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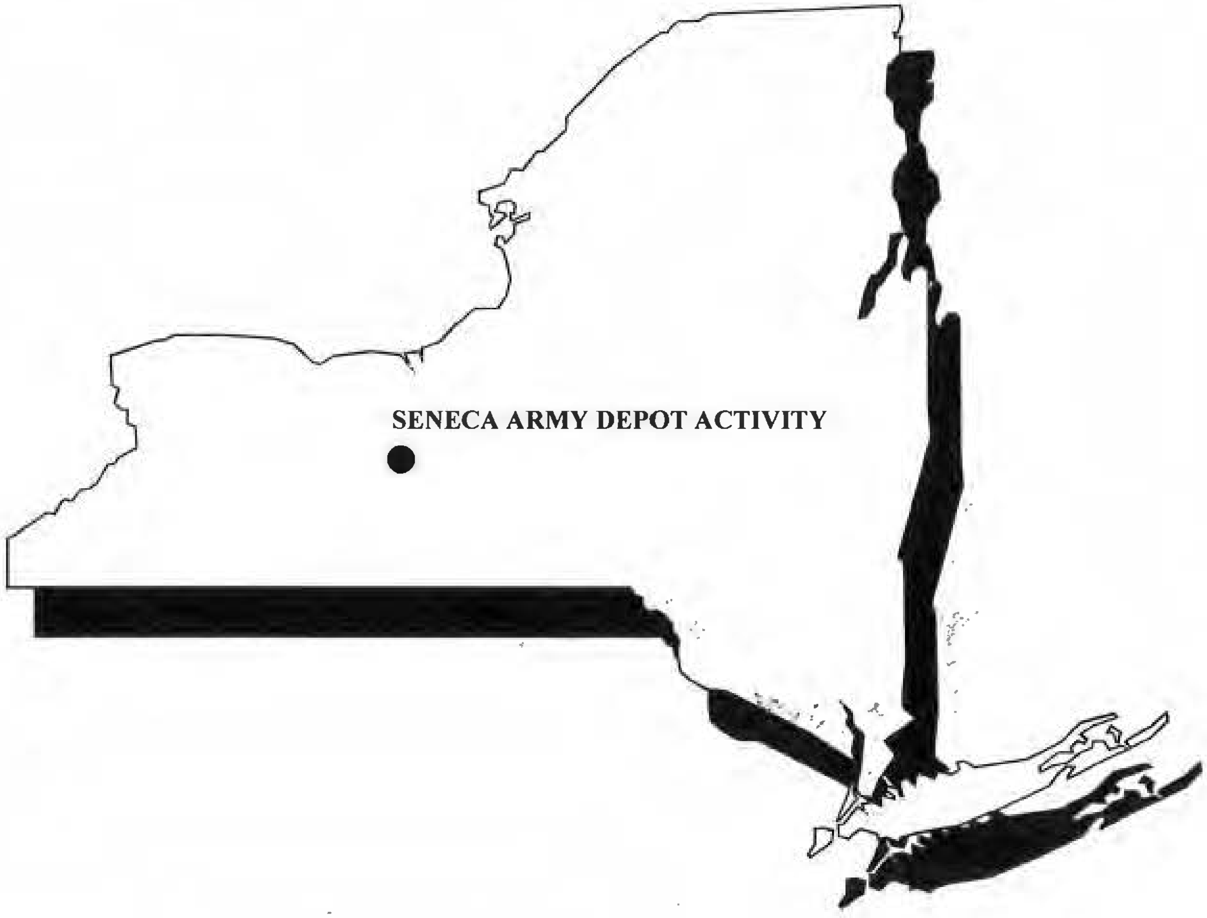
U.S. ARMY ENGINEER DIVISION
HUNTSVILLE, ALABAMA



FINAL

REMEDIAL INVESTIGATION REPORT
AT THE RADIOLOGICAL WASTE BURIAL SITES (SEAD-12)
VOLUME I OF III - REPORT

CONTRACT NO. DACA87-95-D-0031
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AA	Atomic absorption
ABS	Absorption Fraction
AEC	Atomic Energy Commission
AEHA	Army Environmental Hygiene Agency
AET	Actual Evapotranspiration
ALARA	As Low as Reasonably Achievable
AMC	U.S. Army Material Command
AN	Army-Navy
ANOVA	Analysis of Variance (Test)
AOC	Area of Concern
APCS	Air Pollution Control System
AQCR	Genesee-Finger Lakes Air Quality Control Region
ARAR	Applicable or Relevant and Appropriate Requirements
AST	Aboveground Storage Tank
ASTM	American Society for Testing and Materials
ATSDR	Agency for Toxic Substances and Disease Registry
AW	Drilling Rod Size
AWQC	Ambient Water Quality Criteria
AWQS	Ambient Water Quality Standards
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

C	Classification: For water Class C denotes all surface waters
CA	Concentration of Particulate-Associated Chemicals in Ambient Air
$CaCO_3$	Calcium Carbonate
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
cpm	counts per minute
Cr	Chromium
CRAVE	USEPA Carcinogen Risk Assessment Verification Endeavor
CRT	Cathode ray tube
CSM	Conceptual Site Model
CT	Central Tendency
CV	Coefficient of Variance
D	Absorbed Dose
DA	Absorbed Dose Per Event
DARCOM	Development and Readiness Command
DCE	Dichloroethylene
DCGL	Derived Concentration Guideline Levels
DCT	Dose Conversion Factor
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
DERA	Defense Environmental Restoration Account
DES	Diethyl Stilbestrol
DO	Disolved Oxygen
DOA	Department of the Army
DOD	Department of Defense

DOE	Department of Energy
DOT	Department of Transportation
dpm	Disintegrations Per Minute
DQO	Data Quality Objective
DRMO	Defense, Revitalization and Marketing Office
DWQS	Drinking Water Quality Standard
E	The Emission Rate
EBS	Environmental Baseline Study
ED	Exposure Duration
EEC	Expected Exposure Point Concentration
EF	Exposure Factors/Frequency
Eh	Oxidation Reduction Potential
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
ERAGS	Ecological Risk Assessment Guidance for Superfund
ERQ	Ecological Risk Quotient
ES	Engineering-Science, Inc.
ESE	Environmental Science and Engineering
ESF	Environmental Science and Forestry
ESI	Expanded Site Inspection
ET	Exposure Time Per Event
FDA	Food and Drug Administration
FCM	Food Chain Multipliers
FI	Fraction Ingested
FIDLER	Field Instrument for the Detection of Low Energy Radiations
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
FWIA	Fish and Wildlife Impact Analysis
FWMP	Fish and Wildlife Management Plan
g	gram
GA	Classification: The best usage of Class GA waters is as a source of potable water supply. Class GA waters are fresh groundwaters
GAE	Geophysical anomaly excavations
GC	Gas chromatograph
GC/MS	Gas chromatograph/Mass spectrum
gpm	Gallons per minute
GPR	Ground penetrating radar
GRI	Gas Research Institute
GSSI	Geophysical Survey Systems, Inc.
H	Dose Equivalent
H3	Tritium
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/Hazard Quotient
HSDB	Hazardous Substances Data Bank
HSWA	Hazardous and Solid Waste Amendments
I	Infiltration
IAG	Interagency Agreement
ICF	ICF Technology, Incorporated
IDW	Investigation Derived Waste
ILCR	Incremental Lifetime Cancer Risk
IR	Ingestion Rate
IRIS	Integrated Risk Information System
IRM	Interim remedial measure
IRP	Installation Restoration Program
K_d	Partitioning Coefficient

K_h	Hydraulic Conductivity
Koc	Organic carbon coefficient
K_p	Permeability Coefficient
LC50	Median Lethal Concentration
LD50	Median Lethal Dose
L/min	Liters per minute
lb	pound
LEL	Lowest Effect Level
LOAEL	Lowest Observed Adverse Effect Level
LOT	Limit of Tolerance
LRA	Local Redevelopment Authority
m	meter
m/s	meter per second
MARSSIM	Multi-Agency Radiological Survey and Site Investigation Manual
MCL	Maximum Contaminant Level
MCPA	4-Chloro-2-Methylphenoxy acetic acid
MCPP	4-Chloro-2-Methylphenoxy-2-propionic acid
MCRW	Microwell
MDC	Minimum Detectable Concentration
mg/kg	Milligrams per kilogram
mg/L	Micrograms per liter
mg/l	Milligram per liter
mg/m_3	milligrams/cubic meter
MHz	Megahertz
mi	mile
MIE	Monitoring Instruments for the Environment, Inc.
Miniram	Miniature Real-Time Aerosol Meter
ML	Inorganic Silt
mL	Milliliter
mL/g	milliliter per gram
mmHg	Millimeters Mercury
mmhos/m	Millimhos per meter
mR	Milli Roentgen
MRD	Missouri River Division
mrem	milli roentgen equivalent man
MSL	Mean sea level

MW	Monitor Well
NA	Not analyzed or not available
NAVA	North American Vertical Datum
NBS	National Bureau of Standards
Nc	Noncarcinogenic
NGVD	National Geologic Vertical Datum
NOAA	National Oceanic Atmospheric Administration
NOAEL	No Observed Adverse Effect Level
NPL	National Priority List
NRC	Nuclear Regulatory Commission
NRMP	National Resources Management Plan
NSF	National Sanitation Foundation
NTU	Nephelometric turbidity units
NW	Drilling Rod Designation
NWI	National Wildlife Institute
NYCRR	New York Code of 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
OD	Open Detonation
ODAST	One Dimensional Analytical Solute Transport
OU	Operational Unit
OV	Specific Ovid Quadrangle
OVM	Organic Vapor Meter
PAH	Polynuclear Aromatic Hydrocarbon
Parsons ES	Parsons Engineering Science, Inc.
Pb	Lead
PCB	Plychlorinated Biphenyls
pCi	pico Curies
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

PM	Particulate Matter
PPE	Personal Protective Equipment
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	EPA Risk Assessment Guidance for Superfund
RAT	Radiological Assistance Team (onsite Army)
RCRA	Resource Conservation and Recovery Act
RF	Response factor
RfC	Reference Concentration
RfD	Reference Dose
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
RME	Reasonable Maximum Exposure
ROD	Record of Decision
ROPC	Radionuclides of Potential Concern
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)
sec	Seconds
SEDA	Seneca Army Depot
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
SOW	Statement of Work
SQL	Sample Quantitator Limits
SS	Soil sample
ST	Soil Moisture
STF	Soil Transport and Fate
SUNY-ESF	State University of NY College of Environmental Science and Forestry
SVO	Semivolatile Organic Compounds
SVOCs	Semi-Volatile Organic Compounds
SW	Sediment and surface water sample station
SWMU	Solid Waste Management Unit
T^*	Lag Times/Breakthrough Times for an Organic Compound
T1,2-DCE	trans-1,2-Dichloroethylene
TAGM	New York State Chemical And Administrative Guidance Memorandum
TAL	Target analyte list
TCE	Trichloroethylene
TCL	Target compound list
TCLP	Toxicity Characteristics Leaching Procedure
TDS	Total dissolved solids
TEC	Toxicological Endpoint Concentration
TEDE	Total Effective Dose Equivalent
TEF	Toxicity Equivalency Factor
TEL	Threshold Effects Level
TES	Target Environmental Services, Inc.
TIC	Tentatively Identified Compound
TKN	Total Kjeldah Nitrogen
TLD	Thermoluminescent Detector
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
UCL	Upper Confidence Limit
ug/g	Micrograms per gram
ug/kg	Micrograms per kilogram
ug/L	Micrograms per liter
ug/mg	Micrograms per milligram
ug/wp	Micrograms per wipe
uR	micro Roentgen
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
VC	Vinyl Chloride
VLF-EM	Very Low Frequency Electromagnetic
VOA	Volatile organic analyte
VOC	Volatile Organic Compound
Vs	Volt Second
WB	Wildlife Bioaccumulation
WL	Working Level (see page 3-7 for a definition)
WRS	Wilcoxon Rank Sum Test
WSA	Weapons Storage Area

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.

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 exceedence. The presence or absence of the analyte cannot be determined.

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1.0 INTRODUCTION

1.1 PURPOSE OF REPORT

This purpose of this report is to present and summarize details of the Remedial Investigation (RI) activities conducted at SEAD-12 at the Seneca Army Depot Activity (SEDA) in Romulus, New York. The following report contains sections that:

- discuss the physical characteristics of the site,
- present and interpret the analytical results obtained during the investigation program, and
- identify sources of the potential impacts identified 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 located approximately 40 miles south of Lake Ontario, near Romulus, New York (**Figure 1-1**). The depot lies immediately west of the village of Romulus, NY, 12 miles south of the villages of Waterloo and Seneca Falls, and 2.5 miles north of the village of Ovid, NY. The nearest major cities are Rochester, NY and Syracuse, NY located 60 miles northwest and northeast, respectively. 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 border SEDA to the east and west, respectively. **Figure 1-2** presents a plan view of SEDA.

The 10,587-acre SEDA facility was constructed in 1941 and has been owned by the United States Government and operated by the Department of the Army (DOA) since that date. From its inception in 1941 until 1995, SEDA's primary mission was the receipt, storage, maintenance, and supply of military items, including munitions and equipment. The Depot's mission changed in early 1995 when the Department of Defense (DOD) recommended closure of the SEDA under its

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CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY

RI/FS

SEAD-12

DEPT	DWG NO
ENVIRONMENTAL ENGINEERING	729895-01002

FIGURE 1-1

LOCATION MAP

SCALE	DATE
1"= 8 MILES APPROX	MAY 2000

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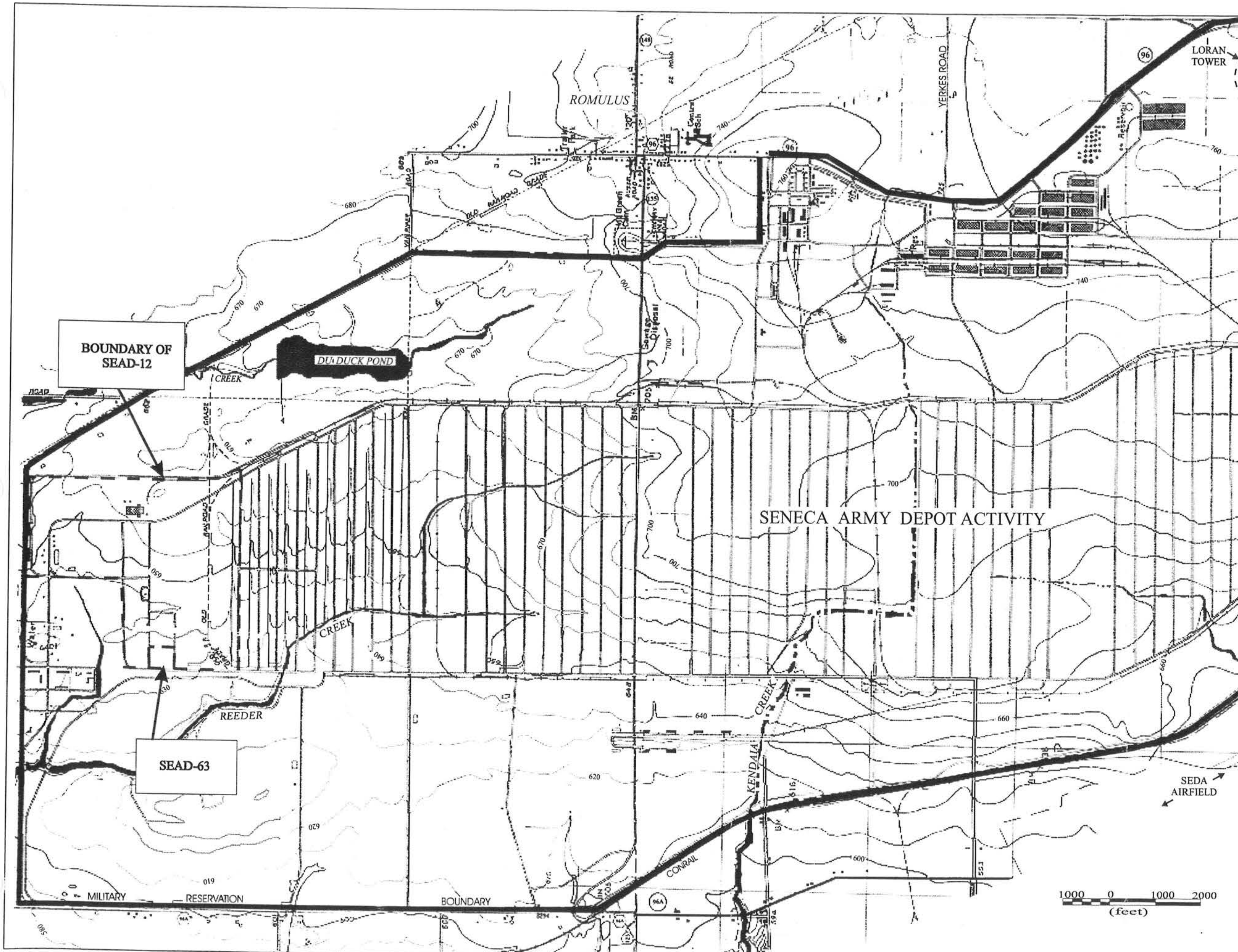

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SENECA ARMY DEPOT ACTIVITY
RI/FS
SEAD-12

FIGURE 1-2
SENECA ARMY DEPOT MAP

SCALE 1" = 2000'   DATE NOVEMBER 2000

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Base Realignment and Closure (BRAC) process. This recommendation was approved by Congress on September 28, 1995 and the Depot is scheduled for closure by July 2001.

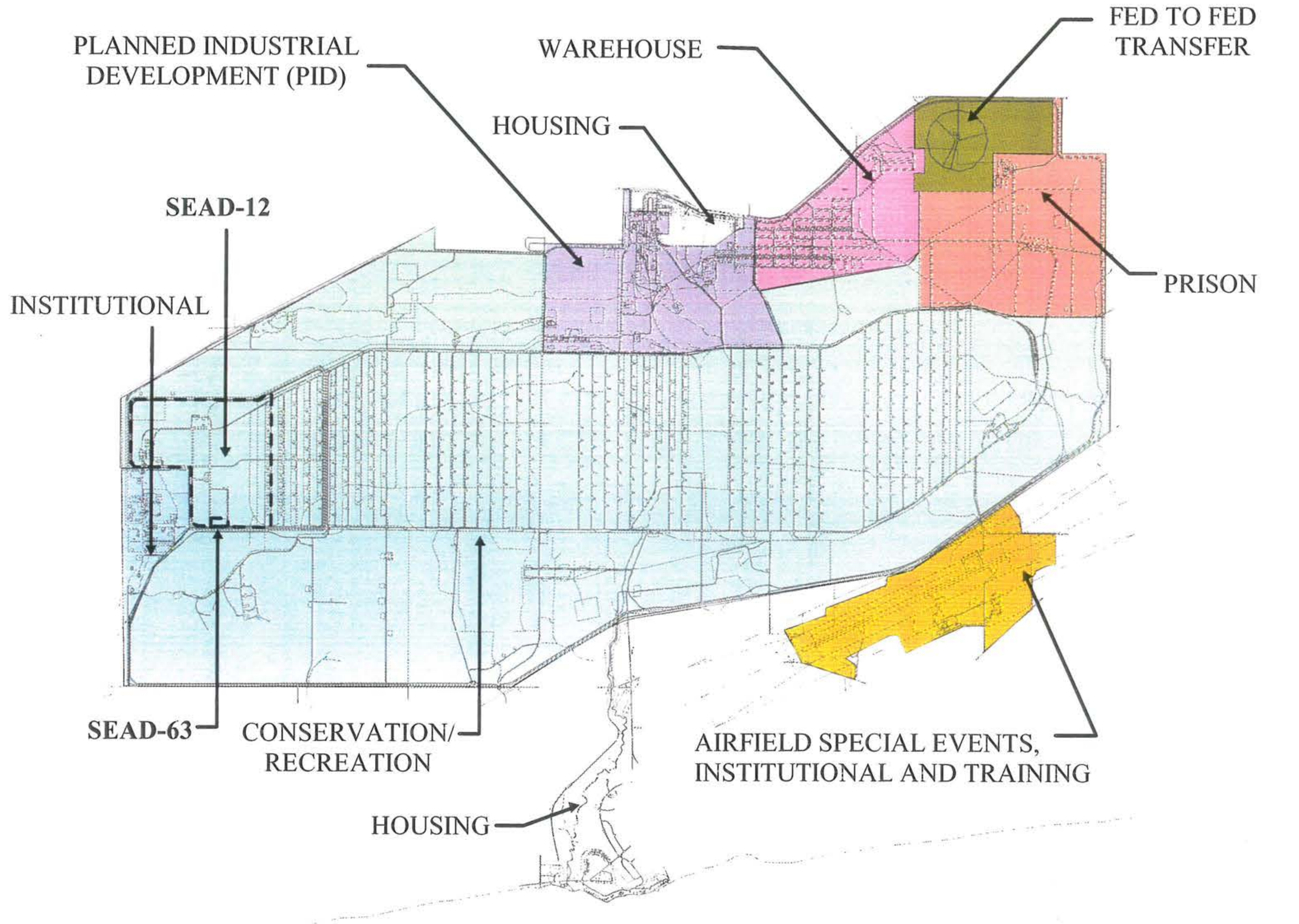
In accordance with the requirements of the BRAC process, the Seneca County Board of Supervisors established the Seneca Army Depot Local Redevelopment Authority (LRA) in October 1995. The primary responsibility assigned to the LRA was to plan and oversee the redevelopment of the Depot. The Reuse Plan and Implementation Strategy for Seneca Army Depot was adopted by the LRA and approved by the Seneca County Board of Supervisors on October 22, 1996. Under this plan and subsequent amendment, areas within the Depot were classified as to their most likely future use. These areas included: housing, institutional, industrial, an area for the existing navigational LORAN transmitter, recreational/conservation and an area designated for a future prison. **Figure 1-3** shows the distribution of the planned future land use at SEDA.

1.3 SEAD-12

1.3.1 General Site Description

SEAD-12 is located in the northern portion of SEDA within the former nuclear Weapons Storage Area (WSA) facility known as the Q Area. Investigation of SEAD-12 originally began as the investigation of two separate areas, formerly designated as SEAD-12A (Radioactive Waste Burial Site – northeast corner of Q) and SEAD-12B (Radioactive Waste Burial Site – northeast of Buildings 803, 804, and 805). SEAD-12A encompassed an area of approximately 1,000 feet long by 1,000 feet wide that is suspected to have included up to five separate small burial pits. SEAD-12B, is smaller, encompassing an area measuring 300 feet long by 300 feet wide and is suspected to have included a 5,000 gallon storage tank and a small dry waste pit. Locations of these two historic SEADs are shown on **Figure 1-4**.

The bounds of SEAD-12 were expanded in 1995 to include all of the area outlined on **Figure 1-4**, after the completion of the Expanded Site Inspections (ESIs) of SEAD-12A and SEAD-12B and the submission of the report summarizing the findings of the ESIs at the two historic SEADs. This decision was based on the similarity of the chemicals found at the two historic SEADs and the general history of the Q Area that suggested that similar constituents were likely to exist throughout the larger area. As redefined, SEAD-12 encompasses an area of approximately 360 acres, including the areas that were formerly designated as SEAD-12A and SEAD-12B in ESI. Also included in the investigations of the RI/FS at SEAD-12 are Building 715 and a portion of Reeder Creek. Building 715 is a sewage treatment plant that is suspected to



LEGEND

- Airfield
- Conservation
- Federal
- Industrial
- Institutional
- Prison
- Warehouse
- Housing

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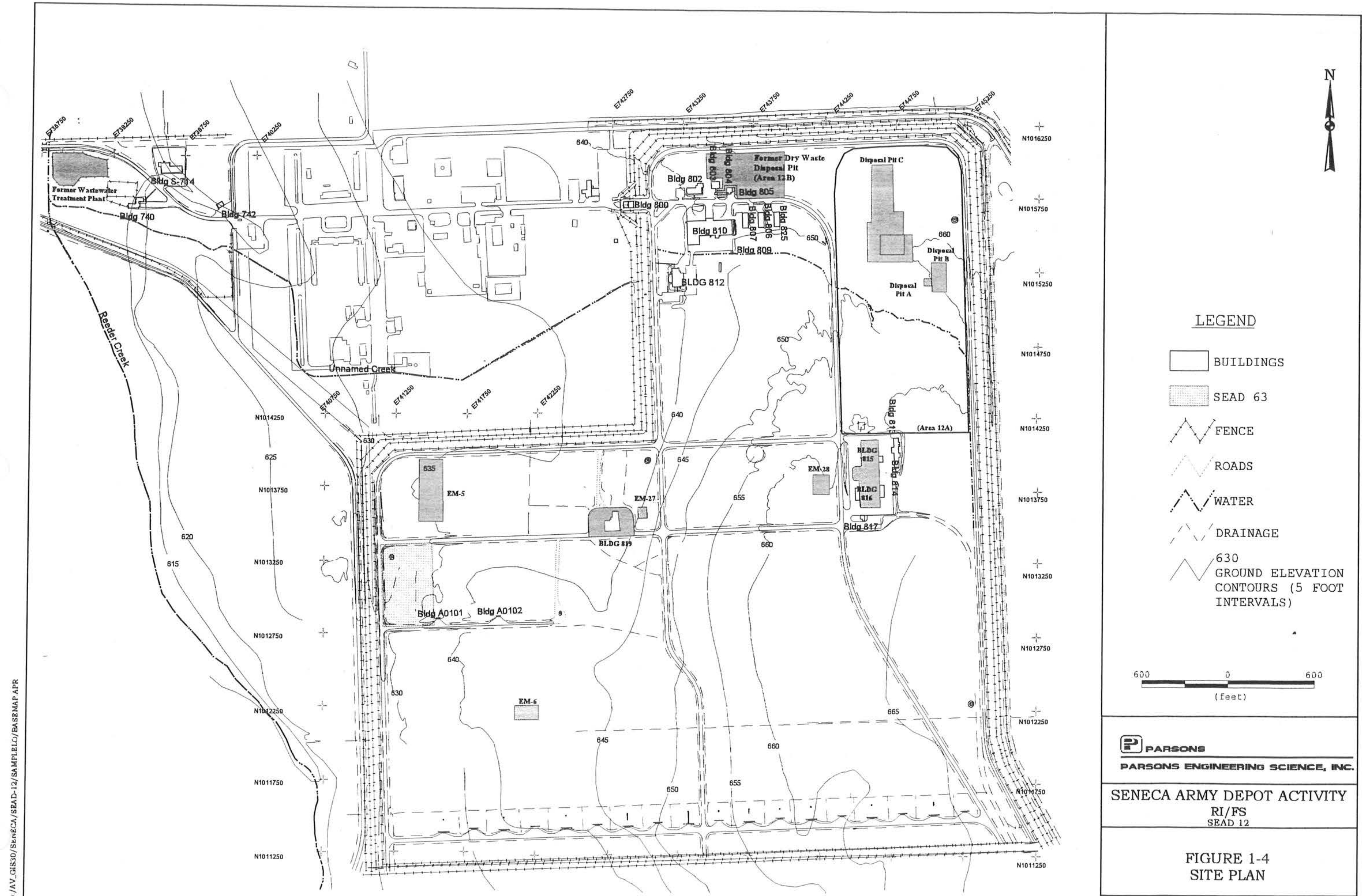
SENECA ARMY DEPOT ACTIVITY
RI/FS
SEAD-12

FIGURE 1-3
FUTURE LAND USE

SCALE	DATE	REV	
AS NOTED	NOV 2000		Sheet 1 of 1

O:\SENECA\SEAD-12\RI_FINAL_SS.APR



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SENECA ARMY DEPOT ACTIVITY
RI/FS
SEAD 12

FIGURE 1-4
SITE PLAN

SCALE	DATE	REV	
1:600	MAY 2000		Sheet 1 of 1

have received waste water from the buildings within the Q Area. Reeder Creek receives the surface water runoff from SEAD-12 as well as any discharge from Building 715.

The northern portion of SEAD-12 was used for disposal of laboratory and maintenance wastes and military components. The northeastern portion of SEAD-12 includes Buildings 803, 804, 802, 805, 806, 807, 810, 812, and 825 which were part of the WSA facility at SEDA. The eastern, western, and southern portions of SEAD-12 are primarily open fields and include Buildings 813 through 817, 819, and 823. These buildings were also part of the former WSA facility at SEDA. The redefined expanse of SEAD-12 is located in a part of SEDA where the future land use is designated as recreational/conservation (see **Figure 1-4**).

The area designated as SEAD-12 excludes the area of SEAD-63, the Miscellaneous Components Burial Site, which is located approximately halfway along the western boundary of the former Q Area (see **Figure 1-4**). SEAD-63 is excluded from the SEAD-12 investigation as it is currently subject to other actions including a non-time-critical removal analysis. Plans for the removal action are presented in the draft-final Engineering Evaluation/Cost Analysis Approval Memorandum (Parsons ES, July 2000) and Action Memorandum for the Miscellaneous Burial Site (SEAD-63) (Parsons ES, October 1999).

1.3.2 Site History - Potential Release Areas

Activities within SEAD-12 between 1962 and the demilitarization of the base in 1996 are classified or unknown. For reporting purposes and based on historical use of the site, the results of the geophysical surveys, the radiological classification, and geographical location, nine potential release areas have been defined for SEAD-12. Details of the ESI and RI activities in these areas are provided in the following sections. The site history and conditions for the potential release areas, **Figure 1-4**, are summarized below based on documented use between initial operations in 1957 to 1962, unclassified historical reports, and investigation observations.

- **Building 819/EM-27** – Open ground and paved areas surround Building 819. Building 819 and the ground in its immediate vicinity were used in the initial WSA operations. During the operational period from 1957 to 1962, Building 819 was used as a quality assurance inspection laboratory and was used by Sandia National Laboratories under contract to the AEC. For the period after 1962, Building 819 was likely used for similar quality assurance inspection purposes. During a site visit to Building 819 in 1994, it was being used for the storage of office furniture. Presently, the building is completely de-militarized. Because of the proximity of Anomaly EM-27 to Building 819, these two areas were combined. EM-27 contained military-related debris.

- **Building 815, Building 816/ EM-28** – Activities within the buildings up until 1962 included inspection and testing of non-nuclear mechanical and electrical systems. Following 1962, and up to approximately 1992, these buildings were used for classified maintenance functions. After 1992, the buildings were used to de-militarize non-nuclear components as part of the nuclear stockpile reduction effort. These buildings have a soil covered roof. A military-debris related EM anomaly, EM-28 is immediately downgradient to Buildings 815 and 816.
- **Disposal Pits A/B** – These disposal pits were initially identified in 1994 in association with EM anomalies. Test pit excavations found metal and fiberglass debris, and miscellaneous electronic components.
- **Disposal Pit C** – Initially investigated in 1994, the test pit operations found and removed military-related debris, including cone-shaped military items. A large stainless steel cylinder was found but not recovered.
- **Dry Waste Disposal Pit** – This lined pit is located northeast of Building 805 (the equipment building for Building 804). Wastes from this pit were reportedly periodically removed and shipped for disposal. The dry waste disposal pit was reported to have been excavated by the AEC in 1957, presumably to empty it for continued use, and again prior to their leaving the site in 1962. The dry waste disposal pit was later excavated by SEDA personnel in 1965 and 1986 and reportedly no buried wastes were found in the area.
- **EM-5** – This anomaly was apparently associated with debris remaining from an original farmstead that predates the SEDA.
- **EM-6** – Associated with multiple EM anomalies, this area may have been a former disposal pit for construction-type debris.
- **Waste Water Treatment Plant** – This area was evaluated to determine the impact from operations at the facility.
- **Class III Areas** – This area encompasses the remainder of SEAD-12 that is not assigned above and not classified as a Class I or Class II area as described in **Section 2**.

The historical use of several of the SEAD-12 buildings, not included in the potential release areas are described below. Currently, all buildings in the former WSA are completely demilitarized. The following buildings are the subject of investigations described in the Draft Radiological Survey Report, Class I and Class II Buildings (July 2000).

Buildings 803, 804, and 805

Buildings 803, 804, and 805 are located in the northern portion of SEAD-12, and include the area investigated as SEAD-12B during the Expanded Site Investigation (ESI) conducted in 1994. This area was the site of the initial WSA operations. During the period from 1957 to 1962, Building 803 was used for the storage of removable nuclear capsules, Building 804 was used as a maintenance building for removable nuclear capsules, and Building 805 was used as a store room. Maintenance activities involved disassembling of nuclear capsules for routine maintenance and cleaning, and for verification of the integrity of the fissile materials.

Wastes generated during the processes performed in Building 804 included swipes containing solvents and uranium oxides, butcher paper, gloves, and lead-wire seals. It is estimated that 5 gallons of trichloroethylene, 1 gallon of alcohol and 1 quart of acetone were used annually. From 1957 to 1962, these wastes were stored in a dry waste disposal pit, which was located 150 feet north and 28 feet east of Building 805 (the equipment building for Building 804). This dry waste disposal pit was lined with and covered by plywood. It was reported by former Sandia National Laboratory personnel that the wastes stored in this pit were removed and shipped for disposal whenever the pit was full. It is presumed that these wastes were shipped to Sandia National Laboratories in New Mexico for disposal, though this has not been confirmed. The dry waste disposal pit was reported to have been excavated by the AEC in 1957, presumably to empty it for continued use, and again prior to their leaving the site in 1962. No data or further information is available on these two excavation events. The dry waste disposal pit was later excavated by SEDA personnel in 1965 and 1986. Reports from the 1965 and 1986 excavations indicated that no buried wastes were found in the area of the dry waste disposal pit. There are no records of radiological surveys from the 1965 excavation. Field notes from the 1986 excavation indicate that some plywood was unearthed, and laboratory analyses from soil samples and plywood samples reported that there was no residual radioactivity present.

Building 804 has a floor drain system that leads to an emergency holding tank, or underground storage tank (UST) located behind the building. The purpose of the UST was to contain any fissile material in case of an accidental release during maintenance of the nuclear capsules. There are no recorded releases of fissile materials at SEDA during the period from 1957 to 1962. In July of 1986, SEDA attempted to remove the tank. During this removal attempt, a portion of the top of the tank was ripped off. The tank was then back filled in place.

Although the operations performed in Building 804 are not known for the period following 1962, advances in weapons design by the mid-1960's had phased out the use of removable nuclear component capsules and the maintenance activities associated with the nuclear capsules at Building 804 should have ceased. Further, SEDA personnel have indicated that the Army has never used Building 803 for nuclear capsule storage or Building 804 for nuclear capsule maintenance since 1962. Since at least the mid 1980s, Building 803 was used by the Army as a holding area for containerized radioactive wastes. Building 804 was occupied by the WSA Security Systems Maintenance Division.

Building 806

When the former WSO was active building 806 was used as a training center for radiological assistance team personnel. Room number 1 in Building 806 was used as a calibrations laboratory to calibrate and function check radiation scanning instruments with sealed radioactive sources.

Building 810

Building 810 was used as a transfer area for military items that entered and exited the WSA. It was used for this purpose from the inception of the WSA in 1957 to the final demilitarization of the WSA in 1996. All military items arriving at and leaving from the WSA were sealed in specially designed containers that were then packed in Department of Transportation compliant transport containers. The only area of Building 810 that would have had sealed military items present that could have had radioactive materials within them is the loading and unloading area (or receiving room) of the Building. This area is located in the center of the northern portion of the building and measures approximately 50 feet by 28 feet. Also included in this area would be the exterior loading dock area, which measures approximately 50 feet by 16 feet. No other areas of Building 810 were used to store or hold shipping containers that could have contained radioactive materials.

Building 812

Building 812 was used as the command structure for all security operations within the former WSO. When the WSO was active all security activities including communications, monitoring, patrolling, and security weapons storage were coordinated and controlled from Building 812. One room within Building 812 (Room 32) was used to store military equipment containing sealed radioactive sources as integral components.

1.3.3 Previous Investigations

SWMU Classification Report

The SWMU Classification Report (Parsons ES, 1994a) provides limited information about SEAD-12, 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-12 (Building 804 and Associated Radioactive Waste Sites), 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-12 as part of the investigation of Fifteen Solid Waste Management Units at SEDA. At the time of the preparation of the SWMU Classification Report, SEAD-12 was classified as a Moderately Low Priority Area of Concern.

Expanded Site Inspection

In accordance with the decision process outlined in the Interagency Agreement (IAG) between the USACE, EPA, and NYSDEC, an Expanded Site Inspection (ESI) was performed at SEAD-12A and 12B in 1994. This investigation included sampling of surface and subsurface soils, groundwater, surface water and sediment to identify hazardous constituents or wastes that may have been released to the environment. The sampling data were compared to state and federal guidelines and standards to determine whether this AOC posed a potential threat or risk to human health and the environment. A summary of the findings of the ESIs at both historic sites (i.e., SEAD-12A and SEAD-12B) are presented below:

<u>Soil</u>

The results of the SEAD-12A ESI indicated that the subsurface soils in the area had been significantly impacted by Radium-226 and its decay products (Ra-226 + D) and by cadmium. The calculated annual radiation dose from the reported concentrations of Ra-226 +D in test pit samples (TP12A-1-1, 492 mrem/year; TP12A-1-2, 1,342 mrem/year) exceeded both the New York State and proposed federal criteria for the protection of the general public. Cadmium was also found in five samples at concentrations ranging from 3.6 mg/Kg to 94.3 mg/Kg, exceeding cadmium's TAGM level of 1 mg/Kg. Additional soil analyses indicated that other volatile and semivolatile organic compounds, pesticides and polychlorinated biphenyls and metals were also present in the soils at SEAD-12A, but generally at low concentrations. Only two semivolatile organic compounds [benzo(a)pyrene and dibenz(a,h)anthracene] were found at concentrations slightly above their respective TAGM, while 17 other metals were found at levels slightly above their respective TAGM values.

The results of the SEAD-12B ESI indicated that subsurface soils were not significantly impacted by any of the constituents analyzed during the program. Volatile and semivolatile organic, pesticide, PCB, metal and radionuclides were detected in collected samples but generally at levels below their respective TAGMs. Seven metals (i.e., copper, magnesium, mercury, potassium, selenium, sodium, and thallium) and the total radionuclide dose measured in one soil sample (105 mrem/year) were above criteria levels.

Groundwater

The results of the groundwater investigation at SEAD-12A identified levels of one volatile organic compound, metals and gross alpha and gross beta radiation. The reported concentration of acetone was present at a low concentration, while the three high levels of iron were present in samples that also exhibited high turbidity. With respect to the gross alpha and beta radiation, both constituents were detected in three samples, but only one value of gross alpha was found at a level that exceeded its criteria level.

Results from the area of SEAD-12B indicated that no volatile organic, semivolatile organic, or pesticide/PCB compounds were present in the groundwater. Additionally, the results indicated that measured concentrations of iron and manganese were above New York Ambient Water Quality Standards (AWQSs) in all three samples, while concentrations measured for lead and thallium exceeded AWQS in two samples. Finally, sampling results indicated that groundwater quality had been impacted by three radionuclides (i.e., radium-226, lead-210, and uranium-235) as well as gross alpha and beta radiation. The concentration of radium-226 and uranium-235 found in one well exceeded proposed MCLs, while the concentrations measured for gross alpha in all four samples exceeded state and federal criteria levels (i.e., NY AWQS, proposed MCLs and federal health advisory). None of the measured gross beta levels exceeded proposed regulatory limits.

Surface Water

Surface water samples were not collected in the area of SEAD-12B during the ESI. Surface water at SEAD-12A was found not to be significantly impacted by any of the constituents found during the program. Analytes detected included semivolatile organic compounds, metals, potassium-40 and gross alpha and gross beta radiation. Iron, pentachlorophenol, and benzo(a)pyrene were each found in a single sample at concentrations that exceeded state guidelines, while aluminum and silver were found in two samples above threshold levels. Potassium-40 was detected in all surface water samples collected at concentrations ranging from 18 to 98 pCi/L. Similarly, gross alpha (2 to 12 pCi/L) and gross beta (9 to 16 pCi/L) radiation were also detected in SEAD-12A surface water samples.

Sediment

Sediment samples were not collected from SEAD-12B during the ESI. Semivolatile organic compounds, metals and radionuclides were detected in sediment samples collected from SEAD-12A. The metals iron, manganese and nickel were found in samples at concentrations exceeding their respective lowest effect and severe effect levels. Only two semivolatile organic compounds (i.e., Di-n-butylphthalate and Fluroanthene) were detected in sediment samples, and their reported concentrations were all low and below existing threshold criteria levels. Comparably, although six radionuclides (i.e., lead-210, radium-226, radium-228, thorium-228, uranium-235 and uranium-238) and gross alpha and gross beta radiation were detected in sediment samples all measured levels were below the proposed federal criteria value (100 mrem/year above background).

The draft final ESI report (Parsons ES, 1995) detailing the findings of the ESI and indicating that impacts to soils, groundwater and sediment exceeding state and federal standards and guidelines had occurred at SEAD-12 was issued in 1995. As part of the ESI report, a CERCLA RI/FS was recommended for SEAD-12.

1.3.4 Archaeological Investigation

As part of the ESI for SEAD-12, a Phase I archaeological investigation was conducted at SEAD-12. The survey consisted of background and preliminary document research, a pedestrian survey of the entire 360-acre parcel, and the systematic excavation of shovel test pits in areas of high-, medium- and low-probability. High-probability areas were identified through the archival research and consisted of former historic farmsteads (19^{th} and 20^{th} century) while medium-probability areas were designated around historic dumps discovered during the pedestrian survey. Low-probability areas were considered to have a low to moderate potential for containing prehistoric (10,500 BC to 1,600 AD) materials. Combined, 463 shovel test pits were excavated within the bounds of SEAD-12.

The Phase I survey resulted in the identification of eight archaeological sites (i.e., 7 historical sites and 1 prehistoric site) and eight isolated finds. The eight sites included four sites associated with former farmsteads, three with historic dumps, and one prehistoric site that consisted of an isolated projectile point. Historic farmstead features identified included structural remains (stone foundations), features (i.e., cobble stone surface/path and a well) and numerous artifacts (e.g., creamware and pearlware, bottle and vessel glass, etc.). The prehistoric projectile fragment resembled an Orient Fishtail type point from the period of 1,200 – 700 B.C. As a result of this work, two sites were recommended as potentially eligible to the National Register as both sites appear to have the potential to contain information important to regional history and retain a sufficient degree of integrity. Full details of this survey are reported in the document SEAD-12 Phase I Archaeological Survey (parsons ES, June 1998).

1.4 BACKGROUND INFORMATION

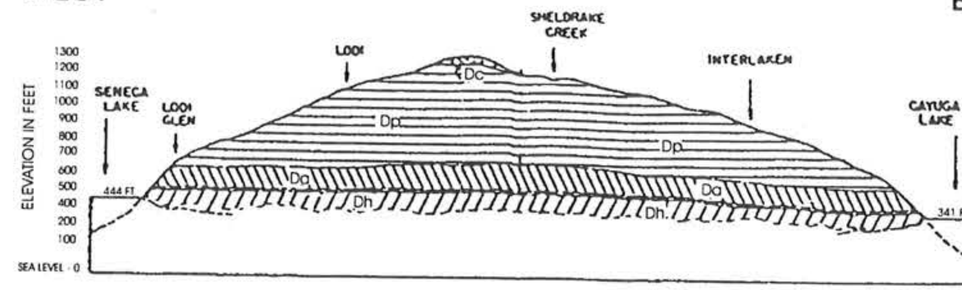
1.4.1 Geology

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

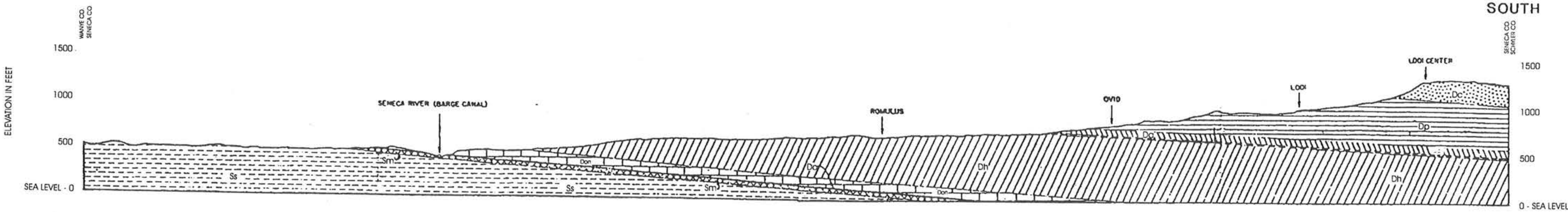
This underlying bedrock below weathered shale is a member of the Ludlowville Formation of the Devonian age Hamilton Group. The Hamilton Group, measuring from 600 to 1,500 feet thick, is divided into four formations. They are, from oldest to youngest, the Marcellus, Skaneateles, Ludlowville, and Moscow formations. The western portion of SEDA is generally located in the Ludlowville Formation while the eastern portion is located in the younger Moscow Formation. The Ludlowville and Moscow formations are characterized by gray, calcareous shales, mudstones and thin limestones with numerous zones of abundant fossils (brachiopods, bivalves, trilobites, corals and bryozoans; Gray, 1991). The lower two formations (Skaneateles and Marcellus) consist largely of black and dark gray sparsely fossiliferous shales (Brett et al., 1991). Locally, the shale is soft, gray, and fissile. **Figure 1-5** displays the stratigraphic section of Paleozoic rocks of Central New York. Three known predominant joint directions, N60°E, N30°W, and N20°E are present within this unit (**Mozola, 1952**).

1.4.2 Hydrogeology

Available geologic information reviewed indicates that the upper portions of the shale formation would be expected to yield small, yet adequate, supplies of water, for domestic use. Regionally,



EAST-WEST SECTION ALONG A- A'



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

LEGEND

DEVONIAN

- UPPER DEVONIAN
  - Dc — WISCOY SHALE, NUNDA SANDSTONE, WEST HILL FORMATION, GRIMES SANDSTONE
  - 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

- SILURIAN (UPPER)
  - Sm — MANLIUS AND RONDOUT LIMESTONES AND COBLESKILL DOLOMITE
  - Ss — SALINA FORMATION INCLUDING BERTIE LIMESTONE MEMBER AND CAMILLUSSHALE MEMBER

SCALE

1 0 1 2 3 MILES

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 SEAD-12 RI REPORT	
DEPT. ENVIRONMENTAL ENGINEERING	DWG NO. 7346026-01001
FIGURE 1-5 REGIONAL GEOLOGIC CROSS SECTIONS	
SCALE AS NOTED	DATE MAY 2000

four distinct hydrologic water-bearing units have been identified **(Mozola A.J., 1951)**. These include two distinct shale formations, a series of limestone units, and unconsolidated beds of Pleistocene glacial drift.

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

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

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

Regional precipitation is derived principally from cyclonic storms that pass from the interior of the country through the St. Lawrence Valley with local influence derived from Lakes Seneca, Cayuga, and Ontario providing some lake effect snows, leading to a significant amount of the winter precipitation and a moderate the local climate.

1.4.3 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 first opened.

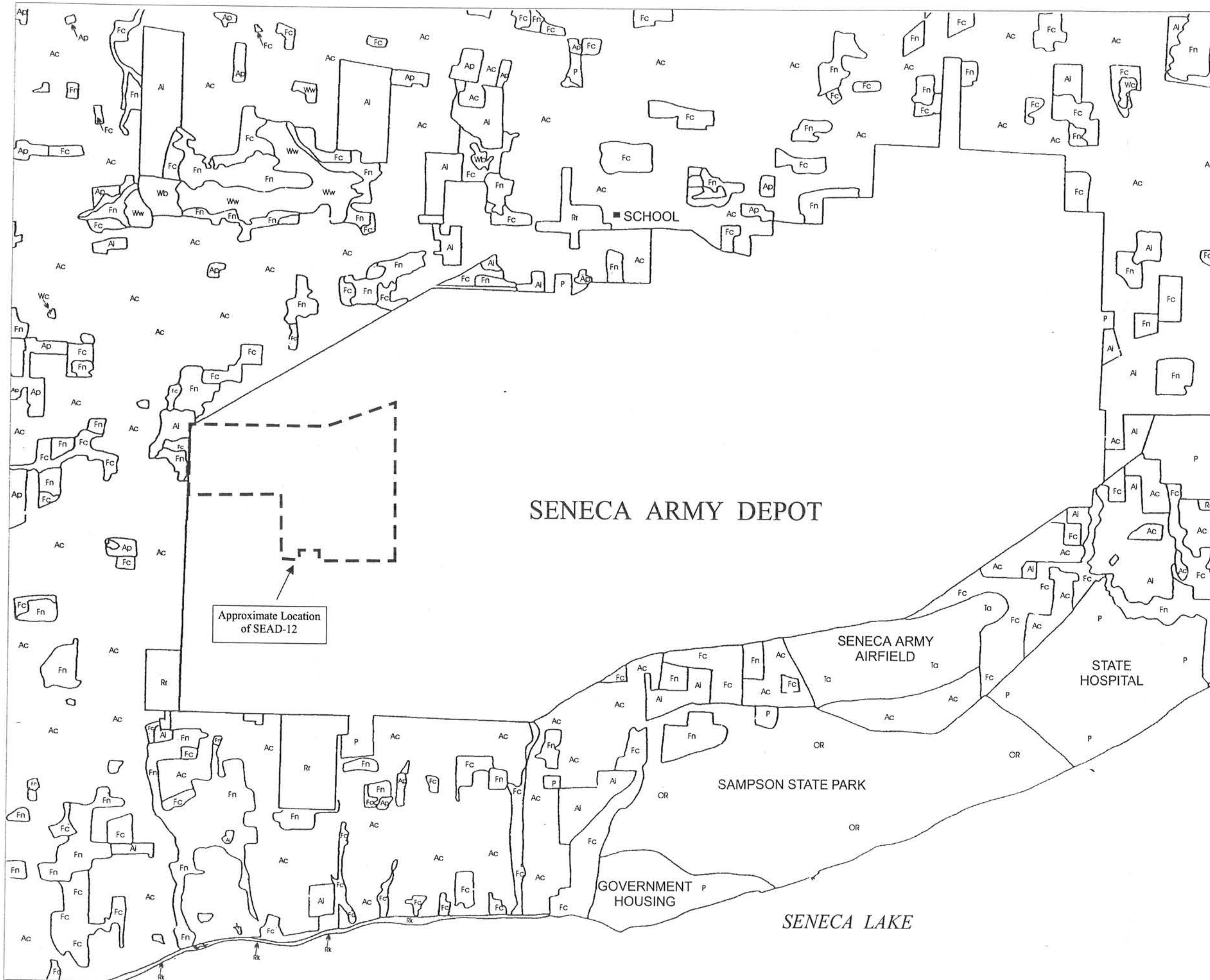
Land use in the region surrounding SEDA is largely agricultural, with some forestry and public land uses (i.e., school, recreation, and state parks) (**Figure 1-6**). Agricultural land uses are categorized as inactive or active use. Inactive agricultural land consists of land committed to eventual forest 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. Future land use at SEDA is shown in **Figure 1-3**.

1.4.4 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.

1.4.5 Regional Climate

Table 1-1 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. The research Farm is administered by the Northeast Regional Climate Center located at Cornell University in Ithaca, New York. Only precipitation and



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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FIGURE 1-6
REGIONAL/LOCAL
LAND USE MAP

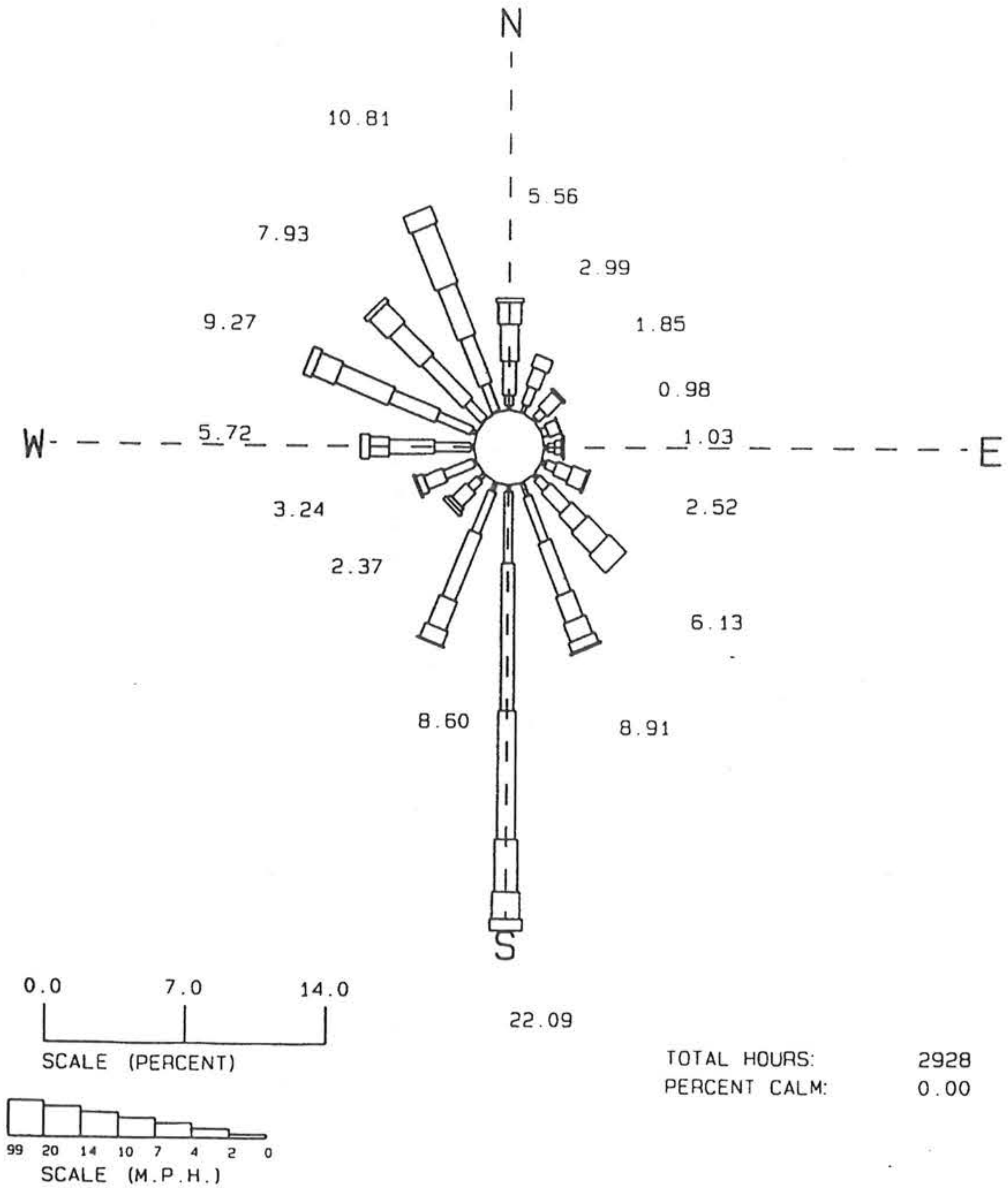
SCALE 1" = 2000'	DATE JUNE 1999

R:\graphics\seneca\SEAD-12\lanuse.cdr(cvm) temperature measurements are available from this location. The other data reported in **Table 1-1** 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 1-7**.

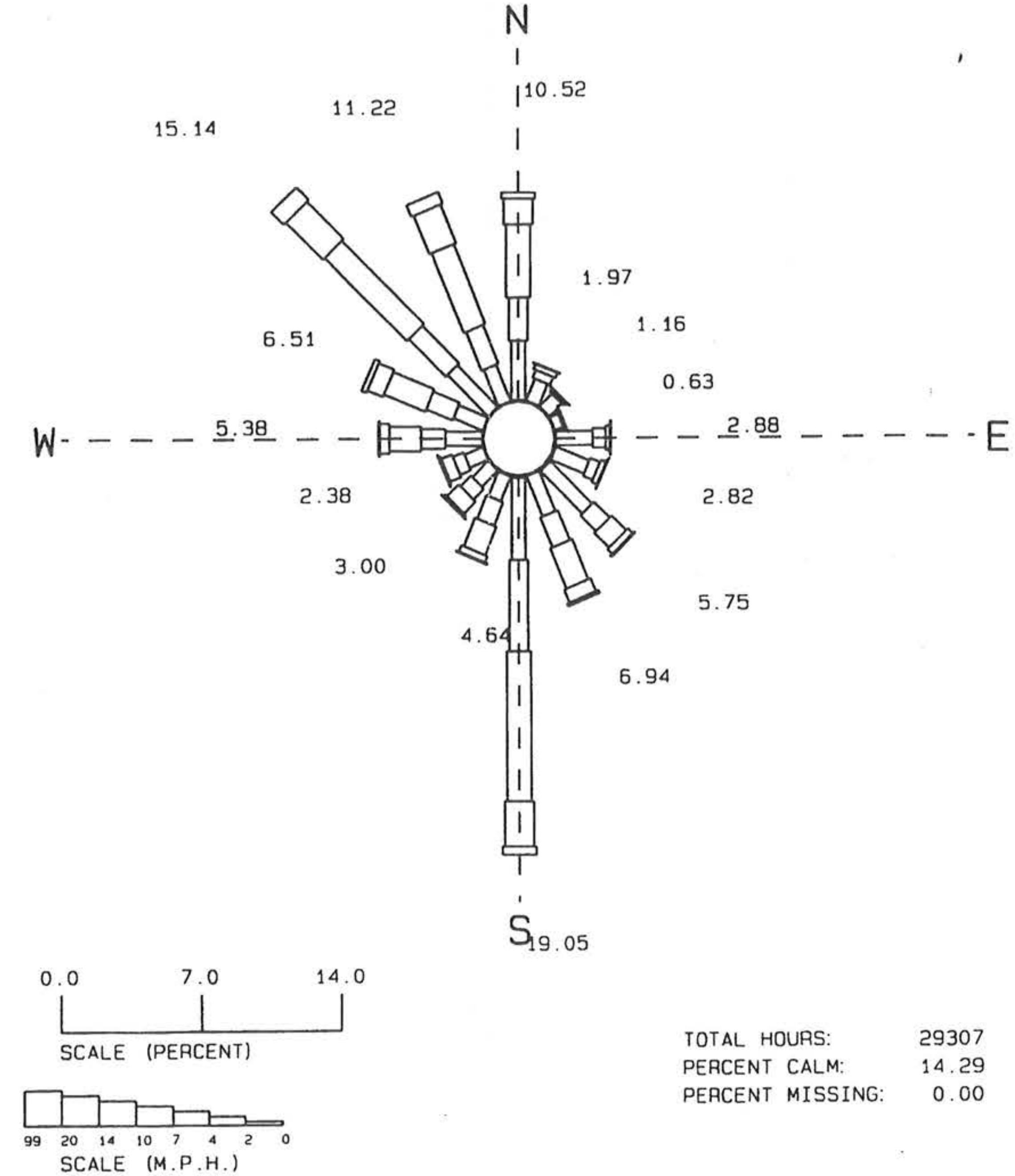
A cool climate exists at SEDA with temperatures ranging from an average of 23° F in January to 69° F in July. Marked temperature differences are found between daytime highs and nighttime lows during the summer and portions of spring and autumn. Precipitation is unusually well-distributed throughout the 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 westerly and west-southwesterly.

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 1-8**. The maximum 24-hour precipitation measured at this station during this period was 3.9 inches on September 26, 1975. Values of 35 inches mean annual pan evaporation and 28 inches for annual lake evaporation were already reported in **Table 1-1**. 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 1-1** 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



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



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

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CLIENT/PROJECT TITLE SENECA ARMY DEPOT ACTIVITY RI/FS SEAD-12	
DEPT ENVIRONMENTAL ENGINEERING	DWG NO 734539-01001
FIGURE 1-7 WIND ROSES	
SCALE NA	DATE JUNE 1999

GRAPHICS\SENECA\SEAD-12\2WROSES.CDR

Table 1-1

Climatological Data for Seneca Army Depot Activity

SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

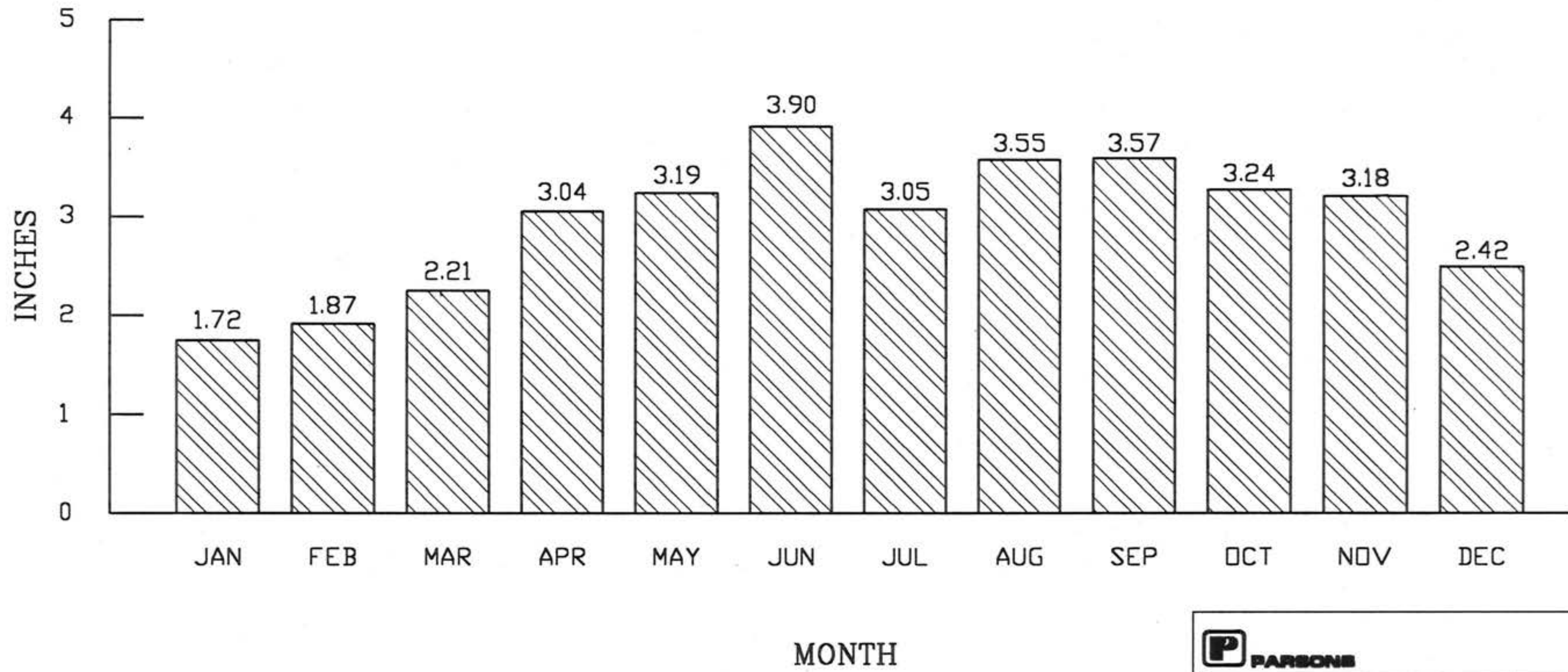
Month	Temperature (1),°F			Mean Precip-itation (1), in.	Mean Relative Humidity (%)	Percent Sunshine	Mean Number of Days (4)		
	Maximum	Minimum	Mean				Clear	Partly Cloudy	Cloudy
January	30.9	14.0	22.5	1.88	70	35	3	7	21
February	32.4	14.1	23.3	2.16	70	50	3	6	19
March	40.6	23.4	32.0	2.45	70	50	4	7	20
April	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.



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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SENECA ARMY DEPOT ACTIVITY
RI REPORT
SEAD-12

DEPT. ENVIRONMENTAL ENGINEERING | Dwg. No. 734516-01001

FIGURE 1-8
AVERAGE MONTHLY PRECIPITATION IN PROXIMITY OF SENECA ARMY DEPOT ACTIVITY

SCALE NA | DATE MAY 2000 | REV A

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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.

1.5 OFF-SITE WELL INVENTORY

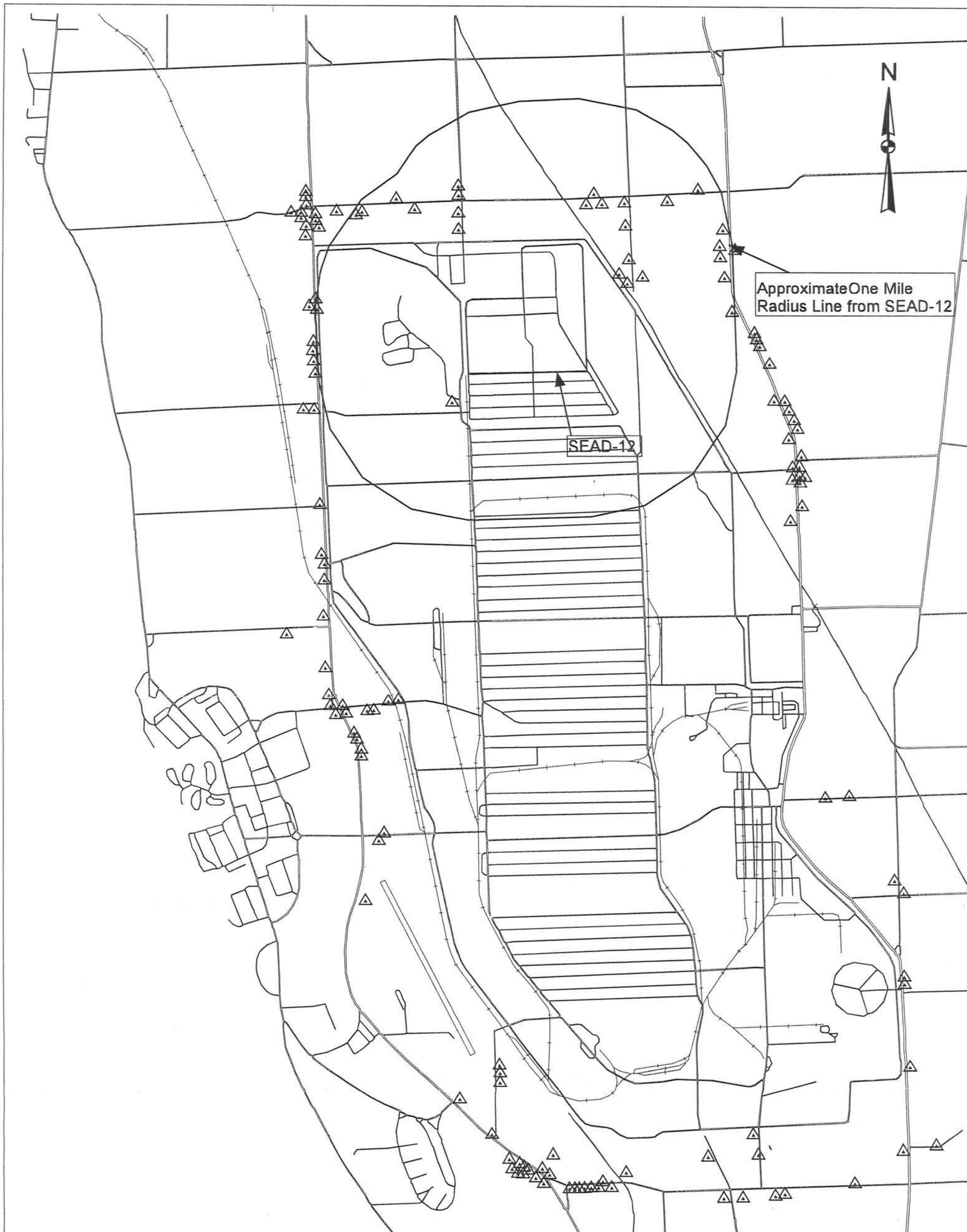
The section identifies private drinking water wells near SEAD-12. Knowledge of off-site wells is required when assessing any potential threats to drinking water supplies from releases at the site being investigated. Approximately 35 drinking water wells were identified within a one-mile distance of the SEAD-12 boundary (**Figure 1-9**). One of the wells is located west of SEAD-12 and within the bounds of SEDA, while the other 34 are exterior of SEDA. The on-site well is and has historically been inactive and was originally drilled to serve as an emergency supply well in an emergency. The remaining 34 wells are all 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 Study Area Investigation first part of Section 2.0 presents the methodologies used during the field 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. Remedial investigation (RI) field work was completed as described in Section 2.

