
								4PIPE		**SW4-3**		**SW4-1**		**42004**		**42003**	
								0		0		0		0		0	
								N/A		N/A		N/A		N/A		N/A	
								12/17/1993		11/2/1993		11/2/1993		12/7/1998		12/7/1998	
								SA		DU		SA		DU		SA	
ANALYTE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYS CLASS C	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	ESI		ESI		ESI		RI Phase 1	Step 1	RI Phase 1	Step 1
								N		N		N		N		N	
Hexachloroethane	UG/L	0	0%	0.6	0	0	13	10	U	10	U	10	U	1.1	U	1	U
Indeno(1,2,3-cd)pyrene	UG/L	0.069	8%		0	1	13	10	U	10	U	10	U	1.1	U	1	U
Isophorone	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1.1	U	1	U
N-Nitrosodiphenylamine	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1.1	U	1	U
N-Nitrosodipropylamine	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1.1	U	1	U
Naphthalene	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1.1	U	1	U
Nitrobenzene	UG/L	0	0%		0	0	13	10	U	10	U	10	U	1.1	U	1	U
Pentachlorophenol	UG/L	0	0%	1	0	0	13	25	U	26	U	25	U	2.6	UJ	2.6	U
Phenanthrene	UG/L	0.35	8%		0	1	13	10	U	10	U	10	U	1.1	U	1	U
Phenol	UG/L	0	0%	1	0	0	13	10	U	10	U	10	U	1.1	U	1	U
Pyrene	UG/L	0.25	15%		0	2	13	10	U	10	U	10	U	0.063	J	1	UJ
EXPLOSIVES																	
1,3,5-Trinitrobenzene	UG/L	0	0%		0	0	13	0.13	U	0.13	U	0.13	UJ	0.25	U	0.25	U
1,3-Dinitrobenzene	UG/L	0.07	8%		0	1	13	0.07	J	0.13	U	0.13	UJ	0.25	U	0.25	U
2,4,6-Trinitrotoluene	UG/L	0	0%		0	0	13	0.13	U	0.13	U	0.13	UJ	0.25	U	0.25	U
2,4-Dinitrotoluene	UG/L	0	0%		0	0	13	0.13	UJ	0.13	U	0.13	UJ	0.25	U	0.25	U
2,6-Dinitrotoluene	UG/L	0	0%		0	0	13	0.13	U	0.13	U	0.13	UJ	0.25	U	0.25	U
2-Nitrotoluene	UG/L	0	0%		0	0	9							0.25	U	0.25	U
2-amino-4,6-Dinitrotoluene	UG/L	0	0%		0	0	13	0.13	U	0.13	U	0.13	UJ	0.25	U	0.25	U
3-Nitrotoluene	UG/L	0	0%		0	0	9							0.25	U	0.25	U
4-Nitrotoluene	UG/L	0	0%		0	0	9							0.25	U	0.25	U
4-amino-2,6-Dinitrotoluene	UG/L	0	0%		0	0	13	0.13	U	0.13	U	0.13	UJ	0.25	U	0.25	U
HMX	UG/L	0	0%		0	0	13	0.13	U	0.13	U	0.13	UJ	0.25	U	0.25	U
Nitrobenzene	UG/L	0	0%		0	0	9							0.25	U	0.25	U
RDX	UG/L	0	0%		0	0	13	0.13	U	0.13	U	0.13	UJ	0.25	U	0.25	U
Tetryl	UG/L	0	0%		0	0	13	0.13	U	0.13	U	0.13	UJ	0.25	U	0.25	U
PESTICIDES/PCBs																	
4,4'-DDD	UG/L	0	0%	0.00008	0	0	13	0.1	U	0.1	U	0.1	U	0.01	U	0.01	U
4,4'-DDE	UG/L	0	0%	0.000007	0	0	13	0.1	U	0.1	U	0.1	U	0.01	U	0.01	U
4,4'-DDT	UG/L	0	0%	0.00001	0	0	13	0.1	U	0.1	U	0.1	U	0.01	U	0.01	U
Aldrin	UG/L	0	0%	0.001	0	0	13	0.052	U	0.05	U	0.052	U	0.0051	U	0.005	U
Alpha-BHC	UG/L	0	0%		0	0	13	0.052	U	0.05	U	0.052	U	0.0051	U	0.005	U
Alpha-Chlordane	UG/L	0.0077	8%		0	1	13	0.052	U	0.05	U	0.052	U	0.0051	U	0.005	U
Aroclor-1016	UG/L	0	0%	0.000001	0	0	13	1	U	1	U	1	U	0.1	U	0.1	U
Aroclor-1221	UG/L	0	0%	0.000001	0	0	13	2.1	U	2	U	2.1	U	0.2	U	0.2	U
Aroclor-1232	UG/L	0	0%	0.000001	0	0	13	1	U	1	U	1	U	0.1	U	0.1	U
Aroclor-1242	UG/L	0	0%	0.000001	0	0	13	1	U	1	U	1	U	0.1	U	0.1	U
Aroclor-1248	UG/L	0	0%	0.000001	0	0	13	1	U	1	U	1	U	0.1	U	0.1	U
Aroclor-1254	UG/L	0	0%	0.000001	0	0	13	1	U	1	U	1	U	0.1	U	0.1	U
Aroclor-1260	UG/L	0	0%	0.000001	0	0	13	1	U	1	U	1	U	0.1	U	0.1	U
Beta-BHC	UG/L	0.0041	8%		0	1	13	0.052	U	0.05	U	0.052	U	0.0051	U	0.005	U
Delta-BHC	UG/L	0	0%		0	0	13	0.052	U	0.05	U	0.052	U	0.0051	U	0.005	U
Dieldrin	UG/L	0	0%	0.0000006	0	0	13	0.1	U	0.1	U	0.1	U	0.01	U	0.01	U
Endosulfan I	UG/L	0	0%	0.009	0	0	13	0.052	U	0.05	U	0.052	U	0.0051	U	0.005	U
Endosulfan II	UG/L	0	0%	0.009	0	0	13	0.1	U	0.1	U	0.1	U	0.01	U	0.01	U
Endosulfan sulfate	UG/L	0	0%		0	0	13	0.1	U	0.1	U	0.1	U	0.01	U	0.01	U
Endrin	UG/L	0	0%	0.002	0	0	13	0.1	U	0.1	U	0.1	U	0.01	U	0.01	U
Endrin aldehyde	UG/L	0	0%		0	0	13	0.1	U	0.1	U	0.1	U	0.01	U	0.01	U
Endrin ketone	UG/L	0	0%		0	0	13	0.1	U	0.1	U	0.1	U	0.01	U	0.01	U

Seneca Army Depot
SEAD-4 Remedial Investigation
Surface Water Sample Results

								SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								4PIPE		SW4-1		SW4-1		SW4-12		SW4-12	
								SURFACE WATER		SURFACE WATER		SURFACE WATER		SURFACE WATER		SURFACE WATER	
								4PIPE		**SW4-3**		**SW4-1**		**42004**		**42003**	
								0		0		0		0		0	
								N/A		N/A		N/A		N/A		N/A	
			FREQUENCY	NYS	NUMBER	NUMBER	NUMBER	12/17/1993		11/2/1993		11/2/1993		12/7/1998		12/7/1998	
			OF	CLASS C	ABOVE	OF	OF	SA		DU		SA		DU		SA	
ANALYTE	UNIT	MAXIMUM	DETECTION		TAGM	DETECTS	ANALYSES	ESI		ESI		ESI		RI Phase 1	Step 1	RI Phase 1	Step 1
								N		N		N		N		N	
Gamma-BHC/Lindane	UG/L	0	0%		0	0	13	0.052	U	0.05	U	0.052	U	0.0051	U	0.005	U
Gamma-Chlordane	UG/L	0.0064	8%		0	1	13	0.052	U	0.05	U	0.052	U	0.0051	U	0.005	U
Heptachlor	UG/L	0	0%	0.0002	0	0	13	0.052	U	0.05	U	0.052	U	0.0051	U	0.005	U
Heptachlor epoxide	UG/L	0	0%	0.0003	0	0	13	0.052	U	0.05	U	0.052	U	0.0051	U	0.005	U
Hexachlorobenzene	UG/L	0	0%	0.00003	0	0	9							0.01	U	0.01	U
Methoxychlor	UG/L	0	0%	0.03	0	0	13	0.52	U	0.5	U	0.52	U	0.051	U	0.05	U
Toxaphene	UG/L	0	0%	0.000006	0	0	13	5.2	U	5	U	5.2	U	0.51	U	0.5	U
HERBICIDES																	
2,4,5-T	UG/L	0	0%		0	0	4	0.11	U	0.11	U	0.11	U				
2,4,5-TP/Silvex	UG/L	0	0%		0	0	4	0.11	U	0.11	U	0.11	U				
2,4-D	UG/L	0	0%		0	0	4	1.1	U	1.1	U	1.1	U				
2,4-DB	UG/L	0	0%		0	0	4	1.1	U	1.1	U	1.1	U				
Dalapon	UG/L	0	0%		0	0	4	2.4	U	2.4	U	2.5	U				
Dicamba	UG/L	0	0%		0	0	4	0.11	U	0.11	U	0.11	U				
Dichloroprop	UG/L	0	0%		0	0	4	1.1	U	1.1	U	1.1	U				
Dinoseb	UG/L	0	0%		0	0	4	0.52	U	0.52	U	0.54	U				
MCPA	UG/L	0	0%		0	0	4	110	U	110	U	110	U				
MCPP	UG/L	0	0%		0	0	4	110	U	110	U	110	U				
METALS																	
Aluminum	UG/L	7350	100%	100	7	13	13	42.6	J	194	J	237		114	J	32	J
Antimony	UG/L	6.6	38%		0	5	13	21.6	U	52.4	U	52.8	U	3.1	U	3.9	J
Arsenic	UG/L	4.2	8%	150	0	1	13	0.8	U	1.2	U	1.2	U	2.3	U	2.3	U
Barium	UG/L	213	100%		0	13	13	49.6	J	21.5	J	21.3	J	62	J	59	J
Beryllium	UG/L	0	0%	1100	0	0	13	0.4	U	0.3	U	0.3	U	0.1	U	0.1	U
Cadmium	UG/L	11.6	46%	1.8628217	1	6	13	2.1	U	3.3	U	3.3	U	0.2	U	0.27	J
Calcium	UG/L	159000	100%		0	13	13	115000		46800		45600		134000		132000	
Chromium	UG/L	44.8	31%	347.27015	0	4	13	2.6	U	19.7		19.2		0.8	U	0.8	U
Cobalt	UG/L	19.6	8%	5	1	1	13	4.4	U	4.9	U	4.9	U	1.6	U	1.6	U
Copper	UG/L	97	77%	20.287735	4	10	13	6	J	50.9		47.3		1.1	J	0.9	U
Cyanide	UG/L	0	0%	5.2	0	0	13	5	U	8.3	U	8.3	U	5	U	5	U
Iron	UG/L	16600	100%	300	7	13	13	657		349	J	443	J	270	J	89.4	J
Lead	UG/L	117	31%	7.1638103	2	4	13	5.7		10.7	J	0.79	UJ	1.3	UJ	1.3	UJ
Magnesium	UG/L	32700	100%		0	13	13	21100		10700		10500		30200		30400	
Manganese	UG/L	2350	100%		0	13	13	1.8	J	25		28.1		63.8		40.2	
Mercury	UG/L	0	0%	0.0007	0	0	13	0.04	U	0.07	U	0.07	U	0.1	U	0.1	U
Nickel	UG/L	32.6	15%	154.48855	0	2	13	4	U	4.1	U	4.1	U	1.9	U	1.9	U
Potassium	UG/L	4790	100%		0	13	13	1170	J	1830	J	1680	J	2260	J	2410	J
Selenium	UG/L	0	0%	4.6	0	0	13	0.7	U	1.1	U	1.1	U	3.6	U	3.6	U
Silver	UG/L	1.7	15%	0.1	2	2	13	4.2	U	6.6	UJ	6.7	UJ	1	J	1	U
Sodium	UG/L	36200	100%		0	13	13	21700		13300		12800		26000		26600	
Thallium	UG/L	2.4	8%	8	0	1	13	2.4	J	1.2	U	1.2	U	3.9	U	3.9	U
Vanadium	UG/L	22.5	31%	14	1	4	13	3.7	U	3.3	U	3.3	U	1.5	U	1.7	J
Zinc	UG/L	492	100%	141.37982	1	13	13	4	J	9.2	J	10.7	J	10	J	23.2	J
Nitrate/Nitrite	MG/L	0.25	100%		0	9	9							0.02	J	0.01	J

ANALYTE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYS CLASS C	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								SW4-13		SW4-19		SW4-2		SW4-49		SW4-50	
								SURFACE WATER		SURFACE WATER		SURFACE WATER		SURFACE WATER		SURFACE WATER	
								42005		**42011**		**SW4-2**		**42014**		**42013**	
								0		0		0		0		0	
								N/A		N/A		N/A		N/A		N/A	
								12/7/1998		12/7/1998		11/2/1993		12/17/1998		12/15/1998	
								SA		SA		SA		SA		DU	
								RI Phase 1 Step 1		RI Phase 1 Step 1		ESI		RI Phase 1 Step 1		RI Phase 1 Step 1	
								N		N		N		N		N	
VOLATILES																	
1,1,1-Trichloroethane	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
1,1,2,2-Tetrachloroethane	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
1,1,2-Trichloroethane	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
1,1-Dichloroethane	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
1,1-Dichloroethene	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
1,2,4-Trichlorobenzene	UG/L	0	0%	5	0	0	4	1	U	1	U						
1,2-Dibromo-3-chloropropane	UG/L	0	0%		0	0	9	1	U	1	U			1	U	1	U
1,2-Dibromoethane	UG/L	0	0%		0	0	9	1	U	1	U			1	U	1	U
1,2-Dichlorobenzene	UG/L	0	0%	5	0	0	9	1	U	1	U			1	U	1	U
1,2-Dichloroethane	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
1,2-Dichloroethene (total)	UG/L	0	0%		0	0	4					10	U				
1,2-Dichloropropane	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
1,3-Dichlorobenzene	UG/L	0	0%	5	0	0	9	1	U	1	U			1	U	1	U
1,4-Dichlorobenzene	UG/L	0	0%	5	0	0	9	1	U	1	U			1	U	1	U
Acetone	UG/L	4	31%		0	4	13	5	U	5	U	10	U	3	J	5	R
Benzene	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
Bromochloromethane	UG/L	0	0%		0	0	9	1	U	1	U			1	U	1	U
Bromodichloromethane	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
Bromoform	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
Carbon disulfide	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
Carbon tetrachloride	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
Chlorobenzene	UG/L	0	0%	5	0	0	13	1	U	1	U	10	U	1	U	1	U
Chlorodibromomethane	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
Chloroethane	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
Chloroform	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
Cis-1,2-Dichloroethene	UG/L	0	0%		0	0	9	1	U	1	U			1	U	1	U
Cis-1,3-Dichloropropene	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
Ethyl benzene	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
Methyl bromide	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
Methyl butyl ketone	UG/L	0	0%		0	0	13	5	U	5	U	10	U	5	U	5	U
Methyl chloride	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
Methyl ethyl ketone	UG/L	0	0%		0	0	13	5	U	5	U	10	U	5	U	5	U
Methyl isobutyl ketone	UG/L	0	0%		0	0	13	5	U	5	U	10	U	5	U	5	U
Methylene chloride	UG/L	0	0%	200	0	0	13	2	U	2	U	10	U	2	U	2	U
Styrene	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
Tetrachloroethene	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
Toluene	UG/L	0	0%	6000	0	0	13	1	U	1	U	10	U	1	U	1	U
Total Xylenes	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
Trans-1,2-Dichloroethene	UG/L	0	0%		0	0	9	1	U	1	U			1	U	1	U
Trans-1,3-Dichloropropene	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
Trichloroethene	UG/L	0	0%	40	0	0	13	1	U	1	U	10	U	1	U	1	U
Vinyl chloride	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
SEMIVOLATILES																	
1,2,4-Trichlorobenzene	UG/L	0	0%	5	0	0	13	1	U	1	U	10	U	1	U	1	U
1,2-Dichlorobenzene	UG/L	0	0%	5	0	0	13	1	U	1	U	10	U	1	U	1	U
1,3-Dichlorobenzene	UG/L	0	0%	5	0	0	13	1	U	1	U	10	U	1	U	1	U
1,4-Dichlorobenzene	UG/L	0	0%	5	0	0	13	1	U	1	U	10	U	1	U	1	U
2,2'-oxybis(1-Chloropropane)	UG/L	0	0%		0	0	4					10	U				

Seneca Army Depot
SEAD-4 Remedial Investigation
Surface Water Sample Results

								SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								SW4-13		SW4-19		SW4-2		SW4-49		SW4-50	
								SURFACE WATER		SURFACE WATER		SURFACE WATER		SURFACE WATER		SURFACE WATER	
								42005		42011		SW4-2		42014		42013	
								0		0		0		0		0	
								N/A		N/A		N/A		N/A		N/A	
								12/7/1998		12/7/1998		11/2/1993		12/17/1998		12/15/1998	
								SA		SA		SA		SA		DU	
ANALYTE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYS CLASS C	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	RI Phase 1	Step 1	RI Phase 1	Step 1	ESI		RI Phase 1	Step 1	RI Phase 1	Step 1
								N		N		N		N		N	
2,4,5-Trichlorophenol	UG/L	0	0%		0	0	13	2.6	U	2.6	U	26	U	2.5	U	2.5	U
2,4,6-Trichlorophenol	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
2,4-Dichlorophenol	UG/L	0	0%	1	0	0	13	1	U	1	U	10	U	1	U	1	U
2,4-Dimethylphenol	UG/L	0	0%	1000	0	0	13	1	U	1	U	10	U	1	U	1	U
2,4-Dinitrophenol	UG/L	0	0%	400	0	0	13	2.6	UJ	2.6	UJ	26	U	2.5	UJ	2.5	UJ
2,4-Dinitrotoluene	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
2,6-Dinitrotoluene	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
2-Chloronaphthalene	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
2-Chlorophenol	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
2-Methylnaphthalene	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
2-Methylphenol	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
2-Nitroaniline	UG/L	0	0%		0	0	13	2.6	U	2.6	U	26	U	2.5	U	2.5	U
2-Nitrophenol	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
3,3'-Dichlorobenzidine	UG/L	0	0%		0	0	13	1	UJ	1	UJ	10	U	1	U	1	U
3-Nitroaniline	UG/L	0	0%		0	0	13	2.6	UJ	2.6	UJ	26	U	2.5	UJ	2.5	UJ
4,6-Dinitro-2-methylphenol	UG/L	0	0%		0	0	13	2.6	UJ	2.6	UJ	26	U	2.5	U	2.5	U
4-Bromophenyl phenyl ether	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
4-Chloro-3-methylphenol	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
4-Chloroaniline	UG/L	0	0%		0	0	13	1	UJ	1	UJ	10	U	1	U	1	U
4-Chlorophenyl phenyl ether	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
4-Methylphenol	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
4-Nitroaniline	UG/L	0	0%		0	0	13	2.6	U	2.6	U	26	U	2.5	U	2.5	U
4-Nitrophenol	UG/L	0	0%		0	0	13	2.6	U	2.6	U	26	U	2.5	U	2.5	U
Acenaphthene	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
Acenaphthylene	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
Anthracene	UG/L	0.068	8%		0	1	13	0.068	J	1	U	10	U	1	U	1	U
Benzo(a)anthracene	UG/L	0.18	8%		0	1	13	0.18	J	1	U	10	U	1	U	1	U
Benzo(a)pyrene	UG/L	0.15	8%		0	1	13	0.15	J	1	U	10	U	1	U	1	U
Benzo(b)fluoranthene	UG/L	0.15	8%		0	1	13	0.15	J	1	U	10	U	1	U	1	U
Benzo(ghi)perylene	UG/L	0.073	8%		0	1	13	0.073	J	1	U	10	U	1	U	1	U
Benzo(k)fluoranthene	UG/L	0.16	8%		0	1	13	0.16	J	1	U	10	U	1	U	1	U
Bis(2-Chloroethoxy)methane	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
Bis(2-Chloroethyl)ether	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
Bis(2-Chloroisopropyl)ether	UG/L	0	0%		0	0	9	1	U	1	U			1	U	1	U
Bis(2-Ethylhexyl)phthalate	UG/L	0.22	23%	0.6	0	3	13	1	UJ	1	UJ	10	U	1	U	0.22	J
Butylbenzylphthalate	UG/L	0.076	8%		0	1	13	1	UJ	1	UJ	10	U	1	U	1	U
Carbazole	UG/L	0.054	8%		0	1	13	0.054	J	1	UJ	10	U	1	U	1	U
Chrysene	UG/L	0.18	8%		0	1	13	0.18	J	1	U	10	U	1	U	1	U
Di-n-butylphthalate	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
Di-n-octylphthalate	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
Dibenz(a,h)anthracene	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
Dibenzofuran	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
Diethyl phthalate	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
Dimethylphthalate	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
Fluoranthene	UG/L	0.41	15%		0	2	13	0.41	J	1	U	10	U	1	U	1	U
Fluorene	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
Hexachlorobenzene	UG/L	0	0%	0.00003	0	0	13	1	U	1	U	10	U	1	U	1	U
Hexachlorobutadiene	UG/L	0	0%	0.01	0	0	13	1	U	1	U	10	U	1	U	1	U
Hexachlorocyclopentadiene	UG/L	0	0%	0.45	0	0	13	1	UJ	1	UJ	10	U	1	UJ	1	UJ

Sene Depot
SEAD-4 Remedial Investigation
Surface Water Sample Results

ANALYTE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYS CLASS C	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4 SW4-13 SURFACE WATER **42005** 0 N/A 12/7/1998 SA RI Phase 1 N	Step 1	SEAD-4 SW4-19 SURFACE WATER **42011** 0 N/A 12/7/1998 SA RI Phase 1 N	Step 1	SEAD-4 SW4-2 SURFACE WATER **SW4-2** 0 N/A 11/2/1993 SA ESI N		SEAD-4 SW4-49 SURFACE WATER **42014** 0 N/A 12/17/1998 SA RI Phase 1 N	Step 1	SEAD-4 SW4-50 SURFACE WATER **42013** 0 N/A 12/15/1998 DU RI Phase 1 N	Step 1
Hexachloroethane	UG/L	0	0%	0.6	0	0	13	1	U	1	U	10	U	1	U	1	U
Indeno(1,2,3-cd)pyrene	UG/L	0.069	8%		0	1	13	0.069	J	1	U	10	U	1	U	1	U
Isophorone	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
N-Nitrosodiphenylamine	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
N-Nitrosodipropylamine	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
Naphthalene	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
Nitrobenzene	UG/L	0	0%		0	0	13	1	U	1	U	10	U	1	U	1	U
Pentachlorophenol	UG/L	0	0%	1	0	0	13	2.6	UJ	2.6	UJ	26	U	2.5	U	2.5	U
Phenanthrene	UG/L	0.35	8%		0	1	13	0.35	J	1	U	10	U	1	U	1	U
Phenol	UG/L	0	0%	1	0	0	13	1	U	1	U	10	U	1	U	1	U
Pyrene	UG/L	0.25	15%		0	2	13	0.25	J	1	UJ	10	U	1	U	1	U
EXPLOSIVES																	
1,3,5-Trinitrobenzene	UG/L	0	0%		0	0	13	0.25	U	0.25	U	0.13	U	0.25	U	0.25	U
1,3-Dinitrobenzene	UG/L	0.07	8%		0	1	13	0.25	U	0.25	U	0.13	U	0.25	U	0.25	U
2,4,6-Trinitrotoluene	UG/L	0	0%		0	0	13	0.25	U	0.25	U	0.13	U	0.25	U	0.25	U
2,4-Dinitrotoluene	UG/L	0	0%		0	0	13	0.25	U	0.25	U	0.13	U	0.25	U	0.25	U
2,6-Dinitrotoluene	UG/L	0	0%		0	0	13	0.25	U	0.25	U	0.13	U	0.25	U	0.25	U
2-Nitrotoluene	UG/L	0	0%		0	0	9	0.25	U	0.25	U			0.25	U	0.25	U
2-amino-4,6-Dinitrotoluene	UG/L	0	0%		0	0	13	0.25	U	0.25	U	0.13	U	0.25	U	0.25	U
3-Nitrotoluene	UG/L	0	0%		0	0	9	0.25	U	0.25	U			0.25	U	0.25	U
4-Nitrotoluene	UG/L	0	0%		0	0	9	0.25	U	0.25	U			0.25	U	0.25	U
4-amino-2,6-Dinitrotoluene	UG/L	0	0%		0	0	13	0.25	U	0.25	U	0.13	U	0.25	U	0.25	U
HMX	UG/L	0	0%		0	0	13	0.25	U	0.25	U	0.13	U	0.25	U	0.25	U
Nitrobenzene	UG/L	0	0%		0	0	9	0.25	U	0.25	U			0.25	U	0.25	U
RDX	UG/L	0	0%		0	0	13	0.25	U	0.25	U	0.13	U	0.25	U	0.25	U
Tetryl	UG/L	0	0%		0	0	13	0.25	U	0.25	U	0.13	U	0.25	U	0.25	U
PESTICIDES/PCBs																	
4,4'-DDD	UG/L	0	0%	0.00008	0	0	13	0.01	U	0.01	U	0.1	U	0.01	U	0.01	U
4,4'-DDE	UG/L	0	0%	0.000007	0	0	13	0.01	U	0.01	U	0.1	U	0.01	U	0.01	U
4,4'-DDT	UG/L	0	0%	0.00001	0	0	13	0.01	U	0.01	U	0.1	U	0.01	UJ	0.01	UJ
Aldrin	UG/L	0	0%	0.001	0	0	13	0.0051	U	0.005	U	0.052	U	0.0052	U	0.0051	U
Alpha-BHC	UG/L	0	0%		0	0	13	0.0051	U	0.005	U	0.052	U	0.0086	U	0.009	U
Alpha-Chlordane	UG/L	0.0077	8%		0	1	13	0.0077		0.005	U	0.052	U	0.0052	U	0.0051	U
Aroclor-1016	UG/L	0	0%	0.000001	0	0	13	0.1	U	0.1	U	1	U	0.1	U	0.1	U
Aroclor-1221	UG/L	0	0%	0.000001	0	0	13	0.2	U	0.2	U	2.1	U	0.21	U	0.2	U
Aroclor-1232	UG/L	0	0%	0.000001	0	0	13	0.1	U	0.1	U	1	U	0.1	U	0.1	U
Aroclor-1242	UG/L	0	0%	0.000001	0	0	13	0.1	U	0.1	U	1	U	0.1	U	0.1	U
Aroclor-1248	UG/L	0	0%	0.000001	0	0	13	0.1	U	0.1	U	1	U	0.1	U	0.1	U
Aroclor-1254	UG/L	0	0%	0.000001	0	0	13	0.1	U	0.1	U	1	U	0.1	U	0.1	U
Aroclor-1260	UG/L	0	0%	0.000001	0	0	13	0.1	U	0.1	U	1	U	0.1	U	0.1	U
Beta-BHC	UG/L	0.0041	8%		0	1	13	0.0051	U	0.005	U	0.052	U	0.0052	U	0.0051	U
Delta-BHC	UG/L	0	0%		0	0	13	0.0051	U	0.005	U	0.052	U	0.0052	U	0.0051	U
Dieldrin	UG/L	0	0%	0.0000006	0	0	13	0.01	U	0.01	U	0.1	U	0.01	UJ	0.01	UJ
Endosulfan I	UG/L	0	0%	0.009	0	0	13	0.0051	U	0.005	U	0.052	U	0.0052	U	0.0051	U
Endosulfan II	UG/L	0	0%	0.009	0	0	13	0.01	U	0.01	U	0.1	U	0.01	U	0.01	U
Endosulfan sulfate	UG/L	0	0%		0	0	13	0.01	U	0.01	U	0.1	U	0.01	U	0.01	U
Endrin	UG/L	0	0%	0.002	0	0	13	0.01	U	0.01	U	0.1	U	0.01	U	0.01	U
Endrin aldehyde	UG/L	0	0%		0	0	13	0.01	U	0.01	U	0.1	U	0.01	U	0.01	U
Endrin ketone	UG/L	0	0%		0	0	13	0.01	U	0.01	U	0.1	U	0.01	U	0.01	U

Seneca Army Depot
SEAD-4 Remedial Investigation
Surface Water Sample Results

ANALYTE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYS CLASS C	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
								SW4-13		SW4-19		SW4-2		SW4-49		SW4-50	
								SURFACE WATER		SURFACE WATER		SURFACE WATER		SURFACE WATER		SURFACE WATER	
								42005		42011		SW4-2		42014		42013	
								0		0		0		0		0	
								N/A		N/A		N/A		N/A		N/A	
								12/7/1998		12/7/1998		11/2/1993		12/17/1998		12/15/1998	
								SA		SA		SA		SA		DU	
								RI Phase 1 Step 1		RI Phase 1 Step 1		ESI		RI Phase 1 Step 1		RI Phase 1 Step 1	
								N		N		N		N		N	
VOLATILES Gamma-BHC/Lindane	UG/L	0	0%		0	0	13	0.0051	U	0.005	U	0.052	U	0.0052	UJ	0.0051	UJ
Gamma-Chlordane	UG/L	0.0064	8%		0	1	13	0.0064	J	0.005	U	0.052	U	0.0052	U	0.0051	U
Heptachlor	UG/L	0	0%	0.0002	0	0	13	0.0051	U	0.005	U	0.052	U	0.0052	UJ	0.0051	UJ
Heptachlor epoxide	UG/L	0	0%	0.0003	0	0	13	0.0051	U	0.005	U	0.052	U	0.0052	U	0.0051	U
Hexachlorobenzene	UG/L	0	0%	0.00003	0	0	9	0.01	U	0.01	U			0.01	U	0.01	U
Methoxychlor	UG/L	0	0%	0.03	0	0	13	0.051	U	0.05	U	0.52	U	0.052	U	0.051	U
Toxaphene	UG/L	0	0%	0.000006	0	0	13	0.51	U	0.5	U	5.2	U	0.52	U	0.51	U
HERBICIDES																	
2,4,5-T	UG/L	0	0%		0	0	4					0.11	U				
2,4,5-TP/Silvex	UG/L	0	0%		0	0	4					0.11	U				
2,4-D	UG/L	0	0%		0	0	4					1.1	U				
2,4-DB	UG/L	0	0%		0	0	4					1.1	U				
Dalapon	UG/L	0	0%		0	0	4					2.5	U				
Dicamba	UG/L	0	0%		0	0	4					0.11	U				
Dichloroprop	UG/L	0	0%		0	0	4					1.1	U				
Dinoseb	UG/L	0	0%		0	0	4					0.53	U				
MCPA	UG/L	0	0%		0	0	4					110	U				
MCPP	UG/L	0	0%		0	0	4					110	U				
METALS																	
Aluminum	UG/L	7350	100%	100	7	13	13	7350		70.4	J	314		21.9	J	40.2	J
Antimony	UG/L	6.6	38%		0	5	13	6.6	J	3.1	U	52.4	U	3.1	U	3.3	J
Arsenic	UG/L	4.2	8%	150	0	1	13	4.2	J	2.3	U	1.2	U	2.3	U	2.3	U
Barium	UG/L	213	100%		0	13	13	213		33.7	J	24.9	J	64.6	J	64	J
Beryllium	UG/L	0	0%	1100	0	0	13	0.1	U	0.1	U	0.3	U	0.1	U	0.1	U
Cadmium	UG/L	11.6	46%	1.8628217	1	6	13	11.6		0.2	U	3.3	U	0.31	J	0.2	U
Calcium	UG/L	159000	100%		0	13	13	159000		86600		51200		76400		96200	
Chromium	UG/L	44.8	31%	347.27015	0	4	13	12.8		0.8	U	44.8		0.8	U	0.8	U
Cobalt	UG/L	19.6	8%	5	1	1	13	19.6	J	1.6	U	4.9	U	1.6	U	1.6	U
Copper	UG/L	97	77%	20.287735	4	10	13	97		3.7	J	66.9		2.1	J	1.1	J
Cyanide	UG/L	0	0%	5.2	0	0	13	5	U	5	U	8.3	U	5	U	5	U
Iron	UG/L	16600	100%	300	7	13	13	16600		129		430	J	23.1	J	176	
Lead	UG/L	117	31%	7.1638103	2	4	13	117	J	1.3	U	3.1		1.3	U	1.3	U
Magnesium	UG/L	32700	100%		0	13	13	32700		9010		10800		11200		13300	
Manganese	UG/L	2350	100%		0	13	13	2350		142		45.6		23		100	
Mercury	UG/L	0	0%	0.0007	0	0	13	0.1	U	0.1	U	0.07	U	0.1	U	0.1	U
Nickel	UG/L	32.6	15%	154.48855	0	2	13	32.6	J	2.5	J	4.1	U	1.9	U	1.9	U
Potassium	UG/L	4790	100%		0	13	13	4040	J	4790	J	1720	J	1850	J	1400	J
Selenium	UG/L	0	0%	4.6	0	0	13	3.6	U	3.6	U	1.1	U	3.6	U	3.6	U
Silver	UG/L	1.7	15%	0.1	2	2	13	1	U	1.7	J	6.6	UJ	1	U	1	U
Sodium	UG/L	36200	100%		0	13	13	25900		36200		13200		17400		15600	
Thallium	UG/L	2.4	8%	8	0	1	13	3.9	U	3.9	U	1.2	U	3.9	U	3.9	U
Vanadium	UG/L	22.5	31%	14	1	4	13	22.5	J	8.2	J	3.3	U	1.5	U	1.5	U
Zinc	UG/L	492	100%	141.37982	1	13	13	492		29.9		20.3		21.3		4.1	J
Nitrate/Nitrite	MG/L	0.25	100%		0	9	9	0.03		0.02				0.06		0.01	

ANALYTE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYS CLASS C	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4 SW4-50 SURFACE WATER 42012 0 N/A 12/15/1998 SA RI Phase 1 Step 1 N		SEAD-4 SW4-51 SURFACE WATER 42015 0 N/A 12/18/1998 SA RI Phase 1 Step 1 N		SEAD-4 SW4-52 SURFACE WATER 42016 0 N/A 12/18/1998 SA RI Phase 1 Step 1 N	
VOLATILES													
1,1,1-Trichloroethane	UG/L	0	0%		0	0	13	1	U	1	U	1	U
1,1,2,2-Tetrachloroethane	UG/L	0	0%		0	0	13	1	U	1	U	1	U
1,1,2-Trichloroethane	UG/L	0	0%		0	0	13	1	U	1	U	1	U
1,1-Dichloroethane	UG/L	0	0%		0	0	13	1	U	1	U	1	U
1,1-Dichloroethene	UG/L	0	0%		0	0	13	1	U	1	U	1	U
1,2,4-Trichlorobenzene	UG/L	0	0%	5	0	0	4						
1,2-Dibromo-3-chloropropane	UG/L	0	0%		0	0	9	1	U	1	U	1	U
1,2-Dibromoethane	UG/L	0	0%		0	0	9	1	U	1	U	1	U
1,2-Dichlorobenzene	UG/L	0	0%	5	0	0	9	1	U	1	U	1	U
1,2-Dichloroethane	UG/L	0	0%		0	0	13	1	U	1	U	1	U
1,2-Dichloroethene (total)	UG/L	0	0%		0	0	4						
1,2-Dichloropropane	UG/L	0	0%		0	0	13	1	U	1	U	1	U
1,3-Dichlorobenzene	UG/L	0	0%	5	0	0	9	1	U	1	U	1	U
1,4-Dichlorobenzene	UG/L	0	0%	5	0	0	9	1	U	1	U	1	U
Acetone	UG/L	4	31%		0	4	13	3	J	2	J	4	J
Benzene	UG/L	0	0%		0	0	13	1	U	1	U	1	U
Bromochloromethane	UG/L	0	0%		0	0	9	1	U	1	U	1	U
Bromodichloromethane	UG/L	0	0%		0	0	13	1	U	1	U	1	U
Bromoform	UG/L	0	0%		0	0	13	1	U	1	U	1	U
Carbon disulfide	UG/L	0	0%		0	0	13	1	U	1	U	1	U
Carbon tetrachloride	UG/L	0	0%		0	0	13	1	U	1	U	1	U
Chlorobenzene	UG/L	0	0%	5	0	0	13	1	U	1	U	1	U
Chlorodibromomethane	UG/L	0	0%		0	0	13	1	U	1	U	1	U
Chloroethane	UG/L	0	0%		0	0	13	1	U	1	U	1	U
Chloroform	UG/L	0	0%		0	0	13	1	U	1	U	1	U
Cis-1,2-Dichloroethene	UG/L	0	0%		0	0	9	1	U	1	U	1	U
Cis-1,3-Dichloropropene	UG/L	0	0%		0	0	13	1	U	1	U	1	U
Ethyl benzene	UG/L	0	0%		0	0	13	1	U	1	U	1	U
Methyl bromide	UG/L	0	0%		0	0	13	1	U	1	U	1	U
Methyl butyl ketone	UG/L	0	0%		0	0	13	5	U	5	U	5	U
Methyl chloride	UG/L	0	0%		0	0	13	1	U	1	U	1	U
Methyl ethyl ketone	UG/L	0	0%		0	0	13	5	U	5	U	5	U
Methyl isobutyl ketone	UG/L	0	0%		0	0	13	5	U	5	U	5	U
Methylene chloride	UG/L	0	0%	200	0	0	13	2	U	2	U	2	U
Styrene	UG/L	0	0%		0	0	13	1	U	1	U	1	U
Tetrachloroethene	UG/L	0	0%		0	0	13	1	U	1	U	1	U
Toluene	UG/L	0	0%	6000	0	0	13	1	U	1	U	1	U
Total Xylenes	UG/L	0	0%		0	0	13	1	U	1	U	1	U
Trans-1,2-Dichloroethene	UG/L	0	0%		0	0	9	1	U	1	U	1	U
Trans-1,3-Dichloropropene	UG/L	0	0%		0	0	13	1	U	1	U	1	U
Trichloroethene	UG/L	0	0%	40	0	0	13	1	U	1	U	1	U
Vinyl chloride	UG/L	0	0%		0	0	13	1	U	1	U	1	U
SEMIVOLATILES													
1,2,4-Trichlorobenzene	UG/L	0	0%	5	0	0	13	1	U	1	U	1	U
1,2-Dichlorobenzene	UG/L	0	0%	5	0	0	13	1	U	1	U	1	U
1,3-Dichlorobenzene	UG/L	0	0%	5	0	0	13	1	U	1	U	1	U
1,4-Dichlorobenzene	UG/L	0	0%	5	0	0	13	1	U	1	U	1	U
2,2'-oxybis(1-Chloropropane)	UG/L	0	0%		0	0	4						

Seneca Army Depot
SEAD-4 Remedial Investigation
Surface Water Sample Results

								SEAD-4		SEAD-4		SEAD-4	
								SW4-50		SW4-51		SW4-52	
								SURFACE WATER		SURFACE WATER		SURFACE WATER	
								42012		42015		42016	
								0		0		0	
								N/A		N/A		N/A	
								12/15/1998		12/18/1998		12/18/1998	
								SA		SA		SA	
ANALYTE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYS CLASS C	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1
								N		N		N	
VOLATILES 2,4,5-Trichlorophenol	UG/L	0	0%		0	0	13	2.5	U	2.5	U	2.5	U
2,4,6-Trichlorophenol	UG/L	0	0%		0	0	13	1	U	1	U	1	U
2,4-Dichlorophenol	UG/L	0	0%	1	0	0	13	1	U	1	U	1	U
2,4-Dimethylphenol	UG/L	0	0%	1000	0	0	13	1	U	1	U	1	U
2,4-Dinitrophenol	UG/L	0	0%	400	0	0	13	2.5	UJ	2.5	UJ	2.5	UJ
2,4-Dinitrotoluene	UG/L	0	0%		0	0	13	1	U	1	U	1	U
2,6-Dinitrotoluene	UG/L	0	0%		0	0	13	1	U	1	U	1	U
2-Chloronaphthalene	UG/L	0	0%		0	0	13	1	U	1	U	1	U
2-Chlorophenol	UG/L	0	0%		0	0	13	1	U	1	U	1	U
2-Methylnaphthalene	UG/L	0	0%		0	0	13	1	U	1	U	1	U
2-Methylphenol	UG/L	0	0%		0	0	13	1	U	1	U	1	U
2-Nitroaniline	UG/L	0	0%		0	0	13	2.5	U	2.5	U	2.5	U
2-Nitrophenol	UG/L	0	0%		0	0	13	1	U	1	U	1	U
3,3'-Dichlorobenzidine	UG/L	0	0%		0	0	13	1	U	1	U	1	U
3-Nitroaniline	UG/L	0	0%		0	0	13	2.5	UJ	2.5	UJ	2.5	UJ
4,6-Dinitro-2-methylphenol	UG/L	0	0%		0	0	13	2.5	U	2.5	U	2.5	U
4-Bromophenyl phenyl ether	UG/L	0	0%		0	0	13	1	U	1	U	1	U
4-Chloro-3-methylphenol	UG/L	0	0%		0	0	13	1	U	1	U	1	U
4-Chloroaniline	UG/L	0	0%		0	0	13	1	U	1	U	1	U
4-Chlorophenyl phenyl ether	UG/L	0	0%		0	0	13	1	U	1	U	1	U
4-Methylphenol	UG/L	0	0%		0	0	13	1	U	1	U	1	U
4-Nitroaniline	UG/L	0	0%		0	0	13	2.5	U	2.5	U	2.5	U
4-Nitrophenol	UG/L	0	0%		0	0	13	2.5	U	2.5	U	2.5	U
Acenaphthene	UG/L	0	0%		0	0	13	1	U	1	U	1	U
Acenaphthylene	UG/L	0	0%		0	0	13	1	U	1	U	1	U
Anthracene	UG/L	0.068	8%		0	1	13	1	U	1	U	1	U
Benzo(a)anthracene	UG/L	0.18	8%		0	1	13	1	U	1	U	1	U
Benzo(a)pyrene	UG/L	0.15	8%		0	1	13	1	U	1	U	1	U
Benzo(b)fluoranthene	UG/L	0.15	8%		0	1	13	1	U	1	U	1	U
Benzo(ghi)perylene	UG/L	0.073	8%		0	1	13	1	U	1	U	1	U
Benzo(k)fluoranthene	UG/L	0.16	8%		0	1	13	1	U	1	U	1	U
Bis(2-Chloroethoxy)methane	UG/L	0	0%		0	0	13	1	U	1	U	1	U
Bis(2-Chloroethyl)ether	UG/L	0	0%		0	0	13	1	U	1	U	1	U
Bis(2-Chloroisopropyl)ether	UG/L	0	0%		0	0	9	1	U	1	U	1	U
Bis(2-Ethylhexyl)phthalate	UG/L	0.22	23%	0.6	0	3	13	1	U	0.15	J	0.15	J
Butylbenzylphthalate	UG/L	0.076	8%		0	1	13	0.076	J	1	U	1	U
Carbazole	UG/L	0.054	8%		0	1	13	1	U	1	U	1	U
Chrysene	UG/L	0.18	8%		0	1	13	1	U	1	U	1	U
Di-n-butylphthalate	UG/L	0	0%		0	0	13	1	U	1	U	1	U
Di-n-octylphthalate	UG/L	0	0%		0	0	13	1	U	1	U	1	U
Dibenz(a,h)anthracene	UG/L	0	0%		0	0	13	1	U	1	U	1	U
Dibenzofuran	UG/L	0	0%		0	0	13	1	U	1	U	1	U
Diethyl phthalate	UG/L	0	0%		0	0	13	1	U	1	U	1	U
Dimethylphthalate	UG/L	0	0%		0	0	13	1	U	1	U	1	U
Fluoranthene	UG/L	0.41	15%		0	2	13	1	U	1	U	1	U
Fluorene	UG/L	0	0%		0	0	13	1	U	1	U	1	U
Hexachlorobenzene	UG/L	0	0%	0.00003	0	0	13	1	U	1	U	1	U
Hexachlorobutadiene	UG/L	0	0%	0.01	0	0	13	1	U	1	U	1	U
Hexachlorocyclopentadiene	UG/L	0	0%	0.45	0	0	13	1	UJ	1	UJ	1	UJ

Sene Depot
SEAD-4 Remedial Investigation
Surface Water Sample Results

ANALYTE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYS CLASS C	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-4 SW4-50 SURFACE WATER 42012 0 N/A 12/15/1998 SA RI Phase 1 Step 1 N		SEAD-4 SW4-51 SURFACE WATER 42015 0 N/A 12/18/1998 SA RI Phase 1 Step 1 N		SEAD-4 SW4-52 SURFACE WATER 42016 0 N/A 12/18/1998 SA RI Phase 1 Step 1 N	
Hexachloroethane	UG/L	0	0%	0.6	0	0	13	1	U	1	U	1	U
Indeno(1,2,3-cd)pyrene	UG/L	0.069	8%		0	1	13	1	U	1	U	1	U
Isophorone	UG/L	0	0%		0	0	13	1	U	1	U	1	U
N-Nitrosodiphenylamine	UG/L	0	0%		0	0	13	1	U	1	U	1	U
N-Nitrosodipropylamine	UG/L	0	0%		0	0	13	1	U	1	U	1	U
Naphthalene	UG/L	0	0%		0	0	13	1	U	1	U	1	U
Nitrobenzene	UG/L	0	0%		0	0	13	1	U	1	U	1	U
Pentachlorophenol	UG/L	0	0%	1	0	0	13	2.5	U	2.5	U	2.5	U
Phenanthrene	UG/L	0.35	8%		0	1	13	1	U	1	U	1	U
Phenol	UG/L	0	0%	1	0	0	13	1	U	1	U	1	U
Pyrene	UG/L	0.25	15%		0	2	13	1	U	1	U	1	U
EXPLOSIVES													
1,3,5-Trinitrobenzene	UG/L	0	0%		0	0	13	0.25	U	0.25	U	0.25	U
1,3-Dinitrobenzene	UG/L	0.07	8%		0	1	13	0.25	U	0.25	U	0.25	U
2,4,6-Trinitrotoluene	UG/L	0	0%		0	0	13	0.25	U	0.25	U	0.25	U
2,4-Dinitrotoluene	UG/L	0	0%		0	0	13	0.25	U	0.25	U	0.25	U
2,6-Dinitrotoluene	UG/L	0	0%		0	0	13	0.25	U	0.25	U	0.25	U
2-Nitrotoluene	UG/L	0	0%		0	0	9	0.25	U	0.25	U	0.25	U
2-amino-4,6-Dinitrotoluene	UG/L	0	0%		0	0	13	0.25	U	0.25	U	0.25	U
3-Nitrotoluene	UG/L	0	0%		0	0	9	0.25	U	0.25	U	0.25	U
4-Nitrotoluene	UG/L	0	0%		0	0	9	0.25	U	0.25	U	0.25	U
4-amino-2,6-Dinitrotoluene	UG/L	0	0%		0	0	13	0.25	U	0.25	U	0.25	U
HMX	UG/L	0	0%		0	0	13	0.25	U	0.25	U	0.25	U
Nitrobenzene	UG/L	0	0%		0	0	9	0.25	U	0.25	U	0.25	U
RDX	UG/L	0	0%		0	0	13	0.25	U	0.25	U	0.25	U
Tetryl	UG/L	0	0%		0	0	13	0.25	U	0.25	U	0.25	U
PESTICIDES/PCBs													
4,4'-DDD	UG/L	0	0%	0.00008	0	0	13	0.01	U	0.01	U	0.01	U
4,4'-DDE	UG/L	0	0%	0.000007	0	0	13	0.01	U	0.01	U	0.01	U
4,4'-DDT	UG/L	0	0%	0.00001	0	0	13	0.01	UJ	0.01	UJ	0.01	UJ
Aldrin	UG/L	0	0%	0.001	0	0	13	0.0051	U	0.0051	U	0.0051	U
Alpha-BHC	UG/L	0	0%		0	0	13	0.0072	U	0.0085	U	0.0074	U
Alpha-Chlordane	UG/L	0.0077	8%		0	1	13	0.0051	U	0.0051	U	0.0051	U
Aroclor-1016	UG/L	0	0%	0.000001	0	0	13	0.1	U	0.1	U	0.1	U
Aroclor-1221	UG/L	0	0%	0.000001	0	0	13	0.2	U	0.2	U	0.2	U
Aroclor-1232	UG/L	0	0%	0.000001	0	0	13	0.1	U	0.1	U	0.1	U
Aroclor-1242	UG/L	0	0%	0.000001	0	0	13	0.1	U	0.1	U	0.1	U
Aroclor-1248	UG/L	0	0%	0.000001	0	0	13	0.1	U	0.1	U	0.1	U
Aroclor-1254	UG/L	0	0%	0.000001	0	0	13	0.1	U	0.1	U	0.1	U
Aroclor-1260	UG/L	0	0%	0.000001	0	0	13	0.1	U	0.1	U	0.1	U
Beta-BHC	UG/L	0.0041	8%		0	1	13	0.0051	U	0.0041	J	0.0051	U
Delta-BHC	UG/L	0	0%		0	0	13	0.0051	U	0.0051	U	0.0051	U
Dieldrin	UG/L	0	0%	0.0000006	0	0	13	0.01	UJ	0.01	UJ	0.01	UJ
Endosulfan I	UG/L	0	0%	0.009	0	0	13	0.0051	U	0.0051	U	0.0051	U
Endosulfan II	UG/L	0	0%	0.009	0	0	13	0.01	U	0.01	U	0.01	U
Endosulfan sulfate	UG/L	0	0%		0	0	13	0.01	U	0.01	U	0.01	U
Endrin	UG/L	0	0%	0.002	0	0	13	0.01	U	0.01	U	0.01	U
Endrin aldehyde	UG/L	0	0%		0	0	13	0.01	U	0.01	U	0.01	U
Endrin ketone	UG/L	0	0%		0	0	13	0.01	U	0.01	U	0.01	U

Seneca Army Depot
SEAD-4 Remedial Investigation
Surface Water Sample Results

								SEAD-4		SEAD-4		SEAD-4	
								SW4-50		SW4-51		SW4-52	
								SURFACE WATER		SURFACE WATER		SURFACE WATER	
								42012		**42015**		**42016**	
								0		0		0	
								N/A		N/A		N/A	
								12/15/1998		12/18/1998		12/18/1998	
								SA		SA		SA	
ANALYTE	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYS CLASS C	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1
								N		N		N	
VOLATILES Gamma-BHC/Lindane	UG/L	0	0%		0	0	13	0.0051	UJ	0.0051	UJ	0.0051	UJ
Gamma-Chlordane	UG/L	0.0064	8%		0	1	13	0.0051	U	0.0051	U	0.0051	U
Heptachlor	UG/L	0	0%	0.0002	0	0	13	0.0051	UJ	0.0051	UJ	0.0051	UJ
Heptachlor epoxide	UG/L	0	0%	0.0003	0	0	13	0.0051	U	0.0051	U	0.0051	U
Hexachlorobenzene	UG/L	0	0%	0.00003	0	0	9	0.01	U	0.01	U	0.01	U
Methoxychlor	UG/L	0	0%	0.03	0	0	13	0.051	U	0.051	U	0.051	U
Toxaphene	UG/L	0	0%	0.000006	0	0	13	0.51	U	0.51	U	0.51	U
HERBICIDES													
2,4,5-T	UG/L	0	0%		0	0	4						
2,4,5-TP/Silvex	UG/L	0	0%		0	0	4						
2,4-D	UG/L	0	0%		0	0	4						
2,4-DB	UG/L	0	0%		0	0	4						
Dalapon	UG/L	0	0%		0	0	4						
Dicamba	UG/L	0	0%		0	0	4						
Dichloroprop	UG/L	0	0%		0	0	4						
Dinoseb	UG/L	0	0%		0	0	4						
MCPA	UG/L	0	0%		0	0	4						
MCPP	UG/L	0	0%		0	0	4						
METALS													
Aluminum	UG/L	7350	100%	100	7	13	13	29.5	J	227		347	
Antimony	UG/L	6.6	38%		0	5	13	3.1	U	3.8	J	4.5	J
Arsenic	UG/L	4.2	8%	150	0	1	13	2.3	U	2.3	U	2.3	U
Barium	UG/L	213	100%		0	13	13	66.6	J	59	J	63.6	J
Beryllium	UG/L	0	0%	1100	0	0	13	0.1	U	0.1	U	0.1	U
Cadmium	UG/L	11.6	46%	1.8628217	1	6	13	0.83	J	1.3	J	0.24	J
Calcium	UG/L	159000	100%		0	13	13	100000		83500		91500	
Chromium	UG/L	44.8	31%	347.27015	0	4	13	0.8	U	0.8	U	0.8	U
Cobalt	UG/L	19.6	8%	5	1	1	13	1.6	U	1.6	U	1.6	U
Copper	UG/L	97	77%	20.287735	4	10	13	0.9	U	2.5	J	0.9	U
Cyanide	UG/L	0	0%	5.2	0	0	13	5	U	5	U	5	U
Iron	UG/L	16600	100%	300	7	13	13	161		320		1120	
Lead	UG/L	117	31%	7.1638103	2	4	13	1.3	U	1.3	UJ	1.3	UJ
Magnesium	UG/L	32700	100%		0	13	13	13900		13100		14600	
Manganese	UG/L	2350	100%		0	13	13	105		39		365	
Mercury	UG/L	0	0%	0.0007	0	0	13	0.1	U	0.1	U	0.1	U
Nickel	UG/L	32.6	15%	154.48855	0	2	13	1.9	U	1.9	U	1.9	U
Potassium	UG/L	4790	100%		0	13	13	1640	J	2080	J	1920	J
Selenium	UG/L	0	0%	4.6	0	0	13	3.6	U	3.6	U	3.6	U
Silver	UG/L	1.7	15%	0.1	2	2	13	1	U	1	U	1	U
Sodium	UG/L	36200	100%		0	13	13	16100		17900		16500	
Thallium	UG/L	2.4	8%	8	0	1	13	3.9	U	3.9	U	3.9	U
Vanadium	UG/L	22.5	31%	14	1	4	13	1.5	U	1.5	U	1.7	J
Zinc	UG/L	492	100%	141.37982	1	13	13	3.5	J	40.5		11.5	J
Nitrate/Nitrite	MG/L	0.25	100%		0	9	9	0.02		0.25		0.04	

Sediment

Senec y Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4		SEAD-4	
									SD4-1		SD4-10		SD4-11		SD4-12	
									SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
									SD4-1		41001		41002		41004	
									0		0		0		0	
									0.5		0.2		0.2		0.2	
									11/2/1993		12/6/1998		12/6/1998		12/6/1998	
									SA		SA		SA		DU	
									ESI		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
ANALYTE	UNIT	MAX	FREQUENCY	NYS CRITERIA (1)	SPECIFIC CRITERIA (2)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	Value	Q	Value	Q	Value	Q	Value	Q
1,1,1-Trichloroethane	UG/KG	0	0%			0	0	58	36	UJ	17	U	13	U	33	UJ
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	11.7315	NYDEC HHB	0	0	58	36	UJ	17	UJ	13	UJ	33	UJ
1,1,2-Trichloroethane	UG/KG	0	0%			0	0	58	36	UJ	17	U	13	U	33	UJ
1,1-Dichloroethane	UG/KG	0	0%			0	0	58	36	UJ	17	U	13	U	33	UJ
1,1-Dichloroethene	UG/KG	0	0%	0.7821	NYDEC HHB	0	0	58	36	UJ	17	U	13	U	33	UJ
1,2-Dichloroethane	UG/KG	0	0%	27.3735	NYDEC HHB	0	0	58	36	UJ	17	U	13	U	33	UJ
1,2-Dichloroethene (total)	UG/KG	0	0%			0	0	58	36	UJ	17	U	13	U	33	UJ
1,2-Dichloropropane	UG/KG	0	0%			0	0	58	36	UJ	17	U	13	U	33	UJ
Acetone	UG/KG	210	26%			0	15	58	210	J	17	U	13	U	22	J
Benzene	UG/KG	0	0%	23.463	NYDEC HHB	0	0	58	36	UJ	17	U	13	U	33	UJ
Bromodichloromethane	UG/KG	0	0%			0	0	58	36	UJ	17	U	13	U	33	UJ
Bromoform	UG/KG	0	0%			0	0	58	36	UJ	17	UJ	13	UJ	33	UJ
Carbon disulfide	UG/KG	18	9%			0	5	58	10	J	17	U	13	U	5	J
Carbon tetrachloride	UG/KG	0	0%	23.463	NYDEC HHB	0	0	58	36	UJ	17	U	13	U	33	UJ
Chlorobenzene	UG/KG	0	0%	136.8675	BENTHIC-CHRONIC	0	0	58	36	UJ	17	UJ	13	UJ	33	UJ
Chlorodibromomethane	UG/KG	0	0%			0	0	58	36	UJ	17	U	13	U	33	UJ
Chloroethane	UG/KG	0	0%			0	0	58	36	UJ	17	U	13	U	33	UJ
Chloroform	UG/KG	14	3%			0	2	58	36	UJ	17	U	6	J	33	UJ
Cis-1,3-Dichloropropene	UG/KG	0	0%			0	0	58	36	UJ	17	U	13	U	33	UJ
Ethyl benzene	UG/KG	0	0%	938.52	BENTHIC-CHRONIC	0	0	58	36	UJ	17	UJ	13	UJ	33	UJ
Methyl bromide	UG/KG	0	0%			0	0	58	36	UJ	17	U	13	U	33	UJ
Methyl butyl ketone	UG/KG	0	0%			0	0	58	36	UJ	17	U	13	U	33	UJ
Methyl chloride	UG/KG	5	2%			0	1	58	36	UJ	17	U	13	U	33	UJ
Methyl ethyl ketone	UG/KG	49	2%			0	1	58	49	J	17	U	13	U	33	UJ
Methyl isobutyl ketone	UG/KG	0	0%			0	0	58	36	UJ	17	U	13	U	33	UJ
Methylene chloride	UG/KG	11	5%			0	3	58	36	UJ	17	U	13	U	33	UJ
Styrene	UG/KG	3	3%			0	2	58	36	UJ	17	UJ	13	UJ	33	UJ
Tetrachloroethene	UG/KG	0	0%	31.284	NYDEC HHB	0	0	58	36	UJ	17	U	13	U	33	UJ
Toluene	UG/KG	42	9%	1916.145	BENTHIC-CHRONIC	0	5	58	36	UJ	17	U	13	U	33	UJ
Total Xylenes	UG/KG	7	3%	3597.66	BENTHIC-CHRONIC	0	2	58	36	UJ	17	UJ	13	UJ	33	UJ
Trans-1,3-Dichloropropene	UG/KG	0	0%			0	0	58	36	UJ	17	U	13	U	33	UJ
Trichloroethene	UG/KG	0	0%	78.21	NYDEC HHB	0	0	58	36	UJ	17	U	13	U	33	UJ
Vinyl chloride	UG/KG	0	0%	2.73735	NYDEC HHB	0	0	58	36	UJ	17	U	13	U	33	UJ
1,2,4-Trichlorobenzene	UG/KG	0	0%			0	0	58	1200	UJ	120	UJ	110	UJ	520	UJ
1,2-Dichlorobenzene	UG/KG	0	0%	4692.6	BENTHIC-CHRONIC	0	0	58	1200	UJ	120	UJ	110	UJ	520	UJ
1,3-Dichlorobenzene	UG/KG	0	0%	469.26	BENTHIC-CHRONIC	0	0	58	1200	UJ	120	UJ	110	UJ	520	UJ
1,4-Dichlorobenzene	UG/KG	73	2%	469.26	BENTHIC-CHRONIC	0	1	58	1200	UJ	120	UJ	110	UJ	73	J
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%			0	0	9	1200	UJ						
2,4,5-Trichlorophenol	UG/KG	0	0%			0	0	58	2800	UJ	280	UJ	260	UJ	1300	UJ
2,4,6-Trichlorophenol	UG/KG	0	0%			0	0	58	1200	UJ	120	UJ	110	UJ	520	UJ
2,4-Dichlorophenol	UG/KG	0	0%			0	0	58	1200	UJ	120	UJ	110	UJ	520	UJ

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4		SEAD-4	
									SD4-1		SD4-10		SD4-11		SD4-12	
									SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
									SD4-1		41001		41002		41004	
									0		0		0		0	
									0.5		0.2		0.2		0.2	
									11/2/1993		12/6/1998		12/6/1998		12/6/1998	
									SA		SA		SA		DU	
									ESI		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
ANALYTE	UNIT	MAX	FREQUENCY	NYS CRITERIA (1)	SPECIFIC CRITERIA (2)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	Value	Q	Value	Q	Value	Q	Value	Q
2,4-Dimethylphenol	UG/KG	0	0%	19.5525	BENTHIC-CHRONIC	0	0	58	1200	UJ	120	UJ	110	UJ	520	UJ
2,4-Dinitrophenol	UG/KG	0	0%			0	0	58	2800	UJ	280	UJ	260	UJ	1300	UJ
2,4-Dinitrotoluene	UG/KG	0	0%			0	0	58	1200	UJ	120	UJ	110	UJ	520	UJ
2,6-Dinitrotoluene	UG/KG	0	0%			0	0	58	1200	UJ	120	UJ	110	UJ	520	UJ
2-Chloronaphthalene	UG/KG	0	0%			0	0	58	1200	UJ	120	UJ	110	UJ	520	UJ
2-Chlorophenol	UG/KG	0	0%			0	0	58	1200	UJ	120	UJ	110	UJ	520	UJ
2-Methylnaphthalene	UG/KG	31	9%	1329.57	BENTHIC-CHRONIC	0	5	58	1200	UJ	120	UJ	110	UJ	520	UJ
2-Methylphenol	UG/KG	0	0%			0	0	58	1200	UJ	120	UJ	110	UJ	520	UJ
2-Nitroaniline	UG/KG	0	0%			0	0	58	2800	UJ	280	UJ	260	UJ	1300	UJ
2-Nitrophenol	UG/KG	0	0%	19.5525	BENTHIC-CHRONIC	0	0	58	1200	UJ	120	UJ	110	UJ	520	UJ
3,3'-Dichlorobenzidine	UG/KG	0	0%			0	0	58	1200	UJ	120	UJ	110	UJ	520	UJ
3-Nitroaniline	UG/KG	0	0%			0	0	58	2800	UJ	280	UJ	260	UJ	1300	UJ
4,6-Dinitro-2-methylphenol	UG/KG	0	0%			0	0	58	2800	UJ	280	UJ	260	UJ	1300	UJ
4-Bromophenyl phenyl ether	UG/KG	0	0%			0	0	58	1200	UJ	120	UJ	110	UJ	520	UJ
4-Chloro-3-methylphenol	UG/KG	0	0%			0	0	58	1200	UJ	120	UJ	110	UJ	520	UJ
4-Chloroaniline	UG/KG	0	0%			0	0	58	1200	UJ	120	UJ	110	UJ	520	UJ
4-Chlorophenyl phenyl ether	UG/KG	0	0%			0	0	58	1200	UJ	120	UJ	110	UJ	520	UJ
4-Methylphenol	UG/KG	140	10%	19.5525	BENTHIC-CHRONIC	2	6	58	[illegible]	J	120	UJ	110	UJ	520	UJ
4-Nitroaniline	UG/KG	0	0%			0	0	58	2800	UJ	280	UJ	260	UJ	1300	UJ
4-Nitrophenol	UG/KG	0	0%			0	0	58	2800	UJ	280	UJ	260	UJ	1300	UJ
Acenaphthene	UG/KG	610	19%	5474.7	BENTHIC-CHRONIC	0	11	58	1200	UJ	120	UJ	110	UJ	520	UJ
Acenaphthylene	UG/KG	130	17%			0	10	58	1200	UJ	120	UJ	110	UJ	520	UJ
Anthracene	UG/KG	1700	47%	4184.235	BENTHIC-CHRONIC	0	27	58	1200	UJ	120	UJ	110	UJ	110	J
Benzo(a)anthracene	UG/KG	5900	84%	50.8365	NYDEC HHB	26	49	58	1200	UJ	16	J	6.2	J	260	J
Benzo(a)pyrene	UG/KG	5100	84%	50.8365	NYDEC HHB	26	49	58	1200	UJ	17	J	13	J	260	J
Benzo(b)fluoranthene	UG/KG	4800	88%	50.8365	NYDEC HHB	35	51	58	1200	UJ	21	J	32	J	280	J
Benzo(ghi)perylene	UG/KG	3200	78%			0	45	58	1200	UJ	17	J	17	J	170	J
Benzo(k)fluoranthene	UG/KG	5700	43%	50.8365	NYDEC HHB	20	25	58	1200	UJ	18	J	110	UR	330	J
Bis(2-Chloroethoxy)methane	UG/KG	0	0%			0	0	58	1200	UJ	120	UJ	110	UJ	520	UJ
Bis(2-Chloroethyl)ether	UG/KG	0	0%			0	0	58	1200	UJ	120	UJ	110	UJ	520	UJ
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%			0	0	49			120	UJ	110	UJ	520	UJ
Bis(2-Ethylhexyl)phthalate	UG/KG	42000	40%	7801.4475	BENTHIC-CHRONIC	1	23	58	1200	UJ	12	J	30	J	3600	J
Butylbenzylphthalate	UG/KG	16	9%			0	5	58	1200	UJ	120	UJ	110	UJ	520	UJ
Carbazole	UG/KG	500	40%			0	23	58	1200	UJ	120	UJ	110	UJ	520	UJ
Chrysene	UG/KG	6200	90%	50.8365	NYDEC HHB	34	52	58	1200	UJ	21	J	16	J	330	J
Di-n-butylphthalate	UG/KG	250	47%			0	27	58	1200	UJ	120	UJ	7.2	J	130	J
Di-n-octylphthalate	UG/KG	46	5%			0	3	58	1200	UJ	120	UJ	110	UJ	520	UJ
Dibenz(a,h)anthracene	UG/KG	1200	50%			0	29	58	1200	UJ	120	UJ	110	UJ	45	J
Dibenzofuran	UG/KG	230	17%			0	10	58	1200	UJ	120	UJ	110	UJ	39	J
Diethyl phthalate	UG/KG	17	3%			0	2	58	1200	UJ	120	UJ	110	UJ	520	UJ
Dimethylphthalate	UG/KG	0	0%			0	0	58	1200	UJ	120	UJ	110	UJ	520	UJ

Senec[illegible] Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4		SEAD-4	
									SD4-1		SD4-10		SD4-11		SD4-12	
									SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
									SD4-1		41001		41002		41004	
									0		0		0		0	
									0.5		0.2		0.2		0.2	
									11/2/1993		12/6/1998		12/6/1998		12/6/1998	
									SA		SA		SA		DU	
									ESI		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
ANALYTE	UNIT	MAX	FREQUENCY	NYS CRITERIA (1)	SPECIFIC CRITERIA (2)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	Value	Q	Value	Q	Value	Q	Value	Q
Fluoranthene	UG/KG	16000	93%	39887.1	BENTHIC-CHRONIC	0	54	58	1200	UJ	37	J	23	J	620	J
Fluorene	UG/KG	660	22%	312.84	BENTHIC-CHRONIC	1	13	58	1200	UJ	120	UJ	110	UJ	29	J
Hexachlorobenzene	UG/KG	840	3%	5.86575	NYDEC HHB	2	2	58	1200	UJ	120	UJ	110	UJ	520	UJ
Hexachlorobutadiene	UG/KG	0	0%			0	0	58	1200	UJ	120	UJ	110	UJ	520	UJ
Hexachlorocyclopentadiene	UG/KG	0	0%			0	0	58	1200	UJ	120	UJ	110	UJ	520	UJ
Hexachloroethane	UG/KG	0	0%			0	0	58	1200	UJ	120	UJ	110	UJ	520	UJ
Indeno(1,2,3-cd)pyrene	UG/KG	3100	74%	50.8365	NYDEC HHB	21	43	58	1200	UJ	16	J	16	UJ	170	J
Isophorone	UG/KG	0	0%			0	0	58	1200	UJ	120	UJ	110	UJ	520	UJ
N-Nitrosodiphenylamine	UG/KG	760	2%			0	1	58	1200	UJ	120	UJ	110	UJ	520	UJ
N-Nitrosodipropylamine	UG/KG	410	2%			0	1	58	1200	UJ	120	UJ	110	UJ	520	UJ
Naphthalene	UG/KG	13	12%	1173.15	BENTHIC-CHRONIC	0	7	58	1200	UJ	120	UJ	110	UJ	520	UJ
Nitrobenzene	UG/KG	0	0%			0	0	58	1200	UJ	120	UJ	110	UJ	520	UJ
Pentachlorophenol	UG/KG	0	0%	1564.2	BENTHIC-CHRONIC	0	0	58	2800	UJ	280	UJ	260	UJ	1300	UJ
Phenanthrene	UG/KG	7900	88%	4692.6	BENTHIC-CHRONIC	1	51	58	1200	UJ	21	J	11	J	370	J
Phenol	UG/KG	210	7%	19.5525	BENTHIC-CHRONIC	4	4	58	1200	UJ	120	UJ	110	UJ	520	UJ
Pyrene	UG/KG	12000	93%	37579.905	BENTHIC-CHRONIC	0	54	58	1200	UJ	27	J	15	J	530	J
1,3,5-Trinitrobenzene	UG/KG	0	0%			0	0	58	130	UJ	120	U	120	U	120	UJ
1,3-Dinitrobenzene	UG/KG	0	0%			0	0	58	130	UJ	120	U	120	U	120	UJ
2,4,6-Trinitrotoluene	UG/KG	0	0%			0	0	58	130	UJ	120	U	120	U	120	UJ
2,4-Dinitrotoluene	UG/KG	0	0%			0	0	58	130	UJ	120	U	120	U	120	UJ
2,6-Dinitrotoluene	UG/KG	0	0%			0	0	58	130	UJ	120	U	120	U	120	UJ
2-Nitrotoluene	UG/KG	450	2%			0	1	49			120	U	120	U	120	U
2-amino-4,6-Dinitrotoluene	UG/KG	200	2%			0	1	58	130	UJ	120	U	120	U	120	UJ
3-Nitrotoluene	UG/KG	0	0%			0	0	49			120	U	120	U	120	U
4-Nitrotoluene	UG/KG	0	0%			0	0	49			120	U	120	U	120	U
4-amino-2,6-Dinitrotoluene	UG/KG	140	2%			0	1	58	130	UJ	120	U	120	U	120	UJ
HMX	UG/KG	0	0%			0	0	58	130	UJ	120	U	120	U	120	UJ
Nitrobenzene	UG/KG	0	0%			0	0	49			120	U	120	U	120	U
RDX	UG/KG	0	0%			0	0	58	130	UJ	120	U	120	U	120	UJ
Tetryl	UG/KG	0	0%			0	0	58	130	UJ	120	U	120	U	120	UJ
4,4'-DDD	UG/KG	90	22%	0.39105	NYDEC HHB	13	13	58	12	UJ	5.6	U	5.3	U	49	J
4,4'-DDE	UG/KG	86	33%	0.39105	NYDEC HHB	19	19	58	12	UJ	5.6	U	3.7	J	44	J
4,4'-DDT	UG/KG	45	28%	0.39105	NYDEC HHB	16	16	58	12	UJ	5.6	U	5.3	U	39	J
Aldrin	UG/KG	2.8	5%	3.9105	NYDEC HHB	0	3	58	6.1	UJ	2.9	U	2.7	U	9.4	UJ
Alpha-BHC	UG/KG	0	0%			0	0	58	6.1	UJ	2.9	U	2.7	U	9.4	UJ
Alpha-Chlordane	UG/KG	44	14%	0.039105	NYDEC HHB	8	8	58	6.1	UJ	2.9	U	2.7	U	27	J
Aroclor-1016	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	120	UJ	56	U	53	U	180	UJ
Aroclor-1221	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	240	UJ	110	U	110	U	370	UJ
Aroclor-1232	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	120	UJ	56	U	53	U	180	UJ
Aroclor-1242	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	120	UJ	56	U	53	U	180	UJ
Aroclor-1248	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	120	UJ	56	U	53	U	180	UJ

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4		SEAD-4	
									SD4-1		SD4-10		SD4-11		SD4-12	
									SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
									SD4-1		41001		41002		41004	
									0		0		0		0	
									0.5		0.2		0.2		0.2	
									11/2/1993		12/6/1998		12/6/1998		12/6/1998	
									SA		SA		SA		DU	
									ESI		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
ANALYTE	UNIT	MAX	FREQUENCY	NYS CRITERIA (1)	SPECIFIC CRITERIA (2)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	Value	Q	Value	Q	Value	Q	Value	Q
Aroclor-1254	UG/KG	580	45%	0.031284	NYDEC HHB	26	26	58	120	UJ	56	U	39	J	410	J
Aroclor-1260	UG/KG	250	16%	0.031284	NYDEC HHB	9	9	58	120	UJ	56	U	53	U	180	J
Beta-BHC	UG/KG	3.3	7%			0	4	58	6.1	UJ	2.9	U	2.7	U	9.4	UJ
Delta-BHC	UG/KG	0	0%			0	0	58	6.1	UJ	2.9	U	2.7	U	9.4	UJ
Dieldrin	UG/KG	18	7%	3.9105	NYDEC HHB	4	4	58	12	UJ	5.6	U	5.3	U	16	J
Endosulfan I	UG/KG	1.9	2%	1.17315	BENTHIC-CHRONIC	1	1	58	6.1	UJ	2.9	U	2.7	U	9.4	UJ
Endosulfan II	UG/KG	6.8	3%	1.17315	BENTHIC-CHRONIC	2	2	58	12	UJ	5.6	U	5.3	U	18	UJ
Endosulfan sulfate	UG/KG	12	9%			0	5	58	12	UJ	5.6	U	5.3	U	18	UJ
Endrin	UG/KG	0	0%	31.284	NYDEC W/H	0	0	58	12	UJ	5.6	U	5.3	U	18	UJ
Endrin aldehyde	UG/KG	15	12%			0	7	58	12	UJ	5.6	U	5.3	U	18	UJ
Endrin ketone	UG/KG	62	7%			0	4	58	12	UJ	5.6	U	5.3	U	18	UJ
Gamma-BHC/Lindane	UG/KG	0	0%			0	0	58	6.1	UJ	2.9	U	2.7	U	9.4	UJ
Gamma-Chlordane	UG/KG	40	17%	0.039105	NYDEC HHB	10	10	58	6.1	UJ	2.9	U	2.7	U	27	J
Heptachlor	UG/KG	2.4	2%	0.031284	NYDEC HHB	1	1	58	6.1	UJ	2.9	U	2.7	U	9.4	UJ
Heptachlor epoxide	UG/KG	10	10%	0.031284	NYDEC HHB	6	6	58	6.1	UJ	2.9	U	2.7	U	7.2	J
Methoxychlor	UG/KG	68	3%			0	2	58	61	UJ	29	U	27	U	94	UJ
Toxaphene	UG/KG	0	0%			0	0	58	610	UJ	290	U	270	U	940	UJ
2,4,5-T	UG/KG	21	11%			0	1	9	21	J						
2,4,5-TP/Silvex	UG/KG	0	0%			0	0	9	18	UJ						
2,4-D	UG/KG	0	0%			0	0	9	180	UJ						
2,4-DB	UG/KG	0	0%			0	0	9	180	UJ						
Dalapon	UG/KG	0	0%			0	0	9	430	UJ						
Dicamba	UG/KG	0	0%			0	0	9	18	UJ						
Dichloroprop	UG/KG	0	0%			0	0	9	180	UJ						
Dinoseb	UG/KG	0	0%			0	0	9	89	UJ						
MCPA	UG/KG	0	0%			0	0	9	18000	UJ						
MCPP	UG/KG	0	0%			0	0	9	18000	UJ						
Aluminum	MG/KG	22100	100%			0	58	58	17500	J	13200	J	9890	J	20600	J
Antimony	MG/KG	82.7	53%	2	NYS LEL	20	31	58	24.5	UJ	0.99	UR	1.4	J	27.1	J
Arsenic	MG/KG	37.7	98%	6	NYS LEL	19	57	58	[illegible]	J	4.2		3.4		11.5	J
Barium	MG/KG	488	100%			0	58	58	102	J	80.5	J	97.6	J	194	J
Beryllium	MG/KG	1.1	100%			0	58	58	0.58	J	0.67	J	0.54	J	0.96	J
Cadmium	MG/KG	34.1	47%	0.6	NYS LEL	24	27	58	1.5	UJ	0.16	U	1.8		16.4	J
Calcium	MG/KG	140000	100%			0	58	58	68100	J	4790		30900		43200	J
Chromium	MG/KG	4800	100%	26	NYS LEL	28	58	58	[illegible]	J	20.3	J	19.5	J	64.8	J
Cobalt	MG/KG	28.4	100%			0	58	58	14.1	J	11	J	13.6		25.3	J
Copper	MG/KG	2640	100%	16	NYS LEL	55	58	58	[illegible]	J	21.1	J	24.3	J	152	J
Cyanide	MG/KG	0	0%			0	0	58	1.6	UJ	0.99	U	0.79	U	3.1	UJ
Iron	MG/KG	87900	100%	20000	NYS LEL	45	58	58	[illegible]	J	[illegible]	J	20600	J	46500	J
Lead	MG/KG	374	95%	31	NYS LEL	35	55	58	13.5	J	24.5		[illegible]		368	J
Magnesium	MG/KG	27900	100%			0	58	58	7630	J	4800	J	4490	J	8990	J

									SEAD-4		SEAD-4		SEAD-4		SEAD-4	
									SD4-1		SD4-10		SD4-11		SD4-12	
									SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
									SD4-1		41001		41002		41004	
									0		0		0		0	
									0.5		0.2		0.2		0.2	
									11/2/1993		12/6/1998		12/6/1998		12/6/1998	
									SA		SA		SA		DU	
						NUMBER	NUMBER	NUMBER	ESI		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF								
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q	Value	Q
Manganese	MG/KG	5480	100%	460	NYS LEL	28	58	58	569	J	535		1120		775	J
Mercury	MG/KG	2.4	59%	0.15	NYS LEL	16	34	58	0.07	J	0.08	UJ	0.08	J	0.64	J
Nickel	MG/KG	453	100%	16	NYS LEL	58	58	58	[illegible]	J	30.8		32.9		66.8	J
Potassium	MG/KG	3460	100%			0	58	58	2760	J	1490	J	1260	J	2340	J
Selenium	MG/KG	6.1	41%			0	24	58	0.64	UJ	1.2	U	0.96	U	1.9	UJ
Silver	MG/KG	1.7	45%	1	NYS LEL	4	26	58	3.1	UJ	0.32	U	0.27	U	1.1	J
Sodium	MG/KG	1370	64%			0	37	58	207	J	89.8	J	118	J	378	J
Thallium	MG/KG	0	0%			0	0	58	0.7	UJ	1.2	U	0.96	U	3.4	UJ
Vanadium	MG/KG	1140	100%			0	58	58	28.2	J	25.2	J	17.3	J	40.3	J
Zinc	MG/KG	1150	100%	120	NYS LEL	41	58	58	180	J	101		113		685	J

Notes

(1) Criteria calculated using a TOC of 3.91%. This is a site wide TOC value.

(2) NYSDEC HHB = NYS HUMAN HEALTH BIOACCUMULATION CRITERIA
BENTHIC-CHRONIC = NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITERIA
NYDEC W/H = NYS WILD/HUMAN BIOACCUM CRITERIA
NYS LEL = NYS LOWEST EFFECT LEVEL

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-12		SD4-13		SD4-14	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41003		41005		41006	
									0		0		0	
									0.2		0.2		0.2	
									12/7/1998		12/6/1998		12/6/1998	
									SA		SA		SA	
						NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
ANALYTE	UNIT	MAX	FREQUENCY	NYS CRITERIA (1)	SPECIFIC CRITERIA (2)				Value	Q	Value	Q	Value	Q
1,1,1-Trichloroethane	UG/KG	0	0%			0	0	58	56	UJ	30	UJ	23	UJ
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	11.7315	NYDEC HHB	0	0	58	56	UJ	30	UJ	23	UJ
1,1,2-Trichloroethane	UG/KG	0	0%			0	0	58	56	UJ	30	UJ	23	UJ
1,1-Dichloroethane	UG/KG	0	0%			0	0	58	56	UJ	30	UJ	23	UJ
1,1-Dichloroethene	UG/KG	0	0%	0.7821	NYDEC HHB	0	0	58	56	UJ	30	UJ	23	UJ
1,2-Dichloroethane	UG/KG	0	0%	27.3735	NYDEC HHB	0	0	58	56	UJ	30	UJ	23	UJ
1,2-Dichloroethene (total)	UG/KG	0	0%			0	0	58	56	UJ	30	UJ	23	UJ
1,2-Dichloropropane	UG/KG	0	0%			0	0	58	56	UJ	30	UJ	23	UJ
Acetone	UG/KG	210	26%			0	15	58	120	J	17	J	23	UJ
Benzene	UG/KG	0	0%	23.463	NYDEC HHB	0	0	58	56	UJ	30	UJ	23	UJ
Bromodichloromethane	UG/KG	0	0%			0	0	58	56	UJ	30	UJ	23	UJ
Bromoform	UG/KG	0	0%			0	0	58	56	UJ	30	UJ	23	UJ
Carbon disulfide	UG/KG	18	9%			0	5	58	17	J	30	UJ	23	UJ
Carbon tetrachloride	UG/KG	0	0%	23.463	NYDEC HHB	0	0	58	56	UJ	30	UJ	23	UJ
Chlorobenzene	UG/KG	0	0%	136.8675	BENTHIC-CHRONIC	0	0	58	56	UJ	30	UJ	23	UJ
Chlorodibromomethane	UG/KG	0	0%			0	0	58	56	UJ	30	UJ	23	UJ
Chloroethane	UG/KG	0	0%			0	0	58	56	UJ	30	UJ	23	UJ
Chloroform	UG/KG	14	3%			0	2	58	56	UJ	30	UJ	23	UJ
Cis-1,3-Dichloropropene	UG/KG	0	0%			0	0	58	56	UJ	30	UJ	23	UJ
Ethyl benzene	UG/KG	0	0%	938.52	BENTHIC-CHRONIC	0	0	58	56	UJ	30	UJ	23	UJ
Methyl bromide	UG/KG	0	0%			0	0	58	56	UJ	30	UJ	23	UJ
Methyl butyl ketone	UG/KG	0	0%			0	0	58	56	UJ	30	UJ	23	UJ
Methyl chloride	UG/KG	5	2%			0	1	58	56	UJ	30	UJ	23	UJ
Methyl ethyl ketone	UG/KG	49	2%			0	1	58	56	UJ	30	UJ	23	UJ
Methyl isobutyl ketone	UG/KG	0	0%			0	0	58	56	UJ	30	UJ	23	UJ
Methylene chloride	UG/KG	11	5%			0	3	58	56	UJ	30	UJ	23	UJ
Styrene	UG/KG	3	3%			0	2	58	56	UJ	30	UJ	23	UJ
Tetrachloroethene	UG/KG	0	0%	31.284	NYDEC HHB	0	0	58	56	UJ	30	UJ	23	UJ
Toluene	UG/KG	42	9%	1916.145	BENTHIC-CHRONIC	0	5	58	42	J	30	UJ	23	UJ
Total Xylenes	UG/KG	7	3%	3597.66	BENTHIC-CHRONIC	0	2	58	56	UJ	30	UJ	23	UJ
Trans-1,3-Dichloropropene	UG/KG	0	0%			0	0	58	56	UJ	30	UJ	23	UJ
Trichloroethene	UG/KG	0	0%	78.21	NYDEC HHB	0	0	58	56	UJ	30	UJ	23	UJ
Vinyl chloride	UG/KG	0	0%	2.73735	NYDEC HHB	0	0	58	56	UJ	30	UJ	23	UJ
1,2,4-Trichlorobenzene	UG/KG	0	0%			0	0	58	690	UJ	310	UJ	150	UJ
1,2-Dichlorobenzene	UG/KG	0	0%	4692.6	BENTHIC-CHRONIC	0	0	58	690	UJ	310	UJ	150	UJ
1,3-Dichlorobenzene	UG/KG	0	0%	469.26	BENTHIC-CHRONIC	0	0	58	690	UJ	310	UJ	150	UJ
1,4-Dichlorobenzene	UG/KG	73	2%	469.26	BENTHIC-CHRONIC	0	1	58	690	UJ	310	UJ	150	UJ
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%			0	0	9						
2,4,5-Trichlorophenol	UG/KG	0	0%			0	0	58	1700	UJ	760	UJ	370	UJ
2,4,6-Trichlorophenol	UG/KG	0	0%			0	0	58	690	UJ	310	UJ	150	UJ
2,4-Dichlorophenol	UG/KG	0	0%			0	0	58	690	UJ	310	UJ	150	UJ

Seneca [illegible] Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-12		SD4-13		SD4-14	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41003		41005		41006	
									0		0		0	
									0.2		0.2		0.2	
									12/7/1998		12/6/1998		12/6/1998	
									SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF						
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
2,4-Dimethylphenol	UG/KG	0	0%	19.5525	BENTHIC-CHRONIC	0	0	58	690	UJ	310	UJ	150	UJ
2,4-Dinitrophenol	UG/KG	0	0%			0	0	58	1700	UJ	760	UJ	370	UJ
2,4-Dinitrotoluene	UG/KG	0	0%			0	0	58	690	UJ	310	UJ	150	UJ
2,6-Dinitrotoluene	UG/KG	0	0%			0	0	58	690	UJ	310	UJ	150	UJ
2-Chloronaphthalene	UG/KG	0	0%			0	0	58	690	UJ	310	UJ	150	UJ
2-Chlorophenol	UG/KG	0	0%			0	0	58	690	UJ	310	UJ	150	UJ
2-Methylnaphthalene	UG/KG	31	9%	1329.57	BENTHIC-CHRONIC	0	5	58	690	UJ	310	UJ	150	UJ
2-Methylphenol	UG/KG	0	0%			0	0	58	690	UJ	310	UJ	150	UJ
2-Nitroaniline	UG/KG	0	0%			0	0	58	1700	UJ	760	UJ	370	UJ
2-Nitrophenol	UG/KG	0	0%	19.5525	BENTHIC-CHRONIC	0	0	58	690	UJ	310	UJ	150	UJ
3,3'-Dichlorobenzidine	UG/KG	0	0%			0	0	58	690	UJ	310	UJ	150	UJ
3-Nitroaniline	UG/KG	0	0%			0	0	58	1700	UJ	760	UJ	370	UJ
4,6-Dinitro-2-methylphenol	UG/KG	0	0%			0	0	58	1700	UJ	760	UJ	370	UJ
4-Bromophenyl phenyl ether	UG/KG	0	0%			0	0	58	690	UJ	310	UJ	150	UJ
4-Chloro-3-methylphenol	UG/KG	0	0%			0	0	58	690	UJ	310	UJ	150	UJ
4-Chloroaniline	UG/KG	0	0%			0	0	58	690	UJ	310	UJ	150	UJ
4-Chlorophenyl phenyl ether	UG/KG	0	0%			0	0	58	690	UJ	310	UJ	150	UJ
4-Methylphenol	UG/KG	140	10%	19.5525	BENTHIC-CHRONIC	2	6	58	690	UJ	310	UJ	150	UJ
4-Nitroaniline	UG/KG	0	0%			0	0	58	1700	UJ	760	UJ	370	UJ
4-Nitrophenol	UG/KG	0	0%			0	0	58	1700	UJ	760	UJ	370	UJ
Acenaphthene	UG/KG	610	19%	5474.7	BENTHIC-CHRONIC	0	11	58	55	J	310	UJ	150	UJ
Acenaphthylene	UG/KG	130	17%			0	10	58	690	UJ	310	UJ	150	UJ
Anthracene	UG/KG	1700	47%	4184.235	BENTHIC-CHRONIC	0	27	58	160	J	16	J	11	J
Benzo(a)anthracene	UG/KG	5900	84%	50.8365	NYDEC HHB	26	49	58	[illegible]	J	47	J	63	J
Benzo(a)pyrene	UG/KG	5100	84%	50.8365	NYDEC HHB	26	49	58	[illegible]	J	62	J	72	J
Benzo(b)fluoranthene	UG/KG	4800	88%	50.8365	NYDEC HHB	35	51	58	[illegible]	J	93	J	200	J
Benzo(ghi)perylene	UG/KG	3200	78%			0	45	58	200	J	48	J	63	J
Benzo(k)fluoranthene	UG/KG	5700	43%	50.8365	NYDEC HHB	20	25	58	[illegible]	J	72	J	150	UR
Bis(2-Chloroethoxy)methane	UG/KG	0	0%			0	0	58	690	UJ	310	UJ	150	UJ
Bis(2-Chloroethyl)ether	UG/KG	0	0%			0	0	58	690	UJ	310	UJ	150	UJ
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%			0	0	49	690	UJ	310	UJ	150	UJ
Bis(2-Ethylhexyl)phthalate	UG/KG	42000	40%	7801.4475	BENTHIC-CHRONIC	1	23	58	3900	J	310	UJ	170	J
Butylbenzylphthalate	UG/KG	16	9%			0	5	58	690	UJ	310	UJ	150	UJ
Carbazole	UG/KG	500	40%			0	23	58	690	UJ	310	UJ	13	J
Chrysene	UG/KG	6200	90%	50.8365	NYDEC HHB	34	52	58	[illegible]	J	84	J	100	J
Di-n-butylphthalate	UG/KG	250	47%			0	27	58	120	J	39	J	21	J
Di-n-octylphthalate	UG/KG	46	5%			0	3	58	690	UJ	310	UJ	150	UJ
Dibenz(a,h)anthracene	UG/KG	1200	50%			0	29	58	120	J	310	UJ	23	J
Dibenzofuran	UG/KG	230	17%			0	10	58	59	J	310	UJ	150	UJ
Diethyl phthalate	UG/KG	17	3%			0	2	58	690	UJ	310	UJ	150	UJ
Dimethylphthalate	UG/KG	0	0%			0	0	58	690	UJ	310	UJ	150	UJ

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-12		SD4-13		SD4-14	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41003		41005		41006	
									0		0		0	
									0.2		0.2		0.2	
									12/7/1998		12/6/1998		12/6/1998	
									SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF						
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
Fluoranthene	UG/KG	16000	93%	39887.1	BENTHIC-CHRONIC	0	54	58	840	J	130	J	160	J
Fluorene	UG/KG	660	22%	312.84	BENTHIC-CHRONIC	1	13	58	81	J	310	UJ	150	UJ
Hexachlorobenzene	UG/KG	840	3%	5.86575	NYDEC HHB	2	2	58	690	UJ	310	UJ	150	UJ
Hexachlorobutadiene	UG/KG	0	0%			0	0	58	690	UJ	310	UJ	150	UJ
Hexachlorocyclopentadiene	UG/KG	0	0%			0	0	58	690	UJ	310	UJ	150	UJ
Hexachloroethane	UG/KG	0	0%			0	0	58	690	UJ	310	UJ	150	UJ
Indeno(1,2,3-cd)pyrene	UG/KG	3100	74%	50.8365	NYDEC HHB	21	43	58	[illegible]	J	45	J	58	J
Isophorone	UG/KG	0	0%			0	0	58	690	UJ	310	UJ	150	UJ
N-Nitrosodiphenylamine	UG/KG	760	2%			0	1	58	690	UJ	310	UJ	150	UJ
N-Nitrosodipropylamine	UG/KG	410	2%			0	1	58	690	UJ	310	UJ	150	UJ
Naphthalene	UG/KG	13	12%	1173.15	BENTHIC-CHRONIC	0	7	58	690	UJ	310	UJ	150	UJ
Nitrobenzene	UG/KG	0	0%			0	0	58	690	UJ	310	UJ	150	UJ
Pentachlorophenol	UG/KG	0	0%	1564.2	BENTHIC-CHRONIC	0	0	58	1700	UJ	760	UJ	370	UJ
Phenanthrene	UG/KG	7900	88%	4692.6	BENTHIC-CHRONIC	1	51	58	660	J	86	J	82	J
Phenol	UG/KG	210	7%	19.5525	BENTHIC-CHRONIC	4	4	58	690	UJ	310	UJ	150	UJ
Pyrene	UG/KG	12000	93%	37579.905	BENTHIC-CHRONIC	0	54	58	700	J	97	J	110	J
1,3,5-Trinitrobenzene	UG/KG	0	0%			0	0	58	120	UJ	120	UJ	120	UJ
1,3-Dinitrobenzene	UG/KG	0	0%			0	0	58	120	UJ	120	UJ	120	UJ
2,4,6-Trinitrotoluene	UG/KG	0	0%			0	0	58	120	UJ	120	UJ	120	UJ
2,4-Dinitrotoluene	UG/KG	0	0%			0	0	58	120	UJ	120	UJ	120	UJ
2,6-Dinitrotoluene	UG/KG	0	0%			0	0	58	120	UJ	120	UJ	120	UJ
2-Nitrotoluene	UG/KG	450	2%			0	1	49	120	U	120	U	120	U
2-amino-4,6-Dinitrotoluene	UG/KG	200	2%			0	1	58	120	UJ	120	UJ	120	UJ
3-Nitrotoluene	UG/KG	0	0%			0	0	49	120	U	120	U	120	U
4-Nitrotoluene	UG/KG	0	0%			0	0	49	120	U	120	U	120	U
4-amino-2,6-Dinitrotoluene	UG/KG	140	2%			0	1	58	120	UJ	120	UJ	120	UJ
HMX	UG/KG	0	0%			0	0	58	120	UJ	120	UJ	120	UJ
Nitrobenzene	UG/KG	0	0%			0	0	49	120	U	120	U	120	U
RDX	UG/KG	0	0%			0	0	58	120	UJ	120	UJ	120	UJ
Tetryl	UG/KG	0	0%			0	0	58	120	UJ	120	UJ	120	UJ
4,4'-DDD	UG/KG	90	22%	0.39105	NYDEC HHB	13	13	58	[illegible]	J	16	J	7.7	UJ
4,4'-DDE	UG/KG	86	33%	0.39105	NYDEC HHB	19	19	58	[illegible]	J	14	J	6.7	J
4,4'-DDT	UG/KG	45	28%	0.39105	NYDEC HHB	16	16	58	[illegible]	J	25	J	7.7	UJ
Aldrin	UG/KG	2.8	5%	3.9105	NYDEC HHB	0	3	58	7.1	UJ	8.1	UJ	4	UJ
Alpha-BHC	UG/KG	0	0%			0	0	58	7.1	UJ	8.1	UJ	4	UJ
Alpha-Chlordane	UG/KG	44	14%	0.039105	NYDEC HHB	8	8	58	[illegible]	J	44	J	21	J
Aroclor-1016	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	140	UJ	160	UJ	77	UJ
Aroclor-1221	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	280	UJ	320	UJ	160	UJ
Aroclor-1232	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	140	UJ	160	UJ	77	UJ
Aroclor-1242	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	140	UJ	160	UJ	77	UJ
Aroclor-1248	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	140	UJ	160	UJ	77	UJ

Seneca A Jepot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-12		SD4-13		SD4-14	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41003		41005		41006	
									0		0		0	
									0.2		0.2		0.2	
									12/7/1998		12/6/1998		12/6/1998	
									SA		SA		SA	
						NUMBER ABOVE	NUMBER OF	NUMBER OF	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
ANALYTE	UNIT	MAX	FREQUENCY	NYS CRITERIA (1)	SPECIFIC CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
Aroclor-1254	UG/KG	580	45%	0.031284	NYDEC HHB	26	26	58	[illegible]	J	210	J	150	J
Aroclor-1260	UG/KG	250	16%	0.031284	NYDEC HHB	9	9	58	[illegible]	J	110	J	58	J
Beta-BHC	UG/KG	3.3	7%			0	4	58	7.1	UJ	8.1	UJ	4	UJ
Delta-BHC	UG/KG	0	0%			0	0	58	7.1	UJ	8.1	UJ	4	UJ
Dieldrin	UG/KG	18	7%	3.9105	NYDEC HHB	4	4	58	[illegible]	J	16	UJ	7.7	UJ
Endosulfan I	UG/KG	1.9	2%	1.17315	BENTHIC-CHRONIC	1	1	58	7.1	UJ	8.1	UJ	4	UJ
Endosulfan II	UG/KG	6.8	3%	1.17315	BENTHIC-CHRONIC	2	2	58	14	UJ	16	UJ	7.7	UJ
Endosulfan sulfate	UG/KG	12	9%			0	5	58	14	UJ	16	UJ	7.7	UJ
Endrin	UG/KG	0	0%	31.284	NYDEC W/H	0	0	58	14	U	16	UJ	7.7	UJ
Endrin aldehyde	UG/KG	15	12%			0	7	58	14	UJ	16	UJ	7.7	UJ
Endrin ketone	UG/KG	62	7%			0	4	58	14	UJ	16	UJ	7.7	UJ
Gamma-BHC/Lindane	UG/KG	0	0%			0	0	58	7.1	UJ	8.1	UJ	4	UJ
Gamma-Chlordane	UG/KG	40	17%	0.039105	NYDEC HHB	10	10	58	[illegible]	J	40	J	13	J
Heptachlor	UG/KG	2.4	2%	0.031284	NYDEC HHB	1	1	58	7.1	UJ	8.1	UJ	4	UJ
Heptachlor epoxide	UG/KG	10	10%	0.031284	NYDEC HHB	6	6	58	10	J	8.1	UJ	5.6	J
Methoxychlor	UG/KG	68	3%			0	2	58	71	UJ	81	UJ	40	UJ
Toxaphene	UG/KG	0	0%			0	0	58	710	UJ	810	UJ	400	UJ
2,4,5-T	UG/KG	21	11%			0	1	9						
2,4,5-TP/Silvex	UG/KG	0	0%			0	0	9						
2,4-D	UG/KG	0	0%			0	0	9						
2,4-DB	UG/KG	0	0%			0	0	9						
Dalapon	UG/KG	0	0%			0	0	9						
Dicamba	UG/KG	0	0%			0	0	9						
Dichloroprop	UG/KG	0	0%			0	0	9						
Dinoseb	UG/KG	0	0%			0	0	9						
MCPA	UG/KG	0	0%			0	0	9						
MCPP	UG/KG	0	0%			0	0	9						
Aluminum	MG/KG	22100	100%			0	58	58	8680	J	13400	J	12300	J
Antimony	MG/KG	82.7	53%	2	NYS LEL	20	31	58	[illegible]	J	6.1	J	2.8	J
Arsenic	MG/KG	37.7	98%	6	NYS LEL	19	57	58	2.5	J	2	UJ	12.3	J
Barium	MG/KG	488	100%			0	58	58	163	J	98.2	J	359	J
Beryllium	MG/KG	1.1	100%			0	58	58	0.46	J	0.59	J	0.66	J
Cadmium	MG/KG	34.1	47%	0.6	NYS LEL	24	27	58	[illegible]	J	7.6	J	7.7	J
Calcium	MG/KG	140000	100%			0	58	58	34300	J	7450	J	15600	J
Chromium	MG/KG	4800	100%	26	NYS LEL	28	58	58	[illegible]	J	36.5	J	27.7	J
Cobalt	MG/KG	28.4	100%			0	58	58	9.6	J	9.8	J	28.4	J
Copper	MG/KG	2640	100%	16	NYS LEL	55	58	58	[illegible]	J	121	J	82.4	J
Cyanide	MG/KG	0	0%			0	0	58	2	UJ	2.4	UJ	1.3	UJ
Iron	MG/KG	87900	100%	20000	NYS LEL	45	58	58	19200	J	18000	J	33900	J
Lead	MG/KG	374	95%	31	NYS LEL	35	55	58	[illegible]	J	193	J	134	J
Magnesium	MG/KG	27900	100%			0	58	58	3470	J	4940	J	4930	J

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-12		SD4-13		SD4-14	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41003		41005		41006	
									0		0		0	
									0.2		0.2		0.2	
									12/7/1998		12/6/1998		12/6/1998	
									SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF						
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
Manganese	MG/KG	5480	100%	460	NYS LEL	28	58	58	[illegible]	J	174	J	5480	J
Mercury	MG/KG	2.4	59%	0.15	NYS LEL	16	34	58	[illegible]	J	0.42	J	0.26	J
Nickel	MG/KG	453	100%	16	NYS LEL	58	58	58	[illegible]	J	[illegible]	J	47.6	J
Potassium	MG/KG	3460	100%			0	58	58	1500	J	2590	J	2640	J
Selenium	MG/KG	6.1	41%			0	24	58	1.5	UJ	2.7	J	4.5	J
Silver	MG/KG	1.7	45%	1	NYS LEL	4	26	58	[illegible]	J	0.88	UJ	0.8	J
Sodium	MG/KG	1370	64%			0	37	58	312	J	231	UJ	219	J
Thallium	MG/KG	0	0%			0	0	58	2.8	UJ	3.2	UJ	15.7	UJ
Vanadium	MG/KG	1140	100%			0	58	58	21	J	21.6	J	41.7	J
Zinc	MG/KG	1150	100%	120	NYS LEL	41	58	58	[illegible]	J	1150	J	410	J

Notes:

(1) Criteria calculated using a TOC of 3.91%. This is a site wide TOC value.

(2) NYSDEC HHB = NYS HUMAN HEALTH BIOACCUMULATION CRITERIA
BENTHIC-CHRONIC = NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITERIA
NYDEC W/H = NYS WILD/HUMAN BIOACCUM CRITERIA
NYS LEL = NYS LOWEST EFFECT LEVEL

Seneca A[illegible]epot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-15		SD4-16		SD4-17	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41007		41008		41009	
									0		0		0	
									0.2		0.2		0.2	
									12/6/1998		12/6/1998		12/6/1998	
									SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
ANALYTE	UNIT	MAX	FREQUENCY	NYS CRITERIA (1)	SPECIFIC CRITERIA (2)	ABOVE CRITERIA	OF DETECTS	OF ANALYSES	Value	Q	Value	Q	Value	Q
1,1,1-Trichloroethane	UG/KG	0	0%			0	0	58	12	U	14	U	21	U
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	11.7315	NYDEC HHB	0	0	58	12	U	14	UJ	21	UJ
1,1,2-Trichloroethane	UG/KG	0	0%			0	0	58	12	U	14	U	21	U
1,1-Dichloroethane	UG/KG	0	0%			0	0	58	12	U	14	U	21	U
1,1-Dichloroethene	UG/KG	0	0%	0.7821	NYDEC HHB	0	0	58	12	U	14	U	21	U
1,2-Dichloroethane	UG/KG	0	0%	27.3735	NYDEC HHB	0	0	58	12	U	14	U	21	U
1,2-Dichloroethene (total)	UG/KG	0	0%			0	0	58	12	U	14	U	21	U
1,2-Dichloropropane	UG/KG	0	0%			0	0	58	12	U	14	U	21	U
Acetone	UG/KG	210	26%			0	15	58	12	U	14	U	21	U
Benzene	UG/KG	0	0%	23.463	NYDEC HHB	0	0	58	12	U	14	U	21	U
Bromodichloromethane	UG/KG	0	0%			0	0	58	12	U	14	U	21	U
Bromoform	UG/KG	0	0%			0	0	58	12	U	14	UJ	21	UJ
Carbon disulfide	UG/KG	18	9%			0	5	58	12	U	14	U	21	U
Carbon tetrachloride	UG/KG	0	0%	23.463	NYDEC HHB	0	0	58	12	U	14	U	21	U
Chlorobenzene	UG/KG	0	0%	136.8675	BENTHIC-CHRONIC	0	0	58	12	U	14	UJ	21	UJ
Chlorodibromomethane	UG/KG	0	0%			0	0	58	12	U	14	U	21	U
Chloroethane	UG/KG	0	0%			0	0	58	12	U	14	U	21	U
Chloroform	UG/KG	14	3%			0	2	58	12	U	14	U	21	U
Cis-1,3-Dichloropropene	UG/KG	0	0%			0	0	58	12	U	14	U	21	U
Ethyl benzene	UG/KG	0	0%	938.52	BENTHIC-CHRONIC	0	0	58	12	U	14	UJ	21	UJ
Methyl bromide	UG/KG	0	0%			0	0	58	12	U	14	U	21	U
Methyl butyl ketone	UG/KG	0	0%			0	0	58	12	U	14	U	21	U
Methyl chloride	UG/KG	5	2%			0	1	58	12	U	14	U	21	U
Methyl ethyl ketone	UG/KG	49	2%			0	1	58	12	U	14	U	21	U
Methyl isobutyl ketone	UG/KG	0	0%			0	0	58	12	U	14	U	21	U
Methylene chloride	UG/KG	11	5%			0	3	58	12	U	14	U	21	U
Styrene	UG/KG	3	3%			0	2	58	12	U	14	UJ	21	UJ
Tetrachloroethene	UG/KG	0	0%	31.284	NYDEC HHB	0	0	58	12	U	14	U	21	U
Toluene	UG/KG	42	9%	1916.145	BENTHIC-CHRONIC	0	5	58	12	U	3	J	21	U
Total Xylenes	UG/KG	7	3%	3597.66	BENTHIC-CHRONIC	0	2	58	12	U	14	UJ	21	UJ
Trans-1,3-Dichloropropene	UG/KG	0	0%			0	0	58	12	U	14	U	21	U
Trichloroethene	UG/KG	0	0%	78.21	NYDEC HHB	0	0	58	12	U	14	U	21	U
Vinyl chloride	UG/KG	0	0%	2.73735	NYDEC HHB	0	0	58	12	U	14	U	21	U
1,2,4-Trichlorobenzene	UG/KG	0	0%			0	0	58	77	UJ	280	U	2400	U
1,2-Dichlorobenzene	UG/KG	0	0%	4692.6	BENTHIC-CHRONIC	0	0	58	77	UJ	280	U	2400	U
1,3-Dichlorobenzene	UG/KG	0	0%	469.26	BENTHIC-CHRONIC	0	0	58	77	UJ	280	U	2400	U
1,4-Dichlorobenzene	UG/KG	73	2%	469.26	BENTHIC-CHRONIC	0	1	58	77	UJ	280	U	2400	U
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%			0	0	9						
2,4,5-Trichlorophenol	UG/KG	0	0%			0	0	58	190	UJ	690	U	5700	U
2,4,6-Trichlorophenol	UG/KG	0	0%			0	0	58	77	UJ	280	U	2400	U
2,4-Dichlorophenol	UG/KG	0	0%			0	0	58	77	UJ	280	U	2400	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-15		SD4-16		SD4-17	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41007		41008		41009	
									0		0		0	
									0.2		0.2		0.2	
									12/6/1998		12/6/1998		12/6/1998	
									SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF						
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
2,4-Dimethylphenol	UG/KG	0	0%	19.5525	BENTHIC-CHRONIC	0	0	58	77	UJ	280	UJ	2400	UJ
2,4-Dinitrophenol	UG/KG	0	0%			0	0	58	190	UJ	690	UJ	5700	UJ
2,4-Dinitrotoluene	UG/KG	0	0%			0	0	58	77	UJ	280	U	2400	U
2,6-Dinitrotoluene	UG/KG	0	0%			0	0	58	77	UJ	280	U	2400	U
2-Chloronaphthalene	UG/KG	0	0%			0	0	58	77	UJ	280	U	2400	U
2-Chlorophenol	UG/KG	0	0%			0	0	58	77	UJ	280	U	2400	U
2-Methylnaphthalene	UG/KG	31	9%	1329.57	BENTHIC-CHRONIC	0	5	58	77	UJ	280	U	2400	U
2-Methylphenol	UG/KG	0	0%			0	0	58	77	UJ	280	U	2400	U
2-Nitroaniline	UG/KG	0	0%			0	0	58	190	UJ	690	U	5700	U
2-Nitrophenol	UG/KG	0	0%	19.5525	BENTHIC-CHRONIC	0	0	58	77	UJ	280	U	2400	U
3,3'-Dichlorobenzidine	UG/KG	0	0%			0	0	58	77	UJ	280	U	2400	U
3-Nitroaniline	UG/KG	0	0%			0	0	58	190	UJ	690	U	5700	U
4,6-Dinitro-2-methylphenol	UG/KG	0	0%			0	0	58	190	UJ	690	U	5700	U
4-Bromophenyl phenyl ether	UG/KG	0	0%			0	0	58	77	UJ	280	U	2400	U
4-Chloro-3-methylphenol	UG/KG	0	0%			0	0	58	77	UJ	280	U	2400	U
4-Chloroaniline	UG/KG	0	0%			0	0	58	77	UJ	280	U	2400	U
4-Chlorophenyl phenyl ether	UG/KG	0	0%			0	0	58	77	UJ	280	U	2400	U
4-Methylphenol	UG/KG	140	10%	19.5525	BENTHIC-CHRONIC	2	6	58	77	UJ	280	U	2400	U
4-Nitroaniline	UG/KG	0	0%			0	0	58	190	UJ	690	U	5700	U
4-Nitrophenol	UG/KG	0	0%			0	0	58	190	UJ	690	U	5700	U
Acenaphthene	UG/KG	610	19%	5474.7	BENTHIC-CHRONIC	0	11	58	77	UJ	46	J	610	J
Acenaphthylene	UG/KG	130	17%			0	10	58	77	UJ	25	J	2400	U
Anthracene	UG/KG	1700	47%	4184.235	BENTHIC-CHRONIC	0	27	58	6.9	J	110	J	1700	J
Benzo(a)anthracene	UG/KG	5900	84%	50.8365	NYDEC HHB	26	49	58	[illegible]	J	790		5900	
Benzo(a)pyrene	UG/KG	5100	84%	50.8365	NYDEC HHB	26	49	58	[illegible]	J	830		5100	
Benzo(b)fluoranthene	UG/KG	4800	88%	50.8365	NYDEC HHB	35	51	58	[illegible]	J	1500		4800	
Benzo(ghi)perylene	UG/KG	3200	78%			0	45	58	39	J	460		3200	
Benzo(k)fluoranthene	UG/KG	5700	43%	50.8365	NYDEC HHB	20	25	58	[illegible]	J	280	U	5700	
Bis(2-Chloroethoxy)methane	UG/KG	0	0%			0	0	58	77	UJ	280	U	2400	U
Bis(2-Chloroethyl)ether	UG/KG	0	0%			0	0	58	77	UJ	280	U	2400	U
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%			0	0	49	77	UJ	280	U	2400	U
Bis(2-Ethylhexyl)phthalate	UG/KG	42000	40%	7801.4475	BENTHIC-CHRONIC	1	23	58	77	UJ	280	U	2400	U
Butylbenzylphthalate	UG/KG	16	9%			0	5	58	77	UJ	280	U	2400	U
Carbazole	UG/KG	500	40%			0	23	58	6	J	94	J	500	J
Chrysene	UG/KG	6200	90%	50.8365	NYDEC HHB	34	52	58	[illegible]	J	980		6200	
Di-n-butylphthalate	UG/KG	250	47%			0	27	58	77	UJ	280	U	2400	U
Di-n-octylphthalate	UG/KG	46	5%			0	3	58	77	UJ	280	U	2400	U
Dibenz(a,h)anthracene	UG/KG	1200	50%			0	29	58	20	J	250	J	1200	J
Dibenzofuran	UG/KG	230	17%			0	10	58	77	UJ	17	J	230	J
Diethyl phthalate	UG/KG	17	3%			0	2	58	77	UJ	280	U	2400	U
Dimethylphthalate	UG/KG	0	0%			0	0	58	77	UJ	280	U	2400	U

									SEAD-4		SEAD-4		SEAD-4	
									SD4-15		SD4-16		SD4-17	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41007		41008		41009	
									0		0		0	
									0.2		0.2		0.2	
									12/6/1998		12/6/1998		12/6/1998	
									SA		SA		SA	
ANALYTE	UNIT	MAX	FREQUENCY	NYS CRITERIA (1)	SPECIFIC CRITERIA (2)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	RI PHASE 1 STEP 1 Value	Q	RI PHASE 1 STEP 1 Value	Q	RI PHASE 1 STEP 1 Value	Q
Fluoranthene	UG/KG	16000	93%	39887.1	BENTHIC-CHRONIC	0	54	58	140	J	1700		16000	
Fluorene	UG/KG	660	22%	312.84	BENTHIC-CHRONIC	1	13	58	77	UJ	46	J	660	J
Hexachlorobenzene	UG/KG	840	3%	5.86575	NYDEC HHB	2	2	58	77	U	280	U	2400	U
Hexachlorobutadiene	UG/KG	0	0%			0	0	58	77	UJ	280	U	2400	U
Hexachlorocyclopentadiene	UG/KG	0	0%			0	0	58	77	UJ	280	U	2400	U
Hexachloroethane	UG/KG	0	0%			0	0	58	77	UJ	280	U	2400	U
Indeno(1,2,3-cd)pyrene	UG/KG	3100	74%	50.8365	NYDEC HHB	21	43	58	40	J	460		3100	
Isophorone	UG/KG	0	0%			0	0	58	77	UJ	280	U	2400	U
N-Nitrosodiphenylamine	UG/KG	760	2%			0	1	58	77	UJ	280	U	2400	U
N-Nitrosodipropylamine	UG/KG	410	2%			0	1	58	77	UJ	280	U	2400	U
Naphthalene	UG/KG	13	12%	1173.15	BENTHIC-CHRONIC	0	7	58	77	UJ	280	U	2400	U
Nitrobenzene	UG/KG	0	0%			0	0	58	77	UJ	280	U	2400	U
Pentachlorophenol	UG/KG	0	0%	1564.2	BENTHIC-CHRONIC	0	0	58	190	UJ	690	U	5700	U
Phenanthrene	UG/KG	7900	88%	4692.6	BENTHIC-CHRONIC	1	51	58	61	J	780		7900	
Phenol	UG/KG	210	7%	19.5525	BENTHIC-CHRONIC	4	4	58	77	UJ	280	U	2400	U
Pyrene	UG/KG	12000	93%	37579.905	BENTHIC-CHRONIC	0	54	58	100	J	1300		12000	
1,3,5-Trinitrobenzene	UG/KG	0	0%			0	0	58	120	U	120	U	120	U
1,3-Dinitrobenzene	UG/KG	0	0%			0	0	58	120	U	120	U	120	U
2,4,6-Trinitrotoluene	UG/KG	0	0%			0	0	58	120	U	120	U	120	U
2,4-Dinitrotoluene	UG/KG	0	0%			0	0	58	120	U	120	U	120	U
2,6-Dinitrotoluene	UG/KG	0	0%			0	0	58	120	U	120	U	120	U
2-Nitrotoluene	UG/KG	450	2%			0	1	49	120	U	120	U	450	J
2-amino-4,6-Dinitrotoluene	UG/KG	200	2%			0	1	58	120	U	120	U	120	U
3-Nitrotoluene	UG/KG	0	0%			0	0	49	120	U	120	U	120	U
4-Nitrotoluene	UG/KG	0	0%			0	0	49	120	U	120	U	120	U
4-amino-2,6-Dinitrotoluene	UG/KG	140	2%			0	1	58	120	U	120	U	120	U
HMX	UG/KG	0	0%			0	0	58	120	U	120	U	120	U
Nitrobenzene	UG/KG	0	0%			0	0	49	120	U	120	U	120	U
RDX	UG/KG	0	0%			0	0	58	120	U	120	U	120	U
Tetryl	UG/KG	0	0%			0	0	58	120	U	120	U	120	U
4,4'-DDD	UG/KG	90	22%	0.39105	NYDEC HHB	13	13	58	3.8	U	4.9	U	5.9	U
4,4'-DDE	UG/KG	86	33%	0.39105	NYDEC HHB	19	19	58	3.8	U	9	J	5.9	U
4,4'-DDT	UG/KG	45	28%	0.39105	NYDEC HHB	16	16	58	3.8	U	16	J	6.3	J
Aldrin	UG/KG	2.8	5%	3.9105	NYDEC HHB	0	3	58	2	U	2.8	J	2.3	J
Alpha-BHC	UG/KG	0	0%			0	0	58	2	U	2.5	U	3	U
Alpha-Chlordane	UG/KG	44	14%	0.039105	NYDEC HHB	8	8	58	2	U	2.5	U	3	U
Aroclor-1016	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	38	U	49	U	59	U
Aroclor-1221	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	78	U	100	U	120	U
Aroclor-1232	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	38	U	49	U	59	U
Aroclor-1242	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	38	U	49	U	59	U
Aroclor-1248	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	38	U	49	U	59	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-15		SD4-16		SD4-17	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41007		41008		41009	
									0		0		0	
									0.2		0.2		0.2	
									12/6/1998		12/6/1998		12/6/1998	
									SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF						
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
Aroclor-1254	UG/KG	580	45%	0.031284	NYDEC HHB	26	26	58	38	U	49	U	59	U
Aroclor-1260	UG/KG	250	16%	0.031284	NYDEC HHB	9	9	58	38	U	49	U	59	U
Beta-BHC	UG/KG	3.3	7%			0	4	58	2	U	2.5	U	2.1	J
Delta-BHC	UG/KG	0	0%			0	0	58	2	U	2.5	U	3	U
Dieldrin	UG/KG	18	7%	3.9105	NYDEC HHB	4	4	58	3.8	U	4.9	U	5.9	U
Endosulfan I	UG/KG	1.9	2%	1.17315	BENTHIC-CHRONIC	1	1	58	2	U	2.5	U	1.9	J
Endosulfan II	UG/KG	6.8	3%	1.17315	BENTHIC-CHRONIC	2	2	58	3.8	U	6.8	J	5.9	U
Endosulfan sulfate	UG/KG	12	9%			0	5	58	3.8	U	4.9	U	12	J
Endrin	UG/KG	0	0%	31.284	NYDEC W/H	0	0	58	3.8	U	4.9	U	5.9	U
Endrin aldehyde	UG/KG	15	12%			0	7	58	3.8	U	4.9	U	6.9	J
Endrin ketone	UG/KG	62	7%			0	4	58	3.8	U	4.9	U	29	
Gamma-BHC/Lindane	UG/KG	0	0%			0	0	58	2	U	2.5	U	3	U
Gamma-Chlordane	UG/KG	40	17%	0.039105	NYDEC HHB	10	10	58	2	U	2.5	U	12	
Heptachlor	UG/KG	2.4	2%	0.031284	NYDEC HHB	1	1	58	2	U	2.4	J	3	U
Heptachlor epoxide	UG/KG	10	10%	0.031284	NYDEC HHB	6	6	58	2	U	1.6	J	3	U
Methoxychlor	UG/KG	68	3%			0	2	58	20	U	25	U	68	J
Toxaphene	UG/KG	0	0%			0	0	58	200	U	250	U	300	U
2,4,5-T	UG/KG	21	11%			0	1	9						
2,4,5-TP/Silvex	UG/KG	0	0%			0	0	9						
2,4-D	UG/KG	0	0%			0	0	9						
2,4-DB	UG/KG	0	0%			0	0	9						
Dalapon	UG/KG	0	0%			0	0	9						
Dicamba	UG/KG	0	0%			0	0	9						
Dichloroprop	UG/KG	0	0%			0	0	9						
Dinoseb	UG/KG	0	0%			0	0	9						
MCPA	UG/KG	0	0%			0	0	9						
MCPP	UG/KG	0	0%			0	0	9						
Aluminum	MG/KG	22100	100%			0	58	58	8660		11000		13500	
Antimony	MG/KG	82.7	53%	2	NYS LEL	20	31	58	0.59	U	0.89	U	0.94	U
Arsenic	MG/KG	37.7	98%	6	NYS LEL	19	57	58	3.2		4.8		4.3	
Barium	MG/KG	488	100%			0	58	58	52.7		78.1		80.4	
Beryllium	MG/KG	1.1	100%			0	58	58	0.34	J	0.5	J	0.53	J
Cadmium	MG/KG	34.1	47%	0.6	NYS LEL	24	27	58	0.09	U	0.14	U	0.15	U
Calcium	MG/KG	140000	100%			0	58	58	16800		14700		9040	
Chromium	MG/KG	4800	100%	26	NYS LEL	28	58	58	12.5	J	13.2	J	19.3	J
Cobalt	MG/KG	28.4	100%			0	58	58	10.5		9.5	J	14.3	J
Copper	MG/KG	2640	100%	16	NYS LEL	55	58	58	11.2		24.3		33.6	
Cyanide	MG/KG	0	0%			0	0	58	0.59	UJ	0.89	UJ	1.1	UJ
Iron	MG/KG	87900	100%	20000	NYS LEL	45	58	58	17900	J	19400	J	27800	J
Lead	MG/KG	374	95%	31	NYS LEL	35	55	58	8.8		45.3		48.9	
Magnesium	MG/KG	27900	100%			0	58	58	3800		4760		5830	

Seneca A   epot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-15		SD4-16		SD4-17	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41007		41008		41009	
									0		0		0	
									0.2		0.2		0.2	
									12/6/1998		12/6/1998		12/6/1998	
									SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF						
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
Manganese	MG/KG	5480	100%	460	NYS LEL	28	58	58	[illegible]	J	756	J	401	J
Mercury	MG/KG	2.4	59%	0.15	NYS LEL	16	34	58	0.06	UJ	0.08	J	0.11	J
Nickel	MG/KG	453	100%	16	NYS LEL	58	58	58	[illegible]		[illegible]		40.9	
Potassium	MG/KG	3460	100%			0	58	58	795	J	1650		1590	
Selenium	MG/KG	6.1	41%			0	24	58	0.38	U	0.71	J	0.6	U
Silver	MG/KG	1.7	45%	1	NYS LEL	4	26	58	0.34	J	0.59	J	0.38	J
Sodium	MG/KG	1370	64%			0	37	58	65.3	J	74.9	U	141	J
Thallium	MG/KG	0	0%			0	0	58	6.8	U	10.3	U	1.1	U
Vanadium	MG/KG	1140	100%			0	58	58	9.3	J	14.5		36.8	
Zinc	MG/KG	1150	100%	120	NYS LEL	41	58	58	59.8		233		181	

Notes

(1) Criteria calculated using a TOC of 3.91%. This is a site wide TOC value.

(2) NYSDEC HHB = NYS HUMAN HEALTH BIOACCUMULATION CRITERIA
BENTHIC-CHRONIC = NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITERIA
NYDEC W/H = NYS WILD/HUMAN BIOACCUM CRITERIA
NYS LEL = NYS LOWEST EFFECT LEVEL

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4		SEAD-4	
									SD4-18		SD4-19		SD4-2		SD4-20	
									SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
									41010		41011		SD4-2		41012	
									0		0		0		0	
									0.2		0.2		0.5		0.2	
									12/6/1998		12/6/1998		11/2/1993		12/6/1998	
									SA		SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		ESI		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF								
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q	Value	Q
1,1,1-Trichloroethane	UG/KG	0	0%			0	0	58	14	U	19	UJ	33	U	15	U
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	11.7315	NYDEC HHB	0	0	58	14	UJ	19	UJ	33	U	15	UJ
1,1,2-Trichloroethane	UG/KG	0	0%			0	0	58	14	U	19	UJ	33	U	15	UJ
1,1-Dichloroethane	UG/KG	0	0%			0	0	58	14	U	19	UJ	33	U	15	U
1,1-Dichloroethene	UG/KG	0	0%	0.7821	NYDEC HHB	0	0	58	14	U	19	UJ	33	U	15	U
1,2-Dichloroethane	UG/KG	0	0%	27.3735	NYDEC HHB	0	0	58	14	U	19	UJ	33	U	15	U
1,2-Dichloroethene (total)	UG/KG	0	0%			0	0	58	14	U	19	UJ	33	U	15	U
1,2-Dichloropropane	UG/KG	0	0%			0	0	58	14	U	19	UJ	33	U	15	UJ
Acetone	UG/KG	210	26%			0	15	58	14	U	19	UJ	51		15	U
Benzene	UG/KG	0	0%	23.463	NYDEC HHB	0	0	58	14	U	19	UJ	33	U	15	UJ
Bromodichloromethane	UG/KG	0	0%			0	0	58	14	U	19	UJ	33	U	15	UJ
Bromoform	UG/KG	0	0%			0	0	58	14	UJ	19	UJ	33	U	15	UJ
Carbon disulfide	UG/KG	18	9%			0	5	58	14	U	19	UJ	33	U	15	U
Carbon tetrachloride	UG/KG	0	0%	23.463	NYDEC HHB	0	0	58	14	U	19	UJ	33	U	15	U
Chlorobenzene	UG/KG	0	0%	136.8675	BENTHIC-CHRONIC	0	0	58	14	UJ	19	UJ	33	U	15	UJ
Chlorodibromomethane	UG/KG	0	0%			0	0	58	14	U	19	UJ	33	U	15	UJ
Chloroethane	UG/KG	0	0%			0	0	58	14	U	19	UJ	33	U	15	U
Chloroform	UG/KG	14	3%			0	2	58	14	U	19	UJ	33	U	15	U
Cis-1,3-Dichloropropene	UG/KG	0	0%			0	0	58	14	U	19	UJ	33	U	15	UJ
Ethyl benzene	UG/KG	0	0%	938.52	BENTHIC-CHRONIC	0	0	58	14	UJ	19	UJ	33	U	15	UJ
Methyl bromide	UG/KG	0	0%			0	0	58	14	U	19	UJ	33	U	15	U
Methyl butyl ketone	UG/KG	0	0%			0	0	58	14	U	19	UJ	33	U	15	U
Methyl chloride	UG/KG	5	2%			0	1	58	14	U	19	UJ	33	U	15	U
Methyl ethyl ketone	UG/KG	49	2%			0	1	58	14	U	19	UJ	33	U	15	U
Methyl isobutyl ketone	UG/KG	0	0%			0	0	58	14	U	19	UJ	33	U	15	U
Methylene chloride	UG/KG	11	5%			0	3	58	14	U	19	UJ	33	U	15	U
Styrene	UG/KG	3	3%			0	2	58	14	UJ	19	UJ	33	U	15	UJ
Tetrachloroethene	UG/KG	0	0%	31.284	NYDEC HHB	0	0	58	14	U	19	UJ	33	U	15	U
Toluene	UG/KG	42	9%	1916.145	BENTHIC-CHRONIC	0	5	58	14	U	19	UJ	33	U	15	U
Total Xylenes	UG/KG	7	3%	3597.66	BENTHIC-CHRONIC	0	2	58	14	UJ	19	UJ	33	U	15	UJ
Trans-1,3-Dichloropropene	UG/KG	0	0%			0	0	58	14	U	19	UJ	33	U	15	UJ
Trichloroethene	UG/KG	0	0%	78.21	NYDEC HHB	0	0	58	14	U	19	UJ	33	U	15	UJ
Vinyl chloride	UG/KG	0	0%	2.73735	NYDEC HHB	0	0	58	14	U	19	UJ	33	U	15	U
1,2,4-Trichlorobenzene	UG/KG	0	0%			0	0	58	100	U	160	UJ	580	U	98	U
1,2-Dichlorobenzene	UG/KG	0	0%	4692.6	BENTHIC-CHRONIC	0	0	58	100	U	160	UJ	580	U	98	U
1,3-Dichlorobenzene	UG/KG	0	0%	469.26	BENTHIC-CHRONIC	0	0	58	100	U	160	UJ	580	U	98	U
1,4-Dichlorobenzene	UG/KG	73	2%	469.26	BENTHIC-CHRONIC	0	1	58	100	U	160	UJ	580	U	98	U
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%			0	0	9					580	U		
2,4,5-Trichlorophenol	UG/KG	0	0%			0	0	58	250	U	380	UJ	1400	U	240	U
2,4,6-Trichlorophenol	UG/KG	0	0%			0	0	58	100	U	160	UJ	580	U	98	U
2,4-Dichlorophenol	UG/KG	0	0%			0	0	58	100	U	160	UJ	580	U	98	U

SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4		SEAD-4	
									SD4-18		SD4-19		SD4-2		SD4-20	
									SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
									41010		41011		SD4-2		41012	
									0		0		0		0	
									0.2		0.2		0.5		0.2	
									12/6/1998		12/6/1998		11/2/1993		12/6/1998	
									SA		SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		ESI		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF								
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q	Value	Q
2,4-Dimethylphenol	UG/KG	0	0%	19.5525	BENTHIC-CHRONIC	0	0	58	100	UJ	160	UJ	580	U	98	UJ
2,4-Dinitrophenol	UG/KG	0	0%			0	0	58	250	UJ	380	UJ	1400	U	240	UJ
2,4-Dinitrotoluene	UG/KG	0	0%			0	0	58	100	U	160	UJ	580	U	98	U
2,6-Dinitrotoluene	UG/KG	0	0%			0	0	58	100	U	160	UJ	580	U	98	U
2-Chloronaphthalene	UG/KG	0	0%			0	0	58	100	U	160	UJ	580	U	98	U
2-Chlorophenol	UG/KG	0	0%			0	0	58	100	U	160	UJ	580	U	98	U
2-Methylnaphthalene	UG/KG	31	9%	1329.57	BENTHIC-CHRONIC	0	5	58	5.7	J	160	UJ	580	U	9.4	J
2-Methylphenol	UG/KG	0	0%			0	0	58	100	U	160	UJ	580	U	98	U
2-Nitroaniline	UG/KG	0	0%			0	0	58	250	U	380	UJ	1400	U	240	U
2-Nitrophenol	UG/KG	0	0%	19.5525	BENTHIC-CHRONIC	0	0	58	100	U	160	UJ	580	U	98	U
3,3'-Dichlorobenzidine	UG/KG	0	0%			0	0	58	100	U	160	UJ	580	U	98	U
3-Nitroaniline	UG/KG	0	0%			0	0	58	250	U	380	UJ	1400	U	240	U
4,6-Dinitro-2-methylphenol	UG/KG	0	0%			0	0	58	250	U	380	UJ	1400	U	240	U
4-Bromophenyl phenyl ether	UG/KG	0	0%			0	0	58	100	U	160	UJ	580	U	98	U
4-Chloro-3-methylphenol	UG/KG	0	0%			0	0	58	100	U	160	UJ	580	U	98	U
4-Chloroaniline	UG/KG	0	0%			0	0	58	100	U	160	UJ	580	U	98	U
4-Chlorophenyl phenyl ether	UG/KG	0	0%			0	0	58	100	U	160	UJ	580	U	98	U
4-Methylphenol	UG/KG	140	10%	19.5525	BENTHIC-CHRONIC	2	6	58	16	J	160	UJ	580	U	98	U
4-Nitroaniline	UG/KG	0	0%			0	0	58	250	U	380	UJ	1400	U	240	U
4-Nitrophenol	UG/KG	0	0%			0	0	58	250	U	380	UJ	1400	U	240	U
Acenaphthene	UG/KG	610	19%	5474.7	BENTHIC-CHRONIC	0	11	58	25	J	160	UJ	580	U	98	U
Acenaphthylene	UG/KG	130	17%			0	10	58	10	J	160	UJ	580	U	98	U
Anthracene	UG/KG	1700	47%	4184.235	BENTHIC-CHRONIC	0	27	58	53	J	11	J	580	U	98	U
Benzo(a)anthracene	UG/KG	5900	84%	50.8365	NYDEC HHB	26	49	58	150		63	J	580	U	56	J
Benzo(a)pyrene	UG/KG	5100	84%	50.8365	NYDEC HHB	26	49	58	150		76	J	580	U	37	J
Benzo(b)fluoranthene	UG/KG	4800	88%	50.8365	NYDEC HHB	35	51	58	190		150	J	580	U	110	
Benzo(ghi)perylene	UG/KG	3200	78%			0	45	58	180		56	J	580	U	36	J
Benzo(k)fluoranthene	UG/KG	5700	43%	50.8365	NYDEC HHB	20	25	58	130		160	UJ	580	U	98	U
Bis(2-Chloroethoxy)methane	UG/KG	0	0%			0	0	58	100	U	160	UJ	580	U	98	U
Bis(2-Chloroethyl)ether	UG/KG	0	0%			0	0	58	100	U	160	UJ	580	U	98	U
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%			0	0	49	100	U	160	UJ			98	U
Bis(2-Ethylhexyl)phthalate	UG/KG	42000	40%	7801.4475	BENTHIC-CHRONIC	1	23	58	100	U	160	UJ	580	U	98	U
Butylbenzylphthalate	UG/KG	16	9%			0	5	58	100	U	160	UJ	580	U	98	U
Carbazole	UG/KG	500	40%			0	23	58	49	J	9	J	580	U	98	U
Chrysene	UG/KG	6200	90%	50.8365	NYDEC HHB	34	52	58	140		110	J	580	U	63	J
Di-n-butylphthalate	UG/KG	250	47%			0	27	58	43	J	12	J	580	U	7	J
Di-n-octylphthalate	UG/KG	46	5%			0	3	58	100	U	160	UJ	46	J	98	U
Dibenz(a,h)anthracene	UG/KG	1200	50%			0	29	58	85	J	25	J	580	U	10	J
Dibenzofuran	UG/KG	230	17%			0	10	58	10	J	160	UJ	580	U	98	U
Diethyl phthalate	UG/KG	17	3%			0	2	58	100	U	160	UJ	580	U	98	U
Dimethylphthalate	UG/KG	0	0%			0	0	58	100	U	160	UJ	580	U	98	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4		SEAD-4	
									SD4-18		SD4-19		SD4-2		SD4-20	
									SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
									41010		41011		SD4-2		41012	
									0		0		0		0	
									0.2		0.2		0.5		0.2	
									12/6/1998		12/6/1998		11/2/1993		12/6/1998	
									SA		SA		SA		SA	
									RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		ESI		RI PHASE 1 STEP 1	
ANALYTE	UNIT	MAX	FREQUENCY	NYS CRITERIA (1)	SPECIFIC CRITERIA (2)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	Value	Q	Value	Q	Value	Q	Value	Q
Fluoranthene	UG/KG	16000	93%	39887.1	BENTHIC-CHRONIC	0	54	58	800		140	J	31	J	79	J
Fluorene	UG/KG	660	22%	312.84	BENTHIC-CHRONIC	1	13	58	28	J	160	UJ	29	J	98	U
Hexachlorobenzene	UG/KG	840	3%	5.86575	NYDEC HHB	2	2	58	100	U	160	UJ	580	U	98	U
Hexachlorobutadiene	UG/KG	0	0%			0	0	58	100	U	160	UJ	580	U	98	U
Hexachlorocyclopentadiene	UG/KG	0	0%			0	0	58	100	U	160	UJ	580	U	98	U
Hexachloroethane	UG/KG	0	0%			0	0	58	100	U	160	UJ	580	U	98	U
Indeno(1,2,3-cd)pyrene	UG/KG	3100	74%	50.8365	NYDEC HHB	21	43	58	100		40	J	580	U	17	J
Isophorone	UG/KG	0	0%			0	0	58	100	U	160	UJ	580	U	98	U
N-Nitrosodiphenylamine	UG/KG	760	2%			0	1	58	100	U	160	UJ	580	U	98	U
N-Nitrosodipropylamine	UG/KG	410	2%			0	1	58	100	U	160	UJ	410	J	98	U
Naphthalene	UG/KG	13	12%	1173.15	BENTHIC-CHRONIC	0	7	58	6.9	J	160	UJ	580	U	98	U
Nitrobenzene	UG/KG	0	0%			0	0	58	100	U	160	UJ	580	U	98	U
Pentachlorophenol	UG/KG	0	0%	1564.2	BENTHIC-CHRONIC	0	0	58	250	U	380	UJ	1400	U	240	U
Phenanthrene	UG/KG	7900	88%	4692.6	BENTHIC-CHRONIC	1	51	58	430		68	J	580	U	43	J
Phenol	UG/KG	210	7%	19.5525	BENTHIC-CHRONIC	4	4	58	150		160	UJ	580	U	98	U
Pyrene	UG/KG	12000	93%	37579.905	BENTHIC-CHRONIC	0	54	58	660		130	J	26	J	85	J
1,3,5-Trinitrobenzene	UG/KG	0	0%			0	0	58	120	U	120	UJ	130	U	120	U
1,3-Dinitrobenzene	UG/KG	0	0%			0	0	58	120	U	120	UJ	130	U	120	U
2,4,6-Trinitrotoluene	UG/KG	0	0%			0	0	58	120	U	120	UJ	130	U	120	U
2,4-Dinitrotoluene	UG/KG	0	0%			0	0	58	120	U	120	UJ	130	U	120	U
2,6-Dinitrotoluene	UG/KG	0	0%			0	0	58	120	U	120	UJ	130	U	120	U
2-Nitrotoluene	UG/KG	450	2%			0	1	49	120	U	120	U			120	U
2-amino-4,6-Dinitrotoluene	UG/KG	200	2%			0	1	58	120	U	120	UJ	130	U	120	U
3-Nitrotoluene	UG/KG	0	0%			0	0	49	120	U	120	U			120	U
4-Nitrotoluene	UG/KG	0	0%			0	0	49	120	U	120	U			120	U
4-amino-2,6-Dinitrotoluene	UG/KG	140	2%			0	1	58	120	U	120	UJ	140	J	120	U
HMX	UG/KG	0	0%			0	0	58	120	U	120	UJ	130	U	120	U
Nitrobenzene	UG/KG	0	0%			0	0	49	120	U	120	U			120	U
RDX	UG/KG	0	0%			0	0	58	120	U	120	UJ	130	U	120	U
Tetryl	UG/KG	0	0%			0	0	58	120	U	120	UJ	130	U	120	U
4,4'-DDD	UG/KG	90	22%	0.39105	NYDEC HHB	13	13	58	16		7.8	UJ	5.8	U	18	J
4,4'-DDE	UG/KG	86	33%	0.39105	NYDEC HHB	19	19	58	5.2	U	7.8	UJ	4.1	J	3.4	J
4,4'-DDT	UG/KG	45	28%	0.39105	NYDEC HHB	16	16	58	5.2	U	7.8	UJ	5.8	U	3.7	J
Aldrin	UG/KG	2.8	5%	3.9105	NYDEC HHB	0	3	58	2.6	U	4	UJ	3	U	2.5	U
Alpha-BHC	UG/KG	0	0%			0	0	58	2.6	U	4	UJ	3	U	2.5	U
Alpha-Chlordane	UG/KG	44	14%	0.039105	NYDEC HHB	8	8	58	2.6	U	4	UJ	3	U	2.5	U
Aroclor-1016	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	52	U	78	UJ	58	U	49	U
Aroclor-1221	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	100	U	160	UJ	120	U	100	U
Aroclor-1232	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	52	U	78	UJ	58	U	49	U
Aroclor-1242	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	52	U	78	UJ	58	U	49	U
Aroclor-1248	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	52	U	78	UJ	58	U	49	U

Seneca Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4		SEAD-4	
									SD4-18		SD4-19		SD4-2		SD4-20	
									SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
									41010		41011		SD4-2		41012	
									0		0		0		0	
									0.2		0.2		0.5		0.2	
									12/6/1998		12/6/1998		11/2/1993		12/6/1998	
									SA		SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		ESI		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF								
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q	Value	Q
Aroclor-1254	UG/KG	580	45%	0.031284	NYDEC HHB	26	26	58	52	U	78	UJ	280		66	J
Aroclor-1260	UG/KG	250	16%	0.031284	NYDEC HHB	9	9	58	52	U	78	UJ	58	U	49	U
Beta-BHC	UG/KG	3.3	7%			0	4	58	2.6	U	4	UJ	3	U	2.5	U
Delta-BHC	UG/KG	0	0%			0	0	58	2.6	U	4	UJ	3	U	2.5	U
Dieldrin	UG/KG	18	7%	3.9105	NYDEC HHB	4	4	58	5.2	U	7.8	UJ	5.8	U	4.9	U
Endosulfan I	UG/KG	1.9	2%	1.17315	BENTHIC-CHRONIC	1	1	58	2.6	U	4	UJ	3	U	2.5	U
Endosulfan II	UG/KG	6.8	3%	1.17315	BENTHIC-CHRONIC	2	2	58	5.2	U	7.8	UJ	5.8	U	4.9	U
Endosulfan sulfate	UG/KG	12	9%			0	5	58	3.2	J	7.8	UJ	5.8	U	4.9	U
Endrin	UG/KG	0	0%	31.284	NYDEC W/H	0	0	58	5.2	U	7.8	UJ	5.8	U	4.9	U
Endrin aldehyde	UG/KG	15	12%			0	7	58	5.2	U	7.8	UJ	3	J	4.9	U
Endrin ketone	UG/KG	62	7%			0	4	58	5.2	U	7.8	UJ	5.8	U	4.9	U
Gamma-BHC/Lindane	UG/KG	0	0%			0	0	58	2.6	U	4	UJ	3	U	2.5	U
Gamma-Chlordane	UG/KG	40	17%	0.039105	NYDEC HHB	10	10	58	2.6	U	4	UJ	3	U	2.5	U
Heptachlor	UG/KG	2.4	2%	0.031284	NYDEC HHB	1	1	58	2.6	U	4	UJ	3	U	2.5	U
Heptachlor epoxide	UG/KG	10	10%	0.031284	NYDEC HHB	6	6	58	2.6	U	4	UJ	3	U	2.5	U
Methoxychlor	UG/KG	68	3%			0	2	58	26	U	40	UJ	30	U	25	U
Toxaphene	UG/KG	0	0%			0	0	58	260	U	400	UJ	300	U	250	U
2,4,5-T	UG/KG	21	11%			0	1	9					8.7	U		
2,4,5-TP/Silvex	UG/KG	0	0%			0	0	9					8.7	U		
2,4-D	UG/KG	0	0%			0	0	9					87	U		
2,4-DB	UG/KG	0	0%			0	0	9					87	U		
Dalapon	UG/KG	0	0%			0	0	9					210	U		
Dicamba	UG/KG	0	0%			0	0	9					8.7	U		
Dichloroprop	UG/KG	0	0%			0	0	9					87	U		
Dinoseb	UG/KG	0	0%			0	0	9					44	U		
MCPA	UG/KG	0	0%			0	0	9					8700	U		
MCPP	UG/KG	0	0%			0	0	9					8700	U		
Aluminum	MG/KG	22100	100%			0	58	58	14700		8020	J	12000		7850	
Antimony	MG/KG	82.7	53%	2	NYS LEL	20	31	58	0.86	U	1.2	UJ	30.1		0.91	U
Arsenic	MG/KG	37.7	98%	6	NYS LEL	19	57	58	5.5		2.4	J	3.8		3.4	
Barium	MG/KG	488	100%			0	58	58	111		63.3	J	61.3		61	
Beryllium	MG/KG	1.1	100%			0	58	58	0.66	J	0.4	J	0.54	J	0.47	J
Cadmium	MG/KG	34.1	47%	0.6	NYS LEL	24	27	58	0.14	U	0.19	UJ	0.92	U	0.15	U
Calcium	MG/KG	140000	100%			0	58	58	5510		60600	J	26200		140000	
Chromium	MG/KG	4800	100%	26	NYS LEL	28	58	58	16.3	J	11.5	J	2230		12.2	J
Cobalt	MG/KG	28.4	100%			0	58	58	11.2	J	7.7	J	9.5	J	8.1	J
Copper	MG/KG	2640	100%	16	NYS LEL	55	58	58	[illegible]		49	J	1560		72.2	
Cyanide	MG/KG	0	0%			0	0	58	0.87	UJ	1.4	UJ	0.78	U	0.81	UJ
Iron	MG/KG	87900	100%	20000	NYS LEL	45	58	58	[illegible]	J	14300	J	21100		16600	J
Lead	MG/KG	374	95%	31	NYS LEL	35	55	58	[illegible]		35	J	18.6		37.4	
Magnesium	MG/KG	27900	100%			0	58	58	3630		4500	J	4830		7710	

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4		SEAD-4	
									SD4-18		SD4-19		SD4-2		SD4-20	
									SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
									41010		41011		SD4-2		41012	
									0		0		0		0	
									0.2		0.2		0.5		0.2	
									12/6/1998		12/6/1998		11/2/1993		12/6/1998	
									SA		SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		ESI		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF								
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q	Value	Q
Manganese	MG/KG	5480	100%	460	NYS LEL	28	58	58	761	J	371	J	363		437	J
Mercury	MG/KG	2.4	59%	0.15	NYS LEL	16	34	58	0.08	J	0.11	UJ	0.16		0.07	UJ
Nickel	MG/KG	453	100%	16	NYS LEL	58	58	58	[illegible]		35	J	26.5		44.6	
Potassium	MG/KG	3460	100%			0	58	58	1990		1300	J	1640		1470	J
Selenium	MG/KG	6.1	41%			0	24	58	0.66	J	1.2	J	0.27	U	0.75	J
Silver	MG/KG	1.7	45%	1	NYS LEL	4	26	58	0.6	J	0.41	J	1.9	U	0.77	J
Sodium	MG/KG	1370	64%			0	37	58	72.6	U	283	J	97	J	185	J
Thallium	MG/KG	0	0%			0	0	58	10	U	1.3	UJ	0.29	U	1.1	U
Vanadium	MG/KG	1140	100%			0	58	58	19.8		55.3	J	19.5		74.9	
Zinc	MG/KG	1150	100%	120	NYS LEL	41	58	58	87.3		111	J	526		91.6	

Notes.

(1) Criteria calculated using a TOC of 3.91%. This is a site wide TOC value.

(2) NYSDEC HHB = NYS HUMAN HEALTH BIOACCUMULATION CRITERIA
BENTHIC-CHRONIC = NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITERIA
NYDEC W/H = NYS WILD/HUMAN BIOACCUM CRITERIA
NYS LEL = NYS LOWEST EFFECT LEVEL

Seneca A Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-21		SD4-22		SD4-23	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41013		41014		41015	
									0		0		0	
									0.2		0.2		0.2	
									12/6/1998		12/9/1998		12/8/1998	
									SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF						
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
1,1,1-Trichloroethane	UG/KG	0	0%			0	0	58	13	U	15	U	34	UJ
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	11.7315	NYDEC HHB	0	0	58	13	UJ	15	UJ	34	UJ
1,1,2-Trichloroethane	UG/KG	0	0%			0	0	58	13	UJ	15	UJ	34	UJ
1,1-Dichloroethane	UG/KG	0	0%			0	0	58	13	U	15	U	34	UJ
1,1-Dichloroethene	UG/KG	0	0%	0.7821	NYDEC HHB	0	0	58	13	U	15	U	34	UJ
1,2-Dichloroethane	UG/KG	0	0%	27.3735	NYDEC HHB	0	0	58	13	U	15	U	34	UJ
1,2-Dichloroethene (total)	UG/KG	0	0%			0	0	58	13	U	15	U	34	UJ
1,2-Dichloropropane	UG/KG	0	0%			0	0	58	13	UJ	15	UJ	34	UJ
Acetone	UG/KG	210	26%			0	15	58	10	J	15	U	78	J
Benzene	UG/KG	0	0%	23.463	NYDEC HHB	0	0	58	13	UJ	15	UJ	34	UJ
Bromodichloromethane	UG/KG	0	0%			0	0	58	13	UJ	15	UJ	34	UJ
Bromoform	UG/KG	0	0%			0	0	58	13	UJ	15	UJ	34	UJ
Carbon disulfide	UG/KG	18	9%			0	5	58	13	U	15	U	34	UJ
Carbon tetrachloride	UG/KG	0	0%	23.463	NYDEC HHB	0	0	58	13	U	15	U	34	UJ
Chlorobenzene	UG/KG	0	0%	136.8675	BENTHIC-CHRONIC	0	0	58	13	UJ	15	UJ	34	UJ
Chlorodibromomethane	UG/KG	0	0%			0	0	58	13	UJ	15	UJ	34	UJ
Chloroethane	UG/KG	0	0%			0	0	58	13	U	15	U	34	UJ
Chloroform	UG/KG	14	3%			0	2	58	13	U	15	U	34	UJ
Cis-1,3-Dichloropropene	UG/KG	0	0%			0	0	58	13	UJ	15	UJ	34	UJ
Ethyl benzene	UG/KG	0	0%	938.52	BENTHIC-CHRONIC	0	0	58	13	UJ	15	UJ	34	UJ
Methyl bromide	UG/KG	0	0%			0	0	58	13	U	15	U	34	UJ
Methyl butyl ketone	UG/KG	0	0%			0	0	58	13	U	15	U	34	UJ
Methyl chloride	UG/KG	5	2%			0	1	58	13	U	15	U	34	UJ
Methyl ethyl ketone	UG/KG	49	2%			0	1	58	13	U	15	U	34	UJ
Methyl isobutyl ketone	UG/KG	0	0%			0	0	58	13	U	15	U	34	UJ
Methylene chloride	UG/KG	11	5%			0	3	58	13	U	15	U	34	UJ
Styrene	UG/KG	3	3%			0	2	58	13	UJ	15	UJ	34	UJ
Tetrachloroethene	UG/KG	0	0%	31.284	NYDEC HHB	0	0	58	13	U	15	U	34	UJ
Toluene	UG/KG	42	9%	1916.145	BENTHIC-CHRONIC	0	5	58	7	J	15	U	34	UJ
Total Xylenes	UG/KG	7	3%	3597.66	BENTHIC-CHRONIC	0	2	58	13	UJ	15	UJ	34	UJ
Trans-1,3-Dichloropropene	UG/KG	0	0%			0	0	58	13	UJ	15	UJ	34	UJ
Trichloroethene	UG/KG	0	0%	78.21	NYDEC HHB	0	0	58	13	UJ	15	UJ	34	UJ
Vinyl chloride	UG/KG	0	0%	2.73735	NYDEC HHB	0	0	58	13	U	15	U	34	UJ
1,2,4-Trichlorobenzene	UG/KG	0	0%			0	0	58	89	U	200	U	150	UJ
1,2-Dichlorobenzene	UG/KG	0	0%	4692.6	BENTHIC-CHRONIC	0	0	58	89	U	200	U	150	UJ
1,3-Dichlorobenzene	UG/KG	0	0%	469.26	BENTHIC-CHRONIC	0	0	58	89	U	200	U	150	UJ
1,4-Dichlorobenzene	UG/KG	73	2%	469.26	BENTHIC-CHRONIC	0	1	58	89	U	200	U	150	UJ
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%			0	0	9						
2,4,5-Trichlorophenol	UG/KG	0	0%			0	0	58	220	U	480	U	370	UJ
2,4,6-Trichlorophenol	UG/KG	0	0%			0	0	58	89	U	200	U	150	UJ
2,4-Dichlorophenol	UG/KG	0	0%			0	0	58	89	U	200	U	150	UJ

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-21		SD4-22		SD4-23	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41013		41014		41015	
									0		0		0	
									0.2		0.2		0.2	
									12/6/1998		12/9/1998		12/8/1998	
									SA		SA		SA	
						NUMBER ABOVE	NUMBER OF	NUMBER OF	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
ANALYTE	UNIT	MAX	FREQUENCY	NYS CRITERIA (1)	SPECIFIC CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
2,4-Dimethylphenol	UG/KG	0	0%	19.5525	BENTHIC-CHRONIC	0	0	58	89	UJ	200	UJ	150	UJ
2,4-Dinitrophenol	UG/KG	0	0%			0	0	58	220	UJ	480	UJ	370	UJ
2,4-Dinitrotoluene	UG/KG	0	0%			0	0	58	89	U	200	U	150	UJ
2,6-Dinitrotoluene	UG/KG	0	0%			0	0	58	89	U	200	U	150	UJ
2-Chloronaphthalene	UG/KG	0	0%			0	0	58	89	U	200	U	150	UJ
2-Chlorophenol	UG/KG	0	0%			0	0	58	89	U	200	U	150	UJ
2-Methylnaphthalene	UG/KG	31	9%	1329.57	BENTHIC-CHRONIC	0	5	58	8.8	J	31	J	150	UJ
2-Methylphenol	UG/KG	0	0%			0	0	58	89	U	200	U	150	UJ
2-Nitroaniline	UG/KG	0	0%			0	0	58	220	U	480	U	370	UJ
2-Nitrophenol	UG/KG	0	0%	19.5525	BENTHIC-CHRONIC	0	0	58	89	U	200	U	150	UJ
3,3'-Dichlorobenzidine	UG/KG	0	0%			0	0	58	89	U	200	U	150	UJ
3-Nitroaniline	UG/KG	0	0%			0	0	58	220	U	480	U	370	UJ
4,6-Dinitro-2-methylphenol	UG/KG	0	0%			0	0	58	220	U	480	U	370	UJ
4-Bromophenyl phenyl ether	UG/KG	0	0%			0	0	58	89	U	200	U	150	UJ
4-Chloro-3-methylphenol	UG/KG	0	0%			0	0	58	89	U	200	U	150	UJ
4-Chloroaniline	UG/KG	0	0%			0	0	58	89	U	200	U	150	UJ
4-Chlorophenyl phenyl ether	UG/KG	0	0%			0	0	58	89	U	200	U	150	UJ
4-Methylphenol	UG/KG	140	10%	19.5525	BENTHIC-CHRONIC	2	6	58	89	U	200	U	150	UJ
4-Nitroaniline	UG/KG	0	0%			0	0	58	220	U	480	U	370	UJ
4-Nitrophenol	UG/KG	0	0%			0	0	58	220	U	480	U	370	UJ
Acenaphthene	UG/KG	610	19%	5474.7	BENTHIC-CHRONIC	0	11	58	6.6	J	200	U	150	UJ
Acenaphthylene	UG/KG	130	17%			0	10	58	89	U	200	U	150	UJ
Anthracene	UG/KG	1700	47%	4184.235	BENTHIC-CHRONIC	0	27	58	20	J	23	J	150	UJ
Benzo(a)anthracene	UG/KG	5900	84%	50.8365	NYDEC HHB	26	49	58	51	J	410		12	J
Benzo(a)pyrene	UG/KG	5100	84%	50.8365	NYDEC HHB	26	49	58	49	J	370	J	13	J
Benzo(b)fluoranthene	UG/KG	4800	88%	50.8365	NYDEC HHB	35	51	58	150		1000	J	43	J
Benzo(ghi)perylene	UG/KG	3200	78%			0	45	58	36	J	340	J	15	J
Benzo(k)fluoranthene	UG/KG	5700	43%	50.8365	NYDEC HHB	20	25	58	89	U	200	UJ	150	UR
Bis(2-Chloroethoxy)methane	UG/KG	0	0%			0	0	58	89	U	200	U	150	UJ
Bis(2-Chloroethyl)ether	UG/KG	0	0%			0	0	58	89	U	200	U	150	UJ
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%			0	0	49	89	U	200	U	150	UJ
Bis(2-Ethylhexyl)phthalate	UG/KG	42000	40%	7801.4475	BENTHIC-CHRONIC	1	23	58	89	U	200	U	150	UJ
Butylbenzylphthalate	UG/KG	16	9%			0	5	58	13	J	200	U	150	UJ
Carbazole	UG/KG	500	40%			0	23	58	15	J	34	J	150	UJ
Chrysene	UG/KG	6200	90%	50.8365	NYDEC HHB	34	52	58	75	J	520		24	J
Di-n-butylphthalate	UG/KG	250	47%			0	27	58	14	J	17	J	38	J
Di-n-octylphthalate	UG/KG	46	5%			0	3	58	89	U	200	UJ	150	UJ
Dibenz(a,h)anthracene	UG/KG	1200	50%			0	29	58	14	J	140	J	150	UJ
Dibenzofuran	UG/KG	230	17%			0	10	58	6.2	J	200	U	150	UJ
Diethyl phthalate	UG/KG	17	3%			0	2	58	89	U	200	U	150	UJ
Dimethylphthalate	UG/KG	0	0%			0	0	58	89	U	200	U	150	UJ

SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-21		SD4-22		SD4-23	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41013		41014		41015	
									0		0		0	
									0.2		0.2		0.2	
									12/6/1998		12/9/1998		12/8/1998	
									SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF						
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
Fluoranthene	UG/KG	16000	93%	39887.1	BENTHIC-CHRONIC	0	54	58	150		560		29	J
Fluorene	UG/KG	660	22%	312.84	BENTHIC-CHRONIC	1	13	58	9.2	J	13	J	150	UJ
Hexachlorobenzene	UG/KG	840	3%	5.86575	NYDEC HHB	2	2	58	89	U	200	U	150	UJ
Hexachlorobutadiene	UG/KG	0	0%			0	0	58	89	U	200	U	150	UJ
Hexachlorocyclopentadiene	UG/KG	0	0%			0	0	58	89	U	200	U	150	UJ
Hexachloroethane	UG/KG	0	0%			0	0	58	89	U	200	U	150	UJ
Indeno(1,2,3-cd)pyrene	UG/KG	3100	74%	50.8365	NYDEC HHB	21	43	58	26	J	250		14	J
Isophorone	UG/KG	0	0%			0	0	58	89	U	200	U	150	UJ
N-Nitrosodiphenylamine	UG/KG	760	2%			0	1	58	89	U	200	U	150	UJ
N-Nitrosodipropylamine	UG/KG	410	2%			0	1	58	89	U	200	U	150	UJ
Naphthalene	UG/KG	13	12%	1173.15	BENTHIC-CHRONIC	0	7	58	5.4	J	13	J	150	UJ
Nitrobenzene	UG/KG	0	0%			0	0	58	89	U	200	U	150	UJ
Pentachlorophenol	UG/KG	0	0%	1564.2	BENTHIC-CHRONIC	0	0	58	220	U	480	U	370	UJ
Phenanthrene	UG/KG	7900	88%	4692.6	BENTHIC-CHRONIC	1	51	58	120		160	J	20	J
Phenol	UG/KG	210	7%	19.5525	BENTHIC-CHRONIC	4	4	58	89	U	200	U	150	UJ
Pyrene	UG/KG	12000	93%	37579.905	BENTHIC-CHRONIC	0	54	58	140		760		18	J
1,3,5-Trinitrobenzene	UG/KG	0	0%			0	0	58	120	U	120	U	120	UJ
1,3-Dinitrobenzene	UG/KG	0	0%			0	0	58	120	U	120	U	120	UJ
2,4,6-Trinitrotoluene	UG/KG	0	0%			0	0	58	120	U	120	U	120	UJ
2,4-Dinitrotoluene	UG/KG	0	0%			0	0	58	120	U	120	U	120	UJ
2,6-Dinitrotoluene	UG/KG	0	0%			0	0	58	120	U	120	U	120	UJ
2-Nitrotoluene	UG/KG	450	2%			0	1	49	120	U	120	U	120	U
2-amino-4,6-Dinitrotoluene	UG/KG	200	2%			0	1	58	120	U	120	U	120	UJ
3-Nitrotoluene	UG/KG	0	0%			0	0	49	120	U	120	U	120	U
4-Nitrotoluene	UG/KG	0	0%			0	0	49	120	U	120	U	120	U
4-amino-2,6-Dinitrotoluene	UG/KG	140	2%			0	1	58	120	U	120	U	120	UJ
HMX	UG/KG	0	0%			0	0	58	120	U	120	U	120	UJ
Nitrobenzene	UG/KG	0	0%			0	0	49	120	U	120	U	120	U
RDX	UG/KG	0	0%			0	0	58	120	U	120	U	120	UJ
Tetryl	UG/KG	0	0%			0	0	58	120	U	120	U	120	UJ
4,4'-DDD	UG/KG	90	22%	0.39105	NYDEC HHB	13	13	58	4.4	U	4.9	U	4.2	J
4,4'-DDE	UG/KG	86	33%	0.39105	NYDEC HHB	19	19	58	6.5	J	6.6	J	6	J
4,4'-DDT	UG/KG	45	28%	0.39105	NYDEC HHB	16	16	58	4.5	J	7.7	J	7.7	UJ
Aldrin	UG/KG	2.8	5%	3.9105	NYDEC HHB	0	3	58	2.3	U	2.5	U	4	UJ
Alpha-BHC	UG/KG	0	0%			0	0	58	2.3	U	2.5	U	4	UJ
Alpha-Chlordane	UG/KG	44	14%	0.039105	NYDEC HHB	8	8	58	2.3	U	2.5	U	4	UJ
Aroclor-1016	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	44	U	49	U	77	UJ
Aroclor-1221	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	90	U	100	U	160	UJ
Aroclor-1232	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	44	U	49	U	77	UJ
Aroclor-1242	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	44	U	49	U	77	UJ
Aroclor-1248	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	44	U	49	U	77	UJ

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-21		SD4-22		SD4-23	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41013		41014		41015	
									0		0		0	
									0.2		0.2		0.2	
									12/6/1998		12/9/1998		12/8/1998	
									SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF						
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
Aroclor-1254	UG/KG	580	45%	0.031284	NYDEC HHB	26	26	58	44	U	160		86	J
Aroclor-1260	UG/KG	250	16%	0.031284	NYDEC HHB	9	9	58	44	U	150		50	J
Beta-BHC	UG/KG	3.3	7%			0	4	58	2.3	U	2.5	U	4	UJ
Delta-BHC	UG/KG	0	0%			0	0	58	2.3	U	2.5	U	4	UJ
Dieldrin	UG/KG	18	7%	3.9105	NYDEC HHB	4	4	58	4.4	U	6.4	J	7.7	UJ
Endosulfan I	UG/KG	1.9	2%	1.17315	BENTHIC-CHRONIC	1	1	58	2.3	U	2.5	U	4	UJ
Endosulfan II	UG/KG	6.8	3%	1.17315	BENTHIC-CHRONIC	2	2	58	4.4	U	4.9	U	7.7	UJ
Endosulfan sulfate	UG/KG	12	9%			0	5	58	4.4	U	3.6	J	7.7	UJ
Endrin	UG/KG	0	0%	31.284	NYDEC W/H	0	0	58	4.4	U	4.9	U	7.7	UJ
Endrin aldehyde	UG/KG	15	12%			0	7	58	4.4	U	8.5		7.7	UJ
Endrin ketone	UG/KG	62	7%			0	4	58	4.4	U	4.9	U	7.7	UJ
Gamma-BHC/Lindane	UG/KG	0	0%			0	0	58	2.3	U	2.5	U	4	UJ
Gamma-Chlordane	UG/KG	40	17%	0.039105	NYDEC HHB	10	10	58	2.3	U	2.5	U	4	UJ
Heptachlor	UG/KG	2.4	2%	0.031284	NYDEC HHB	1	1	58	2.3	U	2.5	U	4	UJ
Heptachlor epoxide	UG/KG	10	10%	0.031284	NYDEC HHB	6	6	58	2.3	U	1.6	J	4	UJ
Methoxychlor	UG/KG	68	3%			0	2	58	23	U	25	U	40	UJ
Toxaphene	UG/KG	0	0%			0	0	58	230	U	250	U	400	UJ
2,4,5-T	UG/KG	21	11%			0	1	9						
2,4,5-TP/Silvex	UG/KG	0	0%			0	0	9						
2,4-D	UG/KG	0	0%			0	0	9						
2,4-DB	UG/KG	0	0%			0	0	9						
Dalapon	UG/KG	0	0%			0	0	9						
Dicamba	UG/KG	0	0%			0	0	9						
Dichloroprop	UG/KG	0	0%			0	0	9						
Dinoseb	UG/KG	0	0%			0	0	9						
MCPA	UG/KG	0	0%			0	0	9						
MCPP	UG/KG	0	0%			0	0	9						
Aluminum	MG/KG	22100	100%			0	58	58	10900		13300		15800	
Antimony	MG/KG	82.7	53%	2	NYS LEL	20	31	58	0.77	U	0.87	U	7	J
Arsenic	MG/KG	37.7	98%	6	NYS LEL	19	57	58	4.3		4		2.1	J
Barium	MG/KG	488	100%			0	58	58	65.2		55.4	J	112	J
Beryllium	MG/KG	1.1	100%			0	58	58	0.53	J	0.62	J	0.7	J
Cadmium	MG/KG	34.1	47%	0.6	NYS LEL	24	27	58	0.12	U	0.14	U	4.1	J
Calcium	MG/KG	140000	100%			0	58	58	27300		54900		49800	J
Chromium	MG/KG	4800	100%	26	NYS LEL	28	58	58	15.4	J	20	J	33.6	J
Cobalt	MG/KG	28.4	100%			0	58	58	10	J	13.5	J	14.8	J
Copper	MG/KG	2640	100%	16	NYS LEL	55	58	58	24.5		31.3		57.7	J
Cyanide	MG/KG	0	0%			0	0	58	0.78	UJ	0.87	UJ	1.3	UJ
Iron	MG/KG	87900	100%	20000	NYS LEL	45	58	58	[illegible]	J	23500	J	20200	J
Lead	MG/KG	374	95%	31	NYS LEL	35	55	58	[illegible]		55.5		158	J
Magnesium	MG/KG	27900	100%			0	58	58	5730		9090		6210	J

									SEAD-4		SEAD-4		SEAD-4	
									SD4-21		SD4-22		SD4-23	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41013		41014		41015	
									0		0		0	
									0.2		0.2		0.2	
									12/6/1998		12/9/1998		12/8/1998	
									SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF						
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
Manganese	MG/KG	5480	100%	460	NYS LEL	28	58	58	408	J	415	J	643	J
Mercury	MG/KG	2.4	59%	0.15	NYS LEL	16	34	58	0.08	J	0.07	UJ	0.43	J
Nickel	MG/KG	453	100%	16	NYS LEL	58	58	58	[illegible]		50.1		49.4	J
Potassium	MG/KG	3460	100%			0	58	58	1750		2570		3460	J
Selenium	MG/KG	6.1	41%			0	24	58	0.68	J	1.3	J	0.88	UJ
Silver	MG/KG	1.7	45%	1	NYS LEL	4	26	58	0.49	J	0.34	J	0.78	J
Sodium	MG/KG	1370	64%			0	37	58	65.3	U	108	J	215	J
Thallium	MG/KG	0	0%			0	0	58	0.9	U	1	U	15.9	UJ
Vanadium	MG/KG	1140	100%			0	58	58	35		58.5		24.2	J
Zinc	MG/KG	1150	100%	120	NYS LEL	41	58	58	75.6		149		193	J

Notes.

(1) Criteria calculated using a TOC of 3.91%. This is a site wide TOC value.

(2) NYSDEC HHB = NYS HUMAN HEALTH BIOACCUMULATION CRITERIA
BENTHIC-CHRONIC = NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITERIA
NYDEC W/H = NYS WILD/HUMAN BIOACCUM CRITERIA
NYS LEL = NYS LOWEST EFFECT LEVEL

									SEAD-4		SEAD-4		SEAD-4	
									SD4-24		SD4-25		SD4-26	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41016		41017		41018	
									0		0		0	
									0.2		0.2		0.2	
									12/8/1998		12/8/1998		12/8/1998	
									SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF						
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
1,1,1-Trichloroethane	UG/KG	0	0%			0	0	58	26	UJ	24	UJ	15	U
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	11.7315	NYDEC HHB	0	0	58	26	UJ	24	UJ	15	UJ
1,1,2-Trichloroethane	UG/KG	0	0%			0	0	58	26	UJ	24	UJ	15	U
1,1-Dichloroethane	UG/KG	0	0%			0	0	58	26	UJ	24	UJ	15	U
1,1-Dichloroethene	UG/KG	0	0%	0.7821	NYDEC HHB	0	0	58	26	UJ	24	UJ	15	U
1,2-Dichloroethane	UG/KG	0	0%	27.3735	NYDEC HHB	0	0	58	26	UJ	24	UJ	15	U
1,2-Dichloroethene (total)	UG/KG	0	0%			0	0	58	26	UJ	24	UJ	15	U
1,2-Dichloropropane	UG/KG	0	0%			0	0	58	26	UJ	24	UJ	15	U
Acetone	UG/KG	210	26%			0	15	58	17	J	12	J	15	U
Benzene	UG/KG	0	0%	23.463	NYDEC HHB	0	0	58	26	UJ	24	UJ	15	U
Bromodichloromethane	UG/KG	0	0%			0	0	58	26	UJ	24	UJ	15	U
Bromoform	UG/KG	0	0%			0	0	58	26	UJ	24	UJ	15	UJ
Carbon disulfide	UG/KG	18	9%			0	5	58	26	UJ	24	UJ	15	U
Carbon tetrachloride	UG/KG	0	0%	23.463	NYDEC HHB	0	0	58	26	UJ	24	UJ	15	U
Chlorobenzene	UG/KG	0	0%	136.8675	BENTHIC-CHRONIC	0	0	58	26	UJ	24	UJ	15	UJ
Chlorodibromomethane	UG/KG	0	0%			0	0	58	26	UJ	24	UJ	15	U
Chloroethane	UG/KG	0	0%			0	0	58	26	UJ	24	UJ	15	U
Chloroform	UG/KG	14	3%			0	2	58	26	UJ	24	UJ	15	U
Cis-1,3-Dichloropropene	UG/KG	0	0%			0	0	58	26	UJ	24	UJ	15	U
Ethyl benzene	UG/KG	0	0%	938.52	BENTHIC-CHRONIC	0	0	58	26	UJ	24	UJ	15	UJ
Methyl bromide	UG/KG	0	0%			0	0	58	26	UJ	24	UJ	15	U
Methyl butyl ketone	UG/KG	0	0%			0	0	58	26	UJ	24	UJ	15	U
Methyl chloride	UG/KG	5	2%			0	1	58	26	UJ	24	UJ	15	U
Methyl ethyl ketone	UG/KG	49	2%			0	1	58	26	UJ	24	UJ	15	U
Methyl isobutyl ketone	UG/KG	0	0%			0	0	58	26	UJ	24	UJ	15	U
Methylene chloride	UG/KG	11	5%			0	3	58	26	UJ	24	UJ	15	U
Styrene	UG/KG	3	3%			0	2	58	26	UJ	24	UJ	15	UJ
Tetrachloroethene	UG/KG	0	0%	31.284	NYDEC HHB	0	0	58	26	UJ	24	UJ	15	U
Toluene	UG/KG	42	9%	1916.145	BENTHIC-CHRONIC	0	5	58	26	UJ	24	UJ	15	U
Total Xylenes	UG/KG	7	3%	3597.66	BENTHIC-CHRONIC	0	2	58	26	UJ	24	UJ	15	UJ
Trans-1,3-Dichloropropene	UG/KG	0	0%			0	0	58	26	UJ	24	UJ	15	U
Trichloroethene	UG/KG	0	0%	78.21	NYDEC HHB	0	0	58	26	UJ	24	UJ	15	U
Vinyl chloride	UG/KG	0	0%	2.73735	NYDEC HHB	0	0	58	26	UJ	24	UJ	15	U
1,2,4-Trichlorobenzene	UG/KG	0	0%			0	0	58	180	UJ	140	UJ	120	U
1,2-Dichlorobenzene	UG/KG	0	0%	4692.6	BENTHIC-CHRONIC	0	0	58	180	UJ	140	UJ	120	U
1,3-Dichlorobenzene	UG/KG	0	0%	469.26	BENTHIC-CHRONIC	0	0	58	180	UJ	140	UJ	120	U
1,4-Dichlorobenzene	UG/KG	73	2%	469.26	BENTHIC-CHRONIC	0	1	58	180	UJ	140	UJ	120	U
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%			0	0	9						
2,4,5-Trichlorophenol	UG/KG	0	0%			0	0	58	430	UJ	340	UJ	280	U
2,4,6-Trichlorophenol	UG/KG	0	0%			0	0	58	180	UJ	140	UJ	120	U
2,4-Dichlorophenol	UG/KG	0	0%			0	0	58	180	UJ	140	UJ	120	U

Seneca Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-24		SD4-25		SD4-26	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41016		41017		41018	
									0		0		0	
									0.2		0.2		0.2	
									12/8/1998		12/8/1998		12/8/1998	
									SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF						
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
2,4-Dimethylphenol	UG/KG	0	0%	19.5525	BENTHIC-CHRONIC	0	0	58	180	UJ	140	UJ	120	UJ
2,4-Dinitrophenol	UG/KG	0	0%			0	0	58	430	UJ	340	UJ	280	UJ
2,4-Dinitrotoluene	UG/KG	0	0%			0	0	58	180	UJ	140	UJ	120	U
2,6-Dinitrotoluene	UG/KG	0	0%			0	0	58	180	UJ	140	UJ	120	U
2-Chloronaphthalene	UG/KG	0	0%			0	0	58	180	UJ	140	UJ	120	U
2-Chlorophenol	UG/KG	0	0%			0	0	58	180	UJ	140	UJ	120	U
2-Methylnaphthalene	UG/KG	31	9%	1329.57	BENTHIC-CHRONIC	0	5	58	180	UJ	140	UJ	120	U
2-Methylphenol	UG/KG	0	0%			0	0	58	180	UJ	140	UJ	120	U
2-Nitroaniline	UG/KG	0	0%			0	0	58	430	UJ	340	UJ	280	U
2-Nitrophenol	UG/KG	0	0%	19.5525	BENTHIC-CHRONIC	0	0	58	180	UJ	140	UJ	120	U
3,3'-Dichlorobenzidine	UG/KG	0	0%			0	0	58	180	UJ	140	UJ	120	U
3-Nitroaniline	UG/KG	0	0%			0	0	58	430	UJ	340	UJ	280	UJ
4,6-Dinitro-2-methylphenol	UG/KG	0	0%			0	0	58	430	UJ	340	UJ	280	U
4-Bromophenyl phenyl ether	UG/KG	0	0%			0	0	58	180	UJ	140	UJ	120	U
4-Chloro-3-methylphenol	UG/KG	0	0%			0	0	58	180	UJ	140	UJ	120	U
4-Chloroaniline	UG/KG	0	0%			0	0	58	180	UJ	140	UJ	120	UJ
4-Chlorophenyl phenyl ether	UG/KG	0	0%			0	0	58	180	UJ	140	UJ	120	U
4-Methylphenol	UG/KG	140	10%	19.5525	BENTHIC-CHRONIC	2	6	58	180	UJ	14	J	120	U
4-Nitroaniline	UG/KG	0	0%			0	0	58	430	UJ	340	UJ	280	U
4-Nitrophenol	UG/KG	0	0%			0	0	58	430	UJ	340	UJ	280	U
Acenaphthene	UG/KG	610	19%	5474.7	BENTHIC-CHRONIC	0	11	58	180	UJ	140	UJ	120	U
Acenaphthylene	UG/KG	130	17%			0	10	58	180	UJ	140	UJ	120	U
Anthracene	UG/KG	1700	47%	4184.235	BENTHIC-CHRONIC	0	27	58	180	UJ	140	UJ	120	U
Benzo(a)anthracene	UG/KG	5900	84%	50.8365	NYDEC HHB	26	49	58	28	J	12	J	19	J
Benzo(a)pyrene	UG/KG	5100	84%	50.8365	NYDEC HHB	26	49	58	23	J	17	J	23	J
Benzo(b)fluoranthene	UG/KG	4800	88%	50.8365	NYDEC HHB	35	51	58	74	J	43	J	70	J
Benzo(ghi)perylene	UG/KG	3200	78%			0	45	58	21	J	13	J	22	J
Benzo(k)fluoranthene	UG/KG	5700	43%	50.8365	NYDEC HHB	20	25	58	180	UR	140	UR	120	UR
Bis(2-Chloroethoxy)methane	UG/KG	0	0%			0	0	58	180	UJ	140	UJ	120	U
Bis(2-Chloroethyl)ether	UG/KG	0	0%			0	0	58	180	UJ	140	UJ	120	U
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%			0	0	49	180	UJ	140	UJ	120	U
Bis(2-Ethylhexyl)phthalate	UG/KG	42000	40%	7801.4475	BENTHIC-CHRONIC	1	23	58	180	UJ	140	UJ	120	U
Butylbenzylphthalate	UG/KG	16	9%			0	5	58	180	UJ	140	UJ	120	U
Carbazole	UG/KG	500	40%			0	23	58	180	UJ	140	UJ	120	UJ
Chrysene	UG/KG	6200	90%	50.8365	NYDEC HHB	34	52	58	49	J	24	J	35	J
Di-n-butylphthalate	UG/KG	250	47%			0	27	58	12	J	7.3	J	6.7	J
Di-n-octylphthalate	UG/KG	46	5%			0	3	58	180	UJ	140	UJ	120	U
Dibenz(a,h)anthracene	UG/KG	1200	50%			0	29	58	11	J	140	UJ	120	U
Dibenzofuran	UG/KG	230	17%			0	10	58	180	UJ	140	UJ	120	U
Diethyl phthalate	UG/KG	17	3%			0	2	58	180	UJ	140	UJ	120	U
Dimethylphthalate	UG/KG	0	0%			0	0	58	180	UJ	140	UJ	120	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-24		SD4-25		SD4-26	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41016		41017		41018	
									0		0		0	
									0.2		0.2		0.2	
									12/8/1998		12/8/1998		12/8/1998	
									SA		SA		SA	
									RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
ANALYTE	UNIT	MAX	FREQUENCY	NYS CRITERIA (1)	SPECIFIC CRITERIA (2)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	Value	Q	Value	Q	Value	Q
Fluoranthene	UG/KG	16000	93%	39887.1	BENTHIC-CHRONIC	0	54	58	82	J	36	J	52	J
Fluorene	UG/KG	660	22%	312.84	BENTHIC-CHRONIC	1	13	58	180	UJ	140	UJ	120	U
Hexachlorobenzene	UG/KG	840	3%	5.86575	NYDEC HHB	2	2	58	180	UJ	140	UJ	120	U
Hexachlorobutadiene	UG/KG	0	0%			0	0	58	180	UJ	140	UJ	120	U
Hexachlorocyclopentadiene	UG/KG	0	0%			0	0	58	180	UJ	140	UJ	120	UJ
Hexachloroethane	UG/KG	0	0%			0	0	58	180	UJ	140	UJ	120	U
Indeno(1,2,3-cd)pyrene	UG/KG	3100	74%	50.8365	NYDEC HHB	21	43	58	20	J	12	J	21	J
Isophorone	UG/KG	0	0%			0	0	58	180	UJ	140	UJ	120	U
N-Nitrosodiphenylamine	UG/KG	760	2%			0	1	58	180	UJ	140	UJ	120	U
N-Nitrosodipropylamine	UG/KG	410	2%			0	1	58	180	UJ	140	UJ	120	U
Naphthalene	UG/KG	13	12%	1173.15	BENTHIC-CHRONIC	0	7	58	180	UJ	140	UJ	6.1	J
Nitrobenzene	UG/KG	0	0%			0	0	58	180	UJ	140	UJ	120	U
Pentachlorophenol	UG/KG	0	0%	1564.2	BENTHIC-CHRONIC	0	0	58	430	UJ	340	UJ	280	U
Phenanthrene	UG/KG	7900	88%	4692.6	BENTHIC-CHRONIC	1	51	58	33	J	24	J	29	J
Phenol	UG/KG	210	7%	19.5525	BENTHIC-CHRONIC	4	4	58	180	UJ	140	UJ	120	U
Pyrene	UG/KG	12000	93%	37579.905	BENTHIC-CHRONIC	0	54	58	51	J	22	J	32	J
1,3,5-Trinitrobenzene	UG/KG	0	0%			0	0	58	120	UJ	120	UJ	120	U
1,3-Dinitrobenzene	UG/KG	0	0%			0	0	58	120	UJ	120	UJ	120	U
2,4,6-Trinitrotoluene	UG/KG	0	0%			0	0	58	120	UJ	120	UJ	120	U
2,4-Dinitrotoluene	UG/KG	0	0%			0	0	58	120	UJ	120	UJ	120	U
2,6-Dinitrotoluene	UG/KG	0	0%			0	0	58	120	UJ	120	UJ	120	U
2-Nitrotoluene	UG/KG	450	2%			0	1	49	120	U	120	U	120	U
2-amino-4,6-Dinitrotoluene	UG/KG	200	2%			0	1	58	120	UJ	120	UJ	120	U
3-Nitrotoluene	UG/KG	0	0%			0	0	49	120	U	120	U	120	U
4-Nitrotoluene	UG/KG	0	0%			0	0	49	120	U	120	U	120	U
4-amino-2,6-Dinitrotoluene	UG/KG	140	2%			0	1	58	120	UJ	120	UJ	120	U
HMX	UG/KG	0	0%			0	0	58	120	UJ	120	UJ	120	U
Nitrobenzene	UG/KG	0	0%			0	0	49	120	U	120	U	120	U
RDX	UG/KG	0	0%			0	0	58	120	UJ	120	UJ	120	U
Tetryl	UG/KG	0	0%			0	0	58	120	UJ	120	UJ	120	U
4,4'-DDD	UG/KG	90	22%	0.39105	NYDEC HHB	13	13	58	8.9	UJ	7	UJ	5.8	U
4,4'-DDE	UG/KG	86	33%	0.39105	NYDEC HHB	19	19	58	8.9	UJ	7	UJ	5.8	U
4,4'-DDT	UG/KG	45	28%	0.39105	NYDEC HHB	16	16	58	8.9	UJ	7	UJ	5.8	U
Aldrin	UG/KG	2.8	5%	3.9105	NYDEC HHB	0	3	58	4.6	UJ	3.6	UJ	3	U
Alpha-BHC	UG/KG	0	0%			0	0	58	4.6	UJ	3.6	UJ	3	U
Alpha-Chlordane	UG/KG	44	14%	0.039105	NYDEC HHB	8	8	58	4.6	UJ	3.6	UJ	3	U
Aroclor-1016	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	89	UJ	70	UJ	58	U
Aroclor-1221	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	180	UJ	140	UJ	120	U
Aroclor-1232	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	89	UJ	70	UJ	58	U
Aroclor-1242	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	89	UJ	70	UJ	58	U
Aroclor-1248	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	89	UJ	70	UJ	58	U

									SEAD-4		SEAD-4		SEAD-4	
									SD4-24		SD4-25		SD4-26	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41016		41017		41018	
									0		0		0	
									0.2		0.2		0.2	
									12/8/1998		12/8/1998		12/8/1998	
									SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF						
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
Aroclor-1254	UG/KG	580	45%	0.031284	NYDEC HHB	26	26	58	89	UJ	70	UJ	58	U
Aroclor-1260	UG/KG	250	16%	0.031284	NYDEC HHB	9	9	58	89	UJ	70	UJ	58	U
Beta-BHC	UG/KG	3.3	7%			0	4	58	4.6	UJ	3.6	UJ	3	U
Delta-BHC	UG/KG	0	0%			0	0	58	4.6	UJ	3.6	UJ	3	U
Dieldrin	UG/KG	18	7%	3.9105	NYDEC HHB	4	4	58	8.9	UJ	7	UJ	5.8	U
Endosulfan I	UG/KG	1.9	2%	1.17315	BENTHIC-CHRONIC	1	1	58	4.6	UJ	3.6	UJ	3	U
Endosulfan II	UG/KG	6.8	3%	1.17315	BENTHIC-CHRONIC	2	2	58	8.9	UJ	7	UJ	5.8	U
Endosulfan sulfate	UG/KG	12	9%			0	5	58	8.9	UJ	7	UJ	5.8	U
Endrin	UG/KG	0	0%	31.284	NYDEC W/H	0	0	58	8.9	UJ	7	UJ	5.8	U
Endrin aldehyde	UG/KG	15	12%			0	7	58	8.9	UJ	7	UJ	5.8	U
Endrin ketone	UG/KG	62	7%			0	4	58	8.9	UJ	7	UJ	5.8	U
Gamma-BHC/Lindane	UG/KG	0	0%			0	0	58	4.6	UJ	3.6	UJ	3	U
Gamma-Chlordane	UG/KG	40	17%	0.039105	NYDEC HHB	10	10	58	4.6	UJ	3.6	UJ	3	U
Heptachlor	UG/KG	2.4	2%	0.031284	NYDEC HHB	1	1	58	4.6	UJ	3.6	UJ	3	U
Heptachlor epoxide	UG/KG	10	10%	0.031284	NYDEC HHB	6	6	58	4.6	UJ	3.6	UJ	3	U
Methoxychlor	UG/KG	68	3%			0	2	58	46	UJ	36	UJ	30	U
Toxaphene	UG/KG	0	0%			0	0	58	460	UJ	360	UJ	300	U
2,4,5-T	UG/KG	21	11%			0	1	9						
2,4,5-TP/Silvex	UG/KG	0	0%			0	0	9						
2,4-D	UG/KG	0	0%			0	0	9						
2,4-DB	UG/KG	0	0%			0	0	9						
Dalapon	UG/KG	0	0%			0	0	9						
Dicamba	UG/KG	0	0%			0	0	9						
Dichloroprop	UG/KG	0	0%			0	0	9						
Dinoseb	UG/KG	0	0%			0	0	9						
MCPA	UG/KG	0	0%			0	0	9						
MCPP	UG/KG	0	0%			0	0	9						
Aluminum	MG/KG	22100	100%			0	58	58	14900	J	15900	J	17200	
Antimony	MG/KG	82.7	53%	2	NYS LEL	20	31	58	3.5	J	1.5	J	1.1	U
Arsenic	MG/KG	37.7	98%	6	NYS LEL	19	57	58	19.2	J	7.8	J	6.2	
Barium	MG/KG	488	100%			0	58	58	129	J	70.5	J	86.3	
Beryllium	MG/KG	1.1	100%			0	58	58	0.76	J	0.74	J	0.78	J
Cadmium	MG/KG	34.1	47%	0.6	NYS LEL	24	27	58	4.4	J	0.18	UJ	0.17	U
Calcium	MG/KG	140000	100%			0	58	58	36800	J	56700	J	46000	
Chromium	MG/KG	4800	100%	26	NYS LEL	28	58	58	23	J	24.1	J	22.9	J
Cobalt	MG/KG	28.4	100%			0	58	58	23.2	J	19.7	J	13.9	J
Copper	MG/KG	2640	100%	16	NYS LEL	55	58	58	51.5	J	37.8	J	30.7	
Cyanide	MG/KG	0	0%			0	0	58	1.5	UJ	1.2	UJ	0.87	UJ
Iron	MG/KG	87900	100%	20000	NYS LEL	45	58	58	41600	J	34200	J	28300	J
Lead	MG/KG	374	95%	31	NYS LEL	35	55	58	[illegible]	J	41.4	J	36.1	
Magnesium	MG/KG	27900	100%			0	58	58	7180	J	8660	J	8230	

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-24		SD4-25		SD4-26	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41016		41017		41018	
									0		0		0	
									0.2		0.2		0.2	
									12/8/1998		12/8/1998		12/8/1998	
									SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF						
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
Manganese	MG/KG	5480	100%	460	NYS LEL	28	58	58	1060	J	700	J	421	J
Mercury	MG/KG	2.4	59%	0.15	NYS LEL	16	34	58	0.13	UJ	0.11	UJ	0.08	UJ
Nickel	MG/KG	453	100%	16	NYS LEL	58	58	58	57.5	J	53.6	J	46.7	
Potassium	MG/KG	3460	100%			0	58	58	3110	J	3170	J	2000	
Selenium	MG/KG	6.1	41%			0	24	58	1	UJ	0.73	UJ	0.7	U
Silver	MG/KG	1.7	45%	1	NYS LEL	4	26	58	1	J	0.76	J	0.67	J
Sodium	MG/KG	1370	64%			0	37	58	217	J	162	J	98.8	J
Thallium	MG/KG	0	0%			0	0	58	18.6	UJ	1.3	UJ	1.3	U
Vanadium	MG/KG	1140	100%			0	58	58	70.2	J	30.3	J	35.2	
Zinc	MG/KG	1150	100%	120	NYS LEL	41	58	58	201	J	170	J	166	

Notes:

(1) Criteria calculated using a TOC of 3.91%. This is a site wide TOC value.