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



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Seneca Army Depot Activity
DRAFT RI REPORT
SEAD-12

Figure 1-9

Distribution of Known Private Wells Near SEDA

SCALE	DATE	
AS NOTED	MAY 2000	PAGE 1 OF 1

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Transport) provides a discussion of the mechanisms involved in the weathering and transport of constituents found at the site. Section 6 (Human Health Baseline Risk Assessment) evaluates the risk to human health and the environment. Section 7 (Ecological Screening Risk Assessment) presents the results of an evaluation of the risk to ecological populations. Section 8 (Summary) presents an investigation summary, then lists conclusions and recommendations for each potential release area. Appendices contain the supporting data for this report.

2.0 STUDY AREA INVESTIGATIONS

2.1 INTRODUCTION

This section of the CERCLA Remedial Investigation (RI) Report describes the field activities performed to characterize the nature and extent of risks posed by conditions at SEAD-12. These activities were proposed in the *Project Scoping Plan for Performing a CERCLA Remedial Investigation/Feasibility Study (RI/FS) at Building 804, and the Associated Radioactive Waste Burial Sites (SEAD-12) and the Miscellaneous Components Burial Site (SEAD-63)* (Parsons ES, 1998), hereafter referred to as the Project Scoping Plan. As described in **Section 1**, field activities were also completed at SEAD-12 as part of the Expanded Site Investigation (ESI) conducted in the Spring of 1994. ESI activities were performed in two areas of the site known as SEAD-12A and SEAD-12B and are described in the *Eight Solid Waste Management Units (SWMUs) Report* (Parsons ES, 1995a). Based on the findings of the ESI, an RI/FS was recommended for SEAD-12 and the RI field investigation program was developed.

The SEAD-12 Project Scoping Plan described the specific field tasks to be performed at SEAD-12, as well as field procedures associated with radiological survey investigations. The Generic Installation Remedial Investigation/Feasibility Study (RI/FS) Workplan (Parsons ES, 1995b), hereafter described as the Generic Workplan, described the operating procedures for the remaining field investigation tasks (e.g. surface soil sampling, installation of groundwater monitoring wells, etc.). Those portions of the Project Scoping Plan describing field activities associated with SEAD-63 were later segregated from the work at SEAD-12 after the Army proposed to perform an Engineering Evaluation/Cost Analysis at SEAD-63, instead of an RI/FS.

Tasks completed during the SEAD-12RI field investigation include:

- Geophysical Investigations;
- Radiation Scanning;
- Soil Gas Survey;
- Soils (surface and subsurface) screening, descriptions, and sampling;
- Groundwater field parameter screening and sampling;
- Aquifer Testing,
- Surface Water and Sediment Investigations ,
- Human Health Risk Assessment
- Ecological Risk Assessment, and
- Surveying

2.2 GEOPHYSICAL INVESTIGATIONS

The SEAD-12 RI geophysical investigations included the seismic refraction, electromagnetic (EM), and ground penetrating radar (GPR) surveys, as described in Section 4.2.1 of the Project Scoping Plan. These surveys were the first tasks performed in the RI investigation since many of the remaining field tasks were based on their findings. **Figure 2-1** shows a decision flowchart describing how the geophysical survey results were used in planning remaining field investigation tasks. Upgradient and downgradient monitoring well locations were based on seismic refraction survey results. EM and GPR survey results were used to plan test pit investigations, subsurface and surface sampling locations as well as some radiological scanning surveys. These surveys were completed in accordance with procedures described in detail in the Section 3.3 of the Generic Workplan.

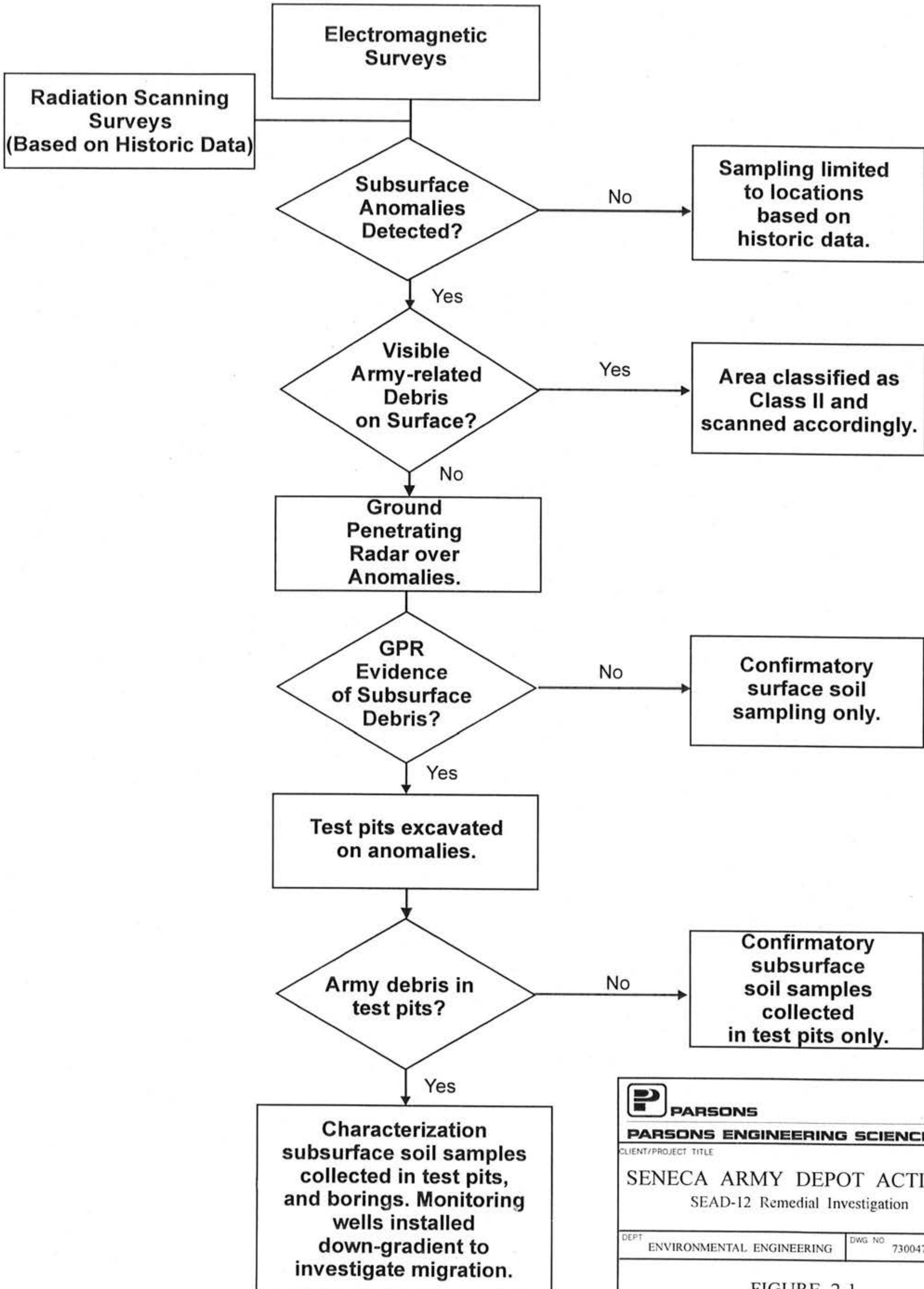
2.2.1 Seismic Refraction Surveys

Seismic refraction surveys were performed at SEAD-12 to measure either the depth to the water table or the depth to bedrock. Completed in August 1996, these 8 transects (920 linear feet), along with topographic information, were used to more accurately determine groundwater flow direction and to select locations for upgradient and downgradient monitoring wells installed during the RI field investigation, **Section 2.6**. Seismic refraction survey procedures, briefly described below, are described in detail in Section 3.3.1 of the Generic Workplan.

Four 115-foot seismic refraction transects were laid out at each of two sites at the north end of SEAD-12, in the vicinity of Disposal Pits A and B (**Figure 2-2**). Due to a shallow water table (generally <10 feet below ground surface) a low energy source (impact or dropped weight) was sufficient as the seismic energy source to accurately image the water table surface. Geophones were spaced at 5 feet or less throughout the survey. Five impact points were used for each geophysical spread: one located at the spread center, one at each end of the spread and one approximately 40 feet beyond each end of the spread. A paper copy of each seismic record was made in the field.

Each record was reviewed for quality and 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. At every shot point for each spread, upon final acceptance of each shot, the seismic record was annotated to identify the transect number, the spread number, the shot point number, and shot point location.

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



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SENECA ARMY DEPOT ACTIVITY

SEAD-12 Remedial Investigation

DEPT	DWG NO
ENVIRONMENTAL ENGINEERING	730047

FIGURE 2-1

SEAD-12 INVESTIGATIONS FLOW CHART

SCALE	DATE
Not Applicable	May 2000

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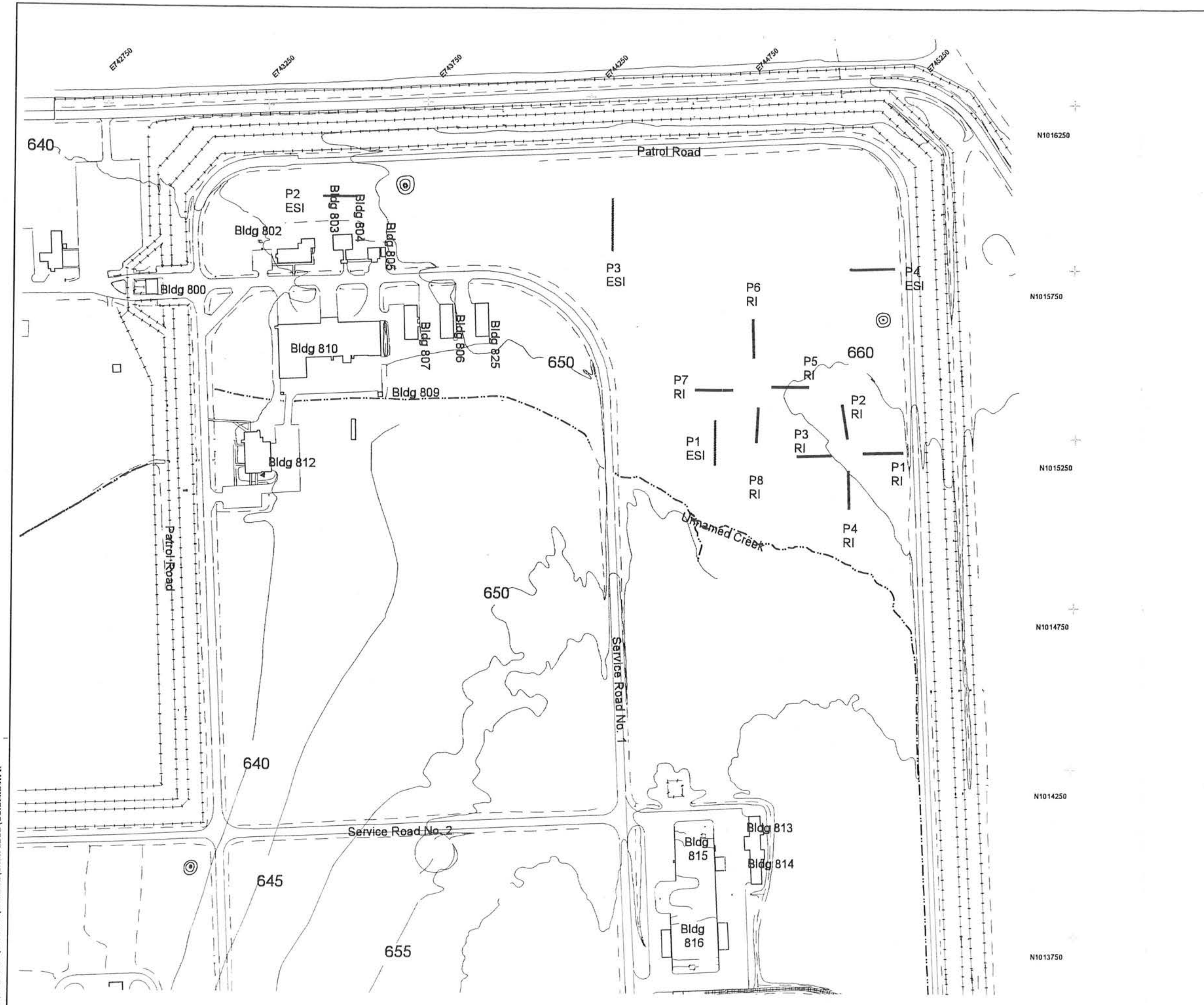

LEGEND

P1
RI
SEISMIC PROFILE
CONDUCTED DURING RI

P1
ESI
SEISMIC PROFILE
CONDUCTED DURING ESI

RI SEISMIC REFRACTION DATA
COLLECTED DURING
THE REMEDIAL INVESTIGATION
(AUG. 1996)

ESI SEISMIC REFRACTION DATA
COLLECTED DURING
THE EXPANDED SITE INSPECTION
(1994)

300 0 300
(feet)

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SENECA ARMY DEPOT ACTIVITY
RI/FS
SEAD 12

FIGURE 2-2
SEISMIC SECTION
LOCATIONS

SCALE 1:300	DATE MAY 2000	REV	Sheet 1 of 1

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The results of the computer modeling were reviewed in conjunction 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 were 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.

2.2.2 Electromagnetic Surveys

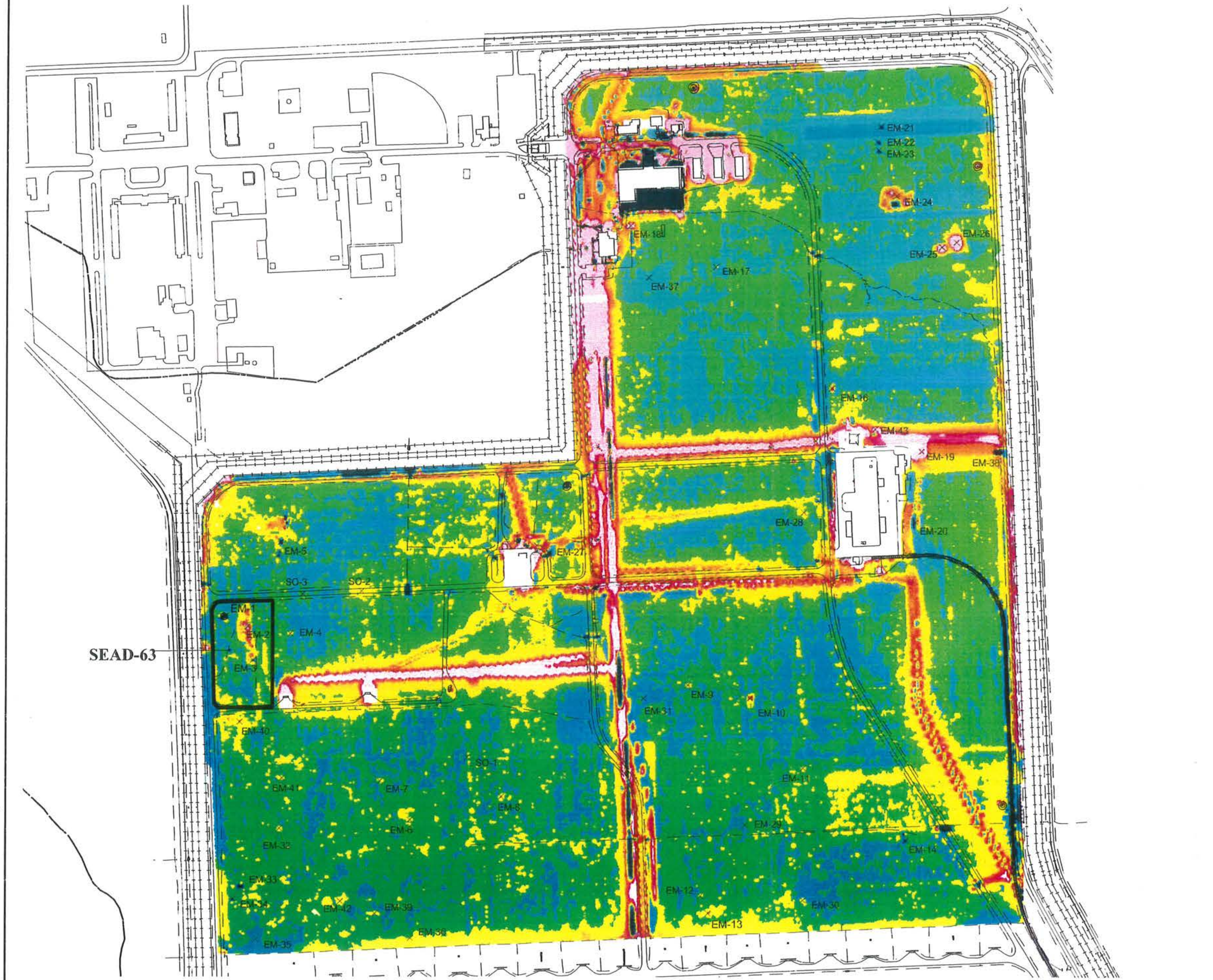
An EM-31electromagnetic survey was completed at SEAD-12 to identify areas where metallic objects were buried beneath the ground surface. The EM-31 was conducted as described in Section 3.2.2 of the Generic RI/FS Workplan (Parsons, 1995b) and was performed in north-south transect lines spaced 20 feet apart across the entire site. Upon completion of the EM-31 survey, the in-phase and quadrature components of the electromagnetic field were evaluated to identify locations of possible buried metallic objects within the subsurface. Based on the in-phase electromagnetic field data (**Figure 2-3**) four surface anomalies and 43 subsurface anomalies were identified within SEAD-12. Subsequently, all EM-31 anomalies were re-located using an EM-61, as described in Section 3.3.3 of the Generic RI/FS Workplan (Parsons, 1995b) and field inspected in an effort to identify the sources of the anomalies.

All locations interpreted to have potential to contain buried metallic objects or debris (**Table 2-1**) were assigned a electromagnetic anomaly number (i.e.: EM-11). These electromagnetic anomaly locations are presented on **Figure 2-3**. These data were compared to the results of the GPR surveys (described in **Section 2.2.3**) to provide as complete and as accurate interpretation of the subsurface conditions as possible.

The EM-31 response was measured at a calibration area, free of cultural interference, at the start of each day. This check was made to insure that no significant meter drift was occurring during each day of surveying. The EM-31 instrument was initially calibrated by the manufacturer with this secondary field calibration performed on a daily basis to insure repeatability of measurements and to check against daily meter drift.

2.2.3 Ground Penetrating Radar Surveys

The objectives of the ground penetrating radar (GPR) surveys were to locate buried structures (i.e., buried or filled-in pits, trenches, disposal areas) and to provide better subsurface definition of anomalies detected during the EM-31 surveys. The GPR transects surveyed in SEAD-12 during the SEAD-12 RI/FS are presented on **Figure 2-4**. Two types of GPR surveys were conducted at



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LEGEND

× EM-24

INTERPRETED EM-31 IN-PHASE ELECTROMAGNETIC ANOMALY

500 0 500
(feet)

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SENECA ARMY DEPOT ACTIVITY
RI/FS
SEAD 12

FIGURE 2-3
COLOR ELECTROMAGNETIC DATA MAP

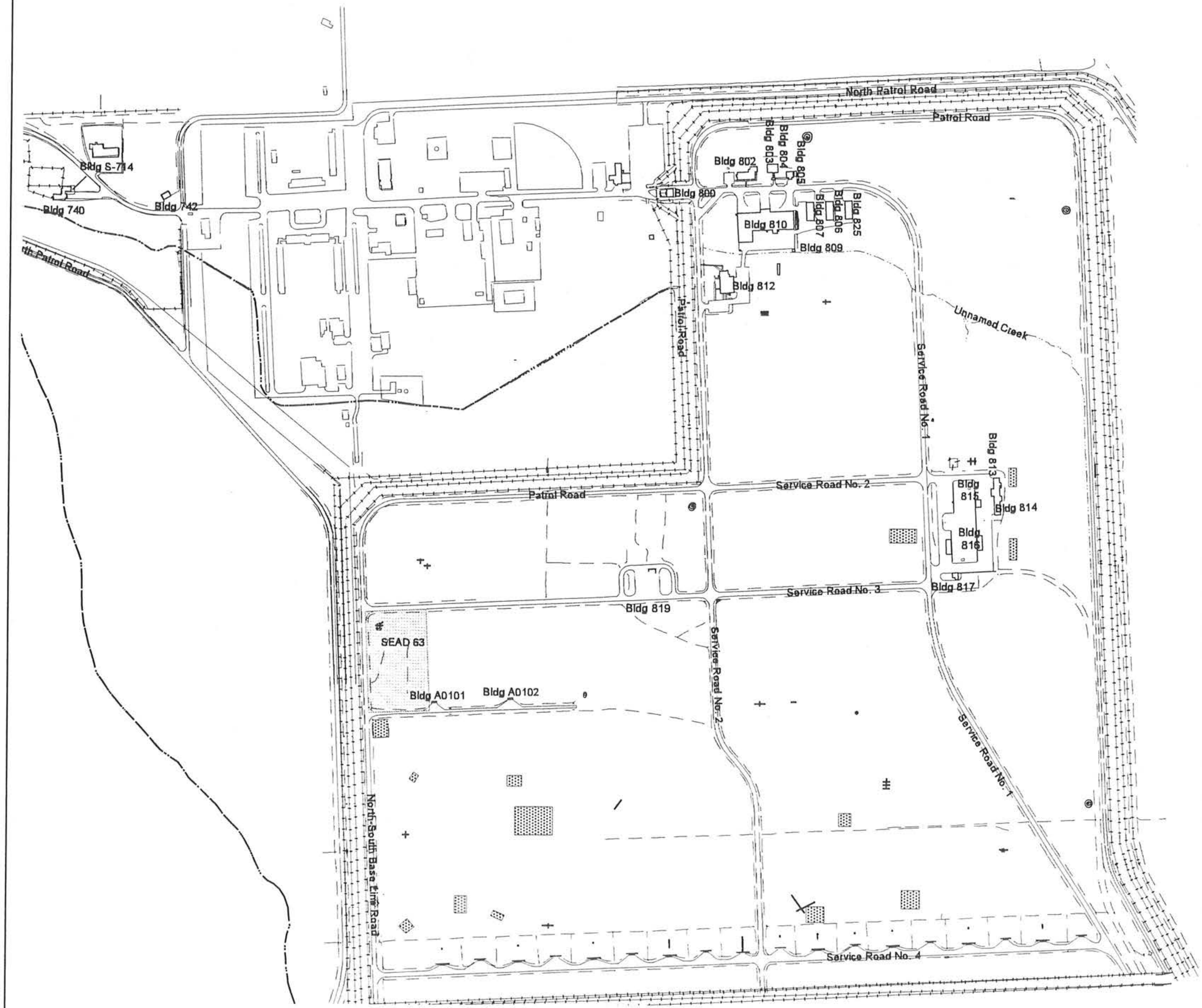
SCALE	DATE	REV	
1:500	NOV 2000		Sheet 1 of 1

TABLE 2-1
Geophysical Anomaly Investigation Summary
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Electromagnetic Anomaly ID	Performed as Part of This Prgram?	**Interpretation based on Geophysical Data**	Associated Test Pit IDs	Associated Monitoring Well IDs
SO-1	NO	little vegetation cover, old 12 inch wrench at surface	None	
SO-2	NO	cement on surface of drainage ditch	None	
SO-3	NO	cement on surface of drainage ditch	None	
SO-4	NO	large area marsh, surface mostly saturated	None	
EM-1	NO	disposal pit, characterized in 1994	None	
EM-2	NO	disposal pit, characterized in 1994	None	
EM-3	NO	disposal pit, characterized in 1994	None	
EM-4	NO	small point source anomaly	None	
EM-5	YES	multiple large amplitude anomalies, may be buried drums	TP12-15	MW12-22
			TP12-16	MW12-23
EM-6	YES	multiple medium sized anomalies, may be debris pit	TP12-11	MW12-24
			TP12-12	MW12-25
				MW12-26
EM-7	YES	small point source anomaly	TP12-9	
EM-8	YES	moderate size point source anomaly	TP12-10	
EM-9	YES	point source anomaly, in in-phase data only	Hand Dug	
EM-10	YES	small area, large amplitude anomaly, may be single buried object or small disposal pit	TP12-21	MW12-27
				SB12-28
EM-11	YES	point source anomaly, in in-phase data only	TP12-14	
EM-12	YES	point source anomaly, in in-phase data only	TP12-22A	
EM-13	YES	small area, small amplitude anomaly	TP12-22B	
EM-14	YES	multiple medium amplitude point anomalies	TP12-24	MW21-31
				MW12-32
EM-15	NO	probable septic system tank	None	
EM-16	NO	point source anomaly, in in-phase data only	None	
EM-17	YES	moderate size point source anomaly, due to surface debris	None	
EM-18	NO	Anomaly due to exercise equipment	None	
EM-19	YES	Anomaly due to backhoe	None	
EM-20	YES	large amplitude point source anomaly, later identified as associated with water line	None	
EM-21	NO	small point source anomaly, characterized in 1994	TP12-8 TP12-7B TP12A-7	
EM-22	NO	small point source anomaly, characterized in 1994	TP12-7A TP12A-6	MW12-34
EM-23	NO	small point source anomaly, characterized in 1994	TP12-5 TP12A-5	MW12-33
			TP12A-8	
			TP12-6	
			TP12-23	
EM-24	NO	Disposal Area C, characterized in 1994	TP12-3 TP12A-3	MW12-15
			TP12-4 TP12A-4	MW12-7
				MW12-14
EM-25	NO	Disposal Area B, characterized in 1994	TP12A-2	MW12-13
				SB12-3
				SB12-4
EM-26	NO	Disposal Area A, characterized in 1994	TP12-1 TP12A-1	MW12-8

TABLE 2-1
Geophysical Anomaly Investigation Summary
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Electromagnetic Anomaly ID	Performed as Part of This Prgram?	**Interpretation based on Geophysical Data**	Associated Test Pit IDs	Associated Monitoring Well IDs
			TP12-2	MW12-10
				MW12-12
				SB12-1
				SB12-2
EM-27	NO	crushed drum at surface	TP12-17	MW12-21
EM-28	YES	point source anomaly, in in-phase anomaly only, may be associated with utilities	TP12-18	MW12-29
			TP12-19	MW12-30
EM-29	YES	small area, medium amplitude anomaly, ground conductivity anomaly only	Hand Dug	
EM-30	YES	large area, medium amplitude, ground conductivity anomaly due to high water table/surface water	None	
EM-31	YES	small point source anomaly, ground conductivity anomaly only	Hand Dug	
EM-32	YES	small point source anomaly	None	
EM-33	YES	small point source anomaly	Hand Dug	
EM-34	YES	small point source anomaly due metal farm debris on surface	None	
EM-35	YES	small point source anomaly	Hand Dug	
EM-36	YES	small point source anomaly due to debris on surface	None	
EM-37	YES	small ground conductivity anomaly only. Could not be reproduced	None	
EM-38	YES	small point source anomaly	TP12-20	
EM-39	YES	small point source anomaly	Hand Dug	
EM-40	YES	small point source anomaly	TP12-13	
EM-41	YES	small unreproducable point source anomaly	None	
EM-42	YES	small point source anomaly	Hand Dug	
EM-43	NO	transformer	None	
EM-44	NO	large amplitude anomaly, associated with utility	None	
Former Dry Waste Disposal Pit Area	NO		TP12B-1 TP12B-2 TP12B-3 TP12-25 TP12-26	MW12-9 MW12-16 MW12-17 SB12-5 SB12-6



LEGEND

GROUND PENETRATING RADAR GRID

GROUND PENETRATING RADAR TRANSECT

× EM-21 ELECTROMAGNETIC ANOMOLY LOCATION

⊕ MW12-34 MONITORING WELL LOCATION

600 0 600
(feet)

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FIGURE 2-4
GROUND PENETRATING RADAR

SCALE	DATE	REV	
1:600	MAY 2000		Sheet 1 of 1

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SEAD-12 using a hand operated GSSI SIR-3 Ground Penetrating Radar unit with a 300 megahertz antenna. Detailed operating procedures for conducting GPR surveys are included in Section 3.3.4 of the Generic Workplan.

The number and spacing of GPR transects were based on the shape and extent of the EM-31 anomaly. For point and line or area anomalies the survey procedures were:

- Point Anomaly - two transects perpendicular to each other were performed over the point.
- Line or Area Anomaly - several transects were surveyed parallel to each other with line spacing no more than 10 feet apart.

The radar pulses from the antenna were reflected by subsurface materials to a receiver unit where they were converted to analog signals. The electronically processed analog signal was recorded as a continuous chart display on electro-sensitive paper, allowing real-time data interpretation. A daily field calibration was performed over a known anomaly (buried water pipe) to insure repeatability of measurements and to check daily meter drift.

2.3 RADIOLOGICAL INVESTIGATIONS

This section describes the outdoor radiological scanning survey conducted at SEAD-12 and sets the basis for the soil sampling conducted for radionuclide constituents at the site. Other radiological investigations were conducted at SEAD-12 and these include a radiological investigation of the inside of on-site buildings, and sampling and analysis of groundwater, sediment, and surface water for radionuclides of concern. The building radiological surveys are addressed the **Radiological Survey Report – SEAD-12, Class 1 and Class 2 Buildings** (July 2000), describing survey work completed in buildings 803, 804, 805, 806, 810, 812, 815, 816, and 819. The sampling and analysis of groundwater, surface water, and sediment for radionuclides of concern are addressed in **Sections 2.8** and **2.10** of this section. Additional detail on the soil sampling conducted for radionuclide constituents is presented in **Section 2.7**.

Outdoor radiological surveys and soil sampling for radiological analytes were conducted to identify any areas where radioactive materials were potentially released, and to collect sufficient data to demonstrate that this site may be released for unrestricted use. For this radiological survey, data collection followed procedures from several guidance documents. These guidance documents included NUREG 1500, NUREG 1505, NUREG 1506, NUREG 1507, NUREG 5849, Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM-NUREG-1575, EPA 402-R-97-016, December 1997), Methods for Evaluating the Attainment of Cleanup Standards, Volume 3 (EPA 1989), and procedures discussed in detail in the Project Scoping Workplan.

As these surveys are designed to compare survey area data sets to reference data sets, Data Quality Objectives (DQOs), (Section 3.5 of the Project Scoping Plan) were used to determine the minimum number of data points that are statistically needed from the survey units and reference sites. The minimum number of data points for these data set comparisons are:

- 17 data points from each survey unit and
- 17 data points from the reference area.

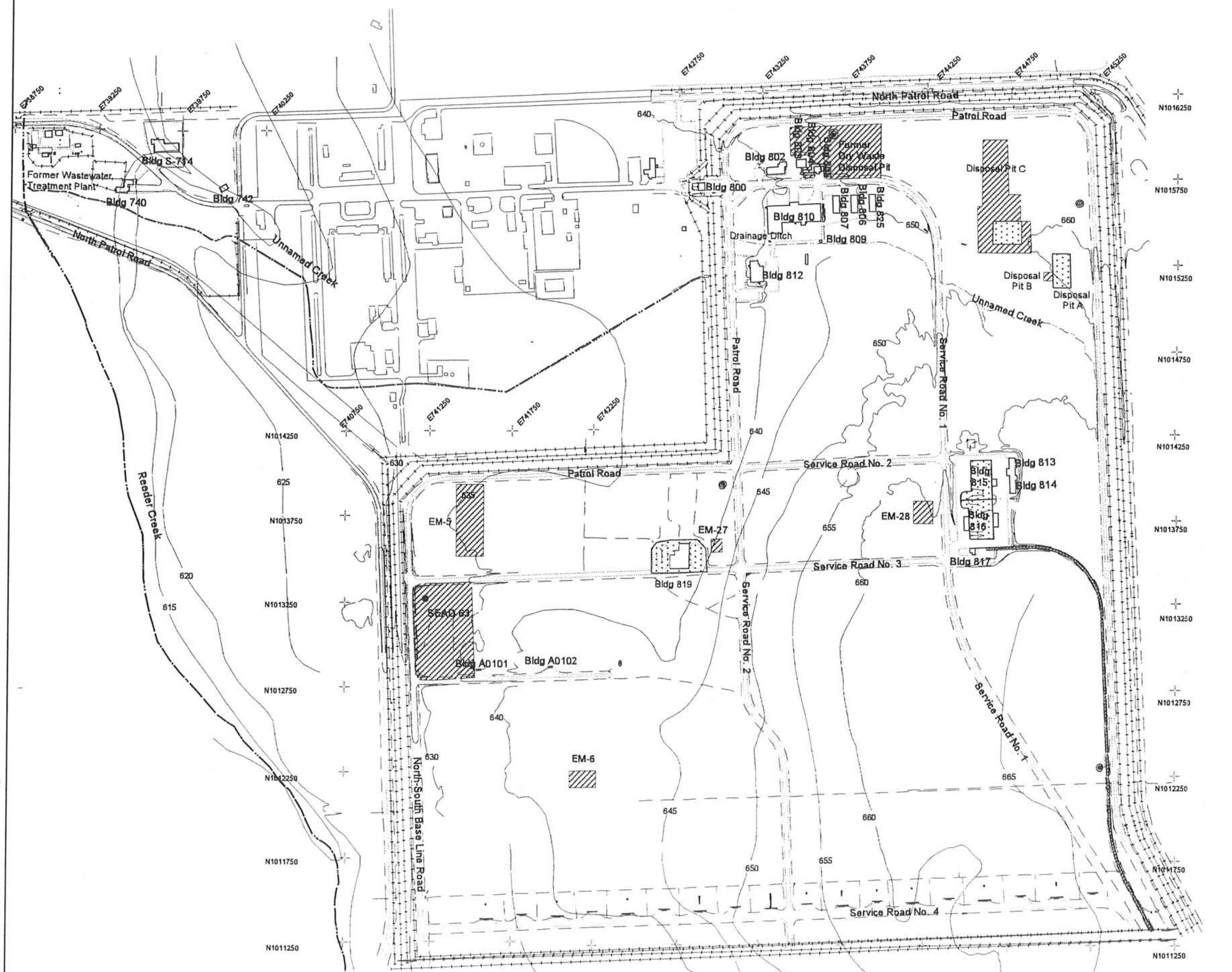
Following NUREG and MARSSIM guidance, this number was increased by 20%, to 20 for each data set.

2.3.1 Survey Units

For the purposes of establishing the sampling and measurement frequency of the radiological surveys at SEAD-12, areas within the former Q Area were divided into survey units. Each survey unit was then classified as a Class I, Class II, or Class III site based upon past operating history in the area or in the building located within the area, as presented in **Section 1.3**. In addition, area classifications were evaluated and adjusted based on field scanning results and observations. The survey unit designations and the survey unit classifications, **Figure 2-5**, as well as the rationale for those classifications are presented in **Table 2-2**. In the SEAD-12 Project Scoping Plan impacted areas were subdivided into three classes and defined as:

- Class I areas: Areas that have, or had prior to remediation, a potential for radioactive contamination (based on site operating history) or known contamination (based on previous radiological surveys). Note that areas containing contamination in excess of the DCGL prior to remediation were classified as Class I areas.
  Class II areas: These areas have, or had prior to remediation, a potential for radioactive contamination or known contamination, but are not expected to exceed the DCGL.
- Class III areas: Any potentially impacted areas that are not expected to contain any residual radioactivity, or are expected to contain levels of residual radioactivity at a small fraction of the DCGL, based on site operating history and previous radiological surveys.

According to MARSSIM, a characterization survey is normally conducted prior to establishing a survey area and assignment of its classification used for the final survey. Limited information was available for much of the site and the Army did not feel it was cost effective to conduct both a characterization and final survey of each building. Therefore, this survey program was designed to serve as both a characterization survey and a final status survey to be conducted



LEGEND

RADIATION CLASSIFICATION AREAS

CLASS 1

CLASS 2

CLASS 3

600 0 600 (feet)

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FIGURE 2-5
UNIT CLASSIFICATION MAP

SCALE	DATE	REV	
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Table 2-2
Survey Unit Classifications
SEAD 12 Remedial Investigation Report
Seneca Army Depot Activity

Class One Survey Units	Rational For Classification	Radionuclides of Concern
Disposal Pit A	Radium-226 detected above background levels during ESI in 1994.	Pu-239, U-238, U-235, Ra-226, Co-60, Co-57, H-3
Disposal Pit C	Radium-226 detected above background levels during ESI in 1994.	Pu-239, U-238, U-235, Ra-226, Co-60, Co-57, H-3
Roof of Building 815; Hot Room of Building 815 and areas of adjoining rooms to a distance of 2 meters from the access point to the Hot Room.	Used to perform maintainance on military items that contained radionuclides. Uranium bearing alloys were exposed to ambient air	Pu-239, U-238, U-235, Ra-226, Pm-147, Co-60, H-3
Roof of Building 816; Hot Room of Building 816 and areas of adjoining rooms to a distance of 2 meters from the access point of the Hot Room.	Used to perform maintainance on military items that contained radionuclides. Uranium bearing alloys were exposed to ambient air.	Pu-239, U-238, U-235, Ra-226, Pm-147, Co-60, H-3
Building 819; and Surrounding Grounds and Asphalt	Used to perform quality assurance testing on military items that contained radionuclides.	Pu-239, U-238, U-235, Ra-226, Co-60, H-3

Class Two Survey Units	Rational For Classification	Radionuclides of Concern
Building 815 and surrounding asphalt, except hot room and adjoining areas described above	Building 815 was used to perform maintainance on military items that contained radionuclides.	Pu-239, U-238, U-235, Ra-226, Pm-147, Co-60, H-3
Building 816 and surrounding asphalt, except hot room and adjoining areas described above	Building 816 was used to perform maintainance on military items that contained radionuclides.	Pu-239, U-238, U-235, Ra-226, Pm-147, Co-60, H-3
Drainage Ditch Between Building 816 and Reeder Creek Tributary, Reeder Creek Tributary, and Drainage Ditch Between Buildings 803, 804, 810 and Reeder Creek Tributary	These are the main surface water drainage pathways for the Class One Buildings 803, 804, 805, 815, and 816.	None, Screening for all radionuclides stored on-site will be performed
Grounds and Drainage Ditch Behind Buildings 803 and 804	ESI data and 1986 SEDA excavation data indicate that this area is most likely free from residual radioactivity.	None, Screening for all radionuclides stored on-site will be performed
Disposal Pit Areas Identified By Geophysics Except Disposal Pit A and Portions of Disposal Pit C	Disposal of materials that contained radionuclides is very unlikely, but no documentation to this effect exists.	None, Screening for all radionuclides stored on-site will be performed

Class Three Survey Units	Rational For Classification	Radionuclides of Concern
All open grounds not classified as either Class One or Class Two Survey Units	No known uses of these areas included the storage or disposal of military items that contained radionuclides. Also, aerial photo reviews and geophysical data will demonstrate that Class Three open grounds have not been impacted.	None, Screening for all radionuclides stored on-site will be performed

within SEAD-12. Survey areas at SEAD-12 were established and assigned conservative classifications based on past operating history. Sampling and measurement frequency of the radiological surveys at SEAD-12, were then determined based on this classification. Although establishment of survey areas and final survey classifications without first conducting a characterization survey is a deviation from MARSSIM methodology, the conservative classification system employed and dense sampling coverage assigned provided a high degree of confidence for detection of radioactive contamination. The ultimate goal of collecting adequate survey data to assess each survey area for both characterization and final closure is achieved through the conservative assignment of classifications for each survey area.

Although MARSSIM allows the scanning of Class III survey units to be based on professional judgment, grid-based surveys (Section 4.2.3.1 of the Workplan) were completed. Additionally, non-impacted structures (i.e. areas with no historical evidence of radionuclide impact) were subjected to Class III surveys. Utilizing the methodology followed by the Army, each survey unit was comprised of potentially multiple classifications and the number of data points were based upon the classification.

2.3.2 Radionuclides Of Concern

The identity of all radionuclides that were stored as integral parts of military items in the Q Area and all radionuclides that were contained in sealed calibration check sources in the Q Area has been released by the Army. These radionuclides, and the buildings in which they were stored or maintained, are listed in **Table 2-2**. In addition, **Table 2-3** presents a partial list of the military items that may have been stored in the Q Area along with the radionuclides that would have been present as components of those items.

2.3.3 Instrument Daily Function Checks

All radiation survey data were collected using laboratory calibrated radiation survey instruments. The surveying instruments were calibrated every twelve months with the exception of the Bicron FIDLER (field instrument for detecting low energy radiations) which was calibrated every three months. In addition to the periodic laboratory recalibration, daily function checks were performed on all survey and health and safety instruments three times daily, using NIST traceable radioactive sources. **Appendix A** documents the procedure and completion of daily function checks.

All health and safety instruments were calibrated every six months with the exception of the Bicron Micro-Rem that was calibrated every four months.

Table 2-3
Military Items That Contain Radionuclides
As Integral Parts Of Their Components
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Taken from the Generic Radioactive Commodity Site Remediation Survey Protocol (November 1995)	
Military Item	Isotope
Front Sight Post Assembly	H-3
Radioluminous Fire Control Devices	H-3
Compasses	H-3
Infinity Collimator	H-3
M1A1 Collimator	H-3
M1A1 Quadrant Fire Control Device	H-3
M58 and M59 Aiming Light Post	H-3
Wrist Watches	H-3
M72 Light Antitank Weapon (LAW)	Pm-147
Front Sight Post Assembly	Pm-147
Radium Dial/Compass/Check Source	Ra-226
MC-1 Moisture Density Tester	Am-241
M8A1 Chemical Agent Alarm	Am-241
MA1 Tank Armor	U-238
M1 Tank Armor	DU (Depleted Uranium)
MC-1 Moisture Density Gauge	Cs-137 Am-241

2.3.4 Radiation Scanning Surveys

2.3.4.1 Instrument Flag Values

During scanning surveys, the flag value (instrument efficiency) was determined on a daily basis. Flag values were established for alpha, beta and gamma radiation for each instrument in use. These values indicate whether further investigation in a particular area may be necessary. When scanning or direct measurements exceed a flag value, additional investigations were performed to verify if contamination existed and to identify the radioactive isotopes responsible for the "hot spot". The investigations may have involved comparing survey data to a survey area-specific DCGLs, additional surveying, smear or material sampling.

The flag value was calculated using the following formula:

$$Flag = \left(G \bullet f_{gd} \bullet E_{inst.}\right) + B$$

G = survey unit specific guideline value (specific for alpha and beta radiation);
f_{gd} = fraction of guideline value that must be detected, equal to 25% for interior surveys and 75% for exterior surveys;
$E_{inst.}$ = detection efficiency of the instrument (**Table 2-4**);
B = daily background count rate (determined on an instrument specific basis, background data collection at bunker C0912);
(U.S. Army Generic Radioactive Commodity Site Radiation Survey Protocol, November 1995)

Flag values, calculated early in the field work, were roughly twice background levels. Therefore, two times the daily background reading was used as the field flag value.

2.3.4.2 Grounds Survey Instrumentation

Instruments used during the exterior grounds radiation surveys included:

- Bicron Analyst portable count rate meter combined with a Model G5 Fidler NaI (Tl) crystal scintillation probe employing a 5 inch diameter NaI (Tl) crystal and photo multiplier (FIDLER) - low energy gamma (γ);
- Radiac AN/PDR-77 with NaI (Tl) crystal scintillation probe - low energy gamma (γ);
- Ludlum Model 3260 rate meter with Ludlum 43-37 probe - alpha (α), beta (β),
- Ludlum Model 19 Micro-R meter – gamma (γ);

TABLE 2-4
Radionuclide Specific Instrument Efficiencies and MDAs
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Instrument	Serial Number	Source	Radiation Type	Background (CPM)	Instrument Efficiency	Probe Area (cm2)	Scanning MDA (dpm/100 cm2)	Static MDA (dpm/100 cm2)
Floor Monitor (1)	138256/136498	TH-230	Alpha	2	12.10%	425	118	19
Floor Monitor	138256/136498	TC-99	Beta	798	22.10%	425	1285	143
Floor Monitor	138262/136498	TH-230	Alpha	1	8.79%	425	115	20
Floor Monitor	138262/136499	TC-99	Beta	440	20.40%	425	1034	116
Hand held (2)	138238/138734	TH-230	Alpha	1	18.20%	100	235	42
Hand held	138238/138734	TC-99	Beta	73	20.20%	75	2407	281
Hand held	138254/140515	TH-230	Alpha	1	17.30%	100	248	44
Hand held	138254/140515	TC-99	beta	81	21.20%	100	1812	211
Fidler (3)	A981P/A397Q	AM-241	Gamma	6490	1.80%	126	151843	16645
Fidler	A959P/A386Q	AM-241	Gamma	6490	1.80%	126	151843	16645
Phoswich (4)	133669/166008	Th-230	Alpha	2	27.80%	86	253	40
Phoswich	133669/166008	Tc-99	Beta	218	25.40%	86	2890	328
Phoswich	138254/155183	TH-230	Alpha	2	28.90%	86	243	39
Phoswich	138254/155183	Tc-99	Beta	218	20.30%	86	3625	411

(1) Ludlum-Model 3260
(2) Ludlum-Model 3260
(3) Bicron Analyst
(4) Ludlum-Model 3260

- Bicron Micro-Rem survey meter - beta (β), gamma (γ); and
- Ludlum Model 3 scaler/rate meter with a Pancake G-M probe - beta (β), gamma (γ).

The last three instruments are primarily for exposure monitoring.

The FIDLER was the primary instrument used during exterior grounds surface scanning surveys, replacing the Radiac AN/PDR-77 that was used initially. The FIDLER scanning instrument, configured with an open window, represented an instrumentation compromise, scanning for low energy gamma and for the broadest possible energy range. The FIDLER's short reaction time to small changes in direct radiation levels and its audible indicator capability made it preferable for scanning surveys. Audible indicators were used to identify locations having elevated (>1.5 to 3 times ambient) levels of direct radiation.

Scanning using the FIDLER involved moving the probe across the ground surface at speeds of 0.5 meters per second or less, while sweeping the detector from side to side. The probe was moved in such a manner so that four sweeps were achieved for every one square meter area surveyed (i.e. the detector is moving within a one square meter area for a period of at least 8 seconds). This method was employed to maximize the detection of small variations in direct radiation levels (typically between 100 and 300 counts per minute). Detailed scanning procedures are discussed in Section 4.2.3.1 of the Project Scoping Plan.

The Ludlum Model 19 Micro-R meter was used to evaluate suspected hot spots located by the Bicron Fidler or the AN-PDR-77. Upon locating and duplicating a hot spot with the Bicron Fidler a higher resolution, 100 percent coverage survey was conducted with the Micro-R over the hot spot in a cross pattern at 0.5 foot increments to ensure that the hot spot was reproducible with a second instrument and therefore due to a concentration of radionuclides and not a perturbation in background radiation. Locations detected and duplicated in this manner where a hot spot was suspected to exist were marked for later soil sampling.

Exposure rate measurements were collected in SEAD-12 employing either a Bicron Micro-Rem survey meter or a Ludlum Model-19 Micro-R meter depending on instrument availability.

A Ludlum Model 3 scaler/rate meter with a Pancake G-M probe was employed to scan the hands and feet of personnel at noon and at the end of each day to ensure that personnel were not transporting radioactive contamination off site on their hands and feet.

2.3.4.3 Alpha, Beta, and Gamma Scanning Surveys

The scanning surveys were conducted following the schedules detailed below. Areas where scanning measurements indicated the potential presence of residual radiation were marked for further investigations. Professional judgement was used to determine if additional surveys were warranted. The additional surveys included additional direct measurements, additional surface scanning (such as a 100% coverage using a NaI detector), or material sampling depending upon the subject surface and radiation levels detected.

Class I Survey Units

Scanning coverage of surfaces and grounds within Class I survey units entailed 100% coverage of surfaces for gamma radiation based on a 1 by 1 meter grid spacing. Alpha and beta grounds surveys were performed on asphalt and concrete covered areas immediately surrounding Class I buildings. Class I survey units, as shown in **Figure 2-5**, in SEAD-12 were:

- pavement surrounding Buildings 803, 804, 805, 815, 816, and 819, as well as the grass covered areas immediately surrounding buildings 803, 804, 805, 819, and disposal pit A;
- grass covered roofs of buildings 815 and 816;
- drainage ditch immediately east and north of buildings 815 and 816; and
- ground surface over disposal pit C and area immediately surrounding disposal pit C area (reclassified from Class II and rescanned based on debris from test pit TP12-3)

Class II Survey Units

Class II survey units were scanned at a frequency of 50% coverage for gamma radiation. As shown on **Figure 2-5**, areas surveyed as Class II units were:

- grass covered area north of buildings 803, 804, and 805;
- grass covered area north of disposal pit C where several small point source electromagnetic anomalies were found.
- electromagnetic anomalies EM-27 and EM-28 (due to proximity to buildings 819 and 815/816); and
- electromagnetic anomalies EM-5 and EM-6 (due to possible Army-related debris visible on the ground surface).

Class III Survey Units

The Class III Scanning surveys, covering the remainder of SEAD-12 not included in Class I, Class II or building surveys, were completed along survey lines that were separated by approximately 15 meters, resulting in a surface coverage of approximately 10%. Surface scanning surveys of pavement surfaces were conducted for alpha, beta, and gamma radiation. Surveys of unpaved exterior grounds were performed for gamma radiation only.

2.3.4.4 Alpha and Beta Direct Measurements

Direct measurement surveys compare grid area alpha and beta radiation measurements taken on asphalt and concrete areas to daily flag values (**Section 2.3.4.1**). These surveys were performed to detect areas where elevated levels of surface, or near surface, radiation may be present at levels undetected by gamma scanning. The direct measurement survey data were compared to the daily flag value. Alpha and beta direct measurements were also taken in areas where the gamma flag value was exceeded.

An area at Building 819 was the only location where the daily flag values for alpha and beta were exceeded. This area and the actions taken are summarized in detail in **Section 4.3.1.1**.

All direct measurements were recorded on grid diagrams that are directly related to the grid pattern established in each survey unit. Building exterior pavement grid sizes were 10 meters by 10 meters. Each survey set grid was such that at a minimum 20 data points were collected per survey area. For all classes of survey unit, direct measurement data points consist of integrating counts over a 1-minute period.

Class I Survey Units

Direct measurements of alpha and beta surface activity were performed for select grids locations using the instruments outlined in **Section 2.3.4.2**. For Class I surveys, direct measurements were collected in paved areas with one data collection location per 10 meter by 10 meter grid. The instrument was located at the center of the subject survey grid.

Class II Survey Units

Class II direct measurement surveys, measured alpha and beta surface activity in the same manner as Class I surveys.

Class Three Survey Units

Class II direct measurement surveys, measured alpha and beta surface activity in the same manner as Class I surveys.

2.3.4.5 Exposure Rate Surveys

Exposure rate measurements were collected in units of µRem/hr using a Bicron Micro-Rem meter or in µR/hr using a Ludlum Model 19 Micro-R Meter. Exposure rate surveys determine whether specific location exposure rates are above or below the guideline value for a radiologically safe working environment (Scoping Plan, Section 4.2.3.3). A minimum of 20 exposure rate measurements were collected from each survey unit in order to meet the DQOs selected for SEAD-12. Additional exposure rate measurements were collected at all soil, groundwater, surface water, sediment, and archeological sampling locations in SEAD-12.

2.3.5 Bore Hole Geophysics Survey

A bore hole geophysics survey was performed in the area of Disposal Pits A and B to define the horizontal and vertical extent of Radium-226 contamination in the waste material and the surrounding subsurface. The methodology employed was based upon and closely followed the methodology described in "Estimate of Volume of Radium Contaminated Soil On Five Sites In Ottawa, Illinois" prepared for the USEPA by the Argonne National Laboratory (document ANL/ESH/TS-89/100). The borings were surveyed using a model 44-62-2 1-inch down-hole probe equipped with a NaI crystal gamma scintillator and photomultiplier in conjunction with a hand held Ludlum model 12 scaler/ratemeter. The probe, the scaler/ratemeter, and the associated cable were calibrated as a set in the laboratory immediately before they were used for this project to maximize data quality. Laboratory calibration included calibration sources: Iodine-125, Cobalt-157, Barium-133, Cesium-137, and Radium-226. In addition to the initial factory calibration, daily function checks were performed using NIST traceable sources to ensure that the instrument was operating within specific operational guidelines.

A detailed description of the bore hole survey procedures were provided in Section 4.2.1 of the Project Scoping Plan. In general, the gross gamma radiation flux was measured from the bottom of the bore hole to the top in 0.5 foot increments. At each measurement interval, the bore hole probe was held stationary for one minute and the total counts of gamma radiation flux (cpm) recorded.

Sixty-five (65) bore hole locations were placed at the grid nodes of the 15-foot by 15-foot grid established over the Disposal Pit A and B area (**Figure 2-6**). Four additional bore holes were placed in background locations upgradient of disposal pits A and B. Bore hole locations were also placed at 15-foot intervals along three lines extending radially downgradient from the downgradient boundary of Disposal Pit A. These data were used qualitatively to identify areas of elevated count rates that were then targeted for intrusive investigations during the soil boring and test pit programs (**Section 2.7.1**).

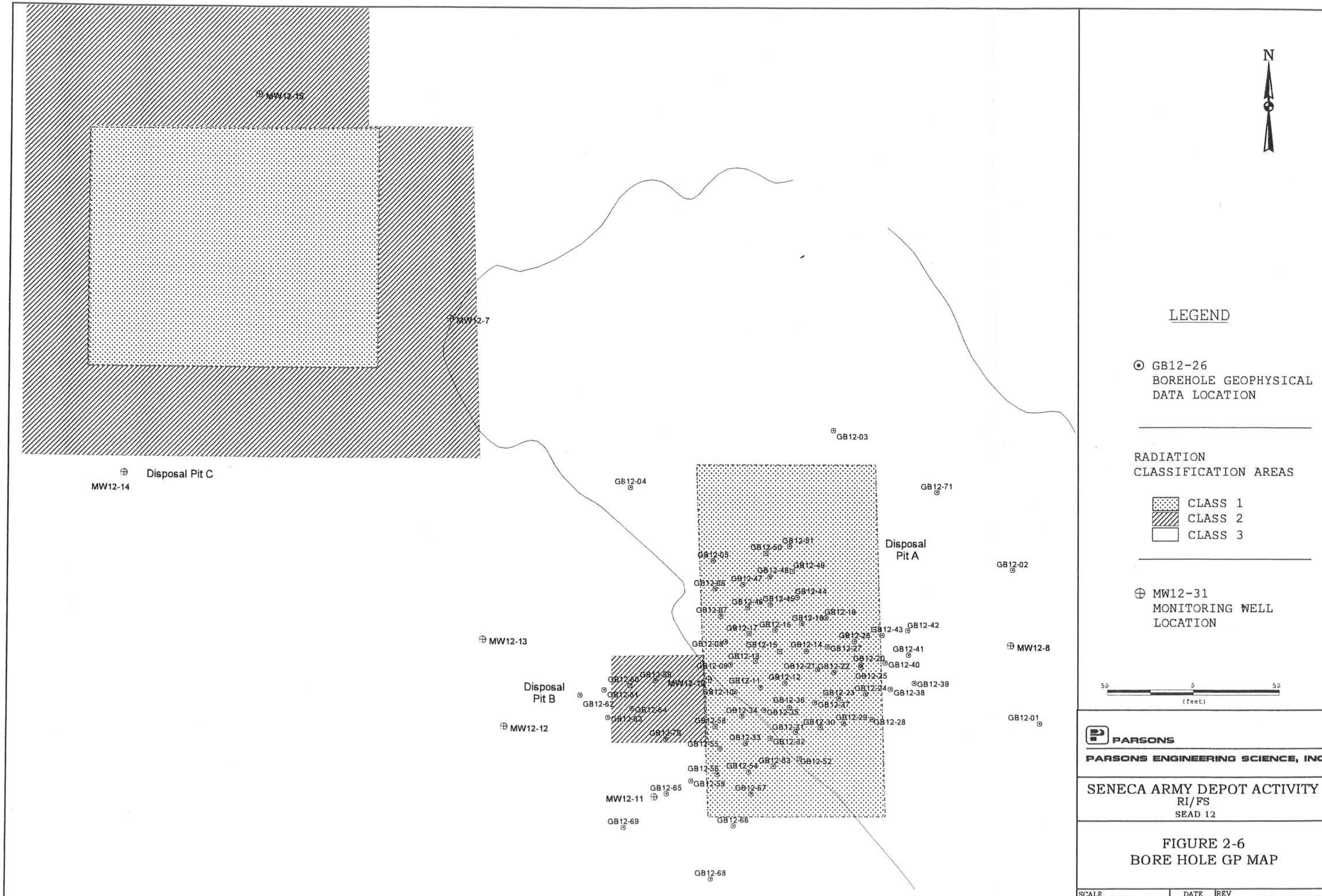

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FIGURE 2-6
BORE HOLE GP MAP

SCALE	DATE	REV	
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LEGEND

SG12-121 SOIL GAS SAMPLE LOCATION

MW12-33 MONITORING WELL LOCATION

100 0 100

(feet)

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SEAD 12

FIGURE 2-7
SOIL GAS
SURVEY LOCATIONS

SCALE	DATE	REV	
1:100	MAY 2000		Sheet 1 of 1

O:\AV_GIS30 ...CA\SEAD12\SAMPLELO\GKLOCS.APR penetrometer point to dislodge from the rod, thus creating a void space through which soil gas was collected. Bentonite chips were hydrated and packed around the sampling rod at the ground surface to prevent influx of atmospheric air into the sampling probe. The top of the sampling rod exposed above ground surface was fitted with a coupling containing evacuation and sampling ports. Latex laboratory tubing connected the evacuation port to the intake of a SKC Aircheck Sampler Pump. The sampling port was fitted with a new self sealing Teflon® septum at each location to avoid cross contamination.

The sampling probe was purged for 2-3 minutes, after which a sample was collected. The effluent gas was monitored continuously with an Organic Vapor Meter (OVM). If the effluent monitoring indicated an increase in the concentration of volatiles a soil gas sample was collected prior to completing the 2-3 minute purge; a second sample was collected after 2-3 minutes. Gas samples were collected to coincide, as much as possible, with the highest concentration of gas measured by the OVM. Approximately 3 ml of soil gas was extracted through the sampling port using a Hamilton Gastight™ sampling syringe.

2.5.2 Analytical Support

A temporary soil gas laboratory was established in a field trailer located at the entrance to the OB Grounds. Soil gas samples were analyzed in the field using a Photovac 10S50 portable gas chromatograph to facilitate real time data acquisition. The volume of the gas sample (between 0.25 ml and 1.0 ml) injected into the portable gas chromatograph depended on the expected VOC concentration in the sample. Expected VOC contents were estimated by continuous OVM measurements during sample collection. A smaller sample volume was used where high VOCs were expected to keep detector response within the calibrated range of the instrument.

The field calibration standard was prepared from a certified gas standard. The gas standards used for this project were prepared by Scott Specialty Gas which is certified by National Specialty Gases to be traceable to the National Bureau of Standards (NBS). The gas standard mixture included benzene, toluene, ethylbenzene, M-xylene, O-xylene, and P-xylene, each at concentrations of 51.5, 50.4, 50.0, 50.3, 50.3, and 50.1 (parts per million per volume (ppmv)), respectively. Dilutions were made from this standard by injecting a known volume of calibration gas into a clean glass sampling bulb of known volume. The instrument was calibrated each day prior to the analysis of a sample.

2.5.3 Data Interpretation

The interpretation of the soil gas data involved identification of each organic compound by retention time comparison with gas standards. Sample concentrations were quantified using the following equation:

$$C = RF_{slope} \times DR_{compound}$$

where:

C = Concentration of the gas (ppmv);

RF = Response Factor (based on the slope of a line for a standard compound); and

$DR_{compound}$ = Detector Response for a specific compound [volt-seconds (vs)].

The final concentration of the collected sample was determined by applying either a dilution factor or a concentration factor, depending upon the volume injected. The prepared calibration curves and best fit line statistical analyses are presented in **Appendix F**.

2.6 REFERENCE DATA SETS

Reference data sets for soil, sediment, surface water, and groundwater were established for chemical and radiological data. Site-wide background data sets developed for soil and groundwater (used for the calculation of TAGM values for some metals) are included in the appendices G and J. Background sample locations specific to SEAD-12 are listed by matrix in **Sections 2.7, 2.8 and 2.9**, and designated on the analytical matrix tables included in those sections.

The site specific background soil sample set were collected for the characterization of radiological data. The data set consists of surface (27) and subsurface (14) soil samples collected from locations that are up and cross gradient to SEAD-12. The subsurface samples include a mid-depth soil sample collected near each of the three existing background monitoring wells that were used for the background groundwater database, and subsurface soil samples collected from each of the six up or cross-gradient monitoring wells installed east and north of the WSA. Surface soil samples include: samples collected upgradient monitoring wells installed east and north of the WSA, samples collected from various locations east and north of the WSA, and soil samples collected in the North Post's baseball field.

The background surface water and sediment sample set consists of a total of nine background surface water and nine sediment samples collected from within drainage ditches and Reeder Creek locations upgradient of SEAD-12.

The site-wide background groundwater data set consists of samples collected from nine monitoring wells for chemical characterization. For radiological and metals characterization, six wells east and north of the WSA were sampled.

2.7 SOILS INVESTIGATION

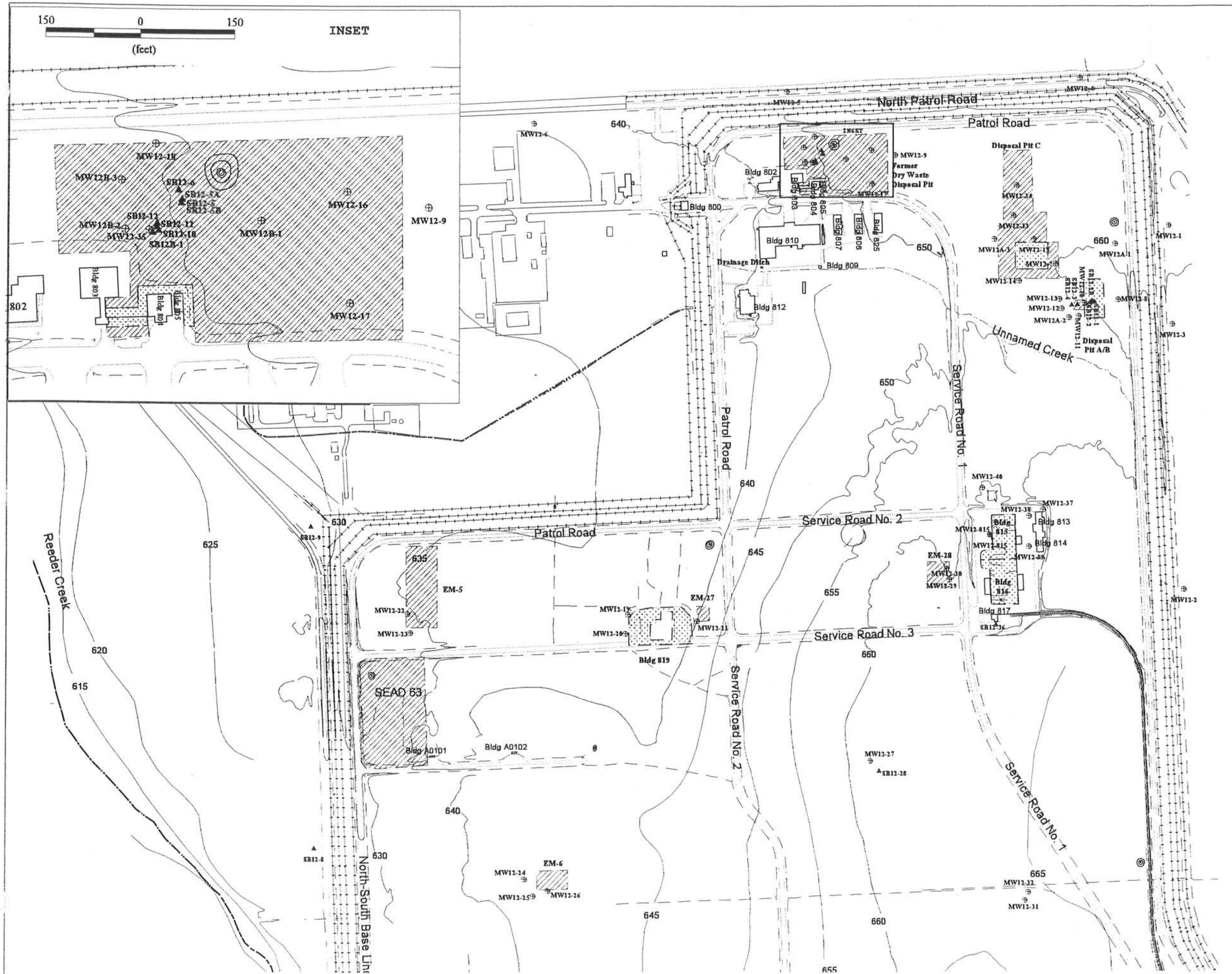
The soils investigation program was completed in accordance with the Project Scoping Plan and Section 3.4 of the Generic Workplan. The investigation objectives were:

- determine the nature and extent of soil impacts,
- provide data on the background soil quality,
- investigate anomalies detected during the geophysical survey, and
- investigate stratigraphic and bedrock conditions.

The locations of soil borings, monitoring wells, and test pits, **Figure 2-8** and **Figure 2-9**, proposed in the Project Scoping Plan were adjusted based on results of geophysical investigations, radiation scanning investigations, bore hole geophysics investigations, and soil gas investigations. Individual soil boring logs, monitoring well installation logs, and test pit logs are included in **Appendix B.** Soil sampling is discussed below in terms of surface (0-0.2 feet) and subsurface (>0.2) sampling, and in terms of associated potential release area.

Screening procedures were implemented in association with all types of soil sampling (borings, test pits, and monitoring wells). Soil samples collected during the SEAD-12 soils program were screened for volatile organic compounds using an Organic Vapor Meter (OVM) 580B and for gross gamma radiation flux with a Ludlum Model-19 Micro-R meter. The OVM was calibrated at the beginning of each day and checked at the end of each day. As described in Section 2.3.3 function checks were completed 3-times per day. Procedures for the calibration of the OVM and function checks of the Ludlum were provided in the Generic Workplan and the Project Scoping Plan.

A Ludlum model 3 scaler/rate meter with a Pancake G-M probe was used twice daily (noon and at the end of the day) to scan the hands and feet of all personnel. This scanning was for personal protection and to ensure that radioactive contamination was not transported offsite on the hands and feet of site workers. Access to SEAD-12 was restricted to Environmental and Army personnel with a chain link fence and a remotely operated gate. In addition, all field personnel were enrolled in a thermoluminescent detector (TLD) badge program. All personnel wore a TLD badge at all times when they were working in SEAD-12. TLD badges were analyzed on a quarterly basis, with personal exposures calculated for each site worker.