(2) NYSDEC HHB = NYS HUMAN HEALTH BIOACCUMULATION CRITERIA
BENTHIC-CHRONIC = NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITERIA
NYDEC W/H = NYS WILD/HUMAN BIOACCUM CRITERIA
NYS LEL = NYS LOWEST EFFECT LEVEL

Seneca [illegible] Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4		SEAD-4	
									SD4-27		SD4-28		SD4-29		SD4-3	
									SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
									41019		41020		41021		SD4-3	
									0		0		0		0	
									0.2		0.2		0.2		0.5	
									12/8/1998		12/8/1998		12/9/1998		11/2/1993	
									SA		SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		ESI	
				NYS	SPECIFIC	ABOVE	OF	OF								
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q	Value	Q
1,1,1-Trichloroethane	UG/KG	0	0%			0	0	58	25	U	18	U	13	U	23	U
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	11.7315	NYDEC HHB	0	0	58	25	UJ	18	UJ	13	UJ	23	U
1,1,2-Trichloroethane	UG/KG	0	0%			0	0	58	25	U	18	U	13	U	23	U
1,1-Dichloroethane	UG/KG	0	0%			0	0	58	25	U	18	U	13	U	23	U
1,1-Dichloroethene	UG/KG	0	0%	0.7821	NYDEC HHB	0	0	58	25	U	18	U	13	U	23	U
1,2-Dichloroethane	UG/KG	0	0%	27.3735	NYDEC HHB	0	0	58	25	U	18	U	13	U	23	U
1,2-Dichloroethene (total)	UG/KG	0	0%			0	0	58	25	U	18	U	13	U	23	U
1,2-Dichloropropane	UG/KG	0	0%			0	0	58	25	U	18	U	13	U	23	U
Acetone	UG/KG	210	26%			0	15	58	25	U	18	U	13	U	23	U
Benzene	UG/KG	0	0%	23.463	NYDEC HHB	0	0	58	25	U	18	U	13	U	23	U
Bromodichloromethane	UG/KG	0	0%			0	0	58	25	U	18	U	13	U	23	U
Bromoform	UG/KG	0	0%			0	0	58	25	UJ	18	UJ	13	UJ	23	U
Carbon disulfide	UG/KG	18	9%			0	5	58	25	U	18	U	13	U	12	J
Carbon tetrachloride	UG/KG	0	0%	23.463	NYDEC HHB	0	0	58	25	U	18	U	13	U	23	U
Chlorobenzene	UG/KG	0	0%	136.8675	BENTHIC-CHRONIC	0	0	58	25	UJ	18	UJ	13	UJ	23	U
Chlorodibromomethane	UG/KG	0	0%			0	0	58	25	U	18	U	13	U	23	U
Chloroethane	UG/KG	0	0%			0	0	58	25	U	18	U	13	U	23	U
Chloroform	UG/KG	14	3%			0	2	58	25	U	18	U	13	U	23	U
Cis-1,3-Dichloropropene	UG/KG	0	0%			0	0	58	25	U	18	U	13	U	23	U
Ethyl benzene	UG/KG	0	0%	938.52	BENTHIC-CHRONIC	0	0	58	25	UJ	18	UJ	13	UJ	23	U
Methyl bromide	UG/KG	0	0%			0	0	58	25	U	18	U	13	U	23	U
Methyl butyl ketone	UG/KG	0	0%			0	0	58	25	U	18	U	13	U	23	U
Methyl chloride	UG/KG	5	2%			0	1	58	25	U	18	U	13	U	23	U
Methyl ethyl ketone	UG/KG	49	2%			0	1	58	25	U	18	U	13	U	23	U
Methyl isobutyl ketone	UG/KG	0	0%			0	0	58	25	U	18	U	13	U	23	U
Methylene chloride	UG/KG	11	5%			0	3	58	25	U	18	U	13	U	23	U
Styrene	UG/KG	3	3%			0	2	58	25	UJ	18	UJ	13	UJ	23	U
Tetrachloroethene	UG/KG	0	0%	31.284	NYDEC HHB	0	0	58	25	U	18	U	13	U	23	U
Toluene	UG/KG	42	9%	1916.145	BENTHIC-CHRONIC	0	5	58	4	J	6	J	13	U	23	U
Total Xylenes	UG/KG	7	3%	3597.66	BENTHIC-CHRONIC	0	2	58	25	UJ	18	UJ	13	UJ	23	U
Trans-1,3-Dichloropropene	UG/KG	0	0%			0	0	58	25	U	18	U	13	U	23	U
Trichloroethene	UG/KG	0	0%	78.21	NYDEC HHB	0	0	58	25	U	18	U	13	U	23	U
Vinyl chloride	UG/KG	0	0%	2.73735	NYDEC HHB	0	0	58	25	U	18	U	13	U	23	U
1,2,4-Trichlorobenzene	UG/KG	0	0%			0	0	58	170	UJ	180	UJ	5400	U	410	U
1,2-Dichlorobenzene	UG/KG	0	0%	4692.6	BENTHIC-CHRONIC	0	0	58	170	UJ	180	UJ	5400	U	410	U
1,3-Dichlorobenzene	UG/KG	0	0%	469.26	BENTHIC-CHRONIC	0	0	58	170	UJ	180	UJ	5400	U	410	U
1,4-Dichlorobenzene	UG/KG	73	2%	469.26	BENTHIC-CHRONIC	0	1	58	170	UJ	180	UJ	5400	U	410	U
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%			0	0	9							410	U
2,4,5-Trichlorophenol	UG/KG	0	0%			0	0	58	420	UJ	430	UJ	13000	U	990	U
2,4,6-Trichlorophenol	UG/KG	0	0%			0	0	58	170	UJ	180	UJ	5400	U	410	U
2,4-Dichlorophenol	UG/KG	0	0%			0	0	58	170	UJ	180	UJ	5400	U	410	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4		SEAD-4	
									SD4-27		SD4-28		SD4-29		SD4-3	
									SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
									41019		41020		41021		SD4-3	
									0		0		0		0	
									0.2		0.2		0.2		0.5	
									12/8/1998		12/8/1998		12/9/1998		11/2/1993	
									SA		SA		SA		SA	
									RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		ESI	
ANALYTE	UNIT	MAX	FREQUENCY	NYS CRITERIA (1)	SPECIFIC CRITERIA (2)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	Value	Q	Value	Q	Value	Q	Value	Q
2,4-Dimethylphenol	UG/KG	0	0%	19.5525	BENTHIC-CHRONIC	0	0	58	170	UJ	180	UJ	5400	UJ	410	U
2,4-Dinitrophenol	UG/KG	0	0%			0	0	58	420	UJ	430	UJ	13000	UJ	990	U
2,4-Dinitrotoluene	UG/KG	0	0%			0	0	58	170	UJ	180	UJ	5400	U	410	U
2,6-Dinitrotoluene	UG/KG	0	0%			0	0	58	170	UJ	180	UJ	5400	U	410	U
2-Chloronaphthalene	UG/KG	0	0%			0	0	58	170	UJ	180	UJ	5400	U	410	U
2-Chlorophenol	UG/KG	0	0%			0	0	58	170	UJ	180	UJ	5400	U	410	U
2-Methylnaphthalene	UG/KG	31	9%	1329.57	BENTHIC-CHRONIC	0	5	58	170	UJ	180	U	5400	U	410	U
2-Methylphenol	UG/KG	0	0%			0	0	58	170	UJ	180	UJ	5400	U	410	U
2-Nitroaniline	UG/KG	0	0%			0	0	58	420	UJ	430	UJ	13000	U	990	U
2-Nitrophenol	UG/KG	0	0%	19.5525	BENTHIC-CHRONIC	0	0	58	170	UJ	180	UJ	5400	U	410	U
3,3'-Dichlorobenzidine	UG/KG	0	0%			0	0	58	170	UJ	180	UJ	5400	U	410	U
3-Nitroaniline	UG/KG	0	0%			0	0	58	420	UJ	430	UJ	13000	UJ	990	U
4,6-Dinitro-2-methylphenol	UG/KG	0	0%			0	0	58	420	UJ	430	UJ	13000	U	990	U
4-Bromophenyl phenyl ether	UG/KG	0	0%			0	0	58	170	UJ	180	UJ	5400	U	410	U
4-Chloro-3-methylphenol	UG/KG	0	0%			0	0	58	170	UJ	180	UJ	5400	U	410	U
4-Chloroaniline	UG/KG	0	0%			0	0	58	170	UJ	180	UJ	5400	UJ	410	U
4-Chlorophenyl phenyl ether	UG/KG	0	0%			0	0	58	170	UJ	180	UJ	5400	U	410	U
4-Methylphenol	UG/KG	140	10%	19.5525	BENTHIC-CHRONIC	2	6	58	170	UJ	180	UJ	5400	U	410	U
4-Nitroaniline	UG/KG	0	0%			0	0	58	420	UJ	430	U	13000	U	990	U
4-Nitrophenol	UG/KG	0	0%			0	0	58	420	UJ	430	U	13000	U	990	U
Acenaphthene	UG/KG	610	19%	5474.7	BENTHIC-CHRONIC	0	11	58	170	UJ	180	UJ	5400	U	410	U
Acenaphthylene	UG/KG	130	17%			0	10	58	54	J	11	J	5400	U	410	U
Anthracene	UG/KG	1700	47%	4184.235	BENTHIC-CHRONIC	0	27	58	33	J	13	J	5400	U	410	U
Benzo(a)anthracene	UG/KG	5900	84%	50.8365	NYDEC HHB	26	49	58	340	J	80	J	620	J	410	U
Benzo(a)pyrene	UG/KG	5100	84%	50.8365	NYDEC HHB	26	49	58	470	J	78	J	760	J	410	U
Benzo(b)fluoranthene	UG/KG	4800	88%	50.8365	NYDEC HHB	35	51	58	1000	J	260	J	530	J	410	U
Benzo(ghi)perylene	UG/KG	3200	78%			0	45	58	240	J	69	J	420	J	410	U
Benzo(k)fluoranthene	UG/KG	5700	43%	50.8365	NYDEC HHB	20	25	58	630	J	180	UR	970	J	410	U
Bis(2-Chloroethoxy)methane	UG/KG	0	0%			0	0	58	170	UJ	180	UJ	5400	U	410	U
Bis(2-Chloroethyl)ether	UG/KG	0	0%			0	0	58	170	UJ	180	UJ	5400	U	410	U
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%			0	0	49	170	UJ	180	UJ	5400	U		
Bis(2-Ethylhexyl)phthalate	UG/KG	42000	40%	7801.4475	BENTHIC-CHRONIC	1	23	58	170	U	180	UJ	42000		410	U
Butylbenzylphthalate	UG/KG	16	9%			0	5	58	15	J	180	UJ	5400	U	410	U
Carbazole	UG/KG	500	40%			0	23	58	25	J	180	UJ	5400	UJ	410	U
Chrysene	UG/KG	6200	90%	50.8365	NYDEC HHB	34	52	58	650	J	120	J	800	J	410	U
Di-n-butylphthalate	UG/KG	250	47%			0	27	58	170	UJ	17	J	5400	U	410	U
Di-n-octylphthalate	UG/KG	46	5%			0	3	58	12	J	180	UJ	5400	U	410	U
Dibenz(a,h)anthracene	UG/KG	1200	50%			0	29	58	120	J	24	J	5400	U	410	U
Dibenzofuran	UG/KG	230	17%			0	10	58	170	UJ	180	UJ	5400	U	410	U
Diethyl phthalate	UG/KG	17	3%			0	2	58	170	UJ	180	UJ	5400	U	410	U
Dimethylphthalate	UG/KG	0	0%			0	0	58	170	UJ	180	UJ	5400	U	410	U

Seneca A[illegible]epot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4		SEAD-4	
									SD4-27		SD4-28		SD4-29		SD4-3	
									SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
									41019		41020		41021		SD4-3	
									0		0		0		0	
									0.2		0.2		0.2		0.5	
									12/8/1998		12/8/1998		12/9/1998		11/2/1993	
									SA		SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		ESI	
				NYS	SPECIFIC	ABOVE	OF	OF								
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q	Value	Q
Fluoranthene	UG/KG	16000	93%	39887.1	BENTHIC-CHRONIC	0	54	58	420	J	160	J	1400	J	410	U
Fluorene	UG/KG	660	22%	312.84	BENTHIC-CHRONIC	1	13	58	170	UJ	180	UJ	5400	U	410	U
Hexachlorobenzene	UG/KG	840	3%	5.86575	NYDEC HHB	2	2	58	170	UJ	180	U	5400	U	410	U
Hexachlorobutadiene	UG/KG	0	0%			0	0	58	170	UJ	180	UJ	5400	U	410	U
Hexachlorocyclopentadiene	UG/KG	0	0%			0	0	58	170	UJ	180	UJ	5400	UJ	410	U
Hexachloroethane	UG/KG	0	0%			0	0	58	170	UJ	180	UJ	5400	U	410	U
Indeno(1,2,3-cd)pyrene	UG/KG	3100	74%	50.8365	NYDEC HHB	21	43	58	280	J	55	J	500	J	410	U
Isophorone	UG/KG	0	0%			0	0	58	170	UJ	180	UJ	5400	U	410	U
N-Nitrosodiphenylamine	UG/KG	760	2%			0	1	58	170	UJ	180	UJ	5400	U	410	U
N-Nitrosodipropylamine	UG/KG	410	2%			0	1	58	170	UJ	180	UJ	5400	U	410	U
Naphthalene	UG/KG	13	12%	1173.15	BENTHIC-CHRONIC	0	7	58	9.4	J	180	UJ	5400	U	410	U
Nitrobenzene	UG/KG	0	0%			0	0	58	170	UJ	180	UJ	5400	U	410	U
Pentachlorophenol	UG/KG	0	0%	1564.2	BENTHIC-CHRONIC	0	0	58	420	UJ	430	UJ	13000	U	990	U
Phenanthrene	UG/KG	7900	88%	4692.6	BENTHIC-CHRONIC	1	51	58	91	J	38	J	600	J	410	U
Phenol	UG/KG	210	7%	19.5525	BENTHIC-CHRONIC	4	4	58	170	UJ	210	J	5400	U	410	U
Pyrene	UG/KG	12000	93%	37579.905	BENTHIC-CHRONIC	0	54	58	350	J	120	J	1100	J	410	U
1,3,5-Trinitrobenzene	UG/KG	0	0%			0	0	58	120	U	120	U	120	U	130	U
1,3-Dinitrobenzene	UG/KG	0	0%			0	0	58	120	U	120	U	120	U	130	U
2,4,6-Trinitrotoluene	UG/KG	0	0%			0	0	58	120	U	120	U	120	U	130	U
2,4-Dinitrotoluene	UG/KG	0	0%			0	0	58	120	U	120	U	120	U	130	U
2,6-Dinitrotoluene	UG/KG	0	0%			0	0	58	120	U	120	U	120	U	130	U
2-Nitrotoluene	UG/KG	450	2%			0	1	49	120	U	120	U	120	U		
2-amino-4,6-Dinitrotoluene	UG/KG	200	2%			0	1	58	120	U	120	U	120	U	130	U
3-Nitrotoluene	UG/KG	0	0%			0	0	49	120	U	120	U	120	U		
4-Nitrotoluene	UG/KG	0	0%			0	0	49	120	U	120	U	120	U		
4-amino-2,6-Dinitrotoluene	UG/KG	140	2%			0	1	58	120	U	120	U	120	U	130	U
HMX	UG/KG	0	0%			0	0	58	120	U	120	U	120	U	130	U
Nitrobenzene	UG/KG	0	0%			0	0	49	120	U	120	U	120	U		
RDX	UG/KG	0	0%			0	0	58	120	U	120	U	120	U	130	U
Tetryl	UG/KG	0	0%			0	0	58	120	U	120	U	120	U	130	U
4,4'-DDD	UG/KG	90	22%	0.39105	NYDEC HHB	13	13	58	8.7	UJ	8.9	UJ	5.4	U	4.1	U
4,4'-DDE	UG/KG	86	33%	0.39105	NYDEC HHB	19	19	58	8.7	UJ	8.9	UJ	4.5	J	4.1	U
4,4'-DDT	UG/KG	45	28%	0.39105	NYDEC HHB	16	16	58	8.7	UJ	8.9	UJ	8		4.1	U
Aldrin	UG/KG	2.8	5%	3.9105	NYDEC HHB	0	3	58	4.5	UJ	4.6	UJ	2.8	U	2.1	U
Alpha-BHC	UG/KG	0	0%			0	0	58	4.5	UJ	4.6	UJ	2.8	U	2.1	U
Alpha-Chlordane	UG/KG	44	14%	0.039105	NYDEC HHB	8	8	58	4.5	UJ	4.6	UJ	2.8	U	2.1	U
Aroclor-1016	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	87	UJ	89	UJ	54	U	41	U
Aroclor-1221	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	180	UJ	180	UJ	110	U	83	U
Aroclor-1232	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	87	UJ	89	UJ	54	U	41	U
Aroclor-1242	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	87	UJ	89	UJ	54	U	41	U
Aroclor-1248	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	87	UJ	89	UJ	54	U	41	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4		SEAD-4	
									SD4-27		SD4-28		SD4-29		SD4-3	
									SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
									41019		41020		41021		SD4-3	
									0		0		0		0	
									0.2		0.2		0.2		0.5	
									12/8/1998		12/8/1998		12/9/1998		11/2/1993	
									SA		SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		ESI	
				NYS	SPECIFIC	ABOVE	OF	OF								
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q	Value	Q
Aroclor-1254	UG/KG	580	45%	0.031284	NYDEC HHB	26	26	58	87	UJ	**80**	J	**82**	J	**29**	J
Aroclor-1260	UG/KG	250	16%	0.031284	NYDEC HHB	9	9	58	87	UJ	**220**	J	54	U	41	U
Beta-BHC	UG/KG	3.3	7%			0	4	58	4.5	UJ	4.6	UJ	2.8	U	2.1	U
Delta-BHC	UG/KG	0	0%			0	0	58	4.5	UJ	4.6	UJ	2.8	U	2.1	U
Dieldrin	UG/KG	18	7%	3.9105	NYDEC HHB	4	4	58	8.7	UJ	8.9	UJ	5.4	U	4.1	U
Endosulfan I	UG/KG	1.9	2%	1.17315	BENTHIC-CHRONIC	1	1	58	4.5	UJ	4.6	UJ	2.8	U	2.1	U
Endosulfan II	UG/KG	6.8	3%	1.17315	BENTHIC-CHRONIC	2	2	58	8.7	UJ	8.9	UJ	5.4	U	4.1	U
Endosulfan sulfate	UG/KG	12	9%			0	5	58	8.7	UJ	8.9	UJ	5.4	U	4.1	U
Endrin	UG/KG	0	0%	31.284	NYDEC W/H	0	0	58	8.7	UJ	8.9	UJ	5.4	U	4.1	U
Endrin aldehyde	UG/KG	15	12%			0	7	58	8.7	UJ	8.9	UJ	5.4	U	4.1	U
Endrin ketone	UG/KG	62	7%			0	4	58	8.7	UJ	8.9	UJ	4.1	J	4.1	U
Gamma-BHC/Lindane	UG/KG	0	0%			0	0	58	4.5	UJ	4.6	UJ	2.8	U	2.1	U
Gamma-Chlordane	UG/KG	40	17%	0.039105	NYDEC HHB	10	10	58	4.5	UJ	4.6	UJ	2.8	U	2.1	U
Heptachlor	UG/KG	2.4	2%	0.031284	NYDEC HHB	1	1	58	4.5	UJ	4.6	UJ	2.8	U	2.1	U
Heptachlor epoxide	UG/KG	10	10%	0.031284	NYDEC HHB	6	6	58	4.5	UJ	4.6	UJ	2.8	U	2.1	U
Methoxychlor	UG/KG	68	3%			0	2	58	45	UJ	46	UJ	28	U	21	U
Toxaphene	UG/KG	0	0%			0	0	58	450	UJ	460	UJ	280	U	210	U
2,4,5-T	UG/KG	21	11%			0	1	9							6.2	U
2,4,5-TP/Silvex	UG/KG	0	0%			0	0	9							6.2	U
2,4-D	UG/KG	0	0%			0	0	9							62	U
2,4-DB	UG/KG	0	0%			0	0	9							62	U
Dalapon	UG/KG	0	0%			0	0	9							150	U
Dicamba	UG/KG	0	0%			0	0	9							6.2	U
Dichloroprop	UG/KG	0	0%			0	0	9							62	U
Dinoseb	UG/KG	0	0%			0	0	9							31	U
MCPA	UG/KG	0	0%			0	0	9							6200	U
MCPP	UG/KG	0	0%			0	0	9							6200	U
Aluminum	MG/KG	22100	100%			0	58	58	14500	J	18100	J	17000		15000	
Antimony	MG/KG	82.7	53%	2	NYS LEL	20	31	58	**9.5**	J	1.3	UJ	0.84	U	**50.4**	
Arsenic	MG/KG	37.7	98%	6	NYS LEL	19	57	58	**37.7**	J	**18.3**	J	**8.5**		**8.1**	
Barium	MG/KG	488	100%			0	58	58	160	J	488	J	121		68.8	
Beryllium	MG/KG	1.1	100%			0	58	58	0.76	J	1.1	J	0.77	J	0.65	J
Cadmium	MG/KG	34.1	47%	0.6	NYS LEL	24	27	58	**2.4**	J	**0.93**	J	0.14	U	0.59	U
Calcium	MG/KG	140000	100%			0	58	58	49300	J	129000	J	22500		11800	
Chromium	MG/KG	4800	100%	26	NYS LEL	28	58	58	19.1	J	**45.1**	J	22.8	J	**3310**	
Cobalt	MG/KG	28.4	100%			0	58	58	24	J	27.7	J	19.2		12.4	
Copper	MG/KG	2640	100%	16	NYS LEL	55	58	58	**36.2**	J	**551**	J	**36.6**		**2640**	
Cyanide	MG/KG	0	0%			0	0	58	1.5	UJ	1.7	UJ	0.92	UJ	0.6	U
Iron	MG/KG	87900	100%	20000	NYS LEL	45	58	58	**73800**	J	**87900**	J	**31400**	J	**29200**	
Lead	MG/KG	374	95%	31	NYS LEL	35	55	58	**50.2**	J	**214**	J	**52.6**		16.6	
Magnesium	MG/KG	27900	100%			0	58	58	6610	J	9150	J	8780		6070	

Seneca [illegible] Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4		SEAD-4	
									SD4-27		SD4-28		SD4-29		SD4-3	
									SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
									41019		41020		41021		SD4-3	
									0		0		0		0	
									0.2		0.2		0.2		0.5	
									12/8/1998		12/8/1998		12/9/1998		11/2/1993	
									SA		SA		SA		SA	
ANALYTE	UNIT	MAX	FREQUENCY	NYS CRITERIA (1)	SPECIFIC CRITERIA (2)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	RI PHASE 1 STEP 1 Value	Q	RI PHASE 1 STEP 1 Value	Q	RI PHASE 1 STEP 1 Value	Q	ESI Value	Q
Manganese	MG/KG	5480	100%	460	NYS LEL	28	58	58	**819**	J	**3050**	J	**1430**	J	430	
Mercury	MG/KG	2.4	59%	0.15	NYS LEL	16	34	58	0.12	UJ	**0.5**	J	0.07	UJ	0.13	
Nickel	MG/KG	453	100%	16	NYS LEL	58	58	58	**51.6**	J	**453**	J	**50**		**33.4**	
Potassium	MG/KG	3460	100%			0	58	58	2040	J	2830	J	2100		1410	
Selenium	MG/KG	6.1	41%			0	24	58	1.2	J	6.1	J	0.84	J	0.26	U
Silver	MG/KG	1.7	45%	1	NYS LEL	4	26	58	**1.2**	J	1	J	0.35	J	1.2	U
Sodium	MG/KG	1370	64%			0	37	58	306	J	1370	J	77.3	J	78	J
Thallium	MG/KG	0	0%			0	0	58	1.7	UJ	15.4	UJ	9.8	U	0.28	U
Vanadium	MG/KG	1140	100%			0	58	58	48.9	J	1140	J	31.3		23.7	
Zinc	MG/KG	1150	100%	120	NYS LEL	41	58	58	**340**	J	**916**	J	**128**		**630**	

Notes:

(1) Criteria calculated using a TOC of 3.91%. This is a site wide TOC value

(2) NYSDEC HHB = NYS HUMAN HEALTH BIOACCUMULATION CRITERIA
BENTHIC-CHRONIC = NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITERIA
NYDEC W/H = NYS WILD/HUMAN BIOACCUM CRITERIA
NYS LEL = NYS LOWEST EFFECT LEVEL

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-30		SD4-31		SD4-32	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41022		41023		41024	
									0		0		0	
									0.2		0.2		0.2	
									12/9/1998		12/9/1998		12/14/1998	
									SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF						
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
1,1,1-Trichloroethane	UG/KG	0	0%			0	0	58	42	U	21	U	20	UJ
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	11.7315	NYDEC HHB	0	0	58	42	U	21	U	20	UJ
1,1,2-Trichloroethane	UG/KG	0	0%			0	0	58	42	U	21	U	20	UJ
1,1-Dichloroethane	UG/KG	0	0%			0	0	58	42	U	21	U	20	UJ
1,1-Dichloroethene	UG/KG	0	0%	0.7821	NYDEC HHB	0	0	58	42	U	21	U	20	UJ
1,2-Dichloroethane	UG/KG	0	0%	27.3735	NYDEC HHB	0	0	58	42	U	21	U	20	UJ
1,2-Dichloroethene (total)	UG/KG	0	0%			0	0	58	42	U	21	U	20	UJ
1,2-Dichloropropane	UG/KG	0	0%			0	0	58	42	U	21	U	20	UJ
Acetone	UG/KG	210	26%			0	15	58	140		8	J	20	UJ
Benzene	UG/KG	0	0%	23.463	NYDEC HHB	0	0	58	42	U	21	U	20	UJ
Bromodichloromethane	UG/KG	0	0%			0	0	58	42	U	21	U	20	UJ
Bromoform	UG/KG	0	0%			0	0	58	42	U	21	U	20	UJ
Carbon disulfide	UG/KG	18	9%			0	5	58	42	U	21	U	20	UJ
Carbon tetrachloride	UG/KG	0	0%	23.463	NYDEC HHB	0	0	58	42	U	21	U	20	UJ
Chlorobenzene	UG/KG	0	0%	136.8675	BENTHIC-CHRONIC	0	0	58	42	U	21	U	20	UJ
Chlorodibromomethane	UG/KG	0	0%			0	0	58	42	U	21	U	20	UJ
Chloroethane	UG/KG	0	0%			0	0	58	42	U	21	U	20	UJ
Chloroform	UG/KG	14	3%			0	2	58	14	J	21	U	20	UJ
Cis-1,3-Dichloropropene	UG/KG	0	0%			0	0	58	42	U	21	U	20	UJ
Ethyl benzene	UG/KG	0	0%	938.52	BENTHIC-CHRONIC	0	0	58	42	U	21	U	20	UJ
Methyl bromide	UG/KG	0	0%			0	0	58	42	U	21	U	20	UJ
Methyl butyl ketone	UG/KG	0	0%			0	0	58	42	U	21	U	20	UJ
Methyl chloride	UG/KG	5	2%			0	1	58	42	U	21	U	20	UJ
Methyl ethyl ketone	UG/KG	49	2%			0	1	58	42	U	21	U	20	UJ
Methyl isobutyl ketone	UG/KG	0	0%			0	0	58	42	U	21	U	20	UJ
Methylene chloride	UG/KG	11	5%			0	3	58	7	J	21	U	20	UJ
Styrene	UG/KG	3	3%			0	2	58	42	U	21	U	20	UJ
Tetrachloroethene	UG/KG	0	0%	31.284	NYDEC HHB	0	0	58	42	U	21	U	20	UJ
Toluene	UG/KG	42	9%	1916.145	BENTHIC-CHRONIC	0	5	58	42	U	21	U	20	UJ
Total Xylenes	UG/KG	7	3%	3597.66	BENTHIC-CHRONIC	0	2	58	42	U	21	U	20	UJ
Trans-1,3-Dichloropropene	UG/KG	0	0%			0	0	58	42	U	21	U	20	UJ
Trichloroethene	UG/KG	0	0%	78.21	NYDEC HHB	0	0	58	42	U	21	U	20	UJ
Vinyl chloride	UG/KG	0	0%	2.73735	NYDEC HHB	0	0	58	42	U	21	U	20	UJ
1,2,4-Trichlorobenzene	UG/KG	0	0%			0	0	58	110	U	130	UJ	140	UJ
1,2-Dichlorobenzene	UG/KG	0	0%	4692.6	BENTHIC-CHRONIC	0	0	58	110	U	130	UJ	140	UJ
1,3-Dichlorobenzene	UG/KG	0	0%	469.26	BENTHIC-CHRONIC	0	0	58	110	U	130	UJ	140	UJ
1,4-Dichlorobenzene	UG/KG	73	2%	469.26	BENTHIC-CHRONIC	0	1	58	110	U	130	UJ	140	UJ
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%			0	0	9						
2,4,5-Trichlorophenol	UG/KG	0	0%			0	0	58	260	U	320	UJ	330	UJ
2,4,6-Trichlorophenol	UG/KG	0	0%			0	0	58	110	U	130	UJ	140	UJ
2,4-Dichlorophenol	UG/KG	0	0%			0	0	58	110	U	130	UJ	140	UJ

Seneca A[illegible]epot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-30		SD4-31		SD4-32	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41022		41023		41024	
									0		0		0	
									0.2		0.2		0.2	
									12/9/1998		12/9/1998		12/14/1998	
									SA		SA		SA	
									RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
ANALYTE	UNIT	MAX	FREQUENCY	NYS CRITERIA (1)	SPECIFIC CRITERIA (2)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	Value	Q	Value	Q	Value	Q
2,4-Dimethylphenol	UG/KG	0	0%	19.5525	BENTHIC-CHRONIC	0	0	58	110	UJ	130	UJ	140	UJ
2,4-Dinitrophenol	UG/KG	0	0%			0	0	58	260	UJ	320	UJ	330	UJ
2,4-Dinitrotoluene	UG/KG	0	0%			0	0	58	110	U	130	UJ	140	UJ
2,6-Dinitrotoluene	UG/KG	0	0%			0	0	58	110	U	130	UJ	140	UJ
2-Chloronaphthalene	UG/KG	0	0%			0	0	58	110	U	130	UJ	140	UJ
2-Chlorophenol	UG/KG	0	0%			0	0	58	110	U	130	UJ	140	UJ
2-Methylnaphthalene	UG/KG	31	9%	1329.57	BENTHIC-CHRONIC	0	5	58	110	U	11	UJ	140	UJ
2-Methylphenol	UG/KG	0	0%			0	0	58	110	U	130	UJ	140	UJ
2-Nitroaniline	UG/KG	0	0%			0	0	58	260	UJ	320	UJ	330	UJ
2-Nitrophenol	UG/KG	0	0%	19.5525	BENTHIC-CHRONIC	0	0	58	110	U	130	UJ	140	UJ
3,3'-Dichlorobenzidine	UG/KG	0	0%			0	0	58	110	U	130	UJ	140	UJ
3-Nitroaniline	UG/KG	0	0%			0	0	58	260	U	320	UJ	330	UJ
4,6-Dinitro-2-methylphenol	UG/KG	0	0%			0	0	58	260	U	320	UJ	330	UJ
4-Bromophenyl phenyl ether	UG/KG	0	0%			0	0	58	110	U	130	UJ	140	UJ
4-Chloro-3-methylphenol	UG/KG	0	0%			0	0	58	110	U	130	UJ	140	UJ
4-Chloroaniline	UG/KG	0	0%			0	0	58	110	UJ	130	UJ	140	UJ
4-Chlorophenyl phenyl ether	UG/KG	0	0%			0	0	58	110	U	130	UJ	140	UJ
4-Methylphenol	UG/KG	140	10%	19.5525	BENTHIC-CHRONIC	2	6	58	110	U	9.7	J	140	UJ
4-Nitroaniline	UG/KG	0	0%			0	0	58	260	U	320	U	330	UJ
4-Nitrophenol	UG/KG	0	0%			0	0	58	260	U	320	U	330	UJ
Acenaphthene	UG/KG	610	19%	5474.7	BENTHIC-CHRONIC	0	11	58	110	U	130	UJ	140	UJ
Acenaphthylene	UG/KG	130	17%			0	10	58	110	U	130	UJ	140	UJ
Anthracene	UG/KG	1700	47%	4184.235	BENTHIC-CHRONIC	0	27	58	110	U	130	UJ	8	J
Benzo(a)anthracene	UG/KG	5900	84%	50.8365	NYDEC HHB	26	49	58	12	J	22	J	23	J
Benzo(a)pyrene	UG/KG	5100	84%	50.8365	NYDEC HHB	26	49	58	14	J	33	J	26	J
Benzo(b)fluoranthene	UG/KG	4800	88%	50.8365	NYDEC HHB	35	51	58	38	J	80	J	37	J
Benzo(ghi)perylene	UG/KG	3200	78%			0	45	58	15	J	34	J	35	J
Benzo(k)fluoranthene	UG/KG	5700	43%	50.8365	NYDEC HHB	20	25	58	110	UR	130	UR	35	J
Bis(2-Chloroethoxy)methane	UG/KG	0	0%			0	0	58	110	U	130	UJ	140	UJ
Bis(2-Chloroethyl)ether	UG/KG	0	0%			0	0	58	110	U	130	UJ	140	UJ
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%			0	0	49	110	U	130	UJ	140	UJ
Bis(2-Ethylhexyl)phthalate	UG/KG	42000	40%	7801.4475	BENTHIC-CHRONIC	1	23	58	110	U	590	J	140	UJ
Butylbenzylphthalate	UG/KG	16	9%			0	5	58	8.6	J	15	J	16	J
Carbazole	UG/KG	500	40%			0	23	58	110	UJ	7	J	7.5	J
Chrysene	UG/KG	6200	90%	50.8365	NYDEC HHB	34	52	58	26	J	54	J	50	J
Di-n-butylphthalate	UG/KG	250	47%			0	27	58	110	U	130	UJ	140	UJ
Di-n-octylphthalate	UG/KG	46	5%			0	3	58	110	U	6.7	J	140	UJ
Dibenz(a,h)anthracene	UG/KG	1200	50%			0	29	58	7.3	J	12	J	13	J
Dibenzofuran	UG/KG	230	17%			0	10	58	110	U	130	UJ	140	UJ
Diethyl phthalate	UG/KG	17	3%			0	2	58	110	U	17	J	140	UJ
Dimethylphthalate	UG/KG	0	0%			0	0	58	110	U	130	UJ	140	UJ

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-30		SD4-31		SD4-32	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41022		41023		41024	
									0		0		0	
									0.2		0.2		0.2	
									12/9/1998		12/9/1998		12/14/1998	
									SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF						
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
Fluoranthene	UG/KG	16000	93%	39887.1	BENTHIC-CHRONIC	0	54	58	34	J	64	J	85	J
Fluorene	UG/KG	660	22%	312.84	BENTHIC-CHRONIC	1	13	58	110	U	130	UJ	140	UJ
Hexachlorobenzene	UG/KG	840	3%	5.86575	NYDEC HHB	2	2	58	110	U	130	U	140	UJ
Hexachlorobutadiene	UG/KG	0	0%			0	0	58	110	U	130	UJ	140	UJ
Hexachlorocyclopentadiene	UG/KG	0	0%			0	0	58	110	UJ	130	UJ	140	UJ
Hexachloroethane	UG/KG	0	0%			0	0	58	110	U	130	UJ	140	UJ
Indeno(1,2,3-cd)pyrene	UG/KG	3100	74%	50.8365	NYDEC HHB	21	43	58	11	J	28	J	27	J
Isophorone	UG/KG	0	0%			0	0	58	110	U	130	UJ	140	UJ
N-Nitrosodiphenylamine	UG/KG	760	2%			0	1	58	110	U	130	UJ	140	UJ
N-Nitrosodipropylamine	UG/KG	410	2%			0	1	58	110	U	130	UJ	140	UJ
Naphthalene	UG/KG	13	12%	1173.15	BENTHIC-CHRONIC	0	7	58	110	U	8.9	J	140	UJ
Nitrobenzene	UG/KG	0	0%			0	0	58	110	U	130	UJ	140	UJ
Pentachlorophenol	UG/KG	0	0%	1564.2	BENTHIC-CHRONIC	0	0	58	260	U	320	UJ	330	UJ
Phenanthrene	UG/KG	7900	88%	4692.6	BENTHIC-CHRONIC	1	51	58	19	J	33	J	50	J
Phenol	UG/KG	210	7%	19.5525	BENTHIC-CHRONIC	4	4	58	110	U	130	UJ	140	UJ
Pyrene	UG/KG	12000	93%	37579.905	BENTHIC-CHRONIC	0	54	58	22	J	47	J	60	J
1,3,5-Trinitrobenzene	UG/KG	0	0%			0	0	58	120	U	120	U	120	UJ
1,3-Dinitrobenzene	UG/KG	0	0%			0	0	58	120	U	120	U	120	UJ
2,4,6-Trinitrotoluene	UG/KG	0	0%			0	0	58	120	U	120	U	120	UJ
2,4-Dinitrotoluene	UG/KG	0	0%			0	0	58	120	U	120	U	120	UJ
2,6-Dinitrotoluene	UG/KG	0	0%			0	0	58	120	U	120	U	120	UJ
2-Nitrotoluene	UG/KG	450	2%			0	1	49	120	U	120	U	120	UJ
2-amino-4,6-Dinitrotoluene	UG/KG	200	2%			0	1	58	120	U	120	U	120	UJ
3-Nitrotoluene	UG/KG	0	0%			0	0	49	120	U	120	U	120	UJ
4-Nitrotoluene	UG/KG	0	0%			0	0	49	120	U	120	U	120	UJ
4-amino-2,6-Dinitrotoluene	UG/KG	140	2%			0	1	58	120	U	120	U	120	UJ
HMX	UG/KG	0	0%			0	0	58	120	U	120	U	120	UJ
Nitrobenzene	UG/KG	0	0%			0	0	49	120	U	120	U	120	UJ
RDX	UG/KG	0	0%			0	0	58	120	U	120	U	120	UJ
Tetryl	UG/KG	0	0%			0	0	58	120	U	120	U	120	UJ
4,4'-DDD	UG/KG	90	22%	0.39105	NYDEC HHB	13	13	58	5.4	U	6.6	U	6.9	UJ
4,4'-DDE	UG/KG	86	33%	0.39105	NYDEC HHB	19	19	58	5.4	U	6.6	U	6.9	UJ
4,4'-DDT	UG/KG	45	28%	0.39105	NYDEC HHB	16	16	58	5.4	U	6	J	6.9	UJ
Aldrin	UG/KG	2.8	5%	3.9105	NYDEC HHB	0	3	58	2.8	U	3.4	U	3.5	UJ
Alpha-BHC	UG/KG	0	0%			0	0	58	2.8	U	3.4	U	3.5	UJ
Alpha-Chlordane	UG/KG	44	14%	0.039105	NYDEC HHB	8	8	58	2.8	U	3.4	U	3.5	UJ
Aroclor-1016	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	54	U	66	U	69	UJ
Aroclor-1221	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	110	U	130	U	140	UJ
Aroclor-1232	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	54	U	66	U	69	UJ
Aroclor-1242	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	54	U	66	U	69	UJ
Aroclor-1248	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	54	U	66	U	69	UJ

Seneca A[illegible]epot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-30		SD4-31		SD4-32	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41022		41023		41024	
									0		0		0	
									0.2		0.2		0.2	
									12/9/1998		12/9/1998		12/14/1998	
									SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF						
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
Aroclor-1254	UG/KG	580	45%	0.031284	NYDEC HHB	26	26	58	43	J	77		40	J
Aroclor-1260	UG/KG	250	16%	0.031284	NYDEC HHB	9	9	58	54	U	66	U	69	UJ
Beta-BHC	UG/KG	3.3	7%			0	4	58	2.8	U	3.4	U	3.5	UJ
Delta-BHC	UG/KG	0	0%			0	0	58	2.8	U	3.4	U	3.5	UJ
Dieldrin	UG/KG	18	7%	3.9105	NYDEC HHB	4	4	58	5.4	U	6.6	U	6.9	UJ
Endosulfan I	UG/KG	1.9	2%	1.17315	BENTHIC-CHRONIC	1	1	58	2.8	U	3.4	U	3.5	UJ
Endosulfan II	UG/KG	6.8	3%	1.17315	BENTHIC-CHRONIC	2	2	58	5.4	U	6.6	U	6.9	UJ
Endosulfan sulfate	UG/KG	12	9%			0	5	58	5.4	U	6.6	U	6.9	UJ
Endrin	UG/KG	0	0%	31.284	NYDEC W/H	0	0	58	5.4	U	6.6	U	6.9	UJ
Endrin aldehyde	UG/KG	15	12%			0	7	58	5.4	U	6.6	U	6.9	UJ
Endrin ketone	UG/KG	62	7%			0	4	58	5.4	U	6.6	U	6.9	UJ
Gamma-BHC/Lindane	UG/KG	0	0%			0	0	58	2.8	U	3.4	U	3.5	UJ
Gamma-Chlordane	UG/KG	40	17%	0.039105	NYDEC HHB	10	10	58	2.8	U	3.4	U	3.5	UJ
Heptachlor	UG/KG	2.4	2%	0.031284	NYDEC HHB	1	1	58	2.8	U	3.4	U	3.5	UJ
Heptachlor epoxide	UG/KG	10	10%	0.031284	NYDEC HHB	6	6	58	2.8	U	3.4	U	3.5	UJ
Methoxychlor	UG/KG	68	3%			0	2	58	28	U	34	U	35	UJ
Toxaphene	UG/KG	0	0%			0	0	58	280	U	340	U	350	UJ
2,4,5-T	UG/KG	21	11%			0	1	9						
2,4,5-TP/Silvex	UG/KG	0	0%			0	0	9						
2,4-D	UG/KG	0	0%			0	0	9						
2,4-DB	UG/KG	0	0%			0	0	9						
Dalapon	UG/KG	0	0%			0	0	9						
Dicamba	UG/KG	0	0%			0	0	9						
Dichloroprop	UG/KG	0	0%			0	0	9						
Dinoseb	UG/KG	0	0%			0	0	9						
MCPA	UG/KG	0	0%			0	0	9						
MCPP	UG/KG	0	0%			0	0	9						
Aluminum	MG/KG	22100	100%			0	58	58	7940		11800		14600	J
Antimony	MG/KG	82.7	53%	2	NYS LEL	20	31	58	9.3	J	1.6	J	1.2	UR
Arsenic	MG/KG	37.7	98%	6	NYS LEL	19	57	58	2	J	7		13.5	J
Barium	MG/KG	488	100%			0	58	58	62.7	J	63.1		99.3	J
Beryllium	MG/KG	1.1	100%			0	58	58	0.35	J	0.6	J	0.75	J
Cadmium	MG/KG	34.1	47%	0.6	NYS LEL	24	27	58	1.2	J	0.82	J	0.51	J
Calcium	MG/KG	140000	100%			0	58	58	10200		69100		73300	J
Chromium	MG/KG	4800	100%	26	NYS LEL	28	58	58	12.7	J	24		27.1	J
Cobalt	MG/KG	28.4	100%			0	58	58	7.7	J	11.9	J	14.8	J
Copper	MG/KG	2640	100%	16	NYS LEL	55	58	58	17.2		33.1		42.3	J
Cyanide	MG/KG	0	0%			0	0	58	0.85	UJ	1.1	U	1.2	UJ
Iron	MG/KG	87900	100%	20000	NYS LEL	45	58	58	12900	J	29900	J	46100	J
Lead	MG/KG	374	95%	31	NYS LEL	35	55	58	69.2		45.3		48.5	J
Magnesium	MG/KG	27900	100%			0	58	58	2590		8050		12400	J

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-30		SD4-31		SD4-32	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41022		41023		41024	
									0		0		0	
									0.2		0.2		0.2	
									12/9/1998		12/9/1998		12/14/1998	
									SA		SA		SA	
									RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
ANALYTE	UNIT	MAX	FREQUENCY	NYS CRITERIA (1)	SPECIFIC CRITERIA (2)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	Value	Q	Value	Q	Value	Q
Manganese	MG/KG	5480	100%	460	NYS LEL	28	58	58	447	J	245		373	J
Mercury	MG/KG	2.4	59%	0.15	NYS LEL	16	34	58	0.08	U	0.13	J	0.13	J
Nickel	MG/KG	453	100%	16	NYS LEL	58	58	58	19.3		37		46	J
Potassium	MG/KG	3460	100%			0	58	58	1100	J	1950		2470	J
Selenium	MG/KG	6.1	41%			0	24	58	0.65	U	1	U	1.4	UJ
Silver	MG/KG	1.7	45%	1	NYS LEL	4	26	58	0.36	J	0.28	U	0.39	UJ
Sodium	MG/KG	1370	64%			0	37	58	118	J	142	J	113	J
Thallium	MG/KG	0	0%			0	0	58	1.2	U	1	U	1.4	UJ
Vanadium	MG/KG	1140	100%			0	58	58	16.5		31.9		40.6	J
Zinc	MG/KG	1150	100%	120	NYS LEL	41	58	58	90.3		164		156	J

Notes:

(1) Criteria calculated using a TOC of 3.91%. This is a site wide TOC value.

(2) NYSDEC HHB = NYS HUMAN HEALTH BIOACCUMULATION CRITERIA
BENTHIC-CHRONIC = NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITERIA
NYDEC W/H = NYS WILD/HUMAN BIOACCUM CRITERIA
NYS LEL = NYS LOWEST EFFECT LEVEL

Seneca Arm[illegible]pot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-33		SD4-34		SD4-35	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41026		41027		41028	
									0		0		0	
									0.2		0.2		0.2	
									12/9/1998		12/9/1998		12/9/1998	
									SA		SA		SA	
									RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
ANALYTE	UNIT	MAX	FREQUENCY	NYS CRITERIA (1)	SPECIFIC CRITERIA (2)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	Value	Q	Value	Q	Value	Q
1,1,1-Trichloroethane	UG/KG	0	0%			0	0	58	12	U	14	U	18	U
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	11.7315	NYDEC HHB	0	0	58	12	U	14	UJ	18	UJ
1,1,2-Trichloroethane	UG/KG	0	0%			0	0	58	12	U	14	U	18	U
1,1-Dichloroethane	UG/KG	0	0%			0	0	58	12	U	14	U	18	U
1,1-Dichloroethene	UG/KG	0	0%	0.7821	NYDEC HHB	0	0	58	12	U	14	U	18	U
1,2-Dichloroethane	UG/KG	0	0%	27.3735	NYDEC HHB	0	0	58	12	U	14	U	18	U
1,2-Dichloroethene (total)	UG/KG	0	0%			0	0	58	12	U	14	U	18	U
1,2-Dichloropropane	UG/KG	0	0%			0	0	58	12	U	14	U	18	U
Acetone	UG/KG	210	26%			0	15	58	4	J	14	U	18	U
Benzene	UG/KG	0	0%	23.463	NYDEC HHB	0	0	58	12	U	14	U	18	U
Bromodichloromethane	UG/KG	0	0%			0	0	58	12	U	14	U	18	U
Bromoform	UG/KG	0	0%			0	0	58	12	U	14	UJ	18	UJ
Carbon disulfide	UG/KG	18	9%			0	5	58	12	U	14	U	18	U
Carbon tetrachloride	UG/KG	0	0%	23.463	NYDEC HHB	0	0	58	12	U	14	U	18	U
Chlorobenzene	UG/KG	0	0%	136.8675	BENTHIC-CHRONIC	0	0	58	12	U	14	UJ	18	UJ
Chlorodibromomethane	UG/KG	0	0%			0	0	58	12	U	14	U	18	U
Chloroethane	UG/KG	0	0%			0	0	58	12	U	14	U	18	U
Chloroform	UG/KG	14	3%			0	2	58	12	U	14	U	18	U
Cis-1,3-Dichloropropene	UG/KG	0	0%			0	0	58	12	U	14	U	18	U
Ethyl benzene	UG/KG	0	0%	938.52	BENTHIC-CHRONIC	0	0	58	12	U	14	UJ	18	UJ
Methyl bromide	UG/KG	0	0%			0	0	58	12	U	14	U	18	U
Methyl butyl ketone	UG/KG	0	0%			0	0	58	12	U	14	U	18	U
Methyl chloride	UG/KG	5	2%			0	1	58	12	U	14	U	18	U
Methyl ethyl ketone	UG/KG	49	2%			0	1	58	12	U	14	U	18	U
Methyl isobutyl ketone	UG/KG	0	0%			0	0	58	12	U	14	U	18	U
Methylene chloride	UG/KG	11	5%			0	3	58	12	U	14	U	18	U
Styrene	UG/KG	3	3%			0	2	58	12	U	14	UJ	18	UJ
Tetrachloroethene	UG/KG	0	0%	31.284	NYDEC HHB	0	0	58	12	U	14	U	18	U
Toluene	UG/KG	42	9%	1916.145	BENTHIC-CHRONIC	0	5	58	12	U	14	U	18	U
Total Xylenes	UG/KG	7	3%	3597.66	BENTHIC-CHRONIC	0	2	58	12	U	14	UJ	18	UJ
Trans-1,3-Dichloropropene	UG/KG	0	0%			0	0	58	12	U	14	U	18	U
Trichloroethene	UG/KG	0	0%	78.21	NYDEC HHB	0	0	58	12	U	14	U	18	U
Vinyl chloride	UG/KG	0	0%	2.73735	NYDEC HHB	0	0	58	12	U	14	U	18	U
1,2,4-Trichlorobenzene	UG/KG	0	0%			0	0	58	84	UJ	86	UJ	110	UJ
1,2-Dichlorobenzene	UG/KG	0	0%	4692.6	BENTHIC-CHRONIC	0	0	58	84	UJ	86	UJ	110	UJ
1,3-Dichlorobenzene	UG/KG	0	0%	469.26	BENTHIC-CHRONIC	0	0	58	84	UJ	86	UJ	110	UJ
1,4-Dichlorobenzene	UG/KG	73	2%	469.26	BENTHIC-CHRONIC	0	1	58	84	UJ	86	UJ	110	UJ
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%			0	0	9						
2,4,5-Trichlorophenol	UG/KG	0	0%			0	0	58	200	UJ	210	UJ	260	UJ
2,4,6-Trichlorophenol	UG/KG	0	0%			0	0	58	84	UJ	86	UJ	110	UJ
2,4-Dichlorophenol	UG/KG	0	0%			0	0	58	84	UJ	86	UJ	110	UJ

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-33		SD4-34		SD4-35	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41026		41027		41028	
									0		0		0	
									0.2		0.2		0.2	
									12/9/1998		12/9/1998		12/9/1998	
									SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF						
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
2,4-Dimethylphenol	UG/KG	0	0%	19.5525	BENTHIC-CHRONIC	0	0	58	84	UJ	86	UJ	110	UJ
2,4-Dinitrophenol	UG/KG	0	0%			0	0	58	200	UJ	210	UJ	260	UJ
2,4-Dinitrotoluene	UG/KG	0	0%			0	0	58	84	UJ	86	UJ	110	UJ
2,6-Dinitrotoluene	UG/KG	0	0%			0	0	58	84	UJ	86	UJ	110	UJ
2-Chloronaphthalene	UG/KG	0	0%			0	0	58	84	UJ	86	UJ	110	UJ
2-Chlorophenol	UG/KG	0	0%			0	0	58	84	UJ	86	UJ	110	UJ
2-Methylnaphthalene	UG/KG	31	9%	1329.57	BENTHIC-CHRONIC	0	5	58	84	UJ	86	UJ	110	UJ
2-Methylphenol	UG/KG	0	0%			0	0	58	84	UJ	86	UJ	110	UJ
2-Nitroaniline	UG/KG	0	0%			0	0	58	200	UJ	210	UJ	260	UJ
2-Nitrophenol	UG/KG	0	0%	19.5525	BENTHIC-CHRONIC	0	0	58	84	UJ	86	UJ	110	UJ
3,3'-Dichlorobenzidine	UG/KG	0	0%			0	0	58	84	UJ	86	UJ	110	UJ
3-Nitroaniline	UG/KG	0	0%			0	0	58	200	UJ	210	UJ	260	UJ
4,6-Dinitro-2-methylphenol	UG/KG	0	0%			0	0	58	200	UJ	210	UJ	260	UJ
4-Bromophenyl phenyl ether	UG/KG	0	0%			0	0	58	84	UJ	86	UJ	110	UJ
4-Chloro-3-methylphenol	UG/KG	0	0%			0	0	58	84	UJ	86	UJ	110	UJ
4-Chloroaniline	UG/KG	0	0%			0	0	58	84	UJ	86	UJ	110	UJ
4-Chlorophenyl phenyl ether	UG/KG	0	0%			0	0	58	84	UJ	86	UJ	110	UJ
4-Methylphenol	UG/KG	140	10%	19.5525	BENTHIC-CHRONIC	2	6	58	[illegible]	J	86	UJ	110	UJ
4-Nitroaniline	UG/KG	0	0%			0	0	58	200	U	210	U	260	UJ
4-Nitrophenol	UG/KG	0	0%			0	0	58	200	U	210	U	260	UJ
Acenaphthene	UG/KG	610	19%	5474.7	BENTHIC-CHRONIC	0	11	58	5.2	J	86	UJ	110	UJ
Acenaphthylene	UG/KG	130	17%			0	10	58	84	UJ	86	UJ	5.9	J
Anthracene	UG/KG	1700	47%	4184.235	BENTHIC-CHRONIC	0	27	58	9.5	J	86	UJ	9.1	J
Benzo(a)anthracene	UG/KG	5900	84%	50.8365	NYDEC HHB	26	49	58	23	J	12	J	**75**	J
Benzo(a)pyrene	UG/KG	5100	84%	50.8365	NYDEC HHB	26	49	58	24	J	12	J	**96**	J
Benzo(b)fluoranthene	UG/KG	4800	88%	50.8365	NYDEC HHB	35	51	58	45	J	43	J	**180**	J
Benzo(ghi)perylene	UG/KG	3200	78%			0	45	58	16	J	13	J	52	J
Benzo(k)fluoranthene	UG/KG	5700	43%	50.8365	NYDEC HHB	20	25	58	84	UR	86	UR	110	UR
Bis(2-Chloroethoxy)methane	UG/KG	0	0%			0	0	58	84	UJ	86	UJ	110	UJ
Bis(2-Chloroethyl)ether	UG/KG	0	0%			0	0	58	84	UJ	86	UJ	110	UJ
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%			0	0	49	84	UJ	86	UJ	110	UJ
Bis(2-Ethylhexyl)phthalate	UG/KG	42000	40%	7801.4475	BENTHIC-CHRONIC	1	23	58	16	J	22	J	34	J
Butylbenzylphthalate	UG/KG	16	9%			0	5	58	84	UJ	86	UJ	110	UJ
Carbazole	UG/KG	500	40%			0	23	58	5.3	J	86	UJ	6.3	J
Chrysene	UG/KG	6200	90%	50.8365	NYDEC HHB	34	52	58	30	J	30	J	**110**	J
Di-n-butylphthalate	UG/KG	250	47%			0	27	58	84	UJ	86	UJ	110	UJ
Di-n-octylphthalate	UG/KG	46	5%			0	3	58	84	UJ	86	UJ	110	UJ
Dibenz(a,h)anthracene	UG/KG	1200	50%			0	29	58	6.8	J	5.4	J	25	UJ
Dibenzofuran	UG/KG	230	17%			0	10	58	4.6	J	7	J	110	UJ
Diethyl phthalate	UG/KG	17	3%			0	2	58	84	UJ	86	UJ	110	UJ
Dimethylphthalate	UG/KG	0	0%			0	0	58	84	UJ	86	UJ	110	UJ

Seneca Ar[illegible]epot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-33		SD4-34		SD4-35	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41026		41027		41028	
									0		0		0	
									0.2		0.2		0.2	
									12/9/1998		12/9/1998		12/9/1998	
									SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF						
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
Fluoranthene	UG/KG	16000	93%	39887.1	BENTHIC-CHRONIC	0	54	58	71	J	52	J	180	J
Fluorene	UG/KG	660	22%	312.84	BENTHIC-CHRONIC	1	13	58	5.7	J	86	UJ	110	UJ
Hexachlorobenzene	UG/KG	840	3%	5.86575	NYDEC HHB	2	2	58	84	UJ	86	UJ	110	J
Hexachlorobutadiene	UG/KG	0	0%			0	0	58	84	UJ	86	UJ	110	UJ
Hexachlorocyclopentadiene	UG/KG	0	0%			0	0	58	84	UJ	86	UJ	110	UJ
Hexachloroethane	UG/KG	0	0%			0	0	58	84	UJ	86	UJ	110	UJ
Indeno(1,2,3-cd)pyrene	UG/KG	3100	74%	50.8365	NYDEC HHB	21	43	58	16	UJ	12	J	55	J
Isophorone	UG/KG	0	0%			0	0	58	84	UJ	86	UJ	110	UJ
N-Nitrosodiphenylamine	UG/KG	760	2%			0	1	58	84	UJ	86	UJ	110	UJ
N-Nitrosodipropylamine	UG/KG	410	2%			0	1	58	84	UJ	86	UJ	110	UJ
Naphthalene	UG/KG	13	12%	1173.15	BENTHIC-CHRONIC	0	7	58	84	UJ	86	UJ	110	UJ
Nitrobenzene	UG/KG	0	0%			0	0	58	84	UJ	86	UJ	110	UJ
Pentachlorophenol	UG/KG	0	0%	1564.2	BENTHIC-CHRONIC	0	0	58	200	UJ	210	UJ	260	UJ
Phenanthrene	UG/KG	7900	88%	4692.6	BENTHIC-CHRONIC	1	51	58	53	J	34	J	65	J
Phenol	UG/KG	210	7%	19.5525	BENTHIC-CHRONIC	4	4	58	84	UJ	86	UJ	110	UJ
Pyrene	UG/KG	12000	93%	37579.905	BENTHIC-CHRONIC	0	54	58	53	J	31	J	130	J
1,3,5-Trinitrobenzene	UG/KG	0	0%			0	0	58	120	U	120	U	120	U
1,3-Dinitrobenzene	UG/KG	0	0%			0	0	58	120	U	120	U	120	U
2,4,6-Trinitrotoluene	UG/KG	0	0%			0	0	58	120	U	120	U	120	U
2,4-Dinitrotoluene	UG/KG	0	0%			0	0	58	120	U	120	U	120	U
2,6-Dinitrotoluene	UG/KG	0	0%			0	0	58	120	U	120	U	120	U
2-Nitrotoluene	UG/KG	450	2%			0	1	49	120	U	120	U	120	U
2-amino-4,6-Dinitrotoluene	UG/KG	200	2%			0	1	58	120	U	120	U	120	U
3-Nitrotoluene	UG/KG	0	0%			0	0	49	120	U	120	U	120	U
4-Nitrotoluene	UG/KG	0	0%			0	0	49	120	U	120	U	120	U
4-amino-2,6-Dinitrotoluene	UG/KG	140	2%			0	1	58	120	U	120	U	120	U
HMX	UG/KG	0	0%			0	0	58	120	U	120	U	120	U
Nitrobenzene	UG/KG	0	0%			0	0	49	120	U	120	U	120	U
RDX	UG/KG	0	0%			0	0	58	120	U	120	U	120	U
Tetryl	UG/KG	0	0%			0	0	58	120	U	120	U	120	U
4,4'-DDD	UG/KG	90	22%	0.39105	NYDEC HHB	13	13	58	4.2	U	4.3	U	5.4	U
4,4'-DDE	UG/KG	86	33%	0.39105	NYDEC HHB	19	19	58	4.2	U	4.3	U	5.4	U
4,4'-DDT	UG/KG	45	28%	0.39105	NYDEC HHB	16	16	58	4.2	U	4.3	U	8.8	
Aldrin	UG/KG	2.8	5%	3.9105	NYDEC HHB	0	3	58	2.2	U	2.2	U	2.8	U
Alpha-BHC	UG/KG	0	0%			0	0	58	2.2	U	2.2	U	2.8	U
Alpha-Chlordane	UG/KG	44	14%	0.039105	NYDEC HHB	8	8	58	2.2	U	2.2	U	2.8	U
Aroclor-1016	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	42	U	43	U	54	U
Aroclor-1221	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	85	U	87	U	110	U
Aroclor-1232	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	42	U	43	U	54	U
Aroclor-1242	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	42	U	43	U	54	U
Aroclor-1248	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	42	U	43	U	54	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-33		SD4-34		SD4-35	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41026		41027		41028	
									0		0		0	
									0.2		0.2		0.2	
									12/9/1998		12/9/1998		12/9/1998	
									SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF						
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
Aroclor-1254	UG/KG	580	45%	0.031284	NYDEC HHB	26	26	58	42	U	43	U	94	J
Aroclor-1260	UG/KG	250	16%	0.031284	NYDEC HHB	9	9	58	42	U	43	U	54	U
Beta-BHC	UG/KG	3.3	7%			0	4	58	2.2	U	2.2	U	2.8	U
Delta-BHC	UG/KG	0	0%			0	0	58	2.2	U	2.2	U	2.8	U
Dieldrin	UG/KG	18	7%	3.9105	NYDEC HHB	4	4	58	4.2	U	4.3	U	5.4	U
Endosulfan I	UG/KG	1.9	2%	1.17315	BENTHIC-CHRONIC	1	1	58	2.2	U	2.2	U	2.8	U
Endosulfan II	UG/KG	6.8	3%	1.17315	BENTHIC-CHRONIC	2	2	58	4.2	U	4.3	U	5.4	U
Endosulfan sulfate	UG/KG	12	9%			0	5	58	4.2	U	4.3	U	5.4	U
Endrin	UG/KG	0	0%	31.284	NYDEC W/H	0	0	58	4.2	U	4.3	U	5.4	U
Endrin aldehyde	UG/KG	15	12%			0	7	58	4.2	U	4.3	U	5.4	U
Endrin ketone	UG/KG	62	7%			0	4	58	4.2	U	4.3	U	5.4	U
Gamma-BHC/Lindane	UG/KG	0	0%			0	0	58	2.2	U	2.2	U	2.8	U
Gamma-Chlordane	UG/KG	40	17%	0.039105	NYDEC HHB	10	10	58	2.2	U	2.2	U	2.8	U
Heptachlor	UG/KG	2.4	2%	0.031284	NYDEC HHB	1	1	58	2.2	U	2.2	U	2.8	U
Heptachlor epoxide	UG/KG	10	10%	0.031284	NYDEC HHB	6	6	58	2.2	U	2.2	U	2.8	U
Methoxychlor	UG/KG	68	3%			0	2	58	22	U	22	U	28	U
Toxaphene	UG/KG	0	0%			0	0	58	220	U	220	U	280	U
2,4,5-T	UG/KG	21	11%			0	1	9						
2,4,5-TP/Silvex	UG/KG	0	0%			0	0	9						
2,4-D	UG/KG	0	0%			0	0	9						
2,4-DB	UG/KG	0	0%			0	0	9						
Dalapon	UG/KG	0	0%			0	0	9						
Dicamba	UG/KG	0	0%			0	0	9						
Dichloroprop	UG/KG	0	0%			0	0	9						
Dinoseb	UG/KG	0	0%			0	0	9						
MCPA	UG/KG	0	0%			0	0	9						
MCPP	UG/KG	0	0%			0	0	9						
Aluminum	MG/KG	22100	100%			0	58	58	11900		12700		14800	
Antimony	MG/KG	82.7	53%	2	NYS LEL	20	31	58	0.66	UR	0.81	UR	0.8	UR
Arsenic	MG/KG	37.7	98%	6	NYS LEL	19	57	58	4.4		4.8		2.4	J
Barium	MG/KG	488	100%			0	58	58	57.2		79.2		87.6	
Beryllium	MG/KG	1.1	100%			0	58	58	0.55	J	0.49	J	0.68	J
Cadmium	MG/KG	34.1	47%	0.6	NYS LEL	24	27	58	0.11	U	0.13	U	8.5	
Calcium	MG/KG	140000	100%			0	58	58	53400		64000		21900	
Chromium	MG/KG	4800	100%	26	NYS LEL	28	58	58	21		22.2		48	
Cobalt	MG/KG	28.4	100%			0	58	58	11.6		12.9	J	12.8	J
Copper	MG/KG	2640	100%	16	NYS LEL	55	58	58	22.2		24.6		35.6	
Cyanide	MG/KG	0	0%			0	0	58	0.77	U	0.72	U	0.95	U
Iron	MG/KG	87900	100%	20000	NYS LEL	45	58	58	24300	J	26100	J	28300	J
Lead	MG/KG	374	95%	31	NYS LEL	35	55	58	18.9		19.3		257	
Magnesium	MG/KG	27900	100%			0	58	58	8250		13000		8510	

Seneca Ar. pot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-33		SD4-34		SD4-35	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41026		41027		41028	
									0		0		0	
									0.2		0.2		0.2	
									12/9/1998		12/9/1998		12/9/1998	
									SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF						
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
Manganese	MG/KG	5480	100%	460	NYS LEL	28	58	58	302		576		324	
Mercury	MG/KG	2.4	59%	0.15	NYS LEL	16	34	58	0.09	J	0.12	J	0.08	U
Nickel	MG/KG	453	100%	16	NYS LEL	58	58	58	33.9		37.4		52.5	
Potassium	MG/KG	3460	100%			0	58	58	1510		1430		1930	
Selenium	MG/KG	6.1	41%			0	24	58	0.77	U	0.94	U	0.93	U
Silver	MG/KG	1.7	45%	1	NYS LEL	4	26	58	0.21	U	0.26	U	0.37	J
Sodium	MG/KG	1370	64%			0	37	58	56	U	68.2	U	78.9	J
Thallium	MG/KG	0	0%			0	0	58	0.77	U	9.4	U	0.93	U
Vanadium	MG/KG	1140	100%			0	58	58	21.4		22.8		26.2	
Zinc	MG/KG	1150	100%	120	NYS LEL	41	58	58	91.2		103		292	

Notes:

(1) Criteria calculated using a TOC of 3.91%. This is a site wide TOC value.

(2) NYSDEC HHB = NYS HUMAN HEALTH BIOACCUMULATION CRITERIA
BENTHIC-CHRONIC = NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITERIA
NYDEC W/H = NYS WILD/HUMAN BIOACCUM CRITERIA
NYS LEL = NYS LOWEST EFFECT LEVEL

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-36		SD4-37		SD4-38	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41029		41025		41030	
									0		0		0	
									0.2		0.2		0.2	
									12/9/1998		12/14/1998		12/14/1998	
									SA		SA		SA	
ANALYTE	UNIT	MAX	FREQUENCY	NYS CRITERIA (1)	SPECIFIC CRITERIA (2)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	RI PHASE 1 STEP 1 Value	Q	RI PHASE 1 STEP 1 Value	Q	RI PHASE 1 STEP 1 Value	Q
1,1,1-Trichloroethane	UG/KG	0	0%			0	0	58	15	U	18	U	21	U
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	11.7315	NYDEC HHB	0	0	58	15	UJ	18	U	21	U
1,1,2-Trichloroethane	UG/KG	0	0%			0	0	58	15	UJ	18	U	21	U
1,1-Dichloroethane	UG/KG	0	0%			0	0	58	15	U	18	U	21	U
1,1-Dichloroethene	UG/KG	0	0%	0.7821	NYDEC HHB	0	0	58	15	U	18	U	21	U
1,2-Dichloroethane	UG/KG	0	0%	27.3735	NYDEC HHB	0	0	58	15	U	18	U	21	U
1,2-Dichloroethene (total)	UG/KG	0	0%			0	0	58	15	U	18	U	21	U
1,2-Dichloropropane	UG/KG	0	0%			0	0	58	15	UJ	18	UJ	21	U
Acetone	UG/KG	210	26%			0	15	58	15	U	18	UJ	21	U
Benzene	UG/KG	0	0%	23.463	NYDEC HHB	0	0	58	15	UJ	18	U	21	U
Bromodichloromethane	UG/KG	0	0%			0	0	58	15	UJ	18	U	21	U
Bromoform	UG/KG	0	0%			0	0	58	15	UJ	18	U	21	U
Carbon disulfide	UG/KG	18	9%			0	5	58	15	U	18	U	21	U
Carbon tetrachloride	UG/KG	0	0%	23.463	NYDEC HHB	0	0	58	15	U	18	U	21	U
Chlorobenzene	UG/KG	0	0%	136.8675	BENTHIC-CHRONIC	0	0	58	15	UJ	18	U	21	U
Chlorodibromomethane	UG/KG	0	0%			0	0	58	15	UJ	18	U	21	U
Chloroethane	UG/KG	0	0%			0	0	58	15	U	18	U	21	U
Chloroform	UG/KG	14	3%			0	2	58	15	U	18	U	21	U
Cis-1,3-Dichloropropene	UG/KG	0	0%			0	0	58	15	UJ	18	U	21	U
Ethyl benzene	UG/KG	0	0%	938.52	BENTHIC-CHRONIC	0	0	58	15	UJ	18	U	21	U
Methyl bromide	UG/KG	0	0%			0	0	58	15	U	18	UJ	21	UJ
Methyl butyl ketone	UG/KG	0	0%			0	0	58	15	U	18	UJ	21	U
Methyl chloride	UG/KG	5	2%			0	1	58	15	U	18	U	21	U
Methyl ethyl ketone	UG/KG	49	2%			0	1	58	15	U	18	UJ	21	U
Methyl isobutyl ketone	UG/KG	0	0%			0	0	58	15	U	18	U	21	U
Methylene chloride	UG/KG	11	5%			0	3	58	15	U	18	U	21	U
Styrene	UG/KG	3	3%			0	2	58	15	UJ	18	U	21	U
Tetrachloroethene	UG/KG	0	0%	31.284	NYDEC HHB	0	0	58	15	U	18	U	21	U
Toluene	UG/KG	42	9%	1916.145	BENTHIC-CHRONIC	0	5	58	15	U	18	U	21	U
Total Xylenes	UG/KG	7	3%	3597.66	BENTHIC-CHRONIC	0	2	58	15	UJ	18	U	21	U
Trans-1,3-Dichloropropene	UG/KG	0	0%			0	0	58	15	UJ	18	U	21	U
Trichloroethene	UG/KG	0	0%	78.21	NYDEC HHB	0	0	58	15	UJ	18	U	21	U
Vinyl chloride	UG/KG	0	0%	2.73735	NYDEC HHB	0	0	58	15	U	18	U	21	U
1,2,4-Trichlorobenzene	UG/KG	0	0%			0	0	58	840	UJ	120	U	120	U
1,2-Dichlorobenzene	UG/KG	0	0%	4692.6	BENTHIC-CHRONIC	0	0	58	840	UJ	120	U	120	U
1,3-Dichlorobenzene	UG/KG	0	0%	469.26	BENTHIC-CHRONIC	0	0	58	840	UJ	120	U	120	U
1,4-Dichlorobenzene	UG/KG	73	2%	469.26	BENTHIC-CHRONIC	0	1	58	840	UJ	120	U	120	U
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%			0	0	9						
2,4,5-Trichlorophenol	UG/KG	0	0%			0	0	58	2000	UJ	300	U	280	U
2,4,6-Trichlorophenol	UG/KG	0	0%			0	0	58	840	UJ	120	U	120	U
2,4-Dichlorophenol	UG/KG	0	0%			0	0	58	840	UJ	120	U	120	U

Seneca Ar[illegible]pot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-36		SD4-37		SD4-38	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41029		41025		41030	
									0		0		0	
									0.2		0.2		0.2	
									12/9/1998		12/14/1998		12/14/1998	
									SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF						
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
2,4-Dimethylphenol	UG/KG	0	0%	19.5525	BENTHIC-CHRONIC	0	0	58	840	UJ	120	UJ	120	UJ
2,4-Dinitrophenol	UG/KG	0	0%			0	0	58	2000	UJ	300	UJ	280	UJ
2,4-Dinitrotoluene	UG/KG	0	0%			0	0	58	840	UJ	120	U	120	U
2,6-Dinitrotoluene	UG/KG	0	0%			0	0	58	840	UJ	120	U	120	U
2-Chloronaphthalene	UG/KG	0	0%			0	0	58	840	UJ	120	U	120	U
2-Chlorophenol	UG/KG	0	0%			0	0	58	840	UJ	120	U	120	U
2-Methylnaphthalene	UG/KG	31	9%	1329.57	BENTHIC-CHRONIC	0	5	58	840	UJ	120	U	120	U
2-Methylphenol	UG/KG	0	0%			0	0	58	840	UJ	120	U	120	U
2-Nitroaniline	UG/KG	0	0%			0	0	58	2000	UJ	300	U	280	U
2-Nitrophenol	UG/KG	0	0%	19.5525	BENTHIC-CHRONIC	0	0	58	840	UJ	120	U	120	U
3,3'-Dichlorobenzidine	UG/KG	0	0%			0	0	58	840	UJ	120	U	120	U
3-Nitroaniline	UG/KG	0	0%			0	0	58	2000	UJ	300	U	280	UJ
4,6-Dinitro-2-methylphenol	UG/KG	0	0%			0	0	58	2000	UJ	300	U	280	U
4-Bromophenyl phenyl ether	UG/KG	0	0%			0	0	58	840	UJ	120	U	120	U
4-Chloro-3-methylphenol	UG/KG	0	0%			0	0	58	840	UJ	120	U	120	U
4-Chloroaniline	UG/KG	0	0%			0	0	58	840	UJ	120	U	120	UJ
4-Chlorophenyl phenyl ether	UG/KG	0	0%			0	0	58	840	UJ	120	U	120	U
4-Methylphenol	UG/KG	140	10%	19.5525	BENTHIC-CHRONIC	2	6	58	840	UJ	120	U	120	U
4-Nitroaniline	UG/KG	0	0%			0	0	58	2000	U	300	U	280	U
4-Nitrophenol	UG/KG	0	0%			0	0	58	2000	U	300	U	280	U
Acenaphthene	UG/KG	610	19%	5474.7	BENTHIC-CHRONIC	0	11	58	840	UJ	120	U	120	U
Acenaphthylene	UG/KG	130	17%			0	10	58	130	J	120	U	9.1	J
Anthracene	UG/KG	1700	47%	4184.235	BENTHIC-CHRONIC	0	27	58	160	J	120	U	9.3	J
Benzo(a)anthracene	UG/KG	5900	84%	50.8365	NYDEC HHB	26	49	58	3200	J	11	J	46	J
Benzo(a)pyrene	UG/KG	5100	84%	50.8365	NYDEC HHB	26	49	58	4100	J	15	J	55	J
Benzo(b)fluoranthene	UG/KG	4800	88%	50.8365	NYDEC HHB	35	51	58	3900	J	38	J	97	J
Benzo(ghi)perylene	UG/KG	3200	78%			0	45	58	1700	J	120	UJ	46	J
Benzo(k)fluoranthene	UG/KG	5700	43%	50.8365	NYDEC HHB	20	25	58	3600	J	120	UR	68	J
Bis(2-Chloroethoxy)methane	UG/KG	0	0%			0	0	58	840	UJ	120	U	120	U
Bis(2-Chloroethyl)ether	UG/KG	0	0%			0	0	58	840	UJ	120	U	120	U
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%			0	0	49	840	UJ	120	U	120	U
Bis(2-Ethylhexyl)phthalate	UG/KG	42000	40%	7801.4475	BENTHIC-CHRONIC	1	23	58	180	J	120	U	120	U
Butylbenzylphthalate	UG/KG	16	9%			0	5	58	840	UJ	120	U	120	U
Carbazole	UG/KG	500	40%			0	23	58	840	UJ	120	U	6.9	J
Chrysene	UG/KG	6200	90%	50.8365	NYDEC HHB	34	52	58	3200	J	21	J	65	J
Di-n-butylphthalate	UG/KG	250	47%			0	27	58	840	UJ	120	U	6.4	J
Di-n-octylphthalate	UG/KG	46	5%			0	3	58	840	UJ	120	U	120	U
Dibenz(a,h)anthracene	UG/KG	1200	50%			0	29	58	1100	J	120	U	17	J
Dibenzofuran	UG/KG	230	17%			0	10	58	840	UJ	120	U	120	U
Diethyl phthalate	UG/KG	17	3%			0	2	58	840	UJ	120	U	120	U
Dimethylphthalate	UG/KG	0	0%			0	0	58	840	UJ	120	U	120	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-36		SD4-37		SD4-38	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41029		41025		41030	
									0		0		0	
									0.2		0.2		0.2	
									12/9/1998		12/14/1998		12/14/1998	
									SA		SA		SA	
						NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
ANALYTE	UNIT	MAX	FREQUENCY	NYS CRITERIA (1)	SPECIFIC CRITERIA (2)				Value	Q	Value	Q	Value	Q
Fluoranthene	UG/KG	16000	93%	39887.1	BENTHIC-CHRONIC	0	54	58	3100	J	24	J	96	J
Fluorene	UG/KG	660	22%	312.84	BENTHIC-CHRONIC	1	13	58	840	UJ	120	U	120	U
Hexachlorobenzene	UG/KG	840	3%	5.86575	NYDEC HHB	2	2	58	840	J	120	U	120	U
Hexachlorobutadiene	UG/KG	0	0%			0	0	58	840	UJ	120	U	120	U
Hexachlorocyclopentadiene	UG/KG	0	0%			0	0	58	840	UJ	120	UJ	120	UJ
Hexachloroethane	UG/KG	0	0%			0	0	58	840	UJ	120	U	120	U
Indeno(1,2,3-cd)pyrene	UG/KG	3100	74%	50.8365	NYDEC HHB	21	43	58	1000	J	120	U	36	J
Isophorone	UG/KG	0	0%			0	0	58	840	UJ	120	U	120	U
N-Nitrosodiphenylamine	UG/KG	760	2%			0	1	58	840	UJ	120	U	120	U
N-Nitrosodipropylamine	UG/KG	410	2%			0	1	58	840	UJ	120	U	120	U
Naphthalene	UG/KG	13	12%	1173.15	BENTHIC-CHRONIC	0	7	58	840	UJ	120	U	120	U
Nitrobenzene	UG/KG	0	0%			0	0	58	840	UJ	120	U	120	U
Pentachlorophenol	UG/KG	0	0%	1564.2	BENTHIC-CHRONIC	0	0	58	2000	UJ	300	U	280	U
Phenanthrene	UG/KG	7900	88%	4692.6	BENTHIC-CHRONIC	1	51	58	330	J	13	J	29	J
Phenol	UG/KG	210	7%	19.5525	BENTHIC-CHRONIC	4	4	58	840	UJ	120	U	120	U
Pyrene	UG/KG	12000	93%	37579.905	BENTHIC-CHRONIC	0	54	58	3200	J	21	J	70	J
1,3,5-Trinitrobenzene	UG/KG	0	0%			0	0	58	120	U	120	U	120	U
1,3-Dinitrobenzene	UG/KG	0	0%			0	0	58	120	U	120	U	120	U
2,4,6-Trinitrotoluene	UG/KG	0	0%			0	0	58	120	U	120	U	120	U
2,4-Dinitrotoluene	UG/KG	0	0%			0	0	58	120	U	120	U	120	U
2,6-Dinitrotoluene	UG/KG	0	0%			0	0	58	120	U	120	U	120	U
2-Nitrotoluene	UG/KG	450	2%			0	1	49	120	U	120	U	120	U
2-amino-4,6-Dinitrotoluene	UG/KG	200	2%			0	1	58	120	U	120	U	120	U
3-Nitrotoluene	UG/KG	0	0%			0	0	49	120	U	120	U	120	U
4-Nitrotoluene	UG/KG	0	0%			0	0	49	120	U	120	U	120	U
4-amino-2,6-Dinitrotoluene	UG/KG	140	2%			0	1	58	120	U	120	U	120	U
HMX	UG/KG	0	0%			0	0	58	120	U	120	U	120	U
Nitrobenzene	UG/KG	0	0%			0	0	49	120	U	120	U	120	U
RDX	UG/KG	0	0%			0	0	58	120	U	120	U	120	U
Tetryl	UG/KG	0	0%			0	0	58	120	U	120	U	120	U
4,4'-DDD	UG/KG	90	22%	0.39105	NYDEC HHB	13	13	58	6.6	J	6.1	U	5.8	U
4,4'-DDE	UG/KG	86	33%	0.39105	NYDEC HHB	19	19	58	3	J	6.1	U	5.8	U
4,4'-DDT	UG/KG	45	28%	0.39105	NYDEC HHB	16	16	58	12	J	6.1	U	6.2	
Aldrin	UG/KG	2.8	5%	3.9105	NYDEC HHB	0	3	58	2.2	U	3.1	U	3	U
Alpha-BHC	UG/KG	0	0%			0	0	58	2.2	U	3.1	U	3	U
Alpha-Chlordane	UG/KG	44	14%	0.039105	NYDEC HHB	8	8	58	2.2	U	3.1	U	3	U
Aroclor-1016	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	42	U	61	U	58	U
Aroclor-1221	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	85	U	120	U	120	U
Aroclor-1232	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	42	U	61	U	58	U
Aroclor-1242	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	42	U	61	U	58	U
Aroclor-1248	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	42	U	61	U	58	U

Seneca Ar[illegible]epot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-36		SD4-37		SD4-38	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41029		41025		41030	
									0		0		0	
									0.2		0.2		0.2	
									12/9/1998		12/14/1998		12/14/1998	
									SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF						
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
Aroclor-1254	UG/KG	580	45%	0.031284	NYDEC HHB	26	26	58	42	U	61	U	53	J
Aroclor-1260	UG/KG	250	16%	0.031284	NYDEC HHB	9	9	58	42	U	61	U	58	U
Beta-BHC	UG/KG	3.3	7%			0	4	58	2.2	U	3.1	U	3	U
Delta-BHC	UG/KG	0	0%			0	0	58	2.2	U	3.1	U	3	U
Dieldrin	UG/KG	18	7%	3.9105	NYDEC HHB	4	4	58	4.2	U	6.1	U	5.8	U
Endosulfan I	UG/KG	1.9	2%	1.17315	BENTHIC-CHRONIC	1	1	58	2.2	U	3.1	U	3	U
Endosulfan II	UG/KG	6.8	3%	1.17315	BENTHIC-CHRONIC	2	2	58	3.1	J	6.1	U	5.8	U
Endosulfan sulfate	UG/KG	12	9%			0	5	58	9.2	J	6.1	U	5.8	U
Endrin	UG/KG	0	0%	31.284	NYDEC W/H	0	0	58	4.2	U	6.1	U	5.8	U
Endrin aldehyde	UG/KG	15	12%			0	7	58	15	J	6.1	U	5.8	U
Endrin ketone	UG/KG	62	7%			0	4	58	62		6.1	U	5.8	U
Gamma-BHC/Lindane	UG/KG	0	0%			0	0	58	2.2	U	3.1	U	3	U
Gamma-Chlordane	UG/KG	40	17%	0.039105	NYDEC HHB	10	10	58	3.8	J	3.1	U	3	U
Heptachlor	UG/KG	2.4	2%	0.031284	NYDEC HHB	1	1	58	2.2	U	3.1	U	3	U
Heptachlor epoxide	UG/KG	10	10%	0.031284	NYDEC HHB	6	6	58	1.4	J	3.1	U	3	U
Methoxychlor	UG/KG	68	3%			0	2	58	30	J	31	U	30	U
Toxaphene	UG/KG	0	0%			0	0	58	220	U	310	U	300	U
2,4,5-T	UG/KG	21	11%			0	1	9						
2,4,5-TP/Silvex	UG/KG	0	0%			0	0	9						
2,4-D	UG/KG	0	0%			0	0	9						
2,4-DB	UG/KG	0	0%			0	0	9						
Dalapon	UG/KG	0	0%			0	0	9						
Dicamba	UG/KG	0	0%			0	0	9						
Dichloroprop	UG/KG	0	0%			0	0	9						
Dinoseb	UG/KG	0	0%			0	0	9						
MCPA	UG/KG	0	0%			0	0	9						
MCPP	UG/KG	0	0%			0	0	9						
Aluminum	MG/KG	22100	100%			0	58	58	9280		9160		8640	
Antimony	MG/KG	82.7	53%	2	NYS LEL	20	31	58	0.72	J	1.1	UR	0.81	J
Arsenic	MG/KG	37.7	98%	6	NYS LEL	19	57	58	3.5		3.3	J	3.2	
Barium	MG/KG	488	100%			0	58	58	73.4		106		167	
Beryllium	MG/KG	1.1	100%			0	58	58	0.31	J	0.47	J	0.49	J
Cadmium	MG/KG	34.1	47%	0.6	NYS LEL	24	27	58	1.1		1.3	J	0.79	J
Calcium	MG/KG	140000	100%			0	58	58	30300		15200		9470	
Chromium	MG/KG	4800	100%	26	NYS LEL	28	58	58	35		20		25.1	
Cobalt	MG/KG	28.4	100%			0	58	58	14.1		8.8	J	10.7	J
Copper	MG/KG	2640	100%	16	NYS LEL	55	58	58	27.1		23.1		22.6	
Cyanide	MG/KG	0	0%			0	0	58	0.76	U	1.1	U	0.97	U
Iron	MG/KG	87900	100%	20000	NYS LEL	45	58	58	21700	J	20500	J	27600	
Lead	MG/KG	374	95%	31	NYS LEL	35	55	58	144		30.9		55.6	
Magnesium	MG/KG	27900	100%			0	58	58	5650		5620		4190	

									SEAD-4		SEAD-4		SEAD-4	
									SD4-36		SD4-37		SD4-38	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41029		41025		41030	
									0		0		0	
									0.2		0.2		0.2	
									12/9/1998		12/14/1998		12/14/1998	
									SA		SA		SA	
					NUMBER	NUMBER	NUMBER		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF						
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
Manganese	MG/KG	5480	100%	460	NYS LEL	28	58	58	507		224		217	
Mercury	MG/KG	2.4	59%	0.15	NYS LEL	16	34	58	0.15	J	0.16	J	0.08	UJ
Nickel	MG/KG	453	100%	16	NYS LEL	58	58	58	33.3		25.5		29.6	
Potassium	MG/KG	3460	100%			0	58	58	1170		1840		1410	
Selenium	MG/KG	6.1	41%			0	24	58	0.8	U	1.3	U	0.64	J
Silver	MG/KG	1.7	45%	1	NYS LEL	4	26	58	0.34	J	0.49	J	0.26	U
Sodium	MG/KG	1370	64%			0	37	58	74.4	J	95.8	U	68.1	U
Thallium	MG/KG	0	0%			0	0	58	8	U	1.3	U	0.94	U
Vanadium	MG/KG	1140	100%			0	58	58	17		18.8		19.2	
Zinc	MG/KG	1150	100%	120	NYS LEL	41	58	58	387		218		260	J

Notes:

(1) Criteria calculated using a TOC of 3.91%. This is a site wide TOC value.

(2) NYSDEC HHB = NYS HUMAN HEALTH BIOACCUMULATION CRITERIA
BENTHIC-CHRONIC = NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITERIA
NYDEC W/H = NYS WILD/HUMAN BIOACCUM CRITERIA
NYS LEL = NYS LOWEST EFFECT LEVEL

Seneca Arm, pot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4		SEAD-4	
									SD4-39		SD4-4		SD4-40		SD4-41	
									SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
									41039		SD4-4		41040		41041	
									0		0		0		0	
									0.2		0.5		0.2		0.2	
									12/18/1998		12/14/1993		12/18/1998		12/18/1998	
									SA		SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		ESI		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF								
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q	Value	Q
1,1,1-Trichloroethane	UG/KG	0	0%			0	0	58	15	U	18	U	19	U	18	U
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	11.7315	NYDEC HHB	0	0	58	15	U	18	U	19	U	18	UJ
1,1,2-Trichloroethane	UG/KG	0	0%			0	0	58	15	U	18	U	19	U	18	U
1,1-Dichloroethane	UG/KG	0	0%			0	0	58	15	U	18	U	19	U	18	U
1,1-Dichloroethene	UG/KG	0	0%	0.7821	NYDEC HHB	0	0	58	15	U	18	U	19	U	18	U
1,2-Dichloroethane	UG/KG	0	0%	27.3735	NYDEC HHB	0	0	58	15	U	18	U	19	U	18	U
1,2-Dichloroethene (total)	UG/KG	0	0%			0	0	58	15	U	18	U	19	U	18	U
1,2-Dichloropropane	UG/KG	0	0%			0	0	58	15	U	18	U	19	U	18	U
Acetone	UG/KG	210	26%			0	15	58	15	U	18	U	19	U	18	U
Benzene	UG/KG	0	0%	23.463	NYDEC HHB	0	0	58	15	U	18	U	19	U	18	U
Bromodichloromethane	UG/KG	0	0%			0	0	58	15	U	18	U	19	U	18	U
Bromoform	UG/KG	0	0%			0	0	58	15	U	18	U	19	U	18	UJ
Carbon disulfide	UG/KG	18	9%			0	5	58	15	U	18	U	19	U	18	U
Carbon tetrachloride	UG/KG	0	0%	23.463	NYDEC HHB	0	0	58	15	U	18	U	19	U	18	U
Chlorobenzene	UG/KG	0	0%	136.8675	BENTHIC-CHRONIC	0	0	58	15	U	18	U	19	U	18	UJ
Chlorodibromomethane	UG/KG	0	0%			0	0	58	15	U	18	U	19	U	18	U
Chloroethane	UG/KG	0	0%			0	0	58	15	U	18	U	19	U	18	U
Chloroform	UG/KG	14	3%			0	2	58	15	U	18	U	19	U	18	U
Cis-1,3-Dichloropropene	UG/KG	0	0%			0	0	58	15	U	18	U	19	U	18	U
Ethyl benzene	UG/KG	0	0%	938.52	BENTHIC-CHRONIC	0	0	58	15	U	18	U	19	U	18	UJ
Methyl bromide	UG/KG	0	0%			0	0	58	15	U	18	U	19	U	18	U
Methyl butyl ketone	UG/KG	0	0%			0	0	58	15	U	18	U	19	U	18	U
Methyl chloride	UG/KG	5	2%			0	1	58	15	U	18	U	19	U	18	U
Methyl ethyl ketone	UG/KG	49	2%			0	1	58	15	U	18	U	19	U	18	U
Methyl isobutyl ketone	UG/KG	0	0%			0	0	58	15	U	18	U	19	U	18	U
Methylene chloride	UG/KG	11	5%			0	3	58	15	U	18	U	19	U	18	U
Styrene	UG/KG	3	3%			0	2	58	15	U	18	U	19	U	18	UJ
Tetrachloroethene	UG/KG	0	0%	31.284	NYDEC HHB	0	0	58	15	U	18	U	19	U	18	U
Toluene	UG/KG	42	9%	1916.145	BENTHIC-CHRONIC	0	5	58	15	U	18	U	19	U	18	U
Total Xylenes	UG/KG	7	3%	3597.66	BENTHIC-CHRONIC	0	2	58	15	U	18	U	19	U	18	UJ
Trans-1,3-Dichloropropene	UG/KG	0	0%			0	0	58	15	U	18	U	19	U	18	U
Trichloroethene	UG/KG	0	0%	78.21	NYDEC HHB	0	0	58	15	U	18	U	19	U	18	U
Vinyl chloride	UG/KG	0	0%	2.73735	NYDEC HHB	0	0	58	15	U	18	U	19	U	18	U
1,2,4-Trichlorobenzene	UG/KG	0	0%			0	0	58	100	U	580	U	130	U	120	U
1,2-Dichlorobenzene	UG/KG	0	0%	4692.6	BENTHIC-CHRONIC	0	0	58	100	U	580	U	130	U	120	U
1,3-Dichlorobenzene	UG/KG	0	0%	469.26	BENTHIC-CHRONIC	0	0	58	100	U	580	U	130	U	120	U
1,4-Dichlorobenzene	UG/KG	73	2%	469.26	BENTHIC-CHRONIC	0	1	58	100	U	580	U	130	U	120	U
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%			0	0	9			580	U				
2,4,5-Trichlorophenol	UG/KG	0	0%			0	0	58	240	U	1400	U	310	U	280	U
2,4,6-Trichlorophenol	UG/KG	0	0%			0	0	58	100	U	580	U	130	U	120	U
2,4-Dichlorophenol	UG/KG	0	0%			0	0	58	100	U	580	U	130	U	120	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4		SEAD-4	
									SD4-39		SD4-4		SD4-40		SD4-41	
									SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
									41039		SD4-4		41040		41041	
									0		0		0		0	
									0.2		0.5		0.2		0.2	
									12/18/1998		12/14/1993		12/18/1998		12/18/1998	
									SA		SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		ESI		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF								
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q	Value	Q
2,4-Dimethylphenol	UG/KG	0	0%	19.5525	BENTHIC-CHRONIC	0	0	58	100	UJ	580	U	130	UJ	120	U
2,4-Dinitrophenol	UG/KG	0	0%			0	0	58	240	U	1400	U	310	U	280	U
2,4-Dinitrotoluene	UG/KG	0	0%			0	0	58	100	U	580	U	130	U	120	U
2,6-Dinitrotoluene	UG/KG	0	0%			0	0	58	100	U	580	U	130	U	120	U
2-Chloronaphthalene	UG/KG	0	0%			0	0	58	100	U	580	U	130	U	120	U
2-Chlorophenol	UG/KG	0	0%			0	0	58	100	U	580	U	130	U	120	U
2-Methylnaphthalene	UG/KG	31	9%	1329.57	BENTHIC-CHRONIC	0	5	58	100	U	580	U	130	U	120	U
2-Methylphenol	UG/KG	0	0%			0	0	58	100	U	580	U	130	U	120	U
2-Nitroaniline	UG/KG	0	0%			0	0	58	240	U	1400	U	310	U	280	U
2-Nitrophenol	UG/KG	0	0%	19.5525	BENTHIC-CHRONIC	0	0	58	100	U	580	U	130	U	120	U
3,3'-Dichlorobenzidine	UG/KG	0	0%			0	0	58	100	U	580	U	130	U	120	U
3-Nitroaniline	UG/KG	0	0%			0	0	58	240	U	1400	U	310	U	280	U
4,6-Dinitro-2-methylphenol	UG/KG	0	0%			0	0	58	240	U	1400	U	310	U	280	U
4-Bromophenyl phenyl ether	UG/KG	0	0%			0	0	58	100	U	580	U	130	U	120	U
4-Chloro-3-methylphenol	UG/KG	0	0%			0	0	58	100	U	580	U	130	U	120	U
4-Chloroaniline	UG/KG	0	0%			0	0	58	100	U	580	U	130	U	120	U
4-Chlorophenyl phenyl ether	UG/KG	0	0%			0	0	58	100	U	580	U	130	U	120	U
4-Methylphenol	UG/KG	140	10%	19.5525	BENTHIC-CHRONIC	2	6	58	100	U	580	U	130	U	120	U
4-Nitroaniline	UG/KG	0	0%			0	0	58	240	U	1400	U	310	U	280	U
4-Nitrophenol	UG/KG	0	0%			0	0	58	240	U	1400	U	310	U	280	U
Acenaphthene	UG/KG	610	19%	5474.7	BENTHIC-CHRONIC	0	11	58	100	U	580	U	130	U	120	U
Acenaphthylene	UG/KG	130	17%			0	10	58	100	U	580	U	130	U	120	U
Anthracene	UG/KG	1700	47%	4184.235	BENTHIC-CHRONIC	0	27	58	100	U	580	U	130	U	120	U
Benzo(a)anthracene	UG/KG	5900	84%	50.8365	NYDEC HHB	26	49	58	7.9	J	95	J	15	J	11	J
Benzo(a)pyrene	UG/KG	5100	84%	50.8365	NYDEC HHB	26	49	58	10	J	140	J	22	J	15	J
Benzo(b)fluoranthene	UG/KG	4800	88%	50.8365	NYDEC HHB	35	51	58	14	J	280	J	50	J	38	J
Benzo(ghi)perylene	UG/KG	3200	78%			0	45	58	100	U	65	J	130	U	120	UJ
Benzo(k)fluoranthene	UG/KG	5700	43%	50.8365	NYDEC HHB	20	25	58	14	J	95	J	130	UR	120	UR
Bis(2-Chloroethoxy)methane	UG/KG	0	0%			0	0	58	100	U	580	U	130	U	120	U
Bis(2-Chloroethyl)ether	UG/KG	0	0%			0	0	58	100	U	580	U	130	U	120	U
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%			0	0	49	100	U			130	U	120	U
Bis(2-Ethylhexyl)phthalate	UG/KG	42000	40%	7801.4475	BENTHIC-CHRONIC	1	23	58	36	J	500	J	39	J	120	U
Butylbenzylphthalate	UG/KG	16	9%			0	5	58	100	U	580	U	130	U	120	U
Carbazole	UG/KG	500	40%			0	23	58	100	U	580	U	130	U	120	U
Chrysene	UG/KG	6200	90%	50.8365	NYDEC HHB	34	52	58	13	J	160	J	26	J	20	J
Di-n-butylphthalate	UG/KG	250	47%			0	27	58	100	U	580	U	8.1	J	38	J
Di-n-octylphthalate	UG/KG	46	5%			0	3	58	100	U	580	U	130	U	120	UJ
Dibenz(a,h)anthracene	UG/KG	1200	50%			0	29	58	100	U	580	U	130	U	120	U
Dibenzofuran	UG/KG	230	17%			0	10	58	100	U	580	U	130	U	120	U
Diethyl phthalate	UG/KG	17	3%			0	2	58	100	U	580	U	130	U	120	U
Dimethylphthalate	UG/KG	0	0%			0	0	58	100	U	580	U	130	U	120	U

Seneca A. Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4		SEAD-4	
									SD4-39		SD4-4		SD4-40		SD4-41	
									SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
									41039		SD4-4		41040		41041	
									0		0		0		0	
									0.2		0.5		0.2		0.2	
									12/18/1998		12/14/1993		12/18/1998		12/18/1998	
									SA		SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		ESI		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF								
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q	Value	Q
Fluoranthene	UG/KG	16000	93%	39887.1	BENTHIC-CHRONIC	0	54	58	19	J	190	J	32	J	33	J
Fluorene	UG/KG	660	22%	312.84	BENTHIC-CHRONIC	1	13	58	100	U	580	U	130	U	120	U
Hexachlorobenzene	UG/KG	840	3%	5.86575	NYDEC HHB	2	2	58	100	U	580	U	130	U	120	U
Hexachlorobutadiene	UG/KG	0	0%			0	0	58	100	U	580	U	130	U	120	U
Hexachlorocyclopentadiene	UG/KG	0	0%			0	0	58	100	UJ	580	U	130	UJ	120	U
Hexachloroethane	UG/KG	0	0%			0	0	58	100	U	580	U	130	U	120	U
Indeno(1,2,3-cd)pyrene	UG/KG	3100	74%	50.8365	NYDEC HHB	21	43	58	100	U	86	J	130	U	120	U
Isophorone	UG/KG	0	0%			0	0	58	100	U	580	U	130	U	120	U
N-Nitrosodiphenylamine	UG/KG	760	2%			0	1	58	100	U	580	U	130	U	120	U
N-Nitrosodipropylamine	UG/KG	410	2%			0	1	58	100	U	580	U	130	U	120	U
Naphthalene	UG/KG	13	12%	1173.15	BENTHIC-CHRONIC	0	7	58	100	U	580	U	130	U	120	U
Nitrobenzene	UG/KG	0	0%			0	0	58	100	U	580	U	130	U	120	U
Pentachlorophenol	UG/KG	0	0%	1564.2	BENTHIC-CHRONIC	0	0	58	240	U	1400	U	310	U	280	U
Phenanthrene	UG/KG	7900	88%	4692.6	BENTHIC-CHRONIC	1	51	58	9.2	J	86	J	15	J	26	J
Phenol	UG/KG	210	7%	19.5525	BENTHIC-CHRONIC	4	4	58	46	J	580	U	130	U	120	U
Pyrene	UG/KG	12000	93%	37579.905	BENTHIC-CHRONIC	0	54	58	17	J	180	J	29	J	21	J
1,3,5-Trinitrobenzene	UG/KG	0	0%			0	0	58	120	U	130	U	120	U	120	U
1,3-Dinitrobenzene	UG/KG	0	0%			0	0	58	120	U	130	U	120	U	120	U
2,4,6-Trinitrotoluene	UG/KG	0	0%			0	0	58	120	U	130	U	120	U	120	U
2,4-Dinitrotoluene	UG/KG	0	0%			0	0	58	120	U	130	U	120	U	120	U
2,6-Dinitrotoluene	UG/KG	0	0%			0	0	58	120	U	130	U	120	U	120	U
2-Nitrotoluene	UG/KG	450	2%			0	1	49	120	U			120	U	120	U
2-amino-4,6-Dinitrotoluene	UG/KG	200	2%			0	1	58	120	U	130	U	120	U	120	U
3-Nitrotoluene	UG/KG	0	0%			0	0	49	120	U			120	U	120	U
4-Nitrotoluene	UG/KG	0	0%			0	0	49	120	U			120	U	120	U
4-amino-2,6-Dinitrotoluene	UG/KG	140	2%			0	1	58	120	U	130	U	120	U	120	U
HMX	UG/KG	0	0%			0	0	58	120	U	130	U	120	U	120	U
Nitrobenzene	UG/KG	0	0%			0	0	49	120	U			120	U	120	U
RDX	UG/KG	0	0%			0	0	58	120	U	130	U	120	U	120	U
Tetryl	UG/KG	0	0%			0	0	58	120	U	130	U	120	U	120	U
4,4'-DDD	UG/KG	90	22%	0.39105	NYDEC HHB	13	13	58	4.3	J	5.1	J	6.3	U	5.8	U
4,4'-DDE	UG/KG	86	33%	0.39105	NYDEC HHB	19	19	58	5	U	9.4	J	6.3	U	5.8	U
4,4'-DDT	UG/KG	45	28%	0.39105	NYDEC HHB	16	16	58	5	U	5.7	U	6.3	U	3.2	J
Aldrin	UG/KG	2.8	5%	3.9105	NYDEC HHB	0	3	58	2.6	U	2.9	U	3.3	U	3	U
Alpha-BHC	UG/KG	0	0%			0	0	58	2.6	U	2.9	U	3.3	U	3	U
Alpha-Chlordane	UG/KG	44	14%	0.039105	NYDEC HHB	8	8	58	2.6	U	4.5	J	3.3	U	3	U
Aroclor-1016	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	50	U	57	U	63	U	58	U
Aroclor-1221	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	100	U	120	U	130	U	120	U
Aroclor-1232	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	50	U	57	U	63	U	58	U
Aroclor-1242	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	50	U	57	U	63	U	58	U
Aroclor-1248	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	50	U	57	U	63	U	58	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4		SEAD-4	
									SD4-39		SD4-4		SD4-40		SD4-41	
									SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
									41039		SD4-4		41040		41041	
									0		0		0		0	
									0.2		0.5		0.2		0.2	
									12/18/1998		12/14/1993		12/18/1998		12/18/1998	
									SA		SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		ESI		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF								
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q	Value	Q
Aroclor-1254	UG/KG	580	45%	0.031284	NYDEC HHB	26	26	58	50	U	360	J	63	U	58	U
Aroclor-1260	UG/KG	250	16%	0.031284	NYDEC HHB	9	9	58	50	U	57	U	63	U	58	U
Beta-BHC	UG/KG	3.3	7%			0	4	58	2.6	U	2.9	U	3.3	U	3	U
Delta-BHC	UG/KG	0	0%			0	0	58	2.6	U	2.9	U	3.3	U	3	U
Dieldrin	UG/KG	18	7%	3.9105	NYDEC HHB	4	4	58	5	U	5.7	U	6.3	U	5.8	U
Endosulfan I	UG/KG	1.9	2%	1.17315	BENTHIC-CHRONIC	1	1	58	2.6	U	2.9	U	3.3	U	3	U
Endosulfan II	UG/KG	6.8	3%	1.17315	BENTHIC-CHRONIC	2	2	58	5	U	5.7	U	6.3	U	5.8	U
Endosulfan sulfate	UG/KG	12	9%			0	5	58	5	U	5.7	U	6.3	U	5.8	U
Endrin	UG/KG	0	0%	31.284	NYDEC W/H	0	0	58	5	U	5.7	U	6.3	U	5.8	U
Endrin aldehyde	UG/KG	15	12%			0	7	58	5	U	5.7	U	6.3	U	5.8	U
Endrin ketone	UG/KG	62	7%			0	4	58	5	U	5.7	U	6.3	U	5.8	U
Gamma-BHC/Lindane	UG/KG	0	0%			0	0	58	2.6	U	2.9	U	3.3	U	3	U
Gamma-Chlordane	UG/KG	40	17%	0.039105	NYDEC HHB	10	10	58	2.6	U	3.1	J	3.3	U	3	U
Heptachlor	UG/KG	2.4	2%	0.031284	NYDEC HHB	1	1	58	2.6	U	2.9	U	3.3	U	3	U
Heptachlor epoxide	UG/KG	10	10%	0.031284	NYDEC HHB	6	6	58	2.6	U	2.9	U	3.3	U	3	U
Methoxychlor	UG/KG	68	3%			0	2	58	26	U	29	U	33	U	30	U
Toxaphene	UG/KG	0	0%			0	0	58	260	U	290	U	330	U	300	U
2,4,5-T	UG/KG	21	11%			0	1	9			8.8	U				
2,4,5-TP/Silvex	UG/KG	0	0%			0	0	9			8.8	U				
2,4-D	UG/KG	0	0%			0	0	9			88	U				
2,4-DB	UG/KG	0	0%			0	0	9			88	U				
Dalapon	UG/KG	0	0%			0	0	9			210	U				
Dicamba	UG/KG	0	0%			0	0	9			8.8	U				
Dichloroprop	UG/KG	0	0%			0	0	9			88	U				
Dinoseb	UG/KG	0	0%			0	0	9			44	U				
MCPA	UG/KG	0	0%			0	0	9			8800	U				
MCPP	UG/KG	0	0%			0	0	9			8800	U				
Aluminum	MG/KG	22100	100%			0	58	58	12600		19700		10100		22100	
Antimony	MG/KG	82.7	53%	2	NYS LEL	20	31	58	1	J	7.2	UJ	3	J	1.9	J
Arsenic	MG/KG	37.7	98%	6	NYS LEL	19	57	58	4.4		4.5		3.8		12.2	
Barium	MG/KG	488	100%			0	58	58	98.5		121		101		106	
Beryllium	MG/KG	1.1	100%			0	58	58	0.73	J	1	J	0.7	J	1.1	J
Cadmium	MG/KG	34.1	47%	0.6	NYS LEL	24	27	58	0.74	J	3.1		1	J	0.16	U
Calcium	MG/KG	140000	100%			0	58	58	6060		13600		8680		98300	
Chromium	MG/KG	4800	100%	26	NYS LEL	28	58	58	24.5		89.3	J	310		46.4	
Cobalt	MG/KG	28.4	100%			0	58	58	15.2		17.3		11	J	25.8	
Copper	MG/KG	2640	100%	16	NYS LEL	55	58	58	21.6		46.5	J	113		39.6	
Cyanide	MG/KG	0	0%			0	0	58	0.88	U	0.85	U	1.2	U	0.91	U
Iron	MG/KG	87900	100%	20000	NYS LEL	45	58	58	28700		35100		20300		58300	
Lead	MG/KG	374	95%	31	NYS LEL	35	55	58	29.1		535	R	36.5		20.7	
Magnesium	MG/KG	27900	100%			0	58	58	4820		9130		3620		27900	

Seneca Arn., epot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4		SEAD-4	
									SD4-39		SD4-4		SD4-40		SD4-41	
									SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
									41039		SD4-4		41040		41041	
									0		0		0		0	
									0.2		0.5		0.2		0.2	
									12/18/1998		12/14/1993		12/18/1998		12/18/1998	
									SA		SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		ESI		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF								
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q	Value	Q
Manganese	MG/KG	5480	100%	460	NYS LEL	28	58	58	**1190**	J	299		**707**	J	**1680**	J
Mercury	MG/KG	2.4	59%	0.15	NYS LEL	16	34	58	0.06	UJ	0.07	J	0.08	UJ	0.08	J
Nickel	MG/KG	453	100%	16	NYS LEL	58	58	58	**35.3**		**53.1**		**26**		**63.2**	
Potassium	MG/KG	3460	100%			0	58	58	1740		2540		1400	J	2270	
Selenium	MG/KG	6.1	41%			0	24	58	0.95	U	0.93	J	1.6	J	1.2	U
Silver	MG/KG	1.7	45%	1	NYS LEL	4	26	58	0.26	U	1.4	U	0.33	U	0.33	U
Sodium	MG/KG	1370	64%			0	37	58	89.6	U	184	J	116	J	200	J
Thallium	MG/KG	0	0%			0	0	58	0.82	UJ	0.25	U	1	UJ	1	U
Vanadium	MG/KG	1140	100%			0	58	58	23.3		35.6		21.7		32.5	
Zinc	MG/KG	1150	100%	120	NYS LEL	41	58	58	**192**		**667**		**183**		**181**	

Notes.

(1) Criteria calculated using a TOC of 3.91% This is a site wide TOC value.

(2) NYSDEC HHB = NYS HUMAN HEALTH BIOACCUMULATION CRITERIA
BENTHIC-CHRONIC = NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITERIA
NYDEC W/H = NYS WILD/HUMAN BIOACCUM CRITERIA
NYS LEL = NYS LOWEST EFFECT LEVEL

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-42		SD4-43		SD4-44	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41042		41043		41044	
									0		0		0	
									0.2		0.2		0.2	
									12/18/1998		12/19/1998		12/19/1998	
									SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF						
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
1,1,1-Trichloroethane	UG/KG	0	0%			0	0	58	28	UJ	15	U	18	U
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	11.7315	NYDEC HHB	0	0	58	28	UJ	15	UJ	18	UJ
1,1,2-Trichloroethane	UG/KG	0	0%			0	0	58	28	UJ	15	U	18	U
1,1-Dichloroethane	UG/KG	0	0%			0	0	58	28	UJ	15	U	18	U
1,1-Dichloroethene	UG/KG	0	0%	0.7821	NYDEC HHB	0	0	58	28	UJ	15	U	18	U
1,2-Dichloroethane	UG/KG	0	0%	27.3735	NYDEC HHB	0	0	58	28	UJ	15	U	18	U
1,2-Dichloroethene (total)	UG/KG	0	0%			0	0	58	28	UJ	15	U	18	U
1,2-Dichloropropane	UG/KG	0	0%			0	0	58	28	UJ	15	U	18	U
Acetone	UG/KG	210	26%			0	15	58	76	UJ	15	U	18	U
Benzene	UG/KG	0	0%	23.463	NYDEC HHB	0	0	58	28	UJ	15	U	18	U
Bromodichloromethane	UG/KG	0	0%			0	0	58	28	UJ	15	U	18	U
Bromoform	UG/KG	0	0%			0	0	58	28	UJ	15	UJ	18	UJ
Carbon disulfide	UG/KG	18	9%			0	5	58	28	UJ	15	U	18	U
Carbon tetrachloride	UG/KG	0	0%	23.463	NYDEC HHB	0	0	58	28	UJ	15	U	18	U
Chlorobenzene	UG/KG	0	0%	136.8675	BENTHIC-CHRONIC	0	0	58	28	UJ	15	UJ	18	UJ
Chlorodibromomethane	UG/KG	0	0%			0	0	58	28	UJ	15	U	18	U
Chloroethane	UG/KG	0	0%			0	0	58	28	UJ	15	U	18	U
Chloroform	UG/KG	14	3%			0	2	58	28	UJ	15	U	18	U
Cis-1,3-Dichloropropene	UG/KG	0	0%			0	0	58	28	UJ	15	U	18	U
Ethyl benzene	UG/KG	0	0%	938.52	BENTHIC-CHRONIC	0	0	58	28	UJ	15	UJ	18	UJ
Methyl bromide	UG/KG	0	0%			0	0	58	28	UJ	15	U	18	U
Methyl butyl ketone	UG/KG	0	0%			0	0	58	28	UJ	15	U	18	U
Methyl chloride	UG/KG	5	2%			0	1	58	28	UJ	15	U	18	U
Methyl ethyl ketone	UG/KG	49	2%			0	1	58	28	UJ	15	U	18	U
Methyl isobutyl ketone	UG/KG	0	0%			0	0	58	28	UJ	15	U	18	U
Methylene chloride	UG/KG	11	5%			0	3	58	28	UJ	15	U	18	U
Styrene	UG/KG	3	3%			0	2	58	28	UJ	15	UJ	18	UJ
Tetrachloroethene	UG/KG	0	0%	31.284	NYDEC HHB	0	0	58	28	UJ	15	U	18	U
Toluene	UG/KG	42	9%	1916.145	BENTHIC-CHRONIC	0	5	58	28	UJ	15	U	18	U
Total Xylenes	UG/KG	7	3%	3597.66	BENTHIC-CHRONIC	0	2	58	28	UJ	15	UJ	18	UJ
Trans-1,3-Dichloropropene	UG/KG	0	0%			0	0	58	28	UJ	15	U	18	U
Trichloroethene	UG/KG	0	0%	78.21	NYDEC HHB	0	0	58	28	UJ	15	U	18	U
Vinyl chloride	UG/KG	0	0%	2.73735	NYDEC HHB	0	0	58	28	UJ	15	U	18	U
1,2,4-Trichlorobenzene	UG/KG	0	0%			0	0	58	130	UJ	100	UJ	110	U
1,2-Dichlorobenzene	UG/KG	0	0%	4692.6	BENTHIC-CHRONIC	0	0	58	130	UJ	100	UJ	110	U
1,3-Dichlorobenzene	UG/KG	0	0%	469.26	BENTHIC-CHRONIC	0	0	58	130	UJ	100	UJ	110	U
1,4-Dichlorobenzene	UG/KG	73	2%	469.26	BENTHIC-CHRONIC	0	1	58	130	UJ	100	UJ	110	U
2.2'-oxybis(1-Chloropropane)	UG/KG	0	0%			0	0	9						
2,4,5-Trichlorophenol	UG/KG	0	0%			0	0	58	330	UJ	240	UJ	270	U
2,4,6-Trichlorophenol	UG/KG	0	0%			0	0	58	130	UJ	100	UJ	110	U
2,4-Dichlorophenol	UG/KG	0	0%			0	0	58	130	UJ	100	UJ	110	U

SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-42		SD4-43		SD4-44	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41042		41043		41044	
									0		0		0	
									0.2		0.2		0.2	
									12/18/1998		12/19/1998		12/19/1998	
									SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF						
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
2,4-Dimethylphenol	UG/KG	0	0%	19.5525	BENTHIC-CHRONIC	0	0	58	130	UJ	100	UJ	110	U
2,4-Dinitrophenol	UG/KG	0	0%			0	0	58	330	UJ	240	UR	270	UR
2,4-Dinitrotoluene	UG/KG	0	0%			0	0	58	130	UJ	100	UJ	110	U
2,6-Dinitrotoluene	UG/KG	0	0%			0	0	58	130	UJ	100	UJ	110	U
2-Chloronaphthalene	UG/KG	0	0%			0	0	58	130	UJ	100	UJ	110	U
2-Chlorophenol	UG/KG	0	0%			0	0	58	130	UJ	100	UJ	110	U
2-Methylnaphthalene	UG/KG	31	9%	1329.57	BENTHIC-CHRONIC	0	5	58	130	UJ	100	UJ	110	U
2-Methylphenol	UG/KG	0	0%			0	0	58	130	UJ	100	UJ	110	U
2-Nitroaniline	UG/KG	0	0%			0	0	58	330	UJ	240	UJ	270	U
2-Nitrophenol	UG/KG	0	0%	19.5525	BENTHIC-CHRONIC	0	0	58	130	UJ	100	UJ	110	U
3,3'-Dichlorobenzidine	UG/KG	0	0%			0	0	58	130	UJ	100	UJ	110	UJ
3-Nitroaniline	UG/KG	0	0%			0	0	58	330	UJ	240	UJ	270	U
4,6-Dinitro-2-methylphenol	UG/KG	0	0%			0	0	58	330	UJ	240	UJ	270	U
4-Bromophenyl phenyl ether	UG/KG	0	0%			0	0	58	130	UJ	100	UJ	110	U
4-Chloro-3-methylphenol	UG/KG	0	0%			0	0	58	130	UJ	100	UJ	110	U
4-Chloroaniline	UG/KG	0	0%			0	0	58	130	UJ	100	UJ	110	U
4-Chlorophenyl phenyl ether	UG/KG	0	0%			0	0	58	130	UJ	100	UJ	110	U
4-Methylphenol	UG/KG	140	10%	19.5525	BENTHIC-CHRONIC	2	6	58	130	UJ	100	UJ	110	U
4-Nitroaniline	UG/KG	0	0%			0	0	58	330	UJ	240	UJ	270	U
4-Nitrophenol	UG/KG	0	0%			0	0	58	330	UJ	240	UJ	270	U
Acenaphthene	UG/KG	610	19%	5474.7	BENTHIC-CHRONIC	0	11	58	130	UJ	100	UJ	110	U
Acenaphthylene	UG/KG	130	17%			0	10	58	130	UJ	100	UJ	110	U
Anthracene	UG/KG	1700	47%	4184.235	BENTHIC-CHRONIC	0	27	58	130	UJ	100	UJ	110	U
Benzo(a)anthracene	UG/KG	5900	84%	50.8365	NYDEC HHB	26	49	58	27	J	83	J	36	J
Benzo(a)pyrene	UG/KG	5100	84%	50.8365	NYDEC HHB	26	49	58	31	J	120	J	41	J
Benzo(b)fluoranthene	UG/KG	4800	88%	50.8365	NYDEC HHB	35	51	58	49	J	160	J	130	J
Benzo(ghi)perylene	UG/KG	3200	78%			0	45	58	25	J	73	J	22	J
Benzo(k)fluoranthene	UG/KG	5700	43%	50.8365	NYDEC HHB	20	25	58	38	J	140	J	110	UR
Bis(2-Chloroethoxy)methane	UG/KG	0	0%			0	0	58	130	UJ	100	UJ	110	U
Bis(2-Chloroethyl)ether	UG/KG	0	0%			0	0	58	130	UJ	100	UJ	110	U
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%			0	0	49	130	UJ	100	UJ	110	U
Bis(2-Ethylhexyl)phthalate	UG/KG	42000	40%	7801.4475	BENTHIC-CHRONIC	1	23	58	22	J	39	J	110	U
Butylbenzylphthalate	UG/KG	16	9%			0	5	58	130	UJ	100	UJ	110	U
Carbazole	UG/KG	500	40%			0	23	58	130	UJ	100	UJ	110	U
Chrysene	UG/KG	6200	90%	50.8365	NYDEC HHB	34	52	58	41	J	140		69	J
Di-n-butylphthalate	UG/KG	250	47%			0	27	58	30	J	59	J	110	U
Di-n-octylphthalate	UG/KG	46	5%			0	3	58	130	UJ	100	UJ	110	U
Dibenz(a,h)anthracene	UG/KG	1200	50%			0	29	58	130	UJ	30	J	110	U
Dibenzofuran	UG/KG	230	17%			0	10	58	130	UJ	100	UJ	110	U
Diethyl phthalate	UG/KG	17	3%			0	2	58	130	UJ	100	UJ	110	U
Dimethylphthalate	UG/KG	0	0%			0	0	58	130	UJ	100	UJ	110	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-42		SD4-43		SD4-44	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41042		41043		41044	
									0		0		0	
									0.2		0.2		0.2	
									12/18/1998		12/19/1998		12/19/1998	
									SA		SA		SA	
									RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
ANALYTE	UNIT	MAX	FREQUENCY	NYS CRITERIA (1)	SPECIFIC CRITERIA (2)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	Value	Q	Value	Q	Value	Q
Fluoranthene	UG/KG	16000	93%	39887.1	BENTHIC-CHRONIC	0	54	58	62	J	170	J	100	J
Fluorene	UG/KG	660	22%	312.84	BENTHIC-CHRONIC	1	13	58	130	UJ	100	UJ	110	U
Hexachlorobenzene	UG/KG	840	3%	5.86575	NYDEC HHB	2	2	58	130	UJ	100	UJ	110	U
Hexachlorobutadiene	UG/KG	0	0%			0	0	58	130	UJ	100	UJ	110	U
Hexachlorocyclopentadiene	UG/KG	0	0%			0	0	58	130	UJ	100	UJ	110	UJ
Hexachloroethane	UG/KG	0	0%			0	0	58	130	UJ	100	UJ	110	U
Indeno(1,2,3-cd)pyrene	UG/KG	3100	74%	50.8365	NYDEC HHB	21	43	58	24	J	55	J	22	J
Isophorone	UG/KG	0	0%			0	0	58	130	UJ	100	UJ	110	U
N-Nitrosodiphenylamine	UG/KG	760	2%			0	1	58	130	UJ	100	UJ	110	U
N-Nitrosodipropylamine	UG/KG	410	2%			0	1	58	130	UJ	100	UJ	110	U
Naphthalene	UG/KG	13	12%	1173.15	BENTHIC-CHRONIC	0	7	58	130	UJ	100	UJ	110	U
Nitrobenzene	UG/KG	0	0%			0	0	58	130	UJ	100	UJ	110	U
Pentachlorophenol	UG/KG	0	0%	1564.2	BENTHIC-CHRONIC	0	0	58	330	UJ	240	UJ	270	U
Phenanthrene	UG/KG	7900	88%	4692.6	BENTHIC-CHRONIC	1	51	58	25	J	61	J	66	J
Phenol	UG/KG	210	7%	19.5525	BENTHIC-CHRONIC	4	4	58	130	UJ	100	UJ	110	U
Pyrene	UG/KG	12000	93%	37579.905	BENTHIC-CHRONIC	0	54	58	53	J	160	J	84	J
1,3,5-Trinitrobenzene	UG/KG	0	0%			0	0	58	120	UJ	120	U	120	U
1,3-Dinitrobenzene	UG/KG	0	0%			0	0	58	120	UJ	120	U	120	U
2,4,6-Trinitrotoluene	UG/KG	0	0%			0	0	58	120	UJ	120	U	120	U
2,4-Dinitrotoluene	UG/KG	0	0%			0	0	58	120	UJ	120	U	120	U
2,6-Dinitrotoluene	UG/KG	0	0%			0	0	58	120	UJ	120	U	120	U
2-Nitrotoluene	UG/KG	450	2%			0	1	49	120	UJ	120	U	120	U
2-amino-4,6-Dinitrotoluene	UG/KG	200	2%			0	1	58	120	UJ	120	U	120	U
3-Nitrotoluene	UG/KG	0	0%			0	0	49	120	UJ	120	U	120	U
4-Nitrotoluene	UG/KG	0	0%			0	0	49	120	UJ	120	U	120	U
4-amino-2,6-Dinitrotoluene	UG/KG	140	2%			0	1	58	120	UJ	120	U	120	U
HMX	UG/KG	0	0%			0	0	58	120	UJ	120	U	120	U
Nitrobenzene	UG/KG	0	0%			0	0	49	120	UJ	120	U	120	U
RDX	UG/KG	0	0%			0	0	58	120	UJ	120	U	120	U
Tetryl	UG/KG	0	0%			0	0	58	120	UJ	120	U	120	U
4,4'-DDD	UG/KG	90	22%	0.39105	NYDEC HHB	13	13	58	6.7	UJ	5	U	5.5	U
4,4'-DDE	UG/KG	86	33%	0.39105	NYDEC HHB	19	19	58	6.7	UJ	5	U	5.5	U
4,4'-DDT	UG/KG	45	28%	0.39105	NYDEC HHB	16	16	58	6.7	UJ	5	U	5.5	U
Aldrin	UG/KG	2.8	5%	3.9105	NYDEC HHB	0	3	58	3.5	UJ	2.6	U	2.8	U
Alpha-BHC	UG/KG	0	0%			0	0	58	3.5	UJ	2.6	U	2.8	U
Alpha-Chlordane	UG/KG	44	14%	0.039105	NYDEC HHB	8	8	58	3.5	UJ	2.6	U	2.8	U
Aroclor-1016	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	67	UJ	50	U	55	U
Aroclor-1221	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	140	UJ	100	U	110	U
Aroclor-1232	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	67	UJ	50	U	55	U
Aroclor-1242	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	67	UJ	50	U	55	U
Aroclor-1248	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	67	UJ	50	U	55	U

Seneca Arm_ ot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-42		SD4-43		SD4-44	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41042		41043		41044	
									0		0		0	
									0.2		0.2		0.2	
									12/18/1998		12/19/1998		12/19/1998	
									SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF						
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
Aroclor-1254	UG/KG	580	45%	0.031284	NYDEC HHB	26	26	58	67	UJ	50	U	55	U
Aroclor-1260	UG/KG	250	16%	0.031284	NYDEC HHB	9	9	58	67	UJ	50	U	55	U
Beta-BHC	UG/KG	3.3	7%			0	4	58	3.5	UJ	2.6	U	3.3	J
Delta-BHC	UG/KG	0	0%			0	0	58	3.5	UJ	2.6	U	2.8	U
Dieldrin	UG/KG	18	7%	3.9105	NYDEC HHB	4	4	58	6.7	UJ	5	U	5.5	U
Endosulfan I	UG/KG	1.9	2%	1.17315	BENTHIC-CHRONIC	1	1	58	3.5	UJ	2.6	U	2.8	U
Endosulfan II	UG/KG	6.8	3%	1.17315	BENTHIC-CHRONIC	2	2	58	6.7	UJ	5	U	5.5	U
Endosulfan sulfate	UG/KG	12	9%			0	5	58	6.7	UJ	5	U	5.5	U
Endrin	UG/KG	0	0%	31.284	NYDEC W/H	0	0	58	6.7	UJ	5	U	5.5	U
Endrin aldehyde	UG/KG	15	12%			0	7	58	6.7	UJ	5	U	5.5	U
Endrin ketone	UG/KG	62	7%			0	4	58	6.7	UJ	5	U	5.5	U
Gamma-BHC/Lindane	UG/KG	0	0%			0	0	58	3.5	UJ	2.6	U	2.8	U
Gamma-Chlordane	UG/KG	40	17%	0.039105	NYDEC HHB	10	10	58	3.5	UJ	2.6	U	2.8	U
Heptachlor	UG/KG	2.4	2%	0.031284	NYDEC HHB	1	1	58	3.5	UJ	2.6	U	2.8	U
Heptachlor epoxide	UG/KG	10	10%	0.031284	NYDEC HHB	6	6	58	3.5	UJ	2.6	U	2.8	U
Methoxychlor	UG/KG	68	3%			0	2	58	35	UJ	26	U	28	U
Toxaphene	UG/KG	0	0%			0	0	58	350	UJ	260	U	280	U
2,4,5-T	UG/KG	21	11%			0	1	9						
2,4,5-TP/Silvex	UG/KG	0	0%			0	0	9						
2,4-D	UG/KG	0	0%			0	0	9						
2,4-DB	UG/KG	0	0%			0	0	9						
Dalapon	UG/KG	0	0%			0	0	9						
Dicamba	UG/KG	0	0%			0	0	9						
Dichloroprop	UG/KG	0	0%			0	0	9						
Dinoseb	UG/KG	0	0%			0	0	9						
MCPA	UG/KG	0	0%			0	0	9						
MCPP	UG/KG	0	0%			0	0	9						
Aluminum	MG/KG	22100	100%			0	58	58	13800	J	12300		14500	
Antimony	MG/KG	82.7	53%	2	NYS LEL	20	31	58	53.4	J	35.8	J	1.7	J
Arsenic	MG/KG	37.7	98%	6	NYS LEL	19	57	58	7.1	J	6.4		7.1	
Barium	MG/KG	488	100%			0	58	58	133	J	81.4		125	
Beryllium	MG/KG	1.1	100%			0	58	58	0.68	J	0.58	J	1	J
Cadmium	MG/KG	34.1	47%	0.6	NYS LEL	24	27	58	0.31	J	0.1	U	0.14	U
Calcium	MG/KG	140000	100%			0	58	58	8000	J	4980		4050	
Chromium	MG/KG	4800	100%	26	NYS LEL	28	58	58	4800	J	3170		90.1	
Cobalt	MG/KG	28.4	100%			0	58	58	15.2	J	11.2		14	J
Copper	MG/KG	2640	100%	16	NYS LEL	55	58	58	988	J	522		65	
Cyanide	MG/KG	0	0%			0	0	58	1.1	UJ	0.88	U	0.92	U
Iron	MG/KG	87900	100%	20000	NYS LEL	45	58	58	29900	J	28300		31200	
Lead	MG/KG	374	95%	31	NYS LEL	35	55	58	32	J	34.9		24.8	
Magnesium	MG/KG	27900	100%			0	58	58	5390	J	4970		4500	

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-42		SD4-43		SD4-44	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41042		41043		41044	
									0		0		0	
									0.2		0.2		0.2	
									12/18/1998		12/19/1998		12/19/1998	
									SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF						
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
Manganese	MG/KG	5480	100%	460	NYS LEL	28	58	58	1790	J	291	J	862	J
Mercury	MG/KG	2.4	59%	0.15	NYS LEL	16	34	58	2.4	J	0.58	J	0.08	UJ
Nickel	MG/KG	453	100%	16	NYS LEL	58	58	58	44	J	35.5		30.3	
Potassium	MG/KG	3460	100%			0	58	58	2080	J	1480		1680	
Selenium	MG/KG	6.1	41%			0	24	58	1.6	J	0.73	U	1	U
Silver	MG/KG	1.7	45%	1	NYS LEL	4	26	58	0.62	J	0.23	J	0.29	U
Sodium	MG/KG	1370	64%			0	37	58	128	UJ	68.8	U	98.3	U
Thallium	MG/KG	0	0%			0	0	58	1.2	UJ	0.63	U	0.9	U
Vanadium	MG/KG	1140	100%			0	58	58	21.6	J	20		24.9	
Zinc	MG/KG	1150	100%	120	NYS LEL	41	58	58	629	J	446		98.9	

Notes.

(1) Criteria calculated using a TOC of 3.91%. This is a site wide TOC value.

(2) NYSDEC HHB = NYS HUMAN HEALTH BIOACCUMULATION CRITERIA
BENTHIC-CHRONIC = NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITERIA
NYDEC W/H = NYS WILD/HUMAN BIOACCUM CRITERIA
NYS LEL = NYS LOWEST EFFECT LEVEL

Seneca Army ot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-45		SD4-46		SD4-47	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41045		41046		41038	
									0		0		0	
									0.2		0.2		0.2	
									12/19/1998		12/18/1998		12/18/1998	
									SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF						
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
1,1,1-Trichloroethane	UG/KG	0	0%			0	0	58	14	U	12	U	23	UJ
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	11.7315	NYDEC HHB	0	0	58	14	UJ	12	U	23	UJ
1,1,2-Trichloroethane	UG/KG	0	0%			0	0	58	14	U	12	U	23	UJ
1,1-Dichloroethane	UG/KG	0	0%			0	0	58	14	U	12	U	23	UJ
1,1-Dichloroethene	UG/KG	0	0%	0.7821	NYDEC HHB	0	0	58	14	U	12	U	23	UJ
1,2-Dichloroethane	UG/KG	0	0%	27.3735	NYDEC HHB	0	0	58	14	U	12	U	23	UJ
1,2-Dichloroethene (total)	UG/KG	0	0%			0	0	58	14	U	12	U	23	UJ
1,2-Dichloropropane	UG/KG	0	0%			0	0	58	14	U	12	U	23	UJ
Acetone	UG/KG	210	26%			0	15	58	14	U	12	U	23	UJ
Benzene	UG/KG	0	0%	23.463	NYDEC HHB	0	0	58	14	U	12	U	23	UJ
Bromodichloromethane	UG/KG	0	0%			0	0	58	14	U	12	U	23	UJ
Bromoform	UG/KG	0	0%			0	0	58	14	UJ	12	U	23	UJ
Carbon disulfide	UG/KG	18	9%			0	5	58	14	U	12	U	23	UJ
Carbon tetrachloride	UG/KG	0	0%	23.463	NYDEC HHB	0	0	58	14	U	12	U	23	UJ
Chlorobenzene	UG/KG	0	0%	136.8675	BENTHIC-CHRONIC	0	0	58	14	UJ	12	U	23	UJ
Chlorodibromomethane	UG/KG	0	0%			0	0	58	14	U	12	U	23	UJ
Chloroethane	UG/KG	0	0%			0	0	58	14	U	12	U	23	UJ
Chloroform	UG/KG	14	3%			0	2	58	14	U	12	U	23	UJ
Cis-1,3-Dichloropropene	UG/KG	0	0%			0	0	58	14	U	12	U	23	UJ
Ethyl benzene	UG/KG	0	0%	938.52	BENTHIC-CHRONIC	0	0	58	14	UJ	12	U	23	UJ
Methyl bromide	UG/KG	0	0%			0	0	58	14	U	12	U	23	UJ
Methyl butyl ketone	UG/KG	0	0%			0	0	58	14	U	12	U	23	UJ
Methyl chloride	UG/KG	5	2%			0	1	58	14	U	12	U	23	UJ
Methyl ethyl ketone	UG/KG	49	2%			0	1	58	14	U	12	U	23	UJ
Methyl isobutyl ketone	UG/KG	0	0%			0	0	58	14	U	12	U	23	UJ
Methylene chloride	UG/KG	11	5%			0	3	58	14	U	12	U	23	UJ
Styrene	UG/KG	3	3%			0	2	58	14	UJ	12	U	23	UJ
Tetrachloroethene	UG/KG	0	0%	31.284	NYDEC HHB	0	0	58	14	U	12	U	23	UJ
Toluene	UG/KG	42	9%	1916.145	BENTHIC-CHRONIC	0	5	58	14	U	12	U	23	UJ
Total Xylenes	UG/KG	7	3%	3597.66	BENTHIC-CHRONIC	0	2	58	14	UJ	12	U	23	UJ
Trans-1,3-Dichloropropene	UG/KG	0	0%			0	0	58	14	U	12	U	23	UJ
Trichloroethene	UG/KG	0	0%	78.21	NYDEC HHB	0	0	58	14	U	12	U	23	UJ
Vinyl chloride	UG/KG	0	0%	2.73735	NYDEC HHB	0	0	58	14	U	12	U	23	UJ
1,2,4-Trichlorobenzene	UG/KG	0	0%			0	0	58	79	U	75	U	170	UJ
1,2-Dichlorobenzene	UG/KG	0	0%	4692.6	BENTHIC-CHRONIC	0	0	58	79	U	75	U	170	UJ
1,3-Dichlorobenzene	UG/KG	0	0%	469.26	BENTHIC-CHRONIC	0	0	58	79	U	75	U	170	UJ
1,4-Dichlorobenzene	UG/KG	73	2%	469.26	BENTHIC-CHRONIC	0	1	58	79	U	75	U	170	UJ
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%			0	0	9						
2,4,5-Trichlorophenol	UG/KG	0	0%			0	0	58	190	U	180	U	420	UJ
2,4,6-Trichlorophenol	UG/KG	0	0%			0	0	58	79	U	75	U	170	UJ
2,4-Dichlorophenol	UG/KG	0	0%			0	0	58	79	U	75	U	170	UJ

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-45		SD4-46		SD4-47	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41045		41046		41038	
									0		0		0	
									0.2		0.2		0.2	
									12/19/1998		12/18/1998		12/18/1998	
									SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF						
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
2,4-Dimethylphenol	UG/KG	0	0%	19.5525	BENTHIC-CHRONIC	0	0	58	79	UJ	75	U	170	UJ
2,4-Dinitrophenol	UG/KG	0	0%			0	0	58	190	UJ	180	U	420	UJ
2,4-Dinitrotoluene	UG/KG	0	0%			0	0	58	79	U	75	U	170	UJ
2,6-Dinitrotoluene	UG/KG	0	0%			0	0	58	79	U	75	U	170	UJ
2-Chloronaphthalene	UG/KG	0	0%			0	0	58	79	U	75	U	170	UJ
2-Chlorophenol	UG/KG	0	0%			0	0	58	79	U	75	U	170	UJ
2-Methylnaphthalene	UG/KG	31	9%	1329.57	BENTHIC-CHRONIC	0	5	58	79	U	75	U	170	UJ
2-Methylphenol	UG/KG	0	0%			0	0	58	79	U	75	U	170	UJ
2-Nitroaniline	UG/KG	0	0%			0	0	58	190	U	180	U	420	UJ
2-Nitrophenol	UG/KG	0	0%	19.5525	BENTHIC-CHRONIC	0	0	58	79	U	75	U	170	UJ
3,3'-Dichlorobenzidine	UG/KG	0	0%			0	0	58	79	U	75	U	170	UJ
3-Nitroaniline	UG/KG	0	0%			0	0	58	190	U	180	U	420	UJ
4,6-Dinitro-2-methylphenol	UG/KG	0	0%			0	0	58	190	U	180	U	420	UJ
4-Bromophenyl phenyl ether	UG/KG	0	0%			0	0	58	79	U	75	U	170	UJ
4-Chloro-3-methylphenol	UG/KG	0	0%			0	0	58	79	U	75	U	170	UJ
4-Chloroaniline	UG/KG	0	0%			0	0	58	79	U	75	U	170	UJ
4-Chlorophenyl phenyl ether	UG/KG	0	0%			0	0	58	79	U	75	U	170	UJ
4-Methylphenol	UG/KG	140	10%	19.5525	BENTHIC-CHRONIC	2	6	58	16	J	75	U	170	UJ
4-Nitroaniline	UG/KG	0	0%			0	0	58	190	U	180	U	420	UJ
4-Nitrophenol	UG/KG	0	0%			0	0	58	190	U	180	U	420	UJ
Acenaphthene	UG/KG	610	19%	5474.7	BENTHIC-CHRONIC	0	11	58	79	U	75	U	10	J
Acenaphthylene	UG/KG	130	17%			0	10	58	79	U	75	U	29	J
Anthracene	UG/KG	1700	47%	4184.235	BENTHIC-CHRONIC	0	27	58	6	J	75	U	30	J
Benzo(a)anthracene	UG/KG	5900	84%	50.8365	NYDEC HHB	26	49	58	79	U	75	U	**230**	J
Benzo(a)pyrene	UG/KG	5100	84%	50.8365	NYDEC HHB	26	49	58	79	U	75	U	**330**	J
Benzo(b)fluoranthene	UG/KG	4800	88%	50.8365	NYDEC HHB	35	51	58	79	U	12	J	**480**	J
Benzo(ghi)perylene	UG/KG	3200	78%			0	45	58	79	U	75	U	180	J
Benzo(k)fluoranthene	UG/KG	5700	43%	50.8365	NYDEC HHB	20	25	58	79	U	75	UR	**330**	J
Bis(2-Chloroethoxy)methane	UG/KG	0	0%			0	0	58	79	U	75	U	170	UJ
Bis(2-Chloroethyl)ether	UG/KG	0	0%			0	0	58	79	U	75	U	170	UJ
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%			0	0	49	79	U	75	U	170	UJ
Bis(2-Ethylhexyl)phthalate	UG/KG	42000	40%	7801.4475	BENTHIC-CHRONIC	1	23	58	79	U	75	U	99	J
Butylbenzylphthalate	UG/KG	16	9%			0	5	58	79	U	75	U	170	UJ
Carbazole	UG/KG	500	40%			0	23	58	79	U	75	U	40	J
Chrysene	UG/KG	6200	90%	50.8365	NYDEC HHB	34	52	58	6.6	J	4.9	J	**350**	J
Di n-butylphthalate	UG/KG	250	47%			0	27	58	79	U	75	U	63	J
Di-n-octylphthalate	UG/KG	46	5%			0	3	58	79	U	75	U	170	UJ
Dibenz(a,h)anthracene	UG/KG	1200	50%			0	29	58	79	U	75	U	90	J
Dibenzofuran	UG/KG	230	17%			0	10	58	79	U	75	U	170	UJ
Diethyl phthalate	UG/KG	17	3%			0	2	58	79	U	75	U	170	UJ
Dimethylphthalate	UG/KG	0	0%			0	0	58	79	U	75	U	170	UJ

Seneca A Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-45		SD4-46		SD4-47	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41045		41046		41038	
									0		0		0	
									0.2		0.2		0.2	
									12/19/1998		12/18/1998		12/18/1998	
									SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF						
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
Fluoranthene	UG/KG	16000	93%	39887.1	BENTHIC-CHRONIC	0	54	58	8.7	J	7.8	J	510	J
Fluorene	UG/KG	660	22%	312.84	BENTHIC-CHRONIC	1	13	58	79	U	75	U	170	UJ
Hexachlorobenzene	UG/KG	840	3%	5.86575	NYDEC HHB	2	2	58	79	U	75	U	170	UJ
Hexachlorobutadiene	UG/KG	0	0%			0	0	58	79	U	75	U	170	UJ
Hexachlorocyclopentadiene	UG/KG	0	0%			0	0	58	79	U	75	U	170	UJ
Hexachloroethane	UG/KG	0	0%			0	0	58	79	U	75	U	170	UJ
Indeno(1,2,3-cd)pyrene	UG/KG	3100	74%	50.8365	NYDEC HHB	21	43	58	79	U	75	U	150	J
Isophorone	UG/KG	0	0%			0	0	58	79	U	75	U	170	UJ
N-Nitrosodiphenylamine	UG/KG	760	2%			0	1	58	79	U	75	U	170	UJ
N-Nitrosodipropylamine	UG/KG	410	2%			0	1	58	79	U	75	U	170	UJ
Naphthalene	UG/KG	13	12%	1173.15	BENTHIC-CHRONIC	0	7	58	79	U	75	U	170	UJ
Nitrobenzene	UG/KG	0	0%			0	0	58	79	U	75	U	170	UJ
Pentachlorophenol	UG/KG	0	0%	1564.2	BENTHIC-CHRONIC	0	0	58	190	U	180	U	420	UJ
Phenanthrene	UG/KG	7900	88%	4692.6	BENTHIC-CHRONIC	1	51	58	6	J	75	U	190	J
Phenol	UG/KG	210	7%	19.5525	BENTHIC-CHRONIC	4	4	58	79	U	75	U	170	UJ
Pyrene	UG/KG	12000	93%	37579.905	BENTHIC-CHRONIC	0	54	58	6.8	J	5.8	J	420	J
1,3,5-Trinitrobenzene	UG/KG	0	0%			0	0	58	120	U	120	U	120	UJ
1,3-Dinitrobenzene	UG/KG	0	0%			0	0	58	120	U	120	U	120	UJ
2,4,6-Trinitrotoluene	UG/KG	0	0%			0	0	58	120	U	120	U	120	UJ
2,4-Dinitrotoluene	UG/KG	0	0%			0	0	58	120	U	120	U	120	UJ
2,6-Dinitrotoluene	UG/KG	0	0%			0	0	58	120	U	120	U	120	UJ
2-Nitrotoluene	UG/KG	450	2%			0	1	49	120	U	120	U	120	UJ
2-amino-4,6-Dinitrotoluene	UG/KG	200	2%			0	1	58	120	U	120	U	120	UJ
3-Nitrotoluene	UG/KG	0	0%			0	0	49	120	U	120	U	120	UJ
4-Nitrotoluene	UG/KG	0	0%			0	0	49	120	U	120	U	120	UJ
4-amino-2,6-Dinitrotoluene	UG/KG	140	2%			0	1	58	120	U	120	U	120	UJ
HMX	UG/KG	0	0%			0	0	58	120	U	120	U	120	UJ
Nitrobenzene	UG/KG	0	0%			0	0	49	120	U	120	U	120	UJ
RDX	UG/KG	0	0%			0	0	58	120	U	120	U	120	UJ
Tetryl	UG/KG	0	0%			0	0	58	120	U	120	U	120	UJ
4,4'-DDD	UG/KG	90	22%	0.39105	NYDEC HHB	13	13	58	4	U	3.7	U	8.7	UJ
4,4'-DDE	UG/KG	86	33%	0.39105	NYDEC HHB	19	19	58	4	U	3.7	U	8.7	UJ
4,4'-DDT	UG/KG	45	28%	0.39105	NYDEC HHB	16	16	58	4	U	3.7	U	4.7	J
Aldrin	UG/KG	2.8	5%	3.9105	NYDEC HHB	0	3	58	2	U	1.9	U	4.5	UJ
Alpha-BHC	UG/KG	0	0%			0	0	58	2	U	1.9	U	4.5	UJ
Alpha-Chlordane	UG/KG	44	14%	0.039105	NYDEC HHB	8	8	58	2	U	1.9	U	4.5	UJ
Aroclor-1016	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	40	U	37	U	87	UJ
Aroclor-1221	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	81	U	76	U	180	UJ
Aroclor-1232	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	40	U	37	U	87	UJ
Aroclor-1242	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	40	U	37	U	87	UJ
Aroclor-1248	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	40	U	37	U	87	UJ

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-45		SD4-46		SD4-47	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41045		41046		41038	
									0		0		0	
									0.2		0.2		0.2	
									12/19/1998		12/18/1998		12/18/1998	
									SA		SA		SA	
									RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
ANALYTE	UNIT	MAX	FREQUENCY	NYS CRITERIA (1)	SPECIFIC CRITERIA (2)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	Value	Q	Value	Q	Value	Q
Aroclor-1254	UG/KG	580	45%	0.031284	NYDEC HHB	26	26	58	40	U	37	U	48	J
Aroclor-1260	UG/KG	250	16%	0.031284	NYDEC HHB	9	9	58	40	U	37	U	87	UJ
Beta-BHC	UG/KG	3.3	7%			0	4	58	2	U	1.9	U	4.5	UJ
Delta-BHC	UG/KG	0	0%			0	0	58	2	U	1.9	U	4.5	UJ
Dieldrin	UG/KG	18	7%	3.9105	NYDEC HHB	4	4	58	4	U	3.7	U	8.7	UJ
Endosulfan I	UG/KG	1.9	2%	1.17315	BENTHIC-CHRONIC	1	1	58	2	U	1.9	U	4.5	UJ
Endosulfan II	UG/KG	6.8	3%	1.17315	BENTHIC-CHRONIC	2	2	58	4	U	3.7	U	8.7	UJ
Endosulfan sulfate	UG/KG	12	9%			0	5	58	4	U	3.7	U	8.7	UJ
Endrin	UG/KG	0	0%	31.284	NYDEC W/H	0	0	58	4	U	3.7	U	8.7	UJ
Endrin aldehyde	UG/KG	15	12%			0	7	58	4	U	3.7	U	8.7	UJ
Endrin ketone	UG/KG	62	7%			0	4	58	4	U	3.7	U	8.7	UJ
Gamma-BHC/Lindane	UG/KG	0	0%			0	0	58	2	U	1.9	U	4.5	UJ
Gamma-Chlordane	UG/KG	40	17%	0.039105	NYDEC HHB	10	10	58	2	U	1.9	U	4.5	UJ
Heptachlor	UG/KG	2.4	2%	0.031284	NYDEC HHB	1	1	58	2	U	1.9	U	4.5	UJ
Heptachlor epoxide	UG/KG	10	10%	0.031284	NYDEC HHB	6	6	58	2	U	1.9	U	4.5	UJ
Methoxychlor	UG/KG	68	3%			0	2	58	20	U	19	U	45	UJ
Toxaphene	UG/KG	0	0%			0	0	58	200	U	190	U	450	UJ
2,4,5-T	UG/KG	21	11%			0	1	9						
2,4,5-TP/Silvex	UG/KG	0	0%			0	0	9						
2,4-D	UG/KG	0	0%			0	0	9						
2,4-DB	UG/KG	0	0%			0	0	9						
Dalapon	UG/KG	0	0%			0	0	9						
Dicamba	UG/KG	0	0%			0	0	9						
Dichloroprop	UG/KG	0	0%			0	0	9						
Dinoseb	UG/KG	0	0%			0	0	9						
MCPA	UG/KG	0	0%			0	0	9						
MCPP	UG/KG	0	0%			0	0	9						
Aluminum	MG/KG	22100	100%			0	58	58	11200		16300		10300	J
Antimony	MG/KG	82.7	53%	2	NYS LEL	20	31	58	8.6	J	0.84	UR	2.2	J
Arsenic	MG/KG	37.7	98%	6	NYS LEL	19	57	58	5.9		8		2.3	J
Barium	MG/KG	488	100%			0	58	58	57		86.8		107	J
Beryllium	MG/KG	1.1	100%			0	58	58	0.36	J	0.86	J	0.66	J
Cadmium	MG/KG	34.1	47%	0.6	NYS LEL	24	27	58	0.11	U	0.11	U	0.72	J
Calcium	MG/KG	140000	100%			0	58	58	36600		3260		25000	J
Chromium	MG/KG	4800	100%	26	NYS LEL	28	58	58	681		28.8		183	J
Cobalt	MG/KG	28.4	100%			0	58	58	11	J	18.4		11.6	J
Copper	MG/KG	2640	100%	16	NYS LEL	55	58	58	179		35.7		137	J
Cyanide	MG/KG	0	0%			0	0	58	0.68	U	0.63	U	1.4	UJ
Iron	MG/KG	87900	100%	20000	NYS LEL	45	58	58	38700		40100		17400	J
Lead	MG/KG	374	95%	31	NYS LEL	35	55	58	12	J	14		62	J
Magnesium	MG/KG	27900	100%			0	58	58	14100		6600		5510	J

Seneca Arm[illegible]ot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-45		SD4-46		SD4-47	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41045		41046		41038	
									0		0		0	
									0.2		0.2		0.2	
									12/19/1998		12/18/1998		12/18/1998	
									SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF						
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
Manganese	MG/KG	5480	100%	460	NYS LEL	28	58	58	563		802	J	655	J
Mercury	MG/KG	2.4	59%	0.15	NYS LEL	16	34	58	0.08	J	0.06	J	0.16	J
Nickel	MG/KG	453	100%	16	NYS LEL	58	58	58	28.1		49.1		33	J
Potassium	MG/KG	3460	100%			0	58	58	1130	J	1420		2220	J
Selenium	MG/KG	6.1	41%			0	24	58	0.82	U	0.78	U	3.8	J
Silver	MG/KG	1.7	45%	1	NYS LEL	4	26	58	0.23	U	0.22	U	0.48	UJ
Sodium	MG/KG	1370	64%			0	37	58	65.2	J	73	U	311	J
Thallium	MG/KG	0	0%			0	0	58	0.71	U	0.67	U	1.5	UJ
Vanadium	MG/KG	1140	100%			0	58	58	19		24.8		22.5	J
Zinc	MG/KG	1150	100%	120	NYS LEL	41	58	58	138	J	104		231	J

Notes

(1) Criteria calculated using a TOC of 3.91%. This is a site wide TOC value.

(2) NYSDEC HHB = NYS HUMAN HEALTH BIOACCUMULATION CRITERIA
BENTHIC-CHRONIC = NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITERIA
NYDEC W/H = NYS WILD/HUMAN BIOACCUM CRITERIA
NYS LEL = NYS LOWEST EFFECT LEVEL

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4		SEAD-4	
									SD4-48		SD4-49		SD4-5		SD4-50	
									SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
									41031		41034		SD4-5		41033	
									0		0		0		0	
									0.2		0.2		0.5		0.2	
									12/14/1998		12/17/1998		12/14/1993		12/16/1998	
									SA		SA		SA		DU	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		ESI		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF								
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q	Value	Q
1,1,1-Trichloroethane	UG/KG	0	0%			0	0	58	20	U	15	U	17	U	23	UJ
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	11.7315	NYDEC HHB	0	0	58	20	UJ	15	U	17	U	23	UJ
1,1,2-Trichloroethane	UG/KG	0	0%			0	0	58	20	U	15	U	17	U	23	UJ
1,1-Dichloroethane	UG/KG	0	0%			0	0	58	20	U	15	U	17	U	23	UJ
1,1-Dichloroethene	UG/KG	0	0%	0.7821	NYDEC HHB	0	0	58	20	U	15	U	17	U	23	UJ
1,2-Dichloroethane	UG/KG	0	0%	27.3735	NYDEC HHB	0	0	58	20	U	15	U	17	U	23	UJ
1,2-Dichloroethene (total)	UG/KG	0	0%			0	0	58	20	U	15	U	17	U	23	UJ
1,2-Dichloropropane	UG/KG	0	0%			0	0	58	20	U	15	U	17	U	23	UJ
Acetone	UG/KG	210	26%			0	15	58	20	U	15	U	17	U	23	UJ
Benzene	UG/KG	0	0%	23.463	NYDEC HHB	0	0	58	20	U	15	U	17	U	23	UJ
Bromodichloromethane	UG/KG	0	0%			0	0	58	20	U	15	U	17	U	23	UJ
Bromoform	UG/KG	0	0%			0	0	58	20	UJ	15	U	17	U	23	UJ
Carbon disulfide	UG/KG	18	9%			0	5	58	20	U	15	U	17	U	23	UJ
Carbon tetrachloride	UG/KG	0	0%	23.463	NYDEC HHB	0	0	58	20	U	15	U	17	U	23	UJ
Chlorobenzene	UG/KG	0	0%	136.8675	BENTHIC-CHRONIC	0	0	58	20	UJ	15	U	17	U	23	UJ
Chlorodibromomethane	UG/KG	0	0%			0	0	58	20	U	15	U	17	U	23	UJ
Chloroethane	UG/KG	0	0%			0	0	58	20	U	15	UJ	17	U	23	UJ
Chloroform	UG/KG	14	3%			0	2	58	20	U	15	U	17	U	23	UJ
Cis-1,3-Dichloropropene	UG/KG	0	0%			0	0	58	20	U	15	U	17	U	23	UJ
Ethyl benzene	UG/KG	0	0%	938.52	BENTHIC-CHRONIC	0	0	58	20	UJ	15	U	17	U	23	UJ
Methyl bromide	UG/KG	0	0%			0	0	58	20	UJ	15	U	17	U	23	UJ
Methyl butyl ketone	UG/KG	0	0%			0	0	58	20	U	15	U	17	U	23	UJ
Methyl chloride	UG/KG	5	2%			0	1	58	20	U	15	U	17	U	23	UJ
Methyl ethyl ketone	UG/KG	49	2%			0	1	58	20	U	15	UJ	17	U	23	UJ
Methyl isobutyl ketone	UG/KG	0	0%			0	0	58	20	U	15	U	17	U	23	UJ
Methylene chloride	UG/KG	11	5%			0	3	58	20	U	15	U	17	U	23	UJ
Styrene	UG/KG	3	3%			0	2	58	20	UJ	15	U	3	J	23	UJ
Tetrachloroethene	UG/KG	0	0%	31.284	NYDEC HHB	0	0	58	20	U	15	U	17	U	23	UJ
Toluene	UG/KG	42	9%	1916.145	BENTHIC-CHRONIC	0	5	58	20	U	15	U	17	U	23	UJ
Total Xylenes	UG/KG	7	3%	3597.66	BENTHIC-CHRONIC	0	2	58	20	UJ	15	U	7	J	23	UJ
Trans-1,3-Dichloropropene	UG/KG	0	0%			0	0	58	20	U	15	U	17	U	23	UJ
Trichloroethene	UG/KG	0	0%	78.21	NYDEC HHB	0	0	58	20	U	15	U	17	U	23	UJ
Vinyl chloride	UG/KG	0	0%	2.73735	NYDEC HHB	0	0	58	20	U	15	U	17	U	23	UJ
1,2,4-Trichlorobenzene	UG/KG	0	0%			0	0	58	130	U	110	U	630	U	150	UJ
1,2-Dichlorobenzene	UG/KG	0	0%	4692.6	BENTHIC-CHRONIC	0	0	58	130	U	110	U	630	U	150	UJ
1,3-Dichlorobenzene	UG/KG	0	0%	469.26	BENTHIC-CHRONIC	0	0	58	130	U	110	U	630	U	150	UJ
1,4-Dichlorobenzene	UG/KG	73	2%	469.26	BENTHIC-CHRONIC	0	1	58	130	U	110	U	630	U	150	UJ
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%			0	0	9					630	U		
2,4,5-Trichlorophenol	UG/KG	0	0%			0	0	58	320	U	260	U	1500	U	360	UJ
2,4,6-Trichlorophenol	UG/KG	0	0%			0	0	58	130	U	110	U	630	U	150	UJ
2,4-Dichlorophenol	UG/KG	0	0%			0	0	58	130	U	110	U	630	U	150	UJ

Seneca Arn ot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4		SEAD-4	
									SD4-48		SD4-49		SD4-5		SD4-50	
									SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
									41031		41034		SD4-5		41033	
									0		0		0		0	
									0.2		0.2		0.5		0.2	
									12/14/1998		12/17/1998		12/14/1993		12/16/1998	
									SA		SA		SA		DU	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		ESI		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF								
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q	Value	Q
2,4-Dimethylphenol	UG/KG	0	0%	19.5525	BENTHIC-CHRONIC	0	0	58	130	UJ	110	U	630	U	150	UJ
2,4-Dinitrophenol	UG/KG	0	0%			0	0	58	320	UJ	260	UJ	1500	U	360	UJ
2,4-Dinitrotoluene	UG/KG	0	0%			0	0	58	130	U	110	U	630	U	150	UJ
2,6-Dinitrotoluene	UG/KG	0	0%			0	0	58	130	U	110	U	630	U	150	UJ
2-Chloronaphthalene	UG/KG	0	0%			0	0	58	130	U	110	U	630	U	150	UJ
2-Chlorophenol	UG/KG	0	0%			0	0	58	130	U	110	U	630	U	150	UJ
2-Methylnaphthalene	UG/KG	31	9%	1329.57	BENTHIC-CHRONIC	0	5	58	130	U	110	U	630	U	150	UJ
2-Methylphenol	UG/KG	0	0%			0	0	58	130	U	110	U	630	U	150	UJ
2-Nitroaniline	UG/KG	0	0%			0	0	58	320	U	260	U	1500	U	360	UJ
2-Nitrophenol	UG/KG	0	0%	19.5525	BENTHIC-CHRONIC	0	0	58	130	U	110	U	630	U	150	UJ
3,3'-Dichlorobenzidine	UG/KG	0	0%			0	0	58	130	U	110	U	630	U	150	UJ
3-Nitroaniline	UG/KG	0	0%			0	0	58	320	UJ	260	U	1500	U	360	UJ
4,6-Dinitro-2-methylphenol	UG/KG	0	0%			0	0	58	320	U	260	U	1500	U	360	UJ
4-Bromophenyl phenyl ether	UG/KG	0	0%			0	0	58	130	U	110	U	630	U	150	UJ
4-Chloro-3-methylphenol	UG/KG	0	0%			0	0	58	130	U	110	U	630	U	150	UJ
4-Chloroaniline	UG/KG	0	0%			0	0	58	130	UJ	110	U	630	U	150	UJ
4-Chlorophenyl phenyl ether	UG/KG	0	0%			0	0	58	130	U	110	U	630	U	150	UJ
4-Methylphenol	UG/KG	140	10%	19.5525	BENTHIC-CHRONIC	2	6	58	130	U	110	U	630	U	150	UJ
4-Nitroaniline	UG/KG	0	0%			0	0	58	320	U	260	U	1500	U	360	UJ
4-Nitrophenol	UG/KG	0	0%			0	0	58	320	U	260	U	1500	U	360	UJ
Acenaphthene	UG/KG	610	19%	5474.7	BENTHIC-CHRONIC	0	11	58	130	U	110	U	630	U	12	J
Acenaphthylene	UG/KG	130	17%			0	10	58	130	U	110	U	630	U	150	UJ
Anthracene	UG/KG	1700	47%	4184.235	BENTHIC-CHRONIC	0	27	58	130	U	7.2	J	630	U	19	J
Benzo(a)anthracene	UG/KG	5900	84%	50.8365	NYDEC HHB	26	49	58	50	J	26	J	630	U	110	J
Benzo(a)pyrene	UG/KG	5100	84%	50.8365	NYDEC HHB	26	49	58	50	J	29	J	630	U	150	J
Benzo(b)fluoranthene	UG/KG	4800	88%	50.8365	NYDEC HHB	35	51	58	82	J	35	J	630	U	210	J
Benzo(ghi)perylene	UG/KG	3200	78%			0	45	58	41	J	36	J	630	U	110	J
Benzo(k)fluoranthene	UG/KG	5700	43%	50.8365	NYDEC HHB	20	25	58	74	J	36	J	630	U	140	J
Bis(2-Chloroethoxy)methane	UG/KG	0	0%			0	0	58	130	U	110	U	630	U	150	UJ
Bis(2-Chloroethyl)ether	UG/KG	0	0%			0	0	58	130	U	110	U	630	U	150	UJ
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%			0	0	49	130	U	110	U			150	UJ
Bis(2-Ethylhexyl)phthalate	UG/KG	42000	40%	7801.4475	BENTHIC-CHRONIC	1	23	58	120	U	110	U	630	U	150	UJ
Butylbenzylphthalate	UG/KG	16	9%			0	5	58	130	U	110	U	630	U	150	UJ
Carbazole	UG/KG	500	40%			0	23	58	130	UJ	6.8	J	630	U	22	J
Chrysene	UG/KG	6200	90%	50.8365	NYDEC HHB	34	52	58	68	J	38	J	630	U	170	J
Di-n-butylphthalate	UG/KG	250	47%			0	27	58	28	J	110	U	630	U	7.5	J
Di-n-octylphthalate	UG/KG	46	5%			0	3	58	130	U	110	U	630	U	150	UJ
Dibenz(a,h)anthracene	UG/KG	1200	50%			0	29	58	130	U	12	J	630	U	150	UJ
Dibenzofuran	UG/KG	230	17%			0	10	58	130	U	110	U	630	U	150	UJ
Diethyl phthalate	UG/KG	17	3%			0	2	58	8.6	J	110	U	630	U	150	UJ
Dimethylphthalate	UG/KG	0	0%			0	0	58	130	U	110	U	630	U	150	UJ

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4		SEAD-4	
									SD4-48		SD4-49		SD4-5		SD4-50	
									SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
									41031		41034		SD4-5		41033	
									0		0		0		0	
									0.2		0.2		0.5		0.2	
									12/14/1998		12/17/1998		12/14/1993		12/16/1998	
									SA		SA		SA		DU	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		ESI		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF								
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q	Value	Q
Fluoranthene	UG/KG	16000	93%	39887.1	BENTHIC-CHRONIC	0	54	58	82	J	68	J	630	U	260	J
Fluorene	UG/KG	660	22%	312.84	BENTHIC-CHRONIC	1	13	58	130	U	110	U	630	U	11	J
Hexachlorobenzene	UG/KG	840	3%	5.86575	NYDEC HHB	2	2	58	130	U	110	U	630	U	150	UJ
Hexachlorobutadiene	UG/KG	0	0%			0	0	58	130	U	110	U	630	U	150	UJ
Hexachlorocyclopentadiene	UG/KG	0	0%			0	0	58	130	UJ	110	U	630	U	150	UJ
Hexachloroethane	UG/KG	0	0%			0	0	58	130	U	110	U	630	U	150	UJ
Indeno(1,2,3-cd)pyrene	UG/KG	3100	74%	50.8365	NYDEC HHB	21	43	58	42	J	25	J	630	U	110	J
Isophorone	UG/KG	0	0%			0	0	58	130	U	110	U	630	U	150	UJ
N-Nitrosodiphenylamine	UG/KG	760	2%			0	1	58	130	U	110	U	630	U	150	UJ
N-Nitrosodipropylamine	UG/KG	410	2%			0	1	58	130	U	110	U	630	U	150	UJ
Naphthalene	UG/KG	13	12%	1173.15	BENTHIC-CHRONIC	0	7	58	130	U	110	U	630	U	150	UJ
Nitrobenzene	UG/KG	0	0%			0	0	58	130	U	110	U	630	U	150	UJ
Pentachlorophenol	UG/KG	0	0%	1564.2	BENTHIC-CHRONIC	0	0	58	320	U	260	U	1500	U	360	UJ
Phenanthrene	UG/KG	7900	88%	4692.6	BENTHIC-CHRONIC	1	51	58	25	J	34	J	630	U	130	J
Phenol	UG/KG	210	7%	19.5525	BENTHIC-CHRONIC	4	4	58	130	J	110	U	630	U	150	UJ
Pyrene	UG/KG	12000	93%	37579.905	BENTHIC-CHRONIC	0	54	58	56	J	52	J	630	U	210	J
1,3,5-Trinitrobenzene	UG/KG	0	0%			0	0	58	120	U	120	U	130	U	120	UJ
1,3-Dinitrobenzene	UG/KG	0	0%			0	0	58	120	U	120	U	130	U	120	UJ
2,4,6-Trinitrotoluene	UG/KG	0	0%			0	0	58	120	U	120	U	130	U	120	UJ
2,4-Dinitrotoluene	UG/KG	0	0%			0	0	58	120	U	120	U	130	U	120	UJ
2,6-Dinitrotoluene	UG/KG	0	0%			0	0	58	120	U	120	U	130	U	120	UJ
2-Nitrotoluene	UG/KG	450	2%			0	1	49	120	U	120	U			120	UJ
2-amino-4,6-Dinitrotoluene	UG/KG	200	2%			0	1	58	200	J	120	U	130	U	120	UJ
3-Nitrotoluene	UG/KG	0	0%			0	0	49	120	U	120	U			120	UJ
4-Nitrotoluene	UG/KG	0	0%			0	0	49	120	U	120	U			120	UJ
4-amino-2,6-Dinitrotoluene	UG/KG	140	2%			0	1	58	120	U	120	U	130	U	120	UJ
HMX	UG/KG	0	0%			0	0	58	120	U	120	U	130	U	120	UJ
Nitrobenzene	UG/KG	0	0%			0	0	49	120	U	120	U			120	UJ
RDX	UG/KG	0	0%			0	0	58	120	U	120	U	130	U	120	UJ
Tetryl	UG/KG	0	0%			0	0	58	120	U	120	U	130	U	120	UJ
4,4'-DDD	UG/KG	90	22%	0.39105	NYDEC HHB	13	13	58	11	J	5.5	U	6.3	U	7.3	UJ
4,4'-DDE	UG/KG	86	33%	0.39105	NYDEC HHB	19	19	58	6.6	U	5.5	U	6.3	U	7.3	UJ
4,4'-DDT	UG/KG	45	28%	0.39105	NYDEC HHB	16	16	58	6.6	U	5.5	U	6.3	U	7.3	UJ
Aldrin	UG/KG	2.8	5%	3.9105	NYDEC HHB	0	3	58	3.4	U	2.8	U	3.3	U	3.8	UJ
Alpha-BHC	UG/KG	0	0%			0	0	58	3.4	U	2.8	U	3.3	U	3.8	UJ
Alpha-Chlordane	UG/KG	44	14%	0.039105	NYDEC HHB	8	8	58	3.4	U	2.8	U	3.3	U	3.8	UJ
Aroclor-1016	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	66	U	55	U	63	U	73	UJ
Aroclor-1221	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	130	U	110	U	130	U	150	UJ
Aroclor-1232	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	66	U	55	U	63	U	73	UJ
Aroclor-1242	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	66	U	55	U	63	U	73	UJ
Aroclor-1248	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	66	U	55	U	63	U	73	UJ

Seneca Ar epot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4		SEAD-4	
									SD4-48		SD4-49		SD4-5		SD4-50	
									SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
									41031		41034		SD4-5		41033	
									0		0		0		0	
									0.2		0.2		0.5		0.2	
									12/14/1998		12/17/1998		12/14/1993		12/16/1998	
									SA		SA		SA		DU	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		ESI		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF								
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q	Value	Q
Aroclor-1254	UG/KG	580	45%	0.031284	NYDEC HHB	26	26	58	66	U	55	U	130	J	73	UJ
Aroclor-1260	UG/KG	250	16%	0.031284	NYDEC HHB	9	9	58	66	U	55	U	63	U	73	UJ
Beta-BHC	UG/KG	3.3	7%			0	4	58	3.4	U	2.8	U	3.3	U	3.8	UJ
Delta-BHC	UG/KG	0	0%			0	0	58	3.4	U	2.8	U	3.3	U	3.8	UJ
Dieldrin	UG/KG	18	7%	3.9105	NYDEC HHB	4	4	58	6.6	U	5.5	U	6.3	U	7.3	UJ
Endosulfan I	UG/KG	1.9	2%	1.17315	BENTHIC-CHRONIC	1	1	58	3.4	U	2.8	U	3.3	U	3.8	UJ
Endosulfan II	UG/KG	6.8	3%	1.17315	BENTHIC-CHRONIC	2	2	58	6.6	U	5.5	U	6.3	U	7.3	UJ
Endosulfan sulfate	UG/KG	12	9%			0	5	58	6.6	U	5.5	U	6.3	U	7.3	UJ
Endrin	UG/KG	0	0%	31.284	NYDEC W/H	0	0	58	6.6	U	5.5	U	6.3	U	7.3	UJ
Endrin aldehyde	UG/KG	15	12%			0	7	58	6.6	U	5.5	U	6.3	U	7.3	UJ
Endrin ketone	UG/KG	62	7%			0	4	58	6.6	U	5.5	U	6.3	U	7.3	UJ
Gamma-BHC/Lindane	UG/KG	0	0%			0	0	58	3.4	U	2.8	U	3.3	U	3.8	UJ
Gamma-Chlordane	UG/KG	40	17%	0.039105	NYDEC HHB	10	10	58	3.4	U	2.8	U	3.3	U	3.8	UJ
Heptachlor	UG/KG	2.4	2%	0.031284	NYDEC HHB	1	1	58	3.4	U	2.8	U	3.3	U	3.8	UJ
Heptachlor epoxide	UG/KG	10	10%	0.031284	NYDEC HHB	6	6	58	3.4	U	2.8	U	3.3	U	3.8	UJ
Methoxychlor	UG/KG	68	3%			0	2	58	34	U	28	U	33	U	38	UJ
Toxaphene	UG/KG	0	0%			0	0	58	340	U	280	U	330	U	380	UJ
2,4,5-T	UG/KG	21	11%			0	1	9					9.6	U		
2,4,5-TP/Silvex	UG/KG	0	0%			0	0	9					9.6	U		
2,4-D	UG/KG	0	0%			0	0	9					96	U		
2,4-DB	UG/KG	0	0%			0	0	9					96	U		
Dalapon	UG/KG	0	0%			0	0	9					230	U		
Dicamba	UG/KG	0	0%			0	0	9					9.6	U		
Dichloroprop	UG/KG	0	0%			0	0	9					96	U		
Dinoseb	UG/KG	0	0%			0	0	9					48	U		
MCPA	UG/KG	0	0%			0	0	9					9600	U		
MCPP	UG/KG	0	0%			0	0	9					9600	U		
Aluminum	MG/KG	22100	100%			0	58	58	7920		7640		18200		8560	J
Antimony	MG/KG	82.7	53%	2	NYS LEL	20	31	58	18.5	J	0.88	J	7	J	1.2	UJ
Arsenic	MG/KG	37.7	98%	6	NYS LEL	19	57	58	2.8	J	2.3	J	5.2		2.8	J
Barium	MG/KG	488	100%			0	58	58	70		66.7		130		86	J
Beryllium	MG/KG	1.1	100%			0	58	58	0.11	J	0.37	J	0.99	J	0.42	J
Cadmium	MG/KG	34.1	47%	0.6	NYS LEL	24	27	58	0.21	J	0.06	U	2.8		0.08	UJ
Calcium	MG/KG	140000	100%			0	58	58	11000		35300		19800		46800	J
Chromium	MG/KG	4800	100%	26	NYS LEL	28	58	58	2340		12.9		59.9	J	15.3	J
Cobalt	MG/KG	28.4	100%			0	58	58	7	J	8.1	J	15.1		9.1	J
Copper	MG/KG	2640	100%	16	NYS LEL	55	58	58	359		15		33	J	20.5	J
Cyanide	MG/KG	0	0%			0	0	58	1	U	0.91	U	0.99	U	1.1	UJ
Iron	MG/KG	87900	100%	20000	NYS LEL	45	58	58	14300		14400		37200		16900	J
Lead	MG/KG	374	95%	31	NYS LEL	35	55	58	21.8		16.9		236	UR	18.7	J
Magnesium	MG/KG	27900	100%			0	58	58	2880		7420		7750		9900	J

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4		SEAD-4	
									SD4-48		SD4-49		SD4-5		SD4-50	
									SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
									41031		41034		SD4-5		41033	
									0		0		0		0	
									0.2		0.2		0.5		0.2	
									12/14/1998		12/17/1998		12/14/1993		12/16/1998	
									SA		SA		SA		DU	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		ESI		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF								
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q	Value	Q
Manganese	MG/KG	5480	100%	460	NYS LEL	28	58	58	1080		246	J	337		313	J
Mercury	MG/KG	2.4	59%	0.15	NYS LEL	16	34	58	0.34	J	0.08	U	0.04	U	0.11	UJ
Nickel	MG/KG	453	100%	16	NYS LEL	58	58	58	30.4		20.1		47.7		24.2	J
Potassium	MG/KG	3460	100%			0	58	58	2070		1140	J	1580		1010	J
Selenium	MG/KG	6.1	41%			0	24	58	1.3	J	0.57	U	0.53	J	0.75	UJ
Silver	MG/KG	1.7	45%	1	NYS LEL	4	26	58	0.33	U	0.28	U	1.2	U	0.38	UJ
Sodium	MG/KG	1370	64%			0	37	58	87.4	U	74.1	U	127	J	98.3	UJ
Thallium	MG/KG	0	0%			0	0	58	12	U	1	UJ	0.27	U	1.4	UJ
Vanadium	MG/KG	1140	100%			0	58	58	17.1		15.5		27.7		18.3	J
Zinc	MG/KG	1150	100%	120	NYS LEL	41	58	58	389	J	75.9		674		90.1	J

Notes:

(1) Criteria calculated using a TOC of 3.91%. This is a site wide TOC value.

(2) NYSDEC HHB = NYS HUMAN HEALTH BIOACCUMULATION CRITERIA
BENTHIC-CHRONIC = NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITERIA
NYDEC W/H = NYS WILD/HUMAN BIOACCUM CRITERIA
NYS LEL = NYS LOWEST EFFECT LEVEL

									SEAD-4		SEAD-4		SEAD-4	
									SD4-50		SD4-51		SD4-52	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41032		41035		41036	
									0		0		0	
									0.2		0.2		0.2	
									12/16/1998		12/18/1998		12/18/1998	
									SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF						
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
1,1,1-Trichloroethane	UG/KG	0	0%			0	0	58	23	UJ	13	U	27	UJ
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	11.7315	NYDEC HHB	0	0	58	23	UJ	13	U	27	UJ
1,1,2-Trichloroethane	UG/KG	0	0%			0	0	58	23	UJ	13	U	27	UJ
1,1-Dichloroethane	UG/KG	0	0%			0	0	58	23	UJ	13	U	27	UJ
1,1-Dichloroethene	UG/KG	0	0%	0.7821	NYDEC HHB	0	0	58	23	UJ	13	U	27	UJ
1,2-Dichloroethane	UG/KG	0	0%	27.3735	NYDEC HHB	0	0	58	23	UJ	13	U	27	UJ
1,2-Dichloroethene (total)	UG/KG	0	0%			0	0	58	23	UJ	13	U	27	UJ
1,2-Dichloropropane	UG/KG	0	0%			0	0	58	23	UJ	13	U	27	UJ
Acetone	UG/KG	210	26%			0	15	58	23	UJ	13	U	32	J
Benzene	UG/KG	0	0%	23.463	NYDEC HHB	0	0	58	23	UJ	13	U	27	UJ
Bromodichloromethane	UG/KG	0	0%			0	0	58	23	UJ	13	U	27	UJ
Bromoform	UG/KG	0	0%			0	0	58	23	UJ	13	U	27	UJ
Carbon disulfide	UG/KG	18	9%			0	5	58	23	UJ	13	U	27	UJ
Carbon tetrachloride	UG/KG	0	0%	23.463	NYDEC HHB	0	0	58	23	UJ	13	U	27	UJ
Chlorobenzene	UG/KG	0	0%	136.8675	BENTHIC-CHRONIC	0	0	58	23	UJ	13	U	27	UJ
Chlorodibromomethane	UG/KG	0	0%			0	0	58	23	UJ	13	U	27	UJ
Chloroethane	UG/KG	0	0%			0	0	58	23	UJ	13	UJ	27	UJ
Chloroform	UG/KG	14	3%			0	2	58	23	UJ	13	U	27	UJ
Cis-1,3-Dichloropropene	UG/KG	0	0%			0	0	58	23	UJ	13	U	27	UJ
Ethyl benzene	UG/KG	0	0%	938.52	BENTHIC-CHRONIC	0	0	58	23	UJ	13	U	27	UJ
Methyl bromide	UG/KG	0	0%			0	0	58	23	UJ	13	U	27	UJ
Methyl butyl ketone	UG/KG	0	0%			0	0	58	23	UJ	13	U	27	UJ
Methyl chloride	UG/KG	5	2%			0	1	58	23	UJ	13	U	5	J
Methyl ethyl ketone	UG/KG	49	2%			0	1	58	23	UJ	13	UJ	27	UJ
Methyl isobutyl ketone	UG/KG	0	0%			0	0	58	23	UJ	13	U	27	UJ
Methylene chloride	UG/KG	11	5%			0	3	58	23	UJ	13	U	27	UJ
Styrene	UG/KG	3	3%			0	2	58	23	UJ	13	U	27	UJ
Tetrachloroethene	UG/KG	0	0%	31.284	NYDEC HHB	0	0	58	23	UJ	13	U	27	UJ
Toluene	UG/KG	42	9%	1916.145	BENTHIC-CHRONIC	0	5	58	23	UJ	13	U	27	UJ
Total Xylenes	UG/KG	7	3%	3597.66	BENTHIC-CHRONIC	0	2	58	23	UJ	13	U	27	UJ
Trans-1,3-Dichloropropene	UG/KG	0	0%			0	0	58	23	UJ	13	U	27	UJ
Trichloroethene	UG/KG	0	0%	78.21	NYDEC HHB	0	0	58	23	UJ	13	U	27	UJ
Vinyl chloride	UG/KG	0	0%	2.73735	NYDEC HHB	0	0	58	23	UJ	13	U	27	UJ
1,2,4-Trichlorobenzene	UG/KG	0	0%			0	0	58	130	UJ	81	U	160	UJ
1,2-Dichlorobenzene	UG/KG	0	0%	4692.6	BENTHIC-CHRONIC	0	0	58	130	UJ	81	U	160	UJ
1,3-Dichlorobenzene	UG/KG	0	0%	469.26	BENTHIC-CHRONIC	0	0	58	130	UJ	81	U	160	UJ
1,4-Dichlorobenzene	UG/KG	73	2%	469.26	BENTHIC-CHRONIC	0	1	58	130	UJ	81	U	160	UJ
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%			0	0	9						
2,4,5-Trichlorophenol	UG/KG	0	0%			0	0	58	320	UJ	200	U	380	UJ
2,4,6-Trichlorophenol	UG/KG	0	0%			0	0	58	130	UJ	81	U	160	UJ
2,4-Dichlorophenol	UG/KG	0	0%			0	0	58	130	UJ	81	U	160	UJ

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-50		SD4-51		SD4-52	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41032		41035		41036	
									0		0		0	
									0.2		0.2		0.2	
									12/16/1998		12/18/1998		12/18/1998	
									SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF						
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
2,4-Dimethylphenol	UG/KG	0	0%	19.5525	BENTHIC-CHRONIC	0	0	58	130	UJ	81	U	160	UJ
2,4-Dinitrophenol	UG/KG	0	0%			0	0	58	320	UJ	200	UJ	380	UJ
2,4-Dinitrotoluene	UG/KG	0	0%			0	0	58	130	UJ	81	U	160	UJ
2,6-Dinitrotoluene	UG/KG	0	0%			0	0	58	130	UJ	81	U	160	UJ
2-Chloronaphthalene	UG/KG	0	0%			0	0	58	130	UJ	81	U	160	UJ
2-Chlorophenol	UG/KG	0	0%			0	0	58	130	UJ	81	U	160	UJ
2-Methylnaphthalene	UG/KG	31	9%	1329.57	BENTHIC-CHRONIC	0	5	58	130	UJ	8.9	J	160	UJ
2-Methylphenol	UG/KG	0	0%			0	0	58	130	UJ	81	U	160	UJ
2-Nitroaniline	UG/KG	0	0%			0	0	58	320	UJ	200	U	380	UJ
2-Nitrophenol	UG/KG	0	0%	19.5525	BENTHIC-CHRONIC	0	0	58	130	UJ	81	U	160	UJ
3,3'-Dichlorobenzidine	UG/KG	0	0%			0	0	58	130	UJ	81	U	160	UJ
3-Nitroaniline	UG/KG	0	0%			0	0	58	320	UJ	200	U	380	UJ
4,6-Dinitro-2-methylphenol	UG/KG	0	0%			0	0	58	320	UJ	200	U	380	UJ
4-Bromophenyl phenyl ether	UG/KG	0	0%			0	0	58	130	UJ	81	U	160	UJ
4-Chloro-3-methylphenol	UG/KG	0	0%			0	0	58	130	UJ	81	U	160	UJ
4-Chloroaniline	UG/KG	0	0%			0	0	58	130	UJ	81	U	160	UJ
4-Chlorophenyl phenyl ether	UG/KG	0	0%			0	0	58	130	UJ	81	U	160	UJ
4-Methylphenol	UG/KG	140	10%	19.5525	BENTHIC-CHRONIC	2	6	58	130	UJ	81	U	160	UJ
4-Nitroaniline	UG/KG	0	0%			0	0	58	320	UJ	200	U	380	UJ
4-Nitrophenol	UG/KG	0	0%			0	0	58	320	UJ	200	U	380	UJ
Acenaphthene	UG/KG	610	19%	5474.7	BENTHIC-CHRONIC	0	11	58	10	J	9.2	J	160	UJ
Acenaphthylene	UG/KG	130	17%			0	10	58	130	UJ	28	J	11	J
Anthracene	UG/KG	1700	47%	4184.235	BENTHIC-CHRONIC	0	27	58	19	J	46	J	22	J
Benzo(a)anthracene	UG/KG	5900	84%	50.8365	NYDEC HHB	26	49	58	96	J	190		130	J
Benzo(a)pyrene	UG/KG	5100	84%	50.8365	NYDEC HHB	26	49	58	130	J	180		150	J
Benzo(b)fluoranthene	UG/KG	4800	88%	50.8365	NYDEC HHB	35	51	58	150	J	190		200	J
Benzo(ghi)perylene	UG/KG	3200	78%			0	45	58	94	J	100		86	J
Benzo(k)fluoranthene	UG/KG	5700	43%	50.8365	NYDEC HHB	20	25	58	130	J	170		190	J
Bis(2-Chloroethoxy)methane	UG/KG	0	0%			0	0	58	130	UJ	81	U	160	UJ
Bis(2-Chloroethyl)ether	UG/KG	0	0%			0	0	58	130	UJ	81	U	160	UJ
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%			0	0	49	130	UJ	81	U	160	UJ
Bis(2-Ethylhexyl)phthalate	UG/KG	42000	40%	7801.4475	BENTHIC-CHRONIC	1	23	58	130	UJ	81	U	160	UJ
Butylbenzylphthalate	UG/KG	16	9%			0	5	58	130	UJ	81	U	160	UJ
Carbazole	UG/KG	500	40%			0	23	58	21	J	12	J	14	J
Chrysene	UG/KG	6200	90%	50.8365	NYDEC HHB	34	52	58	140	J	220		200	J
Di-n-butylphthalate	UG/KG	250	47%			0	27	58	130	UJ	81	U	160	UJ
Di-n-octylphthalate	UG/KG	46	5%			0	3	58	130	UJ	81	U	160	UJ
Dibenz(a,h)anthracene	UG/KG	1200	50%			0	29	58	130	UJ	64	J	38	J
Dibenzofuran	UG/KG	230	17%			0	10	58	130	UJ	14	J	160	UJ
Diethyl phthalate	UG/KG	17	3%			0	2	58	130	UJ	81	U	160	UJ
Dimethylphthalate	UG/KG	0	0%			0	0	58	130	UJ	81	U	160	UJ

Seneca Army [illegible]ot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-50		SD4-51		SD4-52	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41032		41035		41036	
									0		0		0	
									0.2		0.2		0.2	
									12/16/1998		12/18/1998		12/18/1998	
									SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF						
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
Fluoranthene	UG/KG	16000	93%	39887.1	BENTHIC-CHRONIC	0	54	58	240	J	320		340	J
Fluorene	UG/KG	660	22%	312.84	BENTHIC-CHRONIC	1	13	58	10	J	18	J	160	UJ
Hexachlorobenzene	UG/KG	840	3%	5.86575	NYDEC HHB	2	2	58	130	UJ	81	U	160	UJ
Hexachlorobutadiene	UG/KG	0	0%			0	0	58	130	UJ	81	U	160	UJ
Hexachlorocyclopentadiene	UG/KG	0	0%			0	0	58	130	UJ	81	U	160	UJ
Hexachloroethane	UG/KG	0	0%			0	0	58	130	UJ	81	U	160	UJ
Indeno(1,2,3-cd)pyrene	UG/KG	3100	74%	50.8365	NYDEC HHB	21	43	58	92	J	140		100	J
Isophorone	UG/KG	0	0%			0	0	58	130	UJ	81	U	160	UJ
N-Nitrosodiphenylamine	UG/KG	760	2%			0	1	58	130	UJ	81	U	160	UJ
N-Nitrosodipropylamine	UG/KG	410	2%			0	1	58	130	UJ	81	U	160	UJ
Naphthalene	UG/KG	13	12%	1173.15	BENTHIC-CHRONIC	0	7	58	130	UJ	12	J	160	UJ
Nitrobenzene	UG/KG	0	0%			0	0	58	130	UJ	81	U	160	UJ
Pentachlorophenol	UG/KG	0	0%	1564.2	BENTHIC-CHRONIC	0	0	58	320	UJ	200	U	380	UJ
Phenanthrene	UG/KG	7900	88%	4692.6	BENTHIC-CHRONIC	1	51	58	120	J	140		120	J
Phenol	UG/KG	210	7%	19.5525	BENTHIC-CHRONIC	4	4	58	130	UJ	81	U	160	UJ
Pyrene	UG/KG	12000	93%	37579.905	BENTHIC-CHRONIC	0	54	58	180	J	290		260	J
1,3,5-Trinitrobenzene	UG/KG	0	0%			0	0	58	120	UJ	120	U	120	UJ
1,3-Dinitrobenzene	UG/KG	0	0%			0	0	58	120	UJ	120	U	120	UJ
2,4,6-Trinitrotoluene	UG/KG	0	0%			0	0	58	120	UJ	120	U	120	UJ
2,4-Dinitrotoluene	UG/KG	0	0%			0	0	58	120	UJ	120	U	120	UJ
2,6-Dinitrotoluene	UG/KG	0	0%			0	0	58	120	UJ	120	U	120	UJ
2-Nitrotoluene	UG/KG	450	2%			0	1	49	120	UJ	120	U	120	UJ
2-amino-4,6-Dinitrotoluene	UG/KG	200	2%			0	1	58	120	UJ	120	U	120	UJ
3-Nitrotoluene	UG/KG	0	0%			0	0	49	120	UJ	120	U	120	UJ
4-Nitrotoluene	UG/KG	0	0%			0	0	49	120	UJ	120	U	120	UJ
4-amino-2,6-Dinitrotoluene	UG/KG	140	2%			0	1	58	120	UJ	120	U	120	UJ
HMX	UG/KG	0	0%			0	0	58	120	UJ	120	U	120	UJ
Nitrobenzene	UG/KG	0	0%			0	0	49	120	UJ	120	U	120	UJ
RDX	UG/KG	0	0%			0	0	58	120	UJ	120	U	120	UJ
Tetryl	UG/KG	0	0%			0	0	58	120	UJ	120	U	120	UJ
4,4'-DDD	UG/KG	90	22%	0.39105	NYDEC HHB	13	13	58	6.6	UJ	4.1	U	7.8	UJ
4,4'-DDE	UG/KG	86	33%	0.39105	NYDEC HHB	19	19	58	6.6	UJ	4.1	U	7.8	UJ
4,4'-DDT	UG/KG	45	28%	0.39105	NYDEC HHB	16	16	58	6.6	UJ	4.1	U	7.8	UJ
Aldrin	UG/KG	2.8	5%	3.9105	NYDEC HHB	0	3	58	3.4	UJ	2.1	U	4	UJ
Alpha-BHC	UG/KG	0	0%			0	0	58	3.4	UJ	2.1	U	4	UJ
Alpha-Chlordane	UG/KG	44	14%	0.039105	NYDEC HHB	8	8	58	3.4	UJ	2.1	U	4	UJ
Aroclor-1016	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	66	UJ	41	U	78	UJ
Aroclor-1221	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	130	UJ	83	U	160	UJ
Aroclor-1232	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	66	UJ	41	U	78	UJ
Aroclor-1242	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	66	UJ	41	U	78	UJ
Aroclor-1248	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	66	UJ	41	U	78	UJ

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-50		SD4-51		SD4-52	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41032		41035		41036	
									0		0		0	
									0.2		0.2		0.2	
									12/16/1998		12/18/1998		12/18/1998	
									SA		SA		SA	
									RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
ANALYTE	UNIT	MAX	FREQUENCY	NYS CRITERIA (1)	SPECIFIC CRITERIA (2)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	Value	Q	Value	Q	Value	Q
Aroclor-1254	UG/KG	580	45%	0.031284	NYDEC HHB	26	26	58	66	UJ	41	U	78	UJ
Aroclor-1260	UG/KG	250	16%	0.031284	NYDEC HHB	9	9	58	66	UJ	41	U	78	UJ
Beta-BHC	UG/KG	3.3	7%			0	4	58	3.4	UJ	2.1	U	4	UJ
Delta-BHC	UG/KG	0	0%			0	0	58	3.4	UJ	2.1	U	4	UJ
Dieldrin	UG/KG	18	7%	3.9105	NYDEC HHB	4	4	58	6.6	UJ	4.1	U	7.8	UJ
Endosulfan I	UG/KG	1.9	2%	1.17315	BENTHIC-CHRONIC	1	1	58	3.4	UJ	2.1	U	4	UJ
Endosulfan II	UG/KG	6.8	3%	1.17315	BENTHIC-CHRONIC	2	2	58	6.6	UJ	4.1	U	7.8	UJ
Endosulfan sulfate	UG/KG	12	9%			0	5	58	6.6	UJ	2.9	J	7.8	UJ
Endrin	UG/KG	0	0%	31.284	NYDEC W/H	0	0	58	6.6	UJ	4.1	U	7.8	UJ
Endrin aldehyde	UG/KG	15	12%			0	7	58	6.6	UJ	3.2	J	7.8	UJ
Endrin ketone	UG/KG	62	7%			0	4	58	6.6	UJ	2.8	J	7.8	UJ
Gamma-BHC/Lindane	UG/KG	0	0%			0	0	58	3.4	UJ	2.1	U	4	UJ
Gamma-Chlordane	UG/KG	40	17%	0.039105	NYDEC HHB	10	10	58	3.4	UJ	2.1	U	4	UJ
Heptachlor	UG/KG	2.4	2%	0.031284	NYDEC HHB	1	1	58	3.4	UJ	2.1	U	4	UJ
Heptachlor epoxide	UG/KG	10	10%	0.031284	NYDEC HHB	6	6	58	3.4	UJ	2.1	U	4	UJ
Methoxychlor	UG/KG	68	3%			0	2	58	34	UJ	21	U	40	UJ
Toxaphene	UG/KG	0	0%			0	0	58	340	UJ	210	U	400	UJ
2,4,5-T	UG/KG	21	11%			0	1	9						
2,4,5-TP/Silvex	UG/KG	0	0%			0	0	9						
2,4-D	UG/KG	0	0%			0	0	9						
2,4-DB	UG/KG	0	0%			0	0	9						
Dalapon	UG/KG	0	0%			0	0	9						
Dicamba	UG/KG	0	0%			0	0	9						
Dichloroprop	UG/KG	0	0%			0	0	9						
Dinoseb	UG/KG	0	0%			0	0	9						
MCPA	UG/KG	0	0%			0	0	9						
MCPP	UG/KG	0	0%			0	0	9						
Aluminum	MG/KG	22100	100%			0	58	58	7840	J	9240		9140	
Antimony	MG/KG	82.7	53%	2	NYS LEL	20	31	58	1	UJ	0.75	UJ	1.3	J
Arsenic	MG/KG	37.7	98%	6	NYS LEL	19	57	58	2.6	J	**7.8**		3.1	J
Barium	MG/KG	488	100%			0	58	58	81.4	J	55		90.9	J
Beryllium	MG/KG	1.1	100%			0	58	58	0.38	J	0.36	J	0.39	J
Cadmium	MG/KG	34.1	47%	0.6	NYS LEL	24	27	58	0.07	UJ	0.05	U	0.09	UJ
Calcium	MG/KG	140000	100%			0	58	58	53200	J	45900		53500	J
Chromium	MG/KG	4800	100%	26	NYS LEL	28	58	58	14.5	J	17.7		15.8	J
Cobalt	MG/KG	28.4	100%			0	58	58	8.9	J	9.3	J	8.3	J
Copper	MG/KG	2640	100%	16	NYS LEL	55	58	58	**19.7**	J	15.5		**20.8**	J
Cyanide	MG/KG	0	0%			0	0	58	1.1	UJ	0.65	U	1.2	UJ
Iron	MG/KG	87900	100%	20000	NYS LEL	45	58	58	15800	J	**26000**		17100	J
Lead	MG/KG	374	95%	31	NYS LEL	35	55	58	17.3	J	20.6		21.7	J
Magnesium	MG/KG	27900	100%			0	58	58	12800	J	9720		6910	J

Seneca Army [illegible]pot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-50		SD4-51		SD4-52	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41032		41035		41036	
									0		0		0	
									0.2		0.2		0.2	
									12/16/1998		12/18/1998		12/18/1998	
									SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF						
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
Manganese	MG/KG	5480	100%	460	NYS LEL	28	58	58	290	J	368	J	407	J
Mercury	MG/KG	2.4	59%	0.15	NYS LEL	16	34	58	0.09	UJ	0.06	UJ	0.15	J
Nickel	MG/KG	453	100%	16	NYS LEL	58	58	58	[illegible]	J	25.2		21.6	J
Potassium	MG/KG	3460	100%			0	58	58	915	J	1050	J	1460	J
Selenium	MG/KG	6.1	41%			0	24	58	0.67	UJ	0.48	U	0.85	UJ
Silver	MG/KG	1.7	45%	1	NYS LEL	4	26	58	0.33	UJ	0.24	U	0.47	J
Sodium	MG/KG	1370	64%			0	37	58	87.3	UJ	63.3	U	112	UJ
Thallium	MG/KG	0	0%			0	0	58	1.2	UJ	0.87	UJ	1.5	UJ
Vanadium	MG/KG	1140	100%			0	58	58	17.2	J	17.8		17.8	J
Zinc	MG/KG	1150	100%	120	NYS LEL	41	58	58	86.5	J	175		137	J

Notes

(1) Criteria calculated using a TOC of 3.91%. This is a site wide TOC value.

(2) NYSDEC HHB = NYS HUMAN HEALTH BIOACCUMULATION CRITERIA
BENTHIC-CHRONIC = NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITERIA
NYDEC W/H = NYS WILD/HUMAN BIOACCUM CRITERIA
NYS LEL = NYS LOWEST EFFECT LEVEL

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-53		SD4-54		SD4-55	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41037		41047		41049	
									0		0		0	
									0.2		0.2		0.2	
									12/17/1998		12/19/1998		12/19/1998	
									SA		SA		DU	
									RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
ANALYTE	UNIT	MAX	FREQUENCY	NYS CRITERIA (1)	SPECIFIC CRITERIA (2)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	Value	Q	Value	Q	Value	Q
1,1,1-Trichloroethane	UG/KG	0	0%			0	0	58	18	U	16	U	16	U
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	11.7315	NYDEC HHB	0	0	58	18	UJ	16	UJ	16	UR
1,1,2-Trichloroethane	UG/KG	0	0%			0	0	58	18	UJ	16	U	16	UJ
1,1-Dichloroethane	UG/KG	0	0%			0	0	58	18	U	16	U	16	U
1,1-Dichloroethene	UG/KG	0	0%	0.7821	NYDEC HHB	0	0	58	18	U	16	U	16	U
1,2-Dichloroethane	UG/KG	0	0%	27.3735	NYDEC HHB	0	0	58	18	U	16	U	16	U
1,2-Dichloroethene (total)	UG/KG	0	0%			0	0	58	18	U	16	U	16	U
1,2-Dichloropropane	UG/KG	0	0%			0	0	58	18	UJ	16	U	16	UJ
Acetone	UG/KG	210	26%			0	15	58	18	U	16	U	16	U
Benzene	UG/KG	0	0%	23.463	NYDEC HHB	0	0	58	18	UJ	16	U	16	UJ
Bromodichloromethane	UG/KG	0	0%			0	0	58	18	UJ	16	U	16	UJ
Bromoform	UG/KG	0	0%			0	0	58	18	UJ	16	UJ	16	UR
Carbon disulfide	UG/KG	18	9%			0	5	58	18	U	16	U	16	U
Carbon tetrachloride	UG/KG	0	0%	23.463	NYDEC HHB	0	0	58	18	U	16	U	16	U
Chlorobenzene	UG/KG	0	0%	136.8675	BENTHIC-CHRONIC	0	0	58	18	UJ	16	UJ	16	UR
Chlorodibromomethane	UG/KG	0	0%			0	0	58	18	UJ	16	U	16	UJ
Chloroethane	UG/KG	0	0%			0	0	58	18	U	16	U	16	U
Chloroform	UG/KG	14	3%			0	2	58	18	U	16	U	16	U
Cis-1,3-Dichloropropene	UG/KG	0	0%			0	0	58	18	UJ	16	U	16	UJ
Ethyl benzene	UG/KG	0	0%	938.52	BENTHIC-CHRONIC	0	0	58	18	UJ	16	UJ	16	UR
Methyl bromide	UG/KG	0	0%			0	0	58	18	U	16	U	16	U
Methyl butyl ketone	UG/KG	0	0%			0	0	58	18	U	16	U	16	U
Methyl chloride	UG/KG	5	2%			0	1	58	18	U	16	U	16	U
Methyl ethyl ketone	UG/KG	49	2%			0	1	58	18	U	16	U	16	U
Methyl isobutyl ketone	UG/KG	0	0%			0	0	58	18	U	16	U	16	U
Methylene chloride	UG/KG	11	5%			0	3	58	18	U	16	U	16	U
Styrene	UG/KG	3	3%			0	2	58	18	UJ	16	UJ	16	UR
Tetrachloroethene	UG/KG	0	0%	31.284	NYDEC HHB	0	0	58	18	U	16	U	16	U
Toluene	UG/KG	42	9%	1916.145	BENTHIC-CHRONIC	0	5	58	18	U	16	U	16	U
Total Xylenes	UG/KG	7	3%	3597.66	BENTHIC-CHRONIC	0	2	58	18	UJ	16	UJ	16	UR
Trans-1,3-Dichloropropene	UG/KG	0	0%			0	0	58	18	UJ	16	U	16	UJ
Trichloroethene	UG/KG	0	0%	78.21	NYDEC HHB	0	0	58	18	UJ	16	U	16	UJ
Vinyl chloride	UG/KG	0	0%	2.73735	NYDEC HHB	0	0	58	18	U	16	U	16	U
1,2,4-Trichlorobenzene	UG/KG	0	0%			0	0	58	210	U	100	U	110	U
1,2-Dichlorobenzene	UG/KG	0	0%	4692.6	BENTHIC-CHRONIC	0	0	58	210	U	100	U	110	U
1,3-Dichlorobenzene	UG/KG	0	0%	469.26	BENTHIC-CHRONIC	0	0	58	210	U	100	U	110	U
1,4-Dichlorobenzene	UG/KG	73	2%	469.26	BENTHIC-CHRONIC	0	1	58	210	U	100	U	110	U
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%			0	0	9						
2,4,5-Trichlorophenol	UG/KG	0	0%			0	0	58	520	U	250	U	260	U
2,4,6-Trichlorophenol	UG/KG	0	0%			0	0	58	210	U	100	U	110	U
2,4-Dichlorophenol	UG/KG	0	0%			0	0	58	210	U	100	U	110	U

Seneca Arm[illegible]pot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-53		SD4-54		SD4-55	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41037		41047		41049	
									0		0		0	
									0.2		0.2		0.2	
									12/17/1998		12/19/1998		12/19/1998	
									SA		SA		DU	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF						
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
2,4-Dimethylphenol	UG/KG	0	0%	19.5525	BENTHIC-CHRONIC	0	0	58	210	UJ	100	UJ	110	UJ
2,4-Dinitrophenol	UG/KG	0	0%			0	0	58	520	U	250	UR	260	U
2,4-Dinitrotoluene	UG/KG	0	0%			0	0	58	210	U	100	U	110	U
2,6-Dinitrotoluene	UG/KG	0	0%			0	0	58	210	U	100	U	110	U
2-Chloronaphthalene	UG/KG	0	0%			0	0	58	210	U	100	U	110	U
2-Chlorophenol	UG/KG	0	0%			0	0	58	210	U	100	U	110	U
2-Methylnaphthalene	UG/KG	31	9%	1329.57	BENTHIC-CHRONIC	0	5	58	210	U	100	U	110	U
2-Methylphenol	UG/KG	0	0%			0	0	58	210	U	100	U	110	U
2-Nitroaniline	UG/KG	0	0%			0	0	58	520	U	250	U	260	U
2-Nitrophenol	UG/KG	0	0%	19.5525	BENTHIC-CHRONIC	0	0	58	210	U	100	U	110	U
3,3'-Dichlorobenzidine	UG/KG	0	0%			0	0	58	210	U	100	U	110	U
3-Nitroaniline	UG/KG	0	0%			0	0	58	520	U	250	U	260	U
4,6-Dinitro-2-methylphenol	UG/KG	0	0%			0	0	58	520	U	250	UJ	260	U
4-Bromophenyl phenyl ether	UG/KG	0	0%			0	0	58	210	U	100	U	110	U
4-Chloro-3-methylphenol	UG/KG	0	0%			0	0	58	210	U	100	U	110	U
4-Chloroaniline	UG/KG	0	0%			0	0	58	210	U	100	U	110	U
4-Chlorophenyl phenyl ether	UG/KG	0	0%			0	0	58	210	U	100	U	110	U
4-Methylphenol	UG/KG	140	10%	19.5525	BENTHIC-CHRONIC	2	6	58	210	U	100	U	110	U
4-Nitroaniline	UG/KG	0	0%			0	0	58	520	U	250	U	260	U
4-Nitrophenol	UG/KG	0	0%			0	0	58	520	U	250	U	260	U
Acenaphthene	UG/KG	610	19%	5474.7	BENTHIC-CHRONIC	0	11	58	210	U	100	U	110	U
Acenaphthylene	UG/KG	130	17%			0	10	58	210	U	100	U	110	U
Anthracene	UG/KG	1700	47%	4184.235	BENTHIC-CHRONIC	0	27	58	210	U	100	U	110	U
Benzo(a)anthracene	UG/KG	5900	84%	50.8365	NYDEC HHB	26	49	58	**110**	J	37	J	**56**	J
Benzo(a)pyrene	UG/KG	5100	84%	50.8365	NYDEC HHB	26	49	58	**120**	J	44	J	48	J
Benzo(b)fluoranthene	UG/KG	4800	88%	50.8365	NYDEC HHB	35	51	58	**200**	J	46	J	**160**	J
Benzo(ghi)perylene	UG/KG	3200	78%			0	45	58	96	J	25	J	35	J
Benzo(k)fluoranthene	UG/KG	5700	43%	50.8365	NYDEC HHB	20	25	58	210	UR	**58**	J	110	UR
Bis(2-Chloroethoxy)methane	UG/KG	0	0%			0	0	58	210	U	100	U	110	U
Bis(2-Chloroethyl)ether	UG/KG	0	0%			0	0	58	210	U	100	U	110	U
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%			0	0	49	210	U	100	U	110	U
Bis(2-Ethylhexyl)phthalate	UG/KG	42000	40%	7801.4475	BENTHIC-CHRONIC	1	23	58	1200		100	U	84	J
Butylbenzylphthalate	UG/KG	16	9%			0	5	58	210	U	100	U	110	U
Carbazole	UG/KG	500	40%			0	23	58	15	J	100	U	8.9	J
Chrysene	UG/KG	6200	90%	50.8365	NYDEC HHB	34	52	58	**170**	J	**52**	J	**85**	J
Di-n-butylphthalate	UG/KG	250	47%			0	27	58	210	U	100	U	110	U
Di-n-octylphthalate	UG/KG	46	5%			0	3	58	210	U	100	U	110	U
Dibenz(a,h)anthracene	UG/KG	1200	50%			0	29	58	210	U	13	J	21	J
Dibenzofuran	UG/KG	230	17%			0	10	58	210	U	100	U	110	U
Diethyl phthalate	UG/KG	17	3%			0	2	58	210	U	100	U	110	U
Dimethylphthalate	UG/KG	0	0%			0	0	58	210	U	100	U	110	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-53		SD4-54		SD4-55	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41037		41047		41049	
									0		0		0	
									0.2		0.2		0.2	
									12/17/1998		12/19/1998		12/19/1998	
									SA		SA		DU	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF						
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
Fluoranthene	UG/KG	16000	93%	39887.1	BENTHIC-CHRONIC	0	54	58	270		77	J	140	
Fluorene	UG/KG	660	22%	312.84	BENTHIC-CHRONIC	1	13	58	210	U	100	U	110	U
Hexachlorobenzene	UG/KG	840	3%	5.86575	NYDEC HHB	2	2	58	210	U	100	U	110	U
Hexachlorobutadiene	UG/KG	0	0%			0	0	58	210	U	100	U	110	U
Hexachlorocyclopentadiene	UG/KG	0	0%			0	0	58	210	U	100	UJ	110	UJ
Hexachloroethane	UG/KG	0	0%			0	0	58	210	U	100	U	110	U
Indeno(1,2,3-cd)pyrene	UG/KG	3100	74%	50.8365	NYDEC HHB	21	43	58	[illegible]	J	23	J	26	J
Isophorone	UG/KG	0	0%			0	0	58	210	U	100	U	110	U
N-Nitrosodiphenylamine	UG/KG	760	2%			0	1	58	210	U	100	U	110	U
N-Nitrosodipropylamine	UG/KG	410	2%			0	1	58	210	U	100	U	110	U
Naphthalene	UG/KG	13	12%	1173.15	BENTHIC-CHRONIC	0	7	58	210	U	100	U	110	U
Nitrobenzene	UG/KG	0	0%			0	0	58	210	U	100	U	110	U
Pentachlorophenol	UG/KG	0	0%	1564.2	BENTHIC-CHRONIC	0	0	58	520	U	250	U	260	U
Phenanthrene	UG/KG	7900	88%	4692.6	BENTHIC-CHRONIC	1	51	58	120	J	48	J	57	J
Phenol	UG/KG	210	7%	19.5525	BENTHIC-CHRONIC	4	4	58	210	U	100	U	110	U
Pyrene	UG/KG	12000	93%	37579.905	BENTHIC-CHRONIC	0	54	58	200	J	64	J	110	
1,3,5-Trinitrobenzene	UG/KG	0	0%			0	0	58	120	U	120	U	120	U
1,3-Dinitrobenzene	UG/KG	0	0%			0	0	58	120	U	120	U	120	U
2,4,6-Trinitrotoluene	UG/KG	0	0%			0	0	58	120	U	120	U	120	U
2,4-Dinitrotoluene	UG/KG	0	0%			0	0	58	120	U	120	U	120	U
2,6-Dinitrotoluene	UG/KG	0	0%			0	0	58	120	U	120	U	120	U
2-Nitrotoluene	UG/KG	450	2%			0	1	49	120	U	120	U	120	U
2-amino-4,6-Dinitrotoluene	UG/KG	200	2%			0	1	58	120	U	120	U	120	U
3-Nitrotoluene	UG/KG	0	0%			0	0	49	120	U	120	U	120	U
4-Nitrotoluene	UG/KG	0	0%			0	0	49	120	U	120	U	120	U
4-amino-2,6-Dinitrotoluene	UG/KG	140	2%			0	1	58	120	U	120	U	120	U
HMX	UG/KG	0	0%			0	0	58	120	U	120	U	120	U
Nitrobenzene	UG/KG	0	0%			0	0	49	120	U	120	U	120	U
RDX	UG/KG	0	0%			0	0	58	120	U	120	U	120	U
Tetryl	UG/KG	0	0%			0	0	58	120	U	120	U	120	U
4,4'-DDD	UG/KG	90	22%	0.39105	NYDEC HHB	13	13	58	11		5.2	U	5.5	U
4,4'-DDE	UG/KG	86	33%	0.39105	NYDEC HHB	19	19	58	27		5.2	U	3.4	J
4,4'-DDT	UG/KG	45	28%	0.39105	NYDEC HHB	16	16	58	20		5.2	U	5.5	U
Aldrin	UG/KG	2.8	5%	3.9105	NYDEC HHB	0	3	58	3	U	2.7	U	2.8	U
Alpha-BHC	UG/KG	0	0%			0	0	58	3	U	2.7	U	2.8	U
Alpha-Chlordane	UG/KG	44	14%	0.039105	NYDEC HHB	8	8	58	3	U	2.7	U	2.8	U
Aroclor-1016	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	59	U	52	U	55	U
Aroclor-1221	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	120	U	110	U	110	U
Aroclor-1232	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	59	U	52	U	55	U
Aroclor-1242	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	59	U	52	U	55	U
Aroclor-1248	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	59	U	52	U	55	U

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-53		SD4-54		SD4-55	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41037		41047		41049	
									0		0		0	
									0.2		0.2		0.2	
									12/17/1998		12/19/1998		12/19/1998	
									SA		SA		DU	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF						
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
Aroclor-1254	UG/KG	580	45%	0.031284	NYDEC HHB	26	26	58	47	J	52	U	31	J
Aroclor-1260	UG/KG	250	16%	0.031284	NYDEC HHB	9	9	58	59	U	52	U	55	U
Beta-BHC	UG/KG	3.3	7%			0	4	58	3	U	2.7	U	2.4	J
Delta-BHC	UG/KG	0	0%			0	0	58	3	U	2.7	U	2.8	U
Dieldrin	UG/KG	18	7%	3.9105	NYDEC HHB	4	4	58	5.9	U	5.2	U	5.5	U
Endosulfan I	UG/KG	1.9	2%	1.17315	BENTHIC-CHRONIC	1	1	58	3	U	2.7	U	2.8	U
Endosulfan II	UG/KG	6.8	3%	1.17315	BENTHIC-CHRONIC	2	2	58	5.9	U	5.2	U	5.5	U
Endosulfan sulfate	UG/KG	12	9%			0	5	58	5.9	U	5.2	U	5.5	U
Endrin	UG/KG	0	0%	31.284	NYDEC W/H	0	0	58	5.9	U	5.2	U	5.5	U
Endrin aldehyde	UG/KG	15	12%			0	7	58	5.9	U	5.2	U	5.5	U
Endrin ketone	UG/KG	62	7%			0	4	58	5.9	U	5.2	U	5.5	U
Gamma-BHC/Lindane	UG/KG	0	0%			0	0	58	3	U	2.7	U	2.8	U
Gamma-Chlordane	UG/KG	40	17%	0.039105	NYDEC HHB	10	10	58	3	U	2.7	U	2.8	U
Heptachlor	UG/KG	2.4	2%	0.031284	NYDEC HHB	1	1	58	3	U	2.7	U	2.8	U
Heptachlor epoxide	UG/KG	10	10%	0.031284	NYDEC HHB	6	6	58	3	U	2.7	U	2.8	U
Methoxychlor	UG/KG	68	3%			0	2	58	30	U	27	U	28	U
Toxaphene	UG/KG	0	0%			0	0	58	300	U	270	U	280	U
2,4,5-T	UG/KG	21	11%			0	1	9						
2,4,5-TP/Silvex	UG/KG	0	0%			0	0	9						
2,4-D	UG/KG	0	0%			0	0	9						
2,4-DB	UG/KG	0	0%			0	0	9						
Dalapon	UG/KG	0	0%			0	0	9						
Dicamba	UG/KG	0	0%			0	0	9						
Dichloroprop	UG/KG	0	0%			0	0	9						
Dinoseb	UG/KG	0	0%			0	0	9						
MCPA	UG/KG	0	0%			0	0	9						
MCPP	UG/KG	0	0%			0	0	9						
Aluminum	MG/KG	22100	100%			0	58	58	13300		14900		11600	
Antimony	MG/KG	82.7	53%	2	NYS LEL	20	31	58	1.1	UR	1.2	UR	1.2	UR
Arsenic	MG/KG	37.7	98%	6	NYS LEL	19	57	58	5.1		4.4		4.1	
Barium	MG/KG	488	100%			0	58	58	80.7		90.6		64.3	
Beryllium	MG/KG	1.1	100%			0	58	58	0.81	J	0.69	J	0.72	J
Cadmium	MG/KG	34.1	47%	0.6	NYS LEL	24	27	58	1.5		0.15	U	0.15	U
Calcium	MG/KG	140000	100%			0	58	58	31900		6730		23600	
Chromium	MG/KG	4800	100%	26	NYS LEL	28	58	58	48.8		25		21.5	
Cobalt	MG/KG	28.4	100%			0	58	58	14.2		11.8	J	11.7	J
Copper	MG/KG	2640	100%	16	NYS LEL	55	58	58	45.4		24.8		49.6	
Cyanide	MG/KG	0	0%			0	0	58	0.98	U	0.96	U	1	U
Iron	MG/KG	87900	100%	20000	NYS LEL	45	58	58	27100		27500		24500	
Lead	MG/KG	374	95%	31	NYS LEL	35	55	58	233		28.2	J	32.1	
Magnesium	MG/KG	27900	100%			0	58	58	9440		5670		7680	

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4	
									SD4-53		SD4-54		SD4-55	
									SEDIMENT		SEDIMENT		SEDIMENT	
									41037		41047		41049	
									0		0		0	
									0.2		0.2		0.2	
									12/17/1998		12/19/1998		12/19/1998	
									SA		SA		DU	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
				NYS	SPECIFIC	ABOVE	OF	OF						
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q
Manganese	MG/KG	5480	100%	460	NYS LEL	28	58	58	325	J	315		287	J
Mercury	MG/KG	2.4	59%	0.15	NYS LEL	16	34	58	0.09	UJ	0.11	J	0.08	UJ
Nickel	MG/KG	453	100%	16	NYS LEL	58	58	58	43.5		32.7		39.8	
Potassium	MG/KG	3460	100%			0	58	58	1570		1690		1610	
Selenium	MG/KG	6.1	41%			0	24	58	1.2	J	1.1	U	1.1	J
Silver	MG/KG	1.7	45%	1	NYS LEL	4	26	58	0.28	U	0.31	U	0.3	U
Sodium	MG/KG	1370	64%			0	37	58	126	J	81	U	110	J
Thallium	MG/KG	0	0%			0	0	58	0.87	UJ	0.96	U	0.93	U
Vanadium	MG/KG	1140	100%			0	58	58	40		31.1		28.5	
Zinc	MG/KG	1150	100%	120	NYS LEL	41	58	58	227		159	J	104	

Notes:

(1) Criteria calculated using a TOC of 3.91%. This is a site wide TOC value.

(2) NYSDEC HHB = NYS HUMAN HEALTH BIOACCUMULATION CRITERIA
BENTHIC-CHRONIC = NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITERIA
NYDEC W/H = NYS WILD/HUMAN BIOACCUM CRITERIA
NYS LEL = NYS LOWEST EFFECT LEVEL

Seneca Ar pot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
									SD4-55		SD4-6		SD4-7		SD4-8		SD4-9	
									SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
									41048		SD4-6		SD4-7		SD4-8		SD4-9	
									0		0		0		0		0	
									0.2		0.5		0.5		0.5		0.5	
									12/19/1998		12/14/1993		12/14/1993		12/14/1993		12/14/1993	
									SA		SA		SA		SA		SA	
									RI PHASE 1 STEP 1		ESI		ESI		ESI		ESI	
ANALYTE	UNIT	MAX	FREQUENCY	NYS CRITERIA (1)	SPECIFIC CRITERIA (2)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	Value	Q	Value	Q	Value	Q	Value	Q	Value	Q
1,1,1-Trichloroethane	UG/KG	0	0%			0	0	58	16	UJ	18	UJ	14	U	56	UJ	31	UJ
1,1,2,2-Tetrachloroethane	UG/KG	0	0%	11.7315	NYDEC HHB	0	0	58	16	UR	18	UJ	14	U	56	UJ	31	UJ
1,1,2-Trichloroethane	UG/KG	0	0%			0	0	58	16	UJ	18	UJ	14	U	56	UJ	31	UJ
1,1-Dichloroethane	UG/KG	0	0%			0	0	58	16	UJ	18	UJ	14	U	56	UJ	31	UJ
1,1-Dichloroethene	UG/KG	0	0%	0.7821	NYDEC HHB	0	0	58	16	UJ	18	UJ	14	U	56	UJ	31	UJ
1,2-Dichloroethane	UG/KG	0	0%	27.3735	NYDEC HHB	0	0	58	16	UJ	18	UJ	14	U	56	UJ	31	UJ
1,2-Dichloroethene (total)	UG/KG	0	0%			0	0	58	16	UJ	18	UJ	14	U	56	UJ	31	UJ
1,2-Dichloropropane	UG/KG	0	0%			0	0	58	16	UJ	18	UJ	14	U	56	UJ	31	UJ
Acetone	UG/KG	210	26%			0	15	58	16	UJ	18	UJ	21	U	180	J	36	J
Benzene	UG/KG	0	0%	23.463	NYDEC HHB	0	0	58	16	UJ	18	UJ	14	U	56	UJ	31	UJ
Bromodichloromethane	UG/KG	0	0%			0	0	58	16	UJ	18	UJ	14	U	56	UJ	31	UJ
Bromoform	UG/KG	0	0%			0	0	58	16	UR	18	UJ	14	U	56	UJ	31	UJ
Carbon disulfide	UG/KG	18	9%			0	5	58	16	UJ	18	UJ	14	U	56	UJ	18	J
Carbon tetrachloride	UG/KG	0	0%	23.463	NYDEC HHB	0	0	58	16	UJ	18	UJ	14	U	56	UJ	31	UJ
Chlorobenzene	UG/KG	0	0%	136.8675	BENTHIC-CHRONIC	0	0	58	16	UR	18	UJ	14	U	56	UJ	31	UJ
Chlorodibromomethane	UG/KG	0	0%			0	0	58	16	UJ	18	UJ	14	U	56	UJ	31	UJ
Chloroethane	UG/KG	0	0%			0	0	58	16	UJ	18	UJ	14	U	56	UJ	31	UJ
Chloroform	UG/KG	14	3%			0	2	58	16	UJ	18	UJ	14	U	56	UJ	31	UJ
Cis-1,3-Dichloropropene	UG/KG	0	0%			0	0	58	16	UJ	18	UJ	14	U	56	UJ	31	UJ
Ethyl benzene	UG/KG	0	0%	938.52	BENTHIC-CHRONIC	0	0	58	16	UR	18	UJ	14	U	56	UJ	31	UJ
Methyl bromide	UG/KG	0	0%			0	0	58	16	UJ	18	UJ	14	U	56	UJ	31	UJ
Methyl butyl ketone	UG/KG	0	0%			0	0	58	16	UJ	18	UJ	14	U	56	UJ	31	UJ
Methyl chloride	UG/KG	5	2%			0	1	58	16	UJ	18	UJ	14	U	56	UJ	31	UJ
Methyl ethyl ketone	UG/KG	49	2%			0	1	58	16	UJ	18	UJ	14	U	28	UJ	31	UJ
Methyl isobutyl ketone	UG/KG	0	0%			0	0	58	16	UJ	18	UJ	14	U	56	UJ	31	UJ
Methylene chloride	UG/KG	11	5%			0	3	58	16	UJ	18	UJ	2	J	11	J	31	UJ
Styrene	UG/KG	3	3%			0	2	58	16	UR	3	J	14	U	56	UJ	31	UJ
Tetrachloroethene	UG/KG	0	0%	31.284	NYDEC HHB	0	0	58	16	UJ	18	UJ	14	U	56	UJ	31	UJ
Toluene	UG/KG	42	9%	1916.145	BENTHIC-CHRONIC	0	5	58	16	UJ	18	UJ	14	U	56	UJ	31	UJ
Total Xylenes	UG/KG	7	3%	3597.66	BENTHIC-CHRONIC	0	2	58	16	UR	4	J	14	U	56	UJ	31	UJ
Trans-1,3-Dichloropropene	UG/KG	0	0%			0	0	58	16	UJ	18	UJ	14	U	56	UJ	31	UJ
Trichloroethene	UG/KG	0	0%	78.21	NYDEC HHB	0	0	58	16	UJ	18	UJ	14	U	56	UJ	31	UJ
Vinyl chloride	UG/KG	0	0%	2.73735	NYDEC HHB	0	0	58	16	UJ	18	UJ	14	U	56	UJ	31	UJ
1,2,4-Trichlorobenzene	UG/KG	0	0%			0	0	58	110	U	780	UJ	1000	UJ	3900	UJ	2800	UJ
1,2-Dichlorobenzene	UG/KG	0	0%	4692.6	BENTHIC-CHRONIC	0	0	58	110	U	780	UJ	1000	UJ	3900	UJ	2800	UJ
1,3-Dichlorobenzene	UG/KG	0	0%	469.26	BENTHIC-CHRONIC	0	0	58	110	U	780	UJ	1000	UJ	3900	UJ	2800	UJ
1,4-Dichlorobenzene	UG/KG	73	2%	469.26	BENTHIC-CHRONIC	0	1	58	110	U	780	UJ	1000	UJ	3900	UJ	2800	UJ
2,2'-oxybis(1-Chloropropane)	UG/KG	0	0%			0	0	9			780	UJ	1000	UJ	3900	UJ	2800	UJ
2,4,5-Trichlorophenol	UG/KG	0	0%			0	0	58	270	U	1900	UJ	2500	UJ	9400	UJ	6700	UJ
2,4,6-Trichlorophenol	UG/KG	0	0%			0	0	58	110	U	780	UJ	1000	UJ	3900	UJ	2800	UJ
2,4-Dichlorophenol	UG/KG	0	0%			0	0	58	110	U	780	UJ	1000	UJ	3900	UJ	2800	UJ

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
									SD4-55		SD4-6		SD4-7		SD4-8		SD4-9	
									SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
									41048		SD4-6		SD4-7		SD4-8		SD4-9	
									0		0		0		0		0	
									0.2		0.5		0.5		0.5		0.5	
									12/19/1998		12/14/1993		12/14/1993		12/14/1993		12/14/1993	
									SA		SA		SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		ESI		ESI		ESI		ESI	
				NYS	SPECIFIC	ABOVE	OF	OF										
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q	Value	Q	Value	Q
2,4-Dimethylphenol	UG/KG	0	0%	19.5525	BENTHIC-CHRONIC	0	0	58	110	UJ	780	UJ	1000	UJ	3900	UJ	2800	UJ
2,4-Dinitrophenol	UG/KG	0	0%			0	0	58	270	U	1900	UJ	2500	UJ	9400	UJ	6700	UJ
2,4-Dinitrotoluene	UG/KG	0	0%			0	0	58	110	U	780	UJ	1000	UJ	3900	UJ	2800	UJ
2,6-Dinitrotoluene	UG/KG	0	0%			0	0	58	110	U	780	UJ	1000	UJ	3900	UJ	2800	UJ
2-Chloronaphthalene	UG/KG	0	0%			0	0	58	110	U	780	UJ	1000	UJ	3900	UJ	2800	UJ
2-Chlorophenol	UG/KG	0	0%			0	0	58	110	U	780	UJ	1000	UJ	3900	UJ	2800	UJ
2-Methylnaphthalene	UG/KG	31	9%	1329.57	BENTHIC-CHRONIC	0	5	58	110	U	780	UJ	1000	UJ	3900	UJ	2800	UJ
2-Methylphenol	UG/KG	0	0%			0	0	58	110	U	780	UJ	1000	UJ	3900	UJ	2800	UJ
2-Nitroaniline	UG/KG	0	0%			0	0	58	270	U	1900	UJ	2500	UJ	9400	UJ	6700	UJ
2-Nitrophenol	UG/KG	0	0%	19.5525	BENTHIC-CHRONIC	0	0	58	110	U	780	UJ	1000	UJ	3900	UJ	2800	UJ
3,3'-Dichlorobenzidine	UG/KG	0	0%			0	0	58	110	U	780	UJ	1000	UJ	3900	UJ	2800	UJ
3-Nitroaniline	UG/KG	0	0%			0	0	58	270	U	1900	UJ	2500	UJ	9400	UJ	6700	UJ
4,6-Dinitro-2-methylphenol	UG/KG	0	0%			0	0	58	270	U	1900	UJ	2500	UJ	9400	UJ	6700	UJ
4-Bromophenyl phenyl ether	UG/KG	0	0%			0	0	58	110	U	780	UJ	1000	UJ	3900	UJ	2800	UJ
4-Chloro-3-methylphenol	UG/KG	0	0%			0	0	58	110	U	780	UJ	1000	UJ	3900	UJ	2800	UJ
4-Chloroaniline	UG/KG	0	0%			0	0	58	110	U	780	UJ	1000	UJ	3900	UJ	2800	UJ
4-Chlorophenyl phenyl ether	UG/KG	0	0%			0	0	58	110	U	780	UJ	1000	UJ	3900	UJ	2800	UJ
4-Methylphenol	UG/KG	140	10%	19.5525	BENTHIC-CHRONIC	2	6	58	110	U	780	UJ	1000	UJ	3900	UJ	2800	UJ
4-Nitroaniline	UG/KG	0	0%			0	0	58	270	U	1900	UJ	2500	UJ	9400	UJ	6700	UJ
4-Nitrophenol	UG/KG	0	0%			0	0	58	270	U	1900	UJ	2500	UJ	9400	UJ	6700	UJ
Acenaphthene	UG/KG	610	19%	5474.7	BENTHIC-CHRONIC	0	11	58	110	U	780	UJ	56	J	3900	UJ	2800	UJ
Acenaphthylene	UG/KG	130	17%			0	10	58	110	U	780	UJ	1000	UJ	3900	UJ	2800	UJ
Anthracene	UG/KG	1700	47%	4184.235	BENTHIC-CHRONIC	0	27	58	9.4	J	780	UJ	170	J	3900	UJ	2800	UJ
Benzo(a)anthracene	UG/KG	5900	84%	50.8365	NYDEC HHB	26	49	58	49	J	780	UJ	**300**	J	3900	UJ	2800	UJ
Benzo(a)pyrene	UG/KG	5100	84%	50.8365	NYDEC HHB	26	49	58	**53**	J	780	UJ	**240**	J	3900	UJ	2800	UJ
Benzo(b)fluoranthene	UG/KG	4800	88%	50.8365	NYDEC HHB	35	51	58	**130**	J	780	UJ	**330**	J	3900	UJ	**230**	J
Benzo(ghi)perylene	UG/KG	3200	78%			0	45	58	28	J	780	UJ	79	J	3900	UJ	2800	UJ
Benzo(k)fluoranthene	UG/KG	5700	43%	50.8365	NYDEC HHB	20	25	58	110	UR	780	UJ	**120**	J	3900	UJ	2800	UJ
Bis(2-Chloroethoxy)methane	UG/KG	0	0%			0	0	58	110	U	780	UJ	1000	UJ	3900	UJ	2800	UJ
Bis(2-Chloroethyl)ether	UG/KG	0	0%			0	0	58	110	U	780	UJ	1000	UJ	3900	UJ	2800	UJ
Bis(2-Chloroisopropyl)ether	UG/KG	0	0%			0	0	49	110	U								
Bis(2-Ethylhexyl)phthalate	UG/KG	42000	40%	7801.4475	BENTHIC-CHRONIC	1	23	58	49	J	780	UJ	2200	J	3600	J	560	J
Butylbenzylphthalate	UG/KG	16	9%			0	5	58	110	U	780	UJ	1000	UJ	3900	UJ	2800	UJ
Carbazole	UG/KG	500	40%			0	23	58	9.2	J	780	UJ	1000	UJ	3900	UJ	2800	UJ
Chrysene	UG/KG	6200	90%	50.8365	NYDEC HHB	34	52	58	**70**	J	780	UJ	**290**	J	3900	UJ	**200**	J
Di-n-butylphthalate	UG/KG	250	47%			0	27	58	9	J	69	J	83	J	250	J	2800	UJ
Di-n-octylphthalate	UG/KG	46	5%			0	3	58	110	U	780	UJ	1000	UJ	3900	UJ	2800	UJ
Dibenz(a,h)anthracene	UG/KG	1200	50%			0	29	58	18	J	780	UJ	1000	UJ	3900	UJ	2800	UJ
Dibenzofuran	UG/KG	230	17%			0	10	58	110	U	780	UJ	63	J	3900	UJ	2800	UJ
Diethyl phthalate	UG/KG	17	3%			0	2	58	110	U	780	UJ	1000	UJ	3900	UJ	2800	UJ
Dimethylphthalate	UG/KG	0	0%			0	0	58	110	U	780	UJ	1000	UJ	3900	UJ	2800	UJ

Seneca Arm [illegible]pot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
									SD4-55		SD4-6		SD4-7		SD4-8		SD4-9	
									SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
									41048		SD4-6		SD4-7		SD4-8		SD4-9	
									0		0		0		0		0	
									0.2		0.5		0.5		0.5		0.5	
									12/19/1998		12/14/1993		12/14/1993		12/14/1993		12/14/1993	
									SA		SA		SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		ESI		ESI		ESI		ESI	
				NYS	SPECIFIC	ABOVE	OF	OF										
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q	Value	Q	Value	Q
Fluoranthene	UG/KG	16000	93%	39887.1	BENTHIC-CHRONIC	0	54	58	110	J	780	UJ	560	J	330	J	310	J
Fluorene	UG/KG	660	22%	312.84	BENTHIC-CHRONIC	1	13	58	110	U	780	UJ	85	J	3900	UJ	2800	UJ
Hexachlorobenzene	UG/KG	840	3%	5.86575	NYDEC HHB	2	2	58	110	U	780	UJ	1000	UJ	3900	UJ	2800	UJ
Hexachlorobutadiene	UG/KG	0	0%			0	0	58	110	U	780	UJ	1000	UJ	3900	UJ	2800	UJ
Hexachlorocyclopentadiene	UG/KG	0	0%			0	0	58	110	UJ	780	UJ	1000	UJ	3900	UJ	2800	UJ
Hexachloroethane	UG/KG	0	0%			0	0	58	110	U	780	UJ	1000	UJ	3900	UJ	2800	UJ
Indeno(1,2,3-cd)pyrene	UG/KG	3100	74%	50.8365	NYDEC HHB	21	43	58	26	J	780	UJ	130	J	3900	UJ	2800	UJ
Isophorone	UG/KG	0	0%			0	0	58	110	U	780	UJ	1000	UJ	3900	UJ	2800	UJ
N-Nitrosodiphenylamine	UG/KG	760	2%			0	1	58	110	U	780	UJ	760	J	3900	UJ	2800	UJ
N-Nitrosodipropylamine	UG/KG	410	2%			0	1	58	110	U	780	UJ	1000	UJ	3900	UJ	2800	UJ
Naphthalene	UG/KG	13	12%	1173.15	BENTHIC-CHRONIC	0	7	58	110	U	780	UJ	1000	UJ	3900	UJ	2800	UJ
Nitrobenzene	UG/KG	0	0%			0	0	58	110	U	780	UJ	1000	UJ	3900	UJ	2800	UJ
Pentachlorophenol	UG/KG	0	0%	1564.2	BENTHIC-CHRONIC	0	0	58	270	U	1900	UJ	2500	UJ	9400	UJ	6700	UJ
Phenanthrene	UG/KG	7900	88%	4692.6	BENTHIC-CHRONIC	1	51	58	57	J	780	UJ	490	J	3900	UJ	220	J
Phenol	UG/KG	210	7%	19.5525	BENTHIC-CHRONIC	4	4	58	110	U	780	UJ	1000	UJ	3900	UJ	2800	UJ
Pyrene	UG/KG	12000	93%	37579.905	BENTHIC-CHRONIC	0	54	58	85	J	780	UJ	480	J	320	J	290	J
1,3,5-Trinitrobenzene	UG/KG	0	0%			0	0	58	120	U	130	UJ	130	U	130	UJ	130	UJ
1,3-Dinitrobenzene	UG/KG	0	0%			0	0	58	120	U	130	UJ	130	U	130	UJ	130	UJ
2,4,6-Trinitrotoluene	UG/KG	0	0%			0	0	58	120	U	130	UJ	130	U	130	UJ	130	UJ
2,4-Dinitrotoluene	UG/KG	0	0%			0	0	58	120	U	130	UJ	130	UJ	130	UJ	130	UJ
2,6-Dinitrotoluene	UG/KG	0	0%			0	0	58	120	U	130	UJ	130	U	130	UJ	130	UJ
2-Nitrotoluene	UG/KG	450	2%			0	1	49	120	U								
2-amino-4,6-Dinitrotoluene	UG/KG	200	2%			0	1	58	120	U	130	UJ	130	U	130	UJ	130	UJ
3-Nitrotoluene	UG/KG	0	0%			0	0	49	120	U								
4-Nitrotoluene	UG/KG	0	0%			0	0	49	120	U								
4-amino-2,6-Dinitrotoluene	UG/KG	140	2%			0	1	58	120	U	130	UJ	130	U	130	UJ	130	UJ
HMX	UG/KG	0	0%			0	0	58	120	U	130	UJ	130	U	130	UJ	130	UJ
Nitrobenzene	UG/KG	0	0%			0	0	49	120	U								
RDX	UG/KG	0	0%			0	0	58	120	U	130	UJ	130	U	130	UJ	130	UJ
Tetryl	UG/KG	0	0%			0	0	58	120	U	130	UJ	130	U	130	UJ	130	UJ
4,4'-DDD	UG/KG	90	22%	0.39105	NYDEC HHB	13	13	58	5.7	U	7.9	UJ	9.1	J	90	J	14	UJ
4,4'-DDE	UG/KG	86	33%	0.39105	NYDEC HHB	19	19	58	1.8	J	7.9	UJ	9.8	J	86	J	14	UJ
4,4'-DDT	UG/KG	45	28%	0.39105	NYDEC HHB	16	16	58	5.7	U	7.9	UJ	5.2	U	9.7	UJ	14	UJ
Aldrin	UG/KG	2.8	5%	3.9105	NYDEC HHB	0	3	58	2.9	U	4	UJ	2.7	U	2.5	J	7.1	UJ
Alpha-BHC	UG/KG	0	0%			0	0	58	2.9	U	4	UJ	2.7	U	5	UJ	7.1	UJ
Alpha-Chlordane	UG/KG	44	14%	0.039105	NYDEC HHB	8	8	58	2.9	U	4	UJ	7.5	J	12	J	18	J
Aroclor-1016	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	57	U	79	UJ	52	U	97	UJ	140	UJ
Aroclor-1221	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	120	U	160	UJ	110	U	200	UJ	280	UJ
Aroclor-1232	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	57	U	79	UJ	52	U	97	UJ	140	UJ
Aroclor-1242	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	57	U	79	UJ	52	U	97	UJ	140	UJ
Aroclor-1248	UG/KG	0	0%	0.031284	NYDEC HHB	0	0	58	57	U	79	UJ	52	U	97	UJ	140	UJ

Seneca Army Depot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
									SD4-55		SD4-6		SD4-7		SD4-8		SD4-9	
									SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
									41048		SD4-6		SD4-7		SD4-8		SD4-9	
									0		0		0		0		0	
									0.2		0.5		0.5		0.5		0.5	
									12/19/1998		12/14/1993		12/14/1993		12/14/1993		12/14/1993	
									SA		SA		SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		ESI		ESI		ESI		ESI	
				NYS	SPECIFIC	ABOVE	OF	OF										
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q	Value	Q	Value	Q
Aroclor-1254	UG/KG	580	45%	0.031284	NYDEC HHB	26	26	58	42	J	79	UJ	95		430	J	74	J
Aroclor-1260	UG/KG	250	16%	0.031284	NYDEC HHB	9	9	58	57	U	79	UJ	46	J	230	J	140	UJ
Beta-BHC	UG/KG	3.3	7%			0	4	58	2.5	J	4	UJ	2.7	U	5	UJ	7.1	UJ
Delta-BHC	UG/KG	0	0%			0	0	58	2.9	U	4	UJ	2.7	U	5	UJ	7.1	UJ
Dieldrin	UG/KG	18	7%	3.9105	NYDEC HHB	4	4	58	5.7	U	7.9	UJ	5.2	U	4.6	J	14	UJ
Endosulfan I	UG/KG	1.9	2%	1.17315	BENTHIC-CHRONIC	1	1	58	2.9	U	4	UJ	2.7	U	5	UJ	7.1	UJ
Endosulfan II	UG/KG	6.8	3%	1.17315	BENTHIC-CHRONIC	2	2	58	5.7	U	7.9	UJ	5.2	U	9.7	UJ	14	UJ
Endosulfan sulfate	UG/KG	12	9%			0	5	58	5.7	U	7.9	UJ	5.2	U	9.7	UJ	14	UJ
Endrin	UG/KG	0	0%	31.284	NYDEC W/H	0	0	58	5.7	U	7.9	UJ	5.2	U	9.7	UJ	14	UJ
Endrin aldehyde	UG/KG	15	12%			0	7	58	5.7	U	7.9	UJ	3.2	J	11	J	14	UJ
Endrin ketone	UG/KG	62	7%			0	4	58	5.7	U	7.9	UJ	5.2	U	9.7	UJ	14	UJ
Gamma-BHC/Lindane	UG/KG	0	0%			0	0	58	2.9	U	4	UJ	2.7	U	5	UJ	7.1	UJ
Gamma-Chlordane	UG/KG	40	17%	0.039105	NYDEC HHB	10	10	58	2.9	U	4	UJ	6.8	J	11	J	12	J
Heptachlor	UG/KG	2.4	2%	0.031284	NYDEC HHB	1	1	58	2.9	U	4	UJ	2.7	U	5	UJ	7.1	UJ
Heptachlor epoxide	UG/KG	10	10%	0.031284	NYDEC HHB	6	6	58	2.9	U	4	UJ	2.7	U	5	UJ	7.1	UJ
Methoxychlor	UG/KG	68	3%			0	2	58	29	U	40	UJ	27	U	50	UJ	71	UJ
Toxaphene	UG/KG	0	0%			0	0	58	290	U	400	UJ	270	U	500	UJ	710	UJ
2,4,5-T	UG/KG	21	11%			0	1	9			12	UJ	8	U	15	UJ	21	UJ
2,4,5-TP/Silvex	UG/KG	0	0%			0	0	9			12	UJ	8	U	15	UJ	21	UJ
2,4-D	UG/KG	0	0%			0	0	9			120	UJ	80	U	150	UJ	210	UJ
2,4-DB	UG/KG	0	0%			0	0	9			120	UJ	80	U	150	UJ	210	UJ
Dalapon	UG/KG	0	0%			0	0	9			290	UJ	190	U	360	UJ	500	UJ
Dicamba	UG/KG	0	0%			0	0	9			12	UJ	8	U	15	UJ	21	UJ
Dichloroprop	UG/KG	0	0%			0	0	9			120	UJ	80	U	150	UJ	210	UJ
Dinoseb	UG/KG	0	0%			0	0	9			60	UJ	40	U	74	UJ	110	UJ
MCPA	UG/KG	0	0%			0	0	9			12000	UJ	8000	U	15000	UJ	21000	UJ
MCPP	UG/KG	0	0%			0	0	9			12000	UJ	8000	U	15000	UJ	21000	UJ
Aluminum	MG/KG	22100	100%			0	58	58	12400		16500	J	9720		13000	J	10200	J
Antimony	MG/KG	82.7	53%	2	NYS LEL	20	31	58	1.4	J	82.7	J	36.2	J	14.1	J	14.9	UJ
Arsenic	MG/KG	37.7	98%	6	NYS LEL	19	57	58	4.2		5.6	J	5.9		4.9	J	8	J
Barium	MG/KG	488	100%			0	58	58	65.5	J	120	J	311		121	J	150	J
Beryllium	MG/KG	1.1	100%			0	58	58	0.75	J	0.82	J	0.91	J	0.87	J	0.66	J
Cadmium	MG/KG	34.1	47%	0.6	NYS LEL	24	27	58	0.17	U	0.78	UJ	34.1		8.3	J	8.6	J
Calcium	MG/KG	140000	100%			0	58	58	24900		7720	J	127000		15500	J	33700	J
Chromium	MG/KG	4800	100%	26	NYS LEL	28	58	58	23.8		4170	J	61.3		49.7	J	29.9	J
Cobalt	MG/KG	28.4	100%			0	58	58	12.4	J	11.3	J	14	J	12.2	J	11.6	J
Copper	MG/KG	2640	100%	16	NYS LEL	55	58	58	30.8		497	J	112		151	J	94	J
Cyanide	MG/KG	0	0%			0	0	58	1	U	1.2	UJ	0.75	U	1.5	UJ	1.9	UJ
Iron	MG/KG	87900	100%	20000	NYS LEL	45	58	58	26600		38700	J	23300		24700	J	27000	J
Lead	MG/KG	374	95%	31	NYS LEL	35	55	58	40.3		30.7	JR	254		374	J	117	J
Magnesium	MG/KG	27900	100%			0	58	58	8470		4420	J	4220		5080	J	4980	J

Seneca Arn pot Activity
SEAD-4 Remedial Investigation
Sediment Sample Results

									SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
									SD4-55		SD4-6		SD4-7		SD4-8		SD4-9	
									SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
									41048		SD4-6		SD4-7		SD4-8		SD4-9	
									0		0		0		0		0	
									0.2		0.5		0.5		0.5		0.5	
									12/19/1998		12/14/1993		12/14/1993		12/14/1993		12/14/1993	
									SA		SA		SA		SA		SA	
						NUMBER	NUMBER	NUMBER	RI PHASE 1 STEP 1		ESI		ESI		ESI		ESI	
				NYS	SPECIFIC	ABOVE	OF	OF										
ANALYTE	UNIT	MAX	FREQUENCY	CRITERIA (1)	CRITERIA (2)	CRITERIA	DETECTS	ANALYSES	Value	Q	Value	Q	Value	Q	Value	Q	Value	Q
Manganese	MG/KG	5480	100%	460	NYS LEL	28	58	58	312	J	525	J	1790		274	J	381	J
Mercury	MG/KG	2.4	59%	0.15	NYS LEL	16	34	58	0.08	UJ	0.55	J	0.55		0.52	J	0.27	J
Nickel	MG/KG	453	100%	16	NYS LEL	58	58	58	42.7		37	J	28.7		42.4	J	33.9	J
Potassium	MG/KG	3460	100%			0	58	58	1710		1660	J	1370	J	1750	J	1690	J
Selenium	MG/KG	6.1	41%			0	24	58	1.2	U	0.58	J	2.1		2.2	J	2.5	J
Silver	MG/KG	1.7	45%	1	NYS LEL	4	26	58	0.34	U	1.7	J	1.2	U	1.9	UJ	2.9	UJ
Sodium	MG/KG	1370	64%			0	37	58	115	U	96.3	J	575	J	183	J	225	J
Thallium	MG/KG	0	0%			0	0	58	1.1	UJ	0.55	UJ	0.35	U	0.54	UJ	0.83	UJ
Vanadium	MG/KG	1140	100%			0	58	58	32		35.1	J	29.6		49.9	J	29.1	J
Zinc	MG/KG	1150	100%	120	NYS LEL	41	58	58	111		330	J	685		484	J	363	J

Notes

(1) Criteria calculated using a TOC of 3.91%. This is a site wide TOC value

(2) NYSDEC HHB = NYS HUMAN HEALTH BIOACCUMULATION CRITERIA
BENTHIC-CHRONIC = NYS BENTHIC AQUATIC LIFE CHRONIC TOXICITY CRITERIA
NYDEC W/H = NYS WILD/HUMAN BIOACCUM CRITERIA
NYS LEL = NYS LOWEST EFFECT LEVEL

Soil Analysis Results from Pond Area - June 28, 1990

TABLE A-4

SOIL ANALYSIS RESULTS FROM POND AREA

JUNE 28, 1990

TABLE A-4
SOIL ANALYSIS RESULTS FROM POND AREA

Sample Number	Units	Explosives		
		2,4,6-TNT	2,4-DNT	2,6-DNT
1	ug/g	U	U	U
2	ug/g	U	U	U
3	ug/g	U	U	U
4	ug/g	U	U	U
5	ug/g	U	U	U
6	ug/g	U	U	U
7	ug/g	U	U	U
8	ug/g	U	U	U
9	ug/g	U	U	U
10	ug/g	U	U	U
11	ug/g	U	U	U
12	ug/g	U	U	U
13	ug/g	U	U	U
14	ug/g	U	U	U
15	ug/g	U	U	U
16	ug/g	U	U	U
17	ug/g	U	U	U
18	ug/g	U	U	U
19	ug/g	U	U	U
20	ug/g	U	U	U
21	ug/g	U	U	U
22	ug/g	U	U	U
23	ug/g	U	U	U
24	ug/g	U	U	U
25	ug/g	U	U	U
26	ug/g	U	U	U
27	ug/g	U	U	U
28	ug/g	U	U	U
29	ug/g	U	U	U
30	ug/g	U	U	U
31	ug/g	U	U	U

TABLE A-4 (CONTINUED)
SOIL ANALYSIS RESULTS FROM POND AREA

Sample Number	Units	Explosives		
		2,4,6-TNT	2,4-DNT	2,6-DNT
32	ug/g	U	U	U
36 (surface)	ug/g	U	U	U
34	ug/g	U	U	U
35	ug/g	U	U	U
36 (surface to 6")	ug/g	U	U	U
37	ug/g	U	U	U
38	ug/g	U	U	U
39	ug/g	U	U	U
40	ug/g	U	U	U
41	ug/g	U	U	U
42	ug/g	U	U	U
43	ug/g	U	U	U
44	ug/g	U	U	U
45	ug/g	U	U	U
46	ug/g	U	U	U
47	ug/g	U	U	U
48	ug/g	U	U	U
49	ug/g	U	U	U
50	ug/g	U	U	U
51	ug/g	U	U	U
52	ug/g	U	U	U
53	ug/g	U	U	U
54	ug/g	U	U	U
55	ug/g	U	U	U
56	ug/g	U	U	U
57	ug/g	U	U	U
58 (surface to 10")	ug/g	U	U	U
58 (surface)	ug/g	U	U	U

TABLE A-4 (CONTINUED)
SOIL ANALYSIS RESULTS FROM POND AREA

Sample Number	Units	Explosives		
		2.4,6-TNT	2,4-DNT	2,6-DNT
60	ug/g	U	U	U
61	ug/g	U	U	U
62	ug/g	U	U	U
63	ug/g	U	U	U
64	ug/g	U	U	U
65	ug/g	U	U	U
66	ug/g	U	U	U
67	ug/g	U	U	U
68	ug/g	U	U	U
69	ug/g	U	U	U
70	ug/g	U	U	U

NOTES:
1. U = analyzed, not detected
2. Samples collected June 28, 1990.

SEDA Soil Background Data

BACKGROUND SOIL DATA
SEAD-4 Remedial Investigation
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:								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE DATE:			FREQUENCY		NUMBER	NUMBER	NUMBER	11/5/1991		11/5/1991		11/5/1991		11/5/1991		11/5/1991		11/5/1991	
SAMP ID:			OF		ABOVE	OF	OF	S1105-24SOIL1		S1105-25SOIL1		S1105-26(1)SOIL1		S1105-27SOIL1		S1105-28SOIL1		S1105-29SOIL1	
COMPOUND	UNIT	MAXIMUM	DETECTION	TAGM	TAGM	DETECTS	ANALYSES	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q
METALS																			
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

BACKGROUND SOIL DATA
SEAD-4 Remedial Investigation
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:								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE DATE:			FREQUENCY		NUMBER	NUMBER	NUMBER	11/5/1991		12/16/1992		12/16/1992		1/20/1993		1/20/1993		1/20/1993	
SAMP ID:			OF		ABOVE	OF	OF	S1105-30RESOIL1		BK-1SOIL3		BK-2RESOIL3		GB35-1GRID		GB35-2GRID		GB35-6DUGRID	
COMPOUND	UNIT	MAXIMUM	DETECTION	TAGM	TAGM	DETECTS	ANALYSES	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q
METALS																			
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	

BACKGROUND SOIL DATA
SEAD-4 Remedial Investigation
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	VALUE	Q	VALUE	Q
METALS																			
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	

BACKGROUND SOIL DATA
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

LOC_ID:								SB24-5		MW25-1		MW25-1		MW25-6		MW25-6		MW25-6	
QC CODE:								SA		SA		SA		SA		SA		SA	
STUDY ID:								ESI		ESI		ESI		RI ROUND1		RI ROUND1		RI ROUND1	
TOP:								-1		0		2		0		4		6	
BOTTOM:								-1		2		4		0.17		6		8	
MATRIX:								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE DATE:			FREQUENCY		NUMBER	NUMBER	NUMBER	12/02/93		12/3/1993		12/3/1993		9/25/1995		9/25/1995		9/25/1995	
SAMP ID:			OF		ABOVE	OF	OF	SB24-5-5		SB25-6-01		SB25-6-02		SB25-7-00		SB25-7-03		SB25-7-04	
COMPOUND	UNIT	MAXIMUM	DETECTION	TAGM	TAGM	DETECTS	ANALYSES	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q
METALS																			
Aluminum	MG/KG	21000	100%	19520	3	57	57	13700		10600		7070		12500		8020		7550	
Antimony	MG/KG	6.8	18%	6	2	10	57	11.3	UJ	4.2	U	3	U	0.4		0.42	UJ	0.44	U
Arsenic	MG/KG	21.5	95%	8.9	2	54	57	5		8.3		4.8		4.3		4.1		3.4	
Barium	MG/KG	159	100%	300	0	57	57	67.2		59.1		35		71.3		58		52	
Beryllium	MG/KG	1.4	100%	1.13	2	57	57	0.62	J	0.48	J	0.35	J	0.56		0.43		0.39	
Cadmium	MG/KG	2.9	35%	2.46	2	20	57	0.7	U	0.41	U	0.29	U	0.05	U	0.06	U	0.06	U
Calcium	MG/KG	293000	100%	125300	2	57	57	49000		82500		122000		47400	J	120000	J	137000	J
Chromium	MG/KG	32.7	100%	30	2	57	57	23.1		16.9		11.3		16.9	J	13.7	J	12.4	J
Cobalt	MG/KG	29.1	100%	30	0	57	57	12		11.2		6.6	J	8		8.2		6.9	
Copper	MG/KG	62.8	100%	33	3	57	57	22.2		20.2	J	12	J	15.7		17.7		16.4	
Cyanide	MG/KG	0	0%	0.35	0	0	51	0.57	U	0.58	U	0.64	U	0.44	U	0.57	U	0.51	U
Iron	MG/KG	38600	100%	37410	2	57	57	26700		21400		15800		20500		18900		15400	
Lead	MG/KG	266	95%	24.4	3	54	57	7.9	J	9.5		13.8		11.1		7		6.5	
Magnesium	MG/KG	29100	100%	21700	2	54	54	11400		19600		22800		11700		17400		20700	
Manganese	MG/KG	2380	95%	1100	2	54	57	450		722	J	610	J	452		735		402	
Mercury	MG/KG	0.13	72%	0.1	2	41	57	0.04	JR	0.03	J	0.04	U	0.03		0.02		0.01	
Nickel	MG/KG	62.3	98%	50	2	56	57	35.2		26.8		18		22.3		26.4		22.4	
Potassium	MG/KG	3160	100%	2623	2	57	57	1660		1480		1060		1110		1280		1430	
Selenium	MG/KG	1.7	40%	2	0	23	57	0.22	UJ	0.97	J	0.63	J	0.63	U	0.7	U	0.74	U
Silver	MG/KG	0.87	4%	0.8	1	2	54	1.4	U	0.82	U	0.59	U	0.89	U	0.98	U	1	U
Sodium	MG/KG	269	82%	188	2	47	57	139	J	269	J	186	J	59.9		89.1		110	
Thallium	MG/KG	1.2	17%	0.855	3	9	54	0.24	U	0.24	UJ	0.21	UJ	1.2		1.1		0.6	U
Vanadium	MG/KG	32.7	100%	150	0	57	57	19.5		18.5		12		21		13.4		13.7	
Zinc	MG/KG	126	95%	115	2	54	57	63.2		71.6	J	40.6	J	54.1		64.9		65.1	

BACKGROUND SOIL DATA
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

LOC_ID:								MW25-6		MW64A-1		MW64A-1		MW64A-1		MW64B-1		MW64B-1	
QC CODE:								DU		SA		SA		SA		SA		SA	
STUDY ID:								RI ROUND1		ESI		ESI		ESI		ESI		ESI	
TOP:								0		0		2		4		0		4	
BOTTOM:								0.17		0.2		4		6		0.2		6	
MATRIX:								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE DATE:			FREQUENCY		NUMBER	NUMBER	NUMBER	9/25/1995		4/2/1994		4/2/1994		4/2/1994		5/13/1994		5/13/1994	
SAMP ID:			OF		ABOVE	OF	OF	SB25-7-10		MW64A-1-1		MW64A-1-2		MW64A-1-3		MW64B-1-1		MW64B-1-2	
COMPOUND	UNIT	MAXIMUM	DETECTION	TAGM	TAGM	DETECTS	ANALYSES	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q
METALS																			
Aluminum	MG/KG	21000	100%	19520	3	57	57	12500		16100		19800		12600		13400		8870	
Antimony	MG/KG	6.8	18%	6	2	10	57	0.4	UJ	0.23	J	0.2	UJ	0.2	UJ	0.3	J	0.15	UJ
Arsenic	MG/KG	21.5	95%	8.9	2	54	57	4.3		7.1		8.2		5		5.5		4.3	
Barium	MG/KG	159	100%	300	0	57	57	71.3		83.7		91.2		62.3		75.5		70.8	
Beryllium	MG/KG	1.4	100%	1.13	2	57	57	0.56		0.68	J	0.74	J	0.53	J	0.56	J	0.43	J
Cadmium	MG/KG	2.9	35%	2.46	2	20	57	0.05	U	0.11	J	0.02	U	0.12	J	0.63	J	0.64	J
Calcium	MG/KG	293000	100%	125300	2	57	57	47400	J	7210		4300		72400		5530		70000	
Chromium	MG/KG	32.7	100%	30	2	57	57	16.9	J	23		25		19		17.5		14.1	
Cobalt	MG/KG	29.1	100%	30	0	57	57	8		11.8		11.3		9.1	J	7.2	J	10	
Copper	MG/KG	62.8	100%	33	3	57	57	15.7		25.5		21		23.7		18.9		20.2	
Cyanide	MG/KG	0	0%	0.35	0	0	51	0.444	U	0.66	U	0.56	U	0.55	U	0.6	U	0.5	U
Iron	MG/KG	38600	100%	37410	2	57	57	20500		28500		28000		22600		20900		18400	
Lead	MG/KG	266	95%	24.4	3	54	57	11.1		21.6		13.6		15.4		21.4		8.8	
Magnesium	MG/KG	29100	100%	21700	2	54	54	11700		5480		5010		14800		3720		18900	
Manganese	MG/KG	2380	95%	1100	2	54	57	452		558		604		402		207		434	
Mercury	MG/KG	0.13	72%	0.1	2	41	57	0.03		0.05	J	0.03	J	0.02	J	0.05	J	0.02	J
Nickel	MG/KG	62.3	98%	50	2	56	57	22.3		32.2		28.6		26.7		19.8		28.2	
Potassium	MG/KG	3160	100%	2623	2	57	57	1110		2590	J	2260	J	2700	J	1700		1630	
Selenium	MG/KG	1.7	40%	2	0	23	57	0.66	U	0.96		1.7		0.34	U	0.99	J	0.26	U
Silver	MG/KG	0.87	4%	0.8	1	2	54	0.92	U	0.12	U	0.14	U	0.14	U	0.16	UJ	0.11	UJ
Sodium	MG/KG	269	82%	188	2	47	57	57.5		27.5	U	31.8	U	92.1	J	35.9	U	96.8	J
Thallium	MG/KG	1.2	17%	0.855	3	9	54	1.2		0.42	J	0.32	U	0.32	U	0.41	J	0.24	U
Vanadium	MG/KG	32.7	100%	150	0	57	57	21		27.6		32.2		22.8		23.3		14.8	
Zinc	MG/KG	126	95%	115	2	54	57	54.1		104		87.1		64.9		72.2		59	

BACKGROUND SOIL DATA

SEAD-4 Remedial Investigation

Seneca Army Depot Activity

LOC_ID:								MW64B-1		MW64B-1		MW67-2		MW67-2		MW67-2		MW70-1	
QC CODE:								SA		SA		SA		SA		SA		SA	
STUDY ID:								ESI		ESI		ESI		ESI		ESI		ESI	
TOP:								6		6		0		2		4		0	
BOTTOM:								8		8		0.2		4		5		0.2	
MATRIX:								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE DATE:			FREQUENCY		NUMBER	NUMBER	NUMBER	5/13/1994		13-May-94		3/30/1994		3/30/1994		3/30/1994		5/11/1994	
SAMP ID:			OF		ABOVE	OF	OF	MW64B-1-3		MW64B-1-04		MW67-2-1		MW67-2-2		MW67-2-3		MW70-1-1	
COMPOUND	UNIT	MAXIMUM	DETECTION	TAGM	TAGM	DETECTS	ANALYSES	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q
METALS																			
Aluminum	MG/KG	21000	100%	19520	3	57	57	7620		7620		16700		14900		9460		12200	
Antimony	MG/KG	6.8	18%	6	2	10	57	0.15	UJ	0.15	UJ	0.27	J	0.22	J	0.2	UJ	0.23	UJ
Arsenic	MG/KG	21.5	95%	8.9	2	54	57	5.5		5.5		4.4		4.5		4.2		5.4	
Barium	MG/KG	159	100%	300	0	57	57	76.7		76.7		114		105		80.8		67.5	
Beryllium	MG/KG	1.4	100%	1.13	2	57	57	0.37	J	0.37	J	0.67	J	0.61	J	0.4	J	0.44	J
Cadmium	MG/KG	2.9	35%	2.46	2	20	57	0.54	J	0.54	J	0.2	J	0.11	J	0.12	J	0.57	J
Calcium	MG/KG	293000	100%	125300	2	57	57	75900		75900		3580		79000		77800		3600	
Chromium	MG/KG	32.7	100%	30	2	57	57	13.5		13.5		19.5		22.5		14.8		13.7	
Cobalt	MG/KG	29.1	100%	30	0	57	57	7.4	J	7.4	J	7.5	J	10.4	J	9.7	J	5.5	J
Copper	MG/KG	62.8	100%	33	3	57	57	17.6		17.6		16.5		20.3		20.5		12.4	
Cyanide	MG/KG	0	0%	0.35	0	0	51	0.48	U	0.48	U	0.64	U	0.5	U	0.54	U		
Iron	MG/KG	38600	100%	37410	2	57	57	17100		17100		20500		24400		18700		17700	
Lead	MG/KG	266	95%	24.4	3	54	57	8.3		8.3		17.5		9.3		8.5		20.7	
Magnesium	MG/KG	29100	100%	21700	2	54	54	21500		21500								2830	
Manganese	MG/KG	2380	95%	1100	2	54	57	389		389		438		528		411		233	
Mercury	MG/KG	0.13	72%	0.1	2	41	57	0.01	U	0.01	U	0.04		0.01	J	0.02	J	0.1	J
Nickel	MG/KG	62.3	98%	50	2	56	57	22.6		22.6		18.7		32.3		25.9		12.3	
Potassium	MG/KG	3160	100%	2623	2	57	57	1650		1650		1780	J	3160	J	1970	J	982	J
Selenium	MG/KG	1.7	40%	2	0	23	57	0.57	J	0.57	J	0.81		0.36	U	0.34	U	1	J
Silver	MG/KG	0.87	4%	0.8	1	2	54	0.11	UJ	0.11	UJ	0.11	U	0.15	U	0.14	U		
Sodium	MG/KG	269	82%	188	2	47	57	79.6	J	79.6	J	25.1	U	112	J	107	J	36.4	U
Thallium	MG/KG	1.2	17%	0.855	3	9	54	0.24	U	0.24	U	0.48	J	0.34	U	0.32	U		
Vanadium	MG/KG	32.7	100%	150	0	57	57	14.2		14.2		28.2		24.8		16.5		23.3	
Zinc	MG/KG	126	95%	115	2	54	57	45.6		45.600		64.8		62		60.1		55.4	

BACKGROUND SOIL DATA
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

LOC_ID:								MW70-1		MW70-1		SB11-3		SB11-3		SB11-3		SB13-1	
QC CODE:								SA		SA		SA		SA		SA		SA	
STUDY ID:								ESI		ESI		ESI		ESI		ESI		ESI	
TOP:								2		4		0		2		10		0	
BOTTOM:								4		6		2		4		12		2	
MATRIX:								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE DATE:			FREQUENCY		NUMBER	NUMBER	NUMBER	5/11/1994		5/11/1994		11/2/1993		11/2/1993		11/3/1993		12/8/1993	
SAMP ID:			OF		ABOVE	OF	OF	MW70-1-2		MW70-1-3		SB11-3-1		SB11-3-2		SB11-3-6		SB13-1-1	
COMPOUND	UNIT	MAXIMUM	DETECTION	TAGM	TAGM	DETECTS	ANALYSES	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q
METALS																			
Aluminum	MG/KG	21000	100%	19520	3	57	57	9480		11000		17600		6330		10900		18300	
Antimony	MG/KG	6.8	18%	6	2	10	57	0.21	UJ	0.19	UJ	10.8	UJ	8	UJ	7.6	UJ	5.1	J
Arsenic	MG/KG	21.5	95%	8.9	2	54	57	4.1		5.7		5.6		0		0		7	
Barium	MG/KG	159	100%	300	0	57	57	56.6		79.9		113		57.4		62.7		106	
Beryllium	MG/KG	1.4	100%	1.13	2	57	57	0.41	J	0.54	J	0.85	J	0.34	J	0.47	J	0.92	J
Cadmium	MG/KG	2.9	35%	2.46	2	20	57	0.43	J	0.8	J	0.67	U	0.5	U	0.48	U	0.45	U
Calcium	MG/KG	293000	100%	125300	2	57	57	51600		48600		4950		91300		48600		3570	
Chromium	MG/KG	32.7	100%	30	2	57	57	14.7		17.8		24		11.1		18.6		29.4	
Cobalt	MG/KG	29.1	100%	30	0	57	57	7.1	J	21		11.3		6.5	J	10.1		12	
Copper	MG/KG	62.8	100%	33	3	57	57	19.7		33.5		20		12.2		21.7		11.6	
Cyanide	MG/KG	0	0%	0.35	0	0	51					0.57	U	0.47	U	0.53	U	0.61	U
Iron	MG/KG	38600	100%	37410	2	57	57	16000		26400		27200		13200		28300		32500	
Lead	MG/KG	266	95%	24.4	3	54	57	9.1		13.6		37.9		11.4		10.1		15	
Magnesium	MG/KG	29100	100%	21700	2	54	54	13600		7980		4160		12900		10100		5890	
Manganese	MG/KG	2380	95%	1100	2	54	57	470		1040		674		356		434		451	
Mercury	MG/KG	0.13	72%	0.1	2	41	57	0.03	J	0.02	J	0.05	J	0.04	U	0.03	U	0.03	J
Nickel	MG/KG	62.3	98%	50	2	56	57	17.6		52.4		28.3		16.7		29.5		34.9	
Potassium	MG/KG	3160	100%	2623	2	57	57	1590		1350		2110		1110		1230		2190	
Selenium	MG/KG	1.7	40%	2	0	23	57	0.64	J	0.32	U	0.24	J	0.13	UJ	0.21	UJ	0.26	J
Silver	MG/KG	0.87	4%	0.8	1	2	54					1.4	UJ	1	UJ	0.97	UJ	0.9	U
Sodium	MG/KG	269	82%	188	2	47	57	126	J	165	J	66.3	J	136	J	146	J	80.6	J
Thallium	MG/KG	1.2	17%	0.855	3	9	54					0.19	U	1.5	U	0.23	U	0.43	J
Vanadium	MG/KG	32.7	100%	150	0	57	57	17.2		17.6		31.8		13.3		17		32.7	
Zinc	MG/KG	126	95%	115	2	54	57	42.4		116		83.2		0		0		81.9	

BACKGROUND SOIL DATA
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

LOC_ID:								SB13-1		SB13-1		MW13-6		MW13-6		MW13-6		SB17-1	
QC CODE:								SA		SA		SA		SA		SA		SA	
STUDY ID:								ESI		ESI		ESI		ESI		ESI		ESI	
TOP:										6		0		4		6		0	
BOTTOM:										8		2		6		8		2	
MATRIX:								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE DATE:										12/8/1993		15-Dec-93		15-Dec-93		15-Dec-93		12/1/1993	
SAMP ID:								SB13-1-2		SB13-1-3		SB13-6-1		SB13-6-3		SB13-6-4		SB17-1-1	
COMPOUND	UNIT	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q
METALS																			
Aluminum	MG/KG	21000	100%	19520	3	57	57	8250		11700		16000		13500		10200		13700	
Antimony	MG/KG	6.8	18%	6	2	10	57	3.7	UJ	2.8	UJ	3.2	UJ	2.5	UJ	2.9	UJ	11.7	UJ
Arsenic	MG/KG	21.5	95%	8.9	2	54	57	6.2		5.7		4.6		2.7		2.3		4.3	
Barium	MG/KG	159	100%	300	0	57	57	88.1		33.9		103		60.4		56.8		107	
Beryllium	MG/KG	1.4	100%	1.13	2	57	57	0.42	J	0.54	J	0.92		0.71		0.58	J	0.7	J
Cadmium	MG/KG	2.9	35%	2.46	2	20	57	0.36	U	0.27	U	0.31	U	0.25	U	0.28	U	0.73	U
Calcium	MG/KG	293000	100%	125300	2	57	57	87700		50300		5140		31800		45200		2870	
Chromium	MG/KG	32.7	100%	30	2	57	57	13.3		19.6		21.5		23.5		17.8		17.6	
Cobalt	MG/KG	29.1	100%	30	0	57	57	7.2	J	11.1		10.6		15		11.3		9.9	J
Copper	MG/KG	62.8	100%	33	3	57	57	18.4		17.6		16		27.4		14.5		46.4	
Cyanide	MG/KG	0	0%	0.35	0	0	51	0.5	U	0.53	U	0.6	U	0.53	U	0.51	U	0	NA
Iron	MG/KG	38600	100%	37410	2	57	57	17400		24700		25300		26900		20700		25100	
Lead	MG/KG	266	95%	24.4	3	54	57	0		0		13.8		11.6		11.7		266	
Magnesium	MG/KG	29100	100%	21700	2	54	54	20800		12600		3750		6640		5220		3330	
Manganese	MG/KG	2380	95%	1100	2	54	57	517		404		934		508		556		547	
Mercury	MG/KG	0.13	72%	0.1	2	41	57	0.07	J	0.02	U	0.03	J	0.01	U	0.01	U	0.05	J
Nickel	MG/KG	62.3	98%	50	2	56	57	24		33.1		22.7		41.9		33		19.1	
Potassium	MG/KG	3160	100%	2623	2	57	57	1390		1270		1330		1120		1000		628	J
Selenium	MG/KG	1.7	40%	2	0	23	57	0.56	J	0.51	J	1.2		0.11	J	0.24	J	0.25	UJ
Silver	MG/KG	0.87	4%	0.8	1	2	54	0.71	U	0.54	U	0.62	U	0.49	U	0.56	U	1.5	U
Sodium	MG/KG	269	82%	188	2	47	57	155	J	134	J	61.9	J	116	J	141	J	46.2	J
Thallium	MG/KG	1.2	17%	0.855	3	9	54	0.43	J	0.64	J	0.18	U	0.14	U	0.23	U	0.28	UJ
Vanadium	MG/KG	32.7	100%	150	0	57	57	13.3		16.3		29.9		18.5		13.8		23.1	
Zinc	MG/KG	126	95%	115	2	54	57	56.2		45.8		62.5		64.7		39.3		93.4	

BACKGROUND SOIL DATA
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

LOC_ID:								SB17-1		SB17-1		SB26-1		SB26-1		SB4-1		SB4-1	
QC CODE:								SA		SA		SA		SA		SA		DU	
STUDY ID:								ESI		ESI		ESI		ESI		ESI		ESI	
TOP:								2		4		0		2		0		0	
BOTTOM:								4		6		2		4		2		2	
MATRIX:								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE DATE:			FREQUENCY		NUMBER	NUMBER	NUMBER	12/1/1993		12/1/1993		11/17/1993		11/17/1993		12/6/1993		12/6/1993	
SAMP ID:			OF		ABOVE	OF	OF	SB17-1-2		SB17-1-3		SB26-1-1		SB26-1-2		SB4-1-1		SB4-1-10	
COMPOUND	UNIT	MAXIMUM	DETECTION	TAGM	TAGM	DETECTS	ANALYSES	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q
METALS																			
Aluminum	MG/KG	21000	100%	19520	3	57	57	18100		8700		5560		9040		14800		21000	
Antimony	MG/KG	6.8	18%	6	2	10	57	11.8	UJ	9	UJ	7.3	UJ	6.7	UJ	4.8	UJ	3.8	UJ
Arsenic	MG/KG	21.5	95%	8.9	2	54	57	5.2		3.4		3.2		5.3		6.2		4.2	
Barium	MG/KG	159	100%	300	0	57	57	114		59.4		73.2		43.7		72		97.7	
Beryllium	MG/KG	1.4	100%	1.13	2	57	57	0.9	J	0.42	J	0.35	J	0.41	J	0.73	J	0.64	J
Cadmium	MG/KG	2.9	35%	2.46	2	20	57	0.74	U	0.56	U	0.46	U	0.42	U	0.47	U	0.37	U
Calcium	MG/KG	293000	100%	125300	2	57	57	20900		72800		293000		47300		4280		2460	
Chromium	MG/KG	32.7	100%	30	2	57	57	25.1		13.9		10.3		15.7		23.2		27.9	
Cobalt	MG/KG	29.1	100%	30	0	57	57	13.3		8.8		5.9	J	9.5		11.3		5.9	J
Copper	MG/KG	62.8	100%	33	3	57	57	26.9		20		9.7		14.3		14.1		15.1	
Cyanide	MG/KG	0	0%	0.35	0	0	51	0	NA	0	NA	0.48	U	0.57	U	0.52	U	0.53	U
Iron	MG/KG	38600	100%	37410	2	57	57	29900		18800		8770		19100		27500		19500	
Lead	MG/KG	266	95%	24.4	3	54	57	11.4	J	7.5	J	6.33		8.5		0	J	9.8	J
Magnesium	MG/KG	29100	100%	21700	2	54	54	8490		18100		29100		9160		4270		4460	
Manganese	MG/KG	2380	95%	1100	2	54	57	487		391		309		551		615	J	0	J
Mercury	MG/KG	0.13	72%	0.1	2	41	57	0.06	J	0.03	UJ	0.02	U	0.02	U	0.05	J	0.04	J
Nickel	MG/KG	62.3	98%	50	2	56	57	42		25.2		31.6	R	23.9		27.8		25.1	
Potassium	MG/KG	3160	100%	2623	2	57	57	1560		1090		1710		901		1250		2490	
Selenium	MG/KG	1.7	40%	2	0	23	57	0.24	UJ	0.14	UJ	0.13	UJ	0.26	J	0.4	J	0.23	J
Silver	MG/KG	0.87	4%	0.8	1	2	54	1.5	U	1.1	U	0.92	UJ	0.85	UJ	0.93	U	0.74	U
Sodium	MG/KG	269	82%	188	2	47	57	74.6	J	137	J	192	J	108	J	43.8	U	39.2	J
Thallium	MG/KG	1.2	17%	0.855	3	9	54	0.26	UJ	0.15	UJ	0.73	U	0.17	U	0.23	U	0.23	U
Vanadium	MG/KG	32.7	100%	150	0	57	57	27		13.9		12.7		14.4		28.6		31	
Zinc	MG/KG	126	95%	115	2	54	57	80.2		57.1		283	R	90.6		79.6		72.1	

BACKGROUND SOIL DATA
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

LOC_ID:								SB4-1		SB4-1		TP57-11	
QC CODE:								SA		SA		SA	
STUDY ID:								ESI		ESI		ESI	
TOP:								4		8		3	
BOTTOM:								6		10		3	
MATRIX:								SOIL		SOIL		SOIL	
SAMPLE DATE:			FREQUENCY		NUMBER	NUMBER	NUMBER	12/6/1993		12/6/1993		11/8/1993	
SAMP ID:			OF		ABOVE	OF	OF	SB4-1-2		SB4-1-3		TP57-11	
COMPOUND	UNIT	MAXIMUM	DETECTION	TAGM	TAGM	DETECTS	ANALYSES	VALUE	Q	VALUE	Q	VALUE	Q
METALS													
Aluminum	MG/KG	21000	100%	19520	3	57	57	15300		19200		14600	
Antimony	MG/KG	6.8	18%	6	2	10	57	5	UJ	2.8	UJ	11.3	UJ
Arsenic	MG/KG	21.5	95%	8.9	2	54	57	3.9		21.5		5.9	
Barium	MG/KG	159	100%	300	0	57	57	40.4	J	81.2		120	
Beryllium	MG/KG	1.4	100%	1.13	2	57	57	0.74	J	1		0.81	J
Cadmium	MG/KG	2.9	35%	2.46	2	20	57	0.49	U	0.27	U	0.71	U
Calcium	MG/KG	293000	100%	125300	2	57	57	30900		14400		22300	
Chromium	MG/KG	32.7	100%	30	2	57	57	27.6		32.7		20.1	
Cobalt	MG/KG	29.1	100%	30	0	57	57	16.5		29.1		8.8	J
Copper	MG/KG	62.8	100%	33	3	57	57	62.8		21.6		21.7	
Cyanide	MG/KG	0	0%	0.35	0	0	51	0.53	U	0.47	U	0.54	U
Iron	MG/KG	38600	100%	37410	2	57	57	34300		37900		24900	
Lead	MG/KG	266	95%	24.4	3	54	57	7.5	J	9.1	J	11.3	
Magnesium	MG/KG	29100	100%	21700	2	54	54	7130		8040		5360	
Manganese	MG/KG	2380	95%	1100	2	54	57	0		0		329	
Mercury	MG/KG	0.13	72%	0.1	2	41	57	0.04	J	0.04	J	0.04	J
Nickel	MG/KG	62.3	98%	50	2	56	57	47.6		62.3		25.7	
Potassium	MG/KG	3160	100%	2623	2	57	57	1300		2030		1430	
Selenium	MG/KG	1.7	40%	2	0	23	57	0.09	U	0.14	U	0.46	J
Silver	MG/KG	0.87	4%	0.8	1	2	54	0.98	U	0.64	J	1.4	UJ
Sodium	MG/KG	269	82%	188	2	47	57	105	J	91.6	J	93	J
Thallium	MG/KG	1.2	17%	0.855	3	9	54	0.16	U	0.24	U	0.17	U
Vanadium	MG/KG	32.7	100%	150	0	57	57	22.2		29.3		27.8	
Zinc	MG/KG	126	95%	115	2	54	57	102		115		57.9	

SEDA Groundwater Background Data

BACKGROUND GROUND WATER DATA
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

STUDY ID:								3Q93		RI PHASE		ESI		ESI		ESI		RI ROUND	
LOC ID:								MW-35		MW-35		MW11-1		MW13-1		MW13-6		MW16-1	
QC CODE:								SA		SA		SA		SA		SA		SA	
SAMP. DETH TOP:								NONE		NONE		NONE		NONE		NONE		3.3	
SAMP. DEPTH BOT:								NONE		NONE		NONE		NONE		NONE		5.3	
MATRIX:								GROUND		GROUND		GROUND		GROUND		GROUND		GROUND	
SAMP ID:								MW35OB3		MW-35GW		MW11-1-1		MW13-1-1		MW13-6-1		16101	
PARAMETER	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NY AWQS CLASS GA	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	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	
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
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
Barium	UG/L	337	94%	1000	0	29	31	97.3	B	103	J	25.2	J	337		34.3	J	74.2	
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	
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
Calcium	UG/L	181000	100%		0	31	31	108000		94700		97500		181000		81500		157000	
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	
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	
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	
Cyanide	UG/L	2.8	3%	100	0	1	31	2.8	B	10	UJ	5	U	5	U	5	U	5	U
Iron	UG/L	69400	100%	300	22	31	31	321		10500		41.4	J	69400		4550		2400	J
Lead	UG/L	34.8	32%	25	1	10	31	2.8	B	3.3		1.1	J	[illegible]		1.5	J	1.7	U
Magnesium	UG/L	58200	100%		0	31	31	15600		14600		29700		50300		51500		23300	
Manganese	UG/L	1120	97%	300	8	30	31	23.4		557	J	278		[illegible]		376		210	
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
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	
Potassium	UG/L	10200	94%		0	29	31	1400	B	4180	J	7100		10100		6780	J	1670	
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
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
Sodium	UG/L	59400	97%	20000	7	30	31	13400		44100		4860	J	9350		7880		8750	
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
Vanadium	UG/L	70.8	52%		0	16	31	3	U	30.3	U	3.7	U	70.8		5.9	J	3.3	
Zinc	UG/L	143	84%	300	0	26	31	72.7		58.2		21.4		143		50.6		15.6	R

BACKGROUND GROUND WATER DATA
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

STUDY ID:								RI ROUND		RI ROUND		RI ROUND		RI ROUND		RI ROUND		ESI	
LOC ID:								MW16-1		MW17-1		MW17-1		MW25-6		MW25-6		MW26-1	
QC CODE:								SA		SA		SA		SA		SA		SA	
SAMP. DETH TOP:								731.5		3.4		731.1		NONE		NONE		NONE	
SAMP. DEPTH BOT:								728.4		7.4		727.1		NONE		NONE		NONE	
MATRIX:								GROUND		GROUND		GROUND		GROUND		GROUND		GROUND	
SAMP ID:								16152		16108		16171		MW25-6		25008		MW26-1-1	
PARAMETER	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NY AWQS CLASS GA	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q
METALS																			
Aluminum	UG/L	42400	87%		0	27	31	143	U	90.4		386		162		529		188	J
Antimony	UG/L	52.7	13%		0	4	31	3	U	2	U	3	U	2.2	U	2.3	U	21.5	U
Arsenic	UG/L	10	13%	25	0	4	31	4.4	U	2.7	U	4.4	U	2.1	U	3.5	U	0.8	U
Barium	UG/L	337	94%	1000	0	29	31	48.2	U	85		90.4	U	85.6		72.3		31.9	J
Beryllium	UG/L	2.2	13%		0	4	31	0.2	U	0.26		0.2	U	0.27	U	0.13	U	0.4	U
Cadmium	UG/L	0	0%	10	0	0	31	0.6	U	0.3	U	0.6	U	0.3	U	0.32	U	2.1	U
Calcium	UG/L	181000	100%		0	31	31	116000		108000		104000		133000		118000		115000	
Chromium	UG/L	69.4	48%	50	1	15	31	1	U	1	U	1	U	2.2		1.3	U	2.6	U
Cobalt	UG/L	34.6	45%		0	14	31	1.3	U	1.2	U	2	U	1.3		1.1	U	4.4	U
Copper	UG/L	32.5	48%	200	0	15	31	1.9	U	3.1		1.1	U	0.99		1.1		3.1	U
Cyanide	UG/L	2.8	3%	100	0	1	31	5	UJ	5	U	5	UJ	5	U	5	UJ	5	U
Iron	UG/L	69400	100%	300	22	31	31	296		119		[redacted]	J	[redacted]		[redacted]		286	
Lead	UG/L	34.8	32%	25	1	10	31	1.5	U	1.7	U	1.5	U	4.4		1.1	U	0.5	U
Magnesium	UG/L	58200	100%		0	31	31	17600		22600		22900		35900		32900		16700	
Manganese	UG/L	1120	97%	300	8	30	31	64.2		21.3		9.7	U	56		22		529	
Mercury	UG/L	0.06	23%	0.7	0	7	31	0.1	U	0.1	U	0.1	U	0.02	U	0.1	U	0.05	J
Nickel	UG/L	99.8	61%	100	0	19	31	2.5	U	1.8		2.5	U	2.6		1.7	U	4	U
Potassium	UG/L	10200	94%		0	29	31	998	U	472		843	U	1840	J	1420		10200	
Selenium	UG/L	3.6	19%	10	0	6	31	4.7	UJ	2.4	U	4.7	UJ	3.7	U	3.4	U	0.7	U
Silver	UG/L	0.98	6%	50	0	2	31	1.5	U	1.3	U	1.5	U	0.8	U	1.1	U	4.2	U
Sodium	UG/L	59400	97%	20000	7	30	31	3870	U	9290		8190		[redacted]	J	16500		30300	
Thallium	UG/L	4.7	13%		0	4	31	5.9	U	4.4		4.1	U	3	U	3.5	U	1.2	U
Vanadium	UG/L	70.8	52%		0	16	31	1.6	U	1.2	U	1.6	U	1.4		1.2	U	3.7	U
Zinc	UG/L	143	84%	300	0	26	31	5.8	U	2.5	R	14.4	U	7.5		2.2		26.7	

BACKGROUND GROUND WATER DATA

SEAD-4 Remedial Investigation

Seneca Army Depot Activity

STUDY ID:								RI ROUND		RI ROUND		ESI		ESI		ESI		ESI	
LOC ID:								MW26-1		MW26-1		MW4-1		MW44A-1		MW44B-1		MW57-1	
QC CODE:								SA		SA		SA		SA		SA		SA	
SAMP. DETH TOP:								NONE		NONE		NONE		NONE		NONE		NONE	
SAMP. DEPTH BOT:								NONE		NONE		NONE		NONE		NONE		NONE	
MATRIX:								GROUND		GROUND		GROUND		GROUND		GROUND		GROUND	
SAMP ID:								MW26-1		26001		MW4-1-1		MW44A-1-		MW44B-1-		MW57-1-1	
PARAMETER	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NY AWQS CLASS GA	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q
METALS																			
Aluminum	UG/L	42400	87%		0	27	31	457		38.7		41.9	U	69	J	288	J	4200	
Antimony	UG/L	52.7	13%		0	4	31	2.2	U	1.4		21.6	U	1.3	U	1.3	U	44.7	J
Arsenic	UG/L	10	13%	25	0	4	31	2.1	U	4	U	2.2	J	2	U	2	U	1.4	U
Barium	UG/L	337	94%	1000	0	29	31	33.2		29.9		19.6	J	102	J	72.6	J	36.5	J
Beryllium	UG/L	2.2	13%		0	4	31	0.27	U	0.1	U	0.4	U	0.1	U	0.1	U	0.4	U
Cadmium	UG/L	0	0%	10	0	0	31	0.3	U	0.3	U	2.1	U	0.2	U	0.2	U	2.1	U
Calcium	UG/L	181000	100%		0	31	31	121000		110000		137000		92200		120000		82000	
Chromium	UG/L	69.4	48%	50	1	15	31	4.7		0.73		2.6	U	0.4	U	0.4	U	7.7	J
Cobalt	UG/L	34.6	45%		0	14	31	1.1		0.9	U	4.6	J	0.5	U	0.91	J	4.4	U
Copper	UG/L	32.5	48%	200	0	15	31	5.7		1	U	3.1	U	0.5	U	0.5	U	3.1	U
Cyanide	UG/L	2.8	3%	100	0	1	31	5	U	5	U	5	U	5	U	5	U	5	U
Iron	UG/L	69400	100%	300	22	31	31	867		58.4	J	332		114	J	666		6360	
Lead	UG/L	34.8	32%	25	1	10	31	7.8		1.9	U	0.5	U	0.9	U	0.9	U	2.1	J
Magnesium	UG/L	58200	100%		0	31	31	16600		15500		57600		19000		31800		11400	
Manganese	UG/L	1120	97%	300	8	30	31	27.5		2.5		346		18.2		219		245	
Mercury	UG/L	0.06	23%	0.7	0	7	31	0.02	U	0.2	U	0.04	U	0.04	U	0.04	U	0.04	U
Nickel	UG/L	99.8	61%	100	0	19	31	6.2		1.6	U	4	U	0.7	U	0.73	J	8.2	J
Potassium	UG/L	10200	94%		0	29	31	3620		3860	J	7380		1050	J	2150	J	3860	J
Selenium	UG/L	3.6	19%	10	0	6	31	3.7	U	3.4	U	2.1	J	2.7	U	2.7	U	0.69	U
Silver	UG/L	0.98	6%	50	0	2	31	0.8	U	1.3	U	4.2	U	0.5	U	0.68	J	4.2	U
Sodium	UG/L	59400	97%	20000	7	30	31	24600		34800		11700		2310	J	7190		4080	J
Thallium	UG/L	4.7	13%		0	4	31	4.3		4.7	U	1.2	U	1.9	U	4.7	J	1.2	U
Vanadium	UG/L	70.8	52%		0	16	31	1.3	J	1.1	U	3.7	U	0.5	U	0.5	U	7.6	J
Zinc	UG/L	143	84%	300	0	26	31	20.5		3.1	J	19.1	J	3.8	J	2.2	U	57.4	

BACKGROUND GROUND WATER DATA
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

STUDY ID:								ESI		ESI		ESI		ESI		ESI		RI PHASE	
LOC ID:								MW58-1		MW64A-1		MW64B-1		MW64C-9		MW64D-1		PT-10	
QC CODE:								SA		SA		SA		SA		SA		SA	
SAMP. DETH TOP:								NONE		NONE		NONE		NONE		NONE		NONE	
SAMP. DEPTH BOT:								NONE		NONE		NONE		NONE		NONE		NONE	
MATRIX:								GROUND		GROUND		GROUND		GROUND		GROUND		GROUND	
SAMP ID:								MW58-1-1		MW64A-1-		MW64B-1-		MW64C-9-		MW64D-1-		PT10GW1	
PARAMETER	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NY AWQS CLASS GA	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q
METALS																			
Aluminum	UG/L	42400	87%		0	27	31	440		398		198	J	38.2	J	177	J	72	U
Antimony	UG/L	52.7	13%		0	4	31	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U	49.5	UJ
Arsenic	UG/L	10	13%	25	0	4	31	2	U	2	U	2	U	2	U	2	U	1.4	UJ
Barium	UG/L	337	94%	1000	0	29	31	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	0.1	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	0.2	U	0.2	U	0.2	U	0.2	U	2.8	U
Calcium	UG/L	181000	100%		0	31	31	113000		109000		138000		121000		142000		79100	
Chromium	UG/L	69.4	48%	50	1	15	31	0.82	J	0.49	J	0.41	J	0.4	U	0.4	U	2.7	UJ
Cobalt	UG/L	34.6	45%		0	14	31	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	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	10	UJ
Iron	UG/L	69400	100%	300	22	31	31	[illegible]		[illegible]	J	400		[illegible]		[illegible]		85.6	J
Lead	UG/L	34.8	32%	25	1	10	31	0.89	U	0.89	U	0.9	U	0.9	U	0.9	U	0.79	U
Magnesium	UG/L	58200	100%		0	31	31	17300		16800		45600		49400		14800		34200	
Manganese	UG/L	1120	97%	300	8	30	31	84		28.3		98.9		96		223		124	
Mercury	UG/L	0.06	23%	0.7	0	7	31	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	1.6	J	1	J	1.4	J	1.2	J	1.4	J	7.4	UJ
Potassium	UG/L	10200	94%		0	29	31	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	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	0.5	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	4180	J	2180	J	8140		6420		12300		41100	
Thallium	UG/L	4.7	13%		0	4	31	1.9	U	1.9	U	1.9	U	1.9	U	2.2	J		
Vanadium	UG/L	70.8	52%		0	16	31	0.81	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	7.1	J	3.9	J	3.9	J	3.9	J	3.8	J	8.8	J

BACKGROUND GROUND WATER DATA
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

STUDY ID:								ESI		QUARTER		ESI		ESI		ESI		ESI	
LOC ID:								MW24-1		MW45-4		MW60-1		MW62-1		MW63-1		MW67-1	
QC CODE:								SA		SA		SA		SA		SA		SA	
SAMP DETH TOP:								NONE		NONE		NONE		NONE		NONE		NONE	
SAMP DEPTH BOT:								NONE		NONE		NONE		NONE		NONE		NONE	
MATRIX:								GROUND		GROUND		GROUND		GROUND		GROUND		GROUND	
SAMP ID:								MW24-1		OB108		MW60-1		MW62-1		MW63-1		MW67-2	
PARAMETER	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NY AWQS CLASS GA	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q	VALUE	Q
METALS																			
Aluminum	UG/L	42400	87%		0	27	31	19100		36.8	U	348		499		747		1240	
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
Arsenic	UG/L	10	13%	25	0	4	31	10		3.6	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
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
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
Calcium	UG/L	181000	100%		0	31	31	180000		112000		95100		91700		89400		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
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
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
Cyanide	UG/L	2.8	3%	100	0	1	31	5	U			5	U	5	UJ	5	U	5	U
Iron	UG/L	69400	100%	300	22	31	31	32000		62.8		1290		797	J	1260		2270	
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
Magnesium	UG/L	58200	100%		0	31	31	39800		24200		31100		58200		16400		24200	
Manganese	UG/L	1120	97%	300	8	30	31	712		5	J	377		271		548		153	
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
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
Potassium	UG/L	10200	94%		0	29	31	9220		2180		8760		7470	J	3870	J	1870	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
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
Sodium	UG/L	59400	97%	20000	7	30	31	5950		10600		59400		18100		5710		13700	
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
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
Zinc	UG/L	143	84%	300	0	26	31	107		6.8		6.9	J	4.2	J	7.1	J	6.5	J

BACKGROUND GROUND WATER DATA
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

STUDY ID:								ESI	
LOC ID:								MW70-1	
QC CODE:								SA	
SAMP. DETH TOP:								NONE	
SAMP. DEPTH BOT:								NONE	
MATRIX:								GROUND	
SAMP ID:								MW70-1	
PARAMETER	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NY AWQS CLASS GA	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	Q
METALS									
Aluminum	UG/L	42400	87%		0	27	31	88.2	J
Antimony	UG/L	52.7	13%		0	4	31	1.3	U
Arsenic	UG/L	10	13%	25	0	4	31	2	U
Barium	UG/L	337	94%	1000	0	29	31	86.5	J
Beryllium	UG/L	2.2	13%		0	4	31	0.1	U
Cadmium	UG/L	0	0%	10	0	0	31	0.2	U
Calcium	UG/L	181000	100%		0	31	31	119000	
Chromium	UG/L	69.4	48%	50	1	15	31	0.4	U
Cobalt	UG/L	34.6	45%		0	14	31	0.5	U
Copper	UG/L	32.5	48%	200	0	15	31	0.5	U
Cyanide	UG/L	2.8	3%	100	0	1	31	5	U
Iron	UG/L	69400	100%	300	22	31	31	213	
Lead	UG/L	34.8	32%	25	1	10	31	0.9	U
Magnesium	UG/L	58200	100%		0	31	31	28100	
Manganese	UG/L	1120	97%	300	8	30	31	107	
Mercury	UG/L	0.06	23%	0.7	0	7	31	0.06	J
Nickel	UG/L	99.8	61%	100	0	19	31	1.5	J
Potassium	UG/L	10200	94%		0	29	31	1540	J
Selenium	UG/L	3.6	19%	10	0	6	31	2.7	U
Silver	UG/L	0.98	6%	50	0	2	31	0.5	U
Sodium	UG/L	59400	97%	20000	7	30	31	5220	
Thallium	UG/L	4.7	13%		0	4	31	1.9	U
Vanadium	UG/L	70.8	52%		0	16	31	0.5	U
Zinc	UG/L	143	84%	300	0	26	31	3.5	J

Statistical Comparison of SEAD-4 Inorganics in Soil and Groundwater

Statistical Comparison of SEAD-4 Inorganics (mg/kg) in Soils
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Compound	Number of Analyses	Number of Detects	Minimum Soils	Maximum Soils	Average Soils	Standard Deviation	95th Upper Confidence Limit	Median
Aluminum	162	162	3510.000	21000.000	12299.608	3119.964	12793.977	12100.000
Antimony	162	55	0.230	148.000	8.629	20.417	12.480	1.925
Arsenic	162	162	2.500	21.500	5.266	2.333	5.636	4.900
Barium	162	162	24.400	278.000	74.498	35.824	80.175	69.800
Beryllium	162	161	0.010	1.800	0.558	0.206	0.590	0.530
Cadmium	162	14	0.015	2.300	0.170	0.337	0.223	0.050
Calcium	162	162	1050.000	196000.000	25604.118	34394.875	31054.105	8880.000
Chromium	162	147	8.900	18600.000	621.764	2093.578	969.804	24.400
Cobalt	162	162	3.400	29.100	11.193	3.525	11.752	10.600
Copper	162	162	9.800	7330.000	306.106	1026.923	468.826	23.700
Cyanide	162	2	0.225	0.870	0.335	0.089	0.350	0.315
Iron	162	162	9900.000	64600.000	25366.667	6933.929	26465.372	24100.000
Lead	162	155	4.700	7360.000	83.777	610.183	182.753	15.850
Magnesium	162	162	1750.000	35300.000	6807.712	4795.930	7567.644	5370.000
Manganese	162	145	133.000	2100.000	530.854	272.890	576.550	455.000
Mercury	162	79	0.005	1.200	0.066	0.123	0.085	0.030
Nickel	162	162	11.600	228.000	31.910	19.010	34.922	28.500
Potassium	162	162	429.000	2490.000	1359.627	373.266	1418.773	1310.000
Selenium	162	45	0.045	3.400	0.364	0.325	0.415	0.340
Silver	162	11	0.070	1.700	0.233	0.239	0.271	0.115
Sodium	162	75	15.900	1270.000	63.970	105.656	80.712	37.600
Thallium	162	19	0.065	5.400	0.862	1.210	1.060	0.343
Vanadium	162	162	9.000	1250.000	29.308	99.472	45.070	21.300
Zinc	162	162	45.500	2020.000	171.202	273.006	214.461	83.400
Chromium, Hexavalent	15	4	2.900	16.500	7.671	4.166	9.854	6.450

Notes: For statistical calculations, all detections (no qualifier or J qualifier) were taken at full value, and all non-detections (U or UJ qualifiers) were taken at half value. Samples and duplicates were averaged.

Statistical Comparison of SEAD-4 Inorganics (ug/l) in Groundwater
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Compound	Number of Anaylses	Number of Detects	Minimum Groundwater	Maximum Groundwater	Average Groundwater	Standard Deviation	95th Upper Confidence Limit	Median
Aluminum	30	27	5.200	3820.000	630.967	867.937	941.548	269.000
Antimony	30	7	1.100	39.300	5.448	9.148	8.722	1.850
Arsenic	30	5	0.400	6.500	1.933	1.592	2.503	0.900
Barium	30	30	18.600	121.000	42.890	26.510	52.376	36.550
Beryllium	30	3	0.050	6.300	0.351	1.126	0.754	0.200
Cadmium	30	2	0.150	5.600	0.575	0.994	0.931	0.450
Calcium	30	30	26400.000	147000.000	92796.667	31139.735	103939.656	95250.000
Chromium	30	18	0.350	260.000	11.988	47.155	28.862	1.500
Cobalt	30	5	0.750	8.200	1.835	1.648	2.425	1.700
Copper	30	9	0.500	37.600	3.533	6.782	5.960	1.450
Iron	30	27	7.450	6900.000	859.820	1342.389	1340.178	308.500
Lead	30	4	0.250	2.200	0.547	0.428	0.700	0.450
Magnesium	30	30	5420.000	57600.000	21569.667	14193.704	26648.717	20000.000
Manganese	30	28	0.200	855.000	168.860	189.396	236.633	116.500
Mercury	30	2	0.020	0.050	0.046	0.009	0.050	0.050
Nickel	30	12	0.700	9.900	2.598	2.050	3.332	2.000
Potassium	30	30	260.000	14400.000	3396.333	3227.000	4551.078	2100.000
Selenium	30	11	0.350	24.000	3.050	4.864	4.790	1.450
Silver	30	5	0.450	6.700	1.308	1.182	1.731	1.250
Sodium	30	30	2030.000	82600.000	15625.000	17624.018	21931.549	10065.000
Thallium	30	3	0.600	4.900	1.400	0.957	1.743	1.025
Vanadium	30	9	0.800	11.400	2.208	2.344	3.047	1.250
Zinc	30	26	1.500	95.000	19.507	25.486	28.626	9.150

Notes: For statistical calculations, all detections (no qualifier or J qualifier) were taken at full value, and all non-detections (U or UJ qualifiers) were taken at half value. Samples and duplicates were averaged.

Appendix G

Human Heath Risk Assessment Calculation Tables

Appendix G

Human Heath Risk Assessment Calculation Tables

TABLE G-1
AMBIENT AIR EXPOSURE POINT CONCENTRATIONS - SEAD-4
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Equation for Air EPC from Surface Soil (mg/m³) = $CS_{surf} \times PM_{10} \times CF$	Equation for Air EPC from Total Soils (mg/m³) = $CS_{tot} \times PM_{10} \times CF$
Variables:	Variables:
CS_{surf} = Chemical Concentration in Surface Soil, from EPC data (mg/kg)	CS_{tot} = Chemical Concentration in Total Soils, from EPC data (mg/kg)
PM_{10} = Average Measured PM_{10} Concentration = 17 ug/m³	PM_{10} = PM_{10} Concentration Calculated for Construction Worker= 167 ug/m³
CF = Conversion Factor = 1E-9 kg/ug	CF = Conversion Factor = 1E-9 kg/ug

Analyte	EPC Data for Surface Soil (mg/kg)	EPC Data for Total Soils (mg/kg)	Calculated Air EPC Surface Soil (mg/m³)	Calculated Air EPC Total Soils (mg/m³)
Volatile Organics				
1,1-Dichloroethane	2.00E-03	2.00E-03	3.40E-11	3.34E-10
1,2-Dichloroethene (total)	4.00E-03	4.00E-03	6.80E-11	6.68E-10
Acetone	1.39E-02	9.52E-03	2.36E-10	1.59E-09
Benzene	1.00E-03	1.00E-03	1.70E-11	1.67E-10
Chloroform	ND	6.73E-03	ND	1.12E-09
Ethyl benzene	ND	1.00E-03	ND	1.67E-10
Methyl butyl ketone	8.19E-03	6.64E-03	1.39E-10	1.11E-09
Methylene chloride	3.00E-03	3.00E-03	5.10E-11	5.01E-10
Toluene	7.00E-03	6.45E-03	1.19E-10	1.08E-09
Total Xylenes	ND	6.64E-03	ND	1.11E-09
Trichloroethene	3.00E-03	3.00E-03	5.10E-11	5.01E-10
Semivolatile Organics				
2-Methylnaphthalene	3.50E-02	1.10E-01	5.95E-10	1.84E-08
Acenaphthene	7.49E-02	8.80E-02	1.27E-09	1.47E-08
Acenaphthylene	5.11E-02	1.01E-01	8.69E-10	1.69E-08
Anthracene	7.54E-02	1.02E-01	1.28E-09	1.70E-08
Benzo(a)anthracene	8.40E-02	1.27E-01	1.43E-09	2.12E-08
Benzo(a)pyrene	8.56E-02	1.20E-01	1.46E-09	2.00E-08
Benzo(b)fluoranthene	1.15E-01	1.25E-01	1.96E-09	2.09E-08
Benzo(ghi)perylene	8.56E-02	1.10E-01	1.46E-09	1.84E-08
Benzo(k)fluoranthene	8.23E-02	1.06E-01	1.40E-09	1.77E-08
Bis(2-Ethylhexyl)phthalate	4.19E-01	2.59E-01	7.12E-09	4.33E-08
Butylbenzylphthalate	9.52E-02	1.10E-01	1.62E-09	1.84E-08
Carbazole	8.12E-02	1.04E-01	1.38E-09	1.74E-08
Chrysene	9.49E-02	1.25E-01	1.61E-09	2.09E-08
Di-n-butylphthalate	8.74E-02	8.15E-02	1.49E-09	1.36E-08
Di-n-octylphthalate	5.28E-02	4.40E-02	8.98E-10	7.35E-09
Dibenz(a,h)anthracene	7.97E-02	1.02E-01	1.35E-09	1.70E-08
Dibenzofuran	5.76E-02	5.80E-02	9.79E-10	9.69E-09
Diethyl phthalate	2.20E-02	2.20E-02	3.74E-10	3.67E-09
Fluoranthene	1.09E-01	1.28E-01	1.85E-09	2.14E-08
Fluorene	7.25E-02	9.94E-02	1.23E-09	1.66E-08
Indeno(1,2,3-cd)pyrene	8.63E-02	1.12E-01	1.47E-09	1.87E-08
N-Nitrosodiphenylamine	1.90E-02	1.90E-02	3.23E-10	3.17E-09
Naphthalene	7.37E-02	1.06E-01	1.25E-09	1.77E-08
Phenanthrene	9.51E-02	1.38E-01	1.62E-09	2.30E-08
Phenol	1.70E-02	1.70E-02	2.89E-10	2.84E-09
Pyrene	1.15E-01	1.39E-01	1.96E-09	2.32E-08
Pesticides/PCBs				
4,4'-DDD	4.52E-03	3.03E-03	7.68E-11	5.06E-10
4,4'-DDE	5.66E-03	3.56E-03	9.62E-11	5.95E-10
4,4'-DDT	7.12E-03	3.94E-03	1.21E-10	6.58E-10
Aldrin	1.32E-03	1.12E-03	2.24E-11	1.87E-10
Alpha-BHC	1.35E-03	1.13E-03	2.30E-11	1.89E-10
Alpha-Chlordane	1.41E-03	1.18E-03	2.40E-11	1.97E-10
Aroclor-1248	ND	2.15E-02	ND	3.59E-09
Aroclor-1254	3.96E-02	3.10E-02	6.73E-10	5.18E-09
Aroclor-1260	2.71E-02	2.22E-02	4.61E-10	3.71E-09
Beta-BHC	1.60E-03	1.25E-03	2.72E-11	2.09E-10
Delta-BHC	ND	1.11E-03	ND	1.85E-10
Dieldrin	2.79E-03	2.26E-03	4.74E-11	3.77E-10
Endosulfan I	1.32E-03	1.13E-03	2.24E-11	1.89E-10
Endosulfan II	2.62E-03	2.18E-03	4.45E-11	3.64E-10
Endosulfan sulfate	2.57E-03	2.16E-03	4.37E-11	3.61E-10
Endrin	2.80E-03	2.34E-03	4.76E-11	3.91E-10
Endrin aldehyde	2.93E-03	2.38E-03	4.98E-11	3.97E-10
Endrin ketone	2.56E-03	2.17E-03	4.35E-11	3.62E-10
Gamma-Chlordane	1.61E-03	1.24E-03	2.74E-11	2.07E-10
Heptachlor	1.36E-03	1.13E-03	2.31E-11	1.89E-10
Heptachlor epoxide	1.40E-03	1.15E-03	2.38E-11	1.92E-10
Herbicides				
Dicamba	ND	3.36E-03	ND	5.61E-10
Nitroaromatics				
1,3,5-Trinitrobenzene	6.88E-02	6.28E-02	1.17E-09	1.05E-08
2,4,6-Trinitrotoluene	6.81E-02	6.26E-02	1.16E-09	1.05E-08
2,4-Dinitrotoluene	6.95E-02	6.47E-02	1.18E-09	1.08E-08
2-amino-4,6-Dinitrotoluene	6.83E-02	6.27E-02	1.16E-09	1.05E-08
4-Nitrotoluene	7.30E-02	6.39E-02	1.24E-09	1.07E-08
Metals				
Antimony	9.11E+00	5.95E+00	1.55E-07	9.94E-07
Chromium	1.19E+03	3.78E+02	2.02E-05	6.31E-05
Chromium, Hexavalent	1.02E+01	1.02E+01	1.73E-07	1.70E-06
Copper	3.87E+02	1.67E+02	6.58E-06	2.79E-05
Cyanide	4.30E-01	3.40E-01	7.31E-09	5.68E-08
Lead	6.85E+01	3.73E+01	1.16E-06	6.23E-06
Mercury	1.00E-01	6.00E-02	1.70E-09	1.00E-08
Thallium	1.40E+00	1.27E+00	2.38E-08	2.12E-07
Zinc	2.44E+02	1.66E+02	4.15E-06	2.77E-05

ND = Compound was not detected.

TABLE G-2
CALCULATION OF INTAKE AND RISK FROM INHALATION OF DUST IN AMBIENT AIR
REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-4
SEAD-4 Risk Assessment
Seneca Army Depot Activity

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

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 Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Inhalation RfD (mg/kg-day)	Carc. Slope Inhalation (mg/kg-day)-1	Air EPC* from Surface Soil (mg/m3)	Air EPC* from Total Soils (mg/m3)	Current Site Worker				Future Outdoor Park Worker			
					Intake (mg/kg-day) (Nc)	Intake (mg/kg-day) (Car)	Hazard Quotient	Cancer Risk	Intake (mg/kg-day) (Nc)	Intake (mg/kg-day) (Car)	Hazard Quotient	Cancer Risk
Volatile Organics												
1.1-Dichloroethane	4.00E-02	NA	3.40E-11	3.34E-10	2.55E-13		6E-12		1.86E-12		5E-11	
1.2-Dichloroethene (total)	NA	NA	6.80E-11	6.68E-10								
Acetone	NA	NA	2.36E-10	1.59E-09								
Benzene	1.71E-03	2.73E-02	1.70E-11	1.67E-10	1.28E-13	4.56E-14	7E-11	1E-15	9.32E-13	3.33E-13	5E-10	9E-15
Chloroform	NA	8.05E-02	ND	1.12E-09								
Ethyl benzene	2.86E-01	NA	ND	1.67E-10								
Methyl butyl ketone	NA	NA	1.39E-10	1.11E-09								
Methylene chloride	8.57E-01	1.65E-03	5.10E-11	5.01E-10	3.83E-13	1.37E-13	4E-13	2E-16	2.79E-12	9.98E-13	3E-12	2E-15
Toluene	1.14E-01	NA	1.19E-10	1.08E-09	8.94E-13		8E-12		6.52E-12		6E-11	
Total Xylenes	NA	NA	ND	1.11E-09								
Trichloroethene	NA	6.00E-03	5.10E-11	5.01E-10		1.37E-13		8E-16		9.98E-13		6E-15
Semivolatile Organics												
2-Methylnaphthalene	NA	NA	5.95E-10	1.84E-08								
Acenaphthene	NA	NA	1.27E-09	1.47E-08								
Acenaphthylene	NA	NA	8.69E-10	1.69E-08								
Anthracene	NA	NA	1.28E-09	1.70E-08								
Benzo(a)anthracene	NA	NA	1.43E-09	2.12E-08								
Benzo(a)pyrene	NA	NA	1.46E-09	2.00E-08								
Benzo(b)fluoranthene	NA	NA	1.96E-09	2.09E-08								
Benzo(ghi)perylene	NA	NA	1.46E-09	1.84E-08								
Benzo(k)fluoranthene	NA	NA	1.40E-09	1.77E-08								
Bis(2-Ethylhexyl)phthalate	NA	NA	7.12E-09	4.33E-08								
Butylbenzylphthalate	NA	NA	1.62E-09	1.84E-08								
Carbazole	NA	NA	1.38E-09	1.74E-08								
Chrysene	NA	NA	1.61E-09	2.09E-08								
Di-n-butylphthalate	NA	NA	1.49E-09	1.36E-08								
Di-n-octylphthalate	NA	NA	8.98E-10	7.35E-09								
Dibenz(a.h)anthracene	NA	NA	1.35E-09	1.70E-08								
Dibenzofuran	NA	NA	9.79E-10	9.69E-09								
Diethyl phthalate	NA	NA	3.74E-10	3.67E-09								
Fluoranthene	NA	NA	1.85E-09	2.14E-08								
Fluorene	NA	NA	1.23E-09	1.66E-08								
Indeno(1.2.3-cd)pyrene	NA	NA	1.47E-09	1.87E-08								
N-Nitrosodiphenylamine	NA	NA	3.23E-10	3.17E-09								
Naphthalene	8.60E-04	NA	1.25E-09	1.77E-08	9.42E-12		1E-08		6.87E-11		8E-08	
Phenanthrene	NA	NA	1.62E-09	2.30E-08								
Phenol	NA	NA	2.89E-10	2.84E-09								
Pyrene	NA	NA	1.96E-09	2.32E-08								
Pesticides/PCBs												
4.4'-DDD	NA	NA	7.68E-11	5.06E-10								
4.4'-DDE	NA	NA	9.62E-11	5.95E-10								
4.4'-DDT	NA	3.40E-01	1.21E-10	6.58E-10		3.25E-13		1E-13		2.37E-12		8E-13
Aldrin	NA	1 72E+01	2.24E-11	1.87E-10		6.02E-14		1E-12		4.39E-13		8E-12
Alpha-BHC	NA	6.30E+00	2.30E-11	1.89E-10		6.16E-14		4E-13		4.49E-13		3E-12
Alpha-Chlordane	2.00E-04	3.50E-01	2.40E-11	1.97E-10	1.80E-13	6.43E-14	9E-10	2E-14	1.31E-12	4.69E-13	7E-09	2E-13
Aroclor-1248	NA	NA	ND	3.59E-09								
Aroclor-1254	NA	4.00E-01	6.73E-10	5.18E-09		1.81E-12		7E-13		1.32E-11		5E-12
Aroclor-1260	NA	4.00E-01	4.61E-10	3.71E-09		1.24E-12		5E-13		9 02E-12		4E-12
Beta-BHC	NA	1.86E+00	2.72E-11	2.09E-10		7.30E-14		1E-13		5.32E-13		1E-12
Delta-BHC	NA	NA	ND	1.85E-10								
Dieldrin	NA	1.61E+01	4.74E-11	3.77E-10		1.27E-13		2E-12		9.28E-13		1E-11
Endosulfan I	NA	NA	2.24E-11	1.89E-10								
Endosulfan II	NA	NA	4.45E-11	3.64E-10								
Endosulfan sulfate	NA	NA	4.37E-11	3.61E-10								
Endrin	NA	NA	4.76E-11	3.91E-10								
Endrin aldehyde	NA	NA	4.98E-11	3.97E-10								
Endrin ketone	NA	NA	4.35E-11	3.62E-10								
Gamma-Chlordane	2.00E-04	3.50E-01	2.74E-11	2.07E-10	2.06E-13	7.35E-14	1E-09	3E-14	1.50E-12	5 36E-13	7E-09	2E-13
Heptachlor	NA	4.55E+00	2.31E-11	1.89E-10		6.20E-14		3E-13		4.52E-13		2E-12
Heptachlor epoxide	NA	9.10E+00	2.38E-11	1.92E-10		6.39E-14		6E-13		4.66E-13		4E-12
Herbicides												
Dicamba	NA	NA	ND	5.61E-10								
Nitroaromatics												
1.3.5-Trinitrobenzene	NA	NA	1.17E-09	1.05E-08								
2.4.6-Trinitrotoluene	NA	NA	1.16E-09	1.05E-08								
2.4-Dinitrotoluene	NA	NA	1 18E-09	1.08E-08								
2-amino-4.6-Dinitrotoluene	NA	NA	1.16E-09	1.05E-08								
4-Nitrotoluene	NA	NA	1.24E-09	1.07E-08								
Metals												
Antimony	NA	NA	1.55E-07	9.94E-07								
Chromium	NA	NA	2.02E-05	6.31E-05								
Chromium. Hexavalent	2.80E-05	4.20E+01	1.73E-07	1.70E-06	1.30E-09	4.65E-10	5E-05	2E-08	9.50E-09	3.39E-09	3E-04	1E-07
Copper	NA	NA	6.58E-06	2.79E-05								
Cyanide	NA	NA	7.31E-09	5.68E-08								
Lead	NA	NA	1.16E-06	6.23E-06								
Mercury	8 57E-05	NA	1.70E-09	1.00E-08	1.28E-11		1E-07		9.32E-11		1E-06	
Thallium	NA	NA	2.38E-08	2.12E-07								
Zinc	NA	NA	4.15E-06	2.77E-05								
Total Hazard Quotient and Cancer Risk:							**5E-05**	**2E-08**			**3E-04**	**1E-07**

Assumptions for Current Site Worker			Assumptions for Future Outdoor Park Worker		
CA =	EPC Surface Only		CA =	EPC Surface Only	
BW =	70	kg	BW =	70	kg
IR =	9.6	m3/day	IR =	8	m3/day
EF =	20	days/year	EF =	175	days/year
ED =	25	years	ED =	25	years
AT (Nc) =	9,125	days	AT (Nc) =	9,125	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 G-1 for calculation of Air EPC.
NA= Information not available.
ND = Compound not detected.

TABLE G-2
CALCULATION OF INTAKE AND RISK FROM INHALATION OF DUST IN AMBIENT AIR
REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-4
SEAD-4 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

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

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

Analyte	Inhalation RfD	Carc. Slope Inhalation	Air EPC* from Surface Soil	Air EPC* from Total Soils	Future Recreational Visitor (Child)				Future Construction Worker			
					Intake (mg/kg-day)		Hazard Quotient	Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Cancer Risk
	(mg/kg-day)	(mg/kg-day)-1	(mg/m3)	(mg/m3)	(Nc)	(Car)			(Nc)	(Car)		
Volatile Organics												
1.1-Dichloroethane	4.00E-02	NA	3.40E-11	3.34E-10	7.56E-13		2E-11		3.40E-11		8E-10	
1.2-Dichloroethene (total)	NA	NA	6.80E-11	6.68E-10								
Acetone	NA	NA	2.36E-10	1.59E-09								
Benzene	1.71E-03	2.73E-02	1.70E-11	1.67E-10	3.78E-13	2.70E-14	2E-10	7E-16	1.70E-11	2.43E-13	1E-08	7E-15
Chloroform	NA	8.05E-02	ND	1.12E-09						1.63E-12		1E-13
Ethyl benzene	2.86E-01	NA	ND	1.67E-10					1.70E-11		6E-11	
Methyl butyl ketone	NA	NA	1.39E-10	1.11E-09								
Methylene chloride	8.57E-01	1.65E-03	5.10E-11	5.01E-10	1.13E-12	8.10E-14	1E-12	1E-16	5.10E-11	7.28E-13	6E-11	1E-15
Toluene	1.14E-01	NA	1.19E-10	1.08E-09	2.65E-12		2E-11		1.10E-10		1E-09	
Total Xylenes	NA	NA	ND	1.11E-09								
Trichloroethene	NA	6.00E-03	5.10E-11	5.01E-10		8.10E-14		5E-16		7.28E-13		4E-15
Semivolatile Organics												
2-Methylnaphthalene	NA	NA	5.95E-10	1.84E-08								
Acenaphthene	NA	NA	1.27E-09	1.47E-08								
Acenaphthylene	NA	NA	8.69E-10	1.69E-08								
Anthracene	NA	NA	1.28E-09	1.70E-08								
Benzo(a)anthracene	NA	NA	1.43E-09	2.12E-08								
Benzo(a)pyrene	NA	NA	1.46E-09	2.00E-08								
Benzo(b)fluoranthene	NA	NA	1.96E-09	2.09E-08								
Benzo(ghi)perylene	NA	NA	1.46E-09	1.84E-08								
Benzo(k)fluoranthene	NA	NA	1.40E-09	1.77E-08								
Bis(2-Ethylhexyl)phthalate	NA	NA	7.12E-09	4.33E-08								
Butylbenzylphthalate	NA	NA	1.62E-09	1.84E-08								
Carbazole	NA	NA	1.38E-09	1.74E-08								
Chrysene	NA	NA	1.61E-09	2.09E-08								
Di-n-butylphthalate	NA	NA	1.49E-09	1.36E-08								
Di-n-octylphthalate	NA	NA	8.98E-10	7.35E-09								
Dibenz(a.h)anthracene	NA	NA	1.35E-09	1.70E-08								
Dibenzofuran	NA	NA	9.79E-10	9.69E-09								
Diethyl phthalate	NA	NA	3.74E-10	3.67E-09								
Fluoranthene	NA	NA	1.85E-09	2.14E-08								
Fluorene	NA	NA	1.23E-09	1.66E-08								
Indeno(1.2.3-cd)pyrene	NA	NA	1.47E-09	1.87E-08								
N-Nitrosodiphenylamine	NA	NA	3.23E-10	3.17E-09								
Naphthalene	8 60E-04	NA	1.25E-09	1.77E-08	2.79E-11		3E-08		1.80E-09		2E-06	
Phenanthrene	NA	NA	1.62E-09	2.30E-08								
Phenol	NA	NA	2.89E-10	2.84E-09								
Pyrene	NA	NA	1.96E-09	2.32E-08								
Pesticides/PCBs												
4.4'-DDD	NA	NA	7.68E-11	5.06E-10								
4.4'-DDE	NA	NA	9.62E-11	5.95E-10								
4.4'-DDT	NA	3.40E-01	1.21E-10	6.58E-10		1.92E-13		7E-14		9.57E-13		3E-13
Aldrin	NA	1.72E+01	2.24E-11	1.87E-10		3.57E-14		6E-13		2.72E-13		5E-12
Alpha-BHC	NA	6.30E+00	2.30E-11	1.89E-10		3.65E-14		2E-13		2.74E-13		2E-12
Alpha-Chlordane	2.00E-04	3.50E-01	2.40E-11	1.97E-10	5.33E-13	3.81E-14	3E-09	1E-14	2.01E-11	2.86E-13	1E-07	1E-13
Aroclor-1248	NA	NA	ND	3.59E-09								
Aroclor-1254	NA	4.00E-01	6.73E-10	5.18E-09		1.07E-12		4E-13		7.53E-12		3E-12
Aroclor-1260	NA	4.00E-01	4.61E-10	3.71E-09		7.32E-13		3E-13		5.39E-12		2E-12
Beta-BHC	NA	1.86E+00	2.72E-11	2.09E-10		4.32E-14		8E-14		3.03E-13		6E-13
Delta-BHC	NA	NA	ND	1.85E-10								
Dieldrin	NA	1.61E+01	4.74E-11	3.77E-10		7.54E-14		1E-12		5.49E-13		9E-12
Endosulfan I	NA	NA	2.24E-11	1.89E-10								
Endosulfan II	NA	NA	4.45E-11	3.64E-10								
Endosulfan sulfate	NA	NA	4.37E-11	3.61E-10								
Endrin	NA	NA	4.76E-11	3.91E-10								
Endrin aldehyde	NA	NA	4.98E-11	3.97E-10								
Endrin ketone	NA	NA	4.35E-11	3.62E-10								
Gamma-Chlordane	2.00E-04	3.50E-01	2.74E-11	2.07E-10	6.09E-13	4.35E-14	3E-09	2E-14	2.11E-11	3.01E-13	1E-07	1E-13
Heptachlor	NA	4 55E+00	2.31E-11	1.89E-10		3.67E-14		2E-13		2.74E-13		1E-12
Heptachlor epoxide	NA	9.10E+00	2.38E-11	1.92E-10		3.78E-14		3E-13		2.79E-13		3E-12
Herbicides												
Dicamba	NA	NA	ND	5.61E-10								
Nitroaromatics												
1.3.5-Trinitrobenzene	NA	NA	1.17E-09	1.05E-08								
2.4.6-Trinitrotoluene	NA	NA	1.16E-09	1.05E-08								
2.4-Dinitrotoluene	NA	NA	1.18E-09	1.08E-08								
2-amino-4.6-Dinitrotoluene	NA	NA	1.16E-09	1.05E-08								
4-Nitrotoluene	NA	NA	1.24E-09	1.07E-08								
Metals												
Antimony	NA	NA	1.55E-07	9.94E-07								
Chromium	NA	NA	2.02E-05	6.31E-05								
Chromium. Hexavalent	2.80E-05	4.20E+01	1.73E-07	1.70E-06	3.86E-09	2.76E-10	1E-04	1E-08	1.73E-07	2.48E-09	6E-03	1E-07
Copper	NA	NA	6.58E-06	2.79E-05								
Cyanide	NA	NA	7.31E-09	5.68E-08								
Lead	NA	NA	1.16E-06	6.23E-06								
Mercury	8.57E-05	NA	1.70E-09	1.00E-08	3.78E-11		4E-07		1.02E-09		1E-05	
Thallium	NA	NA	2.38E-08	2.12E-07								
Zinc	NA	NA	4.15E-06	2.77E-05								
Total Hazard Quotient and Cancer Risk:							**1E-04**	**1E-08**			**6E-03**	**1E-07**

Assumptions for Future Recreational Visitor (Child)		**Assumptions for Future Construction Worker**	
CA =	EPC Surface Only	CA =	EPC Surface and Sub-Surface
BW =	15 kg	BW =	70 kg
IR =	8.7 m3/day	IR =	10.4 m3/day
EF =	14 days/year	EF =	250 days/year
ED =	5 years	ED =	1 years
AT (Nc) =	1,825 days	AT (Nc) =	365 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 G-1 for calculation of Air EPC.
NA= Information not available.
ND = Compound not detected.

TABLE G-2
CALCULATION OF INTAKE AND RISK FROM INHALATION OF DUST IN AMBIENT AIR
REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-4
SEAD-4 Risk Assessment
Seneca Army Depot Activity

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

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 Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

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	Carc. Slope Inhalation	Air EPC* from Surface Soil	Future Resident (Adult)				Future Resident (Child)				Resident
				Intake (mg/kg-day)		Hazard Quotient	Contribution to Lifetime Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Contribution to Lifetime Cancer Risk	Total Lifetime Cancer Risk
	(mg/kg-day)	(mg/kg-day)-1	(mg/m3)	(Nc)	(Car)			(Nc)	(Car)			
Volatile Organics												
1.1-Dichloroethane	4.00E-02	NA	3.40E-11	9.32E-12		2E-10		1.89E-11		5E-10		
1.2-Dichloroethene (total)	NA	NA	6.80E-11									
Acetone	NA	NA	2.36E-10									
Benzene	1.71E-03	2.73E-02	1.70E-11	4.66E-12	1.60E-12	3E-09	4E-14	9.45E-12	8.10E-13	6E-09	2E-14	7E-14
Chloroform	NA	8.05E-02	ND									
Ethyl benzene	2.86E-01	NA	ND									
Methyl butyl ketone	NA	NA	1.39E-10									
Methylene chloride	8.57E-01	1.65E-03	5.10E-11	1.40E-11	4.79E-12	2E-11	8E-15	2.84E-11	2.43E-12	3E-11	4E-15	1E-14
Toluene	1.14E-01	NA	1.19E-10	3.26E-11		3E-10		6.62E-11		6E-10		
Total Xylenes	NA	NA	ND									
Trichloroethene	NA	6.00E-03	5.10E-11		4.79E-12		3E-14		2.43E-12		1E-14	4E-14
Semivolatile Organics												
2-Methylnaphthalene	NA	NA	5.95E-10									
Acenaphthene	NA	NA	1.27E-09									
Acenaphthylene	NA	NA	8.69E-10									
Anthracene	NA	NA	1.28E-09									
Benzo(a)anthracene	NA	NA	1.43E-09									
Benzo(a)pyrene	NA	NA	1.46E-09									
Benzo(b)fluoranthene	NA	NA	1.96E-09									
Benzo(ghi)perylene	NA	NA	1.46E-09									
Benzo(k)fluoranthene	NA	NA	1.40E-09									
Bis(2-Ethylhexyl)phthalate	NA	NA	7.12E-09									
Butylbenzylphthalate	NA	NA	1.62E-09									
Carbazole	NA	NA	1.38E-09									
Chrysene	NA	NA	1.61E-09									
Di-n-butylphthalate	NA	NA	1.49E-09									
Di-n-octylphthalate	NA	NA	8.98E-10									
Dibenz(a.h)anthracene	NA	NA	1.35E-09									
Dibenzofuran	NA	NA	9.79E-10									
Diethyl phthalate	NA	NA	3.74E-10									
Fluoranthene	NA	NA	1.85E-09									
Fluorene	NA	NA	1.23E-09									
Indeno(1.2.3-cd)pyrene	NA	NA	1.47E-09									
N-Nitrosodiphenylamine	NA	NA	3.23E-10									
Naphthalene	8.60E-04	NA	1.25E-09	3.43E-10		4E-07		6.97E-10		8E-07		
Phenanthrene	NA	NA	1.62E-09									
Phenol	NA	NA	2.89E-10									
Pyrene	NA	NA	1.96E-09									
Pesticides/PCBs												
4.4'-DDD	NA	NA	7.68E-11									
4.4'-DDE	NA	NA	9.62E-11									
4.4'-DDT	NA	3.40E-01	1.21E-10		1.14E-11		4E-12		5.77E-12		2E-12	6E-12
Aldrin	NA	1.72E+01	2.24E-11		2.11E-12		4E-11		1.07E-12		2E-11	5E-11
Alpha-BHC	NA	6.30E+00	2.30E-11		2.16E-12		1E-11		1.09E-12		7E-12	2E-11
Alpha-Chlordane	2.00E-04	3.50E-01	2.40E-11	6.57E-12	2.25E-12	3E-08	8E-13	1.33E-11	1.14E-12	7E-08	4E-13	1E-12
Aroclor-1248	NA	NA	ND									
Aroclor-1254	NA	4.00E-01	6.73E-10		6.32E-11		3E-11		3.21E-11		1E-11	4E-11
Aroclor-1260	NA	4.00E-01	4.61E-10		4.33E-11		2E-11		2.20E-11		9E-12	3E-11
Beta-BHC	NA	1.86E+00	2.72E-11		2.55E-12		5E-12		1.30E-12		2E-12	7E-12
Delta-BHC	NA	NA	ND									
Dieldrin	NA	1.61E+01	4.74E-11		4.46E-12		7E-11		2.26E-12		4E-11	1E-10
Endosulfan I	NA	NA	2.24E-11									
Endosulfan II	NA	NA	4.45E-11									
Endosulfan sulfate	NA	NA	4.37E-11									
Endrin	NA	NA	4.76E-11									
Endrin aldehyde	NA	NA	4.98E-11									
Endrin ketone	NA	NA	4.35E-11									
Gamma-Chlordane	2.00E-04	3.50E-01	2.74E-11	7.50E-12	2.57E-12	4E-08	9E-13	1.52E-11	1.30E-12	8E-08	5E-13	1E-12
Heptachlor	NA	4.55E+00	2.31E-11		2.17E-12		1E-11		1.10E-12		5E-12	1E-11
Heptachlor epoxide	NA	9.10E+00	2.38E-11		2.24E-12		2E-11		1.13E-12		1E-11	3E-11
Herbicides												
Dicamba	NA	NA	ND									
Nitroaromatics												
1.3.5-Trinitrobenzene	NA	NA	1.17E-09									
2.4.6-Trinitrotoluene	NA	NA	1.16E-09									
2.4-Dinitrotoluene	NA	NA	1.18E-09									
2-amino-4.6-Dinitrotoluene	NA	NA	1.16E-09									
4-Nitrotoluene	NA	NA	1.24E-09									
Metals												
Antimony	NA	NA	1.55E-07									
Chromium	NA	NA	2.02E-05									
Chromium. Hexavalent	2.80E-05	4.20E+01	1.73E-07	4.75E-08	1.63E-08	2E-03	7E-07	9.64E-08	8.27E-09	3E-03	3E-07	1E-06
Copper	NA	NA	6.58E-06									
Cyanide	NA	NA	7.31E-09									
Lead	NA	NA	1.16E-06									
Mercury	8.57E-05	NA	1.70E-09	4.66E-10		5E-06		9.45E-10		1E-05		
Thallium	NA	NA	2.38E-08									
Zinc	NA	NA	4.15E-06									
Total Hazard Quotient and Cancer Risk:						**2E-03**				**3E-03**		**1E-06**

Assumptions for Future Resident (Adult)			Assumptions for Future Resident (Child)		
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 G-1 for calculation of Air EPC.
NA= Information not available.

TABLE G-3
CALCULATION OF INTAKE AND RISK FROM INHALATION OF DUST IN AMBIENT AIR
CENTRAL TENDENCY(CT) - SEAD-4
SEAD-4 Risk Assessment
Seneca Army Depot Activity

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

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 Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Inhalation RfD	Carc. Slope Inhalation	Air EPC* from Surface Soil	Air EPC* from Total Soils	Current Site Worker				Future Outdoor Park Worker			
					Intake (mg/kg-day)		Hazard Quotient	Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Cancer Risk
	(mg/kg-day)	(mg/kg-day)-1	(mg/m3)	(mg/m3)	(Nc)	(Car)			(Nc)	(Car)		
Volatile Organics												
1.1-Dichloroethane	4.00E-02	NA	3.40E-11	3.34E-10	1.28E-13		3E-12		1.63E-12		4E-11	
1.2-Dichloroethene (total)	NA	NA	6.80E-11	6.68E-10								
Acetone	NA	NA	2.36E-10	1.59E-09								
Benzene	1.71E-03	2.73E-02	1.70E-11	1.67E-10	6.39E-14	6.39E-15	4E-11	2E-16	8.14E-13	8.14E-14	5E-10	2E-15
Chloroform	NA	8.05E-02	ND	1.12E-09								
Ethyl benzene	2.86E-01	NA	ND	1.67E-10								
Methyl butyl ketone	NA	NA	1.39E-10	1.11E-09								
Methylene chloride	8.57E-01	1.65E-03	5.10E-11	5.01E-10	1.92E-13	1.92E-14	2E-13	3E-17	2.44E-12	2.44E-13	3E-12	4E-16
Toluene	1.14E-01	NA	1.19E-10	1.08E-09	4.47E-13		4E-12		5.70E-12		5E-11	
Total Xylenes	NA	NA	ND	1.11E-09								
Trichloroethene	NA	6.00E-03	5.10E-11	5.01E-10		1.92E-14		1E-16		2.44E-13		1E-15
Semivolatile Organics												
2-Methylnaphthalene	NA	NA	5.95E-10	1.84E-08								
Acenaphthene	NA	NA	1.27E-09	1.47E-08								
Acenaphthylene	NA	NA	8.69E-10	1.69E-08								
Anthracene	NA	NA	1.28E-09	1.70E-08								
Benzo(a)anthracene	NA	NA	1.43E-09	2.12E-08								
Benzo(a)pyrene	NA	NA	1.46E-09	2.00E-08								
Benzo(b)fluoranthene	NA	NA	1.96E-09	2.09E-08								
Benzo(ghi)perylene	NA	NA	1.46E-09	1.84E-08								
Benzo(k)fluoranthene	NA	NA	1.40E-09	1.77E-08								
Bis(2-Ethylhexyl)phthalate	NA	NA	7.12E-09	4.33E-08								
Butylbenzylphthalate	NA	NA	1.62E-09	1.84E-08								
Carbazole	NA	NA	1.38E-09	1.74E-08								
Chrysene	NA	NA	1.61E-09	2.09E-08								
Di-n-butylphthalate	NA	NA	1.49E-09	1.36E-08								
Di-n-octylphthalate	NA	NA	8.98E-10	7.35E-09								
Dibenz(a.h)anthracene	NA	NA	1.35E-09	1.70E-08								
Dibenzofuran	NA	NA	9.79E-10	9.69E-09								
Diethyl phthalate	NA	NA	3.74E-10	3.67E-09								
Fluoranthene	NA	NA	1.85E-09	2.14E-08								
Fluorene	NA	NA	1.23E-09	1.66E-08								
Indeno(1.2.3-cd)pyrene	NA	NA	1.47E-09	1.87E-08								
N-Nitrosodiphenylamine	NA	NA	3.23E-10	3.17E-09								
Naphthalene	8.60E-04	NA	1.25E-09	1.77E-08	4.71E-12		5E-09		6.00E-11		7E-08	
Phenanthrene	NA	NA	1.62E-09	2.30E-08								
Phenol	NA	NA	2.89E-10	2.84E-09								
Pyrene	NA	NA	1.96E-09	2.32E-08								
Pesticides/PCBs												
4.4'-DDD	NA	NA	7.68E-11	5.06E-10								
4.4'-DDE	NA	NA	9.62E-11	5.95E-10								
4.4'-DDT	NA	3.40E-01	1.21E-10	6.58E-10		4.55E-14		2E-14		5.80E-13		2E-13
Aldrin	NA	1.72E+01	2.24E-11	1.87E-10		8.43E-15		1E-13		1.08E-13		2E-12
Alpha-BHC	NA	6.30E+00	2.30E-11	1.89E-10		8.62E-15		5E-14		1.10E-13		7E-13
Alpha-Chlordane	2.00E-04	3.50E-01	2.40E-11	1.97E-10	9.01E-14	9.01E-15	5E-10	3E-15	1.15E-12	1.15E-13	6E-09	4E-14
Aroclor-1248	NA	NA	ND	3.59E-09								
Aroclor-1254	NA	4.00E-01	6.73E-10	5.18E-09		2.53E-13		1E-13		3.23E-12		1E-12
Aroclor-1260	NA	4.00E-01	4.61E-10	3.71E-09		1.73E-13		7E-14		2.21E-12		9E-13
Beta-BHC	NA	1.86E+00	2.72E-11	2.09E-10		1.02E-14		2E-14		1.30E-13		2E-13
Delta-BHC	NA	NA	ND	1.85E-10								
Dieldrin	NA	1.61E+01	4.74E-11	3.77E-10		1.78E-14		3E-13		2.27E-13		4E-12
Endosulfan I	NA	NA	2.24E-11	1.89E-10								
Endosulfan II	NA	NA	4.45E-11	3.64E-10								
Endosulfan sulfate	NA	NA	4.37E-11	3.61E-10								
Endrin	NA	NA	4.76E-11	3.91E-10								
Endrin aldehyde	NA	NA	4.98E-11	3.97E-10								
Endrin ketone	NA	NA	4.35E-11	3.62E-10								
Gamma-Chlordane	2.00E-04	3.50E-01	2.74E-11	2.07E-10	1.03E-13	1.03E-14	5E-10	4E-15	1.31E-12	1.31E-13	7E-09	5E-14
Heptachlor	NA	4.55E+00	2.31E-11	1.89E-10		8.69E-15		4E-14		1.11E-13		5E-13
Heptachlor epoxide	NA	9.10E+00	2.38E-11	1.92E-10		8.94E-15		8E-14		1.14E-13		1E-12
Herbicides												
Dicamba	NA	NA	ND	5.61E-10								
Nitroaromatics												
1.3.5-Trinitrobenzene	NA	NA	1.17E-09	1.05E-08								
2.4.6-Trinitrotoluene	NA	NA	1.16E-09	1.05E-08								
2.4-Dinitrotoluene	NA	NA	1.18E-09	1.08E-08								
2-amino-4.6-Dinitrotoluene	NA	NA	1.16E-09	1.05E-08								
4-Nitrotoluene	NA	NA	1.24E-09	1.07E-08								
Metals												
Antimony	NA	NA	1.55E-07	9.94E-07								
Chromium	NA	NA	2.02E-05	6.31E-05								
Chromium. Hexavalent	2.80E-05	4.20E+01	1.73E-07	1.70E-06	6.52E-10	6.52E-11	2E-05	3E-09	8.31E-09	8.31E-10	3E-04	3E-08
Copper	NA	NA	6.58E-06	2.79E-05								
Cyanide	NA	NA	7.31E-09	5.68E-08								
Lead	NA	NA	1.16E-06	6.23E-06								
Mercury	8.57E-05	NA	1.70E-09	1.00E-08	6.39E-12		7E-08		8.14E-11		1E-06	
Thallium	NA	NA	2.38E-08	2.12E-07								
Zinc	NA	NA	4.15E-06	2.77E-05								
Total Hazard Quotient and Cancer Risk:							**2E-05**	**3E-09**			**3E-04**	**3E-08**

Assumptions for Future Current Site Worker			**Assumptions for Future Outdoor Park Worker**		
CA =	EPC Surface Only		CA =	EPC Surface Only	
BW =	70	kg	BW =	70	kg
IR =	9.6	m3/day	IR =	8	m3/day
EF =	10	days/year	EF =	153	days/year
ED =	7	years	ED =	7	years
AT (Nc) =	2555	days	AT (Nc) =	2555	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 G-1 for calculation of Air EPC.
NA= Information not available.
ND = Compound not detected.

TABLE G-3
CALCULATION OF INTAKE AND RISK FROM INHALATION OF DUST IN AMBIENT AIR
CENTRAL TENDENCY(CT) - SEAD-4
SEAD-4 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 Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Inhalation RfD (mg/kg-day)	Carc. Slope Inhalation (mg/kg-day)-1	Air EPC* from Surface Soil (mg/m3)	Air EPC* from Total Soils (mg/m3)	Future Recreational Visitor (Child)				Future Construction Worker			
					Intake (mg/kg-day) (Nc)	Intake (mg/kg-day) (Car)	Hazard Quotient	Cancer Risk	Intake (mg/kg-day) (Nc)	Intake (mg/kg-day) (Car)	Hazard Quotient	Cancer Risk
Volatile Organics												
1.1-Dichloroethane	4.00E-02	NA	3.40E-11	3.34E-10	3.78E-13		9E-12		2.98E-11		7E-10	
1.2-Dichloroethene (total)	NA	NA	6.80E-11	6.68E-10								
Acetone	NA	NA	2.36E-10	1.59E-09								
Benzene	1.71E-03	2.73E-02	1.70E-11	1.67E-10	1.89E-13	2.70E-15	1E-10	7E-17	1.49E-11	2.13E-13	9E-09	6E-15
Chloroform	NA	8.05E-02	ND	1.12E-09						1.43E-12		1E-13
Ethyl benzene	2.86E-01	NA	ND	1.67E-10					1.49E-11		5E-11	
Methyl butyl ketone	NA	NA	1.39E-10	1.11E-09								
Methylene chloride	8.57E-01	1.65E-03	5.10E-11	5.01E-10	5.67E-13	8.10E-15	7E-13	1E-17	4.47E-11	6.38E-13	5E-11	1E-15
Toluene	1.14E-01	NA	1.19E-10	1.08E-09	1.32E-12		1E-11		9.60E-11		8E-10	
Total Xylenes	NA	NA	ND	1.11E-09								
Trichloroethene	NA	6.00E-03	5.10E-11	5.01E-10		8.10E-15		5E-17		6.38E-13		4E-15
Semivolatile Organics												
2-Methylnaphthalene	NA	NA	5.95E-10	1.84E-08								
Acenaphthene	NA	NA	1.27E-09	1.47E-08								
Acenaphthylene	NA	NA	8.69E-10	1.69E-08								
Anthracene	NA	NA	1.28E-09	1.70E-08								
Benzo(a)anthracene	NA	NA	1.43E-09	2.12E-08								
Benzo(a)pyrene	NA	NA	1.46E-09	2.00E-08								
Benzo(b)fluoranthene	NA	NA	1.96E-09	2.09E-08								
Benzo(ghi)perylene	NA	NA	1.46E-09	1.84E-08								
Benzo(k)fluoranthene	NA	NA	1.40E-09	1.77E-08								
Bis(2-Ethylhexyl)phthalate	NA	NA	7.12E-09	4.33E-08								
Butylbenzylphthalate	NA	NA	1.62E-09	1.84E-08								
Carbazole	NA	NA	1.38E-09	1.74E-08								
Chrysene	NA	NA	1.61E-09	2.09E-08								
Di-n-butylphthalate	NA	NA	1.49E-09	1.36E-08								
Di-n-octylphthalate	NA	NA	8.98E-10	7.35E-09								
Dibenz(a.h)anthracene	NA	NA	1.35E-09	1.70E-08								
Dibenzofuran	NA	NA	9.79E-10	9.69E-09								
Diethyl phthalate	NA	NA	3.74E-10	3.67E-09								
Fluoranthene	NA	NA	1.85E-09	2.14E-08								
Fluorene	NA	NA	1.23E-09	1.66E-08								
Indeno(1.2.3-cd)pyrene	NA	NA	1.47E-09	1.87E-08								
N-Nitrosodiphenylamine	NA	NA	3.23E-10	3.17E-09								
Naphthalene	8.60E-04	NA	1.25E-09	1.77E-08	1.39E-11		2E-08		1.58E-09		2E-06	
Phenanthrene	NA	NA	1.62E-09	2.30E-08								
Phenol	NA	NA	2.89E-10	2.84E-09								
Pyrene	NA	NA	1.96E-09	2.32E-08								
Pesticides/PCBs												
4.4'-DDD	NA	NA	7.68E-11	5.06E-10								
4.4'-DDE	NA	NA	9.62E-11	5.95E-10								
4.4'-DDT	NA	3.40E-01	1.21E-10	6.58E-10		1.92E-14		7E-15		8.38E-13		3E-13
Aldrin	NA	1.72E+01	2.24E-11	1.87E-10		3.57E-15		6E-14		2.38E-13		4E-12
Alpha-BHC	NA	6.30E+00	2.30E-11	1.89E-10		3.65E-15		2E-14		2.40E-13		2E-12
Alpha-Chlordane	2.00E-04	3.50E-01	2.40E-11	1.97E-10	2.67E-13	3.81E-15	1E-09	1E-15	1.76E-11	2.51E-13	9E-08	9E-14
Aroclor-1248	NA	NA	ND	3.59E-09								
Aroclor-1254	NA	4.00E-01	6.73E-10	5.18E-09		1.07E-13		4E-14		6.59E-12		3E-12
Aroclor-1260	NA	4.00E-01	4.61E-10	3.71E-09		7.32E-14		3E-14		4.72E-12		2E-12
Beta-BHC	NA	1.86E+00	2.72E-11	2.09E-10		4.32E-15		8E-15		2.66E-13		5E-13
Delta-BHC	NA	NA	ND	1.85E-10								
Dieldrin	NA	1.61E+01	4.74E-11	3.77E-10		7.54E-15		1E-13		4.81E-13		8E-12
Endosulfan I	NA	NA	2.24E-11	1.89E-10								
Endosulfan II	NA	NA	4.45E-11	3.64E-10								
Endosulfan sulfate	NA	NA	4.37E-11	3.61E-10								
Endrin	NA	NA	4.76E-11	3.91E-10								
Endrin aldehyde	NA	NA	4.98E-11	3.97E-10								
Endrin ketone	NA	NA	4.35E-11	3.62E-10								
Gamma-Chlordane	2.00E-04	3.50E-01	2.74E-11	2.07E-10	3.04E-13	4.35E-15	2E-09	2E-15	1.85E-11	2.64E-13	9E-08	9E-14
Heptachlor	NA	4.55E+00	2.31E-11	1.89E-10		3.67E-15		2E-14		2.40E-13		1E-12
Heptachlor epoxide	NA	9.10E+00	2.38E-11	1.92E-10		3.78E-15		3E-14		2.45E-13		2E-12
Herbicides												
Dicamba	NA	NA	ND	5.61E-10								
Nitroaromatics												
1.3.5-Trinitrobenzene	NA	NA	1.17E-09	1.05E-08								
2.4.6-Trinitrotoluene	NA	NA	1.16E-09	1.05E-08								
2.4-Dinitrotoluene	NA	NA	1.18E-09	1.08E-08								
2-amino-4.6-Dinitrotoluene	NA	NA	1.16E-09	1.05E-08								
4-Nitrotoluene	NA	NA	1.24E-09	1.07E-08								
Metals												
Antimony	NA	NA	1.55E-07	9.94E-07								
Chromium	NA	NA	2.02E-05	6.31E-05								
Chromium. Hexavalent	2.80E-05	4.20E+01	1.73E-07	1.70E-06	1.93E-09	2.76E-11	7E-05	1E-09	1.52E-07	2.17E-09	5E-03	9E-08
Copper	NA	NA	6.58E-06	2.79E-05								
Cyanide	NA	NA	7.31E-09	5.68E-08								
Lead	NA	NA	1.16E-06	6.23E-06								
Mercury	8.57E-05	NA	1.70E-09	1.00E-08	1.89E-11		2E-07		8.93E-10		1E-05	
Thallium	NA	NA	2.38E-08	2.12E-07								
Zinc	NA	NA	4.15E-06	2.77E-05								
Total Hazard Quotient and Cancer Risk:							7E-05	1E-09			5E-03	9E-08

Assumptions for Future Recreational Visitor (Child)			Assumptions for Future Construction Worker		
CA =	EPC Surface Only		CA =	EPC Surface and Sub-Surface	
BW =	15	kg	BW =	70	kg
IR =	8.7	m3/day	IR =	10.4	m3/day
EF =	7	days/year	EF =	219	days/year
ED =	1	years	ED =	1	years
AT (Nc) =	365	days	AT (Nc) =	365	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 G-1 for calculation of Air EPC.
NA= Information not available.

TABLE G-3
CALCULATION OF INTAKE AND RISK FROM INHALATION OF DUST IN AMBIENT AIR
CENTRAL TENDENCY(CT) - SEAD-4
SEAD-4 Risk Assessment
Seneca Army Depot Activity

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

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 Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

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	Carc. Slope Inhalation	Air EPC* from Surface Soil	Future Resident (Adult)				Future Resident (Child)				Resident
				Intake (mg/kg-day)		Hazard Quotient	Contribution to Lifetime Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Contribution to Lifetime Cancer Risk	Total Lifetime Cancer Risk
	(mg/kg-day)	(mg/kg-day)-1	(mg/m3)	(Nc)	(Car)			(Nc)	(Car)			
Volatile Organics												
1.1-Dichloroethane	4.00E-02	NA	3.40E-11	6.23E-12		2E-10		1.26E-11		3E-10		
1.2-Dichloroethene (total)	NA	NA	6.80E-11									
Acetone	NA	NA	2.36E-10									
Benzene	1.71E-03	2.73E-02	1.70E-11	3.11E-12	3.11E-13	2E-09	9E-15	6.32E-12	1.81E-13	4E-09	5E-15	1E-14
Chloroform	NA	8.05E-02	ND									
Ethyl benzene	2.86E-01	NA	ND									
Methyl butyl ketone	NA	NA	1.39E-10									
Methylene chloride	8.57E-01	1.65E-03	5.10E-11	9.34E-12	9.34E-13	1E-11	2E-15	1.90E-11	5.42E-13	2E-11	9E-16	2E-15
Toluene	1.14E-01	NA	1.19E-10	2.18E-11		2E-10		4.42E-11		4E-10		
Total Xylenes	NA	NA	ND									
Trichloroethene	NA	6.00E-03	5.10E-11		9.34E-13		6E-15		5.42E-13		3E-15	9E-15
Semivolatile Organics												
2-Methylnaphthalene	NA	NA	5.95E-10									
Acenaphthene	NA	NA	1.27E-09									
Acenaphthylene	NA	NA	8.69E-10									
Anthracene	NA	NA	1.28E-09									
Benzo(a)anthracene	NA	NA	1.43E-09									
Benzo(a)pyrene	NA	NA	1.46E-09									
Benzo(b)fluoranthene	NA	NA	1.96E-09									
Benzo(ghi)perylene	NA	NA	1.46E-09									
Benzo(k)fluoranthene	NA	NA	1.40E-09									
Bis(2-Ethylhexyl)phthalate	NA	NA	7.12E-09									
Butylbenzylphthalate	NA	NA	1.62E-09									
Carbazole	NA	NA	1.38E-09									
Chrysene	NA	NA	1.61E-09									
Di-n-butylphthalate	NA	NA	1.49E-09									
Di-n-octylphthalate	NA	NA	8.98E-10									
Dibenz(a.h)anthracene	NA	NA	1.35E-09									
Dibenzofuran	NA	NA	9.79E-10									
Diethyl phthalate	NA	NA	3.74E-10									
Fluoranthene	NA	NA	1.85E-09									
Fluorene	NA	NA	1.23E-09									
Indeno(1.2.3-cd)pyrene	NA	NA	1.47E-09									
N-Nitrosodiphenylamine	NA	NA	3.23E-10									
Naphthalene	8.60E-04	NA	1.25E-09	2.29E-10		3E-07		4.66E-10		5E-07		
Phenanthrene	NA	NA	1.62E-09									
Phenol	NA	NA	2.89E-10									
Pyrene	NA	NA	1.96E-09									
Pesticides/PCBs												
4.4'-DDD	NA	NA	7.68E-11									
4.4'-DDE	NA	NA	9.62E-11									
4.4'-DDT	NA	3.40E-01	1.21E-10		2.22E-12		8E-13		1.29E-12		4E-13	1E-12
Aldrin	NA	1.72E+01	2.24E-11		4.11E-13		7E-12		2.38E-13		4E-12	1E-11
Alpha-BHC	NA	6.30E+00	2.30E-11		4.20E-13		3E-12		2.44E-13		2E-12	4E-12
Alpha-Chlordane	2.00E-04	3.50E-01	2.40E-11	4.39E-12	4.39E-13	2E-08	2E-13	8.91E-12	2.55E-13	4E-08	9E-14	2E-13
Aroclor-1248	NA	NA	ND									
Aroclor-1254	NA	4.00E-01	6.73E-10		1.23E-11		5E-12		7.15E-12		3E-12	8E-12
Aroclor-1260	NA	4.00E-01	4.61E-10		8.44E-12		3E-12		4.89E-12		2E-12	5E-12
Beta-BHC	NA	1.86E+00	2.72E-11		4.98E-13		9E-13		2.89E-13		5E-13	1E-12
Delta-BHC	NA	NA	ND									
Dieldrin	NA	1.61E+01	4.74E-11		8.69E-13		1E-11		5.04E-13		8E-12	2E-11
Endosulfan I	NA	NA	2.24E-11									
Endosulfan II	NA	NA	4.45E-11									
Endosulfan sulfate	NA	NA	4.37E-11									
Endrin	NA	NA	4.76E-11									
Endrin aldehyde	NA	NA	4.98E-11									
Endrin ketone	NA	NA	4.35E-11									
Gamma-Chlordane	2.00E-04	3.50E-01	2.74E-11	5.01E-12	5.01E-13	3E-08	2E-13	1.02E-11	2.91E-13	5E-08	1E-13	3E-13
Heptachlor	NA	4.55E+00	2.31E-11		4.23E-13		2E-12		2.46E-13		1E-12	3E-12
Heptachlor epoxide	NA	9.10E+00	2.38E-11		4.36E-13		4E-12		2.53E-13		2E-12	6E-12
Herbicides												
Dicamba	NA	NA	ND									
Nitroaromatics												
1.3.5-Trinitrobenzene	NA	NA	1.17E-09									
2.4.6-Trinitrotoluene	NA	NA	1.16E-09									
2.4-Dinitrotoluene	NA	NA	1.18E-09									
2-amino-4.6-Dinitrotoluene	NA	NA	1.16E-09									
4-Nitrotoluene	NA	NA	1.24E-09									
Metals												
Antimony	NA	NA	1.55E-07									
Chromium	NA	NA	2.02E-05									
Chromium. Hexavalent	2.80E-05	4.20E+01	1.73E-07	3.18E-08	3.18E-09	1E-03	1E-07	6.45E-08	1.84E-09	2E-03	8E-08	2E-07
Copper	NA	NA	6.58E-06									
Cyanide	NA	NA	7.31E-09									
Lead	NA	NA	1.16E-06									
Mercury	8.57E-05	NA	1.70E-09	3.11E-10		4E-06		6.32E-10		7E-06		
Thallium	NA	NA	2.38E-08									
Zinc	NA	NA	4.15E-06									
Total Hazard Quotient and Cancer Risk:						**1E-03**				**2E-03**		**2E-07**

Assumptions for Future Resident (Adult)

CA =	EPC Surface Only	
BW =	70	kg
IR =	20	m3/day
EF =	234	days/year
ED =	7	years
AT (Nc) =	2555	days
AT (Car) =	25,550	days

Assumptions for Future Resident (Child)

CA =	EPC Surface Only	
BW =	15	kg
IR =	8.7	m3/day
EF =	234	days/year
ED =	2	years
AT (Nc) =	730	days
AT (Car) =	25,550	days

Note: Cells in this table were intentionally left blank due to a lack of toxicity data.
* See Table G-1 for calculation of Air EPC.
NA= Information not available.

TABLE G-4
INDOOR AIR EXPOSURE POINT CONCENTRATIONS - SEAD-4
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Equation for Air EPC from Surface Soil (mg/m³) = $CS_{surf} \times PM_{10} \times CF$

Variables:
CS_{surf} = Chemical Concentration in Surface Soil, from EPC data (mg/kg)
PM_{10} = Average Measured PM_{10} Concentration = 17 ug/m³
CF = Conversion Factor = 1E-9 kg/ug

Analyte	EPC Data for Solids (Building Debris) (mg/kg)	Calculated Air EPC Solids (Building Debris) (mg/m³)
Volatile Organics		
Acetone	4.00E-02	6.80E-10
Semivolatile Organics		
2,4-Dinitrotoluene	3.60E-01	6.12E-09
2-Methylnaphthalene	1.50E+00	2.55E-08
Acenaphthene	1.40E+00	2.38E-08
Anthracene	6.90E-01	1.17E-08
Benzo(a)anthracene	5.20E+00	8.84E-08
Benzo(a)pyrene	8.50E+00	1.45E-07
Benzo(b)fluoranthene	1.10E+01	1.87E-07
Benzo(ghi)perylene	8.70E+00	1.48E-07
Benzo(k)fluoranthene	8.30E+00	1.41E-07
Bis(2-Ethylhexyl)phthalate	8.90E+02	1.51E-05
Butylbenzylphthalate	1.60E+00	2.72E-08
Carbazole	5.80E+00	9.86E-08
Chrysene	1.30E+01	2.21E-07
Di-n-butylphthalate	3.20E+01	5.44E-07
Dibenz(a,h)anthracene	3.00E+00	5.10E-08
Dibenzofuran	1.50E+00	2.55E-08
Diethyl phthalate	1.30E-01	2.21E-09
Fluoranthene	2.50E+01	4.25E-07
Fluorene	7.60E-01	1.29E-08
Indeno(1,2,3-cd)pyrene	7.50E+00	1.28E-07
N-Nitrosodiphenylamine	6.60E-02	1.12E-09
Naphthalene	1.30E+00	2.21E-08
Pentachlorophenol	4.90E+00	8.33E-08
Phenanthrene	2.30E+01	3.91E-07
Pyrene	2.50E+01	4.25E-07
Pesticides/PCBs		
4,4'-DDD	3.50E-02	5.95E-10
4,4'-DDE	1.20E+00	2.04E-08
4,4'-DDT	5.60E+00	9.52E-08
Alpha-Chlordane	7.80E-01	1.33E-08
Aroclor-1254	9.10E+01	1.55E-06
Aroclor-1260	3.10E+00	5.27E-08
Beta-BHC	3.10E-02	5.27E-10
Dieldrin	1.10E+00	1.87E-08
Endosulfan I	1.60E-01	2.72E-09
Endosulfan II	3.00E-02	5.10E-10
Endosulfan sulfate	2.00E-01	3.40E-09
Endrin	3.20E-01	5.44E-09
Endrin aldehyde	3.90E-01	6.63E-09
Endrin ketone	3.70E-01	6.29E-09
Gamma-Chlordane	9.50E-02	1.62E-09
Heptachlor	3.40E-02	5.78E-10
Heptachlor epoxide	3.60E-01	6.12E-09
Methoxychlor	3.90E-01	6.63E-09
Nitroaromatics		
1,3-Dinitrobenzene	1.80E-01	3.06E-09
2,4,6-Trinitrotoluene	2.60E-01	4.42E-09
2,4-Dinitrotoluene	1.90E+00	3.23E-08
2-amino-4,6-Dinitrotoluene	3.20E-01	5.44E-09
4-amino-2,6-Dinitrotoluene	3.00E-01	5.10E-09
RDX	2.00E-01	3.40E-09
Tetryl	8.20E-01	1.39E-08
Metals		
Aluminum	6.11E+03	1.04E-04
Antimony	2.61E+01	4.44E-07
Arsenic	3.36E+01	5.71E-07
Barium	3.56E+03	6.05E-05
Beryllium	4.60E-01	7.82E-09
Cadmium	1.32E+02	2.24E-06
Calcium	2.53E+05	4.30E-03
Chromium	1.84E+03	3.13E-05
Cobalt	3.71E+01	6.31E-07
Copper	1.22E+03	2.07E-05
Cyanide	2.87E+01	4.88E-07
Iron	3.62E+05	6.15E-03
Lead	1.20E+04	2.04E-04
Magnesium	1.76E+04	2.99E-04
Manganese	1.63E+03	2.77E-05
Mercury	6.28E+01	1.07E-06
Nickel	1.33E+03	2.26E-05
Potassium	3.75E+03	6.38E-05
Silver	5.70E-01	9.69E-09
Sodium	1.53E+03	2.60E-05
Thallium	7.00E+00	1.19E-07
Vanadium	9.48E+02	1.61E-05
Zinc	6.10E+03	1.04E-04

TABLE G-5
CALCULATION OF INTAKE AND RISK FROM INHALATION OF DUST IN INDOOR AIR REASONABLE MAXIMUM EXPOSURE (RME)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

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

Variables (Assumptions for Each Receptor are Listed at the Bottom):

CA = Chemical Concentration in Air, from EPC Solids Data
IR = Ingestion Rate
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Inhalation RfD (mg/kg-day)	Carc. Slope Inhalation (mg/kg-day)-1	Air EPC* from Solids (mg/m3)	Current Site Worker				Future Indoor Park Worker			
				Intake (mg/kg-day) (Nc)	Intake (mg/kg-day) (Car)	Hazard Quotient	Cancer Risk	Intake (mg/kg-day) (Nc)	Intake (mg/kg-day) (Car)	Hazard Quotient	Cancer Risk
Volatile Organics											
Acetone	NA	NA	6.80E-10								
Semivolatile Organics					Inhalation of Indoor Air Dust Not Applicable for Current Site Worker						
2,4-Dinitrotoluene	NA	NA	6.12E-09								
2-Methylnaphthalene	NA	NA	2.55E-08								
Acenaphthene	NA	NA	2.38E-08								
Anthracene	NA	NA	1.17E-08								
Benzo(a)anthracene	NA	NA	8.84E-08								
Benzo(a)pyrene	NA	NA	1.45E-07								
Benzo(b)fluoranthene	NA	NA	1.87E-07								
Benzo(ghi)perylene	NA	NA	1.48E-07								
Benzo(k)fluoranthene	NA	NA	1.41E-07								
Bis(2-Ethylhexyl)phthalate	NA	NA	1.51E-05								
Butylbenzylphthalate	NA	NA	2.72E-08								
Carbazole	NA	NA	9.86E-08								
Chrysene	NA	NA	2.21E-07								
Di-n-butylphthalate	NA	NA	5.44E-07								
Dibenz(a,h)anthracene	NA	NA	5.10E-08								
Dibenzofuran	NA	NA	2.55E-08								
Diethyl phthalate	NA	NA	2.21E-09								
Fluoranthene	NA	NA	4.25E-07								
Fluorene	NA	NA	1.29E-08								
Indeno(1,2,3-cd)pyrene	NA	NA	1.28E-07								
N-Nitrosodiphenylamine	NA	NA	1.12E-09								
Naphthalene	8.60E-04	NA	2.21E-08					1.21E-09		1.4E-06	
Pentachlorophenol	NA	NA	8.33E-08								
Phenanthrene	NA	NA	3.91E-07								
Pyrene	NA	NA	4.25E-07								
Pesticides/PCBs											
4,4'-DDD	NA	NA	5.95E-10								
4,4'-DDE	NA	NA	2.04E-08								
4,4'-DDT	NA	3.40E-01	9.52E-08						1.86E-09		6.3E-10
Alpha-Chlordane	2.00E-04	3.50E-01	1.33E-08					7.27E-10	2.59E-10	3.6E-06	9.1E-11
Aroclor-1254	NA	4.00E-01	1.55E-06						3.03E-08		1.2E-08
Aroclor-1260	NA	4.00E-01	5.27E-08						1.03E-09		4.1E-10
Beta-BHC	NA	1.86E+00	5.27E-10						1.03E-11		1.9E-11
Dieldrin	NA	1.61E+01	1.87E-08						3.66E-10		5.9E-09
Endosulfan I	NA	NA	2.72E-09								
Endosulfan II	NA	NA	5.10E-10								
Endosulfan sulfate	NA	NA	3.40E-09								
Endrin	NA	NA	5.44E-09								
Endrin aldehyde	NA	NA	6.63E-09								
Endrin ketone	NA	NA	6.29E-09								
Gamma-Chlordane	2.00E-04	3.50E-01	1.62E-09					8.85E-11	3.16E-11	4.4E-07	1.1E-11
Heptachlor	NA	4.55E+00	5.78E-10						1.13E-11		5.1E-11
Heptachlor epoxide	NA	9.10E+00	6.12E-09						1.20E-10		1.1E-09
Methoxychlor	NA	NA	6.63E-09								
Nitroaromatics											
1,3-Dinitrobenzene	NA	NA	3.06E-09								
2,4,6-Trinitrotoluene	NA	NA	4.42E-09								
2,4-Dinitrotoluene	NA	NA	3.23E-08								
2-amino-4,6-Dinitrotoluene	NA	NA	5.44E-09								
4-amino-2,6-Dinitrotoluene	NA	NA	5.10E-09								
RDX	NA	NA	3.40E-09								
Tetryl	NA	NA	1.39E-08								
Metals											
Aluminum	1.43E-03	NA	1.04E-04					5.69E-06		4.0E-03	
Antimony	NA	NA	4.44E-07								
Arsenic	NA	1.51E+01	5.71E-07						1.12E-08		1.7E-07
Barium	1.43E-04	NA	6.05E-05					3.32E-06		2.3E-02	
Beryllium	6.00E-06	8.40E+00	7.82E-09					4.28E-10	1.53E-10	7.1E-05	1.3E-09
Cadmium	NA	6.30E+00	2.24E-06						4.39E-08		2.8E-07
Calcium	NA	NA	4.30E-03								
Chromium	NA	NA	3.13E-05								
Cobalt	NA	NA	6.31E-07								
Copper	NA	NA	2.07E-05								
Cyanide	NA	NA	4.88E-07								
Iron	NA	NA	6.15E-03								
Lead	NA	NA	2.04E-04								
Magnesium	NA	NA	2.99E-04								
Manganese	1.40E-05	NA	2.77E-05					1.52E-06		1.1E-01	
Mercury	8.57E-05	NA	1.07E-06					5.85E-08		6.8E-04	
Nickel	NA	NA	2.26E-05								
Potassium	NA	NA	6.38E-05								
Silver	NA	NA	9.69E-09								
Sodium	NA	NA	2.60E-05								
Thallium	NA	NA	1.19E-07								
Vanadium	NA	NA	1.61E-05								
Zinc	NA	NA	1.04E-04								
Total Hazard Quotient and Cancer Risk:										**1E-01**	**5E-07**

Assumptions for Future Indoor Park Worker		
IR =	8	m3/day
EF =	175	days/year
ED =	25	years
BW =	70	kg
AT (Nc) =	9125	days
AT (Car) =	25550	days

Note: Cells in this table were intentionally left blank due to a lack of toxicity data.
* See Table G-4 for calculation of Air EPC.
NA= Information not available.

TABLE G-5
CALCULATION OF INTAKE AND RISK FROM INHALATION OF DUST IN INDOOR AIR
REASONABLE MAXIMUM EXPOSURE (RME)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

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

Variables (Assumptions for Each Receptor are Listed at the Bottom):
CA = Chemical Concentration in Air, from EPC Solids Data
IR = Ingestion Rate
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Inhalation RfD (mg/kg-day)	Carc. Slope Inhalation (mg/kg-day)-1	Air EPC* from Solids (mg/m3)	Future Recreational Visitor (Child)				Future Construction Worker			
				Intake (mg/kg-day) (Nc)	Intake (mg/kg-day) (Car)	Hazard Quotient	Cancer Risk	Intake (mg/kg-day) (Nc)	Intake (mg/kg-day) (Car)	Hazard Quotient	Cancer Risk
Volatile Organics											
Acetone	NA	NA	6.80E-10								
Semivolatile Organics					Inhalation of Indoor Air Dust Not Applicable for Future Recreational Visitor (Child)				Inhalation of Indoor Air Dust Not Applicable for Future Construction Worker		
2.4-Dinitrotoluene	NA	NA	6.12E-09								
2-Methylnaphthalene	NA	NA	2.55E-08								
Acenaphthene	NA	NA	2.38E-08								
Anthracene	NA	NA	1.17E-08								
Benzo(a)anthracene	NA	NA	8.84E-08								
Benzo(a)pyrene	NA	NA	1.45E-07								
Benzo(b)fluoranthene	NA	NA	1.87E-07								
Benzo(ghi)perylene	NA	NA	1.48E-07								
Benzo(k)fluoranthene	NA	NA	1.41E-07								
Bis(2-Ethylhexyl)phthalate	NA	NA	1.51E-05								
Butylbenzylphthalate	NA	NA	2.72E-08								
Carbazole	NA	NA	9.86E-08								
Chrysene	NA	NA	2.21E-07								
Di-n-butylphthalate	NA	NA	5.44E-07								
Dibenz(a,h)anthracene	NA	NA	5.10E-08								
Dibenzofuran	NA	NA	2.55E-08								
Diethyl phthalate	NA	NA	2.21E-09								
Fluoranthene	NA	NA	4.25E-07								
Fluorene	NA	NA	1.29E-08								
Indeno(1.2.3-cd)pyrene	NA	NA	1.28E-07								
N-Nitrosodiphenylamine	NA	NA	1.12E-09								
Naphthalene	8 60E-04	NA	2.21E-08								
Pentachlorophenol	NA	NA	8.33E-08								
Phenanthrene	NA	NA	3.91E-07								
Pyrene	NA	NA	4.25E-07								
Pesticides/PCBs											
4.4'-DDD	NA	NA	5.95E-10								
4.4'-DDE	NA	NA	2.04E-08								
4.4'-DDT	NA	3.40E-01	9 52E-08								
Alpha-Chlordane	2.00E-04	3.50E-01	1.33E-08								
Aroclor-1254	NA	4.00E-01	1.55E-06								
Aroclor-1260	NA	4.00E-01	5.27E-08								
Beta-BHC	NA	1.86E+00	5.27E-10								
Dieldrin	NA	1.61E+01	1.87E-08								
Endosulfan I	NA	NA	2.72E-09								
Endosulfan II	NA	NA	5.10E-10								
Endosulfan sulfate	NA	NA	3.40E-09								
Endrin	NA	NA	5.44E-09								
Endrin aldehyde	NA	NA	6.63E-09								
Endrin ketone	NA	NA	6.29E-09								
Gamma-Chlordane	2.00E-04	3.50E-01	1.62E-09								
Heptachlor	NA	4 55E+00	5.78E-10								
Heptachlor epoxide	NA	9.10E+00	6.12E-09								
Methoxychlor	NA	NA	6.63E-09								
Nitroaromatics											
1.3-Dinitrobenzene	NA	NA	3.06E-09								
2.4.6-Trinitrotoluene	NA	NA	4.42E-09								
2.4-Dinitrotoluene	NA	NA	3.23E-08								
2-amino-4.6-Dinitrotoluene	NA	NA	5.44E-09								
4-amino-2.6-Dinitrotoluene	NA	NA	5.10E-09								
RDX	NA	NA	3.40E-09								
Tetryl	NA	NA	1.39E-08								
Metals											
Aluminum	1.43E-03	NA	1.04E-04								
Antimony	NA	NA	4.44E-07								
Arsenic	NA	1.51E+01	5.71E-07								
Barium	1.43E-04	NA	6.05E-05								
Beryllium	6.00E-06	8.40E+00	7.82E-09								
Cadmium	NA	6.30E+00	2.24E-06								
Calcium	NA	NA	4.30E-03								
Chromium	NA	NA	3.13E-05								
Cobalt	NA	NA	6.31E-07								
Copper	NA	NA	2.07E-05								
Cyanide	NA	NA	4.88E-07								
Iron	NA	NA	6.15E-03								
Lead	NA	NA	2.04E-04								
Magnesium	NA	NA	2.99E-04								
Manganese	1.40E-05	NA	2.77E-05								
Mercury	8.57E-05	NA	1.07E-06								
Nickel	NA	NA	2.26E-05								
Potassium	NA	NA	6.38E-05								
Silver	NA	NA	9.69E-09								
Sodium	NA	NA	2.60E-05								
Thallium	NA	NA	1.19E-07								
Vanadium	NA	NA	1.61E-05								
Zinc	NA	NA	1.04E-04								
Total Hazard Quotient and Cancer Risk:											

Note: Cells in this table were intentionally left blank due to a lack of toxicity data.
* See Table G-4 for calculation of Air EPC.
NA= Information not available.

TABLE G-5
CALCULATION OF INTAKE AND RISK FROM INHALATION OF DUST IN INDOOR AIR
REASONABLE MAXIMUM EXPOSURE (RME)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

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

Variables (Assumptions for Each Receptor are Listed at the Bottom):

CA = Chemical Concentration in Air, from EPC Solids Data
IR = Ingestion Rate
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Inhalation RfD	Carc. Slope Inhalation	Air EPC* from Solids	Future Resident (Adult)				Future Resident (Child)			
				Intake (mg/kg-day)		Hazard Quotient	Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Cancer Risk
	(mg/kg-day)	(mg/kg-day)-1	(mg/m3)	(Nc)	(Car)			(Nc)	(Car)		
Volatile Organics											
Acetone	NA	NA	6.80E-10								
Semivolatile Organics				Inhalation of Indoor Air Dust Not Applicable for Future Resident Adult				Inhalation of Indoor Air Dust Not Applicable for Future Resident Child			
2.4-Dinitrotoluene	NA	NA	6.12E-09								
2-Methylnaphthalene	NA	NA	2 55E-08								
Acenaphthene	NA	NA	2.38E-08								
Anthracene	NA	NA	1.17E-08								
Benzo(a)anthracene	NA	NA	8.84E-08								
Benzo(a)pyrene	NA	NA	1.45E-07								
Benzo(b)fluoranthene	NA	NA	1.87E-07								
Benzo(ghi)perylene	NA	NA	1.48E-07								
Benzo(k)fluoranthene	NA	NA	1.41E-07								
Bis(2-Ethylhexyl)phthalate	NA	NA	1.51E-05								
Butylbenzylphthalate	NA	NA	2.72E-08								
Carbazole	NA	NA	9.86E-08								
Chrysene	NA	NA	2.21E-07								
Di-n-butylphthalate	NA	NA	5.44E-07								
Dibenz(a.h)anthracene	NA	NA	5.10E-08								
Dibenzofuran	NA	NA	2.55E-08								
Diethyl phthalate	NA	NA	2.21E-09								
Fluoranthene	NA	NA	4.25E-07								
Fluorene	NA	NA	1.29E-08								
Indeno(1.2.3-cd)pyrene	NA	NA	1.28E-07								
N-Nitrosodiphenylamine	NA	NA	1.12E-09								
Naphthalene	8.60E-04	NA	2.21E-08								
Pentachlorophenol	NA	NA	8.33E-08								
Phenanthrene	NA	NA	3.91E-07								
Pyrene	NA	NA	4.25E-07								
Pesticides/PCBs											
4.4'-DDD	NA	NA	5.95E-10								
4.4'-DDE	NA	NA	2.04E-08								
4.4'-DDT	NA	3.40E-01	9.52E-08								
Alpha-Chlordane	2.00E-04	3.50E-01	1.33E-08								
Aroclor-1254	NA	4.00E-01	1.55E-06								
Aroclor-1260	NA	4.00E-01	5.27E-08								
Beta-BHC	NA	1.86E+00	5.27E-10								
Dieldrin	NA	1.61E+01	1.87E-08								
Endosulfan I	NA	NA	2.72E-09								
Endosulfan II	NA	NA	5.10E-10								
Endosulfan sulfate	NA	NA	3 40E-09								
Endrin	NA	NA	5.44E-09								
Endrin aldehyde	NA	NA	6.63E-09								
Endrin ketone	NA	NA	6.29E-09								
Gamma-Chlordane	2.00E-04	3.50E-01	1.62E-09								
Heptachlor	NA	4.55E+00	5.78E-10								
Heptachlor epoxide	NA	9.10E+00	6.12E-09								
Methoxychlor	NA	NA	6.63E-09								
Nitroaromatics											
1.3-Dinitrobenzene	NA	NA	3.06E-09								
2.4.6-Trinitrotoluene	NA	NA	4.42E-09								
2.4-Dinitrotoluene	NA	NA	3.23E-08								
2-amino-4.6-Dinitrotoluene	NA	NA	5.44E-09								
4-amino-2.6-Dinitrotoluene	NA	NA	5.10E-09								
RDX	NA	NA	3.40E-09								
Tetryl	NA	NA	1.39E-08								
Metals											
Aluminum	1.43E-03	NA	1.04E-04								
Antimony	NA	NA	4.44E-07								
Arsenic	NA	1.51E+01	5.71E-07								
Barium	1.43E-04	NA	6.05E-05								
Beryllium	6.00E-06	8.40E+00	7.82E-09								
Cadmium	NA	6.30E+00	2.24E-06								
Calcium	NA	NA	4.30E-03								
Chromium	NA	NA	3.13E-05								
Cobalt	NA	NA	6.31E-07								
Copper	NA	NA	2.07E-05								
Cyanide	NA	NA	4.88E-07								
Iron	NA	NA	6.15E-03								
Lead	NA	NA	2.04E-04								
Magnesium	NA	NA	2.99E-04								
Manganese	1.40E-05	NA	2.77E-05								
Mercury	8.57E-05	NA	1.07E-06								
Nickel	NA	NA	2.26E-05								
Potassium	NA	NA	6.38E-05								
Silver	NA	NA	9.69E-09								
Sodium	NA	NA	2.60E-05								
Thallium	NA	NA	1.19E-07								
Vanadium	NA	NA	1.61E-05								
Zinc	NA	NA	1.04E-04								
Total Hazard Quotient and Cancer Risk:											

Note: Cells in this table were intentionally left blank due to a lack of toxicity data.
* See Table G-4 for calculation of Air EPC.
NA= Information not available.

TABLE G-6
CALCULATION OF INTAKE AND RISK FROM INHALATION OF DUST IN INDOOR AIR
CENTRAL TENDENCY (CT)
SEAD-4 Remedial Investigation
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, from EPC Solids Data
IR = Ingestion Rate
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Inhalation RfD	Carc. Slope Inhalation	Air EPC* from Solids	Current Site Worker				Future Indoor Park Worker			
				Intake (mg/kg-day)		Hazard Quotient	Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Cancer Risk
	(mg/kg-day)	(mg/kg-day)-1	(mg/m3)	(Nc)	(Car)			(Nc)	(Car)		
Volatile Organics											
Acetone	NA	NA	6.80E-10			Inhalation of Indoor Air Dust Not Applicable for Current Site Worker					
Semivolatile Organics											
2,4-Dinitrotoluene	NA	NA	6.12E-09								
2-Methylnaphthalene	NA	NA	2.55E-08								
Acenaphthene	NA	NA	2.38E-08								
Anthracene	NA	NA	1.17E-08								
Benzo(a)anthracene	NA	NA	8.84E-08								
Benzo(a)pyrene	NA	NA	1.45E-07								
Benzo(b)fluoranthene	NA	NA	1.87E-07								
Benzo(ghi)perylene	NA	NA	1.48E-07								
Benzo(k)fluoranthene	NA	NA	1.41E-07								
Bis(2-Ethylhexyl)phthalate	NA	NA	1.51E-05								
Butylbenzylphthalate	NA	NA	2.72E-08								
Carbazole	NA	NA	9.86E-08								
Chrysene	NA	NA	2.21E-07								
Di-n-butylphthalate	NA	NA	5.44E-07								
Dibenz(a,h)anthracene	NA	NA	5.10E-08								
Dibenzofuran	NA	NA	2.55E-08								
Diethyl phthalate	NA	NA	2.21E-09								
Fluoranthene	NA	NA	4.25E-07								
Fluorene	NA	NA	1.29E-08								
Indeno(1,2,3-cd)pyrene	NA	NA	1.28E-07								
N-Nitrosodiphenylamine	NA	NA	1.12E-09								
Naphthalene	8.60E-04	NA	2.21E-08					1.06E-09		1E-06	
Pentachlorophenol	NA	NA	8.33E-08								
Phenanthrene	NA	NA	3.91E-07								
Pyrene	NA	NA	4.25E-07								
Pesticides/PCBs											
4,4'-DDD	NA	NA	5.95E-10								
4,4'-DDE	NA	NA	2.04E-08								
4,4'-DDT	NA	3.40E-01	9.52E-08						4.56E-10		2E-10
Alpha-Chlordane	2.00E-04	3.50E-01	1.33E-08					6.35E-10	6.35E-11	3E-06	2E-11
Aroclor-1254	NA	4.00E-01	1.55E-06						7.41E-09		3E-09
Aroclor-1260	NA	4.00E-01	5.27E-08						2.52E-10		1E-10
Beta-BHC	NA	1.86E+00	5.27E-10						2.52E-12		5E-12
Dieldrin	NA	1.61E+01	1.87E-08						8.96E-11		1E-09
Endosulfan I	NA	NA	2.72E-09								
Endosulfan II	NA	NA	5.10E-10								
Endosulfan sulfate	NA	NA	3.40E-09								
Endrin	NA	NA	5.44E-09								
Endrin aldehyde	NA	NA	6.63E-09								
Endrin ketone	NA	NA	6.29E-09								
Gamma-Chlordane	2.00E-04	3.50E-01	1.62E-09					7.74E-11	7.74E-12	4E-07	3E-12
Heptachlor	NA	4.55E+00	5.78E-10						2.77E-12		1E-11
Heptachlor epoxide	NA	9.10E+00	6.12E-09						2.93E-11		3E-10
Methoxychlor	NA	NA	6.63E-09								
Nitroaromatics											
1,3-Dinitrobenzene	NA	NA	3.06E-09								
2,4,6-Trinitrotoluene	NA	NA	4.42E-09								
2,4-Dinitrotoluene	NA	NA	3.23E-08								
2-amino-4,6-Dinitrotoluene	NA	NA	5.44E-09								
4-amino-2,6-Dinitrotoluene	NA	NA	5.10E-09								
RDX	NA	NA	3.40E-09								
Tetryl	NA	NA	1.39E-08								
Metals											
Aluminum	1.43E-03	NA	1.04E-04					4.98E-06		3E-03	
Antimony	NA	NA	4.44E-07								
Arsenic	NA	1.51E+01	5.71E-07						2.74E-09		4E-08
Barium	1.43E-04	NA	6.05E-05					2.90E-06		2E-02	
Beryllium	6.00E-06	8.40E+00	7.82E-09					3.75E-10	3.75E-11	6E-05	3E-10
Cadmium	NA	6.30E+00	2.24E-06						1.08E-08		7E-08
Calcium	NA	NA	4.30E-03								
Chromium	NA	NA	3.13E-05								
Cobalt	NA	NA	6.31E-07								
Copper	NA	NA	2.07E-05								
Cyanide	NA	NA	4.88E-07								
Iron	NA	NA	6.15E-03								
Lead	NA	NA	2.04E-04								
Magnesium	NA	NA	2.99E-04								
Manganese	1.40E-05	NA	2.77E-05					1.33E-06		9E-02	
Mercury	8.57E-05	NA	1.07E-06					5.11E-08		6E-04	
Nickel	NA	NA	2.26E-05								
Potassium	NA	NA	6.38E-05								
Silver	NA	NA	9.69E-09								
Sodium	NA	NA	2.60E-05								
Thallium	NA	NA	1.19E-07								
Vanadium	NA	NA	1.61E-05								
Zinc	NA	NA	1.04E-04								
Total Hazard Quotient and Cancer Risk:										1E-01	1E-07

Assumptions for Future Indoor Park Worker

IR =	8	m3/day
EF =	153	days/year
ED =	7	years
BW =	70	kg
AT (Nc) =	2555	days
AT (Car) =	25550	days

Note: Cells in this table were intentionally left blank due to a lack of toxicity data.
* See Table G-4 for calculation of Air EPC.
NA= Information not available.

TABLE G-6
CALCULATION OF INTAKE AND RISK FROM INHALATION OF DUST IN INDOOR AIR
CENTRAL TENDENCY (CT)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

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

Variables (Assumptions for Each Receptor are Listed at the Bottom):
CA = Chemical Concentration in Air, from EPC Solids Data
IR = Ingestion Rate
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Inhalation RfD	Carc. Slope Inhalation	Air EPC* from Solids	Future Recreational Visitor (Child)				Future Construction Worker			
	(mg/kg-day)	(mg/kg-day)-1	(mg/m3)	Intake (mg/kg-day) (Nc)	Intake (mg/kg-day) (Car)	Hazard Quotient	Cancer Risk	Intake (mg/kg-day) (Nc)	Intake (mg/kg-day) (Car)	Hazard Quotient	Cancer Risk
Volatile Organics											
Acetone	NA	NA	6.80E-10	**Inhalation of Indoor Air Dust Not Applicable for Future Recreational Visitor (Child)**				**Inhalation of Indoor Air Dust Not Applicable for Future Construction Worker**			
Semivolatile Organics											
2,4-Dinitrotoluene	NA	NA	6.12E-09								
2-Methylnaphthalene	NA	NA	2.55E-08								
Acenaphthene	NA	NA	2.38E-08								
Anthracene	NA	NA	1.17E-08								
Benzo(a)anthracene	NA	NA	8.84E-08								
Benzo(a)pyrene	NA	NA	1.45E-07								
Benzo(b)fluoranthene	NA	NA	1.87E-07								
Benzo(ghi)perylene	NA	NA	1.48E-07								
Benzo(k)fluoranthene	NA	NA	1.41E-07								
Bis(2-Ethylhexyl)phthalate	NA	NA	1.51E-05								
Butylbenzylphthalate	NA	NA	2.72E-08								
Carbazole	NA	NA	9.86E-08								
Chrysene	NA	NA	2.21E-07								
Di-n-butylphthalate	NA	NA	5.44E-07								
Dibenz(a,h)anthracene	NA	NA	5.10E-08								
Dibenzofuran	NA	NA	2.55E-08								
Diethyl phthalate	NA	NA	2.21E-09								
Fluoranthene	NA	NA	4.25E-07								
Fluorene	NA	NA	1.29E-08								
Indeno(1,2,3-cd)pyrene	NA	NA	1.28E-07								
N-Nitrosodiphenylamine	NA	NA	1.12E-09								
Naphthalene	8.60E-04	NA	2.21E-08								
Pentachlorophenol	NA	NA	8.33E-08								
Phenanthrene	NA	NA	3.91E-07								
Pyrene	NA	NA	4.25E-07								
Pesticides/PCBs											
4,4'-DDD	NA	NA	5.95E-10								
4,4'-DDE	NA	NA	2.04E-08								
4,4'-DDT	NA	3.40E-01	9.52E-08								
Alpha-Chlordane	2.00E-04	3.50E-01	1.33E-08								
Aroclor-1254	NA	4.00E-01	1.55E-06								
Aroclor-1260	NA	4.00E-01	5.27E-08								
Beta-BHC	NA	1.86E+00	5.27E-10								
Dieldrin	NA	1.61E+01	1.87E-08								
Endosulfan I	NA	NA	2.72E-09								
Endosulfan II	NA	NA	5.10E-10								
Endosulfan sulfate	NA	NA	3.40E-09								
Endrin	NA	NA	5.44E-09								
Endrin aldehyde	NA	NA	6.63E-09								
Endrin ketone	NA	NA	6.29E-09								
Gamma-Chlordane	2.00E-04	3.50E-01	1.62E-09								
Heptachlor	NA	4.55E+00	5.78E-10								
Heptachlor epoxide	NA	9.10E+00	6.12E-09								
Methoxychlor	NA	NA	6.63E-09								
Nitroaromatics											
1,3-Dinitrobenzene	NA	NA	3.06E-09								
2,4,6-Trinitrotoluene	NA	NA	4.42E-09								
2,4-Dinitrotoluene	NA	NA	3.23E-08								
2-amino-4,6-Dinitrotoluene	NA	NA	5.44E-09								
4-amino-2,6-Dinitrotoluene	NA	NA	5.10E-09								
RDX	NA	NA	3.40E-09								
Tetryl	NA	NA	1.39E-08								
Metals											
Aluminum	1.43E-03	NA	1.04E-04								
Antimony	NA	NA	4.44E-07								
Arsenic	NA	1.51E+01	5.71E-07								
Barium	1.43E-04	NA	6.05E-05								
Beryllium	6.00E-06	8.40E+00	7.82E-09								
Cadmium	NA	6.30E+00	2.24E-06								
Calcium	NA	NA	4.30E-03								
Chromium	NA	NA	3.13E-05								
Cobalt	NA	NA	6.31E-07								
Copper	NA	NA	2.07E-05								
Cyanide	NA	NA	4.88E-07								
Iron	NA	NA	6.15E-03								
Lead	NA	NA	2.04E-04								
Magnesium	NA	NA	2.99E-04								
Manganese	1.40E-05	NA	2.77E-05								
Mercury	8.57E-05	NA	1.07E-06								
Nickel	NA	NA	2.26E-05								
Potassium	NA	NA	6.38E-05								
Silver	NA	NA	9.69E-09								
Sodium	NA	NA	2.60E-05								
Thallium	NA	NA	1.19E-07								
Vanadium	NA	NA	1.61E-05								
Zinc	NA	NA	1.04E-04								
Total Hazard Quotient and Cancer Risk:											

Note: Cells in this table were intentionally left blank due to a lack of toxicity data.
* See Table G-4 for calculation of Air EPC.
NA= Information not available.

TABLE G-6
CALCULATION OF INTAKE AND RISK FROM INHALATION OF DUST IN INDOOR AIR
CENTRAL TENDENCY (CT)
SEAD-4 Remedial Investigation
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, from EPC Solids Data
IR = Ingestion Rate
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Inhalation RfD	Carc. Slope Inhalation	Air EPC* from Solids	Future Resident (Adult)				Future Resident (Child)			
				Intake (mg/kg-day)		Hazard Quotient	Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Cancer Risk
	(mg/kg-day)	(mg/kg-day)-1	(mg/m3)	(Nc)	(Car)			(Nc)	(Car)		
Volatile Organics											
Acetone	NA	NA	6.80E-10								
Semivolatile Organics					Inhalation of Indoor Air Dust Not Applicable for Future Resident Adult				Inhalation of Indoor Air Dust Not Applicable for Future Resident Child		
2,4-Dinitrotoluene	NA	NA	6.12E-09								
2-Methylnaphthalene	NA	NA	2.55E-08								
Acenaphthene	NA	NA	2 38E-08								
Anthracene	NA	NA	1.17E-08								
Benzo(a)anthracene	NA	NA	8.84E-08								
Benzo(a)pyrene	NA	NA	1.45E-07								
Benzo(b)fluoranthene	NA	NA	1 87E-07								
Benzo(ghi)perylene	NA	NA	1.48E-07								
Benzo(k)fluoranthene	NA	NA	1.41E-07								
Bis(2-Ethylhexyl)phthalate	NA	NA	1.51E-05								
Butylbenzylphthalate	NA	NA	2.72E-08								
Carbazole	NA	NA	9.86E-08								
Chrysene	NA	NA	2.21E-07								
Di-n-butylphthalate	NA	NA	5.44E-07								
Dibenz(a,h)anthracene	NA	NA	5.10E-08								
Dibenzofuran	NA	NA	2.55E-08								
Diethyl phthalate	NA	NA	2.21E-09								
Fluoranthene	NA	NA	4.25E-07								
Fluorene	NA	NA	1.29E-08								
Indeno(1,2,3-cd)pyrene	NA	NA	1.28E-07								
N-Nitrosodiphenylamine	NA	NA	1.12E-09								
Naphthalene	8.60E-04	NA	2.21E-08								
Pentachlorophenol	NA	NA	8.33E-08								
Phenanthrene	NA	NA	3.91E-07								
Pyrene	NA	NA	4.25E-07								
Pesticides/PCBs											
4,4'-DDD	NA	NA	5.95E-10								
4,4'-DDE	NA	NA	2.04E-08								
4,4'-DDT	NA	3.40E-01	9.52E-08								
Alpha-Chlordane	2.00E-04	3.50E-01	1.33E-08								
Aroclor-1254	NA	4.00E-01	1.55E-06								
Aroclor-1260	NA	4.00E-01	5.27E-08								
Beta-BHC	NA	1.86E+00	5.27E-10								
Dieldrin	NA	1.61E+01	1 87E-08								
Endosulfan I	NA	NA	2.72E-09								
Endosulfan II	NA	NA	5.10E-10								
Endosulfan sulfate	NA	NA	3.40E-09								
Endrin	NA	NA	5.44E-09								
Endrin aldehyde	NA	NA	6.63E-09								
Endrin ketone	NA	NA	6.29E-09								
Gamma-Chlordane	2.00E-04	3.50E-01	1 62E-09								
Heptachlor	NA	4.55E+00	5.78E-10								
Heptachlor epoxide	NA	9 10E+00	6.12E-09								
Methoxychlor	NA	NA	6.63E-09								
Nitroaromatics											
1,3-Dinitrobenzene	NA	NA	3.06E-09								
2,4,6-Trinitrotoluene	NA	NA	4.42E-09								
2,4-Dinitrotoluene	NA	NA	3.23E-08								
2-amino-4,6-Dinitrotoluene	NA	NA	5.44E-09								
4-amino-2,6-Dinitrotoluene	NA	NA	5.10E-09								
RDX	NA	NA	3.40E-09								
Tetryl	NA	NA	1.39E-08								
Metals											
Aluminum	1.43E-03	NA	1.04E-04								
Antimony	NA	NA	4.44E-07								
Arsenic	NA	1.51E+01	5.71E-07								
Barium	1.43E-04	NA	6.05E-05								
Beryllium	6.00E-06	8.40E+00	7.82E-09								
Cadmium	NA	6.30E+00	2.24E-06								
Calcium	NA	NA	4.30E-03								
Chromium	NA	NA	3.13E-05								
Cobalt	NA	NA	6.31E-07								
Copper	NA	NA	2.07E-05								
Cyanide	NA	NA	4.88E-07								
Iron	NA	NA	6.15E-03								
Lead	NA	NA	2.04E-04								
Magnesium	NA	NA	2.99E-04								
Manganese	1.40E-05	NA	2.77E-05								
Mercury	8.57E-05	NA	1.07E-06								
Nickel	NA	NA	2.26E-05								
Potassium	NA	NA	6.38E-05								
Silver	NA	NA	9.69E-09								
Sodium	NA	NA	2.60E-05								
Thallium	NA	NA	1.19E-07								
Vanadium	NA	NA	1.61E-05								
Zinc	NA	NA	1.04E-04								
Total Hazard Quotient and Cancer Risk:											

Note: Cells in this table were intentionally left blank due to a lack of toxicity data.
* See Table G-4 for calculation of Air EPC.
NA= Information not available.

TABLE G-7
CALCULATION OF INTAKE AND RISK FROM THE INGESTION OF INDOOR DUST/DIRT
REASONABLE MAXIMUM EXPOSURE (RME)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Equation for Intake (mg/kg-day) = $\frac{CA \times IR \times CF \times FI \times EF \times ED}{BW \times AT}$

Variables (Assumptions for Each Receptor are Listed at the Bottom):

CA = Chemical Concentration in Air, from EPC Solids Data
IR = Ingestion Rate
CF = Conversion Factor
FI = Fraction Ingested
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Oral RfD (mg/kg-day)	Carc. Slope Oral (mg/kg-day)-1	EPC Solids (mg/kg)	Current Site Worker				Future Indoor Park Worker			
				Intake (mg/kg-day) (Nc)	Intake (mg/kg-day) (Car)	Hazard Quotient	Cancer Risk	Intake (mg/kg-day) (Nc)	Intake (mg/kg-day) (Car)	Hazard Quotient	Cancer Risk
Volatile Organics											
Acetone	1.00E-01	NA	4.00E-02					2.74E-08		3E-07	
Semivolatile Organics											
2,4-Dinitrotoluene	2.00E-03	6.80E-01	3.60E-01		**Ingestion of Indoor Dust/Dirt Not Applicable for Current Site Worker**			2.47E-07	8.81E-08	1E-04	6E-08
2-Methylnaphthalene	4.00E-02	NA	1.50E+00					1.03E-06		3E-05	
Acenaphthene	6.00E-02	NA	1.40E+00					9.59E-07		2E-05	
Anthracene	3.00E-01	NA	6.90E-01					4.73E-07		2E-06	
Benzo(a)anthracene	NA	7.30E-01	5.20E+00						1.27E-06		9E-07
Benzo(a)pyrene	NA	7.30E+00	8.50E+00						2.08E-06		2E-05
Benzo(b)fluoranthene	NA	7.30E-01	1.10E+01						2.69E-06		2E-06
Benzo(ghi)perylene	NA	NA	8.70E+00								
Benzo(k)fluoranthene	NA	7.30E-02	8.30E+00						2.03E-06		1E-07
Bis(2-Ethylhexyl)phthalate	2.00E-02	1.40E-02	8.90E+02					6.10E-04	2.18E-04	3E-02	3E-06
Butylbenzylphthalate	2.00E-01	NA	1.60E+00					1.10E-06		5E-06	
Carbazole	NA	2.00E-02	5.80E+00						1.42E-06		3E-08
Chrysene	NA	7.30E-03	1.30E+01						3.18E-06		2E-08
Di-n-butylphthalate	1.00E-01	NA	3.20E+01					2.19E-05		2E-04	
Dibenz(a,h)anthracene	NA	7.30E+00	3.00E+00						7.34E-07		5E-06
Dibenzofuran	NA	NA	1.50E+00								
Diethyl phthalate	8.00E-01	NA	1.30E-01					8.90E-08		1E-07	
Fluoranthene	4.00E-02	NA	2.50E+01					1.71E-05		4E-04	
Fluorene	4.00E-02	NA	7.60E-01					5.21E-07		1E-05	
Indeno(1,2,3-cd)pyrene	NA	7.30E-01	7.50E+00						1.83E-06		1E-06
N-Nitrosodiphenylamine	NA	4.90E-03	6.60E-02						1.61E-08		8E-11
Naphthalene	2.00E-02	NA	1.30E+00					8.90E-07		4E-05	
Pentachlorophenol	3.00E-02	1.20E-01	4.90E+00					3.36E-06	1.20E-06	1E-04	1E-07
Phenanthrene	NA	NA	2.30E+01								
Pyrene	3.00E-02	NA	2.50E+01					1.71E-05		6E-04	
Pesticides/PCBs											
4,4'-DDD	NA	2.40E-01	3.50E-02						8.56E-09		2E-09
4,4'-DDE	NA	3.40E-01	1.20E+00						2.94E-07		1E-07
4,4'-DDT	5.00E-04	3.40E-01	5.60E+00					3.84E-06	1.37E-06	8E-03	5E-07
Alpha-Chlordane	5.00E-04	3.50E-01	7.80E-01					5.34E-07	1.91E-07	1E-03	7E-08
Aroclor-1254	2.00E-05	2.00E+00	9.10E+01					6.23E-05	2.23E-05	3E+00	4E-05
Aroclor-1260	2.00E-05	2.00E+00	3.10E+00					2.12E-06	7.58E-07	1E-01	2E-06
Beta-BHC	NA	1.80E+00	3.10E-02						7.58E-09		1E-08
Dieldrin	5.00E-05	1.60E+01	1.10E+00					7.53E-07	2.69E-07	2E-02	4E-06
Endosulfan I	6.00E-03	NA	1.60E-01					1.10E-07		2E-05	
Endosulfan II	6.00E-03	NA	3.00E-02					2.05E-08		3E-06	
Endosulfan sulfate	6.00E-03	NA	2.00E-01					1.37E-07		2E-05	
Endrin	3.00E-04	NA	3.20E-01					2.19E-07		7E-04	
Endrin aldehyde	NA	NA	3.90E-01								
Endrin ketone	NA	NA	3.70E-01								
Gamma-Chlordane	5.00E-04	3.50E-01	9.50E-02					6.51E-08	2.32E-08	1E-04	8E-09
Heptachlor	5.00E-04	4.50E+00	3.40E-02					2.33E-08	8.32E-09	5E-05	4E-08
Heptachlor epoxide	1.30E-05	9.10E+00	3.60E-01					2.47E-07	8.81E-08	2E-02	8E-07
Methoxychlor	5.00E-03	NA	3.90E-01					2.67E-07		5E-05	
Nitroaromatics											
1,3-Dinitrobenzene	1.00E-04	NA	1.80E-01					1.23E-07		1E-03	
2,4,6-Trinitrotoluene	5.00E-04	3.00E-02	2.60E-01					1.78E-07	6.36E-08	4E-04	2E-09
2,4-Dinitrotoluene	2.00E-03	6.80E-01	1.90E+00					1.30E-06	4.65E-07	7E-04	3E-07
2-amino-4,6-Dinitrotoluene	NA	NA	3.20E-01								
4-amino-2,6-Dinitrotoluene	NA	NA	3.00E-01								
RDX	3.00E-03	1.10E-01	2.00E-01					1.37E-07	4.89E-08	5E-05	5E-09
Tetryl	1.00E-02	NA	8.20E-01					5.62E-07		6E-05	
Metals											
Aluminum	1.00E+00	NA	6.11E+03					4.18E-03		4E-03	
Antimony	4.00E-04	NA	2.61E+01					1.79E-05		4E-02	
Arsenic	3.00E-04	1.50E+00	3.36E+01					2.30E-05	8.22E-06	8E-02	1E-05
Barium	7.00E-02	NA	3.56E+03					2.44E-03		3E-02	
Beryllium	2.00E-03	NA	4.60E-01					3.15E-07		2E-04	
Cadmium	5.00E-04	NA	1.32E+02					9.04E-05		2E-01	
Calcium	NA	NA	2.53E+05								
Chromium	1 50E+00	NA	1.84E+03					1.26E-03		8E-04	
Cobalt	6.00E-02	NA	3.71E+01					2.54E-05		4E-04	
Copper	4.00E-02	NA	1.22E+03					8.36E-04		2E-02	
Cyanide	2.00E-02	NA	2.87E+01					1.97E-05		1E-03	
Iron	3.00E-01	NA	3.62E+05					2.48E-01		8E-01	
Lead	NA	NA	1.20E+04								
Magnesium	NA	NA	1.76E+04								
Manganese	5.00E-02	NA	1.63E+03					1.12E-03		2E-02	
Mercury	3.00E-04	NA	6.28E+01					4.30E-05		1E-01	
Nickel	2.00E-02	NA	1.33E+03					9.11E-04		5E-02	
Potassium	NA	NA	3.75E+03								
Silver	5.00E-03	NA	5.70E-01					3.90E-07		8E-05	
Sodium	NA	NA	1.53E+03								
Thallium	8.00E-05	NA	7.00E+00					4.79E-06		6E-02	
Vanadium	7.00E-03	NA	9.48E+02					6.49E-04		9E-02	
Zinc	3.00E-01	NA	6.10E+03					4.18E-03		1E-02	
Total Hazard Quotient and Cancer Risk:										5E+00	9E-05

Assumptions for Future Indoor Park Worker

IR =	100	mg solid/day
CF =	1E-06	kg/mg
FI =	1	unitless
EF =	175	days/year
ED =	25	years
BW =	70	kg
AT (Nc) =	9125	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.

TABLE G-7
CALCULATION OF INTAKE AND RISK FROM THE INGESTION OF INDOOR DUST/DIRT
REASONABLE MAXIMUM EXPOSURE (RME)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Equation for Intake (mg/kg-day) = $\frac{CA \times IR \times CF \times FI \times EF \times ED}{BW \times AT}$

Variables (Assumptions for Each Receptor are Listed at the Bottom):
CA = Chemical Concentration in Air, from EPC Solids Data
IR = Ingestion Rate
CF = Conversion Factor
FI = Fraction Ingested
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Oral RfD (mg/kg-day)	Carc. Slope Oral (mg/kg-day)-1	EPC Solids (mg/kg)	Future Construction Worker				Future Recreational Visitor (Child)			
				Intake (mg/kg-day) (Nc)	Intake (mg/kg-day) (Car)	Hazard Quotient	Cancer Risk	Intake (mg/kg-day) (Nc)	Intake (mg/kg-day) (Car)	Hazard Quotient	Cancer Risk
Volatile Organics											
Acetone	1.00E-01	NA	4.00E-02								
Semivolatile Organics											
2,4-Dinitrotoluene	2.00E-03	6.80E-01	3.60E-01	Ingestion of Indoor Dust/Dirt Not Applicable for Future Construction Worker				Ingestion of Indoor Dust/Dirt Not Applicable for Future Recreational Visitor (Child)			
2-Methylnaphthalene	4.00E-02	NA	1.50E+00								
Acenaphthene	6.00E-02	NA	1.40E+00								
Anthracene	3.00E-01	NA	6.90E-01								
Benzo(a)anthracene	NA	7.30E-01	5.20E+00								
Benzo(a)pyrene	NA	7.30E+00	8.50E+00								
Benzo(b)fluoranthene	NA	7.30E-01	1.10E+01								
Benzo(ghi)perylene	NA	NA	8.70E+00								
Benzo(k)fluoranthene	NA	7.30E-02	8.30E+00								
Bis(2-Ethylhexyl)phthalate	2.00E-02	1.40E-02	8.90E+02								
Butylbenzylphthalate	2.00E-01	NA	1.60E+00								
Carbazole	NA	2.00E-02	5.80E+00								
Chrysene	NA	7.30E-03	1.30E+01								
Di-n-butylphthalate	1.00E-01	NA	3.20E+01								
Dibenz(a,h)anthracene	NA	7.30E+00	3.00E+00								
Dibenzofuran	NA	NA	1.50E+00								
Diethyl phthalate	8.00E-01	NA	1.30E-01								
Fluoranthene	4.00E-02	NA	2.50E+01								
Fluorene	4.00E-02	NA	7.60E-01								
Indeno(1,2,3-cd)pyrene	NA	7.30E-01	7.50E+00								
N-Nitrosodiphenylamine	NA	4.90E-03	6.60E-02								
Naphthalene	2.00E-02	NA	1.30E+00								
Pentachlorophenol	3.00E-02	1.20E-01	4.90E+00								
Phenanthrene	NA	NA	2.30E+01								
Pyrene	3.00E-02	NA	2.50E+01								
Pesticides/PCBs											
4,4'-DDD	NA	2.40E-01	3.50E-02								
4,4'-DDE	NA	3.40E-01	1.20E+00								
4,4'-DDT	5.00E-04	3.40E-01	5.60E+00								
Alpha-Chlordane	5.00E-04	3.50E-01	7.80E-01								
Aroclor-1254	2.00E-05	2.00E+00	9.10E+01								
Aroclor-1260	2.00E-05	2.00E+00	3.10E+00								
Beta-BHC	NA	1.80E+00	3.10E-02								
Dieldrin	5.00E-05	1.60E+01	1.10E+00								
Endosulfan I	6.00E-03	NA	1.60E-01								
Endosulfan II	6.00E-03	NA	3.00E-02								
Endosulfan sulfate	6.00E-03	NA	2.00E-01								
Endrin	3 00E-04	NA	3.20E-01								
Endrin aldehyde	NA	NA	3.90E-01								
Endrin ketone	NA	NA	3.70E-01								
Gamma-Chlordane	5.00E-04	3.50E-01	9.50E-02								
Heptachlor	5.00E-04	4.50E+00	3.40E-02								
Heptachlor epoxide	1.30E-05	9 10E+00	3.60E-01								
Methoxychlor	5 00E-03	NA	3.90E-01								
Nitroaromatics											
1,3-Dinitrobenzene	1.00E-04	NA	1.80E-01								
2,4,6-Trinitrotoluene	5.00E-04	3.00E-02	2.60E-01								
2,4-Dinitrotoluene	2.00E-03	6.80E-01	1.90E+00								
2-amino-4,6-Dinitrotoluene	NA	NA	3.20E-01								
4-amino-2,6-Dinitrotoluene	NA	NA	3.00E-01								
RDX	3.00E-03	1.10E-01	2.00E-01								
Tetryl	1.00E-02	NA	8.20E-01								
Metals											
Aluminum	1.00E+00	NA	6.11E+03								
Antimony	4.00E-04	NA	2.61E+01								
Arsenic	3.00E-04	1.50E+00	3.36E+01								
Barium	7.00E-02	NA	3.56E+03								
Beryllium	2.00E-03	NA	4.60E-01								
Cadmium	5.00E-04	NA	1.32E+02								
Calcium	NA	NA	2.53E+05								
Chromium	1 50E+00	NA	1.84E+03								
Cobalt	6.00E-02	NA	3.71E+01								
Copper	4.00E-02	NA	1.22E+03								
Cyanide	2 00E-02	NA	2.87E+01								
Iron	3.00E-01	NA	3.62E+05								
Lead	NA	NA	1.20E+04								
Magnesium	NA	NA	1.76E+04								
Manganese	5.00E-02	NA	1.63E+03								
Mercury	3.00E-04	NA	6.28E+01								
Nickel	2.00E-02	NA	1.33E+03								
Potassium	NA	NA	3.75E+03								
Silver	5.00E-03	NA	5.70E-01								
Sodium	NA	NA	1.53E+03								
Thallium	8.00E-05	NA	7.00E+00								
Vanadium	7.00E-03	NA	9.48E+02								
Zinc	3 00E-01	NA	6.10E+03								
Total Hazard Quotient and Cancer Risk:											

Note: Cells in this table were intentionally left blank due to a lack of toxicity data.
NA= Information not available

TABLE G-7
CALCULATION OF INTAKE AND RISK FROM THE INGESTION OF INDOOR DUST/DIRT
REASONABLE MAXIMUM EXPOSURE (RME)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Equation for Intake (mg/kg-day) = $\frac{CA \times IR \times CF \times FI \times EF \times ED}{BW \times AT}$

Variables (Assumptions for Each Receptor are Listed at the Bottom):

CA = Chemical Concentration in Air. from EPC Solids Data
IR = Ingestion Rate
CF = Conversion Factor
FI = Fraction Ingested
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Oral RfD	Carc. Slope Oral	EPC Solids	Future Resident (Adult)				Future Resident (Child)			
				Intake (mg/kg-day)		Hazard Quotient	Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Cancer Risk
	(mg/kg-day)	(mg/kg-day)-1	(mg/kg)	(Nc)	(Car)			(Nc)	(Car)		
Volatile Organics											
Acetone	1.00E-01	NA	4.00E-02								
Semivolatile Organics											
2,4-Dinitrotoluene	2.00E-03	6.80E-01	3.60E-01	**Ingestion of Indoor Dust/Dirt Not Applicable for Future Resident (Adult)**				**Ingestion of Indoor Dust/Dirt Not Applicable for Future Resident (Child)**			
2-Methylnaphthalene	4.00E-02	NA	1.50E+00								
Acenaphthene	6.00E-02	NA	1.40E+00								
Anthracene	3.00E-01	NA	6.90E-01								
Benzo(a)anthracene	NA	7.30E-01	5.20E+00								
Benzo(a)pyrene	NA	7.30E+00	8.50E+00								
Benzo(b)fluoranthene	NA	7.30E-01	1.10E+01								
Benzo(ghi)perylene	NA	NA	8.70E+00								
Benzo(k)fluoranthene	NA	7.30E-02	8.30E+00								
Bis(2-Ethylhexyl)phthalate	2.00E-02	1.40E-02	8.90E+02								
Butylbenzylphthalate	2.00E-01	NA	1.60E+00								
Carbazole	NA	2.00E-02	5.80E+00								
Chrysene	NA	7 30E-03	1.30E+01								
Di-n-butylphthalate	1.00E-01	NA	3.20E+01								
Dibenz(a,h)anthracene	NA	7.30E+00	3 00E+00								
Dibenzofuran	NA	NA	1.50E+00								
Diethyl phthalate	8.00E-01	NA	1.30E-01								
Fluoranthene	4.00E-02	NA	2.50E+01								
Fluorene	4.00E-02	NA	7.60E-01								
Indeno(1,2,3-cd)pyrene	NA	7.30E-01	7.50E+00								
N-Nitrosodiphenylamine	NA	4.90E-03	6.60E-02								
Naphthalene	2.00E-02	NA	1.30E+00								
Pentachlorophenol	3.00E-02	1.20E-01	4.90E+00								
Phenanthrene	NA	NA	2.30E+01								
Pyrene	3.00E-02	NA	2.50E+01								
Pesticides/PCBs											
4,4'-DDD	NA	2.40E-01	3.50E-02								
4,4'-DDE	NA	3.40E-01	1.20E+00								
4,4'-DDT	5.00E-04	3.40E-01	5.60E+00								
Alpha-Chlordane	5.00E-04	3.50E-01	7.80E-01								
Aroclor-1254	2.00E-05	2.00E+00	9.10E+01								
Aroclor-1260	2.00E-05	2.00E+00	3.10E+00								
Beta-BHC	NA	1.80E+00	3.10E-02								
Dieldrin	5.00E-05	1.60E+01	1.10E+00								
Endosulfan I	6.00E-03	NA	1.60E-01								
Endosulfan II	6.00E-03	NA	3.00E-02								
Endosulfan sulfate	6 00E-03	NA	2.00E-01								
Endrin	3.00E-04	NA	3.20E-01								
Endrin aldehyde	NA	NA	3.90E-01								
Endrin ketone	NA	NA	3.70E-01								
Gamma-Chlordane	5.00E-04	3.50E-01	9.50E-02								
Heptachlor	5.00E-04	4.50E+00	3.40E-02								
Heptachlor epoxide	1.30E-05	9.10E+00	3.60E-01								
Methoxychlor	5.00E-03	NA	3.90E-01								
Nitroaromatics											
1,3-Dinitrobenzene	1.00E-04	NA	1.80E-01								
2,4,6-Trinitrotoluene	5.00E-04	3.00E-02	2.60E-01								
2,4-Dinitrotoluene	2.00E-03	6.80E-01	1.90E+00								
2-amino-4,6-Dinitrotoluene	NA	NA	3.20E-01								
4-amino-2,6-Dinitrotoluene	NA	NA	3.00E-01								
RDX	3.00E-03	1.10E-01	2.00E-01								
Tetryl	1.00E-02	NA	8.20E-01								
Metals											
Aluminum	1.00E+00	NA	6.11E+03								
Antimony	4.00E-04	NA	2.61E+01								
Arsenic	3.00E-04	1.50E+00	3.36E+01								
Barium	7.00E-02	NA	3.56E+03								
Beryllium	2.00E-03	NA	4.60E-01								
Cadmium	5.00E-04	NA	1.32E+02								
Calcium	NA	NA	2.53E+05								
Chromium	1.50E+00	NA	1.84E+03								
Cobalt	6.00E-02	NA	3.71E+01								
Copper	4.00E-02	NA	1.22E+03								
Cyanide	2.00E-02	NA	2.87E+01								
Iron	3.00E-01	NA	3.62E+05								
Lead	NA	NA	1.20E+04								
Magnesium	NA	NA	1.76E+04								
Manganese	5.00E-02	NA	1.63E+03								
Mercury	3.00E-04	NA	6.28E+01								
Nickel	2.00E-02	NA	1.33E+03								
Potassium	NA	NA	3.75E+03								
Silver	5.00E-03	NA	5.70E-01								
Sodium	NA	NA	1.53E+03								
Thallium	8.00E-05	NA	7.00E+00								
Vanadium	7.00E-03	NA	9.48E+02								
Zinc	3.00E-01	NA	6.10E+03								
Total Hazard Quotient a											

Note: Cells in this table were
NA= Information not availabl

TABLE G-8
CALCULATION OF INTAKE AND RISK FROM INGESTION OF INDOOR DUST/DIRT
CENTRAL TENDENCY (CT)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Equation for Intake (mg/kg-day) = $\frac{CA \times IR \times CF \times FI \times EF \times ED}{BW \times AT}$

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):

CA = Chemical Concentration in Air, from EPC Solids Data
IR = Ingestion Rate
CF = Conversion Factor
FI = Fraction Ingested
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Analyte	Oral RfD (mg/kg-day)	Carc. Slope Oral (mg/kg-day)-1	EPC Solids (mg/kg)	Current Site Worker Intake (mg/kg-day) (Nc)	Current Site Worker Intake (mg/kg-day) (Car)	Current Site Worker Hazard Quotient	Current Site Worker Cancer Risk	Future Indoor Park Worker Intake (mg/kg-day) (Nc)	Future Indoor Park Worker Intake (mg/kg-day) (Car)	Future Indoor Park Worker Hazard Quotient	Future Indoor Park Worker Cancer Risk
Volatile Organics											
Acetone	1.00E-01	NA	4.00E-02					1.20E-08		1E-07	
Semivolatile Organics						**Ingestion of Indoor Dust/Dirt Not Applicable for Current Site Worker**					
2,4-Dinitrotoluene	2.00E-03	6.80E-01	3.60E-01					1.08E-07	1.08E-08	5E-05	7E-09
2-Methylnaphthalene	4.00E-02	NA	1.50E+00					4.49E-07		1E-05	
Acenaphthene	6.00E-02	NA	1.40E+00					4.19E-07		7E-06	
Anthracene	3.00E-01	NA	6.90E-01					2.07E-07		7E-07	
Benzo(a)anthracene	NA	7.30E-01	5.20E+00						1.56E-07		1E-07
Benzo(a)pyrene	NA	7.30E+00	8.50E+00						2.55E-07		2E-06
Benzo(b)fluoranthene	NA	7.30E-01	1.10E+01						3.29E-07		2E-07
Benzo(ghi)perylene	NA	NA	8.70E+00								
Benzo(k)fluoranthene	NA	7.30E-02	8.30E+00						2.49E-07		2E-08
Bis(2-Ethylhexyl)phthalate	2.00E-02	1.40E-02	8.90E+02					2.66E-04	2.66E-05	1E-02	4E-07
Butylbenzylphthalate	2.00E-01	NA	1.60E+00					4.79E-07		2E-06	
Carbazole	NA	2.00E-02	5.80E+00						1.74E-07		3E-09
Chrysene	NA	7.30E-03	1.30E+01						3.89E-07		3E-09
Di-n-butylphthalate	1.00E-01	NA	3.20E+01					9.58E-06		1E-04	
Dibenz(a,h)anthracene	NA	7.30E+00	3.00E+00						8.98E-08		7E-07
Dibenzofuran	NA	NA	1.50E+00								
Diethyl phthalate	8.00E-01	NA	1.30E-01					3.89E-08		5E-08	
Fluoranthene	4.00E-02	NA	2.50E+01					7.49E-06		2E-04	
Fluorene	4.00E-02	NA	7.60E-01					2.28E-07		6E-06	
Indeno(1,2,3-cd)pyrene	NA	7.30E-01	7.50E+00						2.25E-07		2E-07
N-Nitrosodiphenylamine	NA	4.90E-03	6.60E-02						1.98E-09		1E-11
Naphthalene	2.00E-02	NA	1.30E+00					3.89E-07		2E-05	
Pentachlorophenol	3.00E-02	1.20E-01	4.90E+00					1.47E-06	1.47E-07	5E-05	2E-08
Phenanthrene	NA	NA	2.30E+01								
Pyrene	3.00E-02	NA	2.50E+01					7.49E-06		2E-04	
Pesticides/PCBs											
4,4'-DDD	NA	2.40E-01	3.50E-02						1.05E-09		3E-10
4,4'-DDE	NA	3.40E-01	1.20E+00						3.59E-08		1E-08
4,4'-DDT	5.00E-04	3.40E-01	5.60E+00					1.68E-06	1.68E-07	3E-03	6E-08
Alpha-Chlordane	5.00E-04	3.50E-01	7.80E-01					2.34E-07	2.34E-08	5E-04	8E-09
Aroclor-1254	2.00E-05	2.00E+00	9.10E+01					2.72E-05	2.72E-06	1E+00	5E-06
Aroclor-1260	2.00E-05	2.00E+00	3.10E+00					9.28E-07	9.28E-08	5E-02	2E-07
Beta-BHC	NA	1.80E+00	3.10E-02						9.28E-10		2E-09
Dieldrin	5.00E-05	1.60E+01	1.10E+00					3.29E-07	3.29E-08	7E-03	5E-07
Endosulfan I	6.00E-03	NA	1.60E-01					4.79E-08		8E-06	
Endosulfan II	6.00E-03	NA	3.00E-02					8.98E-09		1E-06	
Endosulfan sulfate	6.00E-03	NA	2.00E-01					5.99E-08		1E-05	
Endrin	3.00E-04	NA	3.20E-01					9.58E-08		3E-04	
Endrin aldehyde	NA	NA	3.90E-01								
Endrin ketone	NA	NA	3.70E-01								
Gamma-Chlordane	5.00E-04	3.50E-01	9.50E-02					2.84E-08	2.84E-09	6E-05	1E-09
Heptachlor	5.00E-04	4.50E+00	3.40E-02					1.02E-08	1.02E-09	2E-05	5E-09
Heptachlor epoxide	1.30E-05	9.10E+00	3.60E-01					1.08E-07	1.08E-08	8E-03	1E-07
Methoxychlor	5.00E-03	NA	3.90E-01					1.17E-07		2E-05	
Nitroaromatics											
1,3-Dinitrobenzene	1.00E-04	NA	1.80E-01					5.39E-08		5E-04	
2,4,6-Trinitrotoluene	5.00E-04	3.00E-02	2.60E-01					7.78E-08	7.78E-09	2E-04	2E-10
2,4-Dinitrotoluene	2.00E-03	6.80E-01	1.90E+00					5.69E-07	5.69E-08	3E-04	4E-08
2-amino-4,6-Dinitrotoluene	NA	NA	3.20E-01								
4-amino-2,6-Dinitrotoluene	NA	NA	3.00E-01								
RDX	3.00E-03	1.10E-01	2.00E-01					5.99E-08	5.99E-09	2E-05	7E-10
Tetryl	1.00E-02	NA	8.20E-01					2.46E-07		2E-05	
Metals											
Aluminum	1.00E+00	NA	6.11E+03					1.83E-03		2E-03	
Antimony	4.00E-04	NA	2.61E+01					7.81E-06		2E-02	
Arsenic	3.00E-04	1.50E+00	3.36E+01					1.01E-05	1.01E-06	3E-02	2E-06
Barium	7.00E-02	NA	3.56E+03					1.07E-03		2E-02	
Beryllium	2.00E-03	NA	4.60E-01					1.38E-07		7E-05	
Cadmium	5.00E-04	NA	1.32E+02					3.95E-05		8E-02	
Calcium	NA	NA	2.53E+05								
Chromium	1.50E+00	NA	1.84E+03					5.51E-04		4E-04	
Cobalt	6.00E-02	NA	3.71E+01					1.11E-05		2E-04	
Copper	4.00E-02	NA	1.22E+03					3.65E-04		9E-03	
Cyanide	2.00E-02	NA	2.87E+01					8.59E-06		4E-04	
Iron	3.00E-01	NA	3.62E+05					1.08E-01		4E-01	
Lead	NA	NA	1.20E+04								
Magnesium	NA	NA	1.76E+04								
Manganese	5.00E-02	NA	1.63E+03					4.88E-04		1E-02	
Mercury	3.00E-04	NA	6.28E+01					1.88E-05		6E-02	
Nickel	2.00E-02	NA	1.33E+03					3.98E-04		2E-02	
Potassium	NA	NA	3.75E+03								
Silver	5.00E-03	NA	5.70E-01					1.71E-07		3E-05	
Sodium	NA	NA	1.53E+03								
Thallium	8.00E-05	NA	7.00E+00					2.10E-06		3E-02	
Vanadium	7.00E-03	NA	9.48E+02					2.84E-04		4E-02	
Zinc	3.00E-01	NA	6.10E+03					1.83E-03		6E-03	
Total Hazard Quotient and Cancer Risk:										**2E+00**	**1E-05**

Assumptions for Future Indoor Park Worker

IR =	50	mg solid/day
CF =	1E-06	kg/mg
FI =	1	unitless
EF =	153	days/year
ED =	7	years
BW =	70	kg
AT (Nc) =	2555	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

TABLE G-8
CALCULATION OF INTAKE AND RISK FROM INGESTION OF INDOOR DUST/DIRT
CENTRAL TENDENCY (CT)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Equation for Intake (mg/kg-day) = $\frac{CA \times IR \times CF \times FI \times EF \times ED}{BW \times AT}$

Variables (Assumptions for Each Receptor are Listed at the Bottom):

CA = Chemical Concentration in Air, from EPC Solids Data
IR = Ingestion Rate
CF = Conversion Factor
FI = Fraction Ingested
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Oral RfD (mg/kg-day)	Carc. Slope Oral (mg/kg-day)-1	EPC Solids (mg/kg)	Future Construction Worker				Future Recreational Visitor (Child)			
				Intake (mg/kg-day) (Nc)	Intake (mg/kg-day) (Car)	Hazard Quotient	Cancer Risk	Intake (mg/kg-day) (Nc)	Intake (mg/kg-day) (Car)	Hazard Quotient	Cancer Risk
Volatile Organics											
Acetone	1.00E-01	NA	4.00E-02								
Semivolatile Organics											
2,4-Dinitrotoluene	2.00E-03	6.80E-01	3.60E-01			**Ingestion of Indoor Dust/Dirt Not Applicable for Future Construction Worker**				**Ingestion of Indoor Dust/Dirt Not Applicable for Future Recreational Visitor (Child)**	
2-Methylnaphthalene	4.00E-02	NA	1.50E+00								
Acenaphthene	6.00E-02	NA	1.40E+00								
Anthracene	3.00E-01	NA	6.90E-01								
Benzo(a)anthracene	NA	7.30E-01	5.20E+00								
Benzo(a)pyrene	NA	7.30E+00	8.50E+00								
Benzo(b)fluoranthene	NA	7.30E-01	1.10E+01								
Benzo(ghi)perylene	NA	NA	8.70E+00								
Benzo(k)fluoranthene	NA	7.30E-02	8.30E+00								
Bis(2-Ethylhexyl)phthalate	2.00E-02	1.40E-02	8.90E+02								
Butylbenzylphthalate	2.00E-01	NA	1.60E+00								
Carbazole	NA	2.00E-02	5.80E+00								
Chrysene	NA	7.30E-03	1.30E+01								
Di-n-butylphthalate	1.00E-01	NA	3.20E+01								
Dibenz(a,h)anthracene	NA	7.30E+00	3.00E+00								
Dibenzofuran	NA	NA	1.50E+00								
Diethyl phthalate	8.00E-01	NA	1.30E-01								
Fluoranthene	4.00E-02	NA	2.50E+01								
Fluorene	4.00E-02	NA	7.60E-01								
Indeno(1,2,3-cd)pyrene	NA	7.30E-01	7.50E+00								
N-Nitrosodiphenylamine	NA	4.90E-03	6.60E-02								
Naphthalene	2.00E-02	NA	1.30E+00								
Pentachlorophenol	3.00E-02	1.20E-01	4.90E+00								
Phenanthrene	NA	NA	2.30E+01								
Pyrene	3.00E-02	NA	2.50E+01								
Pesticides/PCBs											
4,4'-DDD	NA	2.40E-01	3.50E-02								
4,4'-DDE	NA	3.40E-01	1.20E+00								
4,4'-DDT	5.00E-04	3.40E-01	5.60E+00								
Alpha-Chlordane	5.00E-04	3.50E-01	7.80E-01								
Aroclor-1254	2.00E-05	2.00E+00	9.10E+01								
Aroclor-1260	2.00E-05	2.00E+00	3.10E+00								
Beta-BHC	NA	1.80E+00	3.10E-02								
Dieldrin	5.00E-05	1.60E+01	1.10E+00								
Endosulfan I	6.00E-03	NA	1.60E-01								
Endosulfan II	6.00E-03	NA	3.00E-02								
Endosulfan sulfate	6.00E-03	NA	2.00E-01								
Endrin	3.00E-04	NA	3.20E-01								
Endrin aldehyde	NA	NA	3.90E-01								
Endrin ketone	NA	NA	3.70E-01								
Gamma-Chlordane	5.00E-04	3.50E-01	9.50E-02								
Heptachlor	5.00E-04	4.50E+00	3.40E-02								
Heptachlor epoxide	1.30E-05	9.10E+00	3.60E-01								
Methoxychlor	5.00E-03	NA	3.90E-01								
Nitroaromatics											
1,3-Dinitrobenzene	1.00E-04	NA	1.80E-01								
2,4,6-Trinitrotoluene	5.00E-04	3.00E-02	2.60E-01								
2,4-Dinitrotoluene	2.00E-03	6.80E-01	1.90E+00								
2-amino-4,6-Dinitrotoluene	NA	NA	3.20E-01								
4-amino-2,6-Dinitrotoluene	NA	NA	3.00E-01								
RDX	3.00E-03	1.10E-01	2.00E-01								
Tetryl	1.00E-02	NA	8.20E-01								
Metals											
Aluminum	1.00E+00	NA	6.11E+03								
Antimony	4.00E-04	NA	2.61E+01								
Arsenic	3.00E-04	1.50E+00	3.36E+01								
Barium	7.00E-02	NA	3.56E+03								
Beryllium	2.00E-03	NA	4.60E-01								
Cadmium	5.00E-04	NA	1.32E+02								
Calcium	NA	NA	2.53E+05								
Chromium	1.50E+00	NA	1.84E+03								
Cobalt	6.00E-02	NA	3.71E+01								
Copper	4.00E-02	NA	1.22E+03								
Cyanide	2.00E-02	NA	2.87E+01								
Iron	3.00E-01	NA	3.62E+05								
Lead	NA	NA	1.20E+04								
Magnesium	NA	NA	1.76E+04								
Manganese	5.00E-02	NA	1.63E+03								
Mercury	3.00E-04	NA	6.28E+01								
Nickel	2.00E-02	NA	1.33E+03								
Potassium	NA	NA	3.75E+03								
Silver	5.00E-03	NA	5.70E-01								
Sodium	NA	NA	1.53E+03								
Thallium	8.00E-05	NA	7.00E+00								
Vanadium	7.00E-03	NA	9.48E+02								
Zinc	3.00E-01	NA	6.10E+03								
Total Hazard Quotient and Cancer Risk:											

Note: Cells in this table were intentionally left blank due to a lack of toxicity data.
NA= Information not available.