PARSONS

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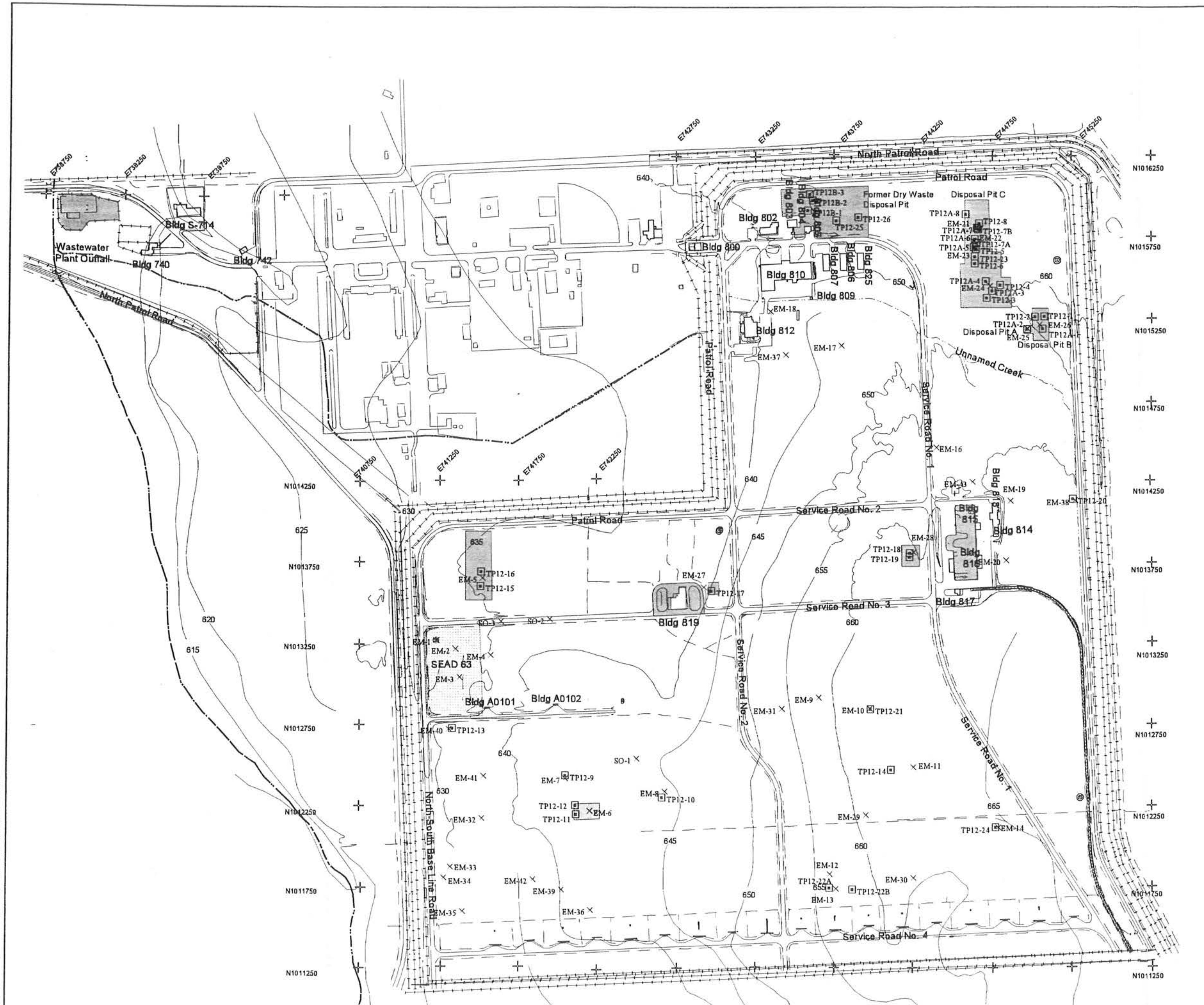
SENECA ARMY DEPOT ACTIVITY
RI/FS
SEAD 12

FIGURE 2-8
SOIL BORINGS AND MW

SCALE	DATE	REV	
1:500	MAY 2000		Sheet 1 of 1

O:\AV_GIS30\...\SEAD12\SAMPLELO\GKLOCS.APR



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N

LEGEND

⊡ TP12-20
TESTPIT LOCATION

× EM-15
ELECTROMAGNETIC
ANOMOLY LOCATION

● POTENTIAL RELEASE
AREA

600 0 600
(feet)

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SENECA ARMY DEPOT ACTIVITY
RI/FS
SEAD 12

FIGURE 2-9
TEST PITS

SCALE	DATE	REV	
1:600	MAY 2000		Sheet 1 of 1

2.7.1 Subsurface Soil Sampling

The subsurface soil sampling locations for each potential release area and location identifier (LOC_ID) are listed in **Table 2-5,** for samples collected in conjunction with soil borings and monitoring wells, and in **Table 2-6,** for samples collected from test pits. The samples were analyzed in accordance with the methods presented in the table.

2.7.1.1 Soil Borings

Drilling Procedures

During the SEAD-12 RI and ESI investigations sixty-two soil borings were drilled (including soil borings completed as monitoring wells). Fifty-two (52) of these borings were drilled to auger refusal, with continuous split-spoon sampling for stratigraphic logging and chemical sampling. As shown in **Figure 2-8**, the borings are concentrated around buildings, disposal pits, and geophysical anomalies. The rational for the borings is described in detail in Section 4.2.4.2 of the Project Scoping Plan and is summarized here:

- Assess background conditions;
- Investigate the extent of possible paint releases in the area of Buildings 813, 814, and 817, based on the soil gas survey;
- Investigate subsurface soil impacts related to possible leakage of transformers Buildings 815 and 818;
- Investigate impact around disposal pits A,B, and C;
- Investigate impact around old dry waste disposal pit north of buildings 804 and 805;
- Investigate subsurface soil impacts from building 819; and
- Investigate content and impact of underground storage tank behind building 804.

Drilling was completed by a CME 55 drill rig using with 4.25-inch I.D. hollow stem augers and standard 2 inch carbon steel split spoons. These borings were drilled to investigate stratigraphic, chemical, and radiological soil conditions across the site and to collect background chemical and radiological data.

Drilling and sampling procedures are described in detail in Section 4.2.4.2 of the Project Scoping Plan, and in Section 3.4 of the Generic Workplan. All soil borings were logged using a standardized boring log form. All soil samples were classified and described according to the Unified Soil Classification System (USCS) modified with the Burmister soil classification system.

Table 2-5
Soil Boring Subsurface Sampling Summary
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

RADIATION SURVEY CLASS	POTENTIAL RELEASE ARE	LOC_ID	SAMP_ID	MATRIX (a	VOCs*	SVOCs*	Pesticides/ PCBs*	Metals*	Analysis Methods for Radiological Data**							
					TCL NYSDEC CLP	TCL NYSDEC CLP	TCL NYSDEC CLP	TCL NYSDEC CLP	EPA 901.1	EPA 906.0	EPA 900.0	SM2540G	HASL 300	EPA 903.0	EPA 913	Promethium-147
I	BLDG 819/EM-27	MW12-19	123041	SOIL	X	X	X	X	X	X		X	X			
I	BLDG 819/EM-27	MW12-19	123042	SOIL	X	X	X	X	X	X		X	X			
I	BLDG 819/EM-27	MW12-20	123047	SOIL	X	X	X	X	X	X		X	X			
I	BLDG 819/EM-27	MW12-20	123048	SOIL	X	X	X	X	X	X		X	X			
I	BLDG 819/EM-27	MW12-21	123050	SOIL	X	X	X	X	X	X		X	X			
I	BLDG 819/EM-27	MW12-21	123051	SOIL	X	X	X	X	X	X		X	X			
II	BLDG 815/816/EM-28	MW12-30	123138	SOIL	X	X	X	X	X	X		X	X			
I	DISPOSAL PIT A/B	MW12-10	123008	SOIL	X	X	X	X	X	X		X	X			
I	DISPOSAL PIT A/B	MW12-10	123009	SOIL	X	X	X	X	X	X		X	X			
I	DISPOSAL PIT A/B	MW12-11	123011	SOIL	X	X	X	X	X	X		X	X			
I	DISPOSAL PIT A/B	MW12-11	123012	SOIL	X	X	X	X	X	X		X	X			
I	DISPOSAL PIT A/B	MW12-12	123014	SOIL	X	X	X	X	X	X		X	X			
I	DISPOSAL PIT A/B	MW12-12	123015	SOIL	X	X	X	X	X	X		X	X			
I	DISPOSAL PIT A/B	MW12-13	123017	SOIL	X	X	X	X	X	X		X	X			
I	DISPOSAL PIT A/B	MW12-13	123018	SOIL	X	X	X	X	X	X		X	X			
I	DISPOSAL PIT A/B	SB12-2	12532	SOIL	X	X	X	X	X	X		X	X			
I	DISPOSAL PIT A/B	SB12-2	12533	SOIL	X	X	X	X	X	X		X	X			
I	DISPOSAL PIT A/B	SB12-2	123113	SOIL	X	X	X	X	X	X		X	X			X
I	DISPOSAL PIT A/B	SB12-2	123114	SOIL	X	X	X	X	X	X		X	X			X
II	DISPOSAL PIT A/B	MW12-8	123184	SOIL	X	X	X	X	X	X		X	X			
II	DISPOSAL PIT A/B	MW12-8	123185	SOIL	X	X	X	X	X	X		X	X			
II	DISPOSAL PIT A/B	SB12-3	12525	SOIL	X	X	X	X	X	X		X	X			
II	DISPOSAL PIT A/B	SB12-3	12526	SOIL	X	X	X	X	X	X		X	X			
II	DISPOSAL PIT A/B	SB12-3	12527	SOIL	X											
II	DISPOSAL PIT A/B	SB12-4	12528	SOIL	X	X	X	X	X	X		X	X			
II	DISPOSAL PIT A/B	SB12-4	12529	SOIL	X	X	X	X	X	X		X	X			
I	DISPOSAL PIT C	MW12-7	123181	SOIL	X	X	X	X	X	X		X	X			
I	DISPOSAL PIT C	MW12-7	123182	SOIL	X	X	X	X	X	X		X	X			
I	DISPOSAL PIT C	MW12-14	123100	SOIL	X	X	X	X	X	X		X	X			X
I	DISPOSAL PIT C	MW12-14	123101	SOIL	X	X	X	X	X	X		X	X			X
I	DISPOSAL PIT C	MW12-15	123029	SOIL	X	X	X	X	X	X		X	X			
I	DISPOSAL PIT C	MW12-15	123030	SOIL	X	X	X	X	X	X		X	X			
II	DISPOSAL PIT C	MW12-33	123196	SOIL	X	X	X	X	X	X		X	X			
II	DISPOSAL PIT C	MW12-33	123197	SOIL	X	X	X	X	X	X		X	X			
II	DISPOSAL PIT C	MW12-34	123199	SOIL	X	X	X	X	X	X		X	X			
II	DISPOSAL PIT C	MW12-34	123200	SOIL	X	X	X	X	X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	MW12-16	123150	SOIL	X	X	X	X	X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	MW12-16	123151	SOIL	X	X	X	X	X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	MW12-17	123153	SOIL	X	X	X	X	X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	MW12-17	123154	SOIL	X	X	X	X	X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	MW12-18	123038	SOIL	X	X	X	X	X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	MW12-18	123039	SOIL	X	X	X	X	X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	MW12-35	123187	SOIL	X	X	X	X	X	X		X	X			

Table 2-5
Soil Boring Subsurface Sampling Summary
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

RADIATION SURVEY CLASS	POTENTIAL RELEASE ARE	LOC_ID	SAMP_ID	MATRIX (a	VOCs*	SVOCs*	Pesticides/ PCBs*	Metals*	Analysis Methods for Radiological Data**							
					TCL NYSDEC CLP	TCL NYSDEC CLP	TCL NYSDEC CLP	TCL NYSDEC CLP	EPA 901.1	EPA 906.0	EPA 900.0	SM2540G	HASL 300	EPA 903.0	EPA 913	Promethium-147
II	FORMER DRY WASTE DISPOSAL PIT	MW12-35	123188	SOIL	X	X	X	X	X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	MW12-9	123156	SOIL	X	X	X	X	X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	MW12-9	123157	SOIL	X	X	X	X	X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	MW12B-1	MW12B-1-20	SOIL	X	X	X	X	X							
II	FORMER DRY WASTE DISPOSAL PIT	MW12B-1	MW12B-1-03	SOIL	X	X	X	X	X							
II	FORMER DRY WASTE DISPOSAL PIT	MW12B-1	MW12B-1-07	SOIL	X	X	X	X	X							
II	FORMER DRY WASTE DISPOSAL PIT	SB12-5A	12519	SOIL	X	X	X	X	X	X		X	X			X
II	FORMER DRY WASTE DISPOSAL PIT	SB12-5A	12520	SOIL	X	X	X	X	X	X		X	X			X
II	FORMER DRY WASTE DISPOSAL PIT	SB12-5A	12521	SOIL	X	X	X	X	X	X		X	X			X
II	FORMER DRY WASTE DISPOSAL PIT	SB12-5A	12522	SOIL	X	X	X	X	X	X		X	X			X
II	FORMER DRY WASTE DISPOSAL PIT	SB12-5A	12523	SOIL	X	X	X	X	X	X		X	X			X
II	FORMER DRY WASTE DISPOSAL PIT	SB12-5A	123097	SOIL	X	X	X	X	X	X		X	X			X
II	FORMER DRY WASTE DISPOSAL PIT	SB12-5A	123098	SOIL	X	X	X	X	X	X		X	X			X
II	FORMER DRY WASTE DISPOSAL PIT	SB12-6	12514	SOIL	X	X	X	X	X	X		X	X			X
II	FORMER DRY WASTE DISPOSAL PIT	SB12-6	12515	SOIL	X	X	X	X	X	X		X	X			X
II	FORMER DRY WASTE DISPOSAL PIT	SB12-6	12516	SOIL	X	X	X	X	X	X		X	X			X
II	FORMER DRY WASTE DISPOSAL PIT	SB12-6	12517	SOIL	X	X	X	X	X	X		X	X			X
II	FORMER DRY WASTE DISPOSAL PIT	SB12-6	12518	SOIL	X	X	X	X	X	X		X	X			X
II	FORMER DRY WASTE DISPOSAL PIT	SB12B-1	SB12B-1-1	SOIL	X	X	X	X	X							
II	EM-5	MW12-22	123069	SOIL	X	X	X	X	X	X		X	X			
II	EM-5	MW12-23	123080	SOIL	X	X	X	X	X	X		X	X			
II	EM-6	MW12-24	123162	SOIL	X	X	X	X	X	X		X	X			
II	EM-6	MW12-24	123163	SOIL	X	X	X	X	X	X		X	X			
II	EM-6	MW12-25	123165	SOIL	X	X	X	X	X	X		X	X			
II	EM-6	MW12-25	123166	SOIL	X	X	X	X	X	X		X	X			
III	EM-6	MW12-26	123168	SOIL	X	X	X	X	X	X		X	X			
III	EM-6	MW12-26	123169	SOIL	X	X	X	X	X	X		X	X			
III	CLASS III	MW12-27	123062	SOIL	X	X	X	X	X	X		X	X			
III	CLASS III	MW12-27	123063	SOIL	X	X	X	X	X	X		X	X			
III	CLASS III	MW12-31	123174	SOIL	X	X	X	X	X	X		X	X			
III	CLASS III	MW12-32	123177	SOIL	X	X	X	X	X	X		X	X			
III	CLASS III	MW12-37	123203	SOIL	X	X	X	X	X	X		X	X			
III	CLASS III	MW12-38	123204	SOIL	X	X	X	X	X	X		X	X			
III	CLASS III	MW12-38	123206	SOIL	X	X	X	X	X	X		X	X			
III	CLASS III	MW12-39	123207	SOIL	X	X	X	X	X	X		X	X			
III	CLASS III	MW12-40	123122	SOIL	X	X	X	X	X	X		X	X			X
III	CLASS III	MW12-40	123123	SOIL	X	X	X	X	X	X		X	X			X
III	CLASS III	MW12A-1	MW12A-1-03	SOIL	X	X	X	X	X							
III	CLASS III	MW12A-1	MW12A-1-05	SOIL	X	X	X	X	X							

Table 2-5
Soil Boring Subsurface Sampling Summary
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Seneca Army Depot Activity

RADIATION SURVEY CLASS	POTENTIAL RELEASE ARE	LOC_ID	SAMP_ID	MATRIX (a	VOCs*	SVOCs*	Pesticides/ PCBs*	Metals*	Analysis Methods for Radiological Data**							
					TCL NYSDEC CLP	TCL NYSDEC CLP	TCL NYSDEC CLP	TCL NYSDEC CLP	EPA 901.1	EPA 906.0	EPA 900.0	SM2540G	HASL 300	EPA 903.0	EPA 913	Promethium-147
	BACKGROUND*	MW12-1	12506	SOIL					X	X		X	X			
	BACKGROUND	MW12-1	12508	SOIL					X	X		X	X			
	BACKGROUND	MW12-2	12513	SOIL					X	X		X	X			
	BACKGROUND	MW12-3	12511	SOIL					X	X		X	X			
	BACKGROUND	MW12-3	12510	SOIL					X	X		X	X			
	BACKGROUND	MW12-4	12501	SOIL					X	X		X	X			
	BACKGROUND	MW12-4	12502	SOIL					X	X		X	X			
	BACKGROUND	MW12-5	12500	SOIL					X	X		X	X			
	BACKGROUND	MW12-5	12503	SOIL					X	X		X	X			
	BACKGROUND	MW12-6	123192	SOIL					X	X		X	X			
	BACKGROUND	MW12-6	123191	SOIL					X	X		X	X			
	BACKGROUND	SB12-7	123194	SOIL					X	X		X	X			
	BACKGROUND	SB12-8	123193	SOIL					X	X		X	X			
	BACKGROUND	SB12-9	123189	SOIL					X	X		X	X			

NOTE: Parameters included in each Analysis Method are:
(1) EPA 901.1-Ra-223,-226, Pb-211,-214, Bi-214, Ce-137, Co-60
(2) EPA 906.0-Not applicable for soil.
(3) EPA 900.0- Gross Alpha and Beta
(4) SM2540G-Not applicable for soil.
(5) HASL 300-Th-227, -230, -232, U-234, -235, -238, Pl-239/240, Am-241, and Alpha spectroscopy.
(6) EPA 903.0-Not applicable for soil.
(7) EPA 913.0-Not applicable for soil.
(8) A separate column was added for Promethium-147 as it was not analyzed for in every sample.

(a) Surface soil samples associated with soil borings are located in Table 2-7.

* Chemical background data from site-wide locations, usted for TAGM calculations; Appendix G, Table G-1
** Radiologicial Data background data included in Appendix G, Table G-19

TABLE 2-6
Test Pit Subsurface Soil Sampling Summary
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

RADIATION SURVEY CLASS	POTENTIAL RELEASE AREA	LOC_ID	SAMP_ID	MATRIX	VOCs	SVOCs	Pesticides/ PCBs	Metals	Analysis Methods for Radiological Data							
					TCL NYSDEC CLP	TCL NYSDEC CLP	TCL NYSDEC CLP	TCL NYSDEC CLP	EPA 901.1	EPA 906.0	EPA 900.0	SM2540G	HASL 300	EPA 903.0	EPA 913	Promethium-147
II	BLDG 819/EM-27	TP12-17A	123036	SOIL	X	X	X	X	X	X		X	X			
II	BLDG 819/EM-27	TP12-17B	123034	SOIL	X	X	X	X	X	X		X	X			
II	BLDG 819/EM-27	TP12-17C	123035	SOIL	X	X	X	X	X	X		X	X			
II	BLDG 815/816/EM-28	TP12-18A	123022	SOIL	X	X	X	X	X	X		X	X			
II	BLDG 815/816/EM-28	TP12-18B	123023	SOIL	X	X	X	X	X	X		X	X			
II	BLDG 815/816/EM-28	TP12-18C	123024	SOIL	X	X	X	X	X	X		X	X			
II	BLDG 815/816/EM-28	TP12-19A	123025	SOIL	X	X	X	X	X	X		X	X			
II	BLDG 815/816/EM-28	TP12-19B	123026	SOIL	X	X	X	X	X	X		X	X			
II	BLDG 815/816/EM-28	TP12-19C	123027	SOIL	X	X	X	X	X	X		X	X			
I	DISPOSAL PIT A/B	TP12A-1	TP12A-1-1	SOIL	X	X	X	X	X							
I	DISPOSAL PIT A/B	TP12A-1	TP12A-1-2	SOIL	X	X	X	X	X							
I	DISPOSAL PIT A/B	TP12A-2	TP12A-2-2	SOIL	X	X	X	X	X							
I	DISPOSAL PIT A/B	TP12A-2	TP12A-2-1	SOIL	X	X	X	X	X							
I	DISPOSAL PIT A/B	TP12-1A	123142	SOIL	X	X	X	X	X	X		X	X			
I	DISPOSAL PIT A/B	TP12-1B	123143	SOIL	X	X	X	X	X	X		X	X			
I	DISPOSAL PIT A/B	TP12-1C	123144	SOIL	X	X	X	X	X	X		X	X			
I	DISPOSAL PIT A/B	TP12-2A	123145	SOIL	X	X	X	X	X	X		X	X			
I	DISPOSAL PIT A/B	TP12-2B	123146	SOIL	X	X	X	X	X	X		X	X			
I	DISPOSAL PIT A/B	TP12-2C	123147	SOIL	X	X	X	X	X	X		X	X			
I	DISPOSAL PIT C	TP12A-3	TP12A-3-1	SOIL	X	X	X	X	X							
I	DISPOSAL PIT C	TP12A-3	TP12A-3-2	SOIL	X	X	X	X	X							
I	DISPOSAL PIT C	TP12A-4	TP12A-4-1	SOIL	X	X	X	X	X							
I	DISPOSAL PIT C	TP12A-4	TP12A-4-2	SOIL	X	X	X	X	X							
I	DISPOSAL PIT C	TP12A-5	TP12A-5-1	SOIL	X	X	X	X	X							
I	DISPOSAL PIT C	TP12A-6	TP12A-6-1	SOIL	X	X	X	X	X							
I	DISPOSAL PIT C	TP12A-6	TP12A-6-2	SOIL	X	X	X	X	X							
I	DISPOSAL PIT C	TP12A-7	TP12A-7-1	SOIL	X	X	X	X	X							
I	DISPOSAL PIT C	TP12A-8	TP12A-8-1	SOIL	X	X	X	X	X							
II	DISPOSAL PIT C	TP12-3A	123082	SOIL	X	X	X	X	X	X		X	X			
II	DISPOSAL PIT C	TP12-3A	123085	SOIL	X	X	X	X	X	X		X	X			
II	DISPOSAL PIT C	TP12-3B	123083	SOIL	X	X	X	X	X	X		X	X			
II	DISPOSAL PIT C	TP12-3C	123084	SOIL	X	X	X	X	X	X		X	X			
II	DISPOSAL PIT C	TP12-4A	123086	SOIL	X	X	X	X	X	X		X	X			
II	DISPOSAL PIT C	TP12-4B	123087	SOIL	X	X	X	X	X	X		X	X			
II	DISPOSAL PIT C	TP12-4C	123088	SOIL	X	X	X	X	X	X		X	X			
II	DISPOSAL PIT C	TP12-5A	123089	SOIL	X	X	X	X	X	X		X	X			
II	DISPOSAL PIT C	TP12-5A	123092	SOIL	X	X	X	X	X	X		X	X			
II	DISPOSAL PIT C	TP12-5B	123090	SOIL	X	X	X	X	X	X		X	X			
II	DISPOSAL PIT C	TP12-5C	123091	SOIL	X	X	X	X	X	X		X	X			
II	DISPOSAL PIT C	TP12-6A	123158	SOIL	X	X	X	X	X	X		X	X			

TABLE 2-6
Test Pit Subsurface Soil Sampling Summary
SEAD-12 Remedial Investigation Report
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RADIATION SURVEY CLASS	POTENTIAL RELEASE AREA	LOC_ID	SAMP_ID	MATRIX	VOCs	SVOCs	Pesticides/ PCBs	Metals	Analysis Methods for Radiological Data							
					TCL NYSDEC CLP	TCL NYSDEC CLP	TCL NYSDEC CLP	TCL NYSDEC CLP	EPA 901.1	EPA 906.0	EPA 900.0	SM2540G	HASL 300	EPA 903.0	EPA 913	Promethium-147
II	DISPOSAL PIT C	TP12-6B	123159	SOIL	X	X	X	X	X	X		X	X			
II	DISPOSAL PIT C	TP12-6C	123160	SOIL	X	X	X	X	X	X		X	X			
II	DISPOSAL PIT C	TP12-7AA	123128	SOIL	X	X	X	X	X	X		X	X			
II	DISPOSAL PIT C	TP12-7BA	123127	SOIL	X	X	X	X	X	X		X	X			
II	DISPOSAL PIT C	TP12-7BB	123129	SOIL	X	X	X	X	X	X		X	X			
II	DISPOSAL PIT C	TP12-8A	123130	SOIL	X	X	X	X	X	X		X	X			
II	DISPOSAL PIT C	TP12-8B	123132	SOIL	X	X	X	X	X	X		X	X			
II	DISPOSAL PIT C	TP12-8C	123131	SOIL	X	X	X	X	X	X		X	X			
II	DISPOSAL PIT C	TP12-23A	123139	SOIL	X	X	X	X	X	X		X	X			
II	DISPOSAL PIT C	TP12-23B	123140	SOIL	X	X	X	X	X	X		X	X			
II	DISPOSAL PIT C	TP12-23C	123141	SOIL	X	X	X	X	X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	TP12B-1	TP12B-1-1	SOIL	X	X	X	X	X							
II	FORMER DRY WASTE DISPOSAL PIT	TP12B-2	TP12B-2-1	SOIL	X	X	X	X	X							
II	FORMER DRY WASTE DISPOSAL PIT	TP12B-3	TP12B-53-1	SOIL	X	X	X	X	X							
II	FORMER DRY WASTE DISPOSAL PIT	TP12B-3	TP12B-3-1	SOIL	X	X	X	X	X							
II	FORMER DRY WASTE DISPOSAL PIT	TP12-25A	123071	SOIL	X	X	X	X	X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	TP12-25A	123077	SOIL	X	X	X	X	X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	TP12-25B	123072	SOIL	X	X	X	X	X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	TP12-25C	123073	SOIL	X	X	X	X	X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	TP12-26A	123074	SOIL	X	X	X	X	X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	TP12-26B	123075	SOIL	X	X	X	X	X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	TP12-26C	123076	SOIL	X	X	X	X	X	X		X	X			
II	EM-5	TP12-15A	123031	SOIL	X	X	X	X	X	X		X	X			
II	EM-5	TP12-15B	123032	SOIL	X	X	X	X	X	X		X	X			
II	EM-5	TP12-15C	123033	SOIL	X	X	X	X	X	X		X	X			
II	EM-5	TP12-16A	123044	SOIL	X	X	X	X	X	X		X	X			
II	EM-5	TP12-16B	123045	SOIL	X	X	X	X	X	X		X	X			
II	EM-5	TP12-16C	123078	SOIL	X	X	X	X	X	X		X	X			
II	EM-6	TP12-11A	123109	SOIL	X	X	X	X	X	X		X	X			X
II	EM-6	TP12-11B	123110	SOIL	X	X	X	X	X	X		X	X			X
II	EM-6	TP12-11C	123111	SOIL	X	X	X	X	X	X		X	X			X
II	EM-6	TP12-12A	123118	SOIL	X	X	X	X	X	X		X	X			X
II	EM-6	TP12-12B	123119	SOIL	X	X	X	X	X	X		X	X			X
II	EM-6	TP12-12C	123120	SOIL	X	X	X	X	X	X		X	X			X
III	CLASS III	TP12-10A	123055	SOIL	X	X	X	X	X	X		X	X			
III	CLASS III	TP12-10A	123067	SOIL	X	X	X	X	X	X		X	X			
III	CLASS III	TP12-10B	123056	SOIL	X	X	X	X	X	X		X	X			
III	CLASS III	TP12-10C	123057	SOIL	X	X	X	X	X	X		X	X			
III	CLASS III	TP12-13A	123052	SOIL	X	X	X	X	X	X		X	X			
III	CLASS III	TP12-13B	123053	SOIL	X	X	X	X	X	X		X	X			

TABLE 2-6
Test Pit Subsurface Soil Sampling Summary
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RADIATION SURVEY CLASS	POTENTIAL RELEASE AREA	LOC_ID	SAMP_ID	MATRIX	VOCs	SVOCs	Pesticides/ PCBs	Metals	Analysis Methods for Radiological Data							
					TCL NYSDEC CLP	TCL NYSDEC CLP	TCL NYSDEC CLP	TCL NYSDEC CLP	EPA 901.1	EPA 906.0	EPA 900.0	SM2540G	HASL 300	EPA 903.0	EPA 913	Promethium-147
III	CLASS III	TP12-13C	123054	SOIL	X	X	X	X	X	X		X	X			
III	CLASS III	TP12-14A	123004	SOIL	X	X	X	X	X	X		X	X			
III	CLASS III	TP12-14B	123005	SOIL	X	X	X	X	X	X		X	X			
III	CLASS III	TP12-14C	123006	SOIL	X	X	X	X	X	X		X	X			
III	CLASS III	TP12-20A	123000	SOIL	X	X	X	X	X	X		X	X			
III	CLASS III	TP12-20A	123019	SOIL	X	X	X	X	X	X		X	X			
III	CLASS III	TP12-20B	123020	SOIL	X	X	X	X	X	X		X	X			
III	CLASS III	TP12-20C	123021	SOIL	X	X	X	X	X	X		X	X			
III	CLASS III	TP12-21A	123001	SOIL	X	X	X	X	X	X		X	X			
III	CLASS III	TP12-21B	123002	SOIL	X	X	X	X	X	X		X	X			
III	CLASS III	TP12-21C	123003	SOIL	X	X	X	X	X	X		X	X			
III	CLASS III	TP12-22AA	123058	SOIL	X	X	X	X	X	X		X	X			
III	CLASS III	TP12-22BA	123059	SOIL	X	X	X	X	X	X		X	X			
III	CLASS III	TP12-22BB	123060	SOIL	X	X	X	X	X	X		X	X			
III	CLASS III	TP12-24A	123093	SOIL	X	X	X	X	X	X		X	X			
III	CLASS III	TP12-24B	123094	SOIL	X	X	X	X	X	X		X	X			
III	CLASS III	TP12-24C	123095	SOIL	X	X	X	X	X	X		X	X			
III	CLASS III	TP12-9A	123124	SOIL	X	X	X	X	X	X		X	X			X
III	CLASS III	TP12-9B	123125	SOIL	X	X	X	X	X	X		X	X			
III	CLASS III	TP12-9C	123126	SOIL	X	X	X	X	X	X		X	X			

NOTE: Parameters included in each Analysis Method are:
(1) EPA 901.1-Ra-223,-226, Pb-211,-214, Bi-214, Ce-137, Co-60
(2) EPA 906.0-Not applicable for soil.
(3) EPA 900.0- Gross Alpha and Beta
(4) SM2540G-Not applicable for soil.
(5) HASL 300-Th-227, -230, -232, U-234, -235, -238, Pl-239/240, Am-241, and Alpha spectroscopy.
(6) EPA 903.0-Not applicable for soil.
(7) EPA 913.0-Not applicable for soil.
(8) A separate column was added for Promethium-147 as it was not analyzed for in every sample.

Sampling Procedure

The protocol for soil sampling, as defined in the Project Scoping Plan, provides for the selection of three chemical analysis soil samples from each soil boring. The sample intervals included:

- 0 to 2 inches below grade (surface samples included in Section 2.7.2);
- immediately above the water table; and
- midway between samples (1) and (2).

The intermediate sample was collected at a depth where one of the following site specific items occurred:

- A stratigraphic change occurred such as the base of the fill,
- evidence of perched water table,
- elevated photoionization detector (PID) readings, or
- elevated gamma radiation readings (Micro-R), or
- visibly affected soil (e.g., petroleum 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 or elevated Micro-R readings, the sample with the highest PID concentration or Micro-R activity was the intermediate sample selected for chemical analysis. Additional samples were collected where the criteria for the intermediate sample applied to more than one interval. The number of samples collected from a specific boring was reduced where refusal was encountered above the water table.

During the RI and ESI field work, a total of 150 subsurface soil samples (including QC duplicates and background) were collected from 52 soil borings (including borings completed as monitoring wells) in SEAD-12. Surface soils collected during the soil boring program are included with the surface soil samples discussed below.

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 rig, augers, split spoons, and sampling rod were steam cleaned between borings at the decontamination pad established in the north-west corner of SEAD-12 adjacent to Building 800. Immediately after filling, all drums containing Investigation Derived Waste (IDW) were relocated to a temporary drum staging area in preparation for final disposition.

2.7.1.2 Test Pits

The test pits were excavated to conduct a visual evaluation of the subsurface soil and fill materials, stratigraphic descriptions of near-surface and subsurface soils, and to collect surface and subsurface soil samples for chemical and radiochemical testing. Subsurface soil samples were collected from excavated at SEAD-12 during the SEAD-12 ESI and RI/FS Program. **Table 2-6** lists the subsurface soil samples collected from test pits and the applicable methods used for analysis. No surface soils were collected during test pit excavations. Test pit locations shown in **Figure 2-9** include:

- Test pits excavated in Disposal Pits A and C (TP12-1 through TP12-4);
- Test pits in an area of weak GPR signal returns identified during the ESI (TP12-5 through TP12-8); and
- Test pits were located based upon geophysical anomalies identified during the SEAD-12 RI geophysical investigations (test pits TP12-9 through TP12-26)

All test pits excavated during the SEAD-12 RI/FS program were excavated to the bottom of the fill layer, to the top of bedrock, or to a maximum depth of approximately eight feet due to equipment limitations. The bedrock surface (if encountered), bottom of fill layer, and the top of the water table (if encountered) were documented at each test pit location.

Samples were collected at depths where there was evidence of impacts based upon field screening and visual observations, or if there was no evidence of impact one sample was collected from the deepest part of the pit, the second was collected from mid-depth, and the third was collected from within one foot of the ground surface. Additional samples were collected for archive purposes should additional analyses be required to further characterize radiological impacts at SEAD-12. Archive samples were collected from areas in the test pit excavation where the scanning measurements of excavated materials are more than 50% above readings without a sample present. Additionally, the material immediately above and below any such areas was also sampled and archived.

The material removed from each test pit for characterization purposes was returned to the excavated area at the completion of each test pit investigation. This procedure was discussed with and agreed to by the New York State Department of Environmental Conservation, Bureau of Radiation, Division of Hazardous Substances (see Appendix J of the Generic Work Plan, Letter of Confirmation of Telephone Conversation Between Parsons ES and NYSDEC, on July 17, 1995). This procedure assured that any residual radiation found at a test pit site did not have the potential to migrate via over-land transport (i.e. by precipitation run-off or by wind transport), and minimized any potential radiation dose or contamination to on-site workers or visitors during the RI/FS process.

Test pitting procedures are provided in Section 3.4.3 of Appendix A, Field Sampling and Analysis Plan in the Generic Workplan. Level C personal protection equipment (PPE) was worn by all personnel performing test pit operations. The excavated soils were monitored for VOCs, using a PID, and for radiation using a Ludlum Model 19 Micro-R meter and a Bicron Fidler during test pitting. Dust monitoring for radionuclides was performed using a personal air pump equipped with a 0.45 micron filter canister. At each test pit location the personal air pump was situated downwind from the active pit and a minimum of three feet off the ground. The personal air pump was run continuously during test pit excavation. The filter canister with collected dust inside was then scanned with a Ludlum Model 19 Micro-R Meter and a Ludlum Model 3 with a Pancake G-M Probe. A new filter canister was used for each test pit.

2.7.2 Surface Soil Sampling

Surface soil samples were collected during the course of the RI/FS Program to investigate the nature and extent of surface soil impacts within and in the vicinity of SEAD-12. Analytical methods and sample densities were adjusted according to the radiological classification of the area. Project Scoping Plan sampling locations were adjusted in the field based on results from geophysical investigations, radiation scanning investigations, and field observations. Surface soil sample locations and analytical methods are summarized in **Table 2-7**, based on potential release area, location identifier (LOC_ID). SEAD-12 surface soil sampling locations (including surface samples from soil borings and monitoring wells) are shown on **Figure 2-10** through **Figure 2-18.**

As listed in **Table 2-7**, 401 surface soil samples were collected for chemical and radiological analyses in association with the SEAD-12 RI investigation. This total includes QC duplicates and surface samples collected from soil borings (including borings completed for the installation of monitoring wells. No surface soil samples were collected during the ESI investigation.

Surface soil sampling procedures are described in detail in Appendix A, Section 3.4.4 of the Generic Workplan. The SEAD-12 RI/FS Program surface soil sampling followed these steps.

1. Collect an exposure rate measurement using either a Ludlum Model 19 Micro-R or a Bicron Micro-Rem Survey Meter.
2. Drive a decontaminated carbon steel split spoon to a minimum depth of 0.5 feet, collecting the volatile organic compound sample from the split spoon. (At locations where sample volume for volatile organic compound analyses was not collected a split spoon was not driven.)

TABLE 2-7
Surface Soil Sampling Summary
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RADIATION SURVEY CLASS	POTENTIAL RELEASE AREA	LOC_ID	SAMP_ID	MATRIX	VOCs*	SVOCs*	Pesticides/ PCBs*	Metals*	Analysis Methods for Radiological Data**							
					TCL NYSDEC CLP	TCL NYSDEC CLP	TCL NYSDEC CLP	TCL NYSDEC CLP	EPA 901.1	EPA 906.0	EPA 900.0	SM2540G	HASL 300	EPA 903.0	EPA 913	Promethium-147
I	BLDG 819/EM-27	MW12-19	123040	SS	X	X	X	X	X	X		X	X			
I	BLDG 819/EM-27	MW12-20	123046	SS	X	X	X	X	X	X		X	X			
I	BLDG 819/EM-27	MW12-21	123049	SS	X	X	X	X	X	X		X	X			
I	BLDG 819/EM-27	SS12-69	123261	SS					X	X		X	X			
I	BLDG 819/EM-27	SS12-70	123262	SS					X	X		X	X			
I	BLDG 819/EM-27	SS12-71	123263	SS					X	X		X	X			
I	BLDG 819/EM-27	SS12-72	123264	SS					X	X		X	X			
I	BLDG 819/EM-27	SS12-73	123265	SS					X	X		X	X			
I	BLDG 819/EM-27	SS12-74	123266	SS					X	X		X	X			
I	BLDG 819/EM-27	SS12-75	123267	SS					X	X		X	X			
I	BLDG 819/EM-27	SS12-76	123268	SS					X	X		X	X			
I	BLDG 819/EM-27	SS12-77	123269	SS					X	X		X	X			
I	BLDG 819/EM-27	SS12-78	123270	SS					X	X		X	X			
I	BLDG 819/EM-27	SS12-79	123271	SS					X	X		X	X			
I	BLDG 819/EM-27	SS12-80	123272	SS					X	X		X	X			
I	BLDG 819/EM-27	SS12-81	123273	SS					X	X		X	X			
I	BLDG 819/EM-27	SS12-82	123274	SS					X	X		X	X			
I	BLDG 819/EM-27	SS12-83	123275	SS					X	X		X	X			
I	BLDG 819/EM-27	SS12-84	123276	SS					X	X		X	X			
I	BLDG 819/EM-27	SS12-85	123277	SS					X	X		X	X			
I	BLDG 819/EM-27	SS12-86	123278	SS					X	X		X	X			
I	BLDG 819/EM-27	SS12-87	123279	SS					X	X		X	X			
I	BLDG 819/EM-27	SS12-87	123282	SS					X	X		X	X			
I	BLDG 819/EM-27	SS12-88	123280	SS	X	X	X	X	X	X		X	X			
I	BLDG 819/EM-27	SS12-89	123281	SS	X	X	X	X	X	X		X	X			
II	BLDG 819/EM-27	SS12-122	123315	SS					X	X		X	X			
II	BLDG 819/EM-27	SS12-123	123316	SS					X	X		X	X			
II	BLDG 819/EM-27	SS12-123	123320	SS					X	X		X	X			
II	BLDG 819/EM-27	SS12-124	123317	SS					X	X		X	X			
II	BLDG 819/EM-27	SS12-125	123318	SS					X	X		X	X			
II	BLDG 819/EM-27	SS12-126	123319	SS					X	X		X	X			
II	BLDG 815/816/EM-28	MW12-29	123133	SS	X	X	X	X	X	X		X	X			
II	BLDG 815/816/EM-28	MW12-30	123136	SS	X	X	X	X	X	X		X	X			
II	BLDG 815/816/EM-28	MW12-30	123148	SS	X	X	X	X	X	X		X	X			
II	BLDG 815/816/EM-28	SS12-240	123436	SS					X	X		X	X			
II	BLDG 815/816/EM-28	SS12-241	123437	SS					X	X		X	X			
II	BLDG 815/816/EM-28	SS12-241	123438	SS					X	X		X	X			
II	BLDG 815/816/EM-28	SS12-242	123439	SS					X	X		X	X			
II	BLDG 815/816/EM-28	SS12-243	123440	SS					X	X		X	X			
II	BLDG 815/816/EM-28	SS12-244	123441	SS					X	X		X	X			
II	BLDG 815/816/EM-28	SS12-245	123442	SS					X	X		X	X			
II	BLDG 815/816/EM-28	SS12-246	123443	SS					X	X		X	X			

TABLE 2-7
Surface Soil Sampling Summary
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RADIATION SURVEY CLASS	POTENTIAL RELEASE AREA	LOC_ID	SAMP_ID	MATRIX	VOCs*	SVOCs*	Pesticides/ PCBs*	Metals*	Analysis Methods for Radiological Data**							
					TCL NYSDEC CLP	TCL NYSDEC CLP	TCL NYSDEC CLP	TCL NYSDEC CLP	EPA 901.1	EPA 906.0	EPA 900.0	SM2540G	HASL 300	EPA 903.0	EPA 913	Promethium-147
II	BLDG 815/816/EM-28	SS12-247	123444	SS					X	X		X	X			
II	BLDG 815/816/EM-28	SS12-248	123445	SS					X	X		X	X			
II	BLDG 815/816/EM-28	SS12-249	123446	SS					X	X		X	X			
II	BLDG 815/816/EM-28	SS12-250	123447	SS					X	X		X	X			
II	BLDG 815/816/EM-28	SS12-251	123448	SS					X	X		X	X			
II	BLDG 815/816/EM-28	SS12-252	123449	SS					X	X		X	X			
II	BLDG 815/816/EM-28	SS12-253	123450	SS					X	X		X	X			
II	BLDG 815/816/EM-28	SS12-254	123451	SS					X	X		X	X			
II	BLDG 815/816/EM-28	SS12-255	123452	SS					X	X		X	X			
II	BLDG 815/816/EM-28	SS12-256	123453	SS					X	X		X	X			
II	BLDG 815/816/EM-28	SS12-257	123454	SS					X	X		X	X			
II	BLDG 815/816/EM-28	SS12-258	123455	SS					X	X		X	X			
II	BLDG 815/816/EM-28	SS12-259	123456	SS					X	X		X	X			
II	BLDG 815/816/EM-28	SS12-260	123457	SS					X	X		X	X			
II	BLDG 815/816/EM-28	SS12-260	123458	SS					X	X		X	X			
II	BLDG 815/816/EM-28	SS12-261	123459	SS					X	X		X	X			
II	BLDG 815/816/EM-28	SS12-262	123460	SS					X	X		X	X			
II	BLDG 815/816/EM-28	SS12-263	123461	SS					X	X		X	X			
II	BLDG 815/816/EM-28	SS12-264	123462	SS					X	X		X	X			
II	BLDG 815/816/EM-28	SS12-265	123463	SS					X	X		X	X			
II	BLDG 815/816/EM-28	SS12-266	123464	SS					X	X		X	X			
II	BLDG 815/816/EM-28	SS12-267	123465	SS					X	X		X	X			
II	BLDG 815/816/EM-28	SS12-268	123466	SS					X	X		X	X			
II	BLDG 815/816/EM-28	SS12-269	123467	SS					X	X		X	X			
II	BLDG 815/816/EM-28	SS12-270	123468	SS					X	X		X	X			
II	BLDG 815/816/EM-28	SS12-271	123469	SS					X	X		X	X			
II	BLDG 815/816/EM-28	SS12-272	123470	SS					X	X		X	X			
II	BLDG 815/816/EM-28	SS12-273	123471	SS					X	X		X	X			
II	BLDG 815/816/EM-28	SS12-274	123472	SS					X	X		X	X			
II	BLDG 815/816/EM-28	SS12-274	123473	SS					X	X		X	X			
II	BLDG 815/816/EM-28	SS12-275	123474	SS					X	X		X	X			
II	BLDG 815/816/EM-28	SS12-276	123475	SS					X	X		X	X			
II	BLDG 815/816/EM-28	SS12-277	123476	SS					X	X		X	X			
II	BLDG 815/816/EM-28	SS12-278	123477	SS					X	X		X	X			
II	BLDG 815/816/EM-28	SS12-279	123478	SS					X	X		X	X			
III	BLDG 815/816/EM-28	SS12-234	123404	SS					X	X		X	X			
III	BLDG 815/816/EM-28	SS12-235	123432	SS					X	X		X	X			
I	DISPOSAL PIT A/B	MW12-10	123007	SS	X	X	X	X	X	X		X	X			
I	DISPOSAL PIT A/B	MW12-11	123010	SS	X	X	X	X	X	X		X	X			
I	DISPOSAL PIT A/B	MW12-12	123013	SS	X	X	X	X	X	X		X	X			
I	DISPOSAL PIT A/B	MW12-13	123016	SS	X	X	X	X	X	X		X	X			
I	DISPOSAL PIT A/B	SB12-1	12209	SS	X	X	X	X	X	X		X	X			

TABLE 2-7
Surface Soil Sampling Summary
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Seneca Army Depot Activity

RADIATION SURVEY CLASS	POTENTIAL RELEASE AREA	LOC_ID	SAMP_ID	MATRIX	VOCs*	SVOCs*	Pesticides/ PCBs*	Metals*	Analysis Methods for Radiological Data**							
					TCL NYSDEC CLP	TCL NYSDEC CLP	TCL NYSDEC CLP	TCL NYSDEC CLP	EPA 901.1	EPA 906.0	EPA 900.0	SM2540G	HASL 300	EPA 903.0	EPA 913	Promethium-147
I	DISPOSAL PIT A/B	SB12-1	12534	SS	X	X	X	X	X	X		X	X			
I	DISPOSAL PIT A/B	SB12-2	123112	SS	X	X	X	X	X	X		X	X			X
I	DISPOSAL PIT A/B	SB12-2B	123064	SS	X	X	X	X	X							
I	DISPOSAL PIT A/B	SS12-15	123211	SS	X	X	X	X	X	X	X	X	X			
I	DISPOSAL PIT A/B	SS12-16	123102	SS	X	X	X	X	X	X		X	X			
I	DISPOSAL PIT A/B	SS12-169	123364	SS					X	X		X	X			
I	DISPOSAL PIT A/B	SS12-169	123396	SS					X	X		X	X			
I	DISPOSAL PIT A/B	SS12-17	123212	SS	X	X	X	X	X	X	X	X	X			
I	DISPOSAL PIT A/B	SS12-170	123365	SS					X	X		X	X			
I	DISPOSAL PIT A/B	SS12-170	123622	SS									X			
I	DISPOSAL PIT A/B	SS12-172	123366	SS					X	X		X	X			
I	DISPOSAL PIT A/B	SS12-172	123626	SS									X			
I	DISPOSAL PIT A/B	SS12-173	123367	SS					X	X		X	X			
I	DISPOSAL PIT A/B	SS12-174	123368	SS					X	X		X	X			
I	DISPOSAL PIT A/B	SS12-175	123369	SS					X	X		X	X			
I	DISPOSAL PIT A/B	SS12-175	123628	SS									X			
I	DISPOSAL PIT A/B	SS12-175	123630	SS									X			
I	DISPOSAL PIT A/B	SS12-176	123370	SS					X	X		X	X			
I	DISPOSAL PIT A/B	SS12-176	123624	SS									X			
I	DISPOSAL PIT A/B	SS12-177	123371	SS					X	X		X	X			
I	DISPOSAL PIT A/B	SS12-178	123372	SS					X	X		X	X			
I	DISPOSAL PIT A/B	SS12-179	123373	SS					X	X		X	X			
I	DISPOSAL PIT A/B	SS12-179	123620	SS									X			
I	DISPOSAL PIT A/B	SS12-180	123374	SS					X	X		X	X			
I	DISPOSAL PIT A/B	SS12-181	123375	SS					X	X		X	X			
I	DISPOSAL PIT A/B	SS12-182	123376	SS					X	X		X	X			
I	DISPOSAL PIT A/B	SS12-183	123377	SS	X	X	X	X	X	X		X	X			
I	DISPOSAL PIT A/B	SS12-183	123618	SS									X			
I	DISPOSAL PIT A/B	SS12-184	123378	SS					X	X		X	X			
I	DISPOSAL PIT A/B	SS12-185	123379	SS					X	X		X	X			
I	DISPOSAL PIT A/B	SS12-186	123380	SS					X	X		X	X			
I	DISPOSAL PIT A/B	SS12-187	123381	SS					X	X		X	X			
I	DISPOSAL PIT A/B	SS12-187	123614	SS									X			
I	DISPOSAL PIT A/B	SS12-188	123382	SS					X	X		X	X			
I	DISPOSAL PIT A/B	SS12-188	123616	SS									X			
I	DISPOSAL PIT A/B	SS12-189	123383	SS					X	X		X	X			
I	DISPOSAL PIT A/B	SS12-190	123384	SS					X	X		X	X			
I	DISPOSAL PIT A/B	SS12-191	123385	SS					X	X		X	X			
I	DISPOSAL PIT A/B	SS12-192	123386	SS					X	X		X	X			
I	DISPOSAL PIT A/B	SS12-193	123387	SS					X	X		X	X			
I	DISPOSAL PIT A/B	SS12-194	123388	SS					X	X		X	X			
I	DISPOSAL PIT A/B	SS12-195	123389	SS					X	X		X	X			

TABLE 2-7
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RADIATION SURVEY CLASS	POTENTIAL RELEASE AREA	LOC_ID	SAMP_ID	MATRIX	VOCs*	SVOCs*	Pesticides/ PCBs*	Metals*	Analysis Methods for Radiological Data**							
					TCL NYSDEC CLP	TCL NYSDEC CLP	TCL NYSDEC CLP	TCL NYSDEC CLP	EPA 901.1	EPA 906.0	EPA 900.0	SM2540G	HASL 300	EPA 903.0	EPA 913	Promethium-147
I	DISPOSAL PIT A/B	SS12-196	123390	SS					X	X		X	X			
I	DISPOSAL PIT A/B	SS12-197	123391	SS					X	X		X	X			
I	DISPOSAL PIT A/B	SS12-197	123612	SS									X			
I	DISPOSAL PIT A/B	SS12-198	123392	SS					X	X		X	X			
I	DISPOSAL PIT A/B	SS12-199	123393	SS					X	X		X	X			
I	DISPOSAL PIT A/B	SS12-199	123610	SS									X			
II	DISPOSAL PIT A/B	MW12-8	123183	SS	X	X	X	X	X	X		X	X			
II	DISPOSAL PIT A/B	SB12-3	12524	SS	X	X	X	X	X	X		X	X			
II	DISPOSAL PIT A/B	SB12-4	12530	SS	X	X	X	X	X	X		X	X			
II	DISPOSAL PIT A/B	SS12-167	123431	SS					X	X		X	X			
II	DISPOSAL PIT A/B	SS12-167	123632	SS									X			
II	DISPOSAL PIT A/B	SS12-168	123363	SS					X	X		X	X			
I	DISPOSAL PIT C	MW12-14	123099	SS	X	X	X	X	X	X		X	X			X
I	DISPOSAL PIT C	MW12-15	123028	SS	X	X	X	X	X	X		X	X			
I	DISPOSAL PIT C	MW12-7	123180	SS	X	X	X	X	X	X		X	X			
I	DISPOSAL PIT C	SS12-18	123103	SS	X	X	X	X	X	X	X	X	X			
I	DISPOSAL PIT C	SS12-200	123394	SS					X	X		X	X			
I	DISPOSAL PIT C	SS12-201	123395	SS					X	X		X	X			
I	DISPOSAL PIT C	SS12-201	123430	SS					X	X		X	X			
I	DISPOSAL PIT C	SS12-201	123642	SS									X			
I	DISPOSAL PIT C	SS12-202	123397	SS					X	X		X	X			
I	DISPOSAL PIT C	SS12-203	123398	SS					X	X		X	X			
I	DISPOSAL PIT C	SS12-204	123399	SS					X	X		X	X			
I	DISPOSAL PIT C	SS12-205	123400	SS					X	X		X	X			
I	DISPOSAL PIT C	SS12-206	123401	SS					X	X		X	X			
I	DISPOSAL PIT C	SS12-207	123402	SS					X	X		X	X			
I	DISPOSAL PIT C	SS12-207	123638	SS									X			
I	DISPOSAL PIT C	SS12-208	123403	SS					X	X		X	X			
I	DISPOSAL PIT C	SS12-210	123405	SS					X	X		X	X			
I	DISPOSAL PIT C	SS12-210	123640	SS									X			
I	DISPOSAL PIT C	SS12-211	123406	SS					X	X		X	X			
I	DISPOSAL PIT C	SS12-212	123407	SS					X	X		X	X			
I	DISPOSAL PIT C	SS12-213	123408	SS					X	X		X	X			
I	DISPOSAL PIT C	SS12-214	123409	SS					X	X		X	X			
I	DISPOSAL PIT C	SS12-215	123410	SS					X	X		X	X			
I	DISPOSAL PIT C	SS12-216	123411	SS					X	X		X	X			
I	DISPOSAL PIT C	SS12-217	123412	SS					X	X		X	X			
I	DISPOSAL PIT C	SS12-218	123413	SS					X	X		X	X			
I	DISPOSAL PIT C	SS12-218	123636	SS									X			
I	DISPOSAL PIT C	SS12-219	123414	SS					X	X		X	X			
I	DISPOSAL PIT C	SS12-220	123415	SS					X	X		X	X			
I	DISPOSAL PIT C	SS12-222	123417B	SS					X	X		X	X			

TABLE 2-7
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					TCL NYSDEC CLP	TCL NYSDEC CLP	TCL NYSDEC CLP	TCL NYSDEC CLP	EPA 901.1	EPA 906.0	EPA 900.0	SM2540G	HASL 300	EPA 903.0	EPA 913	Promethium-147
I	DISPOSAL PIT C	SS12-223	123418	SS					X	X		X	X			
I	DISPOSAL PIT C	SS12-224	123419	SS					X	X		X	X			
I	DISPOSAL PIT C	SS12-225	123420	SS					X	X		X	X			
I	DISPOSAL PIT C	SS12-226	123421	SS					X	X		X	X			
I	DISPOSAL PIT C	SS12-227	123422	SS					X	X		X	X			
I	DISPOSAL PIT C	SS12-228	123423	SS					X	X		X	X			
I	DISPOSAL PIT C	SS12-228	123634	SS									X			
I	DISPOSAL PIT C	SS12-229	123424	SS					X	X		X	X			
I	DISPOSAL PIT C	SS12-230	123425	SS					X	X		X	X			
II	DISPOSAL PIT C	MW12-33	123195	SS	X	X	X	X	X	X		X	X			
II	DISPOSAL PIT C	MW12-34	123198	SS	X	X	X	X	X	X		X	X			
II	DISPOSAL PIT C	SS12-147	123342	SS					X	X		X	X			
II	DISPOSAL PIT C	SS12-148	123343	SS					X	X		X	X			
II	DISPOSAL PIT C	SS12-148	123652	SS									X			
II	DISPOSAL PIT C	SS12-149	123344	SS					X	X		X	X			
II	DISPOSAL PIT C	SS12-150	123345	SS	X	X	X	X	X	X		X	X			
II	DISPOSAL PIT C	SS12-151	123346	SS					X	X		X	X			
II	DISPOSAL PIT C	SS12-152	123347	SS					X	X		X	X			
II	DISPOSAL PIT C	SS12-153	123348	SS					X	X		X	X			
II	DISPOSAL PIT C	SS12-154	123349	SS					X	X		X	X			
II	DISPOSAL PIT C	SS12-155	123350	SS	X	X	X	X	X	X		X	X			
II	DISPOSAL PIT C	SS12-155	123479	SS	X	X	X	X	X	X		X	X			
II	DISPOSAL PIT C	SS12-155	123646	SS									X			
II	DISPOSAL PIT C	SS12-156	123351	SS					X	X		X	X			
II	DISPOSAL PIT C	SS12-157	123352	SS					X	X		X	X			
II	DISPOSAL PIT C	SS12-158	123353	SS					X	X		X	X			
II	DISPOSAL PIT C	SS12-158	123644	SS									X			
II	DISPOSAL PIT C	SS12-159	123354	SS					X	X		X	X			
II	DISPOSAL PIT C	SS12-160	123355	SS					X	X		X	X			
II	DISPOSAL PIT C	SS12-161	123356	SS					X	X		X	X			
II	DISPOSAL PIT C	SS12-162	123357	SS					X	X		X	X			
II	DISPOSAL PIT C	SS12-163	123358	SS					X	X		X	X			
II	DISPOSAL PIT C	SS12-164	123359	SS					XX	X		X	X			
II	DISPOSAL PIT C	SS12-165	123360	SS					X	X		X	X			
II	DISPOSAL PIT C	SS12-166	123361	SS					X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	SS12-127	123321	SS					X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	SS12-127	123548	SS									X			
II	FORMER DRY WASTE DISPOSAL PIT	SS12-128	123322	SS					X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	SS12-129	123323	SS					X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	SS12-129	123552	SS									X			
II	FORMER DRY WASTE DISPOSAL PIT	SS12-130	123324	SS					X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	SS12-131	123325	SS					X	X		X	X			

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RADIATION SURVEY CLASS	POTENTIAL RELEASE AREA	LOC_ID	SAMP_ID	MATRIX	VOCs* TCL NYSDEC CLP	SVOCs* TCL NYSDEC CLP	Pesticides/ PCBs* TCL NYSDEC CLP	Metals* TCL NYSDEC CLP	Analysis Methods for Radiological Data** EPA 901.1	EPA 906.0	EPA 900.0	SM2540G	HASL 300	EPA 903.0	EPA 913	Promethium-147
II	FORMER DRY WASTE DISPOSAL PIT	SS12-132	123326	SS					X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	SS12-133	123327	SS					X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	SS12-134	123328	SS					X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	SS12-134	123650	SS									X			
II	FORMER DRY WASTE DISPOSAL PIT	SS12-135	123329	SS					X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	SS12-135	123556	SS									X			
II	FORMER DRY WASTE DISPOSAL PIT	SS12-136	123330	SS					X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	SS12-136	123550	SS									X			
II	FORMER DRY WASTE DISPOSAL PIT	SS12-137	123331	SS					X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	SS12-137	123558	SS									X			
II	FORMER DRY WASTE DISPOSAL PIT	SS12-138	123332	SS					X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	SS12-139	123333	SS					X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	SS12-139	123566	SS									X			
II	FORMER DRY WASTE DISPOSAL PIT	SS12-140	123334	SS					X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	SS12-140	123562	SS									X			
II	FORMER DRY WASTE DISPOSAL PIT	SS12-141	123335	SS					X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	SS12-141	123336	SS					X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	SS12-141	123560	SS									X			
II	FORMER DRY WASTE DISPOSAL PIT	SS12-142	123337	SS					X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	SS12-143	123338	SS					X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	SS12-144	123339	SS	X	X	X	X	X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	SS12-145	123340	SS	X	X	X	X	X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	SS12-145	123564	SS									X			
II	FORMER DRY WASTE DISPOSAL PIT	SS12-146	123341	SS	X	X	X	X	X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	MW12-16	123149	SS	X	X	X	X	X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	MW12-17	123152	SS	X	X	X	X	X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	MW12-18	123037	SS	X	X	X	X	X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	MW12-18	123043	SS	X	X	X	X	X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	MW12-35	123186	SS	X	X	X	X	X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	MW12-9	123155	SS	X	X	X	X	X	X		X	X			
II	FORMER DRY WASTE DISPOSAL PIT	MW12B-1	W12B-1-0	SS	X	X	X	X	X							
II	FORMER DRY WASTE DISPOSAL PIT	SB12-5A	123096	SS	X	X	X	X	X	X		X	X			X
II	FORMER DRY WASTE DISPOSAL PIT	SB12-10	123179	SS	X	X	X	X	X	X		X	X			
II	EM-5	MW12-22	123068	SS	X	X	X	X	X	X		X	X			
II	EM-5	MW12-23	123079	SS	X	X	X	X	X	X		X	X			
II	EM-5	SS12-102	123296	SS					X	X		X	X			
II	EM-5	SS12-103	123297	SS					X	X		X	X			
II	EM-5	SS12-103	123580	SS					X				X			
II	EM-5	SS12-104	123298	SS					X	X		X	X			
II	EM-5	SS12-105	123299	SS					X	X		X	X			
II	EM-5	SS12-106	123300	SS					X	X		X	X			
II	EM-5	SS12-107	123301	SS					X	X		X	X			

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RADIATION SURVEY CLASS	POTENTIAL RELEASE AREA	LOC_ID	SAMP_ID	MATRIX	VOCs* TCL NYSDEC CLP	SVOCs* TCL NYSDEC CLP	Pesticides/ PCBs* TCL NYSDEC CLP	Metals* TCL NYSDEC CLP	Analysis Methods for Radiological Data** EPA 901.1	EPA 906.0	EPA 900.0	SM2540G	HASL 300	EPA 903.0	EPA 913	Promethium-147
II	EM-5	SS12-108	123302	SS					X	X		X	X			
II	EM-5	SS12-110	123304	SS					X	X		X	X			
II	EM-5	SS12-111	123305	SS					X	X		X	X			
II	EM-5	SS12-112	123306	SS					X	X		X	X			
II	EM-5	SS12-112	123582	SS									X			
II	EM-5	SS12-112	123584	SS									X			
II	EM-5	SS12-113	123307	SS					X	X		X	X			
II	EM-5	SS12-116	123310	SS					X	X		X	X			
II	EM-5	SS12-117	123311	SS					X	X		X	X			
II	EM-5	SS12-118	123312	SS					X	X		X	X			
II	EM-5	SS12-119	123313	SS					X	X		X	X			
II	EM-5	SS12-120	123362	SS					X	X		X	X			
II	EM-5	SS12-121	123314	SS					X	X		X	X			
II	EM-5	SS12-109	123303	SS	X	X	X	X	X	X		X	X			
II	EM-5	SS12-114	123308	SS	X	X	X	X	X	X		X	X			
II	EM-5	SS12-115	123309	SS	X	X	X	X	X	X		X	X			
II	EM-6	MW12-24	123161	SS	X	X	X	X	X	X		X	X			
II	EM-6	MW12-25	123164	SS	X	X	X	X	X	X		X	X			
II	EM-6	SS12-100	123294	SS					X	X		X	X			
II	EM-6	SS12-101	123295	SS					X	X		X	X			
II	EM-6	SS12-90	123283	SS					X	X		X	X			
II	EM-6	SS12-90	123596	SS									X			
II	EM-6	SS12-91	123284	SS					X	X		X	X			
II	EM-6	SS12-92	123285	SS					X	X		X	X			
II	EM-6	SS12-93	123286	SS					X	X		X	X			
II	EM-6	SS12-94	123287	SS					X	X		X	X			
II	EM-6	SS12-94	123288	SS					X	X		X	X			
II	EM-6	SS12-94	123598	SS									X			
II	EM-6	SS12-95	123289	SS					X	X		X	X			
II	EM-6	SS12-96	123290	SS					X	X		X	X			
II	EM-6	SS12-97	123291	SS					X	X		X	X			
II	EM-6	SS12-98	123292	SS					X	X		X	X			
II	EM-6	SS12-99	123293	SS					X	X		X	X			
II	EM-6	SS12-99	123600	SS									X			
III	CLASS III	MW12-26	123167	SS	X	X	X	X	X	X		X	X			
III	CLASS III	MW12-27	123061	SS	X	X	X	X	X	X		X	X			
III	CLASS III	MW12-31	123172	SS	X	X	X	X	X	X		X	X			
III	CLASS III	MW12-32	123175	SS	X	X	X	X	X	X		X	X			
III	CLASS III	MW12-32	123178	SS	X	X	X	X	X	X		X	X			
III	CLASS III	MW12-37	123201	SS	X	X	X	X	X	X		X	X			
III	CLASS III	MW12-37	123210	SS	X	X	X	X	X	X		X	X			
III	CLASS III	MW12-40	123121	SS	X	X	X	X	X	X		X	X			X

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					TCL NYSDEC CLP	TCL NYSDEC CLP	TCL NYSDEC CLP	TCL NYSDEC CLP	EPA 901.1	EPA 906.0	EPA 900.0	SM2540G	HASL 300	EPA 903.0	EPA 913	Promethium-147
III	CLASS III	MW12A-1	W12A-1-0	SS	X	X	X	X	X							
III	CLASS III	SS12-19	123104	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-20	123214	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-21	123215	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-21	123586	SS									X			
III	CLASS III	SS12-22	123216	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-23	123217	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-232	123427	SS					X	X		X	X			
III	CLASS III	SS12-232	123428	SS					X	X		X	X			
III	CLASS III	SS12-233	123429	SS					X	X		X	X			
III	CLASS III	SS12-233	123654	SS									X			
III	CLASS III	SS12-236	123433	SS					X	X		X	X			
III	CLASS III	SS12-236	123604	SS									X			
III	CLASS III	SS12-237	123417	SS					X	X		X	X			
III	CLASS III	SS12-238	123434	SS					X	X		X	X			
III	CLASS III	SS12-239	123435	SS					X	X		X	X			
III	CLASS III	SS12-24	123218	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-24	123578	SS									X			
III	CLASS III	SS12-25	123219	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-26	123220	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-26	123220	SS					X	X		X	X			
III	CLASS III	SS12-26	123602	SS									X			
III	CLASS III	SS12-27	123223	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-27	123224	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-28	123225	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-29	123226	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-30	123227	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-31	123228	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-32	123229	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-33	123230	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-34	123231	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-34	123588	SS									X			
III	CLASS III	SS12-35	123232	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-36	123233	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-36	123554	SS									X			
III	CLASS III	SS12-37	123234	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-38	123235	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-39	123236	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-39	123546	SS									X			
III	CLASS III	SS12-40	123237	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-41	123238	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-42	123239	SS	X	X	X	X	X	X		X	X			

TABLE 2-7
Surface Soil Sampling Summary
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

RADIATION SURVEY CLASS	POTENTIAL RELEASE AREA	LOC_ID	SAMP_ID	MATRIX	VOCs*	SVOCs*	Pesticides/ PCBs*	Metals*	Analysis Methods for Radiological Data**							
					TCL NYSDEC CLP	TCL NYSDEC CLP	TCL NYSDEC CLP	TCL NYSDEC CLP	EPA 901.1	EPA 906.0	EPA 900.0	SM2540G	HASL 300	EPA 903.0	EPA 913	Promethium-147
III	CLASS III	SS12-42	123590	SS									X			
III	CLASS III	SS12-43	123105	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-44	123240	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-45	123241	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-46	123242	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-46	123570	SS									X			
III	CLASS III	SS12-47	123243	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-48	123244	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-49	123245	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-49	123246	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-49	123594	SS									X			
III	CLASS III	SS12-50	123247	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-51	123248	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-51	123608	SS									X			
III	CLASS III	SS12-52	123249	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-52	123568	SS									X			
III	CLASS III	SS12-53	123250	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-53	123250	SS					X	X		X	X			
III	CLASS III	SS12-53	123606	SS									X			
III	CLASS III	SS12-54	123251	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-54	123251	SS					X	X		X	X			
III	CLASS III	SS12-55	123106	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-56	123252	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-57	123253	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-58	123254	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-58	123574	SS									X			
III	CLASS III	SS12-59	123255	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-60	123256	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-61	123257	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-62	123258	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-63	123259	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-66	123260	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-67	123108	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-68	123213	SS	X	X	X	X	X	X		X	X			
III	CLASS III	SS12-68	123544	SS									X			
III	WASTEWATER TREATMENT PLANT	SS12-64	123170	SS	X	X	X	X	X	X		X	X			
III	WASTEWATER TREATMENT PLANT	SS12-64	123171	SS	X	X	X	X	X	X		X	X			
III	WASTEWATER TREATMENT PLANT	SS12-65	123107	SS	X	X	X	X	X	X		X	X			
	BACKGROUND*	SS12-1	12536	SS					X	X		X	X			
	BACKGROUND	SS12-10	12545	SS					X	X		X	X			
	BACKGROUND	SS12-11	12542	SS					X	X		X	X			
	BACKGROUND	SS12-12	12544	SS					X	X		X	X			

TABLE 2-7
Surface Soil Sampling Summary
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

RADIATION SURVEY CLASS	POTENTIAL RELEASE AREA	LOC_ID	SAMP_ID	MATRIX	VOCs*	SVOCs*	Pesticides/ PCBs*	Metals*	Analysis Methods for Radiological Data**							
					TCL NYSDEC CLP	TCL NYSDEC CLP	TCL NYSDEC CLP	TCL NYSDEC CLP	EPA 901.1	EPA 906.0	EPA 900.0	SM2540G	HASL 300	EPA 903.0	EPA 913	Promethium-147
	BACKGROUND	SS12-13	12212	SS					X	X		X	X			
	BACKGROUND	SS12-13	12543	SS					X	X		X	X			
	BACKGROUND	SS12-13	123504	SS					X	X		X	X			
	BACKGROUND	SS12-14	12541	SS					X	X		X	X			
	BACKGROUND	SS12-14	123506	SS					X	X		X	X			
	BACKGROUND	SS12-2	12535	SS					X		X	X				
	BACKGROUND	SS12-3	12537	SS					X		X	X				
	BACKGROUND	SS12-4	12547	SS					X		X	X				
	BACKGROUND	SS12-5	12538	SS					X		X	X				
	BACKGROUND	SS12-6	12539	SS					X		X	X				
	BACKGROUND	SS12-7	12540	SS					X		X	X				
	BACKGROUND	SS12-8	12548	SS					X		X	X				
	BACKGROUND	SS12-9	12546	SS					X		X	X				
	BACKGROUND	SS12-9	123502	SS								X				
	BACKGROUND	MW12-1	123540	SS					X	X		X	X			
	BACKGROUND	MW12-1	123572	SS					X	X		X	X			
	BACKGROUND	MW12-1	12507	SS					X	X		X	X			
	BACKGROUND	MW12-2	12512	SS					X	X		X	X			
	BACKGROUND	MW12-3	123542	SS					X	X		X	X			
	BACKGROUND	MW12-3	12509	SS					X	X		X	X			
	BACKGROUND	MW12-4	12505	SS					X	X		X	X			
	BACKGROUND	MW12-5	12504	SS					X	X		X	X			
	BACKGROUND	MW12-6	123190	SS					X	X		X	X			

NOTE: Parameters included in each Analysis Method are:
(1) EPA 901.1-Ra-223,-226, Pb-211,-214, Bi-214, Ce-137, Co-60
(2) EPA 906.0-Not applicable for soil.
(3) EPA 900.0- Gross Alpha and Beta
(4) SM2540G-Not applicable for soil.
(5) HASL 300-Th-227, -230, -232, U-234, -235, -238, Pl-239/240, Am-241, and Alpha spectroscopy.
(6) EPA 903.0-Not applicable for soil.
(7) EPA 913.0-Not applicable for soil.
(8) A separate column was added for Promethium-147 as it was not analyzed for in every sample.