TABLE G-8
CALCULATION OF INTAKE AND RISK FROM INGESTION OF INDOOR DUST/DIRT
CENTRAL TENDENCY (CT)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Equation for Intake (mg/kg-day) = $\frac{CA \times IR \times CF \times FI \times EF \times ED}{BW \times AT}$

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):
CA = Chemical Concentration in Air, from EPC Solids Data
IR = Ingestion Rate
CF = Conversion Factor
FI = Fraction Ingested
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Analyte	Oral RfD (mg/kg-day)	Carc. Slope Oral (mg/kg-day)-1	EPC Solids (mg/kg)	Future Resident (Adult) Intake (mg/kg-day) (Nc)	Future Resident (Adult) Intake (mg/kg-day) (Car)	Future Resident (Adult) Hazard Quotient	Future Resident (Adult) Cancer Risk	Future Resident (Child) Intake (mg/kg-day) (Nc)	Future Resident (Child) Intake (mg/kg-day) (Car)	Future Resident (Child) Hazard Quotient	Future Resident (Child) Cancer Risk
Volatile Organics											
Acetone	1.00E-01	NA	4.00E-02								
Semivolatile Organics											
2,4-Dinitrotoluene	2.00E-03	6.80E-01	3.60E-01			**Ingestion of Indoor Dust/Dirt Not Applicable for Future Resident (Adult)**				**Ingestion of Indoor Dust/Dirt Not Applicable for Future Resident (Child)**	
2-Methylnaphthalene	4.00E-02	NA	1.50E+00								
Acenaphthene	6.00E-02	NA	1.40E+00								
Anthracene	3.00E-01	NA	6.90E-01								
Benzo(a)anthracene	NA	7.30E-01	5.20E+00								
Benzo(a)pyrene	NA	7.30E+00	8.50E+00								
Benzo(b)fluoranthene	NA	7.30E-01	1.10E+01								
Benzo(ghi)perylene	NA	NA	8.70E+00								
Benzo(k)fluoranthene	NA	7.30E-02	8.30E+00								
Bis(2-Ethylhexyl)phthalate	2.00E-02	1.40E-02	8.90E+02								
Butylbenzylphthalate	2.00E-01	NA	1.60E+00								
Carbazole	NA	2.00E-02	5.80E+00								
Chrysene	NA	7.30E-03	1.30E+01								
Di-n-butylphthalate	1.00E-01	NA	3.20E+01								
Dibenz(a,h)anthracene	NA	7.30E+00	3.00E+00								
Dibenzofuran	NA	NA	1.50E+00								
Diethyl phthalate	8.00E-01	NA	1.30E-01								
Fluoranthene	4.00E-02	NA	2.50E+01								
Fluorene	4.00E-02	NA	7.60E-01								
Indeno(1,2,3-cd)pyrene	NA	7.30E-01	7.50E+00								
N-Nitrosodiphenylamine	NA	4.90E-03	6.60E-02								
Naphthalene	2.00E-02	NA	1.30E+00								
Pentachlorophenol	3.00E-02	1.20E-01	4.90E+00								
Phenanthrene	NA	NA	2.30E+01								
Pyrene	3.00E-02	NA	2.50E+01								
Pesticides/PCBs											
4,4'-DDD	NA	2.40E-01	3.50E-02								
4,4'-DDE	NA	3.40E-01	1.20E+00								
4,4'-DDT	5.00E-04	3.40E-01	5.60E+00								
Alpha-Chlordane	5.00E-04	3.50E-01	7.80E-01								
Aroclor-1254	2.00E-05	2.00E+00	9.10E+01								
Aroclor-1260	2.00E-05	2.00E+00	3.10E+00								
Beta-BHC	NA	1.80E+00	3.10E-02								
Dieldrin	5.00E-05	1.60E+01	1.10E+00								
Endosulfan I	6.00E-03	NA	1.60E-01								
Endosulfan II	6.00E-03	NA	3.00E-02								
Endosulfan sulfate	6.00E-03	NA	2.00E-01								
Endrin	3.00E-04	NA	3.20E-01								
Endrin aldehyde	NA	NA	3.90E-01								
Endrin ketone	NA	NA	3.70E-01								
Gamma-Chlordane	5.00E-04	3.50E-01	9.50E-02								
Heptachlor	5.00E-04	4.50E+00	3.40E-02								
Heptachlor epoxide	1.30E-05	9.10E+00	3.60E-01								
Methoxychlor	5.00E-03	NA	3.90E-01								
Nitroaromatics											
1,3-Dinitrobenzene	1.00E-04	NA	1.80E-01								
2,4,6-Trinitrotoluene	5.00E-04	3.00E-02	2.60E-01								
2,4-Dinitrotoluene	2.00E-03	6.80E-01	1.90E+00								
2-amino-4,6-Dinitrotoluene	NA	NA	3.20E-01								
4-amino-2,6-Dinitrotoluene	NA	NA	3.00E-01								
RDX	3.00E-03	1.10E-01	2.00E-01								
Tetryl	1.00E-02	NA	8.20E-01								
Metals											
Aluminum	1.00E+00	NA	6.11E+03								
Antimony	4.00E-04	NA	2.61E+01								
Arsenic	3.00E-04	1.50E+00	3.36E+01								
Barium	7.00E-02	NA	3.56E+03								
Beryllium	2.00E-03	NA	4.60E-01								
Cadmium	5.00E-04	NA	1.32E+02								
Calcium	NA	NA	2.53E+05								
Chromium	1.50E+00	NA	1.84E+03								
Cobalt	6.00E-02	NA	3.71E+01								
Copper	4.00E-02	NA	1.22E+03								
Cyanide	2.00E-02	NA	2.87E+01								
Iron	3.00E-01	NA	3.62E+05								
Lead	NA	NA	1.20E+04								
Magnesium	NA	NA	1.76E+04								
Manganese	5.00E-02	NA	1.63E+03								
Mercury	3.00E-04	NA	6.28E+01								
Nickel	2.00E-02	NA	1.33E+03								
Potassium	NA	NA	3.75E+03								
Silver	5.00E-03	NA	5.70E-01								
Sodium	NA	NA	1.53E+03								
Thallium	8.00E-05	NA	7.00E+00								
Vanadium	7.00E-03	NA	9.48E+02								
Zinc	3.00E-01	NA	6.10E+03								
Total Hazard Quotient and Cancer Risk:											

Note: Cells in this table were intentionally left blank due to a lack of toxicity data.
NA= Information not available.

TABLE G-9
CALCULATION OF ABSORBED DOSE AND RISK FROM DERMAL CONTACT TO INDOOR DUST/DIRT
REASONABLE MAXIMUM EXPOSURE (RME)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

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

Variables (Assumptions for Each Receptor are Listed at the Bottom):
CS = Chemical Concentration in Air. from EPC Solids Data
CF = Conversion Factor
SA = Surface Area
AF = Soil to Skin Adherence Factor
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Dermal RfD	Carc. Slope Dermal	Absorption Factor*	EPC Solids	Current Site Worker				Future Indoor Park Worker			
	(mg/kg-day)	(mg/kg-day)-1	(unitless)	(mg/kg)	Absorbed Dose (mg/kg-day) (Nc)	Absorbed Dose (mg/kg-day) (Car)	Hazard Quotient	Cancer Risk	Absorbed Dose (mg/kg-day) (Nc)	Absorbed Dose (mg/kg-day) (Car)	Hazard Quotient	Cancer Risk
Volatile Organics												
Acetone	1.00E-01	NA	NA	4.00E-02								
Semivolatile Organics												
2,4-Dinitrotoluene	2 00E-03	6.80E-01	NA	3.60E-01	**Dermal Contact to Indoor Dust/Dirt Not Applicable for Current Site Worker**							
2-Methylnaphthalene	4.00E-02	NA	NA	1.50E+00								
Acenaphthene	6.00E-02	NA	NA	1.40E+00								
Anthracene	3.00E-01	NA	NA	6.90E-01								
Benzo(a)anthracene	NA	7.30E-01	NA	5.20E+00								
Benzo(a)pyrene	NA	1.46E+01	NA	8.50E+00								
Benzo(b)fluoranthene	NA	7.30E-01	NA	1.10E+01								
Benzo(ghi)perylene	NA	NA	NA	8.70E+00								
Benzo(k)fluoranthene	NA	7.30E-02	NA	8.30E+00								
Bis(2-Ethylhexyl)phthalate	1.00E-02	2.80E-02	NA	8.90E+02								
Butylbenzylphthalate	2.00E-01	NA	NA	1.60E+00								
Carbazole	NA	2.00E-02	NA	5.80E+00								
Chrysene	NA	7.30E-03	NA	1.30E+01								
Di-n-butylphthalate	9.00E-02	NA	NA	3.20E+01								
Dibenz(a,h)anthracene	NA	7.30E+00	NA	3 00E+00								
Dibenzofuran	NA	NA	NA	1.50E+00								
Diethyl phthalate	8.00E-01	NA	NA	1.30E-01								
Fluoranthene	4.00E-02	NA	NA	2.50E+01								
Fluorene	4.00E-02	NA	NA	7.60E-01								
Indeno(1,2,3-cd)pyrene	NA	7.30E-01	NA	7.50E+00								
N-Nitrosodiphenylamine	NA	4.90E-03	NA	6.60E-02								
Naphthalene	2.00E-02	NA	NA	1.30E+00								
Pentachlorophenol	3.00E-02	1.20E-01	0.01	4.90E+00					2.78E-06	9.93E-07	9E-05	1E-07
Phenanthrene	NA	NA	NA	2.30E+01								
Pyrene	3.00E-02	NA	NA	2.50E+01								
Pesticides/PCBs												
4,4'-DDD	NA	1.20E+00	NA	3.50E-02								
4.4'-DDE	NA	1.70E+00	NA	1.20E+00								
4.4'-DDT	1.00E-04	1.70E+00	NA	5.60E+00								
Alpha-Chlordane	5.00E-04	3.50E-01	NA	7.80E-01								
Aroclor-1254	1.80E-05	2.22E+00	0.06	9.10E+01					3.10E-04	1.11E-04	2E+01	2E-04
Aroclor-1260	1.80E-05	2.22E+00	0.06	3.10E+00					1.06E-05	3.77E-06	6E-01	8E-06
Beta-BHC	NA	1.80E+00	NA	3.10E-02								
Dieldrin	2.50E-05	3.20E+01	NA	1.10E+00								
Endosulfan I	6 00E-03	NA	NA	1.60E-01								
Endosulfan II	6.00E-03	NA	NA	3.00E-02								
Endosulfan sulfate	6.00E-03	NA	NA	2.00E-01								
Endrin	3.00E-04	NA	NA	3.20E-01								
Endrin aldehyde	NA	NA	NA	3.90E-01								
Endrin ketone	NA	NA	NA	3.70E-01								
Gamma-Chlordane	5.00E-04	3.50E-01	NA	9.50E-02								
Heptachlor	5.00E-04	4.50E+00	NA	3.40E-02								
Heptachlor epoxide	1.30E-05	9.10E+00	NA	3.60E-01								
Methoxychlor	5.00E-03	NA	NA	3.90E-01								
Nitroaromatics												
1,3-Dinitrobenzene	1.00E-04	NA	NA	1.80E-01								
2.4,6-Trinitrotoluene	5.00E-04	3.00E-02	NA	2.60E-01								
2,4-Dinitrotoluene	2.00E-03	6.80E-01	NA	1.90E+00								
2-amino-4.6-Dinitrotoluene	NA	NA	NA	3.20E-01								
4-amino-2.6-Dinitrotoluene	NA	NA	NA	3.00E-01								
RDX	3.00E-03	1.10E-01	NA	2.00E-01								
Tetryl	1.00E-02	NA	NA	8.20E-01								
Metals												
Aluminum	4.00E-02	NA	NA	6.11E+03								
Antimony	4.00E-04	NA	NA	2.61E+01								
Arsenic	2.40E-04	1.88E+00	0.001	3.36E+01					1.91E-06	6.81E-07	8E-03	1E-06
Barium	3.50E-02	NA	NA	3.56E+03								
Beryllium	2.00E-05	NA	NA	4.60E-01								
Cadmium	5.00E-05	NA	0.01	1.32E+02					7.49E-05		1E+00	
Calcium	NA	NA	NA	2.53E+05								
Chromium	3.00E-02	NA	NA	1.84E+03								
Cobalt	3.00E-03	NA	NA	3.71E+01								
Copper	2.40E-02	NA	NA	1.22E+03								
Cyanide	1.00E-02	NA	NA	2.87E+01								
Iron	6.00E-02	NA	NA	3.62E+05								
Lead	NA	NA	NA	1.20E+04								
Magnesium	NA	NA	NA	1.76E+04								
Manganese	1.50E-03	NA	NA	1.63E+03								
Mercury	3.00E-06	NA	NA	6.28E+01								
Nickel	8.00E-04	NA	NA	1.33E+03								
Potassium	NA	NA	NA	3.75E+03								
Silver	1.00E-03	NA	NA	5.70E-01								
Sodium	NA	NA	NA	1.53E+03								
Thallium	8.00E-05	NA	NA	7.00E+00								
Vanadium	7.00E-05	NA	NA	9.48E+02								
Zinc	7.50E-02	NA	NA	6.10E+03								
Total Hazard Quotient and Cancer Risk:											**2E+01**	**3E-04**

Assumptions for Future Indoor Park Worker

CF =	1E-06	kg/mg
SA =	5800	cm2
AF =	1	mg/cm2
EF =	250	days/year
ED =	25	years
BW =	70	kg
AT (Nc) =	9125	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.
* 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 G-9
CALCULATION OF ABSORBED DOSE AND RISK FROM DERMAL CONTACT TO INDOOR DUST/DIRT
REASONABLE MAXIMUM EXPOSURE (RME)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

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

Variables (Assumptions for Each Receptor are Listed at the Bottom):
CS = Chemical Concentration in Air, from EPC Solids Data
CF = Conversion Factor
SA = Surface Area
AF = Soil to Skin Adherence Factor
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

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)-1	Absorption Factor* (unitless)	EPC Solids (mg/kg)	Future Construction Worker				Future Recreational Visitor (Child)			
					Absorbed Dose (mg/kg-day)		Hazard Quotient	Cancer Risk	Absorbed Dose (mg/kg-day)		Hazard Quotient	Cancer Risk
					(Nc)	(Car)			(Nc)	(Car)		
Volatile Organics												
Acetone	1.00E-01	NA	NA	4.00E-02								
Semivolatile Organics												
2.4-Dinitrotoluene	2.00E-03	6.80E-01	NA	3.60E-01	**Dermal Contact to Indoor Dust/Dirt Not Applicable for Future Construction Worker**				**Dermal Contact to Indoor Dust/Dirt Not Applicable for Future Recreational Visitor (Child)**			
2-Methylnaphthalene	4.00E-02	NA	NA	1.50E+00								
Acenaphthene	6.00E-02	NA	NA	1.40E+00								
Anthracene	3.00E-01	NA	NA	6.90E-01								
Benzo(a)anthracene	NA	7.30E-01	NA	5.20E+00								
Benzo(a)pyrene	NA	1.46E+01	NA	8.50E+00								
Benzo(b)fluoranthene	NA	7.30E-01	NA	1.10E+01								
Benzo(ghi)perylene	NA	NA	NA	8.70E+00								
Benzo(k)fluoranthene	NA	7.30E-02	NA	8.30E+00								
Bis(2-Ethylhexyl)phthalate	1.00E-02	2.80E-02	NA	8.90E+02								
Butylbenzylphthalate	2.00E-01	NA	NA	1.60E+00								
Carbazole	NA	2.00E-02	NA	5.80E+00								
Chrysene	NA	7.30E-03	NA	1.30E+01								
Di-n-butylphthalate	9.00E-02	NA	NA	3.20E+01								
Dibenz(a.h)anthracene	NA	7 30E+00	NA	3.00E+00								
Dibenzofuran	NA	NA	NA	1.50E+00								
Diethyl phthalate	8.00E-01	NA	NA	1.30E-01								
Fluoranthene	4.00E-02	NA	NA	2.50E+01								
Fluorene	4.00E-02	NA	NA	7 60E-01								
Indeno(1,2,3-cd)pyrene	NA	7.30E-01	NA	7 50E+00								
N-Nitrosodiphenylamine	NA	4.90E-03	NA	6.60E-02								
Naphthalene	2.00E-02	NA	NA	1.30E+00								
Pentachlorophenol	3.00E-02	1.20E-01	0 010	4.90E+00								
Phenanthrene	NA	NA	NA	2.30E+01								
Pyrene	3 00E-02	NA	NA	2.50E+01								
Pesticides/PCBs												
4.4'-DDD	NA	1.20E+00	NA	3.50E-02								
4.4'-DDE	NA	1.70E+00	NA	1.20E+00								
4.4'-DDT	1.00E-04	1.70E+00	NA	5 60E+00								
Alpha-Chlordane	5.00E-04	3.50E-01	NA	7.80E-01								
Aroclor-1254	1 80E-05	2.22E+00	0.060	9.10E+01								
Aroclor-1260	1.80E-05	2.22E+00	0.060	3.10E+00								
Beta-BHC	NA	1.80E+00	NA	3.10E-02								
Dieldrin	2.50E-05	3.20E+01	NA	1.10E+00								
Endosulfan I	6.00E-03	NA	NA	1.60E-01								
Endosulfan II	6.00E-03	NA	NA	3.00E-02								
Endosulfan sulfate	6.00E-03	NA	NA	2.00E-01								
Endrin	3.00E-04	NA	NA	3.20E-01								
Endrin aldehyde	NA	NA	NA	3 90E-01								
Endrin ketone	NA	NA	NA	3.70E-01								
Gamma-Chlordane	5.00E-04	3.50E-01	NA	9.50E-02								
Heptachlor	5.00E-04	4.50E+00	NA	3.40E-02								
Heptachlor epoxide	1.30E-05	9.10E+00	NA	3.60E-01								
Methoxychlor	5.00E-03	NA	NA	3.90E-01								
Nitroaromatics												
1.3-Dinitrobenzene	1.00E-04	NA	NA	1.80E-01								
2.4,6-Trinitrotoluene	5.00E-04	3.00E-02	NA	2.60E-01								
2.4-Dinitrotoluene	2.00E-03	6.80E-01	NA	1.90E+00								
2-amino-4,6-Dinitrotoluene	NA	NA	NA	3.20E-01								
4-amino-2.6-Dinitrotoluene	NA	NA	NA	3.00E-01								
RDX	3 00E-03	1.10E-01	NA	2.00E-01								
Tetryl	1.00E-02	NA	NA	8.20E-01								
Metals												
Aluminum	4.00E-02	NA	NA	6.11E+03								
Antimony	4.00E-04	NA	NA	2.61E+01								
Arsenic	2.40E-04	1.88E+00	0.001	3.36E+01								
Barium	3.50E-02	NA	NA	3.56E+03								
Beryllium	2.00E-05	NA	NA	4.60E-01								
Cadmium	5.00E-05	NA	0.010	1.32E+02								
Calcium	NA	NA	NA	2.53E+05								
Chromium	3.00E-02	NA	NA	1.84E+03								
Cobalt	3.00E-03	NA	NA	3.71E+01								
Copper	2.40E-02	NA	NA	1.22E+03								
Cyanide	1.00E-02	NA	NA	2.87E+01								
Iron	6.00E-02	NA	NA	3.62E+05								
Lead	NA	NA	NA	1.20E+04								
Magnesium	NA	NA	NA	1 76E+04								
Manganese	1 50E-03	NA	NA	1.63E+03								
Mercury	3.00E-06	NA	NA	6.28E+01								
Nickel	8 00E-04	NA	NA	1.33E+03								
Potassium	NA	NA	NA	3.75E+03								
Silver	1.00E-03	NA	NA	5.70E-01								
Sodium	NA	NA	NA	1.53E+03								
Thallium	8 00E-05	NA	NA	7.00E+00								
Vanadium	7.00E-05	NA	NA	9.48E+02								
Zinc	7.50E-02	NA	NA	6.10E+03								
Total Hazard Quotient and Cancer Risk:												

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 G-9
CALCULATION OF ABSORBED DOSE AND RISK FROM DERMAL CONTACT TO INDOOR DUST/DIRT
REASONABLE MAXIMUM EXPOSURE (RME)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

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

Variables (Assumptions for Each Receptor are Listed at the Bottom):
CS = Chemical Concentration in Air, from EPC Solids Data
CF = Conversion Factor
SA = Surface Area
AF = Soil to Skin Adherence Factor
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

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)-1	Absorption Factor* (unitless)	EPC Solids (mg/kg)	Future Resident (Adult)				Future Resident (Child)			
					Absorbed Dose (mg/kg-day) (Nc)	Absorbed Dose (mg/kg-day) (Car)	Hazard Quotient	Cancer Risk	Absorbed Dose (mg/kg-day) (Nc)	Absorbed Dose (mg/kg-day) (Car)	Hazard Quotient	Cancer Risk
Volatile Organics												
Acetone	1.00E-01	NA	NA	4.00E-02								
Semivolatile Organics												
2,4-Dinitrotoluene	2.00E-03	6.80E-01	NA	3.60E-01			**Dermal Contact to Indoor Dust/Dirt Not Applicable for Future Resident (Adult)**				**Dermal Contact to Indoor Dust/Dirt Not Applicable for Future Resident (Child)**	
2-Methylnaphthalene	4.00E-02	NA	NA	1.50E+00								
Acenaphthene	6.00E-02	NA	NA	1.40E+00								
Anthracene	3.00E-01	NA	NA	6.90E-01								
Benzo(a)anthracene	NA	7.30E-01	NA	5.20E+00								
Benzo(a)pyrene	NA	1.46E+01	NA	8.50E+00								
Benzo(b)fluoranthene	NA	7.30E-01	NA	1.10E+01								
Benzo(ghi)perylene	NA	NA	NA	8.70E+00								
Benzo(k)fluoranthene	NA	7.30E-02	NA	8.30E+00								
Bis(2-Ethylhexyl)phthalate	1.00E-02	2.80E-02	NA	8.90E+02								
Butylbenzylphthalate	2.00E-01	NA	NA	1.60E+00								
Carbazole	NA	2.00E-02	NA	5.80E+00								
Chrysene	NA	7.30E-03	NA	1.30E+01								
Di-n-butylphthalate	9.00E-02	NA	NA	3.20E+01								
Dibenz(a,h)anthracene	NA	7.30E+00	NA	3.00E+00								
Dibenzofuran	NA	NA	NA	1.50E+00								
Diethyl phthalate	8.00E-01	NA	NA	1.30E-01								
Fluoranthene	4.00E-02	NA	NA	2.50E+01								
Fluorene	4.00E-02	NA	NA	7.60E-01								
Indeno(1,2,3-cd)pyrene	NA	7.30E-01	NA	7.50E+00								
N-Nitrosodiphenylamine	NA	4.90E-03	NA	6.60E-02								
Naphthalene	2.00E-02	NA	NA	1.30E+00								
Pentachlorophenol	3.00E-02	1.20E-01	0.010	4.90E+00								
Phenanthrene	NA	NA	NA	2.30E+01								
Pyrene	3.00E-02	NA	NA	2.50E+01								
Pesticides/PCBs												
4,4'-DDD	NA	1.20E+00	NA	3.50E-02								
4,4'-DDE	NA	1.70E+00	NA	1.20E+00								
4,4'-DDT	1.00E-04	1.70E+00	NA	5.60E+00								
Alpha-Chlordane	5.00E-04	3.50E-01	NA	7.80E-01								
Aroclor-1254	1.80E-05	2.22E+00	0.060	9.10E+01								
Aroclor-1260	1.80E-05	2.22E+00	0.060	3.10E+00								
Beta-BHC	NA	1.80E+00	NA	3.10E-02								
Dieldrin	2.50E-05	3.20E+01	NA	1.10E+00								
Endosulfan I	6.00E-03	NA	NA	1.60E-01								
Endosulfan II	6.00E-03	NA	NA	3.00E-02								
Endosulfan sulfate	6.00E-03	NA	NA	2.00E-01								
Endrin	3.00E-04	NA	NA	3.20E-01								
Endrin aldehyde	NA	NA	NA	3.90E-01								
Endrin ketone	NA	NA	NA	3.70E-01								
Gamma-Chlordane	5.00E-04	3.50E-01	NA	9.50E-02								
Heptachlor	5.00E-04	4.50E+00	NA	3.40E-02								
Heptachlor epoxide	1.30E-05	9.10E+00	NA	3.60E-01								
Methoxychlor	5.00E-03	NA	NA	3.90E-01								
Nitroaromatics												
1,3-Dinitrobenzene	1.00E-04	NA	NA	1.80E-01								
2,4,6-Trinitrotoluene	5.00E-04	3.00E-02	NA	2.60E-01								
2,4-Dinitrotoluene	2.00E-03	6.80E-01	NA	1.90E+00								
2-amino-4,6-Dinitrotoluene	NA	NA	NA	3.20E-01								
4-amino-2,6-Dinitrotoluene	NA	NA	NA	3.00E-01								
RDX	3.00E-03	1.10E-01	NA	2.00E-01								
Tetryl	1.00E-02	NA	NA	8.20E-01								
Metals												
Aluminum	4.00E-02	NA	NA	6.11E+03								
Antimony	4.00E-04	NA	NA	2.61E+01								
Arsenic	2.40E-04	1.88E+00	0.001	3.36E+01								
Barium	3.50E-02	NA	NA	3.56E+03								
Beryllium	2.00E-05	NA	NA	4.60E-01								
Cadmium	5.00E-05	NA	0.010	1.32E+02								
Calcium	NA	NA	NA	2.53E+05								
Chromium	3.00E-02	NA	NA	1.84E+03								
Cobalt	3.00E-03	NA	NA	3.71E+01								
Copper	2.40E-02	NA	NA	1.22E+03								
Cyanide	1.00E-02	NA	NA	2.87E+01								
Iron	6.00E-02	NA	NA	3.62E+05								
Lead	NA	NA	NA	1.20E+04								
Magnesium	NA	NA	NA	1.76E+04								
Manganese	1.50E-03	NA	NA	1.63E+03								
Mercury	3.00E-06	NA	NA	6.28E+01								
Nickel	8.00E-04	NA	NA	1.33E+03								
Potassium	NA	NA	NA	3.75E+03								
Silver	1.00E-03	NA	NA	5.70E-01								
Sodium	NA	NA	NA	1.53E+03								
Thallium	8.00E-05	NA	NA	7.00E+00								
Vanadium	7.00E-05	NA	NA	9.48E+02								
Zinc	7.50E-02	NA	NA	6.10E+03								
Total Hazard Quotient and Cancer Risk:												

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 G-10
CALCULATION OF ABSORBED DOSE AND RISK FROM DERMAL CONTACT TO INDOOR DUST/DIRT
CENTRAL TENDENCY (CT)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

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

Variables (Assumptions for Each Receptor are Listed at the Bottom):

CS = Chemical Concentration in Air, from EPC Solids Data
CF = Conversion Factor
SA = Surface Area
AF = Soil to Skin Adherence Factor
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Dermal RfD	Carc. Slope Dermal	Absorption Factor*	EPC Solids	Current Site Worker				Future Indoor Park Worker			
					Absorbed Dose (mg/kg-day)		Hazard Quotient	Cancer Risk	Absorbed Dose (mg/kg-day)		Hazard Quotient	Cancer Risk
	(mg/kg-day)	(mg/kg-day)-1	(unitless)	(mg/kg)	(Nc)	(Car)			(Nc)	(Car)		
Volatile Organics												
Acetone	1.00E-01	NA	NA	4.00E-02			Dermal Contact to Indoor Dust/Dirt Not Applicable for Current Site Worker					
Semivolatile Organics												
2,4-Dinitrotoluene	2.00E-03	6.80E-01	NA	3.60E-01								
2-Methylnaphthalene	4.00E-02	NA	NA	1.50E+00								
Acenaphthene	6.00E-02	NA	NA	1.40E+00								
Anthracene	3.00E-01	NA	NA	6.90E-01								
Benzo(a)anthracene	NA	7.30E-01	NA	5.20E+00								
Benzo(a)pyrene	NA	1.46E+01	NA	8.50E+00								
Benzo(b)fluoranthene	NA	7.30E-01	NA	1.10E+01								
Benzo(ghi)perylene	NA	NA	NA	8.70E+00								
Benzo(k)fluoranthene	NA	7.30E-02	NA	8.30E+00								
Bis(2-Ethylhexyl)phthalate	1.00E-02	2.80E-02	NA	8.90E+02								
Butylbenzylphthalate	2.00E-01	NA	NA	1.60E+00								
Carbazole	NA	2.00E-02	NA	5.80E+00								
Chrysene	NA	7.30E-03	NA	1.30E+01								
Di-n-butylphthalate	9.00E-02	NA	NA	3.20E+01								
Dibenz(a,h)anthracene	NA	7.30E+00	NA	3.00E+00								
Dibenzofuran	NA	NA	NA	1.50E+00								
Diethyl phthalate	8.00E-01	NA	NA	1.30E-01								
Fluoranthene	4.00E-02	NA	NA	2.50E+01								
Fluorene	4.00E-02	NA	NA	7.60E-01								
Indeno(1,2,3-cd)pyrene	NA	7.30E-01	NA	7.50E+00								
N-Nitrosodiphenylamine	NA	4.90E-03	NA	6.60E-02								
Naphthalene	2.00E-02	NA	NA	1.30E+00								
Pentachlorophenol	3.00E-02	1.20E-01	0.01	4.90E+00					2.93E-07	2.93E-08	1E-05	4E-09
Phenanthrene	NA	NA	NA	2.30E+01								
Pyrene	3.00E-02	NA	NA	2.50E+01								
Pesticides/PCBs												
4,4'-DDD	NA	1.20E+00	NA	3.50E-02								
4,4'-DDE	NA	1.70E+00	NA	1.20E+00								
4,4'-DDT	1.00E-04	1.70E+00	NA	5.60E+00								
Alpha-Chlordane	5.00E-04	3.50E-01	NA	7.80E-01								
Aroclor-1254	1.80E-05	2.22E+00	0.06	9.10E+01					3.27E-05	3.27E-06	2E+00	7E-06
Aroclor-1260	1.80E-05	2.22E+00	0.06	3.10E+00					1.11E-06	1.11E-07	6E-02	2E-07
Beta-BHC	NA	1.80E+00	NA	3.10E-02								
Dieldrin	2.50E-05	3.20E+01	NA	1.10E+00								
Endosulfan I	6.00E-03	NA	NA	1.60E-01								
Endosulfan II	6.00E-03	NA	NA	3.00E-02								
Endosulfan sulfate	6.00E-03	NA	NA	2.00E-01								
Endrin	3.00E-04	NA	NA	3.20E-01								
Endrin aldehyde	NA	NA	NA	3.90E-01								
Endrin ketone	NA	NA	NA	3.70E-01								
Gamma-Chlordane	5.00E-04	3.50E-01	NA	9.50E-02								
Heptachlor	5.00E-04	4.50E+00	NA	3.40E-02								
Heptachlor epoxide	1.30E-05	9.10E+00	NA	3.60E-01								
Methoxychlor	5.00E-03	NA	NA	3.90E-01								
Nitroaromatics												
1,3-Dinitrobenzene	1.00E-04	NA	NA	1.80E-01								
2,4,6-Trinitrotoluene	5.00E-04	3.00E-02	NA	2.60E-01								
2,4-Dinitrotoluene	2.00E-03	6.80E-01	NA	1.90E+00								
2-amino-4,6-Dinitrotoluene	NA	NA	NA	3.20E-01								
4-amino-2,6-Dinitrotoluene	NA	NA	NA	3.00E-01								
RDX	3.00E-03	1.10E-01	NA	2.00E-01								
Tetryl	1.00E-02	NA	NA	8.20E-01								
Metals												
Aluminum	4.00E-02	NA	NA	6.11E+03								
Antimony	4.00E-04	NA	NA	2.61E+01								
Arsenic	2.40E-04	1.88E+00	0.001	3.36E+01					2.01E-07	2.01E-08	8E-04	4E-08
Barium	3.50E-02	NA	NA	3.56E+03								
Beryllium	2.00E-05	NA	NA	4.60E-01								
Cadmium	5.00E-05	NA	0.01	1.32E+02					7.90E-06		2E-01	
Calcium	NA	NA	NA	2.53E+05								
Chromium	3.00E-02	NA	NA	1.84E+03								
Cobalt	3.00E-03	NA	NA	3.71E+01								
Copper	2.40E-02	NA	NA	1.22E+03								
Cyanide	1.00E-02	NA	NA	2.87E+01								
Iron	6.00E-02	NA	NA	3.62E+05								
Lead	NA	NA	NA	1.20E+04								
Magnesium	NA	NA	NA	1.76E+04								
Manganese	1.50E-03	NA	NA	1.63E+03								
Mercury	3.00E-06	NA	NA	6.28E+01								
Nickel	8.00E-04	NA	NA	1.33E+03								
Potassium	NA	NA	NA	3.75E+03								
Silver	1.00E-03	NA	NA	5.70E-01								
Sodium	NA	NA	NA	1.53E+03								
Thallium	8.00E-05	NA	NA	7.00E+00								
Vanadium	7.00E-05	NA	NA	9.48E+02								
Zinc	7.50E-02	NA	NA	6.10E+03								
Total Hazard Quotient and Cancer Risk:											**2E+00**	**8E-06**

Assumptions for Future Indoor Park Worker

CF =	1E-06	kg/mg
SA =	5000	cm2
AF =	0.2	mg/cm2
EF =	153	days/year
ED =	7	years
BW =	70	kg
AT (Nc) =	2555	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
* 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 G-10
CALCULATION OF ABSORBED DOSE AND RISK FROM DERMAL CONTACT TO INDOOR DUST/DIRT
CENTRAL TENDENCY (CT)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

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

Variables (Assumptions for Each Receptor are Listed at the Bottom):
CS = Chemical Concentration in Air, from EPC Solids Data
CF = Conversion Factor
SA = Surface Area
AF = Soil to Skin Adherence Factor
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Dermal RfD	Carc. Slope Dermal	Absorption Factor*	EPC Solids	Future Construction Worker				Future Recreational Visitor (Child)			
					Absorbed Dose (mg/kg-day)		Hazard Quotient	Cancer Risk	Absorbed Dose (mg/kg-day)		Hazard Quotient	Cancer Risk
	(mg/kg-day)	(mg/kg-day)-1	(unitless)	(mg/kg)	(Nc)	(Car)			(Nc)	(Car)		
Volatile Organics												
Acetone	1.00E-01	NA	NA	4.00E-02								
Semivolatile Organics						Dermal Contact to Indoor Dust/Dirt Not Applicable for Future Construction Worker				Dermal Contact to Indoor Dust/Dirt Not Applicable for Future Recreational Visitor (Child)		
2,4-Dinitrotoluene	2.00E-03	6.80E-01	NA	3.60E-01								
2-Methylnaphthalene	4.00E-02	NA	NA	1.50E+00								
Acenaphthene	6.00E-02	NA	NA	1.40E+00								
Anthracene	3.00E-01	NA	NA	6.90E-01								
Benzo(a)anthracene	NA	7.30E-01	NA	5.20E+00								
Benzo(a)pyrene	NA	1.46E+01	NA	8.50E+00								
Benzo(b)fluoranthene	NA	7.30E-01	NA	1.10E+01								
Benzo(ghi)perylene	NA	NA	NA	8.70E+00								
Benzo(k)fluoranthene	NA	7.30E-02	NA	8.30E+00								
Bis(2-Ethylhexyl)phthalate	1.00E-02	2.80E-02	NA	8.90E+02								
Butylbenzylphthalate	2.00E-01	NA	NA	1.60E+00								
Carbazole	NA	2.00E-02	NA	5.80E+00								
Chrysene	NA	7.30E-03	NA	1.30E+01								
Di-n-butylphthalate	9.00E-02	NA	NA	3.20E+01								
Dibenz(a.h)anthracene	NA	7.30E+00	NA	3.00E+00								
Dibenzofuran	NA	NA	NA	1.50E+00								
Diethyl phthalate	8.00E-01	NA	NA	1.30E-01								
Fluoranthene	4.00E-02	NA	NA	2.50E+01								
Fluorene	4.00E-02	NA	NA	7.60E-01								
Indeno(1,2.3-cd)pyrene	NA	7.30E-01	NA	7.50E+00								
N-Nitrosodiphenylamine	NA	4.90E-03	NA	6.60E-02								
Naphthalene	2.00E-02	NA	NA	1.30E+00								
Pentachlorophenol	3.00E-02	1.20E-01	0.010	4.90E+00								
Phenanthrene	NA	NA	NA	2.30E+01								
Pyrene	3.00E-02	NA	NA	2.50E+01								
Pesticides/PCBs												
4.4'-DDD	NA	1.20E+00	NA	3.50E-02								
4.4'-DDE	NA	1.70E+00	NA	1.20E+00								
4.4'-DDT	1.00E-04	1.70E+00	NA	5.60E+00								
Alpha-Chlordane	5.00E-04	3.50E-01	NA	7.80E-01								
Aroclor-1254	1.80E-05	2.22E+00	0.060	9.10E+01								
Aroclor-1260	1.80E-05	2.22E+00	0.060	3.10E+00								
Beta-BHC	NA	1.80E+00	NA	3.10E-02								
Dieldrin	2.50E-05	3.20E+01	NA	1.10E+00								
Endosulfan I	6.00E-03	NA	NA	1.60E-01								
Endosulfan II	6.00E-03	NA	NA	3.00E-02								
Endosulfan sulfate	6.00E-03	NA	NA	2.00E-01								
Endrin	3.00E-04	NA	NA	3.20E-01								
Endrin aldehyde	NA	NA	NA	3.90E-01								
Endrin ketone	NA	NA	NA	3.70E-01								
Gamma-Chlordane	5.00E-04	3.50E-01	NA	9.50E-02								
Heptachlor	5.00E-04	4.50E+00	NA	3.40E-02								
Heptachlor epoxide	1.30E-05	9.10E+00	NA	3.60E-01								
Methoxychlor	5.00E-03	NA	NA	3.90E-01								
Nitroaromatics												
1.3-Dinitrobenzene	1.00E-04	NA	NA	1.80E-01								
2.4.6-Trinitrotoluene	5.00E-04	3.00E-02	NA	2.60E-01								
2.4-Dinitrotoluene	2.00E-03	6.80E-01	NA	1.90E+00								
2-amino-4.6-Dinitrotoluene	NA	NA	NA	3.20E-01								
4-amino-2.6-Dinitrotoluene	NA	NA	NA	3.00E-01								
RDX	3.00E-03	1.10E-01	NA	2.00E-01								
Tetryl	1.00E-02	NA	NA	8.20E-01								
Metals												
Aluminum	4.00E-02	NA	NA	6.11E+03								
Antimony	4.00E-04	NA	NA	2.61E+01								
Arsenic	2.40E-04	1.88E+00	0.001	3.36E+01								
Barium	3.50E-02	NA	NA	3.56E+03								
Beryllium	2.00E-05	NA	NA	4.60E-01								
Cadmium	5.00E-05	NA	0.010	1.32E+02								
Calcium	NA	NA	NA	2.53E+05								
Chromium	3.00E-02	NA	NA	1.84E+03								
Cobalt	3.00E-03	NA	NA	3.71E+01								
Copper	2.40E-02	NA	NA	1.22E+03								
Cyanide	1.00E-02	NA	NA	2.87E+01								
Iron	6.00E-02	NA	NA	3.62E+05								
Lead	NA	NA	NA	1.20E+04								
Magnesium	NA	NA	NA	1.76E+04								
Manganese	1.50E-03	NA	NA	1.63E+03								
Mercury	3.00E-06	NA	NA	6.28E+01								
Nickel	8.00E-04	NA	NA	1.33E+03								
Potassium	NA	NA	NA	3.75E+03								
Silver	1.00E-03	NA	NA	5.70E-01								
Sodium	NA	NA	NA	1.53E+03								
Thallium	8.00E-05	NA	NA	7.00E+00								
Vanadium	7.00E-05	NA	NA	9.48E+02								
Zinc	7.50E-02	NA	NA	6.10E+03								
Total Hazard Quotient and Cancer Risk:												

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 G-10
CALCULATION OF ABSORBED DOSE AND RISK FROM DERMAL CONTACT TO INDOOR DUST/DIRT
CENTRAL TENDENCY (CT)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

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

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):

CS = Chemical Concentration in Air, from EPC Solids Data
CF = Conversion Factor
SA = Surface Area
AF = Soil to Skin Adherence Factor
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Analyte	Dermal RfD (mg/kg-day)	Carc. Slope Dermal (mg/kg-day)-1	Absorption Factor* (unitless)	EPC Solids (mg/kg)	Future Resident (Adult) Absorbed Dose (mg/kg-day) (Nc)	Future Resident (Adult) Absorbed Dose (mg/kg-day) (Car)	Future Resident (Adult) Hazard Quotient	Future Resident (Adult) Cancer Risk	Future Resident (Child) Absorbed Dose (mg/kg-day) (Nc)	Future Resident (Child) Absorbed Dose (mg/kg-day) (Car)	Future Resident (Child) Hazard Quotient	Future Resident (Child) Cancer Risk
Volatile Organics												
Acetone	1.00E-01	NA	NA	4.00E-02	Dermal Contact to Indoor Dust/Dirt Not Applicable for Future Resident (Adult)				Dermal Contact to Indoor Dust/Dirt Not Applicable for Future Resident (Child)			
Semivolatile Organics												
2,4-Dinitrotoluene	2.00E-03	6.80E-01	NA	3.60E-01								
2-Methylnaphthalene	4.00E-02	NA	NA	1.50E+00								
Acenaphthene	6.00E-02	NA	NA	1.40E+00								
Anthracene	3.00E-01	NA	NA	6.90E-01								
Benzo(a)anthracene	NA	7.30E-01	NA	5.20E+00								
Benzo(a)pyrene	NA	1.46E+01	NA	8.50E+00								
Benzo(b)fluoranthene	NA	7.30E-01	NA	1.10E+01								
Benzo(ghi)perylene	NA	NA	NA	8.70E+00								
Benzo(k)fluoranthene	NA	7.30E-02	NA	8.30E+00								
Bis(2-Ethylhexyl)phthalate	1.00E-02	2.80E-02	NA	8.90E+02								
Butylbenzylphthalate	2.00E-01	NA	NA	1.60E+00								
Carbazole	NA	2.00E-02	NA	5.80E+00								
Chrysene	NA	7.30E-03	NA	1.30E+01								
Di-n-butylphthalate	9.00E-02	NA	NA	3.20E+01								
Dibenz(a,h)anthracene	NA	7.30E+00	NA	3.00E+00								
Dibenzofuran	NA	NA	NA	1.50E+00								
Diethyl phthalate	8.00E-01	NA	NA	1.30E-01								
Fluoranthene	4.00E-02	NA	NA	2.50E+01								
Fluorene	4.00E-02	NA	NA	7.60E-01								
Indeno(1,2,3-cd)pyrene	NA	7.30E-01	NA	7.50E+00								
N-Nitrosodiphenylamine	NA	4.90E-03	NA	6.60E-02								
Naphthalene	2.00E-02	NA	NA	1.30E+00								
Pentachlorophenol	3.00E-02	1.20E-01	0.010	4.90E+00								
Phenanthrene	NA	NA	NA	2.30E+01								
Pyrene	3.00E-02	NA	NA	2.50E+01								
Pesticides/PCBs												
4,4'-DDD	NA	1.20E+00	NA	3.50E-02								
4,4'-DDE	NA	1.70E+00	NA	1.20E+00								
4,4'-DDT	1.00E-04	1.70E+00	NA	5.60E+00								
Alpha-Chlordane	5.00E-04	3.50E-01	NA	7.80E-01								
Aroclor-1254	1.80E-05	2.22E+00	0.060	9.10E+01								
Aroclor-1260	1.80E-05	2.22E+00	0.060	3.10E+00								
Beta-BHC	NA	1.80E+00	NA	3.10E-02								
Dieldrin	2.50E-05	3.20E+01	NA	1.10E+00								
Endosulfan I	6.00E-03	NA	NA	1.60E-01								
Endosulfan II	6.00E-03	NA	NA	3.00E-02								
Endosulfan sulfate	6.00E-03	NA	NA	2.00E-01								
Endrin	3.00E-04	NA	NA	3.20E-01								
Endrin aldehyde	NA	NA	NA	3.90E-01								
Endrin ketone	NA	NA	NA	3.70E-01								
Gamma-Chlordane	5.00E-04	3.50E-01	NA	9.50E-02								
Heptachlor	5.00E-04	4.50E+00	NA	3.40E-02								
Heptachlor epoxide	1.30E-05	9.10E+00	NA	3.60E-01								
Methoxychlor	5.00E-03	NA	NA	3.90E-01								
Nitroaromatics												
1,3-Dinitrobenzene	1.00E-04	NA	NA	1.80E-01								
2,4,6-Trinitrotoluene	5.00E-04	3.00E-02	NA	2.60E-01								
2,4-Dinitrotoluene	2.00E-03	6.80E-01	NA	1.90E+00								
2-amino-4,6-Dinitrotoluene	NA	NA	NA	3.20E-01								
4-amino-2,6-Dinitrotoluene	NA	NA	NA	3.00E-01								
RDX	3.00E-03	1.10E-01	NA	2.00E-01								
Tetryl	1.00E-02	NA	NA	8.20E-01								
Metals												
Aluminum	4.00E-02	NA	NA	6.11E+03								
Antimony	4.00E-04	NA	NA	2.61E+01								
Arsenic	2.40E-04	1.88E+00	0.001	3.36E+01								
Barium	3.50E-02	NA	NA	3.56E+03								
Beryllium	2.00E-05	NA	NA	4.60E-01								
Cadmium	5.00E-05	NA	0.010	1.32E+02								
Calcium	NA	NA	NA	2.53E+05								
Chromium	3.00E-02	NA	NA	1.84E+03								
Cobalt	3.00E-03	NA	NA	3.71E+01								
Copper	2.40E-02	NA	NA	1.22E+03								
Cyanide	1.00E-02	NA	NA	2.87E+01								
Iron	6.00E-02	NA	NA	3.62E+05								
Lead	NA	NA	NA	1.20E+04								
Magnesium	NA	NA	NA	1.76E+04								
Manganese	1.50E-03	NA	NA	1.63E+03								
Mercury	3.00E-06	NA	NA	6.28E+01								
Nickel	8.00E-04	NA	NA	1.33E+03								
Potassium	NA	NA	NA	3.75E+03								
Silver	1.00E-03	NA	NA	5.70E-01								
Sodium	NA	NA	NA	1.53E+03								
Thallium	8.00E-05	NA	NA	7.00E+00								
Vanadium	7.00E-05	NA	NA	9.48E+02								
Zinc	7.50E-02	NA	NA	6.10E+03								
Total Hazard Quotient and Cancer Risk:												

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 G-11
CALCULATION OF INTAKE AND RISK FROM THE INGESTION OF SOIL
REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-4
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

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

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
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Oral RfD	Carc. Slope Oral	EPC Surface Soil	EPC from Total Soils	Current Site Worker				Future Outdoor Park Worker			
					Intake (mg/kg-day)		Hazard Quotient	Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Cancer Risk
	(mg/kg-day)	(mg/kg-day)-1	(mg/kg)	(mg/kg)	(Nc)	(Car)			(Nc)	(Car)		
Volatile Organics												
1.1-Dichloroethane	1.00E-01	NA	2.00E-03	2.00E-03	1.57E-10		2E-09		1.37E-09		1E-08	
1.2-Dichloroethene (total)	9.00E-03	NA	4.00E-03	4.00E-03	3.13E-10		3E-08		2.74E-09		3E-07	
Acetone	1.00E-01	NA	1.39E-02	9.52E-03	1.09E-09		1E-08		9.52E-09		1E-07	
Benzene	3.00E-03	2.90E-02	1.00E-03	1.00E-03	7.83E-11	2.80E-11	3E-08	8E-13	6.85E-10	2.45E-10	2E-07	7E-12
Chloroform	1.00E-02	6.10E-03	ND	6.73E-03								
Ethyl benzene	1.00E-01	NA	ND	1.00E-03								
Methyl butyl ketone	NA	NA	8.19E-03	6.64E-03								
Methylene chloride	6.00E-02	7.50E-03	3.00E-03	3.00E-03	2.35E-10	8.39E-11	4E-09	6E-13	2.05E-09	7.34E-10	3E-08	6E-12
Toluene	2.00E-01	NA	7.00E-03	6.45E-03	5.48E-10		3E-09		4.79E-09		2E-08	
Total Xylenes	2.00E+00	NA	ND	6.64E-03								
Trichloroethene	NA	1.10E-02	3.00E-03	3.00E-03		8.39E-11		9E-13		7.34E-10		8E-12
Semivolatile Organics												
2-Methylnaphthalene	4.00E-02	NA	3.50E-02	1.10E-01	2.74E-09		7E-08		2.40E-08		6E-07	
Acenaphthene	6.00E-02	NA	7.49E-02	8.80E-02	5.86E-09		1E-07		5.13E-08		9E-07	
Acenaphthylene	NA	NA	5.11E-02	1.01E-01								
Anthracene	3.00E-01	NA	7.54E-02	1.02E-01	5.90E-09		2E-08		5.16E-08		2E-07	
Benzo(a)anthracene	NA	7.30E-01	8.40E-02	1.27E-01		2.35E-09		2E-09		2.05E-08		2E-08
Benzo(a)pyrene	NA	7.30E+00	8.56E-02	1.20E-01		2.39E-09		2E-08		2.09E-08		2E-07
Benzo(b)fluoranthene	NA	7.30E-01	1.15E-01	1.25E-01		3.21E-09		2E-09		2.81E-08		2E-08
Benzo(ghi)perylene	NA	NA	8.56E-02	1.10E-01								
Benzo(k)fluoranthene	NA	7.30E-02	8.23E-02	1.06E-01		2.30E-09		2E-10		2.01E-08		1E-09
Bis(2-Ethylhexyl)phthalate	2.00E-02	1.40E-02	4.19E-01	2.59E-01	3.28E-08	1.17E-08	2E-06	2E-10	2.87E-07	1.02E-07	1E-05	1E-09
Butylbenzylphthalate	2.00E-01	NA	9.52E-02	1.10E-01	7.45E-09		4E-08		6.52E-08		3E-07	
Carbazole	NA	2.00E-02	8.12E-02	1.04E-01		2.27E-09		5E-11		1.99E-08		4E-10
Chrysene	NA	7.30E-03	9.49E-02	1.25E-01		2.65E-09		2E-11		2.32E-08		2E-10
Di-n-butylphthalate	1.00E-01	NA	8.74E-02	8.15E-02	6.84E-09		7E-08		5.99E-08		6E-07	
Di-n-octylphthalate	2.00E-02	NA	5.28E-02	4.40E-02	4.13E-09		2E-07		3.62E-08		2E-06	
Dibenz(a.h)anthracene	NA	7.30E+00	7.97E-02	1.02E-01		2.23E-09		2E-08		1.95E-08		1E-07
Dibenzofuran	NA	NA	5.76E-02	5.80E-02								
Diethyl phthalate	8.00E-01	NA	2.20E-02	2.20E-02	1.72E-09		2E-09		1.51E-08		2E-08	
Fluoranthene	4.00E-02	NA	1.09E-01	1.28E-01	8.53E-09		2E-07		7.47E-08		2E-06	
Fluorene	4.00E-02	NA	7.25E-02	9 94E-02	5.68E-09		1E-07		4.97E-08		1E-06	
Indeno(1.2.3-cd)pyrene	NA	7.30E-01	8.63E-02	1.12E-01		2.41E-09		2E-09		2.11E-08		2E-08
N-Nitrosodiphenylamine	NA	4.90E-03	1.90E-02	1.90E-02		5.31E-10		3E-12		4.65E-09		2E-11
Naphthalene	2.00E-02	NA	7.37E-02	1.06E-01	5.77E-09		3E-07		5.05E-08		3E-06	
Phenanthrene	NA	NA	9.51E-02	1.38E-01								
Phenol	6.00E-01	NA	1.70E-02	1.70E-02	1.33E-09		2E-09		1.16E-08		2E-08	
Pyrene	3.00E-02	NA	1.15E-01	1.39E-01	9.00E-09		3E-07		7.88E-08		3E-06	
Pesticides/PCBs												
4.4'-DDD	NA	2.40E-01	4.52E-03	3.03E-03		1.26E-10		3E-11		1.11E-09		3E-10
4.4'-DDE	NA	3.40E-01	5.66E-03	3.56E-03		1.58E-10		5E-11		1.38E-09		5E-10
4.4'-DDT	5.00E-04	3.40E-01	7.12E-03	3.94E-03	5.57E-10	1.99E-10	1E-06	7E-11	4.88E-09	1.74E-09	1E-05	6E-10
Aldrin	3.00E-05	1.70E+01	1.32E-03	1.12E-03	1.03E-10	3.69E-11	3E-06	6E-10	9.04E-10	3.23E-10	3E-05	5E-09
Alpha-BHC	NA	6.30E+00	1.35E-03	1.13E-03		3.77E-11		2E-10		3.30E-10		2E-09
Alpha-Chlordane	5.00E-04	3.50E-01	1.41E-03	1.18E-03	1.10E-10	3.94E-11	2E-07	1E-11	9.66E-10	3.45E-10	2E-06	1E-10
Aroclor-1248	NA	NA	ND	2.15E-02								
Aroclor-1254	2.00E-05	2.00E+00	3.96E-02	3.10E-02	3.10E-09	1.11E-09	2E-04	2E-09	2.71E-08	9.69E-09	1E-03	2E-08
Aroclor-1260	2.00E-05	2.00E+00	2.71E-02	2.22E-02	2.12E-09	7.58E-10	1E-04	2E-09	1.86E-08	6.63E-09	9E-04	1E-08
Beta-BHC	NA	1.80E+00	1.60E-03	1.25E-03		4.47E-11		8E-11		3.91E-10		7E-10
Delta-BHC	NA	NA	ND	1.11E-03								
Dieldrin	5.00E-05	1.60E+01	2.79E-03	2.26E-03	2.18E-10	7.80E-11	4E-06	1E-09	1.91E-09	6.82E-10	4E-05	1E-08
Endosulfan I	6.00E-03	NA	1.32E-03	1.13E-03	1.03E-10		2E-08		9.04E-10		2E-07	
Endosulfan II	6.00E-03	NA	2.62E-03	2.18E-03	2.05E-10		3E-08		1.79E-09		3E-07	
Endosulfan sulfate	6.00E-03	NA	2.57E-03	2.16E-03	2.01E-10		3E-08		1.76E-09		3E-07	
Endrin	3.00E-04	NA	2.80E-03	2.34E-03	2.19E-10		7E-07		1.92E-09		6E-06	
Endrin aldehyde	NA	NA	2.93E-03	2.38E-03								
Endrin ketone	NA	NA	2.56E-03	2.17E-03								
Gamma-Chlordane	5.00E-04	3.50E-01	1.61E-03	1.24E-03	1.26E-10	4.50E-11	3E-07	2E-11	1.10E-09	3.94E-10	2E-06	1E-10
Heptachlor	5.00E-04	4.50E+00	1.36E-03	1.13E-03	1.06E-10	3.80E-11	2E-07	2E-10	9.32E-10	3.33E-10	2E-06	1E-09
Heptachlor epoxide	1.30E-05	9.10E+00	1.40E-03	1.15E-03	1.10E-10	3.91E-11	8E-06	4E-10	9.59E-10	3.42E-10	7E-05	3E-09
Herbicides												
Dicamba	3.00E-02	NA	ND	3.36E-03								
Nitroaromatics												
1.3.5-Trinitrobenzene	3.00E-02	NA	6.88E-02	6.28E-02	5.39E-09		2E-07		4.71E-08		2E-06	
2.4.6-Trinitrotoluene	5.00E-04	3.00E-02	6.81E-02	6.26E-02	5.33E-09	1.90E-09	1E-05	6E-11	4.66E-08	1.67E-08	9E-05	5E-10
2.4-Dinitrotoluene	2.00E-03	6.80E-01	6.95E-02	6.47E-02	5.44E-09	1.94E-09	3E-06	1E-09	4.76E-08	1.70E-08	2E-05	1E-08
2-amino-4.6-Dinitrotoluene	NA	NA	6.83E-02	6.27E-02								
4-Nitrotoluene	1.00E-02	NA	7.30E-02	6.39E-02	5.71E-09		6E-07		5.00E-08		5E-06	
Metals												
Antimony	4.00E-04	NA	9.11E+00	5.95E+00	7.13E-07		2E-03		6.24E-06		2E-02	
Chromium	1.50E+00	NA	1.19E+03	3.78E+02	9.32E-05		6E-05		8.15E-04		5E-04	
Chromium, Hexavalent	3.00E-03	NA	1.02E+01	1.02E+01	7.98E-07		3E-04		6.99E-06		2E-03	
Copper	4.00E-02	NA	3.87E+02	1.67E+02	3.03E-05		8E-04		2.65E-04		7E-03	
Cyanide	2.00E-02	NA	4.30E-01	3.40E-01	3.37E-08		2E-06		2.95E-07		1E-05	
Lead	NA	NA	6.85E+01	3.73E+01								
Mercury	3.00E-04	NA	1.00E-01	6.00E-02	7.83E-09		3E-05		6.85E-08		2E-04	
Thallium	8.00E-05	NA	1.40E+00	1.27E+00	1.10E-07		1E-03		9.59E-07		1E-02	
Zinc	3.00E-01	NA	2.44E+02	1.66E+02	1.91E-05		6E-05		1.67E-04		6E-04	
Total Hazard Quotient and Cancer Risk:							**5E-03**	**5E-08**			**4E-02**	**4E-07**

Assumptions for Current Site Worker			Assumptions for Future Outdoor Park Worker		
CF =	1E-06	kg/mg	CF =	1E-06	kg/mg
CS =	EPC Surface Only		CS =	EPC Surface Only	
BW =	70	kg	BW =	70	kg
IR =	100	mg soil/day	IR =	100	mg soil/day
FI =	1	unitless	FI =	1	unitless
EF =	20	days/year	EF =	175	days/year
ED =	25	years	ED =	25	years
AT (Nc) =	9.125	days	AT (Nc) =	9.125	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.
ND= Compound not detected.

TABLE G-11
CALCULATION OF INTAKE AND RISK FROM THE INGESTION OF SOIL
REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-4
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

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

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
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Oral RfD	Carc. Slope Oral	EPC Surface Soil	EPC from Total Soils	Future Recreational Visitor (Child)				Future Construction Worker			
					Intake (mg/kg-day)		Hazard Quotient	Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Cancer Risk
	(mg/kg-day)	(mg/kg-day)-1	(mg/kg)	(mg/kg)	(Nc)	(Car)			(Nc)	(Car)		
Volatile Organics												
1,1-Dichloroethane	1.00E-01	NA	2.00E-03	2.00E-03	1.02E-09		1E-08		9.39E-09		9E-08	
1,2-Dichloroethene (total)	9.00E-03	NA	4.00E-03	4.00E-03	2.05E-09		2E-07		1.88E-08		2E-06	
Acetone	1.00E-01	NA	1.39E-02	9.52E-03	7.11E-09		7E-08		4.47E-08		4E-07	
Benzene	3.00E-03	2.90E-02	1.00E-03	1.00E-03	5.11E-10	3.65E-11	2E-07	1E-12	4.70E-09	6.71E-11	2E-06	2E-12
Chloroform	1.00E-02	6.10E-03	ND	6.73E-03					3.16E-08	4.52E-10	3E-06	3E-12
Ethyl benzene	1.00E-01	NA	ND	1.00E-03					4.70E-09		5E-08	
Methyl butyl ketone	NA	NA	8.19E-03	6.64E-03								
Methylene chloride	6.00E-02	7.50E-03	3.00E-03	3.00E-03	1.53E-09	1.10E-10	3E-08	8E-13	1.41E-08	2.01E-10	2E-07	2E-12
Toluene	2.00E-01	NA	7.00E-03	6.45E-03	3.58E-09		2E-08		3.03E-08		2E-07	
Total Xylenes	2.00E+00	NA	ND	6.64E-03					3.12E-08		2E-08	
Trichloroethene	NA	1.10E-02	3.00E-03	3.00E-03		1.10E-10		1E-12		2.01E-10		2E-12
Semivolatile Organics												
2-Methylnaphthalene	4.00E-02	NA	3.50E-02	1.10E-01	1.79E-08		4E-07		5.17E-07		1E-05	
Acenaphthene	6.00E-02	NA	7.49E-02	8.80E-02	3.83E-08		6E-07		4.13E-07		7E-06	
Acenaphthylene	NA	NA	5.11E-02	1.01E-01								
Anthracene	3.00E-01	NA	7.54E-02	1.02E-01	3.86E-08		1E-07		4.79E-07		2E-06	
Benzo(a)anthracene	NA	7.30E-01	8.40E-02	1.27E-01		3.07E-09		2E-09		8.52E-09		6E-09
Benzo(a)pyrene	NA	7.30E+00	8.56E-02	1.20E-01		3.13E-09		2E-08		8.05E-09		6E-08
Benzo(b)fluoranthene	NA	7.30E-01	1.15E-01	1.25E-01		4.20E-09		3E-09		8.39E-09		6E-09
Benzo(ghi)perylene	NA	NA	8.56E-02	1.10E-01								
Benzo(k)fluoranthene	NA	7.30E-02	8.23E-02	1.06E-01		3.01E-09		2E-10		7.11E-09		5E-10
Bis(2-Ethylhexyl)phthalate	2.00E-02	1.40E-02	4.19E-01	2.59E-01	2.14E-07	1.53E-08	1E-05	2E-10	1.22E-06	1.74E-08	6E-05	2E-10
Butylbenzylphthalate	2.00E-01	NA	9.52E-02	1.10E-01	4.87E-08		2E-07		5.17E-07		3E-06	
Carbazole	NA	2.00E-02	8.12E-02	1.04E-01		2.97E-09		6E-11		6.98E-09		1E-10
Chrysene	NA	7.30E-03	9.49E-02	1.25E-01		3.47E-09		3E-11		8.39E-09		6E-11
Di-n-butylphthalate	1.00E-01	NA	8.74E-02	8.15E-02	4.47E-08		4E-07		3.83E-07		4E-06	
Di-n-octylphthalate	2.00E-02	NA	5.28E-02	4.40E-02	2.70E-08		1E-06		2.07E-07		1E-05	
Dibenz(a,h)anthracene	NA	7.30E+00	7.97E-02	1.02E-01		2.91E-09		2E-08		6.84E-09		5E-08
Dibenzofuran	NA	NA	5.76E-02	5.80E-02								
Diethyl phthalate	8.00E-01	NA	2.20E-02	2.20E-02	1.13E-08		1E-08		1.03E-07		1E-07	
Fluoranthene	4.00E-02	NA	1.09E-01	1.28E-01	5.57E-08		1E-06		6.01E-07		2E-05	
Fluorene	4.00E-02	NA	7.25E-02	9.94E-02	3.71E-08		9E-07		4.67E-07		1E-05	
Indeno(1,2,3-cd)pyrene	NA	7.30E-01	8.63E-02	1.12E-01		3.15E-09		2E-09		7.51E-09		5E-09
N-Nitrosodiphenylamine	NA	4.90E-03	1.90E-02	1.90E-02		6.94E-10		3E-12		1.27E-09		6E-12
Naphthalene	2.00E-02	NA	7.37E-02	1.06E-01	3.77E-08		2E-06		4.98E-07		2E-05	
Phenanthrene	NA	NA	9.51E-02	1.38E-01								
Phenol	6.00E-01	NA	1.70E-02	1.70E-02	8.69E-09		1E-08		7.98E-08		1E-07	
Pyrene	3.00E-02	NA	1.15E-01	1.39E-01	5.88E-08		2E-06		6.53E-07		2E-05	
Pesticides/PCBs												
4,4'-DDD	NA	2.40E-01	4.52E-03	3.03E-03		1.65E-10		4E-11		2.03E-10		5E-11
4,4'-DDE	NA	3.40E-01	5.66E-03	3.56E-03		2.07E-10		7E-11		2.39E-10		8E-11
4,4'-DDT	5.00E-04	3.40E-01	7.12E-03	3.94E-03	3.64E-09	2.60E-10	7E-06	9E-11	1.85E-08	2.64E-10	4E-05	9E-11
Aldrin	3.00E-05	1.70E+01	1.32E-03	1.12E-03	6.75E-10	4.82E-11	2E-05	8E-10	5.26E-09	7.51E-11	2E-04	1E-09
Alpha-BHC	NA	6.30E+00	1.35E-03	1.13E-03		4.93E-11		3E-10		7.58E-11		5E-10
Alpha-Chlordane	5.00E-04	3.50E-01	1.41E-03	1.18E-03	7.21E-10	5.15E-11	1E-06	2E-11	5.54E-09	7.92E-11	1E-05	3E-11
Aroclor-1248	NA	NA	ND	2.15E-02								
Aroclor-1254	2.00E-05	2.00E+00	3.96E-02	3.10E-02	2.03E-08	1.45E-09	1E-03	3E-09	1.46E-07	2.08E-09	7E-03	4E-09
Aroclor-1260	2.00E-05	2.00E+00	2.71E-02	2.22E-02	1.39E-08	9.90E-10	7E-04	2E-09	1.04E-07	1.49E-09	5E-03	3E-09
Beta-BHC	NA	1.80E+00	1.60E-03	1.25E-03		5.84E-11		1E-10		8.39E-11		2E-10
Delta-BHC	NA	NA	ND	1.11E-03								
Dieldrin	5.00E-05	1.60E+01	2.79E-03	2.26E-03	1.43E-09	1.02E-10	3E-05	2E-09	1.06E-08	1.52E-10	2E-04	2E-09
Endosulfan I	6.00E-03	NA	1.32E-03	1.13E-03	6.75E-10		1E-07		5.31E-09		9E-07	
Endosulfan II	6.00E-03	NA	2.62E-03	2.18E-03	1.34E-09		2E-07		1.02E-08		2E-06	
Endosulfan sulfate	6.00E-03	NA	2.57E-03	2.16E-03	1.31E-09		2E-07		1.01E-08		2E-06	
Endrin	3.00E-04	NA	2.80E-03	2.34E-03	1.43E-09		5E-06		1.10E-08		4E-05	
Endrin aldehyde	NA	NA	2.93E-03	2.38E-03								
Endrin ketone	NA	NA	2.56E-03	2.17E-03								
Gamma-Chlordane	5.00E-04	3.50E-01	1.61E-03	1.24E-03	8.23E-10	5.88E-11	2E-06	2E-11	5.82E-09	8.32E-11	1E-05	3E-11
Heptachlor	5.00E-04	4.50E+00	1.36E-03	1.13E-03	6.96E-10	4.97E-11	1E-06	2E-10	5.31E-09	7.58E-11	1E-05	3E-10
Heptachlor epoxide	1.30E-05	9.10E+00	1.40E-03	1.15E-03	7.16E-10	5.11E-11	6E-05	5E-10	5.40E-09	7.72E-11	4E-04	7E-10
Herbicides												
Dicamba	3.00E-02	NA	ND	3.36E-03					1.58E-08		5E-07	
Nitroaromatics												
1,3,5-Trinitrobenzene	3.00E-02	NA	6.88E-02	6.28E-02	3.52E-08		1E-06		2.95E-07		1E-05	
2,4,6-Trinitrotoluene	5.00E-04	3.00E-02	6.81E-02	6.26E-02	3.48E-08	2.49E-09	7E-05	7E-11	2.94E-07	4.20E-09	6E-04	1E-10
2,4-Dinitrotoluene	2.00E-03	6.80E-01	6.95E-02	6.47E-02	3.55E-08	2.54E-09	2E-05	2E-09	3.04E-07	4.34E-09	2E-04	3E-09
2-amino-4,6-Dinitrotoluene	NA	NA	6.83E-02	6.27E-02								
4-Nitrotoluene	1.00E-02	NA	7.30E-02	6.39E-02	3.73E-08		4E-06		3.00E-07		3E-05	
Metals												
Antimony	4.00E-04	NA	9.11E+00	5.95E+00	4.66E-06		1E-02		2.79E-05		7E-02	
Chromium	1.50E+00	NA	1.19E+03	3.78E+02	6.09E-04		4E-04		1.78E-03		1E-03	
Chromium, Hexavalent	3.00E-03	NA	1.02E+01	1.02E+01	5.22E-06		2E-03		4.79E-05		2E-02	
Copper	4.00E-02	NA	3.87E+02	1.67E+02	1.98E-04		5E-03		7.84E-04		2E-02	
Cyanide	2.00E-02	NA	4.30E-01	3.40E-01	2.20E-07		1E-05		1.60E-06		8E-05	
Lead	NA	NA	6.85E+01	3.73E+01								
Mercury	3.00E-04	NA	1.00E-01	6.00E-02	5.11E-08		2E-04		2.82E-07		9E-04	
Thallium	8.00E-05	NA	1.40E+00	1.27E+00	7.16E-07		9E-03		5.96E-06		7E-02	
Zinc	3.00E-01	NA	2.44E+02	1.66E+02	1.25E-04		4E-04		7.80E-04		3E-03	
Total Hazard Quotient and Cancer Risk:							3E-02	6E-08			2E-01	1E-07

Assumptions for Future Recreational Visitor (Child)		Assumptions for Future Construction Worker	
CF =	1E-06 kg/mg	CF =	1E-06 kg/mg
CS =	EPC Surface Only	CS =	EPC Surface and Subsurfa
BW =	15 kg	BW =	70 kg
IR =	200 mg soil/day	IR =	480 mg soil/day
FI =	1 unitless	FI =	1 unitless
EF =	14 days/year	EF =	250 days/year
ED =	5 years	ED =	1 years
AT (Nc) =	1,825 days	AT (Nc) =	365 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.
ND= Compound not detected.

TABLE G-11
CALCULATION OF INTAKE AND RISK FROM THE INGESTION OF SOIL
REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-4
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

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

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
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for 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)-1	EPC Surface Soil (mg/kg)	Future Resident (Adult) Intake (mg/kg-day) (Nc)	Future Resident (Adult) Intake (mg/kg-day) (Car)	Future Resident (Adult) Hazard Quotient	Future Resident (Adult) Contribution to Lifetime Cancer Risk	Future Resident (Child) Intake (mg/kg-day) (Nc)	Future Resident (Child) Intake (mg/kg-day) (Car)	Future Resident (Child) Hazard Quotient	Future Resident (Child) Contribution to Lifetime Cancer Risk	Resident Total Lifetime Cancer Risk
Volatile Organics												
1.1-Dichloroethane	1.00E-01	NA	2.00E-03	2.74E-09		3E-08		2.56E-08		3E-07		
1.2-Dichloroethene (total)	9.00E-03	NA	4.00E-03	5.48E-09		6E-07		5.11E-08		6E-06		
Acetone	1.00E-01	NA	1.39E-02	1.90E-08		2E-07		1.78E-07		2E-06		
Benzene	3.00E-03	2.90E-02	1.00E-03	1.37E-09	4.70E-10	5E-07	1E-11	1.28E-08	1.10E-09	4E-06	3E-11	5E-11
Chloroform	1.00E-02	6.10E-03	ND									
Ethyl benzene	1.00E-01	NA	ND									
Methyl butyl ketone	NA	NA	8.19E-03									
Methylene chloride	6.00E-02	7.50E-03	3.00E-03	4.11E-09	1.41E-09	7E-08	1E-11	3.84E-08	3.29E-09	6E-07	2E-11	4E-11
Toluene	2.00E-01	NA	7.00E-03	9.59E-09		5E-08		8.95E-08		4E-07		
Total Xylenes	2.00E+00	NA	ND									
Trichloroethene	NA	1.10E-02	3.00E-03		1.41E-09		2E-11		3.29E-09		4E-11	5E-11
Semivolatile Organics												
2-Methylnaphthalene	4.00E-02	NA	3.50E-02	4.79E-08		1E-06		4.47E-07		1E-05		
Acenaphthene	6.00E-02	NA	7.49E-02	1.03E-07		2E-06		9.58E-07		2E-05		
Acenaphthylene	NA	NA	5.11E-02									
Anthracene	3.00E-01	NA	7.54E-02	1.03E-07		3E-07		9.64E-07		3E-06		
Benzo(a)anthracene	NA	7.30E-01	8.40E-02		3.95E-08		3E-08		9.21E-08		7E-08	1E-07
Benzo(a)pyrene	NA	7.30E+00	8.56E-02		4.02E-08		3E-07		9.38E-08		7E-07	1E-06
Benzo(b)fluoranthene	NA	7.30E-01	1.15E-01		5.40E-08		4E-08		1.26E-07		9E-08	1E-07
Benzo(ghi)perylene	NA	NA	8.56E-02									
Benzo(k)fluoranthene	NA	7.30E-02	8.23E-02		3.87E-08		3E-09		9.02E-08		7E-09	9E-09
Bis(2-Ethylhexyl)phthalate	2.00E-02	1.40E-02	4.19E-01	5.74E-07	1.97E-07	3E-05	3E-09	5.36E-06	4.59E-07	3E-04	6E-09	9E-09
Butylbenzylphthalate	2.00E-01	NA	9.52E-02	1.30E-07		7E-07		1.22E-06		6E-06		
Carbazole	NA	2.00E-02	8.12E-02		3.81E-08		8E-10		8.90E-08		2E-09	3E-09
Chrysene	NA	7.30E-03	9.49E-02		4.46E-08		3E-10		1.04E-07		8E-10	1E-09
Di-n-butylphthalate	1.00E-01	NA	8.74E-02	1.20E-07		1E-06		1.12E-06		1E-05		
Di-n-octylphthalate	2.00E-02	NA	5.28E-02	7.23E-08		4E-06		6.75E-07		3E-05		
Dibenz(a.h)anthracene	NA	7.30E+00	7.97E-02		3.74E-08		3E-07		8.73E-08		6E-07	9E-07
Dibenzofuran	NA	NA	5.76E-02									
Diethyl phthalate	8.00E-01	NA	2.20E-02	3.01E-08		4E-08		2.81E-07		4E-07		
Fluoranthene	4.00E-02	NA	1.09E-01	1.49E-07		4E-06		1.39E-06		3E-05		
Fluorene	4.00E-02	NA	7.25E-02	9.93E-08		2E-06		9.27E-07		2E-05		
Indeno(1.2.3-cd)pyrene	NA	7.30E-01	8.63E-02		4.05E-08		3E-08		9.46E-08		7E-08	1E-07
N-Nitrosodiphenylamine	NA	4.90E-03	1.90E-02		8.92E-09		4E-11		2.08E-08		1E-10	1E-10
Naphthalene	2.00E-02	NA	7.37E-02	1.01E-07		5E-06		9.42E-07		5E-05		
Phenanthrene	NA	NA	9.51E-02									
Phenol	6.00E-01	NA	1.70E-02	2.33E-08		4E-08		2.17E-07		4E-07		
Pyrene	3.00E-02	NA	1.15E-01	1.58E-07		5E-06		1.47E-06		5E-05		
Pesticides/PCBs												
4.4'-DDD	NA	2.40E-01	4.52E-03		2.12E-09		5E-10		4.95E-09		1E-09	2E-09
4.4'-DDE	NA	3.40E-01	5.66E-03		2.66E-09		9E-10		6 20E-09		2E-09	3E-09
4.4'-DDT	5.00E-04	3.40E-01	7.12E-03	9.75E-09	3.34E-09	2E-05	1E-09	9.10E-08	7.80E-09	2E-04	3E-09	4E-09
Aldrin	3.00E-05	1.70E+01	1.32E-03	1.81E-09	6.20E-10	6E-05	1E-08	1.69E-08	1.45E-09	6E-04	2E-08	4E-08
Alpha-BHC	NA	6.30E+00	1.35E-03		6.34E-10		4E-09		1.48E-09		9E-09	1E-08
Alpha-Chlordane	5.00E-04	3.50E-01	1.41E-03	1.93E-09	6.62E-10	4E-06	2E-10	1.80E-08	1.55E-09	4E-05	5E-10	8E-10
Aroclor-1248	NA	NA	ND									
Aroclor-1254	2.00E-05	2.00E+00	3.96E-02	5.42E-08	1.86E-08	3E-03	4E-08	5.06E-07	4.34E-08	3E-02	9E-08	1E-07
Aroclor-1260	2.00E-05	2.00E+00	2.71E-02	3.71E-08	1.27E-08	2E-03	3E-08	3.46E-07	2.97E-08	2E-02	6E-08	8E-08
Beta-BHC	NA	1.80E+00	1.60E-03		7.51E-10		1E-09		1.75E-09		3E-09	5E-09
Delta-BHC	NA	NA	ND									
Dieldrin	5.00E-05	1.60E+01	2.79E-03	3.82E-09	1.31E-09	8E-05	2E-08	3.57E-08	3.06E-09	7E-04	5E-08	7E-08
Endosulfan I	6.00E-03	NA	1.32E-03	1.81E-09		3E-07		1.69E-08		3E-06		
Endosulfan II	6.00E-03	NA	2.62E-03	3.59E-09		6E-07		3.35E-08		6E-06		
Endosulfan sulfate	6.00E-03	NA	2.57E-03	3.52E-09		6E-07		3.29E-08		5E-06		
Endrin	3.00E-04	NA	2.80E-03	3.84E-09		1E-05		3.58E-08		1E-04		
Endrin aldehyde	NA	NA	2.93E-03									
Endrin ketone	NA	NA	2.56E-03									
Gamma-Chlordane	5.00E-04	3.50E-01	1.61E-03	2.21E-09	7.56E-10	4E-06	3E-10	2.06E-08	1.76E-09	4E-05	6E-10	9E-10
Heptachlor	5.00E-04	4.50E+00	1.36E-03	1.86E-09	6.39E-10	4E-06	3E-09	1.74E-08	1.49E-09	3E-05	7E-09	1E-08
Heptachlor epoxide	1.30E-05	9.10E+00	1.40E-03	1.92E-09	6.58E-10	1E-04	6E-09	1.79E-08	1.53E-09	1E-03	1E-08	2E-08
Herbicides												
Dicamba	3.00E-02	NA	ND									
Nitroaromatics												
1.3.5-Trinitrobenzene	3.00E-02	NA	6.88E-02	9.42E-08		3E-06		8.80E-07		3E-05		
2.4.6-Trinitrotoluene	5.00E-04	3.00E-02	6.81E-02	9.33E-08	3.20E-08	2E-04	1E-09	8.71E-07	7.46E-08	2E-03	2E-09	3E-09
2.4-Dinitrotoluene	2.00E-03	6.80E-01	6.95E-02	9.52E-08	3.26E-08	5E-05	2E-08	8.89E-07	7.62E-08	4E-04	5E-08	7E-08
2-amino-4.6-Dinitrotoluene	NA	NA	6.83E-02									
4-Nitrotoluene	1.00E-02	NA	7.30E-02	1.00E-07		1E-05		9.33E-07		9E-05		
Metals												
Antimony	4.00E-04	NA	9.11E+00	1.25E-05		3E-02		1.16E-04		3E-01		
Chromium	1.50E+00	NA	1.19E+03	1.63E-03		1E-03		1.52E-02		1E-02		
Chromium. Hexavalent	3.00E-03	NA	1.02E+01	1.40E-05		5E-03		1.30E-04		4E-02		
Copper	4.00E-02	NA	3.87E+02	5.30E-04		1E-02		4.95E-03		1E-01		
Cyanide	2.00E-02	NA	4.30E-01	5.89E-07		3E-05		5.50E-06		3E-04		
Lead	NA	NA	6.85E+01									
Mercury	3.00E-04	NA	1.00E-01	1.37E-07		5E-04		1.28E-06		4E-03		
Thallium	8.00E-05	NA	1.40E+00	1.92E-06		2E-02		1.79E-05		2E-01		
Zinc	3.00E-01	NA	2.44E+02	3.34E-04		1E-03		3.12E-03		1E-02		
Total Hazard Quotient and Cancer Risk:						**8E-02**				**8E-01**		**3E-06**

Assumptions for Future Resident (Adult)		Assumptions for Future Resident (Child)	
CF =	1E-06 kg/mg	CF =	1E-06 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) =	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.
ND= Compound not detected.

TABLE G-12
CALCULATION OF INTAKE AND RISK FROM THE INGESTION OF SOIL
CENTRAL TENDENCY (CT)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

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

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
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Oral RfD (mg/kg-day)	Carc. Slope Oral mg/kg-day)-1	EPC Surface Soil (mg/kg)	EPC from Total Soils (mg/kg)	Current Site Worker				Future Outdoor Park Worker			
					Intake (mg/kg-day) (Nc)	Intake (mg/kg-day) (Car)	Hazard Quotient	Cancer Risk	Intake (mg/kg-day) (Nc)	Intake (mg/kg-day) (Car)	Hazard Quotient	Cancer Risk
Volatile Organics												
1.1-Dichloroethane	1.00E-01	NA	2.00E-03	2.00E-03	3.91E-11		4E-10		5.99E-10		6E-09	
1.2-Dichloroethene (total)	9.00E-03	NA	4.00E-03	4.00E-03	7.83E-11		9E-09		1.20E-09		1E-07	
Acetone	1.00E-01	NA	1.39E-02	9.52E-03	2.72E-10		3E-09		4.16E-09		4E-08	
Benzene	3.00E-03	2.90E-02	1.00E-03	1.00E-03	1.96E-11	1.96E-12	7E-09	6E-14	2.99E-10	2.99E-11	1E-07	9E-13
Chloroform	1.00E-02	6.10E-03	ND	6.73E-03								
Ethyl benzene	1.00E-01	NA	ND	1.00E-03								
Methyl butyl ketone	NA	NA	8.19E-03	6.64E-03								
Methylene chloride	6.00E-02	7.50E-03	3.00E-03	3.00E-03	5.87E-11	5.87E-12	1E-09	4E-14	8.98E-10	8.98E-11	1E-08	7E-13
Toluene	2.00E-01	NA	7.00E-03	6.45E-03	1.37E-10		7E-10		2.10E-09		1E-08	
Total Xylenes	2.00E+00	NA	ND	6.64E-03								
Trichloroethene	NA	1.10E-02	3.00E-03	3.00E-03		5.87E-12		6E-14		8.98E-11		1E-12
Semivolatile Organics												
2-Methylnaphthalene	4.00E-02	NA	3.50E-02	1.10E-01	6.85E-10		2E-08		1.05E-08		3E-07	
Acenaphthene	6.00E-02	NA	7.49E-02	8.80E-02	1.47E-09		2E-08		2.24E-08		4E-07	
Acenaphthylene	NA	NA	5.11E-02	1.01E-01								
Anthracene	3.00E-01	NA	7.54E-02	1.02E-01	1.48E-09		5E-09		2.26E-08		8E-08	
Benzo(a)anthracene	NA	7.30E-01	8.40E-02	1.27E-01		1.64E-10		1E-10		2.52E-09		2E-09
Benzo(a)pyrene	NA	7.30E+00	8.56E-02	1.20E-01		1.68E-10		1E-09		2.56E-09		2E-08
Benzo(b)fluoranthene	NA	7.30E-01	1.15E-01	1.25E-01		2 25E-10		2E-10		3.44E-09		3E-09
Benzo(ghi)perylene	NA	NA	8.56E-02	1.10E-01								
Benzo(k)fluoranthene	NA	7.30E-02	8.23E-02	1.06E-01		1.61E-10		1E-11		2.46E-09		2E-10
Bis(2-Ethylhexyl)phthalate	2.00E-02	1.40E-02	4.19E-01	2.59E-01	8.20E-09	8.20E-10	4E-07	1E-11	1.25E-07	1 25E-08	6E-06	2E-10
Butylbenzylphthalate	2.00E-01	NA	9.52E-02	1.10E-01	1.86E-09		9E-09		2.85E-08		1E-07	
Carbazole	NA	2.00E-02	8.12E-02	1.04E-01		1.59E-10		3E-12		2.43E-09		5E-11
Chrysene	NA	7.30E-03	9.49E-02	1.25E-01		1.86E-10		1E-12		2.84E-09		2E-11
Di-n-butylphthalate	1.00E-01	NA	8.74E-02	8.15E-02	1.71E-09		2E-08		2.62E-08		3E-07	
Di-n-octylphthalate	2.00E-02	NA	5.28E-02	4.40E-02	1.03E-09		5E-08		1.58E-08		8E-07	
Dibenz(a.h)anthracene	NA	7.30E+00	7 97E-02	1.02E-01		1.56E-10		1E-09		2.39E-09		2E-08
Dibenzofuran	NA	NA	5.76E-02	5.80E-02								
Diethyl phthalate	8.00E-01	NA	2.20E-02	2.20E-02	4.31E-10		5E-10		6.59E-09		8E-09	
Fluoranthene	4.00E-02	NA	1.09E-01	1.28E-01	2.13E-09		5E-08		3.26E-08		8E-07	
Fluorene	4.00E-02	NA	7.25E-02	9.94E-02	1.42E-09		4E-08		2.17E-08		5E-07	
Indeno(1.2.3-cd)pyrene	NA	7.30E-01	8.63E-02	1.12E-01		1.69E-10		1E-10		2.58E-09		2E-09
N-Nitrosodiphenylamine	NA	4.90E-03	1.90E-02	1.90E-02		3.72E-11		2E-13		5.69E-10		3E-12
Naphthalene	2.00E-02	NA	7.37E-02	1.06E-01	1.44E-09		7E-08		2.21E-08		1E-06	
Phenanthrene	NA	NA	9.51E-02	1.38E-01								
Phenol	6.00E-01	NA	1.70E-02	1.70E-02	3.33E-10		6E-10		5.09E-09		8E-09	
Pyrene	3.00E-02	NA	1.15E-01	1.39E-01	2.25E-09		8E-08		3.44E-08		1E-06	
Pesticides/PCBs												
4.4'-DDD	NA	2.40E-01	4.52E-03	3.03E-03		8.85E-12		2E-12		1.35E-10		3E-11
4.4'-DDE	NA	3.40E-01	5.66E-03	3.56E-03		1.11E-11		4E-12		1.69E-10		6E-11
4.4'-DDT	5.00E-04	3.40E-01	7.12E-03	3.94E-03	1.39E-10	1.39E-11	3E-07	5E-12	2.13E-09	2.13E-10	4E-06	7E-11
Aldrin	3.00E-05	1.70E+01	1.32E-03	1.12E-03	2.58E-11	2.58E-12	9E-07	4E-11	3.95E-10	3.95E-11	1E-05	7E-10
Alpha-BHC	NA	6.30E+00	1.35E-03	1.13E-03		2.64E-12		2E-11		4.04E-11		3E-10
Alpha-Chlordane	5.00E-04	3 50E-01	1.41E-03	1.18E-03	2.76E-11	2.76E-12	6E-08	1E-12	4.22E-10	4.22E-11	8E-07	1E-11
Aroclor-1248	NA	NA	ND	2.15E-02								
Aroclor-1254	2.00E-05	2.00E+00	3.96E-02	3.10E-02	7.75E-10	7.75E-11	4E-05	2E-10	1.19E-08	1.19E-09	6E-04	2E-09
Aroclor-1260	2.00E-05	2.00E+00	2.71E-02	2.22E-02	5.30E-10	5.30E-11	3E-05	1E-10	8.11E-09	8.11E-10	4E-04	2E-09
Beta-BHC	NA	1.80E+00	1.60E-03	1.25E-03		3.13E-12		6E-12		4.79E-11		9E-11
Delta-BHC	NA	NA	ND	1.11E-03								
Dieldrin	5.00E-05	1.60E+01	2.79E-03	2.26E-03	5.46E-11	5.46E-12	1E-06	9E-11	8.35E-10	8.35E-11	2E-05	1E-09
Endosulfan I	6.00E-03	NA	1.32E-03	1.13E-03	2.58E-11		4E-09		3.95E-10		7E-08	
Endosulfan II	6.00E-03	NA	2.62E-03	2.18E-03	5.13E-11		9E-09		7.84E-10		1E-07	
Endosulfan sulfate	6.00E-03	NA	2.57E-03	2.16E-03	5.03E-11		8E-09		7.69E-10		1E-07	
Endrin	3.00E-04	NA	2.80E-03	2.34E-03	5.48E-11		2E-07		8.38E-10		3E-06	
Endrin aldehyde	NA	NA	2.93E-03	2.38E-03								
Endrin ketone	NA	NA	2.56E-03	2.17E-03								
Gamma-Chlordane	5.00E-04	3.50E-01	1.61E-03	1.24E-03	3.15E-11	3.15E-12	6E-08	1E-12	4.82E-10	4.82E-11	1E-06	2E-11
Heptachlor	5.00E-04	4.50E+00	1.36E-03	1.13E-03	2.66E-11	2.66E-12	5E-08	1E-11	4.07E-10	4.07E-11	8E-07	2E-10
Heptachlor epoxide	1.30E-05	9.10E+00	1.40E-03	1.15E-03	2.74E-11	2.74E-12	2E-06	2E-11	4.19E-10	4.19E-11	3E-05	4E-10
Herbicides												
Dicamba	3.00E-02	NA	ND	3.36E-03								
Nitroaromatics												
1.3.5-Trinitrobenzene	3.00E-02	NA	6.88E-02	6.28E-02	1.35E-09		4E-08		2.06E-08		7E-07	
2.4.6-Trinitrotoluene	5.00E-04	3.00E-02	6.81E-02	6.26E-02	1.33E-09	1.33E-10	3E-06	4E-12	2.04E-08	2.04E-09	4E-05	6E-11
2.4-Dinitrotoluene	2.00E-03	6.80E-01	6.95E-02	6.47E-02	1.36E-09	1.36E-10	7E-07	9E-11	2.08E-08	2.08E-09	1E-05	1E-09
2-amino-4.6-Dinitrotoluene	NA	NA	6.83E-02	6.27E-02								
4-Nitrotoluene	1.00E-02	NA	7.30E-02	6.39E-02	1.43E-09		1E-07		2.19E-08		2E-06	
Metals												
Antimony	4.00E-04	NA	9.11E+00	5.95E+00	1.78E-07		4E-04		2.73E-06		7E-03	
Chromium	1.50E+00	NA	1.19E+03	3.78E+02	2.33E-05		2E-05		3.56E-04		2E-04	
Chromium. Hexavalent	3.00E-03	NA	1.02E+01	1.02E+01	2.00E-07		7E-05		3.05E-06		1E-03	
Copper	4.00E-02	NA	3.87E+02	1.67E+02	7.57E-06		2E-04		1.16E-04		3E-03	
Cyanide	2.00E-02	NA	4.30E-01	3.40E-01	8.41E-09		4E-07		1.29E-07		6E-06	
Lead	NA	NA	6.85E+01	3.73E+01								
Mercury	3.00E-04	NA	1.00E-01	6.00E-02	1.96E-09		7E-06		2.99E-08		1E-04	
Thallium	8.00E-05	NA	1.40E+00	1.27E+00	2.74E-08		3E-04		4.19E-07		5E-03	
Zinc	3.00E-01	NA	2.44E+02	1.66E+02	4.77E-06		2E-05		7.31E-05		2E-04	
Total Hazard Quotient and Cancer Risk:							**1E-03**	**3E-09**			**2E-02**	**5E-08**

Assumptions for Current Site Worker		Assumptions for Future Outdoor Park Worker	
CF =	1E-06 kg/mg	CF =	1E-06 kg/mg
CS =	EPC Surface Only	CS =	EPC Surface Only
BW =	70 kg	BW =	70 kg
IR =	50 mg soil/day	IR =	50 mg soil/day
FI =	1 unitless	FI =	1 unitless
EF =	10 days/year	EF =	153 days/year
ED =	7 years	ED =	7 years
AT (Nc) =	2555 days	AT (Nc) =	2555 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.
ND= Compound not detected.

TABLE G-12
CALCULATION OF INTAKE AND RISK FROM THE INGESTION OF SOIL
CENTRAL TENDENCY (CT)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

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

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
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Oral RfD	Carc. Slope Oral	EPC Surface Soil	EPC from Total Soils	Future Recreational Visitor (Child)				Future Construction Worker			
					Intake (mg/kg-day)		Hazard Quotient	Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Cancer Risk
	(mg/kg-day)	(mg/kg-day)-1	(mg/kg)	(mg/kg)	(Nc)	(Car)			(Nc)	(Car)		
Volatile Organics												
1,1-Dichloroethane	1.00E-01	NA	2.00E-03	2.00E-03	2.56E-10		3E-09		1.71E-09		2E-08	
1,2-Dichloroethene (total)	9.00E-03	NA	4.00E-03	4.00E-03	5.11E-10		6E-08		3.43E-09		4E-07	
Acetone	1.00E-01	NA	1.39E-02	9.52E-03	1.78E-09		2E-08		8.16E-09		8E-08	
Benzene	3.00E-03	2.90E-02	1.00E-03	1.00E-03	1.28E-10	1.83E-12	4E-08	5E-14	8.57E-10	1.22E-11	3E-07	4E-13
Chloroform	1.00E-02	6.10E-03	ND	6.73E-03					5.77E-09	8.24E-11	6E-07	5E-13
Ethyl benzene	1.00E-01	NA	ND	1.00E-03					8.57E-10		9E-09	
Methyl butyl ketone	NA	NA	8.19E-03	6.64E-03								
Methylene chloride	6.00E-02	7.50E-03	3.00E-03	3.00E-03	3.84E-10	5.48E-12	6E-09	4E-14	2.57E-09	3.67E-11	4E-08	3E-13
Toluene	2.00E-01	NA	7.00E-03	6.45E-03	8.95E-10		4E-09		5.53E-09		3E-08	
Total Xylenes	2.00E+00	NA	ND	6.64E-03					5.69E-09		3E-09	
Trichloroethene	NA	1.10E-02	3.00E-03	3.00E-03		5.48E-12		6E-14		3.67E-11		4E-13
Semivolatile Organics												
2-Methylnaphthalene	4.00E-02	NA	3.50E-02	1.10E-01	4.47E-09		1E-07		9.43E-08		2E-06	
Acenaphthene	6.00E-02	NA	7.49E-02	8.80E-02	9.58E-09		2E-07		7.54E-08		1E-06	
Acenaphthylene	NA	NA	5.11E-02	1.01E-01								
Anthracene	3.00E-01	NA	7.54E-02	1.02E-01	9 64E-09		3E-08		8.74E-08		3E-07	
Benzo(a)anthracene	NA	7.30E-01	8.40E-02	1.27E-01		1.53E-10		1E-10		1.56E-09		1E-09
Benzo(a)pyrene	NA	7.30E+00	8.56E-02	1.20E-01		1.56E-10		1E-09		1.47E-09		1E-08
Benzo(b)fluoranthene	NA	7.30E-01	1.15E-01	1.25E-01		2.10E-10		2E-10		1.53E-09		1E-09
Benzo(ghi)perylene	NA	NA	8.56E-02	1.10E-01								
Benzo(k)fluoranthene	NA	7.30E-02	8.23E-02	1.06E-01		1.50E-10		1E-11		1.30E-09		9E-11
Bis(2-Ethylhexyl)phthalate	2.00E-02	1.40E-02	4.19E-01	2.59E-01	5.36E-08	7.65E-10	3E-06	1E-11	2.22E-07	3.17E-09	1E-05	4E-11
Butylbenzylphthalate	2.00E-01	NA	9.52E-02	1.10E-01	1.22E-08		6E-08		9.43E-08		5E-07	
Carbazole	NA	2.00E-02	8.12E-02	1.04E-01		1.48E-10		3E-12		1.27E-09		3E-11
Chrysene	NA	7.30E-03	9.49E-02	1.25E-01		1.73E-10		1E-12		1.53E-09		1E-11
Di-n-butylphthalate	1.00E-01	NA	8.74E-02	8.15E-02	1.12E-08		1E-07		6.99E-08		7E-07	
Di-n-octylphthalate	2.00E-02	NA	5.28E-02	4.40E-02	6.75E-09		3E-07		3.77E-08		2E-06	
Dibenz(a,h)anthracene	NA	7.30E+00	7.97E-02	1.02E-01		1.46E-10		1E-09		1.25E-09		9E-09
Dibenzofuran	NA	NA	5.76E-02	5.80E-02								
Diethyl phthalate	8.00E-01	NA	2.20E-02	2.20E-02	2.81E-09		4E-09		1.89E-08		2E-08	
Fluoranthene	4.00E-02	NA	1.09E-01	1.28E-01	1.39E-08		3E-07		1.10E-07		3E-06	
Fluorene	4.00E-02	NA	7.25E-02	9 94E-02	9.27E-09		2E-07		8.52E-08		2E-06	
Indeno(1,2,3-cd)pyrene	NA	7.30E-01	8.63E-02	1.12E-01		1.58E-10		1E-10		1.37E-09		1E-09
N-Nitrosodiphenylamine	NA	4.90E-03	1.90E-02	1.90E-02		3.47E-11		2E-13		2.33E-10		1E-12
Naphthalene	2 00E-02	NA	7.37E-02	1.06E-01	9 42E-09		5E-07		9.09E-08		5E-06	
Phenanthrene	NA	NA	9.51E-02	1.38E-01								
Phenol	6.00E-01	NA	1.70E-02	1.70E-02	2.17E-09		4E-09		1.46E-08		2E-08	
Pyrene	3.00E-02	NA	1.15E-01	1.39E-01	1.47E-08		5E-07		1.19E-07		4E-06	
Pesticides/PCBs												
4,4'-DDD	NA	2.40E-01	4.52E-03	3.03E-03		8.26E-12		2E-12		3.71E-11		9E-12
4,4'-DDE	NA	3.40E-01	5.66E-03	3.56E-03		1.03E-11		4E-12		4.36E-11		1E-11
4,4'-DDT	5.00E-04	3.40E-01	7.12E-03	3.94E-03	9.10E-10	1.30E-11	2E-06	4E-12	3.38E-09	4.82E-11	7E-06	2E-11
Aldrin	3.00E-05	1.70E+01	1.32E-03	1.12E-03	1.69E-10	2.41E-12	6E-06	4E-11	9.60E-10	1.37E-11	3E-05	2E-10
Alpha-BHC	NA	6.30E+00	1.35E-03	1.13E-03		2.47E-12		2E-11		1.38E-11		9E-11
Alpha-Chlordane	5.00E-04	3.50E-01	1.41E-03	1.18E-03	1.80E-10	2.58E-12	4E-07	9E-13	1.01E-09	1.44E-11	2E-06	5E-12
Aroclor-1248	NA	NA	ND	2.15E-02								
Aroclor-1254	2.00E-05	2.00E+00	3.96E-02	3.10E-02	5.06E-09	7.23E-11	3E-04	1E-10	2.66E-08	3.80E-10	1E-03	8E-10
Aroclor-1260	2.00E-05	2.00E+00	2.71E-02	2.22E-02	3 46E-09	4.95E-11	2E-04	1E-10	1.90E-08	2.72E-10	1E-03	5E-10
Beta-BHC	NA	1.80E+00	1.60E-03	1.25E-03		2.92E-12		5E-12		1.53E-11		3E-11
Delta-BHC	NA	NA	ND	1.11E-03								
Dieldrin	5.00E-05	1.60E+01	2.79E-03	2.26E-03	3.57E-10	5.10E-12	7E-06	8E-11	1.94E-09	2.77E-11	4E-05	4E-10
Endosulfan I	6.00E-03	NA	1.32E-03	1.13E-03	1.69E-10		3E-08		9.69E-10		2E-07	
Endosulfan II	6.00E-03	NA	2.62E-03	2.18E-03	3.35E-10		6E-08		1.87E-09		3E-07	
Endosulfan sulfate	6.00E-03	NA	2.57E-03	2.16E-03	3.29E-10		5E-08		1.85E-09		3E-07	
Endrin	3.00E-04	NA	2.80E-03	2.34E-03	3.58E-10		1E-06		2.01E-09		7E-06	
Endrin aldehyde	NA	NA	2.93E-03	2.38E-03								
Endrin ketone	NA	NA	2.56E-03	2.17E-03								
Gamma-Chlordane	5.00E-04	3.50E-01	1.61E-03	1.24E-03	2.06E-10	2.94E-12	4E-07	1E-12	1.06E-09	1.52E-11	2E-06	5E-12
Heptachlor	5.00E-04	4.50E+00	1.36E-03	1.13E-03	1.74E-10	2.48E-12	3E-07	1E-11	9.69E-10	1.38E-11	2E-06	6E-11
Heptachlor epoxide	1.30E-05	9.10E+00	1.40E-03	1.15E-03	1.79E-10	2.56E-12	1E-05	2E-11	9.86E-10	1.41E-11	8E-05	1E-10
Herbicides												
Dicamba	3.00E-02	NA	ND	3.36E-03					2.88E-09		1E-07	
Nitroaromatics												
1,3,5-Trinitrobenzene	3.00E-02	NA	6.88E-02	6.28E-02	8.80E-09		3E-07		5.38E-08		2E-06	
2,4,6-Trinitrotoluene	5.00E-04	3.00E-02	6.81E-02	6.26E-02	8.71E-09	1.24E-10	2E-05	4E-12	5.37E-08	7.67E-10	1E-04	2E-11
2,4-Dinitrotoluene	2.00E-03	6.80E-01	6.95E-02	6.47E-02	8.89E-09	1.27E-10	4E-06	9E-11	5.55E-08	7.92E-10	3E-05	5E-10
2-amino-4,6-Dinitrotoluene	NA	NA	6.83E-02	6.27E-02								
4-Nitrotoluene	1.00E-02	NA	7.30E-02	6.39E-02	9.33E-09		9E-07		5.48E-08		5E-06	
Metals												
Antimony	4.00E-04	NA	9.11E+00	5.95E+00	1.16E-06		3E-03		5.10E-06		1E-02	
Chromium	1.50E+00	NA	1.19E+03	3.78E+02	1.52E-04		1E-04		3.24E-04		2E-04	
Chromium, Hexavalent	3.00E-03	NA	1.02E+01	1.02E+01	1.30E-06		4E-04		8.74E-06		3E-03	
Copper	4.00E-02	NA	3.87E+02	1.67E+02	4.95E-05		1E-03		1.43E-04		4E-03	
Cyanide	2.00E-02	NA	4.30E-01	3.40E-01	5.50E-08		3E-06		2.91E-07		1E-05	
Lead	NA	NA	6.85E+01	3.73E+01								
Mercury	3.00E-04	NA	1.00E-01	6.00E-02	1.28E-08		4E-05		5.14E-08		2E-04	
Thallium	8.00E-05	NA	1.40E+00	1.27E+00	1.79E-07		2E-03		1.09E-06		1E-02	
Zinc	3.00E-01	NA	2.44E+02	1.66E+02	3.12E-05		1E-04		1.42E-04		5E-04	
Total Hazard Quotient and Cancer Risk:							**8E-03**	**3E-09**			**4E-02**	**3E-08**

Assumptions for Future Recreational Visitor (Child)		Assumptions for Future Construction Worker	
CF =	1E-06 kg/mg	CF =	1E-06 kg/mg
CS =	EPC Surface Only	CS =	EPC Surface and Subsurface
BW =	15 kg	BW =	70 kg
IR =	100 mg soil/day	IR =	100 mg soil/day
FI =	1 unitless	FI =	1 unitless
EF =	7 days/year	EF =	219 days/year
ED =	1 years	ED =	1 years
AT (Nc) =	365 days	AT (Nc) =	365 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.
ND= Compound not detected.

TABLE G-12
CALCULATION OF INTAKE AND RISK FROM THE INGESTION OF SOIL
CENTRAL TENDENCY (CT)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

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

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
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor
Equation for Total Lifetime Cancer Risk = Adult Contribution + Child Contribution

Analyte	Oral RfD	Carc. Slope Oral	EPC Surface Soil	Future Resident (Adult)				Future Resident (Child)				Resident
	(mg/kg-day)	(mg/kg-day)-1	(mg/kg)	Intake (mg/kg-day) (Nc)	Intake (mg/kg-day) (Car)	Hazard Quotient	Contribution to Lifetime Cancer Risk	Intake (mg/kg-day) (Nc)	Intake (mg/kg-day) (Car)	Hazard Quotient	Contribution to Lifetime Cancer Risk	Total Lifetime Cancer Risk
Volatile Organics												
1,1-Dichloroethane	1.00E-01	NA	2.00E-03	9.16E-10		9E-09		8.55E-09		9E-08		
1,2-Dichloroethene (total)	9.00E-03	NA	4.00E-03	1.83E-09		2E-07		1.71E-08		2E-06		
Acetone	1.00E-01	NA	1.39E-02	6.37E-09		6E-08		5.94E-08		6E-07		
Benzene	3.00E-03	2.90E-02	1.00E-03	4.58E-10	4.58E-11	2E-07	1E-12	4.27E-09	1.22E-10	1E-06	4E-12	5E-12
Chloroform	1.00E-02	6.10E-03	ND									
Ethyl benzene	1.00E-01	NA	ND									
Methyl butyl ketone	NA	NA	8.19E-03									
Methylene chloride	6.00E-02	7.50E-03	3.00E-03	1.37E-09	1.37E-10	2E-08	1E-12	1.28E-08	3.66E-10	2E-07	3E-12	4E-12
Toluene	2.00E-01	NA	7.00E-03	3.21E-09		2E-08		2.99E-08		1E-07		
Total Xylenes	2.00E+00	NA	ND									
Trichloroethene	NA	1.10E-02	3.00E-03		1.37E-10		2E-12		3.66E-10		4E-12	6E-12
Semivolatile Organics												
2-Methylnaphthalene	4.00E-02	NA	3.50E-02	1.60E-08		4E-07		1.50E-07		4E-06		
Acenaphthene	6.00E-02	NA	7.49E-02	3.43E-08		6E-07		3.20E-07		5E-06		
Acenaphthylene	NA	NA	5.11E-02									
Anthracene	3.00E-01	NA	7.54E-02	3.45E-08		1E-07		3.22E-07		1E-06		
Benzo(a)anthracene	NA	7.30E-01	8.40E-02		3.85E-09		3E-09		1.03E-08		7E-09	1E-08
Benzo(a)pyrene	NA	7.30E+00	8.56E-02		3.92E-09		3E-08		1.05E-08		8E-08	1E-07
Benzo(b)fluoranthene	NA	7.30E-01	1.15E-01		5.27E-09		4E-09		1.40E-08		1E-08	1E-08
Benzo(ghi)perylene	NA	NA	8.56E-02									
Benzo(k)fluoranthene	NA	7.30E-02	8.23E-02		3.77E-09		3E-10		1.00E-08		7E-10	1E-09
Bis(2-Ethylhexyl)phthalate	2.00E-02	1.40E-02	4.19E-01	1.92E-07	1.92E-08	1E-05	3E-10	1.79E-06	5.12E-08	9E-05	7E-10	1E-09
Butylbenzylphthalate	2.00E-01	NA	9.52E-02	4.36E-08		2E-07		4.07E-07		2E-06		
Carbazole	NA	2.00E-02	8.12E-02		3.72E-09		7E-11		9.92E-09		2E-10	3E-10
Chrysene	NA	7.30E-03	9.49E-02		4.35E-09		3E-11		1.16E-08		8E-11	1E-10
Di-n-butylphthalate	1.00E-01	NA	8.74E-02	4.00E-08		4E-07		3.74E-07		4E-06		
Di-n-octylphthalate	2.00E-02	NA	5.28E-02	2.42E-08		1E-06		2.26E-07		1E-05		
Dibenz(a,h)anthracene	NA	7.30E+00	7.97E-02		3.65E-09		3E-08		9.73E-09		7E-08	1E-07
Dibenzofuran	NA	NA	5.76E-02									
Diethyl phthalate	8.00E-01	NA	2.20E-02	1.01E-08		1E-08		9.40E-08		1E-07		
Fluoranthene	4.00E-02	NA	1.09E-01	4.99E-08		1E-06		4.66E-07		1E-05		
Fluorene	4.00E-02	NA	7.25E-02	3.32E-08		8E-07		3.10E-07		8E-06		
Indeno(1,2,3-cd)pyrene	NA	7.30E-01	8.63E-02		3.95E-09		3E-09		1.05E-08		8E-09	1E-08
N-Nitrosodiphenylamine	NA	4.90E-03	1.90E-02		8.70E-10		4E-12		2.32E-09		1E-11	2E-11
Naphthalene	2.00E-02	NA	7.37E-02	3.37E-08		2E-06		3.15E-07		2E-05		
Phenanthrene	NA	NA	9.51E-02									
Phenol	6.00E-01	NA	1.70E-02	7.78E-09		1E-08		7.27E-08		1E-07		
Pyrene	3.00E-02	NA	1.15E-01	5.27E-08		2E-06		4.92E-07		2E-05		
Pesticides/PCBs												
4,4'-DDD	NA	2.40E-01	4.52E-03		2.07E-10		5E-11		5.52E-10		1E-10	2E-10
4,4'-DDE	NA	3.40E-01	5.66E-03		2.59E-10		9E-11		6.91E-10		2E-10	3E-10
4,4'-DDT	5.00E-04	3.40E-01	7.12E-03	3.26E-09	3.26E-10	7E-06	1E-10	3.04E-08	8.69E-10	6E-05	3E-10	4E-10
Aldrin	3.00E-05	1.70E+01	1.32E-03	6.04E-10	6.04E-11	2E-05	1E-09	5.64E-09	1.61E-10	2E-04	3E-09	4E-09
Alpha-BHC	NA	6.30E+00	1.35E-03		6.18E-11		4E-10		1.65E-10		1E-09	1E-09
Alpha-Chlordane	5.00E-04	3.50E-01	1.41E-03	6.46E-10	6.46E-11	1E-06	2E-11	6.03E-09	1.72E-10	1E-05	6E-11	8E-11
Aroclor-1248	NA	NA	ND									
Aroclor-1254	2.00E-05	2.00E+00	3.96E-02	1.81E-08	1.81E-09	9E-04	4E-09	1.69E-07	4.84E-09	8E-03	1E-08	1E-08
Aroclor-1260	2.00E-05	2.00E+00	2.71E-02	1.24E-08	1.24E-09	6E-04	2E-09	1.16E-07	3.31E-09	6E-03	7E-09	9E-09
Beta-BHC	NA	1.80E+00	1.60E-03		7.33E-11		1E-10		1.95E-10		4E-10	5E-10
Delta-BHC	NA	NA	ND									
Dieldrin	5.00E-05	1.60E+01	2.79E-03	1.28E-09	1.28E-10	3E-05	2E-09	1.19E-08	3.41E-10	2E-04	5E-09	7E-09
Endosulfan I	6.00E-03	NA	1.32E-03	6.04E-10		1E-07		5.64E-09		9E-07		
Endosulfan II	6.00E-03	NA	2.62E-03	1.20E-09		2E-07		1.12E-08		2E-06		
Endosulfan sulfate	6.00E-03	NA	2.57E-03	1.18E-09		2E-07		1.10E-08		2E-06		
Endrin	3.00E-04	NA	2.80E-03	1.28E-09		4E-06		1.20E-08		4E-05		
Endrin aldehyde	NA	NA	2.93E-03									
Endrin ketone	NA	NA	2.56E-03									
Gamma-Chlordane	5.00E-04	3.50E-01	1.61E-03	7.37E-10	7.37E-11	1E-06	3E-11	6.88E-09	1.97E-10	1E-05	7E-11	9E-11
Heptachlor	5.00E-04	4.50E+00	1.36E-03	6.23E-10	6.23E-11	1E-06	3E-10	5.81E-09	1.66E-10	1E-05	7E-10	1E-09
Heptachlor epoxide	1.30E-05	9.10E+00	1.40E-03	6.41E-10	6.41E-11	5E-05	6E-10	5.98E-09	1.71E-10	5E-04	2E-09	2E-09
Herbicides												
Dicamba	3.00E-02	NA	ND									
Nitroaromatics												
1,3,5-Trinitrobenzene	3.00E-02	NA	6.88E-02	3.15E-08		1E-06		2.94E-07		1E-05		
2,4,6-Trinitrotoluene	5.00E-04	3.00E-02	6.81E-02	3.12E-08	3.12E-09	6E-05	9E-11	2.91E-07	8.32E-09	6E-04	2E-10	3E-10
2,4-Dinitrotoluene	2.00E-03	6.80E-01	6.95E-02	3.18E-08	3.18E-09	2E-05	2E-09	2.97E-07	8.49E-09	1E-04	6E-09	8E-09
2-amino-4,6-Dinitrotoluene	NA	NA	6.83E-02									
4-Nitrotoluene	1.00E-02	NA	7.30E-02	3.34E-08		3E-06		3.12E-07		3E-05		
Metals												
Antimony	4.00E-04	NA	9.11E+00	4.17E-06		1E-02		3.89E-05		1E-01		
Chromium	1.50E+00	NA	1.19E+03	5.45E-04		4E-04		5.09E-03		3E-03		
Chromium, Hexavalent	3.00E-03	NA	1.02E+01	4.67E-06		2E-03		4.36E-05		1E-02		
Copper	4.00E-02	NA	3.87E+02	1.77E-04		4E-03		1.65E-03		4E-02		
Cyanide	2.00E-02	NA	4.30E-01	1.97E-07		1E-05		1.84E-06		9E-05		
Lead	NA	NA	6.85E+01									
Mercury	3.00E-04	NA	1.00E-01	4.58E-08		2E-04		4.27E-07		1E-03		
Thallium	8.00E-05	NA	1.40E+00	6.41E-07		8E-03		5.98E-06		7E-02		
Zinc	3.00E-01	NA	2.44E+02	1.12E-04		4E-04		1.04E-03		3E-03		
Total Hazard Quotient and Cancer Risk:						**3E-02**				**3E-01**		**3E-07**

Assumptions for Future Resident (Adult)			Assumptions for Future Resident (Child)		
CF =	1E-06	kg/mg	CF =	1E-06	kg/mg
CS =	EPC Surface Only		CS =	EPC Surface Only	
BW =	70	kg	BW =	15	kg
IR =	50	mg soil/day	IR =	100	mg soil/day
FI =	1	unitless	FI =	1	unitless
EF =	234	days/year	EF =	234	days/year
ED =	7	years	ED =	2	years
AT (Nc) =	2555	days	AT (Nc) =	730	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.
ND= Compound not detected.

TABLE G-13
CALCULATION OF ABSORBED DOSE AND RISK FROM DERMAL CONTACT TO SOIL
REASONABLE MAXIMUM EXPOSURE (RME)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Equation for Intake (mg/kg-day) = $\frac{CS \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$

Variables (Assumptions for Each Receptor are Listed at the Bottom):
CS = Chemical Concentration in Soil, from Soil EPC Data
CF = Conversion Factor
SA = Surface Area Contact
AF = Adherence Factor
ABS = Absorption Factor
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

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)-1	Absorption Factor* (unitless)	EPC Surface Soil (mg/kg)	EPC from Total Soils (mg/kg)	Current Site Worker				Future Outdoor Park Worker			
						Absorbed Dose (mg/kg-day)		Hazard Quotient	Cancer Risk	Absorbed Dose (mg/kg-day)		Hazard Quotient	Cancer Risk
						(Nc)	(Car)			(Nc)	(Car)		
Volatile Organics													
1,1-Dichloroethane	1.00E-01	NA	NA	2.00E-03	2.00E-03								
1,2-Dichloroethene (total)	9.00E-03	NA	NA	4.00E-03	4.00E-03								
Acetone	1.00E-01	NA	NA	1.39E-02	9.52E-03								
Benzene	2.85E-03	3.05E-02	NA	1.00E-03	1.00E-03								
Chloroform	1.00E-02	6.10E-03	NA	ND	6.73E-03								
Ethyl benzene	1.00E-01	NA	NA	ND	1.00E-03								
Methyl butyl ketone	NA	NA	NA	8.19E-03	6.64E-03								
Methylene chloride	5.88E-02	7.65E-03	NA	3.00E-03	3.00E-03								
Toluene	2.00E-01	NA	NA	7.00E-03	6.45E-03								
Total Xylenes	1.80E+00	NA	NA	ND	6.64E-03								
Trichloroethene	NA	1.22E-02	NA	3.00E-03	3.00E-03								
Semivolatile Organics													
2-Methylnaphthalene	4.00E-02	NA	NA	3.50E-02	1.10E-01								
Acenaphthene	6.00E-02	NA	NA	7.49E-02	8.80E-02								
Acenaphthylene	NA	NA	NA	5.11E-02	1.01E-01								
Anthracene	3.00E-01	NA	NA	7.54E-02	1.02E-01								
Benzo(a)anthracene	NA	7.30E-01	NA	8.40E-02	1.27E-01								
Benzo(a)pyrene	NA	1.46E+01	NA	8.56E-02	1.20E-01								
Benzo(b)fluoranthene	NA	7.30E-01	NA	1.15E-01	1.25E-01								
Benzo(ghi)perylene	NA	NA	NA	8.56E-02	1.10E-01								
Benzo(k)fluoranthene	NA	7.30E-02	NA	8.23E-02	1.06E-01								
Bis(2-Ethylhexyl)phthalate	1.00E-02	2.80E-02	NA	4.19E-01	2.59E-01								
Butylbenzylphthalate	2.00E-01	NA	NA	9.52E-02	1.10E-01								
Carbazole	NA	2.00E-02	NA	8.12E-02	1.04E-01								
Chrysene	NA	7.30E-03	NA	9.49E-02	1.25E-01								
Di-n-butylphthalate	9.00E-02	NA	NA	8.74E-02	8.15E-02								
Di-n-octylphthalate	2.00E-02	NA	NA	5.28E-02	4.40E-02								
Dibenz(a,h)anthracene	NA	7.30E+00	NA	7.97E-02	1.02E-01								
Dibenzofuran	NA	NA	NA	5.76E-02	5.80E-02								
Diethyl phthalate	8.00E-01	NA	NA	2.20E-02	2.20E-02								
Fluoranthene	4.00E-02	NA	NA	1.09E-01	1.28E-01								
Fluorene	4.00E-02	NA	NA	7.25E-02	9.94E-02								
Indeno(1,2,3-cd)pyrene	NA	7.30E-01	NA	8.63E-02	1.12E-01								
N-Nitrosodiphenylamine	NA	4.90E-03	NA	1.90E-02	1.90E-02								
Naphthalene	2.00E-02	NA	NA	7.37E-02	1.06E-01								
Phenanthrene	NA	NA	NA	9.51E-02	1.38E-01								
Phenol	5.40E-01	NA	NA	1.70E-02	1.70E-02								
Pyrene	3.00E-02	NA	NA	1.15E-01	1.39E-01								
Pesticides/PCBs													
4,4'-DDD	NA	1.20E+00	NA	4.52E-03	3.03E-03								
4,4'-DDE	NA	1.70E+00	NA	5.66E-03	3.56E-03								
4,4'-DDT	1.00E-04	1.70E+00	NA	7.12E-03	3.94E-03								
Aldrin	1.50E-05	3.40E+01	NA	1.32E-03	1.12E-03								
Alpha-BHC	NA	6.30E+00	NA	1.35E-03	1.13E-03								
Alpha-Chlordane	5.00E-04	3.50E-01	NA	1.41E-03	1.18E-03								
Aroclor-1248	NA	NA	6.00E-02	ND	2.15E-02								
Aroclor-1254	1.80E-05	2.22E+00	6.00E-02	3.96E-02	3.10E-02	1.08E-08	3.85E-09	6E-04	9E-09	9.44E-08	3.37E-08	5E-03	7E-08
Aroclor-1260	1.80E-05	2.22E+00	6.00E-02	2.71E-02	2.22E-02	7.38E-09	2.64E-09	4E-04	6E-09	6.46E-08	2.31E-08	4E-03	5E-08
Beta-BHC	NA	1.80E+00	NA	1.60E-03	1.25E-03								
Delta-BHC	NA	NA	NA	ND	1.11E-03								
Dieldrin	2.50E-05	3.20E+01	NA	2.79E-03	2.26E-03								
Endosulfan I	6.00E-03	NA	NA	1.32E-03	1.13E-03								
Endosulfan II	6.00E-03	NA	NA	2.62E-03	2.18E-03								
Endosulfan sulfate	6.00E-03	NA	NA	2.57E-03	2.16E-03								
Endrin	3.00E-04	NA	NA	2.80E-03	2.34E-03								
Endrin aldehyde	NA	NA	NA	2.93E-03	2.38E-03								
Endrin ketone	NA	NA	NA	2.56E-03	2.17E-03								
Gamma-Chlordane	5.00E-04	3.50E-01	NA	1.61E-03	1.24E-03								
Heptachlor	5.00E-04	4.50E+00	NA	1.36E-03	1.13E-03								
Heptachlor epoxide	1.30E-05	9.10E+00	NA	1.40E-03	1.15E-03								
Herbicides													
Dicamba	3.00E-02	NA	NA	ND	3.36E-03								
Nitroaromatics													
1,3,5-Trinitrobenzene	5.00E-05	NA	NA	6.88E-02	6.28E-02								
2,4,6-Trinitrotoluene	5.00E-04	3.00E-02	NA	6.81E-02	6.26E-02								
2,4-Dinitrotoluene	2.00E-03	6.80E-01	NA	6.95E-02	6.47E-02								
2-amino-4,6-Dinitrotoluene	NA	NA	NA	6.83E-02	6.27E-02								
4-Nitrotoluene	1.00E-02	NA	NA	7.30E-02	6.39E-02								
Metals													
Antimony	4.00E-04	NA	NA	9.11E+00	5.95E+00								
Chromium	3.00E-02	NA	NA	1.19E+03	3.78E+02								
Chromium, Hexavalent	6.00E-05	NA	NA	1.02E+01	1.02E+01								
Copper	2.40E-02	NA	NA	3.87E+02	1.67E+02								
Cyanide	1.00E-02	NA	NA	4.30E-01	3.40E-01								
Lead	NA	NA	NA	6.85E+01	3.73E+01								
Mercury	3.00E-06	NA	NA	1.00E-01	6.00E-02								
Thallium	8.00E-05	NA	NA	1.40E+00	1.27E+00								
Zinc	7.50E-02	NA	NA	2.44E+02	1.66E+02								
Total Hazard Quotient and Cancer Risk:								**1E-03**	**1E-08**			**9E-03**	**1E-07**

Assumptions for Current Site Worker			**Assumptions for Future Outdoor Park Worker**		
CS =	EPC Surface Only		CS =	EPC Surface Only	
CF =	1.00E-06	kg/mg	CF =	1.00E-06	kg/mg
SA =	5,800	cm2	SA =	5,800	cm2
AF =	1	mg/cm2	AF =	1	mg/cm2
EF =	20	days/year	EF =	175	days/year
ED =	25	years	ED =	25	years
BW =	70	kg	BW =	70	kg
AT (Nc) =	9125	days	AT (Nc) =	9125	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.
* 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 G-13
CALCULATION OF ABSORBED DOSE AND RISK FROM DERMAL CONTACT TO SOIL
REASONABLE MAXIMUM EXPOSURE (RME)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Equation for Intake (mg/kg-day) = $\frac{CS \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$

Variables (Assumptions for Each Receptor are Listed at the Bottom):
CS = Chemical Concentration in Soil, from Soil EPC Data
CF = Conversion Factor
SA = Surface Area Contact
AF = Adherence Factor
ABS = Absorption Factor
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Dermal RfD	Carc. Slope Dermal	Absorption Factor*	EPC Surface-Soil	EPC from Total Soils	Future Recreational Visitor (Child)				Future Construction Worker			
						Absorbed Dose (mg/kg-day)		Hazard Quotient	Cancer Risk	Absorbed Dose (mg/kg-day)		Hazard Quotient	Cancer Risk
	(mg/kg-day)	(mg/kg-day)-1	(unitless)	(mg/kg)	(mg/kg)	(Nc)	(Car)			(Nc)	(Car)		
Volatile Organics													
1,1-Dichloroethane	1.00E-01	NA	NA	2.00E-03	2.00E-03								
1,2-Dichloroethene (total)	9.00E-03	NA	NA	4.00E-03	4.00E-03								
Acetone	1.00E-01	NA	NA	1.39E-02	9.52E-03								
Benzene	2.85E-03	3.05E-02	NA	1.00E-03	1.00E-03								
Chloroform	1.00E-02	6.10E-03	NA	ND	6.73E-03								
Ethyl benzene	1.00E-01	NA	NA	ND	1.00E-03								
Methyl butyl ketone	NA	NA	NA	8.19E-03	6.64E-03								
Methylene chloride	5.88E-02	7.65E-03	NA	3.00E-03	3.00E-03								
Toluene	2.00E-01	NA	NA	7.00E-03	6.45E-03								
Total Xylenes	1.80E+00	NA	NA	ND	6.64E-03								
Trichloroethene	NA	1.22E-02	NA	3.00E-03	3.00E-03								
Semivolatile Organics													
2-Methylnaphthalene	4.00E-02	NA	NA	3.50E-02	1.10E-01								
Acenaphthene	6.00E-02	NA	NA	7.49E-02	8.80E-02								
Acenaphthylene	NA	NA	NA	5.11E-02	1.01E-01								
Anthracene	3.00E-01	NA	NA	7.54E-02	1.02E-01								
Benzo(a)anthracene	NA	7.30E-01	NA	8.40E-02	1.27E-01								
Benzo(a)pyrene	NA	1.46E+01	NA	8.56E-02	1.20E-01								
Benzo(b)fluoranthene	NA	7.30E-01	NA	1.15E-01	1.25E-01								
Benzo(ghi)perylene	NA	NA	NA	8.56E-02	1.10E-01								
Benzo(k)fluoranthene	NA	7.30E-02	NA	8.23E-02	1.06E-01								
Bis(2-Ethylhexyl)phthalate	1.00E-02	2.80E-02	NA	4.19E-01	2.59E-01								
Butylbenzylphthalate	2.00E-01	NA	NA	9.52E-02	1.10E-01								
Carbazole	NA	2.00E-02	NA	8.12E-02	1.04E-01								
Chrysene	NA	7.30E-03	NA	9.49E-02	1.25E-01								
Di-n-butylphthalate	9.00E-02	NA	NA	8.74E-02	8.15E-02								
Di-n-octylphthalate	2.00E-02	NA	NA	5.28E-02	4.40E-02								
Dibenz(a,h)anthracene	NA	7.30E+00	NA	7.97E-02	1.02E-01								
Dibenzofuran	NA	NA	NA	5.76E-02	5.80E-02								
Diethyl phthalate	8.00E-01	NA	NA	2.20E-02	2.20E-02								
Fluoranthene	4.00E-02	NA	NA	1.09E-01	1.28E-01								
Fluorene	4.00E-02	NA	NA	7.25E-02	9.94E-02								
Indeno(1,2,3-cd)pyrene	NA	7.30E-01	NA	8.63E-02	1.12E-01								
N-Nitrosodiphenylamine	NA	4.90E-03	NA	1.90E-02	1.90E-02								
Naphthalene	2.00E-02	NA	NA	7.37E-02	1.06E-01								
Phenanthrene	NA	NA	NA	9.51E-02	1.38E-01								
Phenol	5.40E-01	NA	NA	1.70E-02	1.70E-02								
Pyrene	3.00E-02	NA	NA	1.15E-01	1.39E-01								
Pesticides/PCBs													
4,4'-DDD	NA	1.20E+00	NA	4.52E-03	3.03E-03								
4,4'-DDE	NA	1.70E+00	NA	5.66E-03	3.56E-03								
4,4'-DDT	1.00E-04	1.70E+00	NA	7.12E-03	3.94E-03								
Aldrin	1.50E-05	3.40E+01	NA	1.32E-03	1.12E-03								
Alpha-BHC	NA	6.30E+00	NA	1.35E-03	1.13E-03								
Alpha-Chlordane	5.00E-04	3.50E-01	NA	1.41E-03	1.18E-03								
Aroclor-1248	NA	NA	6.00E-02	ND	2.15E-02								
Aroclor-1254	1.80E-05	2.22E+00	6.00E-02	3.96E-02	3.10E-02	1.40E-08	9.98E-10	8E-04	2E-09	1.06E-07	1.51E-09	6E-03	3E-09
Aroclor-1260	1.80E-05	2.22E+00	6.00E-02	2.71E-02	2.22E-02	9.56E-09	6.83E-10	5E-04	2E-09	7.56E-08	1.08E-09	4E-03	2E-09
Beta-BHC	NA	1.80E+00	NA	1.60E-03	1.25E-03								
Delta-BHC	NA	NA	NA	ND	1.11E-03								
Dieldrin	2.50E-05	3.20E+01	NA	2.79E-03	2.26E-03								
Endosulfan I	6.00E-03	NA	NA	1.32E-03	1.13E-03								
Endosulfan II	6.00E-03	NA	NA	2.62E-03	2.18E-03								
Endosulfan sulfate	6.00E-03	NA	NA	2.57E-03	2.16E-03								
Endrin	3.00E-04	NA	NA	2.80E-03	2.34E-03								
Endrin aldehyde	NA	NA	NA	2.93E-03	2.38E-03								
Endrin ketone	NA	NA	NA	2.56E-03	2.17E-03								
Gamma-Chlordane	5.00E-04	3.50E-01	NA	1.61E-03	1.24E-03								
Heptachlor	5.00E-04	4.50E+00	NA	1.36E-03	1.13E-03								
Heptachlor epoxide	1.30E-05	9.10E+00	NA	1.40E-03	1.15E-03								
Herbicides													
Dicamba	3.00E-02	NA	NA	ND	3.36E-03								
Nitroaromatics													
1,3,5-Trinitrobenzene	5.00E-05	NA	NA	6.88E-02	6.28E-02								
2,4,6-Trinitrotoluene	5.00E-04	3.00E-02	NA	6.81E-02	6.26E-02								
2,4-Dinitrotoluene	2.00E-03	6.80E-01	NA	6.95E-02	6.47E-02								
2-amino-4,6-Dinitrotoluene	NA	NA	NA	6.83E-02	6.27E-02								
4-Nitrotoluene	1.00E-02	NA	NA	7.30E-02	6.39E-02								
Metals													
Antimony	4.00E-04	NA	NA	9.11E+00	5.95E+00								
Chromium	3.00E-02	NA	NA	1.19E+03	3.78E+02								
Chromium, Hexavalent	6.00E-05	NA	NA	1.02E+01	1.02E+01								
Copper	2.40E-02	NA	NA	3.87E+02	1.67E+02								
Cyanide	1.00E-02	NA	NA	4.30E-01	3.40E-01								
Lead	NA	NA	NA	6.85E+01	3.73E+01								
Mercury	3.00E-06	NA	NA	1.00E-01	6.00E-02								
Thallium	8.00E-05	NA	NA	1.40E+00	1.27E+00								
Zinc	7.50E-02	NA	NA	2.44E+02	1.66E+02								
Total Hazard Quotient and Cancer Risk:								**1E-03**	**4E-09**			**1E-02**	**6E-09**

Assumptions for Future Recreational Visitor (Child)			Assumptions for Future Construction Worker		
CS =	EPC Surface Only		CS =	EPC Surface and Subsurface	
CF =	1.00E-06	kg/mg	CF =	1.00E-06	kg/mg
SA =	2,300	cm2	SA =	5,800	cm2
AF =	1	mg/cm2	AF =	1	mg/cm2
EF =	14	days/year	EF =	250	days/year
ED =	5	years	ED =	1	years
BW =	15	kg	BW =	70	kg
AT (Nc) =	1825	days	AT (Nc) =	365	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.
* 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 G-13
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REASONABLE MAXIMUM EXPOSURE (RME)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Equation for Intake (mg/kg-day) = $\frac{CS \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$

Variables (Assumptions for Each Receptor are Listed at the Bottom):
CS = Chemical Concentration in Soil, from Soil EPC Data
CF = Conversion Factor
SA = Surface Area Contact
AF = Adherence Factor
ABS = Absorption Factor

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor
Equation for Total Lifetime Cancer Risk = Adult Contribution + Child Contribution

Analyte	Dermal RfD	Carc. Slope Dermal	Absorption Factor*	EPC Surface Soil	Future Resident (Adult)				Future Resident (Child)				Resident
					Intake (mg/kg-day)		Hazard Quotient	Contribution to Lifetime Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Contribution to Lifetime Cancer Risk	Total Lifetime Cancer Risk
	(mg/kg-day)	(mg/kg-day)-1	(unitless)	(mg/kg)	(Nc)	(Car)			(Nc)	(Car)			
Volatile Organics													
1.1-Dichloroethane	1.00E-01	NA	NA	2.00E-03									
1.2-Dichloroethene (total)	9.00E-03	NA	NA	4.00E-03									
Acetone	1.00E-01	NA	NA	1.39E-02									
Benzene	2.85E-03	3.05E-02	NA	1.00E-03									
Chloroform	1.00E-02	6.10E-03	NA	ND									
Ethyl benzene	1.00E-01	NA	NA	ND									
Methyl butyl ketone	NA	NA	NA	8.19E-03									
Methylene chloride	5.88E-02	7.65E-03	NA	3.00E-03									
Toluene	2.00E-01	NA	NA	7.00E-03									
Total Xylenes	1.80E+00	NA	NA	ND									
Trichloroethene	NA	1.22E-02	NA	3.00E-03									
Semivolatile Organics													
2-Methylnaphthalene	4.00E-02	NA	NA	3.50E-02									
Acenaphthene	6.00E-02	NA	NA	7.49E-02									
Acenaphthylene	NA	NA	NA	5.11E-02									
Anthracene	3.00E-01	NA	NA	7.54E-02									
Benzo(a)anthracene	NA	7.30E-01	NA	8.40E-02									
Benzo(a)pyrene	NA	1.46E+01	NA	8.56E-02									
Benzo(b)fluoranthene	NA	7.30E-01	NA	1.15E-01									
Benzo(ghi)perylene	NA	NA	NA	8.56E-02									
Benzo(k)fluoranthene	NA	7.30E-02	NA	8.23E-02									
Bis(2-Ethylhexyl)phthalate	1.00E-02	2.80E-02	NA	4.19E-01									
Butylbenzylphthalate	2.00E-01	NA	NA	9.52E-02									
Carbazole	NA	2.00E-02	NA	8.12E-02									
Chrysene	NA	7.30E-03	NA	9.49E-02									
Di-n-butylphthalate	9.00E-02	NA	NA	8.74E-02									
Di-n-octylphthalate	2.00E-02	NA	NA	5.28E-02									
Dibenz(a.h)anthracene	NA	7.30E+00	NA	7.97E-02									
Dibenzofuran	NA	NA	NA	5.76E-02									
Diethyl phthalate	8.00E-01	NA	NA	2.20E-02									
Fluoranthene	4.00E-02	NA	NA	1.09E-01									
Fluorene	4.00E-02	NA	NA	7.25E-02									
Indeno(1.2.3-cd)pyrene	NA	7.30E-01	NA	8.63E-02									
N-Nitrosodiphenylamine	NA	4.90E-03	NA	1.90E-02									
Naphthalene	2.00E-02	NA	NA	7.37E-02									
Phenanthrene	NA	NA	NA	9.51E-02									
Phenol	5.40E-01	NA	NA	1.70E-02									
Pyrene	3.00E-02	NA	NA	1.15E-01									
Pesticides/PCBs													
4.4'-DDD	NA	1.20E+00	NA	4.52E-03									
4.4'-DDE	NA	1.70E+00	NA	5.66E-03									
4.4'-DDT	1.00E-04	1.70E+00	NA	7.12E-03									
Aldrin	1.50E-05	3.40E+01	NA	1.32E-03									
Alpha-BHC	NA	6.30E+00	NA	1.35E-03									
Alpha-Chlordane	5.00E-04	3.50E-01	NA	1.41E-03									
Aroclor-1248	NA	NA	6 00E-02	ND									
Aroclor-1254	1.80E-05	2.22E+00	6.00E-02	3.96E-02	1.89E-07	6.47E-08	1E-02	1E-07	3.49E-07	2.99E-08	2E-02	7E-08	2E-07
Aroclor-1260	1.80E-05	2.22E+00	6.00E-02	2.71E-02	1.29E-07	4.43E-08	7E-03	1E-07	2.39E-07	2.05E-08	1E-02	5E-08	1E-07
Beta-BHC	NA	1.80E+00	NA	1.60E-03									
Delta-BHC	NA	NA	NA	ND									
Dieldrin	2.50E-05	3.20E+01	NA	2.79E-03									
Endosulfan I	6.00E-03	NA	NA	1.32E-03									
Endosulfan II	6.00E-03	NA	NA	2.62E-03									
Endosulfan sulfate	6.00E-03	NA	NA	2.57E-03									
Endrin	3.00E-04	NA	NA	2.80E-03									
Endrin aldehyde	NA	NA	NA	2.93E-03									
Endrin ketone	NA	NA	NA	2.56E-03									
Gamma-Chlordane	5.00E-04	3.50E-01	NA	1.61E-03									
Heptachlor	5.00E-04	4.50E+00	NA	1.36E-03									
Heptachlor epoxide	1.30E-05	9.10E+00	NA	1.40E-03									
Herbicides													
Dicamba	3.00E-02	NA	NA	ND									
Nitroaromatics													
1.3.5-Trinitrobenzene	5.00E-05	NA	NA	6.88E-02									
2.4.6-Trinitrotoluene	5.00E-04	3.00E-02	NA	6.81E-02									
2.4-Dinitrotoluene	2.00E-03	6.80E-01	NA	6.95E-02									
2-amino-4.6-Dinitrotoluene	NA	NA	NA	6.83E-02									
4-Nitrotoluene	1.00E-02	NA	NA	7.30E-02									
Metals													
Antimony	4.00E-04	NA	NA	9.11E+00									
Chromium	3.00E-02	NA	NA	1.19E+03									
Chromium, Hexavalent	6.00E-05	NA	NA	1.02E+01									
Copper	2.40E-02	NA	NA	3.87E+02									
Cyanide	1.00E-02	NA	NA	4.30E-01									
Lead	NA	NA	NA	6.85E+01									
Mercury	3.00E-06	NA	NA	1.00E-01									
Thallium	8.00E-05	NA	NA	1.40E+00									
Zinc	7 50E-02	NA	NA	2.44E+02									
Total Hazard Quotient and Cancer Risk:							**2E-02**				**3E-02**		**4E-07**

Assumptions for Future Resident (Adult)			Assumptions for Future Resident (Child)		
CS =	EPC Surface Only		CS =	EPC Surface Only	
CF =	1.00E-06	kg/mg	CF =	1.00E-06	kg/mg
SA =	5,800	cm2	SA =	2,300	cm2
AF =	1	mg/cm2	AF =	1	mg/cm2
EF =	350	days/year	EF =	350	days/year
ED =	24	years	ED =	6	years
BW =	70	kg	BW =	15	kg
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.
* 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 G-14
CALCULATION OF ABSORBED DOSE AND RISK FROM DERMAL CONTACT TO SOIL
CENTRAL TENDENCY (CT)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Equation for Intake (mg/kg-day) =

$$\frac{CS \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$$

Variables (Assumptions for Each Receptor are Listed at the Bottom):

CS = Chemical Concentration in Soil, from Soil EPC Data
CF = Conversion Factor
SA = Surface Area Contact
AF = Adherence Factor
ABS = Absorption Factor
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Dermal RfD	Carc. Slope Dermal	Absorption Factor*	EPC Surface Soil	EPC from Total Soils	Current Site Worker				Future Outdoor Park Worker			
						Absorbed Dose (mg/kg-day)		Hazard Quotient	Cancer Risk	Absorbed Dose (mg/kg-day)		Hazard Quotient	Cancer Risk
	(mg/kg-day)	(mg/kg-day)-1	(unitless)	(mg/kg)	(mg/kg)	(Nc)	(Car)			(Nc)	(Car)		
Volatile Organics													
1,1-Dichloroethane	1.00E-01	NA	NA	2.00E-03	2.00E-03								
1,2-Dichloroethene (total)	9.00E-03	NA	NA	4.00E-03	4.00E-03								
Acetone	1.00E-01	NA	NA	1.39E-02	9.52E-03								
Benzene	2.85E-03	3.05E-02	NA	1.00E-03	1.00E-03								
Chloroform	1.00E-02	6.10E-03	NA	ND	6.73E-03								
Ethyl benzene	1.00E-01	NA	NA	ND	1.00E-03								
Methyl butyl ketone	NA	NA	NA	8.19E-03	6.64E-03								
Methylene chloride	5.88E-02	7.65E-03	NA	3.00E-03	3.00E-03								
Toluene	2.00E-01	NA	NA	7.00E-03	6.45E-03								
Total Xylenes	1.80E+00	NA	NA	ND	6.64E-03								
Trichloroethene	NA	1.22E-02	NA	3.00E-03	3.00E-03								
Semivolatile Organics													
2-Methylnaphthalene	4.00E-02	NA	NA	3.50E-02	1.10E-01								
Acenaphthene	6.00E-02	NA	NA	7.49E-02	8.80E-02								
Acenaphthylene	NA	NA	NA	5.11E-02	1.01E-01								
Anthracene	3.00E-01	NA	NA	7.54E-02	1.02E-01								
Benzo(a)anthracene	NA	7.30E-01	NA	8.40E-02	1.27E-01								
Benzo(a)pyrene	NA	1.46E+01	NA	8.56E-02	1.20E-01								
Benzo(b)fluoranthene	NA	7.30E-01	NA	1.15E-01	1.25E-01								
Benzo(ghi)perylene	NA	NA	NA	8.56E-02	1.10E-01								
Benzo(k)fluoranthene	NA	7.30E-02	NA	8.23E-02	1.06E-01								
Bis(2-Ethylhexyl)phthalate	1.00E-02	2.80E-02	NA	4.19E-01	2.59E-01								
Butylbenzylphthalate	2.00E-01	NA	NA	9.52E-02	1.10E-01								
Carbazole	NA	2.00E-02	NA	8.12E-02	1.04E-01								
Chrysene	NA	7.30E-03	NA	9.49E-02	1.25E-01								
Di-n-butylphthalate	9.00E-02	NA	NA	8.74E-02	8.15E-02								
Di-n-octylphthalate	2.00E-02	NA	NA	5.28E-02	4.40E-02								
Dibenz(a,h)anthracene	NA	7.30E+00	NA	7.97E-02	1.02E-01								
Dibenzofuran	NA	NA	NA	5.76E-02	5.80E-02								
Diethyl phthalate	8.00E-01	NA	NA	2.20E-02	2.20E-02								
Fluoranthene	4.00E-02	NA	NA	1.09E-01	1.28E-01								
Fluorene	4.00E-02	NA	NA	7.25E-02	9.94E-02								
Indeno(1,2,3-cd)pyrene	NA	7.30E-01	NA	8.63E-02	1.12E-01								
N-Nitrosodiphenylamine	NA	4.90E-03	NA	1.90E-02	1.90E-02								
Naphthalene	2.00E-02	NA	NA	7.37E-02	1.06E-01								
Phenanthrene	NA	NA	NA	9.51E-02	1.38E-01								
Phenol	5.40E-01	NA	NA	1.70E-02	1.70E-02								
Pyrene	3.00E-02	NA	NA	1.15E-01	1.39E-01								
Pesticides/PCBs													
4,4'-DDD	NA	1.20E+00	NA	4.52E-03	3.03E-03								
4,4'-DDE	NA	1.70E+00	NA	5.66E-03	3.56E-03								
4,4'-DDT	1.00E-04	1.70E+00	NA	7.12E-03	3.94E-03								
Aldrin	1.50E-05	3.40E+01	NA	1.32E-03	1.12E-03								
Alpha-BHC	NA	6.30E+00	NA	1.35E-03	1.13E-03								
Alpha-Chlordane	5.00E-04	3.50E-01	NA	1.41E-03	1.18E-03								
Aroclor-1248	NA	NA	6.00E-02	ND	2.15E-02								
Aroclor-1254	1.80E-05	2.22E+00	6.00E-02	3.96E-02	3.10E-02	9.30E-10	9.30E-11	5E-05	2E-10	1.42E-08	1.42E-09	8E-04	3E-09
Aroclor-1260	1.80E-05	2.22E+00	6.00E-02	2.71E-02	2.22E-02	6.36E-10	6.36E-11	4E-05	1E-10	9.74E-09	9.74E-10	5E-04	2E-09
Beta-BHC	NA	1.80E+00	NA	1.60E-03	1.25E-03								
Delta-BHC	NA	NA	NA	ND	1.11E-03								
Dieldrin	2.50E-05	3.20E+01	NA	2.79E-03	2.26E-03								
Endosulfan I	6.00E-03	NA	NA	1.32E-03	1.13E-03								
Endosulfan II	6.00E-03	NA	NA	2.62E-03	2.18E-03								
Endosulfan sulfate	6.00E-03	NA	NA	2.57E-03	2.16E-03								
Endrin	3.00E-04	NA	NA	2.80E-03	2.34E-03								
Endrin aldehyde	NA	NA	NA	2.93E-03	2.38E-03								
Endrin ketone	NA	NA	NA	2.56E-03	2.17E-03								
Gamma-Chlordane	5.00E-04	3.50E-01	NA	1.61E-03	1.24E-03								
Heptachlor	5.00E-04	4.50E+00	NA	1.36E-03	1.13E-03								
Heptachlor epoxide	1.30E-05	9.10E+00	NA	1.40E-03	1.15E-03								
Herbicides													
Dicamba	3.00E-02	NA	NA	ND	3.36E-03								
Nitroaromatics													
1,3,5-Trinitrobenzene	5.00E-05	NA	NA	6.88E-02	6.28E-02								
2,4,6-Trinitrotoluene	5.00E-04	3.00E-02	NA	6.81E-02	6.26E-02								
2,4-Dinitrotoluene	2.00E-03	6.80E-01	NA	6.95E-02	6.47E-02								
2-amino-4,6-Dinitrotoluene	NA	NA	NA	6.83E-02	6.27E-02								
4-Nitrotoluene	1.00E-02	NA	NA	7.30E-02	6.39E-02								
Metals													
Antimony	4.00E-04	NA	NA	9.11E+00	5.95E+00								
Chromium	3.00E-02	NA	NA	1.19E+03	3.78E+02								
Chromium, Hexavalent	6.00E-05	NA	NA	1.02E+01	1.02E+01								
Copper	2.40E-02	NA	NA	3.87E+02	1.67E+02								
Cyanide	1.00E-02	NA	NA	4.30E-01	3.40E-01								
Lead	NA	NA	NA	6.85E+01	3.73E+01								
Mercury	3.00E-06	NA	NA	1.00E-01	6.00E-02								
Thallium	8.00E-05	NA	NA	1.40E+00	1.27E+00								
Zinc	7.50E-02	NA	NA	2.44E+02	1.66E+02								
Total Hazard Quotient and Cancer Risk:								9E-05	3E-10			1E-03	5E-09

Assumptions for Current Site Worker			Assumptions for Future Outdoor Park Worker		
CS =	EPC Surface Only		CS =	EPC Surface Only	
CF =	1.00E-06	kg/mg	CF =	1.00E-06	kg/mg
SA =	5000	cm2	SA =	5000	cm2
AF =	0.2	mg/cm2	AF =	0.2	mg/cm2
EF =	10	days/year	EF =	153	days/year
ED =	7	years	ED =	7	years
BW =	70	kg	BW =	70	kg
AT (Nc) =	2,555	days	AT (Nc) =	2,555	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.
* 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 G-14
CALCULATION OF ABSORBED DOSE AND RISK FROM DERMAL CONTACT TO SOIL
CENTRAL TENDENCY (CT)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Equation for Intake (mg/kg-day) = $\frac{CS \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$

Variables (Assumptions for Each Receptor are Listed at the Bottom):
CS = Chemical Concentration in Soil, from Soil EPC Data
CF = Conversion Factor
SA = Surface Area Contact
AF = Adherence Factor
ABS = Absorption Factor
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Dermal RfD	Carc. Slope Dermal	Absorption Factor*	EPC Surface Soil	EPC from Total Soils	Future Recreational Visitor (Child)				Future Construction Worker			
						Absorbed Dose (mg/kg-day)		Hazard Quotient	Cancer Risk	Absorbed Dose (mg/kg-day)		Hazard Quotient	Cancer Risk
	(mg/kg-day)	(mg/kg-day)-1	(unitless)	(mg/kg)	(mg/kg)	(Nc)	(Car)			(Nc)	(Car)		
Volatile Organics													
1.1-Dichloroethane	1.00E-01	NA	NA	2.00E-03	2.00E-03								
1.2-Dichloroethene (total)	9.00E-03	NA	NA	4.00E-03	4.00E-03								
Acetone	1.00E-01	NA	NA	1.39E-02	9.52E-03								
Benzene	2.85E-03	3.05E-02	NA	1.00E-03	1.00E-03								
Chloroform	1.00E-02	6.10E-03	NA	ND	6.73E-03								
Ethyl benzene	1.00E-01	NA	NA	ND	1.00E-03								
Methyl butyl ketone	NA	NA	NA	8.19E-03	6.64E-03								
Methylene chloride	5.88E-02	7.65E-03	NA	3.00E-03	3.00E-03								
Toluene	2.00E-01	NA	NA	7.00E-03	6.45E-03								
Total Xylenes	1.80E+00	NA	NA	ND	6.64E-03								
Trichloroethene	NA	1.22E-02	NA	3.00E-03	3.00E-03								
Semivolatile Organics													
2-Methylnaphthalene	4.00E-02	NA	NA	3.50E-02	1.10E-01								
Acenaphthene	6.00E-02	NA	NA	7.49E-02	8.80E-02								
Acenaphthylene	NA	NA	NA	5.11E-02	1.01E-01								
Anthracene	3.00E-01	NA	NA	7.54E-02	1.02E-01								
Benzo(a)anthracene	NA	7.30E-01	NA	8.40E-02	1.27E-01								
Benzo(a)pyrene	NA	1.46E+01	NA	8.56E-02	1.20E-01								
Benzo(b)fluoranthene	NA	7.30E-01	NA	1.15E-01	1.25E-01								
Benzo(ghi)perylene	NA	NA	NA	8.56E-02	1.10E-01								
Benzo(k)fluoranthene	NA	7.30E-02	NA	8.23E-02	1.06E-01								
Bis(2-Ethylhexyl)phthalate	1.00E-02	2.80E-02	NA	4.19E-01	2.59E-01								
Butylbenzylphthalate	2.00E-01	NA	NA	9.52E-02	1.10E-01								
Carbazole	NA	2.00E-02	NA	8.12E-02	1.04E-01								
Chrysene	NA	7.30E-03	NA	9.49E-02	1.25E-01								
Di-n-butylphthalate	9.00E-02	NA	NA	8.74E-02	8.15E-02								
Di-n-octylphthalate	2.00E-02	NA	NA	5.28E-02	4.40E-02								
Dibenz(a.h)anthracene	NA	7.30E+00	NA	7.97E-02	1.02E-01								
Dibenzofuran	NA	NA	NA	5.76E-02	5.80E-02								
Diethyl phthalate	8.00E-01	NA	NA	2.20E-02	2.20E-02								
Fluoranthene	4.00E-02	NA	NA	1.09E-01	1.28E-01								
Fluorene	4.00E-02	NA	NA	7.25E-02	9.94E-02								
Indeno(1.2.3-cd)pyrene	NA	7.30E-01	NA	8.63E-02	1.12E-01								
N-Nitrosodiphenylamine	NA	4.90E-03	NA	1.90E-02	1.90E-02								
Naphthalene	2.00E-02	NA	NA	7.37E-02	1.06E-01								
Phenanthrene	NA	NA	NA	9.51E-02	1.38E-01								
Phenol	5.40E-01	NA	NA	1.70E-02	1.70E-02								
Pyrene	3.00E-02	NA	NA	1.15E-01	1.39E-01								
Pesticides/PCBs													
4.4'-DDD	NA	1.20E+00	NA	4.52E-03	3.03E-03								
4.4'-DDE	NA	1.70E+00	NA	5.66E-03	3.56E-03								
4.4'-DDT	1.00E-04	1.70E+00	NA	7.12E-03	3.94E-03								
Aldrin	1.50E-05	3.40E+01	NA	1.32E-03	1.12E-03								
Alpha-BHC	NA	6.30E+00	NA	1.35E-03	1.13E-03								
Alpha-Chlordane	5.00E-04	3.50E-01	NA	1.41E-03	1.18E-03								
Aroclor-1248	NA	NA	6.00E-02	ND	2.15E-02								
Aroclor-1254	1.80E-05	2.22E+00	6.00E-02	3.96E-02	3.10E-02	1.20E-09	1.72E-11	7E-05	4E-11	1.59E-08	2.28E-10	9E-04	5E-10
Aroclor-1260	1.80E-05	2.22E+00	6.00E-02	2.71E-02	2.22E-02	8.23E-10	1.18E-11	5E-05	3E-11	1.14E-08	1.63E-10	6E-04	4E-10
Beta-BHC	NA	1.80E+00	NA	1.60E-03	1.25E-03								
Delta-BHC	NA	NA	NA	ND	1.11E-03								
Dieldrin	2.50E-05	3.20E+01	NA	2.79E-03	2.26E-03								
Endosulfan I	6.00E-03	NA	NA	1.32E-03	1.13E-03								
Endosulfan II	6.00E-03	NA	NA	2.62E-03	2.18E-03								
Endosulfan sulfate	6.00E-03	NA	NA	2.57E-03	2.16E-03								
Endrin	3.00E-04	NA	NA	2.80E-03	2.34E-03								
Endrin aldehyde	NA	NA	NA	2.93E-03	2.38E-03								
Endrin ketone	NA	NA	NA	2.56E-03	2.17E-03								
Gamma-Chlordane	5.00E-04	3.50E-01	NA	1.61E-03	1.24E-03								
Heptachlor	5.00E-04	4.50E+00	NA	1.36E-03	1.13E-03								
Heptachlor epoxide	1.30E-05	9.10E+00	NA	1.40E-03	1.15E-03								
Herbicides													
Dicamba	3.00E-02	NA	NA	ND	3.36E-03								
Nitroaromatics													
1.3.5-Trinitrobenzene	5.00E-05	NA	NA	6.88E-02	6.28E-02								
2.4.6-Trinitrotoluene	5.00E-04	3.00E-02	NA	6.81E-02	6.26E-02								
2.4-Dinitrotoluene	2.00E-03	6.80E-01	NA	6.95E-02	6.47E-02								
2-amino-4.6-Dinitrotoluene	NA	NA	NA	6.83E-02	6.27E-02								
4-Nitrotoluene	1.00E-02	NA	NA	7.30E-02	6.39E-02								
Metals													
Antimony	4.00E-04	NA	NA	9.11E+00	5.95E+00								
Chromium	3.00E-02	NA	NA	1.19E+03	3.78E+02								
Chromium. Hexavalent	6.00E-05	NA	NA	1.02E+01	1.02E+01								
Copper	2.40E-02	NA	NA	3.87E+02	1.67E+02								
Cyanide	1.00E-02	NA	NA	4.30E-01	3.40E-01								
Lead	NA	NA	NA	6.85E+01	3.73E+01								
Mercury	3.00E-06	NA	NA	1.00E-01	6.00E-02								
Thallium	8.00E-05	NA	NA	1.40E+00	1.27E+00								
Zinc	7.50E-02	NA	NA	2.44E+02	1.66E+02								
Total Hazard Quotient and Cancer Risk:								1E-04	6E-11			2E-03	9E-10

Assumptions for Future Recreational Visitor (Child)			Assumptions for Future Construction Worker		
CS =	EPC Surface Only		CS =	EPC Surface and Subsurface	
CF =	1.00E-06	kg/mg	CF =	1.00E-06	kg/mg
SA =	1980	cm2	SA =	5000	cm2
AF =	0.2	mg/cm2	AF =	0.2	mg/cm2
EF =	7	days/year	EF =	219	days/year
ED =	1	years	ED =	1	years
BW =	15	kg	BW =	70	kg
AT (Nc) =	365	days	AT (Nc) =	365	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.
* 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 G-14
CALCULATION OF ABSORBED DOSE AND RISK FROM DERMAL CONTACT TO SOIL
CENTRAL TENDENCY (CT)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Equation for Intake (mg/kg-day) = $\frac{CS \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$

Variables (Assumptions for Each Receptor are Listed at the Bottom):
CS = Chemical Concentration in Soil, from Soil EPC Data
CF = Conversion Factor
SA = Surface Area Contact
AF = Adherence Factor
ABS = Absorption Factor

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor
Equation for Total Lifetime Cancer Risk = Adult Contribution + Child Contribution

Analyte	Dermal RfD	Carc. Slope Dermal	Absorption Factor*	EPC Surface Soil	Future Resident (Adult)				Future Resident (Child)				Resident
					Intake (mg/kg-day)		Hazard Quotient	Contribution to Lifetime Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Contribution to Lifetime Cancer Risk	Total Lifetime Cancer Risk
	(mg/kg-day)	(mg/kg-day)-1	(unitless)	(mg/kg)	(Nc)	(Car)			(Nc)	(Car)			
Volatile Organics													
1.1-Dichloroethane	1 00E-01	NA	NA	2.00E-03									
1.2-Dichloroethene (total)	9 00E-03	NA	NA	4.00E-03									
Acetone	1.00E-01	NA	NA	1.39E-02									
Benzene	2.85E-03	3.05E-02	NA	1.00E-03									
Chloroform	1.00E-02	6.10E-03	NA	ND									
Ethyl benzene	1 00E-01	NA	NA	ND									
Methyl butyl ketone	NA	NA	NA	8.19E-03									
Methylene chloride	5.88E-02	7.65E-03	NA	3.00E-03									
Toluene	2.00E-01	NA	NA	7.00E-03									
Total Xylenes	1 80E+00	NA	NA	ND									
Trichloroethene	NA	1.22E-02	NA	3.00E-03									
Semivolatile Organics													
2-Methylnaphthalene	4.00E-02	NA	NA	3.50E-02									
Acenaphthene	6.00E-02	NA	NA	7.49E-02									
Acenaphthylene	NA	NA	NA	5.11E-02									
Anthracene	3.00E-01	NA	NA	7.54E-02									
Benzo(a)anthracene	NA	7.30E-01	NA	8.40E-02									
Benzo(a)pyrene	NA	1.46E+01	NA	8.56E-02									
Benzo(b)fluoranthene	NA	7.30E-01	NA	1.15E-01									
Benzo(ghi)perylene	NA	NA	NA	8.56E-02									
Benzo(k)fluoranthene	NA	7.30E-02	NA	8.23E-02									
Bis(2-Ethylhexyl)phthalate	1 00E-02	2 80E-02	NA	4.19E-01									
Butylbenzylphthalate	2.00E-01	NA	NA	9.52E-02									
Carbazole	NA	2.00E-02	NA	8.12E-02									
Chrysene	NA	7 30E-03	NA	9.49E-02									
Di-n-butylphthalate	9.00E-02	NA	NA	8.74E-02									
Di-n-octylphthalate	2.00E-02	NA	NA	5.28E-02									
Dibenz(a.h)anthracene	NA	7 30E+00	NA	7.97E-02									
Dibenzofuran	NA	NA	NA	5.76E-02									
Diethyl phthalate	8.00E-01	NA	NA	2.20E-02									
Fluoranthene	4.00E-02	NA	NA	1.09E-01									
Fluorene	4.00E-02	NA	NA	7.25E-02									
Indeno(1.2.3-cd)pyrene	NA	7.30E-01	NA	8.63E-02									
N-Nitrosodiphenylamine	NA	4.90E-03	NA	1.90E-02									
Naphthalene	2.00E-02	NA	NA	7.37E-02									
Phenanthrene	NA	NA	NA	9.51E-02									
Phenol	5.40E-01	NA	NA	1.70E-02									
Pyrene	3.00E-02	NA	NA	1.15E-01									
Pesticides/PCBs													
4.4'-DDD	NA	1.20E+00	NA	4.52E-03									
4.4'-DDE	NA	1.70E+00	NA	5.66E-03									
4.4'-DDT	1.00E-04	1.70E+00	NA	7.12E-03									
Aldrin	1.50E-05	3.40E+01	NA	1.32E-03									
Alpha-BHC	NA	6.30E+00	NA	1.35E-03									
Alpha-Chlordane	5.00E-04	3.50E-01	NA	1.41E-03									
Aroclor-1248	NA	NA	6.00E-02	ND									
Aroclor-1254	1.80E-05	2.22E+00	6.00E-02	3.96E-02	2.18E-08	2.18E-09	1E-03	5E-09	4.02E-08	1.15E-09	2E-03	3E-09	7E-09
Aroclor-1260	1.80E-05	2.22E+00	6.00E-02	2.71E-02	1.49E-08	1.49E-09	8E-04	3E-09	2.75E-08	7.86E-10	2E-03	2E-09	5E-09
Beta-BHC	NA	1.80E+00	NA	1.60E-03									
Delta-BHC	NA	NA	NA	ND									
Dieldrin	2.50E-05	3.20E+01	NA	2.79E-03									
Endosulfan I	6 00E-03	NA	NA	1.32E-03									
Endosulfan II	6.00E-03	NA	NA	2.62E-03									
Endosulfan sulfate	6.00E-03	NA	NA	2.57E-03									
Endrin	3.00E-04	NA	NA	2.80E-03									
Endrin aldehyde	NA	NA	NA	2.93E-03									
Endrin ketone	NA	NA	NA	2.56E-03									
Gamma-Chlordane	5 00E-04	3.50E-01	NA	1.61E-03									
Heptachlor	5 00E-04	4.50E+00	NA	1.36E-03									
Heptachlor epoxide	1.30E-05	9 10E+00	NA	1.40E-03									
Herbicides													
Dicamba	3.00E-02	NA	NA	ND									
Nitroaromatics													
1.3.5-Trinitrobenzene	5.00E-05	NA	NA	6.88E-02									
2.4.6-Trinitrotoluene	5.00E-04	3.00E-02	NA	6.81E-02									
2.4-Dinitrotoluene	2.00E-03	6.80E-01	NA	6.95E-02									
2-amino-4.6-Dinitrotoluene	NA	NA	NA	6.83E-02									
4-Nitrotoluene	1.00E-02	NA	NA	7.30E-02									
Metals													
Antimony	4.00E-04	NA	NA	9.11E+00									
Chromium	3.00E-02	NA	NA	1.19E+03									
Chromium. Hexavalent	6 00E-05	NA	NA	1.02E+01									
Copper	2 40E-02	NA	NA	3.87E+02									
Cyanide	1.00E-02	NA	NA	4.30E-01									
Lead	NA	NA	NA	6.85E+01									
Mercury	3.00E-06	NA	NA	1.00E-01									
Thallium	8.00E-05	NA	NA	1.40E+00									
Zinc	7.50E-02	NA	NA	2.44E+02									
Total Hazard Quotient and Cancer Risk:							2E-03				4E-03		1E-08

Assumptions for Future Resident (Adult)			Assumptions for Future Resident (Child)		
CS =	EPC Surface Only		CS =	EPC Surface Only	
CF =	1.00E-06	kg/mg	CF =	1.00E-06	kg/mg
SA =	5,000	cm2	SA =	1,980	cm2
AF =	0.2	mg/cm2	AF =	0.2	mg/cm2
EF =	234	days/year	EF =	234	days/year
ED =	7	years	ED =	2	years
BW =	70	kg	BW =	15	kg
AT (Nc) =	2555	days	AT (Nc) =	730	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.
* 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 G-15
CALCULATION OF AIR CONCENTRATION IN SHOWER FROM VOLATILIZATION OF GROUNDWATER (DAILY) REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-4
SEAD - 4 Remedial Investigation
Seneca Army Depot Activity

Analyte	EPC Air All-Site Wells (mg/m^3)	Time of Shower -Ts (min)	Flow Rate of Shower - Fw (L/min)	EPC Groundwater (mg/l)	Flow Rate of Air in Shower-Fa (m^3/min)	Volume of Bathroom-Vb (m^3)	Henry Laws Constant-H (m^3-atm/mol)	Asymptotic Air Conc.-Cinf (mg/m^3)	Rate Constant-K (1/min)	Efficiency of Release-E (unitless)	Efficiency of Release for TCE E-TCE	Henry Laws Constant-TCE (m^3-atm/mol)	Fraction Emitted* (percent)	Cderm** (Water) (mg/l)
Volatile Organics														
Acetone	2.57E-05	15	19	3.50E-03	2.4	12	2.06E-05	3.76E-05	0.20	1.36E-03	0.6	0.0091	0.09%	3.50E-03
Benzene	3.83E-03	15	19	1.92E-03	2.4	12	5.59E-03	5.60E-03	0.20	3.69E-01	0.6	0.0091	25.18%	1.44E-03
Ethyl benzene	5.16E-03	15	19	2.25E-03	2.4	12	6.43E-03	7.55E-03	0.20	4.24E-01	0.6	0.0091	28.97%	1.60E-03
Toluene	9.09E-04	15	19	4.00E-04	2.4	12	6.37E-03	1.33E-03	0.20	4.20E-01	0.6	0.0091	28.70%	2.85E-04
Total Xylenes	5.27E-03	15	19	2.10E-03	2.4	12	7.04E-03	7.72E-03	0.20	4.64E-01	0.6	0.0091	31.72%	1.43E-03
Semivolatile Organics														
4-Methylphenol	3.02E-07	15	19	1.91E-03	2.4	12	4.43E-07	4.42E-07	0.20	2.92E-05	0.6	0.0091	0.00%	1.91E-03
Bis(2-Ethylhexyl)phthalate	1.42E-07	15	19	1.10E-03	2.4	12	3.61E-07	2.07E-07	0.20	2.38E-05	0.6	0.0091	0.00%	1.10E-03
Di-n-butylphthalate	1.51E-08	15	19	1.50E-04	2.4	12	2.82E-07	2.21E-08	0.20	1.86E-05	0.6	0.0091	0.00%	1.50E-04
Diethyl phthalate	3.62E-07	15	19	8.90E-04	2.4	12	1.14E-06	5.30E-07	0.20	7.52E-05	0.6	0.0091	0.01%	8.90E-04
Naphthalene	7.83E-04	15	19	1.91E-03	2.4	12	1.15E-03	1.15E-03	0.20	7.58E-02	0.6	0.0091	5.18%	1.81E-03
Phenol	6.48E-08	15	19	4.00E-04	2.4	12	4.54E-07	9.48E-08	0.20	2.99E-05	0.6	0.0091	0.00%	4.00E-04
Pesticides/PCBs														
Aldrin	2.05E-08	15	19	3.60E-06	2.4	12	1.60E-05	3.01E-08	0.20	1.05E-03	0.6	0.0091	0.07%	3.60E-06
Alpha-BHC	5.86E-09	15	19	2.80E-06	2.4	12	5.87E-06	8.58E-09	0.20	3.87E-04	0.6	0.0091	0.03%	2.80E-06
Aroclor-1260	1.52E-04	15	19	6.00E-05	2.4	12	7.10E-03	2.22E-04	0.20	4.68E-01	0.6	0.0091	31.99%	4.08E-05
Delta-BHC	3.03E-10	15	19	4.10E-06	2.4	12	2.07E-07	4.43E-10	0.20	1.36E-05	0.6	0.0091	0.00%	4.10E-06
Gamma-Chlordane	3.40E-08	15	19	9.89E-06	2.4	12	9.63E-06	4.97E-08	0.20	6.35E-04	0.6	0.0091	0.04%	9.89E-06
Heptachlor	2.91E-06	15	19	9.97E-06	2.4	12	8.19E-04	4.26E-06	0.20	5.40E-02	0.6	0.0091	3.69%	9.60E-06
Nitroaromatics														
2-Nitrotoluene	2.46E-05	15	19	1.70E-04	2.4	12	4.06E-04	3.60E-05	0.20	2.68E-02	0.6	0.0091	1.83%	1.67E-04
3-Nitrotoluene	3.19E-05	15	19	2.20E-04	2.4	12	4.06E-04	4.66E-05	0.20	2.68E-02	0.6	0.0091	1.83%	2.16E-04
4-Nitrotoluene	4.78E-05	15	19	3.30E-04	2.4	12	4.06E-04	6.99E-05	0.20	2.68E-02	0.6	0.0091	1.83%	3.24E-04
Nitrobenzene	1.33E-06	15	19	1.70E-04	2.4	12	2.20E-05	1.95E-06	0.20	1.45E-03	0.6	0.0091	0.10%	1.70E-04
Metals														
Beryllium	0.00E+00	15	19	3.60E-04	2.4	12	NA	0.00E+00	0.20	0.00E+00	0.6	0.0091	0.00%	3.60E-04
Cadmium	0.00E+00	15	19	7.50E-04	2.4	12	NA	0.00E+00	0.20	0.00E+00	0.6	0.0091	0.00%	7.50E-04
Chromium	0.00E+00	15	19	1.54E-02	2.4	12	NA	0.00E+00	0.20	0.00E+00	0.6	0.0091	0.00%	1.54E-02
Selenium	0.00E+00	15	19	4.24E-03	2.4	12	NA	0.00E+00	0.20	0.00E+00	0.6	0.0091	0.00%	4.24E-03
Silver	0.00E+00	15	19	1.69E-03	2.4	12	NA	0.00E+00	0.20	0.00E+00	0.6	0.0091	0.00%	1.69E-03

Concentration in Air (mg/m^3) = Cinf[1+(1/(kTs)(exp(-kTs)-1)]

Asymptotic Air Conc. - Cinf (mg/m^3) = [(E)(Fw)(Ct)]/Fa

Rate Constant - k (L/min) = Fa/Vb

Efficiency of Release - E (unitless) = (E-tce)(H)/(H-tce)

* **Fraction Emitted (fe) = (EPCair x Fa) / (EPCgw x Fw)**

** **Cderm = EPCgw x (1 - fe)**

Variables:

CA = Chemical Concentration in Air (mg/m^3)
Ts = Time of Shower (minutes)
Fw = Flow Rate of Shower (L/min)
Fa = Flow Rate of Air in Shower (m^3/min)
Vb = Volume of Bathroom (m^3)

Assumptions:

EPC - Groundwater Data - RME
15 (RME default)
19 (Estimated RME)
2.4 (Average Air Flow)
12 (Average Bathroom Volume)

TABLE G-16
CALCULATION OF AIR CONCENTRATION IN SHOWER FROM VOLATILIZATION OF GROUNDWATER (DAILY)
CENTRAL TENDENCY (CT) - SEAD-4
SEAD - 4 Remedial Investigation
Seneca Army Depot Activity

Analyte	EPC Air All-Site Wells (mg/m^3)	Time of Shower -Ts (min)	Flow Rate of Shower - Fw (L/min)	EPC Groundwater (mg/l)	Flow Rate of Air in Shower-Fa (m^3/min)	Volume of Bathroom-Vb (m^3)	Henry Laws Constant-H (m^3-atm/mol)	Asymptotic Air Conc.-Cinf (mg/m^3)	Rate Constant-K (l/min)	Efficiency of Release-E (unitless)	Efficiency of Release for TCE E-TCE	Henry Laws Constant-TCE (m^3-atm/mol)	Fraction Emitted* (percent)	Cderm** (Water) (mg/l)
Volatile Organics														
Acetone	2.14E-05	10	19	3.50E-03	2.4	12	2.06E-05	3.76E-05	0.20	1.36E-03	0.6	0.0091	0.08%	3.50E-03
Benzene	3.18E-03	10	19	1.92E-03	2.4	12	5.59E-03	5.60E-03	0.20	3.69E-01	0.6	0.0091	20.92%	1.52E-03
Ethyl benzene	4.29E-03	10	19	2.25E-03	2.4	12	6.43E-03	7.55E-03	0.20	4.24E-01	0.6	0.0091	24.07%	1.71E-03
Toluene	7.55E-04	10	19	4.00E-04	2.4	12	6.37E-03	1.33E-03	0.20	4.20E-01	0.6	0.0091	23.84%	3.05E-04
Total Xylenes	4.38E-03	10	19	2.10E-03	2.4	12	7.04E-03	7.72E-03	0.20	4.64E-01	0.6	0.0091	26.35%	1.55E-03
Semivolatile Organics														
4-Methylphenol	2.51E-07	10	19	1.91E-03	2.4	12	4.43E-07	4.42E-07	0.20	2.92E-05	0.6	0.0091	0.00%	1.91E-03
Bis(2-Ethylhexyl)phthalate	1.18E-07	10	19	1.10E-03	2.4	12	3.61E-07	2.07E-07	0.20	2.38E-05	0.6	0.0091	0.00%	1.10E-03
Di-n-butylphthalate	1.25E-08	10	19	1.50E-04	2.4	12	2.82E-07	2.21E-08	0.20	1.86E-05	0.6	0.0091	0.00%	1.50E-04
Diethyl phthalate	3.01E-07	10	19	8.90E-04	2.4	12	1.14E-06	5.30E-07	0.20	7.52E-05	0.6	0.0091	0.00%	8.90E-04
Naphthalene	6.51E-04	10	19	1.91E-03	2.4	12	1.15E-03	1.15E-03	0.20	7.58E-02	0.6	0.0091	4.30%	1.83E-03
Phenol	5.38E-08	10	19	4.00E-04	2.4	12	4.54E-07	9.48E-08	0.20	2.99E-05	0.6	0.0091	0.00%	4.00E-04
Pesticides/PCBs														
Aldrin	1.71E-08	10	19	3.60E-06	2.4	12	1.60E-05	3.01E-08	0.20	1.05E-03	0.6	0.0091	0.06%	3.60E-06
Alpha-BHC	4.87E-09	10	19	2.80E-06	2.4	12	5.87E-06	8.58E-09	0.20	3.87E-04	0.6	0.0091	0.02%	2.80E-06
Aroclor-1260	1.26E-04	10	19	6.00E-05	2.4	12	7.10E-03	2.22E-04	0.20	4.68E-01	0.6	0.0091	26.57%	4.41E-05
Delta-BHC	2.51E-10	10	19	4.10E-06	2.4	12	2.07E-07	4.43E-10	0.20	1.36E-05	0.6	0.0091	0.00%	4.10E-06
Gamma-Chlordane	2.82E-08	10	19	9.89E-06	2.4	12	9.63E-06	4.97E-08	0.20	6.35E-04	0.6	0.0091	0.04%	9.89E-06
Heptachlor	2.42E-06	10	19	9.97E-06	2.4	12	8.19E-04	4.26E-06	0.20	5.40E-02	0.6	0.0091	3.07%	9.66E-06
Nitroaromatics														
2-Nitrotoluene	2.05E-05	10	19	1.70E-04	2.4	12	4.06E-04	3.60E-05	0.20	2.68E-02	0.6	0.0091	1.52%	1.67E-04
3-Nitrotoluene	2.65E-05	10	19	2.20E-04	2.4	12	4.06E-04	4.66E-05	0.20	2.68E-02	0.6	0.0091	1.52%	2.17E-04
4-Nitrotoluene	3.97E-05	10	19	3.30E-04	2.4	12	4.06E-04	6.99E-05	0.20	2.68E-02	0.6	0.0091	1.52%	3.25E-04
Nitrobenzene	1.11E-06	10	19	1.70E-04	2.4	12	2.20E-05	1.95E-06	0.20	1.45E-03	0.6	0.0091	0.08%	1.70E-04
Metals														
Beryllium	0.00E+00	10	19	3.60E-04	2.4	12	NA	0.00E+00	0.20	0.00E+00	0.6	0.0091	0.00%	3.60E-04
Cadmium	0.00E+00	10	19	7.50E-04	2.4	12	NA	0.00E+00	0.20	0.00E+00	0.6	0.0091	0.00%	7.50E-04
Chromium	0.00E+00	10	19	1.54E-02	2.4	12	NA	0.00E+00	0.20	0.00E+00	0.6	0.0091	0.00%	1.54E-02
Selenium	0.00E+00	10	19	4.24E-03	2.4	12	NA	0.00E+00	0.20	0.00E+00	0.6	0.0091	0.00%	4.24E-03
Silver	0.00E+00	10	19	1.69E-03	2.4	12	NA	0.00E+00	0.20	0.00E+00	0.6	0.0091	0.00%	1.69E-03

Concentration in Air (mg/m^3) = Cinf[1+(1/(kTs)(exp(-kTs)-1)]

Asymptotic Air Conc. - Cinf (mg/m^3) = [(E)(Fw)(Ct)]/Fa

Rate Constant - k (L/min) = Fa/Vb

Efficiency of Release - E (unitless) = (E-tce)(H)/(H-tce)

*** Fraction Emitted (fe) = (EPCair x Fa) / (EPCgw x Fw)**

**** Cderm = EPCgw x (1 - fe)**

Variables:

CA = Chemical Concentration in Air (mg/m^3)
Ts = Time of Shower (minutes)
Fw = Flow Rate of Shower (L/min)
Fa = Flow Rate of Air in Shower (m^3/min)
Vb = Volume of Bathroom (m^3)

Assumptions:

EPC - Groundwater Data - RME
15 (RME default)
19 (Estimated RME)
2.4 (Average Air Flow)
12 (Average Bathroom Volume)

TABLE G-17
CALCULATION OF INTAKE AND RISK FROM INHALATION OF GROUNDWATER (WHILE SHOWERING)
REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-4
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

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

Variables (Assumptions for Each Receptor are Listed at the Bottom):
CA =Chemical Concentration in Air
IR = Inhalation Rate
EF = Exposure Frequency
ED=Exposure Duration
BW=Bodyweight
AT = Averaging Time

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Inhalation RfD	Carc. Slope Inhalation	EPC* Air	Current Site Worker				Future Outdoor Park Worker				Future Recreational Visitor (Child)				Future 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	Intake (mg/kg-day)		Hazard Quotient	Cancer Risk
	(mg/kg-day)	(mg/kg-day)-1	(mg/m³)	(Nc)	(Car)			(Nc)	(Car)			(Nc)	(Car)			(Nc)	(Car)		
Volatile Organics																			
Acetone	NA	NA	2.57E-05	Inhalation of Groundwater Not Applicable for Current Site Worker				Inhalation of Groundwater Not Applicable for Future Outdoor Park Worker								Inhalation of Groundwater Not Applicable for Future Construction Worker			
Benzene	1.71E-03	2.73E-02	3.83E-03									7.34E-07	5.24E-08	4E-04	1E-09				
Ethyl benzene	2.86E-01	NA	5.16E-03									9.90E-07		3E-06					
Toluene	1.14E-01	NA	9.09E-04									1.74E-07		2E-06					
Total Xylenes	NA	NA	5.27E-03																
Semivolatile Organics																			
4-Methylphenol	NA	NA	3.02E-07																
Bis(2-Ethylhexyl)phthalate	NA	NA	1.42E-07																
Di-n-butylphthalate	NA	NA	1.51E-08																
Diethyl phthalate	NA	NA	3.62E-07																
Naphthalene	8.60E-04	NA	7.83E-04									1.50E-07		2E-04					
Phenol	NA	NA	6.48E-08																
Pesticides/PCBs																			
Aldrin	NA	1.72E+01	2.05E-08										2.81E-13		5E-12				
Alpha-BHC	NA	6.30E+00	5.86E-09										8.03E-14		5E-13				
Aroclor-1260	NA	4.00E-01	1.52E-04										2.08E-09		8E-10				
Delta-BHC	NA	NA	3.03E-10																
Gamma-Chlordane	2.00E-04	3.50E-01	3.40E-08									6.51E-12	4.65E-13	3E-08	2E-13				
Heptachlor	NA	4.55E+00	2.91E-06										3.99E-11		2E-10				
Nitroaromatics																			
2-Nitrotoluene	NA	NA	2.46E-05																
3-Nitrotoluene	NA	NA	3.19E-05																
4-Nitrotoluene	NA	NA	4.78E-05																
Nitrobenzene	5.71E-04	NA	1.33E-06									2 56E-10		4E-07					
Metals																			
Beryllium	6.00E-06	8.40E+00	NA																
Cadmium	NA	6.30E+00	NA																
Chromium	NA	NA	NA																
Selenium	NA	NA	NA																
Silver	NA	NA	NA																
Total Hazard Quotient and Cancer Risk:														**6E-04**	**2E-09**				

Assumptions for Future Recreational Visitor (Child)

BW =	15 kg
IR =	0.08 m3/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 G-15.

TABLE G-17
CALCULATION OF INTAKE AND RISK FROM INHALATION OF GROUNDWATER (WHILE SHOWERING)
REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-4
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

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

Variables (Assumptions for Each Receptor are Listed at the Bottom):
CA =Chemical Concentration in Air
IR = Inhalation Rate
EF = Exposure Frequency
ED=Exposure Duration
BW=Bodyweight
AT = Averaging Time

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Inhalation RfD	Carc. Slope Inhalation	EPC* Air	Future Resident (Adult)				Future Resident (Child)				Resident
	(mg/kg-day)	(mg/kg-day)-1	(mg/m³)	Intake (mg/kg-day) (Nc)	Intake (mg/kg-day) (Car)	Hazard Quotient	Contribution to Lifetime Cancer Risk	Intake (mg/kg-day) (Nc)	Intake (mg/kg-day) (Car)	Hazard Quotient	Contribution to Lifetime Cancer Risk	Total Lifetime Cancer Risk
Volatile Organics												
Acetone	NA	NA	2.57E-05									
Benzene	1.71E-03	2.73E-02	3.83E-03	6.55E-06	2 25E-06	4E-03	6E-08	1.84E-05	1.57E-06	1E-02	4E-08	1E-07
Ethyl benzene	2.86E-01	NA	5.16E-03	8.84E-06		3E-05		2.47E-05		9E-05		
Toluene	1.14E-01	NA	9.09E-04	1.56E-06		1E-05		4.36E-06		4E-05		
Total Xylenes	NA	NA	5.27E-03									
Semivolatile Organics												
4-Methylphenol	NA	NA	3.02E-07									
Bis(2-Ethylhexyl)phthalate	NA	NA	1.42E-07									
Di-n-butylphthalate	NA	NA	1.51E-08									
Diethyl phthalate	NA	NA	3.62E-07									
Naphthalene	8.60E-04	NA	7.83E-04	1 34E-06		2E-03		3.76E-06		4E-03		
Phenol	NA	NA	6 48E-08									
Pesticides/PCBs												
Aldrin	NA	1.72E+01	2.05E-08		1.21E-11		2E-10		8 44E-12		1E-10	4E-10
Alpha-BHC	NA	6.30E+00	5.86E-09		3.44E-12		2E-11		2.41E-12		2E-11	4E-11
Aroclor-1260	NA	4.00E-01	1.52E-04		8.92E-08		4E-08		6 24E-08		2E-08	6E-08
Delta-BHC	NA	NA	3.03E-10									
Gamma-Chlordane	2.00E-04	3.50E-01	3.40E-08	5.82E-11	1.99E-11	3E-07	7E-12	1.63E-10	1 40E-11	8E-07	5E-12	1E-11
Heptachlor	NA	4.55E+00	2.91E-06		1.71E-09		8E-09		1.20E-09		5E-09	1E-08
Nitroaromatics												
2-Nitrotoluene	NA	NA	2.46E-05									
3-Nitrotoluene	NA	NA	3.19E-05									
4-Nitrotoluene	NA	NA	4.78E-05									
Nitrobenzene	5.71E-04	NA	1.33E-06	2.28E-09		4E-06		6.40E-09		1E-05		
Metals												
Beryllium	6.00E-06	8.40E+00	NA									
Cadmium	NA	6.30E+00	NA									
Chromium	NA	NA	NA									
Selenium	NA	NA	NA									
Silver	NA	NA	NA									
Total Hazard Quotient and Cancer Risk:						**5E-03**				**2E-02**		**2E-07**

Assumptions for Future Resident (Adult)		Assumptions for Future Resident (Child)	
BW =	70 kg	BW =	15 kg
IR =	0.13 m3/day	IR =	0.08 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 G-15.

TABLE G-18
CALCULATION OF INTAKE AND RISK FROM INHALATION OF GROUNDWATER (WHILE SHOWERING)
CENTRAL TENDENCY (CT) - SEAD-4
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

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

Variables (Assumptions for Each Receptor are Listed at the Bottom).
CA = Chemical Concentration in Air
IR = Inhalation Rate
EF = Exposure Frequency
ED=Exposure Duration
BW=Bodyweight
AT = Averaging Time

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Inhalation RfD (mg/kg-day)	Carc. Slope Inhalation (mg/kg-day)-1	EPC* Air (mg/m³)	Current Site Worker				Future Outdoor Park Worker				Future Recreational Visitor (Child)				Future Construction Worker			
				Intake (mg/kg-day) (Nc)	Intake (mg/kg-day) (Car)	Hazard Quotient	Cancer Risk	Intake (mg/kg-day) (Nc)	Intake (mg/kg-day) (Car)	Hazard Quotient	Cancer Risk	Intake (mg/kg-day) (Nc)	Intake (mg/kg-day) (Car)	Hazard Quotient	Cancer Risk	Intake (mg/kg-day) (Nc)	Intake (mg/kg-day) (Car)	Hazard Quotient	Cancer Risk
Volatile Organics																			
Acetone	NA	NA	2.14E-05																
Benzene	1.71E-03	2.73E-02	3.18E-03	Inhalation of Groundwater				Inhalation of Groundwater				2.03E-07	2.90E-09	1E-04	8E-11	Inhalation of Groundwater			
Ethyl benzene	2.86E-01	NA	4.29E-03	Not Applicable for				Not Applicable for				2.74E-07		1E-06		Not Applicable for			
Toluene	1.14E-01	NA	7.55E-04	Current Site Worker				Future Outdoor Park Worker				4 83E-08		4E-07		Future Construction Worker			
Total Xylenes	NA	NA	4.38E-03																
Semivolatile Organics																			
4-Methylphenol	NA	NA	2.51E-07																
Bis(2-Ethylhexyl)phthalate	NA	NA	1.18E-07																
Di-n-butylphthalate	NA	NA	1.25E-08																
Diethyl phthalate	NA	NA	3.01E-07																
Naphthalene	8.60E-04	NA	6.51E-04									4.16E-08		5E-05					
Phenol	NA	NA	5.38E-08																
Pesticides/PCBs																			
Aldrin	NA	1.72E+01	1.71E-08										1.56E-14		3E-13				
Alpha-BHC	NA	6.30E+00	4.87E-09										4.45E-15		3E-14				
Aroclor-1260	NA	4.00E-01	1.26E-04										1.15E-10		5E-11				
Delta-BHC	NA	NA	2.51E-10																
Gamma-Chlordane	2.00E-04	3.50E-01	2.82E-08									1.80E-12	2.58E-14	9E-09	9E-15				
Heptachlor	NA	4.55E+00	2.42E-06										2.21E-12		1E-11				
Nitroaromatics																			
2-Nitrotoluene	NA	NA	2.05E-05																
3-Nitrotoluene	NA	NA	2.65E-05																
4-Nitrotoluene	NA	NA	3.97E-05																
Nitrobenzene	5.71E-04	NA	1.11E-06									7.08E-11		1E-07					
Metals																			
Beryllium	6.00E-06	8.40E+00	NA																
Cadmium	NA	6.30E+00	NA																
Chromium	NA	NA	NA																
Selenium	NA	NA	NA																
Silver	NA	NA	NA																
Total Hazard Quotient and Cancer Risk:														**2E-04**	**1E-10**				

Assumptions for Future Recreational Visitor (Child)

BW =	15	kg
IR =	0.05	m3/day
EF =	7	days/year
ED =	1	years
AT (Nc) =	365	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 G-16

TABLE G-18
CALCULATION OF INTAKE AND RISK FROM INHALATION OF GROUNDWATER (WHILE SHOWERING)
CENTRAL TENDENCY (CT) - SEAD-4
SEAD-4 Remedial Investigation
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
ED=Exposure Duration
BW=Bodyweight
AT = Averaging Time

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Inhalation RfD (mg/kg-day)	Carc. Slope Inhalation (mg/kg-day)-1	EPC* Air (mg/m³)	Future Resident (Adult) Intake (mg/kg-day) (Nc)	Future Resident (Adult) Intake (mg/kg-day) (Car)	Future Resident (Adult) Hazard Quotient	Future Resident (Adult) Contribution to Lifetime Cancer Risk	Future Resident (Child) Intake (mg/kg-day) (Nc)	Future Resident (Child) Intake (mg/kg-day) (Car)	Future Resident (Child) Hazard Quotient	Future Resident (Child) Contribution to Lifetime Cancer Risk	Resident Total Lifetime Cancer Risk
Volatile Organics												
Acetone	NA	NA	2.14E-05									
Benzene	1 71E-03	2.73E-02	3.18E-03	2.43E-06	2.43E-07	1E-03	7E-09	6.80E-06	1.94E-07	4E-03	5E-09	1E-08
Ethyl benzene	2.86E-01	NA	4.29E-03	3.27E-06		1E-05		9.16E-06		3E-05		
Toluene	1.14E-01	NA	7.55E-04	5.76E-07		5E-06		1.61E-06		1E-05		
Total Xylenes	NA	NA	4.38E-03									
Semivolatile Organics												
4-Methylphenol	NA	NA	2.51E-07									
Bis(2-Ethylhexyl)phthalate	NA	NA	1.18E-07									
Di-n-butylphthalate	NA	NA	1.25E-08									
Diethyl phthalate	NA	NA	3.01E-07									
Naphthalene	8 60E-04	NA	6.51E-04	4.97E-07		6E-04		1.39E-06		2E-03		
Phenol	NA	NA	5.38E-08									
Pesticides/PCBs												
Aldrin	NA	1.72E+01	1.71E-08		1.30E-12		2E-11		1.04E-12		2E-11	4E-11
Alpha-BHC	NA	6.30E+00	4.87E-09		3.72E-13		2E-12		2.97E-13		2E-12	4E-12
Aroclor-1260	NA	4 00E-01	1.26E-04		9.63E-09		4E-09		7.71E-09		3E-09	7E-09
Delta-BHC	NA	NA	2.51E-10									
Gamma-Chlordane	2.00E-04	3.50E-01	2.82E-08	2.15E-11	2.15E-12	1E-07	8E-13	6.03E-11	1.72E-12	3E-07	6E-13	1E-12
Heptachlor	NA	4.55E+00	2.42E-06		1.85E-10		8E-10		1.48E-10		7E-10	2E-09
Nitroaromatics												
2-Nitrotoluene	NA	NA	2.05E-05									
3-Nitrotoluene	NA	NA	2.65E-05									
4-Nitrotoluene	NA	NA	3.97E-05									
Nitrobenzene	5.71E-04	NA	1.11E-06	8.46E-10		1E-06		2.37E-09		4E-06		
Metals												
Beryllium	6.00E-06	8.40E+00	NA									
Cadmium	NA	6.30E+00	NA									
Chromium	NA	NA	NA									
Selenium	NA	NA	NA									
Silver	NA	NA	NA									
Total Hazard Quotient and Cancer Risk:						**2E-03**				**6E-03**		**2E-08**

Assumptions for Future Resident (Adult)

BW = 70 kg
IR = 0.08 m3/day
EF = 234 days/year
ED = 7 years
AT (Nc) = 2,555 days
AT (Car) = 25,550 days

Assumptions for Future Resident (Child)

BW = 15 kg
IR = 0.05 m3/day
EF = 234 days/year
ED = 2 years
AT (Nc) = 730 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 G-16.

TABLE G-19
CALCULATION OF INTAKE AND RISK FROM THE INGESTION OF GROUNDWATER
REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-4
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

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

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 Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Oral RfD	Carc. Slope Oral	EPC Groundwater	Current Site Worker				Future Outdoor Park Worker				Future Indoor Park Worker				Future Recreational Visitor (Child)				Future 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	Intake (mg/kg-day)		Hazard Quotient	Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Cancer Risk
	(mg/kg-day)	(mg/kg-day)-1	(mg/liter)	(Nc)	(Car)			(Nc)	(Car)			(Nc)	(Car)			(Nc)	(Car)			(Nc)	(Car)		
Volatile Organics																							
Acetone	1.00E-01	NA	3.50E-03	**Ingestion of Groundwater Not Applicable Current Site Worker**				2.40E-05		2E-04		2.40E-05		2E-04		8.95E-06		9E-05		**Ingestion of Groundwater Not Applicable for Future Construction Worker**			
Benzene	3.00E-03	2.90E-02	1.92E-03					1.32E-05	4.70E-06	4E-03	1E-07	1.32E-05	4.70E-06	4E-03	1E-07	4.91E-06	3.51E-07	2E-03	1E-08				
Ethyl benzene	1.00E-01	NA	2.25E-03					1.54E-05		2E-04		1.54E-05		2E-04		5.75E-06		6E-05					
Toluene	2.00E-01	NA	4.00E-04					2.74E-06		1E-05		2.74E-06		1E-05		1.02E-06		5E-06					
Total Xylenes	2.00E+00	NA	2.10E-03					1.44E-05		7E-06		1.44E-05		7E-06		5.37E-06		3E-06					
Semivolatile Organics																							
4-Methylphenol	5.00E-03	NA	1.91E-03					1.31E-05		3E-03		1.31E-05		3E-03		4.88E-06		1E-03					
Bis(2-Ethylhexyl)phthalate	2.00E-02	1.40E-02	1.10E-03					7.53E-06	2.69E-06	4E-04	4E-08	7.53E-06	2.69E-06	4E-04	4E-08	2.81E-06	2.01E-07	1E-04	3E-09				
Di-n-butylphthalate	1.00E-01	NA	1.50E-04					1.03E-06		1E-05		1.03E-06		1E-05		3.84E-07		4E-06					
Diethyl phthalate	8.00E-01	NA	8.90E-04					6.10E-06		8E-06		6.10E-06		8E-06		2.28E-06		3E-06					
Naphthalene	2.00E-02	NA	1.91E-03					1.31E-05		7E-04		1.31E-05		7E-04		4.88E-06		2E-04					
Phenol	6.00E-01	NA	4.00E-04					2.74E-06		5E-06		2.74E-06		5E-06		1.02E-06		2E-06					
Pesticides/PCBs																							
Aldrin	3.00E-05	1.70E+01	3.60E-06					2.47E-08	8.81E-09	8E-04	1E-07	2.47E-08	8.81E-09	8E-04	1E-07	9.21E-09	6.58E-10	3E-04	1E-08				
Alpha-BHC	NA	6.30E+00	2.80E-06						6.85E-09		4E-08		6.85E-09		4E-08		5.11E-10		3E-09				
Aroclor-1260	2.00E-05	2.00E+00	6.00E-05					4.11E-07	1.47E-07	2E-02	3E-07	4.11E-07	1.47E-07	2E-02	3E-07	1.53E-07	1.10E-08	8E-03	2E-08				
Delta-BHC	NA	NA	4.10E-06																				
Gamma-Chlordane	5.00E-04	3.50E-01	9.89E-06					6.77E-08	2.42E-08	1E-04	8E-09	6.77E-08	2.42E-08	1E-04	8E-09	2.53E-08	1.81E-09	5E-05	6E-10				
Heptachlor	5.00E-04	4.50E+00	9.97E-06					6.83E-08	2.44E-08	1E-04	1E-07	6.83E-08	2.44E-08	1E-04	1E-07	2.55E-08	1.82E-09	5E-05	8E-09				
Nitroaromatics																							
2-Nitrotoluene	1.00E-02	NA	1.70E-04					1.16E-06		1E-04		1.16E-06		1E-04		4.35E-07		4E-05					
3-Nitrotoluene	1.00E-02	NA	2.20E-04					1.51E-06		2E-04		1.51E-06		2E-04		5.63E-07		6E-05					
4-Nitrotoluene	1.00E-02	NA	3.30E-04					2.26E-06		2E-04		2.26E-06		2E-04		8.44E-07		8E-05					
Nitrobenzene	5.00E-04	NA	1.70E-04					1.16E-06		2E-03		1.16E-06		2E-03		4.35E-07		9E-04					
Metals																							
Beryllium	2.00E-03	NA	3.60E-04					2.47E-06		1E-03		2.47E-06		1E-03		9.21E-07		5E-04					
Cadmium	5.00E-04	NA	7.50E-04					5.14E-06		1E-02		5.14E-06		1E-02		1.92E-06		4E-03					
Chromium	1.50E+00	NA	1.54E-02					1.05E-04		7E-05		1.05E-04		7E-05		3.94E-05		3E-05					
Selenium	5.00E-03	NA	4.24E-03					2.90E-05		6E-03		2.90E-05		6E-03		1.08E-05		2E-03					
Silver	5.00E-03	NA	1.69E-03					1.16E-05		2E-03		1.16E-05		2E-03		4.32E-06		9E-04					
Total Hazard Quotient and Cancer Risk:										**5E-02**	**8E-07**			**5E-02**	**8E-07**			**2E-02**	**6E-08**				

Assumptions for Future Outdoor Park Worker			Assumptions for Future Indoor Park Worker			Assumptions for Future Recreational Visitor (Child)		
BW =	70	kg	BW =	70	kg	BW =	15	kg
IR =	1	liter/day	IR =	1	liter/day	IR =	1	liter/day
EF =	175	days/year	EF =	175	days/year	EF =	14	days/year
ED =	25	years	ED =	25	years	ED =	5	years
AT (Nc) =	9,125	days	AT (Nc) =	9,125	days	AT (Nc) =	1,825	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.
NA= Information not available.

TABLE G-19
CALCULATION OF INTAKE AND RISK FROM THE INGESTION OF GROUNDWATER
REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-4
SEAD-4 Remedial Investigation
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	Carc. Slope Oral	EPC Groundwater	Future Resident (Adult)				Future Resident (Child)				Resident
				Intake (mg/kg-day)		Hazard Quotient	Contribution to Lifetime Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Contribution to Lifetime Cancer Risk	Total Lifetime Cancer Risk
	(mg/kg-day)	(mg/kg-day)-1	(mg/liter)	(Nc)	(Car)			(Nc)	(Car)			
Volatile Organics												
Acetone	1.00E-01	NA	3.50E-03	9.59E-05		1E-03		2.24E-04		2E-03		
Benzene	3.00E-03	2.90E-02	1.92E-03	5.26E-05	1.80E-05	2E-02	5E-07	1.23E-04	1.05E-05	4E-02	3E-07	8E-07
Ethyl benzene	1.00E-01	NA	2.25E-03	6.16E-05		6E-04		1.44E-04		1E-03		
Toluene	2.00E-01	NA	4.00E-04	1.10E-05		5E-05		2.56E-05		1E-04		
Total Xylenes	2.00E+00	NA	2.10E-03	5.75E-05		3E-05		1.34E-04		7E-05		
Semivolatile Organics												
4-Methylphenol	5.00E-03	NA	1.91E-03	5.23E-05		1E-02		1.22E-04		2E-02		
Bis(2-Ethylhexyl)phthalate	2.00E-02	1.40E-02	1.10E-03	3.01E-05	1.03E-05	2E-03	1E-07	7.03E-05	6.03E-06	4E-03	8E-08	2E-07
Di-n-butylphthalate	1.00E-01	NA	1.50E-04	4.11E-06		4E-05		9.59E-06		1E-04		
Diethyl phthalate	8.00E-01	NA	8.90E-04	2.44E-05		3E-05		5.69E-05		7E-05		
Naphthalene	2.00E-02	NA	1.91E-03	5.23E-05		3E-03		1.22E-04		6E-03		
Phenol	6.00E-01	NA	4.00E-04	1.10E-05		2E-05		2.56E-05		4E-05		
Pesticides/PCBs												
Aldrin	3.00E-05	1.70E+01	3.60E-06	9.86E-08	3.38E-08	3E-03	6E-07	2.30E-07	1.97E-08	8E-03	3E-07	9E-07
Alpha-BHC	NA	6.30E+00	2.80E-06		2.63E-08		2E-07		1.53E-08		1E-07	3E-07
Aroclor-1260	2.00E-05	2.00E+00	6.00E-05	1.64E-06	5.64E-07	8E-02	1E-06	3.84E-06	3.29E-07	2E-01	7E-07	2E-06
Delta-BHC	NA	NA	4.10E-06									
Gamma-Chlordane	5.00E-04	3.50E-01	9.89E-06	2.71E-07	9.29E-08	5E-04	3E-08	6.32E-07	5.42E-08	1E-03	2E-08	5E-08
Heptachlor	5.00E-04	4.50E+00	9.97E-06	2.73E-07	9.37E-08	5E-04	4E-07	6.37E-07	5.46E-08	1E-03	2E-07	7E-07
Nitroaromatics												
2-Nitrotoluene	1.00E-02	NA	1.70E-04	4.66E-06		5E-04		1.09E-05		1E-03		
3-Nitrotoluene	1.00E-02	NA	2.20E-04	6.03E-06		6E-04		1.41E-05		1E-03		
4-Nitrotoluene	1.00E-02	NA	3.30E-04	9.04E-06		9E-04		2.11E-05		2E-03		
Nitrobenzene	5.00E-04	NA	1.70E-04	4.66E-06		9E-03		1.09E-05		2E-02		
Metals												
Beryllium	2.00E-03	NA	3.60E-04	9.86E-06		5E-03		2.30E-05		1E-02		
Cadmium	5.00E-04	NA	7.50E-04	2.05E-05		4E-02		4.79E-05		1E-01		
Chromium	1.50E+00	NA	1.54E-02	4.22E-04		3E-04		9.84E-04		7E-04		
Selenium	5.00E-03	NA	4.24E-03	1.16E-04		2E-02		2.71E-04		5E-02		
Silver	5.00E-03	NA	1.69E-03	4.63E-05		9E-03		1.08E-04		2E-02		
Total Hazard Quotient and Cancer Risk:						**2E-01**				**5E-01**		**5E-06**

Assumptions for Future Resident (Adult)

BW	70	kg
IR =	2	liters/day
EF =	350	days/year
ED	24	years
AT (Nc) =	8,760	days
AT (Car) =	25,550	days

Assumptions for Future Resident (Child)

BW =	15	kg
IR =	1	liters/day
EF =	350	days/year
ED =	6	years
AT (Nc) =	2,190	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 G-20
CALCULATION OF INTAKE AND RISK FROM THE INGESTION OF GROUNDWATER
CENTRAL TENDENCY (CT) - SEAD-4
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

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

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 Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Oral RfD	Carc. Slope Oral	EPC Groundwater	Current Site Worker				Future Outdoor Park Worker				Future Indoor Park Worker				Future Recreational Visitor (Child)				Future 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	Intake (mg/kg-day)		Hazard Quotient	Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Cancer Risk
	(mg/kg-day)	(mg/kg-day)-1	(mg/liter)	(Nc)	(Car)			(Nc)	(Car)			(Nc)	(Car)			(Nc)	(Car)			(Nc)	(Car)		
Volatile Organics																							
Acetone	1.00E-01	NA	3.50E-03					2 10E-05		2E-04		2.10E-05		2E-04		3.31E-06		3E-05					
Benzene	3.00E-03	2.90E-02	1.92E-03					1 15E-05	1.15E-06	4E-03	3E-08	1 15E-05	1.15E-06	4E-03	3E-08	1.82E-06	2.60E-08	6E-04	8E-10				
Ethyl benzene	1.00E-01	NA	2.25E-03	**Ingestion of Groundwater Not Applicable for Current Site Worker**				1.35E-05		1E-04		1.35E-05		1E-04		2.13E-06		2E-05		**Ingestion of Groundwater Not Applicable for Construction Worker**			
Toluene	2.00E-01	NA	4.00E-04					2.40E-06		1E-05		2.40E-06		1E-05		3.78E-07		2E-06					
Total Xylenes	2.00E+00	NA	2.10E-03					1.26E-05		6E-06		1 26E-05		6E-06		1.99E-06		1E-06					
Semivolatile Organics																							
4-Methylphenol	5.00E-03	NA	1.91E-03					1 14E-05		2E-03		1.14E-05		2E-03		1.81E-06		4E-04					
Bis(2-Ethylhexyl)phthalate	2.00E-02	1.40E-02	1.10E-03					6.59E-06	6.59E-07	3E-04	9E-09	6.59E-06	6.59E-07	3E-04	9E-09	1.04E-06	1.49E-08	5E-05	2E-10				
Di-n-butylphthalate	1.00E-01	NA	1.50E-04					8.98E-07		9E-06		8.98E-07		9E-06		1.42E-07		1E-06					
Diethyl phthalate	8.00E-01	NA	8.90E-04					5.33E-06		7E-06		5.33E-06		7E-06		8.42E-07		1E-06					
Naphthalene	2.00E-02	NA	1.91E-03					1.14E-05		6E-04		1.14E-05		6E-04		1.81E-06		9E-05					
Phenol	6.00E-01	NA	4.00E-04					2.40E-06		4E-06		2.40E-06		4E-06		3.78E-07		6E-07					
Pesticides/PCBs																							
Aldrin	3.00E-05	1.70E+01	3.60E-06					2.16E-08	2.16E-09	7E-04	4E-08	2.16E-08	2.16E-09	7E-04	4E-08	3.41E-09	4.87E-11	1E-04	8E-10				
Alpha-BHC	NA	6.30E+00	2.80E-06						1.68E-09		1E-08		1.68E-09		1E-08		3.78E-11		2E-10				
Aroclor-1260	2.00E-05	2.00E+00	6.00E-05					3.59E-07	3.59E-08	2E-02	7E-08	3.59E-07	3.59E-08	2E-02	7E-08	5.68E-08	8.11E-10	3E-03	2E-09				
Delta-BHC	NA	NA	4.10E-06																				
Gamma-Chlordane	5.00E-04	3.50E-01	9.89E-06					5.92E-08	5.92E-09	1E-04	2E-09	5.92E-08	5.92E-09	1E-04	2E-09	9.36E-09	1.34E-10	2E-05	5E-11				
Heptachlor	5.00E-04	4.50E+00	9.97E-06					5.97E-08	5.97E-09	1E-04	3E-08	5.97E-08	5.97E-09	1E-04	3E-08	9.43E-09	1.35E-10	2E-05	6E-10				
Nitroaromatics																							
2-Nitrotoluene	1.00E-02	NA	1.70E-04					1.02E-06		1E-04		1.02E-06		1E-04		1.61E-07		2E-05					
3-Nitrotoluene	1.00E-02	NA	2.20E-04					1.32E-06		1E-04		1.32E-06		1E-04		2.08E-07		2E-05					
4-Nitrotoluene	1.00E-02	NA	3.30E-04					1.98E-06		2E-04		1.98E-06		2E-04		3.12E-07		3E-05					
Nitrobenzene	5.00E-04	NA	1.70E-04					1.02E-06		2E-03		1.02E-06		2E-03		1.61E-07		3E-04					
Metals																							
Beryllium	2.00E-03	NA	3.60E-04					2.16E-06		1E-03		2 16E-06		1E-03		3.41E-07		2E-04					
Cadmium	5.00E-04	NA	7.50E-04					4.49E-06		9E-03		4.49E-06		9E-03		7.10E-07		1E-03					
Chromium	1.50E+00	NA	1 54E-02					9.22E-05		6E-05		9.22E-05		6E-05		1.46E-05		1E-05					
Selenium	5.00E-03	NA	4.24E-03					2.54E-05		5E-03		2.54E-05		5E-03		4.01E-06		8E-04					
Silver	5.00E-03	NA	1.69E-03					1.01E-05		2E-03		1.01E-05		2E-03		1.60E-06		3E-04					
Total Hazard Quotient and Cancer Risk:										**5E-02**	**2E-07**			**5E-02**	**2E-07**			**7E-03**	**4E-09**				

Assumptions for Future Outdoor Park Worker

BW =	70	kg
IR =	1	liter/day
EF =	153	days/year
ED =	7	years
AT (Nc) =	2555	days
AT (Car) =	25,550	days

Assumptions for Future Indoor Park Worker

BW =	70	kg
IR =	1	liter/day
EF =	153	days/year
ED =	7	years
AT (Nc) =	2555	days
AT (Car) =	25,550	days

Assumptions for Future Recreational Visitor (Child)

BW =	15	kg
IR =	0.74	liter/day
EF =	7	days/year
ED =	1	years
AT (Nc) =	365	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 G-20
CALCULATION OF INTAKE AND RISK FROM THE INGESTION OF GROUNDWATER
CENTRAL TENDENCY (CT) - SEAD-4
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Equation for Intake (mg/kg-day) = CW x IR x EF x ED / BW x 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)-1	EPC Groundwater (mg/liter)	Future Resident (Adult) Intake (mg/kg-day) (Nc)	Future Resident (Adult) Intake (mg/kg-day) (Car)	Future Resident (Adult) Hazard Quotient	Future Resident (Adult) Contribution to Lifetime Cancer Risk	Future Resident (Child) Intake (mg/kg-day) (Nc)	Future Resident (Child) Intake (mg/kg-day) (Car)	Future Resident (Child) Hazard Quotient	Future Resident (Child) Contribution to Lifetime Cancer Risk	Resident Total Lifetime Cancer Risk
Volatile Organics												
Acetone	1.00E-01	NA	3.50E-03	4.49E-05		4E-04		1.11E-04		1E-03		
Benzene	3.00E-03	2.90E-02	1.92E-03	2.46E-05	2.46E-06	8E-03	7E-08	6.07E-05	1.73E-06	2E-02	5E-08	1E-07
Ethyl benzene	1.00E-01	NA	2.25E-03	2.88E-05		3E-04		7.12E-05		7E-04		
Toluene	2.00E-01	NA	4.00E-04	5.13E-06		3E-05		1.27E-05		6E-05		
Total Xylenes	2.00E+00	NA	2.10E-03	2.69E-05		1E-05		6.64E-05		3E-05		
Semivolatile Organics												
4-Methylphenol	5.00E-03	NA	1.91E-03	2.45E-05		5E-03		6.04E-05		1E-02		
Bis(2-Ethylhexyl)phthalate	2.00E-02	1.40E-02	1.10E-03	1.41E-05	1.41E-06	7E-04	2E-08	3.48E-05	9.94E-07	2E-03	1E-08	3E-08
Di-n-butylphthalate	1.00E-01	NA	1.50E-04	1.92E-06		2E-05		4.74E-06		5E-05		
Diethyl phthalate	8.00E-01	NA	8.90E-04	1.14E-05		1E-05		2.81E-05		4E-05		
Naphthalene	2.00E-02	NA	1.91E-03	2.45E-05		1E-03		6.04E-05		3E-03		
Phenol	6.00E-01	NA	4.00E-04	5.13E-06		9E-06		1.27E-05		2E-05		
Pesticides/PCBs												
Aldrin	3.00E-05	1.70E+01	3.60E-06	4.62E-08	4.62E-09	2E-03	8E-08	1.14E-07	3.25E-09	4E-03	6E-08	1E-07
Alpha-BHC	NA	6.30E+00	2.80E-06		3.59E-09		2E-08		2.53E-09		2E-08	4E-08
Aroclor-1260	2.00E-05	2.00E+00	6.00E-05	7.69E-07	7.69E-08	4E-02	2E-07	1.90E-06	5.42E-08	9E-02	1E-07	3E-07
Delta-BHC	NA	NA	4.10E-06									
Gamma-Chlordane	5.00E-04	3.50E-01	9.89E-06	1.27E-07	1.27E-08	3E-04	4E-09	3.13E-07	8.94E-09	6E-04	3E-09	8E-09
Heptachlor	5.00E-04	4.50E+00	9.97E-06	1.28E-07	1.28E-08	3E-04	6E-08	3.15E-07	9.01E-09	6E-04	4E-08	1E-07
Nitroaromatics												
2-Nitrotoluene	1.00E-02	NA	1.70E-04	2.18E-06		2E-04		5.38E-06		5E-04		
3-Nitrotoluene	1.00E-02	NA	2.20E-04	2.82E-06		3E-04		6.96E-06		7E-04		
4-Nitrotoluene	1.00E-02	NA	3.30E-04	4.23E-06		4E-04		1.04E-05		1E-03		
Nitrobenzene	5.00E-04	NA	1.70E-04	2.18E-06		4E-03		5.38E-06		1E-02		
Metals												
Beryllium	2.00E-03	NA	3.60E-04	4.62E-06		2E-03		1.14E-05		6E-03		
Cadmium	5.00E-04	NA	7.50E-04	9.62E-06		2E-02		2.37E-05		5E-02		
Chromium	1.50E+00	NA	1.54E-02	1.97E-04		1E-04		4.87E-04		3E-04		
Selenium	5.00E-03	NA	4.24E-03	5.44E-05		1E-02		1.34E-04		3E-02		
Silver	5.00E-03	NA	1.69E-03	2.17E-05		4E-03		5.35E-05		1E-02		
Total Hazard Quotient and Cancer Risk:						**1E-01**				**2E-01**		**7E-07**

Assumptions for Future Resident (Adult)

BW =	70	kg
IR =	1.4	liters/day
EF =	234	days/year
ED =	7	years
AT (Nc) =	2,555	days
AT (Car) =	25,550	days

Assumptions for Future Resident (Child)

BW =	15	kg
IR =	0.74	liters/day
EF =	234	days/year
ED =	2	years
AT (Nc) =	730	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 G-21
CALCULATION OF INTAKE AND RISK FROM DERMAL CONTACT TO GROUNDWATER (WHILE SHOWERING)
REASONABLE MAXIMUM EXPOSURE (RME)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Equation for Intake (mg/kg-day) = $\frac{DA \times SA \times EF \times ED}{BW \times AT}$

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
BW = Bodyweight
AT = Averaging Time

Equation for Absorbed Dose per Event (DA):

For organics:

$$DA \quad 2Kp \cdot CW \sqrt{\frac{6 \cdot \tau \cdot ET}{\pi}} \quad CF$$

For inorganics: DA = Kp x CW x ET x CF

Kp = Permeability Coefficie
CW = EPC Cderm
ET = Exposure Time
τ Lag Time
CF = Conversion Factor

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)-1	Permeability Coefficient Kp (cm/hr)	Tau (hours)	EPC Groundwater (mg/liter)	Absorbed Dose/Event (mg-cm²/event)	Current Site Worker				Future Outdoor Park Worker				Future Recreational Visitor (Child)				Future Construction Worker			
							Intake (mg/kg-day) (Nc)	Intake (mg/kg-day) (Car)	Hazard Quotient	Cancer Risk	Intake (mg/kg-day) (Nc)	Intake (mg/kg-day) (Car)	Hazard Quotient	Cancer Risk	Intake (mg/kg-day) (Nc)	Intake (mg/kg-day) (Car)	Hazard Quotient	Cancer Risk	Intake (mg/kg-day) (Nc)	Intake (mg/kg-day) (Car)	Hazard Quotient	Cancer Risk
Volatile Organics																						
Acetone	1.00E-01	NA	5.70E-04	2.00E-01	3.50E-03	1.23E-09									2.89E-08		3E-07					
Benzene	2.85E-03	3.05E-02	2.10E-02	2.60E-01	1.44E-03	2.13E-08	**Dermal Contact to Groundwater** **Not Applicable** **for Current Site Worker**				**Dermal Contact to Groundwater** **Not Applicable** **for Future Outdoor Park Worker**				4.99E-07	3.56E-08	2E-04	1E-09	**Dermal Contact to Groundwater** **Not Applicable** **for Future Construction Worker**			
Ethyl benzene	1.00E-01	NA	7.40E-02	3.90E-01	1.60E-03	1.02E-07									2.40E-06		2E-05					
Toluene	2.00E-01	NA	4.50E-02	3.20E-01	2.85E-04	1.00E-08									2.36E-07		1E-06					
Total Xylenes	1.80E+00	NA	8.00E-02	3.90E-01	1.43E-03	9.90E-08									2.32E-06		1E-06					
Semivolatile Organics																						
4-Methylphenol	5.00E-03	NA	9.8E-03	4.0E-01	1.91E-03	1.63E-08									3.83E-07		8E-05					
Bis(2-Ethylhexyl)phthalate	1.00E-02	2.80E-02	5.3E-03	2.1E+01	1.10E-03	3.68E-08									8.63E-07	6.17E-08	9E-05	2E-09				
Di-n-butylphthalate	9.00E-02	NA	3.30E-02	4.30E+00	1.50E-04	1.42E-08									3.33E-07		4E-06					
Diethyl phthalate	8.00E-01	NA	4.80E-03	2.00E+00	8.90E-04	8.35E-09									1.96E-07		2E-07					
Naphthalene	2.00E-02	NA	6.90E-02	5.30E-01	1.81E-03	1.26E-07									2.95E-06		1E-04					
Phenol	5.40E-01	NA	5.50E-03	3.30E-01	4.00E-04	1.75E-09									4.10E-08		8E-08					
Pesticides/PCBs																						
Aldrin	1.50E-05	3.40E+01	1.60E-03	1.50E+01	3.60E-06	3.08E-11									7.23E-10	5.17E-11	5E-05	2E-09				
Alpha-BHC	NA	6.30E+00	1.88E-02	5.20E+00	2.80E-06	1.66E-10										2.78E-10		2E-09				
Aroclor-1260	1.80E-05	2.22E+00	1.30E+00	5.30E+00	4.08E-05	1.69E-07									3.96E-06	2.83E-07	2E-01	6E-07				
Delta-BHC	NA	NA	2.61E-02	5.20E+00	4.10E-06	3.38E-10																
Gamma-Chlordane	5.00E-04	3.50E-01	5.2E-02	2.8E+01	9.89E-06	3.76E-09									8.82E-08	6.30E-09	2E-04	2E-09				
Heptachlor	5.00E-04	4.50E+00	1.10E-02	1.70E+01	9.60E-06	6.02E-10									1.41E-08	1.01E-09	3E-05	5E-09				
Nitroaromatics																						
2-Nitrotoluene	1.00E-02	NA	1.56E-02	6.00E-01	1.67E-04	2.79E-09									6.56E-08		7E-06					
3-Nitrotoluene	1.00E-02	NA	1.56E-02	6.00E-01	2.16E-04	3.61E-09									8.48E-08		8E-06					
4-Nitrotoluene	1.00E-02	NA	1.56E-02	6.00E-01	3.24E-04	5.42E-09									1.27E-07		1E-05					
Nitrobenzene	5.00E-04	NA	6.96E-03	4.93E-01	1.70E-04	1.15E-09									2.69E-08		5E-05					
Metals																						
Beryllium	2.00E-05	NA	1.00E-03	NA	3.60E-04	9.00E-11									2.11E-09		1E-04					
Cadmium	5.00E-05	NA	1.00E-03	NA	7.50E-04	1.88E-10									4.40E-09		9E-05					
Chromium	3.00E-02	NA	4.00E-03	NA	1.54E-02	1.54E-08									3.61E-07		1E-05					
Selenium	4.50E-03	NA	1.00E-03	NA	4.24E-03	1.06E-09									2.49E-08		6E-06					
Silver	1.00E-03	NA	6.00E-04	NA	1.69E-03	2.54E-10									5.95E-09		6E-06					
Total Hazard Quotient and Cancer Risk:																	**2E-01**	**6E-07**				

Assumptions for Future Recreational Visitor (Child)

CF =	0.001	l/cm3
BW =	15	kg
SA =	9,180	cm2
ET =	0.25	hours/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.

TABLE G-21
CALCULATION OF INTAKE AND RISK FROM DERMAL CONTACT TO GROUNDWATER (WHILE SHOWERING)
REASONABLE MAXIMUM EXPOSURE (RME)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Equation for Intake (mg/kg-day) = $\frac{DA \times SA \times EF \times ED}{BW \times AT}$

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
BW = Bodyweight
AT = Averaging Time

Equation for Absorbed Dose per Event (DA):

For organics: $DA = 2Kp \cdot CW \sqrt{\frac{6 \cdot \tau \cdot ET}{\pi}} \cdot CF$

For inorganics: $DA = Kp \times CW \times ET \times CF$

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

Analyte	Dermal RfD (mg/kg-day)	Carc. Slope Dermal (mg/kg-day)-1	Permeability Coefficient *Kp* (cm/hr)	Tau (hours)	EPC Groundwater (mg/liter)	Absorbed Dose/Event (mg-cm²/event)	Future Resident (Adult) Intake (mg/kg-day) (Nc)	Future Resident (Adult) Intake (mg/kg-day) (Car)	Future Resident (Adult) Hazard Quotient	Future Resident (Adult) Contribution to Lifetime Cancer Risk	Future Resident (Child) Intake (mg/kg-day) (Nc)	Future Resident (Child) Intake (mg/kg-day) (Car)	Future Resident (Child) Hazard Quotient	Future Resident (Child) Contribution to Lifetime Cancer Risk	Resident Total Lifetime Cancer Risk
Volatile Organics															
Acetone	1.00E-01	NA	5.70E-04	2.00E-01	3.50E-03	1.23E-09	3.88E-07		4E-06		7.23E-07		7E-06		
Benzene	2.85E-03	3.05E-02	2.10E-02	2.60E-01	1.44E-03	2.13E-08	6.70E-06	2.30E-06	2E-03	7E-08	1.25E-05	1.07E-06	4E-03	3E-08	1E-07
Ethyl benzene	1.00E-01	NA	7.40E-02	3.90E-01	1.60E-03	1.02E-07	3.22E-05		3E-04		5.99E-05		6E-04		
Toluene	2.00E-01	NA	4.50E-02	3.20E-01	2.85E-04	1.00E-08	3.16E-06		2E-05		5.89E-06		3E-05		
Total Xylenes	1.80E+00	NA	8.00E-02	3.90E-01	1.43E-03	9.90E-08	3.12E-05		2E-05		5.81E-05		3E-05		
Semivolatile Organics															
4-Methylphenol	5.00E-03	NA	9.8E-03	4.0E-01	1.91E-03	1.63E-08	5.14E-06		1E-03		9.58E-06		2E-03		
Bis(2-Ethylhexyl)phthalate	1.00E-02	2.80E-02	5.3E-03	2.1E+01	1.10E-03	3.68E-08	1.16E-05	3.97E-06	1E-03	1E-07	2.16E-05	1.85E-06	2E-03	5E-08	2E-07
Di-n-butylphthalate	9.00E-02	NA	3.30E-02	4.30E+00	1.50E-04	1.42E-08	4.47E-06		5E-05		8.32E-06		9E-05		
Diethyl phthalate	8.00E-01	NA	4.80E-03	2.00E+00	8.90E-04	8.35E-09	2.63E-06		3E-06		4.90E-06		6E-06		
Naphthalene	2.00E-02	NA	6.90E-02	5.30E-01	1.81E-03	1.26E-07	3.96E-05		2E-03		7.38E-05		4E-03		
Phenol	5.40E-01	NA	5.50E-03	3.30E-01	4.00E-04	1.75E-09	5.50E-07		1E-06		1.02E-06		2E-06		
Pesticides/PCBs															
Aldrin	1.50E-05	3.40E+01	1.60E-03	1.50E+01	3.60E-06	3.08E-11	9.71E-09	3.33E-09	6E-04	1E-07	1.81E-08	1.55E-09	1E-03	5E-08	2E-07
Alpha-BHC	NA	6.30E+00	1.88E-02	5.20E+00	2.80E-06	1.66E-10		1.79E-08		1E-07		8.35E-09		5E-08	2E-07
Aroclor-1260	1.80E-05	2.22E+00	1.30E+00	5.30E+00	4.08E-05	1.69E-07	5.32E-05	1.82E-05	3E+00	4E-05	9.91E-05	8.49E-06	6E+00	2E-05	6E-05
Delta-BHC	NA	NA	2.61E-02	5.20E+00	4.10E-06	3.38E-10									
Gamma-Chlordane	5.00E-04	3.50E-01	5.2E-02	2.8E+01	9.89E-06	3.76E-09	1.18E-06	4.06E-07	2E-03	1E-07	2.21E-06	1.89E-07	4E-03	7E-08	2E-07
Heptachlor	5.00E-04	4.50E+00	1.10E-02	1.70E+01	9.60E-06	6.02E-10	1.90E-07	6.50E-08	4E-04	3E-07	3.53E-07	3.03E-08	7E-04	1E-07	4E-07
Nitroaromatics															
2-Nitrotoluene	1.00E-02	NA	1.56E-02	6.00E-01	1.67E-04	2.79E-09	8.80E-07		9E-05		1.64E-06		2E-04		
3-Nitrotoluene	1.00E-02	NA	1.56E-02	6.00E-01	2.16E-04	3.61E-09	1.14E-06		1E-04		2.12E-06		2E-04		
4-Nitrotoluene	1.00E-02	NA	1.56E-02	6.00E-01	3.24E-04	5.42E-09	1.71E-06		2E-04		3.18E-06		3E-04		
Nitrobenzene	5.00E-04	NA	6.96E-03	4.93E-01	1.70E-04	1.15E-09	3.61E-07		7E-04		6.73E-07		1E-03		
Metals															
Beryllium	2.00E-05	NA	1.00E-03	NA	3.60E-04	9.00E-11	2.84E-08		1E-03		5.28E-08		3E-03		
Cadmium	5.00E-05	NA	1.00E-03	NA	7.50E-04	1.88E-10	5.91E-08		1E-03		1.10E-07		2E-03		
Chromium	3.00E-02	NA	4.00E-03	NA	1.54E-02	1.54E-08	4.85E-06		2E-04		9.04E-06		3E-04		
Selenium	4.50E-03	NA	1.00E-03	NA	4.24E-03	1.06E-09	3.34E-07		7E-05		6.22E-07		1E-04		
Silver	1.00E-03	NA	6.00E-04	NA	1.69E-03	2.54E-10	7.99E-08		8E-05		1.49E-07		1E-04		
Total Hazard Quotient and Cancer Risk:									**3E+00**				**6E+00**		**6E-05**

Assumptions for Future Resident (Adult)
CF = 0.001 l/cm3
BW = 70 kg
SA = 23,000 cm2
ET = 0.25 hours/day
EF = 350 days/year
ED = 24 years
AT (Nc) = 8,760 days
AT (Car) = 25,550 days

Assumptions for Future Resident (Child)
CF = 0.001 l/cm3
BW = 15 kg
SA = 9,180 cm2
ET = 0.25 hours/day
EF = 350 days/year
ED = 6 years
AT (Nc) = 2,190 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 G-22
CALCULATION OF INTAKE AND RISK FROM DERMAL CONTACT TO GROUNDWATER (WHILE SHOWERING)
CENTRAL TENDENCY (CT)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Equation for Intake (mg/kg-day) = $\frac{DA \times SA \times EF \times ED}{BW \times AT}$

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
BW = Bodyweight
AT = Averaging Time

Equation for Absorbed Dose per Event (DA):

For organics: $DA = 2Kp \cdot CW \sqrt{\frac{6 \cdot \tau \cdot ET}{\pi}} \cdot CF$

For inorganics: DA = Kp x CW x ET x CF

Kp = Permeability Coefficient
CW = EPC Cderm
ET = Exposure Time
τ Lag Time
CF = Conversion Factor

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)-1	Permeability Coefficient *Kp* (cm/hr)	Tau (hours)	EPC Groundwater (mg/liter)	Absorbed Dose/Event (mg-cm²/event)
Volatile Organics						
Acetone	1.00E-01	NA	5.70E-04	2.00E-01	3.50E-03	1.02E-09
Benzene	2.85E-03	3.05E-02	2.10E-02	2.60E-01	1.52E-03	1.85E-08
Ethyl benzene	1.00E-01	NA	7.40E-02	3.90E-01	1.71E-03	9.00E-08
Toluene	2.00E-01	NA	4.50E-02	3.20E-01	3.05E-04	8.84E-09
Total Xylenes	1.80E+00	NA	8.00E-02	3.90E-01	1.55E-03	8.81E-08
Semivolatile Organics						
4-Methylphenol	5.00E-03	NA	9.8E-03	4.0E-01	1.91E-03	1.35E-08
Bis(2-Ethylhexyl)phthalate	1.00E-02	2.80E-02	5.3E-03	2.1E+01	1.10E-03	3.03E-08
Di-n-butylphthalate	9.00E-02	NA	3.30E-02	4.30E+00	1.50E-04	1.17E-08
Diethyl phthalate	8.00E-01	NA	4.80E-03	2.00E+00	8.90E-04	6.88E-09
Naphthalene	2.00E-02	NA	6.90E-02	5.30E-01	1.83E-03	1.05E-07
Phenol	5.40E-01	NA	5.50E-03	3.30E-01	4.00E-04	1.44E-09
Pesticides/PCBs						
Aldrin	1.50E-05	3.40E+01	1.60E-03	1.50E+01	3.60E-06	2.54E-11
Alpha-BHC	NA	6.30E+00	1.88E-02	5.20E+00	2.80E-06	1.37E-10
Aroclor-1260	1.80E-05	2.22E+00	1.30E+00	5.30E+00	4.41E-05	1.50E-07
Delta-BHC	NA	NA	2.61E-02	5.20E+00	4.10E-06	2.78E-10
Gamma-Chlordane	5.00E-04	3.50E-01	5.2E-02	2.8E+01	9.89E-06	3.10E-09
Heptachlor	5.00E-04	4.50E+00	1.10E-02	1.70E+01	9.66E-06	5.00E-10
Nitroaromatics						
2-Nitrotoluene	1.00E-02	NA	1.56E-02	6.00E-01	1.67E-04	2.31E-09
3-Nitrotoluene	1.00E-02	NA	1.56E-02	6.00E-01	2.17E-04	2.99E-09
4-Nitrotoluene	1.00E-02	NA	1.56E-02	6.00E-01	3.25E-04	4.48E-09
Nitrobenzene	5.00E-04	NA	6.96E-03	4.93E-01	1.70E-04	9.46E-10
Metals						
Beryllium	2.00E-05	NA	1.00E-03	NA	3.60E-04	6.12E-11
Cadmium	5.00E-05	NA	1.00E-03	NA	7.50E-04	1.28E-10
Chromium	3.00E-02	NA	4.00E-03	NA	1.54E-02	1.05E-08
Selenium	4.50E-03	NA	1.00E-03	NA	4.24E-03	7.21E-10
Silver	1.00E-03	NA	6.00E-04	NA	1.69E-03	1.72E-10
Total Hazard Quotient and Cancer Risk:						

Analyte	Current Site Worker				Future Outdoor Park Worker				Future Recreational Visitor (Child)				Future 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	Intake (mg/kg-day)		Hazard Quotient	Cancer Risk
	(Nc)	(Car)			(Nc)	(Car)			(Nc)	(Car)			(Nc)	(Car)		
Volatile Organics																
Acetone									1.03E-08		1E-07					
Benzene									1.88E-07	2.68E-09	7E-05	8E-11				
Ethyl benzene									9.12E-07		9E-06					
Toluene	Dermal Contact to Groundwater Not Applicable for Current Site Worker				Dermal Contact to Groundwater Not Applicable for Future Outdoor Park Worker				8.96E-08		4E-07		Dermal Contact to Groundwater Not Applicable for Construction Worker			
Total Xylenes									8.93E-07		5E-07					
Semivolatile Organics																
4-Methylphenol									1.36E-07		3E-05					
Bis(2-Ethylhexyl)phthalate									3.08E-07	4.39E-09	3E-05	1E-10				
Di-n-butylphthalate									1.19E-07		1E-06					
Diethyl phthalate									6.98E-08		9E-08					
Naphthalene									1.06E-06		5E-05					
Phenol									1.46E-08		3E-08					
Pesticides/PCBs																
Aldrin									2.58E-10	3.68E-12	2E-05	1E-10				
Alpha-BHC										1.98E-11		1E-10				
Aroclor-1260									1.52E-06	2.18E-08	8E-02	5E-08				
Delta-BHC																
Gamma-Chlordane									3.14E-08	4.49E-10	6E-05	2E-10				
Heptachlor									5.06E-09	7.23E-11	1E-05	3E-10				
Nitroaromatics																
2-Nitrotoluene									2.34E-08		2E-06					
3-Nitrotoluene									3.03E-08		3E-06					
4-Nitrotoluene									4.55E-08		5E-06					
Nitrobenzene									9.59E-09		2E-05					
Metals																
Beryllium									6.20E-10		3E-05					
Cadmium									1.29E-09		3E-05					
Chromium									1.06E-07		4E-06					
Selenium									7.31E-09		2E-06					
Silver									1.75E-09		2E-06					
Total Hazard Quotient and Cancer Risk:											**9E-02**	**5E-08**				

Assumptions for Future Recreational Visitor (Child)

CF =	0.001	l/cm3
BW =	15	kg
SA =	7,930	cm2
ET =	0.17	hours/day
EF =	7	days/year
ED =	1	years
AT (Nc) =	365	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 G-22
CALCULATION OF INTAKE AND RISK FROM DERMAL CONTACT TO GROUNDWATER (WHILE SHOWERING)
CENTRAL TENDENCY (CT)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Equation for Intake (mg/kg-day) = $\frac{DA \times SA \times EF \times ED}{BW \times AT}$

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
BW = Bodyweight
AT = Averaging Time

Equation for Absorbed Dose per Event (DA):

For organics: $DA \quad 2Kp \quad CW \sqrt{\frac{6 \quad \tau \quad ET}{\pi}} \quad CF$

For inorganics. DA = Kp x CW x ET x CF

Kp = Permeability Coefficient
CW = EPC Cderm
ET = Exposure Time
τ = Lag 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 Fact
Equation for Total Lifetime Cancer Risk = Adult Contribution + Child Contribution

Analyte	Dermal RfD (mg/kg-day)	Carc. Slope Dermal (mg/kg-day)-1	Permeability Coefficient Kp (cm/hr)	Tau (hours)	EPC Groundwater (mg/liter)	Absorbed Dose/Event (mg-cm²/event)	Future Resident (Adult) Intake (mg/kg-day) (Nc)	Future Resident (Adult) Intake (mg/kg-day) (Car)	Future Resident (Adult) Hazard Quotient	Future Resident (Adult) Contribution to Lifetime Cancer Risk	Future Resident (Child) Intake (mg/kg-day) (Nc)	Future Resident (Child) Intake (mg/kg-day) (Car)	Future Resident (Child) Hazard Quotient	Future Resident (Child) Contribution to Lifetime Cancer Risk	Resident Total Lifetime Cancer Risk
Volatile Organics															
Acetone	1.00E-01	NA	5.70E-04	2.00E-01	3.50E-03	1.02E-09	1.86E-07		2E-06		3.44E-07		3E-06		
Benzene	2.85E-03	3.05E-02	2.10E-02	2.60E-01	1.52E-03	1.85E-08	3.39E-06	3.39E-07	1E-03	1E-08	6.28E-06	1.79E-07	2E-03	5E-09	2E-08
Ethyl benzene	1.00E-01	NA	7.40E-02	3.90E-01	1.71E-03	9.00E-08	1.65E-05		2E-04		3.05E-05		3E-04		
Toluene	2.00E-01	NA	4.50E-02	3.20E-01	3.05E-04	8.84E-09	1.62E-06		8E-06		3.00E-06		1E-05		
Total Xylenes	1.80E+00	NA	8.00E-02	3.90E-01	1.55E-03	8.81E-08	1.61E-05		9E-06		2.98E-05		2E-05		
Semivolatile Organics															
4-Methylphenol	5.00E-03	NA	9.8E-03	4.0E-01	1.91E-03	1.35E-08	2.47E-06		5E-04		4.56E-06		9E-04		
Bis(2-Ethylhexyl)phthalate	1.00E-02	2.80E-02	5.3E-03	2.1E+01	1.10E-03	3.03E-08	5.56E-06	5.56E-07	6E-04	2E-08	1.03E-05	2.94E-07	1E-03	8E-09	2E-08
Di-n-butylphthalate	9.00E-02	NA	3.30E-02	4.30E+00	1.50E-04	1.17E-08	2.14E-06		2E-05		3.96E-06		4E-05		
Diethyl phthalate	8.00E-01	NA	4.80E-03	2.00E+00	8.90E-04	6.88E-09	1.26E-06		2E-06		2.33E-06		3E-06		
Naphthalene	2.00E-02	NA	6.90E-02	5.30E-01	1.83E-03	1.05E-07	1.92E-05		1E-03		3.55E-05		2E-03		
Phenol	5.40E-01	NA	5.50E-03	3.30E-01	4.00E-04	1.44E-09	2.64E-07		5E-07		4.88E-07		9E-07		
Pesticides/PCBs															
Aldrin	1.50E-05	3.40E+01	1.60E-03	1.50E+01	3.60E-06	2.54E-11	4.65E-09	4.65E-10	3E-04	2E-08	8.61E-09	2.46E-10	6E-04	8E-09	2E-08
Alpha-BHC	NA	6.30E+00	1.88E-02	5.20E+00	2.80E-06	1.37E-10		2.51E-09		2E-08		1.33E-09		8E-09	2E-08
Aroclor-1260	1.80E-05	2.22E+00	1.30E+00	5.30E+00	4.41E-05	1.50E-07	2.75E-05	2.75E-06	2E+00	6E-06	5.09E-05	1.46E-06	3E+00	3E-06	9E-06
Delta-BHC	NA	NA	2.61E-02	5.20E+00	4.10E-06	2.78E-10									
Gamma-Chlordane	5.00E-04	3.50E-01	5.2E-02	2.8E+01	9.89E-06	3.10E-09	5.68E-07	5.68E-08	1E-03	2E-08	1.05E-06	3.00E-08	2E-03	1E-08	3E-08
Heptachlor	5.00E-04	4.50E+00	1.10E-02	1.70E+01	9.66E-06	5.00E-10	9.15E-08	9.15E-09	2E-04	4E-08	1.69E-07	4.84E-09	3E-04	2E-08	6E-08
Nitroaromatics															
2-Nitrotoluene	1.00E-02	NA	1.56E-02	6.00E-01	1.67E-04	2.31E-09	4.23E-07		4E-05		7.83E-07		8E-05		
3-Nitrotoluene	1.00E-02	NA	1.56E-02	6.00E-01	2.17E-04	2.99E-09	5.48E-07		5E-05		1.01E-06		1E-04		
4-Nitrotoluene	1.00E-02	NA	1.56E-02	6.00E-01	3.25E-04	4.48E-09	8.21E-07		8E-05		1.52E-06		2E-04		
Nitrobenzene	5.00E-04	NA	6.96E-03	4.93E-01	1.70E-04	9.46E-10	1.73E-07		3E-04		3.21E-07		6E-04		
Metals															
Beryllium	2.00E-05	NA	1.00E-03	NA	3.60E-04	6.12E-11	1.12E-08		6E-04		2.07E-08		1E-03		
Cadmium	5.00E-05	NA	1.00E-03	NA	7.50E-04	1.28E-10	2.34E-08		5E-04		4.32E-08		9E-04		
Chromium	3.00E-02	NA	4.00E-03	NA	1.54E-02	1.05E-08	1.92E-06		6E-05		3.55E-06		1E-04		
Selenium	4.50E-03	NA	1.00E-03	NA	4.24E-03	7.21E-10	1.32E-07		3E-05		2.44E-07		5E-05		
Silver	1.00E-03	NA	6.00E-04	NA	1.69E-03	1.72E-10	3.16E-08		3E-05		5.84E-08		6E-05		
Total Hazard Quotient and Cancer Risk:									**2E+00**				**3E+00**		**1E-05**

Assumptions for Future Resident (Adult)
CF = 0.001 l/cm3
BW = 70 kg
SA = 20,000 cm2
ET = 0.17 hours/day
EF = 234 days/year
ED = 7 years
AT (Nc) = 2555 days
AT (Car) = 25,550 days

Assumptions for Future Resident (Child)
CF = 0.001 l/cm3
BW = 15 kg
SA = 7,930 cm2
ET = 0.17 hours/day
EF = 234 days/year
ED = 2 years
AT (Nc) = 730 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 G-23
CALCULATION OF ABSORBED DOSE AND RISK FROM DERMAL CONTACT TO SURFACE WATER
REASONABLE MAXIMUM EXPOSURE (RME)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Equation for Intake (mg/kg-day) = $\frac{DA \times SA \times EF \times ED}{BW \times AT}$

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
BW = Bodyweight
AT = Averaging Time

Equation for Absorbed Dose per Event (DA):

For organics with ET < t*: $DA = 2K_p \cdot CW \sqrt{\frac{6 \cdot \tau \cdot ET}{\pi}} \cdot CF$

For organics with ET > t*: DA = Kp x CW x [ET/(1+B) + 2Tau(1+3B)/(1+B)] x CF

For inorganics: DA = Kp x CW x ET x CF

Kp = Permeability Coefficient
CW = EPC Surface Water
ET = Exposure Time
Tau = Lag Time
CF = Conversion Factor
B = Bunge Model Value

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)-1	Permeability Coefficient Kp (cm/hr)	Tau (hours)	B (unitless)	EPC Surface Water (mg/L)	Absorbed Dose/Event (mg-cm³/event)	Current Site Worker Intake (mg/kg-day) (Nc)	Current Site Worker Intake (mg/kg-day) (Car)	Current Site Worker Hazard Quotient	Current Site Worker Cancer Risk	Future Outdoor Park Worker Intake (mg/kg-day) (Nc)	Future Outdoor Park Worker Intake (mg/kg-day) (Car)	Future Outdoor Park Worker Hazard Quotient	Future Outdoor Park Worker Cancer Risk	Future Recreational Visitor (Child) Intake (mg/kg-day) (Nc)	Future Recreational Visitor (Child) Intake (mg/kg-day) (Car)	Future Recreational Visitor (Child) Hazard Quotient	Future Recreational Visitor (Child) Cancer Risk	Future Construction Worker Intake (mg/kg-day) (Nc)	Future Construction Worker Intake (mg/kg-day) (Car)	Future Construction Worker Hazard Quotient	Future Construction Worker Cancer Risk
Volatile Organics																							
Acetone	1.00E-01	NA	5.70E-04	2.00E-01	5.75E-05	4.00E-03	3.19E-09					5.60E-09		6E-08		1.89E-08		2E-07					
Semivolatile Organics								**Dermal Contact to Surface Water Not Applicable for Current Worker**												**Dermal Contact to Surface Water Not Applicable for Construction Worker**			
Anthracene	3.00E-01	NA	2.25E-01	1.07E+00		7.00E-05	4.50E-08					7.90E-08		3E-07		2.66E-07		9E-07					
Benzo(a)anthracene	NA	7.30E-01	8.10E-01	2.20E+00		1.80E-04	5.98E-07						3.74E-07		3E-07		2.52E-07		2E-07				
Benzo(a)pyrene	NA	1.46E+01	1.20E+00	2.90E+00		1.50E-04	8.47E-07						5.31E-07		8E-06		3.58E-07		5E-06				
Benzo(b)fluoranthene	NA	7.30E-01	1.20E+00	3.00E+00		1.50E-04	8.62E-07						5.40E-07		4E-07		3.64E-07		3E-07				
Benzo(ghi)perylene	NA	NA	1.65E+00	4.24E+00		7.00E-05	6.56E-07																
Benzo(k)fluoranthene	NA	7.30E-02	1.11E+00	3.03E+00		1.60E-04	8.51E-07						5.33E-07		4E-08		3.60E-07		3E-08				
Bis(2-Ethylhexyl)phthalate	1.00E-02	2.80E-02	5.27E-03	2.11E+01		3.60E-04	2.41E-08					4.22E-08	1.51E-08	4E-06	4E-10	1.42E-07	1.02E-08	1E-05	3E-10				
Butylbenzylphthalate	2.00E-01	NA	6.06E-02	7.04E+00		2.90E-04	1.29E-07					2.26E-07		1E-06		7.62E-07		4E-06					
Carbazole	NA	2.00E-02	5.65E-02	9.16E-01		5.00E-05	7.47E-09						4.68E-09		9E-11		3.16E-09		6E-11				
Chrysene	NA	7.30E-03	8.10E-01	2.20E+00		1.80E-04	5.98E-07						3.74E-07		3E-09		2.52E-07		2E-09				
Fluoranthene	4.00E-02	NA	3.60E-01	1.50E+00		4.10E-04	5.00E-07					8.76E-07		2E-05		2.95E-06		7E-05					
Indeno(1,2,3-cd)pyrene	NA	7.30E-01	1.90E+00	4.20E+00		7.00E-05	7.53E-07						4.72E-07		3E-07		3.18E-07		2E-07				
Phenanthrene	NA	NA	2.30E-01	1.10E+00		3.50E-04	2.33E-07																
Pyrene	3.00E-02	NA	3.24E-01	1.50E+00		2.80E-04	3.07E-07					5.39E-07		2E-05		1.82E-06		6E-05					
Pesticides/PCBs																							
Alpha-Chlordane	5.00E-04	3.50E-01	1.37E-03	2.76E+01		4.83E-06	9.64E-11					1.69E-10	6.04E-11	3E-07	2E-11	5.70E-10	4.07E-11	1E-06	1E-11				
Beta-BHC	NA	1.80E+00	1.88E-02	5.20E+00		3.20E-06	3.80E-10						2.38E-10		4E-10		1.60E-10		3E-10				
Gamma-Chlordane	5.00E-04	3.50E-01	5.20E-02	2.80E+01		4.22E-06	3.21E-09					5.63E-09	2.01E-09	1E-05	7E-10	1.90E-08	1.36E-09	4E-05	5E-10				
Nitroaromatics																							
1,3-Dinitrobenzene	1.00E-04	NA	2.54E-03	9.28E-01		7.00E-05	4.73E-10					8.30E-10		8E-06		2.80E-09		3E-05					
Metals																							
Aluminum	4.00E-02	NA	1.00E-03	NA		7.35E+00	7.35E-06					1.29E-05		3E-04		4.35E-05		1E-03					
Antimony	4.00E-04	NA	1.00E-03	NA		6.60E-03	6.60E-09					1.16E-08		3E-05		3.90E-08		1E-04					
Arsenic	2.40E-04	1.88E+00	1.00E-03	NA		2.08E-03	2.08E-09					3.65E-09	1.30E-09	2E-05	2E-09	1.23E-08	8.79E-10	5E-05	2E-09				
Barium	3.50E-02	NA	1.00E-03	NA		1.10E-01	1.10E-07					1.93E-07		6E-06		6.50E-07		2E-05					
Cadmium	5.00E-05	NA	1.00E-03	NA		1.16E-02	1.16E-08					2.03E-08		4E-04		6.86E-08		1E-03					
Calcium	NA	NA	1.00E-03	NA		1.14E+02	1.14E-04																
Chromium	3.00E-02	NA	4.00E-03	NA		4.48E-02	1.79E-07					3.14E-07		1E-05		1.06E-06		4E-05					
Cobalt	3.00E-03	NA	4.00E-04	NA		7.75E-03	3.10E-09					5.44E-09		2E-06		1.83E-08		6E-06					
Copper	2.40E-02	NA	1.00E-03	NA		9.70E-02	9.70E-08					1.70E-07		7E-06		5.74E-07		2E-05					
Iron	6.00E-02	NA	1.00E-03	NA		1.66E+01	1.66E-05					2.91E-05		5E-04		9.82E-05		2E-03					
Lead	NA	NA	4.00E-06	NA		1.17E-01	4.68E-10																
Magnesium	NA	NA	1.00E-03	NA		2.31E+01	2.31E-05																
Manganese	1.50E-03	NA	1.00E-03	NA		2.35E+00	2.35E-06					4.12E-06		3E-03		1.39E-05		9E-03					
Nickel	8.00E-04	NA	1.00E-03	NA		1.10E-02	1.10E-08					1.93E-08		2E-05		6.50E-08		8E-05					
Potassium	NA	NA	1.00E-03	NA		3.15E+00	3.15E-06																
Silver	1.00E-03	NA	6.00E-04	NA		1.70E-03	1.02E-09					1.79E-09		2E-06		6.03E-09		6E-06					
Sodium	NA	NA	1.00E-03	NA		2.46E+01	2.46E-05																
Thallium	8.00E-05	NA	1.00E-03	NA		2.40E-03	2.40E-09					4.21E-09		5E-05		1.42E-08		2E-04					
Vanadium	7.00E-05	NA	1.00E-03	NA		1.24E-02	1.24E-08					2.18E-08		3E-04		7.33E-08		1E-03					
Zinc	7.50E-02	NA	6.00E-04	NA		3.04E-01	1.82E-07					3.20E-07		4E-06		1.08E-06		1E-05					
Total Hazard Quotient and Cancer Risk:														**4E-03**	**9E-06**			**2E-02**	**6E-06**				

Assumptions for Future Outdoor Park Worker

CF =	1E-03	liter/cm3
BW =	70	kg
SA =	2,490	cm2
ET =	1	hour/day
EF =	18	days/year
ED =	25	years
AT (Nc) =	9,125	days
AT (Car) =	25,550	days

Assumptions for Future Recreational Visitor (Child)

CF =	1E-03	liter/cm3
BW =	15	kg
SA =	4,625	cm2
ET =	1	hour/day
EF =	7	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.

TABLE G-23
CALCULATION OF ABSORBED DOSE AND RISK FROM DERMAL CONTACT TO SURFACE WATER
REASONABLE MAXIMUM EXPOSURE (RME)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Equation for Intake (mg/kg-day) = $\frac{DA \times SA \times EF \times ED}{BW \times AT}$

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
BW = Bodyweight
AT = Averaging Time

Equation for Absorbed Dose per Event (DA):

For organics with ET < t*: $DA\ 2Kp\ CW\sqrt{\frac{6 \cdot \tau \cdot ET}{\pi}} \cdot CF$

For organics with ET > t*: DA = Kp x CW x [ET/(1+B) + 2Tau(1+3B)/(1+B)] x

For inorganics: DA = Kp x CW x ET x CF

Kp = Permeability Coefficient
CW = EPC Surface Water
ET = Exposure Time
Tau = Lag Time
CF = Conversion Factor
B = Bunge Model Value

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor
Equation for Total Lifetime Cancer Risk = Adult Contribution + Child Contribution

Analyte	Dermal RfD	Carc. Slope Dermal	Permeability Coefficient *Kp*	Tau	B	EPC Surface Water	Absorbed Dose/Event	Future Resident (Adult)				Future Resident (Child)				Resident
								Intake (mg/kg-day)		Hazard Quotient	Contribution to Lifetime Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Contribution to Lifetime Cancer Risk	Total Lifetime Cancer Risk
	(mg/kg-day)	(mg/kg-day)-	(cm/hr)	(hours)	(unitless)	(mg/L)	(mg-cm²/event)	(Nc)	(Car)			(Nc)	(Car)			
Volatile Organics																
Acetone	1.00E-01	NA	5.70E-04	2.00E-01	5.75E-05	4.00E-03	3.19E-09	4.88E-08		5E-07		5.69E-08		6E-07		
Semivolatile Organics																
Anthracene	3.00E-01	NA	2.25E-01	1.07E+00		7.00E-05	4.50E-08	6.89E-07		2E-06		8.03E-07		3E-06		
Benzo(a)anthracene	NA	7.30E-01	8.10E-01	2.20E+00		1.80E-04	5.98E-07		3.13E-06		2E-06		9.14E-07		7E-07	3E-06
Benzo(a)pyrene	NA	1.46E+01	1.20E+00	2.90E+00		1.50E-04	8.47E-07		4.44E-06		6E-05		1.30E-06		2E-05	8E-05
Benzo(b)fluoranthene	NA	7.30E-01	1.20E+00	3.00E+00		1.50E-04	8.62E-07		4.52E-06		3E-06		1.32E-06		1E-06	4E-06
Benzo(ghi)perylene	NA	NA	1.65E+00	4.24E+00		7.00E-05	6.56E-07									
Benzo(k)fluoranthene	NA	7.30E-02	1.11E+00	3.03E+00		1.60E-04	8.51E-07		4.46E-06		3E-07		1.30E-06		1E-07	4E-07
Bis(2-Ethylhexyl)phthalat	1.00E-02	2.80E-02	5.27E-03	2.11E+01		3.60E-04	2.41E-08	3.68E-07	1.26E-07	4E-05	4E-09	4.29E-07	3.68E-08	4E-05	1E-09	5E-09
Butylbenzylphthalate	2.00E-01	NA	6.06E-02	7.04E+00		2.90E-04	1.29E-07	1.97E-06		1E-05		2.30E-06		1E-05		
Carbazole	NA	2.00E-02	5.65E-02	9.16E-01		5.00E-05	7.47E-09		3.92E-08		8E-10		1.14E-08		2E-10	1E-09
Chrysene	NA	7.30E-03	8.10E-01	2.20E+00		1.80E-04	5.98E-07		3.13E-06		2E-08		9.14E-07		7E-09	3E-08
Fluoranthene	4.00E-02	NA	3.60E-01	1.50E+00		4.10E-04	5.00E-07	7.64E-06		2E-04		8.91E-06		2E-04		
Indeno(1,2,3-cd)pyrene	NA	7.30E-01	1.90E+00	4.20E+00		7.00E-05	7.53E-07		3.95E-06		3E-06		1.15E-06		8E-07	4E-06
Phenanthrene	NA	NA	2.30E-01	1.10E+00		3.50E-04	2.33E-07									
Pyrene	3.00E-02	NA	3.24E-01	1.50E+00		2.80E-04	3.07E-07	4.70E-06		2E-04		5.48E-06		2E-04		
Pesticides/PCBs																
Alpha-Chlordane	5.00E-04	3.50E-01	1.37E-03	2.76E+01		4.83E-06	9.64E-11	1.47E-09	5.05E-10	3E-06	2E-10	1.72E-09	1.47E-10	3E-06	5E-11	2E-10
Beta-BHC	NA	1.80E+00	1.88E-02	5.20E+00		3.20E-06	3.80E-10		1.99E-09		4E-09		5.81E-10		1E-09	5E-09
Gamma-Chlordane	5.00E-04	3.50E-01	5.20E-02	2.80E+01		4.22E-06	3.21E-09	4.91E-08	1.68E-08	1E-04	6E-09	5.72E-08	4.91E-09	1E-04	2E-09	8E-09
Nitroaromatics																
1,3-Dinitrobenzene	1.00E-04	NA	2.54E-03	9.28E-01		7.00E-05	4.73E-10	7.23E-09		7E-05		8.44E-09		8E-05		
Metals																
Aluminum	4.00E-02	NA	1.00E-03	NA		7.35E+00	7.35E-06	1.12E-04		3E-03		1.31E-04		3E-03		
Antimony	4.00E-04	NA	1.00E-03	NA		6.60E-03	6.60E-09	1.01E-07		3E-04		1.18E-07		3E-04		
Arsenic	2.40E-04	1.88E+00	1.00E-03	NA		2.08E-03	2.08E-09	3.18E-08	1.09E-08	1E-04	2E-08	3.71E-08	3.18E-09	2E-04	6E-09	3E-08
Barium	3.50E-02	NA	1.00E-03	NA		1.10E-01	1.10E-07	1.68E-06		5E-05		1.96E-06		6E-05		
Cadmium	5.00E-05	NA	1.00E-03	NA		1.16E-02	1.16E-08	1.77E-07		4E-03		2.07E-07		4E-03		
Calcium	NA	NA	1.00E-03	NA		1.14E+02	1.14E-04									
Chromium	3.00E-02	NA	4.00E-03	NA		4.48E-02	1.79E-07	2.74E-06		9E-05		3.20E-06		1E-04		
Cobalt	3.00E-03	NA	4.00E-04	NA		7.75E-03	3.10E-09	4.74E-08		2E-05		5.53E-08		2E-05		
Copper	2.40E-02	NA	1.00E-03	NA		9.70E-02	9.70E-08	1.48E-06		6E-05		1.73E-06		7E-05		
Iron	6.00E-02	NA	1.00E-03	NA		1.66E+01	1.66E-05	2.54E-04		4E-03		2.96E-04		5E-03		
Lead	NA	NA	4.00E-06	NA		1.17E-01	4.68E-10									
Magnesium	NA	NA	1.00E-03	NA		2.31E+01	2.31E-05									
Manganese	1.50E-03	NA	1.00E-03	NA		2.35E+00	2.35E-06	3.59E-05		2E-02		4.19E-05		3E-02		
Nickel	8.00E-04	NA	1.00E-03	NA		1.10E-02	1.10E-08	1.68E-07		2E-04		1.96E-07		2E-04		
Potassium	NA	NA	1.00E-03	NA		3.15E+00	3.15E-06									
Silver	1.00E-03	NA	6.00E-04	NA		1.70E-03	1.02E-09	1.56E-08		2E-05		1.82E-08		2E-05		
Sodium	NA	NA	1.00E-03	NA		2.46E+01	2.46E-05									
Thallium	8.00E-05	NA	1.00E-03	NA		2.40E-03	2.40E-09	3.67E-08		5E-04		4.28E-08		5E-04		
Vanadium	7.00E-05	NA	1.00E-03	NA		1.24E-02	1.24E-08	1.90E-07		3E-03		2.21E-07		3E-03		
Zinc	7.50E-02	NA	6.00E-04	NA		3.04E-01	1.82E-07	2.79E-06		4E-05		3.25E-06		4E-05		
Total Hazard Quotient and Cancer Risk:										4E-02				5E-02		1E-04

Assumptions for Future Resident (Adult)

CF =	1E-03	liter/cm3
BW =	70	kg
SA =	8,680	cm2
ET =	1	hour/day
EF =	45	days/year
ED =	24	years
AT (Nc) =	8,760	days
AT (Car) =	25,550	days

Assumptions for Future Resident (Child)

CF =	1E-03	liter/cm3
BW =	15	kg
SA =	2,170	cm2
ET =	1	hour/day
EF =	45	days/year
ED =	6	years
AT (Nc) =	2,190	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 G-24
CALCULATION OF ABSORBED DOSE AND RISK FROM DERMAL CONTACT TO SURFACE WATER
CENTRAL TENDENCY (CT)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Equation for Intake (mg/kg-day) = $\frac{DA \times SA \times EF \times ED}{BW \times AT}$

Variables (Assumptions for Each Receptor are Listed at the Bottom):
DA = Absorbed Dose per Event
ED = Exposure Duration
SA = Surface Area Contact
BW = Bodyweight
EF = Exposure Frequency
AT = Averaging Time

Equation for Absorbed Dose per Event (DA):

For organics DA = Kp x CW x [ET/(1+B) + 2Tau(1+3B)/(1+B)] x CF

For inorgani DA = Kp x CW x ET x CF

Kp = Permeability Coefficient
CW = EPC Surface Water
ET = Exposure Time
Tau = Lag Time
CF = Conversion Factor
B = Bunge Model Value

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Dermal RfD	Carc. Slope Dermal	Permeability Coefficient Kp	Tau	B	EPC Surface Water	Absorbed Dose/Event	Current Site Worker				Future Outdoor Park Worker				Future Recreational Visitor (Child)				Future 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	Intake (mg/kg-day)		Hazard Quotient	Cancer Risk
	(mg/kg-day)	(mg/kg-day)-1	(cm/hr)	(hours)	(unitless)	(mg/L)	(mg-cm³/event)	(Nc)	(Car)			(Nc)	(Car)			(Nc)	(Car)			(Nc)	(Car)		
Volatile Organics																							
Acetone	1.00E-01	NA	5.70E-04	2.00E-01	5.75E-05	4.00E-03	3.19E-09					1.39E-08		1E-07		8.69E-09		9E-08					
Semivolatile Organics																							
Anthracene	3.00E-01	NA	2.25E-01	1.07E+00		7.00E-05	4.50E-08	**Dermal Contact to Surface Water Not Applicable for Current Site Worker**				1.95E-07		7E-07		1.23E-07		4E-07		**Dermal Contact to Surface Water Not Applicable for Construction Worker**			
Benzo(a)anthracene	NA	7.30E-01	8.10E-01	2.20E+00		1.80E-04	5.98E-07						3.71E-08		3E-08		2.32E-08		2E-08				
Benzo(a)pyrene	NA	1.46E+01	1.20E+00	2.90E+00		1.50E-04	8.47E-07						5.25E-08		8E-07		3.29E-08		5E-07				
Benzo(b)fluoranthene	NA	7.30E-01	1.20E+00	3.00E+00		1.50E-04	8.62E-07						5.34E-08		4E-08		3.35E-08		2E-08				
Benzo(ghi)perylene	NA	NA	1.65E+00	4.24E+00		7.00E-05	6.56E-07																
Benzo(k)fluoranthene	NA	7.30E-02	1.11E+00	3.03E+00		1.60E-04	8.51E-07						5.28E-08		4E-09		3.31E-08		2E-09				
Bis(2-Ethylhexyl)phthalate	1.00E-02	2.80E-02	5.27E-03	2.11E+01		3.60E-04	2.41E-08					1.04E-07	1.49E-09	1E-05	4E-11	6.55E-08	9.36E-10	7E-06	3E-11				
Butylbenzylphthalate	2.00E-01	NA	6.06E-02	7.04E+00		2.90E-04	1.29E-07					5.59E-07		3E-06		3.51E-07		2E-06					
Carbazole	NA	2.00E-02	5.65E-02	9.16E-01		5.00E-05	7.47E-09						4.63E-10		9E-12		2.91E-10		6E-12				
Chrysene	NA	7.30E-03	8.10E-01	2.20E+00		1.80E-04	5.98E-07						3.71E-08		3E-10		2.32E-08		2E-10				
Fluoranthene	4.00E-02	NA	3.60E-01	1.50E+00		4.10E-04	5.00E-07					2.17E-06		5E-05		1.36E-06		3E-05					
Indeno(1,2,3-cd)pyrene	NA	7.30E-01	1.90E+00	4.20E+00		7.00E-05	7.53E-07						4.67E-08		3E-08		2.93E-08		2E-08				
Phenanthrene	NA	NA	2.30E-01	1.10E+00		3.50E-04	2.33E-07																
Pyrene	3.00E-02	NA	3.24E-01	1.50E+00		2.80E-04	3.07E-07					1.33E-06		4E-05		8.37E-07		3E-05					
Pesticides/PCBs																							
Alpha-Chlordane	5.00E-04	3.50E-01	1.37E-03	2.76E+01		4.83E-06	9.64E-11					4.18E-10	5.97E-12	8E-07	2E-12	2.62E-10	3.75E-12	5E-07	1E-12				
Beta-BHC	NA	1.80E+00	1.88E-02	5.20E+00		3.20E-06	3.80E-10						2.35E-11		4E-11		1.48E-11		3E-11				
Gamma-Chlordane	5.00E-04	3.50E-01	5.20E-02	2.80E+01		4.22E-06	3.21E-09					1.39E-08	1.99E-10	3E-05	7E-11	8.73E-09	1.25E-10	2E-05	4E-11				
Nitroaromatics																							
1,3-Dinitrobenzene	1.00E-04	NA	2.54E-03	9.28E-01		7.00E-05	4.73E-10					2.05E-09		2E-05		1.29E-09		1E-05					
Metals																							
Aluminum	4.00E-02	NA	1.00E-03	NA		7.35E+00	7.35E-06					3.19E-05		8E-04		2.00E-05		5E-04					
Antimony	4.00E-04	NA	1.00E-03	NA		6.60E-03	6.60E-09					2.86E-08		7E-05		1.80E-08		4E-05					
Arsenic	2.40E-04	1.88E+00	1.00E-03	NA		2.08E-03	2.08E-09					9.03E-09	1.29E-10	4E-05	2E-10	5.66E-09	8.09E-11	2E-05	2E-10				
Barium	3.50E-02	NA	1.00E-03	NA		1.10E-01	1.10E-07					4.77E-07		1E-05		2.99E-07		9E-06					
Cadmium	5.00E-05	NA	1.00E-03	NA		1.16E-02	1.16E-08					5.03E-08		1E-03		3.16E-08		6E-04					
Calcium	NA	NA	1.00E-03	NA		1.14E+02	1.14E-04																
Chromium	3.00E-02	NA	4.00E-03	NA		4.48E-02	1.79E-07					7.78E-07		3E-05		4.88E-07		2E-05					
Cobalt	3.00E-03	NA	4.00E-04	NA		7.75E-03	3.10E-09					1.35E-08		4E-06		8.44E-09		3E-06					
Copper	2.40E-02	NA	1.00E-03	NA		9.70E-02	9.70E-08					4.21E-07		2E-05		2.64E-07		1E-05					
Iron	6.00E-02	NA	1.00E-03	NA		1.66E+01	1.66E-05					7.20E-05		1E-03		4.52E-05		8E-04					
Lead	NA	NA	4.00E-06	NA		1.17E-01	4.68E-10																
Magnesium	NA	NA	1.00E-03	NA		2.31E+01	2.31E-05																
Manganese	1.50E-03	NA	1.00E-03	NA		2.35E+00	2.35E-06					1.02E-05		7E-03		6.40E-06		4E-03					
Nickel	8.00E-04	NA	1.00E-03	NA		1.10E-02	1.10E-08					4.77E-08		6E-05		2.99E-08		4E-05					
Potassium	NA	NA	1.00E-03	NA		3.15E+00	3.15E-06																
Silver	1.00E-03	NA	6.00E-04	NA		1.70E-03	1.02E-09					4.43E-09		4E-06		2.78E-09		3E-06					
Sodium	NA	NA	1.00E-03	NA		2.46E+01	2.46E-05																
Thallium	8.00E-05	NA	1.00E-03	NA		2.40E-03	2.40E-09					1.04E-08		1E-04		6.53E-09		8E-05					
Vanadium	7.00E-05	NA	1.00E-03	NA		1.24E-02	1.24E-08					5.38E-08		8E-04		3.37E-08		5E-04					
Zinc	7.50E-02	NA	6.00E-04	NA		3.04E-01	1.82E-07					7.92E-07		1E-05		4.96E-07		7E-06					
Total Hazard Quotient and Cancer Risk:														**1E-02**	**9E-07**			**7E-03**	**5E-07**				

Assumptions for Future Outdoor Park Worker

CF =	1E-03	liter/cm3
BW =	70	kg
SA =	1,980	cm2
ET =	1	hour/day
EF =	8	days/year
ED =	7	years
AT (Nc) =	365	days
AT (Car) =	25,550	days

Assumptions for Future Recreational Visitor (Child)

CF =	1E-03	liter/cm3
BW =	15	kg
SA =	3725	cm2
ET =	1	hour/day
EF =	4	days/year
ED =	1	years
AT (Nc) =	365	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 G-24
CALCULATION OF ABSORBED DOSE AND RISK FROM DERMAL CONTACT TO SURFACE WATER
CENTRAL TENDENCY (CT)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Equation for Intake (mg/kg-day) = $\frac{DA \times SA \times EF \times ED}{BW \times AT}$

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
BW = Bodyweight
AT = Averaging Time

Equation for Absorbed Dose per Event (DA):

For organics: $DA = Kp \times CW \times [\, ET/(1+B) + 2Tau(1+3B)/(1+B) \,] \times CF$

For inorganics: $DA = Kp \times CW \times ET \times CF$

Kp = Permeability Coefficient
CW = EPC Surface Water
ET = Exposure Time
Tau = Lag Time
CF = Conversion Factor
B = Bunge Model Value

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor
Equation for Total Lifetime Cancer Risk = Adult Contribution + Child Contribution

Analyte	Dermal RfD (mg/kg-day)	Carc. Slope Dermal (mg/kg-day)-1	Permeability Coefficient *Kp* (cm/hr)	Tau (hours)	B (unitless)	EPC Surface Water (mg/L)	Absorbed Dose/Event (mg-cm²/event)	Future Resident (Adult) Intake (mg/kg-day) (Nc)	Future Resident (Adult) Intake (mg/kg-day) (Car)	Future Resident (Adult) Hazard Quotient	Future Resident (Adult) Contribution to Lifetime Cancer Risk	Future Resident (Child) Intake (mg/kg-day) (Nc)	Future Resident (Child) Intake (mg/kg-day) (Car)	Future Resident (Child) Hazard Quotient	Future Resident (Child) Contribution to Lifetime Cancer Risk	Resident Total Lifetime Cancer Risk
Volatile Organics																
Acetone	1.00E-01	NA	5.70E-04	2.00E-01	5.75E-05	4.00E-03	3.19E-09	1.19E-08		1E-07		1.39E-08		1E-07		
Semivolatile Organics																
Anthracene	3.00E-01	NA	2.25E-01	1.07E+00		7.00E-05	4.50E-08	1.68E-07		6E-07		1.96E-07		7E-07		
Benzo(a)anthracene	NA	7.30E-01	8.10E-01	2.20E+00		1.80E-04	5.98E-07		2.23E-07		2E-07		7.44E-08		5E-08	2E-07
Benzo(a)pyrene	NA	1.46E+01	1.20E+00	2.90E+00		1.50E-04	8.47E-07		3.16E-07		5E-06		1.05E-07		2E-06	6E-06
Benzo(b)fluoranthene	NA	7.30E-01	1.20E+00	3.00E+00		1.50E-04	8.62E-07		3.22E-07		2E-07		1.07E-07		8E-08	3E-07
Benzo(ghi)perylene	NA	NA	1.65E+00	4.24E+00		7.00E-05	6.56E-07									
Benzo(k)fluoranthene	NA	7.30E-02	1.11E+00	3.03E+00		1.60E-04	8.51E-07		3.18E-07		2E-08		1.06E-07		8E-09	3E-08
Bis(2-Ethylhexyl)phthalate	1.00E-02	2.80E-02	5.27E-03	2.11E+01		3.60E-04	2.41E-08	8.99E-08	8.99E-09	9E-06	3E-10	1.05E-07	3.00E-09	1E-05	8E-11	3E-10
Butylbenzylphthalate	2.00E-01	NA	6.06E-02	7.04E+00		2.90E-04	1.29E-07	4.81E-07		2E-06		5.61E-07		3E-06		
Carbazole	NA	2.00E-02	5.65E-02	9.16E-01		5.00E-05	7.47E-09		2.79E-09		6E-11		9.30E-10		2E-11	7E-11
Chrysene	NA	7.30E-03	8.10E-01	2.20E+00		1.80E-04	5.98E-07		2.23E-07		2E-09		7.44E-08		5E-10	2E-09
Fluoranthene	4.00E-02	NA	3.60E-01	1.50E+00		4.10E-04	5.00E-07	1.87E-06		5E-05		2.18E-06		5E-05		
Indeno(1,2,3-cd)pyrene	NA	7.30E-01	1.90E+00	4.20E+00		7.00E-05	7.53E-07		2.81E-07		2E-07		9.38E-08		7E-08	3E-07
Phenanthrene	NA	NA	2.30E-01	1.10E+00		3.50E-04	2.33E-07									
Pyrene	3.00E-02	NA	3.24E-01	1.50E+00		2.80E-04	3.07E-07	1.15E-06		4E-05		1.34E-06		4E-05		
Pesticides/PCBs																
Alpha-Chlordane	5.00E-04	3.50E-01	1.37E-03	2.76E+01		4.83E-06	9.64E-11	3.60E-10	3.60E-11	7E-07	1E-11	4.20E-10	1.20E-11	8E-07	4E-12	2E-11
Beta-BHC	NA	1.80E+00	1.88E-02	5.20E+00		3.20E-06	3.80E-10		1.42E-10		3E-10		4.73E-11		9E-11	3E-10
Gamma-Chlordane	5.00E-04	3.50E-01	5.20E-02	2.80E+01		4.22E-06	3.21E-09	1.20E-08	1.20E-09	2E-05	4E-10	1.40E-08	3.99E-10	3E-05	1E-10	6E-10
Nitroaromatics																
1,3-Dinitrobenzene	1.00E-04	NA	2.54E-03	9.28E-01		7.00E-05	4.73E-10	1.77E-09		2E-05		2.06E-09		2E-05		
Metals																
Aluminum	4.00E-02	NA	1.00E-03	NA		7.35E+00	7.35E-06	2.74E-05		7E-04		3.20E-05		8E-04		
Antimony	4.00E-04	NA	1.00E-03	NA		6.60E-03	6.60E-09	2.46E-08		6E-05		2.88E-08		7E-05		
Arsenic	2.40E-04	1.88E+00	1.00E-03	NA		2.08E-03	2.08E-09	7.77E-09	7.77E-10	3E-05	1E-09	9.06E-09	2.59E-10	4E-05	5E-10	2E-09
Barium	3.50E-02	NA	1.00E-03	NA		1.10E-01	1.10E-07	4.11E-07		1E-05		4.79E-07		1E-05		
Cadmium	5.00E-05	NA	1.00E-03	NA		1.16E-02	1.16E-08	4.33E-08		9E-04		5.05E-08		1E-03		
Calcium	NA	NA	1.00E-03	NA		1.14E+02	1.14E-04									
Chromium	3.00E-02	NA	4.00E-03	NA		4.48E-02	1.79E-07	6.69E-07		2E-05		7.81E-07		3E-05		
Cobalt	3.00E-03	NA	4.00E-04	NA		7.75E-03	3.10E-09	1.16E-08		4E-06		1.35E-08		5E-06		
Copper	2.40E-02	NA	1.00E-03	NA		9.70E-02	9.70E-08	3.62E-07		2E-05		4.23E-07		2E-05		
Iron	6.00E-02	NA	1.00E-03	NA		1.66E+01	1.66E-05	6.20E-05		1E-03		7.23E-05		1E-03		
Lead	NA	NA	4.00E-06	NA		1.17E-01	4.68E-10									
Magnesium	NA	NA	1.00E-03	NA		2.31E+01	2.31E-05									
Manganese	1.50E-03	NA	1.00E-03	NA		2.35E+00	2.35E-06	8.77E-06		6E-03		1.02E-05		7E-03		
Nickel	8.00E-04	NA	1.00E-03	NA		1.10E-02	1.10E-08	4.11E-08		5E-05		4.79E-08		6E-05		
Potassium	NA	NA	1.00E-03	NA		3.15E+00	3.15E-06									
Silver	1.00E-03	NA	6.00E-04	NA		1.70E-03	1.02E-09	3.81E-09		4E-06		4.44E-09		4E-06		
Sodium	NA	NA	1.00E-03	NA		2.46E+01	2.46E-05									
Thallium	8.00E-05	NA	1.00E-03	NA		2.40E-03	2.40E-09	8.96E-09		1E-04		1.05E-08		1E-04		
Vanadium	7.00E-05	NA	1.00E-03	NA		1.24E-02	1.24E-08	4.63E-08		7E-04		5.40E-08		8E-04		
Zinc	7.50E-02	NA	6.00E-04	NA		3.04E-01	1.82E-07	6.81E-07		9E-06		7.95E-07		1E-05		
Total Hazard Quotient and Cancer Risk:										**1E-02**				**1E-02**		7E-06

Assumptions for Future Resident (Adult)
CF = 1E-03 liter/cm3
BW = 70 kg
SA = 6,360 cm2
ET = 1 hour/day
EF = 15 days/year
ED = 7 years
AT (Nc) = 2,555 days
AT (Car) = 25,550 days

Assumptions for Future Resident (Child)
CF = 1E-03 liter/cm3
BW = 15 kg
SA = 1,590 cm2
ET = 1 hour/day
EF = 15 days/year
ED = 2 years
AT (Nc) = 730 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 G-25
CALCULATION OF INTAKE AND RISK FROM THE INGESTION OF SEDIMENT
REASONABLE MAXIMUM EXPOSURE (RME)
SEAD-4 Remedial Investigation
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 Sediment, from Sediment EPC Data
IR = Ingestion Rate
CF = Conversion Factor
FI = Fraction Ingested
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Oral RfD	Carc. Slope Oral	EPC Sediment	Current Site Worker				Future Outdoor Park Worker			
				Intake (mg/kg-day)		Hazard Quotient	Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Cancer Risk
	(mg/kg-day)	(mg/kg-day)-1	(mg/kg)	(Nc)	(Car)			(Nc)	(Car)		
Volatile Organics											
Acetone	1.00E-01	NA	2.36E-02								
Carbon disulfide	1.00E-01	NA	1.09E-02								
Chloroform	1.00E-02	6.10E-03	1.11E-02		**Ingestion of Onsite Sediment Not Applicable for Current Site Worker**				**Ingestion of Onsite Sediment Not Applicable for Future Outdoor Park Worker**		
Methyl chloride	NA	1.30E-02	5.00E-03								
Methyl ethyl ketone	6.00E-01	NA	1.16E-02								
Methylene chloride	6.00E-02	7.50E-03	1.07E-02								
Styrene	2.00E-01	NA	3.00E-03								
Toluene	2.00E-01	NA	1.13E-02								
Total Xylenes	2.00E+00	NA	7.00E-03								
Semivolatile Organics											
1.4-Dichlorobenzene	NA	2.40E-02	7.30E-02								
2-Methylnaphthalene	4.00E-02	NA	3.10E-02								
4-Methylphenol	5.00E-03	NA	1.37E-01								
Acenaphthene	6.00E-02	NA	2.73E-01								
Acenaphthylene	NA	NA	1.29E-01								
Anthracene	3.00E-01	NA	3.04E-01								
Benzo(a)anthracene	NA	7.30E-01	5.62E-01								
Benzo(a)pyrene	NA	7.30E+00	5.54E-01								
Benzo(b)fluoranthene	NA	7.30E-01	5.67E-01								
Benzo(ghi)perylene	NA	NA	3.25E-01								
Benzo(k)fluoranthene	NA	7.30E-02	3.98E-01								
Bis(2-Ethylhexyl)phthalate	2.00E-02	1.40E-02	6.99E-01								
Butylbenzylphthalate	2.00E-01	NA	1.60E-02								
Carbazole	NA	2.00E-02	3.53E-01								
Chrysene	NA	7.30E-03	5.64E-01								
Di-n-butylphthalate	1.00E-01	NA	2.29E-01								
Di-n-octylphthalate	2.00E-02	NA	4.60E-02								
Dibenz(a.h)anthracene	NA	7.30E+00	3.88E-01								
Dibenzofuran	NA	NA	2.10E-01								
Diethyl phthalate	8.00E-01	NA	1.70E-02								
Fluoranthene	4.00E-02	NA	6.81E-01								
Fluorene	4.00E-02	NA	2.44E-01								
Hexachlorobenzene	8.00E-04	1.60E+00	2.76E-01								
Indeno(1.2.3-cd)pyrene	NA	7.30E-01	3.63E-01								
~~N-Nitrosodiphenylamine~~	~~NA~~	~~4.90E-03~~	~~2.70E-01~~								
N-Nitrosodipropylamine	NA	7.00E+00	2.67E-01								
Naphthalene	2.00E-02	NA	1.30E-02								
Phenanthrene	NA	NA	3.74E-01								
Phenol	6.00E-01	NA	1.96E-01								
Pyrene	3.00E-02	NA	6.34E-01								
Pesticides/PCBs											
4.4'-DDD	NA	2.40E-01	7.07E-03								
4.4'-DDE	NA	3.40E-01	6.93E-03								
4.4'-DDT	5.00E-04	3.40E-01	5.75E-03								
Aldrin	3.00E-05	1.70E+01	1.88E-03								
Alpha-Chlordane	5.00E-04	3.50E-01	3.73E-03								
Aroclor-1254	2.00E-05	2.00E+00	8.58E-02								
Aroclor-1260	2.00E-05	2.00E+00	4.97E-02								
Beta-BHC	NA	1.80E+00	1.91E-03								
Dieldrin	5.00E-05	1.60E+01	3.81E-03								
Endosulfan I	6.00E-03	NA	1.84E-03								
Endosulfan II	6.00E-03	NA	3.67E-03								
Endosulfan sulfate	6.00E-03	NA	3.96E-03								
Endrin aldehyde	NA	NA	4.23E-03								
Endrin ketone	NA	NA	4.86E-03								
Gamma-Chlordane	5.00E-04	3.50E-01	3.74E-03								
Heptachlor	5.00E-04	4.50E+00	1.85E-03								
Heptachlor epoxide	1.30E-05	9.10E+00	2.01E-03								
Methoxychlor	5.00E-03	NA	1.98E-02								
Nitroaromatics											
2-Nitrotoluene	1.00E-02	NA	7.09E-02								
2-amino-4.6-Dinitrotoluene	NA	NA	6.54E-02								
4-amino-2.6-Dinitrotoluene	NA	NA	6.37E-02								
Herbicides											
2.4.5-T	1.00E-02	NA	1.21E-02								
Metals											
Aluminum	1.00E+00	NA	1.35E+04								
Antimony	4.00E-04	NA	1.53E+01								
Arsenic	3.00E-04	1.50E+00	7.26E+00								
Barium	7.00E-02	NA	1.20E+02								
Beryllium	2.00E-03	NA	6.80E-01								
Cadmium	5.00E-04	NA	6.10E+00								
Calcium	NA	NA	5.00E+04								
Chromium	1.50E+00	NA	4.49E+02								
Cobalt	6.00E-02	NA	1.46E+01								
Copper	4.00E-02	NA	2.05E+02								
Iron	3.00E-01	NA	3.07E+04								
Lead	NA	NA	9.90E+01								
Magnesium	NA	NA	7.72E+03								
Manganese	5.00E-02	NA	8.40E+02								
Mercury	3.00E-04	NA	2.40E-01								
Nickel	2.00E-02	NA	4.73E+01								
Potassium	NA	NA	1.95E+03								
Selenium	5.00E-03	NA	1.17E+00								
Silver	5.00E-03	NA	6.40E-01								
Sodium	NA	NA	1.76E+02								
Vanadium	7.00E-03	NA	4.20E+01								
Zinc	3.00E-01	NA	3.36E+02								
Total Hazard Quotient and Cancer Risk:											

Note: Cells in this table were intentionally left blank due to a lack of toxicity data.
NA= Information not available.

TABLE G-25
CALCULATION OF INTAKE AND RISK FROM THE INGESTION OF SEDIMENT
REASONABLE MAXIMUM EXPOSURE (RME)
SEAD-4 Remedial Investigation
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

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Variables (Assumptions for Each Receptor are Listed at the Bottom):
CS = Chemical Concentration in Sediment, from Sediment EPC Data
IR = Ingestion Rate
CF = Conversion Factor
FI = Fraction Ingested
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Analyte	Oral RfD (mg/kg-day)	Carc. Slope Oral (mg/kg-day)-1	EPC Sediment (mg/kg)	Future Recreational Visitor (Child)				Future Construction Worker			
				Intake (mg/kg-day) (Nc)	Intake (mg/kg-day) (Car)	Hazard Quotient	Cancer Risk	Intake (mg/kg-day) (Nc)	Intake (mg/kg-day) (Car)	Hazard Quotient	Cancer Risk
Volatile Organics											
Acetone	1.00E-01	NA	2.36E-02	6.03E-09		6E-08					
Carbon disulfide	1.00E-01	NA	1.09E-02	2.79E-09		3E-08					
Chloroform	1.00E-02	6.10E-03	1.11E-02	2.84E-09	2.03E-10	3E-07	1E-12	**Ingestion of Onsite Sediment Not Applicable for Future Construction Worker**			
Methyl chloride	NA	1.30E-02	5.00E-03		9.13E-11		1E-12				
Methyl ethyl ketone	6.00E-01	NA	1.16E-02	2.97E-09		5E-09					
Methylene chloride	6.00E-02	7.50E-03	1.07E-02	2.74E-09	1.95E-10	5E-08	1E-12				
Styrene	2.00E-01	NA	3.00E-03	7.67E-10		4E-09					
Toluene	2.00E-01	NA	1.13E-02	2.89E-09		1E-08					
Total Xylenes	2.00E+00	NA	7.00E-03	1.79E-09		9E-10					
Semivolatile Organics											
1,4-Dichlorobenzene	NA	2.40E-02	7.30E-02		1.33E-09		3E-11				
2-Methylnaphthalene	4.00E-02	NA	3.10E-02	7.93E-09		2E-07					
4-Methylphenol	5.00E-03	NA	1.37E-01	3.50E-08		7E-06					
Acenaphthene	6.00E-02	NA	2.73E-01	6.98E-08		1E-06					
Acenaphthylene	NA	NA	1.29E-01								
Anthracene	3.00E-01	NA	3.04E-01	7.77E-08		3E-07					
Benzo(a)anthracene	NA	7.30E-01	5.62E-01		1.03E-08		7E-09				
Benzo(a)pyrene	NA	7.30E+00	5.54E-01		1.01E-08		7E-08				
Benzo(b)fluoranthene	NA	7.30E-01	5.67E-01		1.04E-08		8E-09				
Benzo(ghi)perylene	NA	NA	3.25E-01								
Benzo(k)fluoranthene	NA	7.30E-02	3.98E-01		7.27E-09		5E-10				
Bis(2-Ethylhexyl)phthalate	2.00E-02	1.40E-02	6.99E-01	1.79E-07	1.28E-08	9E-06	2E-10				
Butylbenzylphthalate	2.00E-01	NA	1.60E-02	4.09E-09		2E-08					
Carbazole	NA	2.00E-02	3.53E-01		6.45E-09		1E-10				
Chrysene	NA	7.30E-03	5.64E-01		1.03E-08		8E-11				
Di-n-butylphthalate	1.00E-01	NA	2.29E-01	5.86E-08		6E-07					
Di-n-octylphthalate	2.00E-02	NA	4.60E-02	1.18E-08		6E-07					
Dibenz(a,h)anthracene	NA	7.30E+00	3.88E-01		7.09E-09		5E-08				
Dibenzofuran	NA	NA	2.10E-01								
Diethyl phthalate	8.00E-01	NA	1.70E-02	4.35E-09		5E-09					
Fluoranthene	4.00E-02	NA	6.81E-01	1.74E-07		4E-06					
Fluorene	4.00E-02	NA	2.44E-01	6.24E-08		2E-06					
Hexachlorobenzene	8.00E-04	1.60E+00	2.76E-01	7.06E-08	5.04E-09	9E-05	8E-09				
Indeno(1,2,3-cd)pyrene	NA	7.30E-01	3.63E-01		6.63E-09		5E-09				
N-Nitrosodiphenylamine	NA	4.90E-03	2.70E-01		4.93E-09		2E-11				
N-Nitrosodipropylamine	NA	7.00E+00	2.67E-01		4.88E-09		3E-08				
Naphthalene	2.00E-02	NA	1.30E-02	3.32E-09		2E-07					
Phenanthrene	NA	NA	3.74E-01								
Phenol	6.00E-01	NA	1.96E-01	5.01E-08		8E-08					
Pyrene	3.00E-02	NA	6.34E-01	1.62E-07		5E-06					
Pesticides/PCBs											
4,4'-DDD	NA	2.40E-01	7.07E-03		1.29E-10		3E-11				
4,4'-DDE	NA	3.40E-01	6.93E-03		1.27E-10		4E-11				
4,4'-DDT	5.00E-04	3.40E-01	5.75E-03	1.47E-09	1.05E-10	3E-06	4E-11				
Aldrin	3.00E-05	1.70E+01	1.88E-03	4.81E-10	3.43E-11	2E-05	6E-10				
Alpha-Chlordane	5.00E-04	3.50E-01	3.73E-03	9.54E-10	6.81E-11	2E-06	2E-11				
Aroclor-1254	2.00E-05	2.00E+00	8.58E-02	2.19E-08	1.57E-09	1E-03	3E-09				
Aroclor-1260	2.00E-05	2.00E+00	4.97E-02	1.27E-08	9.08E-10	6E-04	2E-09				
Beta-BHC	NA	1.80E+00	1.91E-03		3.49E-11		6E-11				
Dieldrin	5.00E-05	1.60E+01	3.81E-03	9.74E-10	6.96E-11	2E-05	1E-09				
Endosulfan I	6.00E-03	NA	1.84E-03	4.71E-10		8E-08					
Endosulfan II	6.00E-03	NA	3.67E-03	9.38E-10		2E-07					
Endosulfan sulfate	6.00E-03	NA	3.96E-03	1.01E-09		2E-07					
Endrin aldehyde	NA	NA	4.23E-03								
Endrin ketone	NA	NA	4.86E-03								
Gamma-Chlordane	5.00E-04	3.50E-01	3.74E-03	9.56E-10	6.83E-11	2E-06	2E-11				
Heptachlor	5.00E-04	4.50E+00	1.85E-03	4.73E-10	3.38E-11	9E-07	2E-10				
Heptachlor epoxide	1.30E-05	9.10E+00	2.01E-03	5.14E-10	3.67E-11	4E-05	3E-10				
Methoxychlor	5.00E-03	NA	1.98E-02	5.06E-09		1E-06					
Nitroaromatics											
2-Nitrotoluene	1.00E-02	NA	7.09E-02	1.81E-08		2E-06					
2-amino-4,6-Dinitrotoluene	NA	NA	6.54E-02								
4-amino-2,6-Dinitrotoluene	NA	NA	6.37E-02								
Herbicides											
2,4,5-T	1.00E-02	NA	1.21E-02	3.09E-09		3E-07					
Metals											
Aluminum	1.00E+00	NA	1.35E+04	3.46E-03		3E-03					
Antimony	4.00E-04	NA	1.53E+01	3.92E-06		1E-02					
Arsenic	3.00E-04	1.50E+00	7.26E+00	1.86E-06	1.33E-07	6E-03	2E-07				
Barium	7.00E-02	NA	1.20E+02	3.06E-05		4E-04					
Beryllium	2.00E-03	NA	6.80E-01	1.74E-07		9E-05					
Cadmium	5.00E-04	NA	6.10E+00	1.56E-06		3E-03					
Calcium	NA	NA	5.00E+04								
Chromium	1.50E+00	NA	4.49E+02	1.15E-04		8E-05					
Cobalt	6.00E-02	NA	1.46E+01	3.73E-06		6E-05					
Copper	4.00E-02	NA	2.05E+02	5.25E-05		1E-03					
Iron	3.00E-01	NA	3.07E+04	7.86E-03		3E-02					
Lead	NA	NA	9.90E+01								
Magnesium	NA	NA	7.72E+03								
Manganese	5.00E-02	NA	8.40E+02	2.15E-04		4E-03					
Mercury	3.00E-04	NA	2.40E-01	6.14E-08		2E-04					
Nickel	2.00E-02	NA	4.73E+01	1.21E-05		6E-04					
Potassium	NA	NA	1.95E+03								
Selenium	5.00E-03	NA	1.17E+00	2.99E-07		6E-05					
Silver	5.00E-03	NA	6.40E-01	1.64E-07		3E-05					
Sodium	NA	NA	1.76E+02								
Vanadium	7.00E-03	NA	4.20E+01	1.07E-05		2E-03					
Zinc	3.00E-01	NA	3.36E+02	8.60E-05		3E-04					
Total Hazard Quotient and Cancer Risk:						**6E-02**	**4E-07**				

Assumptions for Future Recreational Visitor (Child)

IR =	200	mg sed/day
CF =	1E-06	kg/mg
FI =	1	unitless
EF =	7	days/year
ED =	5	years
BW =	15	kg
AT (Nc) =	1825	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.

TABLE G-25
CALCULATION OF INTAKE AND RISK FROM THE INGESTION OF SEDIMENT
REASONABLE MAXIMUM EXPOSURE (RME)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

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

Variables (Assumptions for Each Receptor are Listed at the Bottom):
CS = Chemical Concentration in Sediment, from Sediment EPC Data
IR = Ingestion Rate
CF = Conversion Factor
FI = Fraction Ingested
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor
Equation for Total Lifetime Cancer Risk = Adult Contribution + Child Contribution

Analyte	Oral RfD	Carc. Slope Oral	EPC Sediment	Future Resident (Adult)				Future Resident (Child)				Resident
				Intake (mg/kg-day)		Hazard Quotient	Contribution to Lifetime Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Contribution to Lifetime Cancer Risk	Total Lifetime Cancer Risk
	(mg/kg-day)	(mg/kg-day)-1	(mg/kg)	(Nc)	(Car)			(Nc)	(Car)			
Volatile Organics												
Acetone	1.00E-01	NA	2.36E-02	4.16E-09		4E-08		3.88E-08		4E-07		
Carbon disulfide	1.00E-01	NA	1.09E-02	1.92E-09		2E-08		1.79E-08		2E-07		
Chloroform	1.00E-02	6.10E-03	1.11E-02	1.95E-09	6.70E-10	2E-07	4E-12	1.82E-08	1.56E-09	2E-06	1E-11	1E-11
Methyl chloride	NA	1.30E-02	5.00E-03		3.02E-10		4E-12		7.05E-10		9E-12	1E-11
Methyl ethyl ketone	6.00E-01	NA	1.16E-02	2.04E-09		3E-09		1.91E-08		3E-08		
Methylene chloride	6.00E-02	7.50E-03	1.07E-02	1.88E-09	6.46E-10	3E-08	5E-12	1.76E-08	1.51E-09	3E-07	1E-11	2E-11
Styrene	2.00E-01	NA	3.00E-03	5.28E-10		3E-09		4.93E-09		2E-08		
Toluene	2.00E-01	NA	1.13E-02	1.99E-09		1E-08		1.86E-08		9E-08		
Total Xylenes	2.00E+00	NA	7.00E-03	1.23E-09		6E-10		1.15E-08		6E-09		
Semivolatile Organics												
1,4-Dichlorobenzene	NA	2.40E-02	7.30E-02		4.41E-09		1E-10		1.03E-08		2E-10	4E-10
2-Methylnaphthalene	4.00E-02	NA	3.10E-02	5.46E-09		1E-07		5.10E-08		1E-06		
4-Methylphenol	5.00E-03	NA	1.37E-01	2.41E-08		5E-06		2.25E-07		5E-05		
Acenaphthene	6.00E-02	NA	2.73E-01	4.81E-08		8E-07		4.49E-07		7E-06		
Acenaphthylene	NA	NA	1.29E-01									
Anthracene	3.00E-01	NA	3.04E-01	5.35E-08		2E-07		5.00E-07		2E-06		
Benzo(a)anthracene	NA	7.30E-01	5.62E-01		3.39E-08		2E-08		7.92E-08		6E-08	8E-08
Benzo(a)pyrene	NA	7.30E+00	5.54E-01		3.35E-08		2E-07		7.81E-08		6E-07	8E-07
Benzo(b)fluoranthene	NA	7.30E-01	5.67E-01		3.42E-08		2E-08		7.99E-08		6E-08	8E-08
Benzo(ghi)perylene	NA	NA	3.25E-01									
Benzo(k)fluoranthene	NA	7.30E-02	3.98E-01		2.40E-08		2E-09		5.61E-08		4E-09	6E-09
Bis(2-Ethylhexyl)phthalate	2.00E-02	1.40E-02	6.99E-01	1.23E-07	4.22E-08	6E-06	6E-10	1.15E-06	9.85E-08	6E-05	1E-09	2E-09
Butylbenzylphthalate	2.00E-01	NA	1.60E-02	2.82E-09		1E-08		2.63E-08		1E-07		
Carbazole	NA	2.00E-02	3.53E-01		2.13E-08		4E-10		4.97E-08		1E-09	1E-09
Chrysene	NA	7.30E-03	5.64E-01		3.41E-08		2E-10		7.95E-08		6E-10	8E-10
Di-n-butylphthalate	1.00E-01	NA	2.29E-01	4.03E-08		4E-07		3.76E-07		4E-06		
Di-n-octylphthalate	2.00E-02	NA	4.60E-02	8.10E-09		4E-07		7.56E-08		4E-06		
Dibenz(a,h)anthracene	NA	7.30E+00	3.88E-01		2.34E-08		2E-07		5.47E-08		4E-07	6E-07
Dibenzofuran	NA	NA	2.10E-01									
Diethyl phthalate	8.00E-01	NA	1.70E-02	2.99E-09		4E-09		2.79E-08		3E-08		
Fluoranthene	4.00E-02	NA	6.81E-01	1.20E-07		3E-06		1.12E-06		3E-05		
Fluorene	4.00E-02	NA	2.44E-01	4.30E-08		1E-06		4.01E-07		1E-05		
Hexachlorobenzene	8.00E-04	1.60E+00	2.76E-01	4.86E-08	1.67E-08	6E-05	3E-08	4.54E-07	3.89E-08	6E-04	6E-08	9E-08
Indeno(1,2,3-cd)pyrene	NA	7.30E-01	3.63E-01		2.19E-08		2E-08		5.11E-08		4E-08	5E-08
N-Nitrosodiphenylamine	NA	4.90E-03	2.70E-01		1.63E-08		8E-11		3.80E-08		2E-10	3E-10
N-Nitrosodipropylamine	NA	7.00E+00	2.67E-01		1.61E-08		1E-07		3.76E-08		3E-07	4E-07
Naphthalene	2.00E-02	NA	1.30E-02	2.29E-09		1E-07		2.14E-08		1E-06		
Phenanthrene	NA	NA	3.74E-01									
Phenol	6.00E-01	NA	1.96E-01	3.45E-08		6E-08		3.22E-07		5E-07		
Pyrene	3.00E-02	NA	6.34E-01	1.12E-07		4E-06		1.04E-06		3E-05		
Pesticides/PCBs												
4,4'-DDD	NA	2.40E-01	7.07E-03		4.27E-10		1E-10		9.96E-10		2E-10	3E-10
4,4'-DDE	NA	3.40E-01	6.93E-03		4.18E-10		1E-10		9.76E-10		3E-10	5E-10
4,4'-DDT	5.00E-04	3.40E-01	5.75E-03	1.01E-09	3.47E-10	2E-06	1E-10	9.45E-09	8.10E-10	2E-05	3E-10	4E-10
Aldrin	3.00E-05	1.70E+01	1.88E-03	3.31E-10	1.14E-10	1E-05	2E-09	3.09E-09	2.65E-10	1E-04	5E-09	6E-09
Alpha-Chlordane	5.00E-04	3.50E-01	3.73E-03	6.57E-10	2.25E-10	1E-06	8E-11	6.13E-09	5.26E-10	1E-05	2E-10	3E-10
Aroclor-1254	2.00E-05	2.00E+00	8.58E-02	1.51E-08	5.18E-09	8E-04	1E-08	1.41E-07	1.21E-08	7E-03	2E-08	3E-08
Aroclor-1260	2.00E-05	2.00E+00	4.97E-02	8.75E-09	3.00E-09	4E-04	6E-09	8.17E-08	7.00E-09	4E-03	1E-08	2E-08
Beta-BHC	NA	1.80E+00	1.91E-03		1.15E-10		2E-10		2.69E-10		5E-10	7E-10
Dieldrin	5.00E-05	1.60E+01	3.81E-03	6.71E-10	2.30E-10	1E-05	4E-09	6.26E-09	5.37E-10	1E-04	9E-09	1E-08
Endosulfan I	6.00E-03	NA	1.84E-03	3.24E-10		5E-08		3.02E-09		5E-07		
Endosulfan II	6.00E-03	NA	3.67E-03	6.46E-10		1E-07		6.03E-09		1E-06		
Endosulfan sulfate	6.00E-03	NA	3.96E-03	6.97E-10		1E-07		6.51E-09		1E-06		
Endrin aldehyde	NA	NA	4.23E-03									
Endrin ketone	NA	NA	4.86E-03									
Gamma-Chlordane	5.00E-04	3.50E-01	3.74E-03	6.59E-10	2.26E-10	1E-06	8E-11	6.15E-09	5.27E-10	1E-05	2E-10	3E-10
Heptachlor	5.00E-04	4.50E+00	1.85E-03	3.26E-10	1.12E-10	7E-07	5E-10	3.04E-09	2.61E-10	6E-06	1E-09	2E-09
Heptachlor epoxide	1.30E-05	9.10E+00	2.01E-03	3.54E-10	1.21E-10	3E-05	1E-09	3.30E-09	2.83E-10	3E-04	3E-09	4E-09
Methoxychlor	5.00E-03	NA	1.98E-02	3.49E-09		7E-07		3.25E-08		7E-06		
Nitroaromatics												
2-Nitrotoluene	1.00E-02	NA	7.09E-02	1.25E-08		1E-06		1.17E-07		1E-05		
2-amino-4,6-Dinitrotoluene	NA	NA	6.54E-02									
4-amino-2,6-Dinitrotoluene	NA	NA	6.37E-02									
Herbicides												
2,4,5-T	1.00E-02	NA	1.21E-02	2.13E-09		2E-07		1.99E-08		2E-06		
Metals												
Aluminum	1.00E+00	NA	1.35E+04	2.38E-03		2E-03		2.23E-02		2E-02		
Antimony	4.00E-04	NA	1.53E+01	2.70E-06		7E-03		2.52E-05		6E-02		
Arsenic	3.00E-04	1.50E+00	7.26E+00	1.28E-06	4.38E-07	4E-03	7E-07	1.19E-05	1.02E-06	4E-02	2E-06	2E-06
Barium	7.00E-02	NA	1.20E+02	2.11E-05		3E-04		1.97E-04		3E-03		
Beryllium	2.00E-03	NA	6.80E-01	1.20E-07		6E-05		1.12E-06		6E-04		
Cadmium	5.00E-04	NA	6.10E+00	1.07E-06		2E-03		1.00E-05		2E-02		
Calcium	NA	NA	5.00E+04									
Chromium	1.50E+00	NA	4.49E+02	7.91E-05		5E-05		7.38E-04		5E-04		
Cobalt	6.00E-02	NA	1.46E+01	2.57E-06		4E-05		2.40E-05		4E-04		
Copper	4.00E-02	NA	2.05E+02	3.61E-05		9E-04		3.37E-04		8E-03		
Iron	3.00E-01	NA	3.07E+04	5.41E-03		2E-02		5.05E-02		2E-01		
Lead	NA	NA	9.90E+01									
Magnesium	NA	NA	7.72E+03									
Manganese	5.00E-02	NA	8.40E+02	1.48E-04		3E-03		1.38E-03		3E-02		
Mercury	3.00E-04	NA	2.40E-01	4.23E-08		1E-04		3.95E-07		1E-03		
Nickel	2.00E-02	NA	4.73E+01	8.33E-06		4E-04		7.77E-05		4E-03		
Potassium	NA	NA	1.95E+03									
Selenium	5.00E-03	NA	1.17E+00	2.06E-07		4E-05		1.92E-06		4E-04		
Silver	5.00E-03	NA	6.40E-01	1.13E-07		2E-05		1.05E-06		2E-04		
Sodium	NA	NA	1.76E+02									
Vanadium	7.00E-03	NA	4.20E+01	7.40E-06		1E-03		6.91E-05		1E-02		
Zinc	3.00E-01	NA	3.36E+02	5.93E-05		2E-04		5.53E-04		2E-03		
Total Hazard Quotient and Cancer Risk:						**4E-02**				**4E-01**		**4E-06**

Assumptions for Future Resident (Adult)			Assumptions for Future Resident (Child)		
IR =	100	mg sed/day	IR =	200	mg sed/day
CF =	1E-06	kg/mg	CF =	1E-06	kg/mg
FI =	1	unitless	FI =	1	unitless
EF =	45	days/year	EF =	45	days/year
ED =	24	years	ED =	6	years
BW =	70	kg	BW =	15	kg
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 G-26
CALCULATION OF INTAKE AND RISK FROM THE INGESTION OF SEDIMENT
CENTRAL TENDENCY (CT)
SEAD-4 Remedial Investigation
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

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Variables (Assumptions for Each Receptor are Listed at the Bottom):

CS = Chemical Concentration in Sediment. from Sediment EPC Data
IR = Ingestion Rate
CF = Conversion Factor
FI = Fraction Ingested
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Analyte	Oral RfD	Carc. Slope Oral	EPC Sediment	Current Site Worker				Future Outdoor Park Worker			
				Intake (mg/kg-day)		Hazard Quotient	Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Cancer Risk
	(mg/kg-day)	(mg/kg-day)-1	(mg/kg)	(Nc)	(Car)			(Nc)	(Car)		
Volatile Organics											
Acetone	1.00E-01	NA	2.36E-02								
Carbon disulfide	1.00E-01	NA	1.09E-02								
Chloroform	1.00E-02	6.10E-03	1.11E-02	Ingestion of Onsite Sediment Not Applicable for Current Site Worker				Ingestion of Onsite Sediment Not Applicable for Future Outdoor Park Worker			
Methyl chloride	NA	1.30E-02	5.00E-03								
Methyl ethyl ketone	6.00E-01	NA	1.16E-02								
Methylene chloride	6.00E-02	7.50E-03	1.07E-02								
Styrene	2.00E-01	NA	3.00E-03								
Toluene	2.00E-01	NA	1.13E-02								
Total Xylenes	2.00E+00	NA	7.00E-03								
Semivolatile Organics											
1.4-Dichlorobenzene	NA	2.40E-02	7.30E-02								
2-Methylnaphthalene	4.00E-02	NA	3.10E-02								
4-Methylphenol	5.00E-03	NA	1.37E-01								
Acenaphthene	6.00E-02	NA	2.73E-01								
Acenaphthylene	NA	NA	1.29E-01								
Anthracene	3.00E-01	NA	3.04E-01								
Benzo(a)anthracene	NA	7.30E-01	5.62E-01								
Benzo(a)pyrene	NA	7.30E+00	5.54E-01								
Benzo(b)fluoranthene	NA	7.30E-01	5.67E-01								
Benzo(ghi)perylene	NA	NA	3.25E-01								
Benzo(k)fluoranthene	NA	7.30E-02	3.98E-01								
Bis(2-Ethylhexyl)phthalate	2.00E-02	1.40E-02	6.99E-01								
Butylbenzylphthalate	2.00E-01	NA	1.60E-02								
Carbazole	NA	2.00E-02	3.53E-01								
Chrysene	NA	7.30E-03	5.64E-01								
Di-n-butylphthalate	1.00E-01	NA	2.29E-01								
Di-n-octylphthalate	2.00E-02	NA	4.60E-02								
Dibenz(a.h)anthracene	NA	7.30E+00	3.88E-01								
Dibenzofuran	NA	NA	2.10E-01								
Diethyl phthalate	8.00E-01	NA	1.70E-02								
Fluoranthene	4.00E-02	NA	6.81E-01								
Fluorene	4.00E-02	NA	2.44E-01								
Hexachlorobenzene	8.00E-04	1.60E+00	2.76E-01								
Indeno(1.2.3-cd)pyrene	NA	7.30E-01	3.63E-01								
N-Nitrosodiphenylamine	NA	4.90E-03	2.70E-01								
N-Nitrosodipropylamine	NA	7.00E+00	2.67E-01								
Naphthalene	2.00E-02	NA	1.30E-02								
Phenanthrene	NA	NA	3.74E-01								
Phenol	6.00E-01	NA	1.96E-01								
Pyrene	3.00E-02	NA	6.34E-01								
Pesticides/PCBs											
4.4'-DDD	NA	2.40E-01	7.07E-03								
4.4'-DDE	NA	3.40E-01	6.93E-03								
4.4'-DDT	5.00E-04	3.40E-01	5.75E-03								
Aldrin	3.00E-05	1.70E+01	1.88E-03								
Alpha-Chlordane	5.00E-04	3.50E-01	3.73E-03								
Aroclor-1254	2.00E-05	2.00E+00	8.58E-02								
Aroclor-1260	2.00E-05	2.00E+00	4.97E-02								
Beta-BHC	NA	1.80E+00	1.91E-03								
Dieldrin	5.00E-05	1.60E+01	3.81E-03								
Endosulfan I	6.00E-03	NA	1.84E-03								
Endosulfan II	6.00E-03	NA	3.67E-03								
Endosulfan sulfate	6.00E-03	NA	3.96E-03								
Endrin aldehyde	NA	NA	4.23E-03								
Endrin ketone	NA	NA	4.86E-03								
Gamma-Chlordane	5.00E-04	3.50E-01	3.74E-03								
Heptachlor	5.00E-04	4.50E+00	1.85E-03								
Heptachlor epoxide	1.30E-05	9.10E+00	2.01E-03								
Methoxychlor	5.00E-03	NA	1.98E-02								
Nitroaromatics											
2-Nitrotoluene	1.00E-02	NA	7.09E-02								
2-amino-4.6-Dinitrotoluene	NA	NA	6.54E-02								
4-amino-2.6-Dinitrotoluene	NA	NA	6.37E-02								
Herbicides											
2.4.5-T	1.00E-02	NA	1.21E-02								
Metals											
Aluminum	1.00E+00	NA	1.35E+04								
Antimony	4.00E-04	NA	1.53E+01								
Arsenic	3.00E-04	1.50E+00	7.26E+00								
Barium	7.00E-02	NA	1.20E+02								
Beryllium	2.00E-03	NA	6.80E-01								
Cadmium	5.00E-04	NA	6.10E+00								
Calcium	NA	NA	5.00E+04								
Chromium	1.50E+00	NA	4.49E+02								
Cobalt	6.00E-02	NA	1.46E+01								
Copper	4.00E-02	NA	2.05E+02								
Iron	3.00E-01	NA	3.07E+04								
Lead	NA	NA	9.90E+01								
Magnesium	NA	NA	7.72E+03								
Manganese	5.00E-02	NA	8.40E+02								
Mercury	3.00E-04	NA	2.40E-01								
Nickel	2.00E-02	NA	4.73E+01								
Potassium	NA	NA	1.95E+03								
Selenium	5.00E-03	NA	1.17E+00								
Silver	5.00E-03	NA	6.40E-01								
Sodium	NA	NA	1.76E+02								
Vanadium	7.00E-03	NA	4.20E+01								
Zinc	3.00E-01	NA	3.36E+02								
Total Hazard Quotient and Cancer Risk:											

Note: Cells in this table were intentionally left blank due to a lack of toxicity data.
NA= Information not available.

TABLE G-26
CALCULATION OF INTAKE AND RISK FROM THE INGESTION OF SEDIMENT
CENTRAL TENDENCY (CT)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

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

Variables (Assumptions for Each Receptor are Listed at the Bottom):
CS = Chemical Concentration in Sediment, from Sediment EPC Data
IR = Ingestion Rate
CF = Conversion Factor
FI = Fraction Ingested
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Oral RfD	Carc. Slope Oral	EPC Sediment	Future Recreational Visitor (Child)				Future Construction Worker			
				Intake (mg/kg-day)		Hazard Quotient	Cancer Risk	Intake (mg/kg-day)		Hazard Quotient	Cancer Risk
	(mg/kg-day)	(mg/kg-day)-1	(mg/kg)	(Nc)	(Car)			(Nc)	(Car)		
Volatile Organics											
Acetone	1.00E-01	NA	2.36E-02	1.72E-09		2E-08					
Carbon disulfide	1.00E-01	NA	1.09E-02	7.96E-10		8E-09					
Chloroform	1.00E-02	6.10E-03	1.11E-02	8.11E-10	1.16E-11	8E-08	7E-14	**Ingestion of Onsite Sediment Not Applicable for Future Construction Worker**			
Methyl chloride	NA	1.30E-02	5.00E-03		5.22E-12		7E-14				
Methyl ethyl ketone	6.00E-01	NA	1.16E-02	8.47E-10		1E-09					
Methylene chloride	6.00E-02	7.50E-03	1.07E-02	7.82E-10	1.12E-11	1E-08	8E-14				
Styrene	2.00E-01	NA	3.00E-03	2.19E-10		1E-09					
Toluene	2.00E-01	NA	1.13E-02	8.26E-10		4E-09					
Total Xylenes	2.00E+00	NA	7.00E-03	5.11E-10		3E-10					
Semivolatile Organics											
1,4-Dichlorobenzene	NA	2.40E-02	7.30E-02		7.62E-11		2E-12				
2-Methylnaphthalene	4.00E-02	NA	3.10E-02	2.26E-09		6E-08					
4-Methylphenol	5.00E-03	NA	1.37E-01	1.00E-08		2E-06					
Acenaphthene	6.00E-02	NA	2.73E-01	1.99E-08		3E-07					
Acenaphthylene	NA	NA	1.29E-01								
Anthracene	3.00E-01	NA	3.04E-01	2.22E-08		7E-08					
Benzo(a)anthracene	NA	7.30E-01	5.62E-01		5.87E-10		4E-10				
Benzo(a)pyrene	NA	7.30E+00	5.54E-01		5.78E-10		4E-09				
Benzo(b)fluoranthene	NA	7.30E-01	5.67E-01		5.92E-10		4E-10				
Benzo(ghi)perylene	NA	NA	3.25E-01								
Benzo(k)fluoranthene	NA	7.30E-02	3.98E-01		4.15E-10		3E-11				
Bis(2-Ethylhexyl)phthalate	2.00E-02	1.40E-02	6.99E-01	5.11E-08	7.30E-10	3E-06	1E-11				
Butylbenzylphthalate	2.00E-01	NA	1.60E-02	1.17E-09		6E-09					
Carbazole	NA	2.00E-02	3.53E-01		3.68E-10		7E-12				
Chrysene	NA	7.30E-03	5.64E-01		5.89E-10		4E-12				
Di-n-butylphthalate	1.00E-01	NA	2.29E-01	1.67E-08		2E-07					
Di-n-octylphthalate	2.00E-02	NA	4.60E-02	3.36E-09		2E-07					
Dibenz(a,h)anthracene	NA	7.30E+00	3.88E-01		4.05E-10		3E-09				
Dibenzofuran	NA	NA	2.10E-01								
Diethyl phthalate	8.00E-01	NA	1.70E-02	1.24E-09		2E-09					
Fluoranthene	4.00E-02	NA	6.81E-01	4.98E-08		1E-06					
Fluorene	4.00E-02	NA	2.44E-01	1.78E-08		4E-07					
Hexachlorobenzene	8.00E-04	1.60E+00	2.76E-01	2.02E-08	2.88E-10	3E-05	5E-10				
Indeno(1,2,3-cd)pyrene	NA	7.30E-01	3.63E-01		3.79E-10		3E-10				
N-Nitrosodiphenylamine	NA	4.90E-03	2.70E-01		2.82E-10		1E-12				
N-Nitrosodipropylamine	NA	7.00E+00	2.67E-01		2.79E-10		2E-09				
Naphthalene	2.00E-02	NA	1.30E-02	9.50E-10		5E-08					
Phenanthrene	NA	NA	3.74E-01								
Phenol	6.00E-01	NA	1.96E-01	1.43E-08		2E-08					
Pyrene	3.00E-02	NA	6.34E-01	4.63E-08		2E-06					
Pesticides/PCBs											
4,4'-DDD	NA	2.40E-01	7.07E-03		7.38E-12		2E-12				
4,4'-DDE	NA	3.40E-01	6.93E-03		7.23E-12		2E-12				
4,4'-DDT	5.00E-04	3.40E-01	5.75E-03	4.20E-10	6.00E-12	8E-07	2E-12				
Aldrin	3.00E-05	1.70E+01	1.88E-03	1.37E-10	1.96E-12	5E-06	3E-11				
Alpha-Chlordane	5.00E-04	3.50E-01	3.73E-03	2.73E-10	3.89E-12	5E-07	1E-12				
Aroclor-1254	2.00E-05	2.00E+00	8.58E-02	6.27E-09	8.95E-11	3E-04	2E-10				
Aroclor-1260	2.00E-05	2.00E+00	4.97E-02	3.63E-09	5.19E-11	2E-04	1E-10				
Beta-BHC	NA	1.80E+00	1.91E-03		1.99E-12		4E-12				
Dieldrin	5.00E-05	1.60E+01	3.81E-03	2.78E-10	3.98E-12	6E-06	6E-11				
Endosulfan I	6.00E-03	NA	1.84E-03	1.34E-10		2E-08					
Endosulfan II	6.00E-03	NA	3.67E-03	2.68E-10		4E-08					
Endosulfan sulfate	6.00E-03	NA	3.96E-03	2.89E-10		5E-08					
Endrin aldehyde	NA	NA	4.23E-03								
Endrin ketone	NA	NA	4.86E-03								
Gamma-Chlordane	5.00E-04	3.50E-01	3.74E-03	2.73E-10	3.90E-12	5E-07	1E-12				
Heptachlor	5.00E-04	4.50E+00	1.85E-03	1.35E-10	1.93E-12	3E-07	9E-12				
Heptachlor epoxide	1.30E-05	9.10E+00	2.01E-03	1.47E-10	2.10E-12	1E-05	2E-11				
Methoxychlor	5.00E-03	NA	1.98E-02	1.45E-09		3E-07					
Nitroaromatics											
2-Nitrotoluene	1.00E-02	NA	7.09E-02	5.18E-09		5E-07					
2-amino-4,6-Dinitrotoluene	NA	NA	6.54E-02								
4-amino-2,6-Dinitrotoluene	NA	NA	6.37E-02								
Herbicides											
2,4,5-T	1.00E-02	NA	1.21E-02	8.84E-10		9E-08					
Metals											
Aluminum	1.00E+00	NA	1.35E+04	9.89E-04		1E-03					
Antimony	4.00E-04	NA	1.53E+01	1.12E-06		3E-03					
Arsenic	3.00E-04	1.50E+00	7.26E+00	5.30E-07	7.58E-09	2E-03	1E-08				
Barium	7.00E-02	NA	1.20E+02	8.75E-06		1E-04					
Beryllium	2.00E-03	NA	6.80E-01	4.97E-08		2E-05					
Cadmium	5.00E-04	NA	6.10E+00	4.46E-07		9E-04					
Calcium	NA	NA	5.00E+04								
Chromium	1.50E+00	NA	4.49E+02	3.28E-05		2E-05					
Cobalt	6.00E-02	NA	1.46E+01	1.07E-06		2E-05					
Copper	4.00E-02	NA	2.05E+02	1.50E-05		4E-04					
Iron	3.00E-01	NA	3.07E+04	2.25E-03		7E-03					
Lead	NA	NA	9.90E+01								
Magnesium	NA	NA	7.72E+03								
Manganese	5.00E-02	NA	8.40E+02	6.14E-05		1E-03					
Mercury	3.00E-04	NA	2.40E-01	1.75E-08		6E-05					
Nickel	2.00E-02	NA	4.73E+01	3.45E-06		2E-04					
Potassium	NA	NA	1.95E+03								
Selenium	5.00E-03	NA	1.17E+00	8.55E-08		2E-05					
Silver	5.00E-03	NA	6.40E-01	4.68E-08		9E-06					
Sodium	NA	NA	1.76E+02								
Vanadium	7.00E-03	NA	4.20E+01	3.07E-06		4E-04					
Zinc	3.00E-01	NA	3.36E+02	2.46E-05		8E-05					
Total Hazard Quotient and Cancer Risk:						**2E-02**	**2E-08**				

Assumptions for Future Recreational Visitor (Child)

IR =	100	mg sed/day
CF =	1E-06	kg/mg
FI =	1	unitless
EF =	4	days/year
ED =	1	year
BW =	15	kg
AT (Nc) =	365	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.

TABLE G-26
CALCULATION OF INTAKE AND RISK FROM THE INGESTION OF SEDIMENT
CENTRAL TENDENCY (CT)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

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

Variables (Assumptions for Each Receptor are Listed at the Bottom):
CS = Chemical Concentration in Sediment, from Sediment EPC Data
IR = Ingestion Rate
CF = Conversion Factor
FI = Fraction Ingested
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for 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)-1	EPC Sediment (mg/kg)	Future Resident (Adult) Intake (mg/kg-day) (Nc)	Future Resident (Adult) Intake (mg/kg-day) (Car)	Future Resident (Adult) Hazard Quotient	Future Resident (Adult) Contribution to Lifetime Cancer Risk	Future Resident (Child) Intake (mg/kg-day) (Nc)	Future Resident (Child) Intake (mg/kg-day) (Car)	Future Resident (Child) Hazard Quotient	Future Resident (Child) Contribution to Lifetime Cancer Risk	Resident Total Lifetime Cancer Risk
Volatile Organics												
Acetone	1.00E-01	NA	2.36E-02	6.93E-10		7E-09		6.47E-09		6E-08		
Carbon disulfide	1.00E-01	NA	1.09E-02	3.20E-10		3E-09		2.99E-09		3E-08		
Chloroform	1.00E-02	6.10E-03	1.11E-02	3.26E-10	3.26E-11	3E-08	2E-13	3.04E-09	8.69E-11	3E-07	5E-13	7E-13
Methyl chloride	NA	1.30E-02	5.00E-03		1.47E-11		2E-13		3.91E-11		5E-13	7E-13
Methyl ethyl ketone	6.00E-01	NA	1.16E-02	3.41E-10		6E-10		3.18E-09		5E-09		
Methylene chloride	6.00E-02	7.50E-03	1.07E-02	3.14E-10	3.14E-11	5E-09	2E-13	2.93E-09	8.38E-11	5E-08	6E-13	9E-13
Styrene	2.00E-01	NA	3.00E-03	8.81E-11		4E-10		8.22E-10		4E-09		
Toluene	2.00E-01	NA	1.13E-02	3.32E-10		2E-09		3.10E-09		2E-08		
Total Xylenes	2.00E+00	NA	7.00E-03	2.05E-10		1E-10		1.92E-09		1E-09		
Semivolatile Organics												
1,4-Dichlorobenzene	NA	2.40E-02	7.30E-02		2.14E-10		5E-12		5.71E-10		1E-11	2E-11
2-Methylnaphthalene	4.00E-02	NA	3.10E-02	9.10E-10		2E-08		8.49E-09		2E-07		
4-Methylphenol	5.00E-03	NA	1.37E-01	4.02E-09		8E-07		3.75E-08		8E-06		
Acenaphthene	6.00E-02	NA	2.73E-01	8.01E-09		1E-07		7.48E-08		1E-06		
Acenaphthylene	NA	NA	1.29E-01									
Anthracene	3.00E-01	NA	3.04E-01	8.92E-09		3E-08		8.33E-08		3E-07		
Benzo(a)anthracene	NA	7.30E-01	5.62E-01		1.65E-09		1E-09		4.40E-09		3E-09	4E-09
Benzo(a)pyrene	NA	7.30E+00	5.54E-01		1.63E-09		1E-08		4.34E-09		3E-08	4E-08
Benzo(b)fluoranthene	NA	7.30E-01	5.67E-01		1.66E-09		1E-09		4.44E-09		3E-09	4E-09
Benzo(ghi)perylene	NA	NA	3.25E-01									
Benzo(k)fluoranthene	NA	7.30E-02	3.98E-01		1.17E-09		9E-11		3.12E-09		2E-10	3E-10
Bis(2-Ethylhexyl)phthalate	2.00E-02	1.40E-02	6.99E-01	2.05E-08	2.05E-09	1E-06	3E-11	1.92E-07	5.47E-09	1E-05	8E-11	1E-10
Butylbenzylphthalate	2.00E-01	NA	1.60E-02	4.70E-10		2E-09		4.38E-09		2E-08		
Carbazole	NA	2.00E-02	3.53E-01		1.04E-09		2E-11		2.76E-09		6E-11	8E-11
Chrysene	NA	7.30E-03	5.64E-01		1.66E-09		1E-11		4.41E-09		3E-11	4E-11
Di-n-butylphthalate	1.00E-01	NA	2.29E-01	6.72E-09		7E-08		6.27E-08		6E-07		
Di-n-octylphthalate	2.00E-02	NA	4.60E-02	1.35E-09		7E-08		1.26E-08		6E-07		
Dibenz(a,h)anthracene	NA	7.30E+00	3.88E-01		1.14E-09		8E-09		3.04E-09		2E-08	3E-08
Dibenzofuran	NA	NA	2.10E-01									
Diethyl phthalate	8.00E-01	NA	1.70E-02	4.99E-10		6E-10		4.66E-09		6E-09		
Fluoranthene	4.00E-02	NA	6.81E-01	2.00E-08		5E-07		1.87E-07		5E-06		
Fluorene	4.00E-02	NA	2.44E-01	7.16E-09		2E-07		6.68E-08		2E-06		
Hexachlorobenzene	8.00E-04	1.60E+00	2.76E-01	8.10E-09	8.10E-10	1E-05	1E-09	7.56E-08	2.16E-09	9E-05	3E-09	5E-09
Indeno(1,2,3-cd)pyrene	NA	7.30E-01	3.63E-01		1.07E-09		8E-10		2.84E-09		2E-09	3E-09
N-Nitrosodiphenylamine	NA	4.90E-03	2.70E-01		7.93E-10		4E-12		2.11E-09		1E-11	1E-11
N-Nitrosodipropylamine	NA	7.00E+00	2.67E-01		7.84E-10		5E-09		2.09E-09		1E-08	2E-08
Naphthalene	2.00E-02	NA	1.30E-02	3.82E-10		2E-08		3.56E-09		2E-07		
Phenanthrene	NA	NA	3.74E-01									
Phenol	6.00E-01	NA	1.96E-01	5.75E-09		1E-08		5.37E-08		9E-08		
Pyrene	3.00E-02	NA	6.34E-01	1.86E-08		6E-07		1.74E-07		6E-06		
Pesticides/PCBs												
4,4'-DDD	NA	2.40E-01	7.07E-03		2.08E-11		5E-12		5.53E-11		1E-11	2E-11
4,4'-DDE	NA	3.40E-01	6.93E-03		2.03E-11		7E-12		5.42E-11		2E-11	3E-11
4,4'-DDT	5.00E-04	3.40E-01	5.75E-03	1.69E-10	1.69E-11	3E-07	6E-12	1.58E-09	4.50E-11	3E-06	2E-11	2E-11
Aldrin	3.00E-05	1.70E+01	1.88E-03	5.52E-11	5.52E-12	2E-06	9E-11	5.15E-10	1.47E-11	2E-05	3E-10	3E-10
Alpha-Chlordane	5.00E-04	3.50E-01	3.73E-03	1.09E-10	1.09E-11	2E-07	4E-12	1.02E-09	2.92E-11	2E-06	1E-11	1E-11
Aroclor-1254	2.00E-05	2.00E+00	8.58E-02	2.52E-09	2.52E-10	1E-04	5E-10	2.35E-08	6.72E-10	1E-03	1E-09	2E-09
Aroclor-1260	2.00E-05	2.00E+00	4.97E-02	1.46E-09	1.46E-10	7E-05	3E-10	1.36E-08	3.89E-10	7E-04	8E-10	1E-09
Beta-BHC	NA	1.80E+00	1.91E-03		5.61E-12		1E-11		1.50E-11		3E-11	4E-11
Dieldrin	5.00E-05	1.60E+01	3.81E-03	1.12E-10	1.12E-11	2E-06	2E-10	1.04E-09	2.98E-11	2E-05	5E-10	7E-10
Endosulfan I	6.00E-03	NA	1.84E-03	5.40E-11		9E-09		5.04E-10		8E-08		
Endosulfan II	6.00E-03	NA	3.67E-03	1.08E-10		2E-08		1.01E-09		2E-07		
Endosulfan sulfate	6.00E-03	NA	3.96E-03	1.16E-10		2E-08		1.08E-09		2E-07		
Endrin aldehyde	NA	NA	4.23E-03									
Endrin ketone	NA	NA	4.86E-03									
Gamma-Chlordane	5.00E-04	3.50E-01	3.74E-03	1.10E-10	1.10E-11	2E-07	4E-12	1.02E-09	2.93E-11	2E-06	1E-11	1E-11
Heptachlor	5.00E-04	4.50E+00	1.85E-03	5.43E-11	5.43E-12	1E-07	2E-11	5.07E-10	1.45E-11	1E-06	7E-11	9E-11
Heptachlor epoxide	1.30E-05	9.10E+00	2.01E-03	5.90E-11	5.90E-12	5E-06	5E-11	5.51E-10	1.57E-11	4E-05	1E-10	2E-10
Methoxychlor	5.00E-03	NA	1.98E-02	5.81E-10		1E-07		5.42E-09		1E-06		
Nitroaromatics												
2-Nitrotoluene	1.00E-02	NA	7.09E-02	2.08E-09		2E-07		1.94E-08		2E-06		
2-amino-4,6-Dinitrotoluene	NA	NA	6.54E-02									
4-amino-2,6-Dinitrotoluene	NA	NA	6.37E-02									
Herbicides												
2,4,5-T	1.00E-02	NA	1.21E-02	3.55E-10		4E-08		3.32E-09		3E-07		
Metals												
Aluminum	1.00E+00	NA	1.35E+04	3.97E-04		4E-04		3.71E-03		4E-03		
Antimony	4.00E-04	NA	1.53E+01	4.50E-07		1E-03		4.20E-06		1E-02		
Arsenic	3.00E-04	1.50E+00	7.26E+00	2.13E-07	2.13E-08	7E-04	3E-08	1.99E-06	5.68E-08	7E-03	9E-08	1E-07
Barium	7.00E-02	NA	1.20E+02	3.51E-06		5E-05		3.28E-05		5E-04		
Beryllium	2.00E-03	NA	6.80E-01	2.00E-08		1E-05		1.86E-07		9E-05		
Cadmium	5.00E-04	NA	6.10E+00	1.79E-07		4E-04		1.67E-06		3E-03		
Calcium	NA	NA	5.00E+04									
Chromium	1.50E+00	NA	4.49E+02	1.32E-05		9E-06		1.23E-04		8E-05		
Cobalt	6.00E-02	NA	1.46E+01	4.28E-07		7E-06		4.00E-06		7E-05		
Copper	4.00E-02	NA	2.05E+02	6.02E-06		2E-04		5.62E-05		1E-03		
Iron	3.00E-01	NA	3.07E+04	9.02E-04		3E-03		8.42E-03		3E-02		
Lead	NA	NA	9.90E+01									
Magnesium	NA	NA	7.72E+03									
Manganese	5.00E-02	NA	8.40E+02	2.47E-05		5E-04		2.30E-04		5E-03		
Mercury	3.00E-04	NA	2.40E-01	7.05E-09		2E-05		6.58E-08		2E-04		
Nickel	2.00E-02	NA	4.73E+01	1.39E-06		7E-05		1.30E-05		6E-04		
Potassium	NA	NA	1.95E+03									
Selenium	5.00E-03	NA	1.17E+00	3.43E-08		7E-06		3.21E-07		6E-05		
Silver	5.00E-03	NA	6.40E-01	1.88E-08		4E-06		1.75E-07		4E-05		
Sodium	NA	NA	1.76E+02									
Vanadium	7.00E-03	NA	4.20E+01	1.23E-06		2E-04		1.15E-05		2E-03		
Zinc	3.00E-01	NA	3.36E+02	9.88E-06		3E-05		9.22E-05		3E-04		
Total Hazard Quotient and Cancer Risk:						**7E-03**				**6E-02**		**2E-07**

Assumptions for Future Resident (Adult)			Assumptions for Future Resident (Child)		
IR =	50	mg sed/day	IR =	100	mg sed/day
CF =	1E-06	kg/mg	CF =	1E-06	kg/mg
FI =	1	unitless	FI =	1	unitless
EF =	15	days/year	EF =	15	days/year
ED =	7	years	ED =	2	years
BW =	70	kg	BW =	15	kg
AT (Nc) =	2,555	days	AT (Nc) =	730	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 G-27
CALCULATION OF ABSORBED DOSE AND RISK FROM DERMAL CONTACT TO SEDIMENT
REASONABLE MAXIMUM EXPOSURE (RME)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Equation for Intake (mg/kg-day) = $\frac{CS \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$

Variables (Assumptions for Each Receptor 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
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Dermal RfD	Carc. Slope Dermal	Absorption Factor*	EPC Sediment	Current Site Worker				Future Outdoor Park Worker			
					Absorbed Dose (mg/kg-day)		Hazard Quotient	Cancer Risk	Absorbed Dose (mg/kg-day)		Hazard Quotient	Cancer Risk
	(mg/kg-day)	(mg/kg-day)-1	(unitless)	(mg/kg)	(Nc)	(Car)			(Nc)	(Car)		
Volatile Organics												
Acetone	1.00E-01	NA	NA	2.36E-02								
Carbon disulfide	6.30E-02	NA	NA	1.09E-02								
Chloroform	1.00E-02	6.10E-03	NA	1.11E-02			**Contact to Onsite Sediment Not Applicable for Current Site Worker**					
Methyl chloride	NA	1.30E-02	NA	5.00E-03								
Methyl ethyl ketone	6.00E-01	NA	NA	1.16E-02								
Methylene chloride	5.88E-02	7.65E-03	NA	1.07E-02								
Styrene	2.00E-01	NA	NA	3.00E-03								
Toluene	2.00E-01	NA	NA	1.13E-02								
Total Xylenes	1.80E+00	NA	NA	7.00E-03								
Semivolatile Organics												
1,4-Dichlorobenzene	NA	2.40E-02	NA	7.30E-02								
2-Methylnaphthalene	4.00E-02	NA	NA	3.10E-02								
4-Methylphenol	5.00E-03	NA	NA	1.37E-01								
Acenaphthene	6.00E-02	NA	NA	2.73E-01								
Acenaphthylene	NA	NA	NA	1.29E-01								
Anthracene	3.00E-01	NA	NA	3.04E-01								
Benzo(a)anthracene	NA	7.30E-01	NA	5.62E-01								
Benzo(a)pyrene	NA	1.46E+01	NA	5.54E-01								
Benzo(b)fluoranthene	NA	7.30E-01	NA	5.67E-01								
Benzo(ghi)perylene	NA	NA	NA	3.25E-01								
Benzo(k)fluoranthene	NA	7.30E-02	NA	3.98E-01								
Bis(2-Ethylhexyl)phthalate	1.00E-02	2.80E-02	NA	6.99E-01								
Butylbenzylphthalate	2.00E-01	NA	NA	1.60E-02								
Carbazole	NA	2.00E-02	NA	3.53E-01								
Chrysene	NA	7.30E-03	NA	5.64E-01								
Di-n-butylphthalate	9.00E-02	NA	NA	2.29E-01								
Di-n-octylphthalate	2.00E-02	NA	NA	4.60E-02								
Dibenz(a,h)anthracene	NA	7.30E+00	NA	3.88E-01								
Dibenzofuran	NA	NA	NA	2.10E-01								
Diethyl phthalate	8.00E-01	NA	NA	1.70E-02								
Fluoranthene	4.00E-02	NA	NA	6.81E-01								
Fluorene	4.00E-02	NA	NA	2.44E-01								
Hexachlorobenzene	8.00E-04	1.60E+00	NA	2.76E-01								
Indeno(1,2,3-cd)pyrene	NA	7.30E-01	NA	3.63E-01								
N-Nitrosodiphenylamine	NA	4.90E-03	NA	2.70E-01								
N-Nitrosodipropylamine	NA	7.00E+00	NA	2.67E-01								
Naphthalene	2.00E-02	NA	NA	1.30E-02								
Phenanthrene	NA	NA	NA	3.74E-01								
Phenol	5.40E-01	NA	NA	1.96E-01								
Pyrene	3.00E-02	NA	NA	6.34E-01								
Pesticides/PCBs												
4,4'-DDD	NA	1.20E+00	NA	7.07E-03								
4,4'-DDE	NA	1.70E+00	NA	6.93E-03								
4,4'-DDT	1.00E-04	1.70E+00	NA	5.75E-03								
Aldrin	1.50E-05	3.40E+01	NA	1.88E-03								
Alpha-Chlordane	5.00E-04	3.50E-01	NA	3.73E-03								
Aroclor-1254	1.80E-05	2.22E+00	0.06	8.58E-02					9.03E-09	3.23E-09	5E-04	7E-09
Aroclor-1260	1.80E-05	2.22E+00	0.06	4.97E-02					5.23E-09	1.87E-09	3E-04	4E-09
Beta-BHC	NA	1.80E+00	NA	1.91E-03								
Dieldrin	2.50E-05	3.20E+01	NA	3.81E-03								
Endosulfan I	6.00E-03	NA	NA	1.84E-03								
Endosulfan II	6.00E-03	NA	NA	3.67E-03								
Endosulfan sulfate	6.00E-03	NA	NA	3.96E-03								
Endrin aldehyde	NA	NA	NA	4.23E-03								
Endrin ketone	NA	NA	NA	4.86E-03								
Gamma-Chlordane	5.00E-04	3.50E-01	NA	3.74E-03								
Heptachlor	5.00E-04	4.50E+00	NA	1.85E-03								
Heptachlor epoxide	1.30E-05	9.10E+00	NA	2.01E-03								
Methoxychlor	5.00E-03	NA	NA	1.98E-02								
Nitroaromatics												
2-Nitrotoluene	1.00E-02	NA	NA	7.09E-02								
2-amino-4,6-Dinitrotoluene	NA	NA	NA	6.54E-02								
4-amino-2,6-Dinitrotoluene	NA	NA	NA	6.37E-02								
Herbicides												
2,4,5-T	1.00E-02	NA	NA	1.21E-02								
Metals												
Aluminum	4.00E-02	NA	NA	1.35E+04								
Antimony	4.00E-04	NA	NA	1.53E+01								
Arsenic	2.40E-04	1.88E+00	0.001	7.26E+00					1.27E-08	4.55E-09	5E-05	9E-09
Barium	3.50E-02	NA	NA	1.20E+02								
Beryllium	2.00E-05	NA	NA	6.80E-01								
Cadmium	5.00E-05	NA	0.01	6.10E+00					1.07E-07		2E-03	
Calcium	NA	NA	NA	5.00E+04								
Chromium	3.00E-02	NA	NA	4.49E+02								
Cobalt	3.00E-03	NA	NA	1.46E+01								
Copper	2.40E-02	NA	NA	2.05E+02								
Iron	6.00E-02	NA	NA	3.07E+04								
Lead	NA	NA	NA	9.90E+01								
Magnesium	NA	NA	NA	7.72E+03								
Manganese	1.50E-03	NA	NA	8.40E+02								
Mercury	3.00E-06	NA	NA	2.40E-01								
Nickel	8.00E-04	NA	NA	4.73E+01								
Potassium	NA	NA	NA	1.95E+03								
Selenium	4.50E-03	NA	NA	1.17E+00								
Silver	1.00E-03	NA	NA	6.40E-01								
Sodium	NA	NA	NA	1.76E+02								
Vanadium	7.00E-05	NA	NA	4.20E+01								
Zinc	7.50E-02	NA	NA	3.36E+02								
Total Hazard Quotient and Cancer Risk:											**3E-03**	**2E-08**

Assumptions for Future Outdoor Park Worker

CF =	1E-06	kg/mg
SA =	2490	cm2
AF =	1	mg/cm2
EF =	18	days/year
ED =	25	years
BW =	70	kg
AT (Nc) =	9125	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.
* 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 c

TABLE G-27
CALCULATION OF ABSORBED DOSE AND RISK FROM DERMAL CONTACT TO SEDIMENT
REASONABLE MAXIMUM EXPOSURE (RME)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Equation for Intake (mg/kg-day) = $\frac{CS \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$

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):
CS = Chemical Concentration in Sediment, from Sediment EPC Data
CF = Conversion Factor
SA = Surface Area Contact
AF = Adherence Factor
ABS = Absorption Factor
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Analyte	Dermal RfD	Carc. Slope Dermal	Absorption Factor*	EPC Sediment	Future Recreational Visitor (Child)				Future Construction Worker			
					Absorbed Dose (mg/kg-day)		Hazard Quotient	Cancer Risk	Absorbed Dose (mg/kg-day)		Hazard Quotient	Cancer Risk
	(mg/kg-day)	(mg/kg-day)-1	(unitless)	(mg/kg)	(Nc)	(Car)			(Nc)	(Car)		
Volatile Organics												
Acetone	1.00E-01	NA	NA	2.36E-02								
Carbon disulfide	6.30E-02	NA	NA	1.09E-02								
Chloroform	1.00E-02	6.10E-03	NA	1.11E-02					**Dermal Contact to Onsite Sediment Not Applicable for Future Construction Worker**			
Methyl chloride	NA	1.30E-02	NA	5.00E-03								
Methyl ethyl ketone	6.00E-01	NA	NA	1.16E-02								
Methylene chloride	5.88E-02	7.65E-03	NA	1.07E-02								
Styrene	2.00E-01	NA	NA	3.00E-03								
Toluene	2.00E-01	NA	NA	1.13E-02								
Total Xylenes	1.80E+00	NA	NA	7.00E-03								
Semivolatile Organics												
1.4-Dichlorobenzene	NA	2.40E-02	NA	7.30E-02								
2-Methylnaphthalene	4.00E-02	NA	NA	3.10E-02								
4-Methylphenol	5.00E-03	NA	NA	1.37E-01								
Acenaphthene	6.00E-02	NA	NA	2.73E-01								
Acenaphthylene	NA	NA	NA	1.29E-01								
Anthracene	3.00E-01	NA	NA	3.04E-01								
Benzo(a)anthracene	NA	7.30E-01	NA	5.62E-01								
Benzo(a)pyrene	NA	1.46E+01	NA	5.54E-01								
Benzo(b)fluoranthene	NA	7.30E-01	NA	5.67E-01								
Benzo(ghi)perylene	NA	NA	NA	3.25E-01								
Benzo(k)fluoranthene	NA	7.30E-02	NA	3 98E-01								
Bis(2-Ethylhexyl)phthalate	1.00E-02	2.80E-02	NA	6.99E-01								
Butylbenzylphthalate	2.00E-01	NA	NA	1.60E-02								
Carbazole	NA	2.00E-02	NA	3.53E-01								
Chrysene	NA	7.30E-03	NA	5.64E-01								
Di-n-butylphthalate	9.00E-02	NA	NA	2.29E-01								
Di-n-octylphthalate	2.00E-02	NA	NA	4.60E-02								
Dibenz(a.h)anthracene	NA	7.30E+00	NA	3.88E-01								
Dibenzofuran	NA	NA	NA	2.10E-01								
Diethyl phthalate	8.00E-01	NA	NA	1.70E-02								
Fluoranthene	4.00E-02	NA	NA	6.81E-01								
Fluorene	4.00E-02	NA	NA	2.44E-01								
Hexachlorobenzene	8.00E-04	1.60E+00	NA	2.76E-01								
Indeno(1.2.3-cd)pyrene	NA	7.30E-01	NA	3.63E-01								
N-Nitrosodiphenylamine	NA	4.90E-03	NA	2.70E-01								
N-Nitrosodipropylamine	NA	7.00E+00	NA	2.67E-01								
Naphthalene	2.00E-02	NA	NA	1.30E-02								
Phenanthrene	NA	NA	NA	3.74E-01								
Phenol	5.40E-01	NA	NA	1.96E-01								
Pyrene	3.00E-02	NA	NA	6.34E-01								
Pesticides/PCBs												
4.4'-DDD	NA	1.20E+00	NA	7.07E-03								
4.4'-DDE	NA	1.70E+00	NA	6.93E-03								
4.4'-DDT	1.00E-04	1.70E+00	NA	5.75E-03								
Aldrin	1.50E-05	3.40E+01	NA	1.88E-03								
Alpha-Chlordane	5.00E-04	3.50E-01	NA	3.73E-03								
Aroclor-1254	1.80E-05	2.22E+00	0.06	8.58E-02	3.04E-08	2.17E-09	2E-03	5E-09				
Aroclor-1260	1.80E-05	2.22E+00	0.06	4.97E-02	1.76E-08	1.26E-09	1E-03	3E-09				
Beta-BHC	NA	1.80E+00	NA	1.91E-03								
Dieldrin	2.50E-05	3.20E+01	NA	3.81E-03								
Endosulfan I	6.00E-03	NA	NA	1.84E-03								
Endosulfan II	6.00E-03	NA	NA	3.67E-03								
Endosulfan sulfate	6.00E-03	NA	NA	3.96E-03								
Endrin aldehyde	NA	NA	NA	4.23E-03								
Endrin ketone	NA	NA	NA	4.86E-03								
Gamma-Chlordane	5.00E-04	3.50E-01	NA	3.74E-03								
Heptachlor	5.00E-04	4.50E+00	NA	1.85E-03								
Heptachlor epoxide	1.30E-05	9.10E+00	NA	2.01E-03								
Methoxychlor	5.00E-03	NA	NA	1.98E-02								
Nitroaromatics												
2-Nitrotoluene	1.00E-02	NA	NA	7.09E-02								
2-amino-4.6-Dinitrotoluene	NA	NA	NA	6.54E-02								
4-amino-2.6-Dinitrotoluene	NA	NA	NA	6.37E-02								
Herbicides												
2.4.5-T	1.00E-02	NA	NA	1.21E-02								
Metals												
Aluminum	4.00E-02	NA	NA	1.35E+04								
Antimony	4.00E-04	NA	NA	1.53E+01								
Arsenic	2.40E-04	1.88E+00	0.001	7.26E+00	4.29E-08	3.07E-09	2E-04	6E-09				
Barium	3.50E-02	NA	NA	1.20E+02								
Beryllium	2.00E-05	NA	NA	6.80E-01								
Cadmium	5.00E-05	NA	0.01	6.10E+00	3.61E-07		7E-03					
Calcium	NA	NA	NA	5.00E+04								
Chromium	3.00E-02	NA	NA	4.49E+02								
Cobalt	3.00E-03	NA	NA	1.46E+01								
Copper	2.40E-02	NA	NA	2.05E+02								
Iron	6.00E-02	NA	NA	3.07E+04								
Lead	NA	NA	NA	9.90E+01								
Magnesium	NA	NA	NA	7.72E+03								
Manganese	1.50E-03	NA	NA	8.40E+02								
Mercury	3.00E-06	NA	NA	2.40E-01								
Nickel	8.00E-04	NA	NA	4.73E+01								
Potassium	NA	NA	NA	1.95E+03								
Selenium	4.50E-03	NA	NA	1.17E+00								
Silver	1.00E-03	NA	NA	6.40E-01								
Sodium	NA	NA	NA	1.76E+02								
Vanadium	7.00E-05	NA	NA	4.20E+01								
Zinc	7.50E-02	NA	NA	3.36E+02								
Total Hazard Quotient and Cancer Risk:							**1E-02**	**1E-08**				

Assumptions for Future Recreational Visitor (Child)

CF =	1E-06	kg/mg
SA =	4625	cm2
AF =	1	mg/cm2
EF =	7	days/year
ED =	5	years
BW =	15	kg
AT (Nc) =	1825	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.

* 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 co

TABLE G-28
CALCULATION OF ABSORBED DOSE AND RISK FROM DERMAL CONTACT TO SEDIMENT
CENTRAL TENDENCY (CT)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Equation for Intake (mg/kg-day) = $\frac{CS \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$

Variables (Assumptions for Each Receptor 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
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Dermal RfD	Carc. Slope Dermal	Absorption Factor*	EPC Sediment	Current Site Worker				Future Outdoor Park Worker			
					Absorbed Dose (mg/kg-day)		Hazard Quotient	Cancer Risk	Absorbed Dose (mg/kg-day)		Hazard Quotient	Cancer Risk
	(mg/kg-day)	(mg/kg-day)-1	(unitless)	(mg/kg)	(Nc)	(Car)			(Nc)	(Car)		
Volatile Organics												
Acetone	1.00E-01	NA	NA	2.36E-02								
Carbon disulfide	6.30E-02	NA	NA	1.09E-02								
Chloroform	1.00E-02	6.10E-03	NA	1.11E-02	**Contact to Onsite Sediment Not Applicable for Current Site Worker**							
Methyl chloride	NA	1.30E-02	NA	5.00E-03								
Methyl ethyl ketone	6.00E-01	NA	NA	1.16E-02								
Methylene chloride	5.88E-02	7.65E-03	NA	1.07E-02								
Styrene	2.00E-01	NA	NA	3.00E-03								
Toluene	2.00E-01	NA	NA	1.13E-02								
Total Xylenes	1.80E+00	NA	NA	7.00E-03								
Semivolatile Organics												
1,4-Dichlorobenzene	NA	2.40E-02	NA	7.30E-02								
2-Methylnaphthalene	4.00E-02	NA	NA	3.10E-02								
4-Methylphenol	5.00E-03	NA	NA	1.37E-01								
Acenaphthene	6.00E-02	NA	NA	2.73E-01								
Acenaphthylene	NA	NA	NA	1.29E-01								
Anthracene	3.00E-01	NA	NA	3.04E-01								
Benzo(a)anthracene	NA	7.30E-01	NA	5.62E-01								
Benzo(a)pyrene	NA	1.46E+01	NA	5.54E-01								
Benzo(b)fluoranthene	NA	7.30E-01	NA	5.67E-01								
Benzo(ghi)perylene	NA	NA	NA	3.25E-01								
Benzo(k)fluoranthene	NA	7.30E-02	NA	3.98E-01								
Bis(2-Ethylhexyl)phthalate	1.00E-02	2.80E-02	NA	6.99E-01								
Butylbenzylphthalate	2.00E-01	NA	NA	1.60E-02								
Carbazole	NA	2.00E-02	NA	3.53E-01								
Chrysene	NA	7.30E-03	NA	5.64E-01								
Di-n-butylphthalate	9.00E-02	NA	NA	2.29E-01								
Di-n-octylphthalate	2.00E-02	NA	NA	4.60E-02								
Dibenz(a,h)anthracene	NA	7.30E+00	NA	3.88E-01								
Dibenzofuran	NA	NA	NA	2.10E-01								
Diethyl phthalate	8.00E-01	NA	NA	1.70E-02								
Fluoranthene	4.00E-02	NA	NA	6.81E-01								
Fluorene	4.00E-02	NA	NA	2.44E-01								
Hexachlorobenzene	8.00E-04	1.60E+00	NA	2.76E-01								
Indeno(1,2,3-cd)pyrene	NA	7.30E-01	NA	3.63E-01								
N-Nitrosodiphenylamine	NA	4.90E-03	NA	2.70E-01								
N-Nitrosodipropylamine	NA	7.00E+00	NA	2.67E-01								
Naphthalene	2.00E-02	NA	NA	1.30E-02								
Phenanthrene	NA	NA	NA	3.74E-01								
Phenol	5.40E-01	NA	NA	1.96E-01								
Pyrene	3.00E-02	NA	NA	6.34E-01								
Pesticides/PCBs												
4,4'-DDD	NA	1.20E+00	NA	7.07E-03								
4,4'-DDE	NA	1.70E+00	NA	6.93E-03								
4,4'-DDT	1.00E-04	1.70E+00	NA	5.75E-03								
Aldrin	1.50E-05	3.40E+01	NA	1.88E-03								
Alpha-Chlordane	5.00E-04	3.50E-01	NA	3.73E-03								
Aroclor-1254	1.80E-05	2.22E+00	0.06	8.58E-02					4.5E-09	6.4E-11	2E-04	1E-10
Aroclor-1260	1.80E-05	2.22E+00	0.06	4.97E-02					2.6E-09	3.7E-11	1E-04	8E-11
Beta-BHC	NA	1.80E+00	NA	1.91E-03								
Dieldrin	2.50E-05	3.20E+01	NA	3.81E-03								
Endosulfan I	6.00E-03	NA	NA	1.84E-03								
Endosulfan II	6.00E-03	NA	NA	3.67E-03								
Endosulfan sulfate	6.00E-03	NA	NA	3.96E-03								
Endrin aldehyde	NA	NA	NA	4.23E-03								
Endrin ketone	NA	NA	NA	4.86E-03								
Gamma-Chlordane	5.00E-04	3.50E-01	NA	3.74E-03								
Heptachlor	5.00E-04	4.50E+00	NA	1.85E-03								
Heptachlor epoxide	1.30E-05	9.10E+00	NA	2.01E-03								
Methoxychlor	5.00E-03	NA	NA	1.98E-02								
Nitroaromatics												
2-Nitrotoluene	1.00E-02	NA	NA	7.09E-02								
2-amino-4,6-Dinitrotoluene	NA	NA	NA	6.54E-02								
4-amino-2,6-Dinitrotoluene	NA	NA	NA	6.37E-02								
Herbicides												
2,4,5-T	1.00E-02	NA	NA	1.21E-02								
Metals												
Aluminum	4.00E-02	NA	NA	1.35E+04								
Antimony	4.00E-04	NA	NA	1.53E+01								
Arsenic	2.40E-04	1.88E+00	0.001	7.26E+00					6.3E-09	9.0E-11	3E-05	2E-10
Barium	3.50E-02	NA	NA	1.20E+02								
Beryllium	2.00E-05	NA	NA	6.80E-01								
Cadmium	5.00E-05	NA	0.01	6.10E+00					5.3E-08		1E-03	
Calcium	NA	NA	NA	5.00E+04								
Chromium	3.00E-02	NA	NA	4.49E+02								
Cobalt	3.00E-03	NA	NA	1.46E+01								
Copper	2.40E-02	NA	NA	2.05E+02								
Iron	6.00E-02	NA	NA	3.07E+04								
Lead	NA	NA	NA	9.90E+01								
Magnesium	NA	NA	NA	7.72E+03								
Manganese	1.50E-03	NA	NA	8.40E+02								
Mercury	3.00E-06	NA	NA	2.40E-01								
Nickel	8.00E-04	NA	NA	4.73E+01								
Potassium	NA	NA	NA	1.95E+03								
Selenium	4.50E-03	NA	NA	1.17E+00								
Silver	1.00E-03	NA	NA	6.40E-01								
Sodium	NA	NA	NA	1.76E+02								
Vanadium	7.00E-05	NA	NA	4.20E+01								
Zinc	7.50E-02	NA	NA	3.36E+02								
Total Hazard Quotient and Cancer Risk:											1E-03	4E-10

Assumptions for Future Outdoor Park Worker

CF =	1E-06	kg/mg
SA =	1980	cm2
AF =	0.2	mg/cm2
EF =	8	days/year
ED =	7	years
BW =	70	kg
AT (Nc) =	365	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.
* 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 o

TABLE G-28
CALCULATION OF ABSORBED DOSE AND RISK FROM DERMAL CONTACT TO SEDIMENT
CENTRAL TENDENCY (CT)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Equation for Intake (mg/kg-day) = $\frac{CS \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Variables (Assumptions for Each Receptor are Listed at the Bottom):
CS = Chemical Concentration in Sediment, from Sediment EPC Data
CF = Conversion Factor
SA = Surface Area Contact
AF = Adherence Factor
ABS = Absorption Factor

EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor

Analyte	Dermal RfD	Carc. Slope Dermal	Absorption Factor*	EPC Sediment	Future Construction Worker				Future Recreational Visitor (Child)			
					Absorbed Dose (mg/kg-day)		Hazard Quotient	Cancer Risk	Absorbed Dose (mg/kg-day)		Hazard Quotient	Cancer Risk
	(mg/kg-day)	(mg/kg-day)-1	(unitless)	(mg/kg)	(Nc)	(Car)			(Nc)	(Car)		
Volatile Organics												
Acetone	1.00E-01	NA	NA	2.36E-02								
Carbon disulfide	6.30E-02	NA	NA	1.09E-02								
Chloroform	1.00E-02	6.10E-03	NA	1.11E-02	**Contact to Onsite Sediment Not Applicable for Future Construction Worker**							
Methyl chloride	NA	1.30E-02	NA	5.00E-03								
Methyl ethyl ketone	6.00E-01	NA	NA	1.16E-02								
Methylene chloride	5.88E-02	7.65E-03	NA	1.07E-02								
Styrene	2.00E-01	NA	NA	3.00E-03								
Toluene	2.00E-01	NA	NA	1.13E-02								
Total Xylenes	1.80E+00	NA	NA	7.00E-03								
Semivolatile Organics												
1,4-Dichlorobenzene	NA	2.40E-02	NA	7.30E-02								
2-Methylnaphthalene	4.00E-02	NA	NA	3.10E-02								
4-Methylphenol	5.00E-03	NA	NA	1.37E-01								
Acenaphthene	6.00E-02	NA	NA	2.73E-01								
Acenaphthylene	NA	NA	NA	1.29E-01								
Anthracene	3.00E-01	NA	NA	3.04E-01								
Benzo(a)anthracene	NA	7.30E-01	NA	5.62E-01								
Benzo(a)pyrene	NA	1.46E+01	NA	5.54E-01								
Benzo(b)fluoranthene	NA	7.30E-01	NA	5.67E-01								
Benzo(ghi)perylene	NA	NA	NA	3.25E-01								
Benzo(k)fluoranthene	NA	7.30E-02	NA	3.98E-01								
Bis(2-Ethylhexyl)phthalate	1.00E-02	2.80E-02	NA	6.99E-01								
Butylbenzylphthalate	2.00E-01	NA	NA	1.60E-02								
Carbazole	NA	2.00E-02	NA	3.53E-01								
Chrysene	NA	7.30E-03	NA	5.64E-01								
Di-n-butylphthalate	9.00E-02	NA	NA	2.29E-01								
Di-n-octylphthalate	2.00E-02	NA	NA	4.60E-02								
Dibenz(a,h)anthracene	NA	7.30E+00	NA	3.88E-01								
Dibenzofuran	NA	NA	NA	2.10E-01								
Diethyl phthalate	8.00E-01	NA	NA	1.70E-02								
Fluoranthene	4.00E-02	NA	NA	6.81E-01								
Fluorene	4.00E-02	NA	NA	2.44E-01								
Hexachlorobenzene	8.00E-04	1.60E+00	NA	2.76E-01								
Indeno(1,2,3-cd)pyrene	NA	7.30E-01	NA	3.63E-01								
N-Nitrosodiphenylamine	NA	4.90E-03	NA	2.70E-01								
N-Nitrosodipropylamine	NA	7.00E+00	NA	2.67E-01								
Naphthalene	2.00E-02	NA	NA	1.30E-02								
Phenanthrene	NA	NA	NA	3.74E-01								
Phenol	5.40E-01	NA	NA	1.96E-01								
Pyrene	3.00E-02	NA	NA	6.34E-01								
Pesticides/PCBs												
4,4'-DDD	NA	1.20E+00	NA	7.07E-03								
4,4'-DDE	NA	1.70E+00	NA	6.93E-03								
4,4'-DDT	1.00E-04	1.70E+00	NA	5.75E-03								
Aldrin	1.50E-05	3.40E+01	NA	1.88E-03								
Alpha-Chlordane	5.00E-04	3.50E-01	NA	3.73E-03								
Aroclor-1254	1.80E-05	2.22E+00	0.06	8.58E-02					2.80E-09	4.00E-11	2E-04	9E-11
Aroclor-1260	1.80E-05	2.22E+00	0.06	4.97E-02					1.62E-09	2.32E-11	9E-05	5E-11
Beta-BHC	NA	1.80E+00	NA	1.91E-03								
Dieldrin	2.50E-05	3.20E+01	NA	3.81E-03								
Endosulfan I	6.00E-03	NA	NA	1.84E-03								
Endosulfan II	6.00E-03	NA	NA	3.67E-03								
Endosulfan sulfate	6.00E-03	NA	NA	3.96E-03								
Endrin aldehyde	NA	NA	NA	4.23E-03								
Endrin ketone	NA	NA	NA	4.86E-03								
Gamma-Chlordane	5.00E-04	3.50E-01	NA	3.74E-03								
Heptachlor	5.00E-04	4.50E+00	NA	1.85E-03								
Heptachlor epoxide	1.30E-05	9.10E+00	NA	2.01E-03								
Methoxychlor	5.00E-03	NA	NA	1.98E-02								
Nitroaromatics												
2-Nitrotoluene	1.00E-02	NA	NA	7.09E-02								
2-amino-4,6-Dinitrotoluene	NA	NA	NA	6.54E-02								
4-amino-2,6-Dinitrotoluene	NA	NA	NA	6.37E-02								
Herbicides												
2,4,5-T	1.00E-02	NA	NA	1.21E-02								
Metals												
Aluminum	4.00E-02	NA	NA	1.35E+04								
Antimony	4.00E-04	NA	NA	1.53E+01								
Arsenic	2.40E-04	1.88E+00	0.001	7.26E+00					3.95E-09	5.65E-11	2E-05	1E-10
Barium	3.50E-02	NA	NA	1.20E+02								
Beryllium	2.00E-05	NA	NA	6.80E-01								
Cadmium	5.00E-05	NA	0.01	6.10E+00					3.32E-08		7E-04	
Calcium	NA	NA	NA	5.00E+04								
Chromium	3.00E-02	NA	NA	4.49E+02								
Cobalt	3.00E-03	NA	NA	1.46E+01								
Copper	2.40E-02	NA	NA	2.05E+02								
Iron	6.00E-02	NA	NA	3.07E+04								
Lead	NA	NA	NA	9.90E+01								
Magnesium	NA	NA	NA	7.72E+03								
Manganese	1.50E-03	NA	NA	8.40E+02								
Mercury	3.00E-06	NA	NA	2.40E-01								
Nickel	8.00E-04	NA	NA	4.73E+01								
Potassium	NA	NA	NA	1.95E+03								
Selenium	4.50E-03	NA	NA	1.17E+00								
Silver	1.00E-03	NA	NA	6.40E-01								
Sodium	NA	NA	NA	1.76E+02								
Vanadium	7.00E-05	NA	NA	4.20E+01								
Zinc	7.50E-02	NA	NA	3.36E+02								
Total Hazard Quotient and Cancer Risk:											9E-04	2E-10

Assumptions for Future Recreational Visitor (Child)

CF =	1E-06	kg/mg
SA =	3725	cm2
AF =	0.2	mg/cm2
EF =	4	days/year
ED =	1	years
BW =	15	kg
AT (Nc) =	365	days
AT (Car) =	25550	days

Note: Cells in this table were intentionally left blank due to a lack of toxicity
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 o

TABLE G-27
CALCULATION OF ABSORBED DOSE AND RISK FROM DERMAL CONTACT TO SEDIMENT
REASONABLE MAXIMUM EXPOSURE (RME)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Equation for Intake (mg/kg-day) = $\frac{CS \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Variables (Assumptions for Each Receptor are Listed at the Bottom):
CS = Chemical Concentration in Sediment, from Sediment EPC Data
CF = Conversion Factor
SA = Surface Area Contact
AF = Adherence Factor
ABS = Absorption Factor
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor
Equation for Total Lifetime Cancer Risk = Adult Contribution + Child Contribution

Analyte	Dermal RfD (mg/kg-day)	Carc. Slope Dermal (mg/kg-day)-1	Absorption Factor* (unitless)	EPC Sediment (mg/kg)	Future Resident (Adult) Absorbed Dose (mg/kg-day) (Nc)	Future Resident (Adult) Absorbed Dose (mg/kg-day) (Car)	Future Resident (Adult) Hazard Quotient	Future Resident (Adult) Contribution to Lifetime Cancer Risk	Future Resident (Child) Absorbed Dose (mg/kg-day) (Nc)	Future Resident (Child) Absorbed Dose (mg/kg-day) (Car)	Future Resident (Child) Hazard Quotient	Future Resident (Child) Contribution to Lifetime Cancer Risk	Resident Total Lifetime Cancer Risk
Volatile Organics													
Acetone	1.00E-01	NA	NA	2.36E-02									
Carbon disulfide	6.30E-02	NA	NA	1.09E-02									
Chloroform	1.00E-02	6.10E-03	NA	1.11E-02									
Methyl chloride	NA	1.30E-02	NA	5.00E-03									
Methyl ethyl ketone	6.00E-01	NA	NA	1.16E-02									
Methylene chloride	5.88E-02	7.65E-03	NA	1.07E-02									
Styrene	2.00E-01	NA	NA	3.00E-03									
Toluene	2.00E-01	NA	NA	1.13E-02									
Total Xylenes	1.80E+00	NA	NA	7.00E-03									
Semivolatile Organics													
1.4-Dichlorobenzene	NA	2.40E-02	NA	7.30E-02									
2-Methylnaphthalene	4.00E-02	NA	NA	3.10E-02									
4-Methylphenol	5.00E-03	NA	NA	1.37E-01									
Acenaphthene	6.00E-02	NA	NA	2.73E-01									
Acenaphthylene	NA	NA	NA	1.29E-01									
Anthracene	3.00E-01	NA	NA	3.04E-01									
Benzo(a)anthracene	NA	7.30E-01	NA	5.62E-01									
Benzo(a)pyrene	NA	1.46E+01	NA	5.54E-01									
Benzo(b)fluoranthene	NA	7.30E-01	NA	5.67E-01									
Benzo(ghi)perylene	NA	NA	NA	3.25E-01									
Benzo(k)fluoranthene	NA	7.30E-02	NA	3.98E-01									
Bis(2-Ethylhexyl)phthalate	1.00E-02	2.80E-02	NA	6.99E-01									
Butylbenzylphthalate	2.00E-01	NA	NA	1.60E-02									
Carbazole	NA	2.00E-02	NA	3.53E-01									
Chrysene	NA	7.30E-03	NA	5.64E-01									
Di-n-butylphthalate	9.00E-02	NA	NA	2.29E-01									
Di-n-octylphthalate	2.00E-02	NA	NA	4.60E-02									
Dibenz(a,h)anthracene	NA	7.30E+00	NA	3.88E-01									
Dibenzofuran	NA	NA	NA	2.10E-01									
Diethyl phthalate	8.00E-01	NA	NA	1.70E-02									
Fluoranthene	4.00E-02	NA	NA	6.81E-01									
Fluorene	4.00E-02	NA	NA	2.44E-01									
Hexachlorobenzene	8.00E-04	1.60E+00	NA	2.76E-01									
Indeno(1.2.3-cd)pyrene	NA	7.30E-01	NA	3.63E-01									
N-Nitrosodiphenylamine	NA	4.90E-03	NA	2.70E-01									
N-Nitrosodipropylamine	NA	7.00E+00	NA	2.67E-01									
Naphthalene	2.00E-02	NA	NA	1.30E-02									
Phenanthrene	NA	NA	NA	3.74E-01									
Phenol	5.40E-01	NA	NA	1.96E-01									
Pyrene	3.00E-02	NA	NA	6.34E-01									
Pesticides/PCBs													
4.4'-DDD	NA	1.20E+00	NA	7.07E-03									
4.4'-DDE	NA	1.70E+00	NA	6.93E-03									
4.4'-DDT	1.00E-04	1.70E+00	NA	5.75E-03									
Aldrin	1.50E-05	3.40E+01	NA	1.88E-03									
Alpha-Chlordane	5.00E-04	3.50E-01	NA	3.73E-03									
Aroclor-1254	1.80E-05	2.22E+00	0.06	8.58E-02	7.87E-08	2.70E-08	4E-03	6E-08	9.18E-08	7.87E-09	5E-03	2E-08	8E-08
Aroclor-1260	1.80E-05	2.22E+00	0.06	4.97E-02	4.56E-08	1.56E-08	3E-03	3E-08	5.32E-08	4.56E-09	3E-03	1E-08	4E-08
Beta-BHC	NA	1.80E+00	NA	1.91E-03									
Dieldrin	2.50E-05	3.20E+01	NA	3.81E-03									
Endosulfan I	6.00E-03	NA	NA	1.84E-03									
Endosulfan II	6.00E-03	NA	NA	3.67E-03									
Endosulfan sulfate	6.00E-03	NA	NA	3.96E-03									
Endrin aldehyde	NA	NA	NA	4.23E-03									
Endrin ketone	NA	NA	NA	4.86E-03									
Gamma-Chlordane	5.00E-04	3.50E-01	NA	3.74E-03									
Heptachlor	5.00E-04	4.50E+00	NA	1.85E-03									
Heptachlor epoxide	1.30E-05	9.10E+00	NA	2.01E-03									
Methoxychlor	5.00E-03	NA	NA	1.98E-02									
Nitroaromatics													
2-Nitrotoluene	1.00E-02	NA	NA	7.09E-02									
2-amino-4.6-Dinitrotoluene	NA	NA	NA	6.54E-02									
4-amino-2.6-Dinitrotoluene	NA	NA	NA	6.37E-02									
Herbicides													
2.4.5-T	1.00E-02	NA	NA	1.21E-02									
Metals													
Aluminum	4.00E-02	NA	NA	1.35E+04									
Antimony	4.00E-04	NA	NA	1.53E+01									
Arsenic	2.40E-04	1.88E+00	0.001	7.26E+00	1.11E-07	3.81E-08	5E-04	7E-08	1.29E-07	1.11E-08	5E-04	2E-08	9E-08
Barium	3.50E-02	NA	NA	1.20E+02									
Beryllium	2.00E-05	NA	NA	6.80E-01									
Cadmium	5.00E-05	NA	0.01	6.10E+00	9.33E-07		2E-02		1.09E-06		2E-02		
Calcium	NA	NA	NA	5.00E+04									
Chromium	3.00E-02	NA	NA	4.49E+02									
Cobalt	3.00E-03	NA	NA	1.46E+01									
Copper	2.40E-02	NA	NA	2.05E+02									
Iron	6.00E-02	NA	NA	3.07E+04									
Lead	NA	NA	NA	9.90E+01									
Magnesium	NA	NA	NA	7.72E+03									
Manganese	1.50E-03	NA	NA	8.40E+02									
Mercury	3.00E-06	NA	NA	2.40E-01									
Nickel	8.00E-04	NA	NA	4.73E+01									
Potassium	NA	NA	NA	1.95E+03									
Selenium	4.50E-03	NA	NA	1.17E+00									
Silver	1.00E-03	NA	NA	6.40E-01									
Sodium	NA	NA	NA	1.76E+02									
Vanadium	7.00E-05	NA	NA	4.20E+01									
Zinc	7.50E-02	NA	NA	3.36E+02									
Total Hazard Quotient and Cancer Risk:							3E-02				3E-02		2E-07

Assumptions for Future Resident (Adult)			Assumptions for Future Resident (Child)		
CF =	1E-06	kg/mg	CF =	1E-06	kg/mg
SA =	8.680	cm2	SA =	2.170	cm2
AF =	1	mg/cm2	AF =	1	mg/cm2
EF =	45	days/year	EF =	45	days/year
ED =	24	years	ED =	6	years
BW =	70	kg	BW =	15	kg
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.
* 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 G-28
CALCULATION OF ABSORBED DOSE AND RISK FROM DERMAL CONTACT TO SEDIMENT
CENTRAL TENDENCY (CT)
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Equation for Intake (mg/kg-day) = $\frac{CS \times CF \times SA \times AF \times ABS \times EF \times ED}{BW \times AT}$

Variables (Assumptions for Each Receptor 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
EF = Exposure Frequency
ED = Exposure Duration
BW = Bodyweight
AT = Averaging Time

Equation for Hazard Quotient = Chronic Daily Intake (Nc)/Reference Dose

Equation for Cancer Risk = Chronic Daily Intake (Car) x Slope Factor
Equation for Total Lifetime Cancer Risk = Adult Contribution + Child Contribution

Analyte	Dermal RfD (mg/kg-day)	Carc. Slope Dermal (mg/kg-day)-1	Absorption Factor* (unitless)	EPC Sediment (mg/kg)	Future Resident (Adult) Absorbed Dose (mg/kg-day) (Nc)	Future Resident (Adult) Absorbed Dose (mg/kg-day) (Car)	Future Resident (Adult) Hazard Quotient	Future Resident (Adult) Contribution to Lifetime Cancer Risk	Future Resident (Child) Absorbed Dose (mg/kg-day) (Nc)	Future Resident (Child) Absorbed Dose (mg/kg-day) (Car)	Future Resident (Child) Hazard Quotient	Future Resident (Child) Contribution to Lifetime Cancer Risk	Resident Total Lifetime Cancer Risk
Volatile Organics													
Acetone	1.00E-01	NA	NA	2.36E-02									
Carbon disulfide	6.30E-02	NA	NA	1.09E-02									
Chloroform	1.00E-02	6.10E-03	NA	1.11E-02									
Methyl chloride	NA	1.30E-02	NA	5.00E-03									
Methyl ethyl ketone	6.00E-01	NA	NA	1.16E-02									
Methylene chloride	5.88E-02	7.65E-03	NA	1.07E-02									
Styrene	2.00E-01	NA	NA	3.00E-03									
Toluene	2.00E-01	NA	NA	1.13E-02									
Total Xylenes	1.80E+00	NA	NA	7.00E-03									
Semivolatile Organics													
1.4-Dichlorobenzene	NA	2.40E-02	NA	7.30E-02									
2-Methylnaphthalene	4.00E-02	NA	NA	3.10E-02									
4-Methylphenol	5.00E-03	NA	NA	1.37E-01									
Acenaphthene	6.00E-02	NA	NA	2.73E-01									
Acenaphthylene	NA	NA	NA	1.29E-01									
Anthracene	3.00E-01	NA	NA	3.04E-01									
Benzo(a)anthracene	NA	7.30E-01	NA	5.62E-01									
Benzo(a)pyrene	NA	1.46E+01	NA	5.54E-01									
Benzo(b)fluoranthene	NA	7.30E-01	NA	5.67E-01									
Benzo(ghi)perylene	NA	NA	NA	3.25E-01									
Benzo(k)fluoranthene	NA	7.30E-02	NA	3.98E-01									
Bis(2-Ethylhexyl)phthalate	1.00E-02	2.80E-02	NA	6.99E-01									
Butylbenzylphthalate	2.00E-01	NA	NA	1.60E-02									
Carbazole	NA	2.00E-02	NA	3.53E-01									
Chrysene	NA	7.30E-03	NA	5.64E-01									
Di-n-butylphthalate	9.00E-02	NA	NA	2.29E-01									
Di-n-octylphthalate	2.00E-02	NA	NA	4.60E-02									
Dibenz(a.h)anthracene	NA	7.30E+00	NA	3.88E-01									
Dibenzofuran	NA	NA	NA	2.10E-01									
Diethyl phthalate	8.00E-01	NA	NA	1.70E-02									
Fluoranthene	4.00E-02	NA	NA	6.81E-01									
Fluorene	4.00E-02	NA	NA	2.44E-01									
Hexachlorobenzene	8.00E-04	1.60E+00	NA	2.76E-01									
Indeno(1.2.3-cd)pyrene	NA	7.30E-01	NA	3.63E-01									
N-Nitrosodiphenylamine	NA	4.90E-03	NA	2.70E-01									
N-Nitrosodipropylamine	NA	7.00E+00	NA	2.67E-01									
Naphthalene	2.00E-02	NA	NA	1.30E-02									
Phenanthrene	NA	NA	NA	3.74E-01									
Phenol	5.40E-01	NA	NA	1.96E-01									
Pyrene	3.00E-02	NA	NA	6.34E-01									
Pesticides/PCBs													
4.4'-DDD	NA	1.20E+00	NA	7.07E-03									
4.4'-DDE	NA	1.70E+00	NA	6.93E-03									
4.4'-DDT	1.00E-04	1.70E+00	NA	5.75E-03									
Aldrin	1.50E-05	3.40E+01	NA	1.88E-03									
Alpha-Chlordane	5.00E-04	3.50E-01	NA	3.73E-03									
Aroclor-1254	1.80E-05	2.22E+00	0.06	8.58E-02	3.84E-09	3.84E-10	2E-04	9E-10	4.49E-09	1.28E-10	2E-04	3E-10	1E-09
Aroclor-1260	1.80E-05	2.22E+00	0.06	4.97E-02	2.23E-09	2.23E-10	1E-04	5E-10	2.60E-09	7.42E-11	1E-04	2E-10	7E-10
Beta-BHC	NA	1.80E+00	NA	1.91E-03									
Dieldrin	2.50E-05	3.20E+01	NA	3.81E-03									
Endosulfan I	6.00E-03	NA	NA	1.84E-03									
Endosulfan II	6.00E-03	NA	NA	3.67E-03									
Endosulfan sulfate	6.00E-03	NA	NA	3.96E-03									
Endrin aldehyde	NA	NA	NA	4.23E-03									
Endrin ketone	NA	NA	NA	4.86E-03									
Gamma-Chlordane	5.00E-04	3.50E-01	NA	3.74E-03									
Heptachlor	5.00E-04	4.50E+00	NA	1.85E-03									
Heptachlor epoxide	1.30E-05	9.10E+00	NA	2.01E-03									
Methoxychlor	5.00E-03	NA	NA	1.98E-02									
Nitroaromatics													
2-Nitrotoluene	1.00E-02	NA	NA	7.09E-02									
2-amino-4.6-Dinitrotoluene	NA	NA	NA	6.54E-02									
4-amino-2.6-Dinitrotoluene	NA	NA	NA	6.37E-02									
Herbicides													
2.4.5-T	1.00E-02	NA	NA	1.21E-02									
Metals													
Aluminum	4.00E-02	NA	NA	1.35E+04									
Antimony	4.00E-04	NA	NA	1.53E+01									
Arsenic	2.40E-04	1.88E+00	0.001	7.26E+00	5.42E-09	5.42E-10	2E-05	1E-09	6.33E-09	1.81E-10	3E-05	3E-10	1E-09
Barium	3.50E-02	NA	NA	1.20E+02									
Beryllium	2.00E-05	NA	NA	6.80E-01									
Cadmium	5.00E-05	NA	0.01	6.10E+00	4.56E-08		9E-04		5.31E-08		1E-03		
Calcium	NA	NA	NA	5.00E+04									
Chromium	3.00E-02	NA	NA	4.49E+02									
Cobalt	3.00E-03	NA	NA	1.46E+01									
Copper	2.40E-02	NA	NA	2.05E+02									
Iron	6.00E-02	NA	NA	3.07E+04									
Lead	NA	NA	NA	9.90E+01									
Magnesium	NA	NA	NA	7.72E+03									
Manganese	1.50E-03	NA	NA	8.40E+02									
Mercury	3.00E-06	NA	NA	2.40E-01									
Nickel	8.00E-04	NA	NA	4.73E+01									
Potassium	NA	NA	NA	1.95E+03									
Selenium	4.50E-03	NA	NA	1.17E+00									
Silver	1.00E-03	NA	NA	6.40E-01									
Sodium	NA	NA	NA	1.76E+02									
Vanadium	7.00E-05	NA	NA	4.20E+01									
Zinc	7.50E-02	NA	NA	3.36E+02									
Total Hazard Quotient and Cancer Risk:							1E-03				1E-03		3E-09

Assumptions for Future Resident (Adult)

CF =	1E-06	kg/mg
SA =	6.360	cm2
AF =	0.20	mg/cm2
EF =	15	days/year
ED =	7	years
BW =	70	kg
AT (Nc) =	2.555	days
AT (Car) =	25.550	days

Assumptions for Future Resident (Child)

CF =	1E-06	kg/mg
SA =	1.590	cm2
AF =	0.20	mg/cm2
EF =	15	days/year
ED =	2	years
BW =	15	kg
AT (Nc) =	730	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.

Appendix H

Ecological Risk Assessment Calculation Tables

APPENDIX H
List of Tables for Ecological Risk Assessment
SEAD-4
Seneca Army Depot, NY

APPENDIX H
List of Tables for Ecological Risk Assessment
SEAD-4
Seneca Army Depot, NY

Table H.1
Surface Soil (0-1 ft bls) Exposure Point Concentration Summary
SEAD-4 - Remedial Investigation
Seneca Army Depot Activity

Analyte	No. of Valid Analyses	No. of Hits	Frequency (%)	Mean (mg/Kg)	Standard Deviation (mg/Kg)	Max Hit (mg/Kg)	Normal?	95% UCL of Mean (mg/Kg)	Exposure Point Concentration (EPC)* (mg/Kg)
Volatile Organics									
1,1-Dichloroethane	79	2	3%	7.12E-03	2.32E-03	2.00E-03	FALSE	7.58E-03	2.00E-03
1,2-Dichloroethene (total)	79	3	4%	7.15E-03	2.25E-03	4.00E-03	FALSE	7.49E-03	4.00E-03
Acetone	80	30	38%	1.41E-02	2.25E-02	1.40E-01	FALSE	1.39E-02	1.39E-02
Benzene	79	1	1%	7.18E-03	2.27E-03	1.00E-03	FALSE	7.70E-03	1.00E-03
Chloroform	80	2	3%	8.24E-03	7.89E-03	1.20E-02	FALSE	8.43E-03	8.43E-03
Methyl butyl ketone	80	1	1%	8.04E-03	7.86E-03	9.00E-03	FALSE	8.19E-03	8.19E-03
Methylene chloride	79	1	1%	7.21E-03	2.21E-03	3.00E-03	FALSE	7.55E-03	3.00E-03
Toluene	79	22	28%	6.29E-03	2.60E-03	7.00E-03	FALSE	7.05E-03	7.00E-03
Trichloroethene	79	3	4%	7.09E-03	2.34E-03	3.00E-03	FALSE	7.54E-03	3.00E-03
Semivolatile Organics									
2-Methylnaphthalene	70	13	19%	4.32E-02	2.15E-02	3.50E-02	FALSE	5.63E-02	3.50E-02
Acenaphthene	78	7	9%	6.29E-02	5.45E-02	7.80E-02	FALSE	7.49E-02	7.49E-02
Acenaphthylene	70	7	10%	4.56E-02	1.54E-02	5.19E-02	FALSE	5.11E-02	5.11E-02
Anthracene	80	13	16%	6.72E-02	7.04E-02	1.10E-01	FALSE	7.54E-02	7.54E-02
Benzo(a)anthracene	80	67	84%	6.44E-02	1.08E-01	5.60E-01	FALSE	8.40E-02	8.40E-02
Benzo(a)pyrene	80	65	81%	6.71E-02	1.03E-01	4.40E-01	FALSE	8.56E-02	8.56E-02
Benzo(b)fluoranthene	80	65	81%	9.46E-02	1.54E-01	8.30E-01	FALSE	1.15E-01	1.15E-01
Benzo(ghi)perylene	80	45	56%	6.83E-02	8.27E-02	3.00E-01	FALSE	8.56E-02	8.56E-02
Benzo(k)fluoranthene	80	39	49%	7.02E-02	9.41E-02	5.10E-01	FALSE	8.23E-02	8.23E-02
Bis(2-Ethylhexyl)phthalate	80	62	77%	6.43E-01	2.27E+00	1.30E+01	FALSE	4.19E-01	4.19E-01
Butylbenzylphthalate	80	9	11%	1.51E-01	7.89E-01	7.10E+00	FALSE	9.52E-02	9.52E-02
Carbazole	80	17	21%	6.54E-02	7.34E-02	1.20E-01	FALSE	8.12E-02	8.12E-02
Chrysene	80	70	88%	7.50E-02	1.17E-01	5.70E-01	FALSE	9.49E-02	9.49E-02
Di-n-butylphthalate	80	41	51%	5.98E-02	7.43E-02	2.70E-01	FALSE	8.74E-02	8.74E-02
Di-n-octylphthalate	71	7	10%	4.71E-02	1.75E-02	4.40E-02	FALSE	5.61E-02	4.40E-02
Dibenz(a,h)anthracene	80	17	21%	6.82E-02	7.27E-02	1.25E-01	FALSE	7.97E-02	7.97E-02
Dibenzofuran	71	13	18%	4.42E-02	2.11E-02	5.80E-02	FALSE	5.76E-02	5.76E-02
Diethyl phthalate	70	13	19%	4.26E-02	2.09E-02	2.20E-02	FALSE	5.25E-02	2.20E-02
Fluoranthene	80	75	94%	9.81E-02	1.87E-01	1.05E+00	FALSE	1.09E-01	1.09E-01
Fluorene	79	5	6%	6.76E-02	6.24E-02	7.40E-02	FALSE	7.25E-02	7.25E-02
Indeno(1,2,3-cd)pyrene	80	44	55%	6.49E-02	8.16E-02	2.70E-01	FALSE	8.63E-02	8.63E-02
N-Nitrosodiphenylamine	70	1	1%	4.95E-02	1.60E-02	1.90E-02	FALSE	5.24E-02	1.90E-02
Naphthalene	77	11	14%	5.78E-02	4.73E-02	7.40E-02	FALSE	7.37E-02	7.37E-02
Phenanthrene	80	70	88%	7.53E-02	1.28E-01	6.40E-01	FALSE	9.51E-02	9.51E-02
Phenol	70	2	3%	4.90E-02	1.69E-02	1.70E-02	FALSE	5.34E-02	1.70E-02
Pyrene	80	71	89%	9.24E-02	1.65E-01	9.80E-01	FALSE	1.15E-01	1.15E-01
Pesticides/PCBs									
4,4'-DDD	80	19	24%	5.89E-03	2.13E-02	1.90E-01	FALSE	4.52E-03	4.52E-03
4,4'-DDE	80	26	32%	6.45E-03	1.82E-02	1.60E-01	FALSE	5.66E-03	5.66E-03
4,4'-DDT	80	27	34%	1.46E-02	8.48E-02	7.60E-01	FALSE	7.12E-03	7.12E-03
Aldrin	80	1	1%	1.26E-03	4.10E-04	2.20E-03	FALSE	1.32E-03	1.32E-03
Alpha-BHC	80	5	6%	1.29E-03	4.30E-04	2.40E-03	FALSE	1.35E-03	1.35E-03
Alpha-Chlordane	80	8	10%	1.34E-03	5.90E-04	4.90E-03	FALSE	1.41E-03	1.41E-03
Aroclor-1254	80	20	25%	3.94E-02	5.50E-02	3.10E-01	FALSE	3.96E-02	3.96E-02
Aroclor-1260	80	3	4%	2.58E-02	1.26E-02	1.10E-01	FALSE	2.71E-02	2.71E-02
Beta-BHC	80	10	13%	1.51E-03	9.20E-04	7.60E-03	FALSE	1.60E-03	1.60E-03
Dieldrin	80	5	6%	2.64E-03	1.13E-03	7.40E-03	FALSE	2.79E-03	2.79E-03
Endosulfan I	80	4	5%	1.26E-03	4.00E-04	1.70E-03	FALSE	1.32E-03	1.32E-03
Endosulfan II	80	3	4%	2.49E-03	8.40E-04	5.20E-03	FALSE	2.62E-03	2.62E-03
Endosulfan sulfate	80	1	1%	2.46E-03	7.90E-04	3.80E-03	FALSE	2.57E-03	2.57E-03

Table H.1
Surface Soil (0-1 ft bls) Exposure Point Concentration Summary
SEAD-4 - Remedial Investigation
Seneca Army Depot Activity

Analyte	No. of Valid Analyses	No. of Hits	Frequency (%)	Mean (mg/Kg)	Standard Deviation (mg/Kg)	Max Hit (mg/Kg)	Normal?	95% UCL of Mean (mg/Kg)	Exposure Point Concentration (EPC)* (mg/Kg)
Endrin	80	3	4%	2.75E-03	2.85E-03	2.70E-02	FALSE	2.80E-03	2.80E-03
Endrin aldehyde	80	8	10%	2.81E-03	2.19E-03	2.00E-02	FALSE	2.93E-03	2.93E-03
Endrin ketone	80	2	3%	2.44E-03	7.70E-04	4.20E-03	FALSE	2.56E-03	2.56E-03
Gamma-Chlordane	80	8	10%	1.49E-03	1.14E-03	7.40E-03	FALSE	1.61E-03	1.61E-03
Heptachlor	80	3	4%	1.29E-03	5.20E-04	4.20E-03	FALSE	1.36E-03	1.36E-03
Heptachlor epoxide	80	4	5%	1.32E-03	5.30E-04	3.60E-03	FALSE	1.40E-03	1.40E-03
Nitroaromatics									
1,3,5-Trinitrobenzene	80	1	1%	6.64E-02	1.80E-02	1.20E-01	FALSE	6.88E-02	6.88E-02
2,4,6-Trinitrotoluene	80	1	1%	6.58E-02	1.70E-02	7.20E-02	FALSE	6.81E-02	6.81E-02
2,4-Dinitrotoluene	80	1	1%	6.70E-02	2.39E-02	2.25E-01	FALSE	6.95E-02	6.95E-02
2-amino-4,6-Dinitrotoluene	80	1	1%	6.60E-02	1.72E-02	9.00E-02	FALSE	6.83E-02	6.83E-02
4-Nitrotoluene	73	1	1%	7.03E-02	4.19E-02	3.90E-01	FALSE	7.30E-02	7.30E-02
Metals									
Aluminum	80	80	100%	11652.13	2631.98	18800	FALSE	12332.58	12332.58
Antimony	80	31	39%	8.21	22.67	148	FALSE	9.11	9.11
Arsenic	80	80	100%	4.96	1.98	14.6	FALSE	5.25	5.25
Barium	80	80	100%	79.71	42.37	278	FALSE	87.77	87.77
Beryllium	80	80	100%	0.55	0.2	1.8	FALSE	0.59	0.59
Cadmium	80	9	11%	0.17	0.41	2.3	FALSE	0.16	0.16
Calcium	80	80	100%	20529.44	37178.88	196000	FALSE	23979.91	23979.91
Chromium	80	80	100%	916.29	2663.41	18600	FALSE	1189.19	1189.19
Chromium, Hexavalent	15	4	27%	8.15	4.42	14.7	TRUE	10.15	10.15
Cobalt	80	80	100%	10.12	2.69	19.1	FALSE	10.62	10.62
Copper	80	80	100%	463.61	1344.75	7330	FALSE	387.17	387.17
Cyanide	80	2	3%	0.41	0.15	0.87	FALSE	0.43	0.43
Iron	80	80	100%	23674.38	6792.34	64600	FALSE	24790.79	24790.79
Lead	80	73	91%	162.57	1035.8	9280	FALSE	68.54	68.54
Magnesium	80	80	100%	5501.81	4140.06	35300	FALSE	5878.16	5878.16
Manganese	80	80	100%	508.07	228.25	1540	FALSE	549.18	549.18
Mercury	80	42	52%	0.1	0.16	1.2	FALSE	0.1	0.1
Nickel	80	80	100%	29.49	23.98	228	FALSE	30.87	30.87
Potassium	80	80	100%	1422.26	388.74	2340	TRUE	1494.7	1494.7
Selenium	80	20	25%	0.47	0.41	3.4	FALSE	0.52	0.52
Silver	80	5	6%	0.19	0.22	1.7	FALSE	0.19	0.19
Sodium	80	28	35%	68.56	141.84	1270	FALSE	67.28	67.28
Thallium	80	17	21%	1.14	1.47	5.4	FALSE	1.4	1.4
Vanadium	80	80	100%	37.26	137.39	1250	FALSE	28.51	28.51
Zinc	80	80	100%	229.08	361.95	2020	FALSE	243.78	243.78

* EPC is the lesser of the Max Hit vs the 95% UCL.