* Chemical background data from site-wide locations, usted for TAGM calculations; Appendix G, Table G-1
** Radiologicial Data background data included in Appendix G, Table G-19

LEGEND

- SS12-153 Surface Soil sample with Loc_ID
- SD12-153 Sediment sample with Loc_ID
- SW12-153 Surface Water sample with Loc_ID
- Potential Release Area

600 0 600
(feet)

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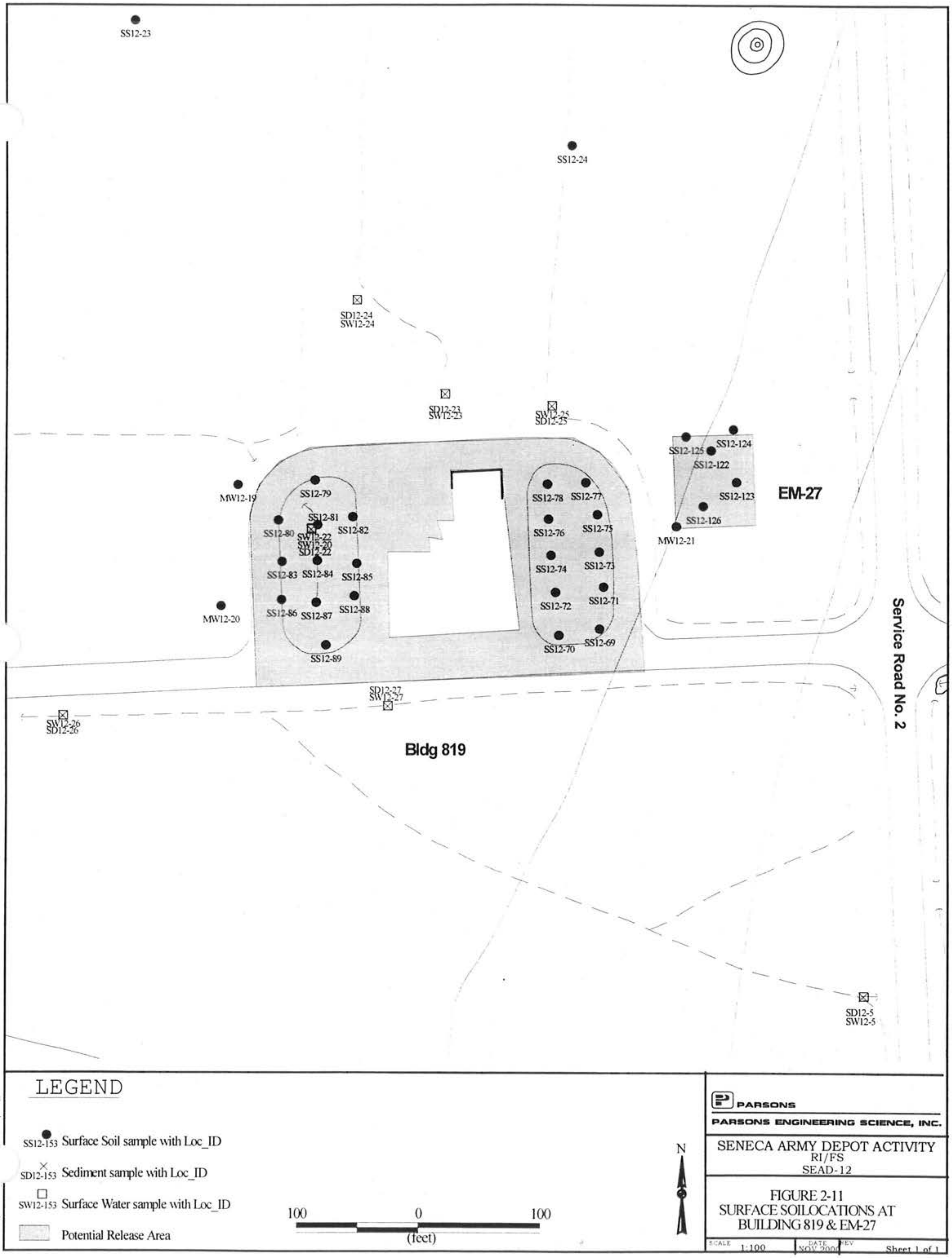
SEAD-12

FIGURE 2-10
SURFACE SOIL LOCATIONS IN THE CLASS 3 AREA

SCALE	DATE	REV	
1:100	NOV 2000		Sheet 1 of 1

C:\SENECA\SEAD-12\SS_LOCS.APR



O:\SENECA\SEAD-12\SS_LOCS.APR

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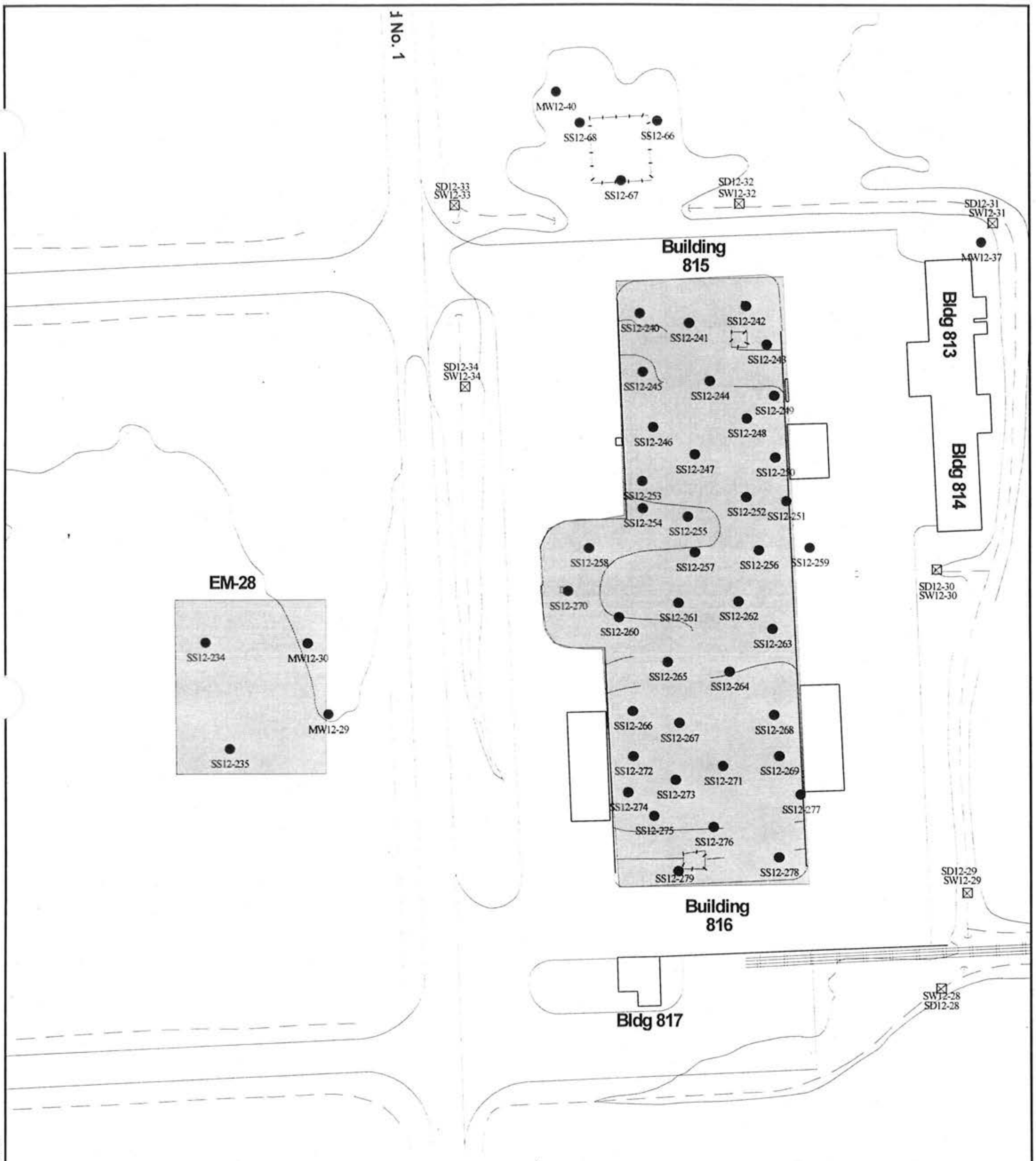
FIGURE 2-11
SURFACE SOILOCATIONS AT
BUILDING 819 & EM-27

SCALE 1:100 | DATE NOV 2000 | REV | Sheet 1 of 1



LEGEND

SS12-153 Surface Soil sample with Loc_ID

SD12-153 Sediment sample with Loc_ID

SW12-153 Surface Water sample with Loc_ID

Potential Release Area

100 0 100
(feet)

N

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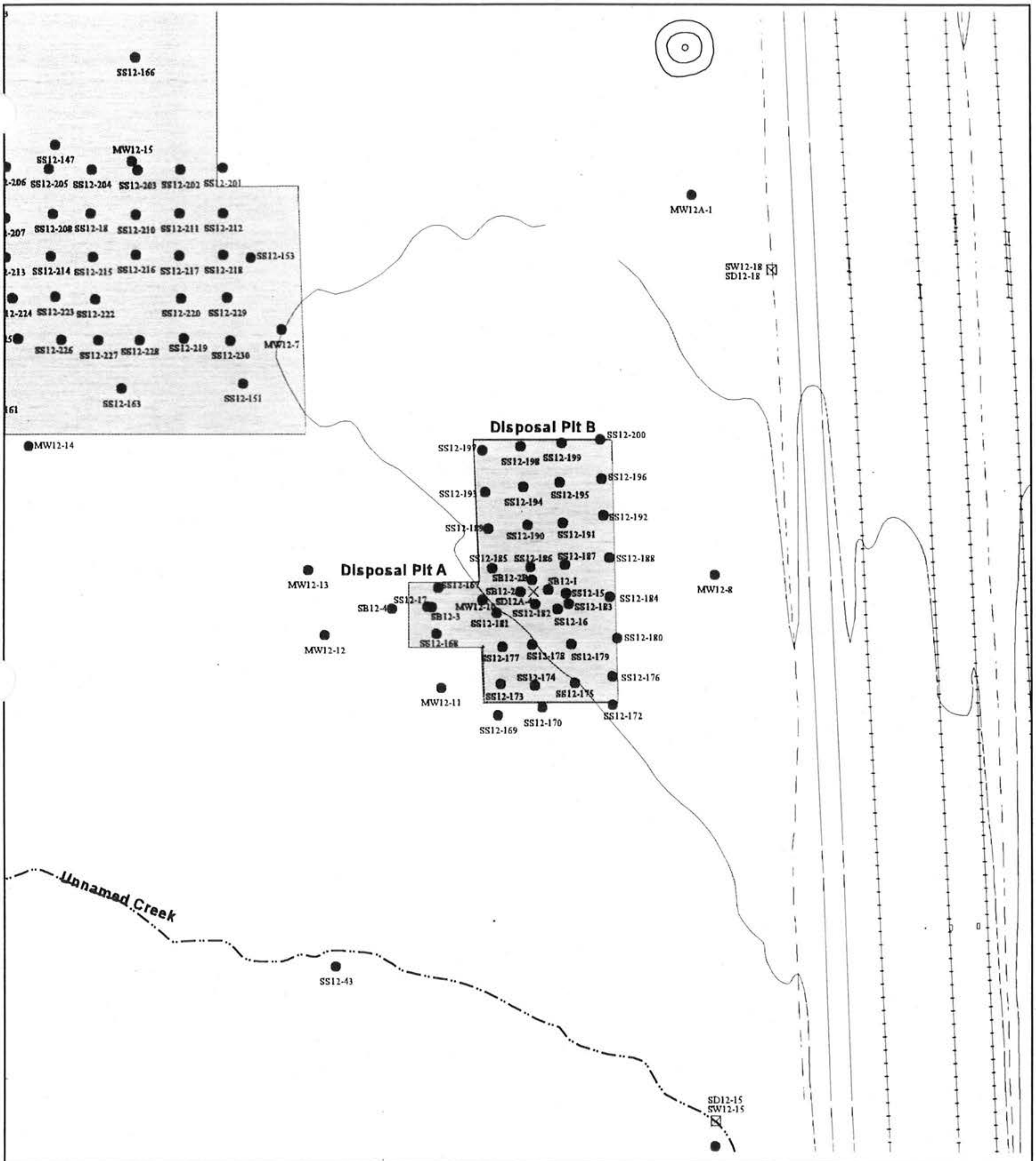
FIGURE 2-12
SURFACE SOIL LOCATIONS AT
BUILDING 815/816 & EM-28

SCALE	DATE	REV	
1:100	NOV 2006		Sheet 1 of 1

O:\SENEC... D-12\SS_LOCS.APR



LEGEND

SS12-153 Surface Soil sample with Loc_ID

SD12-153 Sediment sample with Loc_ID

SW12-153 Surface Water sample with Loc_ID

Potential Release Area

100 0 100

(feet)

N

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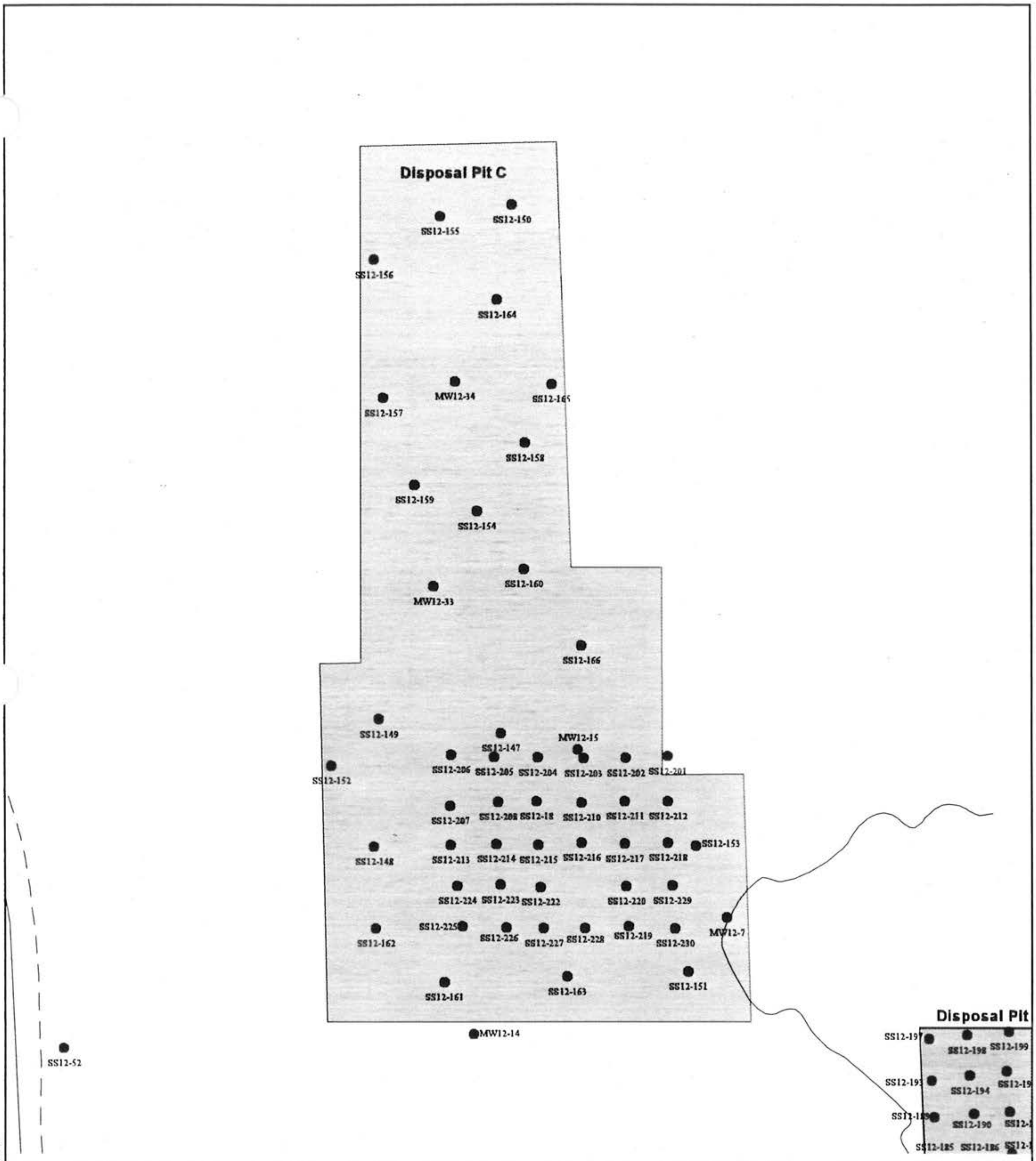
FIGURE 2-13
SURFACE SOIL LOCATIONS AT
DISPOSAL PIT A/B

SCALE 1:100 | DATE NOV 2000 | REV | Sheet 1 of 1

O:\SENECA\ 2\SS_LOCS.APR



O:\SENECA\ 12\SS_LOCS.APR

LEGEND

SS12-153 Surface Soil sample with Loc_ID

SD12-153 Sediment sample with Loc_ID

SW12-153 Surface Water sample with Loc_ID

Potential Release Area

100 0 100
(feet)

N

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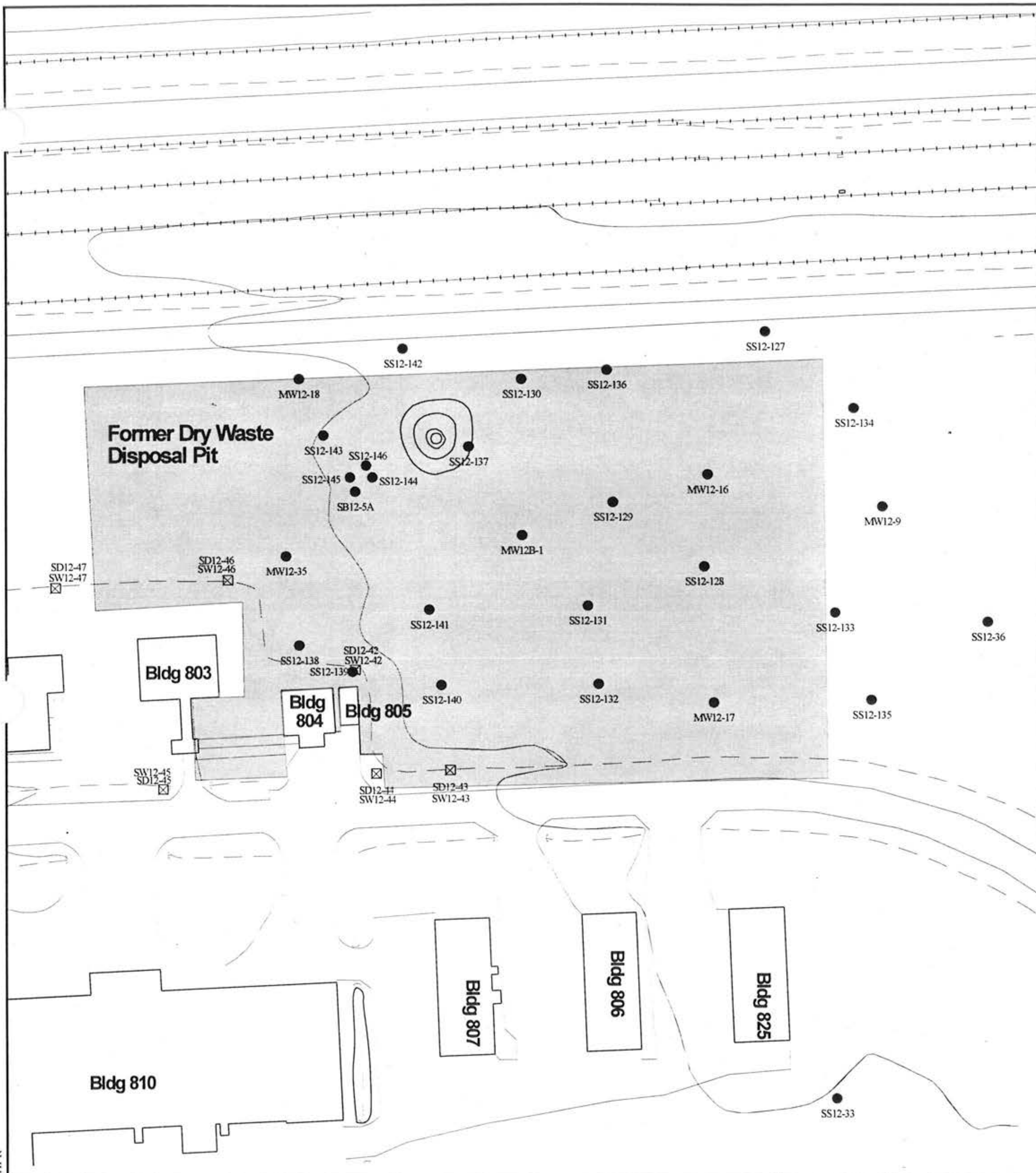
SEAD-12

FIGURE 2-14
SURFACE SOIL LOCATIONS AT
DISPOSAL PIT C

SCALE 1:100	DATE NOV 2000	REV	Sheet 1 of 1



O:\SENECA\...12\SS_LOCS.APR

LEGEND

SS12-153 Surface Soil sample with Loc_ID

SD12-153 Sediment sample with Loc_ID

SW12-153 Surface Water sample with Loc_ID

Potential Release Area

100 0 100
(feet)

N

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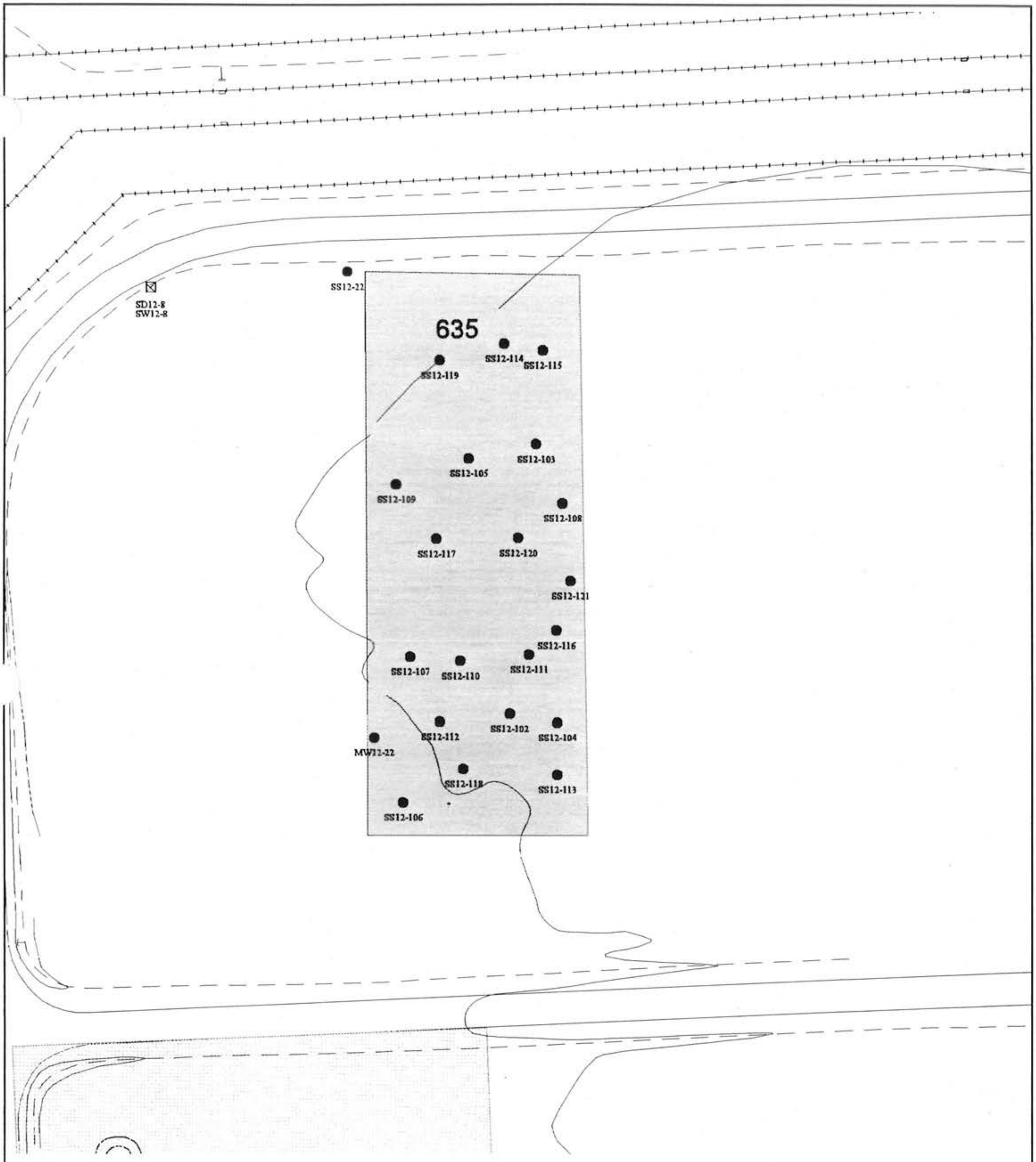
FIGURE 2-15
SURFACE SOIL LOCATIONS AT
THE FORMER DRY WASTE
DISPOSAL PIT

SCALE 1:100	DATE NOV 2000	REV	Sheet 1 of 1



LEGEND

- SS12-153 Surface Soil sample with Loc_ID
- SD12-153 Sediment sample with Loc_ID
- SW12-153 Surface Water sample with Loc_ID
- Potential Release Area

100 0 100
(feet)

N

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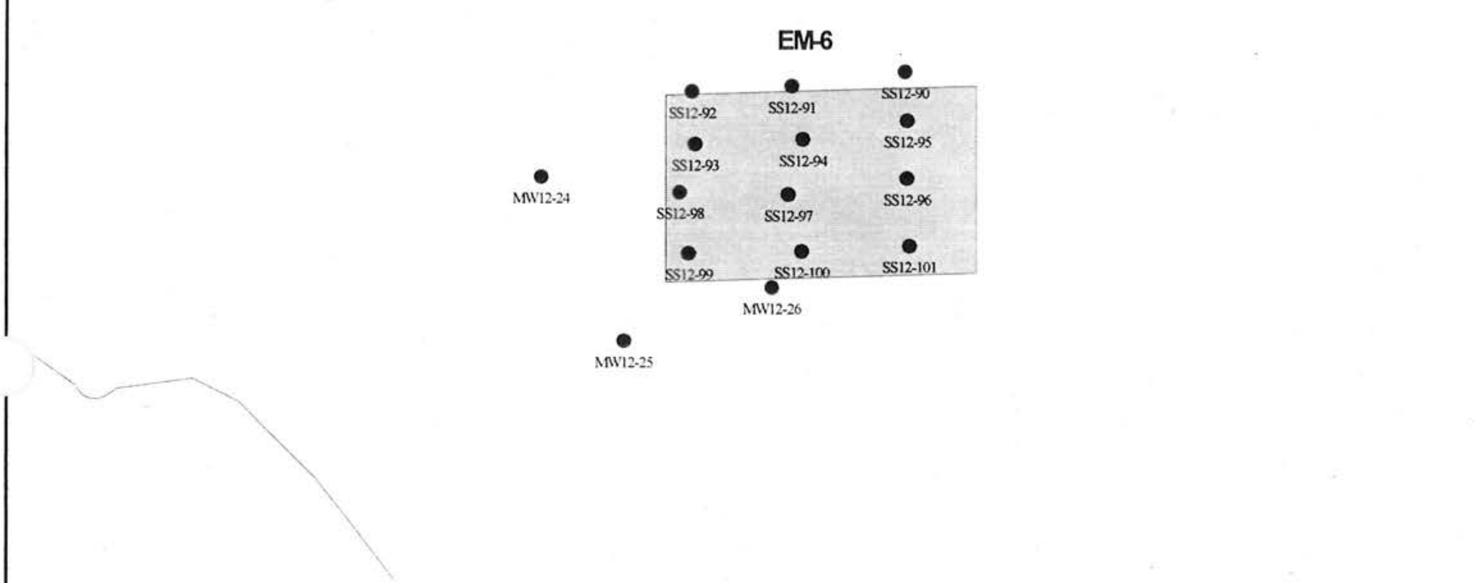
FIGURE 2-16
SURFACE SOIL LOCATIONS AT
EM-5

SCALE	DATE	REV	
1:100	NOV 2000		Sheet 1 of 1

O:\SENECA\ 12\SS_LOCS.APR



LEGEND

SS12-153 Surface Soil sample with Loc_ID

SD12-153 Sediment sample with Loc_ID

SW12-153 Surface Water sample with Loc_ID

Potential Release Area

100 0 100

(feet)

N

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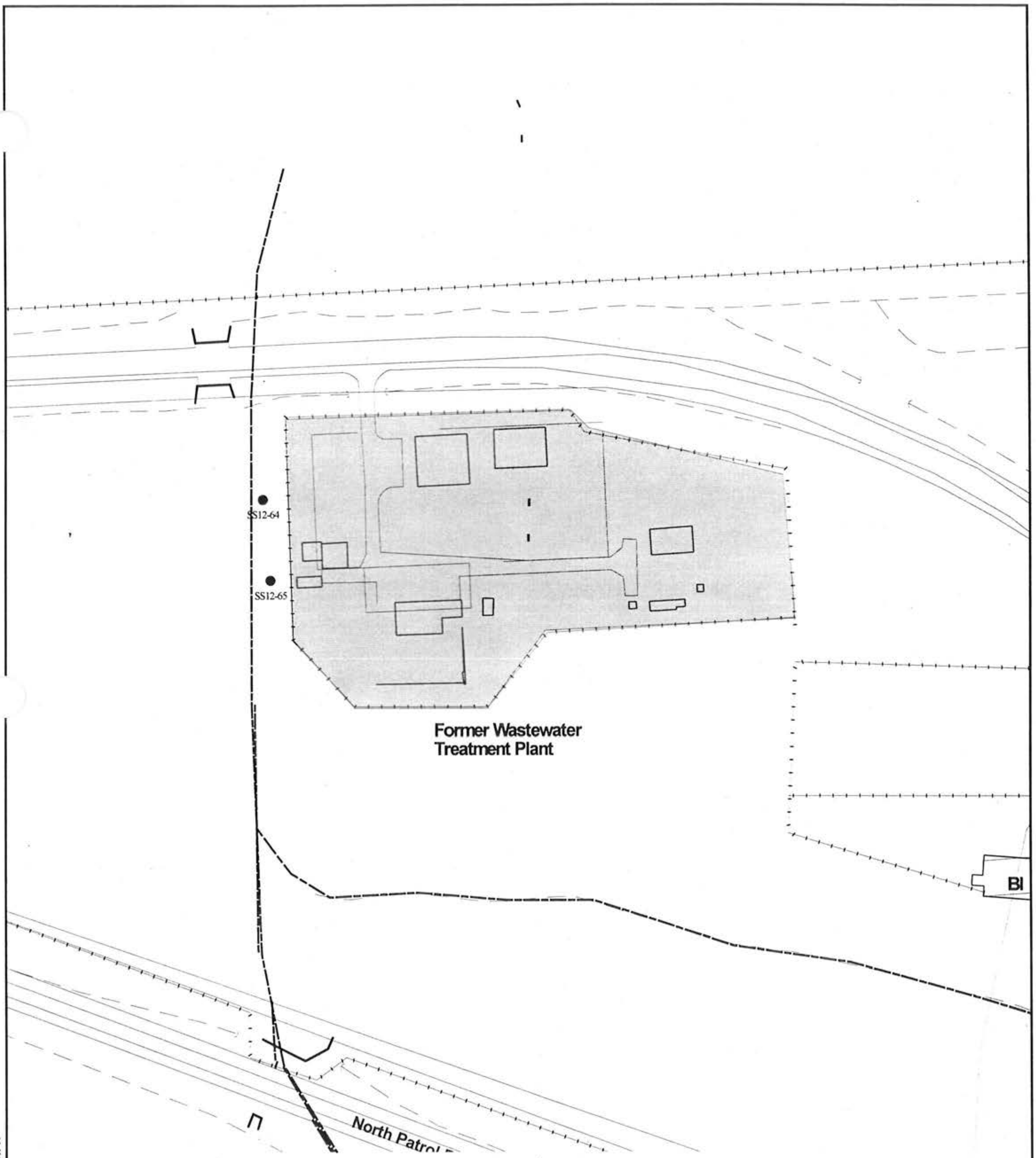
SEAD-12

FIGURE 2-17
SURFACE SOIL LOCATIONS AT EM-6

SCALE	DATE	REV	
1:100	NOV 2000		Sheet 1 of 1

O:\SENE(...)D12\SS_LOCS.APR



LEGEND

SS12-153 Surface Soil sample with Loc_ID

SD12-153 Sediment sample with Loc_ID

SW12-153 Surface Water sample with Loc_ID

Potential Release Area

100 0 100 (feet)

N

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FIGURE 2-18
SURFACE SOIL LOCATIONS AT THE FORMER WASTE WATER TREATMENT PLANT

SCALE 1:100	DATE NOV 2000	REV	Sheet 1 of 1

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3. Collect additional soil was from the immediate vicinity of the split spoon sample, using a decontaminated stainless steel spoon, adding this to the soil in the bowl, and composite the sample.
5. Collect a PID measurement from the headspace of the bowl and scan the soil for gross gamma radiation flux with a Ludlum Model 19 Micro-R.
6. Collect the remaining parameters from the composite soil in the bowl.
7. All surface soil samples were classified and described according to the Unified Soil Classification System (USCS) modified with the Burmiester soil classification system

The SEAD-12 surface soil sampling program included samples collected the nine of the potential release areas (**Figures 2-10** to **Figure 2-18**) and background areas, specifically:

- Background areas north and east of SEAD –12;
- Surface scanning reference area (baseball field);
- Area of ESI test pit locations;
- Randomly selected Class III scanning areas;
- Biased locations in Class III areas based upon the surface scanning and exposure measurement investigations;
- Outfall to Building 715 (the Sewage Treatment Plant) wastewater discharge;
- Beneath the gravel pad at the substation north of Building 815;
- Class One and Class two survey areas surrounding Buildings 804/805, Buildings 815/816, and Building 819;
- Areas identified as waste disposal sites from the geophysical surveys; and
- The earthen roofs of buildings 815 and 816.

For radiological purposes the sampling density within Class I areas was one surface soil sample every ten meters. These samples were collected along sampling lines spaced ten meters apart (resulting in a 10 by 10 meter grid sampling pattern). However, if the surface scanning and/or exposure surveys indicate that a localized area of residual radiation may be present, the grid based surface soil sampling location that was closest to the localized area of residual radiation was relocated to that localized area. Biased surface soil samples were collected from the grounds nearest to downspout drains for Buildings 804, 805, 815, 816, and 819. At these locations, the surface soil that was closest to and in the run-off pattern of a given downspout drain was sampled. The grid based surface soil samples around Buildings 815 and 816 also included biased surface soil samples that were collected from locations that would accumulate precipitation run-off from these buildings.

Within Class II survey areas, surface soil samples for radiological characterization were collected so that up to twenty randomly located and/or biased surface soil samples were collected from each Class II survey unit. For any Class II survey unit, the sampling density did not exceed an average of one sample per 100 square meters. A total of eight Class II areas were sampled. Three of the eight areas were previously identified during the ESI phase (disposal pit B, disposal pit C, and the area behind Buildings 804 and 805, formerly known as SEAD-12B). The remaining five Class II sampling areas consisted of disposal areas first located with aerial photography, later investigated with geophysics, and finally confirmed with test pitting investigations.

For Class III areas locations were positioned so that one random location was sampled per 200 m by 200 m area over the entire SEAD-12 area. In addition, three suspected disposal areas where test pitting found no debris were sampled as Class III areas. In these suspected disposal pit areas two confirmatory samples were collected per area.

As listed on **Table 2-8**, a total of 58 surface soil samples (55 locations, 3 duplicates) were re-collected for Plutonium-239/240 analysis as a result of data quality concerns raised by NYSDEC and USEPA with regard to the detection limits initially requested for Pu-239/240 in soil, **Figure 2-19**. The additional samples collected for Plutonium-239/240 are discussed in **Section 4**.

2.8 SEDIMENT AND SURFACE WATER INVESTIGATION

During the RI program, co-located surface water and sediment samples shown in **Figure 2-20,** were collected from upgradient background locations (ammo area), within SEAD-12, and locations downgradient to SEAD-12 in Reeder Creek. SEAD-12 RI Program upgradient and downgradient off site surface water and sediment sampling locations are shown on **Figure 2-21.** A total of 73 surface water and 99 sediment samples were collected and analyzed during the RI and ESI investigations. Surface water samples were analyzed for the parameters as listed in **Table 2-9**. The sediment samples were analyzed for the parameters as listed in **Table 2-10**.

Upgradient locations were sampled investigate background surface water and sediment quality, and to provide radiochemical data to build a background database. Downgradient surface water and sediment samples, from Reeder Creek, were collected to investigate possible impacts from potential contaminant transport from SEAD-12.

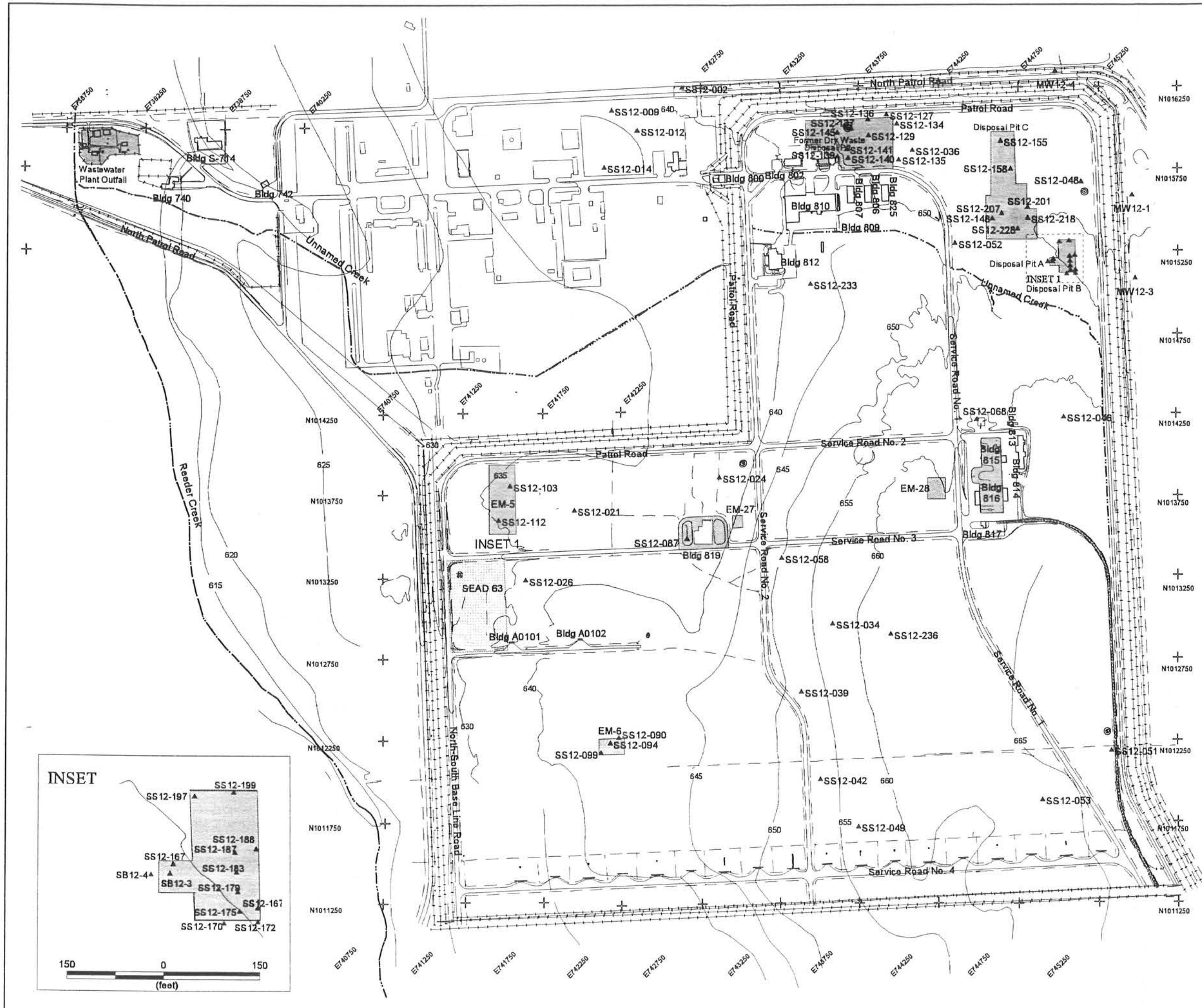
Surface water and sediment sampling procedures are described in detail in the Generic Workplan, Appendix A, Section 3.7. Surface water sampling activities were conducted such that down stream sample locations were collected first, followed by sample locations progressively further up stream. Sample locations were sampled in this manner to insure that surface water samples were not contaminated by sediment disturbance associated with sampling activities at other locations.

TABLE 2-8
RESAMPLED SURFACE SOILS - PLUTONIUM
SEAD-12 REMEDIAL INVESTIGATION
Seneca Army Depot Activity - Romulus, NY

LOCATION I	SAMPLE ID	MATRIX	STUDY ID	PARAMETER
MW12-1	123540	SA	RI PU RESAMPLE	Plutonium-239/240
MW12-1	123572	DU	RI PU RESAMPLE	Plutonium-239/240
MW12-3	123542	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-103	123580	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-112	123582	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-112	123584	DU	RI PU RESAMPLE	Plutonium-239/240
SS12-127	123548	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-129	123552	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-13	123504	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-134	123650	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-135	123556	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-136	123550	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-137	123558	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-139	123566	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-14	123506	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-140	123562	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-141	123560	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-145	123564	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-148	123652	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-155	123646	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-158	123644	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-167	123632	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-170	123622	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-172	123626	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-175	123628	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-175	123630	DU	RI PU RESAMPLE	Plutonium-239/240
SS12-176	123624	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-179	123620	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-183	123618	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-187	123614	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-188	123616	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-197	123612	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-199	123610	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-201	123642	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-207	123638	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-21	123586	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-210	123640	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-218	123636	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-228	123634	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-233	123654	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-236	123604	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-24	123578	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-26	123602	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-34	123588	SA	RI PU RESAMPLE	Plutonium-239/240

TABLE 2-8
RESAMPLED SURFACE SOILS - PLUTONIUM
SEAD-12 REMEDIAL INVESTIGATION
Seneca Army Depot Activity - Romulus, NY

LOCATION I	SAMPLE ID	MATRIX	STUDY ID	PARAMETER
SS12-36	123554	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-39	123546	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-42	123590	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-46	123570	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-49	123594	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-51	123608	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-52	123568	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-53	123606	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-58	123574	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-68	123544	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-9	123502	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-90	123596	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-94	123598	SA	RI PU RESAMPLE	Plutonium-239/240
SS12-99	123600	SA	RI PU RESAMPLE	Plutonium-239/240



SS12-15 SURFACE SOIL RESAMPLE LOCATON

POTENTIAL RELEASE AREAS

600 0 600 Feet

PARSONS

PARSONS ENGINEERING SCIENCE, INC.

SENECA ARMY DEPOT ACTIVITY

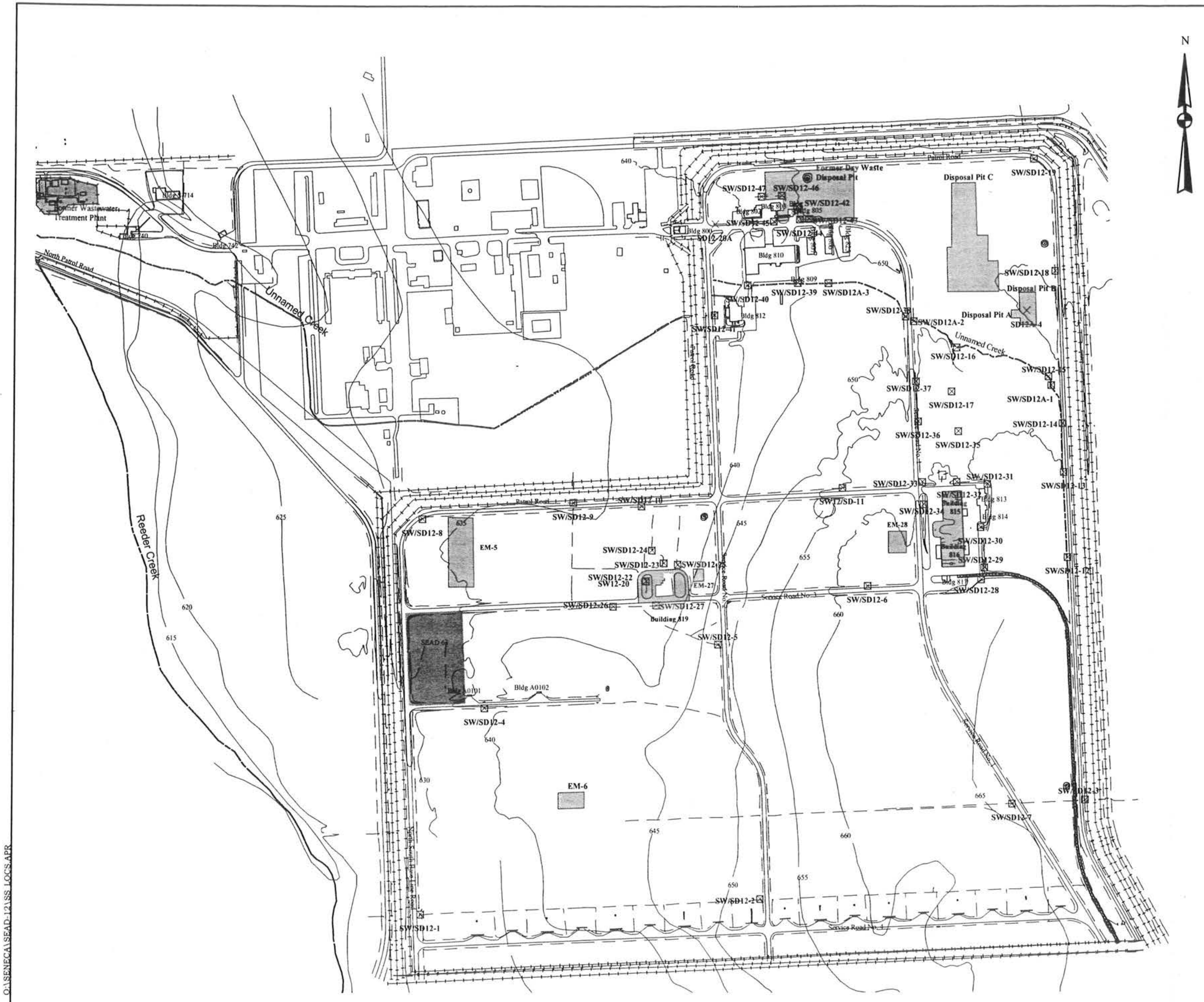
RI / FS

SEAD-12

FIGURE 2-19
LOCATION OF RECOLLECTED SURFACE SOIL SAMPLES

1:600	MAY 2000	SHEET 1 OF 1

G:\AV_GIS30\SENECA\SEAD12\SAMPLELO\SS_LOCS



LEGEND

SD12-153 × Sediment sample with Loc_ID

SW12-153 □ Surface Water sample with Loc_ID

Potential Release Area

600 0 600 (feet)

PARSONS

PARSONS ENGINEERING SCIENCE, INC.

SENECA ARMY DEPOT ACTIVITY
RI/FS
SEAD-12

FIGURE 2-20
SEDIMENT AND SURFACE WATER SAMPLING LOCATIONS

SCALE 1:600	DATE NOV 2000	REV	Sheet 1 of 1

O:\SENECA\SEAD-12\SS_LOCS.APR

O:\AV_GIS30\SENECA\SEAD12\SAMPLELO\GKLOC.APR

N

LEGEND

SWSD12-11
DOWNGRADIENT SURFACE WATER AND SEDIMENT SAMPLE LOCATION

SWSD12-11
BACKGROUND SURFACE WATER AND SEDIMENT SAMPLE LOCATION

2400 0 2400
(feet)

PARSONS
PARSONS ENGINEERING SCIENCE, INC.

SENECA ARMY DEPOT ACTIVITY
RI/FS
SEAD 12

FIGURE 2-21
DOWNGRADIENT AND BACKGROUND SEDIMENT AND SURFACE WATER SAMPLE LOCATIONS

SCALE	DATE	REV	
1:2400	MAY 2000		Sheet 1 of 1

Table 2-9
Surface Water Sampling and Analysis Summary
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

LOCATION ID	SAMPLE ID	MATRIX	LOCATION	VOCs TCL NYSDEC CLP	SVOCs TCL NYSDEC CLP	Pesticides/ PCBs TCL NYSDEC CLP	Metals TCL NYSDEC CLP	Analysis Methods for Radiological Data EPA 901.1	EPA 906.0	EPA 900.0	SM2540G	HASL 300	EPA 903.0	EPA 913	Promethium-147
ESI															
SW12A-1	SW12A-1	SURFACE WATER	ON-SITE	X	X	X	X								
SW12A-1	SW12A-20	SURFACE WATER	ON-SITE	X	X	X	X								
SW12A-2	SW12A-2	SURFACE WATER	ON-SITE	X	X	X	X								
SW12A-3	SW12A-3	SURFACE WATER	ON-SITE	X	X	X	X								
RI															
SW12-1	12039	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	X
SW12-10	12025	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	X
SW12-11	12073	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	
SW12-12	12042	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	X
SW12-13	12041	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	X
SW12-14	12035	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	X
SW12-15	12034	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	X
SW12-16	12028	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	X
SW12-17	12032	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	X
SW12-18	12052	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	
SW12-19	12040	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	X
SW12-2	12001	SURFACE WATER	ON-SITE	X	X	X	X	X		X		X	X	X	
SW12-20	12045	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	
SW12-22	12024	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	
SW12-23	12020	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	
SW12-24	12019	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	
SW12-25	12006	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	
SW12-26	12005	SURFACE WATER	ON-SITE	X	X	X	X	X		X		X	X	X	
SW12-27	12023	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	
SW12-28	12016	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	X
SW12-28	12017	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	X
SW12-29	12063	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	X
SW12-3	12072	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	
SW12-30	12015	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	
SW12-31	12014	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	
SW12-32	12013	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	
SW12-33	12012	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	
SW12-34	12018	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	
SW12-35	12033	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	X

Table 2-9
Surface Water Sampling and Analysis Summary
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

				VOCs	SVOCs	Pesticides/ PCBs	Metals	Analysis Methods for Radiological Data							
LOCATION ID	SAMPLE ID	MATRIX	LOCATION	TCL NYSDEC CLP	TCL NYSDEC CLP	TCL NYSDEC CLP	TCL NYSDEC CLP	EPA 901.1	EPA 906.0	EPA 900.0	SM2540G	HASL 300	EPA 903.0	EPA 913	Promethium-147
SW12-36	12030	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	X
SW12-36	12031	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	X
SW12-37	12029	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	X
SW12-38	12027	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	X
SW12-39	12026	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	X
SW12-4	12038	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	X
SW12-40	12010	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	
SW12-41	12009	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	
SW12-42	12044	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	X
SW12-43	12051	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	
SW12-44	12064	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	
SW12-45	12050	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	
SW12-46	12043	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	
SW12-47	12046	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	
SW12-5	12036	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	
SW12-51	12210	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	
SW12-6	12022	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	
SW12-7	12021	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	
SW12-8	12007	SURFACE WATER	ON-SITE	X	X	X	X	X		X		X	X	X	
SW12-9	12037	SURFACE WATER	ON-SITE	X	X	X	X	X	X	X	X	X	X	X	
SW12-59	12053	SURFACE WATER	BACKGROUND				X	X	X	X	X	X	X	X	
SW12-60	12054	SURFACE WATER	BACKGROUND				X	X	X	X	X	X	X	X	
SW12-61	12055	SURFACE WATER	BACKGROUND				X	X	X	X	X	X	X	X	
SW12-63	12048	SURFACE WATER	BACKGROUND				X	X	X	X	X	X	X	X	
SW12-63	12049	SURFACE WATER	BACKGROUND				X	X	X	X	X	X	X	X	
SW12-64	12056	SURFACE WATER	BACKGROUND				X	X	X	X	X	X	X	X	
SW12-65	12057	SURFACE WATER	BACKGROUND				X	X	X	X	X	X	X	X	
SW12-66	12058	SURFACE WATER	BACKGROUND				X	X	X	X	X	X	X	X	
SW12-67	12047	SURFACE WATER	BACKGROUND				X	X	X	X	X	X	X	X	
SW12-48	12062	SURFACE WATER	OFF-SITE DOWN GRADIENT		X	X	X	X	X	X	X	X	X	X	
SW12-49	12061	SURFACE WATER	OFF-SITE DOWN GRADIENT	X	X	X	X	X	X	X	X	X	X	X	
SW12-50	12060	SURFACE WATER	OFF-SITE DOWN GRADIENT	X	X	X	X	X	X	X	X	X	X	X	
SW12-51	12059	SURFACE WATER	OFF-SITE DOWN GRADIENT	X	X	X	X	X	X	X	X	X	X	X	
SW12-52	12069	SURFACE WATER	OFF-SITE DOWN GRADIENT	X	X	X	X	X	X	X	X	X	X	X	
SW12-53	12070	SURFACE WATER	OFF-SITE DOWN GRADIENT	X	X	X	X	X	X	X	X	X	X	X	

Table 2-9
Surface Water Sampling and Analysis Summary
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

LOCATION ID	SAMPLE ID	MATRIX	LOCATION	VOCs TCL NYSDEC CLP	SVOCs TCL NYSDEC CLP	Pesticides/ PCBs TCL NYSDEC CLP	Metals TCL NYSDEC CLP	Analysis Methods for Radiological Data EPA 901.1	EPA 906.0	EPA 900.0	SM2540G	HASL 300	EPA 903.0	EPA 913	Promethium-147
SW12-54	12071	SURFACE WATER	OFF-SITE DOWN GRADIENT	X	X	X	X	X	X	X	X	X	X	X	
SW12-55	12068	SURFACE WATER	OFF-SITE DOWN GRADIENT	X	X	X	X	X	X	X	X	X	X	X	
SW12-56	12067	SURFACE WATER	OFF-SITE DOWN GRADIENT	X	X	X	X	X	X	X	X	X	X	X	
SW12-57	12066	SURFACE WATER	OFF-SITE DOWN GRADIENT	X	X	X	X	X	X	X	X	X	X	X	
SW12-58	12065	SURFACE WATER	OFF-SITE DOWN GRADIENT	X	X	X	X	X	X	X	X	X	X	X	

NOTE: Parameters included in each Analysis Method are:
(1) EPA 901.1- Pb-211, -214, Bi-214, Ce-137, Co-60
(2) EPA906.0- Tritium
(3) EPA 900.0- Gross Alpha and Beta
(4) SM2540G-Not applicable for ground water.
(5) HASL 300- Th-227, -230, -232, U-234, -235, -238, Pl-239/240, Am-241, and Alpha spectroscopy.
(6) EPA 903.0- Ra-223, -226
(7) EPA913.0- Not applicable for ground water.
(8) A separate column was added for Promethium-147 as it was not analyzed for in every sample.

Table 2-10
Sediment Sampling and Analysis Summary
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

LOCATION ID	SAMPLE ID	MATRIX	LOCATION	VOCs	SVOCs	esticides/ PCB	Metals	Analysis Methods for Radiological Data							
				TCL NYSDEC CLP	TCL NYSDEC CLP	TCL NYSDEC CLP	TCL NYSDEC CLP	EPA 901.1	EPA 906.0	EPA 900.0	SM2540G	HASL 300	EPA 903.0	EPA 913	Promethium-147
ESI															
SD12A-1	SD12A-1	SEDIMENT	ON-SITE	X	X	X	X	X							
SD12A-1	SD12A-20	SEDIMENT	ON-SITE	X	X	X	X	X							
SD12A-2	SD12A-2	SEDIMENT	ON-SITE	X	X	X	X	X							
SD12A-3	SD12A-3	SEDIMENT	ON-SITE	X	X	X	X	X							
SD12A-4	SD12A-4	SEDIMENT	ON-SITE	X	X	X	X	X							
RI															
SD12-1	12439	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			
SD12-10	124245	SEDIMENT	ON-SITE					X	X		X	X			
SD12-10	12425	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			
SD12-11	12473	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			
SD12-12	12442	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			
SD12-13	12441	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			
SD12-14	124098	SEDIMENT	ON-SITE					X	X		X	X			
SD12-14	12435	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			
SD12-15	12434	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			
SD12-16	12428	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			
SD12-17	12432	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			
SD12-18	124097	SEDIMENT	ON-SITE					X	X		X	X			
SD12-18	12452	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			
SD12-19	124096	SEDIMENT	ON-SITE					X	X		X	X			
SD12-19	12440	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			
SD12-2	12002	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			
SD12-20A	124091	SEDIMENT	ON-SITE					X	X		X	X			
SD12-20A	12445	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			
SD12-20	124244	SEDIMENT	ON-SITE					X	X		X	X			
SD12-22	12424	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			
SD12-23	12420	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			
SD12-24	124084	SEDIMENT	ON-SITE					X	X		X	X			
SD12-24	12419	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			
SD12-25	124243	SEDIMENT	ON-SITE					X	X		X	X			

Table 2-10
Sediment Sampling and Analysis Summary
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

LOCATION ID	SAMPLE ID	MATRIX	LOCATION	VOCs	SVOCs	esticides/ PCB	Metals	Analysis Methods for Radiological Data							
				TCL NYSDEC CLP	TCL NYSDEC CLP	TCL NYSDEC CLP	TCL NYSDEC CLP	EPA 901.1	EPA 906.0	EPA 900.0	SM2540G	HASL 300	EPA 903.0	EPA 913	Promethium-147
SD12-25	12401	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			
SD12-26	124086	SEDIMENT	ON-SITE					X	X		X	X			
SD12-26	12400	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			
SD12-27	124085	SEDIMENT	ON-SITE					X	X		X	X			
SD12-27	12423	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			
SD12-28	124100	SEDIMENT	ON-SITE					X	X		X	X			
SD12-28	12409	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			X
SD12-28	12410	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			X
SD12-29	12463	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			X
SD12-3	12472	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			
SD12-30	12408	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			X
SD12-31	12407	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			X
SD12-32	124102	SEDIMENT	ON-SITE					X	X		X	X			
SD12-32	12406	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			X
SD12-33	12405	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			X
SD12-34	12202	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			X
SD12-34	12418	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			X
SD12-35	12433	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			
SD12-36	12430	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			
SD12-36	124103	SEDIMENT	ON-SITE					X	X		X	X			
SD12-36	12431	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			
SD12-37	12429	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			
SD12-38	12427	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			
SD12-39	12426	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			
SD12-4	12438	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			
SD12-40	124090	SEDIMENT	ON-SITE					X	X		X	X			
SD12-40	12404	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			X
SD12-40	124089	SEDIMENT	ON-SITE					X	X		X	X			
SD12-41	12403	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			X
SD12-42	124242	SEDIMENT	ON-SITE					X	X		X	X			
SD12-42	12444	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			

Table 2-10
Sediment Sampling and Analysis Summary
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

LOCATION ID	SAMPLE ID	MATRIX	LOCATION	VOCs	SVOCs	esticides/ PCB	Metals	Analysis Methods for Radiological Data							
				TCL NYSDEC CLP	TCL NYSDEC CLP	TCL NYSDEC CLP	TCL NYSDEC CLP	EPA 901.1	EPA 906.0	EPA 900.0	SM2540G	HASL 300	EPA 903.0	EPA 913	Promethium-147
SD12-43	124095	SEDIMENT	ON-SITE					X	X		X	X			
SD12-43	12451	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			
SD12-44	12464	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			
SD12-45	12450	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			X
SD12-46	124094	SEDIMENT	ON-SITE					X	X		X	X			
SD12-46	124093	SEDIMENT	ON-SITE					X	X		X	X			
SD12-46	12443	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			
SD12-47	124092	SEDIMENT	ON-SITE					X	X		X	X			
SD12-47	12446	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			
SD12-5	124241	SEDIMENT	ON-SITE					X	X		X	X			
SD12-5	12436	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			
SD12-6	12422	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			
SD12-7	124099	SEDIMENT	ON-SITE					X	X		X	X			
SD12-7	12421	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			
SD12-8	12402	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			
SD12-9	12437	SEDIMENT	ON-SITE	X	X	X	X	X	X		X	X			
SD12-59	12453	SEDIMENT	BACKGROUND				X	X	X		X	X			X
SD12-60	124106	SEDIMENT	BACKGROUND					X	X		X	X			
SD12-60	124105	SEDIMENT	BACKGROUND					X	X		X	X			
SD12-60	12454	SEDIMENT	BACKGROUND				X	X	X		X	X			X
SD12-61	12455	SEDIMENT	BACKGROUND				X	X	X		X	X			X
SD12-63	12448	SEDIMENT	BACKGROUND				X	X	X		X	X			X
SD12-63	12449	SEDIMENT	BACKGROUND				X	X	X		X	X			X
SD12-63	124104	SEDIMENT	BACKGROUND					X	X		X	X			
SD12-64	12456	SEDIMENT	BACKGROUND				X	X	X		X	X			X
SD12-65	12457	SEDIMENT	BACKGROUND				X	X	X		X	X			X
SD12-66	12458	SEDIMENT	BACKGROUND				X	X	X		X	X			X
SD12-67	12447	SEDIMENT	BACKGROUND				X	X	X		X	X			X
SD12-48	12462	SEDIMENT	OFF-SITE DOWN GRADIENT	X	X	X	X	X	X		X	X			
SD12-49	12461	SEDIMENT	OFF-SITE DOWN GRADIENT	X	X	X	X	X	X		X	X			
SD12-50	12460	SEDIMENT	OFF-SITE DOWN GRADIENT	X	X	X	X	X	X		X	X			

Table 2-10
Sediment Sampling and Analysis Summary
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

				VOCs	SVOCs	esticides/ PCB	Metals	Analysis Methods for Radiological Data							
LOCATION ID	SAMPLE ID	MATRIX	LOCATION	TCL NYSDEC CLP	TCL NYSDEC CLP	TCL NYSDEC CLP	TCL NYSDEC CLP	EPA 901.1	EPA 906.0	EPA 900.0	SM2540G	HASL 300	EPA 903.0	EPA 913	Promethium-147
SD12-51	12459	SEDIMENT	OFF-SITE DOWN GRADIENT	X	X	X	X	X	X		X	X			
SD12-52	12469	SEDIMENT	OFF-SITE DOWN GRADIENT	X	X	X	X	X	X		X	X			
SD12-53	12470	SEDIMENT	OFF-SITE DOWN GRADIENT	X	X	X	X	X	X		X	X			
SD12-54	12471	SEDIMENT	OFF-SITE DOWN GRADIENT	X	X	X	X	X	X		X	X			
SD12-55	12468	SEDIMENT	OFF-SITE DOWN GRADIENT	X	X	X	X	X	X		X	X			
SD12-56	12467	SEDIMENT	OFF-SITE DOWN GRADIENT	X	X	X	X	X	X		X	X			
SD12-57	12466	SEDIMENT	OFF-SITE DOWN GRADIENT	X	X	X	X	X	X		X	X			
SD12-58	12465	SEDIMENT	OFF-SITE DOWN GRADIENT	X	X	X	X	X	X		X	X			

NOTE: Parameters included in each Analysis Method are:
(1) EPA 901.1-Ra-223,-226, Pb-211,-214, Bi-214, Ce-137, Co-60
(2) EPA 906.0-Not applicable for soil.
(3) EPA 900.0- Gross Alpha and Beta
(4) SM2540G-Not applicable for soil.
(5) HASL 300-Th-227, -230, -232, U-234, -235, -238, Pl-239/240, Am-241, and Alpha spectroscopy.
(6) EPA 903.0-Not applicable for soil.
(7) EPA 913.0-Not applicable for soil.
(8) A separate column was added for Promethium-147 as it was not analyzed for in every sample.

In summary, surface water sampling involved three steps:

1. Collect several rounds of water quality parameters including Temperature, conductivity, pH, and dissolved oxygen (**Table 2-11**). Several readings of each parameter are collected to insure that each instrument is stabilized and is operating correctly. Conductivity and temperature were measured with a YSI Model 33 conductivity meter, and pH was measured with an Orion pH meter, Model SA230 or SA230A.
2. Collect the surface water sample using a clean decontaminated glass beaker or a new sample bottle without preservatives then transferring the water as rapidly as possible into pre-preserved sample bottles. The surface water was removed from the surface water body with a minimum amount of disturbance in an effort to minimize turbidity in the sample.
3. After sampling was complete the location was carefully and distinctly marked with a wood stake and flagging such that the location could be relocated precisely at a later time for sediment sampling and surveying.

Composite sediment samples were collected within 2-3 days of surface water sampling, and collocated with the corresponding surface water sampling location. Sediment samples were collected by:

1. Scooping sediment into a decontaminated stainless steel bowl with a decontaminated trowel to a maximum depth of 0.5 feet below the sediment surface.
2. The sample volume for volatile organic analyses was collected first, prior to any mixing, directly from the top of the stainless bowl.
3. After the volatile organic component was collected the bowl of sediment was thoroughly mixed and the composite soil used to fill the remaining sample containers.

With the primary difference between the ESI and the RI analyses being the addition of nitrate and nitrite for the RI, with the elimination of gross gamma. In addition, the surface water samples were also analyzed for hardness, TOC, and pH, and the sediment samples were analyzed for TOC and grain size distribution including the distribution within the silt and clay fractions.