Table H.2
Mixed Soil (0-4 ft bls) Exposure Point Concentration Summary
SEAD-4 - Remedial Investigation
Seneca Army Depot Activity

Analyte	No. of Valid Analyses	No. of Hits	Frequency (%)	Mean (mg/Kg)	Standard Deviation (mg/Kg)	Max Hit (mg/Kg)	Normal?	95% UCL of Mean (mg/Kg)	Exposure Point Concentration (EPC)* (mg/Kg)
Volatile Organics									
1,1-Dichloroethane	121	2	2%	6.25E-03	1.06E-03	2.00E-03	FALSE	6.46E-03	2.00E-03
1,2-Dichloroethene (total)	121	3	2%	6.27E-03	9.75E-04	4.00E-03	FALSE	6.41E-03	4.00E-03
Acetone	122	31	25%	1.11E-02	1.86E-02	1.40E-01	FALSE	1.04E-02	1.04E-02
Benzene	121	1	1%	6.29E-03	1.03E-03	1.00E-03	FALSE	6.53E-03	1.00E-03
Chloroform	122	3	2%	7.00E-03	6.37E-03	1.50E-02	FALSE	7.06E-03	7.06E-03
Ethyl benzene	121	1	1%	6.29E-03	1.03E-03	1.00E-03	FALSE	6.53E-03	1.00E-03
Methyl butyl ketone	122	1	1%	6.91E-03	6.29E-03	9.00E-03	FALSE	6.91E-03	6.91E-03
Methylene chloride	121	1	1%	6.31E-03	9.53E-04	3.00E-03	FALSE	6.45E-03	3.00E-03
Toluene	122	35	29%	6.20E-03	6.59E-03	1.40E-02	FALSE	6.66E-03	6.66E-03
Total Xylenes	122	1	1%	6.91E-03	6.28E-03	8.00E-03	FALSE	6.91E-03	6.91E-03
Trichloroethene	121	3	2%	6.23E-03	1.07E-03	3.00E-03	FALSE	6.43E-03	3.00E-03
Semivolatile Organics									
2-Methylnaphthalene	122	16	13%	8.53E-02	8.16E-02	2.60E-01	FALSE	1.08E-01	1.08E-01
Acenaphthene	118	9	8%	7.59E-02	6.29E-02	8.80E-02	FALSE	8.80E-02	8.80E-02
Acenaphthylene	122	10	8%	8.49E-02	7.84E-02	1.70E-01	FALSE	9.71E-02	9.71E-02
Anthracene	122	16	13%	8.57E-02	8.17E-02	3.40E-01	FALSE	9.81E-02	9.81E-02
Benzo(a)anthracene	122	72	59%	8.91E-02	1.38E-01	1.10E+00	FALSE	1.25E-01	1.25E-01
Benzo(a)pyrene	122	71	58%	8.84E-02	1.22E-01	8.80E-01	FALSE	1.18E-01	1.18E-01
enzo(b)fluoranthene	122	72	59%	1.04E-01	1.45E-01	8.30E-01	FALSE	1.28E-01	1.28E-01
Benzo(ghi)perylene	122	47	39%	8.57E-02	8.53E-02	3.00E-01	FALSE	1.08E-01	1.08E-01
Benzo(k)fluoranthene	122	44	36%	8.86E-02	1.16E-01	8.90E-01	FALSE	1.03E-01	1.03E-01
Bis(2-Ethylhexyl)phthalate	122	51	42%	4.90E-01	1.87E+00	1.30E+01	FALSE	3.00E-01	3.00E-01
Butylbenzylphthalate	122	10	8%	1.39E-01	6.39E-01	7.10E+00	FALSE	1.09E-01	1.09E-01
Carbazole	122	18	15%	8.19E-02	7.83E-02	1.60E-01	FALSE	1.00E-01	1.00E-01
Chrysene	122	78	64%	9.49E-02	1.39E-01	1.00E+00	FALSE	1.24E-01	1.24E-01
Di-n-butylphthalate	122	44	36%	6.40E-02	7.18E-02	1.90E-01	FALSE	8.30E-02	8.30E-02
Di-n-octylphthalate	117	14	12%	7.44E-02	6.39E-02	4.40E-02	FALSE	8.96E-02	4.40E-02
Dibenz(a,h)anthracene	122	18	15%	8.40E-02	7.78E-02	1.25E-01	FALSE	9.80E-02	9.80E-02
Dibenzofuran	97	14	14%	4.76E-02	3.35E-02	5.80E-02	FALSE	5.71E-02	5.71E-02
Diethyl phthalate	89	13	15%	3.88E-02	1.42E-02	2.20E-02	FALSE	4.50E-02	2.20E-02
Fluoranthene	122	83	68%	1.21E-01	2.63E-01	2.40E+00	FALSE	1.30E-01	1.30E-01
Fluorene	122	8	7%	8.65E-02	7.87E-02	3.30E-01	FALSE	9.53E-02	9.53E-02
Indeno(1,2,3-cd)pyrene	122	46	38%	8.30E-02	8.47E-02	2.70E-01	FALSE	1.10E-01	1.10E-01
N-Nitrosodiphenylamine	89	1	1%	4.38E-02	9.35E-03	1.90E-02	FALSE	4.53E-02	1.90E-02
Naphthalene	122	13	11%	8.41E-02	7.76E-02	1.30E-01	FALSE	1.03E-01	1.03E-01
Phenanthrene	122	76	62%	1.08E-01	2.02E-01	1.40E+00	FALSE	1.40E-01	1.40E-01
Phenol	89	2	2%	4.33E-02	1.02E-02	1.70E-02	FALSE	4.59E-02	1.70E-02
Pyrene	122	78	64%	1.19E-01	2.23E-01	1.80E+00	FALSE	1.45E-01	1.45E-01
Pesticides/PCBs									
4,4'-DDD	122	19	16%	4.49E-03	1.73E-02	1.90E-01	FALSE	3.40E-03	3.40E-03
4,4'-DDE	122	29	24%	4.96E-03	1.49E-02	1.60E-01	FALSE	4.11E-03	4.11E-03
4,4'-DDT	122	28	23%	1.02E-02	6.88E-02	7.60E-01	FALSE	4.69E-03	4.69E-03
Aldrin	122	2	2%	1.15E-03	6.83E-04	8.20E-03	FALSE	1.17E-03	1.17E-03
Alpha-BHC	122	5	4%	1.15E-03	4.34E-04	2.40E-03	FALSE	1.18E-03	1.18E-03
Alpha-Chlordane	122	9	7%	1.22E-03	9.12E-04	1.00E-02	FALSE	1.24E-03	1.24E-03
oclor-1248	122	1	1%	2.18E-02	7.83E-03	2.70E-02	FALSE	2.24E-02	2.24E-02
Aroclor-1254	122	24	20%	4.47E-02	1.49E-01	1.60E+00	FALSE	3.49E-02	3.49E-02
Aroclor-1260	122	3	2%	2.27E-02	1.14E-02	1.10E-01	FALSE	2.33E-02	2.33E-02

Table H.2
Mixed Soil (0-4 ft bls) Exposure Point Concentration Summary
SEAD-4 - Remedial Investigation
Seneca Army Depot Activity

Analyte	No. of Valid Analyses	No. of Hits	Frequency (%)	Mean (mg/Kg)	Standard Deviation (mg/Kg)	Max Hit (mg/Kg)	Normal?	95% UCL of Mean (mg/Kg)	Exposure Point Concentration (EPC)* (mg/Kg)
Beta-BHC	122	10	8%	1.29E-03	8.24E-04	7.60E-03	FALSE	1.33E-03	1.33E-03
Delta-BHC	122	1	1%	1.12E-03	4.83E-04	5.90E-03	FALSE	1.15E-03	1.15E-03
Dieldrin	122	5	4%	2.31E-03	1.06E-03	7.40E-03	FALSE	2.38E-03	2.38E-03
Endosulfan I	122	5	4%	1.17E-03	9.22E-04	1.10E-02	FALSE	1.19E-03	1.19E-03
Endosulfan II	122	3	2%	2.21E-03	8.33E-04	5.20E-03	FALSE	2.27E-03	2.27E-03
Endosulfan sulfate	122	1	1%	2.19E-03	7.96E-04	3.80E-03	FALSE	2.25E-03	2.25E-03
Endrin	122	4	3%	2.58E-03	3.67E-03	3.40E-02	FALSE	2.48E-03	2.48E-03
Endrin aldehyde	122	9	7%	2.47E-03	1.89E-03	2.00E-02	FALSE	2.52E-03	2.52E-03
Endrin ketone	122	2	2%	2.20E-03	8.07E-04	4.20E-03	FALSE	2.26E-03	2.26E-03
Gamma-Chlordane	122	8	7%	1.28E-03	9.79E-04	7.40E-03	FALSE	1.32E-03	1.32E-03
Heptachlor	122	3	2%	1.15E-03	4.96E-04	4.20E-03	FALSE	1.18E-03	1.18E-03
Heptachlor epoxide	122	4	3%	1.17E-03	5.10E-04	3.60E-03	FALSE	1.20E-03	1.20E-03
Herbicides									
Dicamba	29	1	3%	3.39E-03	1.93E-03	1.31E-02	FALSE	3.68E-03	3.68E-03
Nitroaromatics									
1,3,5-Trinitrobenzene	122	1	1%	6.16E-02	5.73E-03	1.20E-01	FALSE	6.27E-02	6.27E-02
2,4,6-Trinitrotoluene	122	1	1%	6.12E-02	2.33E-03	7.20E-02	FALSE	6.25E-02	6.25E-02
2,4-Dinitrotoluene	122	2	2%	6.41E-02	2.32E-02	2.80E-01	FALSE	6.52E-02	6.52E-02
Metals									
Aluminum	122	122	100%	1.24E+04	2.94E+03	2.04E+04	FALSE	1.30E+04	1.30E+04
Antimony	122	45	37%	6.98E+00	1.92E+01	1.48E+02	FALSE	7.20E+00	7.20E+00
Arsenic	122	122	100%	5.08E+00	1.79E+00	1.46E+01	FALSE	5.31E+00	5.31E+00
Barium	122	122	100%	7.90E+01	3.76E+01	2.78E+02	FALSE	8.47E+01	8.47E+01
Beryllium	122	122	100%	5.74E-01	2.00E-01	1.80E+00	FALSE	6.05E-01	6.05E-01
Cadmium	122	12	10%	1.70E-01	3.58E-01	2.30E+00	FALSE	1.77E-01	1.77E-01
Calcium	122	122	100%	2.23E+04	3.49E+04	1.96E+05	FALSE	2.72E+04	2.72E+04
Chromium	122	114	93%	6.85E+02	2.22E+03	1.66E+04	FALSE	5.53E+02	5.53E+02
Chromium, Hexavalent	15	4	27%	8.15E+00	4.42E+00	1.47E+01	TRUE	1.01E+01	1.01E+01
Cobalt	122	122	100%	1.10E+01	3.11E+00	2.01E+01	TRUE	1.14E+01	1.14E+01
Copper	122	122	100%	3.60E+02	1.13E+03	7.33E+03	FALSE	2.24E+02	2.24E+02
Cyanide	122	2	2%	3.47E-01	8.96E-02	8.70E-01	FALSE	3.57E-01	3.57E-01
Iron	122	122	100%	2.53E+04	6.87E+03	6.46E+04	FALSE	2.63E+04	2.63E+04
Lead	122	115	94%	1.14E+02	8.40E+02	9.28E+03	FALSE	4.60E+01	4.60E+01
Magnesium	122	122	100%	6.38E+03	5.00E+03	3.53E+04	FALSE	6.73E+03	6.73E+03
Manganese	122	113	93%	5.20E+02	2.46E+02	1.54E+03	FALSE	5.58E+02	5.58E+02
Mercury	122	67	55%	7.59E-02	1.36E-01	1.20E+00	FALSE	7.62E-02	7.62E-02
Nickel	122	122	100%	3.15E+01	2.04E+01	2.28E+02	FALSE	3.28E+01	3.28E+01
Potassium	122	122	100%	1.39E+03	3.68E+02	2.34E+03	TRUE	1.44E+03	1.44E+03
Selenium	122	35	29%	3.99E-01	3.45E-01	3.40E+00	FALSE	4.42E-01	4.42E-01
Silver	122	9	7%	2.26E-01	2.45E-01	1.70E+00	FALSE	2.40E-01	2.40E-01
Sodium	122	52	43%	6.08E+01	1.16E+02	1.27E+03	FALSE	5.97E+01	5.97E+01
Thallium	122	17	14%	9.63E-01	1.37E+00	5.40E+00	FALSE	1.16E+00	1.16E+00
Vanadium	122	122	100%	3.22E+01	1.11E+02	1.25E+03	FALSE	2.63E+01	2.63E+01
Zinc	122	122	100%	1.92E+02	3.08E+02	2.02E+03	FALSE	1.90E+02	1.90E+02

* EPC is the lesser of the Max Hit vs the 95% UCL.

Table H.3A
Ditch Soil Statistical Summary
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Analyte	No. of Valid Analyses	No. of Hits	Frequency (%)	Mean (mg/Kg)	Standard Deviation (mg/Kg)	Max Hit (mg/Kg)
Volatile Organics						
Acetone	48	11	23%	1.92E-02	3.32E-02	1.80E-01
Carbon disulfide	48	2	4%	9.95E-03	4.16E-03	1.80E-02
Chloroform	48	2	4%	9.97E-03	4.19E-03	1.40E-02
Methylene chloride	48	3	6%	9.38E-03	3.36E-03	1.10E-02
Styrene	47	2	4%	9.93E-03	4.71E-03	3.00E-03
Toluene	48	5	10%	1.02E-02	5.12E-03	4.20E-02
Total Xylenes	47	2	4%	1.00E-02	4.58E-03	7.00E-03
Semivolatile Organics						
1.4-Dichlorobenzene	46	1	2%	1.55E-01	2.69E-01	7.30E-02
2-Methylnaphthalene	44	4	9%	1.03E-01	1.15E-01	3.10E-02
4-Methylphenol	44	5	11%	1.04E-01	1.14E-01	2.30E-02
Acenaphthene	48	8	17%	2.20E-01	5.01E-01	6.10E-01
Acenaphthylene	44	8	18%	9.22E-02	1.04E-01	1.30E-01
Anthracene	48	21	44%	2.27E-01	5.45E-01	1.70E+00
Benzo(a)anthracene	48	42	88%	3.72E-01	9.91E-01	5.90E+00
Benzo(a)pyrene	48	42	88%	3.86E-01	9.74E-01	5.10E+00
Benzo(b)fluoranthene	48	44	92%	4.25E-01	9.15E-01	4.80E+00
Benzo(ghi)perylene	48	38	79%	2.58E-01	5.96E-01	3.20E+00
Benzo(k)fluoranthene	47	19	40%	3.91E-01	1.00E+00	5.70E+00
Bis(2-Ethylhexyl)phthalate	48	21	44%	1.22E+00	6.06E+00	4.20E+01
Butylbenzylphthalate	44	5	11%	1.03E-01	1.15E-01	1.60E-02
Carbazole	48	17	35%	2.19E-01	5.05E-01	5.00E-01
Chrysene	48	45	94%	3.89E-01	1.02E+00	6.20E+00
Di-n-butylphthalate	48	25	52%	1.75E-01	4.56E-01	2.50E-01
Di-n-octylphthalate	44	2	5%	1.05E-01	1.13E-01	1.20E-02
Dibenz(a.h)anthracene	48	24	50%	2.49E-01	5.36E-01	1.20E+00
Dibenzofuran	47	8	17%	1.57E-01	3.41E-01	2.30E-01
Diethyl phthalate	44	2	5%	1.06E-01	1.13E-01	1.70E-02
Fluoranthene	48	46	96%	6.28E-01	2.33E+00	1.60E+01
Fluorene	48	8	17%	2.20E-01	5.02E-01	6.60E-01
Hexachlorobenzene	48	2	4%	2.60E-01	5.22E-01	8.40E-01
Indeno(1.2.3-cd)pyrene	48	36	75%	2.61E-01	6.04E-01	3.10E+00
N-Nitrosodiphenylamine	48	1	2%	2.56E-01	5.20E-01	7.60E-01
Naphthalene	44	6	14%	1.00E-01	1.16E-01	1.30E-02
Phenanthrene	48	44	92%	3.31E-01	1.16E+00	7.90E+00
Phenol	46	4	9%	1.67E-01	2.69E-01	2.10E-01
Pyrene	48	46	96%	5.12E-01	1.77E+00	1.20E+01
Pesticides/PCBs						
4.4'-DDD	48	12	25%	7.71E-03	1.55E-02	9.00E-02
4.4'-DDE	48	16	33%	7.48E-03	1.46E-02	8.60E-02
4.4'-DDT	48	15	31%	5.66E-03	6.85E-03	4.50E-02

Table H.3A
Ditch Soil Statistical Summary
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Analyte	No. of Valid Analyses	No. of Hits	Frequency (%)	Mean (mg/Kg)	Standard Deviation (mg/Kg)	Max Hit (mg/Kg)
Aldrin	48	3	6%	1.74E-03	7.08E-04	2.80E-03
Alpha-Chlordane	48	7	15%	4.12E-03	8.01E-03	4.40E-02
Aroclor-1254	48	22	46%	7.76E-02	1.01E-01	5.80E-01
Aroclor-1260	48	8	17%	4.79E-02	5.08E-02	2.50E-01
BHC, beta	48	3	6%	1.77E-03	7.32E-04	3.30E-03
Dieldrin	48	3	6%	3.58E-03	2.34E-03	1.80E-02
Endosulfan I	48	1	2%	1.70E-03	6.89E-04	1.90E-03
Endosulfan II	48	2	4%	3.41E-03	1.43E-03	6.80E-03
Endosulfan sulfate	48	4	8%	3.67E-03	2.00E-03	1.20E-02
Endrin aldehyde	48	5	10%	3.91E-03	2.52E-03	1.50E-02
Endrin ketone	48	3	6%	5.12E-03	9.26E-03	6.20E-02
Gamma-Chlordane	48	9	19%	3.95E-03	7.12E-03	4.00E-02
Heptachlor	48	1	2%	1.72E-03	6.93E-04	2.40E-03
Heptachlor epoxide	48	5	10%	1.91E-03	1.28E-03	1.00E-02
Methoxychlor	48	2	4%	1.85E-02	1.02E-02	6.80E-02
Nitroaromatics						
2-Nitrotoluene	42	1	2%	6.93E-02	6.02E-02	4.50E-01
2-amino-4,6-Dinitrotoluene	48	1	2%	6.35E-02	2.02E-02	2.00E-01
Metals						
Aluminum	48	48	100%	1.30E+04	3.29E+03	2.21E+04
Antimony	48	26	54%	7.58E+00	1.57E+01	8.27E+01
Arsenic	48	47	98%	6.49E+00	5.95E+00	3.77E+01
Barium	48	48	100%	1.15E+02	7.93E+01	4.88E+02
Beryllium	48	48	100%	6.62E-01	2.07E-01	1.10E+00
Cadmium	48	26	54%	2.51E+00	5.59E+00	3.41E+01
Calcium	48	48	100%	3.44E+04	3.36E+04	1.40E+05
Chromium (total)	48	48	100%	3.53E+02	1.04E+03	4.80E+03
Chromium VI	5	1	20%	3.72E+01	7.04E+01	1.63E+02
Cobalt	48	48	100%	1.40E+01	5.01E+00	2.84E+01
Copper	48	48	100%	1.11E+02	1.83E+02	9.88E+02
Iron	48	48	100%	2.92E+04	1.39E+04	8.79E+04
Lead	48	45	94%	8.55E+01	9.18E+01	3.74E+02
Magnesium	48	48	100%	6.93E+03	3.99E+03	2.79E+04
Manganese	48	48	100%	7.90E+02	8.74E+02	5.48E+03
Mercury	48	29	60%	2.08E-01	3.69E-01	2.40E+00
Nickel	48	48	100%	4.83E+01	6.08E+01	4.53E+02
Potassium	48	48	100%	1.87E+03	5.70E+02	3.46E+03
Selenium	48	24	50%	1.08E+00	1.16E+00	6.10E+00
Silver	48	24	50%	4.87E-01	3.90E-01	1.70E+00
Sodium	48	33	69%	1.56E+02	2.07E+02	1.37E+03
Vanadium	48	48	100%	5.36E+01	1.61E+02	1.14E+03
Zinc	48	48	100%	2.81E+02	2.35E+02	1.15E+03

Note: For the calculation of the mean value, half the detection limit was used for the nondetects.

TABLE H.3B
Sediment Statistical Summary
SEAD-4 Remedial Investigation
Seneca Army Depot Activity

Analyte	No. of Hits	Frequency (%)	Mean (mg/Kg)	Standard Deviation (mg/Kg)	Max Hit (mg/Kg)
Volatile Organics					
Acetone	2	67%	9.08E-02	1.05E-01	2.10E-01
Carbon disulfide	2	67%	1.28E-02	3.33E-03	1.20E-02
Methyl ethyl ketone	1	33%	2.57E-02	2.04E-02	4.90E-02
Semivolatile Organics					
4-Methylphenol	1	33%	2.12E-01	7.52E-02	1.40E-01
Di-n-octylphthalate	1	33%	2.84E-01	2.85E-01	4.60E-02
Fluoranthene	1	33%	2.79E-01	2.92E-01	3.10E-02
Fluorene	1	33%	2.78E-01	2.92E-01	2.90E-02
N-Nitrosodipropylamine	1	33%	4.05E-01	1.98E-01	4.10E-01
Pyrene	1	33%	2.77E-01	2.94E-01	2.60E-02
Pesticide/PCBs					
4.4'-DDE	1	33%	4.05E-03	1.98E-03	4.10E-03
Aroclor-1254	2	67%	1.23E-01	1.37E-01	2.80E-01
Endrin aldehyde	1	33%	3.68E-03	2.06E-03	3.00E-03
Nitroaromatics					
4-amino-2.6-Dinitrotoluene	1	33%	9.00E-02	4.33E-02	1.40E-01
Herbicides					
2.4.5-T	1	33%	9.48E-03	9.99E-03	2.10E-02
Metals					
Aluminum	3	100%	1.48E+04	2.75E+03	1.75E+04
Antimony	2	67%	3.09E+01	1.91E+01	5.04E+01
Arsenic	3	100%	6.43E+00	2.31E+00	8.10E+00
Barium	3	100%	7.74E+01	2.17E+01	1.02E+02
Beryllium	3	100%	5.90E-01	5.57E-02	6.50E-01
Calcium	3	100%	3.54E+04	2.92E+04	6.81E+04
Chromium	3	100%	2.03E+03	1.40E+03	3.31E+03
Cobalt	3	100%	1.20E+01	2.33E+00	1.41E+01
Copper	3	100%	1.54E+03	1.11E+03	2.64E+03
Iron	3	100%	2.52E+04	4.05E+03	2.92E+04
Lead	3	100%	1.62E+01	2.57E+00	1.86E+01
Magnesium	3	100%	6.18E+03	1.40E+03	7.63E+03
Manganese	3	100%	4.54E+02	1.05E+02	5.69E+02
Mercury	3	100%	1.20E-01	4.58E-02	1.60E-01
Nickel	3	100%	3.09E+01	3.82E+00	3.34E+01
Potassium	3	100%	1.94E+03	7.22E+02	2.76E+03
Sodium	3	100%	1.27E+02	6.96E+01	2.07E+02
Vanadium	3	100%	2.38E+01	4.35E+00	2.82E+01
Zinc	3	100%	4.45E+02	2.36E+02	6.30E+02

Notes:

1. Three sediment samples collected from the detention pond (SD4-1. SD4-2. and SD4-3) were included in these statistics.
   See Appendix F for original sampling results.
2. For the calculation of the mean value. half the detection limit was used for the nondetects.

Table H.4
Surface Water Exposure Point Concentration Summary
SEAD-4 - Remedial Investigation
Seneca Army Depot Activity

Analyte	No. of Valid Analyses	No. of Hits	Frequency (%)	Mean (mg/L)	Standard Deviation (mg/L	Max Hit (mg/L)	Normal?	95% UCL of Mean (mg/L)	Exposure Point Concentration (EPC)* (mg/L)
Volatile Organics									
Acetone	10	4	40%	3.55E-03	1.19E-03	4.00E-03	TRUE	4.23E-03	4.00E-03
Semivolatile Organics									
Anthracene	10	1	10%	1.81E-03	2.21E-03	7.00E-05	FALSE	1.36E-02	7.00E-05
Benzo(a)anthracene	10	1	10%	1.82E-03	2.20E-03	1.80E-04	FALSE	8.19E-03	1.80E-04
Benzo(a)pyrene	10	1	10%	1.82E-03	2.20E-03	1.50E-04	FALSE	8.82E-03	1.50E-04
Benzo(b)fluoranthene	10	1	10%	1.82E-03	2.20E-03	1.50E-04	FALSE	8.82E-03	1.50E-04
Benzo(ghi)perylene	10	1	10%	1.81E-03	2.21E-03	7.00E-05	FALSE	1.30E-02	7.00E-05
Benzo(k)fluoranthene	10	1	10%	1.82E-03	2.20E-03	1.60E-04	FALSE	8.59E-03	1.60E-04
Bis(2-Ethylhexyl)phthalate	10	3	30%	1.77E-03	2.23E-03	3.60E-04	FALSE	1.21E-02	3.60E-04
Butylbenzylphthalate	10	1	10%	1.83E-03	2.19E-03	2.90E-04	FALSE	7.05E-03	2.90E-04
Carbazole	10	1	10%	1.81E-03	2.21E-03	5.00E-05	FALSE	1.59E-02	5.00E-05
Chrysene	10	1	10%	1.82E-03	2.20E-03	1.80E-04	FALSE	8.19E-03	1.80E-04
Fluoranthene	10	2	20%	1.82E-03	2.20E-03	4.10E-04	FALSE	7.28E-03	4.10E-04
Indeno(1,2,3-cd)pyrene	10	1	10%	1.81E-03	2.21E-03	7.00E-05	FALSE	1.35E-02	7.00E-05
Phenanthrene	10	1	10%	1.84E-03	2.18E-03	3.50E-04	FALSE	6.73E-03	3.50E-04
Pyrene	10	2	20%	1.80E-03	2.21E-03	2.80E-04	FALSE	8.08E-03	2.80E-04
Pesticides/PCBs									
pha-Chlordane	7	1	14%	3.28E-06	1.95E-06	7.70E-06	FALSE	4.83E-06	4.83E-06
beta-BHC	7	1	14%	2.77E-06	5.88E-07	4.10E-06	FALSE	3.20E-06	3.20E-06
Gamma-Chlordane	7	1	14%	3.10E-06	1.46E-06	6.40E-06	FALSE	4.22E-06	4.22E-06
Nitroaromatics									
1,3-Dinitrobenzene	10	1	10%	1.10E-04	3.00E-05	7.00E-05	FALSE	1.30E-04	7.00E-05
Metals									
Aluminum	10	10	100%	8.74E-01	2.28E+00	7.35E+00	FALSE	8.41E+00	7.35E+00
Antimony	10	5	50%	8.65E-03	9.68E-03	6.60E-03	FALSE	2.74E-02	6.60E-03
Arsenic	10	1	10%	1.27E-03	1.07E-03	4.20E-03	FALSE	2.08E-03	2.08E-03
Barium	10	10	100%	6.56E-02	5.45E-02	2.13E-01	FALSE	1.10E-01	1.10E-01
Cadmium	10	6	60%	1.86E-03	3.48E-03	1.16E-02	FALSE	1.16E-02	1.16E-02
Calcium	10	10	100%	9.41E+01	3.46E+01	1.59E+02	TRUE	1.14E+02	1.14E+02
Chromium	10	3	30%	8.08E-03	1.45E-02	4.48E-02	FALSE	2.67E-01	4.48E-02
Cobalt	10	1	10%	3.15E-03	5.83E-03	1.96E-02	FALSE	7.75E-03	7.75E-03
Copper	10	9	90%	2.29E-02	3.51E-02	9.70E-02	FALSE	1.14E+00	9.70E-02
Iron	10	10	100%	2.02E+00	5.13E+00	1.66E+01	FALSE	2.44E+01	1.66E+01
Lead	10	4	40%	1.35E-02	3.64E-02	1.17E-01	FALSE	1.26E-01	1.17E-01
Magnesium	10	10	100%	1.67E+01	8.49E+00	3.27E+01	FALSE	2.31E+01	2.31E+01
Manganese	10	10	100%	3.15E-01	7.23E-01	2.35E+00	FALSE	9.34E+00	2.35E+00
Nickel	10	2	20%	4.60E-03	9.86E-03	3.26E-02	FALSE	1.10E-02	1.10E-02
Potassium	10	10	100%	2.32E+00	1.16E+00	4.79E+00	FALSE	3.15E+00	3.15E+00
Silver	10	2	20%	1.37E-03	1.17E-03	1.70E-03	FALSE	3.00E-03	1.70E-03
Sodium	10	10	100%	2.04E+01	7.25E+00	3.62E+01	TRUE	2.46E+01	2.46E+01
Thallium	10	1	10%	1.73E-03	6.10E-04	2.40E-03	FALSE	2.63E-03	2.40E-03
Vanadium	10	4	40%	4.10E-03	6.83E-03	2.25E-02	FALSE	1.24E-02	1.24E-02
Zinc	10	10	100%	6.50E-02	1.50E-01	4.92E-01	FALSE	3.04E-01	3.04E-01

* EPC is the lesser of the Max Hit vs the 95% UCL.

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TABLE H.5
Ecological Surface Soil (0-1 ft) Screening
SEAD-4
Seneca Army Depot Activity

Class	Analyte (mg/kg)	COPC	Freq of Detect	Mean	Max Detect	Max Detect Location	Screening Value[1]	Source[2]	Screening HQ[3]	COPC?[4] / Comments
VOCs	1,1-Dichloroethane		2 / 79	7.12E-03	2.00E-03	SS4-59, SS4-64	0.1	Old Dutch	0.02	No-MDC< sc.value
	1,2-Dichloroethene		3 / 79	7.15E-03	4.00E-03	SS4-59, SS4-64, SS4-68	NSV	NA	--	No-Freq of Detect<5%
	Acetone	X	30 / 80	1.41E-02	1.40E-01	SS4-81	NSV	NA	--	Yes-No sc.value
	Benzene		1 / 79	7.18E-03	1.00E-03	MW4-11	0.05	Min. of Housing	0.02	No-MDC< sc.value
	Chloroform		2 / 80	8.24E-03	1.20E-02	SS4-75	0.001	Min. of Housing	12.00	No-Freq of Detect<5%
	Methyl butyl ketone		1 / 80	8.04E-03	9.00E-03	SS4-8	NSV	NA	--	No-Freq of Detect<5%
	Methylene chloride		1 / 79	7.21E-03	3.00E-03	MW4-11	0.2	Min. of Housing	0.02	No-MDC< sc.value
	Toluene		22 / 79	6.29E-03	7.00E-03	SS4-19	0.05	Old Dutch	0.14	No-MDC< sc.value
	Trichloroethene		3 / 79	7.09E-03	3.00E-03	SS4-59	0.001	Min. of Housing	3.00	No-Freq of Detect<5%
SVOCs	2-Methylnaphthalene	X	13 / 70	4.32E-02	3.50E-02	SB4-27	NSV	NA	--	Yes-No sc.value
	Acenaphthene	X	7 / 78	6.29E-02	7.80E-02	SB4-27	NSV	NA	--	Yes-No sc.value
	Acenaphthylene	X	7 / 70	4.56E-02	5.19E-02	SS4-55	NSV	NA	--	Yes-No sc.value
	Anthracene	X	13 / 80	6.72E-02	1.10E-01	SS4-54	0.1	Old Dutch	1.10	Yes-MDC>sc.value
	Benzo(a)anthracene	X	67 / 80	6.44E-02	5.60E-01	SS4-55	NSV	NA	--	Yes-No sc.value
	Benzo(a)pyrene	X	65 / 80	6.71E-02	4.40E-01	SS4-55	0.1	Old Dutch	4.40	Yes-MDC>sc.value
	Benzo(b)fluoranthene	X	65 / 80	9.46E-02	8.30E-01	SS4-55	NSV	NA	--	Yes-No sc.value
	Benzo(ghi)perylene	X	45 / 80	6.83E-02	3.00E-01	SS4-55	NSV	NA	--	Yes-No sc.value
	Benzo(k)fluoranthene	X	39 / 80	7.02E-02	5.10E-01	SS4-54	NSV	NA	--	Yes-No sc.value
	Bis(2-ethylhexyl)phthalate	X	62 / 80	6.43E-01	1.30E+01	SS4-69	NSV	NA	--	Yes-No sc.value
	Butylbenzylphthalate	X	9 / 80	1.51E-01	7.10E+00	SB4-14	NSV	NA	--	Yes-No sc.value
	Carbazole	X	17 / 80	6.54E-02	1.20E-01	SS4-54	NSV	NA	--	Yes-No sc.value
	Chrysene	X	70 / 80	7.50E-02	5.70E-01	SS4-55	NSV	NA	--	Yes-No sc.value
	Di-n-butylphthalate		41 / 80	5.98E-02	2.70E-01	SB4-14	200	Oak Ridge	0.00	No-MDC< sc.value
	Di-n-octylphthalate	X	7 / 71	4.71E-02	4.40E-02	SB4-13	NSV	NA	--	Yes-No sc.value
	Dibenz(a,h)anthracene	X	17 / 80	6.82E-02	1.25E-01	SS4-55	NSV	NA	--	Yes-No sc.value
	Dibenzofuran	X	13 / 71	4.42E-02	5.80E-02	SB4-27	NSV	NA	--	Yes-No sc.value
	Diethyl phthalate		13 / 70	4.26E-02	2.20E-02	SS4-60	100	Oak Ridge	0.00	No-MDC< sc.value
	Fluoranthene	X	75 / 80	9.81E-02	1.05E+00	SS4-55	0.1	Old Dutch	10.50	Yes-MDC>sc.value
	Fluorene	X	5 / 79	6.76E-02	7.40E-02	SB4-16, SB4-27	NSV	NA	--	Yes-No sc.value
	Indeno(1,2,3-cd)pyrene	X	44 / 80	6.49E-02	2.70E-01	SS4-55	NSV	NA	--	Yes-No sc.value
	N-Nitrosodiphenylamine		1 / 70	4.95E-02	1.90E-02	SB4-18	20	Oak Ridge	0.00	No-MDC< sc.value
	Naphthalene		11 / 77	5.78E-02	7.40E-02	SB4-27	0.1	Old Dutch	0.74	No-MDC< sc.value
	Phenanthrene	X	70 / 80	7.53E-02	6.40E-01	SS4-54	0.1	Old Dutch	6.40	Yes-MDC>sc.value
	Phenol		2 / 70	4.90E-02	1.70E-02	SS4-9	0.05	Min. of Housing	0.34	No-MDC< sc.value
	Pyrene	X	71 / 80	9.24E-02	9.80E-01	SS4-55	0.1	Old Dutch	9.80	Yes-MDC>sc.value
Pest/PCBs	4,4'-DDD	X	19 / 80	5.89E-03	1.90E-01	SS4-54	0.0025	Min. of Housing[a]	76.00	Yes-MDC>sc.value
	4,4'-DDE	X	26 / 80	6.45E-03	1.60E-01	SS4-54	0.0025	Min. of Housing[a]	64.00	Yes-MDC>sc.value
	4,4'-DDT	X	27 / 80	1.46E-02	7.60E-01	SS4-54	0.0025	Min. of Housing[a]	304.00	Yes-MDC>sc.value
	Aldrin		1 / 80	1.26E-03	2.20E-03	SS4-1	0.0025	Min. of Housing	0.88	No-MDC< sc.value
	Alpha-BHC		5 / 80	1.29E-03	2.40E-03	MW4-11	0.0025	Min. of Housing	0.96	No-MDC< sc.value
	Alpha-Chlordane		8 / 80	1.34E-03	4.90E-03	SS4-1	0.1	Old Dutch[b]	0.05	No-MDC< sc.value
	Aroclor-1254	X	20 / 80	3.94E-02	3.10E-01	MW4-11, SS4-69	0.02	Min. of Housing[c]	15.50	Yes-MDC>sc.value
	Aroclor-1260		3 / 80	2.58E-02	1.10E-01	SS4-7	0.02	Min. of Housing[c]	5.50	No-Freq of Detect<5%
	Aroclor, total	X	23 / 80	5.27E-02	3.60E-01		0.02	Min. of Housing[c]	18.00	Yes-MDC>sc.value
	Beta-BHC	X	10 / 80	1.51E-03	7.60E-03	SS4-77	0.001	Min. of Housing	7.60	Yes-MDC>sc.value

TABLE H.5
Ecological Surface Soil (0-1 ft) Screening
SEAD-4
Seneca Army Depot Activity

Class	Analyte (mg/kg)	COPC	Freq of Detect	Mean	Max Detect	Max Detect Location	Screening Value[1]	Source[2]	Screening HQ[3]	COPC?[4] / Comments
	Dieldrin	X	5 / 80	2.64E-03	7.40E-03	MW4-11	5.00E-04	Min. of Housing	14.80	Yes-MDC>sc value
	Endosulfan I		4 / 80	1.26E-03	1.70E-03	SS4-10	0.1	Old Dutch[d]	0.02	No-MDC< sc.value
	Endosulfan II		3 / 80	2.49E-03	5.20E-03	SS4-68	0.1	Old Dutch[d]	0.05	No-MDC< sc.value
	Endosulfan sulfate		1 / 80	2.46E-03	3.80E-03	SS4-1	0.1	Old Dutch[d]	0.04	No-MDC< sc.value
	Endrin		3 / 80	2.75E-03	2.70E-02	SS4-18	0.001	Min. of Housing	27.00	No-Freq of Detect<5%
	Endrin aldehyde		8 / 80	2.81E-03	2.00E-02	SS4-81	0.1	Old Dutch	0.20	No-MDC< sc.value
	Endrin ketone		2 / 80	2.44E-03	4.20E-03	SS4-56	0.001	Min. of Housing[c]	4.20	No-Freq of Detect<5%
	Gamma-Chlordane		8 / 80	1.49E-03	7.40E-03	SS4-60, SS4-70	0.1	Old Dutch[b]	0.07	No-MDC< sc.value
	Heptachlor		3 / 80	1.29E-03	4.20E-03	SS4-64	0.1	Old Dutch	0.04	No-MDC< sc.value
	Heptachlor epoxide		4 / 80	1.32E-03	3.60E-03	SS4-70	0.1	Old Dutch[f]	0.04	No-MDC< sc.value
Nitroarom.	1,3,5-Trinitrobenzene		1 / 80	6.64E-02	1.20E-01	SS4-1	40	Oak Ridge[g]	0.00	No-MDC< sc.value
	2,4,6-Trinitrotoluene		1 / 80	6.58E-02	7.20E-02	SS4-1	NSV	NA	--	No-Freq of Detect<5%
	2,4-Dinitrotoluene		1 / 80	6.70E-02	2.25E-01	SS4-55	NSV	NA	--	No-Freq of Detect<5%
	2-amino-4,6-Dinitrotoluene		1 / 80	6.60E-02	9.00E-02	SS4-1	NSV	NA	--	No-Freq of Detect<5%
	4-Nitrotoluene		1 / 73	7.03E-02	3.90E-01	SS4-18	NSV	NA	--	No-Freq of Detect<5%
Metals[5]	Aluminum	X	80 / 80	1.17E+04	1.88E+04	SS4-60	50	Oak Ridge	376	Yes-MDC>sc.value
	Antimony	X	31 / 80	8.21E+00	1.48E+02	SB4-25	3.5	New Dutch	42	Yes-MDC>sc.value
	Arsenic	X	80 / 80	4.96E+00	1.46E+01	SB4-25	10	Oak Ridge	1.46	Yes-MDC>sc.value
	Barium	X	80 / 80	7.97E+01	2.78E+02	SB4-25	165	New Dutch	1.68	Yes-MDC>sc.value
	Beryllium	X	80 / 80	5.50E-01	1.80E+00	SS4-7	1.1	New Dutch	1.64	Yes-MDC>sc.value
	Cadmium	X	9 / 80	1.70E-01	2.30E+00	SS4-69	1.6	New Dutch	1.44	Yes-MDC>sc.value
	Chromium	X	80 / 80	9.16E+02	1.86E+04	SB4-25	0.4	Oak Ridge	46500	Yes-MDC>sc.value
	Chromium, Hexavalent	X	4 / 15	8.15E+00	1.47E+01	SS4-9	0.4	Oak Ridge[h]	36.75	Yes-MDC>sc.value
	Cobalt		80 / 80	1.01E+01	1.91E+01	SB4-14	20	Old Dutch	0.96	No-MDC< sc.value
	Copper	X	80 / 80	4.64E+02	7.33E+03	SB4-25	40	New Dutch	183	Yes-MDC>sc.value
	Cyanide		2 / 80	4.10E-01	8.70E-01	SS4-59	NSV	NA	--	No-Freq of Detect<5%
	Iron	X	80 / 80	2.37E+04	6.46E+04	SS4-7	200	Oak Ridge	323	Yes-MDC>sc.value
	Lead	X	73 / 80	1.63E+02	9.28E+03	SB4-14	50	Old Dutch	186	Yes-MDC>sc.value
	Manganese	X	80 / 80	5.08E+02	1.54E+03	SS4-18	100	Oak Ridge	15	Yes-MDC>sc value
	Mercury	X	42 / 80	1.00E-01	1.20E+00	SB4-25	0.1	Oak Ridge	12	Yes-MDC>sc.value
	Nickel	X	80 / 80	2.95E+01	2.28E+02	SS4-7	30	Oak Ridge	7.60	Yes-MDC>sc.value
	Selenium	X	20 / 80	4.70E-01	3.40E+00	SS4-7	0.81	New Dutch	4.20	Yes-MDC>sc.value
	Silver		5 / 80	1.90E-01	1.70E+00	SB4-25	2	Oak Ridge	0.85	No-MDC< sc.value
	Thallium	X	17 / 80	1.14E+00	5.40E+00	SB4-25	1	Oak Ridge	5.40	Yes-MDC>sc.value
	Vanadium	X	80 / 80	3.73E+01	1.25E+03	SS4-7	2	Oak Ridge	625	Yes-MDC>sc.value
	Zinc	X	80 / 80	2.29E+02	2.02E+03	SB4-25	50	Oak Ridge	40	Yes-MDC>sc.value

(1) Screening value as selected from below sources.
(2) Sources; "Old Dutch"-Beyer (1990); "Oak Ridge"-Oak Ridge National Laboratory (Elfroymson et al 1997), "Canadian"-CCME (1997);
"Min of Housing"-Min. of Housing, Spatial Planning and Environment (1994); and "New Dutch"-Crommentuijn et al. (1997).
(3) HQ - Hazard Quotient: if HQ > 1, chemical is included in Ecological Risk Assessment
(4) COPC - Chemical of Potential Concern
(5) Naturally occuring analytes calcium, sodium, potassium, magnesium, and phosphorous were not included in screening.
(a) Screening value for total DDT/DDD/DDE was used
(b) Screening value for chlorinated pesticides was used

NSV - No Screening Value

TABLE H.5
Ecological Surface Soil (0-1 ft) Screening
SEAD-4
Seneca Army Depot Activity

Class	Analyte (mg/kg)	COPC	Freq of Detect	Mean	Max Detect	Max Detect Location	Screening Value[1]	Source[2]	Screening HQ[3]	COPC?[4] / Comments

(c) Screening value for total PCBs was used
(d) Screening value for Endosulfan was used
(e) Screening value for Endrin was used
(f) Screening value for Heptachlor was used
(g) Screening value for Nitrobenzene was used
(h) Screening value for total Chromium was used

MDC - Maximum Detected Concentration

TABLE H.6
Ecological Mixed Soil (0-4 ft) Screening
SEAD-4
Seneca Army Depot Activity

Class	Analyte (mg/kg)	COPC	Freq of Detect	Mean	Max Detect	Screening Value^{1}	Source^{2}	Screening HQ^{3}	COPC?^{4} / Comments
VOCs	1,1-Dichloroethane		2 / 121	6.25E-03	2.00E-03	0.1	Old Dutch	0.02	No-MDC< sc.value
	1,2-Dichloroethene		3 / 121	6.27E-03	4.00E-03	NSV	NA	--	No-Freq of Detect<5%
	Acetone	X	31 / 122	1.11E-02	1.40E-01	NSV	NA	--	Yes-No sc.value
	Benzene		1 / 121	6.29E-03	1.00E-03	0.05	Min. of Housing	0.02	No-MDC< sc.value
	Chloroform		3 / 122	7.00E-03	1.50E-02	0.001	Min. of Housing	15.00	No-Freq of Detect<5%
	Ethylbenzene		1 121	6.29E-03	1.00E-03	0.05	Old Dutch	0.02	No-MDC< sc.value
	Methyl butyl ketone		1 / 122	6.91E-03	9.00E-03	NSV	NA	--	No-Freq of Detect<5%
	Methylene chloride		1 / 121	6.31E-03	3.00E-03	0.2	Min. of Housing	0.02	No-MDC< sc.value
	Toluene		35 / 122	6.20E-03	1.40E-02	0.05	Old Dutch	0.28	No-MDC< sc.value
	Total xylenes		1 122	6.91E-03	8.00E-03	0.05	Old Dutch	0.16	No-MDC< sc.value
	Trichloroethene		3 / 121	6.23E-03	3.00E-03	0.001	Min. of Housing	3.00	No-Freq of Detect<5%
SVOCs	2-Methylnaphthalene	X	16 / 122	8.53E-02	2.60E-01	NSV	NA	--	Yes-No sc.value
	Acenaphthene	X	9 / 118	7.59E-02	8.80E-02	NSV	NA	--	Yes-No sc.value
	Acenaphthylene	X	10 / 122	8.49E-02	1.70E-01	NSV	NA	--	Yes-No sc.value
	Anthracene	X	16 / 122	8.57E-02	3.40E-01	0.1	Old Dutch	3.40	Yes-MDC>sc.value
	Benzo(a)anthracene	X	72 / 122	8.91E-02	1.10E+00	NSV	NA	--	Yes-No sc.value
	Benzo(a)pyrene	X	71 / 122	8.84E-02	8.80E-01	0.1	Old Dutch	8.80	Yes-MDC>sc.value
	Benzo(b)fluoranthene	X	72 / 122	1.04E-01	8.30E-01	NSV	NA	--	Yes-No sc.value
	Benzo(ghi)perylene	X	47 / 122	8.57E-02	3.00E-01	NSV	NA	--	Yes-No sc.value
	Benzo(k)fluoranthene	X	44 / 122	8.86E-02	8.90E-01	NSV	NA	--	Yes-No sc.value
	Bis(2-Ethylhexyl)phthalate	X	51 / 122	4.90E-01	1.30E+01	NSV	NA	--	Yes-No sc.value
	Butylbenzylphthalate	X	10 / 122	1.39E-01	7.10E+00	NSV	NA	--	Yes-No sc.value
	Carbazole	X	18 / 122	8.19E-02	1.60E-01	NSV	NA	--	Yes-No sc.value
	Chrysene	X	78 / 122	9.49E-02	1.00E+00	NSV	NA	--	Yes-No sc.value
	Di-n-butylphthalate		44 / 122	6.40E-02	1.90E-01	200	Oak Ridge	0.00	No-MDC< sc.value
	Di-n-octylphthalate	X	14 / 117	7.44E-02	4.40E-02	NSV	NA	--	Yes-No sc.value
	Dibenz(a,h)anthracene	X	18 / 122	8.40E-02	1.25E-01	NSV	NA	--	Yes-No sc.value
	Dibenzofuran	X	14 / 97	4.76E-02	5.80E-02	NSV	NA	--	Yes-No sc.value
	Diethyl phthalate		13 / 89	3.88E-02	2.20E-02	100	Oak Ridge	0.00	No-MDC< sc.value
	Fluoranthene	X	83 / 122	1.21E-01	2.40E+00	0.1	Old Dutch	24	Yes-MDC>sc.value
	Fluorene	X	8 / 122	8.65E-02	3.30E-01	NSV	NA	--	Yes-No sc.value
	Indeno(1,2,3-cd)pyrene	X	46 / 122	8.30E-02	2.70E-01	NSV	NA	--	Yes-No sc.value
	N-Nitrosodiphenylamine		1 / 89	4.38E-02	1.90E-02	20	Oak Ridge	0.00	No-MDC< sc.value
	Naphthalene	X	13 / 122	8.41E-02	1.30E-01	0.1	Old Dutch	1.30	Yes-MDC>sc.value
	Phenanthrene	X	76 / 122	1.08E-01	1.40E+00	0.1	Old Dutch	14	Yes-MDC>sc.value
	Phenol		2 / 89	4.33E-02	1.70E-02	0.05	Min. of Housing	0.34	No-MDC< sc value
	Pyrene	X	78 122	1.19E-01	1.80E+00	0.1	Old Dutch	18	Yes-MDC>sc.value
Pest/PCBs	4,4'-DDD	X	19 / 122	4.49E-03	1.90E-01	0.0025	Min. of Housing^{a}	76	Yes-MDC>sc.value
	4,4'-DDE	X	29 / 122	4.96E-03	1.60E-01	0.0025	Min. of Housing^{a}	64	Yes-MDC>sc.value
	4,4'-DDT	X	28 / 122	1.02E-02	7.60E-01	0.0025	Min. of Housing^{a}	304	Yes-MDC>sc.value

TABLE H.6
Ecological Mixed Soil (0-4 ft) Screening
SEAD-4
Seneca Army Depot Activity

Class	Analyte (mg/kg)	COPC	Freq of Detect	Mean	Max Detect	Screening Value[1]	Source[2]	Screening HQ[3]	COPC?[4] / Comments
	Aldrin		2 / 122	1.15E-03	8.20E-03	0.0025	Min. of Housing	3.28	No-Freq of Detect<5%
	Alpha-BHC		5 / 122	1.15E-03	2.40E-03	0.0025	Min. of Housing	0.96	No-MDC< sc.value
	Alpha-Chlordane		9 / 122	1.22E-03	1.00E-02	0.1	Old Dutch[b]	0.10	No-MDC< sc.value
	Aroclor-1248		1 122	2.18E-02	2.70E-02	0.02	Min. of Housing[c]	1.35	No-Freq of Detect<5%
	Aroclor-1254	X	24 / 122	4.47E-02	1.60E+00	0.02	Min. of Housing[c]	80	Yes-MDC>sc.value
	Aroclor-1260		3 / 122	2.27E-02	1.10E-01	0.02	Min. of Housing[c]	5.50	No-Freq of Detect<5%
	Aroclor, total	X	28 / 122	5.22E-02	1.60E+00	0.02	Min. of Housing[c]	80.00	Yes-MDC>sc.value
	Beta-BHC	X	10 / 122	1.29E-03	7.60E-03	0.001	Min. of Housing	7.60	Yes-MDC>sc.value
	Delta-BHC		1 122	1.12E-03	5.90E-03	0.1	Old Dutch	0.06	No-MDC< sc.value
	Dieldrin		5 / 122	2.31E-03	7.40E-03	5.00E-04	Min. of Housing	15	No-Freq of Detect<5%
	Endosulfan I		5 / 122	1.17E-03	1.10E-02	0.1	Old Dutch[d]	0.11	No-MDC< sc.value
	Endosulfan II		3 / 122	2.21E-03	5.20E-03	0.1	Old Dutch[d]	0.05	No-MDC< sc.value
	Endosulfan sulfate		1 / 122	2.19E-03	3.80E-03	0.1	Old Dutch[d]	0.04	No-MDC< sc.value
	Endrin		4 122	2.58E-03	3.40E-02	0.001	Min. of Housing	34	No-Freq of Detect<5%
	Endrin aldehyde		9 / 122	2.47E-03	2.00E-02	0.1	Old Dutch	0.20	No-MDC< sc.value
	Endrin ketone		2 / 122	2.20E-03	4.20E-03	0.001	Min. of Housing[e]	4.20	No-Freq of Detect<5%
	Gamma-Chlordane		8 / 122	1.28E-03	7.40E-03	0.1	Old Dutch[b]	0.07	No-MDC< sc.value
	Heptachlor		3 / 122	1.15E-03	4.20E-03	0.1	Old Dutch	0.04	No-MDC< sc.value
	Heptachlor epoxide		4 / 122	1.17E-03	3.60E-03	0.1	Old Dutch[f]	0.04	No-MDC< sc.value
Herbicides	Dicamba		1 29	3.39E-03	1.31E-02	NSV	NA	--	No-Freq of Detect<5%
Nitroarom.	1,3,5-Trinitrobenzene		1 / 122	6.16E-02	1.20E-01	40	Oak Ridge[g]	0.00	No-MDC< sc.value
	2,4,6-Trinitrotoluene		1 / 122	6.12E-02	7.20E-02	NSV	NA	--	No-Freq of Detect<5%
	2,6-Dinitrotoluene		2 / 122	6.41E-02	2.80E-01	NSV	NA	--	No-Freq of Detect<5%
Metals[5]	Aluminum	X	122 / 122	1.24E+04	2.04E+04	50	Oak Ridge	408	Yes-MDC>sc.value
	Antimony	X	45 / 122	6.98E+00	1.48E+02	3.5	New Dutch	42	Yes-MDC>sc.value
	Arsenic	X	122 / 122	5.08E+00	1.46E+01	10	Oak Ridge	1.46	Yes-MDC>sc.value
	Barium	X	122 / 122	7.90E+01	2.78E+02	165	New Dutch	1.68	Yes-MDC>sc.value
	Beryllium	X	122 / 122	5.74E-01	1.80E+00	1.1	New Dutch	1.64	Yes-MDC>sc.value
	Cadmium	X	12 / 122	1.70E-01	2.30E+00	1.6	New Dutch	1.44	Yes-MDC>sc.value
	Chromium	X	114 / 122	6.85E+02	1.86E+04	0.4	Oak Ridge	46500	Yes-MDC>sc.value
	Chromium, Hexavalent	X	4 / 15	8.15E+00	1.47E+01	0.4	Oak Ridge[h]	37	Yes-MDC>sc.value
	Cobalt	X	122 / 122	1.10E+01	2.01E+01	20	Old Dutch	1.01	Yes-MDC>sc.value
	Copper	X	122 / 122	3.60E+02	7.33E+03	40	New Dutch	183	Yes-MDC>sc.value
	Cyanide		2 / 122	3.47E-01	8.70E-01	NSV	NA	--	No-Freq of Detect<5%
	Iron	X	122 / 122	2.53E+04	6.46E+04	200	Oak Ridge	323	Yes-MDC>sc.value
	Lead	X	115 / 122	1.14E+02	9.28E+03	50	Old Dutch	186	Yes-MDC>sc.value
	Manganese	X	113 / 122	5.20E+02	1.54E+03	100	Oak Ridge	15	Yes-MDC>sc.value
	Mercury	X	67 / 122	7.59E-02	1.20E+00	0.1	Oak Ridge	12	Yes-MDC>sc.value
	Nickel	X	122 / 122	3.15E+01	2.28E+02	30	Oak Ridge	7.60	Yes-MDC>sc.value

TABLE H.6
Ecological Mixed Soil (0-4 ft) Screening
SEAD-4
Seneca Army Depot Activity

Class	Analyte (mg/kg)	COPC	Freq of Detect	Mean	Max Detect	Screening Value^1	Source^2	Screening HQ^3	COPC?^{4} / Comments
	Selenium	X	35 / 122	3.99E-01	3.40E+00	0.81	New Dutch	4.20	Yes-MDC>sc.value
	Silver		9 / 122	2.26E-01	1.70E+00	2	Oak Ridge	0.85	No-MDC< sc.value
	Thallium	X	17 / 122	9.63E-01	5.40E+00	1	Oak Ridge	5.40	Yes-MDC>sc.value
	Vanadium	X	122 / 122	3.22E+01	1.25E+03	2	Oak Ridge	625	Yes-MDC>sc.value
	Zinc	X	122 / 122	1.92E+02	2.02E+03	50	Oak Ridge	40	Yes-MDC>sc.value

(1) Screening value as selected from below sources.

(2) Sources; "Old Dutch"-Beyer (1990); "Oak Ridge"-Oak Ridge National Laboratory (Elfroymson et al. 1997); "Canadian"-CCME (1997); "Min of Housing"-Min. of Housing, Spatial Planning and Environment (1994); and "New Dutch"-Crommentuijn et al. (1997).

(3) HQ - Hazard Quotient: if HQ > 1, chemical is included in Ecologica Risk Assessment

(4) COPC - Chemical of Potential Concern

(5) Naturally occuring analytes calcium, sodium, potassium, magnesium, and phosphorous were not included in screening.

(a) Screening value for total DDT/DDD/DDE was used

(b) Screening value for chlorinated pesticides was used

(c) Screening value for total PCBs was used

(d) Screening value for Endosulfan was used

(e) Screening value for Endrin was used

(f) Screening value for Heptachlor was used

(g) Screening value for Nitrobenzene was used

(h) Screening value for total Chromium was used

NSV - No Screening Value

MDC - Maximum Detected Concentration

TABLE H.7
Ecological Sediment Screening
Seneca / SEAD-4
Seneca Army Depot Activity

Analyte (mg/kg)	COPC	Freq of Detect	Mean	Max Detect	Max Detect Location	Screening Value	Source[1]	Screening HQ[2]	COPC?[3] / Comments
Volatile Organics									
Acetone	X	14 / 55	2.27E-02	2.10E-01	SD4-1	NSV	NA	--	Yes-No sc.value
Carbon disulfide	X	4 / 55	1.01E-02	1.80E-02	SD4-9	NSV	NA	--	Yes-No sc.value
Chloroform		2 / 55	1.03E-02	1.40E-02	SD4-30	NSV	NA	--	No-FOD < 5%
Methyl chloride		1 / 54	9.90E-03	5.00E-03	SD4-52	NSV	NA	--	No-FOD < 5%
Methyl ethyl ketone		1 / 55	1.07E-02	4.90E-02	SD4-1	NSV	NA	--	No-FOD < 5%
Methylene chloride	X	3 / 55	9.73E-03	1.10E-02	SD4-8	NSV	NA	--	Yes-No sc.value
Styrene		2 / 54	1.00E-02	3.00E-03	SD4-5,6	NSV	NA	--	No-FOD < 5%
Toluene		5 / 55	1.02E-02	4.20E-02	SD4-12	2.93	NYSDEC	0.01	No-MDC < Sc. Value
Total Xylenes		2 / 54	1.01E-02	7.00E-03	SD4-5	5.49	NYSDEC	0.00	No-MDC < Sc. Value
Semivolatile Organics									
1,4-Dichlorobenzene		1 / 53	1.63E-01	7.30E-02	SD4-12	0.72	NYSDEC	0.10	No-MDC < Sc. Value
2-Methylnaphthalene		5 / 42	5.99E-02	3.10E-02	SD4-22	2.03	NYSDEC	0.02	No-MDC < Sc. Value
4-Methylphenol	X	6 / 51	1.07E-01	1.40E-01	SD4-1	0.03	NYSDEC[g]	4.69	Yes-MDC > Sc. Value
Acenaphthene		10 / 55	2.15E-01	6.10E-01	SD4-17	8.36	NYSDEC	0.07	No-MDC < Sc. Value
Acenaphthylene		10 / 50	9.43E-02	1.30E-01	SD4-36	0.33	Reg 4	0.39	No-MDC < Sc. Value
Anthracene		25 / 55	2.20E-01	1.70E+00	SD4-17	6.39	NYSDEC	0.27	No-MDC < Sc. Value
Benzo(a)anthracene	X	46 / 55	3.53E-01	5.90E+00	SD4-17	0.72	NYSDEC	8.24	Yes-MDC > Sc. Value
Benzo(a)pyrene	X	46 / 55	3.66E-01	5.10E+00	SD4-17	0.33	Reg 4	15.45	Yes-MDC > Sc. Value
Benzo(b)fluoranthene	X	48 / 55	4.02E-01	4.80E+00	SD4-17	0.66	Reg 4	7.33	Yes-MDC > Sc. Value
Benzo(ghi)perylene	X	42 / 55	2.51E-01	3.20E+00	SD4-17	0.66	Reg 4	4.89	Yes-MDC > Sc. Value
Benzo(k)fluoranthene	X	23 / 55	3.66E-01	5.70E+00	SD4-17	0.66	Reg 4	8.70	Yes-MDC > Sc. Value
Bis(2-Ethylhexyl)phthalate	X	21 / 55	1.09E+00	4.20E+01	SD4-29	11.91	NYSDEC	3.53	Yes-MDC > Sc. Value
Butylbenzylphthalate		5 / 42	6.05E-02	1.60E-02	SD4-32	11.91	NYSDEC[f]	0.00	No-MDC < Sc. Value
Carbazole	X	21 / 55	2.12E-01	5.00E-01	SD4-17	NSV	NA	--	Yes-No sc.value
Chrysene	X	49 / 55	3.71E-01	6.20E+00	SD4-17	0.33	Reg 4	18.79	Yes-MDC > Sc. Value
Di-n-butylphthalate		26 / 55	1.77E-01	2.50E-01	SD4-8	11.91	NYSDEC[f]	0.02	No-MDC < Sc. Value
Di-n-octylphthalate		3 / 43	6.30E-02	4.60E-02	SD4-2	11.91	NYSDEC[f]	0.00	No-MDC < Sc. Value
Dibenz(a,h)anthracene	X	27 / 55	2.41E-01	1.20E+00	SD4-17	0.33	Reg 4	3.64	Yes-MDC > Sc Value
Dibenzofuran	X	9 / 54	1.61E-01	2.30E-01	SD4-17	NSV	NA	--	Yes-No sc.value
Diethyl phthalate		2 / 42	6.41E-02	1.70E-02	SD4-31	11.91015	NYSDEC[f]	0.00	No-MDC < Sc. Value
Fluoranthene		51 / 55	5.81E-01	1.60E+01	SD4-17	60.894	NYSDEC	0.26	No-MDC < Sc Value
Fluorene	X	11 / 55	2.10E-01	6.60E-01	SD4-17	0.4776	NYSDEC	1.38	Yes-MDC > Sc. Value
Hexachlorobenzene		2 / 55	2.51E-01	8.40E-01	SD4-36	332.529	NYSDEC	0.00	No-MDC < Sc Value
Indeno(1,2,3-cd)pyrene	X	40 / 55	2.54E-01	3.10E+00	SD4-17	0.655	Reg 4	4.73	Yes-MDC > Sc. Value
N-Nitrosodiphenylamine		1 / 55	2.48E-01	7.60E-01	SD4-7	NSV	NA	--	No-FOD < 5%
N-Nitrosodipropylamine		1 / 55	2.45E-01	4.10E-01	SD4-2	NSV	NA	--	No-FOD < 5%
Naphthalene		7 / 42	5.74E-02	1.30E-02	SD4-22	1.791	NYSDEC	0.01	No-MDC < Sc. Value
Phenanthrene	X	48 / 55	3.16E-01	7.90E+00	SD4-17	7.164	NYSDEC	1.10	Yes-MDC > Sc. Value
Phenol	X	4 / 53	1.70E-01	2.10E-01	SD4-26	0.02985	NYSDEC[g]	7.04	Yes-MDC > Sc. Value
Pyrene		51 / 55	4.76E-01	1.20E+01	SD4-17	57.3717	NYSDEC	0.21	No-MDC < Sc. Value
Pesticides/PCBs									
4,4'-DDD	X	12 / 55	7.15E-03	9.00E-02	SD4-8	0.0597	NYSDEC	1.51	Yes-MDC > Sc. Value
4,4'-DDE	X	17 / 55	6.97E-03	8.60E-02	SD4-8	0.0597	NYSDEC	1.44	Yes-MDC > Sc. Value
4,4'-DDT		15 / 55	5.30E-03	4.20E-02	SD4-12	0.0597	NYSDEC	0.70	No-MDC < Sc. Value
Aldrin	X	3 / 55	1.74E-03	2.80E-03	SD4-16	NSV	NA	--	Yes-No sc.value
Alpha-Chlordane	X	7 / 55	3.81E-03	4.40E-02	SD4-13	0.001791	NYSDEC[a]	24.57	Yes-MDC > Sc. Value
Aroclor-1254		24 / 55	7.51E-02	4.95E-01	SD4-12	1.15221	NYSDEC[b]	0.43	No-MDC < Sc. Value
Aroclor-1260		8 / 55	4.57E-02	2.30E-01	SD4-8	1.15221	NYSDEC[b]	0.20	No-MDC < Sc. Value
Beta-BHC		3 / 55	1.76E-03	3.30E-03	SD4-44	0.003582	NYSDEC[c]	0.92	No-MDC < Sc. Value
Dieldrin	X	3 / 55	3.53E-03	1.70E-02	SD4-12	0.0033	Reg 4	5.15	Yes-MDC > Sc. Value

TABLE H.7A
Ecological Ditch Soil Screening
SEAD-4
Seneca Army Depot Activity

Class	Analyte (mg/kg)	COPC	Freq of Detect	Mean	Max Detect	Max Detect Location	Screening Value[1]	Source[2]	Screening HQ[3]	COPC?[4] / Comments
VOCs	Acetone	X	11 / 48	1.92E-02	1.80E-01	SD4-8	NSV	NA	--	Yes-No sc value
	Carbon Disulfide		2 / 48	9.95E-03	1.80E-02	SD4-9	NSV	NA	--	No-Freq of Detect< 5%
	Chloroform		2 / 48	9.97E-03	1.40E-02	SD4-30	0.001	Min. of Housing	14.00	No-Freq of Detect< 5%
	Methylene chloride		3 / 48	9.38E-03	1.10E-02	SD4-8	0.2	Min. of Housing	0.06	No-MDC< sc.value
	Styrene		2 / 47	9.93E-03	3.00E-03	SD4-5, SD4-6	0.01	Canadian	0.30	No-MDC< sc.value
	Toluene		5 / 48	1.02E-02	4.20E-02	SD4-12	0.05	Old Dutch	0.84	No-MDC< sc value
	Total Xylenes		2 / 47	1.00E-02	7.00E-03	SD4-5	0.05	Old Dutch	0.14	No-MDC< sc.value
SVOCs	1,4-Dichlorobenzene		1 / 46	1.55E-01	7.30E-02	SD4-12	20	Oak Ridge	0.00	No-MDC< sc.value
	2-Methylnaphthalene	X	4 / 44	1.03E-01	3.10E-02	SD4-22	NSV	NA	--	Yes-No sc.value
	4-Methylphenol	X	5 / 44	1.04E-01	2.30E-02	SD4-33	NSV	NA	--	Yes-No sc.value
	Acenaphthene	X	8 / 48	2.20E-01	6.10E-01	SD4-17	NSV	NA	--	Yes-No sc.value
	Acenaphthylene	X	8 / 44	9.22E-02	1.30E-01	SD4-36	NSV	NA	--	Yes-No sc value
	Anthracene	X	21 / 48	2.27E-01	1.70E+00	SD4-17	0.1	Old Dutch	17.00	Yes-MDC >sc.value
	Benzo(a)anthracene	X	42 / 48	3.72E-01	5.90E+00	SD4-17	NSV	NA	--	Yes-No sc.value
	Benzo(a)pyrene	X	42 / 48	3.86E-01	5.10E+00	SD4-17	0.1	Old Dutch	51.00	Yes-MDC >sc.value
	Benzo(b)fluoranthene	X	44 / 48	4.25E-01	4.80E+00	SD4-17	NSV	NA	--	Yes-No sc.value
	Benzo(ghi)perylene	X	38 / 48	2.58E-01	3.20E+00	SD4-17	NSV	NA	--	Yes-No sc.value
	Benzo(k)fluoranthene	X	19 / 47	3.91E-01	5.70E+00	SD4-17	NSV	NA	--	Yes-No sc value
	Bis(2-ethylhexyl)phthalate	X	21 / 48	1.22E+00	4.20E+01	SD4-29	NSV	NA	--	Yes-No sc.value
	Butylbenzylphthalate	X	5 / 44	1.03E-01	1.60E-02	SD4-32	NSV	NA	--	Yes-No sc.value
	Carbazole	X	17 / 48	2.19E-01	5.00E-01	SD4-17	NSV	NA	--	Yes-No sc.value
	Chrysene	X	45 / 48	3.89E-01	6.20E+00	SD4-17	NSV	NA	--	Yes-No sc value
	Di-n-butylphthalate		25 / 48	1.75E-01	2.50E-01	SD4-8	200	Oak Ridge	0.00	No-MDC< sc.value
	Di-n-octylphthalate		2 / 44	1.05E-01	1.20E-02	SD4-27	NSV	NA	--	No-Freq of Detect< 5%
	Dibenz(a,h)anthracene	X	24 / 48	2.49E-01	1.20E+00	SD4-17	NSV	NA	--	Yes-No sc.value
	Dibenzofuran	X	8 / 47	1.57E-01	2.30E-01	SD4-17	NSV	NA	--	Yes-No sc.value
	Diethyl phthalate		2 / 44	1.06E-01	1.70E-02	SD4-31	100	Oak Ridge	0.00	No-MDC< sc.value
	Fluoranthene	X	46 / 48	6.28E-01	1.60E+01	SD4-17	0.1	Old Dutch	160.00	Yes-MDC >sc.value
	Fluorene	X	8 / 48	2.20E-01	6.60E-01	SD4-17	NSV	NA	--	Yes-No sc.value
	Hexachlorobenzene		2 / 48	2.60E-01	8.40E-01	SD4-36	1000	Oak Ridge	0.00	No-MDC< sc.value
	Indeno(1,2,3-cd)pyrene	X	36 / 48	2.61E-01	3.10E+00	SD4-17	NSV	NA	--	Yes-No sc.value
	N-Nitrosodiphenylamine		1 / 48	2.56E-01	7.60E-01	SD4-7	20	Oak Ridge	0.04	No-MDC< sc.value
	Naphthalene		6 / 44	1.00E-01	1.30E-02	SD4-22	0.1	Old Dutch	0.13	No-MDC< sc.value
	Phenanthrene	X	44 / 48	3.31E-01	7.90E+00	SD4-17	0.1	Old Dutch	79.00	Yes-MDC >sc.value
	Phenol	X	4 / 46	1.67E-01	2.10E-01	SD4-28	0.05	Min. of Housing	4.20	Yes-MDC >sc.value
	Pyrene	X	46 / 48	5.12E-01	1.20E+01	SD4-17	0.1	Old Dutch	120.00	Yes-MDC >sc.value
Pest/PCBs	4,4'-DDD	X	12 / 48	7.71E-03	9.00E-02	SD4-8	0.0025	Min. of Housing[a]	36.00	Yes-MDC >sc value
	4,4'-DDE	X	16 / 48	7.48E-03	8.60E-02	SD4-8	0.0025	Min. of Housing[a]	34.40	Yes-MDC >sc value
	4,4'-DDT	X	15 / 48	5.66E-03	4.50E-02	SD4-12	0.0025	Min. of Housing[a]	18.00	Yes-MDC >sc.value
	Aldrin	X	3 / 48	1.74E-03	2.80E-03	SD4-16	0.0025	Min. of Housing	1.12	Yes-MDC >sc.value
	Alpha-Chlordane		7 / 48	4.12E-03	4.40E-02	SD4-13	0.1	Old Dutch[b]	0.44	No-MDC< sc.value
	Aroclor-1254	X	22 / 48	7.76E-02	5.80E-01	SD4-12	0.02	Min. of Housing[c]	29.00	Yes-MDC >sc value
	Aroclor-1260	X	8 / 48	4.79E-02	2.50E-01	SD4-12	0.02	Min. of Housing[c]	12.50	Yes-MDC >sc value
	BHC, beta	X	3 / 48	1.77E-03	3.30E-03	SD4-44	0.001	Min. of Housing	3.30	Yes-MDC >sc.value
	Dieldrin	X	3 / 48	3.58E-03	1.80E-02	SD4-12	5.00E-04	Min. of Housing	36.00	Yes-MDC >sc.value

TABLE H.7A
Ecological Ditch Soil Screening
SEAD-4
Seneca Army Depot Activity

Class	Analyte (mg/kg)	COPC	Freq of Detect	Mean	Max Detect	Max Detect Location	Screening Value[1]	Source[2]	Screening HQ[3]	COPC?[4] / Comments
	Endosulfan I		1 / 48	1.70E-03	1.90E-03	SD4-17	0.1	Old Dutch[d]	0.02	No-MDC< sc.value
	Endosulfan II		2 / 48	3.41E-03	6.80E-03	SD4-16	0.1	Old Dutch[d]	0.07	No-Freq of Detect <5%
	Endosulfan sulfate		4 / 48	3.67E-03	1.20E-02	SD4-17	0.1	Old Dutch[d]	0.12	No-MDC< sc value
	Endrin aldehyde		5 / 48	3.91E-03	1.50E-02	SD4-36	0.1	Old Dutch	0.15	No-MDC< sc.value
	Endrin ketone	X	3 / 48	5.12E-03	6.20E-02	SD4-36	0.001	Min. of Housing[e]	62.00	Yes-MDC>sc value
	Gamma-Chlordane		9 / 48	3.95E-03	4.00E-02	SD4-13	0.1	Old Dutch[b]	0.40	No-MDC< sc.value
	Heptachlor		1 / 48	1.72E-03	2.40E-03	SD4-16	0.1	Old Dutch	0.02	No-MDC< sc.value
	Heptachlor epoxide		5 / 48	1.91E-03	1.00E-02	SD4-12	0.1	Old Dutch[f]	0.10	No-MDC< sc.value
	Methoxychlor		2 / 48	1.85E-02	6.80E-02	SD4-17	NSV	NA	--	No-Freq of Detect<5%
Nitroarom.	2-Nitrotoluene		1 / 42	6.93E-02	4.50E-01	SD4-17	NSV	NA	--	No-Freq of Detect<5%
	2-amino-4,6-Dinitrotoluene		1 / 48	6.35E-02	2.00E-01	SD4-48	NSV	NA	--	No-Freq of Detect<5%
Metals[5]	Aluminum	X	48 / 48	1.30E+04	2.21E+04	SD4-41	50	Oak Ridge	442	Yes-MDC>sc.value
	Antimony	X	26 / 48	7.58E+00	8.27E+01	SD4-6	3.5	New Dutch	24	Yes-MDC>sc.value
	Arsenic	X	47 / 48	6.49E+00	3.77E+01	SD4-27	10	Oak Ridge	3.77	Yes-MDC>sc.value
	Barium	X	48 / 48	1.15E+02	4.88E+02	SD4-28	165	New Dutch	2.96	Yes-MDC>sc.value
	Beryllium	X	48 / 48	6.62E-01	1.10E+00	SD4-28, SD4-41	1.1	New Dutch	1.00	Yes-MDC=sc.value
	Cadmium	X	26 / 48	2.51E+00	3.41E+01	SD4-7	1.6	New Dutch	21.31	Yes-MDC>sc.value
	Chromium (total)	X	48 / 48	3.53E+02	4.80E+03	SD4-42	0.4	Oak Ridge	12000	Yes-MDC>sc.value
	Chromium VI	X	1 / 5	3.72E+01	1.63E+02	SD4-43	0.4	Oak Ridge[g]	407.50	Yes-MDC>sc value
	Cobalt	X	48 / 48	1.40E+01	2.84E+01	SD4-14	20	Old Dutch	1.42	Yes-MDC>sc.value
	Copper	X	48 / 48	1.11E+02	9.88E+02	SD4-42	40	New Dutch	25	Yes-MDC>sc.value
	Iron	X	48 / 48	2.92E+04	8.79E+04	SD4-28	200	Oak Ridge	440	Yes-MDC>sc.value
	Lead	X	45 / 48	8.55E+01	3.74E+02	SD4-8	50	Old Dutch	7	Yes-MDC>sc.value
	Manganese	X	48 / 48	7.90E+02	5.48E+03	SD4-14	100	Oak Ridge	55	Yes-MDC>sc.value
	Mercury	X	29 / 48	2.08E-01	2.40E+00	SD4-42	0.1	Oak Ridge	24	Yes-MDC>sc.value
	Nickel	X	48 / 48	4.83E+01	4.53E+02	SD4-28	30	Oak Ridge	15.10	Yes-MDC>sc.value
	Selenium	X	24 / 48	1.08E+00	6.10E+00	SD4-28	0.81	New Dutch	7.53	Yes-MDC>sc.value
	Silver		24 / 48	4.87E-01	1.70E+00	SD4-6	2	Oak Ridge	0.85	No-MDC< sc.value
	Vanadium	X	48 / 48	5.36E+01	1.14E+03	SD4-28	2	Oak Ridge	570	Yes-MDC>sc.value
	Zinc	X	48 / 48	2.81E+02	1.15E+03	SD4-13	50	Oak Ridge	23	Yes-MDC>sc.value

(1) Screening value as selected from below sources

(2) Sources. "Old Dutch"-Beyer (1990). "Oak Ridge"-Oak Ridge National Laboratory (Elfroymson et al. 1997); "Canadian"-CCME (1997);
"Min of Housing"-Min. of Housing, Spatial Planning and Environment (1994). and "New Dutch"-Crommentuijn et al. (1997)

(3) HQ - Hazard Quotient. if HQ > 1. chemical is selected as a COPC and is included in Ecological Risk Assessment

(4) COPC - Chemical of Potential Concern

(5) Naturally occuring analytes calcium. sodium. potassium magnesium. and phosphorous were not included in screening

(a) Screening value for total DDT/DDD/DDE was used

(b) Screening value for chlorinated pesticides was used

(c) Screening value for total PCBs was used

(d) Screening value for Endosulfan was used

(e) Screening value for Endrin was used

(f) Screening value for Heptachlor was used

(g) Screening value for total Chromium was used

NSV - No Screening Value

MDC - Maximum Detected Concentration

TA .1.7B
Ecological Sediment Screening
Seneca / SEAD-4
Seneca Army Depot Activity

Analyte (mg/kg)	COPC	Freq of Detect	Mean	Max Detect	Max Detect Location	Screening Value	Source[1]	Screening HQ[2]	COPC?[3] / Comments
Volatile Organics									
Acetone	X	2 / 3	9.08E-02	2.10E-01	SD4-1	NSV	NA	--	Yes-No sc.value
Carbon disulfide	X	2 / 3	1.28E-02	1.20E-02	SD4-3	NSV	NA	--	Yes-No sc.value
Methyl ethyl ketone	X	1 / 3	2.57E-02	4.90E-02	SD4-1	NSV	NA	--	Yes-No sc.value
Semivolatile Organics									
4-Methylphenol	X	1 / 3	2.12E-01	1.40E-01	SD4-1	0.02	NYSDEC[g]	7.00E+00	Yes-MDC > Sc. Value
Di-n-octylphthalate		1 / 3	2.84E-01	4.60E-02	SD4-2	7.80	NYSDEC[f]	5.90E-03	No-MDC < Sc. Value
Fluoranthene		1 / 3	2.79E-01	3.10E-02	SD4-2	39.88	NYSDEC	7.77E-04	No-MDC < Sc. Value
Fluorene		1 / 3	2.78E-01	2.90E-02	SD4-2	0.31	NYSDEC	9.35E-02	No-MDC < Sc. Value
N-Nitrosodipropylamine	X	1 / 3	4.05E-01	4.10E-01	SD4-2	NSV	NA	--	Yes-No sc.value
Pyrene		1 / 3	2.77E-01	2.60E-02	SD4-2	37.58	NYSDEC	6.92E-04	No-MDC < Sc. Value
Pesticides/PCBs									
4,4'-DDE		1 / 3	1.05E-03	4.10E-03	SD4-2, 3	0.0391	NYSDEC[a]	1.05E-01	No-MDC < Sc. Value
Aroclor-1254		2 / 3	1.23E-01	2.80E-01	SD4-2	0.075	NYSDEC[b]	3.73E+00	No-MDC < Sc. Value
Endrin aldehyde		1 / 3	3.68E-03	3.00E-03	SD4-2	0.16	NYSDEC[e]	1.88E-02	No-MDC < Sc. Value
Nitroaromatics									
4-amino-2,6-Dinitrotoluene	X	1 / 3	9.00E-02	1.40E-01	SD4-2	NSV	NA	--	Yes-No sc.value
Herbicides									
2,4,5-T	X	1 / 3	9.48E-03	2.10E-02	SD4-1	NSV	NA	--	Yes-No sc.value
Metals[4]									
Aluminum	X	3 / 3	1.48E+04	1.75E+04	SD4-1	NSV	NA	--	Yes-No sc.value
Antimony	X	2 / 3	3.09E+01	5.04E+01	SD4-3	2.0	NYSDEC	2.52E+01	Yes-MDC > Sc. Value
Arsenic	X	3 / 3	6.43E+00	8.10E+00	SD4-3	6.0	NYSDEC	1.35E+00	Yes-MDC > Sc. Value
Barium	X	3 / 3	7.74E+01	1.02E+02	SD4-1	NSV	NA	--	Yes-No sc.value
Beryllium	X	3 / 3	5.90E-01	6.50E-01	SD4-3	NSV	NA	--	Yes-No sc.value
Chromium (total)	X	3 / 3	2.03E+03	3.31E+03	SD4-3	26.0	NYSDEC	1.27E+02	Yes-MDC > Sc. Value
Cobalt	X	3 / 3	1.20E+01	1.41E+01	SD4-1	NSV	NA	--	Yes-No sc.value
Copper	X	3 / 3	1.54E+03	2.64E+03	SD4-3	16.0	NYSDEC	1.65E+02	Yes-MDC > Sc. Value
Iron	X	3 / 3	2.52E+04	2.92E+04	SD4-3	20,000	1.46	1.46E+00	Yes-MDC > Sc. Value
Lead		3 / 3	1.62E+01	1.86E+01	SD4-2	31.0	NYSDEC	6.00E-01	No-MDC < Sc. Value
Manganese	X	3 / 3	4.54E-01	5.69E+02	SD4-1	460.0	NYSDEC	1.24E+00	Yes-MDC > Sc. Value
Mercury	X	3 / 3	1.20E-04	1.60E-01	SD4-2	0.15	NYSDEC	1.07E+00	Yes-MDC > Sc. Value
Nickel	X	3 / 3	3.09E-02	3.34E+01	SD4-3	16.0	NYSDEC	2.09E+00	Yes-MDC > Sc. Value
Vanadium	X	3 / 3	2.38E-02	2.82E+01	SD4-1	NSV	NA	--	Yes-No sc.value
Zinc	X	3 / 3	4.45E-01	6.30E+02	SD4-3	120.0	NYSDEC	5.25E+00	Yes-MDC > Sc. Value

Notes:

(1) Screening value as selected from below sources

NYSDEC - Technical Guidance for Screening Contaminated Sediments, Sediment Criteria for Non-polar Organic Contaminants (Table 1), benthic aquatic life chronic toxicity, and *Sediment Criteria for Metals* (Table 2), lowest effect level,

Div. of Fish, Wildlife and Marine Resources, NYSDEC January 1999. For non-polar organic contaminants, the lowest value to protect benthic aquatic life was used. Used Seneca site-specific TOC of 3.91% (SEAD-4 DF RI, January 2001, p. 4-44)

(2) Screening HQ = maximum detected concentration / screening criteria

(3) An analyte is considered a Chemical of Potential Concern (COPC) if the maximum detected concentration exceeds the screening criteria or if no screening criteria is available

(4) Naturally occuring analytes calcium, sodium, potassium, magnesium, and phosphorous were not included in screening

NSV No screening value available

MDC = maximum detected concentration

NA = not available

a - value for DDT
b - value for PCBs
e - value for endrin
f - value for bis(2-ethylhexyl)phthalate
g - value for total unchlorinated phenols

TABLE H.7

Ecological Sediment Screening
Seneca / SEAD-4
Seneca Army Depot Activity

Analyte (mg/kg)	COPC	Freq of Detect	Mean	Max Detect	Max Detect Location	Screening Value	Source[1]	Screening HQ[2]	COPC?[3] / Comments
Endosulfan I		1 / 55	1.70E-03	1.90E-03	SD4-17	0.001791	NYSDEC[d]	1.06	No-FOD < 5%
Endosulfan II		2 / 55	3.40E-03	6.80E-03	SD4-16	0.001791	NYSDEC[d]	3.80	No-FOD < 5%
Endosulfan sulfate	X	5 / 55	3.64E-03	1.20E-02	SD4-17	0.001791	NYSDEC[d]	6.70	Yes-MDC > Sc. Value
Endrin aldehyde		7 / 55	3.86E-03	1.50E-02	SD4-36	0.2388	NYSDEC[e]	0.06	No-MDC < Sc. Value
Endrin ketone		4 / 55	4.90E-03	6.20E-02	SD4-36	0.2388	NYSDEC[e]	0.26	No-MDC < Sc. Value
Gamma-Chlordane	X	9 / 55	3.66E-03	4.00E-02	SD4-13	0.001791	NYSDEC[a]	22.33	Yes-MDC > Sc. Value
Heptachlor		1 / 55	1.72E-03	2.40E-03	SD4-16	0.00597	NYSDEC	0.40	No-FOD < 5%
Heptachlor epoxide	X	5 / 55	1.86E-03	8.60E-03	SD4-12	0.00597	NYSDEC	1.44	Yes-MDC > Sc. Value
Methoxychlor		2 / 55	1.83E-02	6.80E-02	SD4-17	0.03582	NYSDEC	1.90	No-FOD < 5%
Nitroaromatics									
2-Nitrotoluene		1 / 46	6.85E-02	4.50E-01	SD4-17	NSV	NA	--	No-FOD < 5%
2-amino-4,6-Dinitrotoluene		1 / 55	6.34E-02	2.00E-01	SD4-48	NSV	NA	--	No-FOD < 5%
4-amino-2,6-Dinitrotoluene		1 / 55	6.22E-02	1.40E-01	SD4-2	NSV	NA	--	No-FOD < 5%
Herbicides									
2,4,5-T	X	1 / 9	7.29E-03	2.10E-02	SD4-1	NSV	NA	--	Yes-No sc.value
Metals[4]									
Aluminum	X	55 / 55	1.28E+04	2.21E+04	SD4-41	NSV	NA	--	Yes-No sc.value
Antimony	X	30 / 55	8.35E+00	8.27E+01	SD4-6	2	NYSDEC	41.35	Yes-MDC > Sc. Value
Arsenic	X	54 / 55	6.30E+00	3.77E+01	SD4-27	6	NYSDEC	6.28	Yes-MDC > Sc. Value
Barium	X	55 / 55	1.10E+02	4.88E+02	SD4-28	NSV	NA	--	Yes-No sc.value
Beryllium	X	55 / 55	6.40E-01	1.10E+00	SD4-28,41	NSV	NA	--	Yes-No sc value
Cadmium	X	26 / 55	2.22E+00	3.41E+01	SD4-7	0.6	NYSDEC	56.83	Yes-MDC > Sc. Value
Chromium	X	55 / 55	4.19E+02	4.80E+03	SD4-42	26	NYSDEC	184.62	Yes-MDC > Sc. Value
Cobalt	X	55 / 55	1.35E+01	2.84E+01	SD4-14	NSV	NA	--	Yes-No sc.value
Copper	X	55 / 55	1.82E+02	2.64E+03	SD4-3	16	NYSDEC	165.00	Yes-MDC > Sc. Value
Iron	X	55 / 55	2.82E+04	8.79E+04	SD4-28	NSV	NA	--	Yes-No sc value
Lead	X	52 / 55	7.69E+01	3.74E+02	SD4-8	31	NYSDEC	12.06	Yes-MDC > Sc. Value
Manganese	X	55 / 55	7.39E+02	5.48E+03	SD4-14	460	NYSDEC	11.91	Yes-MDC > Sc. Value
Mercury	X	33 / 55	1.90E-01	2.40E+00	SD4-42	0.15	NYSDEC	16.00	Yes-MDC > Sc Value
Nickel	X	55 / 55	4.55E+01	4.53E+02	SD4-28	16	NYSDEC	28.31	Yes-MDC > Sc Value
Selenium	X	24 / 55	9.70E-01	6.10E+00	SD4-28	NSV	NA	--	Yes-No sc.value
Silver	X	25 / 55	5.00E-01	1.70E+00	SD4-6	1	NYSDEC	1.70	Yes-MDC > Sc Value
Vanadium	X	55 / 55	4.93E+01	1.14E+03	SD4-28	NSV	NA	--	Yes-No sc.value
Zinc	X	55 / 55	2.78E+02	1.15E+03	SD4-13	120	NYSDEC	9.58	Yes-MDC > Sc Value

Notes:

(1) Screening value as selected from below sources

(2) Sources include, in order of preference

- NYSDEC - Technical Guidance for Screening Contaminated Sediments, *Sediment Criteria for Non-polar Organic Contaminants* (Table 1), benthic aquatic life chronic toxicity and *Sediment Criteria for Metals* (Table 2), lowest effect level, Div of Fish, Wildlife and Marine Resources, NYSDEC January 1999 Used site specific TOC of 5.97%
- Region 4 = *Region 4 Waste Management Division Sediment Screening Values for Hazardous Waste Sites* (Table 3), screening value, USEPA August 11, 1999

(2) Screening HQ = maximum detected concentration / screening criteria.

(3) An analyte is considered a Chemical of Potential Concern (COPC) if the maximum detected concentration exceeds the screening criteria or if no screening criteria is available.

(4) Naturally occuring analytes calcium, sodium, potassium, magnesium, and phosphorous were not included in screening

FOD = frequency of detects
MDC = maximum detected concentration
NA = not available

a - value for chlordane
b - value for PCBs
c - value for hexachlorocyclohexanes
d - value for endosulfan
e - value for endrin
f - value for bis(2-ethylhexyl)phthalate
g - value for total unchlorinated phenols

TABLE H.8

Ecological Surface Water Screening
Seneca / SEAD-4
Seneca Army Depot Activity

Analyte (mg/L)	COPC	Freq of Detect	Mean	Max Detect	Max Detect Location	Screening Value	Source[1]	Screening HQ[2]	COPC?[3] / Comments
Volatile Organics									
Acetone		4 / 10	3.55E-03	4.00E-03	SW4-50	5.00E-02	NY AWQS/g	0.08	No-MDC < Sc. Value
Semivolatile Organics									
Anthracene		1 / 10	1.81E-03	7.00E-05	SW4-13	3.80E-03	NY AWQS/g	0.02	No-MDC < Sc. Value
Benzo(a)anthracene	X	1 / 10	1.82E-03	1.80E-04	SW4-13	3.00E-05	NY AWQS/g	6.00	Yes-MDC > Sc. Value
Benzo(a)pyrene	X	1 / 10	1.82E-03	1.50E-04	SW4-13	NSV	NA	--	Yes-No sc.value
Benzo(b)fluoranthene	X	1 / 10	1.82E-03	1.50E-04	SW4-13	NSV	NA	--	Yes-No sc.value
Benzo(ghi)perylene	X	1 / 10	1.81E-03	7.00E-05	SW4-13	NSV	NA	--	Yes-No sc.value
Benzo(k)fluoranthene	X	1 / 10	1.82E-03	1.60E-04	SW4-13	NSV	NA	--	Yes-No sc.value
Bis(2-Ethylhexyl)phthalate		3 / 10	1.77E-03	3.60E-04	SW4-50	6.00E-04	NY AWQS/s	0.60	No-MDC < Sc. Value
Butylbenzylphthalate		1 / 10	1.83E-03	2.90E-04	SW4-50	2.20E-02	Reg 4	0.01	No-MDC < Sc. Value
Carbazole	X	1 / 10	1.81E-03	5.00E-05	SW4-13	NSV	NA	--	Yes-No sc.value
Chrysene	X	1 / 10	1.82E-03	1.80E-04	SW4-13	NSV	NA	--	Yes-No sc.value
Fluoranthene		2 / 10	1.82E-03	4.10E-04	SW4-13	3.98E-02	Reg 4	0.01	No-MDC < Sc. Value
Indeno(1,2,3-cd)pyrene	X	1 / 10	1.81E-03	7.00E-05	SW4-13	NSV	NA	--	Yes-No sc.value
Phenanthrene		1 / 10	1.84E-03	3.50E-04	SW4-13	4.50E-02	NY AWQS/g	0.01	No-MDC < Sc. Value
Pyrene		2 / 10	1.80E-03	2.80E-04	SW4-13	4.60E-03	NY AWQS/g	0.06	No-MDC < Sc. Value
Pesticides/PCBs									
Alpha-Chlordane	X	1 / 7	3.28E-06	7.70E-06	SW4-13	4.30E-06	Reg 4[a]	1.79	Yes-MDC > Sc. Value
Beta-BHC		1 / 7	2.77E-06	4.10E-06	SW4-51	5.00E+01	Reg 4	0.00	No-MDC < Sc. Value
Gamma-Chlordane	X	1 / 7	3.10E-06	6.40E-06	SW4-13	4.30E-06	Reg 4[a]	1.49	Yes-MDC > Sc. Value
Nitroaromatics									
1,3-Dinitrobenzene	X	1 / 10	1.10E-04	7.00E-05	4Pipe	NSV	NA	--	Yes-No sc.value
Metals[4]									
Aluminum	X	10 / 10	8.74E-01	7.35E+00	SW4-13	1.00E-01	NY AWQS/s	73.50	Yes-MDC > Sc. Value
Antimony		5 / 10	8.65E-03	6.60E-03	SW4-13	1.60E-01	Reg 4	0.04	No-MDC < Sc. Value
Arsenic		1 / 10	1.27E-03	4.20E-03	SW4-13	1.50E-01	NY AWQS/s	0.03	No-MDC < Sc. Value
Barium	X	10 / 10	6.56E-02	2.13E-01	SW4-13	NSV	NA	--	Yes-No sc.value
Cadmium	X	6 / 10	1.86E-03	1.16E-02	SW4-13	2.09E-03	NY AWQS/s[5]	5.54	Yes-MDC > Sc. Value
Chromium		3 / 10	8.08E-03	4.48E-02	SW4-2	7.41E-02	NY AWQS/s[5]	0.60	No-MDC < Sc. Value

TABLE H.8

Ecological Surface Water Screening
Seneca / SEAD-4
Seneca Army Depot Activity

Analyte (mg/L)	COPC	Freq of Detect	Mean	Max Detect	Max Detect Location	Screening Value	Source[1]	Screening HQ[2]	COPC?[3] / Comments
Cobalt	X	1 / 10	3.15E-03	1.96E-02	SW4-13	5.00E-03	NY AWQS/s	3.92	Yes-MDC > Sc. Value
Copper	X	9 / 10	2.29E-02	9.70E-02	SW4-13	8.96E-03	NY AWQS/s[5]	10.83	Yes-MDC > Sc. Value
Iron	X	10 / 10	2.02E+00	1.66E+01	SW4-13	3.00E-01	NY AWQS/s	55.33	Yes-MDC > Sc. Value
Lead	X	4 / 10	1.35E-02	1.17E-01	SW4-13	3.78E-03	NY AWQS/s[5]	30.92	Yes-MDC > Sc. Value
Manganese	X	10 / 10	3.15E-01	2.35E+00	SW4-13	NSV	NA	--	Yes-No sc.value
Nickel		2 / 10	4.60E-03	3.26E-02	SW4-13	5.20E-02	NY AWQS/s[5]	0.63	No-MDC < Sc. Value
Silver	X	2 / 10	1.37E-03	1.70E-03	SW4-19	1.00E-04	NY AWQS/s	17.00	Yes-MDC > Sc. Value
Thallium		1 / 10	1.73E-03	2.40E-03	4Pipe	8.00E-03	NY AWQS/s	0.30	No-MDC < Sc. Value
Vanadium	X	4 / 10	4.10E-03	2.25E-02	SW4-13	1.40E-02	NY AWQS/s	1.61	Yes-MDC > Sc. Value
Zinc	X	10 / 10	6.50E-02	4.92E-01	SW4-13	8.26E-02	NY AWQS/s[5]	5.95	Yes-MDC > Sc. Value

Notes:

(1) Surface water screening values are, in order of preference:

- NY AWQS = *Ambient Water Quality Standards and Guidance Values*, New York, Division of Water Technical and Operational Guidance Series (1.1.1), June 1998.
  Where multiple values were available, the lesser of freshwater Fish (propagation or survival) vs Wildlife types was used.
  s = standard, g = guidance value
- Region 4 = *Region 4 Waste Management Division Freshwater Surface Water Screening Values for Hazardous Waste Sites*, Table 1, chronic, USEPA August 11, 1999

(2) Screening HQ = maximum detected concentration / screening criteria.

(3) An analyte is considered a Chemical of Potential Concern (COPC) if the maximum detected concentration exceeds the screening criteria or if no screening criteria is available.

(4) Naturally occuring analytes calcium, sodium, potassium, magnesium, and phosphorous were not included in screening.

(5) Hardness dependent. Default value of 100 mg/L as CaCO3.

(a) Value for chlordane

MDC = maximum detected concentration

NA = not available

NSV = no screening value

TABLE H.9
Ecological Chemicals of Potential Concern (COPCs)
SEAD-4
Seneca Army Depot Activity

	Primary Expos./Effect[1]		Surface Soils		Mixed Soils	Sediment		Surface Water	
Analyte	Direct	Bioaccum./ Biomagn.	Maximum Concentration (mg/kg)	Max Detect Location	Maximum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Max Detect Location	Maximum Concentration (mg/kg)	Max Detect Location
Volatile Organics									
Acetone	+	--	1.40E-01	SS4-81	same[a]	2.10E-01	SD4-1	--	--
Carbon disulfide	+	--	--	--	--	1.80E-02	SD4-9	--	--
Methylene chloride	+	--	--	--	--	1.10E-02	SD4-8	--	--
Semivolatile Organics									
2-Methylnaphthalene	+	--	3.50E-02	SB4-27	2.60E-01	--	--	--	--
4-Methylphenol	--	--	--	--	--	1.40E-01	SD4-1	--	--
Acenaphthene	+	--	7.80E-02	SB4-27	8.80E-02	--	--	--	--
Acenaphthylene	+	--	5.19E-02	SS4-55	1.70E-01	--	--	--	--
Anthracene	+	--	1.10E-01	SS4-54	3.40E-01	--	--	--	--
Benzo(a)anthracene	+	--	5.60E-01	SS4-55	1.10E+00	5.90E+00	SD4-17	1.80E-04	SW4-13
Benzo(a)pyrene	++	--	4.40E-01	SS4-55	8.80E-01	5.10E+00	SD4-17	1.50E-04	SW4-13
Benzo(b)fluoranthene	+	--	8.30E-01	SS4-55	same	4.80E+00	SD4-17	1.50E-04	SW4-13
Benzo(ghi)perylene	+	--	3.00E-01	SS4-55	same	3.20E+00	SD4-17	7.00E-05	SW4-13
Benzo(k)fluoranthene	+	--	5.10E-01	SS4-54	8.90E-01	5.70E+00	SD4-17	1.60E-04	SW4-13
Bis(2-Ethylhexyl)phthalate	+	++	1.30E+01	SS4-69	same	4.20E+01	SD4-29	--	--
Butylbenzylphthalate			7.10E+00	SB4-14	same	--	--	--	--
Carbazole			1.20E-01	SS4-54	1.60E-01	5.00E-01	SD4-17	5.00E-05	SW4-13
Chrysene	+	--	5.70E-01	SS4-55	1.00E+00	6.20E+00	SD4-17	1.80E-04	SW4-13
Di-n-octylphthalate			4.40E-02	SB4-13	same	--	--	--	--
Dibenz(a,h)anthracene	+	--	1.25E-01	SS4-55	same	1.20E+00	SD4-17	--	--
Dibenzofuran			5.80E-02	SB4-27	same	2.30E-01	SD4-17	--	--
Fluoranthene	+	--	1.05E+00	SS4-55	2.40E+00	--	--	--	--
Fluorene	+	--	7.40E-02	SB4-16, SB4-27	3.30E-01	6.60E-01	SD4-17	--	--
Indeno(1,2,3-cd)pyrene	+	--	2.70E-01	SS4-55	same	3.10E+00	SD4-17	7.00E-05	SW4-13
Naphthalene	+	--	--	--	1.30E-01	--	--	--	--
Phenanthrene	+	--	6.40E-01	SS4-54	1.40E+00	7.90E+00	SD4-17	--	--
Phenol	--	--				2.10E-01	SD4-28	--	--
Pyrene	+	--	9.80E-01	SS4-55	1.80E+00	--	--	--	--
Pesticides/PCBs									
4,4'-DDD	+	++	1.90E-01	SS4-54	same	9.00E-02	SD4-8	--	--
4,4'-DDE	+	++	1.60E-01	SS4-54	same	8.60E-02	SD4-8	--	--
4,4'-DDT	++	++	7.60E-01	SS4-54	same	--	--	--	--
Aldrin	+	++	--	--	--	2.80E-03	SD4-16	--	--
Alpha-Chlordane	+	+	--	--	--	4.40E-02	SD4-13	7.70E-06	SW4-13
Aroclor-1254	--	++	3.10E-01	MW4-11, SS4-69	1.60E+00	--	--		
Beta-BHC	+	++	7.60E-03	SS4-77	same	--	--	--	--

TABLE H.9

Ecological Chemicals of Potential Concern (COPCs)
SEAD-4
Seneca Army Depot Activity

Analyte	Surface Soils		Mixed Soils	Ditch Soils		Sediment		Surface Water	
	Maximum Concentration (mg/kg)	Max Detect Location	Maximum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Max Detect Location	Maximum Concentration (mg/kg)	Max Detect Location	Maximum Concentration (mg/kg)	Max Detect Location
Volatile Organics									
Acetone	1.40E-01	SS4-81	same	1.80E-01	SD4-8	2.10E-01	SD4-1	--	--
Carbon disulfide	--	--	--	--	--	1.20E-02	SD4-3	--	--
Methyl ethyl ketone	--	--	--	--	--	4.90E-02	SD4-1	--	--
Semivolatile Organics									
2-Methylnaphthalene	3.50E-02	SB4-27	2.60E-01	3.10E-02	SD4-22	--	--	--	--
4-Methylphenol	--	--	--	2.30E-02	SD4-33	1.40E-01	SD4-1	--	--
Acenaphthene	7.80E-02	SB4-27	8.80E-02	6.10E-01	SD4-17	--	--	--	--
Acenaphthylene	5.19E-02	SS4-55	1.70E-01	1.30E-01	SD4-36	--	--	--	--
Anthracene	1.10E-01	SS4-54	3.40E-01	1.70E+00	SD4-17	--	--	--	--
Benzo(a)anthracene	5.60E-01	SS4-55	1.10E+00	5.90E+00	SD4-17	--	--	1.80E-04	SW4-13
Benzo(a)pyrene	4.40E-01	SS4-55	8.80E-01	5.10E+00	SD4-17	--	--	1.50E-04	SW4-13
Benzo(b)fluoranthene	8.30E-01	SS4-55	same	4.80E+00	SD4-17	--	--	1.50E-04	SW4-13
Benzo(ghi)perylene	3.00E-01	SS4-55	same	3.20E+00	SD4-17	--	--	7.00E-05	SW4-13
Benzo(k)fluoranthene	5.10E-01	SS4-54	8.90E-01	5.70E+00	SD4-17	--	--	1.60E-04	SW4-13
Bis(2-Ethylhexyl)phthalate	1.30E+01	SS4-69	same	4.20E+01	SD4-29	--	--	--	--
Butylbenzylphthalate	7.10E+00	SB4-14	same	1.60E-02	SD4-32	--	--	--	--
Carbazole	1.20E-01	SS4-54	1.60E-01	5.00E-01	SD4-17	--	--	5.00E-05	SW4-13
Chrysene	5.70E-01	SS4-55	1.00E+00	6.20E+00	SD4-17	--	--	1.80E-04	SW4-13
Di-n-octylphthalate	4.40E-02	SB4-13	same	--	--	--	--	--	--
Dibenz(a,h)anthracene	1.25E-01	SS4-55	same	1.20E+00	SD4-17	--	--	--	--
Dibenzofuran	5.80E-02	SB4-27	same	2.30E-01	SD4-17	--	--	--	--
Fluoranthene	1.05E+00	SS4-55	2.40E+00	1.60E+01	SD4-17	--	--	--	--
Fluorene	7.40E-02	SB4-16, SB4-27	3.30E-01	6.60E-01	SD4-17	--	--	--	--
Indeno(1,2,3-cd)pyrene	2.70E-01	SS4-55	same	3.10E+00	SD4-17	--	--	7.00E-05	SW4-13
Naphthalene	--	--	1.30E-01	--	--	--	--	--	--
Phenanthrene	6.40E-01	SS4-54	1.40E+00	7.90E+00	SD4-17	--	--	--	--
Phenol				2.10E-01	SD4-28	--	--	--	--
Pyrene	9.80E-01	SS4-55	1.80E+00	1.20E+01	SD4-17	--	--	--	--
N-Nitrosodipropylamine	--	--	--	--	--	4.10E-01	SD4-2	--	--
Pesticides/PCBs									
4,4'-DDD	1.90E-01	SS4-54	same	9.00E-02	SD4-8	--	--	--	--
4,4'-DDE	1.60E-01	SS4-54	same	8.60E-02	SD4-8	--	--	--	--
4,4'-DDT	7.60E-01	SS4-54	same	4.50E-02	SD4-12	--	--	--	--
Aldrin	--	--	--	2.80E-03	SD4-16	--	--	--	--
Alpha-Chlordane	--	--	--	--	--	--	--	7.70E-06	SW4-13

TABLE H.9

Ecological Chemicals of Potential Concern (COPCs)
SEAD-4
Seneca Army Depot Activity

	Surface Soils		Mixed Soils	Ditch Soils		Sediment		Surface Water	
Analyte	Maximum Concentration (mg/kg)	Max Detect Location	Maximum Concentration (mg/kg)	Maximum Concentration (mg/kg)	Max Detect Location	Maximum Concentration (mg/kg)	Max Detect Location	Maximum Concentration (mg/kg)	Max Detect Location
Aroclor-1254	3.10E-01	W4-11, SS4-6	1.60E+00	5.80E-01	SD4-12	--	--		
Aroclor-1260				2.50E-01	SD4-12	--	--		
BHC, beta	7.60E-03	SS4-77	same	3.30E-03	SD4-44	--	--	--	--
Dieldrin	7.40E-03	MW4-11	--	1.80E-02	SD4-12	--	--	--	--
Endrin ketone	--	--	--	6.20E-02	SD4-36	--	--	--	--
Gamma-Chlordane	--	--	--	--	--	--	--	6.40E-06	SW4-13
Nitroaromatics									
1,3-Dinitrobenzene	--	--	--	--	--	--	--	7.00E-05	4Pipe
4-Amino-2,6-Dinitrotoluene	--	--	--	--	--	1.40E-01	SD4-2	--	--
Herbicides									
2,4,5-T	--	--	--	--	--	2.10E-02	SD4-1	--	--
Metals									
Aluminum				b		1.75E+04	SD4-1	7.35E+00	SW4-13
Antimony	1.48E+02	SB4-25	b	8.27E+01	SD4-6	5.04E+01	SD4-3	--	--
Arsenic	b		b	b		8.10E+00	SD4-3	--	--
Barium	b		b	b		1.02E+02	SD4-1	2.13E-01	SW4-13
Beryllium	b		b	b		6.50E-01	SD4-3	--	--
Cadmium	b		b	3.41E+01	SD4-7	--	--	1.16E-02	SW4-13
Chromium (total)	1.86E+04	SB4-25	same	4.80E+03	SD4-42	3.31E+03	SD4-3	--	--
Chromium VI	1.47E+01	SS4-9	same	1.63E+02	SD4-43	--	--	--	--
Cobalt	b		b	b		1.41E+01	SD4-1	1.96E-02	SW4-13
Copper	7.33E+03	SB4-25	same	9.88E+02	SD4-42	2.64E+03	SD4-3	9.70E-02	SW4-13
Iron	b		b	8.79E+04	SD4-28	2.92E+04	SD4-3	1.66E+01	SW4-13
Lead	9.28E+03	SB4-14	same	b		--	--	1.17E-01	SW4-13
Manganese	b		b	b		5.69E+02	SD4-1	2.35E+00	SW4-13
Mercury	1.20E+00	SB4-25	b	2.40E+00	SD4-42	1.60E-01	SD4-2	--	--
Nickel	b		b	b		3.34E+01	SD4-3	--	--
Selenium	b		b	b		--	--	--	--
Silver	--	--	--	--	--	--	--	1.70E-03	SW4-19
Thallium	5.40E+00	SB4-25	same	--	--	--	--	--	--
Vanadium	b		b	1.14E+03	SD4-28	2.82E+01	SD4-1	2.25E-02	SW4-13
Zinc	2.02E+03	SB4-25	same	1.15E+03	SD4-13	6.30E+02	SD4-3	4.92E-01	SW4-13

same - Maximum concentration in mixed soils is the same as in surface soils

b - Not Identified as COPC because site average is less than twice background average

-- analyte is not a COPC in this medium

TABLE H.10
NOAEL Toxicity Reference Values - Birds
SEAD 4
Seneca Army Depot Activity

Constituent	Test Organism	Endpoint/Duration/Effect	Source	Effect Dose (mg/kg/day)	Endpoint CF[1]	Study Duration CF[1]	Total CF[1]	TRV[2] (mg/kg/day)
Volatiles								
Acetone	Japanese quail	NOAEL, 14-day old, diet, 5 days, survival	Hill and Camardese 1986	6.10E+03	1	10	10	6.10E+02
PAHs								
Acenaphthene	mallard	LOAEL, diet, 7 months, physiological (mixed PAHs used as surrogate)	Eisler, 1987	2.85E+02	10	1	10	2.85E+01
Acenaphthylene	mallard	LOAEL, diet, 7 months, physiological (mixed PAHs used as surrogate)	Eisler, 1987	2.85E+02	10	1	10	2.85E+01
Anthracene	mallard	LOAEL, diet, 7 months, physiological (mixed PAHs used as surrogate)	Eisler, 1987	2.85E+02	10	1	10	2.85E+01
Benzo(a)anthracene	mallard	LOAEL, diet, 7 months, physiological (mixed PAHs used as surrogate)	Eisler, 1987	2.85E+02	10	1	10	2.85E+01
Benzo(a)pyrene	mallard	LOAEL, diet, 7 months, physiological (mixed PAHs used as surrogate)	Eisler, 1987	2.85E+02	10	1	10	2.85E+01
Benzo(b)fluoranthene	mallard	LOAEL, diet, 7 months, physiological (mixed PAHs used as surrogate)	Eisler, 1987	2.85E+02	10	1	10	2.85E+01
Benzo(ghi)perylene	mallard	LOAEL, diet, 7 months, physiological (mixed PAHs used as surrogate)	Eisler, 1987	2.85E+02	10	1	10	2.85E+01
Benzo(k)fluoranthene	mallard	LOAEL, diet, 7 months, physiological (mixed PAHs used as surrogate)	Eisler, 1987	2.85E+02	10	1	10	2.85E+01
Chrysene	mallard	LOAEL, diet, 7 months, physiological (mixed PAHs used as surrogate)	Eisler, 1987	2.85E+02	10	1	10	2.85E+01
Dibenz(a,h)anthracene	mallard	LOAEL, diet, 7 months, physiological (mixed PAHs used as surrogate)	Eisler, 1987	2.85E+02	10	1	10	2.85E+01
Fluoranthene	mallard	LOAEL, diet, 7 months, physiological (mixed PAHs used as surrogate)	Eisler, 1987	2.85E+02	10	1	10	2.85E+01
Fluorene	mallard	LOAEL, diet, 7 months, physiological (mixed PAHs used as surrogate)	Eisler, 1987	2.85E+02	10	1	10	2.85E+01
Indeno(1,2,3-cd)pyrene	mallard	LOAEL, diet, 7 months, physiological (mixed PAHs used as surrogate)	Eisler, 1987	2.85E+02	10	1	10	2.85E+01
2-Methylnaphthalene	mallard	LOAEL, diet, 7 months, physiological (mixed PAHs used as surrogate)	Eisler, 1987	2.85E+02	10	1	10	2.85E+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
Pyrene	mallard	LOAEL, diet, 7 months, physiological (mixed PAHs used as surrogate)	Eisler, 1987	2.85E+02	10	1	10	2.85E+01
Semi-volatiles								
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
Butylbenzylphthalate		No data available						No data
Carbazole		No data available						No data
Di-n-octylphthalate		No data available						No data
Dibenzofuran	red-winged blackbird	LC50, diet, 18 hours, survival	Schafer et al. 1983.	2.18E+01	10	10	100	2.18E-01
4-Methylphenol	red-winged blackbird	LD50, single gavage, survival	Schafer et al. 1983.	2.06E+01	10	10	100	2.06E-01
Phenol		No data available						no data
PCBs								
Aroclor-1254	ring-necked	NOAEL, oral gelatin capsule, 17 wks. crit. lifestage, reproduction	Sample et al. 1996	1.80E-01	1	1	1	1.80E-01
Aroclor-1260	ring-necked pheasant	NOAEL, oral gelatin capsule, 17 wks. crit. lifestage, reproduction (Aroclor-1254 used as surrogate)	Sample et al. 1996	1.80E-01	1	1	1	1.80E-01
Pesticides								
4,4'-DDD	Amer. kestrel	LOAEL, diet, 2 years, reproduction (DDE as surrogate)	Matsumura 1985	2.20E-01	10	1	10	2.20E-02

TABLE H.10
NOAEL Toxicity Reference Values - Birds
SEAD 4
Seneca Army Depot Activity

Constituent	Test Organism	Endpoint/Duration/Effect	Source	Effect Dose (mg/kg/day)	Endpoint CF[1]	Study Duration CF[1]	Total CF[1]	TRV[2] (mg/kg/day)
4,4'-DDD	brown pelican	NOAEL, diet, 5 yrs, reproduction (used DDT)	Sample et al., 1996	2.80E-03	1	1	1	2.80E-03
4,4'-DDE	Amer. kestrel	LOAEL, diet, 2 years, reproduction	Matsumura 1985	2.20E-01	10	1	10	2.20E-02
4,4'-DDE	brown pelican	NOAEL, diet, 5 yrs, reproduction (used DDT)	Sample et al., 1996	2.80E-03	1	1	1	2.80E-03
4,4'-DDT	Amer. kestrel	LOAEL, diet, 2 years, reproduction (DDE as surrogate)	Matsumura 1985	2.20E-01	10	1	10	2.20E-02
4,4'-DDT	brown pelican	NOAEL, diet, 5 yrs, reproduction	Sample et al., 1996	2.80E-03	1	1	1	2.80E-03
Aldrin	mallard	LOAEL, diet, 30 days, cumulative toxicity	Hudson et al. 1984	5.00E+00	10	1	10	5.00E-01
BHC, beta	Japanese quail	NOAEL, diet, 90 days critical lifestage, reproduction (BHC-mixed isomers)	Sample et al. 1996	5.60E-01	1	1	1	5.60E-01
Dieldrin	barn owl	NOAEL, diet, 2 yr. crit. lifestage, reproduction.	Sample et al. 1996	7.70E-02	1	1	1	7.70E-02
Endrin ketone	Screech owl	NOAEL, diet, 783 d and crit. lifestage, reproduction (endrin used as surrogate)	Sample et al. 1996	1.00E-02	1	1	1	1.00E-02
Metals								
Antimony		No data available						No data
Barium	chicken	NOAEL, diet, 4 wks. (from 1-day old chicks) mortality	Sample et al. 1996	2.08E+02	1	10	10	2.08E+01
Cadmium	mallard	NOAEL, diet, 90 days, reproduction	Sample et al. 1996	1.45E+00	1	1	1	1.45E+00
Chromium (total)	black duck	NOAEL, diet, 10 mos. crit. lifestage, reproduction (Cr+3 as surrogate)	Sample et al. 1996	1.00E+00	1	1	1	1.00E+00
Chromium VI	black duck	NOAEL, diet, 10 mos. crit. lifestage, reproduction (Cr+3 as surrogate)	Sample et al. 1996	1.00E+00	1	1	1	1.00E+00
Copper	chicken	NOAEL, diet, 10 wks, growth, mortality	Sample et al. 1996	4.70E+01	1	1	1	4.70E+01
Iron		No data available						
Lead	Amer. kestrel	NOAEL, diet, 7 mos. crit. lifestage, reproduction	Sample et al. 1996	3.85E+00	1	1	1	3.85E+00
Lead	Japanese quail	NOAEL, diet, 12 wks, reproduction	Sample et al., 1996	1.13E+00	1	1	1	1.13E+00
Mercury	Amer. kestrel	NOAEL, diet, 3 month, eggshell thickness (Dimethylmercury as surrogate)	Peakall, et al. 1972	2.86E+00	1	1	1	2.86E+00
Mercury	Japanese quail	NOAEL, diet, 1 year, reproduction	Sample et al. 1996	4.50E-01	1	1	1	4.50E-01
Mercury	mallard	LOAEL, diet, 3 generations, reproduction (methyl mercury as surrogate)	Sample et al. 1996	6.40E-02	10	1	10	6.40E-03
Nickel	mallard	NOAEL, diet, ducklings, 90 days, mortality, growth, behavior	Sample et al. 1996	7.74E+01	1	1	1	7.74E+01
Thallium	European starling	LD50, single gavage, survival	Schafer et al. 1983.	9.50E+00	10	10	100	9.50E-02
Vanadium	mallard	NOAEL, diet, 12 wks., mortality, body wt, blood chemistry	Sample et al. 1996	1.14E+01	1	1	1	1.14E+01
Zinc	chicken	NOAEL, diet, 44 wks. crit. lifestage, reproduction	Sample et al. 1996	1.45E+01	1	1	1	1.45E+01

1 CF = conversion factor.

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

TABLE H.11
LOAEL Toxicity Reference Values - Birds
SEAD 4
Seneca Army Depot Activity

Constituent	Test Organism	Endpoint/Duration/Effect	Source	Effect Dose (mg/kg/day)	Endpoint CF[1]	Study Duration CF[1]	Total CF[1]	TRV[2] (mg/kg/day)
Volatiles								
Acetone	Japanese quail	NOAEL, 14-day old, diet, 5 days, survival	Hill and Camardese 1986	6.10E+03	1	10	10	6.10E+02
PAHs								
Acenaphthene	mallard	LOAEL, diet, 7 months, physiological (mixed PAHs used as surrogate)	Eisler, 1987	2.85E+02	1	1	1	2.85E+02
Acenaphthylene	mallard	LOAEL, diet, 7 months, physiological (mixed PAHs used as surrogate)	Eisler, 1987	2.85E+02	1	1	1	2.85E+02
Anthracene	mallard	LOAEL, diet, 7 months, physiological (mixed PAHs used as surrogate)	Eisler, 1987	2.85E+02	1	1	1	2.85E+02
Benzo(a)anthracene	mallard	LOAEL, diet, 7 months, physiological (mixed PAHs used as surrogate)	Eisler, 1987	2.85E+02	1	1	1	2.85E+02
Benzo(a)pyrene	mallard	LOAEL, diet, 7 months, physiological (mixed PAHs used as surrogate)	Eisler, 1987	2.85E+02	1	1	1	2.85E+02
Benzo(b)fluoranthene	mallard	LOAEL, diet, 7 months, physiological (mixed PAHs used as surrogate)	Eisler, 1987	2.85E+02	1	1	1	2.85E+02
Benzo(ghi)perylene	mallard	LOAEL, diet, 7 months, physiological (mixed PAHs used as surrogate)	Eisler, 1987	2.85E+02	1	1	1	2.85E+02
Benzo(k)fluoranthene	mallard	LOAEL, diet, 7 months, physiological (mixed PAHs used as surrogate)	Eisler, 1987	2.85E+02	1	1	1	2.85E+02
Chrysene	mallard	LOAEL, diet, 7 months, physiological (mixed PAHs used as surrogate)	Eisler, 1987	2.85E+02	1	1	1	2.85E+02
Dibenz(a,h)anthracene	mallard	LOAEL, diet, 7 months, physiological (mixed PAHs used as surrogate)	Eisler, 1987	2.85E+02	1	1	1	2.85E+02
Fluoranthene	mallard	LOAEL, diet, 7 months, physiological (mixed PAHs used as surrogate)	Eisler, 1987	2.85E+02	1	1	1	2.85E+02
Fluorene	mallard	LOAEL, diet, 7 months, physiological (mixed PAHs used as surrogate)	Eisler, 1987	2.85E+02	1	1	1	2.85E+02
Indeno(1,2,3-cd)pyrene	mallard	LOAEL, diet, 7 months, physiological (mixed PAHs used as surrogate)	Eisler, 1987	2.85E+02	1	1	1	2.85E+02
2-Methylnaphthalene	mallard	LOAEL, diet, 7 months, physiological (mixed PAHs used as surrogate)	Eisler, 1987	2.85E+02	1	1	1	2.85E+02
Naphthalene	mallard	LOAEL, diet, 7 months, physiological (mixed PAHs used as surrogate)	Eisler, 1987	2.85E+02	1	1	1	2.85E+02
Phenanthrene	mallard	LOAEL, diet, 7 months, physiological (mixed PAHs used as surrogate)	Eisler, 1987	2.85E+02	1	1	1	2.85E+02
Pyrene	mallard	LOAEL, diet, 7 months, physiological (mixed PAHs used as surrogate)	Eisler, 1987	2.85E+02	1	1	1	2.85E+02
Semi-volatiles								
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
Butylbenzylphthalate		No data available						No data
Carbazole		No data available						No data
Di-n-octylphthalate		No data available						No data
Dibenzofuran	red-winged blackbird	LC50, diet, 18 hours, survival	Schafer et al. 1983.	2.18E+01	10	10	100	2.18E-01
4-Methylphenol	red-winged blackbird	LD50, single gavage, survival	Schafer et al. 1983.	2.06E+01	10	10	100	2.06E-01
Phenol		No data available						No data
PCBs								
Aroclor-1254	ring-necked	LOAEL, oral gelatin capsule, 17 wks. crit. lifestage, reproduction	Sample et al. 1996	1.80E+00	1	1	1	1.80E+00
Aroclor-1260	ring-necked	LOAEL, oral gelatin capsule, 17 wks. crit. lifestage, reproduction	Sample et al. 1996	1.80E+00	1	1	1	1.80E+00
Pesticides								
4,4'-DDD	Amer. kestrel	LOAEL, diet, 2 years, reproduction (DDE as surrogate)	Matsumura 1985	2.20E-01	1	1	1	2.20E-01

TABLE H.11
LOAEL Toxicity Reference Values - Birds
SEAD 4
Seneca Army Depot Activity

Constituent	Test Organism	Endpoint/Duration/Effect	Source	Effect Dose (mg/kg/day)	Endpoint CF[1]	Study Duration CF[1]	Total CF[1]	TRV[2] (mg/kg/day)
4,4'-DDD	brown pelican	LOAEL, diet, 5 yrs, reproduction (used DDT)	Sample et al., 1996	2.80E-02	1	1	1	2.80E-02
4,4'-DDE	Amer. kestrel	LOAEL, diet, 2 years, reproduction	Matsumura 1985	2.20E-01	1	1	1	2.20E-01
4,4'-DDE	brown pelican	NOAEL, diet, 5 yrs, reproduction (used DDT)	Sample et al., 1996	2.80E-02	1	1	1	2.80E-02
4,4'-DDT	Amer. kestrel	LOAEL, diet, 2 years, reproduction (DDE as surrogate)	Matsumura 1985	2.20E-01	1	1	1	2.20E-01
4,4'-DDT	brown pelican	NOAEL, diet, 5 yrs, reproduction	Sample et al., 1996	2.80E-02	1	1	1	2.80E-02
Aldrin	mallard	LOAEL, diet, 30 days, cumulative toxicity	Hudson et al 1984	5.00E+00	1	10	10	5.00E-01
BHC, beta	Japanese quail	LOAEL, diet, 90 days critical lifestage, reproduction (BHC-mixed isomers)	Sample et al. 1996	2.25E+00	1	1	1	2.25E+00
Dieldrin	barn owl	NOAEL, diet, 2 yr. crit. lifestage, reproduction.	Sample et al. 1996	7.70E-02	1	1	1	7.70E-02
Endrin ketone	Screech owl	LOAEL, diet, 783 d and crit. lifestage, reproduction (endrin used as surrogate)	Sample et al. 1996	1.00E-01	1	1	1	1.00E-01
Metals								
Antimony		No data available						No data
Barium	chicken	LOAEL, diet, 4 wks. (from 1-day old chicks) mortality	Sample et al. 1996	4.16E+02	1	10	10	4.16E+02
Cadmium	mallard	LOAEL, diet, 90 days, reproduction	Sample et al. 1996	2.00E+01	1	1	1	2.00E+01
Chromium (total)	black duck	LOAEL, diet, 10 mos. crit. lifestage, reproduction (Cr+3 as surrogate)	Sample et al. 1996	5.00E+00	1	1	1	5.00E+00
Chromium VI	black duck	LOAEL, diet, 10 mos. crit. lifestage, reproduction (Cr+3 as surrogate)	Sample et al. 1996	5.00E+00	1	1	1	5.00E+00
Copper	chicken	LOAEL, diet, 10 wks, growth, mortality	Sample et al. 1996	6.17E+01	1	1	1	6.17E+01
Iron		No data available						No data
Lead	Amer. kestrel	NOAEL, diet, 7 mos. crit. lifestage, reproduction	Sample et al. 1996	3.85E+00	1	1	1	3.85E+00
Lead	Japanese quail	NOAEL, diet, 12 wks, reproduction	Sample et al., 1996	1.13E+01	1	1	1	1.13E+01
Mercury	Amer. kestrel	NOAEL, diet, 3 month, eggshell thickness (Dimethylmercury as surrogate)	Peakall, et al. 1972	2.86E+00	1	1	1	2.86E+00
Mercury	Japanese quail	LOAEL, diet, 1 year, reproduction	Sample et al. 1996	9.00E-01	1	1	1	9.00E-01
Mercury	mallard	LOAEL, diet, 3 generations, reproduction (methyl mercury as surrogate)	Sample et al. 1996	6.40E-02	1	1	1	6.40E-02
Nickel	mallard	LOAEL, diet, ducklings, 90 days, mortality, growth, behavior	Sample et al. 1996	1.07E+02	1	1	1	1.07E+02
Thallium	European starling	LD50, single gavage, survival	Schafer et al. 1983.	9.50E+00	10	10	100	9.50E-02
Vanadium	mallard	NOAEL, diet, 12 wks., mortality, body wt, blood chemistry	Sample et al. 1996	1.14E+01	1	1	1	1.14E+01
Zinc	chicken	LOAEL, diet, 44 wks. crit. lifestage, reproduction	Sample et al. 1996	1.31E+02	1	1	1	1.31E+02

1 CF = conversion factor.

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

TABLE H.12
NOAEL Toxicity Reference Values - Soil Receptors (Mammals)
SEAD 4
Seneca Army Depot Activity

Constituent	Test Organism	Endpoint/Duration/Effect	Source	Effect Dose (mg/kg/day)	Endpoint CF[1]	Study Duration CF[1]	Total CF[1]	TRV[2] (mg/kg/day)
Volatiles								
Acetone	short-tailed shrew[3]	NOAEL, gavage, 90-day, liver and kidney damage (rat)	Sample et al. 1996 (Table 12)	2.20E+01	1	1	1	2.20E+01
Acetone	meadow vole[3]	NOAEL, gavage, 90-day, liver and kidney damage (rat)	Sample et al. 1996 (Table 12)	1.68E+01	1	1	1	1.68E+01
PAHs								
2-Methylnaphthalene	mouse	LOAEL, diet, 81 wks., respitory (naphthalene used as surrogate)	ATSDR 1995	7.16E+01	10	1	10	7.16E+00
Acenaphthene	mouse	LOAEL, oral gavage, 13wk, hepatic effects	ATSDR 1995	1.75E+02	10	1	10	1.75E+01
Acenaphthylene	short-tailed shrew[3]	LOAEL, oral intubation, gestation days 7-16 (crit. lifestage), reproduction (mouse as test species) (benzo(a)pyrene used as surrogate)	Sample et al. 1996 (Table 12)	1.19E+00	1	1	1	1.19E+00
Acenaphthylene	meadow vole[3]	LOAEL, oral intubation, gestation days 7-16 (crit. lifestage), reproduction (mouse as test species) (benzo(a)pyrene used as surrogate)	Sample et al. 1996 (Table 12)	9.10E-01	1	1	1	9.10E-01
Anthracene	mouse	NOAEL, oral gavage, 13 wks., hepatic effects	ATSDR 1995	1.00E+03	1	1	1	1.00E+03
Benzo(a)anthracene	short-tailed shrew[3]	LOAEL, oral intubation, gestation days 7-16 (crit. lifestage), reproduction (mouse as test species) (benzo(a)pyrene used as surrogate)	Sample et al. 1996 (Table 12)	1.19E+00	1	1	1	1.19E+00
Benzo(a)anthracene	meadow vole[3]	LOAEL, oral intubation, gestation days 7-16 (crit. lifestage), reproduction (mouse as test species) (benzo(a)pyrene used as surrogate)	Sample et al. 1996 (Table 12)	9.10E-01	1	1	1	9.10E-01
Benzo(a)pyrene	short-tailed shrew[3]	LOAEL, oral intubation, gestation days 7-16 crit. lifestage, reproduction (mouse as test species)	Sample et al. 1996 (Table 12)	1.19E+00	1	1	1	1.19E+00
Benzo(a)pyrene	meadow vole[3]	LOAEL, oral intubation, gestation days 7-16 crit. lifestage, reproduction (mouse as test species)	Sample et al. 1996 (Table 12)	9.10E-01	1	1	1	9.10E-01
Benzo(b)fluoranthene	short-tailed shrew[3]	LOAEL, oral intubation, gestation days 7-16 (crit. lifestage), reproduction (mouse as test species) (benzo(a)pyrene used as surrogate)	Sample et al. 1996 (Table 12)	1.19E+00	1	1	1	1.19E+00
Benzo(b)fluoranthene	meadow vole[3]	LOAEL, oral intubation, gestation days 7-16 (crit. lifestage), reproduction (mouse as test species) (benzo(a)pyrene used as surrogate)	Sample et al. 1996 (Table 12)	9.10E-01	1	1	1	9.10E-01
Benzo(ghi)perylene	short-tailed shrew[3]	LOAEL, oral intubation, gestation days 7-16 (crit. lifestage), reproduction (mouse as test species) (benzo(a)pyrene used as surrogate)	Sample et al. 1996 (Table 12)	1.19E+00	1	1	1	1.19E+00
Benzo(ghi)perylene	meadow vole[3]	LOAEL, oral intubation, gestation days 7-16 (crit. lifestage), reproduction (mouse as test species) (benzo(a)pyrene used as surrogate)	Sample et al. 1996 (Table 12)	9.10E-01	1	1	1	9.10E-01
Benzo(k)fluoranthene	short-tailed shrew[3]	LOAEL, oral intubation, gestation days 7-16 (crit. lifestage), reproduction (mouse as test species) (benzo(a)pyrene used as surrogate)	Sample et al. 1996 (Table 12)	1.19E+00	1	1	1	1.19E+00
Benzo(k)fluoranthene	meadow vole[3]	LOAEL, oral intubation, gestation days 7-16 (crit. lifestage), reproduction (mouse as test species) (benzo(a)pyrene used as surrogate)	Sample et al. 1996 (Table 12)	9.10E-01	1	1	1	9.10E-01
Chrysene	short-tailed shrew[3]	LOAEL, oral intubation, gestation days 7-16 (crit. lifestage), reproduction (mouse as test species) (benzo(a)pyrene used as surrogate)	Sample et al. 1996 (Table 12)	1.19E+00	1	1	1	1.19E+00

TABLE II.12
NOAEL Toxicity Reference Values - Soil Receptors (Mammals)
SEAD 4
Seneca Army Depot Activity

Constituent	Test Organism	Endpoint/Duration/Effect	Source	Effect Dose (mg/kg/day)	Endpoint CF[1]	Study Duration CF[1]	Total CF[1]	TRV[2] (mg/kg/day)
Chrysene	meadow vole[3]	LOAEL, oral intubation, gestation days 7-16 (crit. lifestage), reproduction (mouse as test species) (benzo(a)pyrene used as surrogate)	Sample et al. 1996 (Table 12)	9.10E-01	1	1	1	9.10E-01
Dibenz(a,h)anthracene	short-tailed shrew[3]	LOAEL, oral intubation, gestation days 7-16 (crit. lifestage), reproduction (mouse as test species) (benzo(a)pyrene used as surrogate)	Sample et al. 1996 (Table 12)	1.19E+00	1	1	1	1.19E+00
Dibenz(a,h)anthracene	meadow vole[3]	LOAEL, oral intubation, gestation days 7-16 (crit. lifestage), reproduction (mouse as test species) (benzo(a)pyrene used as surrogate)	Sample et al. 1996 (Table 12)	9.10E-01	1	1	1	9.10E-01
Fluoranthene	mouse	LOAEL, oral gavage, 13 wks., hepatic effects	ATSDR 1995	1.25E+02	10	1	10	1.25E+01
Fluorene	mouse	LOAEL, oral gavage, 13 wks., hepatic effects	ATSDR 1995	1.25E+02	10	1	10	1.25E+01
Indeno(1,2,3-cd)pyrene	short-tailed shrew[3]	LOAEL, oral intubation, gestation days 7-16 (crit. lifestage), reproduction (mouse as test species) (benzo(a)pyrene used as surrogate)	Sample et al. 1996 (Table 12)	1.19E+00	1	1	1	1.19E+00
Indeno(1,2,3-cd)pyrene	meadow vole[3]	LOAEL, oral intubation, gestation days 7-16 (crit. lifestage), reproduction (mouse as test species) (benzo(a)pyrene used as surrogate)	Sample et al. 1996 (Table 12)	9.10E-01	1	1	1	9.10E-01
Phenanthrene	short-tailed shrew[3]	LOAEL, oral intubation, gestation days 7-16 (crit. lifestage), reproduction (mouse as test species) (benzo(a)pyrene used as surrogate)	Sample et al. 1996 (Table 12)	1.19E+00	1	1	1	1.19E+00
Phenanthrene	meadow vole[3]	LOAEL, oral intubation, gestation days 7-16 (crit. lifestage), reproduction (mouse as test species) (benzo(a)pyrene used as surrogate)	Sample et al. 1996 (Table 12)	9.10E-01	1	1	1	9.10E-01
Pyrene	short-tailed shrew[3]	LOAEL, oral intubation, gestation days 7-16 (crit. lifestage), reproduction (mouse as test species) (benzo(a)pyrene used as surrogate)	Sample et al. 1996 (Table 12)	1.19E+00	1	1	1	1.19E+00
Pyrene	meadow vole[3]	LOAEL, oral intubation, gestation days 7-16 (crit. lifestage), reproduction (mouse as test species) (benzo(a)pyrene used as surrogate)	Sample et al. 1996 (Table 12)	9.10E-01	1	1	1	9.10E-01
Semi-volatiles								
Bis(2-ethylhexyl)phthalate	short-tailed shrew[3]	NOAEL, diet, 105 days crit. lifestage, reproduction (mouse)	Sample et al. 1996 (Table 12)	2.18E+01	1	1	1	2.18E+01
Bis(2-ethylhexyl)phthalate	meadow vole[3]	NOAEL, diet, 105 days crit. lifestage, reproduction (mouse)	Sample et al. 1996 (Table 12)	1.66E+01	1	1	1	1.66E+01
Butylbenzylphthalate	rat	NOAEL, diet, 6 months, reproduction, liver weight, blood chemistry	IRIS, 1999	1.59E+02	1	1	1	1.59E+02
Carbazole	rat	LD50, oral	Sax, 1984	5.00E+02	10	10	100	5.00E+00
Dibenzofuran		No data available	NA					
4-Methylphenol	short-tailed shrew[3]	NOAEL, oral, systemic/neurological, 12-14 days, (rabbit)	ATSDR, 1992	2.00E+01	0	0	0	2.00E+01
4-Methylphenol	meadow vole[3]	NOAEL, oral, systemic neurological. 12-14 days crit. Lifestage (rabbit)	ATSDR, 1992	1.52E+01	1	1	1	1.52E+01
Phenol	short-tailed shrew[3]	NOAEL, oral ad libitum, immunological	ATSDR 1998	4.00E+00	1	1	1	4.00E+00
Phenol	meadow vole[3]	NOAEL, oral ad libitum, immunological	ATSDR 1998	3.00E+00	1	1	1	3.00E+00

TABLE H.12
NOAEL Toxicity Reference Values - Soil Receptors (Mammals)
SEAD 4
Seneca Army Depot Activity

Constituent	Test Organism	Endpoint/Duration/Effect	Source	Effect Dose (mg/kg/day)	Endpoint CF[1]	Study Duration CF[1]	Total CF[1]	TRV[2] (mg/kg/day)
PCBs								
Aroclor-1254	short-tailed shrew[3]	LOAEL, diet, 12 mos. crit. lifestage, reproduction (oldfield mouse as test species)	Sample et al. 1996 (Table 12) Total PCBs used as a surrogate	6.70E-02	1	1	1	6.70E-02
Aroclor-1254	meadow vole[3]	LOAEL, diet, 12 mos. crit. lifestage, reproduction (oldfield mouse as test species)	Sample et al. 1996 (Table 12) Total PCBs used as a surrogate	5.10E-02	1	1	1	5.10E-02
Aroclor-1260	short-tailed shrew[3]	LOAEL, diet, 12 mos. crit. lifestage, reproduction (oldfield mouse as test species)	Sample et al. 1996 (Table 12) Total PCBs used as a surrogate	6.70E-02	1	1	1	6.70E-02
Aroclor-1260	meadow vole[3]	LOAEL, diet, 12 mos. crit. lifestage, reproduction (oldfield mouse as test species)	Sample et al. 1996 (Table 12) Total PCBs used as a surrogate	5.10E-02	1	1	1	5.10E-02
Pesticides								
4,4'-DDD	short-tailed shrew[3]	NOAEL, diet, 2 year crit. lifestage, reproduction (rat used as test species) (DDT used as surrogate)	Sample et al. 1996 (Table 12)	1.76E+00	1	1	1	1.76E+00
4,4'-DDD	meadow vole[3]	NOAEL, diet, 2 year crit. lifestage, reproduction (rat used as test species) (DDT used as surrogate)	Sample et al. 1996 (Table 12)	1.34E+00	1	1	1	1.34E+00
4,4'-DDE	short-tailed shrew[3]	NOAEL, diet, 2 year crit. lifestage, reproduction (rat used as test species) (DDT used as surrogate)	Sample et al. 1996 (Table 12)	1.76E+00	1	1	1	1.76E+00
4,4'-DDE	meadow vole[3]	NOAEL, diet, 2 year crit. lifestage, reproduction (rat used as test species) (DDT used as surrogate)	Sample et al. 1996 (Table 12)	1.34E+00	1	1	1	1.34E+00
4,4'-DDT	short-tailed shrew[3]	NOAEL, diet, 2 year crit. lifestage, reproduction (rat used as test species)	Sample et al. 1996 (Table 12)	1.76E+00	1	1	1	1.76E+00
4,4'-DDT	meadow vole[3]	NOAEL, diet, 2 year crit. lifestage, reproduction (rat used as test species)	Sample et al. 1996 (Table 12)	1.34E+00	1	1	1	1.34E+00
Aldrin	short-tailed shrew[3]	NOAEL, diet, greater than 1 yr crit. lifestage, reproduction (rat used as test species)	Sample et al. 1996 (Table 12)	4.40E-01	1	1	1	4.40E-01
Aldrin	meadow vole[3]	NOAEL, diet, greater than 1 yr crit. Lifestage, reproduction (rat used as test species)	Sample et al. 1996 (Table 12)	3.36E-01	1	1	1	3.36E-01
BHC, beta	short-tailed shrew[3]	NOAEL, diet, 4 generations, reproduction (rat used as test species)	Sample et al. 1996 (Table 12)	8.80E-01	1	1	1	8.80E-01
BHC, beta	meadow vole[3]	NOAEL, diet, 4 generations, reproduction (rat used as test species)	Sample et al. 1996 (Table 12)	6.70E-01	1	1	1	6.70E-01
Dieldrin	short-tailed shrew[3]	LOAEL, diet, 3 yr. crit. lifestage, reproduction (rat used as test species).	Sample et al. 1996 (Table 12)	4.40E-02	1	1	1	4.40E-02
Dieldrin	meadow vole[3]	LOAEL, diet, 3 yr. crit. lifestage, reproduction (rat used as test species).	Sample et al. 1996 (Table 12)	3.40E-02	1	1	1	3.40E-02
Endrin Ketone	short-tailed shrew[3]	NOAEL, diet, 2 yr, hepatic & body weight, (rat)	ATSDR, 1996	1.40E-01	1	1	1	1.40E-01
Endrin ketone[4]	meadow vole[3]	NOAEL, diet, 2 yr. crit lifestage, hepatic and body weight (rat)	ATSDR, 1996	6.00E-02	1	1	1	6.00E-02

TABLE H.12
NOAEL Toxicity Reference Values - Soil Receptors (Mammals)
SEAD 4
Seneca Army Depot Activity

Constituent	Test Organism	Endpoint/Duration/Effect	Source	Effect Dose (mg/kg/day)	Endpoint CF[1]	Study Duration CF[1]	Total CF[1]	TRV[2] (mg/kg/day)
Metals								
Antimony	short-tailed shrew[3]	LOAEL, water, lifetime, longevity (mouse used as test species)	Sample et al. 1996 (Table 12)	1.49E-01	1	1	1	1.49E-01
Antimony	meadow vole[3]	LOAEL, water, lifetime, longevity (mouse used as test species)	Sample et al. 1996 (Table 12)	1.14E-01	1	1	1	1.14E-01
Cadmium	short-tailed shrew[3]	NOAEL, gavage, 6 weeks mating and gestation crit. lifestage, reproduction	Sample et al. 1996 (Table 12)	1.00E+00	1	1	1	1.00E+00
Cadmium	meadow vole[3]	NOAEL, gavage, 6 weeks mating and gestation crit. lifestage, reproduction	Sample et al. 1996 (Table 12)	1.00E+00	1	1	1	1.00E+00
Chromium (total)	short-tailed shrew[3]	NOAEL, diet, 2 year, reproduction (rat used as test species, Cr+3 used as surrogate)	Sample et al. 1996 (Table 12)	6.02E+03	1	1	1	6.02E+03
Chromium (total)	meadow vole[3]	NOAEL, diet, 2 year, reproduction (rat used as test species, Cr+3 used as surrogate)	Sample et al., 1996 (Table 12)	4.60E+03	1	1	1	4.60E+03
Chromium VI	short-tailed shrew[3]	NOAEL, water, 1 year, physiological (rat used as test species)	Sample et al. 1996 (Table 12)	7.21E+00	1	1	1	7.21E+00
Chromium VI	meadow vole[3]	NOAEL, water, 1 year, physiological (rat used as test species)	Sample et al. 1996 (Table 12)	5.51E+00	1	1	1	5.51E+00
Copper	short-tailed shrew[3]	NOAEL, diet, 357 d., reproduction effects (mink used as test species)	Sample et al. 1996 (Table 12)	3.34E+01	1	1	1	3.34E+01
Copper	meadow vole[3]	NOAEL, diet, 357 d., reproduction effects (mink used as test species)	Sample et al. 1996 (Table 12)	2.55E+01	1	1	1	2.55E+01
Lead	short-tailed shrew[3]	NOAEL, diet, 3 generations, reproduction (rat used as test species)	Sample et al. 1996 (Table 12)	1.76E+01	1	1	1	1.76E+01
Lead	meadow vole[3]	NOAEL, diet, 3 generations, reproduction (rat used as test species)	Sample et al. 1996 (Table 12)	1.34E+01	1	1	1	1.34E+01
Mercury	short-tailed shrew[3]	NOAEL, diet, 20 mo., mortality, liver and kidney histology, reproduction	Sample et al. 1996 (Table 12)	1.57E+01	1	1	1	1.57E+01
Mercury	meadow vole[3]	NOAEL, diet, 20 mo., mortality, liver and kidney histology, reproduction	Sample et al. 1996 (Table 12)	1.20E+01	1	1	1	1.20E+01
Vanadium	short-tailed shrew[3]	LOAEL, oral intubation, 60 days (critical lifestage), reproduction	Sample et al. 1996 (Table 12)	4.28E-01	1	1	1	4.28E-01
Vanadium	meadow vole[3]	LOAEL, oral intubation, 60 days (critical lifestage), reproduction	Sample et al. 1996 (Table 12)	3.27E-01	1	1	1	3.27E-01
Zinc	short-tailed shrew[3]	NOAEL, oral in diet, 1-16d (critical lifestage) (rat used as test species)	Sample et al. 1996 (Table 12)	3.52E+02	1	1	1	3.52E+02
Zinc	meadow vole[3]	NOAEL, oral in diet, 1-16d (critical lifestage) (rat used as test species)	Sample et al. 1996 (Table 12)	2.69E+02	1	1	1	2.69E+02

1 CF = conversion factor.

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

3 Endpoint species. The effect dose was estimated for endpoint species according to Equation 4 in Sample, et al, 1996.

4 Endrin/Endrin aldehyde used as a surrogate.

TABLE H.13
LOAEL Toxicity Reference Values - Soil Receptors (Mammals)
SEAD 4
Seneca Army Depot Activity

Constituent	Test Organism	Endpoint/Duration/Effect	Source	Effect Dose (mg/kg/day)	Endpoint CF[1]	Study Duration CF[1]	Total CF[1]	TRV[2] (mg/kg/day)
Volatiles								
Acetone	short-tailed shrew[3]	LOAEL, gavage, 90-day, liver and kidney damage (rat)	Sample et al., 1996 (Table 12)	1.10E+02	1	1	1	1.10E+02
Acetone	meadow vole[3]	LOAEL, gavage, 90-day, liver and kidney damage (rat)	Sample et al., 1996 (Table 12)	8.40E+01	1	1	1	8.40E+01
PAHs								
Acenaphthene	mouse	LOAEL, oral gavage, 13wk, hepatic effects	ATSDR 1995	1.75E+02	1	1	1	1.75E+02
Acenaphthylene	short-tailed shrew[3]	LOAEL, oral intubation, gestation days 7-16 (crit. lifestage), reproduction (benzo(a)pyrene used as surrogate)	Sample et al. 1996 (Table 12)	1.19E+01	1	1	1	1.19E+01
Acenaphthylene	meadow vole[3]	LOAEL, oral intubation, gestation days 7-16 (crit. lifestage), reproduction (benzo(a)pyrene used as surrogate)	Sample et al. 1996	9.09E+00	1	1	1	9.09E+00
Anthracene	mouse	NOAEL, oral gavage, 13 wks., hepatic effects	ATSDR 1995	1.00E+03	1	1	1	1.00E+03
Benzo(a)anthracene	short-tailed shrew[3]	LOAEL, oral intubation, gestation days 7-16 crit. lifestage, reproduction (mouse as test species), (benzo(a)pyrene used as surrogate)	Sample et al. 1996 (Table 12)	1.19E+01	1	1	1	1.19E+01
Benzo(a)anthracene	meadow vole[3]	LOAEL, oral intubation, gestation days 7-16 crit. lifestage, reproduction (mouse as test species), (benzo(a)pyrene used as surrogate)	Sample et al. 1996 (Table 12)	9.09E+00	1	1	1	9.09E+00
Benzo(a)pyrene	short-tailed shrew[3]	LOAEL, oral intubation, gestation days 7-16 crit. lifestage, reproduction (mouse as test species)	Sample et al. 1996 (Table 12)	1.19E+01	1	1	1	1.19E+01
Benzo(a)pyrene	meadow vole[3]	LOAEL, oral intubation, gestation days 7-16 crit. lifestage, reproduction (mouse as test species)	Sample et al. 1996 (Table 12)	9.09E+00	1	1	1	9.09E+00
Benzo(b)fluoranthene	short-tailed shrew[3]	LOAEL, oral intubation, gestation days 7-16 crit. lifestage, reproduction (mouse as test species), (benzo(a)pyrene used as surrogate)	Sample et al. 1996 (Table 12)	1.19E+01	1	1	1	1.19E+01
Benzo(b)fluoranthene	meadow vole[3]	LOAEL, oral intubation, gestation days 7-16 crit. lifestage, reproduction (mouse as test species), (benzo(a)pyrene used as surrogate)	Sample et al. 1996 (Table 12)	9.09E+00	1	1	1	9.09E+00
Benzo(ghi)perylene	short-tailed shrew[3]	LOAEL, oral intubation, gestation days 7-16 crit. lifestage, reproduction (mouse as test species), (benzo(a)pyrene used as surrogate)	Sample et al. 1996 (Table 12)	1.19E+01	1	1	1	1.19E+01
Benzo(ghi)perylene	meadow vole[3]	LOAEL, oral intubation, gestation days 7-16 crit. lifestage, reproduction (mouse as test species), (benzo(a)pyrene used as surrogate)	Sample et al. 1996 (Table 12)	9.09E+00	1	1	1	9.09E+00
Benzo(k)fluoranthene	short-tailed shrew[3]	LOAEL, oral intubation, gestation days 7-16 crit. lifestage, reproduction (mouse as test species), (benzo(a)pyrene used as surrogate)	Sample et al. 1996 (Table 12)	1.19E+01	1	1	1	1.19E+01
Benzo(k)fluoranthene	meadow vole[3]	LOAEL, oral intubation, gestation days 7-16 crit. lifestage, reproduction (mouse as test species), (benzo(a)pyrene used as surrogate)	Sample et al. 1996 (Table 12)	9.09E+00	1	1	1	9.09E+00
Chrysene	short-tailed shrew[3]	LOAEL, oral intubation, gestation days 7-16 crit. lifestage, reproduction (mouse as test species), (benzo(a)pyrene used as surrogate)	Sample et al. 1996 (Table 12)	1.19E+01	1	1	1	1.19E+01
Chrysene	meadow vole[3]	LOAEL, oral intubation, gestation days 7-16 crit. lifestage, reproduction (mouse as test species), (benzo(a)pyrene used as surrogate)	Sample et al. 1996 (Table 12)	9.09E+00	1	1	1	9.09E+00
Dibenz(a,h)anthracene	short-tailed shrew[3]	LOAEL, oral intubation, gestation days 7-16 crit. lifestage, reproduction (mouse as test species), (benzo(a)pyrene used as surrogate)	Sample et al. 1996 (Table 12)	1.19E+01	1	1	1	1.19E+01

TABLE H.13
LOAEL Toxicity Reference Values - Soil Receptors (Mammals)
SEAD 4
Seneca Army Depot Activity

Constituent	Test Organism	Endpoint/Duration/Effect	Source	Effect Dose (mg/kg/day)	Endpoint CF[1]	Study Duration CF[1]	Total CF[1]	TRV[2] (mg/kg/day)
Dibenz(a,h)anthracene	meadow vole[3]	LOAEL, oral intubation, gestation days 7-16 crit. lifestage, reproduction (mouse as test species), (benzo(a)pyrene used as surrogate)	Sample et al. 1996 (Table 12)	9.09E+00	1	1	1	9.09E+00
Fluoranthene	mouse	LOAEL, oral gavage, 13 wks., hepatic effects	ATSDR 1995	1.25E+02	1	1	1	1.25E+02
Fluorene	mouse	LOAEL, oral gavage, 13 wks., hepatic effects	ATSDR 1995	1.25E+02	1	1	1	1.25E+02
Indeno(1,2,3-cd)pyrene	short-tailed shrew[3]	LOAEL, oral intubation, gestation days 7-16 crit. lifestage, reproduction (mouse as test species), (benzo(a)pyrene used as surrogate)	Sample et al. 1996 (Table 12)	1.19E+01	1	1	1	1.19E+01
Indeno(1,2,3-cd)pyrene	meadow vole[3]	LOAEL, oral intubation, gestation days 7-16 crit. lifestage, reproduction (mouse as test species), (benzo(a)pyrene used as surrogate)	Sample et al. 1996 (Table 12)	9.09E+00	1	1	1	9.09E+00
2-Methylnaphthalene	mouse	LOAEL, diet, 81 wks., respiratory (naphthalene used as surrogate)	ATSDR 1995	7.16E+01	1	1	1	7.16E+01
Naphthalene	mouse	LOAEL, diet, 81 wks., respiratory	ATSDR 1995	7.16E+01	1	1	1	7.16E+01
Phenanthrene	short-tailed shrew[3]	LOAEL, oral intubation, gestation days 7-16 crit. lifestage, reproduction (mouse as test species), (benzo(a)pyrene used as surrogate)	Sample et al. 1996 (Table 12)	1.19E+01	1	1	1	1.19E+01
Phenanthrene	meadow vole[3]	LOAEL, oral intubation, gestation days 7-16 crit. lifestage, reproduction (mouse as test species), (benzo(a)pyrene used as surrogate)	Sample et al. 1996 (Table 12)	9.09E+00	1	1	1	9.09E+00
Pyrene	short-tailed shrew[3]	LOAEL, oral intubation, gestation days 7-16 crit. lifestage, reproduction (mouse as test species), (benzo(a)pyrene used as surrogate)	Sample et al. 1996 (Table 12)	1.19E+01	1	1	1	1.19E+01
Pyrene	meadow vole[3]	LOAEL, oral intubation, gestation days 7-16 crit. lifestage, reproduction (mouse as test species), (benzo(a)pyrene used as surrogate)	Sample et al. 1996 (Table 12)	9.09E+00	1	1	1	9.09E+00
Semi-volatiles								
bis(2-Ethylhexyl)phthalate	short-tailed shrew[3]	NOAEL, diet, 105 days crit. lifestage, reproduction (mouse as test species)	Sample et al. 1996 (Table 12)	2.18E+02	1	1	1	2.18E+02
bis(2-Ethylhexyl)phthalate	meadow vole[3]	NOAEL, diet, 105 days crit. lifestage, reproduction (mouse as test species)	Sample et al. 1996 (Table 12)	1.66E+02	1	1	1	1.66E+02
Butylbenzylphthalate	rat	LOAEL, diet, 6 months, reproduction, liver weight, blood chemistry	IRIS, 1999	4.70E+02	1	1	1	4.70E+02
Carbazole	rat	LD50, oral	Sax, 1984	5.00E+02	10	10	100	5.00E+00
Di-n-octylphthalate	mouse	LD50, oral	Sax, 1984	6.51E+03	10	10	100	6.51E+01
Dibenzofuran		No data available	NA					
4-Methylphenol	short-tailed shrew3	LOAEL, oral, 2 weeks neurological or 13 weeks systemic, (rat)	ATSDR, 1996	1.43E+02	1	1	1	1.43E+02
4-Methylphenol	meadow vole[3]	LOAEL, oral, 2 weeks neurological or 13 weeks systemic, (rat)	ATSDR, 1992	3.82E+01	1	1	1	3.82E+01
Phenol	short-tailed shrew[3]	NOAEL, oral ad libitum, immunological	ATSDR,1998	4.00E+00	1	1	1	4.00E+00
Phenol	meadow vole[3]	NOAEL, oral ad libitum, immunological	ATSDR 1998	3.00E+00	1	1	1	3.00E+00
PCBs								
Aroclor-1254	short-tailed shrew[3]	LOAEL, diet, 12 mos. crit. lifestage, reproduction (oldfield mouse as test species)	Sample et al. 1996 (Table 12) Total PCBs used as a surrogate	6.68E-01	1	1	1	6.68E-01

TABLE H.13
LOAEL Toxicity Reference Values - Soil Receptors (Mammals)
SEAD 4
Seneca Army Depot Activity

Constituent	Test Organism	Endpoint/Duration/Effect	Source	Effect Dose (mg/kg/day)	Endpoint CF[1]	Study Duration CF[1]	Total CF[1]	TRV[2] (mg/kg/day)
Aroclor-1254	meadow vole[3]	LOAEL, diet, 12 mos. crit. lifestage, reproduction (oldfield mouse as test species)	Sample et al. 1996 (Table 12) Total PCBs used as a surrogate	5.11E-01	1	1	1	5.11E-01
Aroclor-1260	short-tailed shrew[3]	LOAEL, diet, 12 mos. crit. lifestage, reproduction (oldfield mouse as test species)	Sample et al. 1996 (Table 12) Total PCBs used as a surrogate	6.68E-01	1	1	1	6.68E-01
Aroclor-1260	meadow vole[3]	LOAEL, diet, 12 mos. crit. lifestage, reproduction (oldfield mouse as test species)	Sample et al. 1996 (Table 12) Total PCBs used as a surrogate	5.11E-01	1	1	1	5.11E-01
Pesticides								
4,4'-DDD	short-tailed shrew[3]	LOAEL, diet, 2 years, reproduction (rat used as test species) (DDT used as surrogate)	Sample et al., 1996 (Table 12)	8.79E+00	1	1	1	8.79E+00
4,4'-DDD	meadow vole[3]	LOAEL, diet, 2 years, reproduction (rat used as test species) (DDT used as surrogate)	Sample et al., 1996 (Table 12)	6.72E+00	1	1	1	6.72E+00
4,4'-DDE	short-tailed shrew[3]	LOAEL, diet, 2 years, reproduction (rat used as test species) (DDT used as surrogate)	Sample et al., 1996 (Table 12)	8.79E+00	1	1	1	8.79E+00
4,4'-DDE	meadow vole[3]	LOAEL, diet, 2 years, reproduction (rat used as test species) (DDT used as surrogate)	Sample et al., 1996 (Table 12)	6.72E+00	1	1	1	6.72E+00
4,4'-DDT	short-tailed shrew[3]	LOAEL, diet, 2 years, reproduction (rat used as test species)	Sample et al., 1996 (Table 12)	8.79E+00	1	1	1	8.79E+00
4,4'-DDT	meadow vole[3]	LOAEL, diet, 2 years, reproduction (rat used as test species)	Sample et al., 1996 (Table 12)	6.72E+00	1	1	1	6.72E+00
Aldrin	short-tailed shrew[4]	LOAEL, diet, greater than 1 yr, reproduction (rat used as test species)	Sample et al., 1996 (Table 12)	2.20E+00	1	1	1	2.20E+00
Aldrin	meadow vole[3]	LOAEL, diet, greater than 2 yrs, reproduction (rat used as test species)	Sample et al., 1996 (Table 12)	1.68E+00	1	1	1	1.68E+00
BHC, beta	short-tailed shrew[3]	LOAEL, diet, 4 generations, reproduction (rat used as test species)	Sample et al., 1996 (Table 12)	4.40E+00	1	1	1	4.40E+00
BHC, beta	meadow vole[3]	LOAEL, diet, 4 generations, reproduction (rat used as test species)	Sample et al., 1996 (Table 12)	3.36E+00	1	1	1	3.36E+00
Dieldrin	short-tailed shrew[3]	LOAEL, diet, 3 yr, crit. Lifestage, reproduction (rat used as test species)	Sample et al., 1996 (Table 12)	4.40E-01	1	1	1	4.40E-01
Dieldrin	meadow vole[3]	LOAEL, diet, 3 yr, crit. Lifestage, reproduction (rat used as test species)	Sample et al., 1996 (Table 12)	3.36E-01	1	1	1	3.36E-01
Endrin ketone	short-tailed shrew[3]	LOAEL, diet, 80 weeks, systemic & neurological, (mouse)	ASTDR, 1996	2.50E-01	1	1	1	2.50E-01
Endrin ketone[4]	meadow vole[3]	LOAEL, diet, 80 wk., systemic & neurological, (mouse)	ATSDR, 1996	1.90E-01	1	1	1	1.90E-01
Metals								
Antimony	short-tailed shrew[3]	LOAEL, water, lifetime, longevity (mouse used as test species)	Sample et al., 1996 (Table 12)	1.49E+00	1	1	1	1.49E+00
Antimony	meadow vole[3]	LOAEL, water, lifetime, longevity (mouse used as test species)	Sample et al., 1996 (Table 12)	1.14E+00	1	1	1	1.14E+00
Cadmium	rat	LOAEL, gavage, 6 weeks mating and gestation crit. lifestage,	Sample et al. 1996	1.00E+01	1	1	1	1.00E+01
Cadmium	meadow vole[3]	LOAEL, gavage, 6 weeks mating and gestation crit. lifestage, reproduction	Sample et al. 1996	1.00E+01	1	1	1	1.00E+01
Chromium (total)	short-tailed shrew[3]	NOAEL, diet, 2 year, reproduction (rat used as test species, Cr+3 used as surrogate)	Sample et al., 1996 (Table 12)	6.02E+03	1	1	1	6.02E+03
Chromium (total)	meadow vole[3]	NOAEL, diet, 2 year, reproduction (rat used as test species, Cr+3 used	Sample et al., 1996 (Table 12)	4.60E+03	1	1	1	4.60E+03

TABLE H.13
LOAEL Toxicity Reference Values - Soil Receptors (Mammals)
SEAD 4
Seneca Army Depot Activity

Constituent	Test Organism	Endpoint/Duration/Effect	Source	Effect Dose (mg/kg/day)	Endpoint CF^1	Study Duration CF^1	Total CF^1	TRV^2 (mg/kg/day)
Chromium VI	short-tailed shrew^3	LOAEL, water, 1 year, physiological (rat used as test species)	Sample et al. 1996 (Table 12)	2.89E+01	1	1	1	2.89E+01
Chromium VI	meadow vole^3	LOAEL, water, 1 year, physiological (rat used as test species)	Sample et al. 1996 (Table 12)	2.21E+01	1	1	1	2.21E+01
Copper	short-tailed shrew^3	LOAEL, diet, 357 d., reproduction effects (mink used as test species)	Sample et al., 1996 (Table 12)	4.40E+01	1	1	1	4.40E+01
Copper	meadow vole^3	LOAEL, diet, 357 d., reproduction effects (mink used as test species)	Sample et al., 1996 (Table 12)	3.36E+01	1	1	1	3.36E+01
Iron	rat	LD50, oral, acute	RTECS 1994	2.55E+03	10	10	100	2.55E+01
Lead	short-tailed shrew^3	LOAEL, diet, 3 generations, reproduction (rat used as test species)	Sample et al., 1996 (Table 12)	1.76E+02	1	1	1	1.76E+02
Lead	meadow vole^3	LOAEL, diet, 3 generations, reproduction (rat used as test species)	Sample et al., 1996 (Table 12)	1.34E+02	1	1	1	1.34E+02
Mercury	mouse	NOAEL, diet, 20 mo., mortality, liver and kidney histology,	Sample et al. 1996	1.32E+01	1	1	1	1.32E+01
Thallium	short-tailed shrew^3	LOAEL, water, 60 days, reproduction (rat used as test species)	Sample et al., 1996 (Table 12)	1.64E-01	1	1	1	1.64E-01
Thallium	meadow vole^3	LOAEL, water, 60 days, reproduction (rat used as test species)	Sample et al., 1996 (Table 12)	1.26E-01	1	1	1	1.26E-01
Vanadium	short-tailed shrew^3	LOAEL, oral intubation, 60 days (critical lifestage), reproduction (rat)	Sample et al., 1996 (Table 12)	4.29E+00	1	1	1	4.29E+00
Vanadium	meadow vole^3	LOAEL, oral intubation, 60 days (critical lifestage), reproduction (rat)	Sample et al., 1996 (Table 12)	3.89E+00	1	1	1	3.89E+00
Zinc	short-tailed shrew^3	LOAEL, oral in diet, 1-16d (critical lifestage) (rat used as test species)	Sample et al. 1996 (Table 12)	7.03E+02	1	1	1	7.03E+02
Zinc	meadow vole^3	LOAEL, oral in diet, 1-16d (critical lifestage) (rat used as test species)	Sample et al. 1996 (Table 12)	5.37E+02	1	1	1	5.37E+02

1 CF conversion factor.

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

3 Endpoint species. The effect dose was estimated for endpoint species according to Equation 4 in Sample, et al, 1996.

4 Endrin/Endrin aldehyde used as a surrogate.

TABLE H.13
LOAEL Toxicity Reference Values - Soil Receptors (Mammals)
SEAD 4
Seneca Army Depot, NY

Constituent	Test Organism	Endpoint/Duration/Effect	Source	Effect Dose (mg/kg/day)	Endpoint CF[1]	Study Duration CF[1]	Total CF[1]	TRV[2] (mg/kg/day)
Pesticides								
4,4'-DDD	short-tailed shrew[3]	LOAEL, diet, 2 years, reproduction (rat used as test species) (DDT used	Sample et al., 1996 (Table 12)	8.79E+00	1	1	1	8.79E+00
4,4'-DDD	meadow vole[3]	LOAEL, diet, 2 years, reproduction (rat used as test species) (DDT used	Sample et al., 1996 (Table 12)	6.72E+00	1	1	1	6.72E+00
4,4'-DDE	short-tailed shrew[3]	LOAEL, diet, 2 years, reproduction (rat used as test species) (DDT used	Sample et al., 1996 (Table 12)	8.79E+00	1	1	1	8.79E+00
4,4'-DDE	meadow vole[3]	LOAEL, diet, 2 years, reproduction (rat used as test species) (DDT used	Sample et al., 1996 (Table 12)	6.72E+00	1	1	1	6.72E+00
4,4'-DDT	short-tailed shrew[3]	LOAEL, diet, 2 years, reproduction (rat used as test species)	Sample et al., 1996 (Table 12)	8.79E+00	1	1	1	8.79E+00
4,4'-DDT	meadow vole[3]	LOAEL, diet, 2 years, reproduction (rat used as test species)	Sample et al., 1996 (Table 12)	6.72E+00	1	1	1	6.72E+00
BHC, beta	short-tailed shrew[3]	LOAEL, diet, 4 generations, reproduction (rat used as test species)	Sample et al., 1996 (Table 12)	4.40E+00	1	1	1	4.40E+00
BHC, beta	meadow vole[3]	LOAEL, diet, 4 generations, reproduction (rat used as test species)	Sample et al., 1996 (Table 12)	3.36E+00	1	1	1	3.36E+00
Dieldrin	short-tailed shrew[3]	LOAEL, diet, 3 yr, crit. Lifestage, reproduction (rat used as test species)	Sample et al., 1996 (Table 12)	4.40E-01	1	1	1	4.40E-01
Dieldrin	meadow vole[3]	LOAEL, diet, 3 yr, crit. Lifestage, reproduction (rat used as test species)	Sample et al., 1996 (Table 12)	3.36E-01	1	1	1	3.36E-01
Metals								
Antimony	short-tailed shrew[3]	LOAEL, water, lifetime, longevity (mouse used as test species)	Sample et al., 1996 (Table 12)	1.49E+00	1	1	1	1.49E+00
Antimony	meadow vole[3]	LOAEL, water, lifetime, longevity (mouse used as test species)	Sample et al., 1996 (Table 12)	1.14E+00	1	1	1	1.14E+00
Chromium	short-tailed shrew[3]	NOAEL, diet, 2 year, reproduction (rat used as test species)	Sample et al., 1996 (Table 12)	2.89E+01	1	1	1	2.89E+01
Chromium	meadow vole[3]	NOAEL, diet, 2 year, reproduction (rat used as test species)	Sample et al., 1996 (Table 12)	2.21E+01	1	1	1	2.21E+01
Copper	short-tailed shrew[3]	LOAEL, diet, 357 d., reproduction effects (mink used as test species)	Sample et al., 1996 (Table 12)	4.40E+01	1	1	1	4.40E+01
Copper	meadow vole[3]	LOAEL, diet, 357 d., reproduction effects (mink used as test species)	Sample et al., 1996 (Table 12)	3.36E+01	1	1	1	3.36E+01
Lead	short-tailed shrew[3]	LOAEL, diet, 3 generations, reproduction (rat used as test species)	Sample et al., 1996 (Table 12)	1.76E+02	1	1	1	1.76E+02
Lead	meadow vole[3]	LOAEL, diet, 3 generations, reproduction (rat used as test species)	Sample et al., 1996 (Table 12)	1.34E+02	1	1	1	1.34E+02
Mercury	mouse	NOAEL, diet, 20 mo., mortality, liver and kidney histology,	Sample et al. 1996	1.32E+01	1	1	1	1.32E+01
Thallium	short-tailed shrew[3]	LOAEL, water, 60 days, reproduction (rat used as test species)	Sample et al., 1996 (Table 12)	1.64E-01	1	1	1	1.64E-01
Thallium	meadow vole[3]	LOAEL, water, 60 days, reproduction (rat used as test species)	Sample et al., 1996 (Table 12)	1.26E-01	1	1	1	1.26E-01
Zinc	short-tailed shrew[3]	LOAEL, oral in diet, 1-16d (critical lifestage) (rat used as test species)	Sample et al. 1996 (Table 12)	7.03E+02	1	1	1	7.03E+02
Zinc	meadow vole[3]	LOAEL, oral in diet, 1-16d (critical lifestage) (rat used as test species)	Sample et al. 1996 (Table 12)	5.37E+02	1	1	1	5.37E+02

1 CF = conversion factor.

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

3 Endpoint species

TABLE H.14
Toxicity Reference Values for Surface Water COPCs - Fish
SEAD 4
Seneca Army Depot, NY

Constituent	Test Organism	Endpoint/Duration/Effect	Source	Effect Dose (mg/L)	Endpoint CF[1]	Study Duration CF[1]	Total CF[1]	TRV[2] (mg/L)
PAHs								
Benzo(a)anthracene	Bluegill (*Lepomis macrochirus*)	Survival / 6 month / LC-87	Eisler 1987	1.00E+03	10	1	10	1.00E+02
Benzo(a)pyrene	Bluegill (*Lepomis macrochirus*)	Survival / 6 month / LC-87 (benzo(a)anthracene as surrogate)	Eisler 1987	1.00E+03	10	1	10	1.00E+02
Benzo(b)fluoranthene	Bluegill (*Lepomis macrochirus*)	Survival / 6 month / LC-87 (benzo(a)anthracene as surrogate)	Eisler 1987	1.00E+03	10	1	10	1.00E+02
Benzo(g,h,i)perylene	Bluegill (*Lepomis macrochirus*)	Survival / 6 month / LC-87 (benzo(a)anthracene as surrogate)	Eisler 1987	1.00E+03	10	1	10	1.00E+02
Benzo(k)fluoranthene	Bluegill (*Lepomis macrochirus*)	Survival / 6 month / LC-87 (benzo(a)anthracene as surrogate)	Eisler 1987	1.00E+03	10	1	10	1.00E+02
Chrysene	Bluegill (*Lepomis macrochirus*)	Survival / 6 month / LC-87 (benzo(a)anthracene as surrogate)	Eisler 1987	1.00E+03	10	1	10	1.00E+02
Indeno(1,2,3-cd)pyrene	Bluegill (*Lepomis macrochirus*)	Survival / 6 month / LC-87 (benzo(a)anthracene as surrogate)	Eisler 1987	1.00E+03	10	1	10	1.00E+02
Semivolatiles								
Carbazole	no data available						0	
Pesticides								
Alpha-Chlordane	Sheepshead minnow (*Cyprinodon variegatus*)	Reproductive / 28 day / NOEC	Eisler 1990	7.10E-03	1	1	1	7.10E-03
Gamma-Chlordane	Sheepshead minnow (*Cyprinodon variegatus*)	Reproductive / 28 day / NOEC	Eisler 1990	7.10E-03	1	1	1	7.10E-03
Nitroaromatics								
1,3-Dinitrobenzene	Rainbow trout (*Oncorhynchus mykiss*)	Survival / 69 days / NOEC	AQUIRE 1999	5.00E-01	1	1	1	5.00E-01
Metals								
Aluminum	Mosquitofish (*Gambusia affinis*)	Survival / 1 day / LC50	AQUIRE 1999	1.11E+02	10	10	100	1.11E+00

TABLE H.14
Toxicity Reference Values for Surface Water COPCs - Fish
SEAD 4
Seneca Army Depot, NY

Constituent	Test Organism	Endpoint/Duration/Effect	Source	Effect Dose (mg/L)	Endpoint CF[1]	Study Duration CF[1]	Total CF[1]	TRV[2] (mg/L)
Barium	Sheepshead minnow (*Cyprinodon variegatus*)	Survival / 4 days / NOEC	AQUIRE 1999	5.00E+01	1	10	10	5.00E+00
Cadmium	Winter flounder (*Pseudopleuronectes*	Survival / 60day / increased gill resperation (LOAEL)	Eisler 1985	5.00E-03	1	10	10	5.00E-04
Cobalt	Zebra danio (*Brachy danio*)	Survival / 13 day / NOEC	AQUIRE 1999	6.00E-02	1	10	10	6.00E-03
Copper	Snake-head catfish (*Channa striata*)	Survival / 3mo / LC50	AQUIRE 1997	1.24E+01	10	1	10	1.24E+00
Iron	Fathead minnow (*Pimephales promelas*)	Survival, growth, repreduction / 12 month / NOAEL	Smith et al. 1973	1.50E+00	1	1	1	1.50E+00
Lead	Snake-head catfish (*Channa striata*)	Survival / 3mo / LC50	AQUIRE 1997	5.85E+01	10	1	10	5.85E+00
Manganese	Longfin dace (*Agosia chrysogaster*)	Survival / 96 hour / LC50	Lewis 1978	1.30E+02	10	10	100	1.30E+00
Silver	Fathead minnow (*Pimephales promelas*)	Survival / 10 week / NOEC	Ratte 1999	5.00E+00	1	1	1	5.00E+00
Vanadium	Rainbow trout (*Oncorhynchus mykiss*)	Survival / 28 days / LC50	AQUIRE 1999	1.60E-01	10	10	100	1.60E-03
Zinc	Channel catfish (*Channa punctatus*)	Growth / 19day / growth rate reduction (LOAEL)	Eisler 1993	1.20E+01	10	10	100	1.20E-01

1 CF = conversion factor. Conversion factors are based on EPA Region IV guidance (USEPA 1997).

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

TABLE H.15

Chemicals of Potential Concern Environmental Fate and Transport Properties
SEAD 4
Seneca Army Depot Activity

Chemical	Log Kow[1]	SP[2]		Small Mammal BAF[3]		Invertebrate BAF[3]	
Volatiles							
Acetone	-0.24	5.33E+01	Travis & Arms, 1988	3.90E-01	EPA 1995e in Sample et al., 1996	3.90E-01	EPA 1995e in Sample et al., 1996
PAHs							
Acenapthene	3.92	2.10E-01	Travis & Arms 1988 (logKow calc)	5.90E-01	USEPA 1994 (BAP as surrogate)	3.42E-01	Beyer 1990 (BAP as surrogate)
Acenapthylene	4.07	1.72E-01	Travis & Arms 1988 (logKow calc)	5.90E-01	USEPA 1994 (BAP as surrogate)	1.00E+00	default
Anthracene	4.45	1.04E-01	Travis & Arms 1988 (logKow calc)	5.90E-01	USEPA 1994 (BAP as surrogate)	5.10E-02	Beyer 1990
Benzo(a)anthracene	5.90	1.51E-02	Travis & Arms 1988 (logKow calc)	5.90E-01	USEPA 1994 (BAP as surrogate)	1.25E-01	Beyer 1990
Benzo(a)pyrene	6.04	1.02E+00	USEPA 1994	5.90E-01	USEPA 1994	4.50E+00	USEPA 1994
Benzo(b)fluoranthene	6.57	1.00E-02	Travis & Arms, 1988	5.90E-01	USEPA 1994 (BAP as surrogate)	3.20E-01	Beyer, 1990
Benzo(g,h,i)perylene	7.10	3.05E-03	Travis & Arms 1988 (logKow calc)	5.90E-01	USEPA 1994 (BAP as surrogate)	2.40E-01	Beyer, 1990
Benzo(k)fluoranthene	6.85	4.25E-03	Travis & Arms 1988 (logKow calc)	5.90E-01	USEPA 1994 (BAP as surrogate)	2.53E-01	Beyer, 1990
Chrysene	5.61	2.00E-02	Travis & Arms, 1988	5.90E-01	USEPA 1994 (BAP as surrogate)	1.75E-01	Beyer, 1990
Dibenz(a,h)anthracene	6.36	8.16E-03	Travis & Arms 1988 (logKow calc)	5.90E-01	USEPA 1994 (BAP as surrogate)	1.75E-01	Beyer, 1990
Fluoranthene	5.22	3.72E-02	Travis & Arms 1988 (logKow calc)	5.90E-01	USEPA 1994 (BAP as surrogate)	7.92E-01	Beyer, 1990
Fluorene	4.12	1.49E-01	Travis & Arms 1988 (logKow calc)	5.90E-01	USEPA 1994 (BAP as surrogate)	3.42E-01	Beyer 1990 (BAP as surrogate)
Indeno(1,2,3-cd)pyrene	7.70	1.37E-03	Travis & Arms 1988 (logKow calc)	5.90E-01	USEPA 1994 (BAP as surrogate)	4.19E-01	Beyer, 1990
2-Methylnaphthalene	4.11	1.63E-01	Travis & Arms 1988 (logKow calc)	5.90E-01	USEPA 1994 (BAP as surrogate)	3.42E-01	Beyer, 1990
Naphthalene	3.36	4.43E-01	Travis & Arms 1988 (logKow calc)	5.90E-01	USEPA 1994 (BAP as surrogate)	3.42E-01	Beyer, 1990
Phenanthrene	4.46	1.00E-01	Travis & Arms, 1988	5.90E-01	USEPA 1994 (BAP as surrogate)	1.22E-01	Beyer, 1990
Pyrene	5.09	4.43E-02	Travis & Arms 1988 (logKow calc)	5.90E-01	USEPA 1994 (BAP as surrogate)	9.20E-02	Beyer, 1990
Semi-volatiles							
Bis(2-ethylhexyl)phthalate	4.20	1.00E-02	USEPA, 1994	1.50E+00	USEPA, 1994	1.20E+01	USEPA, 1994
Butylbenzylphthalate	4.78	1.00E+00	default	1.00E+00	default	1.00E+00	default
Carbazole	1.00	1.00E+00	default	1.00E+00	default	1.00E+00	default
Di-n-octylphthalate	9.20	1.60E-04	USEPA 1994	6.42E+02	USEPA 1994	4.90E+03	USEPA 1994
Dibenzofuran	4.17	1.51E-01	Travis & Arms 1988 (logKow calc)	1.00E+00	default	1.00E+00	default
PCBs							
Arochlor 1254	6.47	1.00E-02	Travis & Arms, 1988	4.50E+00	USEPA, 1994	4.50E+00	USEPA, 1994
Pesticides							
4,4'-DDD	5.99	1.34E-02	Travis & Arms 1988 (logKow calc)	1.00E-01	USEPA, 1994 (DDT as surrogate)	1.00E-01	USEPA, 1994 (DDT as surrogate)
4,4'-DDE	5.77	1.80E-02	Travis & Arms 1988 (logKow calc)	2.50E-02	Menzie et al., 1992	2.50E-02	Menzie et al., 1992
4,4'-DDT	5.90	1.00E-02	USEPA, 1994	1.00E-01	USEPA, 1994	1.00E-01	USEPA, 1994
BHC, beta	3.96	1.99E-01	Travis & Arms 1988 (logKow calc)	1.00E+00	default	1.00E+00	default
Dieldrin	4.61	1.20E-01	USEPA, 1994	4.70E-02	USEPA, 1994	4.70E-02	USEPA, 1994

Table H.15
Chemicals of Potential Concern Environmental Fate and Transport Properties for Soils
SEAD 4
Seneca Army Depot Activity

Chemical	Log K_{ow}[1]	SP[2]		Small Mammal BAF[3]		Invertebrate BAF[3]	
Volatiles							
Acetone	-0.24	5.33E+01	Travis & Arms, 1988	3.90E-01	EPA 1995c in Sample et al., 1996	3.90E-01	EPA 1995c in Sample et al., 1996
PAHs							
Acenaphthene	3.92	2.10E-01	Travis & Arms 1988 (logKow calc)	5.90E-01	USEPA 1994 (BAP as surrogate)	3.42E-01	Beyer 1990 (BAP as surrogate)
Acenaphthylene	4.07	1.72E-01	Travis & Arms 1988 (logKow calc)	5.90E-01	USEPA 1994 (BAP as surrogate)	1.00E+00	default
Anthracene	4.45	1.04E-01	Travis & Arms 1988 (logKow calc)	5.90E-01	USEPA 1994 (BAP as surrogate)	5.10E-02	Beyer 1990
Benzo(a)anthracene	5.90	1.51E-02	Travis & Arms 1988 (logKow calc)	5.90E-01	USEPA 1994 (BAP as surrogate)	1.25E-01	Beyer 1990
Benzo(a)pyrene	6.04	1.02E+00	USEPA 1994	5.90E-01	USEPA 1994	4.50E+00	USEPA 1994
Benzo(b)fluoranthene	6.57	1.00E-02	Travis & Arms, 1988	5.90E-01	USEPA 1994 (BAP as surrogate)	3.20E-01	Beyer, 1990
Benzo(ghi)perylene	7.10	3.05E-03	Travis & Arms 1988 (logKow calc)	5.90E-01	USEPA 1994 (BAP as surrogate)	2.40E-01	Beyer, 1990
Benzo(k)fluoranthene	6.85	4.25E-03	Travis & Arms 1988 (logKow calc)	5.90E-01	USEPA 1994 (BAP as surrogate)	2.53E-01	Beyer, 1990
Chrysene	5.61	2.00E-02	Travis & Arms, 1988	5.90E-01	USEPA 1994 (BAP as surrogate)	1.75E-01	Beyer, 1990
Dibenz(a,h)anthracene	6.36	8.16E-03	Travis & Arms 1988 (logKow calc)	5.90E-01	USEPA 1994 (BAP as surrogate)	1.75E-01	Beyer, 1990
Fluoranthene	5.22	3.72E-02	Travis & Arms 1988 (logKow calc)	5.90E-01	USEPA 1994 (BAP as surrogate)	7.92E-01	Beyer, 1990
Fluorene	4.12	1.49E-01	Travis & Arms 1988 (logKow calc)	5.90E-01	USEPA 1994 (BAP as surrogate)	3.42E-01	Beyer 1990 (BAP as surrogate)
Indeno(1,2,3-cd)pyrene	7.70	1.37E-03	Travis & Arms 1988 (logKow calc)	5.90E-01	USEPA 1994 (BAP as surrogate)	4.19E-01	Beyer, 1990
2-Methylnaphthalene	4.11	1.63E-01	Travis & Arms 1988 (logKow calc)	5.90E-01	USEPA 1994 (BAP as surrogate)	3.42E-01	Beyer, 1990
Naphthalene	3.36	4.43E-01	Travis & Arms 1988 (logKow calc)	5.90E-01	USEPA 1994 (BAP as surrogate)	3.42E-01	Beyer, 1990
Phenanthrene	4.46	1.00E-01	Travis & Arms, 1988	5.90E-01	USEPA 1994 (BAP as surrogate)	1.22E-01	Beyer, 1990
Pyrene	5.09	4.43E-02	Travis & Arms 1988 (logKow calc)	5.90E-01	USEPA 1994 (BAP as surrogate)	9.20E-02	Beyer, 1990
Semi-volatiles							
Bis(2-ethylhexyl)phthalate	4.20	1.00E-02	USEPA, 1994	1.50E+00	USEPA, 1994	1.20E+01	USEPA, 1994
Butylbenzylphthalate	4.78	1.00E+00	default	1.00E+00	default	1.00E+00	default
Carbazole	1.00	1.00E+00	default	1.00E+00	default	1.00E+00	default
Di-n-octylphthalate	9.20	1.60E-04	USEPA 1994	6.42E+02	USEPA 1994	4.90E+03	USEPA 1994
Dibenzofuran	4.17	1.51E-01	Travis & Arms 1988 (logKow calc)	1.00E+00	default	1.00E+00	default
4-Methylphenol	1.94	2.93E+00	Travis & Arms 1988 (logKow calc)		No data available		No data available
Phenol	1.48	5.40E+00	Travis & Arms 1988 (logKow calc)		No data available		No data available
PCBs							
Aroclor-1254	6.47	7.05E-03	Travis & Arms 1988 (logKow calc)	7.00E+00	USEPA, 1994 (total PCBs as a surrogate)	4.50E+00	USEPA, 1994 (tot PCBs as surrogate)
Aroclor-1260	6.91	3.93E-03	Travis & Arms 1988 (logKow calc)	7.00E+00	USEPA, 1994 (total PCBs as a surrogate)	4.50E+00	USEPA, 1994 (tot PCBs as surrogate)
Pesticides							
4,4'-DDD	5.99	1.34E-02	Travis & Arms 1988 (logKow calc)	1.00E-01	USEPA, 1994 (DDT as surrogate)	1.00E-01	USEPA, 1994 (DDT as surrogate)
4,4'-DDE	5.77	1.80E-02	Travis & Arms 1988 (logKow calc)	2.50E-02	Menzie et al., 1992	2.50E-02	Menzie et al., 1992

Table H.15

Chemicals of Potential Concern Environmental Fate and Transport Properties for Soils
SEAD 4
Seneca Army Depot Activity

Chemical	Log K_{ow}[1]	SP[2]		Small Mammal BAF[3]		Invertebrate BAF[3]	
4,4'-DDT	5.90	1.00E-02	USEPA, 1994	1.00E-01	USEPA, 1994	1.00E-01	USEPA, 1994
Aldrin	5.52	1.00E-02	USEPA, 1994	7.20E+00	USEPA, 1994	3.50E+00	USEPA, 1994
BHC, beta	3.96	1.99E-01	Travis & Arms 1988 (logKow calc)	1.00E+00	default	1.00E+00	default
Dieldrin	4.61	1.20E-01	USEPA, 1994	4.70E-02	USEPA, 1994	4.70E-02	USEPA, 1994
Endrin ketone	5.06	2.20E-02	USEPA 1995	2.40E-02	USEPA, 1994 (endrin as surrogate)	1.80E-01	USEPA, 1994 (endrin as surrogate)
Metals							
Antimony	NA	1.30E-04	NRC 1992	1.00E+00	AQUIRE 1997	1.00E+00	AQUIRE 1997
Barium	NA	1.50E-01	NRC 1992	2.94E-02	Blanchet and Woodard 1997	2.94E-02	Blanchet and Woodard 1997
Beryllium	NA	1.00E-02	NRC 1992	1.00E-04	Venugopal and Luckey 1978	1.00E-04	Venugopal and Luckey 1978
Cadmium	NA	5.50E-01	NRC, 1992	2.15E-02	Ash & Lee, 1980	2.15E-02	Ash & Lee, 1980
Chromium (total)	NA	7.50E-03	NRC, 1992	7.75E-01	Beyer & Cromartie, 1987	7.75E-01	Beyer & Cromartie, 1987
Chromium VI	NA	7.50E-03	NRC, 1992	7.75E-01	Beyer & Cromartie, 1987	7.75E-01	Beyer & Cromartie, 1987
Copper	NA	4.00E-01	NRC, 1992	6.82E-01	MA et al. 1983	6.82E-01	MA et al. 1983
Iron	NA	4.00E-03	NRC, 1992	5.00E-02	Ash & Lee, 1980	5.00E-02	Ash & Lee, 1980
Lead	NA	5.80E-03	NRC 1992	2.10E+00	MA et al. 1983	2.10E+00	Ma et al. 1983
Mercury	NA	9.00E-01	NRC 1992	2.30E+01	USEPA 1994	2.30E+01	USEPA 1994
Nickel	NA	2.80E-01	NRC 1992	1.00E+02	ATSDR 1992	1.00E+02	ATSDR 1992
Thallium	NA	4.00E-03	NRC 1992	2.33E-01	Blanchet and Woodard 1997	2.33E-01	Blanchet and Woodard 1997
Vanadium	NA	1.00E-02	Baes et al., 1984	1.00E+00	Default	1.00E+00	Default
Zinc	NA	1.40E+00	NRC, 1992	9.90E+00	Beyer & Cromartie, 1987	9.90E+00	Beyer & Cromartie, 1987

1 Logarithmic value of octonol-water partition coefficient. Montgomery, J.H. and L.M. Welkom, *Groundwater Chemicals Desk Reference*, 1989.

2 Soil to plant uptake factor

3 Bioaccumulation factor

TABLE H.15

Chemicals of Potential Concern Environmental Fate and Transport Properties
SEAD 4
Seneca Army Depot Activity

Chemical	Log Kow[1]	SP[2]		Small Mammal BAF[3]		Invertebrate BAF[3]	
Metals							
Antimony	NA	1.30E-04	NRC 1992	1.00E+00	AQUIRE 1997	1.00E+00	AQUIRE 1997
Chromium	NA	7.50E-03	NRC, 1992	7.75E-01	Beyer & Cromartie, 1987	7.75E-01	Beyer & Cromartie, 1987
Copper	NA	4.00E-01	NRC, 1992	6.82E-01	MA et al. 1983	6.82E-01	MA et al. 1983
Lead	NA	5.80E-03	NRC 1992	2.10E+00	Ma et al. 1983	2.10E+00	Ma et al. 1983
Mercury	NA	9.00E-01	NRC 1992	2.30E+01	USEPA 1994	2.30E+01	USEPA 1994
Thallium	NA	4.00E-03	NRC 1992	2.33E-01	Blanchet and Woodard 1997	2.33E-01	Blanchet and Woodard 1997
Zinc	NA	1.40E+00	NRC, 1992	9.90E+00	Beyer & Cromartie, 1987	9.90E+00	Beyer & Cromartie, 1987

1 Logarithmic value of octonol-water partition coefficient. Montgomery, J.H. and L.M. Welkom, *Groundwater Chemicals Desk Reference*, 1989.

2 Soil to plant uptake factor

3 Bioaccumulation factor

TABLE H.16
Wildlife Intake Rates - All Receptors
SEAD-4
Seneca Army Depot Activity

Receptor	Body Weight (kg)	Trophic Level[1]	Foraging Factor[2]	Dietary Breakdown			
				Plant (kg/day)	Animal (kg/day)	Soil (kg/day)	Surface Water (L/day)
Short-tailed shrew[3]	0.015	3	1	0.00155	0.00751	0.000022	--
Meadow vole[4]	0.05	2	1	0.0001031	0.0000115	0.00006	--
Red-tailed Hawk[5]	1.24	4	1	0	0.136	--	--
Great Blue Heron[6]	2.39	3	1	<0.00001	0.42	0.03066 (sediment)	0.1058
Mourning dove[7]	0.157	2	1	0.00925	0.00150	0.00125	--

1 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.

2 Foraging factor: adjustment factor (from 0 to 1) based upon an organism's total time of exposure to unit-based contaminants. For this preliminary risk assessment stage, a foraging factor of 1 was assigned to each receptor, even though the foraging area may be greater than the size of the site.

3 Body weight and dietary intake from USEPA (1997).

4 Body weight and dietary intake from USEPA (1997).

5 Wildlife Exposure Factors Handbook, USEPA 1997 and Sample et al., 1996.

6 Great blue heron body weight and diet from Sample et al (1996).

7 Mourning dove body weight and plant matter and animal matter ingestion rates based on northern bobwhite in USEPA (1993); soil intake rate based on American woodcock in Beyer et al. (1994).

TABLE H.17
Adverse Effects Concentrations
REPTILES AND AMPHIBIANS

Constituent	Group	Test Organism	Lifestage	Endpoint/Duration/Effect	Source	Effect Concentration (mg/L)
PAHs						
Benzo(a)anthracene	Amphibian	South African clawed toads	subadult	EC45, 272 days, lymphoid tumors following implantation (BAP as surrogate)	Eisler 1987	1.50E+00
Benzo(a)pyrene	Amphibian	South African clawed toads	subadult	EC45, 272 days, lymphoid tumors following implantation	Eisler 1987	1.50E+00
Benzo(b)fluoranthene	Amphibian	South African clawed toads	subadult	EC45, 272 days, lymphoid tumors following implantation (BAP as surrogate)	Eisler 1987	1.50E+00
Benzo(ghi)perylene	Amphibian	South African clawed toads	subadult	EC45, 272 days, lymphoid tumors following implantation (BAP as surrogate)	Eisler 1987	1.50E+00
Benzo(k)fluoranthene	Amphibian	South African clawed toads	subadult	EC45, 272 days, lymphoid tumors following implantation (BAP as surrogate)	Eisler 1987	1.50E+00
Chrysene	Amphibian	South African clawed toads	subadult	EC45, 272 days, lymphoid tumors following implantation (BAP as surrogate)	Eisler 1987	1.50E+00
Indeno(1,2,3-cd)pyrene	Amphibian	South African clawed toads	subadult	EC45, 272 days, lymphoid tumors following implantation (BAP as surrogate)	Eisler 1987	1.50E+00
Semi-vols						
Carbazole						No data
Pesticides						
Alpha-Chlordane	Amphibian	Northern leopard frog	subadult	LOAEL, 96 hour, survival (chlordane as surrogate)	Kaplan and Overpeck 1964	5.00E-01
Gamma-Chlordane	Amphibian	Northern leopard frog	subadult	LOAEL, 96 hour, survival (chlordane as surrogate)	Kaplan and Overpeck 1964	5.00E-01
Nitroaromatics						
1,3-Dinitrobenzene	Amphibian	No data available				No data
Inorganics						
Aluminum	Amphibian	Eastern narrow-mouthed frog	embryo	LC50, acute, survival	US EPA 1988	5.00E-02
Barium	Amphibian	No data available				No data
Cadmium	Amphibian	Eastern narrow-mouthed frog	embryo	LC50, 7 day, survival	Birge et al 1979	4.00E-02
Cobalt	Amphibian	No data available				No data
Copper	Amphibian	Northern leopard frog	embryo	LC50, 8 day, survival	Birge and Black 1979	5.00E-02
Iron	Amphibian	No data available				No data
Lead	Amphibian	Marbled salamanders	unknown	LC after 8 days, survival	Eisler 1988	1.40E+00
Manganese	Amphibian	No data available				No data
Silver	Amphibian	Leopard frog	embryo	LC50, acute, survival and development	Birge and Zuiderveen 1995	1.00E-02
Vanadium	Amphibian	No data available				No data
Zinc	Amphibian	Marbled salamanders	embryo	LC50, 8 day, survival and deformities	Birge and Zuiderveen 1995	2.38E+00

TABLE H.18
Calculated Surface Soil (0-1' bls) Exposure - Meadow Vole
SEAD 4
Seneca Army Depot Activity

Constituent	Max Detected Conc. (mg/kg)	Mean Conc. (mg/kg)	SP[1] (unitless)	BAF[2] (unitless)	Vole Max Exposure[3] (mg/kg/day)	Vole Mean Exposure[3] (mg/kg/day)
Volatiles						
Acetone	1.40E-01	1.41E-02	5.33E+01	3.90E-01	1.56E-02	1.56E-03
PAHs						
Acenapthene	7.80E-02	6.29E-02	2.10E-01	3.42E-01	1.34E-04	1.08E-04
Acenapthylene	5.19E-02	4.56E-02	1.72E-01	1.00E+00	9.25E-05	8.14E-05
Anthracene	1.10E-01	6.72E-02	1.04E-01	5.10E-02	1.57E-04	9.57E-05
Benzo(a)anthracene	5.60E-01	6.44E-02	1.51E-02	1.25E-01	7.05E-04	8.11E-05
Benzo(a)pyrene	4.40E-01	6.71E-02	1.02E+00	4.50E+00	1.91E-03	2.91E-04
Benzo(b)fluoranthene	8.30E-01	9.46E-02	1.00E-02	3.20E-01	1.07E-03	1.22E-04
Benzo(g,h,i)perylene	3.00E-01	6.83E-02	3.05E-03	2.40E-01	3.78E-04	8.62E-05
Benzo(k)fluoranthene	5.10E-01	7.02E-02	4.25E-03	2.53E-01	6.46E-04	8.89E-05
Chrysene	5.70E-01	7.50E-02	2.00E-02	1.75E-01	7.30E-04	9.61E-05
Dibenz(a,h)anthracene	1.25E-01	6.82E-02	8.16E-03	1.75E-01	1.57E-04	8.57E-05
Fluoranthene	1.05E+00	9.81E-02	3.72E-02	7.92E-01	1.53E-03	1.43E-04
Fluorene	7.40E-02	6.76E-02	1.49E-01	3.42E-01	1.17E-04	1.07E-04
Indeno(1,2,3-cd)pyrene	2.70E-01	6.49E-02	1.37E-03	4.19E-01	3.51E-04	8.43E-05
2-Methylnaphthalene	3.50E-02	4.32E-02	1.63E-01	3.42E-01	5.65E-05	6.97E-05
Phenanthrene	6.40E-01	7.53E-02	1.00E-01	1.22E-01	9.18E-04	1.08E-04
Pyrene	9.80E-01	9.24E-02	4.43E-02	9.20E-02	1.29E-03	1.21E-04
Semi-volatiles						
Bis(2-ethylhexyl)phthalate	1.30E+01	6.43E-01	1.00E-02	1.20E+01	5.17E-02	2.56E-03
Butylbenzylphthalate	7.10E+00	1.51E-01	1.00E+00	1.00E+00	2.48E-02	5.27E-04
Carbazole	1.20E-01	6.54E-02	1.00E+00	1.00E+00	4.19E-04	2.28E-04
Di-n-octylphthalate	4.40E-02	4.71E-02	1.60E-04	4.90E+03	4.96E-02	5.31E-02
Dibenzofuran	5.80E-02	4.42E-02	1.51E-01	1.00E+00	1.01E-04	7.69E-05
PCBs						
Arochlor 1254	3.10E-01	3.94E-02	1.00E-02	4.50E+00	6.99E-04	8.89E-05
Pesticides						
4,4'-DDD	1.90E-01	5.89E-03	1.34E-02	1.00E-01	2.38E-04	7.37E-06
4,4'-DDE	1.60E-01	6.45E-03	1.80E-02	2.50E-02	1.99E-04	8.02E-06
4,4'-DDT	7.60E-01	1.46E-02	1.00E-02	1.00E-01	9.45E-04	1.81E-05
BHC, beta	7.60E-03	1.51E-03	1.99E-01	1.00E+00	1.40E-05	2.78E-06

TABLE H.18
Calculated Surface Soil (0-1' bls) Exposure - Meadow Vole
SEAD 4
Seneca Army Depot Activity

Constituent	Max Detected Conc. (mg/kg)	Mean Conc. (mg/kg)	SP[1] (unitless)	BAF[2] (unitless)	Vole Max Exposure[3] (mg/kg/day)	Vole Mean Exposure[3] (mg/kg/day)
Dieldrin	7.40E-03	2.64E-03	1.20E-01	4.70E-02	1.08E-05	3.85E-06
Metals						
Antimony	1.48E+02	8.21E+00	1.30E-04	1.00E+00	2.12E-01	1.17E-02
Chromium	1.86E+04	9.16E+02	7.50E-03	7.75E-01	2.57E+01	1.27E+00
Copper	7.33E+03	4.64E+02	4.00E-01	6.82E-01	1.12E+01	7.06E-01
Lead	9.28E+03	1.63E+02	5.80E-03	2.10E+00	1.56E+01	2.74E-01
Mercury	1.20E+00	1.00E-01	9.00E-01	2.30E+01	8.23E-03	6.86E-04
Thallium	5.40E+00	1.14E+00	4.00E-03	2.33E-01	6.78E-03	1.43E-03
Zinc	2.02E+03	2.29E+02	1.40E+00	9.90E+00	8.19E+00	9.29E-01

1 SP: soil-to-plant uptake factor.
2 BAF: bioaccumulation factor.
3 Exposure calculated as

ED = [(Cs * SP * CF * Ip) + (Cs * BAF * Ia) + (Cs * Is)] * SFF / BW

Where, ED = exposure dose
Cs = Max or mean conc in soil (mg/kg)
CF = plant dry-to-wet-weight conversion factor (0.2) (inorganics only)
SP = soil-to-plant uptake factor
Ip = plant-matter intake rate
BAF = bioaccumulation factor (unitless)
Ia = animal-matter intake rate
Is = incidental soil intake rate
SFF = site foraging factor
BW = body weight

TABLE H.19
Calculated Mixed Soil (0-4' bls) Exposure - Meadow Vole
SEAD 4
Seneca Army Depot Activity

Constituent	Max Detected Conc. (mg/kg)	Mean Conc. (mg/kg)	SP[1] (unitless)	BAF[2] (unitless)	Vole Max Exposure[3] (mg/kg/day)	Vole Mean Exposure[3] (mg/kg/day)
Volatiles						
Acetone	1.40E-01	1.11E-02	5.33E+01	3.90E-01	1.56E-02	1.23E-03
PAHs						
Acenapthene	8.80E-02	7.59E-02	2.10E-01	3.42E-01	1.51E-04	1.30E-04
Acenapthylene	1.70E-01	8.49E-02	1.72E-01	1.00E+00	3.03E-04	1.52E-04
Anthracene	3.40E-01	8.57E-02	1.04E-01	5.10E-02	4.85E-04	1.22E-04
Benzo(a)anthracene	1.10E+00	8.91E-02	1.51E-02	1.25E-01	1.39E-03	1.12E-04
Benzo(a)pyrene	8.80E-01	8.84E-02	1.02E+00	4.50E+00	3.82E-03	3.84E-04
Benzo(b)fluoranthene	8.30E-01	1.04E-01	1.00E-02	3.20E-01	1.07E-03	1.35E-04
Benzo(g,h,i)perylene	3.00E-01	8.57E-02	3.05E-03	2.40E-01	3.78E-04	1.08E-04
Benzo(k)fluoranthene	8.90E-01	8.86E-02	4.25E-03	2.53E-01	1.13E-03	1.12E-04
Chrysene	1.00E+00	9.49E-02	2.00E-02	1.75E-01	1.28E-03	1.22E-04
Dibenz(a,h)anthracene	1.25E-01	8.40E-02	8.16E-03	1.75E-01	1.57E-04	1.06E-04
Fluoranthene	2.40E+00	1.21E-01	3.72E-02	7.92E-01	3.50E-03	1.77E-04
Fluorene	3.30E-01	8.65E-02	1.49E-01	3.42E-01	5.23E-04	1.37E-04
Indeno(1,2,3-cd)pyrene	2.70E-01	8.30E-02	1.37E-03	4.19E-01	3.51E-04	1.08E-04
2-Methylnaphthalene	2.60E-01	8.53E-02	1.63E-01	3.42E-01	4.20E-04	1.38E-04
Naphthalene	1.30E-01	8.41E-02	4.43E-01	3.42E-01	2.85E-04	1.84E-04
Phenanthrene	1.40E+00	1.08E-01	1.00E-01	1.22E-01	2.01E-03	1.55E-04
Pyrene	1.80E+00	1.19E-01	4.43E-02	9.20E-02	2.36E-03	1.56E-04
Semi-volatiles						
bis(2-Ethylhexyl)phthalate	1.30E+01	4.90E-01	1.00E-02	1.20E+01	5.17E-02	1.95E-03
Butylbenzylphthalate	7.10E+00	1.39E-01	1.00E+00	1.00E+00	2.48E-02	4.84E-04
Carbazole	1.60E-01	8.19E-02	1.00E+00	1.00E+00	5.59E-04	2.86E-04
Di-n-octylphthalate	4.40E-02	7.44E-02	1.60E-04	4.90E+03	4.96E-02	8.39E-02
Dibenzofuran	5.80E-02	4.76E-02	1.51E-01	1.00E+00	1.01E-04	8.29E-05
PCBs						
Aroclor 1254	1.60E+00	4.47E-02	1.00E-02	4.50E+00	3.61E-03	1.01E-04
Pesticides						
4,4'-DDD	1.90E-01	4.49E-03	1.34E-02	1.00E-01	2.38E-04	5.62E-06
4,4'-DDE	1.60E-01	4.96E-03	1.80E-02	2.50E-02	1.99E-04	6.16E-06
4,4'-DDT	7.60E-01	1.02E-02	1.00E-02	1.00E-01	9.45E-04	1.27E-05
BHC, beta	7.60E-03	1.29E-03	1.99E-01	1.00E+00	1.40E-05	2.38E-06

TABLE H.19
Calculated Mixed Soil (0-4' bls) Exposure - Meadow Vole
SEAD 4
Seneca Army Depot Activity

Constituent	Max Detected Conc. (mg/kg)	Mean Conc. (mg/kg)	SP[1] (unitless)	BAF[2] (unitless)	Vole Max Exposure[3] (mg/kg/day)	Vole Mean Exposure[3] (mg/kg/day)
Metals						
Antimony	1.48E+02	6.98E+00	1.30E-04	1.00E+00	2.12E-01	9.98E-03
Chromium	1.86E+04	6.85E+02	7.50E-03	7.75E-01	2.57E+01	9.46E-01
Copper	7.33E+03	3.60E+02	4.00E-01	6.82E-01	1.12E+01	5.47E-01
Lead	9.28E+03	1.14E+02	5.80E-03	2.10E+00	1.56E+01	1.92E-01
Mercury	1.20E+00	7.59E-02	9.00E-01	2.30E+01	8.23E-03	5.21E-04
Thallium	5.40E+00	9.63E-01	4.00E-03	2.33E-01	6.78E-03	1.21E-03
Zinc	2.02E+03	1.92E+02	1.40E+00	9.90E+00	8.19E+00	7.79E-01

1 SP: soil-to-plant uptake factor.
2 BAF: bioaccumulation factor.
3 Exposure calculated as

$$ED = [(Cs * SP * CF * Ip) + (Cs * BAF * Ia) + (Cs * Is)] * SFF / BW$$

Where, ED = exposure dose
Cs = Max or mean conc in soil (mg/kg)
CF = plant dry-to-wet-weight conversion factor (0.2) (inorganics only)
SP = soil-to-plant uptake factor
Ip = plant-matter intake rate
BAF = bioaccumulation factor (unitless)
Ia = animal-matter intake rate
Is = incidental soil intake rate
SFF = site foraging factor
BW = body weight

TABLE H.20
Calculated Surface Soil (0-1' bls) Hazard Quotients - Meadow Vole
SEAD 4
Seneca Army Depot Activity

Constituent	Vole Max Exposure[1] (mg/kg/day)	Vole Mean Exposure[1] (mg/kg/day)	NOAEL Toxicity Reference Value[2] (mg/kg/day)	LOAEL Toxicity Reference Value[3] (mg/kg/day)	NOAEL Max Hazard Quotient[4]	NOAEL Mean Hazard Quotient[4]	LOAEL Max Hazard Quotient[4]	LOAEL Mean Hazard Quotient[4]
Volatiles								
Acetone	1.56E-02	1.56E-03	1.68E+01	8.40E+01	0.0	0.0	0.0	0.0
PAHs								
Acenapthene	1.34E-04	1.08E-04	1.75E+01	1.75E+02	0.0	0.0	0.0	0.0
Acenapthylene	9.25E-05	8.14E-05	9.10E-01	9.09E+00	0.0	0.0	0.0	0.0
Anthracene	1.57E-04	9.57E-05	1.00E+03	1.00E+03	0.0	0.0	0.0	0.0
Benzo(a)anthracene	7.05E-04	8.11E-05	9.10E-01	9.09E+00	0.0	0.0	0.0	0.0
Benzo(a)pyrene	1.91E-03	2.91E-04	9.10E-01	9.09E+00	0.0	0.0	0.0	0.0
Benzo(b)fluoranthene	1.07E-03	1.22E-04	9.10E-01	9.09E+00	0.0	0.0	0.0	0.0
Benzo(g,h,i)perylene	3.78E-04	8.62E-05	9.10E-01	9.09E+00	0.0	0.0	0.0	0.0
Benzo(k)fluoranthene	6.46E-04	8.89E-05	9.10E-01	9.09E+00	0.0	0.0	0.0	0.0
Chrysene	7.30E-04	9.61E-05	9.10E-01	9.09E+00	0.0	0.0	0.0	0.0
Dibenz(a,h)anthracene	1.57E-04	8.57E-05	9.10E-01	9.09E+00	0.0	0.0	0.0	0.0
Fluoranthene	1.53E-03	1.43E-04	1.25E+01	1.25E+02	0.0	0.0	0.0	0.0
Fluorene	1.17E-04	1.07E-04	1.25E+01	1.25E+02	0.0	0.0	0.0	0.0
Indeno(1,2,3-cd)pyrene	3.51E-04	8.43E-05	9.10E-01	9.09E+00	0.0	0.0	0.0	0.0
2-Methylnaphthalene	5.65E-05	6.97E-05	7.16E+00	7.16E+01	0.0	0.0	0.0	0.0
Phenanthrene	9.18E-04	1.08E-04	9.10E-01	9.09E+00	0.0	0.0	0.0	0.0
Pyrene	1.29E-03	1.21E-04	9.10E-01	9.09E+00	0.0	0.0	0.0	0.0
Semi-volatiles								
Bis(2-ethylhexyl)phthalate	5.17E-02	2.56E-03	1.66E+01	1.66E+02	0.0	0.0	0.0	0.0
Butylbenzylphthalate	2.48E-02	5.27E-04	1.59E+02	4.70E+02	0.0	0.0	0.0	0.0
Carbazole	4.19E-04	2.28E-04	5.00E+00	5.00E+00	0.0	0.0	0.0	0.0
Di-n-octylphthalate	4.96E-02	5.31E-02	6.51E+01	6.51E+01	0.0	0.0	0.0	0.0
Dibenzofuran	1.01E-04	7.69E-05	No data	No data	--	--	--	--
PCBs								
Aroclor 1254	6.99E-04	8.89E-05	5.10E-02	5.11E-01	0.0	0.0	0.0	0.0
Pesticides								
4,4'-DDD	2.38E-04	7.37E-06	1.34E+00	6.72E+00	0.0	0.0	0.0	0.0
4,4'-DDE	1.99E-04	8.02E-06	1.34E+00	6.72E+00	0.0	0.0	0.0	0.0
4,4'-DDT	9.45E-04	1.81E-05	1.34E+00	6.72E+00	0.0	0.0	0.0	0.0
BHC, beta	1.40E-05	2.78E-06	6.70E-01	3.36E+00	0.0	0.0	0.0	0.0
Dieldrin	1.08E-05	3.85E-06	3.40E-02	3.36E-01	0.0	0.0	0.0	0.0

TABLE H.20
Calculated Surface Soil (0-1' bls) Hazard Quotients - Meadow Vole
SEAD 4
Seneca Army Depot Activity

Constituent	Vole Max Exposure[1] (mg/kg/day)	Vole Mean Exposure[1] (mg/kg/day)	NOAEL Toxicity Reference Value[2] (mg/kg/day)	LOAEL Toxicity Reference Value[3] (mg/kg/day)	NOAEL Max Hazard Quotient[4]	NOAEL Mean Hazard Quotient[4]	LOAEL Max Hazard Quotient[4]	LOAEL Mean Hazard Quotient[4]
Metals								
Antimony	2.12E-01	1.17E-02	1.14E-01	1.14E+00	**2**	0.1	0.2	0.0
Chromium	2.57E+01	1.27E+00	5.51E+00	2.21E+01	**5**	0.2	**1.2**	0.1
Copper	1.12E+01	7.06E-01	2.55E+01	3.36E+01	0.4	0.0	0.3	0.0
Lead	1.56E+01	2.74E-01	1.34E+01	1.34E+02	**1.2**	0.0	0.1	0.0
Mercury	8.23E-03	6.86E-04	1.20E+01	1.32E+01	0.0	0.0	0.0	0.0
Thallium	6.78E-03	1.43E-03	1.30E-02	1.26E-01	0.5	0.1	0.1	0.0
Zinc	8.19E+00	9.29E-01	2.69E+02	5.37E+02	0.0	0.0	0.0	0.0

1 Receptor exposure from Table H.18.
2 NOAEL toxicity reference value from Table H.12.
3 LOAEL toxicity reference value from Table H.13.
4 Hazard quotient calculated as HQ = exposure rate / toxicity reference value
BOLD : represents receptor HQ > 1.