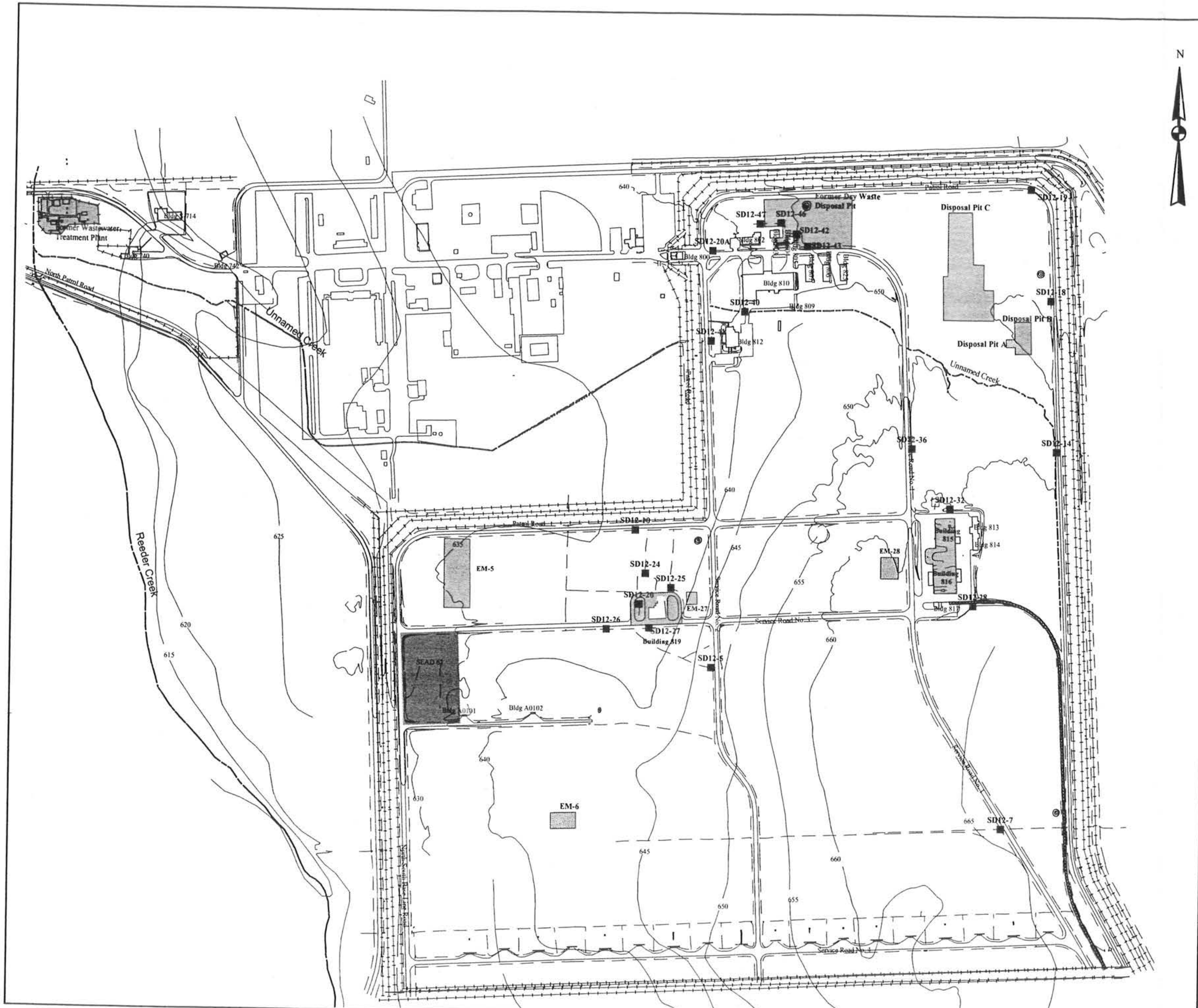
A total of 25 sediment samples were recollected, **Figure 2-22**, for Pu-239/240 analysis to address data quality concerns raised by NYSDEC and USEPA regarding detection limits and associated laboratory errors for Plutonium-239/240 results in soil. This sampling is discussed in **Section 4.**

TABLE 2-11
Surface Water Field Sampling Information
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Surface Water Location	Date Sampled	CREW	INDICATORS				
			Temperature (°C)	pH (standard units)	Conductivity (μmhos/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)
ESI							
SW12A-1	6/24/1994	AS/JWC					
SW12A-2	6/11/1994	AS/JWC					
SW12A-3	6/11/1994	AS/JWC					
RI							
SW12-1	11/5/1997	BJP	9.67	7.64	521	0.75	
SW12-10	11/3/1997	FAO	15.00	7.91	389	3.17	
SW12-11	12/13/1997	KKS	0.30	7.36	417	3.55	8.30
SW12-12	11/6/1997	BJP	11.56	8.04	418	1.27	
SW12-13	11/6/1997	BJP	11.22	7.56	402	4.11	
SW12-14	11/4/1997	CSM	9.17	6.50	398	6.49	
SW12-15	11/4/1997	BJP	9.17	6.50	393	4.32	
SW12-16	11/4/1997	BJP	8.89	7.08	288	3.97	
SW12-17	11/4/1997	BJP	9.00	6.50	214	13.70	
SW12-18	11/10/1997	BJP	7.44		277	17.20	
SW12-19	11/6/1997	BJP	9.67	7.77	396	7.18	
SW12-2	10/26/1997	NAS	10.78	6.93	520	4.25	
SW12-20	11/6/1997	BJP	10.67	8.36	478	0.92	
SW12-22	11/3/1997	FAO	12.39	7.80	294	4.34	
SW12-23	11/3/1997	FAO	14.17	7.25	442	3.89	
SW12-24	11/3/1997	FAO	12.50	7.07	460	4.52	
SW12-25	10/27/1997	NAS	13.61	7.31	158	6.58	
SW12-26	10/27/1997	NAS	11.67	6.85	350	4.10	
SW12-27	11/3/1997	FAO	15.22	7.80	485	1.94	
SW12-28	10/29/1997	FAO	11.06	7.94	606	12.70	
SW12-29	12/4/1997	KKS	4.60	7.97	387	0.70	10.90
SW12-3	12/13/1997	KKS	3.10	7.48	379	1.57	12.03
SW12-30	10/28/1997	FAO	9.61	8.18	320	25.80	
SW12-31	10/28/1997	FAO	7.72	8.25	547	1.80	
SW12-32	10/28/1997	FAO	7.22	8.23	551	3.49	
SW12-33	10/28/1997	FAO	9.06	8.02	841	8.00	
SW12-34	11/3/1997	FAO	11.61	6.77	479	4.07	
SW12-35	11/4/1997	CSM	8.78	6.50	193	19.40	
SW12-36	11/4/1997	FAO	9.28	6.50	421	1.72	
SW12-37	11/4/1997	CSM	9.00	6.87	402	1.58	
SW12-38	11/4/1997	CSM	9.89	6.77	354	2.14	
SW12-39	11/4/1997	BJP	10.33	7.74	414	2.17	
SW12-4	11/5/1997	BJP	9.61	7.63	597	4.59	
SW12-40	10/28/1997	FAO	6.06	7.80	451	3.10	

TABLE 2-11
Surface Water Field Sampling Information
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Surface Water Location	Date Sampled	CREW	INDICATORS				
			Temperature (°C)	pH (standard units)	Conductivity (µmhos/cm)	Turbidity (NTUs)	Dissolved Oxygen (mg/L)
SW12-41	10/28/1997	FAO	9.00	7.59	644	3.80	
SW12-42	11/6/1997	BJP	8.72	7.90	389	1.56	
SW12-43	11/9/1997	KKS	7.50	7.82	224	8.79	
SW12-44	12/5/1997	EAF	2.90	7.21	341	1.02	11.21
SW12-45	11/9/1997	KKS	7.70	8.29	226	4.63	
SW12-46	11/6/1997	BJP	9.39	7.73	399	24.60	
SW12-47	11/7/1997	BJP	9.28	7.69	486	5.51	
SW12-5	11/5/1997	BJP	10.39	7.31	683	0.82	
SW12-51	11/11/1997	KKS	8.00	8.33	500	2.90	
SW12-6	11/3/1997	FAO	12.44	8.26	329	1.60	
SW12-7	11/3/1997	FAO	13.72	8.16	273	7.00	
SW12-8	10/27/1997	NAS	9.33	7.75	671	10.50	
SW12-9	11/5/1997	BJP	8.39	7.67	548	2.46	
SW12-59	11/10/1997	BJP	7.17	8.10	278	3.61	
SW12-60	11/10/1997	NAS	7.28	8.12	297	3.08	
SW12-61	11/11/1997	BJP	9.44	7.92	321	3.64	
SW12-63	11/10/1997	BJP	8.22	7.90	319	0.94	
SW12-64	11/11/1997	EAF	6.28	7.79	356	0.86	
SW12-65	11/11/1997	KKS	5.78	7.50	355	2.04	
SW12-66	11/11/1997	KKS	5.89	7.46	327	4.20	
SW12-67	11/9/1997	KKS	7.10	7.82	295	2.71	
SW12-48	11/11/1997	EAF	6.94	7.60	515	0.74	
SW12-49	11/11/1997	KKS	6.72	7.85	494	2.06	
SW12-50	11/11/1997	EAF	6.39	8.40	492	1.67	
SW12-51	11/11/1997	KKS	8.00	8.33	500	2.90	
SW12-52	12/10/1997	EAF	0.90	7.78	407	1.23	13.55
SW12-53	12/10/1997	EAF	0.80	7.65	376	1.20	13.94
SW12-54	12/10/1997	KKS	0.80	7.77	376	1.21	13.88
SW12-55	12/9/1997	KKS	3.00	8.18	419	1.16	15.37
SW12-56	12/9/1997	KKS	2.70	8.19	419	1.18	15.38
SW12-57	12/9/1997	KKS	1.80	8.12	416	0.68	15.39
SW12-58	12/9/1997	EAF	1.70	8.02	430	1.72	14.64



LEGEND

■ SD12-153 Recollected Sediment sample location with Loc_ID

Potential Release Area

Note: There are a total of 25 recollected sediment sample locations; 21 SA and 1 DU from SEAD 12 and 2 SA and 1 DU from background.

600 0 600
(feet)

PARSONS

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SENECA ARMY DEPOT ACTIVITY
RI/FS
SEAD-12

FIGURE 2-22
LOCATION OF RECOLLECTED
SEDIMENT SAMPLES

SCALE 1:600	DATE NOV 2000	REV	Sheet 1 of 1

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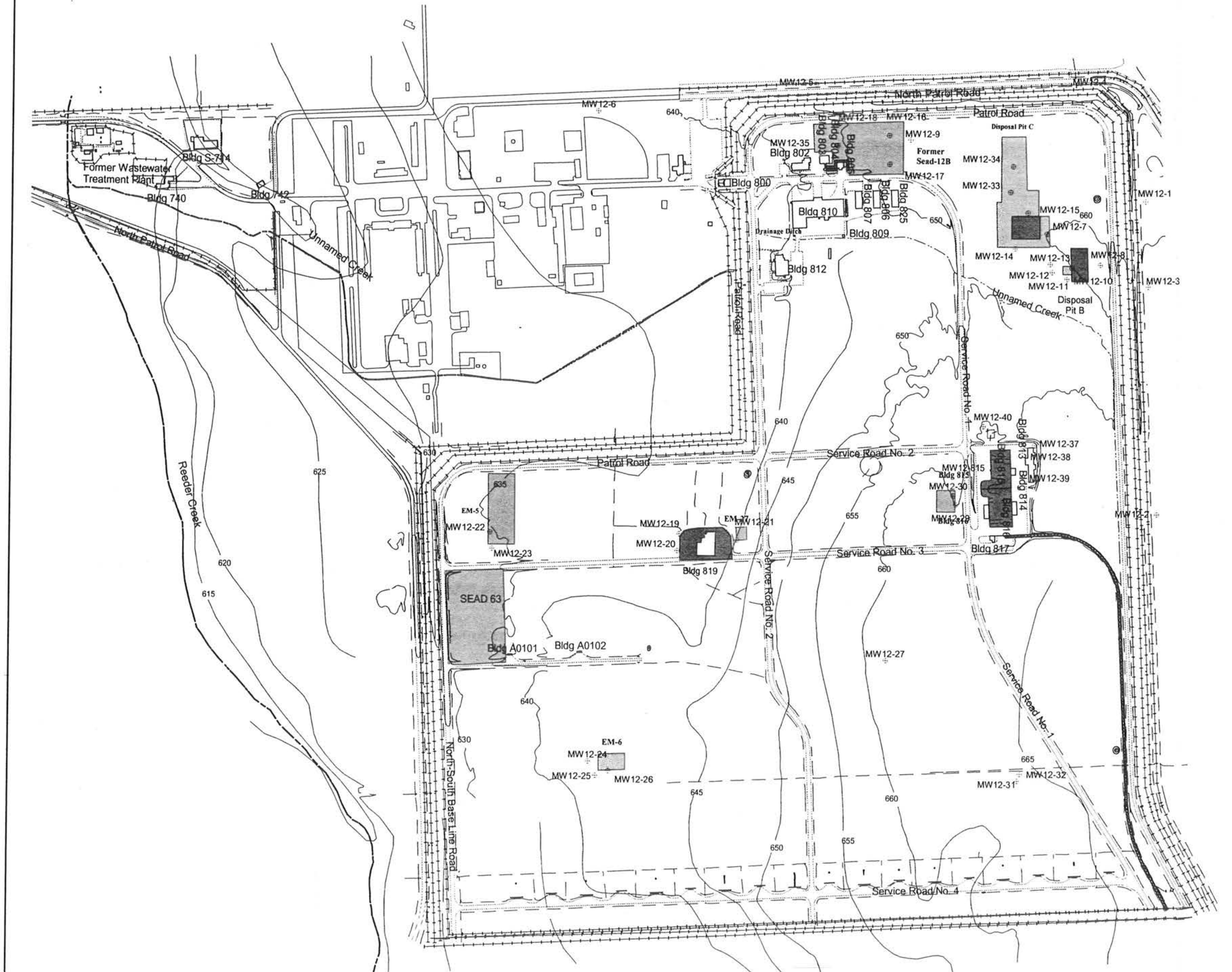
2.9 GROUNDWATER INVESTIGATION

The SEAD-12 RI groundwater investigation program included the installation and testing of 38 new groundwater monitoring wells in conjunction with 6 existing ESI monitoring wells and one existing deep bedrock water well (DW-815 near building 815). Testing was conducted to verify previous sampling data, obtain background water quality data, determine background groundwater quality, confirm the groundwater flow direction, gather additional piezometric head data in the overburden aquifer, and determine if hazardous constituents are migrating in the groundwater from the known disposal pits, newly identified disposal sites, and several buildings. Monitoring well construction, development, monitoring and sampling details are discussed below. SEAD-12 well locations are shown relative to potential release areas in **Figure 2-14**. These monitoring well locations include:

- background wells, upgradient, north and east of SEAD-12;
- upgradient and downgradient of disposal pits A and B;
- upgradient and downgradient of disposal pit C;
- the vicinity of the former dry waste disposal pit, formerly known as SEAD-12B, north of buildings 804 and 805;
- shallow bedrock well downgradient of the under ground storage tank behind building 804;
- vicinity of buildings 813, 814, and 815, based on soil gas investigation;
- downgradient of the transformer substation located due north of building 815;
- upgradient and downgradient of building 819;
- downgradient of disposal pit locations that were originally located with geophysical investigations and later confirmed with test pitting investigations.

2.9.1 Monitoring Well Installation

The installation procedures employed during the SEAD-12 RI/FS Program were consistent with the USEPA Region II CERCLA QA Manual and the NYSDEC Technical and Administrative Guidance Manuals (TAGM) regarding design, installation, development and collection of groundwater samples. Further, the SEAD-12 RI/FS program was 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 RI field program were constructed of factory slotted PVC screens. For the ESI program, monitoring wells were constructed of non-solvent welded/bonded continuous slot wire wrap screens as required in



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LEGEND

⊕ MW 12-15 MONITORING WELL LOCATION WITH LABEL

RADIATION CLASSIFICATION AREAS

- CLASS 1
- CLASS 2
- CLASS 3

600 0 600 (feet)

PARSONS

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SENECA ARMY DEPOT ACTIVITY
RI/FS
SEAD 12

FIGURE 2-23
MONITORING WELL LOCATIONS

SCALE 1:600	DATE NOV 2000	REV	Sheet 1 of 1

O:\AV_GIS30\SENECA\SEAD12\SAMPLELO\GKLOC.APR

6NYCRR Part 360. Refer to **Table 2-12** for well installation details for all monitoring wells installed during the SEAD-12 ESI and RI Programs.

2.9.1.1 Overburden Wells

Appendix A, Section 3.4 and 3.5 of the Generic Workplan, provides detailed descriptions of the operating procedures used during for the drilling, soil sampling for characterization, and installation of the overburden monitoring wells. In general, the overburden monitoring wells were installed using a hollow stem auger rig employing 4.25-inch (inside diameter) hollow stem augers. The borings were advanced to auger refusal, with split spoon samples collected continuously until spoon refusal. During the RI, monitoring wells were constructed of 2-inch I.D., schedule 40 polyvinyl chloride (PVC) having flush threaded joints containing rubber gaskets, and a well screen slot size of 0.010. Well screens were placed to screen the interval 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 final screen length and position.

The sand pack materials and well screen slot sizes and materials 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. 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 poured or tremied into the annular space between the well screen and the hollow stem auger. The sand pack was not extended more than 2 feet (but a minimum of 6 inches) above the top, or 6 inches below the bottom of the screen. A finer grained sand, approximately 6 inches thick, was placed at the top of the sand pack, to prevent infiltration of the bentonite into the sand pack around the well screen.

To seal the well and prevent vertical groundwater migration, a layer of bentonite chips, between 1 and 2 feet thick, was placed top of the choke sand and hydrated with potable water. After the bentonite seal was installed the remaining annular space was completely filled with a lean cement grout containing at least 3% by weight bentonite to cement. In some cases, the bentonite seal extended to the surface, in these cases the cement/bentonite grout was unnecessary.

In all instances, wells were completed with a protective steel surface casing, at least 4 inches in diameter. This protective steel casing extends 3 1/2 feet below the ground surface to prevent frost heave, with a 2-foot (never to exceed a 2.5-foot) stickup above the ground surface. In some cases,

TABLE 2-12
SEAD-12 Monitoring Well Construction Details
SEAD-12 Remedial Investigaion Report
Seneca Army Depot Activity

Well Location Identification	Study	Depth of Well Relative to Top of Casing (ft)	Depth of Well Relative to Ground Surface (ft)	Stickup Length (ft)	Screen Interval Relative to Top of Casing (ft)	Well Screen Length (ft)	Depth to Top of Sand Pack Relative to Top of Casing
MW12-1	RI	11.43	9.01	2.42	5.43 - 10.93	5.50	4.43
MW12-2	RI	8.60	6.09	2.51	5.40 - 8.40	3.00	4.60
MW12-3	RI	20.34	17.86	2.48	8.09 - 21.09	13.00	6.48
MW12-4	RI	14.46	11.78	2.68	7.03 - 14.24	7.21	5.66
MW12-5	RI	20,79	18.40	2.39	7.29 - 20.29	13.00	6.89
MW12-6	RI	14.79	12.00	2.79	6.99 - 14.09	7.10	5.79
MW12-7	RI	16.23	13.64	2.59	8.59 - 15.59	7.00	6.59
MW12-8	RI	14.86	12.11	2.75	7.35 - 14.20	6.85	6.25
MW12-9	RI	16.80	14.21	2.59	8.79 - 15.89	7.10	6.79
MW12-10	RI	19.60	17.11	2.49	8.99 - 18.99	10.00	6.99
MW12-11	RI	15.32	12.90	2.42	10.02 - 15.52	5.50	8.02
MW12-12	RI	15.69	12.95	2.74	8.24 - 15.24	7.00	7.24
MW12-13	RI	15.68	12.86	2.82	8.32 - 15.82	7.50	6.82
MW12-14	RI	16.65	14.01	2.64	8.74 - 15.54	6.80	6.74
MW12-15	RI	15.14	12.54	2.60	7.44 - 14.64	7.20	3.90
MW12-16	RI	16.76	14.33	2.43	8.83 - 15.83	7.00	6.83
MW12-17	RI	21.18	18.33	2.85	8.25 - 20.45	12.20	6.65
MW12-18	RI	17.05	14.52	2.53	8.53 - 15.83	7.30	7.03
MW12-19	RI	13.10	10.32	2.78	8.28 - 13.08	4.80	6.78
MW12-20	RI	16.95	14.29	2.66	8.46 - 15.46	7.00	6.66
MW12-21	RI	13.70	10.79	2.91	8.51 - 13.26	4.75	6.91
MW12-22	RI	15.72	12.72	3.00	7.40 - 14.10	6.70	6.20
MW12-23	RI	15.66	13.29	2.37	7.07 - 14.27	7.20	5.87
MW12-24	RI	12.45	9.89	2.56	7.26 - 12.16	4.90	5.66
MW12-25	RI	13.08	10.19	2.89	7.84 - 12.74	4.90	6.84
MW12-26	RI	13.06	10.34	2.72	7.47 - 12.32	4.85	6.47

TABLE 2-12
SEAD-12 Monitoring Well Construction Details
SEAD-12 Remedial Investigaion Report
Seneca Army Depot Activity

Well Location Identification	Study	Depth of Well Relative to Top of Casing (ft)	Depth of Well Relative to Ground Surface (ft)	Stickup Length (ft)	Screen Interval Relative to Top of Casing (ft)	Well Screen Length (ft)	Depth to Top of Sand Pack Relative to Top of Casing
MW12-27	RI	12.94	9.93	3.01	7.51 - 12.26	4.75	6.51
MW12-29	RI	16.91	13.91	3.00	9.10 - 16.20	7.10	7.10
MW12-30	RI	16.40	13.67	2.73	8.53 - 15.73	7.20	6.73
MW12-31	RI	12.70	10.01	2.69	7.59 - 12.39	4.80	6.19
MW12-32	RI	12.94	10.30	2.64	7.79 - 12.64	4.85	6.64
MW12-33	RI	17.88	15.04	2.84	8.84 - 15.39	6.55	6.84
MW12-34	RI	16.60	14.12	2.48	8.73 - 15.48	6.75	6.73
MW12-35	RI	40.35	37.92	2.43	30.05 - 39.85	9.80	27.05
MW12-37	RI	13.11	10.58	2.53	7.53 - 12.43	4.90	6.53
MW12-38	RI	10.55	10.10	0.45	5.45 - 10.35	4.90	3.95
MW12-39	RI	10.28	10.65	-0.37	4.63 - 9.53	4.90	3.13
MW12-40	RI	13.30	10.62	2.68	8.38 - 13.23	4.85	6.68
MW12A-1	ESI	15.40	14.00	1.40	5.40 - 14.40	9.00	4.30
MW12A-2	ESI	13.04	10.54	2.50	5.34 - 12.14	6.80	4.24
MW12A-3	ESI	16.77	14.27	2.50	5.17 - 15.67	10.50	4.17
MW12B-1	ESI	19.15	16.65	2.50	6.65 - 18.35	11.70	4.65
MW12B-2	ESI	16.00	13.50	2.50	5.90 - 14.90	9.00	5.00
MW12B-3	ESI	15.98	13.48	2.50	5.98 - 14.88	8.90	4.88

the depth of the protective casing was reduced to allow for better well construction in shallow bedrock situations. Monitoring well completion procedures for identification, security, and maintenance are detailed in the Generic Workplan.

2.9.1.2 Shallow Bedrock Wells

A single shallow bedrock well was installed at SEAD-12 in the vicinity of building 804. Well installation required the overburden boring be advanced using 6 1/4-inch I.D. hollow stem augers, and a 5 7/8-inch roller bit. The shallow bedrock well was double cased, setting the 4-inch steel overburden casing 3-4 feet into the competent shale. The 4-inch steel casing was installed with a two foot bentonite seal at its base and the annular space between the 4-inch casing and the bore hole grouted to the surface and allowed to set for a minimum of 48 hours. After the concrete grout was completely set, the boring was advanced 20-feet into bedrock using HQ size coring tools. During coring, potable (demonstrated analyte-free) water was pumped into the core hole to serve as a lubricant and also to remove the fine rock flour and shale chips from the hole. The water was recirculated into the hole after passing through a baffled steel portable drilling pit to settle the majority of the rock flour and shale chips, preventing them from being reintroduced into the core hole. A PVC monitoring well was installed in the 10 to 20 foot zone of the competent shale using similar techniques to those described previously for the overburden wells. The filter pack and grout materials for bedrock wells were installed using a tremie system.

2.9.2 Monitoring Well Development

Subsequent to the well installations, each monitoring well was developed to insure that a proper hydraulic connection existed between the well and the surrounding aquifer. The criteria for determining if the well had been properly developed was based upon the guidance provided by the NYSDEC, TAGM #HWR-88-4015. The development of monitoring wells was performed 2 to 7 days after well installation and at least 7 days before well sampling and water elevation activities. All of the new RI and existing ESI wells were developed. Well development criteria and procedures are defined in Section 3.6 of the Generic Workplan.

Prior to development 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. The development procedure consisted of light surging for 2 to 5 minutes, with periodic removal of water using a bailer. Following the surge and bail phase of development the water level in the well was allowed to equilibrate before development activities continued. After the water level in the well equilibrated, a perastaltic pump, with Teflon® tubing, is used to complete development. While removing water at a rate of between 1.5 and 3 liters per minute, the water level was monitored as to determine the pumping drawdown on the well. This drawdown data allows the determination of preliminary pumping rates for groundwater sampling. At the end of the development process, the water was removed at a rate of approximately 0.1 liter per minute, allowing continued development while not creating a large influx of silt and clay.

Temperature, specific conductivity and pH were measured in the field during the development process. A Hach portable field turbidimeter with full scale ranges of 1.0, 10, and 100 NTUs was used to measure turbidity. Readings were conducted at a minimum frequency of once per well volume. **Table 2-13** lists the final well development parameters for each monitoring well.

Development operations continued until the following conditions were met:

- Water samples had the lowest possible turbidity measurement (preferably < 50 NTUs);
- Temperature, specific conductivity and pH of the water varied by no more than 10 percent over 2 consecutive readings; and
- A minimum of three bore hole volumes of water were removed from each well.

2.9.3 Groundwater Sampling

SEAD-12 groundwater sample locations and analytical methods are summarized in **Table 2-14**, based on potential release area, location identifier (LOC_ID). A total of 120 groundwater samples were collected during multiple groundwater sampling events completed during the ESI and RI programs. Detailed sampling procedures were provided in the Project Scoping Plan and Appendix A of the Generic Workplan. The ESI and RI purge and sample procedures are summarized below.

2.9.3.1 ESI Program Methodology

During the ESI phase of the work at SEAD-12 the monitoring wells were purged prior to sampling using a peristaltic pump and dedicated Teflon tubing. Subsequent to purging the wells were sampled using a clean Teflon bailer. Prior to purging, if the silt thickness at the bottom of the well was greater than one inch the silt was removed with a peristaltic pump and dedicated Teflon tubing. Purging began with the open-end of the Teflon tube at the bottom of the well screen, or at least 6 to 7 inches from the bottom of the well. The purging flow rate was between 0.01 and 2.0 liters per minute (L/min). During the purging process, the water level in the well was not pumped below one half of the pre-purged water column height.

The wells to be sampled were divided into two groups: those that recharge slowly, and those that recharge quickly. A fast recharging well recharges to maintain a water level greater than one-half the pre-purging level, while being purged at a minimum of 0.1 L/min. A slow recharging well recharges too slowly to maintain one-half the pre-purge water column at a minimum purging rate of 0.01 L/min.

TABLE 2-13
SEAD-12 Monitoring Well Development Information
SEAD-12 Remedial Investigation
Seneca Army Depot

WELL NUMBER	STUDY (1)	WELL INSTALLATION DATE	DEVELOPMENT START DATE	CREW	POINT OF WELL (ft)	TURBIDITY (NTUs)	GALLONS REMOVED	WELL VOLUMES REMOVED (gal)
MW12A-1	ESI	6/11/1994	11/10/1998	DRG	15.43	8.4	8.4	2.3
MW12A-2	ESI	6/11/1994	11/9/1998	DRG	13.04	10.1	9.9	3.4
MW12A-3	ESI	6/12/1994	11/11/1998	DRG	16.78	8.39	13.0	2.6
MW12B-1	ESI	6/13/1994	11/12/1998	ITR	19.15	20.5	12.0	2.4
MW12B-2	ESI	6/12/1994	4/8/1999	BJP	16.00	4.4	3.0	0.3
MW12B-3	ESI	6/12/1994	4/8/1999	BJP	15.98	3.85	5.0	0.5
MW12-1	RI	11/5/1997	4/8/1999	BJP	11.43		13.9	2.3
MW12-2	RI	11/7/1997	4/6/1999	BJP	8.06	23.6	6.0	1.4
MW12-3	RI	11/6/1997	4/7/1999	BJP	20.34	22.8	8.0	1.1
MW12-4	RI	11/5/1997	4/7/1999	BJP	14.46	11.9	17.0	1.8
MW12-5	RI	11/5/1997	4/7/1999		20.85			
MW12-6	RI	10/31/1998	4/7/1999	MB	14.5	18.8	15.0	3.1
MW12-7	RI	10/28/1998	4/9/1999	LLB	16.23	6.34	12.5	1.7
MW12-8	RI	10/28/1998	4/6/1999	BJP	14.86		12.6	1.9
MW12-9	RI	10/17/1998	3/31/1999	LLB	16.8		35.3	3.7
MW12-10	RI	9/29/1998	4/5/1999	LLB	19.6	1.55	14.1	1.1
MW12-11	RI	9/29/1998	4/5/1999	LLB	15.32	5.19	10.2	1.0
MW12-12	RI	9/30/1998	4/5/1999	BJP	15.69	34.8	10.0	1.1
MW12-13	RI	10/1/1998	4/2/1999	LLB	15.68	2.52	26.6	3.9
MW12-14	RI	10/15/1998	4/6/1999	LLB	16.65	40	42.2	5.0
MW12-15	RI	10/1/1998	4/1/1999	LLB	15.14	8.87	13.1	1.1
MW12-16	RI	10/17/1998	3/30/1999	BJP	16.76	50	7.5	1.0
MW12-17	RI	10/17/1998	3/31/1999	LLB	21.18	17	24.5	2.1
MW12-18	RI	10/2/1998	3/30/1999	LLB	17.05	33.2	25.5	2.5
MW12-19	RI	10/3/1998	3/24/1999	BJP	13.1	45	14.5	2.4

TABLE 2-13
SEAD-12 Monitoring Well Development Information
SEAD-12 Remedial Investigation
Seneca Army Depot

WELL NUMBER	STUDY (1)	WELL INSTALLATION DATE	DEVELOPMENT START DATE	CREW	POINT OF WELL (ft)	TURBIDITY (NTUs)	GALLONS REMOVED	WELL VOLUMES REMOVED (gal)
MW12-20	RI	10/3/1998	3/24/1999	LLB	16.59	95	20.0	1.9
MW12-21	RI	10/3/1998	3/26/1999	LLB	13.7	3.96	17.0	2.2
MW12-22	RI	10/4/1998	3/24/1999	BJP	15.72	18	14.0	1.4
MW12-23	RI	10/5/1998	3/24/1999	LLB/BJP	15.66	13	15.5	1.6
MW12-24	RI	10/19/1998	3/23/1999	BJP	12.45	5.3	13.0	1.8
MW12-25	RI	10/18/1998	3/23/1999	LLB	13.08	14.5	15.0	2.2
MW12-26	RI	10/18/1998	3/26/1999	BJP	13.06	20	16.0	2.4
MW12-27	RI	10/4/1998	3/26/1999	BJP	12.94	130	7.5	1.1
MW12-29	RI	10/15/1998	3/25/1999	LLB	16.91	8.6	18.5	1.7
MW12-30	RI	10/16/1998	3/25/1999	BJP	16.4	13	14.0	1.3
MW12-31	RI	10/26/1998	4/1/1999	LLB	12.7	45.7	20.5	3.4
MW12-32	RI	10/26/1998	3/26/1999	BJP	12.94	400	4.0	1.2
MW12-33	RI	10/31/1998	3/31/1999	BJP	17.88	47	21.0	1.9
MW12-34	RI	10/31/1998	4/5/1999	BJP	16.6		13.5	1.4
MW12-35	RI	10/30/1998	12/30/1999	LLB	40.35	17.2	22.5	2.1
MW12-37	RI	11/1/1998	3/29/1999	BJP	13.11		18.5	3.0
MW12-38	RI	11/1/1998	3/30/1999	BJP	10.55		7.0	1.0
MW12-39	RI	11/1/1998	3/30/1999	LLB	10.28	17	13.0	1.8
MW12-40	RI	10/15/1998	3/29/1999	BJP	13.3	5.69	15.5	2.7
MW57-1	RI	12/2/1993	4/5/1999	MB	8.62	23	4.5	1.7

For wells that recharge slowly, indicator parameters, (temperature, specific conductivity, and pH), time, flow rate, depth to the bottom of the opening of the Teflon tube, and total volume of water removed were measured and recorded when 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. 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 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. The well was allowed to recharge and the process repeated.

After parameter stabilization, the well was allowed to sit for at least 2-1/2 hours prior to sampling. Prior to sampling, the water level was measured to confirm recovery to 95 percent of the original static level. 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.

For purging a fast recharging well, measurements of indicator parameters (temperature, specific conductance and pH), time, flow rate, depth to the bottom of the Teflon tubing, and total volume of water removed were recorded after removing approximately one well volume. After each well volume was removed the indicator parameters were again 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). Once the indicator parameters reached stability the groundwater was collected.

As noted on **Table 2-14**, groundwater samples collected during the ESI were analyzed for the following parameters:

- TCL volatile organic compounds,
- TCL semivolatile organic compounds,
- TCL pesticides/PCBs,
- TAL Metals and Cyanide according to NYDEC CLP SOW,
- Gross alpha and beta radiation,
- Gamma spectral analysis,
- Alpha spectral analysis.

Table 2-14
Groundwater Sampling and Analysis Summary
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RADIATION SURVEY CLASS	POTENTIAL RELEASE AREA	LOC_ID	SAMP_ID	MATRIX	VOCs TCL NYSDEC CLP	VOCs EPA METHOD 524.2	SVOCs TCL NYSDEC CLP	Pesticides/ PCBs TCL NYSDEC CLP	Metals TCL NYSDEC CLP	Analysis Methods for Radiological Data EPA 901.1	EPA 906.0	EPA 900.0	SM2540G	HASL 300	EPA 903.0	EPA 913	Promethium-147
II	EM-5	MW12-20	122233	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
II	EM-5	MW12-20	122006	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
II	EM-5	MW12-21	122004	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
II	EM-5	MW12-22	122007	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
II	EM-5	MW12-23	122008	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
II	EM-5	MW12-22	122228	GROUND WATER		X	X	X	X	X		X		X			X
II	EM-5	MW12-23	122229	GROUND WATER		X	X	X	X	X	X	X		X			X
II	EM-6	MW12-24	122002	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
II	EM-6	MW12-25	122039	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
II	EM-6	MW12-25	122043	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
II	EM-6	MW12-25	122266	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
II	EM-6	MW12-26	122003	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
II	EM-6	MW12-24	122264	GROUND WATER		X	X	X	X	X	X	X		X			X
II	EM-6	MW12-25	122263	GROUND WATER		X	X	X	X	X	X	X		X			X
II	EM-6	MW12-26	122265	GROUND WATER		X	X	X	X	X	X	X		X			X
I	BLDG 819/EM-27	MW12-19	122005	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
I	BLDG 819/EM-27	MW12-19	122235	GROUND WATER		X	X	X	X	X	X	X		X			X
I	BLDG 819/EM-27	MW12-20	122232	GROUND WATER		X	X	X	X	X	X	X		X			X
I	BLDG 819/EM-27	MW12-21	122236	GROUND WATER		X	X	X	X	X	X	X		X			X
II	BLDG 815/816/EM-28	MW12-29	122014	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
II	BLDG 815/816/EM-28	MW12-30	122013	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
II	BLDG 815/816/EM-28	DW12-815	122018	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
II	BLDG 815/816/EM-28	MW12-29	122251	GROUND WATER		X	X	X	X	X	X	X		X			X
II	BLDG 815/816/EM-28	MW12-30	122252	GROUND WATER		X	X	X	X	X	X	X		X			X
II	BLDG 815/816/EM-28	DW12-815	122255	GROUND WATER		X	X	X	X	X	X	X		X			X
II	DISPOSAL PIT A/B	MW12-8	122046	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
I	DISPOSAL PIT A/B	MW12-10	122040	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
I	DISPOSAL PIT A/B	MW12-11	122038	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
II	DISPOSAL PIT A/B	MW12-12	122041	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
II	DISPOSAL PIT A/B	MW12-13	122047	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
I	DISPOSAL PIT A/B	MW12-10	122261	GROUND WATER		X	X	X	X	X	X	X		X			X
I	DISPOSAL PIT A/B	MW12-11	122259	GROUND WATER		X	X	X	X	X	X	X		X			X
I	DISPOSAL PIT A/B	MW12-12	122262	GROUND WATER		X	X	X	X	X	X	X		X			X
I	DISPOSAL PIT A/B	MW12-13	122260	GROUND WATER		X	X	X	X	X	X	X		X			X
I	DISPOSAL PIT C	MW12-7	122044	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
I	DISPOSAL PIT C	MW12-7	122048	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
I	DISPOSAL PIT C	MW12-14	122049	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
II	DISPOSAL PIT C	MW12-15	122023	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
II	DISPOSAL PIT C	MW12-33	122022	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
II	DISPOSAL PIT C	MW12-34	122045	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
I	DISPOSAL PIT C	MW12-7	122272	GROUND WATER		X	X	X	X	X	X	X		X			X
II	DISPOSAL PIT C	MW12-14	122273	GROUND WATER		X	X	X	X	X	X	X		X			X
II	DISPOSAL PIT C	MW12-15	122271	GROUND WATER		X	X	X	X	X	X	X		X			X
II	DISPOSAL PIT C	MW12-33	122243	GROUND WATER		X	X	X	X	X	X	X		X			X

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RADIATION SURVEY CLASS	POTENTIAL RELEASE AREA	LOC_ID	SAMP_ID	MATRIX	VOCs		SVOCs	Pesticides/ PCBs	Metals	Analysis Methods for Radiological Data							
					TCL NYSDEC CLP	EPA METHOD 524.2	TCL NYSDEC CLP	TCL NYSDEC CLP	TCL NYSDEC CLP	EPA 901.1	EPA 906.0	EPA 900.0	SM2540G	HASL 300	EPA 903.0	EPA 913	Promethium-147
II	DISPOSAL PIT C	MW12-33	122244	GROUND WATER		X	X	X	X	X	X	X		X			X
II	DISPOSAL PIT C	MW12-34	122246	GROUND WATER		X	X	X	X	X	X	X		X			X
II	FORMER DRY WASTE DISPOSA	MW12B-1	MW12B-1	GROUND WATER	X		X	X	X								
II	FORMER DRY WASTE DISPOSA	MW12B-2	MW12B-2	GROUND WATER	X		X	X	X								
II	FORMER DRY WASTE DISPOSA	MW12B-3	MW12B-3	GROUND WATER	X		X	X	X								
II	FORMER DRY WASTE DISPOSA	MW12B-1	122021	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
II	FORMER DRY WASTE DISPOSA	MW12B-2	122031	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
II	FORMER DRY WASTE DISPOSA	MW12B-3	122030	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
II	FORMER DRY WASTE DISPOSA	MW12-9	122050	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
II	FORMER DRY WASTE DISPOSA	MW12-16	122015	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
II	FORMER DRY WASTE DISPOSA	MW12-17	122016	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
II	FORMER DRY WASTE DISPOSA	MW12-18	122017	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
II	FORMER DRY WASTE DISPOSA	MW12-18	122019	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
II	FORMER DRY WASTE DISPOSA	MW12-35	122028	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
II	FORMER DRY WASTE DISPOSA	MW12B-1	122240	GROUND WATER		X	X	X	X	X	X	X		X			X
II	FORMER DRY WASTE DISPOSA	MW12B-2	122239	GROUND WATER		X	X	X	X	X	X	X		X			X
II	FORMER DRY WASTE DISPOSA	MW12B-3	122238	GROUND WATER		X	X	X	X	X	X	X		X			X
II	FORMER DRY WASTE DISPOSA	MW12-8	122258	GROUND WATER		X	X	X	X	X	X	X		X			X
II	FORMER DRY WASTE DISPOSA	MW12-9	122245	GROUND WATER		X	X	X	X	X	X	X		X			X
II	FORMER DRY WASTE DISPOSA	MW12-16	122267	GROUND WATER		X	X	X	X	X	X	X		X			X
II	FORMER DRY WASTE DISPOSA	MW12-17	122242	GROUND WATER		X	X	X	X	X	X	X		X			X
II	FORMER DRY WASTE DISPOSA	MW12-18	122237	GROUND WATER		X	X	X	X	X	X	X		X			X
II	FORMER DRY WASTE DISPOSA	MW12-35	122241	GROUND WATER		X	X	X	X	X	X	X		X			X
III	CLASS III	MW12A-1	MW12A-1	GROUND WATER	X		X	X	X								
III	CLASS III	MW12A-2	MW12A-2	GROUND WATER	X		X	X	X								
III	CLASS III	MW12A-3	MW12A-3	GROUND WATER	X		X	X	X								
III	CLASS III	MW12A-1	122009	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
III	CLASS III	MW12A-2	122010	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
III	CLASS III	MW12A-3	122011	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
III	CLASS III	MW12-27	122012	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
III	CLASS III	MW12-31	122032	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
III	CLASS III	MW12-32	122020	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
III	CLASS III	MW12-37	122025	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
III	CLASS III	MW12-38	122026	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
III	CLASS III	MW12-39	122027	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
III	CLASS III	MW12-40	122024	GROUND WATER	X		X	X	X	X	X	X		X	X	X	
III	CLASS III	MW12A-1	122256	GROUND WATER		X	X	X	X	X	X	X		X			X
III	CLASS III	MW12A-2	122268	GROUND WATER		X	X	X	X	X	X	X		X			X
III	CLASS III	MW12A-3	122249	GROUND WATER		X	X	X	X	X	X	X		X			X
III	CLASS III	MW12-27	122230	GROUND WATER		X	X	X	X	X	X	X		X			X
III	CLASS III	MW12-31	122234	GROUND WATER		X	X	X	X	X	X	X		X			X
III	CLASS III	MW12-32	122231	GROUND WATER		X	X	X	X	X	X	X		X			X
III	CLASS III	MW12-37	122257	GROUND WATER		X	X	X	X	X	X	X		X			X
III	CLASS III	MW12-38	122253	GROUND WATER		X	X	X	X	X	X	X		X			X

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RADIATION SURVEY CLASS	POTENTIAL RELEASE AREA	LOC_ID	SAMP_ID	MATRIX	VOCs		SVOCs	Pesticides/ PCBs	Metals	Analysis Methods for Radiological Data							
					TCL NYSDEC CLP	EPA METHOD 524.2	TCL NYSDEC CLP	TCL NYSDEC CLP	TCL NYSDEC CLP	EPA 901.1	EPA 906.0	EPA 900.0	SM2540G	HASL 300	EPA 903.0	EPA 913	Promethium-147
III	CLASS III	MW12-39	122250	GROUND WATER		X	X	X	X	X	X	X		X			X
III	CLASS III	MW12-40	122254	GROUND WATER		X	X	X	X	X	X	X		X			X
	BACKGROUND	MW12-1	122033	GROUND WATER					X	X	X	X		X	X	X	
	BACKGROUND	MW12-2	122034	GROUND WATER					X	X	X	X		X	X	X	
	BACKGROUND	MW12-3	122035	GROUND WATER					X	X	X	X		X	X	X	
	BACKGROUND	MW12-4	122036	GROUND WATER					X	X	X	X		X	X	X	
	BACKGROUND	MW12-5	122037	GROUND WATER					X	X	X	X		X	X	X	
	BACKGROUND	MW12-6	122042	GROUND WATER					X	X	X	X		X	X	X	
	BACKGROUND	MW12-1	122225	GROUND WATER					X	X	X	X		X			X
	BACKGROUND	MW12-2	122223	GROUND WATER					X	X	X	X		X			X
	BACKGROUND	MW12-3	122224	GROUND WATER					X	X	X	X		X			X
	BACKGROUND	MW12-4	122222	GROUND WATER					X	X		X		X			X
	BACKGROUND	MW12-5	122221	GROUND WATER					X	X	X	X		X			X
	BACKGROUND	MW12-6	122220	GROUND WATER					X	X	X	X		X			X
	BACKGROUND	MW45-4	122000	GROUND WATER					X	X	X	X		X			X
	BACKGROUND	MW45-4	122247	GROUND WATER					X	X	X	X		X			X
	BACKGROUND	MW57-1	122029	GROUND WATER					X	X	X	X		X			X
	BACKGROUND	MW57-1	122227	GROUND WATER					X	X	X	X		X			X
	BACKGROUND	MW34/35	122001	GROUND WATER					X	X	X	X		X			X
	BACKGROUND	MW34/35	122226	GROUND WATER					X	X	X	X		X			X

NOTE: Parameters included in each Analysis Method are:
(1) EPA 901.1- Pb-211, -214, Bi-214, Ce-137, Co-60
(2) EPA906.0- Tritium
(3) EPA 900.0- Gross Alpha and Beta
(4) SM2540G-Not applicable for ground water.
(5) HASL 300- Th-227, -230, -232, U-234, -235, -238, Pl-239/240, Am-241, and Alpha spectroscopy.
(6) EPA 903.0- Ra-223, -226
(7) EPA913.0- Not applicable for ground water.
(8) A separate column was added for Promethium-147 as it was not analyzed for in every sample. It was not analyzed for in ground water.

2.9.3.2 RI Program Methodology

During the SEAD-12 RI/FS Program monitoring wells were sampled using dedicated Teflon® tubing and low-flow bladder pump systems. The low-flow bladder pump systems employed were composed of a 2-inch by 24-inch stainless steel cased bladder pump with Teflon® bladder, Teflon®, a Marschalk® low-flow pump controller, and an electric air compressor.

The sampling process for each well sampled during the SEAD-12 RI/FS Program began by purging the well. The purging process began with a flow rate of between 0.01 and 2 liters per minute (L/min). The water was not pumped below one half of the pre-purge static water column height. All water purged from the wells was collected at the surface with a graduated 5-gallon bucket for flow rate measuring purposes. During removal of the first volume of water, and based on water level response during development activities, it was determined if the well was a slow or fast recharging well, as defined above.

For slow recharge wells, when purging had removed approximately one-half of a well volume, or the water level was lowered to one half the original static water column, indicator parameters (temperature, specific conductivity, and pH), time, flow rate, depth to the bottom of the opening of the Teflon tube, and total volume of water removed were measured and recorded . 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. This process was repeated until at least one well volume had been removed and indicator parameters had stabilized (i.e., two successive measurements varied be less than 10 percent). Upon parameter stabilization the purging stopped.

After parameter stabilization, the well was allowed to sit for 2-1/2 hours prior to sampling at which time the water level was measured in the well. If the well had recovered to 95 percent of the original static level, then sampling of the well was performed. 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.

For purging a fast recharging well, measurements of indicator parameters (temperature, specific conductance and pH), time, flow rate, depth to the bottom of the bladder pump and total volume of water removed were recorded after removing approximately one well volume. 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 if indicator parameters had stabilized (two successive measurements varied by less than 10 percent) the groundwater was collected. If required, additional temperature, specific conductance, and pH measurements were made until they stabilized.

The first and second rounds of groundwater sampling during the RI included the 36 new SEAD-12 RI wells, 6 ESI wells, 3 background wells in the OB/OD grounds and SEAD-57, and 1 water supply well in front of building 815. The RI groundwater samples were analyzed for the parameters as listed in **Table 2-14**. Purging and sampling parameters are reported in **Table 2-15**. The analyte sampling order for both rounds of groundwater sampling was as follows:

- volatile organic compounds,
- semivolatile organic compounds,
- metals,
- cyanide,
- pesticides and PCBs,
- nitrate/nitrite.
- Radionuclide analyses
- At locations where Limited Physical and Chemical parameters were collected, these parameters were collected last.

In addition to analysis listed above, limited physical and chemical parameters were analyzed for in monitoring wells MW12-6, MW12-10, MW12-12, and MW12-25. Limited physical and chemical parameters include:

- Alkalinity
- Iron (ferrous)
- Sulfate/Sulfide
- Total Organic Carbon
- Biological Oxygen Demand
- Hardness
- Total Dissolved Solids
- Chemical Oxygen Demand

This sampling order was employed to collect the aliquots for metals analysis early in the sampling sequence in an effort to obtain water samples for metals that closely represent the actual aquifer conditions, avoiding high turbidity samples that may result from stressing the aquifer.

TABLE 2-15
SEAD-12 Groundwater Field Sampling Information
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Monitoring Well	Date Sampled	INDICATORS Temperature (°C)	pH standard unit	Conductivity (µmhos/cm)	Turbidity (NTUs)	ORP (millivolts)	Dissolved Oxygen (mg/L)	Gallons of Purge Water Removed	Standing Water Vol. (gal)	Well Volumes Removed
Round 1 Groundwater Sampling										
MW12A-1 (ESI)	4/13/1999	7.95	6.82	955	15.90	103.3	5.34	11.40	1.976	5.77
MW12A-2 (ESI)	4/13/1999	6.43	6.92	638	48.80	100.5	5.10	8.25	1.792	4.60
MW12A-3 (ESI)	4/13/1999	8.10	7.09	746	12.30	70.3	4.37	3.60	2.006	1.79
MW12B-1 (ESI)	4/21/1999	8.92	6.79	2117	23.00	103.0	4.62	4.50	1.631	2.76
MW12B-2 (ESI)	4/13/1999	7.70	6.99	1298	2.40	83.2	4.13	2.60	1.722	1.51
MW12B-3 (ESI)	4/23/1999	7.60	7.15	809	5.90	88.0	4.62	5.00	1.686	2.97
MW12-1	4/25/1999	6.75	7.11	594	4.30	88.9	4.48	0.70	1.257	0.56
MW12-2	4/25/1999	6.94	7.19	557	23.00	94.7	4.12	0.65	0.864	0.75
MW12-3	4/25/1999	9.04	7.27	625	18.00	76.4	4.03	1.60	1.376	1.16
MW12-4	4/25/1999	7.92	7.13	857	40.00	40.1	3.53	6.00	1.716	3.50
MW12-5	4/25/1999	9.41	7.14	933	18.00	72.8	3.78	5.20	2.067	2.52
MW12-6	5/4/1999	8.70	7.15	843	16.80	-15.5	3.68	5.30	1.881	2.82
MW12-7	5/5/1999	9.09	6.86	769	6.96	96.0	4.85	1.90	1.060	1.79
MW12-8	5/6/1999	12.33	7.03	602	10.15	77.3	1.67	0.69	1.290	0.53
MW12-9	5/6/1999	12.10	7.07	1548	2.39	75.7	0.91	0.76	1.196	0.64
MW12-10	5/4/1999	8.69	7.19	574	1.41	69.3	3.44	1.35	1.560	0.87
MW12-11	4/25/1999	7.01	7.02	314	2.40	100.7	3.74	2.70	1.919	1.41
MW12-12	5/4/1999	7.62	7.02	681	44.50	59.9	3.41	7.10	1.550	4.58
MW12-13	5/6/1999	12.81	7.31	999	4.83	67.0	1.20	0.56	1.466	0.38
MW12-14	5/6/1999	9.25	7.13	1368	40.80	53.1	1.16	9.05	1.832	4.94
MW12-15	4/21/1999	8.20	7.05	1403	50.00	29.8	0.47	10.80	2.184	4.94
MW12-16	4/19/1999	7.58	6.86	660	31.00	119.3	4.62	2.50	1.220	2.05
MW12-17	4/19/1999	8.69	7.12	677	45.00	86.8	4.03	4.10	1.651	2.48
MW12-18	4/20/1999	8.50	6.97	1574	20.50	54.9	4.50	7.10	1.764	4.02
MW12-19	4/12/1999	8.01	6.90	693	29.00	84.6	4.50	12.80	1.145	11.18
MW12-20	4/12/1999	7.55	6.87	1153	15.00	79.5	4.50	5.60	1.783	3.14
MW12-21	4/11/1999	6.36	7.23	619	1.70	72.6	4.61	5.00	1.151	4.35
MW12-22	4/12/1999	7.95	7.00	858	13.00	77.5	4.50	3.20	1.477	2.17
MW12-23	4/12/1999	7.90	6.97	898	12.40	58.9	4.50	1.50	1.248	1.20
MW12-24	4/11/1999	6.20	6.95	631	3.21	94.0	5.10	1.70	1.038	1.64
MW12-25	5/4/1999	*								
MW12-26	4/11/1999	7.55	6.62	846	39.30	47.4	4.62	4.40	1.056	4.17
MW12-27	4/14/1999	7.28	6.71	560	7.40	88.5	5.23	0.70	1.620	0.43
MW12-29	4/14/1999	8.63	7.27	689	2.10	67.0	4.51	4.60	2.216	2.08

TABLE 2-15
SEAD-12 Groundwater Field Sampling Information
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Monitoring Well	Date Sampled	INDICATORS Temperature (°C)	pH standard unit	Conductivity (µmhos/cm)	Turbidity (NTUs)	ORP (millivolts)	Dissolved Oxygen (mg/L)	Gallons of Purge Water Removed	Standing Water Vol. (gal)	Well Volumes Removed
MW12-30	4/14/1999	8.29	7.28	604	17.00	64.0	4.73	1.10	2.191	0.50
MW12-31	4/24/1999	6.20	6.94	793	3.00	46.2	4.22	0.35	0.823	0.43
MW12-32	4/20/1999	7.85	7.03	697	5.20	106.8	4.62	0.70	1.690	0.41
MW12-33	4/21/1999	8.41	7.09	1353	34.00	49.8	4.13	23.20	2.100	11.05
MW12-34	5/5/1999	11.58	7.22	958	2.35	73.0	5.29	0.60	0.838	0.72
MW12-35	4/23/1999	9.17	7.15	873	10.34	67.1	4.15	6.00	5.690	1.05
MW12-37	4/22/1999	6.79	7.13	1495	5.70	91.6	5.10	0.55	1.737	0.32
MW12-38	4/22/1999	9.12	6.98	4170	4.70	100.7	4.62	0.65	1.021	0.64
MW12-39	4/22/1999	8.99	8.91	2890	17.00	-11.9	4.27	1.70	1.358	1.25
MW12-40	4/22/1999	7.31	7.17	1135	19.00	92.7	5.22	1.10	0.808	1.36
DW12-815	4/19/1999	10.09	7.76	476	3.40	68.8	4.98	2.20		
MW57-1 (Background)	4/23/1999	7.15	7.56	303	12.00	75.1	4.73	1.00	0.720	1.39
MW-34 (Background)	4/9/1999	6.67	7.27	441	9.60	58.0	5.23	1.20	0.487	2.47
MW45-4 Background)	4/9/1999	6.26	9.92	872	0.00	81.0	5.10	1.80	0.586	3.07
Round 2 Groundwater Sampling										
MW12A-1 (ESI)	12/14/1999	12.13	7.13	939	5.00	123.5	2.56	3.50	1.794	1.95
MW12A-2 (ESI)	12/17/1999	10.00	6.96	640	17.90	76.2	3.01	8.60	1.683	5.11
MW12A-3 (ESI)	12/8/1999	12.41	7.11	724	5.00	8.7	0.39	2.50	1.985	1.26
MW12B-1 (ESI)	12/6/1999	13.13	6.93	1202	10.00	58.7	0.25	7.90	1.681	4.70
MW12B-2 (ESI)	12/6/1999	12.94	7.08	1183	2.50	82.3	0.52	3.40	1.698	2.00
MW12B-3 (ESI)	12/6/1999	13.04	7.19	720	5.00	92.0	3.79	4.00	1.654	2.42
MW12-1	12/2/1999	10.82	7.34	592	6.00	158.0	6.05	2.30	0.219	10.52
MW12-2	12/2/1999	9.71	7.24	617	1.35	156.0	6.38	1.60	0.504	3.18
MW12-3	12/2/1999	12.14	7.23	673	4.80	162.0	5.91	2.50	0.741	3.38
MW12-4	12/1/1999	12.42	7.18	839	6.06	28.1	0.79	2.50	1.657	1.51
MW12-5	12/1/1999	12.39	7.16	1009	3.00	92.7	3.25	2.75	1.799	1.53
MW12-6	12/1/1999	10.99	6.93	845	13.70	8.3	0.54	2.48	0.388	6.39
MW12-7	12/18/1999	11.35	7.14	699	3.00	96.4	4.16	3.70	1.240	2.98
MW12-8	12/14/1999	9.73	7.47	537	33.00	162.0	8.46	4.90	1.684	2.91
MW12-9	12/7/1999	11.81	6.95	895	4.50	51.0	0.53	0.40	1.341	0.30
MW12-10	12/15/1999	11.02	7.02	596	2.60	134.7	1.27	3.75	1.564	2.40
MW12-11	12/15/1999	9.55	7.11	572	4.00	105.0	1.38	2.25	1.385	1.62
MW12-12	12/15/1999	10.55	6.82	699	5.45	108.6	0.38	3.25	1.250	2.60
MW12-13	12/15/1999	9.97	7.28	516	6.00	136.0	1.65	3.80	0.709	5.36
MW12-14	12/18/1999	10.90	7.13	686	13.20	65.7	0.30	4.10	1.982	2.07

TABLE 2-15
SEAD-12 Groundwater Field Sampling Information
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Monitoring Well	Date Sampled	INDICATORS Temperature (°C)	pH standard unit	Conductivity (µmhos/cm)	Turbidity (NTUs)	ORP (millivolts)	Dissolved Oxygen (mg/L)	Gallons of Purge Water Removed	Standing Water Vol. (gal)	Well Volumes Removed
MW12-15	12/18/1999	11.01	7.10	735	18.00	17.9	0.60	5.00	2.184	2.29
MW12-16	12/17/1999	11.21	7.08	695	9.50	79.0	5.11	2.00	1.286	1.56
MW12-17	12/7/1999	12.41	7.11	685	5.00	15.8	0.46	3.30	1.669	1.98
MW12-18	15/6/1999	16.86	7.02	1465	10.00	-6.5	0.32	3.20	1.557	2.06
MW12-19	12/5/1999	14.05	7.06	677	10.00	87.0	0.46	2.90	1.226	2.36
MW12-20	15/5/1999	13.30	6.97	1004	49.40	95.7	0.89		1.838	0.00
MW12-21	12/5/1999	14.43	7.29	639	5.00	1080.0	1.19	1.40	1.457	0.96
MW12-22	12/3/1999	10.95	6.99	903	15.00	56.4	1.80	2.20	1.261	1.74
MW12-23	12/3/1999	11.16	7.07	926	7.00	20.1	1.00	3.40	1.220	2.79
MW12-24	12/17/1999	9.34	7.08	638	2.79	59.0	6.05	5.00	0.945	5.29
MW12-25	12/16/1999	11.20	6.64	892	1.50	31.0	1.16	4.25	1.179	3.60
MW12-26	12/17/1999	11.60	6.63	453	10.90	-112.0	0.18	3.20	1.253	2.55
MW12-27	12/3/1999	11.18	7.32	595	4.81	172.0	10.56	0.90	1.636	0.55
MW12-29	12/13/1999	10.29	7.26	662	4.50	80.5	0.85	2.40	1.604	1.50
MW12-30	12/13/1999	10.68	7.32	585	45.20	55.1	0.87	6.40	0.980	6.53
MW12-31	12/3/1999	10.60	7.22	752	3.00	145.0	5.70	0.75	1.446	0.52
MW12-32	12/3/1999	10.95	7.18	754	8.00	65.0	2.35	2.90	0.537	5.40
MW12-33	12/7/1999	11.70	7.20	724	10.00	31.0	0.34	5.80	2.034	2.85
MW12-34	12/7/1999	11.72	6.96	966	10.00	91.0	5.36	0.50	0.878	0.57
MW12-35	12/5/1999	11.17	7.41	831	2.49	-74.2	0.67	5.00	2.590	1.93
MW12-37	12/14/1999	8.72	7.29	841	4.85	139.0	7.10	0.30	0.984	0.30
MW12-38	12/13/1999	10.94	7.04	2122	13.00	139.0	6.25	0.40	1.022	0.39
MW12-39	12/13/1999	12.55	7.50	1743	30.50	219.0	0.89	3.20	0.686	4.66
MW12-40	12/13/1999	9.91	7.28	660	36.80	165.0	7.55	2.40	0.836	2.87
DW12-815	12/14/1999	12.55	7.59	458	15.60	100.0	8.76	0.50		
MW57-1 (Background)	12/2/1999	9.51	7.37	396	9.55	174.0	8.70	3.30	0.318	10.37
MW-34 (Background)	12/2/1999	9.74	7.23	567	32.00	148.0	10.95	2.80	0.049	56.83
MW45-4 Background)	12/7/1999	11.17	7.03	1035	0.96	123.1	0.81	5.00	0.527	9.48

* Sampling completed on date noted- field record for monitoring parameters lost.

2.10 AQUIFER TESTING INVESTIGATION

2.10.1 Groundwater Level Measurements

During the SEAD-12 RI/FS Program, two rounds of groundwater elevation measurements were used to develop a more comprehensive groundwater elevation map and hence a groundwater flow direction map of the SEAD-12 area. The groundwater elevation measurements completed on May 3 and November 30, 1999 were used to develop the groundwater elevation contours. These data, **Section 3,** were collected immediately prior to the two rounds of groundwater sampling.

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 (TOC). Water level measurement equipment, including the water level indicator, was decontaminated before it was used at any monitoring wells, and between well measurements to avoid any potential cross contamination issues.

2.10.2 Rising Head Slug Testing

The horizontal hydraulic conductivity (K_h) within the overburden aquifer was estimated using rising head slug tests. Only rising head slug tests were performed on the 28 shallow wells (23 RI wells, and 5 ESI wells) screened across or near the water table. Refer to **Table 2-16** for rising head slug testing details. Procedures for slug testing are outlined in the Generic Workplan, Appendix A, Section 3.11, and summarized below.

Prior to the beginning the test, the water level in the well was measured using an electronic water level meter. An In-Situ, Inc. model PTX-161 pressure transducer rated to 10 pounds per square inch (pi) was placed one foot above the bottom of the well. The pressure transducer was connected to either a Hermit 1000C or 2000C data logger configured for logarithmic data collection. A 3-foot or 5-foot long stainless steel slug (1.66-inch diameter) was placed so that the top of the slug was just below the static water level previously measured in the well. After allowing the water level stabilize, the slug test was started by simultaneously quickly removing the slug and starting the data logger. 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 data quality. If the data was deemed to be of unacceptably poor quality the test was repeated.

TABLE 2-16
SEAD-12 - Data for Slug Test Hydraulic Conductivity Determinations
SEAD-12 Remedial Investigation
Seneca Army Depot Activity

Well Number	Study (1)	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 Diameter of Well Casing (inches) (4)	Effective Diameter of Well Boring (inches) (4)	Screened Length (feet) (4)
MW12-4	RI	T/WS	17.14	14.46	4.32	2	8	7.21
MW12-5	RI	T/WS	23.18	20.79	9.15	2	2	13
MW12-7	RI	T/WS	13	13.6	10	2	8	5.4
MW12-9	RI	T/WS	13.3	14.1	9.88	2	8	6.1
MW12-10	RI	T/WS	16.5	17.1	9.38	2	8	9.6
MW12-12	RI	T/WS	12.5	13	6.93	2	8	7.5
MW12-13	RI	T/WS	12.5	13	7.27	2	8	7.5
MW12-14	RI	T/WS	13.1	14	5.24	2	8	6.8
MW12-15	RI	T/WS	17.74	15.14	3.77	2	8	3.9
MW12-17	RI	T/WS	17.6	18.4	12.05	2	8	8.3
MW12-18	RI	T/WS	14	14.5	8.59	2	8	7.3
MW12-19	RI	T/WS	10.5	11	5.71	2	8	4.8
MW12-20	RI	T/WS	13.7	14.4	5.3	2	8	7.0
MW12-21	RI	T/WS	16.61	13.7	5.4	2	8	6.9
MW12-22	RI	T/WS	12.1	12.6	5.4	2	8	6.7
MW12-23	RI	T/WS	12.7	13.3	4.71	2	8	7.2
MW12-25	RI	T/WS	9.8	10.3	6.95	2	8	4.9
MW12-30	RI	T/WS	13.3	14.1	4.55	2	8	7.2
MW12-33	RI	T/WS	20.72	17.88	5.93	2	8	6.8
MW12-38	RI	T/WS	10	10.5	4.55	2	8	4.9
MW12-39	RI	T/WS	10	10.5	2.5	2	8	4.9
MW12A-1	RI	T/WS	16.8	15.4	4.82	2	8	4.3
MW12A-2	RI	T/WS	15.54	13.04	3.3	2	8	4.24
MW12A-3	RI	T/WS	19.27	16.77	4.93	2	8	4.17
MW12B-1	RI	T/WS	21.65	19.15	9.16	2	8	4.65
MW12B-2	RI	T/WS	18.5	16	6.31	2	8	5
MW12B-3	RI	T/WS	18.48	15.98	6.34	2	8	4.88

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 Weathered 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.

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 using an excel spread sheet written by Steven Rossello (Parsons ES Syracuse). Once the data were plotted, the hydraulic conductivity was determined using the automatic iterative estimating and interactive on-screen curve matching capabilities of the spread sheet to match 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 » 1) this method was not used. Because all of the overburden wells installed in the till were screened across most of the aquifer saturated thickness, the criteria for test geometry (L/D » 1) held true in most instances.

In another recent article, Hyder and Butler (1995) state that "the Bouwer and Rice (1976) method does appear to provide reasonable estimates of field values [of hydraulic conductivity] in a large number of situations." However, they also present information that can be used to assess the error in the Bouwer and Rice determination of hydraulic conductivity thereby allowing the field practitioner to assess if the parameter estimate is acceptable for a particular application. The recommended techniques of Hyder and Butler (1995) for evaluating the strict applicability of the Bouwer and Rice (1976) method were also employed, where appropriate.

2.11 ECOLOGICAL INVESTIGATION

A qualitative assessment of SEAD-12 was conducted to determine the ecological character of the site. The assessment addressed 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-12 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 lake, and terrestrial areas within the 0.5-mile radius. The procedure for the ecological investigation was developed from the New York State Department of Environmental Conservation (NYSDEC) Fish and Wildlife

Impact Analysis for Inactive Hazardous Waste Sites (1994), and is described in detail in the Project Scoping Plan.

The results of the ecological assessment (**Section 6**) are used in the Ecological Risk Assessment (ERA) component of the Baseline Risk Assessment (BRA). The BRA (**Section** 7) evaluates 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.

2.11.1 Site Habitat Characterization

The purpose of the habitat characterization is to determine whether aquatic and terrestrial resources are present at the site and if they were present at the site prior to contaminant introduction. The results are presented in Section 3. 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. Observations included sightings, vocalizations, tracks, burrows, nests, and scat. Observations and assessments were concentrated on undeveloped upland areas, waterways, and wetlands within the study area. No biological sampling was conducted within the study area. Limited nighttime surveys were conducted to determine the presence of bats.

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. Currently a Cornell University/NYSDEC white-tailed deer immuno-contraception study is being conducted with a captive herd in the SEAD-12 area.

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

Human use of the aquatic and terrestrial resources within a half mile of the site were considered, and included activities such as hunting, fishing, wildlife observation, scientific studies, agriculture, forestry, and other recreational and economic activities.

2.11.2 Contaminant-Specific Impact Analysis

Information from the site description, **Section 1** and **Section 3**, and the site investigation to characterize SEAD-12 contaminants were used to assess the impacts of contaminants on aquatic and terrestrial resources. The impact analysis involved three steps:

- Pathway Analysis;
- Criteria Specific Analysis; and
- Analysis of Toxic Effects.

Each step uses progressively more specific information and fewer conservative assumptions, and is dependant on the conclusion reached for the previous step regarding the degree of impact. When minimal impact can be demonstrated at a specific step, additional steps were not conducted. The results of this analysis are presented in **Section 7**.

2.11.2.1 Pathway Analysis

The pathway analysis identified aquatic and terrestrial resources, contaminants of concern and potential pathways of contaminant migration and exposure. Significant resources or potential pathways were found to be present during field studies, requiring additional impact analyses.

2.11.2.2 Criteria-Specific Analysis

When the presence of contaminated resources and pathways of migration for site-related contaminants was established, the contaminant levels identified in the field investigation were compared with available numerical criteria or criteria developed according to methods established as part of the criteria. If contaminant levels are below criteria, the impact on resources will be considered to be minimal and additional impact analyses will not be performed. If numerical criteria are exceeded or if they do not exist and cannot be developed, an analysis of the toxicological effects will be performed.

2.11.2.3 Analysis of Toxicological Effects

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

One or more of the four following approaches were used to assess the toxicological effects.

- **Indicator Species Analysis** – A toxicological analysis for a indicator species used if the ecology of the resource and the exposure scenarios are simple. The approach assumes exposure to contaminants is continuous throughout the entire life cycle and does not vary among individuals.
- **Population Analysis** – A population level analysis is relevant to and will be used for the evaluation of chronic toxicological effects of contaminants to an entire population or to the acute toxicological effect of contaminant exposure limited to specific classes of organisms within a population.
- **Community Analysis** – Communities with highly interdependent species, including highly specialized predators, highly competitive species, or communities whose composition and diversity is dependent on a key-stone species, are analyzed for alternations in diversity due to contaminant exposure.
- **Ecosystem Analysis** – Perform an analysis of the effects of contaminant exposure on trophic structure and trophic function within an ecosystem if contaminants are expected to uniformly affect physiological processes that are associated with energy transformation within a specific trophic level. Bioconcentration, bioaccumulation, biomagnification, etc., concepts may be used to evaluate the potential effects of contaminant transfer on trophic dynamics.

2.12 SURVEYING

Surveying tasks at SEAD-12 were completed in accordance with the Project Scoping Document and procedures in the Generic Workplan, Appendix A. Tasks included :

- Locate control points for generation of a site base map by stereoscopic photo analysis
- Locating all the environmental sampling points and geophysical surveys,
- Locate control points for volume estimates of impacted soil and sediment,
- Locate control to map the extent of any impacted groundwater above established ARAR limits.