TABLE H.21
Calculated Mixed Soil (0-4' bls) Hazard Quotients - Meadow Vole
SEAD 4
Seneca Army Depot Activity

Constituent	Vole Mean Exposure[1] (mg/kg/day)	Vole Mean Exposure1 (mg/kg/day)	NOAEL Toxicity Reference Value[2] (mg/kg/day)	LOAEL Toxicity Reference Value[3] (mg/kg/day)	NOAEL Max Hazard Quotient[4]	NOAEL Mean Hazard Quotient[4]	LOAEL Max Hazard Quotient[4]	LOAEL Mean Hazard Quotient[4]
Volatiles								
Acetone	1.56E-02	1.23E-03	1.68E+01	8.40E+01	0.0	0.0	0.0	0.0
PAHs								
Acenapthene	1.51E-04	1.30E-04	1.75E+01	1.75E+02	0.0	0.0	0.0	0.0
Acenapthylene	3.03E-04	1.52E-04	9.10E-01	9.09E+00	0.0	0.0	0.0	0.0
Anthracene	4.85E-04	1.22E-04	1.00E+03	1.00E+03	0.0	0.0	0.0	0.0
Benzo(a)anthracene	1.39E-03	1.12E-04	9.10E-01	9.09E+00	0.0	0.0	0.0	0.0
Benzo(a)pyrene	3.82E-03	3.84E-04	9.10E-01	9.09E+00	0.0	0.0	0.0	0.0
Benzo(b)fluoranthene	1.07E-03	1.35E-04	9.10E-01	9.09E+00	0.0	0.0	0.0	0.0
Benzo(g,h,i)perylene	3.78E-04	1.08E-04	9.10E-01	9.09E+00	0.0	0.0	0.0	0.0
Benzo(k)fluoranthene	1.13E-03	1.12E-04	9.10E-01	9.09E+00	0.0	0.0	0.0	0.0
Chrysene	1.28E-03	1.22E-04	9.10E-01	9.09E+00	0.0	0.0	0.0	0.0
Dibenz(a,h)anthracene	1.57E-04	1.06E-04	9.10E-01	9.09E+00	0.0	0.0	0.0	0.0
Fluoranthene	3.50E-03	1.77E-04	1.25E+01	1.25E+02	0.0	0.0	0.0	0.0
Fluorene	5.23E-04	1.37E-04	1.25E+01	1.25E+02	0.0	0.0	0.0	0.0
Indeno(1,2,3-cd)pyrene	3.51E-04	1.08E-04	9.10E-01	9.09E+00	0.0	0.0	0.0	0.0
2-Methylnaphthalene	4.20E-04	1.38E-04	7.16E+00	7.16E+01	0.0	0.0	0.0	0.0
Naphthalene	2.85E-04	1.84E-04	7.16E+00	7.16E+01	0.0	0.0	0.0	0.0
Phenanthrene	2.01E-03	1.55E-04	9.10E-01	9.09E+00	0.0	0.0	0.0	0.0
Pyrene	2.36E-03	1.56E-04	9.10E-01	9.09E+00	0.0	0.0	0.0	0.0
Semi-volatiles								
bis(2-Ethylhexyl)phthalate	5.17E-02	1.95E-03	1.66E+01	1.66E+02	0.0	0.0	0.0	0.0
Butylbenzylphthalate	2.48E-02	4.84E-04	1.59E+02	4.70E+02	0.0	0.0	0.0	0.0
Carbazole	5.59E-04	2.86E-04	5.00E+00	5.00E+00	0.0	0.0	0.0	0.0
Di-n-octylphthalate	4.96E-02	8.39E-02	6.51E+01	6.51E+01	0.0	NA	0.0	NA
Dibenzofuran	1.01E-04	8.29E-05	No data	No data	--	--	--	--
PCBs								
Aroclor 1254	3.61E-03	1.01E-04	5.10E-02	5.11E-01	0.1	0.0	0.0	0.0
Pesticides								
4,4'-DDD	2.38E-04	5.62E-06	1.34E+00	6.72E+00	0.0	0.0	0.0	0.0
4,4'-DDE	1.99E-04	6.16E-06	1.34E+00	6.72E+00	0.0	0.0	0.0	0.0
4,4'-DDT	9.45E-04	1.27E-05	1.34E+00	6.72E+00	0.0	0.0	0.0	0.0
BHC, beta	1.40E-05	2.38E-06	6.70E-01	3.36E+00	0.0	0.0	0.0	0.0

TABLE H.21
Calculated Mixed Soil (0-4' bls) Hazard Quotients - Meadow Vole
SEAD 4
Seneca Army Depot Activity

Constituent	Vole Mean Exposure[1] (mg/kg/day)	Vole Mean Exposure1 (mg/kg/day)	NOAEL Toxicity Reference Value[2] (mg/kg/day)	LOAEL Toxicity Reference Value[3] (mg/kg/day)	NOAEL Max Hazard Quotient[4]	NOAEL Mean Hazard Quotient[4]	LOAEL Max Hazard Quotient[4]	LOAEL Mean Hazard Quotient[4]
Metals								
Antimony	2.12E-01	9.98E-03	1.14E-01	1.14E+00	**1.9**	0.1	0.2	0.0
Chromium	2.57E+01	9.46E-01	5.51E+00	2.21E+01	**4.7**	0.2	**1.2**	0.0
Copper	1.12E+01	5.47E-01	2.55E+01	3.36E+01	0.4	0.0	0.3	0.0
Lead	1.56E+01	1.92E-01	1.34E+01	1.34E+02	**1.2**	0.0	0.1	0.0
Mercury	8.23E-03	5.21E-04	1.20E+01	1.32E+01	0.0	0.0	0.0	0.0
Thallium	6.78E-03	1.21E-03	1.30E-02	1.26E-01	0.5	0.1	0.1	0.0
Zinc	8.19E+00	7.79E-01	2.69E+02	5.37E+02	0.0	0.0	0.0	0.0

1 Receptor exposure from Table H.19.
2 NOAEL toxicity reference value from Table H.12.
3 LOAEL toxicity reference value from Table H.13.
4 Hazard quotient calculated as HQ = exposure rate / toxicity reference value
NA - Not assessed; mean concentration > max concentration because of using 1/2 detection limit to calculate.

BOLD : represents receptor HQ > 1.

TABLE H.22
Calculated Surface Soil (0-1' bls) Exposure - Short-tailed Shrew
SEAD 4
Seneca Army Depot Activity

Constituent	Max Detected Conc. (mg/kg)	Mean Conc. (mg/kg)	SP[1] (unitless)	BAF[2] (unitless)	Shrew Max Exposure[3] (mg/kg/day)	Shrew Mean Exposure[3] (mg/kg/day)
Volatiles						
Acetone	1.40E-01	1.41E-02	5.33E+01	3.90E-01	7.99E-01	8.02E-02
PAHs						
Acenapthene	7.80E-02	6.29E-02	2.10E-01	3.42E-01	1.52E-02	1.22E-02
Acenapthylene	5.19E-02	4.56E-02	1.72E-01	1.00E+00	2.70E-02	2.37E-02
Anthracene	1.10E-01	6.72E-02	1.04E-01	5.10E-02	4.15E-03	2.53E-03
Benzo(a)anthracene	5.60E-01	6.44E-02	1.51E-02	1.25E-01	3.67E-02	4.22E-03
Benzo(a)pyrene	4.40E-01	6.71E-02	1.02E+00	4.50E+00	1.04E+00	1.58E-01
Benzo(b)fluoranthene	8.30E-01	9.46E-02	1.00E-02	3.20E-01	1.35E-01	1.54E-02
Benzo(g,h,i)perylene	3.00E-01	6.83E-02	3.05E-03	2.40E-01	3.66E-02	8.33E-03
Benzo(k)fluoranthene	5.10E-01	7.02E-02	4.25E-03	2.53E-01	6.56E-02	9.02E-03
Chrysene	5.70E-01	7.50E-02	2.00E-02	1.75E-01	5.20E-02	6.84E-03
Dibenz(a,h)anthracene	1.25E-01	6.82E-02	8.16E-03	1.75E-01	1.12E-02	6.13E-03
Fluoranthene	1.05E+00	9.81E-02	3.72E-02	7.92E-01	4.22E-01	3.94E-02
Fluorene	7.40E-02	6.76E-02	1.49E-01	3.42E-01	1.39E-02	1.27E-02
Indeno(1,2,3-cd)pyrene	2.70E-01	6.49E-02	1.37E-03	4.19E-01	5.71E-02	1.37E-02
2-Methylnaphthalene	3.50E-02	4.32E-02	1.63E-01	3.42E-01	6.63E-03	8.19E-03
Phenanthrene	6.40E-01	7.53E-02	1.00E-01	1.22E-01	4.66E-02	5.49E-03
Pyrene	9.80E-01	9.24E-02	4.43E-02	9.20E-02	5.11E-02	4.81E-03
Semi-volatiles						
Bis(2-ethylhexyl)phthalate	1.30E+01	6.43E-01	1.00E-02	1.20E+01	7.81E+01	3.86E+00
Butylbenzylphthalate	7.10E+00	1.51E-01	1.00E+00	1.00E+00	4.30E+00	9.14E-02
Carbazole	1.20E-01	6.54E-02	1.00E+00	1.00E+00	7.27E-02	3.96E-02
Di-n-octylphthalate	4.40E-02	4.71E-02	1.60E-04	4.90E+03	1.08E+02	1.15E+02
Dibenzofuran	5.80E-02	4.42E-02	1.51E-01	1.00E+00	3.00E-02	2.29E-02
PCBs						
Arochlor 1254	3.10E-01	3.94E-02	1.00E-02	4.50E+00	6.99E-01	8.89E-02
Pesticides						
4,4'-DDD	1.90E-01	5.89E-03	1.34E-02	1.00E-01	1.01E-02	3.12E-04
4,4'-DDE	1.60E-01	6.45E-03	1.80E-02	2.50E-02	2.53E-03	1.02E-04
4,4'-DDT	7.60E-01	1.46E-02	1.00E-02	1.00E-01	4.00E-02	7.66E-04
BHC, beta	7.60E-03	1.51E-03	1.99E-01	1.00E+00	3.97E-03	7.89E-04
Dieldrin	7.40E-03	2.64E-03	1.20E-01	4.70E-02	2.77E-04	9.87E-05

TABLE H.22
Calculated Surface Soil (0-1' bls) Exposure - Short-tailed Shrew
SEAD 4
Seneca Army Depot Activity

Constituent	Max Detected Conc. (mg/kg)	Mean Conc. (mg/kg)	SP[1] (unitless)	BAF[2] (unitless)	Shrew Max Exposure[3] (mg/kg/day)	Shrew Mean Exposure[3] (mg/kg/day)
Metals						
Antimony	1.48E+02	8.21E+00	1.30E-04	1.00E+00	7.43E+01	4.12E+00
Chromium	1.86E+04	9.16E+02	7.50E-03	7.75E-01	7.25E+03	3.57E+02
Copper	7.33E+03	4.64E+02	4.00E-01	6.82E-01	2.57E+03	1.63E+02
Lead	9.28E+03	1.63E+02	5.80E-03	2.10E+00	9.77E+03	1.71E+02
Mercury	1.20E+00	1.00E-01	9.00E-01	2.30E+01	1.38E+01	1.15E+00
Thallium	5.40E+00	1.14E+00	4.00E-03	2.33E-01	6.38E-01	1.35E-01
Zinc	2.02E+03	2.29E+02	1.40E+00	9.90E+00	1.01E+04	1.14E+03

1 SP: soil-to-plant uptake factor.
2 BAF: bioaccumulation factor.
3 Exposure calculated as

$ED = [(Cs * SP * CF * Ip) + (Cs * BAF * Ia) + (Cs * Is)] * SFF / BW$

Where, ED = exposure dose
Cs = Max or mean conc in soil (mg/kg)
CF = plant dry-to-wet-weight conversion factor (0.2) (inorganics only)
SP = soil-to-plant uptake factor
Ip = plant-matter intake rate
BAF = bioaccumulation factor (unitless)
Ia = animal-matter intake rate
Is = incidental soil intake rate
SFF = site foraging factor
BW = body weight

TABLE H.23
Calculated Mixed Soil (0-4' bls) Exposure - Short-tailed Shrew
SEAD 4
Seneca Army Depot Activity

Constituent	Max Detected Conc. (mg/kg)	Mean Conc. (mg/kg)	SP[1] (unitless)	BAF[2] (unitless)	Shrew Max Exposure[3] (mg/kg/day)	Shrew Mean Exposure[3] (mg/kg/day)
Volatiles						
Acetone	1.40E-01	1.11E-02	5.33E+01	3.90E-01	7.99E-01	6.32E-02
PAHs						
Acenapthene	8.80E-02	7.59E-02	2.10E-01	3.42E-01	1.71E-02	1.48E-02
Acenapthylene	1.70E-01	8.49E-02	1.72E-01	1.00E+00	8.84E-02	4.42E-02
Anthracene	3.40E-01	8.57E-02	1.04E-01	5.10E-02	1.28E-02	3.23E-03
Benzo(a)anthracene	1.10E+00	8.91E-02	1.51E-02	1.25E-01	7.22E-02	5.84E-03
Benzo(a)pyrene	8.80E-01	8.84E-02	1.02E+00	4.50E+00	2.08E+00	2.09E-01
Benzo(b)fluoranthene	8.30E-01	1.04E-01	1.00E-02	3.20E-01	1.35E-01	1.70E-02
Benzo(g,h,i)perylene	3.00E-01	8.57E-02	3.05E-03	2.40E-01	3.66E-02	1.05E-02
Benzo(k)fluoranthene	8.90E-01	8.86E-02	4.25E-03	2.53E-01	1.14E-01	1.14E-02
Chrysene	1.00E+00	9.49E-02	2.00E-02	1.75E-01	9.12E-02	8.65E-03
Dibenz(a,h)anthracene	1.25E-01	8.40E-02	8.16E-03	1.75E-01	1.12E-02	7.55E-03
Fluoranthene	2.40E+00	1.21E-01	3.72E-02	7.92E-01	9.64E-01	4.87E-02
Fluorene	3.30E-01	8.65E-02	1.49E-01	3.42E-01	6.21E-02	1.63E-02
Indeno(1,2,3-cd)pyrene	2.70E-01	8.30E-02	1.37E-03	4.19E-01	5.71E-02	1.75E-02
2-Methylnaphthalene	2.60E-01	8.53E-02	1.63E-01	3.42E-01	4.93E-02	1.62E-02
Naphthalene	1.30E-01	8.41E-02	4.43E-01	3.42E-01	2.84E-02	1.84E-02
Phenanthrene	1.40E+00	1.08E-01	1.00E-01	1.22E-01	1.02E-01	7.86E-03
Pyrene	1.80E+00	1.19E-01	4.43E-02	9.20E-02	9.38E-02	6.18E-03
Semi-volatiles						
bis(2-Ethylhexyl)phthalate	1.30E+01	4.90E-01	1.00E-02	1.20E+01	7.81E+01	2.94E+00
Butylbenzylphthalate	7.10E+00	1.39E-01	1.00E+00	1.00E+00	4.30E+00	8.39E-02
Carbazole	1.60E-01	8.19E-02	1.00E+00	1.00E+00	9.69E-02	4.96E-02
Di-n-octylphthalate	4.40E-02	7.44E-02	1.60E-04	4.90E+03	1.08E+02	1.83E+02
Dibenzofuran	5.80E-02	4.76E-02	1.51E-01	1.00E+00	3.00E-02	2.47E-02
PCBs						
Aroclor 1254	1.60E+00	4.47E-02	1.00E-02	4.50E+00	3.61E+00	1.01E-01
Pesticides						
4,4'-DDD	1.90E-01	4.49E-03	1.34E-02	1.00E-01	1.01E-02	2.38E-04
4,4'-DDE	1.60E-01	4.96E-03	1.80E-02	2.50E-02	2.53E-03	7.86E-05
4,4'-DDT	7.60E-01	1.02E-02	1.00E-02	1.00E-01	4.00E-02	5.36E-04
BHC, beta	7.60E-03	1.29E-03	1.99E-01	1.00E+00	3.97E-03	6.74E-04

TABLE H.23
Calculated Mixed Soil (0-4' bls) Exposure - Short-tailed Shrew
SEAD 4
Seneca Army Depot Activity

Constituent	Max Detected Conc. (mg/kg)	Mean Conc. (mg/kg)	SP[1] (unitless)	BAF[2] (unitless)	Shrew Max Exposure[3] (mg/kg/day)	Shrew Mean Exposure[3] (mg/kg/day)
Metals						
Antimony	1.48E+02	6.98E+00	1.30E-04	1.00E+00	7.43E+01	3.50E+00
Chromium	1.86E+04	6.85E+02	7.50E-03	7.75E-01	7.25E+03	2.67E+02
Copper	7.33E+03	3.60E+02	4.00E-01	6.82E-01	2.57E+03	1.26E+02
Lead	9.28E+03	1.14E+02	5.80E-03	2.10E+00	9.77E+03	1.20E+02
Mercury	1.20E+00	7.59E-02	9.00E-01	2.30E+01	1.38E+01	8.76E-01
Thallium	5.40E+00	9.63E-01	4.00E-03	2.33E-01	6.38E-01	1.14E-01
Zinc	2.02E+03	1.92E+02	1.40E+00	9.90E+00	1.01E+04	9.58E+02

1 SP: soil-to-plant uptake factor.

2 BAF: bioaccumulation factor.

3 Exposure calculated as

$$ED = [(Cs * SP * CF * Ip) + (Cs * BAF * Ia) + (Cs * Is)] * SFF / BW$$

Where, ED = exposure dose
Cs = Max or mean conc in soil (mg/kg)
CF = plant dry-to-wet-weight conversion factor (0.2) (inorganics only)
SP = soil-to-plant uptake factor
BAF = bioaccumulation factor (unitless)
Ia = animal-matter intake rate
Is = incidental soil intake rate
SFF = site foraging factor
BW = body weight

TABLE H.24
Calculated Surface Soil (0-1' bls) Hazard Quotients - Short-tailed Shrew
SEAD 4
Seneca Army Depot Activity

Constituent	Shrew Max Exposure[1] (mg/kg/day)	Shrew Mean Exposure[1] (mg/kg/day)	NOAEL Toxicity Reference Value[2] (mg/kg/day)	LOAEL Toxicity Reference Value[3] (mg/kg/day)	NOAEL Max Hazard Quotient[4]	NOAEL Mean Hazard Quotient[4]	LOAEL Max Hazard Quotient[4]	LOAEL Mean Hazard Quotient[4]
Volatiles								
Acetone	7.99E-01	8.02E-02	2.20E+01	1.10E+02	0.0	0.0	0.0	0.0
PAHs								
Acenapthene	1.52E-02	1.22E-02	1.75E+01	1.75E+02	0.0	0.0	0.0	0.0
Acenapthylene	2.70E-02	2.37E-02	1.19E+00	1.19E+01	0.0	0.0	0.0	0.0
Anthracene	4.15E-03	2.53E-03	1.00E+03	1.00E+03	0.0	0.0	0.0	0.0
Benzo(a)anthracene	3.67E-02	4.22E-03	1.19E+00	1.19E+01	0.0	0.0	0.0	0.0
Benzo(a)pyrene	1.04E+00	1.58E-01	1.19E+00	1.19E+01	0.9	0.1	0.1	0.0
Benzo(b)fluoranthene	1.35E-01	1.54E-02	1.19E+00	1.19E+01	0.1	0.0	0.0	0.0
Benzo(g,h,i)perylene	3.66E-02	8.33E-03	1.19E+00	1.19E+01	0.0	0.0	0.0	0.0
Benzo(k)fluoranthene	6.56E-02	9.02E-03	1.19E+00	1.19E+01	0.1	0.0	0.0	0.0
Chrysene	5.20E-02	6.84E-03	1.19E+00	1.19E+01	0.0	0.0	0.0	0.0
Dibenz(a,h)anthracene	1.12E-02	6.13E-03	1.19E+00	1.19E+01	0.0	0.0	0.0	0.0
Fluoranthene	4.22E-01	3.94E-02	1.25E+01	1.25E+02	0.0	0.0	0.0	0.0
Fluorene	1.39E-02	1.27E-02	1.25E+01	1.25E+02	0.0	0.0	0.0	0.0
Indeno(1,2,3-cd)pyrene	5.71E-02	1.37E-02	1.19E+00	1.19E+01	0.0	0.0	0.0	0.0
2-Methylnaphthalene	6.63E-03	8.19E-03	7.16E+00	7.16E+01	0.0	0.0	0.0	0.0
Phenanthrene	4.66E-02	5.49E-03	1.19E+00	1.19E+01	0.0	0.0	0.0	0.0
Pyrene	5.11E-02	4.81E-03	1.19E+00	1.19E+01	0.0	0.0	0.0	0.0
Semi-volatiles								
Bis(2-ethylhexyl)phthalate	7.81E+01	3.86E+00	2.18E+01	2.18E+02	**3.6**	0.2	0.4	0.0
Butylbenzylphthalate	4.30E+00	9.14E-02	1.59E+02	4.70E+02	0.0	0.0	0.0	0.0
Carbazole	7.27E-02	3.96E-02	5.00E+00	5.00E+00	0.0	0.0	0.0	0.0
Di-n-octylphthalate	1.08E+02	1.15E+02	6.51E+01	6.51E+01	**1.7**	**1.8**	**1.7**	**1.8**
Dibenzofuran	3.00E-02	2.29E-02	No data	No data	--	--	--	--
PCBs								
Aroclor 1254	6.99E-01	8.89E-02	6.70E-02	6 68E-01	**10**	**1.3**	1.0	0.1
Pesticides								
4,4'-DDD	1.01E-02	3.12E-04	1.76E+00	8.79E+00	0.0	0.0	0.0	0.0
4,4'-DDE	2.53E-03	1.02E-04	1.76E+00	8.79E+00	0.0	0.0	0.0	0.0
4,4'-DDT	4.00E-02	7.66E-04	1.76E+00	8.79E+00	0.0	0.0	0.0	0.0
BHC, beta	3.97E-03	7.89E-04	8.80E-01	4.40E+00	0.0	0.0	0.0	0.0
Dieldrin	2.77E-04	9.87E-05	4.40E-02	4.40E-01	0.0	0.0	0.0	0.0

TABLE H.24
Calculated Surface Soil (0-1' bls) Hazard Quotients - Short-tailed Shrew
SEAD 4
Seneca Army Depot Activity

Constituent	Shrew Max Exposure[1] (mg/kg/day)	Shrew Mean Exposure[1] (mg/kg/day)	NOAEL Toxicity Reference Value[2] (mg/kg/day)	LOAEL Toxicity Reference Value[3] (mg/kg/day)	NOAEL Max Hazard Quotient[4]	NOAEL Mean Hazard Quotient[4]	LOAEL Max Hazard Quotient[4]	LOAEL Mean Hazard Quotient[4]
Metals								
Antimony	7.43E+01	4.12E+00	1.49E-01	1.49E+00	**499**	**28**	**50**	**2.8**
Chromium	7.25E+03	3.57E+02	7.21E+00	2.89E+01	**1005**	**50**	**251**	**12.4**
Copper	2.57E+03	1.63E+02	3.34E+01	4.40E+01	**77**	**4.9**	**59**	**3.7**
Lead	9.77E+03	1.71E+02	1.76E+01	1.76E+02	**556**	**9.7**	**56**	1.0
Mercury	1.38E+01	1.15E+00	1.57E+01	1.32E+01	0.9	0.1	1.0	0.1
Thallium	6.38E-01	1.35E-01	1.60E-02	1.64E-01	**40**	**8.4**	**3.9**	0.8
Zinc	1.01E+04	1.14E+03	3.52E+02	7.03E+02	**29**	**3.2**	**14.3**	**1.6**

1 Receptor exposure from Table H.22.
2 NOAEL toxicity reference value from Table H.12.
3 LOAEL toxicity reference value from Table H.13.
4 Hazard quotient calculated as HQ = exposure rate / toxicity reference value
BOLD : represents receptor HQ > 1.

TABLE H.25
Calculated Mixed Soil (0-4 ft) Hazard Quotients - Short-tailed Shrew
SEAD 4
Seneca Army Depot Activity

Constituent	Shrew Max Exposure[1] (mg/kg/day)	Shrew Mean Exposure[1] (mg/kg/day)	NOAEL Toxicity Reference Value[2] (mg/kg/day)	LOAEL Toxicity Reference Value[3] (mg/kg/day)	NOAEL Max Hazard Quotient[4]	NOAEL Mean Hazard Quotient[4]	LOAEL Max Hazard Quotient[4]	LOAEL Mean Hazard Quotient[4]
Volatiles								
Acetone	7.99E-01	6.32E-02	2.20E+01	1.10E+02	0.0	0.0	0.0	0.0
PAHs								
Acenapthene	1.71E-02	1.48E-02	1.75E+01	1.75E+02	0.0	0.0	0.0	0.0
Acenapthylene	8.84E-02	4.42E-02	1.19E+00	1.19E+01	0.1	0.0	0.0	0.0
Anthracene	1.28E-02	3.23E-03	1.00E+03	1.00E+03	0.0	0.0	0.0	0.0
Benzo(a)anthracene	7.22E-02	5.84E-03	1.19E+00	1.19E+01	0.1	0.0	0.0	0.0
Benzo(a)pyrene	2.08E+00	2.09E-01	1.19E+00	1.19E+01	1.7	0.2	0.2	0.0
Benzo(b)fluoranthene	1.35E-01	1.70E-02	1.19E+00	1.19E+01	0.1	0.0	0.0	0.0
Benzo(g,h,i)perylene	3.66E-02	1.05E-02	1.19E+00	1.19E+01	0.0	0.0	0.0	0.0
Benzo(k)fluoranthene	1.14E-01	1.14E-02	1.19E+00	1.19E+01	0.1	0.0	0.0	0.0
Chrysene	9.12E-02	8.65E-03	1.19E+00	1.19E+01	0.1	0.0	0.0	0.0
Dibenz(a,h)anthracene	1.12E-02	7.55E-03	1.19E+00	1.19E+01	0.0	0.0	0.0	0.0
Fluoranthene	9.64E-01	4.87E-02	1.25E+01	1.25E+02	0.1	0.0	0.0	0.0
Fluorene	6.21E-02	1.63E-02	1.25E+01	1.25E+02	0.0	0.0	0.0	0.0
Indeno(1,2,3-cd)pyrene	5.71E-02	1.75E-02	1.19E+00	1.19E+01	0.0	0.0	0.0	0.0
2-Methylnaphthalene	4.93E-02	1.62E-02	7.16E+00	7.16E+01	0.0	0.0	0.0	0.0
Naphthalene	2.84E-02	1.84E-02	7.16E+00	7.16E+01	0.0	0.0	0.0	0.0
Phenanthrene	1.02E-01	7.86E-03	1.19E+00	1.19E+01	0.1	0.0	0.0	0.0
Pyrene	9.38E-02	6.18E-03	1.19E+00	1.19E+01	0.1	0.0	0.0	0.0
Semi-volatiles								
bis(2-Ethylhexyl)phthalate	7.81E+01	2.94E+00	2.18E+01	2.18E+02	3.6	0.1	0.4	0.0
Butylbenzylphthalate	4.30E+00	8.39E-02	1.59E+02	4.70E+02	0.0	0.0	0.0	0.0
Carbazole	9.69E-02	4.96E-02	5.00E+00	5.00E+00	0.0	0.0	0.0	0.0
Di-n-octylphthalate	1.08E+02	1.83E+02	6.51E+01	6.51E+01	1.7	NA	1.7	NA
Dibenzofuran	3.00E-02	2.47E-02	No data	No data	--	--	--	--
PCBs								
Aroclor 1254	3.61E+00	1.01E-01	6.70E-02	6.68E-01	54	1.5	5.4	0.2
Pesticides								
4,4'-DDD	1.01E-02	2.38E-04	1.76E+00	8.79E+00	0.0	0.0	0.0	0.0
4,4'-DDE	2.53E-03	7.86E-05	1.76E+00	8.79E+00	0.0	0.0	0.0	0.0
4,4'-DDT	4.00E-02	5.36E-04	1.76E+00	8.79E+00	0.0	0.0	0.0	0.0
BHC, beta	3.97E-03	6.74E-04	8.80E-01	4.40E+00	0.0	0.0	0.0	0.0

TABLE H.25
Calculated Mixed Soil (0-4 ft) Hazard Quotients - Short-tailed Shrew
SEAD 4
Seneca Army Depot Activity

Constituent	Shrew Max Exposure[1] (mg/kg/day)	Shrew Mean Exposure[1] (mg/kg/day)	NOAEL Toxicity Reference Value[2] (mg/kg/day)	LOAEL Toxicity Reference Value[3] (mg/kg/day)	NOAEL Max Hazard Quotient[4]	NOAEL Mean Hazard Quotient[4]	LOAEL Max Hazard Quotient[4]	LOAEL Mean Hazard Quotient[4]
Metals								
Antimony	7.43E+01	3.50E+00	1.49E-01	1.49E+00	**499**	**24**	**50**	**2.4**
Chromium	7.25E+03	2.67E+02	7.21E+00	2.89E+01	**1005**	**37**	**251**	**9.2**
Copper	2.57E+03	1.26E+02	3.34E+01	4.40E+01	**77**	**3.8**	**59**	**2.9**
Lead	9.77E+03	1.20E+02	1.76E+01	1.76E+02	**556**	**6.8**	**56**	0.7
Mercury	1.38E+01	8.76E-01	1.57E+01	1.32E+01	0.9	0.1	1.0	0.1
Thallium	6.38E-01	1.14E-01	1.60E-02	1.64E-01	**40**	**7.1**	**3.9**	0.7
Zinc	1.01E+04	9.58E+02	3.52E+02	7.03E+02	**29**	**2.7**	**14.3**	**1.4**

1 Receptor exposure from Table H.23.
2 NOAEL toxicity reference value from Table H.12.
3 LOAEL toxicity reference value from Table H.13.
4 Hazard quotient calculated as HQ = exposure rate / toxicity reference value
NA - Not assessed; mean concentration > max concentration because of using 1/2 detection limit to calculate.

BOLD : represents receptor HQ > 1.

TABLE H.26
Calculated Surface Soil (0-1' bls) Exposure - Red-tailed Hawk
SEAD 4
Seneca Army Depot Activity

Constituent	Max Detected Conc. (mg/kg)	Mean Conc. (mg/kg)	SP[1] (unitless)	Invertebrate BAF[2] (unitless)	Vertebrate BAF[2] (unitless)	Hawk Max Exposure[3] (mg/kg/day)	Hawk Mean Exposure[3] (mg/kg/day)
Volatiles							
Acetone	1.40E-01	1.41E-02	5.33E+01	3.90E-01	3.90E-01	5.14E-05	5.16E-06
PAHs							
Acenapthene	7.80E-02	6.29E-02	2.10E-01	3.42E-01	5.90E-01	1.57E-06	1.27E-06
Acenapthylene	5.19E-02	4.56E-02	1.72E-01	1.00E+00	5.90E-01	2.68E-06	2.36E-06
Anthracene	1.10E-01	6.72E-02	1.04E-01	5.10E-02	5.90E-01	5.44E-07	3.32E-07
Benzo(a)anthracene	5.60E-01	6.44E-02	1.51E-02	1.25E-01	5.90E-01	4.28E-06	4.92E-07
Benzo(a)pyrene	4.40E-01	6.71E-02	1.02E+00	4.50E+00	5.90E-01	1.01E-04	1.55E-05
Benzo(b)fluoranthene	8.30E-01	9.46E-02	1.00E-02	3.20E-01	5.90E-01	1.42E-05	1.61E-06
Benzo(g,h,i)perylene	3.00E-01	6.83E-02	3.05E-03	2.40E-01	5.90E-01	3.94E-06	8.96E-07
Benzo(k)fluoranthene	5.10E-01	7.02E-02	4.25E-03	2.53E-01	5.90E-01	7.02E-06	9.66E-07
Chrysene	5.70E-01	7.50E-02	2.00E-02	1.75E-01	5.90E-01	5.77E-06	7.60E-07
Dibenz(a,h)anthracene	1.25E-01	6.82E-02	8.16E-03	1.75E-01	5.90E-01	1.25E-06	6.83E-07
Fluoranthene	1.05E+00	9.81E-02	3.72E-02	7.92E-01	5.90E-01	4.23E-05	3.95E-06
Fluorene	7.40E-02	6.76E-02	1.49E-01	3.42E-01	5.90E-01	1.45E-06	1.32E-06
Indeno(1,2,3-cd)pyrene	2.70E-01	6.49E-02	1.37E-03	4.19E-01	5.90E-01	5.89E-06	1.41E-06
2-Methylnaphthalene	3.50E-02	4.32E-02	1.63E-01	3.42E-01	5.90E-01	6.89E-07	8.50E-07
Phenanthrene	6.40E-01	7.53E-02	1.00E-01	1.22E-01	5.90E-01	5.35E-06	6.29E-07
Pyrene	9.80E-01	9.24E-02	4.43E-02	9.20E-02	5.90E-01	6.21E-06	5.85E-07
Semi-volatiles							
Bis(2-ethylhexyl)phthalate	1.30E+01	6.43E-01	1.00E-02	1.20E+01	1.50E+00	1.93E-02	9.56E-04
Butylbenzylphthalate	7.10E+00	1.51E-01	1.00E+00	1.00E+00	1.00E+00	7.23E-04	1.54E-05
Carbazole	1.20E-01	6.54E-02	1.00E+00	1.00E+00	1.00E+00	1.22E-05	6.65E-06
Di-n-octylphthalate	4.40E-02	4.71E-02	1.60E-04	4.90E+03	6.42E+02	1.14E+01	1.22E+01
Dibenzofuran	5.80E-02	4.42E-02	1.51E-01	1.00E+00	1.00E+00	5.07E-06	3.86E-06
PCBs							
Arochlor 1254	3.10E-01	3.94E-02	1.00E-02	4.50E+00	4.50E+00	5.21E-04	6.62E-05
Pesticides							
4,4'-DDD	1.90E-01	5.89E-03	1.34E-02	1.00E-01	1.00E-01	2.07E-07	6.41E-09
4,4'-DDE	1.60E-01	6.45E-03	1.80E-02	2.50E-02	2.50E-02	1.91E-08	7.70E-10
4,4'-DDT	7.60E-01	1.46E-02	1.00E-02	1.00E-01	1.00E-01	8.22E-07	1.58E-08
BHC, beta	7.60E-03	1.51E-03	1.99E-01	1.00E+00	1.00E+00	6.70E-07	1.33E-07
Dieldrin	7.40E-03	2.64E-03	1.20E-01	4.70E-02	4.70E-02	2.90E-09	1.03E-09

TABLE H.26
Calculated Surface Soil (0-1' bls) Exposure - Red-tailed Hawk
SEAD 4
Seneca Army Depot Activity

Constituent	Max Detected Conc. (mg/kg)	Mean Conc. (mg/kg)	SP[1] (unitless)	Invertebrate BAF[2] (unitless)	Vertebrate BAF[2] (unitless)	Hawk Max Exposure[3] (mg/kg/day)	Hawk Mean Exposure[3] (mg/kg/day)
Metals							
Antimony	1.48E+02	8.21E+00	1.30E-04	1.00E+00	1.00E+00	1.25E-02	6.96E-04
Chromium	1.86E+04	9.16E+02	7.50E-03	7.75E-01	7.75E-01	9.55E-01	4.71E-02
Copper	7.33E+03	4.64E+02	4.00E-01	6.82E-01	6.82E-01	3.00E-01	1.90E-02
Lead	9.28E+03	1.63E+02	5.80E-03	2.10E+00	2.10E+00	3.42E+00	5.99E-02
Mercury	1.20E+00	1.00E-01	9.00E-01	2.30E+01	2.30E+01	5.24E-02	4.37E-03
Thallium	5.40E+00	1.14E+00	4.00E-03	2.33E-01	2.33E-01	2.72E-05	5.74E-06
Zinc	2.02E+03	2.29E+02	1.40E+00	9.90E+00	9.90E+00	1.65E+01	1.87E+00

1 SP: soil-to-plant uptake factor.
2 BAF: bioaccumulation factor.
3 Exposure calculated as

$$ED = [(Cs *(SP_v * CF * Ip_{hawk} + BAF_{inv} * Ia_{hawk} + Is_{hawk}))]*BAF_{vert}*Ia_{hawk} * UFF / (BW)$$

Where, ED = exposure dose
Cs = maximum or mean concentration in soil (mg/kg)
CF = plant dry-to-wet-weight conversion factor (0.2) for inorganics only
SP_v = soil-to-plant uptake factor for vegetative matter
Ip_{hawk} = plant-matter intake rate for the hawk = 0.0 kg/day
BAF_{inv} = invertebrate bioaccumulation factor (unitless)
Ia_{hawk} = animal-matter intake rate for the hawk = 0.136 kg/day
Is_{hawk} = incidental soil intake rate for the hawk = 0.0 kg/day
BAF_{vert} = vertebrate bioaccumulation factor (unitless)
UFF = unit foraging factor = 1
BW = body weight = 1.24 kg

TABLE H.27
Calculated Mixed Soil (0-4' bls) Exposure - Red-tailed Hawk
SEAD 4
Seneca Army Depot Activity

Constituent	Max Detected Conc. (mg/kg)	Mean Conc. (mg/kg)	SP[1] (unitless)	Invertebrate BAF[2] (unitless)	Vertebrate BAF[2] (unitless)	Hawk Max Exposure[3] (mg/kg/day)	Hawk Mean Exposure[3] (mg/kg/day)
Volatiles							
Acetone	1.40E-01	1.11E-02	5.33E+01	3.90E-01	3.90E-01	5.14E-05	4.06E-06
PAHs							
Acenapthene	8.80E-02	7.59E-02	2.10E-01	3.42E-01	5.90E-01	1.77E-06	1.53E-06
Acenapthylene	1.70E-01	8.49E-02	1.72E-01	1.00E+00	5.90E-01	8.80E-06	4.40E-06
Anthracene	3.40E-01	8.57E-02	1.04E-01	5.10E-02	5.90E-01	1.68E-06	4.24E-07
Benzo(a)anthracene	1.10E+00	8.91E-02	1.51E-02	1.25E-01	5.90E-01	8.41E-06	6.81E-07
Benzo(a)pyrene	8.80E-01	8.84E-02	1.02E+00	4.50E+00	5.90E-01	2.03E-04	2.04E-05
Benzo(b)fluoranthene	8.30E-01	1.04E-01	1.00E-02	3.20E-01	5.90E-01	1.42E-05	1.78E-06
Benzo(g,h,i)perylene	3.00E-01	8.57E-02	3.05E-03	2.40E-01	5.90E-01	3.94E-06	1.12E-06
Benzo(k)fluoranthene	8.90E-01	8.86E-02	4.25E-03	2.53E-01	5.90E-01	1.22E-05	1.22E-06
Chrysene	1.00E+00	9.49E-02	2.00E-02	1.75E-01	5.90E-01	1.01E-05	9.61E-07
Dibenz(a,h)anthracene	1.25E-01	8.40E-02	8.16E-03	1.75E-01	5.90E-01	1.25E-06	8.41E-07
Fluoranthene	2.40E+00	1.21E-01	3.72E-02	7.92E-01	5.90E-01	9.67E-05	4.88E-06
Fluorene	3.30E-01	8.65E-02	1.49E-01	3.42E-01	5.90E-01	6.45E-06	1.69E-06
Indeno(1,2,3-cd)pyrene	2.70E-01	8.30E-02	1.37E-03	4.19E-01	5.90E-01	5.89E-06	1.81E-06
2-Methylnaphthalene	2.60E-01	8.53E-02	1.63E-01	3.42E-01	5.90E-01	5.12E-06	1.68E-06
Naphthalene	1.30E-01	8.41E-02	4.43E-01	3.42E-01	5.90E-01	2.92E-06	1.89E-06
Phenanthrene	1.40E+00	1.08E-01	1.00E-01	1.22E-01	5.90E-01	1.17E-05	9.01E-07
Pyrene	1.80E+00	1.19E-01	4.43E-02	9.20E-02	5.90E-01	1.14E-05	7.52E-07
Semi-volatiles							
bis(2-Ethylhexyl)phthalate	1.30E+01	4.90E-01	1.00E-02	1.20E+01	1.50E+00	1.93E-02	7.28E-04
Butylbenzylphthalate	7.10E+00	1.39E-01	1.00E+00	1.00E+00	1.00E+00	7.23E-04	1.41E-05
Carbazole	1.60E-01	8.19E-02	1.00E+00	1.00E+00	1.00E+00	1.63E-05	8.33E-06
Di-n-octylphthalate	4.40E-02	7.44E-02	1.60E-04	4.90E+03	6.42E+02	1.14E+01	1.93E+01
Dibenzofuran	5.80E-02	4.76E-02	1.51E-01	1.00E+00	1.00E+00	5.07E-06	4.16E-06
PCBs							
Aroclor 1254	1.60E+00	4.47E-02	1.00E-02	4.50E+00	4.50E+00	2.69E-03	7.51E-05
Pesticides							
4,4'-DDD	1.90E-01	4.49E-03	1.34E-02	1.00E-01	1.00E-01	2.07E-07	4.89E-09
4,4'-DDE	1.60E-01	4.96E-03	1.80E-02	2.50E-02	2.50E-02	1.91E-08	5.92E-10
4,4'-DDT	7.60E-01	1.02E-02	1.00E-02	1.00E-01	1.00E-01	8.22E-07	1.10E-08
BHC, beta	7.60E-03	1.29E-03	1.99E-01	1.00E+00	1.00E+00	6.70E-07	1.14E-07

TABLE H.27
Calculated Mixed Soil (0-4' bls) Exposure - Red-tailed Hawk
SEAD 4
Seneca Army Depot Activity

Constituent	Max Detected Conc. (mg/kg)	Mean Conc. (mg/kg)	SP[1] (unitless)	Invertebrate BAF[2] (unitless)	Vertebrate BAF[2] (unitless)	Hawk Max Exposure[3] (mg/kg/day)	Hawk Mean Exposure[3] (mg/kg/day)
Metals							
Antimony	1.48E+02	6.98E+00	1.30E-04	1.00E+00	1.00E+00	1.25E-02	5.91E-04
Chromium	1.86E+04	6.85E+02	7.50E-03	7.75E-01	7.75E-01	9.55E-01	3.52E-02
Copper	7.33E+03	3.60E+02	4.00E-01	6.82E-01	6.82E-01	3.00E-01	1.47E-02
Lead	9.28E+03	1.14E+02	5.80E-03	2.10E+00	2.10E+00	3.42E+00	4.20E-02
Mercury	1.20E+00	7.59E-02	9.00E-01	2.30E+01	2.30E+01	5.24E-02	3.32E-03
Thallium	5.40E+00	9.63E-01	4.00E-03	2.33E-01	2.33E-01	2.72E-05	4.85E-06
Zinc	2.02E+03	1.92E+02	1.40E+00	9.90E+00	9.90E+00	1.65E+01	1.57E+00

1 SP: soil-to-plant uptake factor.

2 BAF: bioaccumulation factor.

3 Exposure calculated as

$ED = [(Cs *(SP_v * CF * Ip_{hawk} + BAF_{inv} * Ia_{hawk} + Is_{hawk}))]*BAF_{vert}*Ia_{hawk} * UFF / (BW)$

Where, ED = exposure dose

Cs = maximum or mean concentration in soil (mg/kg)

CF = plant dry-to-wet-weight conversion factor (0.2) for inorganics only

SP_v = soil-to-plant uptake factor for vegetative matter

Ip_{hawk} = plant-matter intake rate for the hawk = 0.0 kg/day

BAF_{inv} = invertebrate bioaccumulation factor (unitless)

Ia_{hawk} = animal-matter intake rate for the hawk = 0.136 kg/day

Is_{hawk} = incidental soil intake rate for the hawk = 0.0 kg/day

BAF_{vert} = vertebrate bioaccumulation factor (unitless)

UFF = unit foraging factor = 1

BW = body weight = 1.24 kg

TABLE H.28
Calculated Surface Soil (0-1' bls) Hazard Quotients - Red-tailed hawk
SEAD 4
Seneca Army Depot Activity

Constituent	Hawk Max Exposure[1] (mg/kg/day)	Hawk Mean Exposure[1] (mg/kg/day)	NOAEL Toxicity Reference Value[2] (mg/kg/day)	LOAEL Toxicity Reference Value[3] (mg/kg/day)	NOAEL Max Hazard Quotient[4]	NOAEL Mean Hazard Quotient[4]	LOAEL Max Hazard Quotient[4]	LOAEL Mean Hazard Quotient[4]
Volatiles								
Acetone	5.14E-05	5.16E-06	6.10E+02	6.10E+02	0.0	0.0	0.0	0.0
PAHs								
Acenapthene	1.57E-06	1.27E-06	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Acenapthylene	2.68E-06	2.36E-06	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Anthracene	5.44E-07	3.32E-07	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Benzo(a)anthracene	4.28E-06	4.92E-07	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Benzo(a)pyrene	1.01E-04	1.55E-05	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Benzo(b)fluoranthene	1.42E-05	1.61E-06	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Benzo(g,h,i)perylene	3.94E-06	8.96E-07	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Benzo(k)fluoranthene	7.02E-06	9.66E-07	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Chrysene	5.77E-06	7.60E-07	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Dibenz(a,h)anthracene	1.25E-06	6.83E-07	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Fluoranthene	4.23E-05	3.95E-06	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Fluorene	1.45E-06	1.32E-06	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Indeno(1,2,3-cd)pyrene	5.89E-06	1.41E-06	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
2-Methylnaphthalene	6.89E-07	8.50E-07	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Phenanthrene	5.35E-06	6.29E-07	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Pyrene	6.21E-06	5.85E-07	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Semi-volatiles								
Bis(2-ethylhexyl)phthalate	1.93E-02	9.56E-04	1.11E+00	1.11E+00	0.0	0.0	0.0	0.0
Butylbenzylphthalate	7.23E-04	1.54E-05	No data	No data	--	--	--	--
Carbazole	1.22E-05	6.65E-06	No data	No data	--	--	--	--
Di-n-octylphthalate	1.14E+01	1.22E+01	No data	No data	--	--	--	--
Dibenzofuran	5.07E-06	3.86E-06	2.18E-01	2.18E-01	0.0	0.0	0.0	0.0
PCBs								
Aroclor 1254	5.21E-04	6.62E-05	1.00E-01	1.00E+00	0.0	0.0	0.0	0.0
Pesticides								
4,4'-DDD	2.07E-07	6.41E-09	2.20E-02	2.20E-01	0.0	0.0	0.0	0.0
4,4'-DDE	1.91E-08	7.70E-10	2.20E-02	2.20E-01	0.0	0.0	0.0	0.0
4,4'-DDT	8.22E-07	1.58E-08	2.20E-02	2.20E-01	0.0	0.0	0.0	0.0
BHC, beta	6.70E-07	1.33E-07	5.60E-01	2.25E+00	0.0	0.0	0.0	0.0

TABLE H.28
Calculated Surface Soil (0-1' bls) Hazard Quotients - Red-tailed hawk
SEAD 4
Seneca Army Depot Activity

Constituent	Hawk Max Exposure[1] (mg/kg/day)	Hawk Mean Exposure[1] (mg/kg/day)	NOAEL Toxicity Reference Value[2] (mg/kg/day)	LOAEL Toxicity Reference Value[3] (mg/kg/day)	NOAEL Max Hazard Quotient[4]	NOAEL Mean Hazard Quotient[4]	LOAEL Max Hazard Quotient[4]	LOAEL Mean Hazard Quotient[4]
Dieldrin	2.90E-09	1.03E-09	7.70E-02	7.70E-02	0.0	0.0	0.0	0.0
Metals								
Antimony	1.25E-02	6.96E-04	No data	No data	--	--	--	--
Chromium	9.55E-01	4.71E-02	1.00E+00	5.00E+00	1.0	0.0	0.2	0.0
Copper	3.00E-01	1.90E-02	4.70E+01	6.17E+01	0.0	0.0	0.0	0.0
Lead	3.42E+00	5.99E-02	3.85E+00	3.85E+00	0.9	0.0	0.9	0.0
Mercury	5.24E-02	4.37E-03	2.86E+00	2.86E+00	0.0	0.0	0.0	0.0
Thallium	2.72E-05	5.74E-06	9.50E-02	9.50E-02	0.0	0.0	0.0	0.0
Zinc	1.65E+01	1.87E+00	1.45E+01	1.31E+02	**1.1**	0.1	0.1	0.0

1 Receptor exposure from Table H.26.
2 NOAEL toxicity reference value from Table H.10.
3 LOAEL toxicity reference value from Table H.11.
4 Hazard quotient calculated as HQ = exposure rate / toxicity reference value

BOLD : represents receptor HQ > 1.

TABLE H.29
Calculated Mixed Soil (0-4 ft) Hazard Quotients - Red-tailed hawk
SEAD 4
Seneca Army Depot Activity

Constituent	Hawk Max Exposure[1] (mg/kg/day)	Hawk Mean Exposure[1] (mg/kg/day)	NOAEL Toxicity Reference Value[2] (mg/kg/day)	LOAEL Toxicity Reference Value[3] (mg/kg/day)	NOAEL Max Hazard Quotient[4]	NOAEL Mean Hazard Quotient[4]	LOAEL Max Hazard Quotient[4]	LOAEL Mean Hazard Quotient[4]
Volatiles								
Acetone	5.14E-05	4.06E-06	6.10E+02	6.10E+02	0.0	0.0	0.0	0.0
PAHs								
Acenapthene	1.77E-06	1.53E-06	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Acenapthylene	8.80E-06	4.40E-06	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Anthracene	1.68E-06	4.24E-07	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Benzo(a)anthracene	8.41E-06	6.81E-07	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Benzo(a)pyrene	2.03E-04	2.04E-05	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Benzo(b)fluoranthene	1.42E-05	1.78E-06	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Benzo(g,h,i)perylene	3.94E-06	1.12E-06	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Benzo(k)fluoranthene	1.22E-05	1.22E-06	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Chrysene	1.01E-05	9.61E-07	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Dibenz(a,h)anthracene	1.25E-06	8.41E-07	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Fluoranthene	9.67E-05	4.88E-06	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Fluorene	6.45E-06	1.69E-06	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Indeno(1,2,3-cd)pyrene	5.89E-06	1.81E-06	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
2-Methylnaphthalene	5.12E-06	1.68E-06	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Naphthalene	2.92E-06	1.89E-06	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Phenanthrene	1.17E-05	9.01E-07	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Pyrene	1.14E-05	7.52E-07	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Semi-volatiles								
bis(2-Ethylhexyl)phthalate	1.93E-02	7.28E-04	1.11E+00	1.11E+00	0.0	0.0	0.0	0.0
Butylbenzylphthalate	7.23E-04	1.41E-05	No data	No data	--	--	--	--
Carbazole	1.63E-05	8.33E-06	No data	No data	--	--	--	--
Di-n-octylphthalate	1.14E+01	1.93E+01	No data	No data	--	--	--	--
Dibenzofuran	5.07E-06	4.16E-06	2.18E-01	2.18E-01	0.0	0.0	0.0	0.0
PCBs								
Aroclor 1254	-- 2.69E-03	-- 7.51E-05	1.00E-01	1.00E+00	0.0	0.0	0.0	0.0
Pesticides								
4,4'-DDD	2.07E-07	4.89E-09	2.20E-02	2.20E-01	0.0	0.0	0.0	0.0
4,4'-DDE	1.91E-08	5.92E-10	2.20E-02	2.20E-01	0.0	0.0	0.0	0.0
4,4'-DDT	8.22E-07	1.10E-08	2.20E-02	2.20E-01	0.0	0.0	0.0	0.0
BHC, beta	6.70E-07	1.14E-07	5.60E-01	2.25E+00	0.0	0.0	0.0	0.0

TABLE H.29
Calculated Mixed Soil (0-4 ft) Hazard Quotients - Red-tailed hawk
SEAD 4
Seneca Army Depot Activity

Constituent	Hawk Max Exposure[1] (mg/kg/day)	Hawk Mean Exposure[1] (mg/kg/day)	NOAEL Toxicity Reference Value[2] (mg/kg/day)	LOAEL Toxicity Reference Value[3] (mg/kg/day)	NOAEL Max Hazard Quotient[4]	NOAEL Mean Hazard Quotient[4]	LOAEL Max Hazard Quotient[4]	LOAEL Mean Hazard Quotient[4]
Metals								
Antimony	1.25E-02	5.91E-04	No data	No data	--	--	--	--
Chromium	9.55E-01	3.52E-02	1.00E+00	5.00E+00	1.0	0.0	0.2	0.0
Copper	3.00E-01	1.47E-02	4.70E+01	6.17E+01	0.0	0.0	0.0	0.0
Lead	3.42E+00	4.20E-02	3.85E+00	3.85E+00	0.9	0.0	0.9	0.0
Mercury	5.24E-02	3.32E-03	2.86E+00	2.86E+00	0.0	0.0	0.0	0.0
Thallium	2.72E-05	4.85E-06	9.50E-02	9.50E-02	0.0	0.0	0.0	0.0
Zinc	1.65E+01	1.57E+00	1.45E+01	1.31E+02	**1.1**	0.1	0.1	0.0

1 Receptor exposure from Table H.27.

2 NOAEL toxicity reference value from Table H.10.

3 LOAEL toxicity reference value from Table H.11.

4 Hazard quotient calculated as HQ = exposure rate / toxicity reference value

BOLD : represents receptor HQ > 1.

TABLE H.30
Calculated Surface Soil (0-1' bls) Exposure - Mourning Dove
SEAD 4
Seneca Army Depot Activity

Constituent	Max Detected Conc. (mg/kg)	Mean Conc. (mg/kg)	SP[1] (unitless)	BAF[2] (unitless)	Dove Max Exposure[3] (mg/kg/day)	Dove Mean Exposure[3] (mg/kg/day)
Volatiles						
Acetone	1.40E-01	1.41E-02	5.33E+01	3.90E-01	4.41E-01	4.43E-02
PAHs						
Acenapthene	7.80E-02	6.29E-02	2.10E-01	3.42E-01	1.84E-03	1.48E-03
Acenapthylene	5.19E-02	4.56E-02	1.72E-01	1.00E+00	1.43E-03	1.26E-03
Anthracene	1.10E-01	6.72E-02	1.04E-01	5.10E-02	1.60E-03	9.78E-04
Benzo(a)anthracene	5.60E-01	6.44E-02	1.51E-02	1.25E-01	5.62E-03	6.47E-04
Benzo(a)pyrene	4.40E-01	6.71E-02	1.02E+00	4.50E+00	4.89E-02	7.46E-03
Benzo(b)fluoranthene	8.30E-01	9.46E-02	1.00E-02	3.20E-01	9.63E-03	1.10E-03
Benzo(g,h,i)perylene	3.00E-01	6.83E-02	3.05E-03	2.40E-01	3.13E-03	7.13E-04
Benzo(k)fluoranthene	5.10E-01	7.02E-02	4.25E-03	2.53E-01	5.42E-03	7.46E-04
Chrysene	5.70E-01	7.50E-02	2.00E-02	1.75E-01	6.16E-03	8.11E-04
Dibenz(a,h)anthracene	1.25E-01	6.82E-02	8.16E-03	1.75E-01	1.26E-03	6.90E-04
Fluoranthene	1.05E+00	9.81E-02	3.72E-02	7.92E-01	1.86E-02	1.74E-03
Fluorene	7.40E-02	6.76E-02	1.49E-01	3.42E-01	1.48E-03	1.35E-03
Indeno(1,2,3-cd)pyrene	2.70E-01	6.49E-02	1.37E-03	4.19E-01	3.25E-03	7.82E-04
2-Methylnaphthalene	3.50E-02	4.32E-02	1.63E-01	3.42E-01	7.29E-04	9.00E-04
Phenanthrene	6.40E-01	7.53E-02	1.00E-01	1.22E-01	9.61E-03	1.13E-03
Pyrene	9.80E-01	9.24E-02	4.43E-02	9.20E-02	1.12E-02	1.06E-03
Semi-volatiles						
Bis(2-ethylhexyl)phthalate	1.30E+01	6.43E-01	1.00E-02	1.20E+01	1.60E+00	7.92E-02
Butylbenzylphthalate	7.10E+00	1.51E-01	1.00E+00	1.00E+00	5.43E-01	1.15E-02
Carbazole	1.20E-01	6.54E-02	1.00E+00	1.00E+00	9.17E-03	5.00E-03
Di-n-octylphthalate	4.40E-02	4.71E-02	1.60E-04	4.90E+03	2.06E+00	2.20E+00
Dibenzofuran	5.80E-02	4.42E-02	1.51E-01	1.00E+00	1.53E-03	1.17E-03
PCBs						
Arochlor 1254	3.10E-01	3.94E-02	1.00E-02	4.50E+00	1.60E-02	2.03E-03
Pesticides						
4,4'-DDD	1.90E-01	5.89E-03	1.34E-02	1.00E-01	1.84E-03	5.72E-05
4,4'-DDE	1.60E-01	6.45E-03	1.80E-02	2.50E-02	1.48E-03	5.97E-05
4,4'-DDT	7.60E-01	1.46E-02	1.00E-02	1.00E-01	7.22E-03	1.39E-04
BHC, beta	7.60E-03	1.51E-03	1.99E-01	1.00E+00	2.22E-04	4.42E-05
Dieldrin	7.40E-03	2.64E-03	1.20E-01	4.70E-02	1.15E-04	4.09E-05

TABLE H.30
Calculated Surface Soil (0-1' bls) Exposure - Mourning Dove
SEAD 4
Seneca Army Depot Activity

Constituent	Max Detected Conc. (mg/kg)	Mean Conc. (mg/kg)	SP[1] (unitless)	BAF[2] (unitless)	Dove Max Exposure[3] (mg/kg/day)	Dove Mean Exposure[3] (mg/kg/day)
Metals						
Antimony	1.48E+02	8.21E+00	1.30E-04	1.00E+00	2.59E+00	1.44E-01
Chromium	1.86E+04	9.16E+02	7.50E-03	7.75E-01	2.94E+02	1.45E+01
Copper	7.33E+03	4.64E+02	4.00E-01	6.82E-01	2.79E+02	1.76E+01
Lead	9.28E+03	1.63E+02	5.80E-03	2.10E+00	2.63E+02	4.61E+00
Mercury	1.20E+00	1.00E-01	9.00E-01	2.30E+01	3.37E-01	2.81E-02
Thallium	5.40E+00	1.14E+00	4.00E-03	2.33E-01	5.63E-02	1.19E-02
Zinc	2.02E+03	2.29E+02	1.40E+00	9.90E+00	3.74E+02	4.24E+01

1 SP: soil-to-plant uptake factor.
2 BAF: bioaccumulation factor.
3 Exposure calculated as

ED = [(Cs * SP * CF * Ip) + (Cs * BAF * Ia) + (Cs * Is)] * SFF / BW

Where, ED = exposure dose

Cs = maximum or mean concentration in soil (mg/kg)
CF = plant dry-to-wet-weight conversion factor (0.2) for inorganics only
SP = soil-to-plant uptake factor for vegetative matter
Ip = plant-matter intake rate for the Dove = 0.00925 kg/day
BAF = invertebrate bioaccumulation factor (unitless)
Ia = animal-matter intake rate for the Dove = 0.0015 kg/day
Is = animal-matter intake rate for the Dove = 0.00125 kg/day
UFF = unit foraging factor = 1
BW = body weight = 0.157 kg

TABLE H.31
Calculated Mixed Soil (0-4' bls) Exposure - Mourning Dove
SEAD 4
Seneca Army Depot Activity

Constituent	Max Detected Conc. (mg/kg)	Mean Conc. (mg/kg)	SP[1] (unitless)	BAF[2] (unitless)	Dove Max Exposure[3] (mg/kg/day)	Dove Mean Exposure[3] (mg/kg/day)
Volatiles						
Acetone	1.40E-01	1.11E-02	5.33E+01	3.90E-01	4.41E-01	3.49E-02
PAHs						
Acenapthene	8.80E-02	7.59E-02	2.10E-01	3.42E-01	2.08E-03	1.79E-03
Acenapthylene	1.70E-01	8.49E-02	1.72E-01	1.00E+00	4.70E-03	2.35E-03
Anthracene	3.40E-01	8.57E-02	1.04E-01	5.10E-02	4.95E-03	1.25E-03
Benzo(a)anthracene	1.10E+00	8.91E-02	1.51E-02	1.25E-01	1.10E-02	8.94E-04
Benzo(a)pyrene	8.80E-01	8.84E-02	1.02E+00	4.50E+00	9.78E-02	9.83E-03
Benzo(b)fluoranthene	8.30E-01	1.04E-01	1.00E-02	3.20E-01	9.63E-03	1.21E-03
Benzo(g,h,i)perylene	3.00E-01	8.57E-02	3.05E-03	2.40E-01	3.13E-03	8.94E-04
Benzo(k)fluoranthene	8.90E-01	8.86E-02	4.25E-03	2.53E-01	9.46E-03	9.41E-04
Chrysene	1.00E+00	9.49E-02	2.00E-02	1.75E-01	1.08E-02	1.03E-03
Dibenz(a,h)anthracene	1.25E-01	8.40E-02	8.16E-03	1.75E-01	1.26E-03	8.50E-04
Fluoranthene	2.40E+00	1.21E-01	3.72E-02	7.92E-01	4.25E-02	2.15E-03
Fluorene	3.30E-01	8.65E-02	1.49E-01	3.42E-01	6.59E-03	1.73E-03
Indeno(1,2,3-cd)pyrene	2.70E-01	8.30E-02	1.37E-03	4.19E-01	3.25E-03	1.00E-03
2-Methylnaphthalene	2.60E-01	8.53E-02	1.63E-01	3.42E-01	5.42E-03	1.78E-03
Naphthalene	1.30E-01	8.41E-02	4.43E-01	3.42E-01	4.85E-03	3.14E-03
Phenanthrene	1.40E+00	1.08E-01	1.00E-01	1.22E-01	2.10E-02	1.62E-03
Pyrene	1.80E+00	1.19E-01	4.43E-02	9.20E-02	2.06E-02	1.36E-03
Semi-volatiles						
bis(2-Ethylhexyl)phthalate	1.30E+01	4.90E-01	1.00E-02	1.20E+01	1.60E+00	6.03E-02
Butylbenzylphthalate	7.10E+00	1.39E-01	1.00E+00	1.00E+00	5.43E-01	1.06E-02
Carbazole	1.60E-01	8.19E-02	1.00E+00	1.00E+00	1.22E-02	6.26E-03
Di-n-octylphthalate	4.40E-02	7.44E-02	1.60E-04	4.90E+03	2.06E+00	3.48E+00
Dibenzofuran	5.80E-02	4.76E-02	1.51E-01	1.00E+00	1.53E-03	1.26E-03
PCBs						
Aroclor 1254	1.60E+00	4.47E-02	1.00E-02	4.50E+00	8.25E-02	2.31E-03
Pesticides						
4,4'-DDD	1.90E-01	4.49E-03	1.34E-02	1.00E-01	1.84E-03	4.36E-05
4,4'-DDE	1.60E-01	4.96E-03	1.80E-02	2.50E-02	1.48E-03	4.59E-05
4,4'-DDT	7.60E-01	1.02E-02	1.00E-02	1.00E-01	7.22E-03	9.70E-05
BHC, beta	7.60E-03	1.29E-03	1.99E-01	1.00E+00	2.22E-04	3.77E-05

TABLE H.31
Calculated Mixed Soil (0-4' bls) Exposure - Mourning Dove
SEAD 4
Seneca Army Depot Activity

Constituent	Max Detected Conc. (mg/kg)	Mean Conc. (mg/kg)	SP[1] (unitless)	BAF[2] (unitless)	Dove Max Exposure[3] (mg/kg/day)	Dove Mean Exposure[3] (mg/kg/day)
Metals						
Antimony	1.48E+02	6.98E+00	1.30E-04	1.00E+00	2.59E+00	1.22E-01
Chromium	1.86E+04	6.85E+02	7.50E-03	7.75E-01	2.94E+02	1.08E+01
Copper	7.33E+03	3.60E+02	4.00E-01	6.82E-01	2.79E+02	1.37E+01
Lead	9.28E+03	1.14E+02	5.80E-03	2.10E+00	2.63E+02	3.23E+00
Mercury	1.20E+00	7.59E-02	9.00E-01	2.30E+01	3.37E-01	2.13E-02
Thallium	5.40E+00	9.63E-01	4.00E-03	2.33E-01	5.63E-02	1.00E-02
Zinc	2.02E+03	1.92E+02	1.40E+00	9.90E+00	3.74E+02	3.56E+01

1 SP: soil-to-plant uptake factor.
2 BAF: bioaccumulation factor.
3 Exposure calculated as
ED = [(Cs * SP * CF * Ip) + (Cs * BAF * Ia) + (Cs * Is)] * SFF / BW
Where, ED = exposure dose
Cs = maximum or mean concentration in soil (mg/kg)
CF = plant dry-to-wet-weight conversion factor (0.2) for inorganics only
SP = soil-to-plant uptake factor for vegetative matter
Ip = plant-matter intake rate for the Dove = 0.00925 kg/day
BAF = invertebrate bioaccumulation factor (unitless)
Ia = animal-matter intake rate for the Dove = 0.0015 kg/day
Is = animal-matter intake rate for the Dove = 0.00125 kg/day
UFF = unit foraging factor = 1
BW = body weight = 0.157 kg

TABLE H.32
Calculated Surface Soil (0-1' bls) Hazard Quotients - Mourning Dove
SEAD 4
Seneca Army Depot Activity

Constituent	Dove Max Exposure[1] (mg/kg/day)	Dove Mean Exposure[1] (mg/kg/day)	NOAEL Toxicity Reference Value[2] (mg/kg/day)	LOAEL Toxicity Reference Value[3] (mg/kg/day)	NOAEL Max Hazard Quotient[4]	NOAEL Mean Hazard Quotient[4]	LOAEL Max Hazard Quotient[4]	LOAEL Mean Hazard Quotient[4]
Volatiles								
Acetone	4.41E-01	4.43E-02	6.10E+02	6.10E+02	0.0	0.0	0.0	0.0
PAHs								
Acenapthene	1.84E-03	1.48E-03	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Acenapthylene	1.43E-03	1.26E-03	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Anthracene	1.60E-03	9.78E-04	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Benzo(a)anthracene	5.62E-03	6.47E-04	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Benzo(a)pyrene	4.89E-02	7.46E-03	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Benzo(b)fluoranthene	9.63E-03	1.10E-03	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Benzo(g,h,i)perylene	3.13E-03	7.13E-04	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Benzo(k)fluoranthene	5.42E-03	7.46E-04	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Chrysene	6.16E-03	8.11E-04	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Dibenz(a,h)anthracene	1.26E-03	6.90E-04	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Fluoranthene	1.86E-02	1.74E-03	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Fluorene	1.48E-03	1.35E-03	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Indeno(1,2,3-cd)pyrene	3.25E-03	7.82E-04	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
2-Methylnaphthalene	7.29E-04	9.00E-04	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Phenanthrene	9.61E-03	1.13E-03	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Pyrene	1.12E-02	1.06E-03	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Semi-volatiles								
Bis(2-ethylhexyl)phthalate	1.60E+00	7.92E-02	1.11E+00	1.11E+00	**1.4**	0.1	**1.4**	0.1
Butylbenzylphthalate	5.43E-01	1.15E-02	No data	No data	--	--	--	--
Carbazole	9.17E-03	5.00E-03	No data	No data	--	--	--	--
Di-n-octylphthalate	2.06E+00	2.20E+00	No data	No data	--	--	--	--
Dibenzofuran	1.53E-03	1.17E-03	2.18E-01	2.18E-01	0.0	0.0	0.0	0.0
PCBs								
Aroclor 1254	1.60E-02	2.03E-03	1.80E-01	1.80E+00	0.1	0.0	0.0	0.0
Pesticides								
4,4'-DDD	1.84E-03	5.72E-05	2.80E-03	2.80E-02	0.7	0.0	0.1	0.0
4,4'-DDE	1.48E-03	5.97E-05	2.80E-03	2.80E-02	0.5	0.0	0.1	0.0
4,4'-DDT	7.22E-03	1.39E-04	2.80E-03	2.80E-02	**2.6**	0.0	0.3	0.0
BHC, beta	2.22E-04	4.42E-05	5.60E-01	2.25E+00	0.0	0.0	0.0	0.0
Dieldrin	1.15E-04	4.09E-05	7.70E-02	7.70E-02	0.0	0.0	0.0	0.0

TABLE H.32
Calculated Surface Soil (0-1' bls) Hazard Quotients - Mourning Dove
SEAD 4
Seneca Army Depot Activity

Constituent	Dove Max Exposure[1] (mg/kg/day)	Dove Mean Exposure[1] (mg/kg/day)	NOAEL Toxicity Reference Value[2] (mg/kg/day)	LOAEL Toxicity Reference Value[3] (mg/kg/day)	NOAEL Max Hazard Quotient[4]	NOAEL Mean Hazard Quotient[4]	LOAEL Max Hazard Quotient[4]	LOAEL Mean Hazard Quotient[4]
Metals								
Antimony	2.59E+00	1.44E-01	No data	No data	--	--	--	--
Chromium	2.94E+02	1.45E+01	1.00E+00	5.00E+00	**294**	**14**	**59**	**2.9**
Copper	2.79E+02	1.76E+01	4.70E+01	6.17E+01	**5.9**	0.4	**4.5**	0.3
Lead	2.63E+02	4.61E+00	1.13E+00	1.13E+01	**233**	**4.1**	**23**	0.4
Mercury	3.37E-01	2.81E-02	4.50E-01	9.00E-01	0.7	0.1	0.4	0.0
Thallium	5.63E-02	1.19E-02	9.50E-02	9.50E-02	0.6	0.1	0.6	0.1
Zinc	3.74E+02	4.24E+01	1.45E+01	1.31E+02	**26**	**2.9**	**2.9**	0.3

1 Receptor exposure from Table H.30.
2 NOAEL toxicity reference value from Table H.10.
3 LOAEL toxicity reference value from Table H.11.
4 Hazard quotient calculated as HQ = exposure rate / toxicity reference value
BOLD : represents receptor HQ > 1.

TABLE H.33
Calculated Mixed Soil (0-4 ft) Hazard Quotients - Mourning Dove
SEAD 4
Seneca Army Depot Activity

Constituent	Dove Max Exposure[1] (mg/kg/day)	Dove Mean Exposure1 (mg/kg/day)	NOAEL Toxicity Reference Value[2] (mg/kg/day)	LOAEL Toxicity Reference Value[3] (mg/kg/day)	NOAEL Max Hazard Quotient[4]	NOAEL Mean Hazard Quotient[4]	LOAEL Max Hazard Quotient[4]	LOAEL Mean Hazard Quotient[4]
Volatiles								
Acetone	4.41E-01	3.49E-02	6.10E+02	6.10E+02	0.0	0.0	0.0	0.0
PAHs								
Acenapthene	2.08E-03	1.79E-03	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Acenapthylene	4.70E-03	2.35E-03	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Anthracene	4.95E-03	1.25E-03	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Benzo(a)anthracene	1.10E-02	8.94E-04	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Benzo(a)pyrene	9.78E-02	9.83E-03	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Benzo(b)fluoranthene	9.63E-03	1.21E-03	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Benzo(g,h,i)perylene	3.13E-03	8.94E-04	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Benzo(k)fluoranthene	9.46E-03	9.41E-04	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Chrysene	1.08E-02	1.03E-03	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Dibenz(a,h)anthracene	1.26E-03	8.50E-04	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Fluoranthene	4.25E-02	2.15E-03	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Fluorene	6.59E-03	1.73E-03	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Indeno(1,2,3-cd)pyrene	3.25E-03	1.00E-03	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
2-Methylnaphthalene	5.42E-03	1.78E-03	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Naphthalene	4.85E-03	3.14E-03	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Phenanthrene	2.10E-02	1.62E-03	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Pyrene	2.06E-02	1.36E-03	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Semi-volatiles								
bis(2-Ethylhexyl)phthalate	1.60E+00	6.03E-02	1.11E+00	1.11E+00	1.4	0.1	1.4	0.1
Butylbenzylphthalate	5.43E-01	1.06E-02	No data	No data	--	--	--	--
Carbazole	1.22E-02	6.26E-03	No data	No data	--	--	--	--
Di-n-octylphthalate	2.06E+00	3.48E+00	No data	No data	--	--	--	--
Dibenzofuran	1.53E-03	1.26E-03	2.18E-01	2.18E-01	0.0	0.0	0.0	0.0
PCBs								
Aroclor 1254	8.25E-02	2.31E-03	1.80E-01	1.80E+00	0.5	0.0	0.0	0.0
Pesticides								
4,4'-DDD	1.84E-03	4.36E-05	2.80E-03	2.80E-02	0.7	0.0	0.1	0.0
4,4'-DDE	1.48E-03	4.59E-05	2.80E-03	2.80E-02	0.5	0.0	0.1	0.0
4,4'-DDT	7.22E-03	9.70E-05	2.80E-03	2.80E-02	2.6	0.0	0.3	0.0
BHC, beta	2.22E-04	3.77E-05	5.60E-01	2.25E+00	0.0	0.0	0.0	0.0

TABLE H.33
Calculated Mixed Soil (0-4 ft) Hazard Quotients - Mourning Dove
SEAD 4
Seneca Army Depot Activity

Constituent	Dove Max Exposure[1] (mg/kg/day)	Dove Mean Exposure1 (mg/kg/day)	NOAEL Toxicity Reference Value[2] (mg/kg/day)	LOAEL Toxicity Reference Value[3] (mg/kg/day)	NOAEL Max Hazard Quotient[4]	NOAEL Mean Hazard Quotient[4]	LOAEL Max Hazard Quotient[4]	LOAEL Mean Hazard Quotient[4]
Metals								
Antimony	2.59E+00	1.22E-01	No data	No data	--	--	--	--
Chromium	2.94E+02	1.08E+01	1.00E+00	5.00E+00	**294**	**11**	**59**	**2.2**
Copper	2.79E+02	1.37E+01	4.70E+01	6.17E+01	**5.9**	0.3	**4.5**	0.2
Lead	2.63E+02	3.23E+00	1.13E+00	1.13E+01	**233**	**2.9**	**23**	0.3
Mercury	3.37E-01	2.13E-02	4.50E-01	9.00E-01	0.7	0.0	0.4	0.0
Thallium	5.63E-02	1.00E-02	9.50E-02	9.50E-02	0.6	0.1	0.6	0.1
Zinc	3.74E+02	3.56E+01	1.45E+01	1.31E+02	**26**	**2.5**	**2.9**	0.3

1 Receptor exposure from Table H.31.
2 NOAEL toxicity reference value from Table H.10.
3 LOAEL toxicity reference value from Table H.11.
4 Hazard quotient calculated as HQ = exposure rate / toxicity reference value

BOLD : represents receptor HQ > 1.

TABLE H.34
Invertebrate Risk Screening for Soil COPCs
SEAD 4
Seneca Army Depot Activity

	Surface and Mixed Soil		Comparison to Benchmark[1]		
Analyte	Max Detect (mg/kg)	Location	Earth-worms	Micro-organisms	Exceeds Benchmark?
Volatiles					
Acetone	1.40E-01	SS4-81	na	na	No Criteria
PAHs					
Acenapthene	7.80E-02	SB4-27	na	na	No Criteria
Acenapthylene	5.19E-02	SS4-55	na	na	No Criteria
Anthracene	1.10E-01	SS4-54	na	na	No Criteria
Benzo(a)anthracene	5.60E-01	SS4-55	na	na	No Criteria
Banzo(a)pyrene	4.40E-01	SS4-55	na	na	No Criteria
Benzo(b)fluoranthene	8.30E-01	SS4-55	na	na	No Criteria
Benzo(g,h,i)perylene	3.00E-01	SS4-55	na	na	No Criteria
Benzo(k)fluoranthene	5.10E-01	SS4-54	na	na	No Criteria
Chrysene	5.70E-01	SS4-55	na	na	No Criteria
Dibenz(a,h)anthracene	1.25E-01	SS4-55	na	na	No Criteria
Fluoranthene	1.05E+00	SS4-55	na	na	No Criteria
Fluorene	7.40E-02	SB4-16, SB4-27	30	30	No
Indeno(1,2,3-cd)pyrene	2.70E-01	SS4-55	na	na	No Criteria
2-Methylnaphthalene	3.50E-02	SB4-27	na	na	No Criteria
Phenanthrene	6.40E-01	SS4-54	na	na	No Criteria
Pyrene	9.80E-01	SS4-55	na	na	No Criteria
Semi-vols					
Bis(2-ethylhexyl)phthalate	1.30E+01	SS4-69	na	na	No Criteria
Butylbenzylphthalate	7.10E+00	SB4-14	na	na	No Criteria
Carbazole	1.20E-01	SS4-54	na	na	No Criteria
Di-n-octylphthalate	4.40E-02	SB4-13	na	na	No Criteria
Dibenzofuran	5.80E-02	SB4-27	na	na	No Criteria
PCBs					
Arochlor 1254	3.10E-01	MW4-11, SS4-69	na	na	No Criteria
Pesticides					
4,4'-DDD	1.90E-01	SS4-54	na	na	No Criteria
4,4'-DDE	1.60E-01	SS4-54	na	na	No Criteria
4,4'-DDT	7.60E-01	SS4-54	na	na	No Criteria
BHC, beta	7.60E-03	SS4-77	na	na	No Criteria
Dieldrin	7.40E-03	MW4-11	na	na	No Criteria
Metals					
Antimony	1.48E+02	SB4-25	na	na	No Criteria
Chromium	1.86E+04	SB4-25	na	10	Yes
Copper	7.33E+03	SB4-25	50	100	Yes
Lead	9.28E+03	SB4-14	500	900	Yes
Mercury	1.20E+00	SB4-25	na	30	No
Thallium	5.40E+00	SB4-25	na	na	No Criteria
Zinc	2.02E+03	SB4-25	200	100	Yes

1 Will, M.E. and G.W. Suter II, *Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Soil and Litter Invertebrates and Heterotrophic Process*, Martin Marietta Environmental Restoration Program, September 1994.
Earthworms-Screening benchmark concentrations for the toxicity of chemicals to earthworms.
Microorganisms-Screening benchmark concentrations for the toxicity of chemicals to soil microorganisms and microbial processes.
na criteria is not available.

TABLE H.35
Calculated Ditch Soil Exposure - Meadow Vole
SEAD 4
Seneca Army Depot Activity

Constituent	Max Detected Conc. (mg/kg)	Mean Conc. (mg/kg)	SP[1] (unitless)	BAF[2] (unitless)	Vole Max Exposure[3] (mg/kg/day)	Vole Mean Exposure[3] (mg/kg/day)
Volatiles						
Acetone	1.80E-01	1.92E-02	5.33E+01	3.90E-01	2.00E-02	2.13E-03
PAHs						
2-Methylnaphthalene	3.10E-02	NR	1.63E-01	3.42E-01	5.01E-05	NR
Acenaphthene	6.10E-01	2.20E-01	2.10E-01	3.42E-01	1.04E-03	3.77E-04
Acenaphthylene	1.30E-01	9.22E-02	1.72E-01	1.00E+00	2.32E-04	1.64E-04
Anthracene	1.70E+00	2.27E-01	1.04E-01	5.10E-02	2.42E-03	3.24E-04
Benzo(a)anthracene	5.90E+00	3.72E-01	1.51E-02	1.25E-01	7.43E-03	4.69E-04
Benzo(a)pyrene	5.10E+00	3.86E-01	1.02E+00	4.50E+00	2.21E-02	1.68E-03
Benzo(b)fluoranthene	4.80E+00	4.25E-01	1.00E-02	3.20E-01	6.21E-03	5.50E-04
Benzo(ghi)perylene	3.20E+00	2.58E-01	3.05E-03	2.40E-01	4.04E-03	3.26E-04
Benzo(k)fluoranthene	5.70E+00	3.91E-01	4.25E-03	2.53E-01	7.22E-03	4.96E-04
Chrysene	6.20E+00	3.89E-01	2.00E-02	1.75E-01	7.95E-03	4.99E-04
Dibenz(a,h)anthracene	1.20E+00	2.49E-01	8.16E-03	1.75E-01	1.51E-03	3.13E-04
Fluoranthene	1.60E+01	6.28E-01	3.72E-02	7.92E-01	2.33E-02	9.16E-04
Fluorene	6.60E-01	2.20E-01	1.49E-01	3.42E-01	1.05E-03	3.48E-04
Indeno(1,2,3-cd)pyrene	3.10E+00	2.61E-01	1.37E-03	4.19E-01	4.03E-03	3.39E-04
Phenanthrene	7.90E+00	3.31E-01	1.00E-01	1.22E-01	1.13E-02	4.74E-04
Pyrene	1.20E+01	5.12E-01	4.43E-02	9.20E-02	1.57E-02	6.71E-04
Semi-volatiles						
Bis(2-ethylhexyl)phthalate	4.20E+01	1.22E+00	1.00E-02	1.20E+01	1.67E-01	4.87E-03
Butylbenzylphthalate	1.60E-02	NR	1.00E+00	1.00E+00	5.59E-05	NR
Carbazole	5.00E-01	2.19E-01	1.00E+00	1.00E+00	1.75E-03	7.64E-04
Dibenzofuran	2.30E-01	1.57E-01	1.51E-01	1.00E+00	4.00E-04	2.73E-04
4-Methylphenol	2.30E-02	NR	2.93E+00	0.00E+00	--	NR
Phenol	2.10E-01	1.67E-01	5.40E+00	0.00E+00	--	--
PCBs						
Aroclor-1254	5.80E-01	7.76E-02	7.05E-03	4.50E+00	1.30E-03	1.74E-04
Aroclor-1260	2.50E-01	4.79E-02	3.93E-03	4.50E+00	5.61E-04	1.08E-04
Pesticides						
4,4'-DDD	9.00E-02	7.71E-03	1.34E-02	1.00E-01	1.13E-04	9.64E-06
4,4'-DDE	8.60E-02	7.48E-03	1.80E-02	2.50E-02	1.07E-04	9.30E-06
4,4'-DDT	4.50E-02	5.66E-03	1.00E-02	1.00E-01	5.60E-05	7.04E-06
Aldrin	2.80E-03	1.74E-03	1.00E-02	3.50E+00	5.67E-06	3.53E-06

TABLE H.35
Calculated Ditch Soil Exposure - Meadow Vole
SEAD 4
Seneca Army Depot Activity

Constituent	Max Detected Conc. (mg/kg)	Mean Conc. (mg/kg)	SP[1] (unitless)	BAF[2] (unitless)	Vole Max Exposure[3] (mg/kg/day)	Vole Mean Exposure[3] (mg/kg/day)
BHC, beta	3.30E-03	1.77E-03	1.99E-01	1.00E+00	6.07E-06	3.26E-06
Dieldrin	1.80E-02	3.58E-03	1.20E-01	4.70E-02	2.62E-05	5.22E-06
Endrin ketone	6.20E-02	5.12E-03	2.20E-02	1.80E-01	7.98E-05	6.58E-06
Metals						
Antimony	8.27E+01	7.58E+00	1.30E-04	1.00E+00	1.18E-01	1.08E-02
Cadmium	3.41E+01	2.51E+00	5.50E-01	2.15E-02	4.88E-02	3.60E-03
Chromium (total)	4.80E+03	3.53E+02	7.50E-03	7.75E-01	6.63E+00	4.87E-01
Chromium VI	1.63E+02	3.72E+01	7.50E-03	7.75E-01	2.25E-01	5.13E-02
Copper	9.88E+02	1.11E+02	4.00E-01	6.82E-01	1.50E+00	1.68E-01
Lead	3.74E+02	8.55E+01	5.80E-03	2.10E+00	6.30E-01	1.44E-01
Mercury	2.40E+00	2.08E-01	9.00E-01	2.30E+01	1.65E-02	1.43E-03
Vanadium	1.14E+03	5.36E+01	1.00E-02	1.00E+00	1.63E+00	7.68E-02
Zinc	1.15E+03	2.81E+02	1.40E+00	9.90E+00	4.66E+00	1.14E+00

1 SP: soil-to-plant uptake factor.
2 BAF: bioaccumulation factor.
3 Exposure calculated as
ED = [(Cs * SP * CF * Ip) + (Cs * BAF * Ia) + (Cs * Is)] * SFF / BW
Where, ED = exposure dose
Cs = Max or mean conc in soil (mg/kg)
CF = plant dry-to-wet-weight conversion factor (0.2) (inorganics only)
SP = soil-to-plant uptake factor
Ip = plant-matter intake rate
BAF = bioaccumulation factor (unitless)
Ia = animal-matter intake rate
Is = incidental soil intake rate
SFF = site foraging factor
BW = body weight

NR - Not Reported, mean concentration larger than max because of using 1/2 detection limit to calculate

TABLE H.36
Calculated Ditch Soil Hazard Quotients - Meadow Vole
SEAD 4
Seneca Army Depot Activity

Constituent	Vole Max Exposure[1] (mg/kg/day)	Vole Mean Exposure[1] (mg/kg/day)	NOAEL Toxicity Reference Value[2] (mg/kg/day)	LOAEL Toxicity Reference Value[3] (mg/kg/day)	NOAEL Max Hazard Quotient[4]	NOAEL Mean Hazard Quotient[4]	LOAEL Max Hazard Quotient[4]	LOAEL Mean Hazard Quotient[4]
Volatiles								
Acetone	2.00E-02	2.13E-03	1.68E+01	8.40E+01	0.0	0.0	0.0	0.0
PAHs								
2-Methylnaphthalene	5.01E-05	NR	7.16E+00	7.16E+01	0.0	NR	0.0	NR
Acenaphthene	1.04E-03	3.77E-04	1.75E+01	1.75E+02	0.0	0.0	0.0	0.0
Acenaphthylene	2.32E-04	1.64E-04	9.10E-01	9.09E+00	0.0	0.0	0.0	0.0
Anthracene	2.42E-03	3.24E-04	1.00E+03	1.00E+03	0.0	0.0	0.0	0.0
Benzo(a)anthracene	7.43E-03	4.69E-04	9.10E-01	9.09E+00	0.0	0.0	0.0	0.0
Benzo(a)pyrene	2.21E-02	1.68E-03	9.10E-01	9.09E+00	0.0	0.0	0.0	0.0
Benzo(b)fluoranthene	6.21E-03	5.50E-04	9.10E-01	9.09E+00	0.0	0.0	0.0	0.0
Benzo(ghi)perylene	4.04E-03	3.26E-04	9.10E-01	9.09E+00	0.0	0.0	0.0	0.0
Benzo(k)fluoranthene	7.22E-03	4.96E-04	9.10E-01	9.09E+00	0.0	0.0	0.0	0.0
Chrysene	7.95E-03	4.99E-04	9.10E-01	9.09E+00	0.0	0.0	0.0	0.0
Dibenz(a,h)anthracene	1.51E-03	3.13E-04	9.10E-01	9.09E+00	0.0	0.0	0.0	0.0
Fluoranthene	2.33E-02	9.16E-04	1.25E+01	1.25E+02	0.0	0.0	0.0	0.0
Fluorene	1.05E-03	3.48E-04	1.25E+01	1.25E+02	0.0	0.0	0.0	NR
Indeno(1,2,3-cd)pyrene	4.03E-03	3.39E-04	9.10E-01	9.09E+00	0.0	0.0	0.0	0.0
Phenanthrene	1.13E-02	4.74E-04	9.10E-01	9.09E+00	0.0	0.0	0.0	0.0
Pyrene	1.57E-02	6.71E-04	9.10E-01	9.09E+00	0.0	0.0	0.0	0.0
Semi-volatiles								
Bis(2-ethylhexyl)phthalate	1.67E-01	4.87E-03	1.66E+01	1.66E+02	0.0	0.0	0.0	0.0
Butylbenzylphthalate	5.59E-05	NR	1.59E+02	4.70E+02	0.0	NR	0.0	NR
Carbazole	1.75E-03	7.64E-04	5.00E+00	5.00E+00	0.0	0.0	0.0	0.0
Dibenzofuran	4.00E-04	2.73E-04	No data	No data	--	--	--	--
4-Methylphenol	--	NR	1.52E+01	3.82E+01	--	NR	--	NR
Phenol	--	--	3.00E+00	3.00E+00	--	--	--	--
PCBs								
Aroclor-1254	1.30E-03	1.74E-04	5.10E-02	5.11E-01	0.0	0.0	0.0	0.0
Aroclor-1260	5.61E-04	1.08E-04	5.10E-02	5.11E-01	0.0	0.0	0.0	0.0
Pesticides								
4,4'-DDD	1.13E-04	9.64E-06	1.34E+00	6.72E+00	0.0	0.0	0.0	0.0

TABLE H.36
Calculated Ditch Soil Hazard Quotients - Meadow Vole
SEAD 4
Seneca Army Depot Activity

Constituent	Vole Max Exposure[1] (mg/kg/day)	Vole Mean Exposure[1] (mg/kg/day)	NOAEL Toxicity Reference Value[2] (mg/kg/day)	LOAEL Toxicity Reference Value[3] (mg/kg/day)	NOAEL Max Hazard Quotient[4]	NOAEL Mean Hazard Quotient[4]	LOAEL Max Hazard Quotient[4]	LOAEL Mean Hazard Quotient[4]
4,4'-DDE	1.07E-04	9.30E-06	1.34E+00	6.72E+00	0.0	0.0	0.0	0.0
4,4'-DDT	5.60E-05	7.04E-06	1.34E+00	6.72E+00	0.0	0.0	0.0	0.0
Aldrin	5.67E-06	3.53E-06	3.36E-01	1.68E+00	0.0	0.0	0.0	0.0
BHC, beta	6.07E-06	3.26E-06	6.70E-01	3.36E+00	0.0	0.0	0.0	0.0
Dieldrin	2.62E-05	5.22E-06	3.40E-02	3.36E-01	0.0	0.0	0.0	0.0
Endrin ketone	7.98E-05	6.58E-06	No data	No data	--	--	--	--
Metals								
Antimony	1.18E-01	1.08E-02	1.14E-01	1.14E+00	**1.0**	0.1	0.1	0.0
Cadmium	4.88E-02	3.60E-03	1.00E+00	1.00E+01	0.0	0.0	0.0	0.0
Chromium (total)	6.63E+00	4.87E-01	4.60E+03	4.60E+03	0.0	0.0	0.0	0.0
Chromium VI	2.25E-01	5.13E-02	5.51E+00	2.21E+01	0.0	0.0	0.0	0.0
Copper	1.50E+00	1.68E-01	2.55E+01	3.36E+01	0.1	0.0	0.0	0.0
Lead	6.30E-01	1.44E-01	1.34E+01	1.34E+02	0.0	0.0	0.0	0.0
Mercury	1.65E-02	1.43E-03	1.20E+01	1.32E+01	0.0	0.0	0.0	0.0
Vanadium	1.63E+00	7.68E-02	3.27E-01	3.89E+00	**5.0**	0.2	0.4	0.0
Zinc	4.66E+00	1.14E+00	2.69E+02	5.37E+02	0.0	0.0	0.0	0.0

1 Receptor exposure from Table H 35
2 NOAEL toxicity reference value from Table H 12
3 LOAEL toxicity reference value from Table H 13
4 Hazard quotient calculated as HQ = exposure rate / toxicity reference value
BOLD represents receptor HQ > 1
NR - Not Reported, mean concentration larger than max because of using 1/2 detection limit to calculate

TABLE H.37
Calculated Ditch Soil Exposure - Short-tailed Shrew
SEAD 4
Seneca Army Depot Activity

Constituent	Max Detected Conc. (mg/kg)	Mean Conc. (mg/kg)	SP[1] (unitless)	BAF[2] (unitless)	Shrew Max Exposure[3] (mg/kg/day)	Shrew Mean Exposure[3] (mg/kg/day)
Volatiles						
Acetone	1.80E-01	1.92E-02	5.33E+01	3.90E-01	1.03E+00	1.09E-01
PAHs						
Acenaphthene	6.10E-01	2.20E-01	2.10E-01	3.42E-01	1.19E-01	4.28E-02
Acenaphthylene	1.30E-01	9.22E-02	1.72E-01	1.00E+00	6.76E-02	4.79E-02
Anthracene	1.70E+00	2.27E-01	1.04E-01	5.10E-02	6.41E-02	8.56E-03
Benzo(a)anthracene	5.90E+00	3.72E-01	1.51E-02	1.25E-01	3.87E-01	2.44E-02
Benzo(a)pyrene	5.10E+00	3.86E-01	1.02E+00	4.50E+00	1.20E+01	9.12E-01
Benzo(b)fluoranthene	4.80E+00	4.25E-01	1.00E-02	3.20E-01	7.81E-01	6.91E-02
Benzo(ghi)perylene	3.20E+00	2.58E-01	3.05E-03	2.40E-01	3.90E-01	3.15E-02
Benzo(k)fluoranthene	5.70E+00	3.91E-01	4.25E-03	2.53E-01	7.33E-01	5.03E-02
Chrysene	6.20E+00	3.89E-01	2.00E-02	1.75E-01	5.65E-01	3.55E-02
Dibenz(a,h)anthracene	1.20E+00	2.49E-01	8.16E-03	1.75E-01	1.08E-01	2.24E-02
Fluoranthene	1.60E+01	6.28E-01	3.72E-02	7.92E-01	6.43E+00	2.52E-01
Fluorene	6.60E-01	2.20E-01	1.49E-01	3.42E-01	1.24E-01	4.13E-02
Indeno(1,2,3-cd)pyrene	3.10E+00	2.61E-01	1.37E-03	4.19E-01	6.55E-01	5.51E-02
2-Methylnaphthalene	3.10E-02	NR	1.63E-01	3.42E-01	5.88E-03	NR
Phenanthrene	7.90E+00	3.31E-01	1.00E-01	1.22E-01	5.76E-01	2.41E-02
Pyrene	1.20E+01	5.12E-01	4.43E-02	9.20E-02	6.25E-01	2.67E-02
Semi-volatiles						
Bis(2-ethylhexyl)phthalate	4.20E+01	1.22E+00	1.00E-02	1.20E+01	2.52E+02	7.36E+00
Butylbenzylphthalate	1.60E-02	NR	1.00E+00	1.00E+00	9.69E-03	NR
Carbazole	5.00E-01	2.19E-01	1.00E+00	1.00E+00	3.03E-01	1.33E-01
Dibenzofuran	2.30E-01	1.57E-01	1.51E-01	1.00E+00	1.19E-01	8.13E-02
4-Methylphenol	2.30E-02	NR	2.93E+00	--	--	NR
Phenol	2.10E-01	1.67E-01	5.40E+00	--	--	--
PCBs						
Aroclor-1254	5.80E-01	7.76E-02	7.05E-03	4.50E+00	1.31E+00	1.75E-01
Aroclor-1260	2.50E-01	4.79E-02	3.93E-03	4.50E+00	5.64E-01	1.08E-01
Pesticides						

TABLE H.37
Calculated Ditch Soil Exposure - Short-tailed Shrew
SEAD 4
Seneca Army Depot Activity

Constituent	Max Detected Conc. (mg/kg)	Mean Conc. (mg/kg)	SP[1] (unitless)	BAF[2] (unitless)	Shrew Max Exposure[3] (mg/kg/day)	Shrew Mean Exposure[3] (mg/kg/day)
4,4'-DDD	9.00E-02	7.71E-03	1.34E-02	1.00E-01	4.76E-03	4.08E-04
4,4'-DDE	8.60E-02	7.48E-03	1.80E-02	2.50E-02	1.36E-03	1.19E-04
4,4'-DDT	4.50E-02	5.66E-03	1.00E-02	1.00E-01	2.37E-03	2.97E-04
Aldrin	2.80E-03	1.74E-03	1.00E-02	3.50E+00	4.91E-03	3.06E-03
BHC, beta	3.30E-03	1.77E-03	1.99E-01	1.00E+00	1.72E-03	9.25E-04
Dieldrin	1.80E-02	3.58E-03	1.20E-01	4.70E-02	6.73E-04	1.34E-04
Endrin ketone	6.20E-02	5.12E-03	2.20E-02	1.80E-01	5.82E-03	4.80E-04
Metals						
Antimony	8.27E+01	7.58E+00	1.30E-04	1.00E+00	4.15E+01	3.80E+00
Cadmium	3.41E+01	2.51E+00	5.50E-01	2.15E-02	8.05E-01	5.93E-02
Chromium (total)	4.80E+03	3.53E+02	7.50E-03	7.75E-01	1.87E+03	1.37E+02
Chromium VI	1.63E+02	3.72E+01	7.50E-03	7.75E-01	6.35E+01	1.45E+01
Copper	9.88E+02	1.11E+02	4.00E-01	6.82E-01	3.47E+02	3.89E+01
Lead	3.74E+02	8.55E+01	5.80E-03	2.10E+00	3.94E+02	9.00E+01
Mercury	2.40E+00	2.08E-01	9.00E-01	2.30E+01	2.77E+01	2.40E+00
Vanadium	1.14E+03	5.36E+01	1.00E-02	1.00E+00	5.73E+02	2.69E+01
Zinc	1.15E+03	2.81E+02	1.40E+00	9.90E+00	5.74E+03	1.40E+03

1 SP: soil-to-plant uptake factor.

2 BAF: bioaccumulation factor.

3 Exposure calculated as

ED = [(Cs * SP * CF * Ip) + (Cs * BAF * Ia) + (Cs * Is)] * SFF / BW

Where, ED = exposure dose

Cs = Max or mean conc in soil (mg/kg)

CF = plant dry-to-wet-weight conversion factor (0.2) (inorganics only)

SP = soil-to-plant uptake factor

Ip = plant-matter intake rate

BAF = bioaccumulation factor (unitless)

Ia = animal-matter intake rate

Is = incidental soil intake rate

SFF = site foraging factor

BW = body weight

NR - Not Reported, mean concentration larger than max because of using 1/2 detection limit to calculate

TABLE H.38
Calculated Ditch Soil Hazard Quotients - Short-tailed Shrew
SEAD 4
Seneca Army Depot Activity

Constituent	Shrew Max Exposure[1] (mg/kg/day)	Shrew Mean Exposure[1] (mg/kg/day)	NOAEL Toxicity Reference Value[2] (mg/kg/day)	LOAEL Toxicity Reference Value[3] (mg/kg/day)	NOAEL Max Hazard Quotient[4]	NOAEL Mean Hazard Quotient[4]	LOAEL Max Hazard Quotient[4]	LOAEL Mean Hazard Quotient[4]
Volatiles								
Acetone	1.03E+00	1.09E-01	2.20E+01	1.10E+02	0.0	0.0	0.0	0.0
PAHs								
Acenaphthene	1.19E-01	4.28E-02	1.75E+01	1.75E+02	0.0	0.0	0.0	0.0
Acenaphthylene	6.76E-02	4.79E-02	1.19E+00	1.19E+01	0.1	0.0	0.0	0.0
Anthracene	6.41E-02	8.56E-03	1.00E+03	1.00E+03	0.0	0.0	0.0	0.0
Benzo(a)anthracene	3.87E-01	2.44E-02	1.19E+00	1.19E+01	0.3	0.0	0.0	0.0
Benzo(a)pyrene	1.20E+01	9.12E-01	1.19E+00	1.19E+01	**10.1**	0.8	**1.0**	0.1
Benzo(b)fluoranthene	7.81E-01	6.91E-02	1.19E+00	1.19E+01	0.7	0.1	0.1	0.0
Benzo(ghi)perylene	3.90E-01	3.15E-02	1.19E+00	1.19E+01	0.3	0.0	0.0	0.0
Benzo(k)fluoranthene	7.33E-01	5.03E-02	1.19E+00	1.19E+01	0.6	0.0	0.1	0.0
Chrysene	5.65E-01	3.55E-02	1.19E+00	1.19E+01	0.5	0.0	0.0	0.0
Dibenz(a,h)anthracene	1.08E-01	2.24E-02	1.19E+00	1.19E+01	0.1	0.0	0.0	0.0
Fluoranthene	6.43E+00	2.52E-01	1.25E+01	1.25E+02	0.5	0.0	0.1	0.0
Fluorene	1.24E-01	4.13E-02	1.25E+01	1.25E+02	0.0	0.0	0.0	0.0
Indeno(1,2,3-cd)pyrene	6.55E-01	5.51E-02	1.19E+00	1.19E+01	0.6	0.0	0.1	0.0
2-Methylnaphthalene	5.88E-03	NR	7.16E+00	7.16E+01	0.0	NR	0.0	NR
Phenanthrene	5.76E-01	2.41E-02	1.19E+00	1.19E+01	0.5	0.0	0.0	0.0
Pyrene	6.25E-01	2.67E-02	1.19E+00	1.19E+01	0.5	0.0	0.1	0.0
Semi-volatiles								
Bis(2-ethylhexyl)phthalate	2.52E+02	7.36E+00	2.18E+01	2.18E+02	**11.6**	0.3	**1.2**	0.0
Butylbenzylphthalate	9.69E-03	NR	1.59E+02	4.70E+02	0.0	NR	0.0	NR
Carbazole	3.03E-01	1.33E-01	5.00E+00	5.00E+00	0.1	0.0	0.1	0.0
Dibenzofuran	1.19E-01	8.13E-02	No data	No data	--	--	--	--
4-Methylphenol	--	NR	2.00E+01	1.43E+02	--	--	--	--
Phenol	--	--	4.00E+00	4.00E+00	--	--	--	--
PCBs								
Aroclor-1254	1.31E+00	1.75E-01	6.70E-02	6.68E-01	**19.5**	**2.6**	**2.0**	0.3
Aroclor-1260	5.64E-01	1.08E-01	6.70E-02	6.68E-01	**8.4**	**1.6**	0.8	0.2
Pesticides								

TABLE H.38
Calculated Ditch Soil Hazard Quotients - Short-tailed Shrew
SEAD 4
Seneca Army Depot Activity

Constituent	Shrew Max Exposure[1] (mg/kg/day)	Shrew Mean Exposure[1] (mg/kg/day)	NOAEL Toxicity Reference Value[2] (mg/kg/day)	LOAEL Toxicity Reference Value[3] (mg/kg/day)	NOAEL Max Hazard Quotient[4]	NOAEL Mean Hazard Quotient[4]	LOAEL Max Hazard Quotient[4]	LOAEL Mean Hazard Quotient[4]
4,4'-DDD	4.76E-03	4.08E-04	1.76E+00	8.79E+00	0.0	0.0	0.0	0.0
4,4'-DDE	1.36E-03	1.19E-04	1.76E+00	8.79E+00	0.0	0.0	0.0	0.0
4,4'-DDT	2.37E-03	2.97E-04	1.76E+00	8.79E+00	0.0	0.0	0.0	0.0
Aldrin	4.91E-03	3.06E-03	4.40E-01	2.20E+00	0.0	0.0	0.0	0.0
BHC, beta	1.72E-03	9.25E-04	8.80E-01	4.40E+00	0.0	0.0	0.0	0.0
Dieldrin	6.73E-04	1.34E-04	4.40E-02	4.40E-01	0.0	0.0	0.0	0.0
Endrin ketone	5.82E-03	4.80E-04	1.40E-01	2.50E-01	0.0	0.0	0.0	0.0
Metals								
Antimony	4.15E+01	3.80E+00	1.49E-01	1.49E+00	**278.7**	**25.5**	**27.9**	**2.6**
Cadmium	8.05E-01	5.93E-02	1.00E+00	1.00E+01	0.8	0.1	0.1	0.0
Chromium (total)	1.87E+03	1.37E+02	6.02E+03	6.02E+03	0.3	0.0	0.3	0.0
Chromium VI	6.35E+01	1.45E+01	7.21E+00	2.89E+01	**8.8**	**2.0**	**2.2**	0.5
Copper	3.47E+02	3.89E+01	3.34E+01	4.40E+01	**10.4**	**1.2**	**7.9**	0.9
Lead	3.94E+02	9.00E+01	1.76E+01	1.76E+02	**22.4**	**5.1**	**2.2**	0.5
Mercury	2.77E+01	2.40E+00	1.57E+01	1.32E+01	**1.8**	0.2	**2.1**	0.2
Vanadium	5.73E+02	2.69E+01	4.28E-01	4.29E+00	**1338.0**	**62.9**	**133.6**	**6.3**
Zinc	5.74E+03	1.40E+03	3.52E+02	7.03E+02	**16.3**	**4.0**	**8.2**	**2.0**

1 Receptor exposure from Table H.37.
2 NOAEL toxicity reference value from Table H.12.
3 LOAEL toxicity reference value from Table H.13.
4 Hazard quotient calculated as HQ = exposure rate / toxicity reference value
BOLD : represents receptor HQ > 1.
NR - Not Reported, mean concentration larger than max because of using 1/2 detection limit to calculate

TABLE H.39
Calculated Ditch Soil Exposure - Red-tailed Hawk
SEAD 4
Seneca Army Depot Activity

Constituent	Max Detected Conc. (mg/kg)	Mean Conc. (mg/kg)	SP[1] (unitless)	Vertebrate BAF[2] (unitless)	Hawk Max Exposure[3] (mg/kg/day)	Hawk Mean Exposure[3] (mg/kg/day)
Volatiles						
Acetone	1.80E-01	1.92E-02	5.33E+01	3.90E-01	7.70E-03	8.20E-04
PAHs						
Acenaphthene	6.10E-01	2.20E-01	2.10E-01	5.90E-01	3.95E-02	1.42E-02
Acenaphthylene	1.30E-01	9.22E-02	1.72E-01	5.90E-01	8.41E-03	5.96E-03
Anthracene	1.70E+00	2.27E-01	1.04E-01	5.90E-01	1.10E-01	1.47E-02
Benzo(a)anthracene	5.90E+00	3.72E-01	1.51E-02	5.90E-01	3.82E-01	2.41E-02
Benzo(a)pyrene	5.10E+00	3.86E-01	1.02E+00	5.90E-01	3.30E-01	2.50E-02
Benzo(b)fluoranthene	4.80E+00	4.25E-01	1.00E-02	5.90E-01	3.11E-01	2.75E-02
Benzo(ghi)perylene	3.20E+00	2.58E-01	3.05E-03	5.90E-01	2.07E-01	1.67E-02
Benzo(k)fluoranthene	5.70E+00	3.91E-01	4.25E-03	5.90E-01	3.69E-01	2.53E-02
Chrysene	6.20E+00	3.89E-01	2.00E-02	5.90E-01	4.01E-01	2.52E-02
Dibenz(a,h)anthracene	1.20E+00	2.49E-01	8.16E-03	5.90E-01	7.77E-02	1.61E-02
Fluoranthene	1.60E+01	6.28E-01	3.72E-02	5.90E-01	1.04E+00	4.06E-02
Fluorene	6.60E-01	2.20E-01	1.49E-01	5.90E-01	4.27E-02	1.42E-02
Indeno(1,2,3-cd)pyrene	3.10E+00	2.61E-01	1.37E-03	5.90E-01	2.01E-01	1.69E-02
2-Methylnaphthalene	3.10E-02	NR	1.63E-01	5.90E-01	2.01E-03	NR
Phenanthrene	7.90E+00	3.31E-01	1.00E-01	5.90E-01	5.11E-01	2.14E-02
Pyrene	1.20E+01	5.12E-01	4.43E-02	5.90E-01	7.77E-01	3.31E-02
Semi-volatiles						
Bis(2-ethylhexyl)phthalate	4.20E+01	1.22E+00	1.00E-02	1.50E+00	6.91E+00	2.01E-01
Butylbenzylphthalate	1.60E-02	NR	1.00E+00	1.00E+00	1.75E-03	NR
Carbazole	5.00E-01	2.19E-01	1.00E+00	1.00E+00	5.48E-02	2.40E-02
Dibenzofuran	2.30E-01	1.57E-01	1.51E-01	1.00E+00	2.52E-02	1.72E-02
4-Methylphenol	2.30E-02	NR	2.93E+00	--	--	--
Phenol	2.10E-01	1.67E-01	5.40E+00	--	--	--
PCBs						
Aroclor-1254	5.80E-01	7.76E-02	7.05E-03	7.00E+00	4.45E-01	5.95E-02
Aroclor-1260	2.50E-01	4.79E-02	3.93E-03	7.00E+00	1.92E-01	3.68E-02
Pesticides						
4,4'-DDD	9.00E-02	7.71E-03	1.34E-02	1.00E-01	9.87E-04	8.45E-05
4,4'-DDE	8.60E-02	7.48E-03	1.80E-02	2.50E-02	2.36E-04	2.05E-05
4,4'-DDT	4.50E-02	5.66E-03	1.00E-02	1.00E-01	4.94E-04	6.20E-05

TABLE H.39
Calculated Ditch Soil Exposure - Red-tailed Hawk
SEAD 4
Seneca Army Depot Activity

Constituent	Max Detected Conc. (mg/kg)	Mean Conc. (mg/kg)	SP[1] (unitless)	Vertebrate BAF[2] (unitless)	Hawk Max Exposure[3] (mg/kg/day)	Hawk Mean Exposure[3] (mg/kg/day)
Aldrin	2.80E-03	1.74E-03	1.00E-02	7.20E+00	2.21E-03	1.38E-03
BHC, beta	3.30E-03	1.77E-03	1.99E-01	1.00E+00	3.62E-04	1.94E-04
Dieldrin	1.80E-02	3.58E-03	1.20E-01	4.70E-02	9.28E-05	1.85E-05
Endrin ketone	6.20E-02	5.12E-03	2.20E-02	2.40E-02	1.63E-04	1.35E-05
Metals						
Antimony	8.27E+01	7.58E+00	1.30E-04	1.00E+00	9.07E+00	8.31E-01
Cadmium	3.41E+01	2.51E+00	5.50E-01	2.15E-02	8.04E-02	5.92E-03
Chromium (total)	4.80E+03	3.53E+02	7.50E-03	1.60E-02	8.42E+00	6.19E-01
Chromium VI	1.63E+02	3.72E+01	7.50E-03	7.75E-01	1.39E+01	3.16E+00
Copper	9.88E+02	1.11E+02	4.00E-01	6.82E-01	7.39E+01	8.27E+00
Lead	3.74E+02	8.55E+01	5.80E-03	2.10E+00	8.61E+01	1.97E+01
Mercury	2.40E+00	2.08E-01	9.00E-01	2.30E+01	6.05E+00	5.26E-01
Vanadium	1.14E+03	5.36E+01	1.00E-02	1.00E+00	1.25E+02	5.87E+00
Zinc	1.15E+03	2.81E+02	1.40E+00	9.90E+00	1.25E+03	3.05E+02

1 SP: soil-to-plant uptake factor.
2 BAF: bioaccumulation factor.
3 Exposure calculated as

$$ED = [(Cs * SP_v * CF * Ip_{hawk}) + (Cs * BAF_v * Ia_{hawk}) + (Cs * Is_{hawk})] * UFF / BW$$

Where, ED = exposure dose

Cs = maximum or mean concentration in soil (mg/kg)
CF = plant dry-to-wet-weight conversion factor (0.2) for inorganics only
SP_v = soil-to-plant uptake factor for vegetative matter
Ip_{hawk} = plant-matter intake rate for the hawk = 0.0 kg/day
Ia_{hawk} = animal-matter intake rate for the hawk = 0.136 kg/day
Is_{hawk} = incidental soil intake rate for the hawk = 0.0 kg/day
BAF_{vert} = vertebrate bioaccumulation factor (unitless)
UFF = unit foraging factor = 1
BW = body weight = 1.24 kg

NR - Not Reported, mean concentration larger than max because of using 1/2 detection limit to calculate

TABLE H.40
Calculated Ditch Soil Hazard Quotients - Red-tailed hawk
SEAD 4
Seneca Army Depot Activity

Constituent	Hawk Max Exposure[1] (mg/kg/day)	Hawk Mean Exposure[1] (mg/kg/day)	NOAEL Toxicity Reference Value[2] (mg/kg/day)	LOAEL Toxicity Reference Value[3] (mg/kg/day)	NOAEL Max Hazard Quotient[4]	NOAEL Mean Hazard Quotient[4]	LOAEL Max Hazard Quotient[4]	LOAEL Mean Hazard Quotient[4]
Volatiles								
Acetone	7.70E-03	8.20E-04	6.10E+02	6.10E+02	0.0	0.0	0.0	0.0
PAHs								
Acenaphthene	3.95E-02	1.42E-02	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Acenaphthylene	8.41E-03	5.96E-03	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Anthracene	1.10E-01	1.47E-02	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Benzo(a)anthracene	3.82E-01	2.41E-02	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Benzo(a)pyrene	3.30E-01	2.50E-02	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Benzo(b)fluoranthene	3.11E-01	2.75E-02	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Benzo(ghi)perylene	2.07E-01	1.67E-02	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Benzo(k)fluoranthene	3.69E-01	2.53E-02	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Chrysene	4.01E-01	2.52E-02	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Dibenz(a,h)anthracene	7.77E-02	1.61E-02	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Fluoranthene	1.04E+00	4.06E-02	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Fluorene	4.27E-02	1.42E-02	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Indeno(1,2,3-cd)pyrene	2.01E-01	1.69E-02	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
2-Methylnaphthalene	2.01E-03	NR	2.85E+01	2.85E+02	0.0	NR	0.0	NR
Phenanthrene	5.11E-01	2.14E-02	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Pyrene	7.77E-01	3.31E-02	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Semi-volatiles								
Bis(2-ethylhexyl)phthalate	6.91E+00	2.01E-01	1.11E+00	1.11E+00	**6.2**	0.2	**6.2**	0.2
Butylbenzylphthalate	1.75E-03	NR	No data	No data	--	--	--	--
Carbazole	5.48E-02	2.40E-02	No data	No data	--	--	--	--
Dibenzofuran	2.52E-02	1.72E-02	2.18E-01	2.18E-01	0.1	0.1	0.1	0.1
4-Methylphenol	--	--	2.06E-01	2.06E-01	--	NR	--	NR
Phenol	--	--	no data	no data	--	--	--	--
PCBs								
Aroclor-1254	4.45E-01	5.95E-02	1.80E-01	1.80E+00	**2.5**	0.3	0.2	0.0
Aroclor-1260	1.92E-01	3.68E-02	1.80E-01	1.80E+00	**1.1**	0.2	0.1	0.0
Pesticides								
4,4'-DDD	9.87E-04	8.45E-05	2.20E-02	2.20E-01	0.0	0.0	0.0	0.0

TABLE H.40
Calculated Ditch Soil Hazard Quotients - Red-tailed hawk
SEAD 4
Seneca Army Depot Activity

Constituent	Hawk Max Exposure[1] (mg/kg/day)	Hawk Mean Exposure[1] (mg/kg/day)	NOAEL Toxicity Reference Value[2] (mg/kg/day)	LOAEL Toxicity Reference Value[3] (mg/kg/day)	NOAEL Max Hazard Quotient[4]	NOAEL Mean Hazard Quotient[4]	LOAEL Max Hazard Quotient[4]	LOAEL Mean Hazard Quotient[4]
4,4'-DDE	2.36E-04	2.05E-05	2.20E-02	2.20E-01	0.0	0.0	0.0	0.0
4,4'-DDT	4.94E-04	6.20E-05	2.20E-02	2.20E-01	0.0	0.0	0.0	0.0
Aldrin	2.21E-03	1.38E-03	5.00E-01	5.00E-01	0.0	0.0	0.0	0.0
BHC, beta	3.62E-04	1.94E-04	5.60E-01	2.25E+00	0.0	0.0	0.0	0.0
Dieldrin	9.28E-05	1.85E-05	7.70E-02	7.70E-02	0.0	0.0	0.0	0.0
Endrin ketone	1.63E-04	1.35E-05	1.00E-02	1.00E-01	0.0	0.0	0.0	0.0
Metals								
Antimony	9.07E+00	8.31E-01	No data	No data	--	--	--	--
Cadmium	8.04E-02	5.92E-03	1.45E+00	2.00E+01	0.1	0.0	0.0	0.0
Chromium (total)	4.08E+02	3.00E+01	1.00E+00	5.00E+00	**408.0**	**30.0**	**81.6**	**6.0**
Chromium VI	1.39E+01	3.16E+00	1.00E+00	5.00E+00	**13.9**	**3.2**	**2.8**	0.6
Copper	7.39E+01	8.27E+00	4.70E+01	6.17E+01	**1.6**	0.2	**1.2**	0.1
Lead	8.61E+01	1.97E+01	3.85E+00	3.85E+00	**22.4**	**5.1**	**22.4**	**5.1**
Mercury	6.05E+00	5.26E-01	2.86E+00	2.86E+00	**2.1**	0.2	**2.1**	0.2
Vanadium	1.25E+02	5.87E+00	1.14E+01	1.14E+01	**11.0**	0.5	**11.0**	0.5
Zinc	1.25E+03	3.05E+02	1.45E+01	1.31E+02	**86.1**	**21.0**	**9.5**	2.3

1 Receptor exposure from Table H39
2 NOAEL toxicity reference value from Table H.10.
3 LOAEL toxicity reference value from Table H.11.
4 Hazard quotient calculated as HQ = exposure rate / toxicity reference value
BOLD represents receptor HQ > 1
NR - Not Reported, mean concentration larger than max because of using 1/2 detection limit to calculate

TABLE H.41
Calculated Ditch Soil Exposure - Mourning Dove
SEAD 4
Seneca Army Depot Activity

Constituent	Max Detected Conc. (mg/kg)	Mean Conc. (mg/kg)	SP[1] (unitless)	BAF[2] (unitless)	Dove Max Exposure[3] (mg/kg/day)	Dove Mean Exposure[3] (mg/kg/day)
Volatiles						
Acetone	1.80E-01	1.92E-02	5.33E+01	3.90E-01	5.67E-01	6.04E-02
PAHs						
Acenaphthene	6.10E-01	2.20E-01	2.10E-01	3.42E-01	1.44E-02	5.20E-03
Acenaphthylene	1.30E-01	9.22E-02	1.72E-01	1.00E+00	3.59E-03	2.55E-03
Anthracene	1.70E+00	2.27E-01	1.04E-01	5.10E-02	2.48E-02	3.31E-03
Benzo(a)anthracene	5.90E+00	3.72E-01	1.51E-02	1.25E-01	5.93E-02	3.74E-03
Benzo(a)pyrene	5.10E+00	3.86E-01	1.02E+00	4.50E+00	5.67E-01	4.29E-02
Benzo(b)fluoranthene	4.80E+00	4.25E-01	1.00E-02	3.20E-01	5.57E-02	4.93E-03
Benzo(ghi)perylene	3.20E+00	2.58E-01	3.05E-03	2.40E-01	3.34E-02	2.69E-03
Benzo(k)fluoranthene	5.70E+00	3.91E-01	4.25E-03	2.53E-01	6.06E-02	4.16E-03
Chrysene	6.20E+00	3.89E-01	2.00E-02	1.75E-01	6.70E-02	4.21E-03
Dibenz(a,h)anthracene	1.20E+00	2.49E-01	8.16E-03	1.75E-01	1.21E-02	2.52E-03
Fluoranthene	1.60E+01	6.28E-01	3.72E-02	7.92E-01	2.84E-01	1.11E-02
Fluorene	6.60E-01	2.20E-01	1.49E-01	3.42E-01	1.32E-02	4.39E-03
Indeno(1,2,3-cd)pyrene	3.10E+00	2.61E-01	1.37E-03	4.19E-01	3.73E-02	3.14E-03
2-Methylnaphthalene	3.10E-02	NR	1.63E-01	3.42E-01	6.46E-04	NR
Phenanthrene	7.90E+00	3.31E-01	1.00E-01	1.22E-01	1.19E-01	4.97E-03
Pyrene	1.20E+01	5.12E-01	4.43E-02	9.20E-02	1.37E-01	5.86E-03
Semi-volatiles						
Bis(2-ethylhexyl)phthalate	4.20E+01	1.22E+00	1.00E-02	1.20E+01	5.17E+00	1.51E-01
Butylbenzylphthalate	1.60E-02	NR	1.00E+00	1.00E+00	1.22E-03	NR
Carbazole	5.00E-01	2.19E-01	1.00E+00	1.00E+00	3.82E-02	1.67E-02
Dibenzofuran	2.30E-01	1.57E-01	1.51E-01	1.00E+00	6.07E-03	4.14E-03
4-Methylphenol	2.30E-02	NR	2.93E+00	--	--	--
Phenol	2.10E-01	1.67E-01	5.40E+00	--	--	--
PCBs						
Aroclor-1254	5.80E-01	7.76E-02	7.05E-03	4.50E+00	2.98E-02	3.98E-03
Aroclor-1260	2.50E-01	4.79E-02	3.93E-03	4.50E+00	1.28E-02	2.45E-03
Pesticides						
4,4'-DDD	9.00E-02	7.71E-03	1.34E-02	1.00E-01	8.73E-04	7.48E-05
4,4'-DDE	8.60E-02	7.48E-03	1.80E-02	2.50E-02	7.96E-04	6.93E-05
4,4'-DDT	4.50E-02	5.66E-03	1.00E-02	1.00E-01	4.28E-04	5.38E-05
Aldrin	2.80E-03	1.74E-03	1.00E-02	3.50E+00	1.18E-04	7.33E-05

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TABLE H.41
Calculated Ditch Soil Exposure - Mourning Dove
SEAD 4
Seneca Army Depot Activity

Constituent	Max Detected Conc. (mg/kg)	Mean Conc. (mg/kg)	SP[1] (unitless)	BAF[2] (unitless)	Dove Max Exposure[3] (mg/kg/day)	Dove Mean Exposure[3] (mg/kg/day)
BHC, beta	3.30E-03	1.77E-03	1.99E-01	1.00E+00	9.65E-05	5.17E-05
Dieldrin	1.80E-02	3.58E-03	1.20E-01	4.70E-02	2.79E-04	5.55E-05
Endrin ketone	6.20E-02	5.12E-03	2.20E-02	1.80E-01	6.81E-04	5.62E-05
Metals						
Antimony	8.27E+01	7.58E+00	1.30E-04	1.00E+00	1.45E+00	1.33E-01
Cadmium	3.41E+01	2.51E+00	5.50E-01	2.15E-02	4.99E-01	3.68E-02
Chromium (total)	4.80E+03	3.53E+02	7.50E-03	7.75E-01	7.42E+01	5.45E+00
Chromium VI	1.63E+02	3.72E+01	7.50E-03	7.75E-01	2.52E+00	5.74E-01
Copper	9.88E+02	1.11E+02	4.00E-01	6.82E-01	1.90E+01	2.12E+00
Lead	3.74E+02	8.55E+01	5.80E-03	2.10E+00	1.05E+01	2.40E+00
Mercury	2.40E+00	2.08E-01	9.00E-01	2.30E+01	5.72E-01	4.97E-02
Vanadium	1.14E+03	5.36E+01	1.00E-02	1.00E+00	2.01E+01	9.44E-01
Zinc	1.15E+03	2.81E+02	1.40E+00	9.90E+00	1.37E+02	3.34E+01

1 SP: soil-to-plant uptake factor.
2 BAF: bioaccumulation factor.
3 Exposure calculated as
ED [(Cs * SP * CF * Ip) + (Cs * BAF * Ia) + (Cs * Is)] * SFF / BW
Where, ED = exposure dose
Cs = maximum or mean concentration in soil (mg/kg)
CF = plant dry-to-wet-weight conversion factor (0.2) for inorganics only
SP = soil-to-plant uptake factor for vegetative matter
Ip = plant-matter intake rate for the Dove = 0.00925 kg/day
BAF = invertebrate bioaccumulation factor (unitless)
Ia = animal-matter intake rate for the Dove = 0.0015 kg/day
Is = soil intake rate for the Dove = 0.00125 kg/day
SFF = site foraging factor = 1
BW = body weight = 0.157 kg

NR - Not Reported, mean concentration larger than max because of using 1/2 detection limit to calculate

TABLE H.42
Calculated Ditch Soil Hazard Quotients - Mourning Dove
SEAD 4
Seneca Army Depot Activity

Constituent	Dove Max Exposure[1] (mg/kg/day)	Dove Mean Exposure[1] (mg/kg/day)	NOAEL Toxicity Reference Value[2] (mg/kg/day)	LOAEL Toxicity Reference Value[3] (mg/kg/day)	NOAEL Max Hazard Quotient[4]	NOAEL Mean Hazard Quotient[4]	LOAEL Max Hazard Quotient[4]	LOAEL Mean Hazard Quotient[4]
Volatiles								
Acetone	5.67E-01	6.04E-02	6.10E+02	6.10E+02	0.0	0.0	0.0	0.0
PAHs								
Acenaphthene	1.44E-02	5.20E-03	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Acenaphthylene	3.59E-03	2.55E-03	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Anthracene	2.48E-02	3.31E-03	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Benzo(a)anthracene	5.93E-02	3.74E-03	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Benzo(a)pyrene	5.67E-01	4.29E-02	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Benzo(b)fluoranthene	5.57E-02	4.93E-03	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Benzo(ghi)perylene	3.34E-02	2.69E-03	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Benzo(k)fluoranthene	6.06E-02	4.16E-03	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Chrysene	6.70E-02	4.21E-03	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Dibenz(a,h)anthracene	1.21E-02	2.52E-03	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Fluoranthene	2.84E-01	1.11E-02	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Fluorene	1.32E-02	4.39E-03	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Indeno(1,2,3-cd)pyrene	3.73E-02	3.14E-03	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
2-Methylnaphthalene	6.46E-04	NR	2.85E+01	2.85E+02	0.0	NR	0.0	NR
Phenanthrene	1.19E-01	4.97E-03	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Pyrene	1.37E-01	5.86E-03	2.85E+01	2.85E+02	0.0	0.0	0.0	0.0
Semi-volatiles								
Bis(2-ethylhexyl)phthalate	5.17E+00	1.51E-01	1.11E+00	1.11E+00	4.7	0.1	4.7	0.1
Butylbenzylphthalate	1.22E-03	NR	No data	No data	--	--	--	--
Carbazole	3.82E-02	1.67E-02	No data	No data	--	--	--	--
Dibenzofuran	6.07E-03	4.14E-03	2.18E-01	2.18E-01	0.0	0.0	0.0	0.0
4-Methylphenol	--	--	2.06E-01	2.06E-01	--	--	--	--
Phenol	--	--	no data	no data	--	--	--	--
PCBs								
Aroclor-1254	2.98E-02	3.98E-03	1.80E-01	1.80E+00	0.2	0.0	0.0	0.0
Aroclor-1260	1.28E-02	2.45E-03	1.80E-01	1.80E+00	0.1	0.0	0.0	0.0
Pesticides								
4,4'-DDD	8.73E-04	7.48E-05	2.80E-03	2.80E-02	0.3	0.0	0.0	0.0
4,4'-DDE	7.96E-04	6.93E-05	2.80E-03	2.80E-02	0.3	0.0	0.0	0.0
4,4'-DDT	4.28E-04	5.38E-05	2.80E-03	2.80E-02	0.2	0.0	0.0	0.0
Aldrin	1.18E-04	7.33E-05	5.00E-01	5.00E-01	0.0	0.0	0.0	0.0
BHC, beta	9.65E-05	5.17E-05	5.60E-01	2.25E+00	0.0	0.0	0.0	0.0

TABLE H.42
Calculated Ditch Soil Hazard Quotients - Mourning Dove
SEAD 4
Seneca Army Depot Activity

Constituent	Dove Max Exposure[1] (mg/kg/day)	Dove Mean Exposure[1] (mg/kg/day)	NOAEL Toxicity Reference Value[2] (mg/kg/day)	LOAEL Toxicity Reference Value[3] (mg/kg/day)	NOAEL Max Hazard Quotient[4]	NOAEL Mean Hazard Quotient[4]	LOAEL Max Hazard Quotient[4]	LOAEL Mean Hazard Quotient[4]
Dieldrin	2.79E-04	5.55E-05	7.70E-02	7.70E-02	0.0	0.0	0.0	0.0
Endrin ketone	6.81E-04	5.62E-05	1.00E-02	1.00E-01	0.1	0.0	0.0	0.0
Metals								
Antimony	1.45E+00	1.33E-01	No data	No data	--	--	--	--
Cadmium	4.99E-01	3.68E-02	1.45E+00	2.00E+01	0.34	0.0	0.0	0.0
Chromium (total)	7.42E+01	5.45E+00	1.00E+00	5.00E+00	**74.2**	**5.5**	**14.8**	**1.1**
Chromium VI	2.52E+00	5.74E-01	1.00E+00	5.00E+00	**2.5**	0.6	0.5	0.1
Copper	1.90E+01	2.12E+00	4.70E+01	6.17E+01	0.4	0.0	0.3	0.0
Lead	1.05E+01	2.40E+00	1.13E+00	1.13E+01	**9.3**	**2.1**	0.9	0.2
Mercury	5.72E-01	4.97E-02	4.50E-01	9.00E-01	**1.3**	0.1	0.6	0.1
Vanadium	2.01E+01	9.44E-01	1.14E+01	1.14E+01	**1.8**	0.1	**1.8**	0.1
Zinc	1.37E+02	3.34E+01	1.45E+01	1.31E+02	**9.4**	**2.3**	**1.0**	0.3

1 Receptor exposure from Table H.41.

2 NOAEL toxicity reference value from Table H.10.

3 LOAEL toxicity reference value from Table H.11

4 Hazard quotient calculated as HQ exposure rate toxicity reference value

BOLD represents receptor HQ 1.

NR - Not Reported, mean concentration larger than max because of using 1/2 detection limit to calculate

TABLE H.43
Invertebrate Risk Screening for Ditch Soil COPCs
SEAD 4
Seneca Army Depot Activity

	Ditch Soil		Comparison to Benchmark[1]			
Analyte	Max Detect (mg/kg)	Location	Earth-worms	Micro-organisms	Exceeds Earthworm Benchmark?	Exceeds Mircro-organism Benchmark?
Volatiles						
Acetone	1.80E-01	SD4-8	na	na	No Criteria	No Criteria
PAHs						
Acenaphthene	6.10E-01	SD4-17	na	na	No Criteria	No Criteria
Acenaphthylene	1.30E-01	SD4-36	na	na	No Criteria	No Criteria
Anthracene	1.70E+00	SD4-17	na	na	No Criteria	No Criteria
Benzo(a)anthracene	5.90E+00	SD4-17	na	na	No Criteria	No Criteria
Benzo(a)pyrene	5.10E+00	SD4-17	na	na	No Criteria	No Criteria
Benzo(b)fluoranthene	4.80E+00	SD4-17	na	na	No Criteria	No Criteria
Benzo(ghi)perylene	3.20E+00	SD4-17	na	na	No Criteria	No Criteria
Benzo(k)fluoranthene	5.70E+00	SD4-17	na	na	No Criteria	No Criteria
Chrysene	6.20E+00	SD4-17	na	na	No Criteria	No Criteria
Dibenz(a,h)anthracene	1.20E+00	SD4-17	na	na	No Criteria	No Criteria
Fluoranthene	1.60E+01	SD4-17	na	na	No Criteria	No Criteria
Fluorene	6.60E-01	SD4-17	30	na	No	No Criteria
Indeno(1,2,3-cd)pyrene	3.10E+00	SD4-17	na	na	No Criteria	No Criteria
2-Methylnaphthalene	3.10E-02	SD4-22	na	na	No Criteria	No Criteria
Phenanthrene	7.90E+00	SD4-17	na	na	No Criteria	No Criteria
Pyrene	1.20E+01	SD4-17	na	na	No Criteria	No Criteria
Semi-vols						
Bis(2-ethylhexyl)phthalate	4.20E+01	SD4-29	na	na	No Criteria	No Criteria
Butylbenzylphthalate	1.60E-02	SD4-32	na	na	No Criteria	No Criteria
Carbazole	5.00E-01	SD4-17	na	na	No Criteria	No Criteria
Dibenzofuran	2.30E-01	SD4-17	na	na	No Criteria	No Criteria
4-Methylphenol	2.30E-02	SD4-33	na	na	No Criteria	No Criteria
Phenol	2.10E-01	SD4-28	30	100	No	No
PCBs						
Aroclor-1254	5.80E-01	SD4-12	na	na	No Criteria	No Criteria
Aroclor-1260	2.50E-01	SD4-12	na	na	No Criteria	No Criteria
Pesticides						
4,4'-DDD	9.00E-02	SD4-8	na	na	No Criteria	No Criteria
4,4'-DDE	8.60E-02	SD4-8	na	na	No Criteria	No Criteria
4,4'-DDT	4.50E-02	SD4-12	na	na	No Criteria	No Criteria
Aldrin	2.80E-03	SD4-16	na	na	No Criteria	No Criteria
BHC, beta	3.30E-03	SD4-44	na	na	No Criteria	No Criteria
Dieldrin	1.80E-02	SD4-12	na	na	No Criteria	No Criteria
Endrin ketone	6.20E-02	SD4-36	na	na	No Criteria	No Criteria
Metals						
Antimony	8.27E+01	SD4-6	na	na	No Criteria	No Criteria
Cadmium	3.41E+01	SD4-7	20	20	Yes	Yes
Chromium (total)	4.80E+03	SD4-42	0.4	10	Yes	Yes
Chromium VI	1.63E+02	SD4-43	na	10	No Criteria	Yes
Copper	9.88E+02	SD4-42	60	100	Yes	Yes
Lead	3.74E+02	SD4-8	500	900	No	No
Mercury	2.40E+00	SD4-42	0.1	30	Yes	No
Vanadium	1.14E+03	SD4-28	na	20	No Criteria	Yes
Zinc	1.15E+03	SD4-13	100	100	Yes	Yes

1 Will, M.E. and G.W. Suter II. *Toxicological Benchmarks for Screening Potential Contaminants of Concern for Effects on Soil and Litter Invertebrates and Heterotrophic Process*. Martin Marietta Environmental Restoration Program. September 1994 (Table 3)
Earthworms-Screening benchmark concentrations for the toxicity of chemicals to earthworms
Microorganisms-Screening benchmark concentrations for the toxicity of chemicals to soil microorganisms and microbial processes
na - criteria is not available

Table H.44
Calculated Sediment Maximum Exposure - Great Blue Heron
Seneca / SEAD-4
Seneca Army Depot Activity

Constituent	Surface Water Max Conc. (mg/L)[1]	Sediment Max Conc. (mg/kg)[2]	Estimated Pore Water[3]		Bioaccumulation Factors[4]					Trophic Level 2 Tissue Conc. (mg/kg)[5]	Great Blue Heron Exposure (mg/kg/day)[6]
			logKoc	Water Conc. (mg/L)	logKow	BCF	Ref	FCM	BAF		
Volatiles											
Acetone	4.00E-03	2.10E-01			-0.24	0.39		1	0.39	1.55E-03	3.14E-03
Carbon disulfide		1.20E-02	2.38	1.32E-03	1.84	14.7		1	14.7	1.94E-02	3.56E-03
Methyl ethyl ketone[7]		1.90E-02	0.09	1.05E+00	0.28	1.0		1	1.0	1.01E+00	1.78E-01
Semi-Volatiles											
4-Methylphenol		1.40E-01	1.69	7.52E-02	1.67	11		1	11	8.23E-01	1.46E-01
N-Nitrosodipropylamine[7]		4.10E-01	1.38	4.50E-01	1.40	7		1	7	3.07E+00	5.45E-01
Nitroaromatics											
4-amino-2,6-Dinitrotoluene		1.40E-01	--	NA		1	f	1	1	--	1.80E-03
Herbicides											
2,4,5-T		2.10E-02	2.27	2.97E-03	3.40	225.94		1	225.94	6.71E-01	1.18E-01
Metals											
Aluminum	7.35E+00	1.75E+04			NA	231	a	1	231	1.70E+03	5.23E+02
Antimony	6.60E-03	5.04E+01			NA	1	f	1	1	6.60E-03	6.48E-01
Arsenic	4.20E-03	8.10E+00			NA	17	g	1	17	7.14E-02	1.17E-01
Barium	2.13E-01	1.02E+02			NA	100	h	1	100	2.13E+01	5.06E+00
Beryllium		6.50E-01	6310	1.03E-04	NA	19	b	1	19	1.96E-03	8.68E-03
Chromium	4.48E-02	3.31E+03			NA	1	g	1	1	4.48E-02	4.25E+01
Chromium, Hexavalent			--	NA	NA	1	g	1	1		
Cobalt	1.96E-02	1.41E+01			NA	1	f	1	1	1.96E-02	1.85E-01
Copper	9.70E-02	2.64E+03			NA	100	d	1	100	9.70E+00	3.56E+01
Iron	1.66E+01	2.92E+04			NA	1	f	1	1	1.66E+01	3.78E+02
Manganese	2.35E+00	5.69E+02			NA	1	f	1	1	2.35E+00	7.82E+00
Mercury		1.60E-01	--	NA	NA	68600	c	1	68600		2.05E-03
Nickel	3.26E-02	3.34E+01			NA	36	g	1	36	1.17E+00	6.36E-01
Vanadium	2.25E-02	2.82E+01			NA	1	f	1	1	2.25E-02	3.67E-01
Zinc	4.92E-01	6.30E+02			NA	1000	d	1	1000	4.92E+02	9.46E+01

1 Includes concentrations for constituents detected in surface water, blank cell indicates analyte is below detection limit

2 Includes concentrations for constituents detected in sediment, blank cell indicates analyte is below detection limit

3 Pore water concentrations are estimated using partitioning coefficients (Koc and Kd for organics and metals, respectively)
NA and "--" - not available. Blank cells indicate that the estimated pore water data was not necessary for the calculation

4 Kow - octanol-water partition coefficient, BCF - bioconcentration factor, FCM - food chain multiplier, BAF - bioaccumulation factor (see text)
BCF values are calculated using the chemical-specific Kow - $BCF = 10^{(0.76*logKow-0.23)}$ (DPD, 1999) unless otherwise referenced, $BAF = BCF * FCM$

5 Estimated prey concentrations are modeled using measured surface water concentrations and BAFs, if surface water concentrations were not collected, then calculated pore water concentrations were used

6 Exposure for great blue heron (sediment and surface water COPCs) is calculated as
Exposure ED = [(Cs * Is) + (Cf * Ia) + (Cw * Iw)] * SFF / BW
Where, ED = exposure dose

Cs	maximum concentration in sediment (mg/kg)	Cw	maximum concentration in surface water (mg/L)
Is	incidental sediment intake rate (0.0307 kg/day)	Iw	incidental surface water intake rate (0.1058 L/day)
Cf	modeled concentration in fish tissue (mg/kg)	SFF	site foraging factor (assumed to be 1 for screening assessment)
Ia	animal-matter intake rate (0.4200 kg/day)	BW	body weight (2.39 kg)

7 K_{oc} and K_{ow} values were taken from Risk Assessment Information System (RAIS), December 2001

References
a Sample et al. 1996
b AQUIRE database
c Eisler, 1986
d ATSDR, 1993
f default
g ATSDR 1992
h ATSDR 1990

Table H.45
Calculated Sediment Mean Exposure - Great Blue Heron
Seneca / SEAD-4
Seneca Army Depot Activity

Constituent	Surface Water	Sediment	Estimated Pore Water[3]		Bioaccumulation Factors[4]					Trophic Level 2	Great Blue Heron
	Mean Conc. (mg/L)[1]	Mean Conc. (mg/kg)[2]	logKoc or Kd	Water Conc. (mg/L)	logKow	BCF	Ref	FCM	BAF	Tissue Conc. (mg/kg)[5]	Mean Exposure (mg/kg/day)[6]
Volatiles											
Acetone	3.55E-03	9.08E-02			-0.24	0.39		1	0.39	1.37E-03	1.56E-03
Carbon disulfide		1.28E-02	2.38	1.40E-03	1.84	14.7		1	14.7	2.07E-02	3.80E-03
Methyl ethyl ketone[7]		2.57E-02	0.09	5.50E-01	0.28	1.0		1	1.0	5.28E-01	9.32E-02
Semi-Volatiles											
4-Methylphenol		2.12E-01	1.69	1.14E-01	1.67	11		1	11	1.25E+00	2.22E-01
N-Nitrosodipropylamine[7]		4.05E-01	1.38	4.44E-01	1.40	7		1	7	3.03E+00	5.38E-01
Nitroaromatics											
4-amino-2,6-Dinitrotoluene		9.00E-02	--	NA		0.59		1	0.59	--	--
Herbicides											
2,4,5-T		9.48E-03	2.27	1.34E-03	3.40	225.94		1	225.94	3.03E-01	5.33E-02
Metals											
Aluminum	8.74E-01	1.48E+04			NA	231	(a)	1	231	2.02E+02	2.26E+02
Antimony	NR	3.09E+01	--	NA	NA	1	(f)	1	1	--	--
Arsenic	1.27E-03	6.43E+00			NA	17	(i)	1	17	2.16E-02	8.64E-02
Barium	6.56E-02	7.74E+01			NA	100	(g)	1	100	6.56E+00	2.15E+00
Beryllium		5.90E-01	6310	9.35E-05	NA	19	(b)	1	19	1.78E-03	7.88E-03
Chromium	8.08E-03	2.03E+03			NA	1	(g)	1	1	8.08E-03	2.60E+01
Chromium, hexavalent			-	NA	NA	1	(g)	1	1		0.00E+00
Cobalt	3.15E-03	1.20E+01			NA	1	(f)	1	1	3.15E-03	1.55E-01
Copper	2.29E-02	1.54E+03			NA	100	(d)	1	100	2.29E+00	2.01E+01
Iron	2.02E+00	2.52E+04			NA	1.0	(f)	1	1	2.02E+00	3.24E+02
Manganese	3.15E-01	4.54E+02			NA	1	(f)	1	1	3.15E-01	5.89E+00
Mercury		1.20E-01	--	NA	NA	68600	(c)	1	68600		1.54E-03
Nickel	4.60E-03	3.09E+01			NA	36	(i)	1	36	1.66E-01	4.26E-01
Vanadium	4.10E-03	2.38E+01			NA	1	(f)	1	1	4.10E-03	3.06E-01
Zinc	6.50E-02	4.45E+02			NA	1000	(h)	1	1000	6.50E+01	1.71E+01

NR - Not Reported, mean concentration larger than max because of using 1/2 detection limit to calculate

1 Includes concentrations for constituents detected in surface water, blank cell indicates analyte is below detection limit

2 Includes concentrations for constituents detected in sediment, blank cell indicates analyte is below detection limit

3 Pore water concentrations are estimated using partitioning coefficients (Koc and Kd for organics and metals, respectively)
NA and "--" - not available. Blank cells indicate that the estimated pore water data was not necessary for the calculation

4 Kow - octanol-water partition coefficient, BCF - bioconcentration factor, FCM - food chain multiplier, BAF - bioaccumulation factor (see text)
BCF values are calculated using the chemical-specific Kow - BCF = 10 (0.76*logKow-0.23) (DPD, 1999) unless otherwise referenced. BAF = BCF * FCM

5 Estimated prey concentrations are modeled using measured surface water concentrations and BAFs, if surface water concentrations were not collected, then calculated pore water concentrations were used

6 Exposure for great blue heron (sediment and surface water COPCs) is calculated as
Exposure ED = [(Cs * Is) + (Cf * Ia) + (Cw * Iw)] * SFF / BW
Where, ED = exposure dose

Cs = mean concentration in sediment (mg/kg)	Cw = mean concentration in surface water (mg/L)
Is = incidental sediment intake rate (0.0307 kg/day)	Iw = incidental surface water intake rate (0.1058 L/day)
Cf = modeled concentration in fish tissue (mg/kg)	SFF = site foraging factor (assumed to be 1for screening assessment)
Ia = animal-matter intake rate (0.4200 kg/day)	BW = body weight (2.39 kg)

7 K_{oc} and K_{ow} values were taken from Risk Assessment Information System (RAIS) December 2001

References

a Sample et al., 1996	f default
b AQUIRE database	g ATSDR 1992
c Eisler 1986	h ATSDR 1990
d ATSDR 1993	

Table H.46
Calculated Sediment Hazard Quotients - Great Blue Heron
Seneca / SEAD-4
Seneca Army Depot Activity

Constituent	Great Blue Heron Max Exposure[1] (mg/kg/day)	Great Blue Heron Mean Exposure[1] (mg/kg/day)	NOAEL TRV[2] (mg/kg/day)	LOAEL TRV[3] (mg/kg/day)	NOAEL Max Hazard Quotient[4]	NOAEL Mean Hazard Quotient[4]	LOAEL Max Hazard Quotient[4]	LOAEL Mean Hazard Quotient[4]
Volatiles								
Acetone	3.14E-03	1.56E-03	6.10E+02	6.10E+02	0.0	0.0	0.0	0.0
Carbon disulfide	3.56E-03	3.80E-03	no data	no data	--	--	--	--
Methyl ethyl ketone	1.78E-01	9.32E-02	no data	no data	--	--	--	--
Semi-Volatiles								
4-Methylphenol	1.46E-01	2.22E-01	2.06E-01	2.06E-01	0.7	**1.1**	0.7	**1.1**
N-nitrosodipropylamine	5.45E-01	5.38E-01	no data	no data	--	--	--	--
Nitroaromatics								
4-amino-2,6-dinitrotoluene	1.80E-03	--	no data	no data	--	--	--	--
Herbicides								
2,4,5-T	1.18E-01	5.33E-02	no data	no data	--	--	--	--
Metals								
Aluminum	5.23E+02	2.26E+02	1.10E+02	1.10E+02	**4.8**	**2.1**	**4.8**	**2.1**
Antimony	6.48E-01	--	no data	no data	--	--	--	--
Arsenic	1.17E-01	8.64E-02	5.14E+00	1.28E+01	0.0	0.0	0.0	0.0
Barium	5.06E+00	2.15E+00	2.08E+01	4.16E+01	0.2	0.1	0.1	0.1
Beryllium	8.68E-03	7.88E-03	no data	no data	--	--	--	--
Chromium	4.25E+01	2.60E+01	1.00E+00	5.00E+00	**42**	**26**	**8.5**	**5.2**
Chromium, hexavalent	0.00E+00	0.00E+00	1.00E+00	5.00E+00	0.0	0.0	0.0	0.0
Cobalt	1.85E-01	1.55E-01	no data	no data	--	--	--	--
Copper	3.56E+01	2.01E+01	4.70E+01	6.17E+01	0.8	0.4	0.6	0.3
Iron	3.78E+02	3.24E+02	no data	no data	--	--	--	--
Manganese	7.82E+00	5.89E+00	9.77E+02	9.77E+02	0.0	0.0	0.0	0.0
Mercury	2.05E-03	1.54E-03	6.40E-03	6.40E-02	0.3	0.2	0.0	0.0
Nickel	6.36E-01	4.26E-01	7.74E+01	1.07E+02	0.0	0.0	0.0	0.0
Vanadium	3.67E-01	3.06E-01	1.14E+01	1.14E+01	0.0	0.0	0.0	0.0
Zinc	9.46E+01	1.71E+01	1.45E+01	1.31E+02	**6.5**	**1.2**	0.7	0.1

1 Receptor exposure from Table H.44 and Table H.45

2 NOAEL toxicity reference value from Table H.10

3 LOAEL toxicity reference value from Table H.11

4 Hazard quotient calculated as HQ = exposure rate / toxicity reference value. If HQ < 1, no effects are expected

BOLD indicates receptor HQ > 1

"--" Can not be calculated due to lack of toxicity data

TABLE H.47

Surface Water Exposure Concentrations - Largemouth Bass
SEAD 4
Seneca Army Depot, NY

Constituent	Surface Water Max Detect Conc. (mg/L)	Surface Water Mean Conc. (mg/L)	Largemouth Bass Max Exposure (mg/L)[1]	Largemouth Bass Mean Exposure (mg/L)[1]
PAHs				
Benzo(a)anthracene	1.80E-04	1.82E-03	1.80E-04	1.82E-03
Benzo(a)pyrene	1.50E-04	1.82E-03	1.50E-04	1.82E-03
Benzo(b)fluoranthene	1.50E-04	1.82E-03	1.50E-04	1.82E-03
Benzo(ghi)perylene	7.00E-05	1.81E-03	7.00E-05	1.81E-03
Benzo(k)fluoranthene	1.60E-04	1.82E-03	1.60E-04	1.82E-03
Chrysene	1.80E-04	1.82E-03	1.80E-04	1.82E-03
Indeno(1,2,3-cd)pyrene	7.00E-05	1.81E-03	7.00E-05	1.81E-03
Semivolatiles				
Carbazole	5.00E-05	1.81E-03	5.00E-05	1.81E-03
Pesticides				
Alpha-Chlordane	7.70E-06	3.28E-06	7.70E-06	3.28E-06
Gamma-Chlordane	6.40E-06	3.10E-06	6.40E-06	3.10E-06
Nitroaromatics				
1,3-Dinitrobenzene	7.00E-05	1.10E-04	7.00E-05	1.10E-04
Metals				
Aluminum	7.35E+00	8.74E-01	7.35E+00	8.74E-01
Barium	2.13E-01	6.56E-02	2.13E-01	6.56E-02
Cadmium	1.16E-02	1.86E-03	1.16E-02	1.86E-03
Cobalt	1.96E-02	3.15E-03	1.96E-02	3.15E-03
Copper	9.70E-02	2.29E-02	9.70E-02	2.29E-02
Iron	1.66E+01	2.02E+00	1.66E+01	2.02E+00
Lead	1.17E-01	1.35E-02	1.17E-01	1.35E-02
Manganese	2.35E+00	3.15E-01	2.35E+00	3.15E-01
Silver	1.70E-03	1.37E-03	1.70E-03	1.37E-03
Vanadium	2.25E-02	4.10E-03	2.25E-02	4.10E-03
Zinc	4.92E-01	6.50E-02	4.92E-01	6.50E-02

1 Exposure concentrations for fish equals the surface water concentration.

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TABLE H.48
Calculated Surface Water Hazard Quotients - Largemouth Bass
SEAD 4
Seneca Army Depot, NY

Constituent	Largemouth Bass Max Exposure (mg/L)	Largemouth Bass Mean Exposure (mg/L)	Toxicity Reference Value (mg/L)	Max Hazard Quotient[1]	Mean Hazard Quotient[2]
PAHs					
Benzo(a)anthracene	1.80E-04	1.82E-03	1.00E+02	0.0	0.0
Benzo(a)pyrene	1.50E-04	1.82E-03	1.00E+02	0.0	0.0
Benzo(b)fluoranthene	1.50E-04	1.82E-03	1.00E+02	0.0	0.0
Benzo(ghi)perylene	7.00E-05	1.81E-03	1.00E+02	0.0	0.0
Benzo(k)fluoranthene	1.60E-04	1.82E-03	1.00E+02	0.0	0.0
Chrysene	1.80E-04	1.82E-03	1.00E+02	0.0	0.0
Indeno(1,2,3-cd)pyrene	7.00E-05	1.81E-03	1.00E+02	0.0	0.0
Semivolatiles					
Carbazole	5.00E-05	1.81E-03	no data	--	--
Pesticides					
Alpha-Chlordane	7.70E-06	3.28E-06	7.10E-03	0.0	0.0
Gamma-Chlordane	6.40E-06	3.10E-06	7.10E-03	0.0	0.0
Nitroaromatics					
1,3-Dinitrobenzene	7.00E-05	1.10E-04	5.00E-01	0.0	0.0
Metals					
Aluminum	7.35E+00	8.74E-01	1.11E+00	**6.6**	0.8
Barium	2.13E-01	6.56E-02	5.00E+00	0.0	0.0
Cadmium	1.16E-02	1.86E-03	5.00E-04	**23.2**	**3.7**
Cobalt	1.96E-02	3.15E-03	6.00E-03	**3.3**	0.5
Copper	9.70E-02	2.29E-02	1.24E+00	0.1	0.0
Iron	1.66E+01	2.02E+00	1.50E+00	**11.1**	**1.3**
Lead	1.17E-01	1.35E-02	5.85E+00	0.0	0.0
Manganese	2.35E+00	3.15E-01	1.30E+00	**1.8**	0.2
Silver	1.70E-03	1.37E-03	5.00E+00	0	0
Vanadium	2.25E-02	4.10E-03	1.60E-03	**14.1**	**2.6**
Zinc	4.92E-01	6.50E-02	1.20E-01	**4.1**	0.5

1 Max Hazard quotient calculated as HQ = max exposure rate / toxicity reference value

2 Mean Hazard quotient calculated as HQ = mean exposure rate / toxicity reference value

BOLD : indicates receptor HQ > 1.

TABLE H.49

Surface Water Exposure Concentrations - Northern Leopard Frog
SEAD 4
Seneca Army Depot, NY

Constituent	Surface Water Max Detect Conc. (mg/L)	Surface Water Mean Conc. (mg/L)	Northern leopard frog Max Exposure (mg/L)[1]	Northern leopard frog Mean Exposure (mg/L)[1]
PAHs				
Benzo(a)anthracene	1.80E-04	1.82E-03	1.80E-04	1.82E-03
Benzo(a)pyrene	1.50E-04	1.82E-03	1.50E-04	1.82E-03
Benzo(b)fluoranthene	1.50E-04	1.82E-03	1.50E-04	1.82E-03
Benzo(ghi)perylene	7.00E-05	1.81E-03	7.00E-05	1.81E-03
Benzo(k)fluoranthene	1.60E-04	1.82E-03	1.60E-04	1.82E-03
Chrysene	1.80E-04	1.82E-03	1.80E-04	1.82E-03
Indeno(1,2,3-cd)pyrene	7.00E-05	1.81E-03	7.00E-05	1.81E-03
Semivolatiles				
Carbazole	5.00E-05	1.81E-03	5.00E-05	1.81E-03
Pesticides				
Alpha-Chlordane	7.70E-06	3.28E-06	7.70E-06	3.28E-06
Gamma-Chlordane	6.40E-06	3.10E-06	6.40E-06	3.10E-06
Nitroaromatics				
1,3-Dinitrobenzene	7.00E-05	1.10E-04	7.00E-05	1.10E-04
Metals				
Aluminum	7.35E+00	8.74E-01	7.35E+00	8.74E-01
Barium	2.13E-01	6.56E-02	2.13E-01	6.56E-02
Cadmium	1.16E-02	1.86E-03	1.16E-02	1.86E-03
Cobalt	1.96E-02	3.15E-03	1.96E-02	3.15E-03
Copper	9.70E-02	2.29E-02	9.70E-02	2.29E-02
Iron	1.66E+01	2.02E+00	1.66E+01	2.02E+00
Lead	1.17E-01	1.35E-02	1.17E-01	1.35E-02
Manganese	2.35E+00	3.15E-01	2.35E+00	3.15E-01
Silver	1.70E-03	1.37E-03	1.70E-03	1.37E-03
Vanadium	2.25E-02	4.10E-03	2.25E-02	4.10E-03
Zinc	4.92E-01	6.50E-02	4.92E-01	6.50E-02

1 Exposure concentrations for amphibian equals the surface water concentration.

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TABLE H.50
Calculated Surface Water Hazard Quotients - Northern Leopard Frog
SEAD 4
Seneca Army Depot, NY

Constituent	Northern leopard frog Max Exposure (mg/L)	Northern leopard frog Mean Exposure (mg/L)	Effect Concentration (mg/L)	Max Hazard Quotient[1]	Mean Hazard Quotient[2]
PAHs					
Benzo(a)anthracene	1.80E-04	1.82E-03	1.50E+00	0.0	0.0
Benzo(a)pyrene	1.50E-04	1.82E-03	1.50E+00	0.0	0.0
Benzo(b)fluoranthene	1.50E-04	1.82E-03	1.50E+00	0.0	0.0
Benzo(ghi)perylene	7.00E-05	1.81E-03	1.50E+00	0.0	0.0
Benzo(k)fluoranthene	1.60E-04	1.82E-03	1.50E+00	0.0	0.0
Chrysene	1.80E-04	1.82E-03	1.50E+00	0.0	0.0
Indeno(1,2,3-cd)pyrene	7.00E-05	1.81E-03	1.50E+00	0.0	0.0
Semivolatiles					
Carbazole	5.00E-05	1.81E-03	No data	--	--
Pesticides					
Alpha-Chlordane	7.70E-06	3.28E-06	5.00E-01	0.0	0.0
Gamma-Chlordane	6.40E-06	3.10E-06	5.00E-01	0.0	0.0
Nitroaromatics					
1,3-Dinitrobenzene	7.00E-05	1.10E-04	No data	--	--
Metals					
Aluminum	7.35E+00	8.74E-01	5.00E-02	**147**	**17**
Barium	2.13E-01	6.56E-02	No data	--	--
Cadmium	1.16E-02	1.86E-03	4.00E-02	0.3	0.0
Cobalt	1.96E-02	3.15E-03	No data	--	--
Copper	9.70E-02	2.29E-02	5.00E-02	**1.9**	0.5
Iron	1.66E+01	2.02E+00	No data	--	--
Lead	1.17E-01	1.35E-02	1.40E+00	0.1	0.0
Manganese	2.35E+00	3.15E-01	No data	--	--
Silver	1.70E-03	1.37E-03	1.00E-02	0.2	0.1
Vanadium	2.25E-02	4.10E-03	No data	--	--
Zinc	4.92E-01	6.50E-02	2.38E+00	0.2	0.0

1 Max Hazard quotient calculated as HQ = max exposure rate / effect concentration

2 Mean Hazard quotient calculated as HQ = mean exposure rate / effect concentration

BOLD : indicates receptor HQ > 1.

"--" Can not be calculated due to lack of toxicity data.

Appendix I
Toxicity Profiles for Compounds with Significant Contributions to Ecological and Human Health Risk at SEAD-4

1. PAHs
2. PCBs
3. Antimony
4. Barium
5. Cadmium
6. Chromium
7. Copper
8. Iron
9. Lead
10. Mercury
11. Thallium
12. Zinc

POLYCYCLIC AROMATIC HYDROCARBONS

GENERAL

Polycyclic aromatic hydrocarbons (PAHs) are a large group of chemicals formed during the incomplete combustion of organic materials. There are over one hundred PAHs, and they are found throughout the environment in air, water, and soil. Seven of the 15 PAHs addressed in this profile are classified as probable human carcinogens [1,2].

CAS NUMBERS

Acenaphthene	83-32-9	Chrysene	218-01-9
Acenaphthylene	208-96-8	Dibenzo(a,h)anthracene	53-70-3
Anthracene	120-12-7	Fluoranthene	206-44-0
Benzo(a)anthracene	56-55-3	Fluorene	86-73-7
Benzo(a)pyrene	50-32-8	Indeno(1,2,3-cd)pyrene	193-39-5
Benzo(b)fluoranthene	205-99-2	Phenanthrene	85-01-8
Benzo(g,h,i)perylene	191-24-2	Pyrene	129-00-00
Benzo(k)fluoranthene	207-08-9		

COMMON SYNONYMS

Polynuclear aromatic hydrocarbons, PNAs, PAHs.

ANALYTICAL CLASSIFICATION

Semivolatile organic.

PHYSICAL AND CHEMICAL DATA

Water Solubility: insoluble to 3.93 mg/L [1]
Vapor Pressure: negligible to very low at 25°C [1]
Henry's Law Constant: 6.95×10^{-8} to 1.45×10^{-3} atm-m^3/mole [1]
Specific Gravity: approximately 0.9 to 1.4 at 0 to 27°C [1]
Organic Carbon Partition Coefficient (K_{oc}): 2.5×10^3 to 5.5×10^6 [1]

FATE DATA: HALF-LIVES

Soil: 12.3 days to 5.86 years [3]
Air: 0.191 hours to 2.8 days [3]
Surface Water: 0.37 hours to 1.78 years [3]
Groundwater: 24.6 days to 10.4 years [3]

NATURAL SOURCES

Volcanoes, forest fires, crude oil, and oil shale [1].

ARTIFICIAL SOURCES

Motor vehicles and other petroleum fuel engines, wood-burning stoves and fireplaces, furnaces, cigarette smoke, industrial smoke or soot, and charcoal-broiled foods [1].

FATE AND TRANSPORT

Because the physical and chemical properties of PAHs vary substantially depending on the specific compounds in question, the fate and transport characteristics vary. Thus, the following discussion is presented in very general terms. Some fate characteristics are roughly correlated with molecular weight; so the compounds are grouped as follows [1]:

- Low molecular weight: acenaphthene, acenaphthylene, anthracene, fluorene, and phenanthrene;
- Medium molecular weight: fluoranthene and pyrene; and
- High molecular weight: benzo(a)anthracene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(g,h,i)perylene, benzo(a)pyrene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene.

PAHs are present in the atmosphere in the gaseous phase and sorbed to particulates. They may be transported great distances, and are subject to photodegradation as well as wet or dry deposition [1].

PAHs in surface water are removed by volatilization, binding to particulates and sediments, bioaccumulation, and sorption onto aquatic biota. The low molecular weight PAHs have Henry's Law constants in the range of 10^{-3} to 10^{-5} atm-m^3/mole, and would therefore be expected to undergo significant volatilization; medium molecular weight PAHs have constants in the 10^{-6} range; and high molecular weight PAHs have constants in the range of 10^{-5} to 10^{-8}. Half-lives for volatilization of benzo(a)anthracene and benzo(a)pyrene from water have been estimated to be greater than 100 hours. It has been reported that lower molecular weight PAHs could be substantially removed by volatilization under conditions of high temperature, shallow depth, and high wind. For example, anthracene was found to have a half-life for volatilization of 18 hours in a stream with moderate current and wind. In an estuary, volatilization and adsorption are the primary removal mechanisms for medium and high molecular weight PAHs, whereas volatilization and biodegradation are the major mechanisms for low molecular weight compounds. PAHs can bioaccumulate in plants and animals, but are subject to extensive metabolism by high-trophic-level consumers, indicating that biomagnification is not significant [1].

Potential mobility in soil is related to the organic carbon partition coefficient (K_{oc}). The low molecular weight PAHs have K_{oc} values in the range of 10^3 to 10^4, which indicates a moderate potential to be adsorbed to organic material. Medium molecular weight compounds have values on the order of 10^4, while high molecular weight compounds have values in the 10^5 to 10^6 range. The latter compounds, then, have a much greater tendency to adsorb and resist movement through soil. Volatilization of the lower molecular weight compounds from soil may be substantial. However, some portion of PAHs in soil may be transported to groundwater, and then move laterally in the aquifer, depending on soil/water conditions [1].

HUMAN TOXICITY

General. Ingestion of, inhalation of, or dermal contact with PAHs by laboratory animals has been shown to produce tumors. Reports in humans show that individuals exposed by inhalation or dermal contact for long periods of time to mixtures of PAHs and other compounds can also develop cancer. However, the relationship of exposure to any individual PAH with the onset of cancer in humans is not clear [1]. The available RfDs and weight-of-evidence groups for the PAHs addressed in this profile are presented in Table 1. The available slope factors are presented below. No other toxicity values were available [2,4].

Oral Exposure. Indirect evidence suggests that benzo(a)pyrene may not be readily absorbed following oral exposure in humans. On the other hand, absorption in rats appears to be rapid and efficient. Whether or not there is actually a significant difference between humans and rats in the capacity to absorb benzo(a)pyrene is questionable. It should be noted that the degree of uptake is highly dependent on the vehicle of administration. A NOAEL of 150 mg/kg/day was determined for gastrointestinal, hepatic, and renal effects in rats following acute oral exposure to benzo(a)pyrene or benzo(a)anthracene. LOAELs in the range of 40 to 160 mg/kg/day were determined for developmental and reproductive effects in mice following acute oral exposure to benzo(a)pyrene [1]. An oral slope factor of 7.3 $(mg/kg/day)^{-1}$ for benzo(a)pyrene is based on tumors detected in the forestomachs of rats and mice in various diet studies [2].

Inhalation Exposure. The USEPA does not currently provide inhalation RfCs for any of the PAHs [2,4]. Pure PAH aerosols appear to be well absorbed from the lungs of animals. However, PAHs adsorbed to various particles appear to be poorly absorbed, if at all. The latter are most likely to be removed from the lungs by mucociliary clearance and subsequent ingestion. Lung cancer in humans has been strongly associated with long-term inhalation of coke-oven emissions, roofing-tar emissions, and cigarette smoke, all of which contain mixtures of carcinogenic PAHs. It has been estimated that

TABLE 1
SELECTED TOXICITY DATA FOR PAHS[a]

Compound	CAG Group[b]	Oral RfD (mg/kg/d)	Species	Critical Effect	Experimental Doses (mg/kg/day)	Study Type[c]
Acenaphthene	NR	0.06	Mouse	Hepatotoxicity	NOAEL: 175 LOAEL: 350	SC
Acenaphthylene	D	UR				
Anthracene	D	0.3	Mouse	None observed	NOEL: 1,000	SC
Benzo(a)anthracene	B2	NR				
Benzo(a)pyrene	B2	NR				
Benzo(b)fluoranthene	B2	NR				
Benzo(g,h,i)perylene	D	NR				
Benzo(k)fluoranthene	B2	NR				
Chrysene	B2	NR				
Dibenzo(a,h)anthracene	B2	NR				
Fluoranthene	D	0.04	Mouse	Nephropathy, increased liver wt, hematol alter	NOAEL: 125 LOAEL: 250	SC
Fluorene	D	0.04	Mouse	Decreased RBC, packed cell vol, and hemoglobin	NOAEL: 125 LOAEL: 250	SC
Indeno(1,2,3-cd)pyrene	B2	NR				
Phenanthrene	D	NR				
Pyrene	D	0.03	Mouse	Renal tubular pathology, decreased kidney weights	NOAEL: 75 LOAEL: 125	SC

a. From IRIS [2]. When IRIS values were unavailable, HEAST [4] values were used. RfD = reference dose, NR = not reported

b. CAG = USEPA Carcinogen Assessment Group. B2 = probable human carcinogen; D = not classifiable as to human carcinogenicity.

c. SC = subchronic.

the 8-hour time-weighted average exposure to PAHs in older coke plants was approximately 22 to 33 $\mu g/m^3$ [1]. An inhalation slope factor is not available for any of the PAHs [2,4].

Dermal Exposure. Limited *in vivo* evidence exists that PAHs are at least partially absorbed by human skin. An *in vitro* study with human skin indicated that 3% of an applied dose of benzo(a)pyrene was absorbed after 24 hours. Studies in mice indicated that at least 40% of an applied dose of benzo(a)pyrene was absorbed after 24 hours. The carcinogenic PAHs as a group cause various noncancerous skin disorders in humans and animals. Substances containing mixtures of PAHs have been linked to skin cancers in humans. Studies in laboratory animals have demonstrated the ability of benz(a)anthracene, benzo(b)fluoranthene, benzo(a)pyrene, chrysene, dibenzo(a,h)anthracene, and indeno(1,2,3-cd)pyrene to induce skin tumors [1].

ECOLOGICAL TOXICITY

General. The molecular weight of the individual PAHs affects their mobility and solubility in the environment, with lower weight compounds generally being more volatile and soluble than higher weight compounds, which have strong sorption properties. In aquatic environments, PAH partitioning in sediments occurs in an equilibrium process, with a potential for localized occurrences of high levels of dissolved PAHs [5,6]. PAHs can bioaccumulate in plants and animals, but do not biomagnify in food chains. Inter- and intraspecies responses to carcinogenic PAHs are variable, and some PAHs tend to inhibit the carcinogenicity of other compounds in mammals [7]. A variety of adverse effects on aquatic and terrestrial animals has been observed.

Vegetation. Plants absorb PAHs from soils through their root systems, and can translocate them to above ground parts. Lower weight PAHs are absorbed more readily than other PAHs [7]. Airborne deposition of particulate PAHs, and the subsequent adsorption to the skins of fruits and vegetables, accounts for reported higher PAH concentrations in aboveground versus underground plant parts. Soil concentrations of benzo(a)pyrene typically may reach 1,000 mg/kg; concentrations for total PAHs typically exceed benzo(a)pyrene concentrations by at least one order of magnitude. PAH concentrations in vegetation typically range from 20 to 1,000 $\mu g/kg$ [6]. Some plants biocentrate PAHs in their oily parts (e.g., seeds) above levels in surrounding soils, but this does not appear to be typical [6]. In limited studies on PAHs in plants, phytotoxic effects were rare; photosynthetic inhibition in algae has been documented [7,6]. Some vascular plants catabolize benzo(a)pyrene [6], and PAHs synthesized by plants may act as growth hormones [7,8]. Plants may serve as a pathway for exposure of higher-order consumers to toxic levels of PAHs.

Aquatic Life. Most PAHs in aquatic environments tend to sorb to sediments, and sediment-associated PAHs have accounted for up to 77 percent of the steady-state body burden in benthic amphipods [7]. Absorption and assimilation of PAHs vary widely among species and according to the specific compound. Crustaceans and fish appear better able to assimilate, metabolize, and eliminate PAHs than do molluscs and polychaetes [7,8]. Fish appeared to detoxify benzo(a)pyrene as quickly as it was absorbed in water-only exposures [9]. Little potential for biomagnification through aquatic food chains exists, and bioconcentration factors range widely. A 2- to 3-day exposure BCF of 485 was reported for anthracene in fathead minnows, and a 24-hour BCF of 12 was reported for benzo(a)pyrene in bluegill [7].

Toxic effects of PAHs in fish include liver, thyroid, gonad, and skin tumors. Phenanthene has an LC_{50} of 370 μg/L in grass shrimp, and benz(a)anthracene has an LC_{87} of 1,000 μg/L in bluegill [7]. In the Black River, Ohio, where sediment PAH levels were 10,000 times those in a control location, brown bullheads showed elevated concentrations of lower molecular weight PAHs in their livers and a higher incidence of liver tumors [5,7,8]. Dissolved fluorene introduced into pond waters resulted in reduced growth in bluegill at 0.12 mg/L, and in increased vulnerability to predation at 1.0 mg/L [7].

There are no promulgated federal or state aquatic life water quality criteria for any of the PAHs, though the USEPA has proposed a chronic criterion of 6.3 μg/L and an acute criterion of 30 μg/L for phenanthrene in fresh waters [10,11].

Wildlife. PAH toxicity studies in animals are mostly confined to laboratory experiments. Many PAHs can produce tumors in skin and epithelia tissues in all animal species tested, with malignancies induced by microgram acute exposures. Some carcinogenic PAHs can pass across skin, lungs, intestines, and placenta in mammals. Target organs are diverse, and the tissue affected is dependent on the compound and method of exposure. For example, dietary benzo(a)pyrene caused leukemia, lung adenoma, and stomach tumors in mice. Ancillary tissue damage may accompany carcinomas [7]. Selective effects based on age and gender of the receptor have also been observed [8,12,9,13]. Mammals do not tend to accumulate PAHs, which is likely due to the rapid metabolism of these compounds. For example, the biological half-life of benzo(a)pyrene in rat blood and liver was 5 to 10 minutes [7].

There is a scarcity of data on PAHs that are not carcinogenic [14]. Many chemicals, including other PAHs, modify the carcinogenic actions of PAHs in laboratory animals. Inhibitors of PAH-induced tumors include selenium, vitamins A and E, flavones, and ascorbic acid [7]. LD_{50} values also range widely: acute oral LD_{50} values for rodents range from 50 mg/kg body weight for benzo(a)pyrene to 700 mg/kg for phenanthrene, to 2,000 mg/kg for fluoranthene. Chronic oral carcinogenicity values for rodents include 40 mg/kg for benzo(b)fluoranthene, 72 mg/kg for benzo(k)fluoranthene, and 99 mg/kg for chrysene [7].

In a study on mallards, no mortality or visible toxic effects were observed over 7 months during which birds were fed diets containing 4,000 mg/kg PAHs, though heptatic changes were observed. Sax [9] reports that single oral doses of 250 ppm benzo(a)pyrene were not acutely toxic to ducks or chickens.

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POLYCHLORINATED BIPHENYLS
(PCBs)

CAS NUMBERS

Aroclor 1242	53469-21-9
Aroclor 1248	12672-29-6
Aroclor 1254	11097-69-1
Aroclor 1260	11096-82-5
Aroclor 1016	12674-11-2
PCBs	1336-36-3

COMMON SYNONYMS

PCBs, Aroclors, Chlophen, Delor, Fenclor, Kanechlor, Phenoclor, Soval

ANALYTICAL CLASSIFICATION

Semivolatile organic, Organochlorine.

PHYSICAL AND CHEMICAL DATA

Water Solubility: 6.00×10^{-3} to 2.40×10^{-1} mg/L at 24 to 25°C [2]

Vapor Pressure: 7.71×10^{-5} to 4.06×10^{-4} mm Hg at 25°C [2]

Henry's Law Constant: 5.60×10^{-4} to 2.70×10^{-3} atm-m^3/mole [2]

Specific Gravity: 1.38 to 1.62 at 25°C [1]

Organic Carbon Partition Coefficient: 5.13×10^{3} to 2.63×10^{6} [2]

FATE DATA: HALF-LIVES

Soil: 6 to > 365 days [3]

Air: 2 days to 4.7 years [3]

Surface Water: 9.5 hours to > 365 days [3]

Groundwater: persistent

NATURAL SOURCES

None noted.

ARTIFICIAL SOURCES

Electrical transformers; dielectric fluids; solvents.

GENERAL

Polychlorinated biphenyls (PCBs) represent a class of chlorinated aromatic compounds which, until they were banned in 1979, had widespread industrial application because of their stability, inert properties, excellent dielectric properties, and excellent solvent characteristics [1]. PCBs have been widely used as coolants and lubricants because of their insulating and nonflammable properties. This family of compounds contains 209 individual isomers. Monsanto Corporation marketed mixtures of PCBs under the trade name Aroclor. The Aroclors are identified by a four-digit numbering code in which the first two digits indicate biphenyl (12 carbon atoms), and the last two digits indicate the average chlorine content by weight percent. For example, Aroclor 1260 has an average chlorine content of 60%. An exception to this system is Aroclor 1016, with an average chlorine content of 41% [1]. Given their extensive past usage history, PCBs may be expected to be found throughout the environment. PCBs are among the most persistent man-made compounds in the environment, resisting degradation for years. This profile addresses the most prevalent, toxic, and lipophilic of the PCB congeners.

FATE AND TRANSPORT

As a class of compounds, PCBs exhibit a tendency to sorb strongly to soils and suspended solids/sediments in waters. PCB releases to the environment, then, will be expected to show very limited mobility and present only a slight danger of leaching to unprotected groundwater. There is a wide distribution of a variety of microorganisms capable of degrading PCBs, mainly through dechlorination actions. The degradation rate/action of these microorganisms is lowered, however, as the number of chlorine ion substitutions on the biphenyl parent compound increases. In addition, biodegradation rates are slowed by the tight sorptive ability of PCBs, low ambient temperatures, low moisture content, extremes in pH, and available oxygen content (with no biodegradation evidenced under anaerobic conditions). The number of chlorine ion substitutions also affects volatilization and photoionization rates; as chlorine ion substitutions increase, so do these rates.

PCBs volatilize to the atmosphere undergo two major modes of degradation: reaction with hydroxyl radicals and/or reaction with ozone. Reaction with hydroxyl radicals (resulting in substitution of OH^- for Cl^- on the biphenyl parent compounds) is the more important of these two processes. Hydrolysis and/or oxidative reactions are not considered to be important fate processes for PCBs. Bioconcentration of PCBs in aquatic organisms is expected to be an important process for all PCBs, and shows an increase as the chlorine content increases [3].

PCBs subjected to intense heat may be converted to polychlorinated dibenzofurans and dioxins (PCDFs and PCDDs). PCDDs are also formed during the combustion of organic matter and therefore are also produced in small amounts as naturally-occurring compounds. These by-products are thought to have greater acute and chronic toxic effects than PCBs. The mixture of PCBs, PCDFs, and PCDDs in commercially produced products greatly affects the potential toxicity. The position and number of chlorine atoms and the planarity (co-planar versus planar) of these compounds are the primary factor affecting the relative toxicity of the PCB congeners [4].

The physiochemical properties of PCB compounds allow them to resist environmental degradation processes. The degree of chlorination and the position of chlorine substituents of a PCB compound influences the ability of environmental processes to break down the compound. In general, the more chlorinated PCB compounds resist environmental break down reactions and thus remain in the environment for longer periods of time. Due to their physicochemical characteristics, PCBs bind tightly to soil and sediment particles and organic matter. Depending on the particular isomer of PCB, K_{oc} values range from 510 to 13,300,000. As a general rule, most K_{oc} values for PCB mixtures are greater than 5,000 [5].

The environmental persistence of PCBs combined with their lipophilic nature allow them to bioconcentrate, bioaccumulate, and biomagnify significantly in the environment. The physicochemical properties of the PCBs influence the extent of uptake and the metabolic fate of PCBs in the body. The ability of animals to metabolize PCBs tends to increase in the following order: fish< birds< mammals [5]. PCBs are absorbed from the stomach, skin, and lungs. PCBs initially concentrate in the liver, blood, and muscle; however, they soon are sequestered into fat tissue, where they have a long half-life. PCBs that are poorly metabolized tend to become concentrated in the fatty tissue [6].

PCBs have been found in every environmental medium and have been detected in virtually every location across the globe. High body burdens of PCBs and their metabolites are found in wildlife and humans from arctic, tropical, and temperate climate zones. Dispersive and degredative forces have, in general, reduced the concentrations of tissue residues in plants and animals. However, releases of PCBs continue to occur and several locations on the planet contain areas of PCB "hot spots". Therefore, a significant decrease in worldwide levels of PCBs is unlikely in the near future [4].

HUMAN TOXICITY

PCBs are known to cause skin irritations, such as acne and rashes, in humans. Young children of women who ate foods containing high levels of PCBs, such as fish, before and during their pregnancies may experience learning difficulties. Consumption of contaminated food and water and inhalation of contaminated air are presumed to be the major route of exposure for the general population [1,7]. The USEPA has placed PCBs in weight-of-evidence Group B2, indicating that they are probable human carcinogens [8].

Oral Exposure

A chronic RfD of 0.00007 mg/kg/day for Aroclor-1016 is based on a NOAEL of 0.007 mg/kg/day for reduced birth rates in chronically exposed monkeys [8]. A chronic RfD of 0.00002 mg/kg/day for Aroclor-1254 is based on a LOAEL of 0.005 mg/kg/day for clinical effects (ocular exudate, inflammed and prominent Meibomian glands, distorted growth of finger and toe nails) and immunological effects (decreased antibody response to sheep erythrocytes) in a chronic study in monkeys [8]. PCBs are readily absorbed by humans via the oral route. Absorption in rats reportedly ranges from 75% to 90% of the administered dose. Single-dose LD50 values determined for rats ranged from 1,010 mg/kg for Aroclor 1254 to 4,250 mg/kg for Aroclor 1242 [1].

Numerous studies have been done on human children born to mothers who consumed large quantities of PCB-contaminated fish while pregnant. In one such study, the mean concentrations in the fish consumed ranged from 168 ppb to 3,012 ppb [9]. Overall consumption of fish and levels of total PCBs in cord serum were positively correlated with lower birth weight, smaller head circumference, and shorter gestational age [10,11]. By 7 months of age the infants with the highest levels of PCBs in cord serum scored significantly lower on neurobehavioral tests. By 4 years of age the children with the highest levels of PCBs in cord serum exhibited poorer performance on tests involving short-term memory [12,13,14].

Occupational studies have indicated possible PCB-related cancers of the liver, gastrointestinal tract, hematopoietic system, and skin [1]. EPA provides slope factors for PCBs depending upon the route and nature of exposure as follows [8]:

High Risk and Persistence:

Upper-bound slope factor:	2.0 $(mg/kg\text{-}day)^{-1}$
Central-estimate slope factor:	1.0 $(mg/kg\text{-}day)^{-1}$

Low Risk and Persistence:

Upper-bound slope factor:	0.4 $(mg/kg\text{-}day)^{-1}$
Central-estimate slope factor:	0.3 $(mg/kg\text{-}day)^{-1}$

Lowest Risk and Persistence:

Upper-bound slope factor:	0.07 $(mg/kg\text{-}day)^{-1}$
Central-estimate slope factor:	0.04 $(mg/kg\text{-}day)^{-1}$

Inhalation Exposure

The USEPA does not currently provide an inhalation RfC for PCBs [8,15]. Qualitative evidence exists that PCBs are absorbed via inhalation in humans and rats. NOAELs in rats, rabbits, guinea pigs, and mice exposed for up to 121 days ranged from 5.4 to 8.6 mg/m^3. A LOAEL of 1.5 mg/m^3 for liver and kidney degeneration was determined for rats exposed for 213 days. Upper respiratory tract and eye irritation, cough, and tightness of the chest were symptoms noted in humans exposed to 0.007 to 11 mg/m^3. Low birth weight and shortened gestational age has been correlated with occupational exposure of pregnant women to PCBs; however, confounding factors make these studies suspect [16,17,18].

An inhalation slope factor is provided, based on the oral evaluation (see above). For inhalation of evaporated congeners, an upper-bound slope factor of 0.4 $(mg/kg\text{-}day)^{-1}$ is provided by EPA [8]. For inhalation of an aerosol or dust contaminated with PCBs, the oral slope factor for "high risk and persistence" (see above) should be used.

Dermal Exposure

Hard data on dermal absorption of PCBs by humans and animals are lacking. Absorption efficiency in rhesus monkeys and guinea pigs ranged from about 15% to 34% [1]. Median lethal doses for single dermal applications of PCBs to rabbits were as follows (mg/kg): <1,269 for Aroclors 1242 and 1248, <3,169 for Aroclors 1221 and 1262, and <2,000 for Aroclors 1232 and 1260 [19, 20]. Liver and kidney damage were noted in rabbits treated dermally 5 days/week for up to 38 days with up to 44 mg/kg/day Aroclor 1260 [21, 22].

ECOLOGICAL TOXICITY

Environmental persistence of PCBs is determined by the degree of chlorination and the spatial arrangement of the chlorine atoms (planarity). Higher chlorobiphenyls, i.e., those with five or more chlorine atoms, are more persistent in the environment than those with three or fewer chlorine atoms. Aroclor 1254 has five chlorine atoms per molecule, and Aroclor 1260 has six or more, making them among the most stable compounds in this chemical class [23].

Since 1979, the manufacture, processing, distribution, and use of PCB's has been banned in the United States [23]. However, because these chemicals are so stable, the major source of Aroclor 1254 and Aroclor 1260 release to the environment is an environmental cycling process of these compounds previously introduced into the environment. The cycle involves volatilization from water and soil into the atmosphere with subsequent removal from the atmosphere via wet or dry deposition, followed by revolatilization [5]. Although biodegradation of Aroclor 1254 and Aroclor 1260 may occur very slowly in the environment, no other degradation mechanisms have been shown to be important in natural systems. Therefore, biodegradation may be the ultimate fate process [5].

Biological effects of PCBs include enzyme induction, endocrine disruption, and porphyria. PCBs are both mixed function oxidase (MFO) stimulators and endocrine disrupters. The MFO enzymes present primarily in the liver are induced by various PCB concentrations in almost all MFO containing organisms [24]. This enzyme functions primarily in a detoxifying manner; however, the potential for toxic metabolites is of concern. Levels of MFO and other enzymes in organisms also serves as bio-indicators (biomarkers) of exposure to PCBs and other enzyme inducing contaminants [25].

As an endocrine disrupter, PCBs alter the hormonal cycle and functions in many organisms. The fecundity, reproduction, development, and growth of organisms may be adversely affected by disruption of the hormones [26]. Another biomarker of exposure to PCBs and other contaminants is porphyrins and porpyrin related enzyme analyses. The porphyrin/heme pathway in organisms is essential in the production of cytochromes and hemoproteins. Disruption of this pathway may cause adverse effects in a wide range of biological functions such as photosynthesis in plants to blood cell activity in animals [25].

In general, bioaccumulation of PCBs is rapid, depuration is slow, and diet appears to be an important route of PCB accumulation. PCB body burdens in marine organisms, especially benthic organisms, appear directly related to log PCB concentrations in sediments [27]. In terrestrial or semi-aquatic vertebrates, PCBs tend to bioaccumulate to their highest concentrations in the livers of fish-eating birds followed by species that feed on small birds and mammals, worms and insects [23]. In marine food chains, concentrations of PCBs rapidly biomagnify in higher trophic level carnivores. In these food chains, piscivores, such as gulls and pelicans, often have the highest level of PCBs in their body tissues.

PCBs are toxic to several classes of wildlife including invertebrates, fish, birds, and mammals. PCBs are highly lipophilic in biological organisms and tend to bioaccumulate and biomagnify in the food chain [23]. Their persistence in the environment and their ability to bioconcentrate and biomagnify through the food chain make PCBs a potentially significant hazard to fish, wildlife, and invertebrate resources [23].

Vegetation

In general, PCBs are not considered to be potent phytotoxins. In one study, phytoplankton exhibit depressed photosynthesis and cell motility when exposed to concentrations of PCBs [28]. Algae have been demonstrated to bioconcentrate PCBs in water at a range of 10,000 to 100,000 times. It was also demonstrated that as the degree of chlorination of PCB congeners increased, the uptake (bioconcentration) also increased in the algae [29]. In other studies, algae exposed to PCB concentrations had an increased mortality rate, decreased reproduction, and impaired growth [30].

PCBs have been shown to bioconcentrate in both terrestrial and aquatic plants. Studies summarized in Eisler [23] showed dry-weight concentrations in foliage, grasses, aspen leaves, and goldenrod leaves of up to 0.29 ppm, 0.14 ppm, 0.12 ppm, and 0.32 ppm dry weight, respectively [31]. Some of these values exceed the FDA limit of 0.2 ppm for PCBs in feeds for livestock [23]. Crop leaves (soybeans, string beans, and corn) grown on a contaminated site had PCB levels of 30 ppb to 50 ppb [7] Although in-tissue concentrations of PCBs may not be toxic to the plants, they could be important as sources of PCBs in higher trophic levels.

Terrestrial Invertebrates

Very little information was available on the toxicological effects of PCBs on terrestrial invertebrates. PCBs are known to bioconcentrate in invertebrates, and are usually detected at very low concentrations in terrestrial invertebrates such as earthworms and insects. However, as potential food sources for higher trophic level organisms, these primary consumers are often the first step in the biomagnification process. At each successive trophic level, the concentration of PCBs in each organism increases and significant impacts are often seen with top predators in the food chain [1]. As summarized in the ATSDR profile [1], the biomagnification of PCBs was demonstrated within a terrestrial food chain [32]. PCB concentrations (wet weight) ranged from 14.8-18.6 ug/kg in earthworms, 0-208.8 g/kg in mammals, 39.2-68.3 ug/kg in starlings, 71.5-157.2 ug/kg in robins, and 56-219.9 ug/kg in kestrels. PCBs were also detected in robin, kestrel, and herring gull eggs at a range of 66-5,298 ug/kg [32].

Amphibians And Reptiles

PCBs and their metabolites are known to effect the reproduction, sex determination, and development of amphibians via various enzyme changes and the disruption of the endocrine system [26]. Amphibians are often classified as environmental sentinels because of their complex, sensitive life-cycles, occurrence in terrestrial and aquatic habitats, and membrane-permeable eggs, gills, and skin. A comprehensive review of PCB levels in freshwater systems of the southeastern US suggests that chronic adverse effects from PCB exposure occurs at very low concentrations [26]. This study compared the 95th percentile of data from the USEPA STORNET water quality system to chronic concern levels of PCB exposure to amphibians. Findings indicated that levels of PCBs in the environment from the areas where samples were collected (95th percentile was approximately 0.5 ug/L for each congener), are greater than the 0.04 - 0.143 ug/L chronic concern level [26].

PCBs and their metabolites also known to affect the reproduction and sex determination of several reptile species such as the alligator. Toxicity (acute and chronic) in reptiles appears to occur at higher exposure concentrations than for amphibians. For example, snapping turtle populations in New York were abundant in heavily contaminated areas although PCB levels were detected at concentrations of up to 8,000 ppm in fat, 680 ppm in the liver, 27 ppm in muscle, and 43 ppm in eggs [33]. These concentrations are well above established toxicity thresholds in other wildlife species, including amphibians.

Fish and Aquatic Organisms

Adverse effects associated with exposure to PCBs in aquatic organisms include decreased growth, reproductive toxicity, mutagenicity, histopathology, and a variety of biochemical perturbations [23,30]. Reproductive toxicity has been reported for several aquatic species, and the effects include reduced survival of developing eggs, increased mortality in eggs and fry, and reduced fertilization success [23].

The federal water quality criteria for PCBs for the protection aquatic life is 0.014 ug/L (freshwater chronic criteria) and 0.03 ug/L (saltwater chronic criteria) [34]. In addition, tissue level criteria has also been established for PCBs in some states.

Water quality criteria are derived in part from the toxicity of contaminants to aquatic invertebrates and fish. Studies show the PCB 96-hour LC50 values (acute toxicities) for freshwater invertebrates are usually between 50 μg/L and 800 μg/L. Most 96-hour LC50 values for warm water fish are between 100 μg/L and 600 μg/L [2,5,26]. For aquatic invertebrates, a large concentration range for PCB toxicity has been demonstrated. For example, 96 hour LC50 values determined for the amphipod range from 0.052 to 10 mg/L. For oysters and clams, toxicity ranges from approximately 0.01 (96 hr EC50) to 10 mg/L (5 day LOAEL). Generally, an application factor of 0.01 is used to convert acute toxicities to criteria that provide for the chronic protection of aquatic life [35]. However, because of the extent to which PCBs bioaccumulate, more stringent criteria were considered to be appropriate [35].

A major concern to aquatic life is the bioconcentration of PCBs. Studies cited in virtually every summary article on PCBs showed concentration factors ranging from 10^3 to 10^5 in freshwater invertebrates and fish [2,5,26]. PCBs with the highest degree of chlorination (which would include Aroclor 1254 and Aroclor 1260) accumulate most readily [23]. This ability to bioaccumulate further enhances the toxicity of these compounds [23]. Diet contributes most of the total PCB body burdens of upper-level aquatic carnivores, with diet accounting for 90 percent of the total PCB body burden in brown trout and 51 to 83 percent in striped bass [36,37]. Elimination of accumulated PCBs is slow, with no elimination by codfish larvae after 12 days and 97.8 percent retention by chironomid (an invertebrate) larvae after 7 days [38,39].

Mammals

Because of their demonstrated human toxicity and ability to bioaccumulate, PCB toxicity has been studied the most extensively in mammals. In the body, PCBs are accumulated primarily in the adipose tissue, skin, and liver [26].

Studies summarized by Eisler [23] and Sample [40] show that mammalian effects vary among PCB compounds. For example, tissues from cattle that had been dosed with Aroclor 1254 and fed to mink at levels as low as 0.64 ppm fresh weight of diet caused severe reproductive effects. However, Aroclors 1016 and 1221 at dietary concentrations of 2 ppm produced no adverse reproductive effects in mink over a 9-month period, nor did Aroclor 1242 at 5 ppm during a similar period [41].

A 14 month diet study of Aroclor 1248 exposure in rhesus monkeys resulted in a reproductive LOAEL of 0.1 mg/kg/day (2.5 ppm in diet) [42]. A reproductive LOAEL for a 12 month exposure of Aroclor 1254 in oldfield mice was reported to be 0.68 mg/kg/day (5 ppm in diet) [43]. PCB exposures in mammals are associated with reproductive impairment and failure, physiological effects, altered behavior, mutagenic, carcinogenic, and teratogenic effects [30].

Aroclor 1254 has been tested in a number of species of wildlife and toxicity data for dietary intake. These studies have been summarized in Eisler (1986) [23], Sample (1996) [40], and HSDB (1999) [5] and are presented below.

Raccoon	>50 mg/kg LD50, 8 days
Cottontail rabbit	>10 mg/kg LD50, 12 weeks
Mink	4 mg/kg LD50, no time given
Mink	6.7 mg/kg LD50, 9 months
White-footed mouse	>100 mg/kg LD50, 3 weeks
Norway rat	>75 mg/kg LD50, 6 days
Mouse, PCB-resistant >	250 mg/kg LD50, 18 weeks
Oldfield mouse	5 ppm LOAEL, 12 months
Mink	1 ppm NOAEL, 4.5 months

Aroclor 1254 apparently is more toxic to rats than Aroclor 1260. Rats fed Aroclor 1254 at the rate of 1,000 mg/kg in the diet all died in 53 days; mortality started at day 28 [44]. These and other feeding studies suggest that a total intake of about 500 to 2,000 mg of Aroclor 1254 per kg body weight is the lethal level in rats for dietary exposures of 1 to 7 weeks [44].

In mammals, the most consistent pathological changes occur in the liver. In females, however, PCBs are transferred through lactation and the placenta from adult to offspring; hence, in utero effects and fetotoxicity have been observed.

Birds

Birds exposed to PCB concentrations have shown the following effects: disruptions in normal patterns of growth, reproduction, metabolism, and behavior [23]. PCBs can damage the liver, kidney, spleen, and thyroid in birds [30]. However, reproductive impairment is the most sensitive endpoint for birds exposed to PCBs. Reproductive effects caused by PCB exposure include embryo mortality, teratogenic effects, decreased hatching success, and reduced eggshell thickness [30].

Birds are generally more resistant to acutely toxic effects of PCBs than mammals [5]. Studies summarized in Eisler (1986) [23], Sample (1996) [40], and HSDB (1999) [5] showed that mallards, ring-necked pheasants, bobwhite quail, and Japanese quail had 5-day LD50 values for ingestion of Aroclor 1254 and Aroclor 1260 ranging from 600 ppm to more than 2,000 ppm in the diet. Acute LD50 values for European starlings, red-winged blackbirds, and brown-headed cowbirds were all 1,500 mg/kg in the diet [45].

Sublethal effects can occur at much lower concentrations. For example, 20 ppm in the diet of chickens caused a significant decrease both in the hatchability of eggs and in the viability of the surviving chicks [35]. In a review by Sample (1996) [40], a NOAEL of 0.41 mg/kg day (1300-1700 g/month/pair) for Aroclor 1242 was reported for breeding screech owls [46]. For the ring-necked pheasant, a reproductive LOAEL of 1.8 mg/kg/day (12.5 mg/bird/week via oral gelatin capsule) Aroclor 1254 was measured over a 17 week period [47].

Bioaccumulation also occurs in birds. Diet is an important route of PCB accumulation, with highest liver concentrations of PCBs in birds that fed on fish, followed by species that feed on small birds and mammals then on worms and insects. Concentrations were lowest in herbivorous bird species [23]. In general, PCB accumulation is rapid and elimination is slow. For example, in common grackles, the biological half-life of Aroclor 1254 was calculated to be 89 days [45].

Prager (1989), [48] indicates that PCBs cause eggshell thinning and reduced reproductive ability. Although Eisler (1986) [23] cited several PCB-related instances of eggshell thinning and associated reproductive failure in cormorants, peregrine falcons, bald eagles, and black-crowned night herons, he states, "At present, the evidence implicating PCBs as a major source of eggshell thinning is inconclusive."

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ANTIMONY

CAS NUMBER

7440-36-0

COMMON SYNONYMS

None.

ANALYTICAL CLASSIFICATION

Inorganic.

PHYSICAL AND CHEMICAL DATA

Water Solubility: Insoluble (elemental) [1]
Vapor Pressure: Insignificant at 25°C [1]
Henry's Law Constant: Not Applicable
Specific Gravity: Density: 6.68 at 20/4°C [1]
Organic Carbon Partition Coefficient: NA

BACKGROUND CONCENTRATION

Pure antimony is a silver-white, lustrous, hard brittle metal. Antimony was detected (in measurable quantities) in 66 of 354 soils samples from across the conterminous United States [2]. The concentration of antimony in minimally disturbed soils shows limited variations, with a range from <1 ppm up to a maximum of 8.8 ppm, and an overall geometric mean of 0.48. Of the samples collected, 81 percent showed antimony concentrations to be less than 1 ppm [2]. Antimony was not detected in measurable quantities within the State of Ohio.

FATE AND TRANSPORT

Elemental antimony is relatively short-lived in the natural environment undergoing oxidation reactions to form antimony oxides and trihalides. Although not demonstrated, antimony may undergo biological methylation (forming organometals) as do those compounds surrounding it in the periodic table. Antimony oxides and trihalides are expected to volatilize readily, with $SbCl_3$ releasing HCl gas to the atmosphere when in the presence of moisture [1]. Antimony oxides are also expected to undergo photoreduction in aqueous environments. Organic antimony compounds are relatively mobile in all environments, while inorganic antimony compounds tend to be only slightly soluble or decompose in water [1]. Antimony, is not expected to bioconcentrate appreciably in fish or aquatic organisms [1].

HUMAN TOXICITY

General. The major targets of antimony toxicity are the respiratory system, the heart, the gastrointestinal system and the skin [1]. Antimony exposure, however, has beneficial as well as adverse effects. Antimony is currently used to treat two parasitic diseases, schistosomiasis and leishmaniasis. Side effects following treatment include altered EKG, anemia, vomiting, diarrhea, joint and/or muscle pain and even death [1]. Information regarding the genotoxicity of antimony is equivocal. Metallic antimony has been classified as a Group B1 carcinogen by the USEPA [4].

Oral Exposure. A chronic oral RfD of 0.0004 mg Sb/kg/day is based on a LOAEL of 0.35 mg Sb/kg/day for longevity, decreased blood glucose levels and altered cholesterol levels in a chronic oral study in rats [3]. Antimony is poorly absorbed following oral exposure (<10%) [1]. Ingested antimony has not been reported to be fatal to humans, and acute oral LD_{50} values in animals are not available [1]. In humans, gastrointestinal effects have been reported following exposure to oral doses of 0.53 mg Sb/kg/day [1]. In animals, long-term oral exposure to > 0.07 mg Sb/kg/day resulted in effects similar to those reported in humans [1]. There is no evidence that ingested antimony results in developmental or reproductive effects or cancer in humans or animals [1]. An oral Slope Factor for cancer is not available for antimony [4].

Inhalation Exposure. An inhalation RfC for antimony is not available [3]. Antimony is absorbed following inhalation exposure, but the extent of absorption in humans is not known [1]. Inhaled antimony has not been reported to be fatal to humans, and acute inhalation LC_{50} values in animals are not available [1]. The effects of antimony in occupationally exposed workers include pneumoconiosis, altered EKG readings, increased blood pressure, abdominal distress, ulcers, dermatosis, and eye irritation [1]. These effects were generally observed following the inhalation of > 2 mg Sb/m^3 [3]. In animals, long-term inhalation exposure to concentrations > 0.05 mg Sb/m^3 resulted in effects similar to those reported in humans [1]. There is no conclusive evidence that inhaled antimony effects human reproduction or development, but problems with fertility were observed in animals exposed to high levels (209 mg Sb/m^3) of antimony for 9 weeks [1]. An association between inhaled antimony and the an increased incidence of lung cancer has been reported in antimony smelter workers [4] and studies in animals indicate that inhaled antimony may cause lung cancer [1]. An inhalation Unit Risk for cancer is not available for antimony [4].

Dermal Exposure. Dermal exposure to antimony has not been reported to be fatal to humans, and acute dermal LD_{50} values in animals are not available [1]. Antimony is not a skin sensitizer in humans, but animal studies have shown that antimony is a skin and eye irritant [1].

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BARIUM

CAS NUMBER

7440-39-3

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
Specific Gravity: 3.51 at 20/20°C [1]
Organic Carbon Partition Coefficient: NA

BACKGROUND CONCENTRATIONS

Barium is a naturally-occurring element. The concentration of barium in minimally disturbed soils varies tremendously. A collection of 1,319 soil samples from across the conterminous U.S. determined that 86 percent were less than or equal to 700 ppm, with a geometric mean of 440 ppm, but with a maximum value as high as 3,000 ppm [2].

FATE AND TRANSPORT

Barium is a highly reactive metal that occurs naturally only in the combined state. Most barium released to the environment from industrial sources is in forms that do not become widely dispersed. In the atmosphere, barium is likely to be present in the particulate form. Environmental fate processes may transform one barium compound to another; however, barium itself is not degraded. It is removed from the atmosphere primarily by wet or dry deposition [1].

In aquatic media, barium is likely to precipitate out of solution as an insoluble salt, or adsorb to suspended particulate matter. Sedimentation of suspended solids removes a large portion of the barium from surface waters. Barium in sediments is found largely in the form of barium sulfate. Bioconcentration in freshwater aquatic organisms is minimal [1].

Barium in soil may either be taken up to a small extent by vegetation, or transported through soil with precipitation. Barium is not very mobile in most soil systems. The higher the level of organic matter, the greater the adsorption. The presence of calcium carbonate will also limit mobility. Mobility is increased in the presence of high chloride concentrations. Barium complexes with fatty acids, for example, in acidic landfill leachate, will be much more mobile [1].

HUMAN TOXICITY

General. The primary target of barium toxicity is the cardiovascular system [1]. Information regarding the genotoxicity of barium are equivocal. Barium has not been placed in a weight-of-evidence cancer group by the USEPA [3].

Oral Exposure. A chronic oral RfD of 0.07 mg Ba/kg/day is based on a NOAEL of 0.21 mg Ba/kg/day for increased blood pressure in a long-term drinking water study in humans [3]. Barium is poorly absorbed following oral exposure (about 5%) [1]. In rats, acute oral LD_{50} values range from 132 to 277 mg/kg [1]. In humans, ingestion of very large amounts of barium (doses not reported) over a short period may cause paralysis or death. Ingestion of lower doses of barium over a short period may result in difficulties in breathing, increased blood pressure, changes in heart rhythm, stomach irritation, minor changes in blood, muscle weakness, changes in nerve reflexes, swelling of the brain, and damage to the liver, kidney, heart, and spleen [1]. Studies in animals report effects similar to those found in humans. Barium sulfate is sometimes given orally or rectally for the purpose of making X rays. This has not been shown to be harmful [1]. There is no evidence that oral exposure to barium affects human reproduction or development and developmental and reproduction studies in animals are inconclusive [1]. Barium has not been shown to cause cancer in humans or animals following oral exposure, therefore, an oral slope factor is not available [1,3].

Inhalation Exposure. The chronic inhalation RfC for barium of 5×10^{-4} mg/m^3 is based on a NOEL of 0.8 mg/m^3 for fetal toxicity in rats [4]. Approximately 65% of an inhaled concentration of barium is absorbed following inhalation exposure [1]. Barium has not been reported to be fatal to humans or animals following inhalation exposure [1]. Studies examining the toxicity of inhaled barium in humans and animals are extremely limited but suggest that exposure results in effects on the respiratory, cardiovascular, and gastrointestinal systems [1]. There is no evidence that inhaled barium affects human reproduction or development, but studies in animals suggest that barium may have adverse effects on these processes [1]. Barium is not known to cause cancer in humans or animals following inhalation exposure, therefore, an inhalation unit risk is not available [1,3].

Dermal Exposure. Dermal exposure to barium has not been reported to be fatal in humans or animals. Limited animal studies indicate that barium is a dermal and ocular irritant, but the results of this study are inconclusive [1].

ECOLOGICAL TOXICITY

General. Barium compounds are generally insoluble making them relatively unavailable for biological uptake [5]. All water- or acid-soluble barium compounds are poisonous. Barium is considered a nonessential element for plants and animals.

Vegetation. There are very few reports of barium toxicity to plants, except under conditions of acidic soils or with highly concentrated soil solutions where the bioavailable fractions are excessive (e.g., 2 mg/L soluble barium). Some authors report that concentrations of barium need to be extreme before toxicity occurs. Barium accumulation in plants is unusual except when the barium concentration exceeds calcium and magnesium concentrations in the soil, a condition which may occur when sulfate is depleted [6].

Aquatic Life. Barium ions in general are rapidly precipitated or removed from solution by chemical bonding, adsorption, and sedimentation. In most natural water, there is sufficient sulfate or carbonate to precipitate soluble barium present in the water, converting it to an insoluble nontoxic compound [6]. Experimental data indicate that soluble barium concentrations would have to exceed 50,000 μg/L before toxic effects to aquatic life might be observed [5]. Other data show the concentrations of barium lethal to half the test population of fish range from 150 to 10,000 mg/L [7]. Because barium represents little hazard under natural conditions, there are no federal aquatic life water quality standards [8].

Wildlife. Soluble barium compounds such as barium chloride, barium carbonate, barium sulfide, and barium oxide are highly toxic to animals when injested [9], although it is unlikely that suitable conditions would exist under natural conditions to accommodate exposure to these compounds. No reports of barium toxicity to wildlife under natural conditions were identified.

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CADMIUM

CAS NUMBER

7440-43-9

COMMON SYNONYMS

None noted.

ANALYTICAL CLASSIFICATION

Inorganic.

PHYSICAL AND CHEMICAL DATA

Water Solubility: Insoluble [1]
Vapor Pressure: Neglibible [2]
Henry's Law Constant: ND
Specific Gravity: 8.65 at 25/4°C [1]
Organic Carbon Partition Coefficient: ND

BACKGROUND CONCENTRATIONS

Pure cadmium is a silver-white, blue-tinged, lustrous metal with a distorted hexagonal close-packed structure; cadmium is easily cut with a knife. Cadmium can be found in zinc ores, as greenockite (CdS), and as otavite ($CdCO_3$). The estimated occurrence of cadmium in the earth's crust is from 0.1 to 0.2 ppm [1]. No data on cadmium was gathered as part of the 1984 Department of the Interior survey of conterminous United States soils [3].

FATE AND TRANSPORT

Elemental cadmium is insoluble in water [1], while cadmium compounds show varying degrees of solubility depending on the nature of the compounds and the aquatic environment [2]. Cadmium in the environment may be found as cadmium salts, hydrated cations, or organic/inorganic cadmium complexes. As hydrated cations or complexes, cadmium may be considered fairly mobile in water (relative to other heavy metals). Cadmium in soils may leach into water, especially under acidic conditions. It does not volatilize from either waters or soils, but does exhibit a tendency to adsorb strongly to clays, muds, and humic/organic materials in soils and waters. Complexation and sorbing with organic materials are the most important factors in aquatic fate and transport. The evidence indicates that cadmium bioconcentrates in all levels of the food chain. Cadmium accumulation has been reported in many animal and plant species. Reported BCFs range from 113 to 18,000 for invertebrates, and from 3 to 2,213 for fish. The pH and humus content of the water affect bioconcentration [2].

HUMAN TOXICITY

General. Breathing air with very high levels of cadmium severely damages the lungs and can cause death. High cadmium levels in the diet severely irritate the digestive tract, while lower levels consumed over a long period of time may cause kidney damage [2]. The USEPA has placed cadmium in weight-of-evidence Group B1, indicating that it is a probable human carcinogen [4].

Oral Exposure. A chronic oral RfD of 0.0005 mg/kg/day for water is based on a NOAEL of 0.005 mg/kg/day for proteinuria following chronic exposures in humans. A chronic oral RfD of 0.001 mg/kg/day for food is based on a NOAEL of 0.01 mg/kg/day for proteinuria following chronic exposures in humans [4]. It is estimated that humans absorb about 5 percent of ingested cadmium [2]. In rats and mice the acute oral LD_{50} values range from about 100 to 300 mg/kg. Two human deaths due to intentional ingestion of cadmium resulted from doses of 25 and 1,500 mg/kg [4]. Symptoms of acute toxic reaction to ingestion may include gastroenteritis, vomiting, diarrhea, abdominal pain, increased salivation, choking, anemia, hypotension, respiratory arrest, pulmonary edema, renal dysfunction, and death. Chronic oral overexposure symptoms may include renal dysfunction and/or failure, as well as anemia [1,2,5]. Cadmium has been implicated as a fetotoxin by the oral route in animal studies [2].

Inhalation Exposure. The USEPA does not currently provide an inhalation RfC for cadmium [4,6]. It is estimated that humans rapidly absorb about 25 percent of inhaled cadmium. The 15-minute LC_{50} for rats exposed to cadmium oxide fumes is approximately 33 mg/m^3. It has been estimated that exposure to 1 mg/m^3 for 8 hours might be sufficient to cause death in humans [2]. Symptoms associated with acute cadmium poisoning via inhalation may include fever, headache, dyspnea, pleuritic chest pain, conjuctivitis, rhinitis, sore throat, cough, pulmonary edema, extreme restlessness, respiratory failure, and death. Chronic inhalation overexposure symptoms may include renal dysfunction and/or failure, dyspnea, emphysema, bronchitis, and anemia [1,2,5]. Cadmium has been implicated as a developmental toxin by the inhalation route in animal studies [2]. An inhalation unit risk of 0.0018 $(ug/m^3)^{-1}$ is based on excess lung cancers observed in humans [4].

Dermal Exposure. Cadmium is poorly absorbed through the skin [2]. No other useful information regarding dermal exposure to cadmium was located.

ECOLOGICAL TOXICITY

General. Cadmium is considered nonessential for plants and animals. It is relatively mobile in the environment compared to most other heavy metals. Cadmium occurs naturally in close association with zinc, usually in concentrations directly related to zinc levels [7]. Its cumulative nature in organisms and its high toxicity makes it an extremely dangerous poison for most animals. Cadmium is accumulated through the food chain in sufficient quantities to be harmful to higher trophic levels. However, no evidence was found of biomagnification of this element through trophic levels [8].

Vegetation. The soil chemistry of bioavailable cadmium is controlled by pH. Brooks [9] reported that the general toxicity of cadmium to plants was moderate. Cadmium is usually more available in acidic, sandy soils than in neutral or alkaline soils with large amounts of clay and organic matter [7]. Absorption is strongly pH-dependent, increasing as conditions become more alkaline. It has been suggested that there is a 100-fold increase in cadmium absorption for each unit increase in pH [10]. Plants tissues normally contain <0.5 ppm cadmium, but many species may accumulate much higher concentrations (up to several hundred ppm) when they grow in soil with elevated cadmium concentrations. Cadmium levels in plant tissues may subsequently affect the balance of essential elements in the plant [7]. It has been noted that 3 mg/kg of cadmium in the tissues of plants depressed growth [11]. Tall fescue (*Festuca arundinacea*) had a reduced yield of 50 percent with a soil concentration of 320 mg/kg [10].

Aquatic Life. In aquatic systems, water hardness affects the biological toxicity of cadmium. The uptake of cadmium is faster in hard water than in soft water, but the total concentration of cadmium is greater in soft water [12]. Cadmium uptakes also increase with increasing water temperature and decreasing salinity [8]. The environmental mobility of cadmium is influenced by the pH levels in the water. Cadmium is less mobile in alkaline waters than in acid waters because it becomes chemically bound in alkaline waters [13]. Cadmium can be quite toxic to aquatic organisms, even in concentrations of less than 1 ppm [10]. Fish are quite susceptible to acute toxicity, with reported 4-day LC_{50} values ranging from 0.002 to 2.9 mg/L [8]. Cadmium has been reported to accumulate in the tissues of aquatic organisms at concentrations hundreds to thousands of times higher than in the water [12]. The federal chronic freshwater quality criterion for cadmium is 3.37 μg/L based on water hardness of 400 mg/L $CaCo_3$ [14].

Wildlife. Cadmium has been shown to have a toxic effect on a variety of mammals and birds. Mammals have no effective mechanism for the elimination of ingested cadmium; therefore, the cadmium tends to accumulate in the liver and kidneys. Its relative toxicity to mammals has been rated from moderate to high [15]. Toxic effects include decreased growth rates, anemia, infertility, fetus abnormalities, abortion, kidney disease, intestinal disease, and hypertension [11]. The known effects for mallards are all sublethal, primarily affecting the kidneys, testes, and egg production [8]. In mallards chronically dosed with cadmium contaminated food, significant effects on energy metabolism were found at 450 mg/kg, but not at 150 mg/kg [11]. In general, cadmium levels in excess of 20 ppm may reduce reproductive output of nesting waterfowl. More direct effects on individual mallards may occur as cadmium levels approach 200 ppm [8].

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CHROMIUM

CAS NUMBER

7440-47-3

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: 7.2 at 28°C [2]
Organic Carbon Partition Coefficient: NA

BACKGROUND CONCENTRATIONS

Chromium is a naturally-occurring element which is dispersed throughout the environment primarily as a result of anthropogenic activities [1]. The concentration of chromium in minimally disturbed soils varies tremendously. A collection of 1,319 soil samples from across the conterminous U.S. determined that 87 percent were less than or equal to 70 ppm, with a geometric mean of 37 ppm, but with a maximum value as high as 700 ppm [3].

FATE AND TRANSPORT

Two of the major forms of chromium are trivalent or chromium (III), and hexavalent or chromium (VI). Chromium is released into the atmosphere mainly by the combustion of coal and oil. The most toxic form is hexavalent chromium, which is due mainly to chemical manufacture, primary metal production, chrome plating, and cooling towers. Chromium is removed from the atmosphere by fallout and precipitation, but may be transported long distances before removal. The residence time of atmospheric chromium is expected to be less than 10 days. There are no known chromium compounds that can volatilize from water. Most of the trivalent form is expected to precipitate in sediments. Hexavalent chromium will be present predominantly in the soluble form. Hexavalent chromium will eventually be reduced to the trivalent form by the organic materials present in surface water. The residence time of chromium in lake water is estimated to be in the range of 4.6 to 18 years. Bioconcentration should be minimal [1].

Chromium in soil may become airborne due to fugitive dust emissions, while runoff and leaching may transport it to surface water and groundwater. Flooding of soils and the subsequent anaerobic decomposition of plant material may increase the mobilization of chromium from soils. The half-life of chromium in soils may be several years [1].

HUMAN TOXICITY

General. There are two forms of chromium that are of concern; trivalent chromium (chromium III) and hexavalent chromium (chromium VI). In general, chromium (VI) compounds are more toxic than chromium (III) compounds [1]. Trivalent chromium (chromium III) is considered an essential nutrient which helps to maintain normal glucose, cholesterol, and fat metabolism. A daily ingestion of 0.05 to 0.20 mg/day (0.0007 to 0.003 mg/kg/day) is estimated to be safe and adequate [1]. The major targets of chromium toxicity are the respiratory system and the gastrointestinal system. Chromium is considered to be genotoxic. The USEPA [4] has placed chromium (VI) in weight-of-evidence cancer Group A, indicating that it is a human carcinogen. Chromium (III) has not been placed in a cancer class by the USEPA [4].

Oral Exposure. A chronic oral RfD value of 1 mg Cr/kg/day for chromium (III) is based on a NOEL of 1468 mg Cr/kg/day for adverse effects in a chronic feeding study in rats [4]. An oral RfD of 0.005 mg Cr/kg/day for chromium (VI) is based on a NOAEL of 2.4 mg Cr/kg/day for adverse effects in a 1-year drinking study in rats [4]. Chromium is poorly absorbed following oral exposure. Acute oral LD_{50} values in rats ranged from 13 to 2365 mg Cr/kg, depending on the chromium compound [1]. Short-term oral exposure of humans to high doses of chromium (> 4.1 mg Cr (VI)/kg/day) has resulted in stomach upsets and ulcers, convulsions, liver and kidney damage and even death [1]. Information regarding potential effects of chromium on human reproduction and development are not available. Exposure of animals to chromium (VI) (57 mg Cr (IV)/kg/day) during pregnancy has been found to result in developmental effects on the fetus [1]. Treatment of male mice with chromium (III) and (VI) (> 3.5 mg Cr/kg/day) has caused effects on spermatogenesis [1]. There is no evidence that oral exposure to chromium (III) or (VI) causes cancer in humans or animals, therefore, an oral Slope Factor is not available [4].

Inhalation Exposure. Inhalation RfC values for both chromium (III) and chromium (VI) are currently under review by the USEPA [4]. Following inhalation exposure, approximately 53-85% of chromium (VI) compounds and 5-30% of chromium (III) compounds are absorbed into the blood [1]. Acute (4-hour) inhalation LC_{50} values in rats ranged from 29 to 137 mg/kg, depending on chromium compound [1]. In humans, acute inhalation of chromium has not been reported to be fatal. The respiratory system is the major target of toxicity for both forms of chromium following inhalation exposure. Respiratory effects include perforations and ulcerations of the nasal septum, bronchitis, pneumonoconiosis (inflammation of the lung leading to fibrosis), decreased pulmonary function, pneumonia, rhinorrhea (runny nose), nasal itching and soreness and epistaxis (nose bleed) [1]. These effects have occured at concentrations > 0.002 mg Cr (VI)/m^3. In some chromium-sensitive people, chromium exposure may trigger an allergic response manifested by asthma or a skin rash. There is no conclusive evidence that inhaled chromium causes reproductive or developmental effects in humans or animals [1]. Long-term inhalation exposure of workers to low levels of chromium compounds (> 0.04 mg Cr/m^3) has been associated with lung cancer. The form of chromium responsible for this effect has not been established, but only hexavalent chromium has been found to cause cancer in animal studies. An inhalation Unit Risk of 0.012 (ug/m^3)$^{-1}$ for chromium (VI) is based on an increase in the incidence of lung cancer in occupationally exposed workers [4]. An inhalation Unit Risk is not available for chromium (III) [4].

Dermal Exposure. Acute dermal LD_{50} values in rabbits ranged from 30 to 553 mg Cr/kg depending on chromium compound [1]. Dermal exposure to chromium has been found to be fatal in humans, but the exact exposure dose is not known [1]. Dermal exposure of humans to chromium can cause allergic reactions as well as skin burns, blisters and ulcers [1]. Exposure of animals to chromium results in effects similar to those found in humans.

ECOLOGICAL TOXICITY

General. Chromium is essential for mammals, but can be toxic at higher levels. It is beneficial but not essential to the growth in higher plants. Plants do not accumulate chromium, and animals apparently absorb little chromium from plant material in their digestive tract [5]. No biomagnification of chromium has been observed in food chains, and concentrations are usually highest at the lowest trophic levels [6]. The bioconcentration factors for freshwater fish, invertebrates, and plants are 200, 2,000 and 4,000, respectively [6].

Vegetation. The chromium content of plants is controlled mainly by the amount of soluble chromium in the soils. Chromium (VI) is the most soluble and available to plants, but it is also the most unstable form under normal soil conditions [7]. Chromium usually exists in soils as insoluble oxides, which are largely unavailable at pH's greater than 4.0 [7]. There is some indication that chromium is accumulated in plant roots. Some plants experience decreased yields at soil concentrations as low as 0.5 ppm. These data indicate that the phytotoxic concentration is greater than 10 ppm [8]. Translocation of chromium from roots to plant tops apparently is not a serious problem. Typical symptoms of chromium phytotoxicity are wilting of plant tops, root injury, chlorosis in young leaves, brownish-red leaves, and chlorotic bands on cereals [7]. The 96-hour LC_{50} for aquatic freshwater plants ranges from 2,500 μg/L to 25,000 μg/L for chromium (VI) [6].

Aquatic Life. The toxicity of chromium (III) and (VI) to aquatic species appears to increase as pH and/or water hardness decreases [9]. For chromium (VI), the 96-hour LC_{50} values for sensitive freshwater and marine species were between 445 and 2,000 ppb [6]. For chromium (III) the 96-hour LC_{50} concentrations were 2,000 to 3,200 ppb for sensitive freshwater organisms and 3,300 to 7,500 ppb for marine biota [6]. Sensitive freshwater organisms showed reduced growth, inhibited reproduction, and increased bioaccumulation at 10 μg/L of chromium (VI), and other adverse effects at 30 μg/L of chromium (III) [6]. The 96-hour LC_{50} values for bluegill and fathead minnow are 71,900 μg/L and 64,700 μg/L, respectively for chromium (III) [5]. The 96-hour LC_{50} value for bluegill range from 133,000 μg/L to 213,000 μg/L for chromium (VI) [6]. Fish rapidly eliminate chromium upon return to freshwater following exposure. Thus, fish exposed intermittently to high chromium levels would not experience cumulative chromium uptake [10]. The federal acute and chronic water quality criteria for aquatic life in freshwater are 16 μg/L and 11 μg/L, respectively for chromium (VI) and 1,700 μg/L and 210 μg/L, respectively for chromium (III) at 100 mg/L $CaCO_3$ [11].

Wildlife. In mammals, chromium (III) is less toxic than chromium (VI), probably because the former permeates biological membranes less readily [5]. Although chromium is highly toxic to invertebrates, it is only moderately toxic to higher animals, and most mammals can tolerate up to 1,000 ppm chromium in their diets [8]. Eisler found the toxic threshold in rats to be 1,000 ppm chromium (VI) in their diet and 100 percent survival when exposed to 134 ppm in their drinking water for three months [6]. It appears the primary source of uptake of chromium by small mammals is through ingestion of contaminated soil while grooming [6]. Dietary levels of 10 mg/kg of chromium (III) adversely affected young black ducks (*Anas rubripes*) [6].

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COPPER

CAS NUMBER

7440-50-8

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: 8.94 [2]
Organic Carbon Partition Coefficient: NA

BACKGROUND CONCENTRATIONS

Copper is a naturally-occurring element. The concentration of copper in minimally disturbed soils varies tremendously. A collection of 1,311 soil samples from across the conterminous U.S. determined that 85 percent were less than or equal to 30 ppm, with a geometric mean of 17 ppm, but with a maximum value as high as 700 ppm [3]. Copper concentrations in Ohio farm soils were found to range from 11 to 37 ppm, with a mean value of 19 ppm [4].

FATE AND TRANSPORT

Copper is dispersed throughout the atmosphere primarily as a result of anthropogenic activities. Environmental fate processes may transform one copper compound to another; however, copper itself is not degraded. Most of the copper in the atmosphere occurs in the aerosol form, and long-distance transport may occur. Wet or dry deposition is expected to be the primary fate process in air.

Several processes determine the fate of copper in aquatic environments: formation of complexes, especially with humic substances; sorption to hydrous metal oxides, clays, and organic materials; and bioaccumulation. Organic complexes of copper are more easily adsorbed on clay and other surfaces than the free form. The aquatic fate of copper is highly dependent on factors such as pH, oxidation-reduction potential, concentration of organic matter, and the presence of other metals. In regard to the latter, it has been demonstrated that coprecipitation of copper with hydrous oxides of iron effectively scavenges copper from solution, although in most surface waters organic materials prevail over inorganic ions in complexing copper [5].

Generally, copper is considered to be among the more mobile of the heavy metals in surface environments. Seasonal fluctuations have been observed in surface water copper concentrations, with higher levels in fall and winter, and lower levels in the spring and summer. It is not expected to volatilize from water. Since copper is an essential nutrient, it is strongly accumulated by all plants and animals, but is probably not biomagnified [5].

The degree of persistence of copper in soil depends on the soil characteristics and the forms of copper present. For example, in soils of low organic content, soluble copper compounds may move into groundwater at a significant rate. On the other hand, the presence of organic complexing agents may restrict movement in soil, and copper may be immobilized in the form of various inorganic complexes. It is not expected to volatilize from soil.

HUMAN TOXICITY

General. Copper is an essential trace element; therefore, toxic effects can result if too much or too little is taken into the body. The Recommended Dietary Allowance (RDA) for copper is 2 to 3 mg/day (0.03 to 0.04 mg/kg/day) [6]. The major targets of copper toxicity are the gastrointestinal tract following oral exposure and the lungs following inhalation exposure [6]. Information regarding the genotoxicity of copper are equivocal. USEPA has placed copper in weight-of-evidence cancer Group D, indicating that it is not classifiable as to human carcinogenicity [7].

Oral Exposure. A chronic oral RfD of 1.3 mg/L (0.04 mg/kg/day) is based on a LOAEL of 5.3 mg/L for gastrointestinal irritation in humans [8]. Approximately 60% of an oral dose of copper is absorbed through the gastrointestinal tract [6]. Case studies of human suicides indicate that doses of 6 to 637 mg/kg have been fatal [6]. LD_{50} values are not available for animals. In humans, doses greater than 0.07 mg/kg have resulted in gastrointestinal effects including vomiting, diarrhea, nausea, abdominal pain and a metallic taste in the mouth [6]. Adverse effects were also noted in the liver (necrosis) and the kidneys (necrosis, tubular damage) of humans following oral exposure [6]. Chronic toxic effects due to copper are rarely seen except for individuals with Wilson's Disease. Wilson's Disease is a genetically determined condition in which the body absorbs and retains abnormally high copper concentrations [6]. It is not known whether exposure to copper will result in effects on reproduction or development in humans, but animal studies indicate that copper exposure may increase fetal mortality [6]. There is no evidence that copper causes cancer in humans or animals, therefore, an oral slope factor for cancer is not available [7].

Inhalation Exposure. A chronic inhalation RfC is not available for copper [7]. The extent of copper absorption following inhalation exposure is not known. Information regarding the fatal dose of copper following inhalation exposure was not located for humans or animals. In humans, copper is a respiratory irritant. Short-term inhalation exposure to copper dust or fumes (0.075-0.12 mg/m^3) results in a condition known as "metal fume fever". This condition is a 24-48 hour illness characterized by chills, fever, aching muscles, dryness in the mouth and throat and headache [6]. Respiratory effects have also been noted in animals [6]. Information is not available regarding potential effects on reproduction and development in humans or animals following inhalation exposure. There is no evidence that copper exposure causes cancer in human or animals, therefore, an inhalation unit risk for cancer is not available [7].

Dermal Exposure. Dermal exposure to copper may result in allergic contact dermatitis [6]. Other information regarding the toxic effects of dermal exposure to copper are not available [6].

ECOLOGICAL TOXICITY

General. Copper is an essential trace element or micronutrient for plants and animals. However, excessive amounts of the element are toxic [9]. Copper is accumulated by all plants and animals, but it has very little if any potential for biomagnification through the food chain [10].

Vegetation. Copper retention in soils and bioavailability to plants are dependent on pH. Sorption of copper increases with increasing pH [11]. Copper is held most securely at a pH range of 7.0 to 8.0 [12]. Several researchers have reported a decrease in plant copper when large amounts of organic matter are present. Copper is strongly chelated in plant roots. Phytotoxic concentration of copper ranges from about 70 to 640 ppm in the soil for most plants [13]. In vascular plants, toxic levels of copper can cause reduced growth, chlorosis, and stunted root development. Toxic copper concentrations also interfere with the uptake of iron and other heavy metals [9]. Copper salts have been used effectively to control aquatic vegetation, algae, and terrestrial plants invading sewer lines for many years.

Aquatic. The toxicity of copper to aquatic life varies with hardness (increases with decreased hardness), pH (increases with decreased pH), and temperature (increase with higher temperatures) [14]. Many studies have been published on the toxicity of copper to fish and other aquatic life forms. Relatively high concentrations of copper may be tolerated by adult fish for short periods of time. The critical effect appears to be its greater toxicity to young or juvenile fish [11]. Reproduction of fish is impaired at concentrations of 0.018 to 0.033 mg/L, growth is reduced at concentrations of 0.0025 to 0.0184 mg/L, and survival is reduced at 0.018 to 0.04 mg/L [9]. The maximum acceptable toxicant concentration for fathead minnows is 0.011 to 0.018 mg/L, as it affects embryo, larval, and early juvenile stages [14]. The 96-hour LC_{50} acute toxicity of copper sulfate in fathead minnows and bluegills was reported to be 1.4 mg/L and 10.2 mg/L, respectively, at a water hardness of 400 mg/L $CaCO_3$ and a pH of 8.2 [11]. The 96-hour LC_{50} acute toxicity of copper in fathead minnows and creek chub was 0.44 mg/L and 0.31 mg/L, respectively, with a water hardness of 200 mg/L $CaCO_3$ [11].

Concentrations of 0.015 mg/L produced sublethal effects in crayfish and a 4-day LC_{50} of 3.0 ppm [9]. The federal chronic freshwater quality criterion for copper is 38.7 μg/L based on a water hardness of 400 mg/L $CaCO_3$ [15]. The Ohio aquatic life habitat and water supply standard for copper is 42.0 μg/L based on a water hardness of 400 mg/L $CaCO_3$ [16].

Wildlife. Copper is an essential trace element for animals, with some species, such as sheep, being extremely sensitive to excessive concentrations of copper or to certain ratios of copper to molybdenum in their forage. Sheep have died after consuming plants and soils containing 15 ppm copper (dry weight) [17]. The maximum tolerable dietary level for turkey and chickens is 300 ppm [18]. However, copper toxicity in mammals and birds is of little significance because they possess barriers to copper absorption [19]. Mammals and birds are 100 to 1,000 times more resistance to toxic effects than aquatic biota.

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IRON

CAS NUMBER

7439-89-6

COMMON SYNONYMS

Ferrum, Loha, stainless steel

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: 7.86 [2]

Organic Carbon Partition Coefficient: NR

FATE DATA: HALF-LIVES

N/A

NATURAL SOURCES

The Earth's crust, rocks, ores, minerals

ARTIFICIAL SOURCES

Iron and steel castings, other steel-making operations, alloys, drilling fluids

BACKGROUND CONCENTRATIONS

Iron is a silver-white, gray flexible, lustrous metal and naturally-occurring element. The concentration of iron in minimally disturbed soils varies. A collection of 1,317 soil samples from across the conterminous U.S. determined that a range of 100-100,000 ppm, with a geometric mean of 47,000 ppm iron was present [3]. Iron is also considered an essential element for organisms and is the primary component heme present in blood.

FATE AND TRANSPORT

Iron cycling in the environment is a complex process. Iron has two oxidation states (+2 and +3) and occurs as oxide, sulfate, chloride, and sulfide complexes. Iron is a major component of clay soils.

Iron is taken up in some form by all organisms and may be stored in the blood as an essential nutrient. Iron is not known to bioaccumulate in organisms or biomagnify in the food chain.

HUMAN TOXICITY

Iron is a major component of the earth's crust. Iron is also an essential nutrient for humans and toxicity may result from deficiencies as well as excess exposure. Excess iron has been associated with metabolic acidosis, liver damage, renal failure, diabetes mellitus, endocrine disturbances, and cardiovascular effects [4]. Iron is actively regulated and excreted in humans, and an iron overdose is generally the result of accidental ingestion of iron containing medicines, genetic abnormalities I iron metabolism, and excess dietary intake. Another source of iron overload is due to the use of iron pots for cooking and brewing processes [4]. Iron deficiencies may result in the development of anemia.

Oral Exposure

A provisional chronic oral RfD of 0.3 mg/kg/day has been derived for iron [5]. This RfD is based on a NOAEL of 0.27 mg Fe/kg-day for the upperbound value in the range of dietary iron intakes. The range of recommended daily allowances (RDA) for iron is 10 mg/day (0.13 mg/kg/day) for men and 15 mg/day (0.24-0.33 mg/kg/day) for women age 11-50 years. The RDA varies for individual groups as follows: 1 mg/kg/day for non-breast fed infants aged 0-6 months; 0.36-1.11 mg/kg/day for children aged 6 months to 10 years; 0.443 mg/kg/day for pregnant women; 0.25 mg/kg/day for women who are lactating; and 0.18-0.27 mg/kg/day for males aged 11-14 years [6]. In rats, no adverse effects were reported at concentrations up to 76 mg/kg/day, and embryonic mortalities were observed at 240 mg/kg/day [5,7].

In humans, high iron intake has been associated with increased risk for myocardial infarction, neurological effects (lethargy to coma), and hepatic damage [5]. Acute iron poisoning results in vomiting and dark brown-black stools. Hospital referrals by the poison center are generally made for ingestions of 60 mg/kg or greater [5].

Inhalation Exposure

Inhalation of iron oxide fumes or dust has been reported to result in the deposition of iron particles in the lungs [4]. A report of autopsies of hematite miners noted an increase in lung cancer, tuberculosis, and interstitial fibrosis. These miners were also exposed to risk factors such as cigarette smoke and silica dust. The dose level of iron workers developing pneumoconiosis has been reported to exceed 10 mg Fe/m^3 [4].

Dermal Exposure

No information was located concerning iron toxicity from dermal exposure.

ECOLOGICAL TOXICITY

Iron is also an essential element for many organisms and toxicity may result from iron deficiencies as well as excess iron intake. Iron has been documented to accumulate in some lower trophic level organisms such as earthworms, however no biomagnification of aluminum in the food chain is evident [1,8].

Plants

Little is known concerning iron toxicity to plants. Iron is not known to bioconcentrate in plants at levels above comparative soil concentrations [9].

Terrestrial Invertebrates

Very little information was available concerning the effects of iron on terrestrial invertebrates. In Will and Suter (1995), a benchmark of 200 mg/kg is listed for soil microorganisms and microbial processes [10].

Amphibians and Reptiles

No information was found concerning the effects of iron on amphibians and reptiles.

Fish and Aquatic Organisms

Very little information is available concerning iron toxicity to aquatic organisms. One study was found in the literature that reported a 12 month survival, growth, and reproduction NOAEL of 1.0 mg/L for the fathead minnow [11]. The federal water quality criteria for iron for the protection of aquatic life are 1,000 µg/L freshwater and no WQC currently exists for saltwater [12].

Birds

No information was found concerning the effects of iron on birds.

Mammals

Very little information is available concerning iron toxicity to mammals. In rats, no adverse effects were reported at concentrations up to 76 mg/kg/day, and embryonic mortalities were observed at 240 mg/kg/day [5,7]. Another study reported an LD50 of 2,550 mg/kg/day for the rat [13].

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LEAD

CAS NUMBER

7439-92-1

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 [1]
Specific Gravity: 11.34 at 20/4°C [2]
Organic Carbon Partition Coefficient: ND [1]

FATE DATA: HALF-LIVES

Note: Data for tetraethyl lead; CAS No. 78-00-2

Soil: 1 to 4 weeks [3]
Air: 2.3 to 9.0 hours [3]
Surface Water: 2.3 to 9.0 hours [3]
Groundwater: 2 to 8 weeks [3]

BACKGROUND CONCENTRATIONS

Lead is a naturally-occurring element which is dispersed throughout the environment primarily as a result of anthropogenic activities [1]. The concentration of lead in minimally disturbed soils varies tremendously. A collection of 1,300 soil samples from across the conterminous U.S. determined that 80 percent were less than or equal to 30 ppm, with a geometric mean of 16 ppm, but with a maximum value as high as 700 ppm [4]. Concentrations along roadways and adjacent to houses with exterior lead-based paints may be as high as 10,000 ppm [1].

FATE AND TRANSPORT

Lead is extremely persistent in both water and soil. Environmental fate processes may transform one lead compound to another; however, lead itself is not degraded. It is largely associated with suspended solids and sediments in aquatic systems, and it occurs in relatively immobile forms in soil. Lead which has been released to soils may become airborne as a result of fugitive dust generation. Tetraethyl lead may occur in the vapor phase [1].

HUMAN TOXICITY

General. The general human population is exposed to lead primarily via the oral route of exposure, with some contribution from the inhalation route. However, in some subpopulations, the predominant route of exposure is via inhalation. The effects of lead are the same regardless of whether it enters the body through breathing or ingestion. The major health threat from lead arises from the damage it causes to the brain, especially in fetuses, infants, and young children. Young and developing humans are highly sensitive to its effects. Also, young children are prone to ingest more lead as a result of normal mouthing behavior. Decreased IQ and reduced growth may result from childhood exposure. Fetal exposure may result in preterm birth, reduced birth weight, and decreased IQ [1]. The Federal Centers for Disease Control recently lowered the threshold at which children are considered to have lead poisoning from 25 to 10 micrograms of lead per deciliter of blood [5]. Some of the health effects of lead, particularly changes in the levels of certain blood enzymes and in aspects of children's neurobehavioral development, may occur at blood levels so low as to be essentially without a threshold [6].

Lead exposure may increase blood pressure in middle-aged men. High-level exposure can severely damage the brain and kidneys in adults or children. In addition, high doses of lead will cause abortion and damage the male reproductive system [1]. The USEPA currently does not provide any toxicity values for lead [6,7]. The USEPA has placed lead in weight-of-evidence Group B2, indicating that it is a probable human carcinogen [6].

Oral Exposure. Oral absorption of lead appears to be low in humans. The absorption of lead into the body is highly dependent on its state of complexation. In general, soluble lead compounds tend to be more readily absorbed into the body than insoluble compounds, and are therefore more toxic. Certain organic lead compounds are also readily absorbed. Gastrointestinal absorption is highly dependent on the form of lead and the amount of food present. For example, in one experiment 3 percent of lead chloride was absorbed when provided with a meal, but 60 percent was absorbed when animals were fasted. Lead absorption is higher in children than in adults. Oral LD_{50} values were not available. LD_{LO} values for various inorganic lead compounds reportedly ranged from 191 mg lead/kg in the dog to 20,500 mg lead/kg in the guinea pig. An LD_{LO} is the lowest dose causing death. The reported adverse effects of lead in laboratory animals following oral exposure include severe central nervous system damage, elevated blood pressure, impaired heme synthesis, liver damage, kidney damage, fetotoxicity, and damage to the reproductive organs in both males and females. Renal tumors have been observed in laboratory animals following oral administration of lead acetate [1].

Inhalation Exposure. Once deposited in the lower respiratory tract, lead is almost completely absorbed, and all chemical forms of lead also appear to be absorbed. Limited experimental evidence suggests that inhaled tetraethyl lead is rapidly absorbed by rats [1]. No other useful information was located regarding specific adverse health effects resulting from inhalation exposure to lead.

Dermal Exposure. Compounds such as lead acetate are poorly absorbed through skin, while tetraethyl lead appears to be rapidly absorbed [1]. No other useful information was located regarding specific adverse health effects resulting from dermal exposure to lead.

ECOLOGICAL TOXICITY

General. Lead is generally considered a highly toxic contaminant because it is not an essential nutrient to either plants or animals. Lead can be bioaccummulated, but it does not biomagnify in aquatic or terrestrial food chains. The tendency for lead to form complexes with naturally occurring organic material (e.g., humic and fulvic acids) increases its adsorption affinity for clays and other mineral surfaces, and decreases its bioavailability, except under acidic soil or water conditions. Benthic microbes can methylate lead to form tetramethyl lead, which is volatile and more toxic than inorganic lead [8].

Vegetation. Lead toxicity in plants under natural condition is uncommon even though field and laboratory studies have demonstrated lead's toxicity. Most of the lead in soils is insoluble and largely unavailable for plant uptake. Symptoms of lead toxicity are found only in plants grown on acid soils [9]. The amount of bioavailable lead taken up by plants decreases as soil pH, cation exchange capacity, and available phosphorus increase. Lead inhibits plant growth and reduces photosynthesis, mitosis, and water absorption. When taken up by plants, lead is rarely translocated because it becomes chelated in the roots [9]. Lead levels of approximately 500 mg/kg in soil reduced pollen germination by greater than 90 percent in two weed species. Normal germination rates were observed at soil levels of 46 mg/kg, but other adverse effects were observed at lead levels of 12 to 312 mg/kg [8].

Aquatic Life. The toxicity of lead in water is dependent on pH, organic materials, water hardness, and the presence of other metals [10]. Organolead compounds are more toxic than inorganic lead compounds to aquatic organisms [11]. Lead toxicity decreases with increasing water hardness [8]. Lead is more mobile in acidic waters than in higher pH waters. In alkaline and circumneutral waters, removal of lead by sorption and precipitation may occur relatively quickly [10]. The solubility of lead ranges from 500 μg/L in soft water to 3 μg/L in hard water [11]. In aquatic systems, most lead is found in bottom sediments. The toxicity of lead to fish varies from 0.1 to 542 mg/L. Generally, the medium tolerance limit for fathead minnows in hard water (360 mg/L $CaCO_3$) is 482 mg/L [12]. The federal chronic freshwater quality criterion for lead is 18.6 μg/L based on a water hardness of 400 mg/L $CaCO_3$ [13].

Wildlife. Lead bioaccumulates in animal tissues, but does not biomagnify in the food chain [10]. Evidence of lead poisoning in mammals and other wildlife have been reported from sites heavily contaminated by lead smelter emissions and other types of atmospheric fallout. Neurological effects in mallard ducks were observed within 24 hours of dosing them with lead shot for a total intake of 423.8 mg/kg body weight. Assuming a mallard weighs approximately 1.2 kg and consumes food equivalent to 10 percent of its body weight each day, dosage of 423.8 mg/kg body weight is equivalent to an approximate lead concentration in the food of 4,600 mg/kg [8]. It was found that 1,000 ppm dietary lead reduced egg production and caused soft-shelled eggs and 500 ppm inhibited growth and produced anemia [8].

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MERCURY

CAS NUMBER

7439-97-6

COMMON SYNONYMS

Hydragyrum; quicksilver

ANALYTICAL CLASSIFICATION

Inorganic.

PHYSICAL AND CHEMICAL DATA

Water Solubility: 0.56 mg/L [1]
Vapor Pressure: 2 x 10^{-3} mm Hg at 25°C [2]
Henry's Law Constant: ND
Specific Gravity: 13.534 at 25/4°C [2]
Organic Carbon Partition Coefficient: ND

BACKGROUND CONCENTRATIONS

Mercury is a naturally-occurring element. Elemental mercury is a silver-white, heavy, mobile, liquid metal exhibiting slight volatility at room temperature [2]. Concentrations of mercury at sampling points across the contiguous United States exhibit a limited, but varied range. A total of 1,267 soils samples were gathered by the United States Geological Survey for mercury concentration analysis. Of this total, 1,263 samples exhibited some concentration of mercury across a range of <0.01 ppm to a maximum of 4.6 ppm. Fourteen percent of the total samples gathered showed a mercury concentration of from less than 0.01 ppm up to 0.002 ppm; 16 percent showed concentrations between 0.002 ppm and 0.032 ppm, 33 percent between 0.032 and 0.051, 24 percent between 0.051 and 0.13, and 13 percent showed concentrations of mercury to be from 0.13 ppm up to a maximum value of 4.6 ppm; geometric mean concentration of mercury was 0.058 ppm [3].

FATE AND TRANSPORT

Mercury may exist as one of three forms: elemental mercury, inorganic mercury, and organic mercury. Elemental mercury will combine with sulfur at ordinary temperatures, and react with nitric acid and/or ammonia solutions in air (to form Hg_2NOH); it does not react with hydrochloric acid, sulfuric acid (when cold), or alkalies. Mercurous salt will be slowly degraded by sunlight [2]. Inorganic mercury compounds generally dissociate into the mercuric form (Hg^{2+}) rather than the mercurous form (Hg^{+}). Organic mercury compounds are generally divided into two broad classes: alkyl mercury (e.g., monomethyl mercury) and phenyl mercury (e.g., phenylmercury acetate). Organic mercury compounds are more easily absorbed than elemental and/or inorganic forms, but will readily undergo biodegradation with the ultimate release of inorganic mercury. Organomercury compounds, especially alkyl mercury compounds, are viewed as posing the greatest toxicological danger [4]. Given their high specific gravity/density values, elemental and inorganic mercury compounds are generally susceptible to gravitational deposition in sediments of aqueous environments. Given the relative values of water solubility and vapor pressure, mercury should be expected to be a fairly mobile material. Mercury entering surface waters can be microbially converted to methylmercuric ion given favorable conditions. Methylmercury accumulates in carnivorous fish to levels 10,000 times those concentrations found in the ambient water [1].

HUMAN TOXICITY

General. Long-term exposure to either organic or inorganic mercury can permanently damage the brain, kidneys, and developing fetuses. Short-term exposure can also have adverse health effects, but full recovery is more likely. Methylmercury is a potent neurotoxin [1]. The USEPA has placed inorganic mercury in weight-of-evidence Group D, indicating that it is not classifiable as to human carcinogenicity [5].

Oral Exposure. The chronic RfD of 0.0003 mg/kg/day is based on kidney effects observed following oral administration in the rat [6]. Oral absorption of metallic mercury by humans has been estimated to be approximately 0.10%. Organic forms of mercury are readily absorbed by humans and animals via the oral route. For example, in one study approximately 95% of methylmercuric nitrate was absorbed. The oral LD_{50} for $HgCl_2$ ranged from 35 to 105 mg/kg in rats. The lethal dose of $HgCl_2$ in adult humans has been estimated to range from 10 to 42 mg/kg. Signs of acute mercury toxicity in humans and animals include gastrointestinal lesions and renal involvement. Death is usually caused by shock, cardiovascular collapse, acute renal failure, and severe gastrointestinal damage. A number of human deaths have resulted from organic mercury ingestion; the lethal dose is estimated to range between 10 and 60 mg/kg. A neurological syndrome in humans following the consumption of methylmercury-contaminated fish has been characterized by many symptoms including tingling in the extremities, impaired vision, hearing, taste, and smell, incoordination, weakness, slurred speech, irritability, memory loss, depression, and insomnia. Pregnant women who have ingested organic mercury have given birth to infants with severe brain damage. The evidence that the brain damage was caused by organic mercury is very strong [1].

Inhalation Exposure. The RfC of 0.0003 mg/m^3 is based on a NOAEL of 0.009 mg/m^3 determined for humans exposed by inhalation [6]. Metallic mercury diffuses rapidly across lung membranes into the blood. Studies have shown that about 74 to 80% of inhaled elemental mercury vapor is retained in human tissues. Exposure to a metallic mercury vapor concentration of 28.8 mg/m^3 for 1 to 30 hours reportedly caused death in rabbits. In humans, death reportedly occurred following exposure to about 1.1 mg/m^3 diethylmercury vapor for 4 to 5 months. Symptoms of exposure to metallic mercury vapor in humans include chest pains, dyspnea, cough, hemoptysis, impairment of pulmonary function, tremors, insomnia, decreased motor function, headaches, decreased libido, and irritability. Some kidney damage in humans may occur at vapor concentrations of elemental mercury of 0.1 mg/m^3. Inorganic mercury vapor has been reported to cause menstrual disturbances and spontaneous abortions in women, and congenital malformations and resorptions in the offspring of exposed female rats [1].

Dermal Exposure. Both inorganic and organic forms of mercury are absorbed by the skin, although the extent of absorption was not reported. Children exposed to inorganic mercury salts dermally, exhibited the following symptoms: tremor of face or extremities, sudden jerky movements, a lack of muscle tone, impaired reflexes, seizures, light sensitivity, deafness, insomnia, and irritability. Symptoms in an adult human exposed dermally to metallic mercury were reported to include headache, tinnitus, and vertigo [1].

ECOLOGICAL TOXICITY

General. Biologically, mercury is considered nonessential and nonbeneficial for plants and animals. It is a highly toxic element that can both bioaccumulate in biota and readily biomagnify through biological food chains, increasing by a factor of three to five at each higher trophic level [7]. Organic forms of mercury such as methylmercury and dimethylmercury are readily bioavailable; are produced by anaerobic bacteria in aquatic sediments; and are more toxic than inorganic mercury. Substantial environmental research has been conducted for this metal.

Vegetation. Mercury is not readily taken up by plants. Most higher vascular plants are resistant to mercury poisoning, although they may accumulate it to a limited degree [8]. Symptoms of toxicity include stunting of seedling growth and root development, and an inhibition of photosynthesis causing yield reduction [9]. Mercury concentrations in plant leaves range from 0.001 to 0.01 ppm [10]. The phytotoxic concentration of mercury in the soil was reported to be greater than 10 ppm (USEPA, 1983). Phytotoxic levels reported from four studies range from 0.3 to 5 mg/kg (soil dry weight) [9].

Aquatic Life. The most serious mercury contamination in the aquatic food chain occurs with methyl mercury. Methylmercury is very soluble in water, which means it is readily accumulated by aquatic organisms. Freshwater plants appear to be less sensitive than freshwater fish or invertebrates to methyl mercury. Bioaccumulation of mercury was markedly enhanced at elevated water temperatures, reduced water salinity or hardness, reduced water pH, increased age of the organism, and reduced organic matter content of the medium; in the presence of zinc, cadmium, or selenium in the solution; and after increased duration of exposure [11]. Mercury toxicity varies among species, with concentrations in water of 0.1 to 2.0 μg/L fatal to sensitive aquatic species and concentrations of 0.03 to 0.1 μg/L associated with significant sublethal effects [11]. Spawning in fathead minnows was inhibited by 0.00012 mg/L mercury, and the entire test population was killed by 0.0008 mg/L in 3 months [7]. Other studies with the same species, however, found only detrimental effects at 0.12 mg/L and no toxic effects at 0.07 mg/L [7]. Fish toxicity from mercury ranges from 30 μg/L (guppy) to 1,000 μg/L (*Mozambique tilapia*) [9]. In fish, the biological half-life of mercury is between 1 and 3 years [7]. Bioconcentration factors range from 5,000 for mercury to 4,000 to 85,000 for methylmercury [9]. For aquatic life protection, mercury water levels should not exceed 0.012 μg/L (4-day average) or 2.4 μg/L on an hourly average [11]. The federal chronic freshwater quality criterion for mercury is 0.012 μg/L [12].

Wildlife. Mercury in birds and mammals can adversely affect reproduction, growth and development, behavior, blood chemistry, coordination, vision, hearing, and metabolism [9]. Environmental concentrations of 0.1 ppm or greater would have significant detrimental effects on waterfowl population dynamics [7]. Intensive studies have been conducted on mallards. Studies of over three generations of mallards have shown that methylmercury fed in concentrations as low as 0.5 ppm resulted in reduced reproductive output and altered behavior in young ducklings. This concentration is calculated to be equivalent to 0.1 ppm in a wild diet [7]. Acute oral LD_{50} based on tests with five other bird species ranged from 2.2 to 37.8 mg/kg for methylmercury and 11.5 to 75.5 mg/kg for ethylmercury. The LD_{50} in mule deer for organomercury is 17.88 mg/kg [9]. Bowen [14] reported that a dietary intake of 800 ppm mercury (as HG^{+2}) was lethal to rats (study duration not provided). The biological half-life for mercury is 20 to 70 days in most species. The biological half-life of methylmercury in mammals is 70 to 80 days [7].

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THALLIUM

CAS NUMBER

7440-28-0

COMMON SYNONYMS

None.

ANALYTICAL CLASSIFICATION

Inorganic.

PHYSICAL AND CHEMICAL DATA

Water Solubility: Insoluble [1]
Vapor Pressure: Negligible at 25°C [2]
Henry's Law Constant: ND
Specific Gravity: 11.85 [1]
Organic Carbon Partition Coefficient: ND

BACKGROUND CONCENTRATIONS

Thallium is a naturally-occurring element. It can be found as crookesite in Sweden, as lorandite in Greece, and as hutchinsonite in Switzerland. The estimated occurrence of thallium within the Earth's crust is 0.7 ppm [1]. No data on thallium were gathered as part of the 1984 Department of the Interior survey of conterminous United States soils [3]. Therefore, no reference point other than the 0.7 ppm world-wide average is available for Ohio soils.

FATE AND TRANSPORT

Elemental thallium is a bluish-white, very soft, inelastic, easily fusible, heavy metal. It will oxidize superficially in air forming a coat of thallium oxide. It will react with nitric and/or sulfuric acids, but only slightly so with hydrochloric acid [1]. Thallium exists in either monovalent (thallous) or trivalent (thallic) forms; thallous being much more common. Thallic salts are readily reduced to thallous salts; virtually all are chemically reactive with air and moisture. Volatilization of thallium and its salts is not expected to occur at ambient temperatures and pressures. Elemental thallium is insoluble in water; thallium salts show a moderate to high degree of solubility (i.e.: thallium sulfide exhibiting solubility to 200 mg/L; and thallium fluoride exhibiting solubility to 780 g/L) [2]. Therefore, thallium is expected to be relatively mobile in aquatic environments and/or moist-to-wet soils. Thallium shows some tendency to bioconcentrate in aquatic organisms [4].

HUMAN TOXICITY

General. In humans, ingestion of large amounts of thallium can affect the nervous system, lung, heart, liver, and kidney [4]. The USEPA currently provides no toxicity values for metallic thallium [5,6]. Oral RfD values are available, however, for many thallium compounds and are based on the oral RfD of 0.00008 mg/kg-day for thallium sulfate [5]. This RfD is based on a NOAEL of 0.25 mg/kg-day for no adverse effects in a subchronic study in rats [5].

Oral Exposure. Animal studies indicate that thallium is completely absorbed when ingested. Evidence also suggests that thallium is well absorbed in humans. Estimates of the oral LD_{50} for rats vary from 32 to 39 mg/kg. A NOAEL (for death) of 0.2 mg/kg/day for 90 days was determined in rats. Male rats receiving 0.7 mg/kg/day (the LOAEL) for 60 days experienced adverse reproductive effects. The most likely route of human exposure is via direct ingestion. Indirect ingestion of dust may occur following inhalation [4].

Numerous human deaths have occurred following oral exposure to thallium. Damage to several systems have been reported, including the nervous system, cardiovascular system, liver, kidney, and muscles [4]. At physiological pH, thallium is soluble. The exact mechanism of toxicity is unclear; inhibition of enzymatic reactions and/or oxidative phosphorylation are the most likely toxic actions. Thallium poisoning in humans is insidious with four generalized stages. They are as follows:

(1) Immediate (3-4 hours): nausea, vomiting, diarrhea, and possibly hematemesis.

(2) Intermediate (hours to days): central nervous system dysfunction, peripheral nervous system dysfunction, autonomic nervous system dysfunction, ophthalmologic effects, and dermal effects.

(3) Late (2-4 weeks): dry and scaly skin, white stripes across nails, and scalp/facial hair loss;

(4) Residual (months): central/peripheral nervous system abnormalities (ataxia, tremor, foot drop, memory loss).

Thallium is an acknowledged cumulative poison. It has an average lethal adult dose of 1 g of soluble thallium salts [4,7]. Elemental thallium has shown lethality at a dosage of 4.4 mg/kg [8].

Inhalation Exposure. No reliable information was located on pulmonary absorption of thallium [4]. Occupational studies indicate that thallium may adversely affect the human nervous system following inhalation [4].

Dermal Exposure. No reliable information was located on the dermal absorption or adverse health effects of thallium following dermal contact [4].

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ZINC

CAS NUMBER

7440-66-6

COMMON SYNONYMS

None noted.

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: 7.14 at 25/4°C [2]
Organic Carbon Partition Coefficient: NA

BACKGROUND CONCENTRATIONS

Zinc is a naturally occurring element essential to many life forms [1]. It is widespread in nature and may be found in many known compounds. The estimated occurrence of zinc in the earth's crust is 0.02 percent by weight [2]. The concentration of zinc in minimally disturbed soils varies tremendously. A collection of 1,248 soils samples from across the conterminous U.S. determined that 87 percent were less than or equal to 74 ppm, with a geometric mean of 48 ppm, but with a maximum as high as 3500 ppm [3].

FATE AND TRANSPORT

Elemental zinc is a bluish-white, lustrous metal having a distorted hexagonal close-packed structure [2]. It is stable in dry air, but upon exposure to moist air will form a white coating composed of basic carbonate. Zinc loses electrons (oxidizes) in aqueous environments [2]. In the environment, zinc is found primarily in the 2+ oxidation state. Elemental zinc is insoluble; most zinc compounds show negligible solubility as well, with the exception of elements (other than fluoride) from Group VIIa of the Periodic Table compounded with zinc (i.e., $Zn\ Cl_2$, ZnI_2) showing a general 4:1 compound to water solubility level. In polluted waters, zinc often complexes with a variety of organic and inorganic ligands. Therefore, the overall mobility of zinc in an aqueous environment, or through moist-to-wet soils, may be accelerated by compounding/complexing reactions [1].

Zinc has a tendency to adsorb to soils and sediment/suspended solids in waters. Adsorption to sediments/suspended solids is the primary fate for zinc in aqueous environments, and will greatly limit the amount of solubilized zinc. Zinc is an essential element and, therefore, is accumulated by all organisms. Zinc concentrations in air are relatively low except near industrial sources. Volatilization is not an important process from soil or water [1].

HUMAN TOXICITY

General. Zinc is an essential trace element, therefore, toxic effects can result if too much or too little is taken into the body. The Recommended Dietary Allowances (RDAs) for zinc are 15 mg/day for men and 12 mg/day for women [1]. The major targets of zinc toxicity are the gastrointestinal tract following oral exposure and the lungs following inhalation exposure [1]. Zinc is not mutagenic and has been placed in weight-of-evidence Group D, indicating that it is not classifiable as to human carcinogenicity, by the USEPA [4].

Oral Exposure. A chronic oral RfD of 0.2 mg/kg/day is based on a LOAEL of 2.14 mg/kg/day for anemia in humans [5]. Approximately 20-30% of an oral dose of zinc is absorbed by the gastrointestinal tract [1]. Zinc has not been reported to be fatal to humans and oral LD$_{50}$ values in animals are not available [1]. In humans, gastrointestinal effects (vomiting, abdominal cramps, diarrhea) and hematological effects (anemia) have resulted from oral exposure to doses greater than 2 mg zinc/kg/day. Long-term administration of zinc can result in copper deficiency [1]. In animals, effects on the liver and kidneys, as well as the gastrointestinal and hematological systems, have been reported [1]. Studies in animals indicate that exposure to high doses of zinc (200 to 500 mg/kg/day) results in reduced fetal growth and altered concentrations of zinc and copper in both the mother and fetus [1]. There is no evidence that exposure to zinc affects development or reproduction in humans. There is no evidence that zinc causes cancer in humans or animals following oral exposure, therefore, an oral Slope Factor is not available [4].

Inhalation Exposure. A chronic inhalation RfC is not available for zinc [4]. Zinc is absorbed through the respiratory tract, but the extent of absorption is not known. In humans, death has resulted from exposure to high concentrations (estimated at 97,635 mg/m^3) of zinc-containing smoke [1]. In mice, the reported LCT$_{50}$ (product of lethal concentration and time to kill 50% of the animals) of zinc chloride was 11,800 mg-min/m^3 [1]. Short-term exposure to zinc dust and zinc fumes results in "metal fume fever". This condition is characterized by an acute impairment of pulmonary function. Acute (10-12 minutes) inhalation of 600 mg zinc/m^3 as zinc oxide has resulted in nasal passage irritation, cough, chest pain, lung rales, and decreased vital capacity. No symptoms of metal fume fever were reported following exposure to zinc oxide at 14 mg/m^3 for 8 hours, 45 mg/m^3

for 20 minutes, or occupational exposure to 8-12 mg/m^3 [1]. Information is not available regarding effects on reproduction or development in human or animals following inhalation exposure. There is no evidence that inhaled zinc causes cancer in humans or animals, therfore, an inhalation Unit Risk is not available [4].

Dermal Exposure. Zinc has not been reported to be fatal in humans or animals following dermal exposure. Topical application of zinc (in the form of zinc oxide or calamine lotion), however, is used to promote healing of burns and wounds [1].

ECOLOGICAL TOXICITY

General. Zinc is an essential trace element for plants and animals. It is the most mobile of the metals in surface water systems, but only moderately mobile in soil/water systems [6]. Zinc is bioaccumulated by all organisms, but it does not biomagnify in terrestrial or aquatic food chains.

Vegetation. Studies of bulrush, sedge, cattail, and reeds indicate relatively high zinc absorption ability [7]. Bioavailable zinc is readily accumulated in the leaves of many plants; however, it is of low availability to animals, probably due to the formation of insoluble complexes of zinc with calcium and phytic acid in the plants [8]. The phytotoxic level of zinc in the soil ranges from 500 to 2000 ppm, with toxicity being enhanced under acidic soil conditions. The normal range of zinc in leaves of various plants is 15 to 150 ppm, and the maximum suggested concentration in plants to avoid phytotoxicity is 300 ppm [9]. Plant species exhibit a wide range of tolerances to zinc concentrations in soils.

Aquatic Life. Extensive test data are available for zinc effects on aquatic life. The acute lethal toxicity of zinc is greatly affected by water hardness, with soft water being more toxic than hard water. Both an increase in temperature and a reduction in dissolved oxygen also increase zinc toxicity [7]. Zinc is most toxic in aquatic biota at a pH of 8.0, and least toxic at a pH of 6.0 [6]. Fish growth was inhibited by zinc at a concentration of 0.05 to 0.08 mg/L, swimming was impaired at 0.06 to 0.3 mg/L, and reproduction was reduced at 0.05 to 0.88 mg/L [7]. The 96-hour LC_{50} for fathead minnows was 33,000 μg/L at a water hardness of 360 mg/L $CaCO_3$ [10]. The federal chronic freshwater quality criterion for zinc is 343 μg/L based on a water hardness of 400 mg/L $CaCO_3$ [11].

Wildlife. Animals are generally protected from zinc poisoning through plant consumption because high concentrations of zinc are phytotoxic before they accumulate in toxic concentrations in plant tissues eaten by animals [9]. Zinc compounds are relatively nontoxic to animals, particularly mammals, because animals can physiologically regulate the absorption and excretion of this metal. For example, a dietary intake of 2,500 ppm zinc produced no discernable effects in rats, while 10,000 ppm is required to induce high mortality. A zinc concentration of 2.2 g/kg in rats and 1.9 to 2.2 g/kg in rabbits was lethal [8].

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Appendix J

Ecological Field Survey Notes

SCAD 4 - 9/9

AREA AROUND ABANDONED BUILDINGS

Mocking bird
Starling
Brown thrasher
Blue Jay
Daucus carota
wild rose
Solidago ~~sp~~ graminifolia
Great Crested Flycatcher
Vitis sp
Parthenocissus
Rubus idaeus
Trifolium repens
Linaria vulgaris
Dipsacus sylvestris
Populus deltoides
Solidago canadensis
white-tailed deer
Plantago lanceolata
Crataegus
Eastern cottontail - everywhere
Taraxacum officinale

Tragopogon porrifolius
Cichorium intybus
Verbascum thapsus
turkey vulture
Cornus stolonifera
Juniperus virginiana
Asclepias syriaca
Aster-novae angliae
Baptisia? ~~tiny yellow flowers~~ tinctoria
Acer rubrum: occasional sapling
Bobcat scats
Oenothera biennis
great blue heron

7/11
Achillea millefolium
Hieracium sp.
chickweed
Oxalis stricta
Phragmites australis
bluegrass
Rudbeckia hirta

Man made shale pit/pond
algae mats
no litteral vegetation or
emergents
black floc/strong S odor
lots of tracks around edge
- deer, birds, & raccoon

12" pipe on SW side
discharges to depression
on other side of berm
Typha Solidago
Populus Salix
Ambrosia
in depression (≈20x20')

water in pond ≈ 3' deep
about 3½-4 feet below
normal elevation
seined-dip netted
bass ≈ 3-4 inches long

9/10
SCAD 7
Old field next to RR
cardinal
mourning dove

successional shrub
Rhus ?
Prunus serotina
gray squirrel
cardinal
titmouse
Prunus sp.
Rhamnus
Red osier
Vitis
red-tailed hawk
Toxicodendron
Phytolacca
blue jay
Dipsacus sylvestris
Achillea millefolium
Daucus carota
E. cottontail
Bobcat scat

9/12
Forested Area near RR
Mature trees
Populus
Juglans ?sp
Morus alba (sapling)
Fraxinus
Acer (silver)

Wetlands (sc channelized)
drained
closed canopy
understory - poison ivy & Va creeper
~~grey birch~~ Betula populifolia
Fraxinus americana
Quercus rubra
" alba
Acer rubrum
Acer (~~silver~~) saccarum
Tilea americana
~~cotton~~ Populus deltoides
Quercus prinus
common yellow-throat
Salix
Robin · Kestrel
Boehmeria

9/10
SEAD 4
Old field next to RR
cardinal
mourning dove

successional shrub
Rhus ?
Prunus serotina
gray squirrel
cardinal
titmouse
Prunus sp.
Rhamnus
Red osier
Vitis
red-tailed hawk
Toxicodendron
Phytolacca
blue jay
Dipsacus sylvestris
Achillea millefolium
Daucus carota
E. cottontail
Bobcat scat

9/12
Forested Area near RR
Mature trees
Populus
Juglans ?sp
Morus alba (sapling)
Fraxinus
Acer (silver)

Wetlands - (SE channelized) drained
closed canopy
understory - poison ivy & Va creeper
grey birch Betula populifolia
Fraxinus americana
Quercus rubra
" alba
Acer rubrum
Acer (~~silver~~) saccarum
Ilex americana
~~cotton~~ Populus deltoides
Quercus prinus
common yellow-throat
Salix
Robin Kestrel
Boehmeria

Shrubland near RR

Rufous-sided towhee
Robinia pseudo-acacia
fern · Dryopteris ?
ditch - Equisetum hyemale
red tailed hawk - edge
turkey - chickadee
eastern bluebird - edge

Indian Creek stream bed
~~stops~~ no flow -
shallow pools
Rhus
Vitis
acer rubrum
Populus
Salix
Q. rubra

Ditch on roadside igloo area
Equisetum
purple loosestrife
Pontederia
cattail

4/13

Old Field -

Red osier
Rhamnus
~~knapweed~~ Centaurea
Mannagrass
Linaria vulgaris
Dactylis
Vitis
Panicum sp.
Plantago lanceolata
Solidago canadensis
turkey vulture
mockingbird
deer
Starling
Crow
Verbascum
Daucus carota
Melilotus alba
catbird
Tree swallow
Ambrosia artemisiifolia
Rubus

red fox
opossum
gray squirrel
cottontail rabbit
small rodent trail
all over
Fragaria virginiana
white daisy ?
Oxalis (yellow)

Impoundment @ Patriot Road
near airport
(dry)
Phragmites
Typha
Raccoon
purple loosestrife

(discharge pipe blocked)
killed trees adjacent
to road.

9/13

Forested uplands - near glades
& roads
Elm Ulmus americana
Robinia
~~gray bir~~ Betula populifolia
Toxicodendron
Lichen
Rhus typhina
Rubus
Juniper
Ailanthus altissima
Carya glabra
Parthenocissus
starling
Robin
Ambrosia artemisiifolia
Carya ovata
Fraxinus americana

Appendix K

Response to Comments

Response to Comments
from
T. Enroth, USACE, New York District, Seneca Office for Project Management

Pre-Draft Remedial Investigation (RI)
Munitions Washout Facility (SEAD-4)
Seneca Army Depot Activity, Romulus, New York
Comments received July 13, 1999

1: Page viii, List of Figures, Title of Fig. 1-12

a. change …SEDA1-49 to …SEDA

Response: Agreed. The title has been corrected.

2: Section 1.3.1

General Comment- this section needs to demonstrate that there is sufficient information known about the site. It currently gives the impression to the reader that the use of the buildings and the site is somewhat vague. If there are data gaps in building information, state what is known about it without saying "unknown" or "might have been", etc.

Response: Agreed. Section 1.3.1 has been rewritten. Reference has been made in the text for the reader to refer to Section 3.1, which presents more information about the buildings from the building survey conducted during the RI field program.

a. para 1, 2nd sentence: delete "which is still in use today." Sentence can be added to state that building 2073 is the only building of the complex that is currently used.

Response: Agreed. The referenced phrase has been removed. A sentence has been added to paragraph 3 stating that Building 2073 is the only building currently being used.

b. para 3, last sentence: remove "…and a third building of unknown use". Replace with new information about T-30 in the building complex.

Response: The "third building of unknown use" is not Building T-30. The referenced building, which was demolished, was located east of the former Munitions Washout Building and east of the Baseline

Road. The building is now identified on Figure 1-3. The referenced phrase was removed from the text and the building is now designated as the "unnamed building".

c. para 4, third sentence: remove "...which might have been used.." The descriptions need to show that more information is known about the complex of buildings in the workshop area.

Response: No additional was found about the "decontamination building". The text was not changed.

d. Figure 1-3 Site Map for SEAD-4, The words "POND" and "FORMER T30" are repeated twice at their locations on this figure and other figures.

Response: Agreed. The referenced words have been removed from Figure 1-3 and from other figures.

e. para 5, #6 Building 2084- there was also a paint booth and drying oven inside (I will send additional information from a building archive search). Also it is mentioned in section 1.3.1, para 3 that there are 11 buildings in the complex but only 8 here are identified

Response: Agreed. The list of buildings in Section 1.3.1 has been modified to include all 11 buildings. The existance of a paint booth and drying oven was added to this list also.

f. para 6 This paragraph can be re-written with the information from the design plans Mr. Duchesneau has showing the washout plant process

Response: Agreed. Additional information about the washout process, specifically the formation of pellets, has been added to this paragraph.

g. para 7 Remove the second to the last sentence " A former employee indicated...." as this is only what one employee remembers and we have no proof of the validity.

Response: Agreed. The sentence has been removed.

h. para 8, first sentence "....for decontamination of equipment or employees." Remove "or employees" as this seems illogical

Response: Agreed. The words have been removed.

3. Section 1.3.2 Site History

para 3, General Comment- The details of the operation are better understood than it relates here, the information from the design plans should clarify some info here.

Response: Agreed. Additional information about the activities conducted inside the buildings and the dates have been added to the text. The text has been revised to refer the reader to Sections 1.3.1 and 3.1, which describe the activites of the site in more detail.

b. last para of this section discusses soil samples from 1990 analyzed for explosives, these results should be in an appendix

Response: Agreed. The table of results has been added to the Appendix.

4. Section 1.3.3 Previous Investigations

a. Expanded SI Report, para 5, mentions a "vertical pipe" that was sampled. This pipe needs to be explained as to what/where/why

Response: Agreed. A sentence has been added stating that the pipe is associated with the concrete holding tank adjacent to the leach field on the northern portion of the site.

5. Section 1.4.2 Geology at SEDA

a. Table 1-4 Column headings are repeated in first row of each table, delete repeat

Response: Agreed. Table 1-4 has been revised.

6. Section 2.3 Geophysical Program

a. Figure 2-1 The location of the 4" vertical pipe is noted. Is this the septic tank pipe?

Response: This pipe is the surveyed location of the 4" vertical pipe, which is associated with the leach field.

7. Section 2.4 Building Investigations

a. Figure 2-4 The SW corner of the figure notes "unmarked pair of wells (unopenable)", these are vents associated with the underground storage tank that is in use. Call Tom Grasek at 607/869-1450 for active tank size, age, location, etc information. It is associated with the near-by stand pipe. This building also houses a permitted paint booth.

Response: Agreed. Figure 2-4 has been revised to label the UST vents.

b. Figure 2-5 Change description of 50' Dia. Storage Tank to "50' Dia Water Storage Tank"

Response: Agreed. The description has been revised on Figure 2.5.

8. Section 2.5 ESI Program

a. Bullets- the last bullet about aerial photo info says " A discharge pipe form the former washout facility to the pond". True? Does the pipe go from washout building to pond?

Response: The phrase "from the former washout facility" has been removed. It is not known to which building the pipe extents.

b. Section 2.5.2, Figure 2-9 shows "approximate location of 13" manhole" at what was previously noted as "vertical pipe" location. Fix maps to be consistent.

Response: Agreed. The description has been revised on Figure 2-9 and other figures.

9. Section 2.6.2 Monitoring Well Development

a. Last paragraph, last sentence states "In all instances at least one will volume was removed." This does not track with Table2-6, Well Volume Removed column. Same with Table 2-8 and reference on page 2-49 first paragraph about well volumes removed.

Response: Agreed. The data in Table 2-6 has been corrected. At least one well volume was removed during the well development for the ESI and the RI.

The referenced paragraph on page 2-49 discusses the purging procedure for fast recharging wells. In that case, three well volumes are removed. For the slow recharging wells, enough well volume is removed to obtain stabilization of the field parameters as indicated in the text.

10. Section 3.1 Site Features

a. para 5 states a 6" dia clay pipe discharges into the pond. Some figures have this labeled as a "4" buried concrete pipe", other figures as 6' clay pipe. Correct figures to actual findings

Response: Agreed. The figures have been revised to reference a 6" clay pipe.

b. The discussion in para 5 about the pipe is confusing. Earlier in the report, it states aerial photos show the pipe from building to pond, and here it states the pipe does not connect the pond to the former munitions washout building. What is known about the size, type, and location of the pipe?

Response: Aerial photos indicated the presence of the 6" clay pipe. Based on the aerial photo information, test pits were dug during the ESI field program in order to locate the pipe and to determine to which building the pipe was connected. As the text states, no evidence of the pipe was found 400 feet from the pond and therefore, it could not be concluded that the pipe connected to the former munitions washout building as was suspected.

c. **para 6**- If better information is now available as to the name, #s, and use of the other buildings, update this paragraph

Response: No further information was obtained about the unnamed building, which is not Building T-30. Section 1.3.1 has been updated to include the names of the buildings.

d. para 9- According to the last three sentences, there is a location known as the ammunition dumping grounds at SEAD-4 in the northern part where open burning of propellant occurred in 5 open burning pits???????? Where did this information come from, do the pits really exist, why are they not on any map, was geophysical done to locate these pits, etc..???? This statement needs to be fully substantiated or removed completely.

Response: Agreed. The text discussing the ammunition dumping grounds at SEAD-4 has been removed.

e. para 11- Remove this paragraph, building 612 was built in 1954 and does not feature an operation as the munitions washout facility had. True is that ammunition is taken apart and the powder removed, however it may only be speculation that the entire operation was moved to another building

Response: Agreed. The referenced paragraph has been removed.

f. para 13- Revise if better information is known about the washout plant AND one sentence states " The wastewater was then disposed of on-site" which may be true but we do not really know for sure and where it was disposed of. Information on the removed UST's from the site can be obtained from Tom Grasek at 607/869-1450.

Response: Agreed. The formation of pellets was added to the discussion.

Section 3.5.2 EM-31-Survey

a. para 1 discusses 5 areas that were surveyed. One area is known as "the Indian Creek Burial Site"?? The last para of this section and Section 3.5.3 also discusses "the Indian Creek Burial Site" as it was surveyed with the EM-31. Is this area part of SEAD-4? Appendix A figure 2 of this site does not show any reference point other than a culvert under a road, however it seems to be by the airfield just west of SEAD-11. Is this an EBS site?? If so, why is it discussed in this RI? This is very misleading and will raise questions as the name alone makes it sound as if an area from SEAD-4 is a missing burial site. Remove all reference to this here and note in the Appendix A report what the area referred to as AOC 2 ("the Indian Creek Burial Site") is associated with.

Response: Agreed. References to the Indian Creek Burial Site has been removed from the report. The additional geophysical work conducted at this AOC was part of an EBS investigation. A note has been added to the report in Appendix A stating the association of AOC 2.

b. Figure 3-6 and 3-7 show the buried pipe as 4" diameter concrete? Is this the 6" pipe?

Response: Agreed. The figures have been modified.

Section 3.5.3 GPR Survey

a. See above discussion about the "the Indian Creek Burial Site" mentioned here too.

Response: Agreed. The reference to the Indian Creek Burial Site has been removed.

b. This section is not conclusive as to what the GPR did or did not detect. Please summarize the info from Appendix A here

Response: Agreed. The section has been rewritten.

Section 5.2.1.1 Fate of Inorganics (metals)

a. **page 5-8, para 3,** 3rd and 4th sentences do not belong to this SWMU as they discuss the fate as associated with the deactivation furnaces.

Response: Agreed. The sentences have been removed.

END OF COMMENTS

Response to Comments
from
U.S. Army Engineering and Support Center, Huntsville
4820 University Square
Huntsville, AL 35816-1822

HTRW REVIEW COMMENTS
CONTRACT DACA87-95-D-0031

Pre-Draft Remedial Investigation (RI)
Munitions Washout Facility (SEAD-4)
Seneca Army Depot Activity, Romulus, New York
Comments Dated July 9, 1999

NAME: BAVE
OFFICE: CENWO-HX-T
DISCIPLINE: REG
LOCATION: TABLE 1-1
COMMENT NUMBER: 9664307-4

A clarification regarding waste code determinations for the Table 1-1 entries should be added to the text. Specifically, a statement as to why and how these materials have been classified as D001 ignitable should be added. Several propellants listed would appear to be D003 reactive vs. ignitable (i.e. dinitrotoluene, nitrocellulose, nitroglycerin etc.)

The purpose of waste code entries should also be explained to the reader and a discussion of potential RCRA "impacts" to the future work needs to be discussed. A narrative discussion of "redwater" is presented on page 1-6, however there is not a summary or conclusion on whether or not K047 "code" is relevant to the historic activities.

RESPONSE: Tables 1-1 and 1-2 have been removed from the report.

NAME: KEETON
OFFICE: CENWO-HX-G
DISCIPLINE: GEO
LOCATION: Figures 3-4 & 3-5:
COMMENT NUMBER: 7911072-284

Comment: Figure 3-4 (Geological Cross Section A-A'), and Figure 3-5 (Geological Cross

Section B-B'). On figure 3-4, boring SB4-3 is shown as having weathered shale at the bottom of the boring, and the cross section is drawn showing this weathered shale layer. However, on figure 3-5, boring SB 4-3 is shown again, but this time without the shale layer at the bottom, and the cross section does not show this shale layer at all. The boring log for SB 4-3 in appendix B does show this weathered shale near the bottom of the boring, and this should have been shown on figure 3-5. Likewise, borings MW 4-7, and SB 4-13 on figure 3-4, have weathered shale described on their logs in Appendix B, but the borings do not have weathered shale described on them in figure 3-4, although weathered shale is shown in the cross section to pinch out just below the borings.

Response: Agreed. The weathered shale layer has been shown on Figure 3-5 for soil boring SB4-3 and on Figure 3-4 for soil borings MW4-7 and SB4-13.

Comment: The contacts between lithologic units should be shown in the borings on the cross sections, and the contacts on the cross sections should connect with the contacts in the borings depicted on the cross sections. Interpretations for where the contacts are for the various geologic units should be consistent for the same borings on all the cross sections.

Response: Agreed. The lithologic have been shown in the borings on the cross sections.

Comment: On the boring log for MW 4-3/SB 4-3, it is stated that the boring was augured to 9.0 ft, however, a line is drawn on the depth part of the log at 10 ft, while there is no bottom of hole, or end of boring line drawn in the sample description part of the log. The bottom of hole depths, likewise are not shown, or do not correlate with lines drawn for the bottom of the hole for boring logs SB 4-1/MW 4-1, SB 4-2/MW 4-2, SB 4-4/MW 4-4, SB 4-5, MW 4-5, SB 4-6, SB 4-7, SB 4-8, SB 4-9, and SB 4-10. It is very confusing.

Response: Agreed. The boring logs for the referenced soil borings have been revised.

Comment: How for some borings the numbers for the Monitoring Wells (MW) are the same for the same soil boring (SB) logs, and some, like SB 4-10 and MW 4-10 appear to be different borings, with different logs.

Response: As shown on Table 2-3, which clarified the numbering system, monitoring wells MW4-1 through MW4-5 correspond to soil borings SB4-1 through SB4-5, which were installed during the ESI field program. Monitoring wells MW4-6 through MW4-13 (except MW4-10), which were installed during the RI field program, do not correspond to soil borings. Only monitoring well MW4-10, which was installed during the RI field program, corresponds to a soil boring, SB4-14. The text describes the locations of the soil borings and monitoring wells.

Comment: Many of the hand written boring logs are unlegible, and are poorly written.

Response: Agreed. Soil boring logs SB4-1 through SB4-10 were transcribed.

Comment: Also, the top hole elevation for SB 4-3 in Appendix B is shown as 697.6, however, on the cross section in figures 3-4, and 3-5, it is shown as about 700 ft, according to the vertical scale on the side of the cross section, which it self appears to be in error. At a scale of 1 inch equals 5 ft, each division on the scale should be 1.25 ft. On figure 3-4, the elevation shown, as 696.6 should be 697.75, elevation 701.4 should be 700.25, elevation 701.6 should be 702.75. Likewise on figure 3-5, the elevation shown as 688' should be 688.5'.

Response: Agreed. The cross section has been revised for the area around SB4-3/MW4-3. In addition, the vertical scales on both figures have been corrected.

Comment: The geologic cross sections, as well as the hand written boring logs are unacceptable, and should be redone.

Response: The geologic cross sections and boring logs have been revised.

NAME: KEETON
OFFICE: CENWO-HX-G
DISCIPLINE: GEO
LOCATION:
COMMENT NUMBER: 7911072-285

NAME: MEAD
OFFICE: CEMRO-HX-G
DISCIPLINE: CHEM ENGR
LOCATION: 2.8 ANAL PGM
COMMENT NUMBER: 9875793-339

Comment: In addition to data for hazardous and toxic chemicals, other data is often needed for the selection and design of the remedial processes. For example, if air stripping or carbon adsorption are being considered for removal of VOCs from the ground water, it is very important to know the concentration of iron and calcium in the water because iron and calcium can chemically precipitate and plug the process. Iron using bacteria can also foul the process. By knowing this, the water can be pre-treated to remove the iron and calcium . Or, in the case of an air stripper, the column can be acid treated to mitigate the fouling that will occur.

Common soil parameters are also needed to evaluate the feasibility of thermally treating soil that is contaminated with organic chemicals. Some chemicals in the soil cause slag to form on the thermal unit. Other chemicals are corrosive.

The physical and chemical data that may be needed in addition to the toxic and hazardous chemical data follows. This data should be evaluated for collection and analysis on any subsequent sampling events at the site.

PROCESS ANALYTICAL PARAMETER	FIELD OR LABORATORY	METHOD OF ANALYSIS	NOTES
Water Parameters			
pH (units)	Field	Meter	
Dissolved Oxygen test kit	Field	Meter, field test kit	
Temperature	Field	Meter	Natural Attenuation
Eh (redox potential	Field	Meter	Natural Attenuation
Carbon Dioxide (CO^2)	Lab		Natural Attenuation
Hydrogen Sulfide (H2S)	Field	Kit	Natural Attenuation
Dissolved Hydrogen	Field ($$)	Instrument	Natural Attenuation
Dissolved Methane (CH4)			Natural Attenuation
Bicarbonate (HCO3-)	Lab		
Carbonate (CO3=)	Lab		
Sulfate (SO4=)	Lab		
Chloride (Cl-)	Lab		
Fluoride (F-)	Lab		
Nitrate (NO3-)	Lab		
Nitrate (NO2-)	Lab		
Iron (Fe) (total ++, +++)	Lab		
Dissolved			
Calcium (Ca++)	Lab		
Potassium (K+)	Lab		
Magnesium (Mg++)	Lab		
Sodium (Na+)	Lab		
Manganese (Mn++)	Lab		
Total Organic Carbon (TOC)	Lab		
Dissolved Organic Carbon (DOC)	Lab		
Total Dissolved Solids (TDS)	Lab		

Response: Agreed. This information is important in the evaluation of various remedial designs and will be considered in future investigations. Currently, pH, DO, temperature, and Eh are measured routinely in the field.

NAME: MEAD
OFFICE; CEMRO-HX-G
DISCIPLINE: CHEM ENGR
LOCATION: 2.8 ANAL PGM
RM/DETAIL: GENERAL
COMMENT NUMBER: 9875793-3406

Continuation of previous comment:

Soil Parameters	
Nitrogen, Nitrates, Nitrite	Lab
Phosphorous	Lab
TOC	Lab
Ignitability	Lab
Reactivity	Lab
Corrosion Potential	Lab
Plasticity (Atterberg Limits)	Lab
Incineration	
Heat Content (btu/LB)	Lab
Ash Fusion Temperature	Lab
Halides	Lab
Sodium	Lab
Sulfur	Lab
Moisture Content	Lab

Response: Agreed. These parameters will be considered in future investigations.

Response to Comments
From
United States Environmental Protection Agency (US EPA)

Draft Remedial Investigation (RI)
Munitions Washout Facility (SEAD-4
Seneca Army Depot Activity, Romulus, NY

Comments Dated March 10, 2000

This is in reference to the above subject document dated November 10, 1999. EPA reviewed the subject report and submits the following comments. The general comments address concerns that pertained to the entire document. The specific comments address concerns for individual sections.

GENERAL COMMENTS

1. In the Baseline Risk Assessment section of the RI Report, inorganic contaminants of potential concern (COPCs) were determined by comparing inorganics results for the Munitions Washout Facility (SEAD-4) samples against facility-wide soil and groundwater background values. For this comparison, all inorganic analyte concentrations for SEAD-4 soil and groundwater were averaged and compared against Seneca-wide background concentrations for the respective analytes (Section 6.2.3). Only analytes with average concentrations at SEAD-4 exceeding two times the facility-wide average were retained for the risk assessment. The report does not present a statistical evaluation of the data (distribution, standard deviation, etc.).

   Furthermore, both surface and subsurface soil results appear to have been pooled into the SEAD-4 average. Since maximum and average concentrations in surface soil at SEAD-4 appear to be considerably higher for some analytes, this approach has the potential to mask the variability of surface soil contamination and may have eliminated inorganics from further consideration in the risk assessment. Provide separate averages for surface and subsurface soils. Also, state whether sediment sample results from dry creek bed/drainage ditch locations were included in the averaged soil concentrations.

Response: Agreed. Two tables of statistics for of inorganics in soil and groundwater at SEAD-4 have been added to the end of Appendix F as requested in the first paragraph above.

Separate averages for surface and subsurface soils have been added as Tables 6-2B and 6-2C in

Section 6. Sediment from dry creek bed/drainage ditches were not included in the site soil average calculations.

2. The ecological receptors chosen for this ecological risk assessment (ERA) are representative of species addressed in the site description, however, some receptor categories that may merit consideration have been overlooked. These include seed-eating birds; semi-aquatic mammals, which may be exposed to sediments and surface water; amphibians and reptiles. Please explain why these groups of ecological receptors were not addressed in this ERA. Similarly, phytotoxicity screening is not included in this report. A screening of soil concentrations against phytotoxicity data should be done to assess risk to plants.

Response: A granivourous bird receptor (mourning dove) will be added to the risk assessment. In addition, an amphibian receptor will also be included. Semi-aquatic mammals were not included in the screening level risk assessment because of poor habitat quality, no semi-aquatic mammals were observed on the site and the chemicals of concern tend not to bioaccumulate so are not expected to pose and unacceptable risk.

3. Analytical results for groundwater were compared to the lowest value from the following criteria: NY Class GA Standards, Federal Drinking Water Standards MCLs and secondary MCLs. The tables which present this analytical data reference the lowest of these values as the "GW criteria: and do not distinguish which criteria was used. If the values for each of the above criteria are not to be included in the tables, a list with all screening criteria should be included as an appendix for reference. Also, several of the screening criteria presented in the tables were incorrect, as stated in the Specific Comments. After the correct screening values have been added to the tables, the table should be revised accordingly.

Response: Agreed. A table of groundwater criteria has been added to Appendix F, Analytical Results. The screening criteria have been corrected.

4. The report includes a summary section which gives a detailed description of the chemical impacts at the site and the human health and ecological risk characterizations. The report however, does not include a Conclusions section which would have to address data limitations and recommendations for future work or recommendations for remedial action. A Conclusions section should be added to the report. It is also suggested that an Executive Summary section be presented at the beginning of the RI report that summarizes the key elements and findings of the report.

Response: Agreed. A Conclusions section discussing the data limitations and recommendations for future work has been added to Section 8.

SPECIFIC COMMENTS:

1. Section 2.3, page 2-4: GPR and EM-31 surveys to identify the location of former ditch through which washout wastewater was discharged did not include the area near Building 2084 previously identified as the discharge area by the Groundwater Contamination Survey performed by the Army Environmental Hygiene Agency in 1988. Please note that washout discharge may have reached proximity to Building 2084 through an unknown ditch.

Response: Acknowledged. The GPR and EM-31 surveys were conducted to identify the lcoation of the 6" clay pipe which extended from the former Washout Building to the pond. The sentence in Section 2.3 has been revised to state this.

2. Section 4.4, page 4-16: This section should also state that TAGM 4046 also contains maximum soil cleanup objectives values for analyte groups (total VOCs <= 10 ppm, total SVOCs <= 500 ppm, individual SVOCs <= 50 ppm, total pesticides <= 10 ppm) and whether the data for SEAD-4 were compared to these summary cleanup objectives.

Response: Agreed. A discussion of the soil cleanup objective values for total VOCs, total SVOCs, total pesticides, and individual SVOCs has been added to the text.

3. Section 4.4, 1 st paragraph, page 4-16: The definition of surface soil as soil between 0 and 2 inches below the ground surface (BGS) is incorrect. The surface soil sampling depth was defined in the sampling plan which is included in the Generic RI/FS Work Plan (Parsons, 1995) as 2 feet bgs.

Response: Disagree. The Generic RI/FS Work Plan specified the surface soil sampling depth of 0 to 2 inches bgs in Appendix A, Field Sampling and Analysis Plan, page A-30, Section 3.4.4.

4. Section 4.4.1, page 4-17: The NYSDEC Technical and Administrative Memorandum (TAGM) value of 1,200 ug/kg present for trichloroethene in the text is incorrect. This value should be changed to 700 ug/kg.

Response: Agreed. The TAGM value for trichloroethene has been changed to 700 ug/kg.

5. Table 4-3, page 2 of 2: In TAGM 4046, New York State has established an RCO value for total PCBs but not for individual Aroclors. Therefore, only total Aroclor results should be presented and compared against the TAGM PCB value. In addition, the values for Aroclor-1254 and Aroclor-1260 in surface soil (Table 4-3) were incorrect and should be changed to reflect the

RCO for total PCBs of 1,000 ug/kg.

Response: Agreed. Table 4-3 has been revised to present total PCB values.

6. **Table 4-4:** Revise the entry for the TAGM PCB ROCs to indicate that they pertain to total PCBs and identify the background comparison values in the TAGM column (see above comment).

Response: Agreed. Table 4-4 has been revised to present total PCB values and indicate which TAGMs are background values.

7. **Section 4.4.6, page 4-25:** A total of 19 metals were detected in surface soils collected at the site at concentrations that exceed their respective NYSDEC TAGM values. The text states that of these 19 metals, several are more common constituents in soil and are "not considered to pose a significant health risk." Although it is true that such metals as calcium, iron, magnesium, manganese, and sodium are common constituents in soil and considered less toxic, it should also be noted that the maximum concentrations of these metals detected in surface soils samples were well above their respective "average" background concentrations. For instance, Table-1-2 indicates that the average background concentration for iron is 25,221 mg/kg. The maximum iron concentration detected in soils collected during the RI was 64,600 mg/kg. The average background concentration for magnesium is 10, 429 mg/kg whereas the maximum magnesium concentration detected during the RI was 35,300 mg/kg. Prior to making the above statement, a comparison to background values for these constituents should be made.

Response: Agreed. A comparison to average background concentrations for calcium, iron, magnesium, manganese, and sodium has been added to the referenced section.

8. **Section 4.4.6, page 4-26:** The text states that vanadium exceeded the NYSDEC TAGM value in only one surface soil sample. The detected concentration of 1,250 mg/kg significantly exceeds the TAGM RCO value of 150 mg/kg and the Seneca background concentration average of 22 mg/kg. A subsurface sample was not collected at this location (Figure 2-9). The text should identify the sample location, SS4-7 (Figure 2-8). Results for other metals in this sample also exceeded comparison criteria (page 27 of 39, surface soil results table, Appendix F). State how the data for this sample were evaluated and whether these elevated concentrations were spatially delineated.

Response: Agreed. The sample location for SS4-7 has been identified. A sentence has been added stating that concentrations of other metals at this location also exceeded TAGMs. The metals chromium, copper, and lead were spatially delineated in surface soils (Figures 4-4, 4,5, and 4-6).

9. <u>Section 4.4.6, page 4-30:</u> The text states that aluminum exceeds the TAGM value of 19,520 mg/kg in only one subsurface soil sample. Table 4-4 however, indicates that three samples were above the TAGM value. Also, the text states that antimony exceeds the TAGM value in six samples. Table 4-4 however, indicates that 10 samples exceed the TAGM value. These inconsistencies should be corrected.

Response: Agreed. The referenced text has been revised.

10. <u>Section 4.4.7, page 4-33; Section 4.5.7, page 4-39; and Section 4.6.7, page 4-43:</u> According to the text in these sections, nitrate/nitrite-nitrogen were detected in surface soil, subsurface soil, groundwater, surface water and sediment samples. The text reference Tables 4-3, 4-3, 4,6, 4-7, and 4-8 for this analytical data, however, nitrate/nitrite data are not presented in these tables. The tables should be revised to include this analytical data.

Response: Agreed. The nitrate/nitrite-nitrogen data has been added to the referenced tables.

11. <u>Section 4.5.1, page 4-23:</u> The text incorrectly references the NYS Class GA Standard for benzene as 0.7 ug/L. This value should be changed to 1.0 ug/L.

Response: Disagree. The NYS Class GA standard for benzene is 0.7 ug/L. The text has not been changed.

12. <u>Section 4.6.6, page 4-42:</u> The text states that chromium was detected in one sample. Table 4-7 however, indicates that chromium was detected in four samples.

Response: Agreed. The referenced text has been revised.

13. <u>Table 4-8, page 4-45 & 4-46:</u> The New York State sediment criteria used in this table were take from an obsolete 1993 publication, which is also incorrectly referred to in the table header as a TAGM document. The current updated document, *Technical Guidance for Screening Contaminated Sediment* (NYSDEC, 1999) should be used. The table should also indicate that NY State has established a criterion for total PCBs, and not for individual Aroclors. Only total PCB results should be presented and compared against the TAGM PCB criterion.

Response: Table 4-8 has been revised to include new sediment values and total PCB values.

14. <u>Section 4.8, page 4-49:</u> The discussion of the extent of impacts at SEAD-4 should be expanded to include a discussion of hexavalent chromium concentrations at the site.

Response: Agreed. A discussion of the extent of hexavalent chromium impacts has been added to Section 4.8.

15. Table 6-2A: The average background soil concentrations for metals in Table 6-2A do not match those presented in Table 1-2, Table 4-3, and those in the Appendix F results tables for surface and subsurface soil samples. Clearly identify the basis for the presented average (surface soil/subsurface soil, or all background soil samples) and eliminate any inconsistencies.

Response: Agreed. Table 1-2 has been updated and the statistics for site background soil concentrations match those in Table 6-2A.

16. Table 6-2B: The source of the average groundwater background concentrations should be provided.

Response: Agreed. A footnote has been added to Table 6-2 stating that the list of the background groundwater samples are presented at the end of Appendix F.

17. Table 6.3, pages 2 and 4 of 10: The maximum hit for lead of 9,280 mg/kg does not match the maximum lead concentration of 11,200 mg/kg presented in Figure 4-6 and in Appendix F.

Response: Agreed. The concentration of lead in SB4-14 (0-0.2') duplicate sample was 11,200 mg/kg and in SB4-14 (0-0.2') was 7,360 mg/kg. The average of the two concentrations was used in Table 6-3.

18. Table 6-4, page 3 of 3: This table presents a by-media overview of the chemicals quantified in the human health risk assessment. Add a footnote to clarify that lead was evaluated qualitatively only (Section 6.5.3, page 6-111).

Response: Agreed. A footnote has been added to Table 6-4.

19. Figure 6-3: The figure presents a summary of the exposure pathways at the site. The figure indicates that the future construction worker is exposed to surface soils near the Munitions Washout Facility. However, the figure does not indicate that the construction worker is also exposed to subsurface soil. This media should be included on the figure as a secondary source. Similarly, the future construction worker could also be exposed to surface water and sediment if drainage ditches were to be rerouted, etc. Include these media in Figure 6-3.

Response: Agreed. Subsurface soil has been added as a secondary source for exposure to the future construction worker. However, exposure to surface water and sediment in the drainage ditches were not added to the future construction worker. For the risk assessment, it was assumed that the outdoor park worker was more likely to be exposed to surface water and sediment in the drainage ditches. Results of the risk assessment indicate that there is no risk for the outdoor park worker from this exposure scenario.

20. Section 7.2.2, page 7-10: In the list of bulleted contaminants of potential concern (COPCs) for mixed soils, metals have been omitted. A fourth bullet should be added for the 19 metals exceeding criteria, as indicated in Table H.7.

Response: Agreed. The text/tables have been modified to resolve any discrepencies.

21. Section 7.2.2, page 7-10: The list of soil contaminants for which screening criteria are lacking is missing two constituents acenaphthene and di-n-octylphthalate, according to Table H.7.

Response: Agreed. The text/tables have been modified to resolve any discrepencies.

22. Section 7.2.2, page 7-11: The list of sediment contaminants for which screening criteria are lacking is missing one constituent, aldrin, according to Table H.8.

Response: Agreed. The text/tables have been modified to resolve any discrepencies.

23. Section 7.3.1, page 7-15: The list of metals for which screening benchmark values were exceeded, does not correspond to Table H.12.

Response: Agreed. The text/tables have been modified to resolve any discrepencies.

24. Section 7.5.1, page 7-19: The second paragraph lists soil COPCs with NOAELs greater than one, as shown in Table H.26. The semivolatile, di-n-octylphthalate, is missing from this list and from Table 7-2.

Response: Agreed. The text/tables have been modified to resolve any discrepencies.

25. Section 7.5.1, page 7-19: This section discuses the selection of COPCs based on exposure to terrestrial receptors. The section does not include results form the invertebrate risk screening presented in Table H.12>

Response: Agreed. The text has been modified to include results of the invertebrate screen.

26. Section 7.5.1. page 7-22, 2nd paragraph, 24-3rd paragraph and 25-1st paragraph: The text discusses soil COPCs for which hazard quotients (HQs) could not be determined due to lack of toxicity data. This lack of information should be addressed in the uncertainties section.

Response: Agreed. The text has been modified to include a discussion of the uncertainty associated with chemicals for which HQs could not be calculated.

27. Section 7.6.2, pages 7-26 & 7-27: The justification for eliminating Aroclor 1254 as a COC is inadequate. The NOAEL-Max HQ for this chemical is 53. The argument that the other , lower HQs do not indicate significant risk should be supported with information on mechanisms of toxicity, fate and transport processes, potential for bioaccumulation, etc., prior to eliminating this chemical.

Response: Agreed. Additional text has been added to support the elimination of Aroclor 1254 as a COC.

28. Section 7.6.2, page 7-27, 4th paragraph: This paragraph states that antimony, copper, and zinc were not identified as COCs because "[HQs] calculated using LOAEL and /or mean values were relative low, these metals are relatively non-toxic when compared to lead, and they tend not to bioaccumulate." This argument is not entirely logical, as the mean LOAEL HQs, which indicate toxicity, for antimony, copper, and zinc are higher than that for lead. Based on the argument provided in this section, elimination of these metals is premature, without enhanced discussion of mechanisms of toxicity, fate and transport processes, etc. (information which should be in toxicity profiles), and the metals should be retained for further evaluation.

Response: Agreed. Additional text has been added to support the elimination of antimony, copper, and zinc as COCs.

29. Section 7.6.2, page 7-28: This section discusses the identification of sediment COCs for further evaluation. However it does not address assessment or measurement endpoints. These endpoints should be discussed in a fashion similar to that in the previous section on soil COCs. This presentation should also be included in the report summary, Section 8.3, page 8-6.

Response: Agreed. Additional text has been added to address assessment or measurement endpoints.

30. Section 7.6.2, page 7-28: The first paragraph discusses sediment samples in intermittent surface waters. In these areas, sediments were compared to soil background data. Please provide the results from this screening in the report.

Response: Agreed. The text has been modified to include any additional comparisons or calculations.

31. Section 7.6.3, page 7-29: The third sentence states, "To more realistically evaluate surface water contaminants, a re-evaluation was performed using only those data representing standing water at the site (i.e., SW4-1 and SW4-2) for the seven contaminants with NOAEL HQs greater than one." Please provide these results in the report.

Response: Agreed. The results have been included in the report.

32. Appendix F: The results tables for soil data use the NYSDEC TAGM 4046 RCO values and Seneca background concentrations as comparison criteria for inorganic analytes. The comparison column only identifies TAGM. The background concentration values should be identified as such.

Response: Agreed. The soil tables in Appendix F have been revised and indicate which inorganic comparison criteria are background values.

33. Table H.13: This table present literature toxicity reference values (TRVs) for soil receptors. An avian TRV for antimony is not listed in the table; however, the uncertainties section (Page 7-21, first paragraph) states that the NOAEL HQs for antimony were less than one for the red-tailed hawk. As no avian TRVs for antimony are presented in the report, please explain how HWs were calculated for the red-tailed hawk.

Response: There was no HQ calculable for the red-tailed hawk exposed to antimony. The last sentence of the reference paragraph has been removed.

34. Table H.14: The mammal TRV of 1.00E2 mg/kg-d for acetone does not correspond with the values provided in the cited text (Sample et al. 1996).

Response: Agreed. The mammal TRV table has been updated to reflect the correct values. The NOAEL for acetone is 10 mg/kg-d and the LOAEL is 50 mg/kg-d.

35. Table H.14: The TRVs taken from Sample et al. (1996) are for the test organisms, mouse and rat. Sample et al. (2996) provides estimated TRVs that may be more appropriate for the specific mammal receptors chosen for this ERA (short-tailed shrew and cottontail rabbit). Please consider using these values to determine HQs as they are more pertinent to the receptors chosen for this ERA and may be less likely to underestimate risk. Specifically, the TRVs for the cottontail are lower than those for the test organisms and using the latter TRVs may not be protective of the rabbit. Eliminating any COCs without first considering more conservative values for the rabbit may prematurely dismiss risk to herbivorous mammals.

Response: Agreed. The cottontail rabbit has been replaced as a receptor by the meadow vole. The mammal TRV table has been updated with specific values for the short-tailed shrew and meadow vole. The hazard quotient summary tables have been updated to reflect any changed values.

36. Table H.18: The table cites Beyer (1990) for many of the BAF values shown in the fourth column; however, Beyer (1990) does not provide BAF values for acenaphthene, acenaphthylene, or fluorine. Please explain how BAF values for these chemicals were determined.

Response: Acenaphthene and fluorene use the value for benzo(a)pyrene (from Beyer (1990)) as a surrogate. The value for acenaphthylene is a default value of 1.00.

37. Table H.28 and H.29: The exposure determination for the red-tailed hawk uses plant-matter and animal-matter ingestion rates for the shrew. The values used for these two factors in the red-tailed hawk exposure equation are an order of magnitude lower than the correct values. Please redo the calculations and incorporate the corrected values into the ERA summary.

Response: The footnotes on the exposure table for the red-tailed hawk were incorrect. The correct plant-matter and animal-matter ingestion rates for the hawk were used in the exposure calculations. The footnotes have been updated.

38. Table H.32: During review, the exposure values for the great blue heron could not be reproduced using the equation in footnote 6. Please review these calculations. Please confirm if "Cf" in footnote 6 is the Trophic Level 2 Tissue Concentration in the second-to-last column.

Response: The exposure value calculation for the great blue heron was using the incorrect body weight. The exposure table has been updated with the correct value and the hazard quotient summary tables have been updated to reflect any changes. Yes, the "Cf" in footnote 6 is the Trophic Level 2 Tissue Concentration in the second-to-last column.

39. Appendix I: This appendix is entitled *Toxicity Profiles for Compounds with Significant Contributions to Human Health Risk at SEAD-4.* Ecological toxicity is also discussed in the profiles. Please change the title to Toxicity Profiles for Compounds with Significant

Contribution to Ecological and Human Health Risk at SEAD-4, to more accurately reflect the contents of the profiles. Further, please review the list of contaminant of potential concern for both ecological and human health risk to ensure that toxicity profile are included for all constituents. Finally, in the reviewer's copy of the report, pages are missing from this appendix. Please review.

Response: Agreed. The title of Appendix I has been changed to include ecological risk. Additional toxicity profiles have been added for inorganic constituents.

Response to Comments
From
New York State Department of Environmental Conservation (NYSDEC)
on the
Draft Remedial Investigation (RI)
Munitions Washout Facility (SEAD-4
Seneca Army Depot Activity, Romulus, NY

Comments Dated January 26, 2000

The New York State Departments of Health and Environmental Conservation has reviewed the Remedial Investigation Report at the Munitions Washout Facility (SEAD-4), and offer the following:

Comment 1: An explanation should be included in the key to Figure 2-9 for the numbers in parenthesis under the various monitoring well and soil boring identifications, or the numbers should be removed.

Response: Agreed. The numbers in the parenthesis have been removed.

Comment 2: Figure 3-6 and Figure 3-7 incorrectly identify the clay pipe running to the pond as a concrete pipe.

Response: Agreed. The figures have been revised.

Comment 3: The figures which present concentrations of contaminants in the soil (e.g., Figure 4-1) are difficult to decipher, as they merely offer the numerical data without interpretation. Some effort should be taken to present the information more clearly, possibly through isopleths or utilization of bold or colored type for values which exceed certain limits. As presented, it is difficult to extract from these figures important conclusions regarding definition and extent of site contamination.

Response: Agreed. The text on Figures 4-1 and 4-2 has been revised to make the drawings easier to read. Figures 4-4 and 4-6 have been revised to show exceedences above background for chromium and lead in surface soils and sediment.

Comment 4: The underground anomalies discussed in Section 2 and Appendix A should be discussed in Section 8, Summary, and in any Conclusions & Recommendations discussion (see comment below.)

Response: Agreed. A discussion of the underground anomalies has been added to Section 8.

Comment 5: The report should include conclusions and recommendations which explicitly discuss whether there are any remaining data needs or whether available information defines the nature and extent of contamination in each media. For example, Appendix A states that a target was identified that warrants further intrusive investigations, but the report does not further address this issue. Also, Section 8 states that A[g]roundwater at SEAD-4 has been impacted by metals, but the report does not present a description of a plume or suggest that additional sampling is warranted to define one. The report should conclude that no information needs remain towards performing a remediation feasibility study or, conversely, the report should list the data gaps requiring further efforts and suggest methods for obtaining this data.

Response: Agreed. A section discussing the data needs has been added to Section 8.

Comment 6: Each of the tables in Section 4 include a column labeled, "Number Above TAGM." This label is only applicable to a soil quality discussion. Tables which present information on water and sediment quality, such as Table 4-6A, should have this column re-titled.

Response: Agreed. The tables in Section 4 have been revised.

The revised report should also address the enclosed comments from the NYSDEC Division of Fish, Wildlife and Marine Resources (DFWMR) on the SEAD-4 Draft RI , which have been forwarded verbatim to avoid misinterpretation.

Comments from Richard Koeppicus, Hazardous Waste Site Evaluation Unit, Bureau of Habitat, Division of Fish, Wildlife and Marine Resources

Comment 1: General Comment a. The Ecological Risk Assessment is very wearisome to read and rather than bringing clarity tends to obscure the readers focus of areas that present biological threats. To clarify the focus on these areas the ERA should include figures which identify all the sample locations soil, sediment and surface water where one or more biological screening criteria have been exceeded. The figures should clearly delineate buildings, and surface water and drainage features as well as the number of chemical screening criteria exceeded at a location with some identification of their class (e.g volatile, semivolatile, PCB, pesticide and /or metals).

General Comment b: The ERA in many places states the risk analysis is conservative. Though there are many instances where assumptions are conservative, there are also many instances where the analysis is not, some of which are pointed out in the following comments. A big assumption in the ERA is that all the chemicals for which risk is determined are independent of each other. This may not be the case and I would think is not the case for some classes of compounds such as semivolatiles, metals, and pesticides. It may be necessary to do some biological experiments to find some of these answers. However, this may be unnecessary provided some reasonable cleanup is forthcoming in the FS and remaining regulatory processes.

Response: Comments noted. Figures 4-4 and 4-6 in Section 4 have been revised to indicate locations of exceedances over background for chromium and lead in surface soil and sediment.

Comment 2: Table 2-8 Some of the values reported for dissolved oxygen (in particular those above 11 mg/l) do not seem possible since they are above the saturation point of oxygen at the given temperatures. Some are 2 to 4 times higher concentration than oxygen saturation concentrations.

Response: Agreed. However, these are the values that were reported from the field; therefore, they were presented in the report.

Comment 3: P 3-32 Section 3.7.2 Site Habitat Characterization

a. This section states that in order to characterize the site and the habitats within the 0.5 mile radius, pedestrian surveys were conducted. The field collection sheets associated with these surveys should be appended to the report.

Response: Agreed. The field survey notes have been appended to the revised report.

b. The field collection sheets for the small mammal trapping and seining in the wetlands for fish and invertebrates should be appended to the report and the results placed in table format in the body of the report.

Response: As stated in the report, limited small mammal trapping and seining were conducted as part of the qualitative ecological characterization for the site. No small mammals were collected over a three day period. One fish was collected- this species was included on the list of species observed on the site. As discussed above, the field survey notes will be appended to the revised report.

c. This section describes the features of the site as various abandoned buildings, munitions storage igloos, railroad tracks; a network of paved and gravel roads, an excavated pond, and undeveloped areas. It also describes that the predominant off-base land use within a 0.5 mile radius of the study area as agricultural and residential. The RI neglects however to mention, but should, that the actual current land use of the site is by wildlife. The habitat will improve for wildlife as succession takes place because of lack of military maintenance.

Response: To describe the current land use of the SEAD-4 site as wildlife habitat would be misleading. The site was accurately described in the report as a former military installation, and where appropriate, the wildlife habitat provided by the former military installation was described as excellent, valuable, marginal, etc. No attempt was made to diminish or obscure the value of the habitat provided under current conditions. To speculate on the future quality of the habitat is difficult; we agree that if disturbance through maintenance activities were to cease, the habitat value will likely increase. However, it should be noted that designated future land use for this site is Conservation/Recreation area, and existing roadways and drainage features will remain.

d. Additional characterization states that the site has been filled, drained, and graded. The rocky substrate is shale excavated from a nearby borrow pit. Ditches draining the site are small, intermittent and do not support wetland species except in occasional depressions. The ditches either connect to Silver Creek to the east or Indian Creek to the west. Both creeks have been highly altered to enhance drainage. They have been excavated so they are deeper and wider, and straighter and the spoil form the excavation has been placed on the banks to prevent flooding. The ditches/creeks also have been cleared and snagged of all streambed vegetation. The RI does not mention in its ecological evaluations, but should, that these drainages will change without maintenance. They will begin to meander, get snagged, pool and establish vegetation. This process will advance quite rapidly should beaver that are present on the installation establish themselves. Hence the site habitat will have a higher value for fish and wildlife in the future than it has in its existing state.

Response: Comment noted. However, this site is designated to become a Conservation/Recreation area and is not intended to be abandoned but will be maintained as a Conservation/Recreation area in the reasonable future scenario. See response to 3c above.

e. The Artificial Pond is described as offering marginal wildlife habitat due to the lack of vegetation and the poor water quality. The bottom substrate is a black flocculent muck of 1 foot depth and there are no emergent, floating or submerged aquatic species with the exception of green algal mats. The green algal mats implies abundant nutrients to support vegetation and the muck implies a suitable substrate. The clear water in conjunction with suitable substrate and nutrients however implies toxicity. The RI should explain the basis for the conclusion that the water is poor quality and whether chemicals from the site preclude the establishment of aquatic vegetation and biota.

Response: The absence of emergent aquatic macrophytes in the pond is likely due in part to the fact that the substrate would not easily support rooted vegetation. The flocculent material is too loose and undifferentiated to support plant roots, and the shale substrate is very hard and lacking in organic material. The green algal mats likely indicate stagnant water. The small fish taken from this pond was a bass of the variety that was introduced into the pond a few years ago, and the lack of additional biota may be the result of predation or the lack of sufficient substrate. This explanation has been added to the section discussing the Artificial Pond.

f. The RI describes the depot as having no documented species that are endangered, threatened or of special concern. It also states highly disturbed sites are characteristically colonized by opportunistic species and do not typically support rare and endangered species. The RI needs to recognize that some of these categories of species do thrive in these environments provided there is no human disturbance. A typical example would be the peregrine falcon utilization of the abandoned buildings for resting, roosting and nesting and foraging in a preferred disturbed habitat.

Response: It is true that the potential for endangered species utilization of the site exists, and a paragraph discussing that potential has been added to the ecological characterization on page 3-46. In addition, the risk assessment included an evaluation of a surrogate raptor (red-tailed hawk) for this site. The models used in the calculation of the HQs are designed to calculate risks at the organism level and are therefore appropriate to assess risks to other raptors, including threatened and endangered species, that may be present on site (e.g., peregrine falcons). This is in accordance with USEPA and NYDEC guidance.

Comment 4: P 7-8 Section 7.2.2 Ecological COPCs

a. The RI states soil ecological COPCs were identified by comparing maximum detected concentrations to the ecological risk-based screening values. The sources of the screening values referenced include:

- Oak Ridge National Laboratory soil criteria (Elfroymson et al. 1997)
- Canadian soil quality guideline values (CCME 1997)
- Ministry of Housing, Spatial Planning and Environment criteria (1994)

- Updated Dutch Soil Cleanup Criteria (Petts et al. 1997)
- Dutch Soil Cleanup (Interim) Act Criteria (Beyer, 1990)

The above documents should be appended to the RI or submitted to NYSDEC since they form the basis from which ecological risk conclusions in the RI have been made.

Response: These documents were fully referenced in the risk assessment and are available from the respective agency or the open literature. It is not the intent of the risk assessment to provide the hard-copies of references used on the preparation of the document.

b. The RI states COPCs identified for surface and mixed soils and screening values are provided on Tables H. 6 and H.7 respectively. Those tables and the text of the RI do not however state the criteria, but should, for making a selection for a given criterion from the screening references identified. To be conservative the lowest screening criterion should be selected.

Response: Agree. The lowest screening criteria are selected. The text and tables have been modified to reflect this.

c. The RI states for determining if inorganic COPCs (metals) were likely associated with site activities, average concentrations for each metal were compared to two times average background concentrations. NYSDEC does not accept this method for selecting a chemical of concern since an arbitrary factor (2) is being applied to one statistic but not the other. If a factor of 2 is applied to average background concentrations then a factor of 2 should be applied to average site concentrations. If average concentrations are to be utilized as the criteria for discriminating whether a COPC then it should be sufficient to compare the average background value to the average site site value and if the site average is higher than the background it is a COPC. A new Table H.10 of COPC should be generated after removing the unequal weighting factors.

Response: The weighting factor of 2 have been removed from the background comparison. Average background values have been used to compare to site average to determine if the contaminant is above background and should be considered a COPC.

d. P 7-11

i. The RI states the extensive drainage ditches around the perimeter of the site contain water only briefly after storm events and are not providing wetland or aquatic habitat therefore samples collected in them will be treated as soils.. This may be the current state of ditches but with the withdrawal of the army the ditches will plug and aquatic and wetland habitat will develop if only on a temporal basis. Such areas will become home or breeding areas for terrestrial based amphibians, insects that have aquatic life stages and other organisms. The drainage ditches should be ecologically treated as both soil and sediment since some areas are likely to be dry while others are wet. The lower of the soil or sediment criteria should be used for ecological screening purposes.

Response: Comment noted. It is possible that the wildlife habitat provided by the ditches may eventually improve over time. However, as noted in response to 3d, there is no intention to abandon this site and it is expected to be maintained in the reasonable future.

ii. The RI states benzo(a)pyrene was identified as a COPC due to lack of a biological screening criteria for surface water. There is a biological screening criteria in NY Ambient Water Quality Standards and Guidance Values. The guidance value for protection of human health from fish consumption is 0.0012 g/l. Biota should not be exposed to concentrations above this value if they are to retain their value to humans. Hence this value is an appropriate screening value to consider.

Response: Disagree. Values derived for the protection of human health are inappropriate for use as screening criteria in an ecological risk assessment. If fish are exposed to levels above a particular human health screening criteria, it is unknown whether the biota have lost their value to humans. This would require additional study to determine if the value had been lost or reduced. It is also unknown if there are any potential risks to the fish species itself, when contaminants are above a particular screening level. Additionally, if fish are exposed to values below human health criteria, it is unknown if there will be any adverse affects to the fish individuals or populations. Human health criteria are usually not developed with any consideration to the overall success of the fish species especially for fish species that are not normally consumed or otherwise used by humans.

There are several steps that assess the value of the resource to humans. First, the value of the biota to humans and the appropriate remediation steps taken, if any, can be determined by the results of the human health risk assessment. The assessment of the value of the fish resource is also undertaken inherently within the ecological risk assessment. That is, if it is determined that contaminants pose a potential risk to fish species which may be of current or potential use by humans, then remedial steps can be implemented to address these risks.

Comment 5. P 7-12 Section 7.2.3 Preliminary Ecological Conceptual Site Model (CSM)

a. The text should identify what soil invertebrate(s) was(were) used to screen for impacts from direct exposure to soil contaminants.

Response: Agreed. Additional text has been added.

b. The DFWMR rejects the CSM=s use of the eastern cottontail rabbit as being representative of maximum exposure for small herbivorous mammals. The TRVs (toxicity reference values, mg/kg/day) used for the eastern cottontail rabbit were all derived from mouse or rat data. Hence, there is no data for the rabbit specifically that shows it is especially sensitive to site contaminants. Presumably, Parsons Eng... would have chosen mouse or rat toxicity TRV data for any herbivorous mammal frequenting the site. Parsons would also be likely to use uptake factors from soil to plant that remain the same regardless of the mammal species chosen. Hence the only variable controlling the dose, in the model Parsons is using, is the mammals ingestion rate (mg food/kg body weight/day). To be conservative the herbivorous mammal chosen should be the one with the highest ingestion rate. A meadow vole would be a better choice but Parsons should search the literature for choices.

Response: The rabbit was chosen as the surrogate for small herbivorous mammals because it was the only species that was observed on the site. Neither the meadow vole nor any other small herbivores were captured or observed. In accordance with NYDEC guidance, data from controlled laboratory studies were used if receptor-specific TRVs were not available. As noted above, the vole does have a higher rate of ingestion per body weight (~4 times). However, this would only result in one additional chemical (zinc) being identified with a HQ greater than 1 (HQ = ~1.3). Zinc had already been identified as a chemical of concern in soils with an HQ above 1 (HQ=63) by using the shrew receptor. Therefore, the use of the vole receptor verses the rabbit would have little impact on the outcome of the risk assessment. However, the vole receptor has been used in place of the rabbit receptor in this report.

c. P 7-13

i. The RI uses the white crappie to evaluate direct exposure to surface water contaminants because it is a common hardy species likely to be found at the site. The DFWMR rejects this approach for the following reasons.

(1) The conservative approach is to compare the surface water concentrations to the NYS Ambient Water Quality Standards and Guidance Values Class C standards and guidelines values where they exist. The Class C standards and guidance values are risk based and SCGs hence they are the regulatory accepted method of protecting fish and fish propagation.

Response: The NYS ambient water criteria were used to screen contaminants in surface water. While some of these criteria listed are specifically to protect aquatic species, that is not always the case (e.g., chlordane). Those chemicals that were found to be above NYS criteria, as well as chemicals that were above other screening criteria or chemicals with no screening criteria were then carried through the screening level risk assessment. This follows the methods provided by the USEPA ERAGs and the methods outline in FWIA Step IIB(Criteria-Specific Analysis) and IIC(Toxic Effect Analysis) and provides a more comprehensive assessment of potential risks from surface water contaminants than just comparing to NYS screening criteria.

(2) A hardy species should not be used. A sensitive species should be used.

Response: In some instances it may be inappropriate to use a sensitive species due to poor water quality not associated with site activities or contamination. However, in consideration of comment 5ci(3) below, the bass will be used in the evaluation.

(3) If it is important to the model that the fish should be a likely candidate to be resident at the site then the bass should be used since it was the only fish that Parsons found present.

Response: Agreed. The bass appeared to be the only fish present in the pond at the time of the site survey.

d. The CSM should include an evaluation of risk to amphibian reproduction and survival in possible and actual ephemeral or perennial aquatic habitats.

Response: We agree that such an evaluation would help to determine potential ecological risks associated with contaminant exposures. However, exposure and toxicity information available from the literature is very limited, and definitive field studies related to these endpoints are difficult to perform. In addition, risk management decisions at the site are unlikely to be affected by the results of this evaluation. The revised report includes additional text to address this concern.

Comment 6: P 7-15 Section 7.3 Step 1B: Screening -Level Effects Evaluation (Toxicity) The RI states contaminants exceeding screening criteria and background were identified as COPCs. That is incorrect since **twice** background was a requirement to be considered a COPC. The RI text should be corrected.

Response: The text has been corrected. See response to comment 4c.

Comment 7: P 7-16 Section 7.3.2 Development of Wildlife TRVs for Soil and Sediment COPCs The RI states that toxicity values selected from the literature were modified through the application of conversion factors to derive a TRV for each COPC. The RI discusses how the conversion factors are utilized to calculate a TRV but does not discuss how the conversion factors are derived and the appropriateness/validity of the derivation. This needs to be included in the discussion on the development of TRVs.

Response: The discussion of how the conversion factors are derived has been expanded.

Comment 8: P7-17 Section 7.4 Step 2A Screening-level Exposure Estimate

a. Explicit definitions should be provided for the terms soil to plant uptake factors and bioaccumulation factors in the discussion on evaluating COPCs.

Response: Explicit definitions have been added. The discussion of soil to plant uptake factors and bioaccumulation factors has been expanded.

b. The ERA dismisses the actual or potential risk to biota from dermal and/or inhalation exposure pathways as insignificant. The DFWMR does not agree with this assertion. Dermal or inhalation exposure could be very significant for soil burrowing organisms such as earthworms (the invertebrate chosen for evaluation in the ERA), moles etc.. In fact, there are commercial soil fumigants on the market. The DFWMR agrees that there is a scarcity of data available to evaluate these pathways but that does not mean the pathways are insignificant. The ERA makes only an unsubstantiated assumption that ingestion is the major route of exposure. Not including these two routes of exposure contributes to the uncertainty relating to the final exposure calculation validity.

Response: Additional discussion has been added to the uncertainty section noting that these pathways, while not evaluated, could possibly contribute to overall risks at the site.

c. P 7-18 Explicit definitions for bioaccumulation factors (BAFs) and food chain multipliers (FCM) should be provided since they seem to be the same thing.

Response: The discussion of soil to food chain multipliers and bioaccumulation facotrs has been expanded. FCM has been provided.

d. P 7-18 The acronym DPD is used. It is not identified in the RI acronym list and should be.

Response: Reference to the acronym will be removed from the text.

Comment 9: P 7-18 Section 7.5 Step 2B: Screening-Level Risk Calculation The ERA states because conservative (protective) estimates of potential exposures and toxicity are used, screening -level HQs may overestimate actual risks. There have been assumptions in the ERA such as the lower metabolic rate rabbit representing an herbivore and the elimination of inhalation and dermal exposures for soil organisms which tend to underestimate actual risk. The ERA should not characterize the estimate of HQs as an over estimate of actual risk.

Response: While there may be some aspects of the risk assessment that could possibly underestimate actual risks, the overall intent and likely outcome of the screening level assessment in the ERAGs 8-step process is to use conservative (protective) estimates of potential chronic exposures and toxicity. Therefore the statement "screening-level HQs MAY (emphasis added) overestimate actual risks" is correct.

Comment 10: P 7-21 Section7.5.1 COPCs and NOAEL HQs Greater than One

a. The ERA states the maximum concentration of antimony was found in surface soil and resulted in a shrew HQ of 595 based on an estimated maximum exposure of 0.74 mg/kg/day and a TRV of 0.125 mg/kg/day. A correction to the text is needed since those 2 exposures yield an HQ of 5.92.

Response: The text incorrectly stated the maximum exposure concentration at 0.74 mg/kg/day. The correct maximum exposure concentration is 74.3 mg/kg/day and the HQ value reported is correct.

b. P 7-22 The ERA states the potential ecological risks associated with sediment /surface water contaminants at SEAD-4, assessment endpoints of no substantial adverse effects on survival, growth, and reproduction of fish-eating bird populations were selected. The sediment /surface water contaminants assesment endpoints should also include benthic invertebrates and amphibians.

Response: Agree, additional text has been added to include benthic invertebrates and amphibians.

c. P 7-24 The DFWMR does not accept the methodology using the white crappie for determining surface water COPCs. Surface water COPCs should be determined by comparing NYS Ambient Water Quality Standards and Guidance Values for Class C waters to surface water sample concentrations. If the concentrations exceed the standard then there is a risk. This is a regulatory approved risk based calculation.

Response: See response to 5ci(1)

Comment 11: Table H.1 Surface Soil Exposure Point Concentration Summary The DFWMR rejects the screening of soils for toxicity based on the exposure point concentration being the lesser of the Max Hit vs the 95%UCL. The 95% UCL should not play any role in determining an exposure point concentration. DFWMR believes that the main purpose of determining an exposure point concentration is to compare it to screening values. Any locations that exceed screening values (sediment criteria, HQs etc.) should be flagged as potential locations with biological problems and those locations identified on a figure.

Response: The column labeled Exposure Point Concentration is given for information purposes. The maximum detected concentrations are used for screening. Figures showing locations with exceedences above background for chromium and lead have been provided in Section 4.

Comment 12: Table H.2 Mixed Soil Exposure Point Concentration Summary

a. This table is an example of flaws common to many of the tables in Appendix H. Namely, the tables are not stand alone items in that they require diligent searching in the ERA for explanatory text. The titles of tables H.1 and H.2 are very similar and the reader should not have to go to the text to find a description of mixed.

Response: "(0-1')" and "(0-4')" have been added to tables H.1 and H.2, respectively.

b. The DFWMR rejects the screening of soils for toxicity based on the exposure point concentration being the lesser of the Max Hit vs the 95%UCL. The 95% UCL should not play any role in determining an exposure point concentration. DFWMR believes that the main purpose of determining an exposure point concentration is to compare it to screening values.

Response: See response to comment 11.

c. Any locations that exceed screening values (sediment criteria, HQs etc.) should be flagged as potential locations with biological problems and those locations identified on a figure.

Response: See response to comment 11.

Comment 13: Table H.3 Sediment Exposure Point Concentration Summary

a. The DFWMR rejects the screening of sediments for toxicity based on the exposure point concentration being the lesser of the Max Hit vs the 95%UCL. The 95% UCL should not play any role in determining an exposure point concentration. DFWMR believes that the main purpose of determining an exposure point concentration is to compare it to screening values.

Response: See response to comment 11.

b. Any exposure point locations that exceed screening values (sediment criteria, HQs etc.) should be flagged as potential locations with biological problems and those locations identified on a figure.

Response: See response to comment 11.

Comment 14: Table H.4 Surface Water Exposure Point Concentration Summary

a. The DFWMR rejects the screening of surface waters for toxicity based on the exposure point concentration being the lesser of the Max Hit vs the 95%UCL. The 95% UCL should not play any role in determining an exposure point concentration. DFWMR believes that the main purpose of determining an exposure point concentration is to compare it to screening values.

Response: See response to comment 11.

b. Any exposure point locations that exceed screening values (NYS Ambient Water Quality Class C Standards and Guidance Values) should be flagged as potential locations with biological problems and those locations identified on a figure.

Response: See response to comment 11.

Comment 15: Table H.6 Ecological Surface Soil (0-1 ft) Screening

a. There is no biological basis for screening out chemicals because they are detected in less than 5% of samples. This is especially true when the sampling was not randomized.

Response: We agree there is no biological basis for screening out chemicals because they are detected in less than 5% of samples. Screening out chemicals with less than 5% detection is based on guidance in RAGS Part A. Regarding randomized sampling, biased sampling gives more weight of evidence to rejecting data with detections at less than 5%.

b. The Aroclor1254 and 1260 should not be screened individually against a total PCB screening value. The two Aroclors should be added together than compared to the total PCB screening value.

Response: Agree, when only total PCB screening criteria are available, then Aroclors will be added together before screening.

c. The references in footnotes 1 and 2 should be included in appendices or supplied to DFWMR since their content is the basis upon which ecological screening is performed in the ERA.

Response: Footnote 1 has been struck from the Table. See response to comment 4a for footnote 2.

d. Footnote 3 should explicitly state the definition of Hazard Quotient.

Response: Disagree. This footnote is explicitly intended to define the abbreviation of "HQ" and to describe the criteria of a chemical being included in the risk assessment (i.e. HQ>1). The definition of Hazard Quotient can be found in the text.

Comment 16: Table H.7 Ecological Mixed Soil (0-4ft) Screening The comments are the same for Table H.7 as H.6.

Response: See response to Comment 15.

Comment 17: Table H.8 Ecological Sediment Screening

a. There are sediment screening values for semivolatile organics (such as benzo(a)pyrene) that are from *Region 4 Waste Management Division Sediment Screening Values for Hazardous Waste Sites (Table3),* USEPA August 11, 1999. A copy of this reference should be provided or included in an appendix. DFWMR is unfamiliar with it and the acceptability of the screening values in the ERA are directly linked to that references credibility which needs to be reviewed.

Response: These values were used in order to make the risk assessment as comprehensive as possible. The latest version of this table and associated documentation can be found at the following website: http://www.epa.gov/region4/waste/oftecser/ecolbul.htm

b. Regardless of the credibility of the Region 4 document, there generally are screening values in the *Technical Guidance for Screening Contaminated Sediments* for the semivolatiles where screening values were taken from Region 4. Apparently Parsons does not consider NYSDEC sediment screening values which protect human health via consumption of contaminated biota relevant to the ERA. DFWMR rejects the ERA's non-use of those NYS screening criteria because NYSDEC has the responsibility to ensure that biota maintain their value for human uses whether the biota are affected or not. Hence the NYS criteria are appropriate for an ERA.

Response: Please see response to comment 4dii.

Comment 18: Table H.9 Ecological Surface Water Screening

a. The table needs to be completed since the footnotes related to the sources are missing.

Response: The tables have been provided with the footnotes showing.

b. DFWMR reserves the right to comment on the credibility of the Screening Values until the Reg 4 reference is supplied.

Response: Comment noted.

Comment 19: Table H-10 Background Soil Comparison

a. DFWMR rejects the method used by Parsons for determining whether a metal is retained for risk assessment because
i. A factor of 2 should not be applied (as it is for Average Background Soils) to one parameter to be compared unless it s applied to the other (Average of Site Data).

Response: See response to comment 4c.

ii. Averaging the site data is also inappropriate since one of the functions of an RI and also ERA is to distinguish those locations at SEAD-4 that have been affected by contaminants from those that have been unaffected. Hence individual soil samples have to be compared to background not a site average.

Response: This comment needs clarification as it contradicts some of the information provided in 4c.

Comment 20: Table H.11 Ecological Chemicals of Potential Concern (COPCs) and **Table H.12 Invertebrate Risk Screening for Soil COPCs** The tables will have to be modified consistent with the comments on Table H-10.

Response: See response to comment 19.

Comment 21: Table H.18 Soil to Plant Uptake And Bioaccumulation Factors for COPCs The table needs to define the terms *soil to plant uptake factor* and *bioaccumulation factor* since the definition is not intuitively obvious.

Response: Definitions for these terms have been provided in the text.

Comment 22: Table H.20 Calculated Surface Soil (0-1' bls) Exposure - Eastern Cottontail Rabbit and **Table H.21 Calculated Mixed Soil (0-4' bls) Exposure - eastern Cottontail**

a. The following numerical values need to be provided in the tables

- Ip
- Is
- SFF
- CF for inorganics

Response: For Ip, Is, and SFF, see Table H.19. The CF for inorganics is provided in table H.20.

b. Footnote 2 needs to be removed since a 2 is not used in the tables.

Response: Footnote 2 has been removed.

Comment 23: Tables H.22, H.23, H.26, H.27, H.30, H.31 and **H.34** refer in their footnotes to tables beginning with G which are human health tables and unrelated to an ERA or table x which cannot be found. Corrections are needed.

Response: These tables have been corrected.

Response to Comments
from
USACE

Draft Remedial Investigation (RI)
Munitions Washout Facility (SEAD-4)
Seneca Army Depot Activity, Romulus, New York
Comments received January 20, 2000

Comment from C. Forget

Comment 1: Consideration should be given to the documented unacceptable risk from Arochlor-1254 under the future use, indoor worker scenario. Several things are unusual in this scenario. First, it is highly unusual to evaluate ingestion and dermal contact with indoor "dust". Evaluate if this is a "realistic" scenario at this site.

Second, the concentration referred to as "dust" is actually a building debris sample. The make up of these samples is not clearly stated, and therefore, it is impossible to determine if this is a realistic exposure pathway without seeing the site.

Third, the calculated unacceptable risk is from the highest detected concentration of Arochlor-1254. The notes of this sample should be evaluated to see if it was just a localized spill, or a reasonable concentration to apply to the entire exposure area.

Response: Acknowledged. According to field notes from the sampling of indoor debris, dry soil was collected from floor drains in Building 2073; dry soil and debris were scraped from the floors in Buildings 2078 and 2085; and dry soil and debris were collected from floor trenches in Buildings 2076, 2079 and 2084. Therefore, the material sampled from inside the buildings was primarily soil.

The soil sample from Building 2073 was a composite sample collected from several perimeter floor drains in the south room of the building as stated in Table 2-1 of Section 2. This does not indicate a localized spill. The FS for SEAD-4 will propose cleaning of the buildings as part of the Remedial Action.

Comments from Becker

Comment 1, General: I have briefly reviewed the document, with the exception of the risk assessment sections. I found the document to be generally complete and the site characterization procedures used were good technical practice, based on the description in the text. I am concerned that the primary risks identified at the site are related to single samples of the medium

Response: Agreed. The EPC calculations for Arochlor-1260 and Benzo(a)pyrene are correct. The average of half the detection limits were used for non-detected samples with duplicates. The second bullet has been revised.

Comment 9: Section 6.7. Please identify the location of the Araclor hit to limit possible range of deed restrictions or other institutional controls that may ultimately be required.

Response: Agreed. The Arochlor was detected in the groundwater sample from MW4-10, which is located adjacent to Building 2084. The text has been revised.

Response to Comments on the Draft-Final RI Report

Response to the Comments From United States Environmental Protection Agency

Subject: Draft Final Remedial Investigation Report (R1) at SEAD-4
Seneca Army Depot
Romulus, New York, June 2000

Comments Dated: October 12, 2000

Date of Comment Response: January 11, 2001

General Comments:

1. Comment: EPA concurs with the recommendation to move forward to the Feasibility Study (FS) stage as recommended in the Conclusions section added to Section 8. However, this section does not address any data limitations, i.e., data gaps on vertical profiling of contaminants in soils, and the need for any future work. Please address this issue in the FS Report.

   Response: Agree. The data gaps will be addressed in the FS Report.

2. Comment: Response to our General Comment number 2 did not address the inclusion of phytotoxicity screening. Also, there was no explanation of why some groups of ecological receptors were not addressed. Please note that it may not be necessary to add the mourning dove as an ecological receptor since potential risks from exposure to contaminated soil was evaluated using the shrew and the rabbit. It is not necessary to add the semi-aquatic mammal as a receptor since the heron was evaluated for exposure to contaminated prey, sediment, and surface water.

   Response: In general, it was not considered necessary to screen for phytotoxicity at this site since the chemicals present would likely show effects to the other receptors evaluated before they would show adverse effects to plants. However, in order to be more conservative, a screen to toxicity benchmarks for plants can be undertaken in future risk assessments. In general, other receptor groups were not included for similar reasons (i.e., the receptors being evaluated are more sensitive and are therefore protective of the receptor groups not included). The remaining comments on the mourning dove and the semi-aquatic mammal are noted.

Human Health

1. Comment: The ingestion of groundwater as a potential exposure pathway should take into account the State use designation. Although EPA agrees that this pathway should be evaluated under a potential future use scenario, the rationale should include the State's use designation. This could also be addressed in the FS Report.

   Response: Agree. This will be addressed in the FS Report.

2. Comment: On Page 6-56, the "Superfund's Standard Default Exposure for the Central Tendency and Reasonable Maximum Exposure" (US EPA, 1993) is listed as a reference. This reference source is not one of EPA risk assessor "standard" reference and it should be provided to the EPA risk assessor for review.

   Response: The referenced document was published in 1993 as a preliminary review document. The exposure parameters were superseded by information provided in the Exposure Factors Handbook EPA, 1997). The updated exposure factors have been used (1997 updated Exposure Factors Handbook) where they are different from the 1993 document. The 1993 data are still listed as the

primary reference where there has been no change or where the 1993 factors provide the most conservative assessment of risk to human health. These references will be updated in future documents.

3. Comment: Table 6-5: Several exposure parameters utilized in the models for dermal contact with both soil and water are referenced to the "Dermal Exposure Assessment, Principles and Applications" (US EPA, 1992) is listed as a reference. This reference source is not one of EPA risk assessor "standard" reference and it should be provided to the EPA risk assessor for review.

   Response: Several of the tables concerning Body Surface Area and Soil to Skin Adherence Factors are presented in both the "Exposure Factors Handbook" (US EPA, 1997) and the "Dermal Exposure Assessment: Principles and Applications" (EPA, 1992). In addition, there are several references to the 1992 document in the "Exposure Factors Handbook". Reference will be made only to the "Exposure Factors Handbook" in future documents. The 1992 document may still be found on the EPA website.

4. Comment: Table 6-5: The exposure frequency of 20 days per year for the current site worker should be provided. The default value for this parameter is 250 days per year.

   Response: Agree. The text on page 6-59 has been revised to state that the current site worker at SEDA is a security guard who patrols the entire SEDA area checking locks and gates. We have very conservatively assumed that the guard would visit the site every 3 weeks as the reasonable maximum exposure and every 5 weeks for the central tendency.

Ecological Risk Assessment

1. Comment: The proposed future land use of this operable unit should be included in this section.

   Response: The designated future land use for this site is Conservation/Recreation area, and existing roadways and drainage features will remain. This has been noted in the first paragraph of page 7-3.

2. Comment: Page 7-7, Section 7.2.2, last sentence – Region II BTAG considers the 0 to 2 foot depth as surface soil. This depth is considered to be where the majority of terrestrial wildlife will be found living and burrowing.

   Response Comment noted. However, in general, a 0 to 1 foot interval as surface soil will usually result in a higher mean concentration assuming that most contamination results from disposition/spills on the ground surface. This would also likely result in the maximum detected concentration to be found in the 0 to 1 foot interval and not the 1 to 2 foot interval. The overall effect on the outcome of the ERA is likely to be negligible. In future ERAs the 0 to 2 foot interval will be considered.

3. Comment: Page 7-10, Sediment section – Ecological COCs should be selected by comparing the maximum detected concentration to the most stringent value of the NYSDEC or USEPA sediment screening criteria.

   Response: Agree. The lowest screening criteria are selected. The text in the first paragraph of page 7-10 has been modified to reflect this.

4. Comment: Page 7-12, last ¶- If potentially present in the pond, a piscivorous fish species should be evaluated as a receptor of concern.

Response: Comment noted. The largemouth bass was selected as the aquatic fish receptor because it was found at the site. Also, the evaluation of the aquatic species is performed by developing an HQ based on the surface concentrations and a TRV. In general, TRVs are limited for freshwater fish and would likely not change if a different aquatic receptor were selected. Therefore the species of fish selected would likely not change the outcome of the HQ calculations.

5. Comment: Page 7-24, Section 7.6 – A SMDP is present between Steps 2 and 3 of the ERAGS process.

   Response: Agree. However, when it is deemed likely that it will be necessary to proceed past step 2, it is usually more efficient to continue with the ERA into Step 3 in order to provide as much information as possible.

6. Comment: Page 7-29, 4th ¶- The three possible decisions present here come at SMDP #1 after steps 1 and 2 of the ERAGS process.

   Response: Agree. However as noted in comment 6, Steps 1-3 were completed concurrently and therefore the SMDP is necessarily a combination of SMDP 1 and 2. The text has been modified on page 7-29, 4th paragraph, to clarify this point.

Response to the Comments from New York State Department of Environmental Conservation

Subject: Draft Final Remedial Investigation Report
at the Munitions Washout Facility (SEAD-4)
Seneca Army Depot
Romulus, New York
Site ID No. 850006

Comments Dated: July 31, 2000

Date of Comment Response: January 14, 2001

The New York State Departments of Health and Environmental Conservation have reviewed the Remedial Investigation Report at the Munitions Washout Facility (SEAD-4), and offer the following:

The Army has satisfactorily addressed the NYSDOH and NYSDEC comments in its January 26, 2000 letter to the Army; however, further review has resulted in several other comments as presented below.

1) Comment: There appears to be some analytical data that was not included in Appendix F. Although several instances are cited below, the Appendix should be reviewed by SEDA to ensure all sampling points and data generated via the initial ESI and the RI are inclusive. The data in Appendix F should also be amended to present sample locations in ascending order.

Response: Review of the data in Appendix F does not indicate that any data is missing. Monitoring wells were installed in some soil boring locations resulting in two designations for one location. Copies of Tables 2-2 and 2-3, Surface Soil and Soil Boring Sampling Summaries, which present the Location ID, corresponding Well number (if applicable), soil sample number, and depth of sample, will be added to Appendix F to facilitate finding various soil samples.

The presentation of the data is by alphanumeric order, i.e., monitoring wells (MW4) will be presented before soil borings (SB) and test pits (TP). Furthermore, the data is presented by location ID numerically, i.e., 1 through 19, 2-29, 3-39, etc. This will not be changed in the data tables.

2) Comment: An important question is how the low flow sampling would be more accurate or more indicative of groundwater quality than the sampling technique used in the first round of sampling. Section 4.5 discusses volatile and semi volatile organic compounds that were detected during the first round of sampling, specifically benzene at 2 ug/L and ethylbenzene at 6 ug/L both in MW4-10 (in the vicinity of building 2084). The second round of sampling did not result in the detection of these volatile organic compounds. What could be a possible source for benzene and ethylbenzene found in the first round of sampling? What is the explanation as to why these analytes were not detected during the second round of sampling? How did results obtained from the low flow sampling technique reflect the actual dissolved and colloid-associated fraction of metals in groundwater?

Response: Low flow sampling was conducted at SEAD-4 in accordance with approved standard operating procedures. The field procedure described in the EPA Region II Low Stress (Low Flow) Ground Water Sampling Standard Operating Procedures, which is included in Appendix A of the Generic Workplan, and implemented at SEAD-4, obtains a more representative sample at a specific interval while creating a minimum of stress on the aquifer. Due to the relatively low hydraulic conductivities, seasonal water table elevation variations, and the general homogeneity of the aquifer, low flow sampling at SEAD-4 collects a representative composite sample of the screened/saturated interval. The low flow sampling method results in a sample from the entire water column available while purging less volume. Thus, the sample collected is more indicative of formation water having lower turbidity and having been subjected to less aeration than would occur during sampling with bailers. Even when water table draw down occurs in the low-yield surface/water table/overburden shallow aquifer at SEDA, low flow sampling collects a sample from the highest yielding portion of the aquifer (which would be the preferred pathway of constituent movement).

In reference to the two rounds of groundwater sampling that were discussed in Section 4.5 of the RI report, both rounds were sampled using the low flow sampling technique. Since no volatile organics were detected in the second round of groundwater sampling, the presence of benzene and ethylbenzene cannot be confirmed. The source of these compounds in the first round of sampling may be contamination of the samples during the field sampling or cross contamination in the laboratory.

3) Comment: The columns in Appendix F, Groundwater Section (Groundwater Criteria) should include units (ug/L). Also, the groundwater criteria for thallium listed as 2 ug/L is incorrect, the correct value is 0.5 ug/L.

Response: Agree. The referenced table in Appendix F has been revised and a column for units has been added. The groundwater criteria for thallium (2 ug/L) is the EPA Drinking Water MCL and the value 0.5 ug/L is the EPA MCLG, Maximum Contaminant Level Goal, which is a non-enforceable health goal. If a compound has either an EPA Drinking Water MCL or NYSDEC Groundwater GA standard, that criteria is used rather than a guidance value.

4) Comment: Some of the Soil Boring Logs found in Appendix B should be amended to include the PID readings.

Response: Agree. The PID readings have been added to the Soil Boring Logs for SB4-1 through SB4-10.

5) Comment: The Appendices should include the surface and subsurface soil sample results for MW4-10.

Response: As shown in Table 2-3, Subsurface Soil Sampling Summary, MW4-10 is also SB4-14. The data for SB4-14 is presented in Appendix F.

6) Comment: Section 3.0 discusses Buildings T30 and 2084 as being used to prepare packing material for the shipment of the renovated munitions. On page 3-4 the text states A[a]ccording to a current SEDA employee and a former SEDA employee, Building 2084 and T30 were used to paint, stencil, and otherwise prepare the packing material for the shipment of the renovated munitions". Painting booths were also found in Building 2084, along with drying lines.

The log boring for MW4-10 indicates a PID reading of 3.8 ppm at @ 4 feet and 42.5 ppm @ 4.5 feet. The log boring for SB4-14 indicates the same PID readings at the same depths as that of MW4-10. The single subsurface soil sample taken from SB4-14 identifies 1 ug/L ethylbenzene between 2-3 feet below ground surface (BGS). As the data indicates volatiles in the MW4-14 and SB4-14 soil borings, why were samples at varying depths (specifically at the 4 to 4.5 foot level) of the soil boring not taken? As a result of the data presented (or lack thereof), a soil gas survey, or further subsurface soil sampling, in the vicinity of Buildings 2084 and T30 is recommended.

Response: Agree. Please note that monitoring well MW4-10 and soil boring SB4-14 are the same location (See Table 2-3), which is adjacent to Building 2084. A soil sample was not collected from the 4 to 4.5 foot depth because there was little recovery from the split spoon in the weathered shale zone, as indicated on the soil boring log.

The results of the chemical analyses for SB4-14 (2-3') indicate that ethyl benzene (1 J ug/kg) toluene (5 J ug/kg), and xylene (8 J ug/kg) were detected in the soil. These concentrations are below NYSDEC TAGM.

As part of the FS, Parsons ES proposes to mechanically auger to the weathered shale zone and conduct headspace analysis of the soil to confirm the presence of any VOCs in the weathered shale zone. The measurements will be conducted using a PID. Since the source of VOCs is likely Building 2084, augering will be conducted at locations adjacent to SB4-14 and the southwestern side of Building 2084. At locations where the concentrations of VOCs are greater than 10 ppm, a soil sample will be collected and submitted for chemical analysis of TCL Volatile Organic Compounds. The data will be presented as an addendum to the RI Report.

The results of the chemical analyses for two rounds of groundwater sampling from MW4-10 indicate that the following VOCs were detected in Round 1:

acetone (8 ug/L),
benzene (2 ug/L),
ethyl benzene (6 ug/L),
toluene (0.4 J ug/L), and
xylene (4 ug/L).

Of these VOCs, benzene and ethyl benzene were detected at concentrations above the respective NYSDEC GA standards of 1 ug/L and 5 ug/L.

This location was not considered to be an area of concern for groundwater because benzene and ethyl benzene were detected in the groundwater at low levels and at concentrations near the GA

standards. Furthermore, the presence of these VOCs was not confirmed in Round 2 sampling because no VOCs were detected in the groundwater.

As part of the FS for SEAD-4, one of the proposed remedial action objectives is to monitor the groundwater at the site on a bi-annual basis for a period of one year prior to any remedial actions for soil or sediments. After the completion of any remedial actions for soils and sediments, an additional bi-annual round of groundwater samples will be collected for a period of one year. Monitoring well MW4-14 has been included as one of the monitoring wells to be sampled.

7) <u>Comment</u>: The Appendices should be amended to include the analytical results for SB4-11 and SB4-13.

<u>Response</u>: According to Tables 2-2 and 2-3, Surface Soil and Subsurface Soil Sampling Summaries, one surface soil sample (#43132) and one Shelby tube sample from 2-2.9 feet (#43133) were collected at SB4-11. The chemical data for #43132 is presented in Appendix F, Surface Soil Results. The results of the grain size analysis for #43133 are presented in Appendix E, Grain Size Analysis Results, Subsurface Results.

According to Tables 2-2 and 2-3, one surface soil sample (#43116) and one Shelby tube sample from 2-4 feet (#43117) were collected at SB4-13. The chemical data for #43116 is presented in Appendix F, Surface Soil Results. Sample #43117 was analyzed for soil characteristics including density, pH, cation exchange capacity, and TOC; these results are not presented with the chemical data in Appendix F. A footnote has been added to Table 2-3 stating that sample #43117 was analyzed for only soil characteristics.

8) <u>Comment</u>: Figure 4-5 should be modified to delineate exceedances for copper in the same way Figure 4-4 did for chromium and Figure 4-6 did for lead.

<u>Response</u>: Agree. Figure 4-5 has been modified to delineate exceedances for copper.

9) <u>Comment</u>: Analytical results from monitoring wells installed specifically as background wells for the SEAD-4 area (e.g. MW4-1 and MW4-13) should be included in Appendix F (SEDA Background Groundwater Data). Soil analytical results resulting from soil samples taken as background specific to SEAD-4 (e.g. SB4-1 and SB4-26) should be included in Appendix F (SEDA Background Soil Data).

<u>Response</u>: Acknowledged. Analytical results from monitoring well MW4-1 and soil boring SB4-1 have been included in the SEDA Background Groundwater and Soil Data, respectively. These data are included in Appendix F, Background Soil Data pages 9 and 10 of 10 and Background Groundwater Data page 3 of 6. Although SB4-26 and MW4-13 have been designated as background locations for SEAD-4, the data from these locations have not been added to the applicable SEDA-wide background set because the background data set was finalized before these data were collected. The background data set for soil is used to calculate the Site Background values for metals, which are used as TAGMs for all sites at SEDA. Both the background soil and groundwater data sets are used in the risk assessments. The SEDA-wide background data sets for groundwater and soil have been finalized in order that the background statistics (including TAGM values) remain constant for all sites.

Response to Comments from Richard Koeppicus, Hazardous Waste Site Evaluation Unit, Bureau of Habitat, Division of Fish, Wildlife and Marine Resources

DATE: July 27, 2000

SUBJECT: Seneca Army Depot Site 850006. Comments on *Draft-Final Remedial Investigation at SEAD-4* June 2000 by Parsons Engineering Science, Inc.

I have done very little review of this document because there is very little change from the November draft. I did a little spot checking in the document and read the new additional material in Appendix J Ecological Field Notes and Appendix K Response to Comments (only the responses to NYSDEC comments).

Appendix J was very informative and made interesting reading since it was completely factual and not punctuated with the opinions of Parsons Engineering. The reading of the Responses to Comments was discouraging because it was less factual and more opinionated.

Little clarity or interpretive value was gained in this version of the RI by the generation of the NYSDEC comments and Parsons responses for what amounted to being a time consuming review for DFWMR. I have been involved in numerous review of Parsons' documents at Seneca and other sites with similar experiences. The generation of comments by DFWMR only delays coming to a remedy for the site. The DFWMR does not accept or reject the opinions or interpretations presented by Parsons in this document and is in no way binding itself to the opinions or interpretations Parsons sets forth.. The DFWMR will independently analyze the factual data[1] as reported in tables, figures and purely descriptive narrative to formulate its recommendations for site remedies.

Fortunately, there is enough information in the RI that it is possible to move to the feasibility stage. I recommend that be done.

In the interest of coming to a resolution for a remedy regarding soils and sediments, I suggest that the areas that are shaded in Figure 4-4 Chromium in Surface Soils and Sediment (mg/kg) Above Background and Figure 4-6 Lead in Surface Soils and Sediment (mg/kg) Above Background be areas of remediation[2]. I also suggest it will be simpler in the long run to agree to a depth of removal of soils or

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[1] The DFWMR accepts the factual data in tables, figures and descriptive narratives, on their face, to be true since it has no independent means to check its validity. There are some occasions however when it is known that data are erroneous. In its response to NYSDEC comment 2, Parsons Engineering recognizes that some of the oxygen data in Table 2.8 is not possible but is reported anyway because that is the way it was reported from the field. Data should not be reported if it is known to be erroneous without making a notation at the point of reporting that the data is beyond known possible concentrations. To do so is disingenuous. The field crews should have easily recognized some of the reported data as not possible.

[2] Though I am suggesting these areas for remediation, I am not necessarily recommending them because of their chromium or copper concentrations. For instance,

sediments than to agree to parameter cleanup numbers. To do this though, more depth profiling of contaminants or analysis of current data[3] will be needed so that all parties are content with digging to a given depth. I would suggest depth profiling be performed at the 1 and 2 foot depths and with transects across the drainages and the analyses be for semi-volatiles, metals and PCBs. I believe digging to a given depth will provide more benefits to the environment than a patch work of cleanup areas to various target cleanup numbers. It will also be easier to manage the construction.

Virtually no weight is given to Parsons text in these comments. In the future, for other Parsons documents at Seneca the DFWMR will not be reviewing the text for the purpose of commenting on the analyses, opinions, errors or interpretations put forth by Parsons. Comments will focus on whether there is sufficient data to move the process forward.

Response: For the Feasibility Study, three Remedial Action Objectives (RAOs) have been developed for remediation of the soil and sediment at SEAD-4. The first RAO is the remediation of surface and subsurface soils with selected metals and semivolatile organic concentrations exceeding the established threshold values for the protection of ecological receptors. The metals evaluated include antimony, chromium, copper, lead, thallium, and zinc.

The second RAO is the remediation of surface and subsurface soils with selected metals concentrations exceeding site background and semivolatile organic concentrations exceeding TAGM values. Background concentrations of antimony, copper, lead, mercury, thallium, and zinc were used to assess the volume of soils requiring treatment at SEAD-4.

The RAO for sediments is to reduce the concentration of select metals, SVOCs, pesticides, and PCBs in sediments to below the New York State guidance values for sediments. These guidance values are the NYS Division of Fish and Wildlife nd the NYS Division of Marine Resources for the protection of marine and aquatic ecosystems.

Rather than conducting depth profiling prior to the removal of soils and sediments, confirmatory sampling will be conducted to ensure that all contaminated soils and sediments have been removed.

SD4-17 should be remediated primarily because of its PAH concentrations. There are many compounds or elements that often are co-located with the chrome and lead in the figures that trip ecological criteria.

[3] I have made no attempt other than cursory to see if the chemical contaminant soil depth profiles are within the existing data base. This kind of analysis is better left to Parsons.

Response to the Comments From United States Environmental Protection Agency

Subject: Draft Final FS and Revised Final RI for SEAD-4
Seneca Army Depot Activity
Romulus, New York

Comments Dated: March 14, 2002

Date of Comment Response: February 12, 2003

General Comments:

Your response regarding inconclusive groundwater sampling results (Response to Comment 3 and 12) proposes a supplemental groundwater investigation, not a remedy. Therefore, EPA recommends that this portion of the site (groundwater media) be addressed under a separate operable unit (OU) in order to move forward with the proposed soil remedies.

Response: Disagree. In previous responses, the Army has indicated that long-term groundwater monitoring may be necessary. Upon further review of the groundwater data, the Army believes that groundwater monitoring is not necessary at SEAD-4. Two rounds of groundwater sampling were conducted during the remedial investigation (RI): the first in March/April 1999 and the second round in July 1999. In the second round of sampling, there were no detections of VOCs, and the concentrations of metals were significantly lower. Turbidity data shows that in both rounds of sampling, there is a clear correlation between elevated metal concentrations and high turbidity values. Table 1 presents the concentrations of metals in each round.

Round 1 was not conducted using low-flow sampling methods, which contributed to higher turbidity and, consequently, higher concentrations of metals. Round 2 sampling was conducted using a low-flow method; hence the turbidity values, and the concentrations, were significantly lower. In Round 1, several metals including individual VOCs, antimony, thallium, chromium and selenium were detected at concentrations exceeding NYSDEC's Class GA standards. In Round 2, these parameters were either detected at concentrations below the standards or not detected. Although some metals including aluminum, manganese, and sodium exceeded the GA standards in Round 2 of sampling, the values detected are consistent with background. Based on these results, groundwater exceedances are attributable to suspended solids in the water, and not representative of groundwater concentrations. Accordingly, the Army does not intend to perform long-term monitoring of groundwater at SEAD-4.

I. <u>Remedial Investigation Report</u>

Comment 1: *Section* 7.2.3 *Ecological COPCs (page* 7-10): Screening out of COPCs based on frequency of detection should not be done as part of a SLERA. During the refinement of COPCs as

part of the BERA process, frequency of detection may be considered in consultation with BTAG. Based upon the number of samples collected, location of samples, and overall data adequacy this may or may not be acceptable. Refer to "The Role of Screening-Level Risk Assessment and Refining Contaminants of Concern in Baseline Ecological Risk Assessments," Eco Update (EPA 540/F-01/014) for additional information.

Response 1: Agreed. Based on a conference call between Parsons and the EPA on January 29, 2002 (see attached meeting notes), frequency of detection will not be used to screen out COPCs as part of a SLERA. All the constituents that failed the screening test (either by exceeding the benchmark values or not having a benchmark value) were carried through the HQ calculation. Frequency of detection has been addressed in Section 7.6 (Further Refinement of Contaminants of Concern) to support the decision of the refinement of chemicals of concern. The ecological risk assessment has been revised to reflect these changes.

Comment 2: The correct spelling of the author of the Oak Ridge soil criteria document is "Efroymson" (page 7-12).

Response 2: Agreed. The text has been revised.

Comment 3: It is inappropriate to screen out COPCs based upon their relation to background data (pages 7-14,7-17, etc). Refer to the Eco Update indicated above.

Response 3: Agreed. Based on a conversation between Parsons and the EPA on January 29, 2002 (as attached), COPCs are no longer eliminated based on the background concentrations. Rather, a risk management section (Section 7.7) has been added to present the Army's position that when background is the major contributor to the elevated HQs for the COPCs, these constituents do not warrant further evaluation. Tables presenting background comparisons (i.e., Tables 7-2A, 7-2B, and 7-2C) have been removed and the remaining tables in Section 7.0 have been renumbered. The ecological risk assessment in Appendix H has been revised accordingly.

Comment 4: Table H.7A: Ditch sediments are now considered ditch soils and they are screened against appropriate soil guidelines. It should be indicated whether the depth of collection was from the top 6" or from the top 12".

Response 4: Agreed. The depth of collection was from the top 6". The table has been revised to include this information.

Comment 5: It should be noted that the referenced sediment guidance values in Table H.7B are from NYSDEC, 1999 and not from USEPA, 1999.

Response 5: Acknowledged. It should be noted that the NYSDEC (1999) document was referenced in Table H.7B as versus the USEPA (1999).

Comment 6: Table H.9: Please indicate whether the maximum surface water concentrations were from the pond or drainage ditch.

Response 6: Agreed. The locations of the maximum surface water concentrations for COPCs were SW4-13, SW4-19, and 4Pipe, which were all located in drainage ditches. A note has been included in Table H.9 to indicate that the locations where the maximum surface water concentrations were detected (i.e., SW4-13, SW4-19, and 4Pipe) are in drainage ditches.

Comment 7: Table H.12: An explanation should be provided as to when CFs are used; specifically it is unclear why CFs were not used to calculate a NOAEL from a LOAEL, or for study duration (Tables H.12 & H.13).

Response 7: Agreed. An endpoint conversion factor (CF) was used in the case where a NOAEL was used to estimate the LOAEL or a LOAEL was used to estimate the NOAEL. According to the USEPA Ecological Risk Assessment Guidance for Superfund (USEPA 1997), a standard practice to derive a NOAEL when a LOAEL, but not a NOAEL value, is available, is to multiply the LOAEL by 0.1. Therefore, to derive a NOAEL from a LOAEL, an endpoint CF of 0.1 was applied to the LOAEL. Conversely, a CF of 10 was applied to a NOAEL in order to derive a LOAEL.

In addition, a study duration CF was used to normalize the exposure duration. If the exposure duration was subchronic [less than 90 days for rodents; less than 10 weeks for birds (Sample et al. 1996)], a study duration CF of 0.1 was applied to standardize the value for chronic exposure.

The total CF is the product of the endpoint CF and the study duration CF.

It should be noted that Table H.12 has been replaced by Tables H.12A and H.12B, which present NOAEL values for the meadow vole and the short-tailed shrew, respectively. Similarly, Table H.13 has been replaced by Tables H.13A and H.13B, which present LOAEL values for the meadow vole and the short-tailed shrew, respectively. A note has been included in each of the above tables (i.e., Tables H.12A, H.12B, H.13A, H.13B) to clarify the use of the CFs.

Comment 8: Tables H.35, H.37: Calculated Ditch Soil Exposure -Meadow Vole and Calculated Ditch Soil Exposure-Short Tailed Shrew: Certain variables used in the calculation of exposure dose should be provided; specifically BW, I_p, CF (for organics, inorganics a default of 0.2 is used), I_a, and I_s. These variables should be provided similar to the variables provided for the Red-tailed hawk calculations in Table H.39 and the Mourning Dove calculations in Table H.41.

Response 8: Agreed. Tables H.35 and H.37 have been revised to include the values of the variables (BW, I_p, CF, I_a, and I_s). In addition, variables such as body weight and wildlife intake rate for the ecological receptors are presented in Table H.16.

Comment 9: The discussion that NOAEL max HQs were greater than one but less than five should be removed from the second paragraph on page 7-38 (section 7.6.2 Identification of Soil COCs) and throughout the document. Discussion of "low HQs" should be removed from the discussion on page 7-39.

Response 9: Agreed. The text has been revised to address the comment.

Comment 10: Calculations based on a hawk site foraging factor of 10% are found on Table 7-7, not Table 7-6. This should be corrected in the first paragraph on page 7-39.

Response 10: Agreed. The text has been revised to address the comment. It should be noted that since Tables 7-2A/B/C have been removed from the document, Tables 7-6 and 7-7 have been renumbered as Tables 7-5 and 7-6, respectively.

Comment 11: Antimony, copper and zinc should be retained as COCs for surface soil, based on the summary of HQs for the shrew in Table 7-3 (pages 7-39 and 7-40).

Response 11: Acknowledged. It should be noted that Table 7-3 has been renumbered as Table 7-2. In addition, bioaccumulation factor (BAF) values for inorganics (as presented in Table H.15) have been updated and the USEPA recommended values presented in the Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities (USEPA, 1999) have been adopted for the risk characterization. The updated Table (i.e., Table 7-2) is attached.

As shown in Table 7-2, for the dove the hazard quotients associated with the maximum detected copper concentration were slightly above 1 (i.e., 2.0 and 1.6 for NOAEL and LOAEL scenarios, respectively). The max HQs for the shrew were greater than one (6.5 and 5.0, respectively, for the NOAEL and LOAEL scenarios). As discussed in Section 7 of the RI, it was assumed that the contaminant was 100% bioavailable for the screening level ERA. However, this assumption is very conservative. Copper binds relatively strongly to soils. This adsorption to soils is less affected by pH than other metals, making copper less likely to become bioavailable in the acidic conditions of an animal's digestive tract (ATSDR, 1990). In addition, the average copper concentration at the site poses no significant risk to any wildlife receptors. Therefore, copper is not expected to pose adverse effects at the site and should not be considered a COC.

For zinc, the NOAEL max hazard quotient for the shrew and the dove were slightly above one (1.6 and 1.9 for the shrew and the dove, respectively). Similarly, the 100% bioavailability for zinc is a

very conservative assumption, and therefore, zinc is not expected to pose any adverse effects and should not be considered a COC.

For antimony, the maximum detected concentration is associated with elevated HQs for the shrew (i.e., 115 and 12 for the NOAEL and LOAEL scenarios, respectively). The mean HQs for the shrew were 6.4 and 0.6 for the NOAEL and LOAEL scenarios, respectively. All the other HQs are less than one. It should be noted that the toxicity reference value (TRV) identified for antimony (i.e., 0.149 mg/kg-day) is based on a drinking water study where antimony potassium tartrate was used. Antimony potassium tartrate is used as mordant in the textile and leather industry, pesticide, and insecticide. Based on the historical use of the site (ammunition washout), antimony compounds such as antimony alloys and antimony oxides are expected to be the predominant components at the site. A literature review of the toxicity data for antimony trioxide and elemental antimony indicates that the NOAELs published are greater than 50 mg/kg-day. If the alternative TRV (i.e., 50 mg/kg-day) were used, all HQs for antimony would be less than 1. Based on the above discussion, it is concluded that antimony is not expected to pose any adverse effects and should not be considered a COC.

Comment 12: Antimony should be retained as a COC for ditch soil, based on the summary of HQs for the shrew in Table 7-5 (page 7-44). In the discussion of vanadium (first paragraph page 7-46) it should be noted whether the HQ for the mean concentration (excluding the hot spot area) was greater than "1 ". It is unclear why site foraging factors for the dove are discussed for zinc. Zinc should be retained as a COC based on HQs calculated for the shrew (page 7-46).

Response 12: Acknowledged. It should be noted that Table 7-5 has been renumber as Table 7-4. In addition, BAF values for inorganics (as presented in Table H.15) have been updated and the USEPA recommended values presented in the Screening Level Ecological Risk Assessment Protocol for Hazardous Waste Combustion Facilities (USEPA, 1999) have been adopted for the risk characterization. The updated Table (i.e., Table 7-5) is attached.

As discussed in the response to Comment 11, the HQs for antimony were based on a very conservative TRV for antimony potassium tartrate. Based on the historical use of the site (ammunition washout), antimony compounds such as antimony alloys and antimony oxides are expected to be the predominant components at the site. A literature review of the toxicity data for antimony trioxide and elemental antimony indicates that the NOAELs published are greater than 50 mg/kg-day. If the alternative TRV (i.e., 50 mg/kg-day) were used, all HQs for antimony would be less than 1. Based on the above discussion, it is concluded that antimony is not expected to pose any adverse effects and should not be considered as a COC.

The text has been revised to indicate that the HQ for the mean vanadium concentration (excluding the hot spot area) is greater than "1" and therefore, vanadium in ditch soil is considered a COC. However, as the mean vanadium concentration (excluding the hot spot area) is lower than two times

of the background, the Army's risk management position (as presented in Section 7.7) is that vanadium does not warrant further evaluation for the ditch soil at SEAD-4.

For zinc the NOAEL Max HQ was slightly above one (i.e., 1.1) for the dove. All the other HQs for the other receptors were less than 1 for the dove. As a result, zinc in ditch soil is not considered a COC.

Comment 13: The reevaluation of surface water data based on samples SW4-1 and SW4-2 should be shown in a Table, so it is clearly understood why there are no longer COPCs for surface water (page 7-48).

Response 13: Agreed. Table 7-7, which presents the hazard quotients for surface water in the pond, has been added to the text.

Comment 14: A primary measurement endpoint is not the calculation resulting in a LOAEL max HQ (page 7-50).

Response 14: Agreed. The text has been revised to address the comment.

II. Feasibility Study

Comment 1: All comments noted above regarding selection of COCs and the SLERA are also applicable to the Feasibility Study.

Response 1: Acknowledged. Refer to the above response to comments regarding selection of COCs and the SLERA. In summary, in the revised SLERA, all the constituents that failed the screening test (either by exceeding the benchmark values or by not having a benchmark value) were carried through the HQ calculation. COPCs were no longer eliminated based on the background concentrations or on a low frequency of detection. Rather, frequency of detection has been addressed in Section 7.6 (Further Refinement of Contaminants of Concern) to support the decision of the refinement of chemicals of concern. In addition, a risk management section (Section 7.7) has been added to present the Army's position that when background is the major contributor to the elevated HQs for the COPCs, these constituents do not warrant further evaluation. The ecological risk assessment in Appendix H has been revised accordingly.

Comment 2: NYSDEC TAGM values are not appropriate ecological screening values for soils (page 1-15).

Response 2: Acknowledged. It should be noted that the NYSDEC TAGMs were not used as screening values, as shown in Table H.5 of the RI. The statement has been revised to clarify that the NYSDEC TAGM was considered an ARAR, but not an ecological screening value

Comment 3: Upon completion of Steps 1 and 2 of the ERA a SMDP is reached, rather than at the end of Step 3.

Response 3: Agreed. The SLERA presented in the SEAD-4 RI is comprised of Steps 1 and 2 as described in EPA's supplemental ERAG guidance (June 2001). An additional step was taken to refine the COCs as part of Step 3 in accordance with ERAGs.

The Army has chosen to implement this additional step, providing information to support the elimination or retention of COPCs. It is understood that ERAGs recommends a Scientific Management Decision Point (SMDP) prior to starting the baseline risk assessment process. The Army's inclusion of Step 3 in the RI is not an attempt to circumvent the SMDP, but rather it is a method to provide input up front. The Army would be happy to discuss the adequacy of the data with respect to the findings of the screening risk assessment with the EPA, and the Army proposes to schedule a meeting in the near future.

The text has been revised to reflect that SLERA (including Steps 1 and 2 of ERAGS) and an additional step to refine the COCs (as part of Step 3 of ERAGS) have been presented in the RI report.

Comment 4: The cleanup activities recommended for Case 2 and Case 3 are confusing as it appears that different values are being used to clean up chromium and lead in surface soil depending upon whether (page 2-28).

Response 4: Acknowledged. The different cases represent different cleanup goals; consequently, the cleanup goals for chromium and lead vary among the different cases. Case 2 would be protective of ecological receptors and would remediate the site in accordance with its proposed future use, conservation/recreation. In accordance with 6 NYCRR 375–1.10, Case 3 was presented, which provides cleanup goals that would restore the site to its pre-disposal condition.

Comment 5: The reevaluation of surface water data based on samples SW4-1 and SW4-2 should be shown in a table so that it is clearly understood why there are no longer COPCs for surface water.

Response 5: Agreed. Table 7-7, which presents the hazard quotients for surface water in the pond, has been added to the text.

Comment 6: The cleanup activities recommended for Case 2 and Case 3 are confusing as it appears that different values have been used to cleanup chromium and lead in surface soils. Ecologically protective numbers have been developed and TAGM values are also being used. The latter are considerably lower than the concentration derived to be protective of ecological receptors (page 2-28).

Response 6: Acknowledged. The different cases represent different cleanup goals; consequently, the cleanup goals for chromium and lead vary among the different cases. Case 2 would be protective of ecological receptors and would remediate the site in accordance with its proposed future use, conservation/recreation. In compliance with 6 NYCRR 375–1.10, Case 3 was presented, which provides cleanup goals that would restore the site to its pre-disposal condition. Case 3 is a theoretical scenario that would result in unrestricted use for the site and would enable the site to be used for residential use. While the current land use determination for this site is conservation/recreation, the more conservative residential use cleanup scenario, Case 3, received further theoretical consideration in this process for cost comparison purposes.

III. Response to Comments on the FS

Comment 1: All comments are acceptable with the following exception: As noted for the Feasibility Study, all comments regarding COCs and the revised SLERA are applicable to the Response To Comments.

Response 1: Acknowledged. All comments regarding COCs and the revised SLERA have been addressed. In summary, all the constituents that failed the screening test (either by exceeding the benchmark values or by not having a benchmark value) were carried through the HQ calculation. COPCs are no longer eliminated based on the background concentrations or on a low frequency of detection. Rather, frequency of detection was been addressed in Section 7.6 (Further Refinement of Contaminants of Concern) to support the decision of the refinement of chemicals of concern. In addition, a risk management section (Section 7.7) has been added to present the Army's position that when background is the major contributor to the elevated HQs for the COPCs, these constituents do not warrant further evaluation. The ecological risk assessment in Appendix H has been revised accordingly.

TA

Analytical Groundwa[illegible]esults at SEAD-4

SENECA ARMY DEPOT ACTIVITY

								SEAD-4	SEAD-4	SEAD-4	SEAD-4	SEAD-4
								MW4-1	MW4-1	MW4-1	MW4-10	MW4-10
								MW4-1	42017	42031	42026	42032
								5.4	11	12.5	8.4	10
								9.4	11	12.5	8.4	10
								1/21/1994	4/1/1999	7/7/1999	3/30/1999	7/7/1999
								SA	SA	DU	SA	SA
								ESI	RI Phase 1 Step	RI Phase 1 Step	RI Phase 1 Step	RI Phase 1 Step
Parameter	Units	Maximum	Frequency	Action Leve	Exceed	Detect	Analyses	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)
Aluminum	UG/L	3820	90%	50	25	27	30	41.9 U	2480 J	322	222 J	167 J
Antimony	UG/L	39.3	23%	3	5	7	30	21.6 U	2.2 U	3.7 U	2.2 U	3.7 U
Arsenic	UG/L	6.5	17%	25	0	5	30	2.2 J	1.8 U	5.2 U	1.8 U	6.5 J
Barium	UG/L	121	100%	1000	0	30	30	19.6 J	30.9 J	22.3 J	27.6 J	33.4 J
Beryllium	UG/L	6.3	10%	4	1	3	30	0.4 U	0.1 U	0.4 U	0.1 U	0.4 U
Cadmium	UG/L	5.6	7%	10	0	2	30	2.1 U	0.3 U	0.9 U	0.3 U	0.9 U
Calcium	UG/L	147000	100%		0	30	30	137000	115000	112000	75800	81800
Chromium	UG/L	260	60%	50	1	18	30	2.6 U	2.8 J	0.8 U	8.1 J	0.86 J
Cobalt	UG/L	8.2	17%		0	5	30	4.6 J	1.5 U	3.4 U	1.5 U	3.4 U
Copper	UG/L	37.6	30%	200	0	9	30	3.1 U	4.3 J	2.9 U	2.4 U	2.9 U
Cyanide	UG/L	0	0%	100	0	0	28	5 U	5 U	5 U	5 U	5 U
Iron	UG/L	6900	90%	300	15	27	30	[illegible]382	2310	320	257	204
Lead	UG/L	2.2	13%	25	0	4	30	0.5 U	0.9 U	0.8 U	0.9 UJ	0.8 U
Magnesium	UG/L	57600	100%		0	30	30	57600	51700	49000	28800	22600
Manganese	UG/L	855	93%	300	5	28	30	[illegible]846	42.9	17.8	246	145
Mercury	UG/L	0.04	7%	2	0	2	30	0.04 U	0.1 U	0.1 U	0.1 U	0.1 U
Nickel	UG/L	9.9	40%		0	12	30	4 U	6 J	4 U	1.9 J	4 U
Potassium	UG/L	14400	100%	10	30	30	30	[illegible]7380	2900 J	2200 J	2000 J	3350 J
Selenium	UG/L	24	37%	10	3	11	30	2.1 J	5.1	2.9 U	10.4	3.9 J
Silver	UG/L	6.7	17%	50	0	5	30	4.2 U	0.9 U	2.5 U	1 J	2.5 U
Sodium	UG/L	82600	100%	20000	7	30	30	11700	6820	7930	7990	10200
Thallium	UG/L	4.9	10%	2	3	3	30	1.2 U	1.9 U	3 U	3.3 J	3 U
Vanadium	UG/L	11.4	30%		0	9	30	3.7 U	4.3 J	2.5 U	1.8 J	2.5 U
Zinc	UG/L	95	87%	300	0	26	30	19.1 J	82.8	7.1 J	27.6	3 U
Turbidity	NTU								28	9.67	8.9	1.56

TA.

Analytical Groundwater Results at SEAD-4
SENECA ARMY DEPOT ACTIVITY

SEAD-4	SEAD-4	SEAD-4	SEAD-4	SEAD-4	SEAD-4	SEAD-4	SEAD-4	SEAD-4	SEAD-4	SEAD-4
MW4-11	MW4-11	MW4-12	MW4-12	MW4-13	MW4-13	MW4-2	MW4-2	MW4-3	MW4-3	MW4-3
42027	42035	42028	42034	42029	42041	MW4-2	42018	MW4-3	42019	42033
9	10	8.5	12.9	7.9	9	2.2	5.3	3.9	8.5	10.95
9	10	8.5	12.9	7.9	9	3.2	5.3	7.9	8.5	10.95
3/31/1999	7/8/1999	3/30/1999	7/8/1999	3/31/1999	7/9/1999	2/4/1994	4/1/1999	1/20/1994	3/29/1999	7/7/1999
SA	SA	SA	SA	SA	SA	SA	SA	SA	SA	SA
RI Phase 1 Step	RI Phase 1 Step	RI Phase 1 Step	RI Phase 1 Step	RI Phase 1 Step	RI Phase 1 Step	ESI	RI Phase 1 Step	ESI	RI Phase 1 Step	RI Phase 1
Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value
947 J	1390	1260 J	1200	320 J	308	435		725	22.8 J	445
13.8 J	3.7 U	2.9 J	3.7 U	2.2 U	3.7 U	393 J		21.4 U	2.2 U	3.7
1.8 U	5.2 U	1.8 U	5.2 U	1.8 U	5.9 J	1.4 U		1 J	1.8 U	5.2
35.2 J	55.1 J	53.8 J	57.3 J	30 J	118 J	19.3 J		42.7 J	46.1 J	54
0.1 U	0.4 U	0.1 U	0.4 U	0.1 U	0.4 U	0.4 U		6.3	0.1 U	0.4
0.3 U	0.9 U	0.3 U	0.9 U	0.3 U	0.9 U	2.1 U		5.6	0.3 U	0.9
119000	84100	134000	128000	61900	103000	66300		122000	98400	96300
0.7 U	3.2 J	3.2 J	2.6 J	1.7 J	0.82 J	2.6 U		6.9 J	0.7 U	0.8
1.5 U	3.4 U	1.5 J	3.4 U	1.5 U	3.4 U	4.4 U		8.2 J	1.5 U	3.4
2.4 U	3.8 J	2.4 U	2.9 U	2.4 U	10.2 J	3.1 U		6.6 J	2.4 U	2.9
5 U	5 U	5 U	5 U	5 U		5 U		5 U	5 U	5
1280	1920	1920	1460	297	1150	471		745	14.9 U	415
0.9 UJ	0.8 U	0.9 UJ	0.8 U	0.9 UJ	0.8 U	1.9 J		0.56 J	0.9 UJ	0.8
40000	19800	30100	28100	5590	15600	10100		32800	25600	25700
288	229	262	137	378	855	60.5		229	0.4 U	11.4
0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U	0.04 U		0.04 J	0.1 U	0.1
1.4 U	4 U	4 J	4 U	3.1 J	5.8 J	4 U		4.4 J	1.4 U	4
4570 J	4520 J	3110 J	1540 J	2990 J	14400	1840 J		5250	1480 J	1480
1.8 U	2.9 U	13.4	2.9 U	1.8 U	2.9 U	0.7 U		1.4 J	1.8 U	2.9
0.9 U	2.5 U	0.9 U	2.5 U	1.2 J	2.5 U	4.2 U		6.7 J	0.9 U	2.5
82600	[illegible]	35200	22700	4650 J	8090	12400		31100	23200	22200
1.9 U	3 U	4.9 J	3 U	1.9 U	3 U	1.2 U		1.2 U	1.9 U	3
1.6 U	4.7 J	3.3 J	2.5 U	1.6 U	2.5 U	3.7 U		7.7 J	1.6 U	2.5
9 J	10.5 J	7.9 J	5.3 J	9.3 J	16.2 J	15.2 J		17.7 J	3.2 J	4
30	30.8	31	8.4	4.8	8.4		16.4		0.7	3.81

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Analytical Groundw esults at SEAD-4

SENECA ARMY DEPOT ACTIVITY

	SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
	MW4-4		MW4-4		MW4-4		MW4-5		MW4-5		MW4-6		MW4-6		MW4-6		MW4-6		MW4-7	
	MW4-4		42020		42036		MW4-5		42021		42022		42030		42039		42040		42023	
	4.9		10		10		3.1		7		9		9		11		11		6.1	
	8.9		10		10		5.1		7		9		9		11		11		6.1	
	2/1/1994		4/24/1999		7/8/1999		1/20/1994		4/24/1999		4/1/1999		4/1/1999		7/10/1999		7/10/1999		3/29/1999	
	SA		SA		SA		SA		SA		SA		DU		SA		DU		SA	
Step	ESI		RI Phase 1 Step		RI Phase 1 Step		ESI		RI Phase 1 Step		RI Phase 1 Step		RI Phase 1 Step		RI Phase 1 Step		RI Phase 1 Step		RI Phase 1 Step	
(Q)	Value	(Q)	Value	(Q)	Value	(Q)	Value	(Q)	Value	(Q)	Value	(Q)	Value	(Q)	Value	(Q)	Value	(Q)	Value	(Q)
	1240		10.4	U	18.9	U	108	J	249		226	J	115	J	75.3	J	39.5	J	170	J
U	33.8	J	2.2	U	3.7	U	21.4	U	2.2	U	2.8	J	2.2	U	5.2	U	3.7	U	2.2	U
U	1.4	U	1.8	U	5.2	U	0.8	U	1.8	U	1.8	U	1.8	U	5.2	U	5.2	U	1.8	U
J	46.7	J	37	J	41.1	J	36.1	J	38.5	J	19.7	J	18.6	J	99.1	J	28.2	J	19.5	J
U	0.4	U	0.22	J	0.4	U	0.4	U	0.26	J	0.1	U	0.1	U	0.4	U	0.4	U	0.1	U
U	2.1	U	0.3	U	0.9	U	2.1	U	0.3	U	0.3	U	0.3	U	0.55	J	0.9	U	0.3	U
	123000		94200		91900		147000		128000		48900		46300		73000		68100		43800	
U	21.3		1.8	J	2.9	J	2.6	U	0.7	U	0.7	U	1	J	0.8	U	0.8	U	0.7	U
U	4.4	U	1.5	U	3.4	U	5.2	J	1.5	U	1.5	U	1.5	U	2.5	U	3.4	U	1.5	U
U	37.6		1	U	2.9	U	3.1	U	1.9	J	2.4	U	2.4	U	4.5	J	2.9	U	2.4	U
U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U	5	U
	2270		14.9	U	65.9	J	143		296		245	J	153	J	76.7	J	20.8	U	196	
U	2.2	J	0.9	U	0.8	U	0.5	U	0.9	U	0.9	U	0.9	U	0.8	U	0.8	U	0.9	UJ
	19100		13700		13400		31000		18400		5700		5420		8890		8860		5680	
J	263		0.4	U	7.4	J	477		8.5	J	30.2		27.4		117		116		42.8	
U	0.04	U	0.1	UJ	0.1	U	0.04	J	0.1	UJ	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
U	6.4	J	1.4	U	4	U	4	U	2.2	J	1.4	U	2	J	2.3	U	4	U	1.5	J
J	4540	J	766	J	1110	J	7320		1050	J	366	J	260	J	1090	J	1110	J	1560	J
U	0.7	U	1.8	U	2.9	U	0.9	J	3.2	J	1.8	U	1.8	U	2.9	UJ	2.9	U	2.6	J
U	4.2	U	0.9	U	2.5	U	4.2	U	0.9	U	0.9	U	0.9	U	2.5	J	2.5	U	0.9	U
	11200		9270		10500		14100		11200		2260	J	2030	J	5560		6600		5740	
U	1.2	U	1.9	U	3	U	1.2	U	1.9	U	1.9	U	1.9	U	2.2	U	3	U	3.7	J
U	4.9	J	1.6	U	2.5	U	3.7	U	1.6	U	1.6	U	1.6	U	2.9	U	2.5	U	1.6	U
J	95		6.2	J	4.3	J	42.6		10.8	J	2.3	J	48	J	81.1	J	3	UJ	3.5	J
			3.5		4.49				12		18.2		18.2		1.34		1.34		7.3	

TA

Analytical Groundw. .esults at SEAD-4

SENECA ARMY DEPOT ACTIVITY

SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4		SEAD-4	
MW4-7		MW4-8		MW4-8		MW4-9		MW4-9		MW4-9	
42042		42024		42037		42025		42038		042038A	
8.1		8.8		11		6.5		8		8	
8.1		8.8		11		6.5		8		8	
7/10/1999		3/30/1999		7/10/1999		3/30/1999		7/8/1999		7/8/1999	
SA		SA		SA		SA		SA		SA	
RI Phase 1 Step		RI Phase 1 Step		RI Phase 1 Step		RI Phase 1 Step		RI Phase 1 Step		RI Phase 1 Step 1	
Value	(Q)	Value	(Q)	Value	(Q)	Value	(Q)	Value	(Q)	Value	(Q)
3820		176	J	289		2040	J	918	J		
3.7	U	3.2	J	3.7	U	3.7	J	3.7	U		
5.2	U	1.8	U	5.5	J	1.8	U	5.2	U		
121	J	20.3	J	39.2	J	32	J	44.4	J		
0.4	U	0.1	U	0.4	U	0.1	U	0.4	U		
0.9	U	0.3	U	0.9	U	0.3	U	0.9	U		
102000		57300		107000		26400		92400			
9.3	J	2.3	J	1.8	J	260		21.8			
3.9	J	1.5	U	3.4	U	1.5	U	3.4	U		
6.6	J	2.4	U	3.2	J	2.4	U	2.9	U		
		5	U	5	U	5	U	5	U		
6900		228		1090		868		86.7	J		
1	J	0.9	UJ	0.8	U	0.9	UJ	0.8	U		
20200		6150		20200		6500		20800			
187		30.4		4410		13.5	J	87.6			
0.1	U	0.1	U	0.1	U	0.1	U	0.1	U		
9.9	J	1.4	U	4	U	2.1	J	4	U		
9450		968	J	8580		1130	J	3580	J		
2.9	UJ	24		3	J	1.8	U	2.9	U		
2.5	U	1.2	J	2.5	U	0.9	U	2.5	U		
9380		3840	J	9930		6760		10500			
3	U	1.9	U	3	U	1.9	U	3	U		
11.4	J	1.9	J	2.5	U	1.6	J	2.5	U		
29.5		8.8	J	3	U	12.2	J	3	U		
100		10		6.4		31		3.71			

Liu, Chunhua

From: Liu, Chunhua
Sent: Tuesday, January 29, 2002 4:47 PM
To: Vazquez. Julio (E-mail); Thomas R NAN02 Enroth (E-mail); 'pensak.mindy@epa.gov'; 'ajthorne@gw.dec.state.ny.us'; 'absoloms@seneca-hp.army.mil'; 'kevin.w.healy@hnd01.usace.army.mil'
Cc: Schacht, Eliza; Travers, Jacqueline; Liu, Chunhua; Adams, Jeff
Subject: conference call 1/29/02 - SEAD-12 RI

Dear all:

On 1/29/02, Parsons (Jackie Travers and Chunhua Liu) had a conference call with Julio Vazquez (USEPA), Mindy Pensak (BTAG, Region II), Alicia Thorne (NYSDEC), and Tom Enroth (USACOE - NY District). The call focused on how to use background data in the screening level ecological risk assessment for SEAD-12 at the Seneca Army Depot. In the draft RI, background data had been used to eliminate constituents of potential concern (COPCs) prior to calculating hazard quotients (HQs). After comments from USEPA requesting that all COPCs be carried through the screening level risk assessment, Parsons calculated HQs for all COPCs, and in addition, calculated HQs for background concentrations. Background HQs were then subtracted from site HQs to determine the incremental risk. EPA's comments dated 12/28/01 on the Final RI stated that background should not be used to subtract risk from the site and recommended a discussion on the role that background plays in the ecological risk assessment. Specific issues addressed during the conference call include the following:

1) Ms. Pensak mentioned that hazard quotients (HQs) calculated for background should not be subtracted from the site HQs. Background should not be used to eliminate COCs, but may be discussed in the uncertainty section to support risk management decisions. As a result, Parsons will not present incremental risk information. In Section 7.6 of the ecological risk assessment, COCs will not be eliminated based on background concentrations. Rather, a risk management section will be added to the end of the ecological risk assessment section to present the Army's position on whether or not to conduct a baseline ecological risk assessment (BERA). Issues raised in the uncertainty section, such as background, may then be used to support a decision to (1) end the risk assessment process (i.e. either by agreeing to clean up an area or deciding that no additional information is needed to eliminate an area of concern); or (2) to continue on to a BERA. For the compounds with the site concentrations consistent with the background concentrations, the Army will propose that no additional assessment is needed and that elevated HQs calculated are due to concentrations similar to those found in background.

2) Mr. Vazquez and Ms. Pensak requested more information on the background data set. Parsons will add more information on background to the revised final report. The mean concentration for each compound will be added to Table G-1.

3) EPA and BTAG agreed that tissue sampling may be required if a BERA is pursued. If the risk managers decide no BERA is necessary, then no tissue sampling would be required.

4) The Army is going to issue the revised final RI on 2/11/02.

Post-conference note:

After the conference call, Chunhua Liu (Parsons) called Mindy Pensak (BTAG) and discussed two additional EPA comments from 12/28/01:

1) Using detection frequency in the initial screening of chemicals of potential concern (EPA General Comment 3)

Ms. Pensak suggested not to use detection frequency in the initial screening of COPCs. Detection frequency issue can be discussed in Step 3.

2) Excluding nondetects with detection limits greater than two times the maximum detected value in the mean calculation (EPA General Comment 6)

Ms. Pensak suggested this may be an approach used in human health risk assessment but not ecological risk assessment. Parsons is proposing to keep the data as they were because they are conservative (i.e., health protective) and not to revise the mean calculation at this stage.

Please contact me or Jackie if you have any questions.

Regards,

Chunhua Liu, Ph.D.
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Canton, MA 02021-2809
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Response to the Comments from New York State Department of Environmental Conservation

Subject: Draft-Final Feasibility Study at the Munitions Washout Facility (SEAD-4) January 2002
and Revised Final Remedial Investigation at the Munitions Washout Facility (SEAD-4) January 2002
Seneca Army Depot
Romulus, New York

Comments Dated: April 4, 2002

Date of Comment Response: February 12, 2003

General Comments:

General Comment No. 1: As stated in the Department's October 31 2001 letter, the Division of Fish, Wildlife and Marine Resources find the proposed cleanup goals of 324 ppm for chromium (total) and 167 ppm for lead unacceptable. Those proposed cleanup goals do not protect all components of the Seneca Army Depot environment. They are only indicative of the risk to two species; dove and short-tail shrew. The proposed cleanup goals should provide for protection for all elements that make for a complete and healthy environment including plants, earthworms, etc.

Response No. 1: Disagreed. Recently, the Army has received indications from the Seneca County Industrial Development Agency that a future reuser of SEAD-4 will be interested in using the buildings and grounds at SEAD-4, and conduct light industrial activities. The buildings are structurally sound and could be used by the reuser. Since this area most likely would be used for industrial activities, the Army believes that the ecological cleanup goals that were proposed by the Army in the Feasibility Study are no longer appropriate. The Army will propose land use restrictions to this site to limit activities to industrial requirements. These restrictions will be further described in the proposed plan for this site.

The SEAD-4 area is of little value to the ecological community, and would not serve as a desirable habitat for this community. Most likely, ecological receptors will inhabit unaffected areas adjacent to the impacted areas of SEAD-4, thereby avoiding areas where minimal ecological risk exists. The areas where ecological risk exists represent only 2 acres of the entire 7,585 acres of the conservation/recreation area (0.2 percent).

Based on this, the Army believes that human health should be the driver considered in developing cleanup goals for the site. Since the human health risk from debris within the buildings, remediation of the soils at SEAD-4 is no longer proposed.

The Army does recognize that land use restrictions will be required to limit the site to industrial use (excluding the child in day care scenario).

General Comment No. 2: The Army's evaluation for the unrestricted use scenario is unacceptable in that it does not represent a full analysis using the seven evaluation criteria. The Army should perform a full analysis of an unrestricted use scenario against the seven evaluation criteria, not just a simple cost comparison. This full evaluation should be conducted as outlined in the Guidance for Conducting Remedial Investigations and Feasibility Studies under CERCLA; Interim Final, October 1988.

Response No. 2: Agreed. The unrestricted use scenario will be analyzed using the seven evaluation criteria.

General Comment No. 3: A common component of both Alternatives 2 and 3 is Case 4, which proposes sediment cleanup criteria for the "'man-made lagoon" of less than 26 ppm chromium. Alternatives 2 and 3 were also evaluated under both Case 2 (protection of ecological receptors, prevent ingestion/direct contact with metals in soils, and prevent/minimize migration of metals to groundwater) and Case 3 (pre-disposal conditions) for surface, subsurface soil and "ditch soil" contamination. Case 2 proposes soil cleanup criteria of lead less than 167 ppm and chromium less than 324 ppm. Case 3 proposes site specific background levels as soil cleanup criteria for 11 COCs, two of which are lead and chromium. For Alternative 2, the Army is proposing to cleanup the lagoon sediments to less than 26 ppm chromium while proposing to cleanup the upstream "ditch soils" to 324 ppm chromium. Wouldn't the contamination upstream in the ditch soils be washed downstream into the lagoon? How does the Army propose to prevent recontaminating the lagoon sediment under the Alternative 2 option? It appears that the corresponding cleanup criteria for the specific media that was chosen for the OB Grounds would be appropriate for this site as well.

Response No. 3: The Army is no longer proposing to perform remediation of the lagoon since no human health risk exists under a industrial use scenario. Additionally, the Army proposes to remove the temporary berm at the end of the storm water control basin and allow this "lagoon" to return to its natural condition. The storm water in this area will be allowed to follow its natural watercourse.

General Comment No. 4: In the USEPA's March 14, 2002 comment letter regarding the Draft-Final FS, the USEPA recommended that the groundwater media be broken into a separate operable unit to move forward with the proposed soil/sediment remedy. Another possibility of moving forward with the soil/sediment remedy would be to propose long-term groundwater monitoring. However, this subject may be agreed upon at the next BCT meeting therefore we suggest that this topic be added to the next BCT meeting agenda.

Response No. 4: Previously, the Army has indicated that long-term groundwater monitoring may be necessary at SEAD-4. Upon further review of the groundwater data, the Army believes that

groundwater monitoring is not necessary at SEAD-4. Two rounds of groundwater sampling were conducted during the remedial investigation (RI): the first in March/April 1999 and the second round in July 1999. In the second round of sampling, there were no detections of VOCs, and the concentrations of metals were significantly lower. Turbidity data shows that in both rounds of sampling, there is a clear correlation between elevated metal concentrations and high turbidity values. Table 1 presents the concentrations of metals in each round.

Round 1 was not conducted using low-flow sampling methods, which contributed to higher turbidity and, consequently, higher concentrations of metals. Round 2 sampling was conducted using a low-flow method; hence the turbidity values, and the concentrations, were significantly lower. In Round 1, several metals including individual VOCs, antimony, thallium, chromium and selenium were detected at concentrations exceeding NYSDEC's Class GA standards. In Round 2, these parameters were either detected at concentrations below the standards or not detected. Although some metals including aluminum, manganese, and sodium exceeded the GA standards in Round 2 of sampling, the values detected are consistent with background. Based on these results, groundwater exceedances are attributable to suspended solids in the water, and not representative of groundwater concentrations. Accordingly, the Army does not intend to perform long-term monitoring of groundwater at SEAD-4.

General Comment No. 5: Please submit a map of SEAD-4 outlining the areas classified as wetlands, identifying state regulated, federal regulated and non-regulated wetlands.

Response No. 5: The Army will provide a plan showing the storm water drainage ditches that are classified as wetlands.

Specific Comments:

Specific Comment 1: Army's Response #6: A statement is made that "it is the Army's understanding that NYSDEC has not disagreed with the approach of investigating the cost of unrestricted use for comparison purposes." If this statement is meant to explain that the state does not disagree with a cost comparison as the sole criteria used to compare a restricted use alternative with an unrestricted use alternative, then the statement is surprising. Clearly cost is a part of the feasibility analysis, but we reiterate that it is only one of the seven evaluation criteria. The NYSDEC has stated in several of their letters (dated January 4, 2001, February 21, 2001, October 3, 2001, and November 13, 2001) that a full analysis of an alternative that would achieve unrestricted use should be performed against the seven evaluation criteria, not just simple cost comparison. A cost comparison is insufficient in presenting a full comparison of the advantages and disadvantages of a range of alternatives, from unrestricted use to a restricted use scenario that requires institutional controls and long-term monitoring.

Response 1: See response to General Comment No. 2.

Specific Comment 2: Replacement page 2-23, Section 2.5.3. Soil in the Ditches: A statement is made that a "hotspot removal will be conducted at the SD4-28 to remove the vanadium." However, besides being depicted in Table 2-1, this is not stated anywhere else in the document, not in the remedial action objectives, cleanup criteria, not outlined in any of the remedial alternatives. Please reconcile.

Response 2: See response to General Comment No. 1

Specific Comment 3: Table 1: The column titled Proposed Clean-up Goal should be renamed to what it actually is i.e. Calculated Soil Concentrations at the LOAEL for Dove and Short-Tailed Shrew. Also, Table 1 should include the Seneca Army Depot background values for chromium and lead. The levels, when listed in Table 1, should then be compared to determine the best overall protection to human health and the environment. In addition, each cleanup goal should also then be evaluated for its ability to restore the site to pre-release conditions.

Response 3: Disagreed: Although NYSDEC disagreed with the proposed cleanup goals, the column heading is correct. The column does present the Army's Proposed Cleanup Goal.

Please see response to General Comment No. 1 for other comments.

Comment 4: Table 2-1: If a hot spot is proposed (see comment #2) as part of Case 2 (ecological soils cleanup values using a HQ of 1), then the cleanup criteria for Case 3 (pre-disposal conditions), should be at least if not more stringent of vanadium than Case 2. This should be indicated as such.

Response 4: Agreed. Since Case 3 addresses remediation of ditch soils, the vanadium hotspot, SD4-28, is included in the area slated for remediation under this scenario. Table 2-1 has been revised to clarify this point.