The location, identification, coordinates and elevations of all the control points recovered and/or established at the site and all of the geophysical survey areas, soil gas survey areas, soil borings, monitoring wells (new and existing) and all surface water and sediment sampling points are summarized in **Appendix C**.

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

3.0 DETAILED SITE DESCRIPTION

3.1 SITE FEATURES

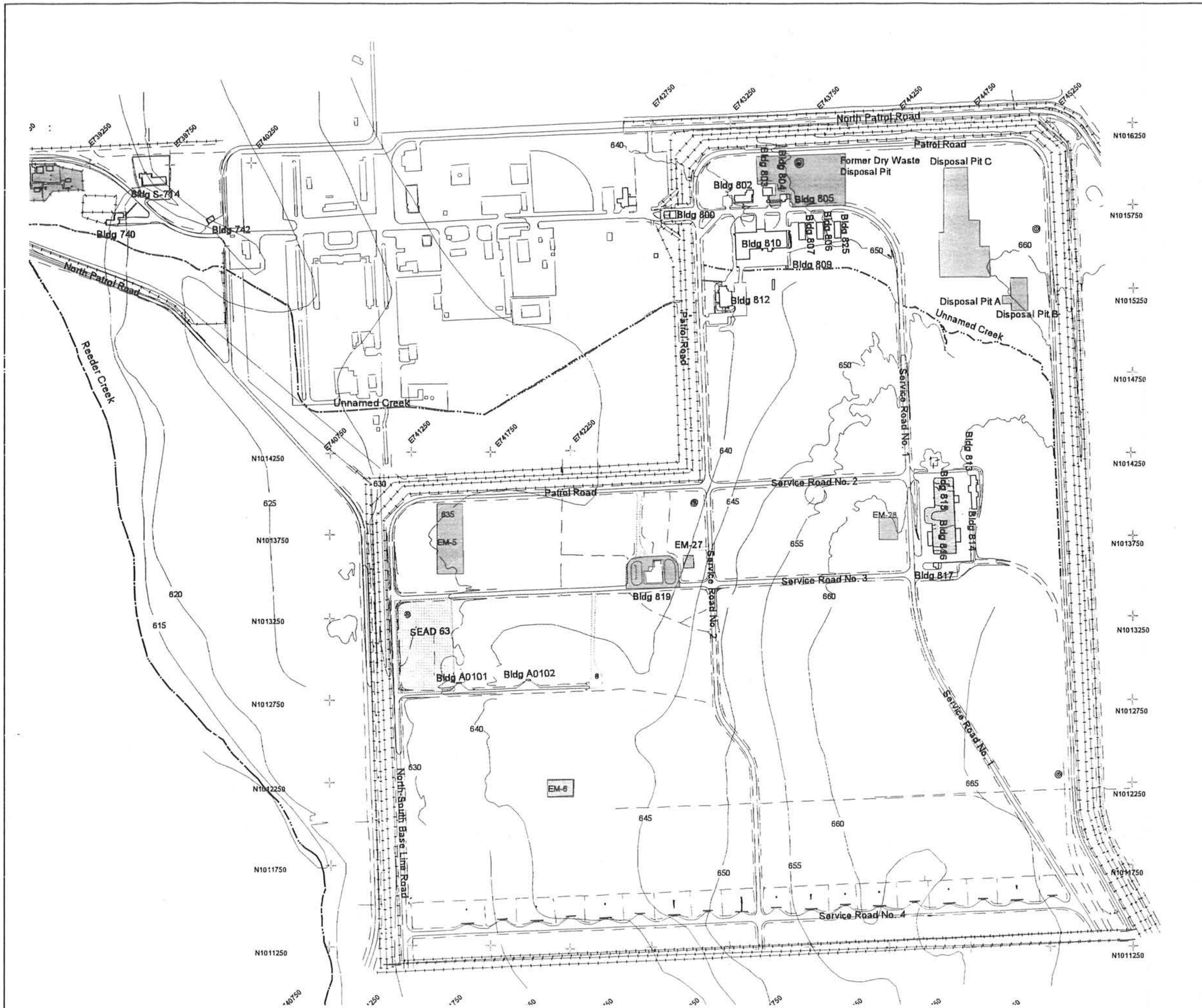
SEAD-12 encompasses approximately 360 acres in the northern portion of SEDA, **Figure 1-1**. The SEAD-12 area begins immediately north of the northern most row of storage igloos and covers the majority of the area formerly known as the Weapons Storage Area (WSA) or Q Area which occupies the northern most portion of the ammo area. As shown on the SEAD-12 Site Plan, **Figure 3-1**, the area approximates a rectangle 4200 feet (east-west) by 5000 feet (north-south), excluding an area 1500- feet by 2000 feet in the northwestern corner. The former WSA, and consequently SEAD-12 are enclosed by a triple strand chain link fence. Access to the site is limited to one point of egress through a remotely operated gate located in the south-eastern corner of the Q area.

Patrol Roads bound the perimeter of SEAD-12. Additional service and patrol roads cross the site in several places, providing access to the buildings in SEAD-12. Railroad tracks run from the southeast corner, along the eastern perimeter, and turn west, ending at a loading dock south of Building 816. A total of 16 buildings of various size and construction are within the site, with current use limited to furniture storage. The remaining area is predominantly open fields, with randomly scattered small evergreen and deciduous trees, an eastern grove of hardwood trees, and a small grove of mixed soft and hardwood trees in the north. A seasonal stream (Unnamed Creek on **Figure 3-1**) flows north along the eastern side of Service Road Number 1, turning west in the northern half of SEAD-12, exiting the area near building 812, and eventually draining into Reeder Creek. Reeder Creek discharges into Seneca Lake.

Underground and overhead utilities provided water, electrical, and sanitary sewer services to all of the SEAD-12 buildings as well as electrical service to the perimeter fences for lighting, cameras, and electrified fences. Most of the utilities are now defunct, the exception being electrical and water services to most of the buildings.

3.1.1 Topography

Surface topography in SEAD-12 in relatively flat-lying, sloping gently to the west and north-west. The topographic high is located west of buildings 815 and 816 (668 feet above mean sea level, MSL), **Figure 3-1**, with the topographic low (628 feet MSL) near the southwestern corner of area.



N

LEGEND

BUILDINGS

SEAD 63

FENCE

ROADS

WATER

DRAINAGE

630
GROUND ELEVATION CONTOURS (5 FOOT INTERVALS)

POTENTIAL RELEASE AREAS

600 0 600
(feet)

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SEAD 12

FIGURE 3-1
SITEPLAN

SCALE	DATE	REV	
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3.1.2 Surface Water

Four watersheds are present on the SEDA installation (USDA, 1989). Kendig Creek drains the central portion of the installation into Seneca Lake. Reeder Creek drains the northwest and north-central (Sead-12) 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.

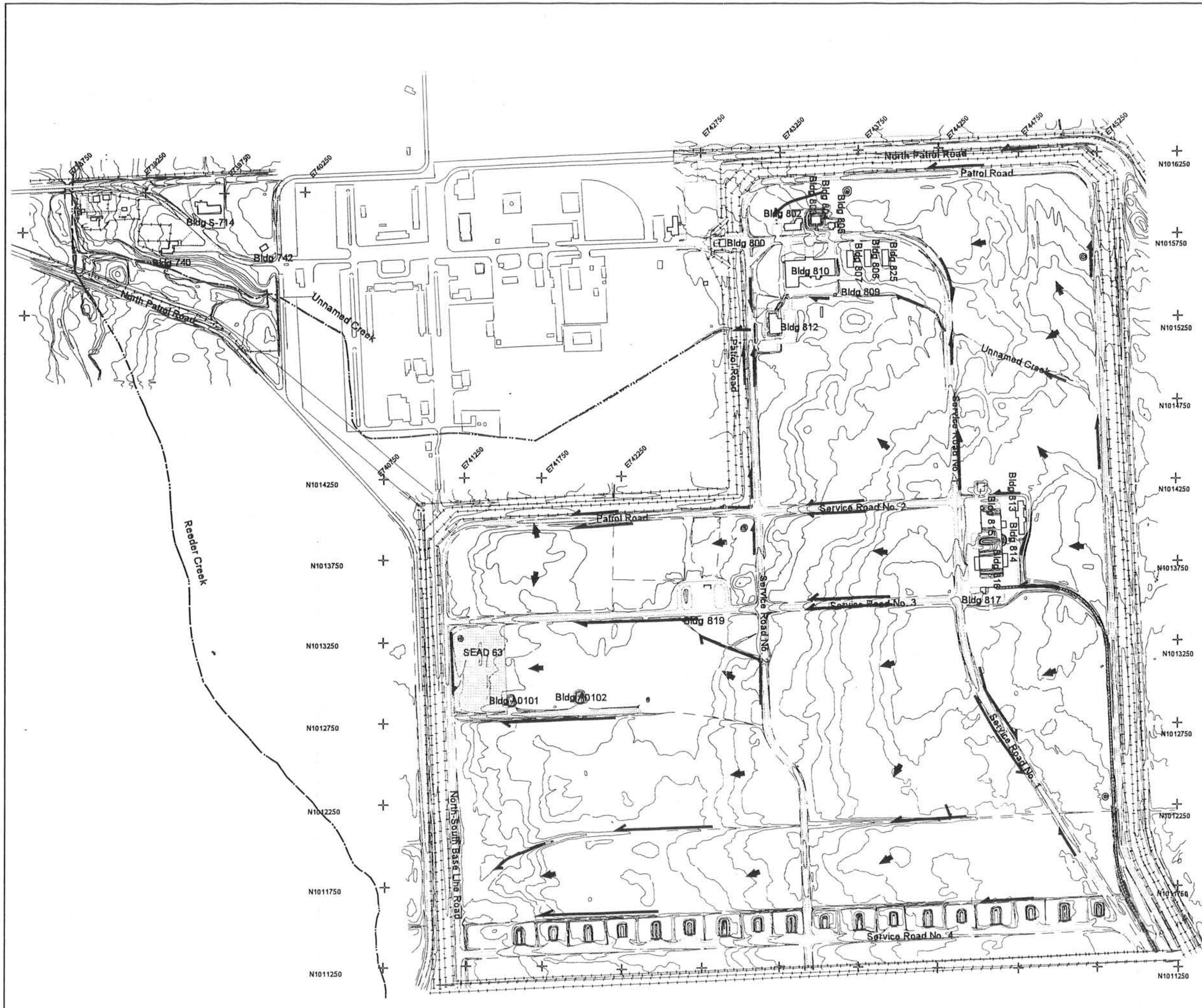
Surface water within SEAD-12 occurs as seasonal flow within drainage ditches and seasonal streams. The majority of the ditches is small and dry and does not appear to be significant drainage features. Surface water flow is generally to the west with local variations due to topography. Surface water flow directions are shown in **Figure 3-2**. Surface water occurs in association with the spring snow melt and periodic rain events (rains are typically the heaviest in the spring and late fall). During the summer and early fall months surface water is typically absent except immediately following heavy rain events. In the northeast portion of SEAD-12, a natural unnamed creek flows to the northwest across the sight. East of Service Road No. 1, this unnamed creek exists as a natural seasonal stream, with former WSA construction activities redirecting flow west of the road. The unnamed creek flows into Reeder Creek west of SEAD-12, and which discharges into Seneca Lake. Reeder Creek also accumulates the surface water flow from the southern portion of SEAD-12. A natural seasonal marsh area occurs near the eastern portion of the unnamed creek. This marsh tends to remain wet throughout the year, drying out only during dry summer months.

3.2 SITE GEOLOGY

The site geology consists of gray Devonian shale bedrock having a thin upper weathered zone that is overlain by a Pleistocene age till. In developed areas, the till or weathered bedrock (where the till has been removed) is overlain by fill material consisting of reworked till. Topsoil covers much of the site. This stratigraphy is consistent over the entire site.

3.2.1 Topsoil and Fill

Darian silt-loam soils, 0 to 18 inches thick, cover the majority of the site. This top soil is developed on and from the till, and is derived 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 soils are typical of soils on uplands in central of Seneca County, developing on 0-3 percent slopes (Hutton, 1972).



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RI/FS
SEAD 12

FIGURE 3-2
SURFACE WATER
RUNOFF DIRECTIONS

SCALE 1:600	DATE MAY 2000	REV	Sheet 1 of 1

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Fill deposits occur those developed areas of the site where the till and weather shale have been removed for disposal pit operations or building and road construction. All of the buildings and most of the roads in SEAD-12 were built on gravel pads ranging from 1 to 2 feet in thickness to improve drainage in the immediate vicinity of the buildings and roads. In addition there are several filled areas in the vicinity of disposal pits A, B, and C where Army material was disposed of by burial as well as several other disposal pit areas where construction debris were buried. The fill deposits are generally less than 5 feet thick, but were found to be up to 12 feet thick (SB12-2) in disposal pit areas. Fill deposits consist of fine to coarse sand and gravel, with variable amount of silt and clay. The remainder of the site is covered with a relatively thin layer of top soil consisting of disturbed and bioturbated till. For this program the layer of disturbed till was considered fill.

3.2.2 Till

A dense till is the predominant unconsolidated geologic unit present at the site. The till is distributed across the entire site and ranges in thickness from 0 to 16.5 feet. The average till thickness in SEAD-12 (refusal data from ESI and RI borings) is 5.3 feet. The till is characterized by brown to olive gray silt and clay, trace amounts of fine sand, with few fine to coarse gravel-sized inclusions of weathered shale. The larger diameter weathered shale clasts are more prevalent in basal portions of the till and are interpreted as rip-up clasts incorporated in the overlying till by glacial scouring during the Laurentian ice age approximately 12000 years ago. A generalized description of the till in SEAD-12 is: *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).*

Grain size analyses have been performed numerous times in the past at many other SEADs at Seneca Army Depot. For grain size analysis samples collected site wide, grain size analysis curves for till samples show a wide distribution of sediment sizes. 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. The porosities of 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).

3.2.3 Weathered Shale

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 upper boundary of the weathered shale was recorded in split spoon samples and the base of the weathered shale was has been defined during this investigation as the depth of hollow stem auger drilling refusal, or where auger drilling became abruptly difficult and slow. The thickness of the weathered shale ranges between 0.8 feet to 12.2 feet on the site. The average thickness on the site is 3.9 feet. No outcrops of weathered or competent shale are exposed at SEAD-12.

3.2.4 Competent Shale

The bedrock underlying the SEAD-12 area is composed of the Moscow Formation of the Devonian age Hamilton Group. The Moscow shale is a soft gray calcareous shale containing an abundance of fossils (Mozola, 1951). 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^{o} E and N 25-30^{o} W (Mozola, 195). 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.

Soil borings within SEAD-12 encountered gray competent shale at depths between 4.7 feet and 19.4 feet below the ground surface. A bedrock topographic map, **Figure 3-3,** was developed based upon hollow stem auger refusal depths (as defined above) and visual observations made during drilling. In all instances, auger refusal was considered to be the top of the competent shale.

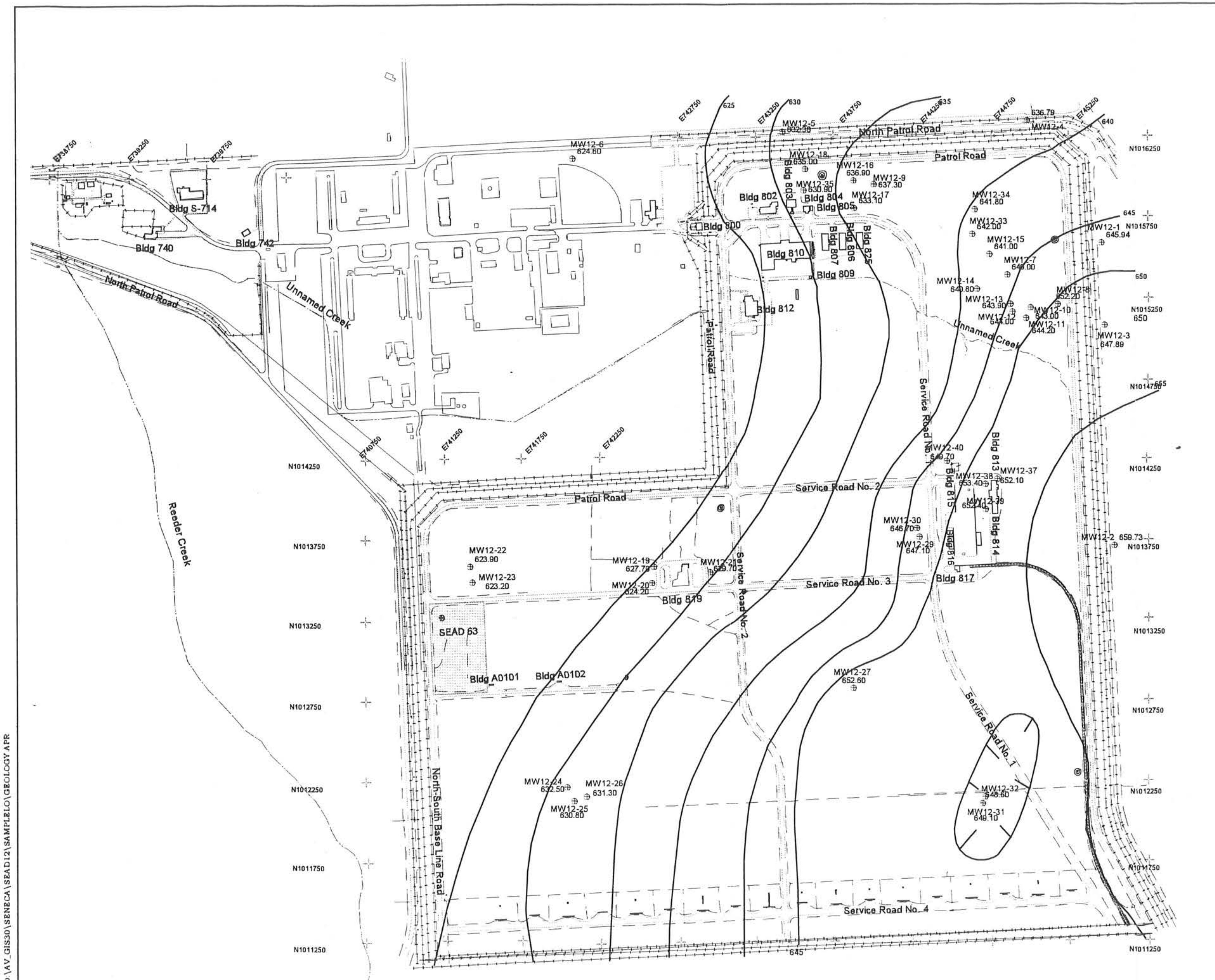
The competent shale bedrock within SEAD-12 was characterized from 20.1 feet of core recovered during the drilling of bedrock monitoring well MW12-35. Observed bedrock features include; bedding plane fractures, joints, limestone layers, fossil beds, and minor mineralization (pyrite) along fractures. Bedding plane fractures were present throughout the competent shale, being better developed and more closely spaced near the top of the recovered section These upper bedding plane fractures were filled with silt and clay. Joints were very common, the majority being spaced joints 4-5 inches apart.

3.2.5 Site Stratigraphy

Three geologic cross-sections were constructed for the site. The locations of these sections are shown in **Figure 3-4**. Cross-sections A-A', B-B', and C-C', **Figures 3-5**, **3-6**, and **3-7,** show the consistent fill, till, weathered shale, and competent shale stratigraphy.

3.3 GEOPHYSICS

The eight RI seismic refraction profiles within SEAD-12 are described in **Section 2.2.1**. The locations of the individual seismic refraction transects are shown in **Figure 2-2**. The seismic survey



LEGEND

645 BEDROCK ELEVATIONS CONTOUR

⊕ 647.3 MONITORING WELL WITH BEDROCK ELEVATION

600 0 600
(feet)

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FIGURE 3-3
COMPETENT BEDROCK
CONTOUR MAP

SCALE	DATE	REV	
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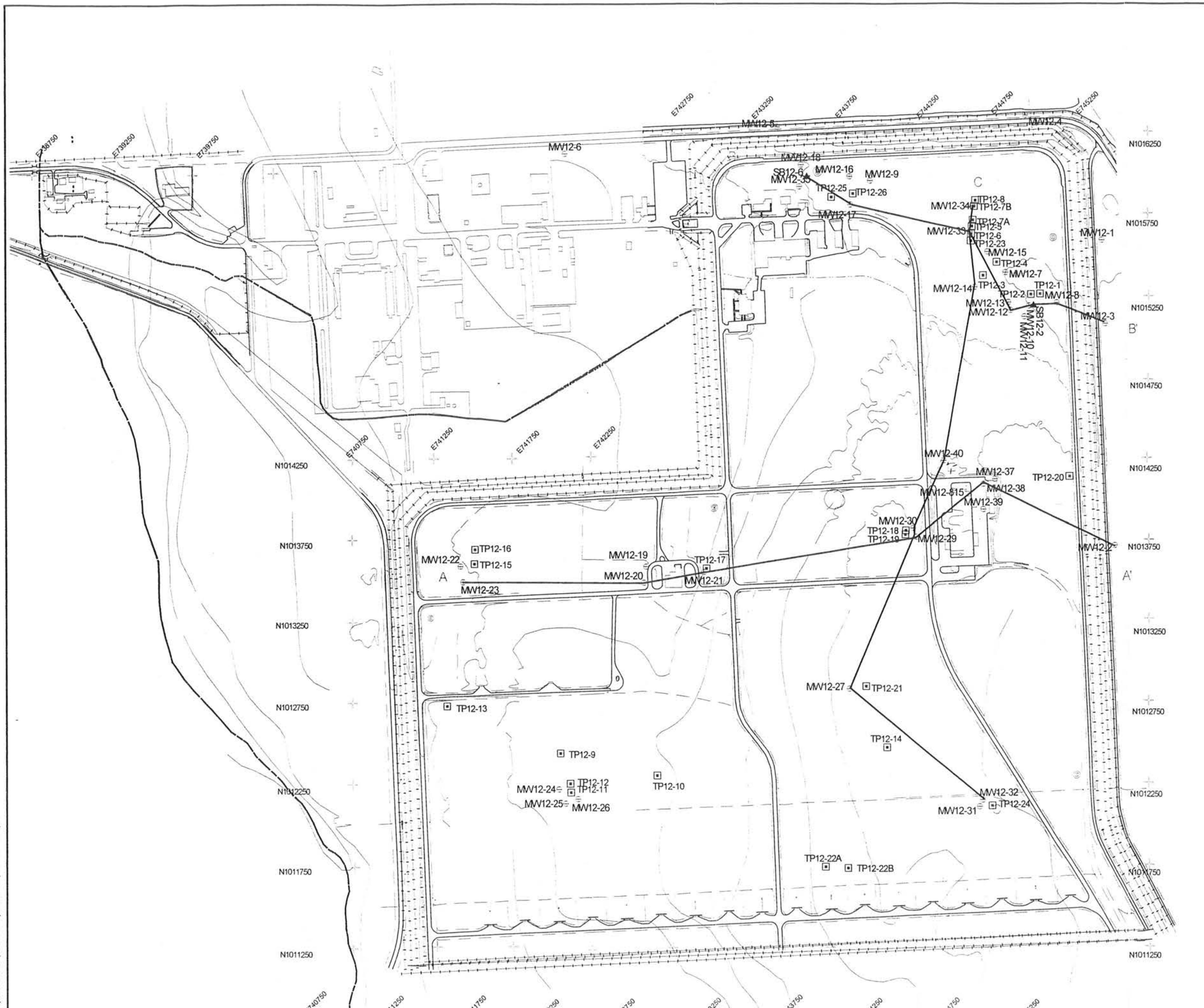

N

LEGEND

⊕ MW 12-15
MONITORING WELL LOCATION

GEOLOGIC CROSS-SECTION TRANSECT

⊡ TP 12-11
TEST PIT LOCATION

▲ SB 12-27
SOIL BORING LOCATION

600 0 600
(feet)

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FIGURE 3-4
GEOLOGIC CROSS SECTION LOCATIONS

SCALE	DATE	REV	
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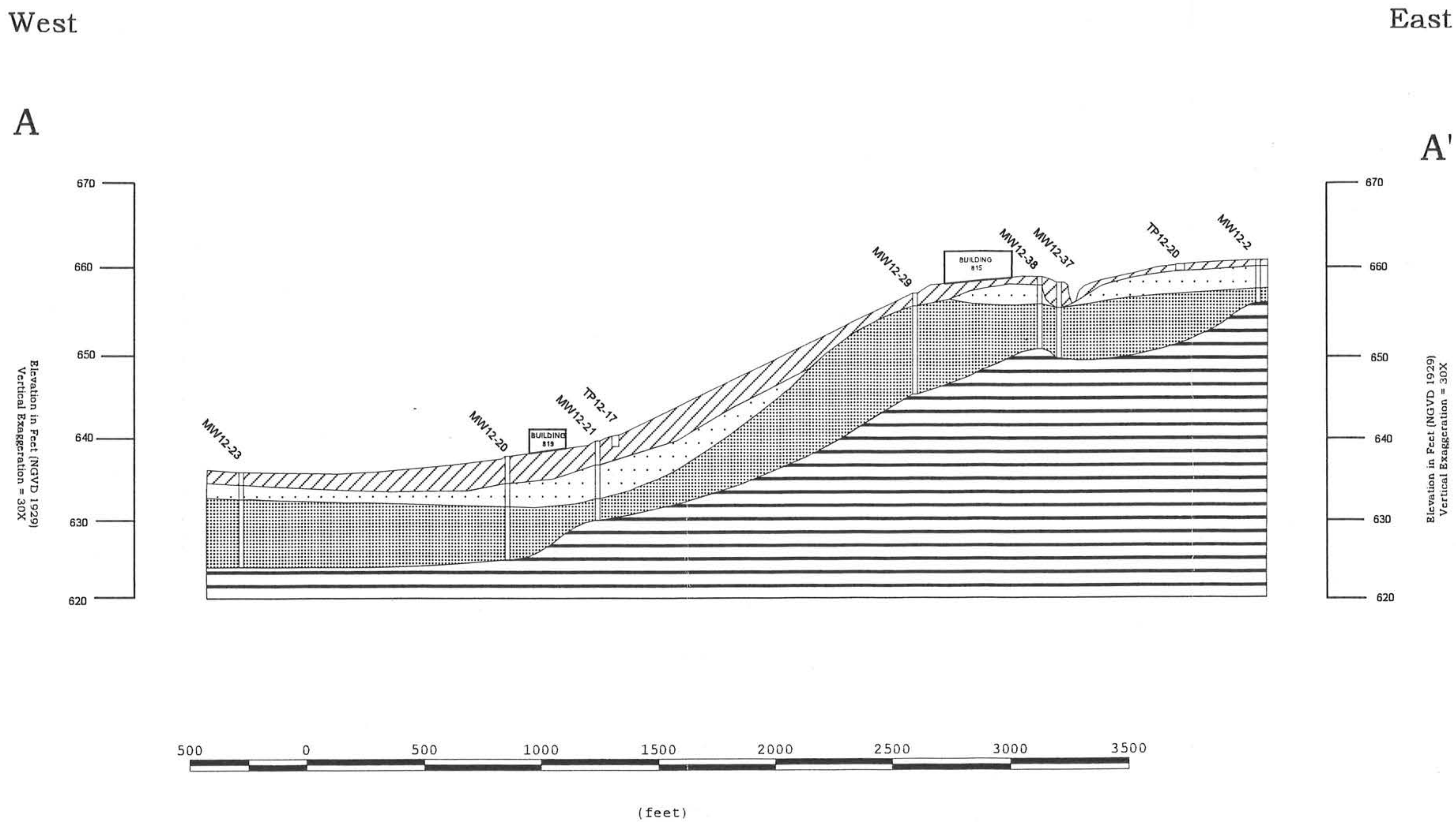


GEOLOGIC LEGEND

FILL

TILL

WEATHERED SHALE

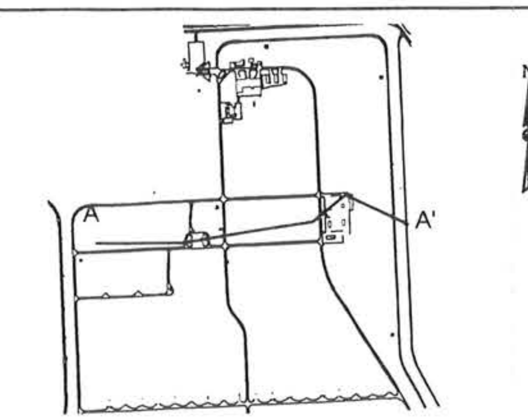
COMPETENT SHALE

TP12-17

Test Pit Locations

MW12-23

Monitoring Well Locations



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SEAD 12

FIGURE 3-5
GEOLOGIC CROSS-SECTION
A-A'

SCALE	DATE	REV	
1:500	MAY 2000		Sheet 1 of 1

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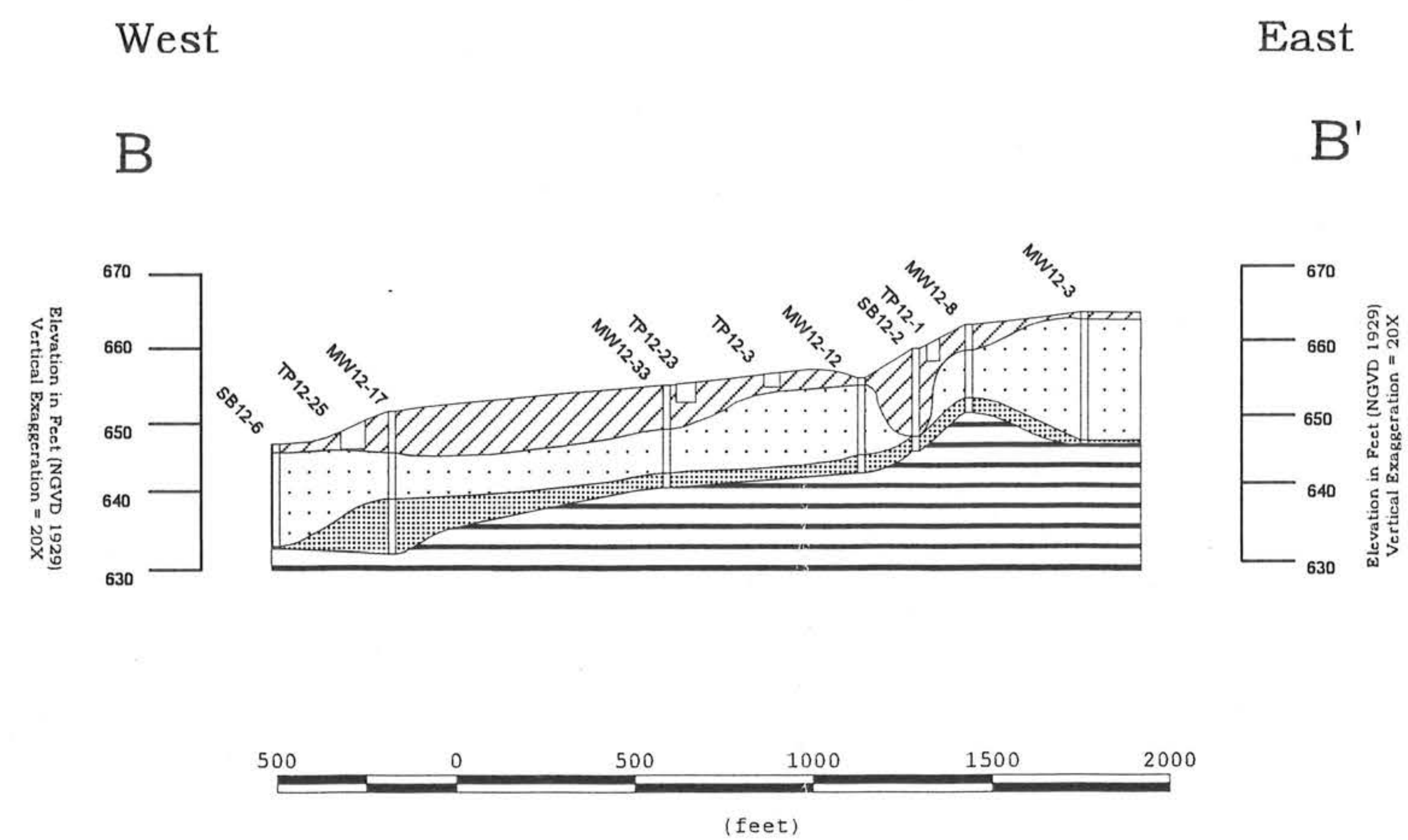

GEOLOGIC LEGEND

FILL

TILL

WEATHERED SHALE

COMPETENT SHALE

TP12-17

Test Pit Locations

MW12-23

Monitoring Well Locations

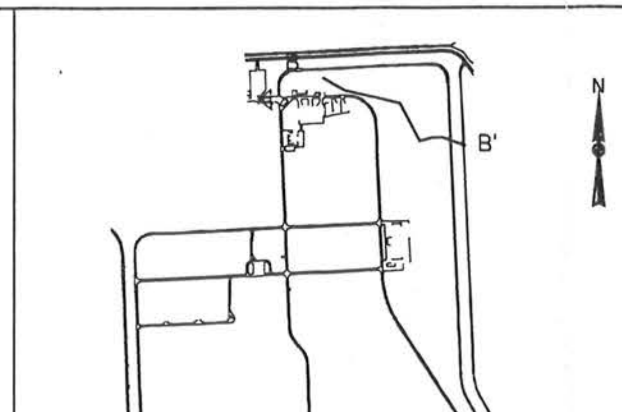

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FIGURE 3-6
GEOLOGIC CROSS-SECTION
B-B'

SCALE	DATE	REV	
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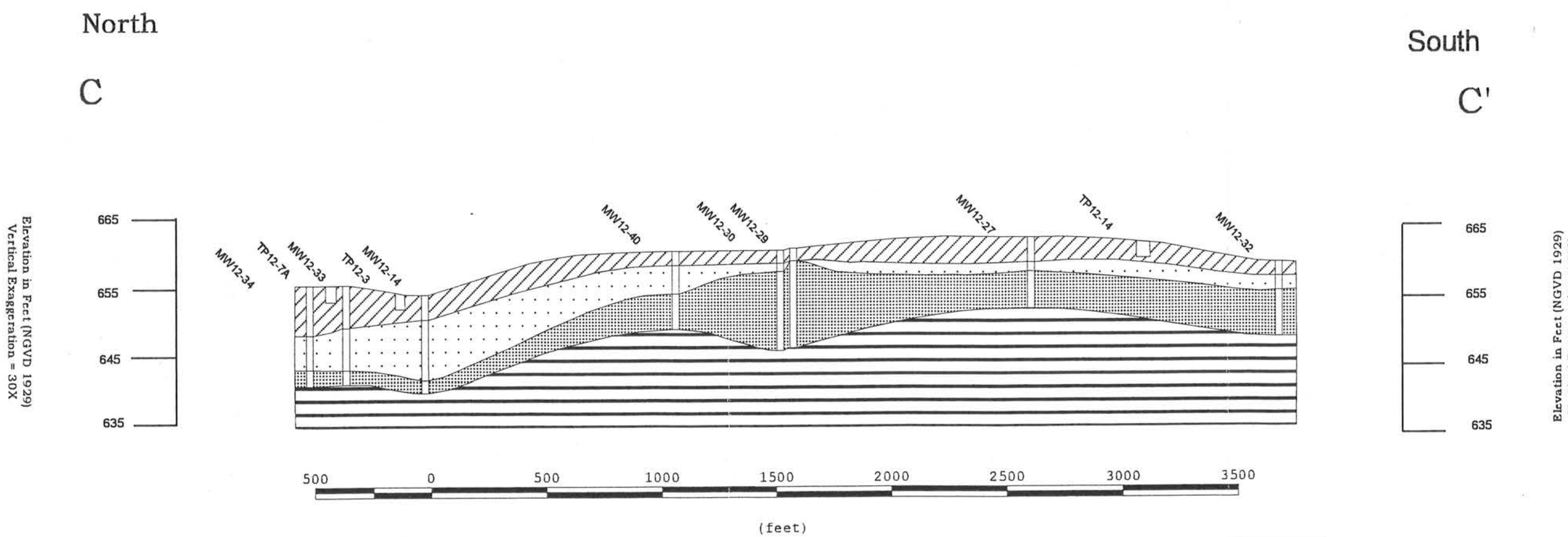


GEOLOGIC LEGEND

FILL

TILL

WEATHERED SHALE

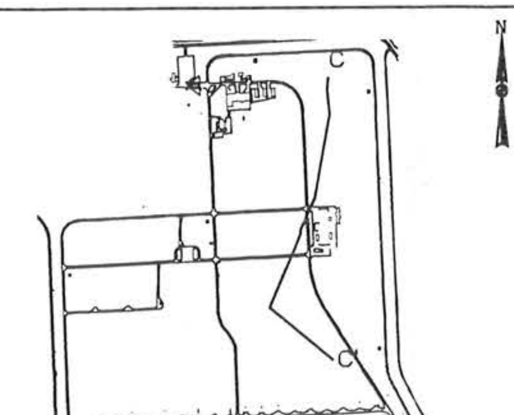
COMPETENT SHALE

TP12-17

Test Pit Locations

MW12-23

Monitoring Well Locations



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SEAD 12

FIGURE 3-7
GEOLOGIC CROSS-SECTION
C-C'

SCALE 1:500	DATE MAY 2000	REV	Sheet 1 of 1

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detected 4 to 8 feet of till, which is characterized by a 1,100 to 1,350 ft/sec travel time, that was overlying bedrock. The bedrock was characterized by a 12,600 to 14,400 ft/sec travel time.

The first seismic refraction survey location is centered in the immediate vicinity of disposal pits A and B. The data from seismic profiles 1 through 4 indicate that groundwater gradients are relatively flat, flowing radially to the west, and south away from the center of the four seismic profiles (**Table 3-1**). The ground surface in this area is also sloping radially downward to the north, west, and south away from a ground surface high in the vicinity of disposal pit A.

The second seismic refraction survey location is centered in the immediate vicinity of disposal pit C. The data from seismic profiles 5 through 8 indicate that groundwater gradients are very flat in the vicinity of disposal pit C and generally ground water flow, as indicated by the seismic data in **Table 3-1**, is toward the west and southwest. The ground surface in the vicinity of disposal pit C is relatively flat, sloping gently toward the west and southwest.

The seismic data and borehole geology found the bedrock surface sloping to the west across most of the site, following the regional ground surface. In the vicinity of disposal pits A, B, and C seismic survey results indicate that the top of bedrock slopes to the west and northwest. Groundwater flow is expected coincide with the bedrock surface, and flow to the west, with local flow to the northwest. Monitoring well locations were adjusted to take maximum advantage of indicated ground water flow directions.

3.4 HYDROGEOLOGY

The hydrogeologic properties of the site were characterized in accordance with the investigation programs described in Section 2.0. This section presents the results of the investigation of the till/weathered shale aquifer, addressing groundwater flow, hydraulic conductivity, and velocity.

3.4.1 Groundwater Flow Direction

3.4.1.1 Overburden Aquifer

SEAD-12 groundwater elevation contour maps, **Figure 3-8** and **Figure 3-9**, were prepared from measurements (**Table 3-2**) taken during gauging events prior to groundwater sampling events of May and December of 1999. Groundwater elevation measurements was completed in December 1998 were not contoured, as measurements were made prior to well development and interpreted to be non-representative of natural ground water conditions. All three gauging events included measurements from all monitoring wells installed in the till and weathered shale aquifer in and around SEAD-12. The May 1999 ground water elevation measurements were collected after all

TABLE 3-1

Seismic Survey Results

SEAD-12 Remedial Investigation Report

Seneca Army Depot Activity

	PROFILE P1					PROFILE P2					PROFILE P3				
		Water table		Bedrock			Water table		Bedrock			Water table		Bedrock	
Distance (1)	Ground Surface Elevation (2)	Depth	Elevation	Depth	Elevation	Ground Surface Elevation (2)	Depth	Elevation	Depth	Elevation	Ground Surface Elevation (2)	Depth	Elevation	Depth	Elevation
0	663.00	4.5	658.5	17.0	646.0	661.50	5.7	655.8	11.2	650.3	659.60	3.6	656.0	10.3	649.3
4	663.15	4.6	658.6	17.3	645.9	661.45	5.5	656.0	11.9	649.6	659.45	3.7	655.8	11.2	648.3
8	663.30	4.6	658.7	17.6	645.7	661.40	5.0	656.4	13.1	648.3	659.30	3.7	655.6	11.1	648.2
12	663.35	4.3	659.1	17.6	645.8	661.55	4.4	657.2	14.9	646.7	659.15	3.6	655.6	13.6	645.6
16	663.40	4.3	659.1	17.7	645.7	661.70	3.9	657.8	17.5	644.2	659.00	3.5	655.5	14.6	644.4
20	663.70	4.5	659.2	18.1	645.6	661.65	3.9	657.8	19.2	642.5	658.70	3.5	655.2	15.2	643.5
24	663.85	4.5	659.4	18.1	645.8	661.63	4.1	657.5	19.2	642.4	658.55	3.7	654.9	15.5	643.1
28	664.00	4.7	659.3	18.2	645.8	661.60	4.2	657.4	19.1	642.5	658.40	3.7	654.7	15.7	642.7
32	664.05	4.6	659.5	19.0	645.1	661.20	3.8	657.4	18.7	642.5	658.20	4.0	654.2	13.7	644.5
36	664.10	4.5	659.6	19.6	644.5	661.70	3.8	657.9	19.5	642.2	658.00	4.0	654.0	13.3	644.7
40	663.75	4.7	659.1	19.9	643.9	661.80	4.4	657.4	19.3	642.5	657.75	3.9	653.9	13.2	644.6
44	663.40	4.8	658.6	19.4	644.0	661.90	4.8	657.1	18.6	643.3	657.50	3.8	653.7	13.8	643.7
48	663.55	5.0	658.6	19.6	644.0	661.80	4.7	657.1	17.2	644.6	657.30	3.4	653.9	14.7	642.6
52	663.63	4.9	658.7	19.8	643.8	661.75	4.8	657.0	17.3	644.5	657.20	3.2	654.0	14.8	642.4
56	663.70	4.8	658.9	20.1	643.6	661.70	4.7	657.0	17.4	644.3	657.10	3.0	654.1	15.0	642.1
60	663.65	4.5	659.2	19.7	644.0	661.70	4.7	657.0	16.3	645.4	657.00	2.7	654.3	14.5	642.5
64	663.60	4.0	659.6	19.4	644.2	661.70	4.4	657.3	16.7	645.0	656.90	3.1	653.8	14.4	642.5
68	663.45	3.7	659.8	19.2	644.3	661.60	4.1	657.5	16.7	644.9	656.65	3.1	653.6	14.2	642.5
72	663.30	3.8	659.5	18.6	644.7	661.50	4.0	657.5	16.2	645.3	656.40	3.0	653.4	13.5	642.9
76	663.30	3.7	659.6	17.9	645.4	661.55	4.0	657.6	16.1	645.5	656.25	2.9	653.4	13.3	643.0
80	663.30	3.7	659.6	17.5	645.8	661.58	4.1	657.5	15.9	645.7	656.18	2.8	653.4	13.3	642.9
84	663.30	3.6	659.7	17.1	646.2	661.60	4.1	657.5	15.8	645.8	656.10	2.8	653.3	13.4	642.7
88	663.10	3.5	659.6	16.1	647.0	661.60	4.2	657.4	15.3	646.3	656.05	2.7	653.4	14.0	642.1
92	662.90	3.9	659.0	15.0	647.9	661.60	4.1	657.5	13.9	647.7	656.00	2.8	653.2	15.4	640.6
96	662.85	4.3	658.6	13.9	649.0	661.65	4.4	657.3	14.2	647.5	656.00	2.7	653.3	15.9	640.1
100	662.80	4.5	658.3	13.1	649.7	661.70	4.4	657.3	14.0	647.7	656.00	2.8	653.2	15.8	640.2
104	662.50	4.2	658.3	12.3	650.2	661.60	4.2	657.4	14.8	646.8	656.10	3.2	652.9	16.3	639.8
108	660.80	4.2	656.6	12.3	648.5	661.20	4.2	657.0	14.8	646.4					

1) Distances are in feet along the axis of the seismic profile.
2) All elevations are in feet referenced to vertical datum NGVD 1929.

TABLE 3-1
Seismic Survey Results
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

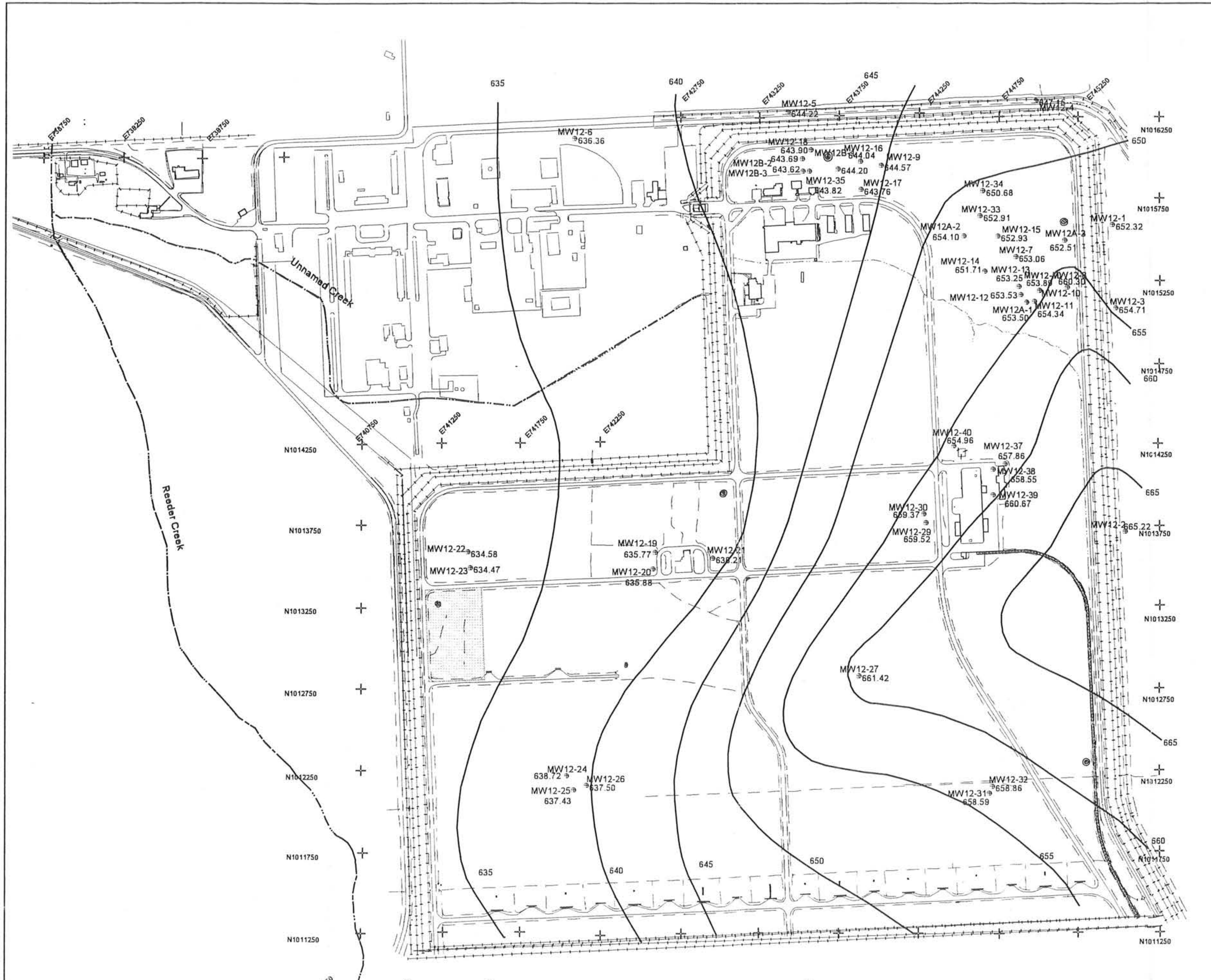
	PROFILE P4					PROFILE P5					PROFILE P6				
		Water table		Bedrock			Water table		Bedrock			Water table		Bedrock	
Distance (1)	Ground Surface Elevation (2)	Depth	Elevation	Depth	Elevation	Ground Surface Elevation (2)	Depth	Elevation	Depth	Elevation	Ground Surface Elevation (2)	Depth	Elevation	Depth	Elevation
0	660.10	4.3	655.8	12.9	647.2	657.90	2.9	655.0	15.0	642.9	654.50	2.1	652.4	13.2	641.3
4	659.95	4.2	655.8	13.4	646.6	658.00	2.9	655.1	14.7	643.3	654.45	1.9	652.6	12.6	641.9
8	659.80	4.2	655.6	12.6	647.2	658.10	3.0	655.1	15.3	642.8	654.40	1.9	652.5	13.2	641.2
12	659.50	4.1	655.4	13.0	646.5	658.20	3.1	655.1	15.7	642.5	654.30	2.0	652.3	13.1	641.2
16	659.20	4.0	655.2	15.0	644.2	658.30	3.0	655.3	15.7	642.6	654.20	1.7	652.5	13.2	641.0
20	659.00	4.0	655.0	15.3	643.7	658.40	3.2	655.2	14.8	643.6	654.10	1.7	652.4	14.0	640.1
24	658.90	3.9	655.0	14.4	644.5	658.45	3.3	655.2	14.4	644.1	654.05	1.6	652.5	14.1	640.0
28	658.80	4.0	654.8	13.8	645.0	658.50	3.3	655.2	14.0	644.5	654.00	1.7	652.3	14.2	639.8
32	658.55	3.5	655.1	14.0	644.6	658.65	3.5	655.2	13.9	644.8	653.95	1.6	652.4	14.0	640.0
36	658.30	2.9	655.4	15.3	643.0	658.80	3.5	655.3	13.2	645.6	653.90	1.6	652.3	13.6	640.3
40	658.15	2.6	655.6	16.5	641.7	658.90	3.5	655.4	13.1	645.8	653.85	1.5	652.4	13.3	640.6
44	658.00	1.9	656.1	16.5	641.5	659.00	3.5	655.5	12.9	646.1	653.80	1.8	652.0	13.3	640.5
48	657.90	1.7	656.2	15.9	642.0	659.10	3.4	655.7	12.9	646.2	653.70	1.7	652.0	13.0	640.7
52	657.85	2.3	655.6	15.5	642.4	659.15	3.5	655.7	13.2	646.0	653.65	1.6	652.1	13.1	640.6
56	657.80	3.0	654.8	15.3	642.5	659.20	3.4	655.8	13.4	645.8	653.60	1.6	652.0	13.3	640.3
60	657.75	3.7	654.1	14.3	643.5	659.20	3.4	655.8	13.2	646.0	653.55	1.6	652.0	13.6	640.0
64	657.70	4.3	653.4	11.5	646.2	659.20	3.2	656.0	12.7	646.5	653.50	1.7	651.8	13.1	640.4
68	657.55	4.0	653.6	10.5	647.1	659.20	3.2	656.0	12.3	646.9	653.45	1.6	651.9	12.4	641.1
72	657.40	3.6	653.8	11.3	646.1	659.20	3.1	656.1	12.5	646.7	653.40	1.4	652.0	12.5	640.9
76	657.25	3.2	654.1	12.2	645.1	659.35	3.1	656.3	13.1	646.3	653.30	1.4	651.9	12.8	640.5
80	657.18	2.8	654.4	12.5	644.7	659.43	3.1	656.3	13.2	646.2	653.25	1.4	651.9	12.8	640.5
84	657.10	2.4	654.7	12.7	644.4	659.50	3.2	656.3	13.4	646.1	653.20	1.5	651.7	12.8	640.4
88	656.90	1.3	655.6	13.6	643.3	659.50	3.1	656.4	13.5	646.0	653.15	1.6	651.6	12.4	640.8
92	656.70	1.9	654.8	13.4	643.3	659.50	3.0	656.5	13.5	646.0	653.10	1.7	651.4	12.4	640.7
96	656.75	1.5	655.3	14.9	641.9	659.65	3.0	656.7	13.7	646.0	653.05	2.0	651.1	12.3	640.8
100	656.80	0.8	656.0	14.6	642.2	659.80	3.2	656.6	13.1	646.7	653.00	2.0	651.0	11.8	641.2
104	656.60	2.3	654.3	13.7	642.9	659.80	3.0	656.8	13.1	646.7	652.90	2.4	650.5	11.9	641.0
108															

1) Distances are in feet along the axis of the seismic profile.
2) All elevations are in feet referenced to vertical datum NGVD 1929.

TABLE 3-1
Seismic Survey Results
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

	PROFILE P7					PROFILE P8				
		Water table		Bedrock			Water table		Bedrock	
Distance (1)	Ground Surface Elevation (2)	Depth	Elevation	Depth	Elevation	Ground Surface Elevation (2)	Depth	Elevation	Depth	Elevation
0	654.45	3.6	650.9	9.2	645.3	656.15	3.7	652.5	14.3	641.9
4	654.50	3.9	650.6	8.4	646.1	656.05	3.6	652.5	15.3	640.8
8	654.55	4.0	650.6	9.2	645.4	655.95	3.5	652.5	15.4	640.6
12	654.60	3.6	651.0	9.6	645.0	655.95	3.4	652.6	15.5	640.5
16	654.65	2.9	651.8	9.4	645.3	655.95	3.3	652.7	16.1	639.9
20	654.65	2.8	651.9	9.6	645.1	655.90	3.2	652.7	15.8	640.1
24	654.65	2.8	651.9	9.5	645.2	655.88	3.2	652.7	15.4	640.5
28	654.65	2.9	651.8	9.4	645.3	655.85	3.2	652.7	14.9	641.0
32	654.50	3.0	651.5	9.3	645.2	655.70	3.1	652.6	14.4	641.3
36	654.35	3.0	651.4	9.1	645.3	655.55	3.0	652.6	13.4	642.2
40	654.30	3.0	651.3	8.9	645.4	655.40	3.1	652.3	12.4	643.0
44	654.25	3.0	651.3	8.8	645.5	655.25	3.0	652.3	12.3	643.0
48	654.25	3.1	651.2	8.7	645.6	655.20	3.0	652.2	12.3	642.9
52	654.25	3.1	651.2	9.1	645.2	655.18	3.1	652.1	12.1	643.1
56	654.25	3.1	651.2	9.5	644.8	655.15	3.0	652.2	11.8	643.4
60	654.30	3.1	651.2	9.7	644.6	655.15	3.4	651.8	11.1	644.1
64	654.35	3.1	651.3	10.1	644.3	655.15	3.7	651.5	10.3	644.9
68	654.30	3.0	651.3	11.0	643.3	655.05	3.9	651.2	10.1	645.0
72	654.25	2.9	651.4	11.3	643.0	654.95	4.0	651.0	11.4	643.6
76	654.20	2.9	651.3	11.1	643.1	654.90	3.8	651.1	11.9	643.0
80	654.18	3.1	651.1	10.8	643.4	654.88	3.7	651.2	11.9	643.0
84	654.15	3.2	651.0	10.4	643.8	654.85	3.4	651.5	11.8	643.1
88	654.15	3.4	650.8	10.1	644.1	654.90	3.0	651.9	11.4	643.5
92	654.15	3.3	650.9	9.8	644.4	654.95	3.5	651.5	10.5	644.5
96	654.05	3.3	650.8	9.4	644.7	654.95	3.5	651.5	9.5	645.5
100	653.95	3.3	650.7	9.2	644.8	654.95	3.5	651.5	9.2	645.8
104	653.85	3.3	650.6	8.2	645.7	654.95	3.4	651.6	9.2	645.8
108										

1) Distances are in feet along the axis of the seismic profile.
2) All elevations are in feet referenced to vertical datum NGVD 1929.



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LEGEND

646.36 GROUND WATER ELEVATION CONTOUR

652.21 MONITORING WELL LOCATION WITH GROUND WATER ELEVATION

600 0 600
(feet)

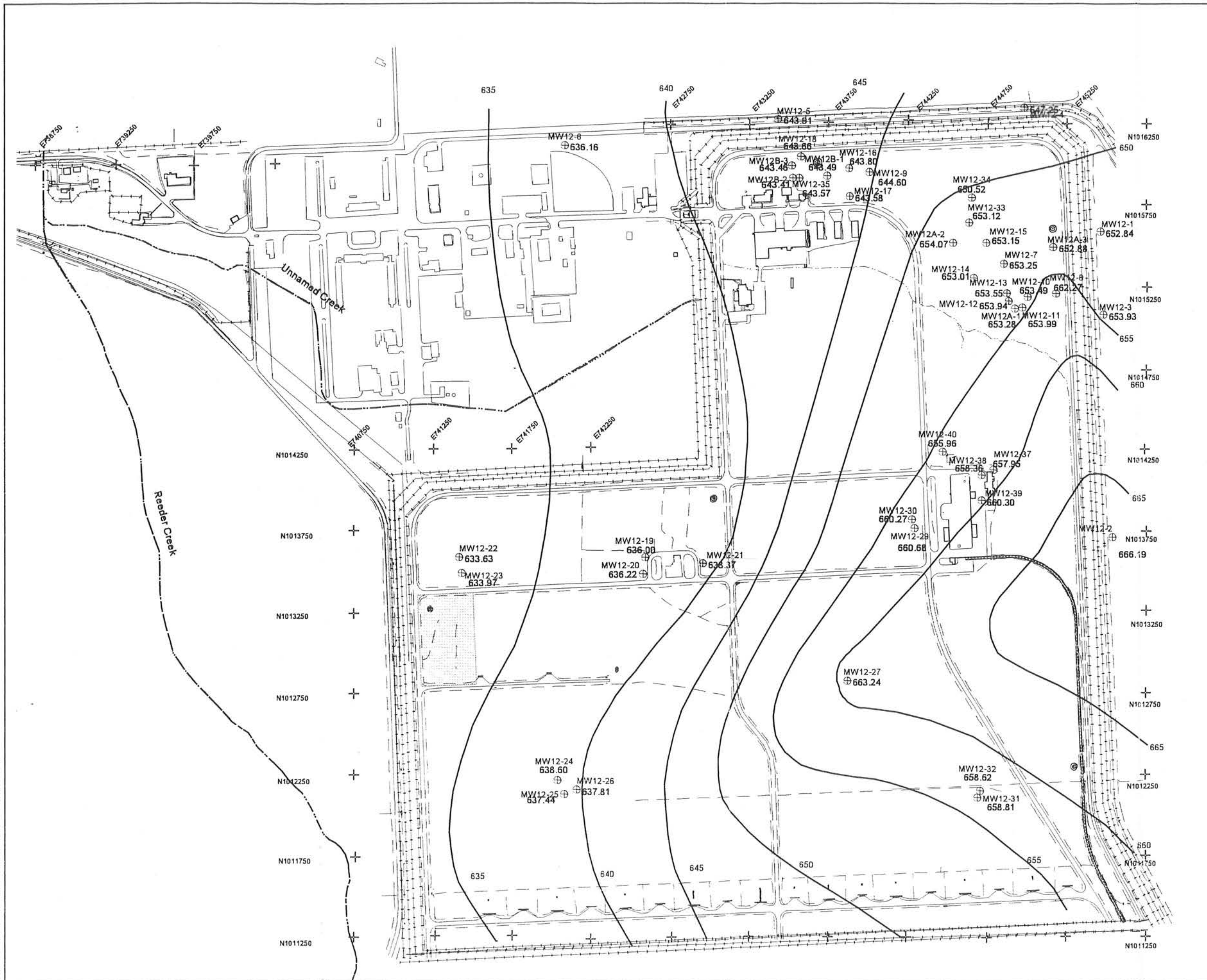
PARSONS

PARSONS ENGINEERING SCIENCE, INC.

SENECA ARMY DEPOT ACTIVITY
RI/FS
SEAD 12

FIGURE 3-8
GROUNDWATER ELEVATION CONTOUR MAP
MAY 1999

SCALE 1:600	DATE MAY 2000	REV	Sheet 1 of 1



N

LEGEND

646.36 GROUND WATER ELEVATION CONTOUR

652.21 MONITORING WELL LOCATION WITH GROUND WATER ELEVATION

600 0 600 (feet)

PARSONS

PARSONS ENGINEERING SCIENCE, INC.

SENECA ARMY DEPOT ACTIVITY
RI/FS
SEAD 12

FIGURE 3-9
GROUNDWATER ELEVATION
CONTOUR MAP
DECEMBER 1999

SCALE	DATE	REV	
1:600	MAY 2000		Sheet 1 of 1

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TABLE 3-2
Ground Water Elevation Data
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

		Fall 1998		Spring 1999		Fall 1999	
Monitoring Well	Top of PVC Elevation (ft)	Depth to Water (ft)	Water Table Elevation (ft)	Depth to Water (ft)	Water Table Elevation (ft)	Depth to Water (ft)	Water Table Elevation (ft)
MW12-1	657.36	11.87	645.49	5.04	652.32	4.52	652.84
MW12-10	662.49	15.36	647.13	8.6	653.89	9.00	653.49
MW12-11	659.62	11.86	647.76	5.28	654.34	5.63	653.99
MW12-12	659.74	12.63	647.11	6.21	653.53	5.80	653.94
MW12-13	659.72	12.65	647.07	6.47	653.25	6.17	653.55
MW12-14	657.24	10.57	646.67	5.53	651.71	4.23	653.01
MW12-15	656.7	9.95	646.75	3.77	652.93	3.55	653.15
MW12-16	653.53	14.58	638.95	9.49	644.04	9.73	643.80
MW12-17	655.36	16.46	638.9	11.6	643.76	11.78	643.58
MW12-18	652.03	13.1	638.93	8.13	643.9	8.37	643.66
MW12-19	641.48	7.5	633.98	5.71	635.77	5.48	636.00
MW12-2	668.24	8.42	659.82	3.02	665.22	2.05	666.19
MW12-20	641.26	7.22	634.04	5.38	635.88	5.04	636.22
MW12-21	643.61	8.41	635.2	5.4	638.21	5.24	638.37
MW12-22	639.5	9.48	630.02	4.92	634.58	5.87	633.63
MW12-23	638.77	8.45	630.32	4.3	634.47	4.80	633.97
MW12-24	645.06	10.91	634.15	6.34	638.72	6.46	638.60
MW12-25	643.99	9.89	634.1	6.56	637.43	6.55	637.44
MW12-26	644.12	9.97	634.15	6.62	637.5	6.31	637.81
MW12-27	665.61	12.2	653.41	4.19	661.42	2.37	663.24
MW12-29	664.1	6.39	657.71	4.58	659.52	3.42	660.68
MW12-3	668.37	20.14	648.23	13.66	654.71	14.44	653.93
MW12-30	663.53	6.4	657.13	4.16	659.37	3.26	660.27
MW12-31	661.99	8.26	653.73	3.4	658.59	3.18	658.81
MW12-32	661.74	8.07	653.67	2.88	658.86	3.12	658.62
MW12-33	658.84	12.2	646.64	5.93	652.91	5.72	653.12
MW12-34	658.38	16.44	641.94	7.7	650.68	7.86	650.52
MW12-35	650.83	12.02	638.81	7.01	643.82	7.26	643.57
MW12-37	665.13	7.25	657.88	7.27	657.86	7.18	657.95
MW12-38	662.95	5.31	657.64	4.4	658.55	4.59	658.36
MW12-39	662.83	3.34	659.49	2.16	660.67	2.53	660.30
MW12-4	651.47	9.64	641.83	4.32	647.15	4.22	647.25
MW12-40	663.38	11.04	652.34	8.42	654.96	7.42	655.96
MW12-5	653.37	14.46	638.91	9.15	644.22	9.46	643.91
MW12-6	639.39	6.95	632.44	3.03	636.36	3.23	636.16
MW12-7	662.19	15.44	646.75	9.13	653.06	8.94	653.25
MW12-8	666.95	15.59	651.36	6.65	660.3	4.68	662.27
MW12-9	653.99	14.98	639.01	9.42	644.57	9.39	644.60
MW12A-1	658.32	11.41	646.91	4.82	653.5	5.04	653.28
MW12A-2	657.4	9.79	647.61	3.3	654.1	3.33	654.07
MW12A-3	657.44	11.08	646.36	4.93	652.51	4.56	652.88
MW12B-1	653.36	14.58	638.78	9.16	644.2	9.87	643.49
MW12B-2	649.93	11.22	638.71	6.31	643.62	6.52	643.41
MW12B-3	650.03	11.29	638.74	6.34	643.69	6.57	643.46

monitoring wells were developed and before the first round of ground water sampling. The May ground water levels were taken to be representative of a high groundwater condition due to the spring snow melt. The December 1999 ground water elevation measurements were collected immediately before the second round of ground water sampling. These December were collected to depict the ground water elevation and flow characteristics for the late fall and winter season when ground water levels are expected to be lower.

The groundwater contour maps (**Figure 3-8**, and **Figure 3-9**) clearly indicates that groundwater flow is predominantly to the west and northwest across the majority of the site. In the north-east corner of the site in the vicinity of disposal pits A, B, and C regional ground water flow is to the north and northwest. Local ground water flow in the immediate vicinity of a relative high near disposal pit C is to the north, northeast, and northwest. Groundwater elevations range from a high of approximately 666 feet (MW12-2) in the east, to a low of approximately 634 feet (MW12-23) on the western side of the site. In general the ground water elevation measurements collected during the December 1999 round of ground water elevation measurements were higher by less than one foot on a well by well basis than those from May 1999. The horizontal groundwater gradient is steepest in the southern and central portions of the site at approximately 0.015 ft/ft. The horizontal groundwater gradient is flattest in the northern portion of the site at 0.007 ft/ft.

3.4.1.2 Shallow Bedrock Aquifer

Although one monitoring well was installed in the shallow bedrock aquifer during the RI phase of work at SEAD-12. No shallow bedrock aquifer groundwater elevation map was prepared due to insufficient data.

3.4.2 Hydraulic Conductivity

The hydraulic conductivity within the till/weathered shale aquifer in SEAD-12 was estimated at 25 wells, using slug tests as described in **Section 2.7.2.** These hydraulic conductivities range between 2.52×10^{-5} cm/sec and 1.24×10^{-2} cm/sec (**Table 3-3**). The hydraulic conductivity test data are presented as **Appendix D**. The geometric mean of the site wide hydraulic conductivity is 9.22×10^{-4} cm/sec (2.61 ft/day). The geometric mean for the SEAD-12 monitoring wells compares well with the published hydraulic conductivity values for till, which range from 8×10^{-4} to 10^{-10} cm/sec (Freeze & Cherry, 1979). The published hydraulic conductivity values for shale are generally less than 10^{-7} cm/sec unless secondary porosity is present.

TABLE 3-3
Hydraulic Conductivity Data
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Location ID	K (cm/sec)	K (ft/day)
MW12-4 [1]	1.12E-03	3.17
MW12-5 [1]	9.44E-04	2.68
MW12-7 [1]	8.42E-03	23.68
MW12-9 [1]	3.54E-03	10.05
MW12-10 [1]	4.45E-04	1.26
MW12-12 [1]	2.63E-04	0.75
MW12-13 [1]	2.52E-05	0.07
MW12-14 [1]	5.89E-04	1.67
MW12-15 [1]	3.13E-03	9.38
MW12-17 [1]	1.24E-02	35.14
MW12-18 [1]	1.66E-03	4.70
MW12-33 [1]	5.04E-03	14.29
MW12A-1 [1]	8.19E-04	2.32
MW12A-2 [1]	1.27E-03	3.59
MW12B-2 [1]	3.16E-03	8.94
MW12B-3 [1]	2.27E-03	6.43
MW12-19 [2]	1.50E-03	4.24
MW12-20 [2]	1.35E-03	3.82
MW12-21 [2]	4.26E-04	1.21
MW12-22 [2]	1.34E-04	0.38
MW12-23 [2]	1.57E-04	0.44
MW12-25 [2]	9.29E-04	2.63
MW12-30 [2]	6.37E-05	0.18
MW12-38 [2]	1.18E-03	3.35
MW12-39 [2]	7.76E-04	2.20
Summary Information		
Maximum	1.24E-02	35.14
Minimum	2.52E-05	0.07
Geometric Mean - Site	9.22E-04	2.61
Median	1.12E-03	3.17
Geometric Mean - North	1.36E-03	3.85
Geometric Mean - South	4.63E-04	1.31

1 - Well in southern portion of SEAD-12
2 - Well in northern portion of SEAD-12

3.4.3 Velocity of Groundwater

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).

The velocity estimates were calculated using average site hydraulic conductivities, effective porosity estimates, and 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, a till effective porosity of 15 percent or 20 percent was used in the calculations. According to Todd (1980), competent shale is reported to have an effective porosity of 6.75 percent.
Input values used to calculate groundwater flow velocity in the southern and central portions of SEAD-12 were:

- the geometric mean of hydraulic conductivity data - 4.63×10^{-4} cm/sec (1.31 ft/day),
- estimated effective porosity of 15 percent (0.15) to 20 percent (0.20), and
- horizontal groundwater gradient of 0.015 ft/ft.

Using the Darcy equation the average linear velocity for the southern and central portions of SEAD-12 is between:

- 0.098 feet/day (or 35.77 feet/year) at 20 percent effective porosity, and
- 0.131 feet/day (or 47.82 feet/year) at 15 percent effective porosity.

Input values used to calculate groundwater flow velocity in the northern portion of SEAD-12 were:

- geometric mean of hydraulic conductivity data - 1.36×10^{-4} cm/sec (3.85 ft/day),
- estimated effective porosity of 15 percent (0.15) to 20 percent (0.20), and
- horizontal groundwater gradient of 0.007 ft/ft.

Using the Darcy equation the average linear velocity for the northern portion of SEAD-12 is between:

- 0.135 feet/day (or 49.27 feet/year) at 20 percent effective porosity, and
- 0.180 feet/day (or 65.6 feet/year) at 15 percent effective porosity.

During certain times of the year, portions of the till weathered shale aquifer may be completely dry. For example, in late September 1999, no groundwater was encountered in the till/weathered shale wells in the central portion of the site. As no groundwater flow occurs within the aquifer when it is dry, it is apparent that the calculated groundwater velocities are unlikely to be sustained throughout the year. Consequently, the actual annual distance of groundwater flow is likely to be significantly lower than the calculated velocities.

3.4.4 Vertical Connection - Till/Weathered Shale & Competent Shale Aquifers

No vertical connection tests were performed in SEAD-12 during either the ESI or the RI programs as there were no well clusters designated either of the respective work plans. Therefore the results of historic vertical connection testing activities at other SEADs will be applied to SEAD-12.

Vertical connection tests have been performed historically at other SEADs at Seneca Army Depot to determine the degree of connection between the till/weathered shale and competent shale aquifers. Specifically, these qualitative tests have been performed to determine whether the contact between the till/weathered shale and competent shale could be considered a lower impermeable boundary for the shallow groundwater flow system.

At SEAD-25, nearly all of the vertical connection tests found negligible displacement in the till/weathered shale wells when pumping/purging from the associated bedrock well. The largest drawdown (0.16 feet) was measured after 100 minutes of purging. These results indicate that the till/weathered shale aquifer is not significantly connected to the underlying competent shale aquifer.

3.5 ECOLOGICAL INVESTIGATION

As described in **Section 2**, A qualitative assessment of SEAD-12 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-12 site and the surrounding area within a radius of 0.5 mile. The results of the ecological assessment will be used (**Section 7**) in the Ecological Risk Assessment (ERA) component of the Baseline Risk Assessment (BRA).

Figure 3-10 shows the site with documented aquatic and terrestrial resources, including the major vegetative communities (wetlands, aquatic habitats, NYSDEC Significant Habitats, and areas of special concern) within a half mile radius of the site. Wetlands were delineated by the U.S. Fish and Wildlife Service as part of BRAC 95. The current (**Figure 1-6**) and potential (**Figure 1-3**) human use of the site and area are summarized in **Section 1**.

3.5.1 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 3-4** Observations included sightings, vocalizations, tracks, burrows, nests, and scat. Observations and assessments were concentrated on undeveloped upland areas, waterways, and wetlands within the study area. No biological sampling was conducted within the study area. Limited nighttime surveys were conducted to determine the presence of bats.

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). As noted in Section 2, information presented in this section was assembled through a combination of literature review, file searches, telephone interviews, office visits, and site inspection.

3.5.1.1 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.

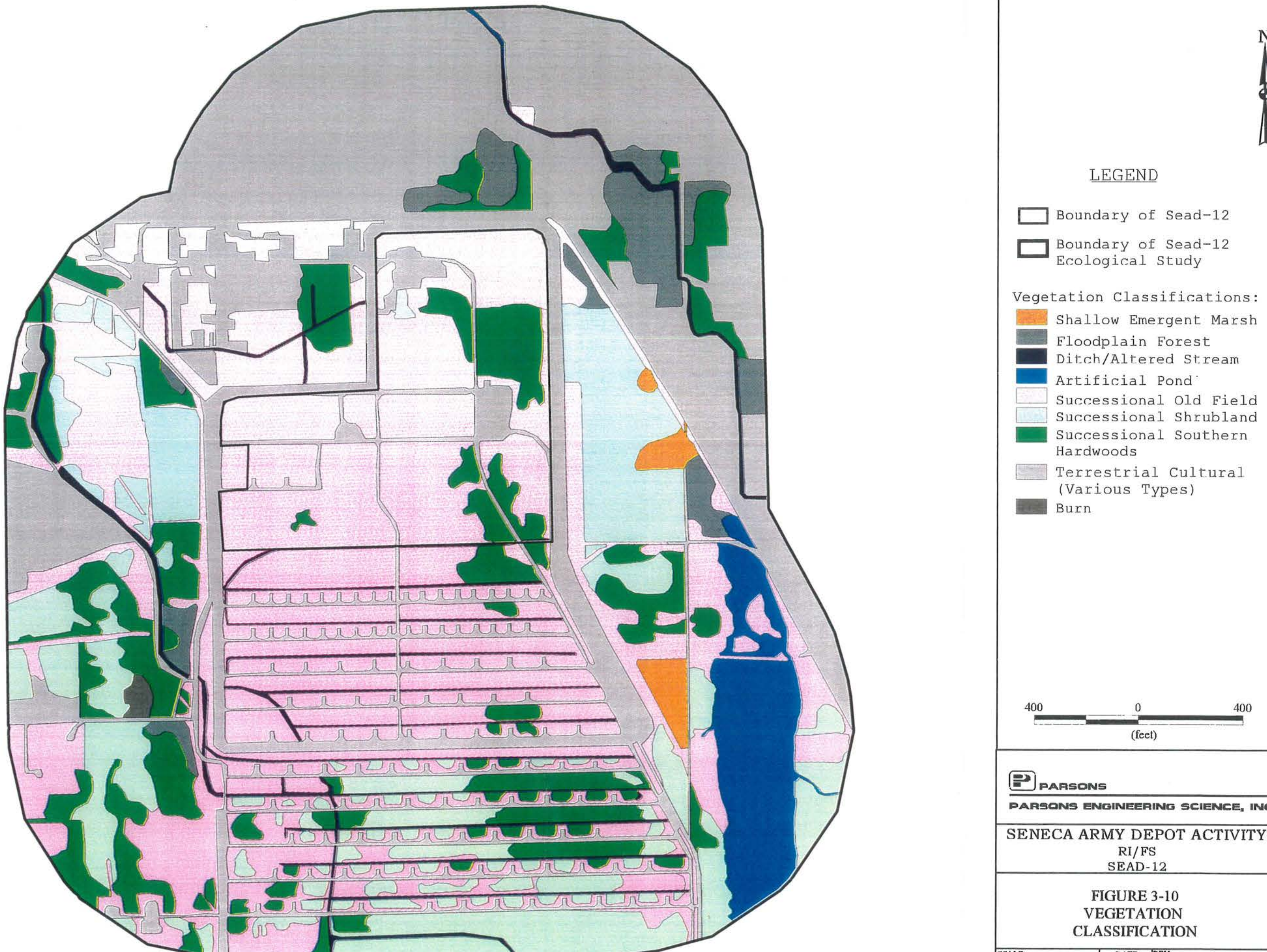
Upland Communities

Successional Old Field. The majority of the SEAD-12 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

TABLE 4-1
Soil Derived Concentration Guideline Levels (DCGLs)
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Nuclide	Decay Products of Concern	Soil DCGLs[1] (pCi/g)									
		EM-5	EM-6	BLDG 819/EM-27	BLDG 815/816/EM-28	DISPOSAL PIT A/B	DISPOSAL PIT C	FORMER DRY WASTE DISPOSAL PIT	CLASS III	MINIMUM VALUES USED	MINIMUM[2,3] VALUE/10
RESIDENTIAL SCENARIO											
Ac-227	Th-227, Ra-223, Pb-211	1.671E+00	1.826E+00	1.672E+00	1.826E+00	1.786E+00	1.598E+00	1.657E+00	2.037E+00	1.598E+00	1.598E-01
Co-57		9.523E+01	9.762E+01	9.524E+01	9.657E+01	9.711E+01	9.423E+01	9.483E+01	9.928E+01	9.423E+01	9.423E+00
Co-60		3.041E+00	3.141E+00	3.042E+00	3.073E+00	3.119E+00	3.004E+00	3.017E+00	3.185E+00	3.004E+00	3.004E-01
Cs-137		1.238E+01	1.275E+01	1.238E+01	1.298E+01	1.267E+01	1.224E+01	1.251E+01	1.343E+01	1.224E+01	1.224E+00
H-3		1.380E+02	8.608E+01	1.477E+02	2.042E+02	9.713E+01	8.005E+01	1.699E+02	2.042E+02	8.005E+01	8.005E+00
Pa-231		8.143E-01	8.517E-01	8.151E-01	9.884E-01	8.422E-01	7.893E-01	8.664E-01	1.057E+00	7.893E-01	7.893E-02
Pb-210		2.788E+00	2.790E+00	2.788E+00	3.948E+00	2.789E+00	2.788E+00	3.248E+00	3.951E+00	2.788E+00	2.788E-01
Pm-147		4.976E+04	5.056E+04	4.976E+04	6.135E+04	5.036E+04	4.935E+04	5.422E+04	6.271E+04	4.935E+04	4.935E+03
Pu-239		2.075E+01	2.221E+01	2.075E+01	2.312E+01	2.183E+01	2.004E+01	2.098E+01	2.517E+01	2.004E+01	2.004E+00
Ra-226	Pb-214, Bi-214	1.285E-01	1.222E-01	1.302E-01	1.437E-01	1.230E-01	1.206E-01	1.350E-01	1.444E-01	1.206E-01	1.206E-02
Ra-228	Ac-228	2.389E+00	2.450E+00	2.389E+00	2.859E+00	2.437E+00	2.354E+00	2.552E+00	2.968E+00	2.354E+00	2.354E-01
Sm-147		1.443E+02	1.567E+02	1.443E+02	1.591E+02	1.535E+02	1.383E+02	1.440E+02	1.764E+02	1.383E+02	1.383E+01
Th-228	Tl-208	4.100E+00	4.448E+00	4.101E+00	4.107E+00	4.371E+00	3.903E+00	3.888E+00	4.497E+00	3.888E+00	3.888E-01
Th-230		3.630E-01	3.398E-01	3.707E-01	4.208E-01	3.429E-01	3.345E-01	3.887E-01	4.233E-01	3.345E-01	3.345E-02
Th-232		1.355E+00	1.421E+00	1.356E+00	1.544E+00	1.406E+00	1.317E+00	1.397E+00	1.642E+00	1.317E+00	1.317E-01
U-234		4.235E+01	4.133E+01	4.334E+01	4.967E+01	4.140E+01	3.851E+01	4.478E+01	5.236E+01	3.851E+01	3.851E+00
U-235		2.085E+01	2.108E+01	6.677E+00	2.486E+01	2.101E+01	1.944E+01	2.226E+01	2.651E+01	6.677E+00	6.677E-01
U-238	Th-234	7.644E+01	8.247E+01	7.647E+01	8.233E+01	8.093E+01	7.360E+01	7.590E+01	9.025E+01	7.360E+01	7.360E+00
WORKER SCENARIO											
Ac-227	Th-227, Ra-223, Pb-211	2.922E+00	3.253E+00	2.923E+00	2.909E+00	3.166E+00	2.771E+00	2.753E+00	3.280E+00	2.753E+00	2.753E-01
Co-57		9.145E+01	9.386E+01	9.146E+01	9.135E+01	9.334E+01	9.044E+01	9.036E+01	9.400E+01	9.036E+01	9.036E+00
Co-60		2.880E+00	2.978E+00	2.880E+00	2.879E+00	2.956E+00	2.843E+00	2.841E+00	2.986E+00	2.841E+00	2.841E-01
Cs-137		1.373E+01	1.423E+01	1.373E+01	1.372E+01	1.412E+01	1.354E+01	1.353E+01	1.426E+01	1.353E+01	1.353E+00
H-3		1.784E+04	3.665E+04	1.789E+04	1.731E+04	3.045E+04	1.252E+04	1.201E+04	3.876E+04	1.201E+04	1.201E+03
Pa-231		2.333E+00	2.565E+00	2.336E+00	2.336E+00	2.504E+00	2.207E+00	2.212E+00	2.612E+00	2.207E+00	2.207E-01
Pb-210		3.305E+01	3.318E+01	3.305E+01	3.304E+01	3.315E+01	3.298E+01	3.297E+01	3.319E+01	3.297E+01	3.297E+00
Pm-147		1.487E+05	1.539E+05	1.488E+05	1.485E+05	1.526E+05	1.462E+05	1.459E+05	1.543E+05	1.459E+05	1.459E+04
Pu-239		3.385E+01	3.649E+01	3.386E+01	3.374E+01	3.581E+01	3.257E+01	3.242E+01	3.670E+01	3.242E+01	3.242E+00
Ra-226	Pb-214, Bi-214	3.780E+00	3.889E+00	3.781E+00	3.781E+00	3.865E+00	3.735E+00	3.737E+00	3.904E+00	3.735E+00	3.735E-01
Ra-228	Ac-228	4.543E+00	4.705E+00	4.544E+00	4.541E+00	4.669E+00	4.482E+00	4.478E+00	4.719E+00	4.478E+00	4.478E-01
Sm-147		2.937E+02	3.298E+02	2.938E+02	2.923E+02	3.201E+02	2.773E+02	2.754E+02	3.327E+02	2.754E+02	2.754E+01
Th-228	Tl-208	4.259E+00	4.422E+00	4.260E+00	4.258E+00	4.384E+00	4.198E+00	4.194E+00	4.436E+00	4.194E+00	4.194E-01
Th-230		9.251E+00	9.530E+00	9.271E+00	9.357E+00	9.466E+00	8.981E+00	9.129E+00	9.783E+00	8.981E+00	8.981E-01
Th-232		2.285E+00	2.398E+00	2.286E+00	2.284E+00	2.371E+00	2.234E+00	2.233E+00	2.412E+00	2.233E+00	2.233E-01
U-234		1.674E+02	1.796E+02	1.688E+02	1.701E+02	1.763E+02	1.509E+02	1.600E+02	1.945E+02	1.509E+02	1.509E+01
U-235		3.488E+01	3.565E+01	3.516E+01	3.646E+01	3.545E+01	3.226E+01	3.445E+01	3.912E+01	3.226E+01	3.226E+00
U-238	Th-234	1.215E+02	1.325E+02	1.216E+02	1.211E+02	1.297E+02	1.165E+02	1.159E+02	1.334E+02	1.159E+02	1.159E+01

NOTES: 1. Soil DCGLs derived using RESRAD. Model inputs are presented in Appendix E.
2. The most conservative value divided by ten was used to represent the RESRAD model output for the lowest activity equivalent to 10 mrem/year of a single radionuclide over 1000 years.
3. Value added to background data set to conduct Wilcoxon Rank Sum analysis with site data set.



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SENECA ARMY DEPOT ACTIVITY
RI/FS
SEAD-12

FIGURE 3-10
VEGETATION
CLASSIFICATION

SCALE	DATE	REV	
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Table 3-4
Species Observed at the SEAD-12 Site
Seneca Army Depot Activity
Romulus, New York

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								
Box elder	*Acer negundo*						X	
Gray birch	*Betula populifolia*			X			X	
American hornbeam	*Carpinus caroliniana*						X	
Red-osier dogwood	*Cornus stolonifera*		X	X				
Hawthorne	*Craetegus* sp.		X	X			X	
White mulberry	*Morus alba*		X	X				

Table 3-4
Species Observed at the SEAD-12 Site
Seneca Army Depot Activity
Romulus, New York

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.)								
Black cherry	*Prunus serotina*	X	X	X				
Black willow	*Salix nigra*						X	
European buckthorn	*Rhamnus cathartica*	X	X	X			X	
Staghorn Sumac	*Rhus typhinia*	X	X	X				
Red raspberry	*Rubus idacus*	X	X	X				
Herbaceous Plants								
Yarrow	*Achillea millefolium*	X	X					
Common ragweed	*Ambrosia artimisiifolia*	X	X	X	X			
New England aster	*Aster novae-anglaie*	X	X					
Spotted knapweed	*Centaurea maculosa*	X	X					
Common chickweed	*Cerastium arvense*	X			X			
Chicory	*Cichorium intybus*	X						
White daisy	*Chrysanthemum*	X						
	Cyperus sp.				X			X
Orchard grass	*Dactylis glomerata*	X						
Queen Anne's lace	*Daucus carota*	X	X		X			
Teasel	*Dipsacus sylvestris*	X	X					
Common strawberry	*Fragaria virginiana*	X						
Manna grass	*Glyceria borealis*	X						
Hawkweed	*Hieracium* sp.	X						
Purple loosestrife	*Lythrum salicaria*				X			X
White sweet clover	*Melilotus alba*	X						
Water lily	*Nymphae sp.*					X		

Table 3-4
Species Observed at the SEAD-12 Site
Seneca Army Depot Activity
Romulus, New York

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
Bluegrass	*Poa palustris*	X						
Pickerelweed	*Pontedaria cordata*				X			
Black-eyed susan	*Rudbeckia hirta*	X			X			
Arrowhead	*Sagittaria lancifolia*					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
Wild grape	*Vitis* sp.	X	X	X	X		X	
Birds								
Wood duck	*Aix sponsa*					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	
Northern flicker	*Colaptes auratus*			X			X	

Table 3-4
Species Observed at the SEAD-12 Site
Seneca Army Depot Activity
Romulus, New York

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 (cont.)								
American crow	*Corvus brachyrhynchos*	X	X	X				
Gray catbird	*Dumetella carolinensis*	X	X					
American kestrel	*Falco sparvarius*	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				
American robin	*Turdus migratorius*	X	X	X			X	
Mourning dove	*Zenaida macroura*	X	X	X				
Mammals								
Opossum	*Didelphis virginiana*	X	X	X	X		X	
Big brown bat	*Eptesicus fuscus*			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								
Carp	*Cyprinus carpio*				X	X		
Largemouth bass	*Micropterus salmoides*					X		

opportunistic species. All uplands 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, 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 significantly by land management practices. Natural creeks have been straightened and channelized, and former wetland areas have been drained and filled.

Artificial Pond. A large (87-acre) pond was excavated on the east side of the installation in the 1970s to attract ducks for hunting purposes. A dirt and gravel road bisects the northern third of the pond, creating a shallower marsh area in the smaller, northern portion of the pond and a deep water pond in the southern portion of the pond. The water was low in both portions of the pond during the field investigation and the muck layer was exposed.

The grading for the pond did not provide for a significant amount of littoral shelf, although the low water elevations did allow opportunistic emergent vegetation to flourish. The vegetation in the northern portion included cattail, arrowhead and willow. The vegetation in the southern portion of the pond included cattail and water lilies. The pond provides good habitat for ducks and wading birds, as well as for turtles, muskrats, and Canada geese.

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, 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 south of this 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. Remnant floodplain forests were located outside the installation in the northeastern portion of the 0.5-mile radius. The creek within the floodplain had been recently channelized and was now a 12- 15-foot wide ditch with graded and sodded side slopes. The remnant forest has a dense, closed canopy of various deciduous hardwood trees such as red and silver maple, gray birch, northern red oak, white ash, 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.

3.5.1.2 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:

a. 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);
b. Enhance non-game species populations for their aesthetic, recreational, and educational values; and
c. 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 3-4**.

3.5.2 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.

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-12 site itself is considered low due to the lack of a diverse vegetative cover and the highly managed condition of the existing vegetation.

3.5.3 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 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-12 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

This section presents the analytical results for all media sampled at SEAD-12. Data from the ESI and the RI investigations have been merged into a single database and are discussed as a whole in this RI report. As noted previously, interior radiological building survey data are reported in a separate document (Radiological Survey Report - SEAD-12; Class 1 and Class 2 Buildings, July 2000).

Section Organization

Section 4.2 through **Section 4.6** present the results of the remedial investigations, comparing them to the regulatory criteria discussed in **Section 4.1**. The geophysical investigation results are presented **Section 4.2**. **Section 4.3** presents the soil remedial investigation results for each of the nine potential release areas developed from the geophysical and historical data. The basis for each potential release area is described in **Section 4.3**. For each potential release area the results are presented on the following order (as applicable):

- Gamma surveying results;
- Test pit results;
- Soil gas results;
- Soil chemistry(surface and subsurface soil); and
- Radiological results;
- Surface water chemistry and radiological results;
- Sediment chemistry and radiological results; and
- Groundwater chemistry and radiological results.

The nature and extent of impacts is summarized at the end of this section, **Section 4.4**.

Data Quality Objectives

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) and as described in the approved Generic Installation RI/FS Workplan for SEDA. The RI investigation activities generated Level I and Level IV analytical data meeting specific quality assurance and quality control elements of the DQO document (USEPA, 1987).

The original DQO document (USEPA, 1987) has been replaced by the Data Quality Objectives Process for Superfund: Interim Final Guidance (USEPA, 1993). Although the workplan for this site references 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-12 essentially followed the steps outlined in the Interim Final Guidance. The Level I 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 workplan and the report prepared for SEDA, the data categories will continue to be referred to using "Level" terminology. In order to maintain consistency between the Generic Installation RI/FS Workplan, the Scoping Plan for SEAD-12 and SEAD-63, and the reports prepared for SEDA, this report will continue to reference the earlier DQO document.

To assess chemical contamination, a non-probabilistic approach was used to develop a sampling program 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.

A probabilistic approach was used in developing a sampling program for radionuclides in soil. This approach, outlined in Section 3.5 of the Project Scoping Plan, was performed such that a sufficient quantity of data would be collected to show compliance with release criteria and adequately compare site data to background data sets. For this approach, probabilities of 0.05 for Type One and Type Two errors were selected and the minimum number of data points required were calculated in accordance with the Multi-Agency Radiation Survey and Site Investigation Manual (MARSSIM-EPA, 1997) and EPA's Statistical Methods for Evaluating the Attainment of Cleanup Standards, Vol.3 (EPA, 1994).

Level I data were gathered primarily for health and safety reasons during soil boring and monitoring well sampling activities using field screening instruments (Thermoenvironmental, Inc. OVM 580B, Bicron FIDLER). Additional Level I data were gathered using the Bicron FIDLER to conduct the gamma scanning surveys over the site grounds.

Level IV analyses generated data that positively identify constituents at SEAD-12. These data define the extent of constituent impacts in five media:

- Soil (surface and subsurface);
- Surface Water;
- Groundwater;
- Sediment; and
- Soil Gas.

The Level IV analytical results of the SEAD-12 investigations are presented below. The results for soil, surface water, groundwater and sediment are presented and compared to relevant criteria discussed in **Section 4.1**. The nature and extent of these results are summarized in **Section 4.4**.

4.1 COMPARISON CRITERIA FOR INVESTIGATION RESULTS

The basis for the regulatory criteria used to compare chemical and radiological results are described below.

4.1.1 Chemical Data

Criteria for soils, sediment, surface water and groundwater were obtained from, or derived from, New York State (NYS) documents. These screening or clean-up criteria are generally divided between organic and inorganic compounds.

The documents used to establish clean-up criteria for chemical constituents are:

- Soils - New York State Department of Environmental Conservation (NYSDEC) Technical and Administrative Guidance Memorandum (TAGM) HWR-94-4046 (January 1994). Per the guidance, TAGM cleanup objectives may be based on listed numerical values (based on state background values), calculated values using site background, or Health Effects Assessment Tables (HEAST).
- Sediment – NYSDEC Technical Guidance for Screening Contaminated Sediment (January 1999).
- Surface Water – NYSDEC Technical and Operation Guidance Series (TOGS, 1.1.1), Class C Standards (June 1998). Site average for hardness (216.38 mg/L) used for TAGM calculations for some metals.
- Groundwater – TOGS, 1.1.1, Class GA Standards (June 1998)

For constituents in sediment, surface water, and groundwater, the regulatory criteria used for comparison to field data are from the above published standards or guidance.

For sediment, the NYSDEC Technical Guidance for Screening Contaminated Sediment provides several criteria for the same constituent and these criteria are based on the organic carbon content of the sediment. Sediment data presented in this section is compared to the lowest published criteria calculated using the site-specific organic content of the sediment.

For soil, criteria for organic constituents are calculated based on the criteria from TAGM-4046 or numerical values as listed in the guidance. The criteria for inorganic constituents in soil are based on TAGM recommended soil clean-up values and site background soil values (TAGM-4046, Appendix A, Table 4). The site background sample data used in the development of soil inorganics criteria are presented in **Appendix G** (annotated for those inorganic constituents where values other that the site background were used). The background data are based on samples collected from areas where it has been established that no chemical impact exists. The 95th percentile of the background inorganics data was used as the TAGM for inorganics where the TAGM specifies that site background should be used.

4.1.2 Radiological Data

Regulatory criteria applicable to radiological data are obtained from three primary sources. For surface water and groundwater, criteria used for comparison were obtained from TOGS 1.1.1 and Federal Maximum Contaminant Levels (MCLs). For soil, derived concentration guideline levels (DCGLs) were developed based on the NYSDEC TAGM-4006 of 10 millirem/yr. In addition, all media were compared to background radiological data collected for each matrix as part of this investigation. Standards statistics such as maximum, minimum, average and standard deviation were compared. In addition, a Wilcoxon Rank Sum (WRS) test was performed on the site data set and background data sets to determine which radionuclides, if any, were distinguishable from background. This test is described in greater detail in **Section 6.** Background radiological data is presented in **Appendix G** for soils, **Appendix H** for sediment, **Appendix I** for surface water, and **Appendix J** for groundwater. SEAD-12 DCGL values are discussed below.

4.1.2.1 DCGL Development

A DCGL is defined as the concentration of residual radioactivity distinguishable from background that, if uniformly distributed throughout a survey unit, would result in a defined total effective dose equivalent (TEDE) to an average member of a critical group. The TEDE selected for development of DCGLs at this site is the NYSDEC TAGM 4006 of 10 millirem per year (mrem/yr). Although EPA allows a TEDE of 15 mrem/yr and the Nuclear Regulatory Commission (NRC) allows a TEDE of 25mrem/yr, this total effective dose equivalent was selected since it is the most conservative.

The process described in MARSSIM was used to develop the derived concentration guideline level (DCGLs) used to evaluate site soil radiological data. MARSSIM describes two types of DCGLs: (1) $DCGL_{EMC}$ which are guideline levels used for elevated measurement comparisons and (2) $DCGL_W$ which are guideline levels added to the background data set and statistically compared to the site data set using the Wilcoxon Rank Sum test. Sections 8.3 and 8.4 of MARSSIM describe how site data is to be evaluated using the $DCGL_{EMC}$ and $DCGL_W$ values.

For the soil data collected from SEAD-12, only $DCGL_W$ values were derived and used for comparison to site data. According to MARSSIM, DCGLs are based on regulatory guidance as well as site-specific pathway modeling. RESRAD Version 5.82 was used to develop $DCGL_W$s based on NYSDEC's TAGM of 10 mrem/yr. Two $DCGL_W$s were developed for comparison purposes. The first $DCGL_W$ derived was based on a residential scenario where the most conservative pathways offered in RESRAD were used. The second $DCGL_W$ derived was based on a worker scenario more realistic of the future land use at SEAD-12. The model and the scenarios are described more fully below.

Model Description

The RESRAD computer code was developed by Argonne National Laboratories and is widely used by the Department of Energy (DOE) and other federal agencies to estimate dose from residual radioactive material and site specific cleanup levels for radioactive contaminants. The residential and occupational exposure scenarios were both considered during the development of the $DCGL_W$s.

Potential exposure pathways for the residential scenario in SEAD-12 include:

- Exposure to direct external radiation from photon emitting radionuclides in the soil;
- Inhalation of radionuclides suspended in dust;
- Incidental ingestion of radionuclide contaminated soil;
- Ingestion of radionuclide contaminated ground water as drinking water;
- Ingestion of contaminated produce grown in contaminated soil;
- Ingestion of contaminated milk and meat taken up by cows grazing on contaminated plants;
- Radon.

Potential exposure pathways for the occupational scenario in SEAD-12 include:

- Exposure to direct external radiation from photon emitting radionuclides in the soil;
- Inhalation of radionuclides suspended in dust;

Specific input parameters are provided and discussed in **Appendix E** of this document.

4.1.2.2 $DCGL_W$ Results

Table 4-1 presents the $DCGL_W$ values established for both the residential scenario and the worker scenario for SEAD-12. RESRAD generates activity concentrations over time equivalent to a specified dose equivalent exposure (10 mrem/yr, in this case) for each specified radionuclide of concern. These activity concentrations are referred to in the RESRAD model output as "Single Radionuclide Soil Guidelines". These single radionuclide soil guidelines do not account for the presence of multiple radionuclides. MARSSIM requires the use of sum of fractions rule if multiple radionuclides of concern are present. Therefore, the values presented in **Table 4-1** represent the RESRAD single radionuclide guideline for each isotope in each potential release area. The minimum value generated for any one area was then divided by a safety factor of 10 and used to demonstrate compliance as described in **Section 4.1.2.3** below. This protects the residential receptor from a total exposure dose equivalent of 10 mrem/yr, if up to 10 radionuclides each contributing one tenth of the exposure dose are present above background at any potential area of concern.

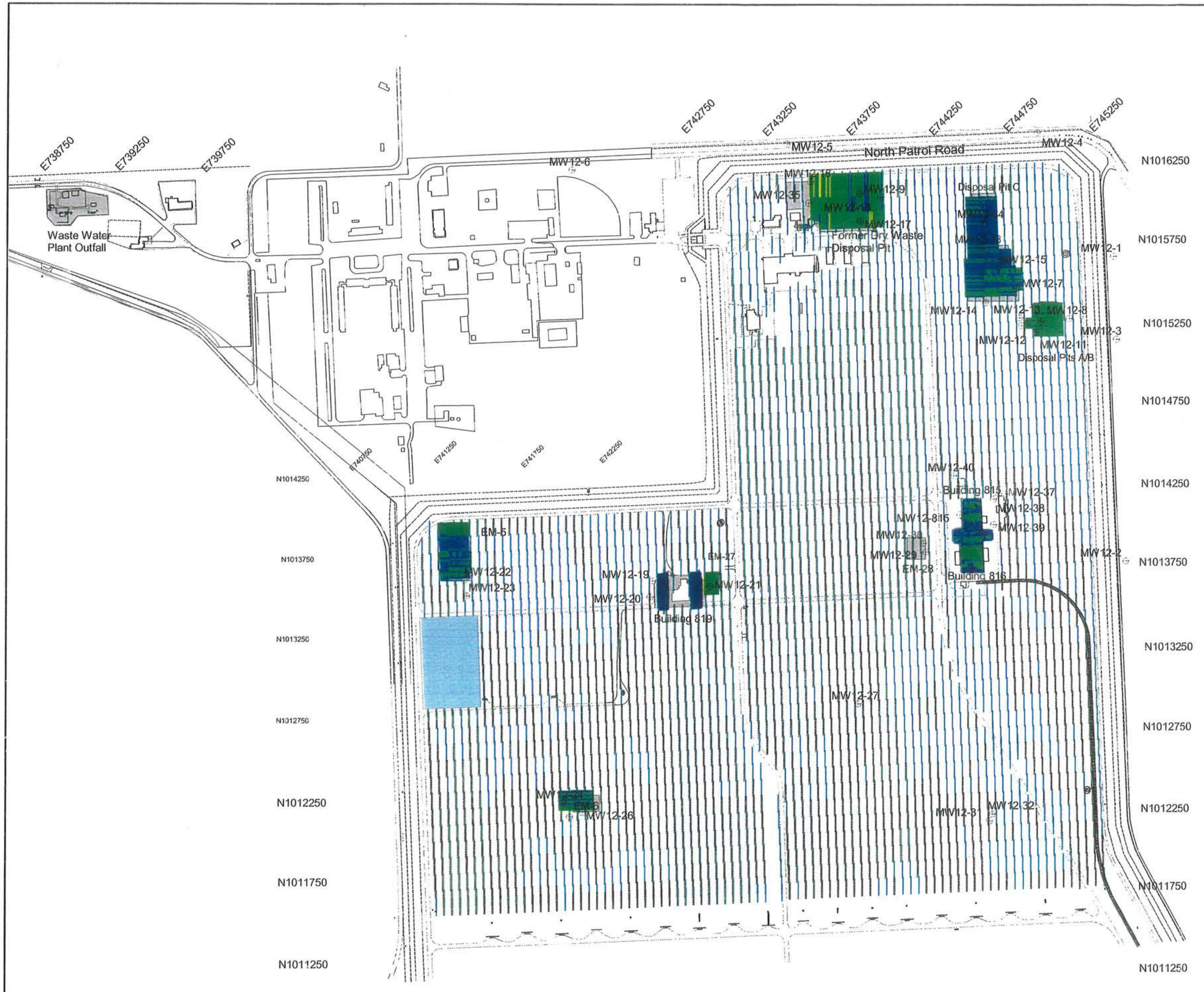
4.1.2.3 Use of the $DCGL_W$ to Show Compliance with Release Criterion

MARSSIM provides guidelines for use in demonstrating compliance with release criterion established for a site. As described above, the WRS test was run to establish whether the site data set of interest was statistically identical to or different from the background data set or whether the site data set is statistically higher or lower than the background data set. In the event that the site data set was statistically higher than the background data set the WRS test was re-run using $DCGL_W$ adjusted background data in place of the background data set as described in MARSSIM Section 8.3. A $DCGL_W$-adjusted background data set was developed by adding the $DCGL_W$ to each background data point. If according to the WRS results, a data set was equal to or less than background, or the DCGL-adjusted background, it was concluded that the survey area meets release criterion and no further investigation is required. If a data set was above the DCGL-adjusted background, additional investigation of the area is recommended.

A site-wide comparison of the gamma scanning results to background is presents as **Figure 4-1**.

4.2 GEOPHYSICAL INVESTIGATIONS

Four surface and 44 subsurface EM anomalies were detected during the EM-31 survey (**Figure 2-3**, **Table 4-2**), as described in **Section 2.2**. Based on the EM survey data, utilities information, and visual observations noted during the EM-31 survey, all four surface anomalies (SO-1 through SO-4) and 17 of the subsurface anomalies were eliminated from the list of anomalies to be investigated further (**Table 4-2**). Ground penetrating radar (GPR) was used to further characterize the subsurface and confirmed 25 of the 28 anomalies. Test pits were then used to further investigate the remaining 25 subsurface anomalies. The results of these investigations are summarized in **Table 4-2** as well as in **Figure 4-2**.



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SENECA ARMY DEPOT ACTIVITY
RI/FS
SEAD 12

FIGURE 4-1
RESULTS OF GAMMA SCANNING SURVEY

SCALE 1:600	DATE MAY 2000	REV	Sheet 1 of 1

TABLE 4-2
Electromagnetic Anomaly and Test PIt Results
SEAD-12 Remedial Investigation
Seneca Army Depot Activity Romulus, NY

RADIATION CLASS	POTENTIAL RELEASE AREA	Electromagnetic Anomaly ID	Ground Penetrating Radar Performed as Part of This Program?	Interpretation based on Geophysical Data	Associated Test Pit IDs	Contents of Associated Test Pit	Military Related Debris?	Associated Monitoring Well IDs
III	CLASS III	SO-1	NO	little vegetation cover, old 12 inch wrench at surface	None			
III	CLASS III	SO-2	NO	cement on surface of drainage ditch	None			
III	CLASS III	SO-3	NO	cement on surface of drainage ditch	None			
III	CLASS III	SO-4	NO	large area marsh, surface mostly saturated	None			
II	EM-5	EM-5	YES	multiple large amplitude anomalies, may be buried drums(not confirmed in subsequent test pit investigation)	TP12-15	nails, burned wood, wire, metal roofing, clay pipe.	No	MW12-22
II	EM-5				TP12-16	horse shoes, metal strapping, glass, nails, concrete, pottery, miscellaneous metal debris.	No	MW12-23
II	EM-6	EM-6	YES	multiple medium sized anomalies, may be debris pit	TP12-11	Stumps, brush, fence posts, other associated roads and grounds debris.	Yes	MW12-24
II	EM-6				TP12-12	Brush, concrete, chain link fencing, wire.	Yes	MW12-25
II	EM-6							MW12-26
III	CLASS III	EM-7	YES	small point source anomaly	TP12-9	No debris	No	
III	CLASS III	EM-8	YES	moderate size point source anomaly	TP12-10	Brick, glass, steel pipe, steel wire.	Yes	
III	CLASS III	EM-9	YES	point source anomaly, in in-phase data only	Hand Dug	Wood fence post with fragments of metal fencing	No	
III	CLASS III	EM-10	YES	small area, large amplitude anomaly, may be single buried object or small disposal pit	TP12-21	brick fragments, lumber, plastic sheeting, rolls of barbed wire.	Yes	MW12-27
III	CLASS III							SB12-28
III	CLASS III	EM-11	YES	point source anomaly, in in-phase data only	TP12-14	Very shallow, undisturbed weathered shale	No	
III	CLASS III	EM-12	YES	point source anomaly, in in-phase data only	TP12-22A	no debris	No	
III	CLASS III	EM-13	YES	small area, small amplitude anomaly	TP12-22B	no debris	No	
III	CLASS III	EM-14	YES	multiple medium amplitude point anomalies	TP12-24	empty metal ammo boxes lined with plywood, iron stakes.	Yes	MW21-31
III	CLASS III							MW12-32
III	CLASS III	EM-15	NO	probable septic system tank	None			
III	CLASS III	EM-16	NO	point source anomaly, in in-phase data only	None			
III	CLASS III	EM-17	YES	moderate size point source anomaly, due to surface debris	None			
III	CLASS III	EM-18	NO	Anomaly due to exercise equipment	None			
III	CLASS III	EM-19	YES	Anomaly due to backhoe	None			
III	CLASS III	EM-20	YES	large amplitude point source anomaly, later identified as associated with water line	None			
II	DISPOSAL PIT C	EM-21	NO	small point source anomaly, characterized in 1994	TP12-8 TP12-7B TP12A-7	concrete, rebar, and wood construction debris as well as asphalt road debris.	Yes	
II	DISPOSAL PIT C	EM-22	NO	small point source anomaly, characterized in 1994	TP12-7A TP12A-6	steel pipe and culvert sections	Yes	MW12-34

TABLE 4-2
Electromagnetic Anomaly and Test PIt Results
SEAD-12 Remedial Investigation
Seneca Army Depot Activity Romulus, NY

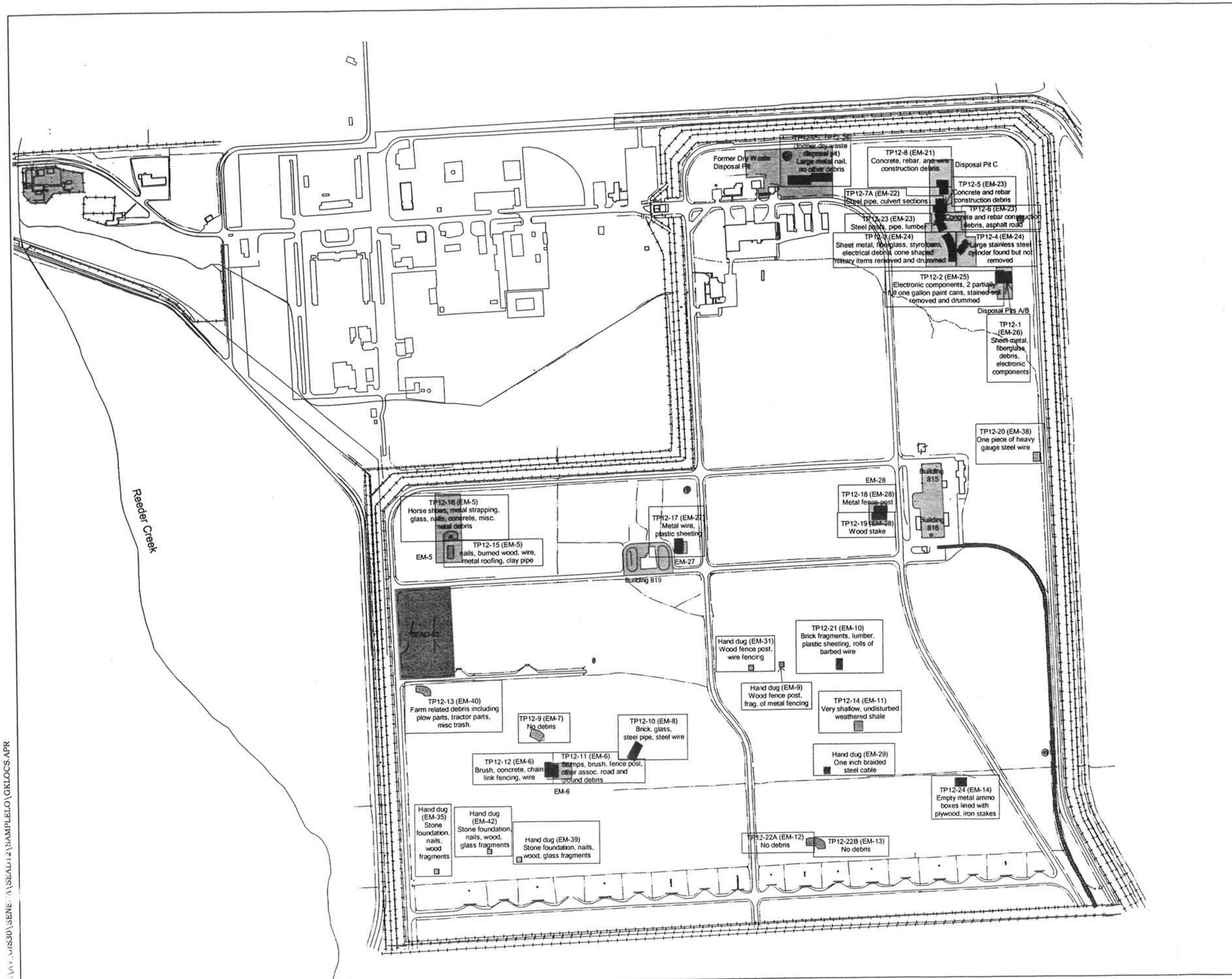
RADIATION CLASS	POTENTIAL RELEASE AREA	Electromagnetic Anomaly ID	Ground Penetrating Radar Performed as Part of This Program?	Interpretation based on Geophysical Data	Associated Test Pit IDs	Contents of Associated Test Pit	Military Related Debris?	Associated Monitoring Well IDs
II	DISPOSAL PIT C	EM-23	NO	small point source anomaly, characterized in 1994	TP12-5 TP12A-5	Concrete and rebar construction debris.	Yes	MW12-33
II	DISPOSAL PIT C				TP12A-8	No debris		
II	DISPOSAL PIT C				TP12-6	Concrete and rebar construction debris as well as asphalt road debris.	Yes	
II	DISPOSAL PIT C				TP12-23	Steel posts, pipe, lumber.	Yes	
I	DISPOSAL PIT C	EM-24	NO	Disposal Area C, characterized in 1994	TP12-3 TP12A-3	Sheet metal, fiberglass, Styrofoam, and various electrical debris. Several cone shaped military items removed and drummed.	Yes	MW12-15
I	DISPOSAL PIT C				TP12-4 TP12A-4	Large stainless steel cylinder found but not recovered.	Yes	MW12-7
I	DISPOSAL PIT C							MW12-14
II	DISPOSAL PIT A/B	EM-25	NO	Disposal Area B, characterized in 1994	TP12A-2	Insterment box,tubes, tools, spool of wire.	Yes	MW12-13
II	DISPOSAL PIT A/B							SB12-3
II	DISPOSAL PIT A/B							SB12-4
I	DISPOSAL PIT A/B	EM-26	NO	Disposal Area A, characterized in 1994	TP12-1 TP12A-1	Sheet metal, metal fragments and fiberglass debris as well as electronic components.	Yes	MW12-8
I	DISPOSAL PIT A/B				TP12-2	Sheet metal and fiberglass debris as well as electronic components, 2 partially full 1 gallon paint cans as well as stained soil removed and drummed.	Yes	MW12-10
I	DISPOSAL PIT A/B							MW12-12
I	DISPOSAL PIT A/B							SB12-1
I	DISPOSAL PIT A/B							SB12-2
II	BLDG 819/EM-27	EM-27	NO	crushed drum at surface	TP12-17	metal wire, plastic sheeting	Yes	MW12-21
II	BLDG 815/816/EM-28	EM-28	YES	point source anomaly, in in-phase anomaly only, may be associated with utilities	TP12-18	metal fence post.	Yes	MW12-29
II	BLDG 815/816/EM-28				TP12-19	wood stake	Yes	MW12-30
III	CLASS III	EM-29	YES	small area, medium amplitude anomaly, ground conductivity anomaly only	Hand Dug	1 inch braided steel cable.	Yes	
III	CLASS III	EM-30	YES	large area, medium amplitude, ground conductivity anomaly due to high water table/surface water	None			
III	CLASS III	EM-31	YES	small point source anomaly, ground conductivity anomaly only	Hand Dug	wood fence post, pieces of wire fencing.	No	
III	CLASS III	EM-32	YES	small point source anomaly	None			
III	CLASS III	EM-33	YES	small point source anomaly	Hand Dug	wood fence post, pieces of wire fencing.		

TABLE 4-2
Electromagnetic Anomaly and Test PIt Results
SEAD-12 Remedial Investigation
Seneca Army Depot Activity Romulus, NY

RADIATIO N CLASS	POTENTIAL RELEASE AREA	Electromagnetic Anomaly ID	Ground Penetrating Radar Performed as Part of This Program?	Interpretation based on Geophysical Data	Associated Test Pit IDs	Contents of Associated Test Pit	Military Related Debris?	Associated Monitoring Well IDs
III	CLASS III	EM-34	YES	small point source anomaly due metal farm debris on surface	None			
III	CLASS III	EM-35	YES	small point source anomaly	Hand Dug	Stone foundation, nails, wood fragments	No	
III	CLASS III	EM-36	YES	small point source anomaly due to debris on surface	None			
III	CLASS III	EM-37	YES	small ground conductivity anomaly only. Could not be reproduced	None			
III	CLASS III	EM-38	YES	small point source anomaly	TP12-20	1 piece of heavy gauge steel wire.	No	
III	CLASS III	EM-39	YES	small point source anomaly	Hand Dug	stone foundation, nails, wood, glass fragments.	No	
III	CLASS III	EM-40	YES	small point source anomaly	TP12-13	Farms related debris including plow parts, tractor parts, miscellaneous trash.	No	
III	CLASS III	EM-41	YES	small unreproducable point source anomaly	None			
III	CLASS III	EM-42	YES	small point source anomaly	Hand Dug	stone foundation, nails, wood, glass fragments.	No	
III	CLASS III	EM-43	NO	transformer	None			
III	CLASS III	EM-44	NO	large amplitude anomaly, associated with utility	None			
II	FORMER DRY WASTE DISPOSAL PIT	Former Dry Waste Disposal Area	NO		TP12-25 TP12-26 TP12B-1 TP12B-2 TP12B-3	large metal nail, sign and fence post. no other debris.	Unknown	MW12-9 MW12-16 MW12-17 SB12-5 SB12-6

Notes

1) Apparent ground conductivity units are milli-seimens per meter
2) In-phase units are in parts per thousand (ppt) of phase shift



N

LEGEND

TP 12-15 (EM-21) Brick fragments, metal debris

TESTPIT LOCATION WITH ASSOCIATED ANOMALY AND DESCRIPTION OF CONTENTS. CONTAINS CULTURAL DUBRIS

Hand dug (EM-18) Brick fragments, metal debris

TESTPIT LOCATION WITH ASSOCIATED ANOMALY AND DISCRIPTION OF CONTENTS. CONTAINS MILITARY RELATED DEBRIS.

POTENTIAL RELEASE AREAS

600 0 600

(feet)

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FIGURE 4-2
DESCRIPTION OF TESTPIT CONTENTS

SCALE 1:600	DATE MAY 2000	REV	Sheet 1 of 1

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All anomalies that were interpreted based on visual observation of test pit contents to contain Military-related debris, were investigated further during the soil boring and monitoring well installation phase of work. Military-related debris was observed during test pit investigations at 12 of the remaining 25 subsurface EM anomalies. These 12 Military-related debris anomalies were confirmed to be disposal pits and were grouped and designated as potential release areas, as shown in **Table 4-2**.

4.3 POTENTIAL RELEASE AREAS

Remedial investigation (RI) field work was completed as described in **Section 2**. Based on historical use of the site, the results of the geophysical surveys, the radiological classification, and geographical location, nine potential release areas were assigned as described in **Section 1**. The nine potential release areas are:

- Building 819 & EM-27;
- Building 815, Building 816 & EM-28;
- Disposal Pit A/B;
- Disposal Pit C
- Dry Waste Disposal Pit;
- EM-5
- EM-6
- Class III Areas; and
- Wastewater Treatment Plant.

This section presents the gamma radiological screening results (**Figure 4-1**), test pit sampling results (**Table 4-2** and **Figure 4-2**), and soil investigation results for each potential release area of concern. Because of the large size of the SEAD-12 investigation area and the various uses of different areas within the site, the following discussion of results is presented on a potential release area basis. In presenting these results in this manner, it becomes more evident which areas of the site may warrant further attention and which areas do not. Areas that may be impacted are not "diluted" with analytical results from non-impacted areas. Likewise, areas not impacted by past activities at the site are not inappropriately included in areas of the site that may require attention. Summary tables highlighting analytical results for soil for each potential area of concern are presented within the text. Complete tables showing compounds detected at each sampling point are compiled at the end of this section for all potential areas of concern. Complete analytical tables are found in **Appendices G, H, I, and J.**

4.3.1 Building 819 and EM-27

Investigations in the area around Building 819 and EM-27 included: radiological scanning surveys (Class I for Building 819, Class II for EM-27), **Figure 4-1**; test pits (EM-27 only), **Figure 4-2**; surface soil sampling (Building 819 only), **Figure 4-3**, and subsurface soil sampling (Building 819 and EM-27), **Figure 4-4**. EM-27 was combined with the Building 819 area as a potential release area due to their close proximity. Surface Water **(Figure 4-5 & Figure 4-6)**, sediment **(Figure 4-7, Figure 4-8, & Figure 4-9)**, and groundwater (**Figure 4-10**) sampling results proximal to the area are presented, then discussed in detail in **Sections 4.4, 4.5**, and **4.6**.

4.3.1.1 Gamma Radiation Scanning Results

Designated as a Class I radiological survey area, a low energy gamma radiation survey was performed on the grounds immediately surrounding Building 819. A Class II survey was conducted over EM-27. Scanning results for SEAD-12 are shown in **Figure 4-1**. Results of the scanning survey in the Building 819/EM-27 area are shown below.

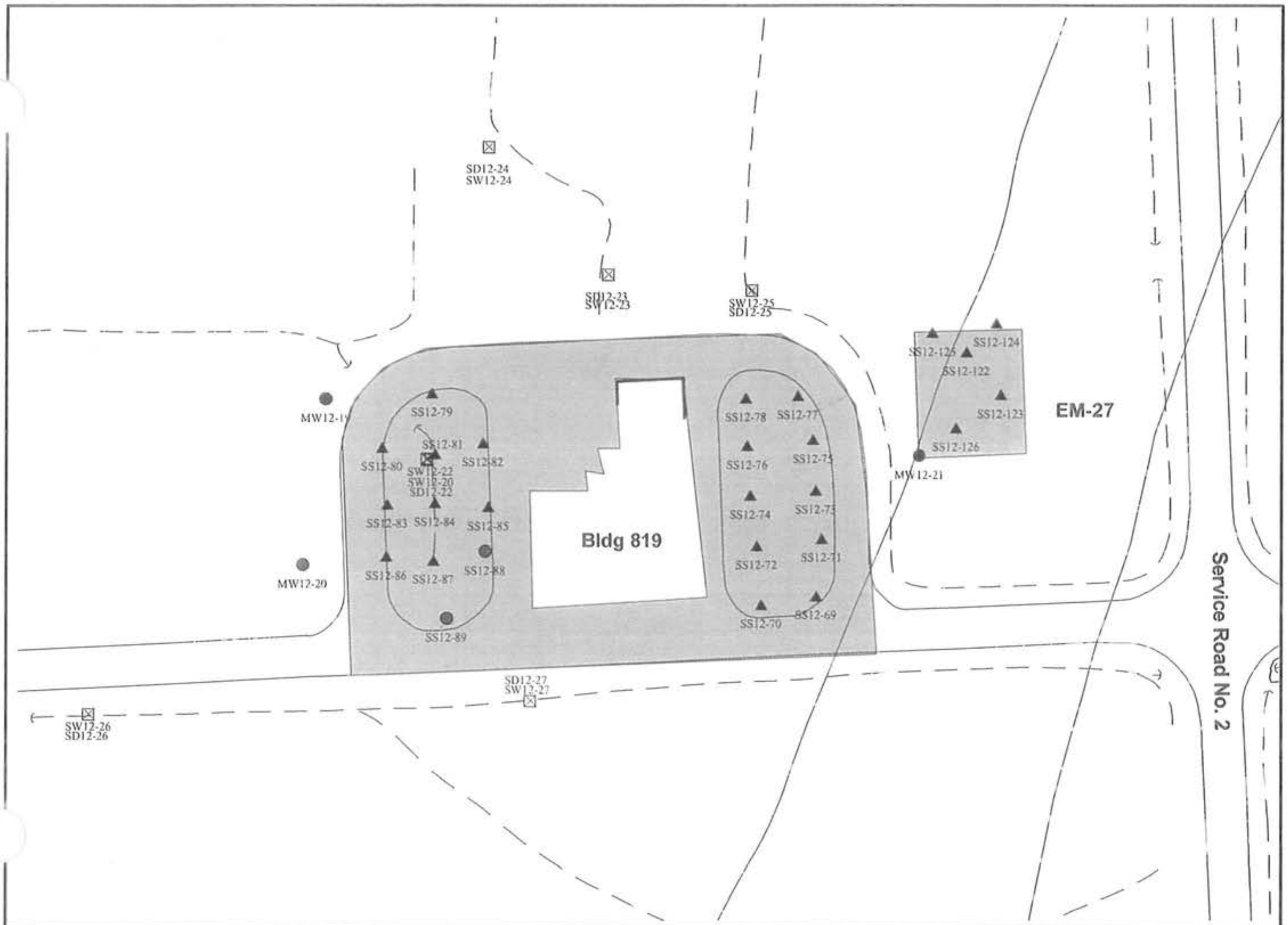
Location	Ave. Compared to Background	Max Compared to Background	Detects > Flag Value (2xBgd)
Building 819	-12%	+239%	1
EM-27	+3%	+5.2%	0

One gamma scanning reading was detected above the flag value of twice background. This reading was detected in the vicinity of Building 819 in a localized area approximately 1 foot in diameter in the eastern lawn area. This localized area was sampled by Parsons ES and removed in December of 1997 by the onsite Army Radiological Assistance Team (RAT). Confirmatory soil samples were collected from the immediate vicinity of the excavation and the bottom of the excavation to ensure that all radioactive contamination had been removed during the excavation. The radionuclide data collected before and after this removal action is presented in **Table 4-3**.

Excluding this localized elevated area, the maximum scanning reading for the area surrounding Building 819 was approximately 1.1% above the background data set. Refer to **Appendix F** for scanning data collected from the areas surrounding Building 819 and EM-27.

4.3.1.2 Test Pit Results

One test pit (TP12-17) approximately 50 feet long was excavated across the EM-27 anomaly. Military-related debris consisting of metal wiring and plastic sheeting was found **(Figure 4-2**,



Loc_id	Parameter	Value	Criteria Level	Units
MW12-19	Thallium	3	0.85	MG/KG
	Benzo(a)anthracene	3800	224	UG/KG
	Benzo(a)pyrene	3800	61	UG/KG
	Benzo(b)fluoranthene	2800	1100	UG/KG
	Benzo(k)fluoranthene	4100	1100	UG/KG
	Chrysene	3600	400	UG/KG
	Dibenz(a,h)anthracene	990	14	UG/KG
MW12-20	Aluminum	20,800	19,520	MG/KG
	Potassium	2660	2623	MG/KG
	Benzo(a)anthracene	260	224	UG/KG
	Benzo(a)pyrene	270	61	UG/KG
	Dibenz(a,h)anthracene	75	14	UG/KG
SS12-88	Lead	33.1	24.4	MG/KG
	Magnesium	34,[illegible]00	21,700	MG/KG
	Benzo(a)anthracene	6200	224	UG/KG
	Benzo(a)pyrene	5400	61	UG/KG
	Benzo(b)fluoranthene	4800	1100	UG/KG
	Benzo(k)fluoranthene	6100	1100	UG/KG
	Chrysene	6800	400	UG/KG
	Dibenz(a,h)anthracene	1500	14	UG/KG
SS12-89	Calcium	202,000	125,300	MG/KG
	Benzo(a)anthracene	400	224	UG/KG
	Benzo(a)pyrene	390	61	UG/KG
	Chrysene	460	400	UG/KG
	Dibenz(a,h)anthracene	100	14	UG/KG

LEGEND

SS12-153 Surface Soil sample with Loc_ID analyzed for chemical and radiological parameters. No exceedences present

SS12-153 Surface Soil sample with Loc_ID analyzed for chemical and radiological parameters. Metal exceedences present

SS12-153 Surface Soil sample with Loc_ID analyzed for chemical and radiological parameters. Semi Volatile Organic exceedences present

SS12-153 Surface Soil sample with Loc_ID analyzed for chemical and radiological parameters. Metal and Semi Volatile Organic exceedences present

SS12-153 Surface Soil sample with Loc_ID analyzed radiological parameters only.

SD12-153 Sediment sample with Loc_ID

SW12-153 Surface Water sample with Loc_ID

Potential Release Area

100 0 100
(feet)

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FIGURE 4-3
SURFACE SOIL EXCEEDENCES
AT BUILDING 819 & EM-27

SCALE	DATE	REV	
1:100	NOV 2000		Sheet 1 of 1

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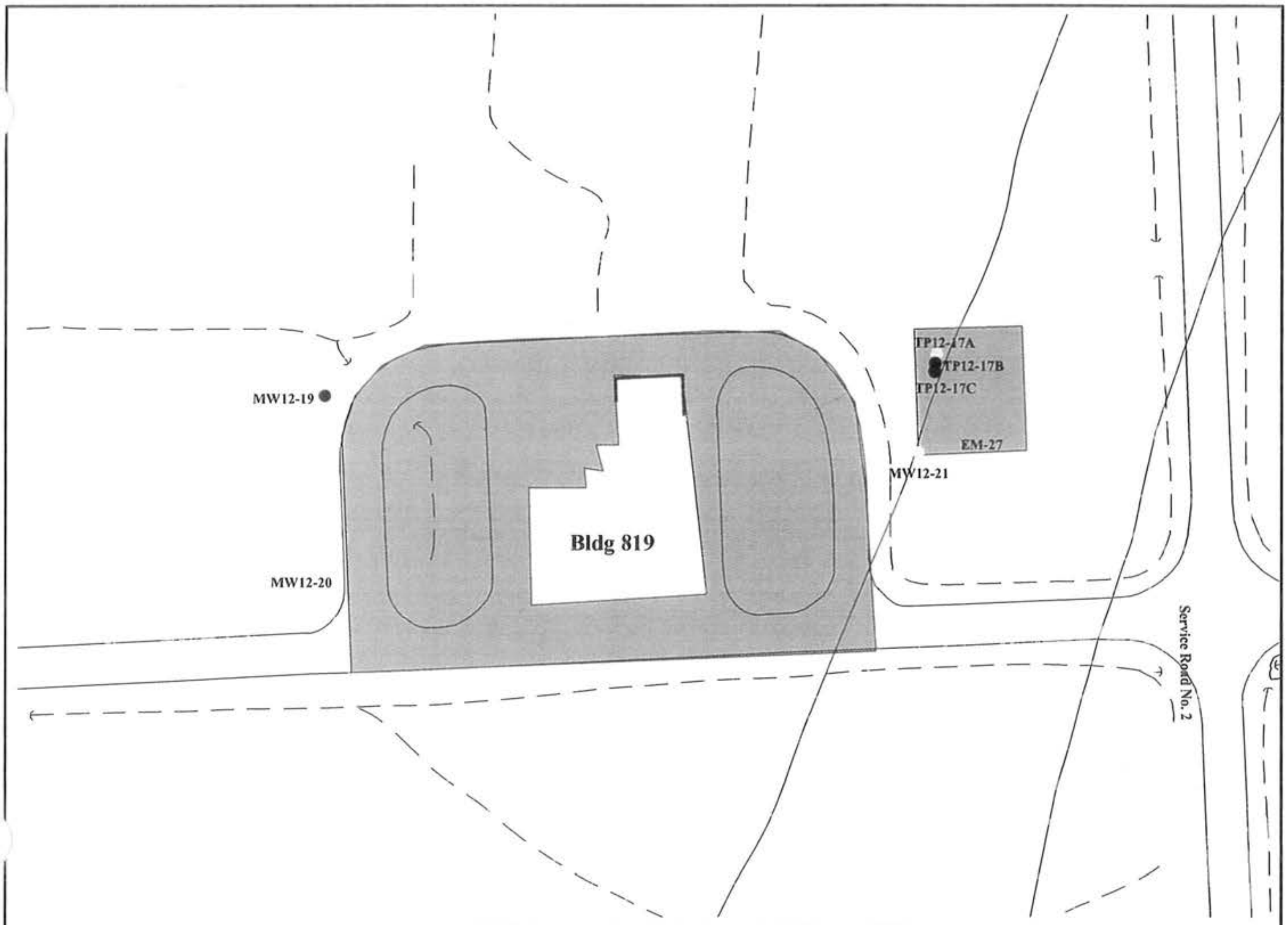

Loc_id	Parameter	Depth Range (feet)	Value	Criteria Level	Units
TP12-17A	Mercury	2-2	0.2	0.1	MG/KG
MW12-20	Aluminum	4-6	21,200	19,520	MG/KG
	Copper		44.7	33	MG/KG
	Iron		44,500	37,410	MG/KG
	Lead		27.1	24.4	MG/KG
	Nickel		64.5	50	MG/KG
	Zinc		124	115	MG/KG
MW12-20	Mercury	6-8	0.11	0.1	MG/KG
	Zinc		120	115	MG/KG
MW12-21	Calcium	6-8	151,000	125,300	MG/KG

Note: The highest value between a sample and a duplicate sample was taken

LEGEND

- MW12-15 Sub-surface Soil sample with Loc_ID analyzed for chemical parameters. No exceedences present
- MW12-15 Sub-surface Soil sample with Loc_ID analyzed for chemical parameters. Metal exceedences present
- MW12-15 Sub-surface Soil sample with Loc_ID analyzed for chemical parameters. Semi Volatile Organic exceedences present.
- MW12-15 Sub-surface Soil sample with Loc_ID analyzed for chemical parameters. Metal and Semi Volatile Organic exceedences present
- MW12-15 Background Sub-surfacerface Soil with Loc_ID analysed for chemical parameters.
- Potential Release Area

100 0 100
(feet)

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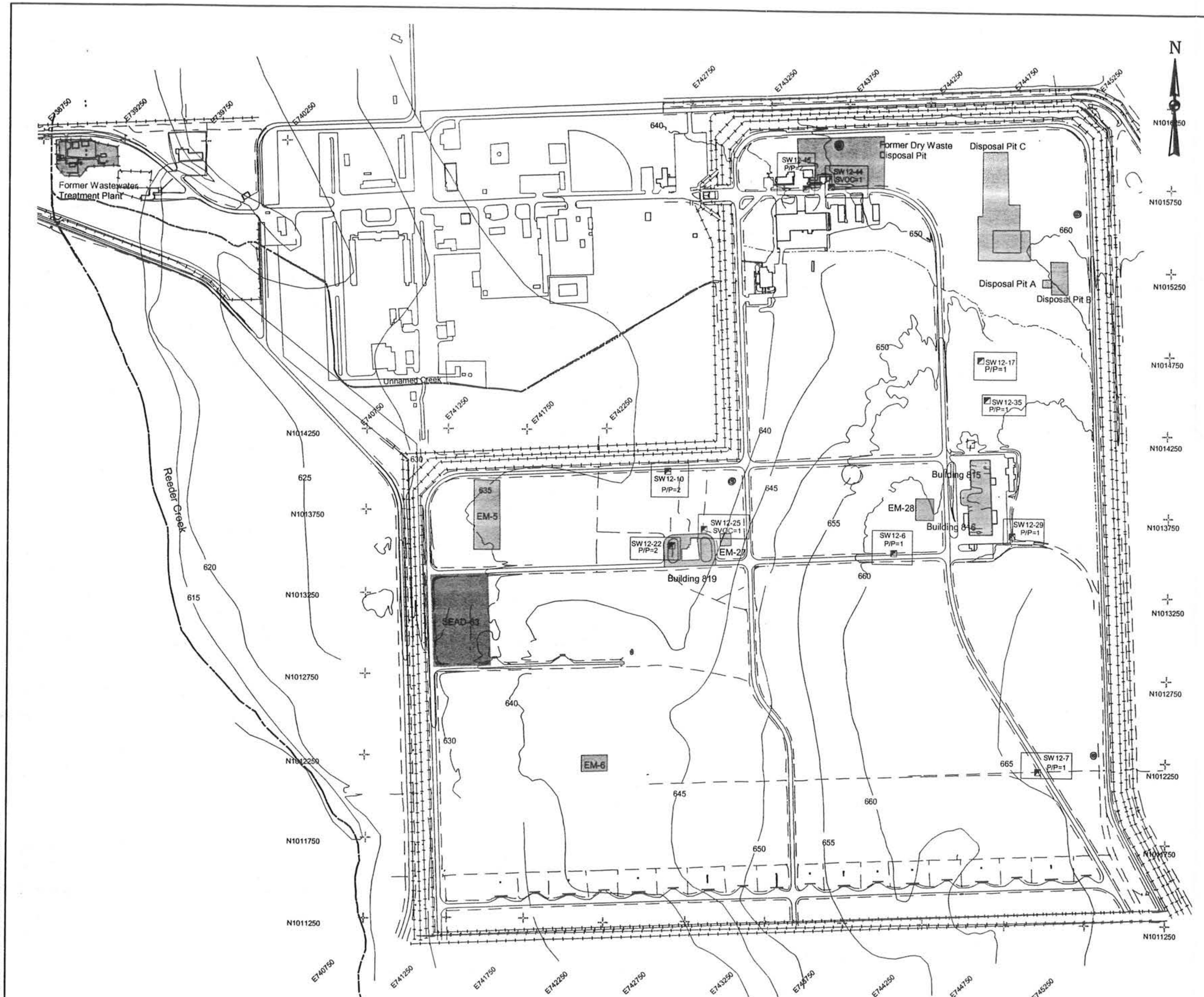
FIGURE 4-4
SUBSURFACE SOIL EXCEEDENCES
AT BUILDING 819 AND EM-27

SCALE	DATE	REV	
1:100	NOV 2000		Sheet 1 of 1



LEGEND

SW 12-15
P/P=1

NYS AWQS Class C (Aquatic) Exceedances with Loc_ID, Chemical Class, and Total Number of Exceedances Posted

Exceedances:
SVOC= Semi Volatile Organic Compounds
P/P= Pesicides and PCBs

Loc_Id	Parameter
SW12-6	Heptachlor epoxide
SW12-7	Heptachlor
SW12-10	Heptachlor
SW12-10	Hexachlorobenzene
SW12-17	Aldrin
SW12-22	Heptaclor
SW12-22	Heptaclor epoxide
SW12-25	Bis(2-Ethylhexyl)phthalate
SW12-29	Hexachlorobenzene
SW12-35	Hexachlorobenzene
SW12-44	Bis(2-Ethylhexyl)phthalate
SW12-45	4,4'-DDE
SW12-45	4,4'-DDT

NOTE: SeeTABLE 4-5 for the concentration and guideline values.

SW SAMPLE LOCATION

NOTE: According to NYS AWQS Class C (aquatic) there are no Metal Exceedances in the surface water samples downgradient of the site.

600 0 600
(feet)

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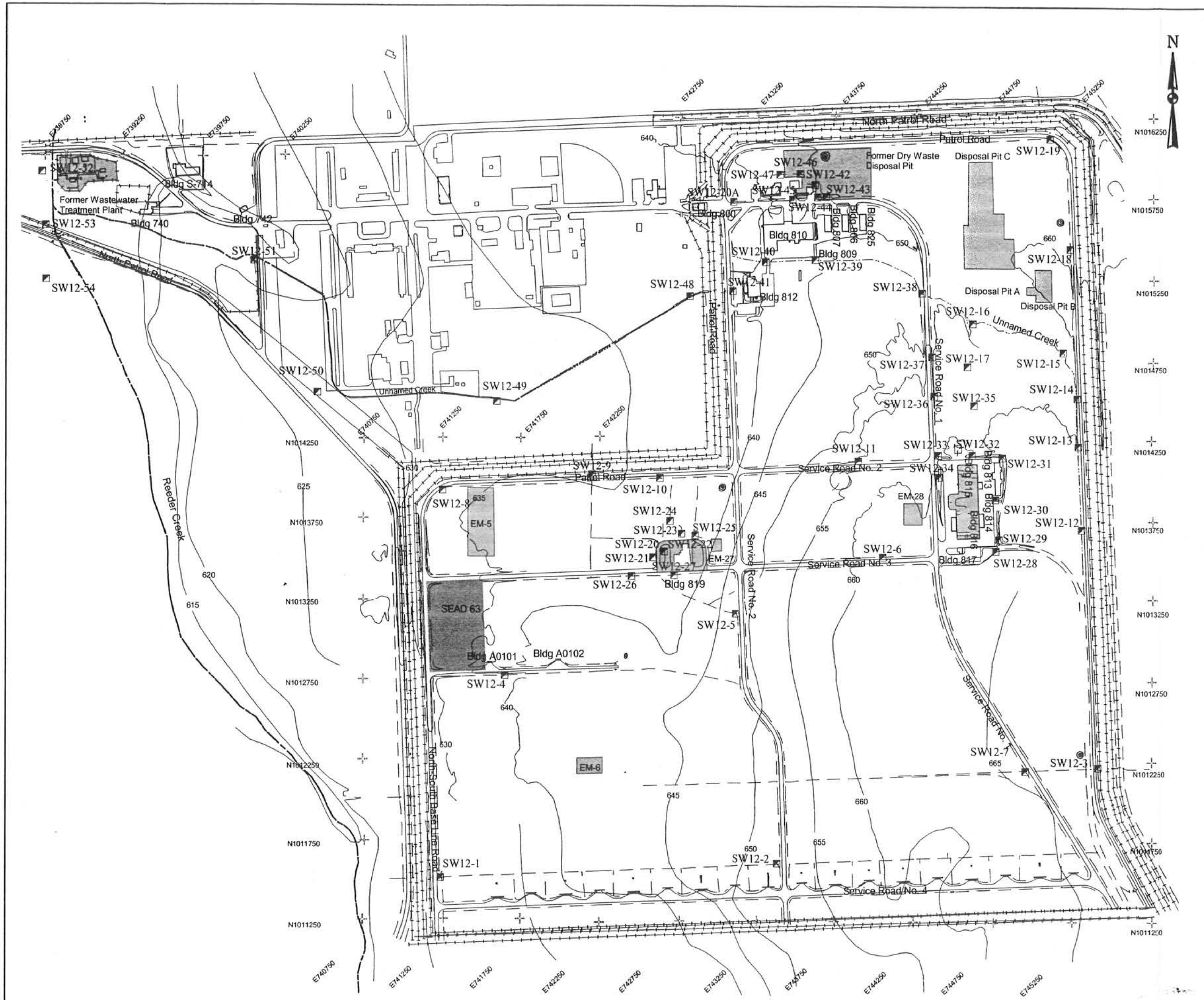
SEAD-12

FIGURE 4-5
SURFACE WATER EXCEEDENCES FOR SVOC AND PESTICIDES/PCB

SCALE 1:600	DATE MAY 2000	REV	Sheet 1 of 1



LEGEND

SW 12-15
M=1

NYS AWQS Class C (Aquatic) Exceedances with Loc_ID, Chemical Class, and Total Number of Exceedances Posted

Exceedances:
M=Metals

Loc_id	Exceednace
SW12-5	Al, Fe
SW12-7	Al
SW12-8	Al, Fe
SW12-13	Al, Ag
SW12-14	Al, Fe, Ag
SW12-16	Hg
SW12-17	Al, Ag
SW12-18	Al, Fe
SW12-19	Al
SW12-24	Pb
SW12-25	Cu, Pb
SW12-26	Al, Fe
SW12-28	Al, Fe
SW12-30	Al, Fe
SW12-35	Al, Co, Cu, Fe, Hg, Pb
SW12-36	Ag
SW12-43	Al
SW12-46	Al, Fe
SW12-47	Al, Fe, Pb
SW12A-1 (dup)	Al, Hg, Ag
SW12A-2	Hg, Ag
SW12A-3	Al, Fe

NOTE: See TABLE 4-S for concentration and guideline values.

SW SAMPLE LOCATION

NOTE: According to NYS AWQS Class C (aquatic) there are no Metal Exceedances in the surface water samples downgradient of the site.

600 0 600
(feet)

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SEAD-12

FIGURE 4-6
SURFACE WATER EXCEEDENCES FOR METALS

SCALE	DATE	REV	
1:600	NOV 2000		Sheet 1 of 1

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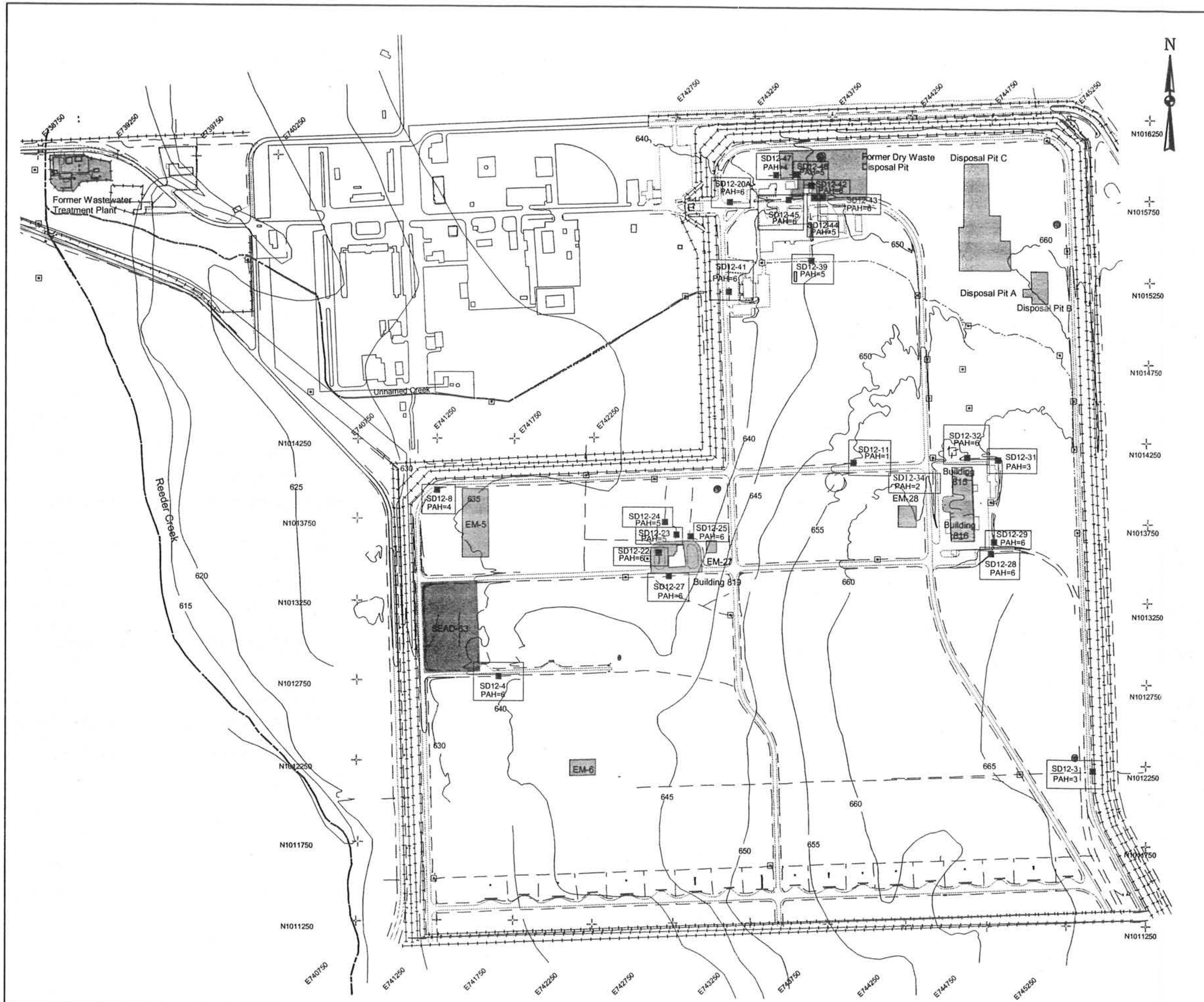

LEGEND

■ SD 12-15
PAH=1

Exceedances:
PAH=Polynuclear Aromatic Hydrocarbons

LOC_ID	PAH Exceedances according to NYSDEC Sediment Screening Standards
SD12-4 SD12-20A SD12-22 SD12-25 SD12-27 SD12-28 SD12-29 SD12-32 SD12-41 SD12-42 SD12-43 SD12-45	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(k)fluoranthene Chrysene Indeno(1,2,3-cd)pyrene
SD12-23 SD12-24 SD12-39 SD12-46 SD12-44	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Chrysene Indeno(1,2,3-cd)pyrene
SD12-47	Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Chrysene
SD12-8	Benzo(a)anthracene Benzo(a)pyrene Benzo(k)fluoranthene Chrysene
SD12-31	Benzo(a)pyrene Chrysene
SD12-34	Benzo(b)fluoranthene Chrysene
SD12-11	Benzo(b)fluoranthene

NOTE: See TABLE 4-S at the end of Section 4 for concentrations and exceedance guidance values.

⊡ SD SAMPLE LOCATION WITH NO PAH EXCEEDANCES

600 0 600
(feet)

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FIGURE 4-7
SEDIMENT EXCEEDENCES
FOR PAHs

SCALE	DATE	REV	
1:600	MAY 2000		Sheet 1 of 1

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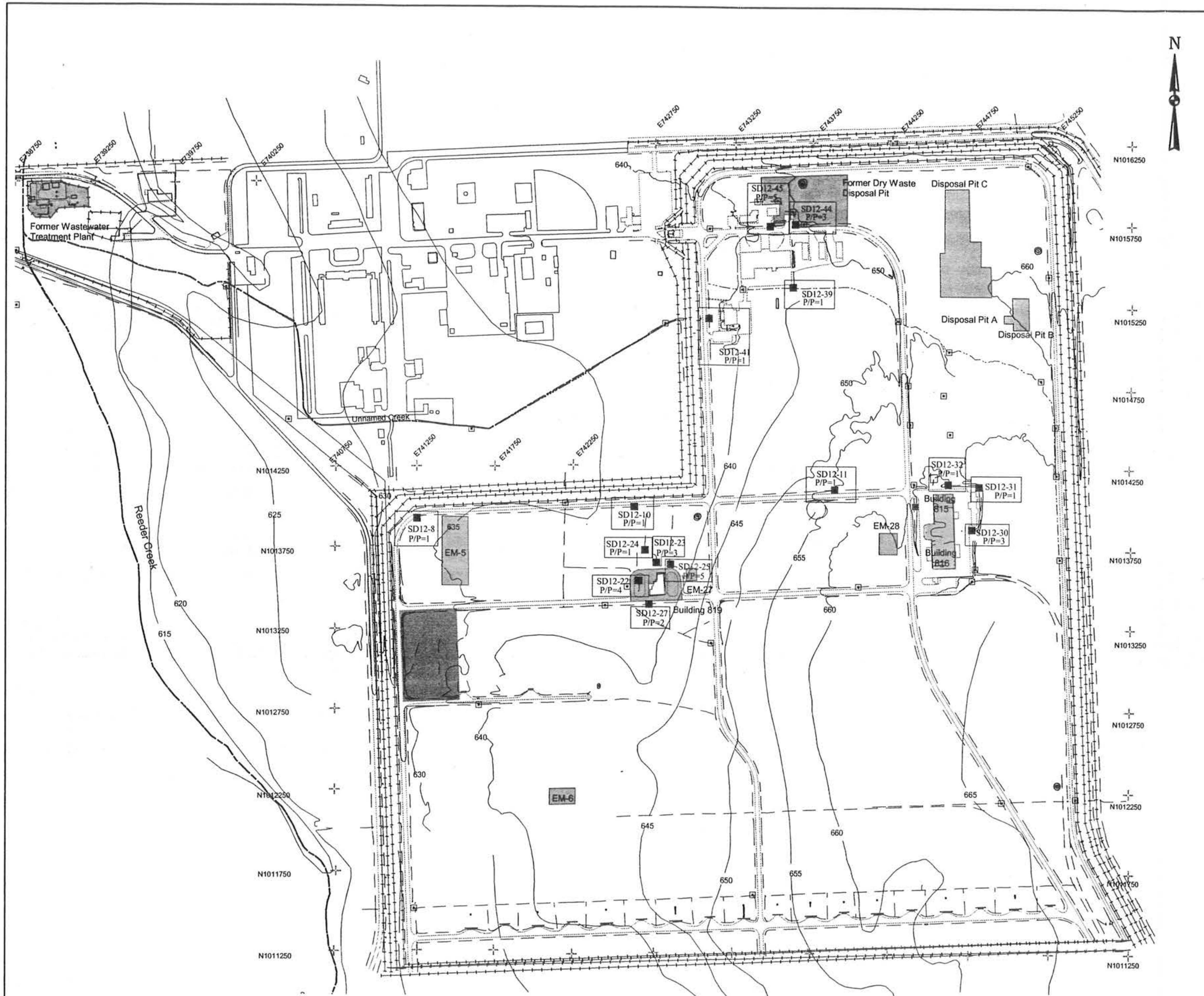

LEGEND

■ SD 12-15
P/P=1

SEDIMENT SAMPLE LOCATION WITH A PESTICIDE OR PCB EXCEEDANCE

Exceedances:
P/P=Pesticide/PCB

LOC_ID	P/P Exceedance according to the NYSDEC Sediment Screening Guidelines
SD12-34	Aroclor-1260
SD12-8 SD12-32 SD12-41	Aroclor-1254
SD12-31	4,4'-DDD
SD12-10 SD12-11 SD12-24	4,4'-DDE
SD12-39	Endosulfan I
SD12-27	4,4'-DDE 4,4'-DDT
SD12-44	4,4'-DDE 4,4'-DDT Aroclor-1254
SD12-23 SD12-30	4,4'-DDD 4,4'-DDE 4,4'-DDT
SD12-22	4,4'-DDD 4,4'-DDE 4,4'-DDT Heptachlor epoxide
SD12-25	4,4'-DDD 4,4'-DDE 4,4'-DDT Endosulfan I
SD12-45	4,4'-DDD 4,4'-DDE 4,4'-DDT Aroclor -1254 Heptaclor epoxide

NOTE: See TABLE 4-V at the end of Section 4 for concentration and guidance values.

▣ SD SAMPLE LOCATION WITH NO PESTICIDE OR PCB EXCEEDANCES

600 0 600
(feet)

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SEAD-12

FIGURE 4-8
SEDIMENT EXCEEDENCES FOR PESTCIDES/ PCBs

SCALE 1:600	DATE MAY 2000	REV	Sheet 1 of 1

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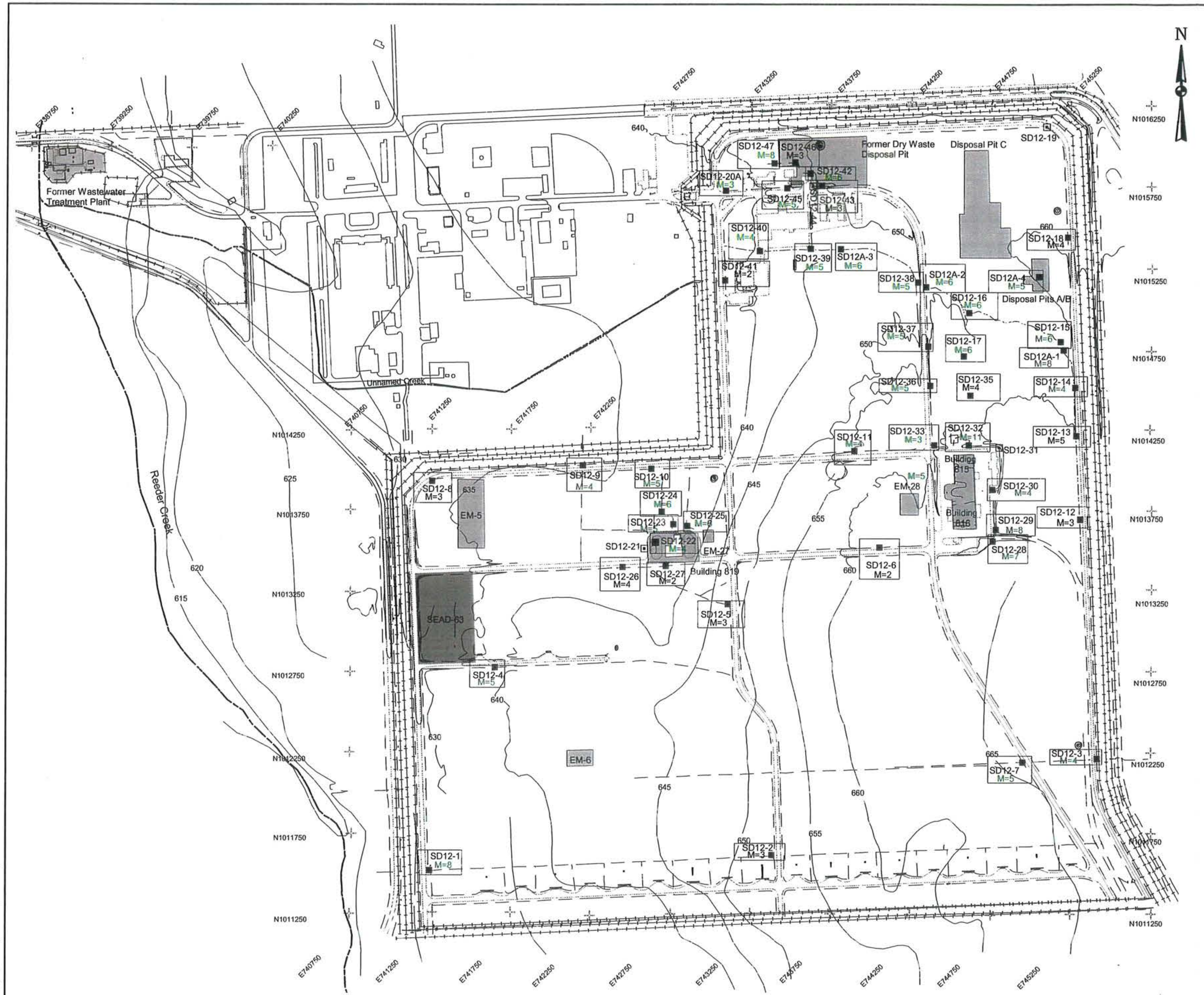

LEGEND

■ SD 12-15 M=1 — Sediment Sample Location with Metal Exceedances according to NYSDEC Sediment Screening Guideline Values.

■ SD 12-15 M=1 — Sediment Sample Location with Metal Exceedances according to NYSDEC Sediment Guideline Values with at least one exceedance being over the 95th percentile calculated on background sediment data set.

Exceedances:
M=Metal

▣ Sediment Sample Location with no Metal Exceedances

LOC_ID	EXCEEDANCE
SD12A-4	CdCu, Fe, Ni, Zn
SD12A-1	As, Cd, Fe, Mn, ZnCr, Cu, Ni
SD12A-2	Cd, Hg, Zn, Cu, Fe, Ni
SD12A-3	Cd, Zn, Cu, Fe, Mn, Ni
SD12-34	Cu, Zn Fe, Mn, Ni
SD12-10	Pb, Zn Cu, Fe, Ni
SD12-17	Hg, Zn Cu, Fe, Mn, Ni
SD12-11	Pb Cu, Mn, Ni
SD12-18	Cu, Fe, Mn, Ni
SD12-16	As, Fe, Mn, Zn Cu, Ni
SD12-12	Cu, Fe, Ni
SD12-13	As, Cu, Fe, Mn, Ni
SD12-1	Cb, Cu, Pb, Zn As, Fe, Mn, Ni
SD12-15	As, Fe, Mn, Zn Cu, Ni
SD12-14	Zn Cu, Fe, Ni
SD12-23	Zn, Cu, Fe, Mn, Ni
SD12-26	Cu, Fe, Hg, Ni
SD12-24	As, Zn Ch, Cu, Fe, Ni
SD12-25	Cd, Cr, Cu, Hg, Fe, Ni
SD12-20A	Zn Cu, Ni
SD12-27	Cu, Ni
SD12-28	Pb, Zn Cr, Cu, Fe, Hg, Ni
SD12-22	Zn, Cu, Fe, Ni
SD12-29	As, Cr, Cu, Fe, Ni, Zn, Mn, Ag
SD12-2	Cu, Fe, Ni
SD12-32	Sn, As, Cd, Cr, Cu, Fe, Pb, Mn, Hg, Ni, Zn
SD12-35	Cu, Fe, Mn, Ni
SD12-3	Zn, Cu, Fe, Ni
SD12-37	Zn Cu, Fe, Mn, Ni
SD12-33	Zn Fe, Ni
SD12-34	Cu, Fe, Mn, Ni, Zn
SD12-36	Zn, Cu, Fe, Mn, Ni
SD12-38	Zn Cu, Fe, Mn, Ni
SD12-30	Cd, Zn Cu, Ni
SD12-39	Zn, Cu, Fe, Mn, Ni
SD12-43	Cu, Mn, Ni
SD12-46	Cu, Fe, Ni
SD12-4	Zn, Cu, Fe, Mn, Ni
SD12-47	As, Cr, Cu, Pb, Mn, Zn Fe, Ni
SD12-45	Pb, Zn Cu, Mn, Ni
SD12-41	Cu, Ni
SD12-42	Cr, Cu, Pb, Hg, Zn, Ni
SD12-40	Zn, Cu, Fe, Ni
SD12-5	Cu, Mn, Ni
SD12-6	Cu, Ni
SD12-7	Zn, Cu, Fe, Mn, Ni
SD12-8	Cu, Fe, Ni
SD12-9	Zn Cu, Fe, Ni

Note: Metals in green have exceeded the 95th percentile calculated on the Sediment background data set. See TABLE 4-V at the end of Section 4 for concentration and guideline values.

600 0 600
(feet)

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SEAD-12

FIGURE 4-9
SEDIMENT EXCEEDENCES
FOR METALS

SCALE	DATE	REV	
1:600	MAY 2000		Sheet 1 of 1

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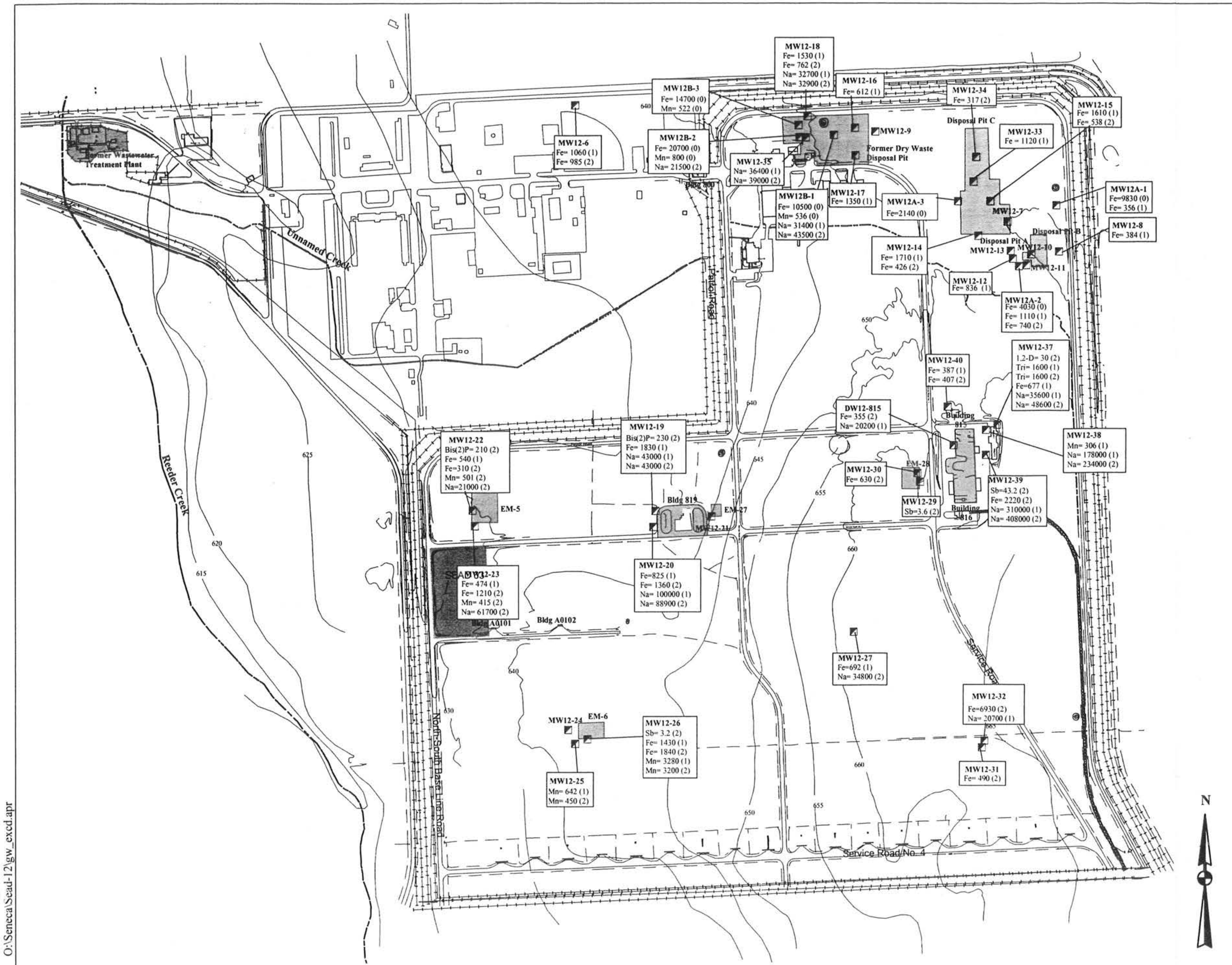

LEGEND

MW12-20 Fe=740 Mn=60.3 — Groundwater Sample Location with LOC_ID and NYS GA Class Standard exceedance parameter with value and sampling round

MW12-21 — Groundwater Sample Location with LOC_ID with no exceedances according to NYS GA Class Standards

Potential Release Area

Parameter	No. Sample Exceedances	No. Duplicate Exceedances	Total Exceedances
Fe	41	3	44
Mn	10	2	12
Na	22	2	24
Sb	3	0	3
1,2-D	1	0	1
Tri	2	0	2
Bis(2)P	2	0	2

The higher value between a sample and duplicate sample was reported.

Note:
1,2-Dichloroethene (total) = 1,2-D
Trichloroethene = Tri
Bis(2-Ethylhexyl)phthalate = Bis(2)P

The groundwater sampling round is indicated in parenthesis after the chemical value.
(0) = ESI sampling done in July 1994
(1) = Round 1 sampling done in April of 1999
(2) = Round 2 sampling done in December of 1999

All parameters are reported in units of UG/L.

600 0 600
(feet)

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SEAD -12
REMEDIAL INVESTIGATION

FIGURE 4-10
GROUNDWATER EXCEEDENCES

SCALE	DATE	REV
1:600	NOV 2000	SHEET 1 OF 1

Table 4-3
Building 819 Removal Action Results
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Date Location Identification Sample Identification	Before Excavation 12/04/1997 BLDG819-1 12552			After Excavation 11/17/1998 SS12-081 123281		
	pCi/g	Qualifier	Error +/-	pCi/g	Qualifier	Error +/-
Bismuth-214	14.8		1	2.8		0.3
Cesium-137	1.6		0.2	0.7		0.2
Cobalt-57	0.1	U		0.1		0.1
Cobalt-60	0.4	U		0.1	U	
Lead-210	58	U		3.3	J	2.2
Lead-211	3.1	U		2.6	UJ	
Lead-214	16		1	3.3		0.3
Plutonium-239/240	0.2	J	0.2	0.2	U	0.1
Radium-223	0.6	U		0.3	U	
Radium-226	14.8		1	2.8		0.3
Radium-228	2.6	U		0.8		0.2
Thorium-227	0.2		0.3			
Thorium-230	2.1	U	0.9	0.9	U	0.3
Thorium-232	0.8		0.5	0.6		0.2
Tritium	0.1	UJ	0.1	6.7		0.1
Uranium-233/234	0.8	UJ	0.3	0.8	J	0.3
Uranium-235	0.1	U	0.1	0.1	U	0.1
Uranium-238	0.7		0.3	0.8	J	0.2

Table 4-2). Test pit logs are provided in **Appendix B**. All of the soil and debris excavated from the test pit was scanned with a Bicron Fidler and a Pancake GM meter, as well as an Organic Vapor meter. There were no elevated radiation readings or organic vapor readings from the soil or the debris removed from TP12-17. One monitoring well was installed (MW12-21) down-gradient from the anomaly to investigate potential impacts to both soil and groundwater of the Military-related debris found in this location.

4.3.1.3 Surface Soil Results

Five chemical surface soil samples (**Figure 4-3**) were collected from the Building 819 EM-27 area. **Table 4-A** located at the end of this section, presents the surface soil analytical data for all compounds detected in this potential release area. The results are summarized below.

Building 819 & EM-27 Surface Soil Constituents	Times Detected	Exceedences	Maximum Detection	TAGM
SVOCs (ug/kg)				
Benzo(a)anthracene	5	4	6200	224
Benzo(a)pyrene	5	4	5400	61
Benzo(b)fluoranthene	5	2	4800	1100
Benzo(k)fluoranthene	5	2	6100	1100
Chrysene	5	3	6800	400
Dibenz(a,h)anthracene	4	4	1500	14
Metals (mg/kg)				
Aluminum	5	1	20800	19520
Calcium	5	1	202000	125300
Lead	5	1	33.1	24.4
Magnesium	5	1	34800	21700
Potassium	5	1	2660	2623
Thallium	1	1	3	0.855

Fifty analytes were detected in the area. Twenty-five exceedences of TAGMs occurred and were limited to the 12 analytes listed above. With the exception of thallium, none of the metals exceed their TAGM value by a factor of 2. The highest semi-volatile organic compound exceedences occur in two locations: MW12-19 and SS12-88.

A full presentation of the analytical data collected for soil is provided in **Appendix G**.

4.3.1.4 Subsurface Soil Results

Six subsurface chemical soil samples (from three monitoring wells) were collected from the Building 819 area, with an additional three samples collected from the EM-27 area, **Figure 4-4**. **Table 4-B** located at the end of this section, presents the subsurface soil analytical data and summary statistics for all compounds detected in this release area. The results are summarized below:

Building 819 & EM-27 Subsurface Constituents	Times Detected	Exceedences	Maximum Detection	TAGM
Metals – mg/kg				
Aluminum	9	1	21200	19520
Calcium	9	1	151000	125300
Copper	9	1	44.7	33
Iron	9	1	44500	37410
Lead	9	1	27.1	24.4
Mercury	2	1	0.11	0.1
Nickel	9	2	64.5	50
Zinc	9	3	124	115

Thirty-nine analytes were detected in the Building 819 and EM-27 areas. Exceedences were limited to the 8 metals analytes listed above, with 11 total exceedences. None of the metals exceed their TAGM value by a factor of 2.

4.3.1.5 Radionuclide Soil Results

A total of 40 surface and subsurface soils were analyzed for radionuclides in the Building 819/EM-27 area. The analytical data are presented in **Appendix G**. Summary statistics comparing the Building 819/EM-27 area radionuclide data in soils to background radionuclide data are presented in **Table 4-4**. This table includes a comparison of number of samples, frequency of detection, minimum, maximum, average, median, and standard deviation. The WRS test results comparing the site data set to the background data set are also presented.

Four radionuclides from the Building 819/EM-27 area soils were found to be statistically above background. The parameters found at levels above background levels are: Bismuth-214 (Bi-214), Cesium-137 (Cs-137), Lead-210 (Pb-210), and Tritium.

For the four radionuclides distinguishable from background in this area, $DCGL_W$s were added to the background data set as described in MARSSIM and in **Section 4.1.2.3** above. **Table 4-5**

TABLE 4-4

Comparison of Summary Statistics in Background Soil to Building 819 EM-27 Soil for Radionuclides
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Parameter	Units	No. of Samples		No. of Detections		Frequency of Detections		Minimum		Maximum		Average		Median		Std Dev		Above Background using WRS?	Above Background + Residential DCGL using WRS?	Above Background+ Worker DCGL using WRS?
		BKGD	Building 819, EM-27	BKGD	Building 819, EM-27	BKGD	Building 819, EM-27	BKGD	Building 819, EM-27	BKGD	Building 819, EM-27	BKGD	Building 819, EM-27	BKGD	Building 819, EM-27	BKGD	Building 819, EM-27			
Gross Alpha	pCi/g	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gross Beta	pCi/g	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Actinium-228	pCi/g	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bismuth -214	pCi/g	35	40	27	40	77%	100%	0.60	0.70	2.60	2.80	1.35	1.65	1.40	1.60	0.47	0.53	YES	YES	NO
Cesium-137	pCi/g	35	40	12	34	34%	85%	0.05	0.05	0.70	1.50	0.32	0.52	0.30	0.50	0.22	0.40	YES	NO	NO
Cobalt-57	pCi/g	35	40	5	14	14%	35%	0.05	0.05	0.10	0.30	0.06	0.07	0.05	0.05	0.02	0.04	NO	NO	NO
Cobalt-60	pCi/g	35	40	6	23	17%	58%	0.05	0.05	0.40	0.60	0.13	0.18	0.10	0.10	0.08	0.15	NO	NO	NO
Lead-210	pCi/g	35	40	5	28	14%	70%	0.60	0.60	21.10	43.30	5.62	9.62	3.43	5.35	5.35	10.04	YES	YES	NO
Lead-211	pCi/g	35	40	4	16	11%	40%	0.40	0.25	10.75	10.60	3.20	4.85	2.15	1.53	3.13	5.55	NO	NO	NO
Lead-214	pCi/g	35	40	33	40	94%	100%	0.60	0.70	2.50	3.30	1.48	1.61	1.45	1.60	0.44	0.49	NO	NO	NO
Plutonium-239	pCi/g	35	40	8	1	23%	3%	0.05	0.05	0.25	0.25	0.13	0'10	0.11	0.10	0.05	0.04	NO	NO	NO
Promethium-147	pCi/g	29	0	10	NA	34%	NA	2.10	NA	17.80	NA	6.43	NA	4.15	NA	4.70	NA	NA	NA	NA
Radium-223	pCi/g	35	40	1	6	3%	15%	0.10	0.15	0.70	1.10	0.22	0.31	0.20	0.21	0.10	0.24	NO	NO	NO
Radium-226	pCi/g	35	40	27	37	77%	93%	0.60	0.05	2.60	2.80	1.36	1.49	1.40	1.50	0.47	0.67	NO	NO	NO
Radium-228	pCi/g	35	40	34	40	97%	100%	1.00	0.70	3.50	4.80	1.73	1.82	1.65	1.70	0.51	0.75	NO	NO	NO
Thallium-208	pCi/g	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thorium-227	pCi/g	29	0	8	NA	28%	NA	0.10	NA	0.55	NA	0.23	NA	0.25	NA	0.11	NA	NA	NA	NA
Thorium-230	pCi/g	35	40	9	10	26%	25%	0.20	0.05	2.70	2.30	0.54	0.48	0.32	0.48	0.53	0.66	NO	NO	NO
Thorium-232	pCi/g	35	40	34	39	97%	98%	0.25	0.20	2.00	1.70	0.98	0.84	0.90	0.84	0.36	0.35	NO	NO	NO
Thorium-234	pCi/g	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tritium	pCi/g	35	40	6	25	17%	63%	0.05	0.05	30.23	148.50	1.68	18.32	0.05	18.32	5.81	45.62	YES	NO	NO
Uranium-233/234	pCi/g	35	40	17	32	49%	80%	0.05	0.05	1.90	1.40	0.46	0.64	0.10	0.70	0.46	0.37	NO	NO	NO
Uranium-235	pCi/g	35	40	19	19	54%	48%	0.05	0.05	0.40	0.30	0.11	0.10	0.10	0.09	0.08	0.06	NO	NO	NO
Uranium-238	pCi/g	35	40	27	40	77%	100%	0.05	0.30	1.40	1.50	0.67	0.81	0.75	0.78	0.40	0.26	NO	NO	NO

For the minimum, maximum, average, median, standard deviation, and the the duplicates and samples were averaged together, the 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 4-5
Wilcoxon Rank Sum Calculation for
Comparison of Building 819 EM-27 Soil to Background Soil
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Parameter	Site Compared to Background +DCGL Value					Site Compared to Background + Residential DCGL Value (1)					Site Compared to Background + Worker DCGL Value (2)				
	Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?	Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?	Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?
	BKGD	Building 819, EM-27				BKGD	Building 819, EM-27				BKGD	Building 819, EM-27			
Bismuth -214	31.97	43.87	-2.368	1.645	YES	32.78	43.08	-2.047	1.645	YES	39.57	36.47	-0.615	1.645	NO
Cesium-137	32.20	43.64	-2.282	1.645	YES	55.59	20.87	-6.907	1.645	NO					
Cobalt-57	35.50	40.43	-1.224	1.645	NO										
Cobalt-60	36.01	39.93	-0.801	1.645	NO										
Lead-210	32.18	43.67	-2.284	1.645	YES	32.70	43.16	-2.077	1.645	YES	41.95	34.16	-1.547	1.645	NO
Lead-211	35.89	40.05	-0.827	1.645	NO										
Lead-214	35.43	40.50	-1.010	1.645	NO										
Plutonium-239	45.15	31.04	-3.042	1.645	NO										
Radium-223	33.97	41.92	-1.634	1.645	NO										
Radium-226	34.73	41.18	-1.285	1.645	NO										
Radium-228	37.92	38.08	-0.032	1.645	NO										
Thorium-230	47.23	29.01	-3.629	1.645	NO										
Thorium-232	41.42	34.67	-1.346	1.645	NO										
Tritium	27.84	47.89	-4.389	1.645	YES	48.32	27.95	-4.207	1.645	NO					
Uranium-233/234	33.92	41.97	-1.618	1.645	NO										
Uranium-235	39.51	36.53	-0.638	1.645	NO										
Uranium-238	35.07	40.86	-1.158	1.645	NO										

Zrs= Statistic for generated from Wilcoxon Rank Sum test

Z(1-alpha)= Maximum allowed probability that WRS test incorrectly indicates that the site and background datasets are distinguishable (alpha= 0.05)

Null Hypothesis: The populations from which the two data sets have been drawn have the same mean

WRS initially is preformed comparing site to background; it null hypothesis is accepted then no further comparisons needed. If null hypothesis is rejected then site is compared to background + residential scenerio, if null hypothesis is accepted then no further comparisons needed. If null hypothesis is rejected then the site is compared to background + worker scenerio.

(1) The most conservative DCGL value for the radionuclide in the residential scenerio was added to background.

(2) The most conservative DCGL value for the radionuclide in the worker scenerio was added to background.

NA= Not analyzed due to parameters only being requested during the Expanded Site Investigation and not the Remedial Investigation. Hence, there were no data for specific radionuclides collected for the background set to compare against the ESI data.

Both groups need to be populated to perform Wilcoxon Rank Sum test. Radionuclides with unpopulated groups not found in table.

shows the results of the WRS test when compared to both residential and worker DCGLs. When compared to residential DCGLs, Bi-214 and Pb-210 exceed DCGLs. When compared to worker DCGLs, no radionuclides exceed DCGLs.

One sample (SS12-87) within the Building 819/EM-27 area was re-sampled in December 1999, to clarify a reported detection of Plutonium-239/240. The re-sampling event as well as the re-sampling results are discussed in **Section 4.3.10**.

4.3.1.6 Surface Water, Sediment, and Groundwater Results

Of seven proximal surface water and sediment locations (**Figure 4-3**), two surface water locations (SW12-25 and SW12-22) exceed criteria for SVOC or pesticide/PCB, **Figure 4-5**, **Table 4-S**, while three (SW12-24, SW12-24 and SW12-26) exceed metals criteria, **Figure 4-6**. Sediment locations exceed criteria for up to six PAHs at six locations (**Figure 4-7, Table 4-V**). Five sediment locations exceed criteria for pesticides/PCBs (**Figure 4-8**, **Table 4-V),** with six locations (**Figure 4-9**, **Table 4-V**) exceeding metals criteria. Groundwater exceedences (**Figure 4-10, Table 4-X**) include one SVOC, (the maximum for Bis(2-Ethylhexyl)Phthalate, 230 μg/l at MW12-19, second round) and exceedences for Na and Fe in both downgradient wells (MW12-19 and MW12-20). SEAD-12 surface water, sediment, and groundwater results are discussed in detail in **Sections 4.4, 4.5, and 4.6**.

4.3.2 Building 815, Building 816 & EM-28

Investigations on top of Building 815/816 and in the area of EM-28, included: radiological scanning surveys (Class I for earthen roofs of buildings 815 and 816, and Class III for EM-28), **Figure 4-1**; test pits (EM-28), **Figure 4-2**; with surface and subsurface soil sampling. This potential release area combines EM-28 and Building 815/816 areas due to their close proximity.

4.3.2.1 Gamma Radiation Scanning Results

The earth covered roofs of both Building 815 and Building 816 were scanned for low energy gamma radiation at a frequency of 100% coverage. Coverage over EM-28 was limited to the 10% required for Class III areas. Scanning results for SEAD-12 including the Building 815/816 and EM-28 area are shown in **Figure 4-1**. Results of the scanning survey in this area are shown below:

Location	Ave. Compared to Background	Max Compared to Background	Detects > Flag Value (2xBgd)
Buildings 815 & 816	-2%	+16.5%	0
EM-28	+	NA	0

Refer to **Appendix F** for scanning data collected from the roofs of Buildings 815 and 816 and EM-28.

4.3.2.2 Test Pit Results

Military-related debris was found in the one test pit (TP12-18) excavated at EM-28 (**Figure 4-2, Table 4-2**). This debris consisted of a steel fence post and a small amount of wire fencing. Test pit logs are provided in **Appendix B**. All of the soil and debris excavated from the test pit were scanned using the Bicron Fidler, Pancake GM meter and Organic Vapor meter, and no elevated radiation or organic vapor readings were detected.

4.3.2.3 Surface Soil Results

Surface soil chemical sampling in this potential release area was limited to three samples (**Figure 4-11,** duplicate sample from MW12-30, MW12-37 part of the Class 3 area) associated with EM-28. The surface soils from the earthen roofs over Building 815 and Building 816 were analyzed for radionuclides only, and are discussed below. **Table 4-C,** presented at the end of this section, shows the surface soil analytical data for all compounds detected in EM-28. A full presentation of the analytical results is found in **Appendix G**. The results are summarized below.

EM-28 Surface Soil Constituents	Times Detected	Exceedences	Maximum Detection	TAGM
<u>**Metals - mg/kg**</u>				
Cadmium	1	1	17.7	2.46
Lead	3	1	25	24.4

Thirty analytes were detected in the EM-28 area. Exceedences were limited to the two metals listed above, both having one exceedence. Only cadmium exceeded the TAGM value by more than a factor of 2.

Loc_id	Parameter	Value	Criteria Level	Units
MW12-29	Lead Cadmium	25 17.7	24.4 2.46	MG/KG MG/KG

LEGEND

SS12-153 — Surface Soil sample with Loc_ID analyzed for chemical and radiological parameters. No exceedences present

SS12-153 — Surface Soil sample with Loc_ID analyzed for chemical and radiological parameters. Metal exceedences present

SS12-153 — Surface Soil sample with Loc_ID analyzed for chemical and radiological parameters. Semi Volatile Organic exceedences present

SS12-153 — Surface Soil sample with Loc_ID analyzed for chemical and radiological parameters. Metal and Semi Volatile Organic exceedences present

SS12-153 — Surface Soil sample with Loc_ID analyzed radiological parameters only.

SD12-153 — Sediment sample with Loc_ID

SW12-153 — Surface Water sample with Loc_ID

Potential Release Area

100 0 100
(feet)

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FIGURE 4-11
SURFACE SOIL EXCEEDENCES AT BUILDING 815/816 & EM-28

SCALE 1:100 | DATE NOV 2000 | REV | Sheet 1 of 1

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4.3.2.4 Subsurface Soil Results

Seven subsurface soil samples (**Figure 4-12**; MW12-37, MW12-38, & MW12-39 are Class 3 area samples) were collected from the monitoring well borings and test pits related to EM-28. No subsurface samples were collected in relation to Buildings 815/816. **Table 4-D** presents the subsurface soil analytical data for all compounds detected in this release area. The results are summarized below.

EM-28 Subsurface Soil Constituents	Times Detected	Exceedences	Maximum Detection	TAGM
Metals - mg/kg				
Nickel	7	1	50.5	50
Thallium	1	1	1.1	0.855

Forty analytes were detected in the EM-28 area. Exceedences were limited to the two metals listed above, both having one exceedence. Neither metal exceeds their respective TAGM value by more than a factor of 2.

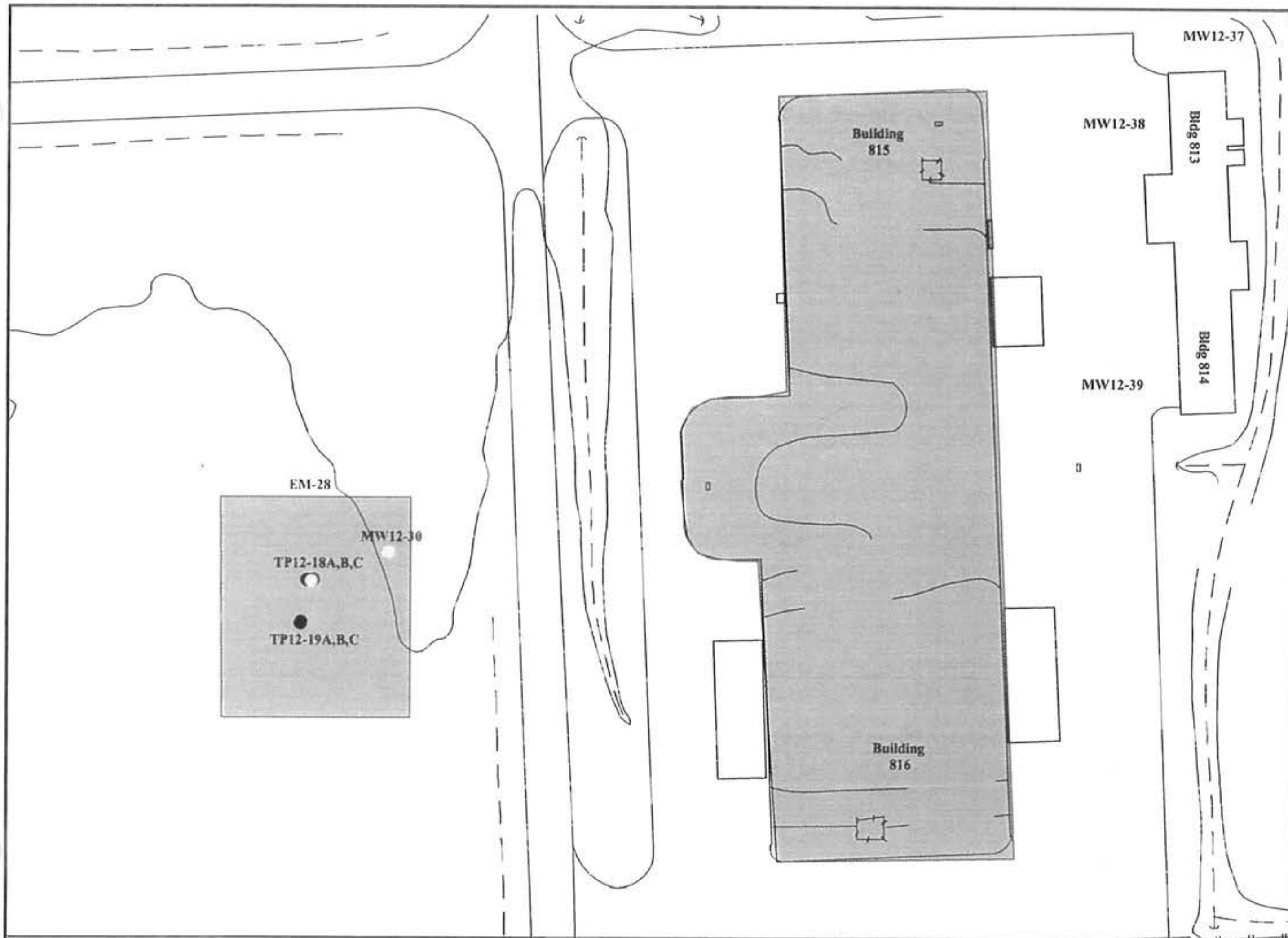
A full presentation of the analytical data collected for soil is provided in **Appendix G**.

4.3.2.5 Radionuclide Soil Results

A total of 55 surface and subsurface soils within the Building 815/816 and EM-28 areas were analyzed for radionuclides. A full presentation of the data is found in **Appendix G.** Summary statistics comparing the Building 815/816 and EM-28 area radionuclide data in soils to background radionuclide data are presented in **Table 4-6**. This comparison includes the number of samples, frequency of detection, minimum, maximum, average, median, and standard deviation. In addition, the WRS test results comparing the site data set to the background data set are presented.

Ten radionuclides from the Building 815/816 and EM-28 area soils were found to be statistically above background. The parameters exceeding background are: Bismuth-214 (Bi-214), Lead-210 (Pb-210), Lead-214 (Pb-214), Radium-223 (Ra-223), Radium-226 (Ra-226), Radium-228 (Ra-228), Thorium-232 (Th-232), Tritium, Uranium-233/234 (U-233/234), and Uranium-238 (U-238).

For the ten radionuclides distinguishable from background in this area, $DCGL_W$s were added to the background data set as described in MARSSIM and in **Section 4.1.2.3** above. **Table 4-7** shows the results of the WRS test when compared to both residential and worker DCGLs. When



Loc_id	Parameter	Depth Range (feet)	Value	Criteria Level	Units
TP12-18C	Nickel	4.5-4.5	50.5	50	MG/KG
MW12-30	Thallium	2.0-3.5	1.1	0.855	MG/KG

Note: The highest value between a sample and a duplicate sample was taken

LEGEND

MW12-15 Sub-surface Soil sample with Loc_ID analyzed for chemical parameters. No exceedences present

MW12-15 Sub-surface Soil sample with Loc_ID analyzed for chemical parameters. Metal exceedences present

MW12-15 Sub-surface Soil sample with Loc_ID analyzed for chemical parameters. Semi Volatile Organic exceedences present.

MW12-15 Sub-surface Soil sample with Loc_ID analyzed for chemical parameters. Metal and Semi Volatile Organic exceedences present

MW12-15 Background Sub-surfacerface Soil with Loc_ID analysed for chemical parameters.

Potential Release Area

100 0 100
(feet)

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FIGURE 4-12
SUBSURFACE SOIL EXCEEDENCES
AT BUILDINGS 815 & 816 AND EM-28

SCALE 1:100	DATE NOV 2000	REV	Sheet 1 of 1

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TABLE 4-6
Comparison of Summary Statistics in
Background Soil to Building 815,816 EM-28 Soil for Radionuclides
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Parameter	Units	No. of Samples		No. of Detections		Frequency of Detections		Minimum		Maximum		Average		Median		Std Dev		Above Background using WRS?	Above Background + Residential DCGL using WRS?	Above Background+ Worker DCGL using WRS?
		BKGD	Building 815, 816, EM-28	BKGD	Building 815, 816, EM-28	BKGD	Building 815, 816, EM-28	BKGD	Building 815, 816, EM-28	BKGD	Building 815, 816, EM-28	BKGD	Building 815, 816, EM-28	BKGD	Building 815, 816, EM-28	BKGD	Building 815, 816, EM-28			
Gross Alpha	pCi/g	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gross Beta	pCi/g	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Actinium-228	pCi/g	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bismuth -214	pCi/g	35	55	27	55	77%	100%	0.60	0.80	2.60	3.80	1.35	1.81	1.40	1.70	0.47	0.54	YES	YES	NO
Cesium-137	pCi/g	35	55	12	39	34%	71%	0.05	0.05	0.70	1.40	0.32	0.48	0.30	0.50	0.22	0.38	NO	NO	NO
Cobalt-57	pCi/g	35	55	5	11	14%	20%	0.05	0.05	0.10	0.30	0.06	0.07	0.05	0.05	0.02	0.04	NO	NO	NO
Cobalt-60	pCi/g	35	55	6	6	17%	11%	0.05	0.05	0.40	0.40	0.13	0.07	0.10	0.05	0.08	0.07	NO	NO	NO
Lead-210	pCi/g	35	55	5	35	14%	64%	0.60	1.00	21.10	88.50	5.62	16.89	3.43	10.20	5.35	19.11	YES	YES	NO
Lead-211	pCi/g	35	55	4	11	11%	20%	0.40	0.15	10.75	15.20	3.20	2.57	2.15	1.15	3.13	3.39	NO	NO	NO
Lead-214	pCi/g	35	55	33	55	94%	100%	0.60	0.70	2.50	3.60	1.48	1.72	1.45	0.60	0.44	0.52	YES	YES	NO
Plutonium-239	pCi/g	35	55	8	1	23%	2%	0.05	0.05	0.25	0.20	0.13	0.08	0.11	0.05	0.05	0.04	NO	NO	NO
Promethium-147	pCi/g	29	24	10	4	34%	17%	2.10	0.40	17.80	3.85	6.43	3.12	4.15	3.25	4.70	0.95	NO	NO	NO
Radium-223	pCi/g	35	55	1	20	3%	36%	0.10	0.15	0.70	2.30	0.22	0.52	0.20	0.25	0.10	0.49	YES	NO	NO
Radium-226	pCi/g	35	55	27	55	77%	100%	0.60	0.76	2.60	3.80	1.36	1.79	1.40	1.70	0.47	0.56	YES	YES	NO
Radium-228	pCi/g	35	55	34	55	97%	100%	1.00	0.90	3.50	3.40	1.73	2.10	1.65	2.10	0.51	0.49	YES	NO	NO
Thallium-208	pCi/g	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thorium-227	pCi/g	29	0	8	NA	28%	NA	0.10	NA	0.55	NA	0.23	NA	0.25	NA	0.11	NA	NA	NA	NA
Thorium-230	pCi/g	35	55	9	15	26%	27%	0.20	0.05	2.70	2.00	0.54	0.48	0.32	0.15	0.53	0.60	NO	NO	NO
Thorium-232	pCi/g	35	55	34	55	97%	100%	0.25	0.40	2.00	2.50	0.98	1.22	0.90	1.20	0.36	0.37	YES	NO	NO
Thorium-234	pCi/g	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tritium	pCi/g	35	55	6	34	17%	62%	0.05	0.05	30.23	203.00	1.68	24.70	0.05	0.30	5.81	50.69	YES	NO	NO
Uranium-233/234	pCi/g	35	55	17	48	49%	87%	0.05	0.05	1.90	1.20	0.46	0.73	0.10	0.80	0.46	0.31	YES	NO	NO
Uranium-235	pCi/g	35	55	19	24	54%	44%	0.05	0.05	0.40	0.30	0.11	0.09	0.10	0.05	0.08	0.06	NO	NO	NO
Uranium-238	pCi/g	35	55	27	52	77%	95%	0.05	0.05	1.40	1.20	0.67	0.82	0.75	0.85	0.40	0.25	YES	NO	NO

For the minimum, maximum, average, median, standard deviation, and the the duplicates and samples were averaged together, the 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 4-7
Wilcoxon Rank Sum Calculations for
Comparison of Building 815, 816 EM-28 Soil to Background Soil
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Parameter	Site Compared to Background +DCGL Value					Site Compared to Background + Residential DCGL Value (1)					Site Compared to Background + Worker DCGL Value (2)				
	Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?	Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?	Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?
	BKGD	Building 815, Building 816, EM-28				BKGD	Building 815, Building 816, EM-28				BKGD	Building 815, Building 816, EM-28			
Bismuth -214	30.97	54.31	-4.245	1.645	YES	32.43	53.25	-3.778	1.645	YES	43.24	45.41	-0.393	1.645	NO
Cesium-137	39.30	48.28	-1.639	1.645	NO										
Cobalt-57	45.08	44.08	-0.249	1.645	NO										
Cobalt-60	58.68	34.22	-5.111	1.645	NO										
Lead-210	30.62	54.57	-4.341	1.645	YES	31.19	54.16	-4.163	1.645	YES	39.49	48.14	-1.568	1.645	NO
Lead-211	47.96	41.99	-1.083	1.645	NO										
Lead-214	37.58	49.52	-2.171	1.645	YES	39.22	48.33	-2.124	1.645	YES	50.70	40.00	-1.942	1.645	NO
Plutonium-239	59.43	33.67	-4.911	1.645	NO										
Promethium-147	35.26	13.57	-5.125	1.645	NO										
Radium-223	30.11	54.94	-4.624	1.645	YES	51.24	39.61	-2.124	1.645	NO					
Radium-226	31.72	53.77	-4.011	1.645	YES	33.22	52.69	-3.533	1.645	YES	43.95	44.90	-0.173	1.645	NO
Radium-228	34.03	52.10	-3.281	1.645	YES	40.92	47.10	-1.121	1.645	NO					
Thorium-230	56.31	35.93	-3.713	1.645	NO										
Thorium-232	34.12	52.03	-3.259	1.645	YES	39.95	47.80	-1.427	1.645	NO					
Tritium	31.92	53.63	-4.326	1.645	YES	55.19	36.75	-3.434	1.645	NO					
Uranium-233/234	35.69	50.89	-2.781	1.645	YES	70.00	26.00	-8.011	1.645	NO					
Uranium-235	41.42	48.74	-1.447	1.645	NO										
Uranium-238	38.15	49.11	-2.007	1.645	YES	70.00	26.00	-8.004	1.645	NO					

Zrs= Statistic for generated from Wilcoxon Rank Sum test

Z(1-alpha)= Maximum allowed probability that WRS test incorrectly indicates that the site and background datasets are distinguishable (alpha= 0.05)

Null Hypothesis: The populations from which the two data sets have been drawn have the same mean.

WRS initially is preformed comparing site to background; it null hypothesis is accepted then no further comparisons needed. If null hypothesis is rejected then site is compared to background + residential scenerio;
if null hypothesis is accepted then no further comparisons needed. If null hypothesis is rejected then the site is compared to background + worker scenerio.

(1) The most conservative DCGL value for the radionuclide in the residential scenerio was added to background.

(2) The most conservative DCGL value for the radionuclide in the worker scenerio was added to background.

NA= Not analyzed due to parameters only being requested during the Expanded Site Investigation and not the Remedial Investigation. Hence, there were no data for specific radionuclides collected for the background set to compare against the ESI data.

Both groups need to be populated to perform Wilcoxon Rank Sum test. Radionuclides with unpopulated groups not found in table.

compared to the residential DCGLs, Bi-214, Pb-214, Pb-210 and Ra-226 DCGLs. All of these radionuclides are within the Ra-226 decay chain. When compared to worker DCGLs, none of the radionuclides exceed DCGLs.

One sample (SS12-235) within the Building 815/816 and EM-28 area was re-sampled in December 1999, to clarify a reported detection of Plutonium-239/240. The re-sampling event as well as the re-sampling results are discussed in **Section 4.3.10** below.

4.3.2.6 Surface Water, Sediment, and Groundwater Results

Of nine proximal surface water and sediment locations (**Figure 4-5** and **Figure 4-11**), two surface water locations (SW12-29 and SW12-6) exceed criteria for pesticide/PCB (**Figure 4-5, Table 4-S**), and two upgradient locations (SW12-28 and SW12-30) exceed the metals criteria, **Figure 4-6**. Sediment locations exceed criteria for up to six PAHs at six locations (**Figure 4-7, Table 4-V**). Five sediment locations exceed criteria for pesticides/PCBs (**Figure 4-8, Table 4-V**), while seven locations (**Figure 4-9, Table 4-V**) exceed criteria metals. Groundwater exceedences (**Figure 4-10, Table 4-X**) include TCE (1600 μg/l) and DCE at MW12-37 (the maximum, for both sampling events), antimony (Sb) at MW12-39 and MW12-29, and exceedences for Na and Fe in upgradient and downgradient wells. SEAD-12 surface water, sediment, and groundwater results are discussed in detail in **Sections 4.4, 4.5, and 4.6**.

4.3.3 Disposal Pit A / B

Investigations in the area of Disposal Pit A/B included: radiological scanning surveys (Class I), **Figure 4-1**; test pits, **Figure 4-2**; with surface and subsurface soil sampling and borehole scanning and for radionuclides of concern and chemical constituents.

4.3.3.1 Gamma Radiation Scanning Results

The Disposal Pit A/B area was scanned for low energy gamma radiation. Since the area was classified as Class I, 100% of the area was scanned. Scanning results for SEAD-12, showing Disposal Pit A/B, are shown in **Figure 4-1**. Results of the scanning survey for this area are listed below.

Location	Ave. Compared to Background	Max Compared to Background	Detects > Flag Value (2xBgd)
Disposal Pit A/B	+6.3%	+16.9%	0

No scanning measurements were detected above the flag value. Refer to **Appendix F** for scanning data collected from Disposal Pit A/B.

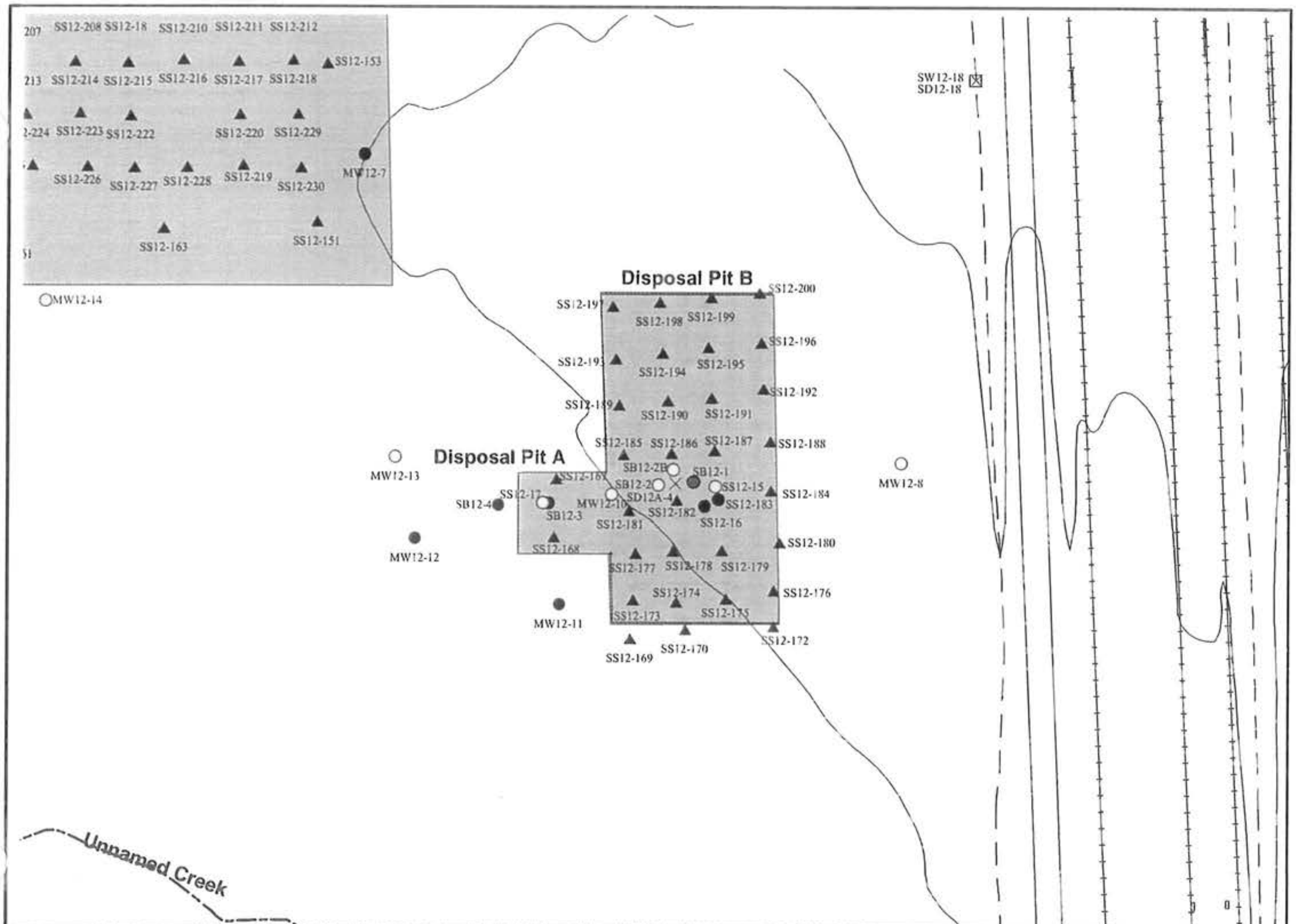
4.3.3.2 Test Pit Results

The Disposal Pit A/B (EM-26 anomaly) area, was originally investigated during the SEAD-12 ESI Program (test pits TP12A-1 and TP12A-2), with the excavation of two additional test pits, TP12-1 and TP12-2 (**Figure 4-2**, **Table 4-2**), completed during the RI. Significant debris was found in the test pits which was interpreted to be military related. Excavated debris consisted of sheet-metal, fiberglass, miscellaneous electronic components, and two 1-gallon metal containers containing liquid tentatively identified as paint. Paint cans and surrounding soil were removed and drummed. A 611 ppm PID OVM reading was observed in the drum containing the two paint cans and associated soil. There were no elevated radiation readings with any of the monitoring instruments on the excavated soil or debris. Ten subsurface soil samples were collected and analyzed (**Table 2-6**). The results from these samples are presented with in the subsurface soil results in **Section 4.3.3.5,** discussed below. Test pit logs are provided in **Appendix B.**

4.3.3.3 Surface Soil Results

Fifteen chemical surface soil samples (**Figure 4-13**) were collected and analyzed (including duplicate samples and surface samples from soil borings and monitoring wells) in the Disposal Pit A/B potential release area. The remaining surface soil samples were submitted for radiological analyses only (**Section 4.3.3.6**). **Table 4-E** presents the surface soil chemical analytical data for all compounds detected in this potential release area. The results are summarized below.

Disposal Pit A/B Surface Soil Constituents	Times Detected	Exceedences	Maximum Detection	TAGM
SVOCs – ug/kg				
Dibenz(a,h)anthracene	2	1	16	14
Metals – mg/kg				
Cadmium	3	1	3.2	2.46
Cyanide	2	2	1.6	0.35
Manganese	15	1	1420	1100
Mercury	3	1	0.11	0.1
Selenium	2	2	2.5	2
Sodium	4	1	207	188
Thallium	5	5	1.8	0.855



Loc_id	Parameter	Value	Criteria Level	Units
MW12-10	Mercury	0.11	0.1	MG/KG
MW12-13	Cyanide	1.2	0.35	MG/KG
MW12-8	Cyanide Thallium	1.6 1.8	0.35 0.855	MG/KG MG/KG
SB12-1	Selenium Sodium Dibenz(a,h)anthracene	2.5 207 16	2.0 188 14	MG/KG MG/KG UG/KG
SB12-2	Cadmium	3.2	2.46	MG/KG
SB12-2B	Manganese	1420	1100	MG/KG
SB12-15	Thallium	1.2	0.855	MG/KG
SB12-17	Thallium	1.4	0.855	MG/KG

LEGEND

SS12-153 — Surface Soil sample with Loc_ID analyzed for chemical and radiological parameters. No exceedences present

SS12-153 — Surface Soil sample with Loc_ID analyzed for chemical and radiological parameters. Metal exceedences present

SS12-153 — Surface Soil sample with Loc_ID analyzed for chemical and radiological parameters. Semi Volatile Organic exceedences present

SS12-153 — Surface Soil sample with Loc_ID analyzed for chemical and radiological parameters. Metal and Semi Volatile Organic exceedences present

SS12-153 — Surface Soil sample with Loc_ID analyzed radiological parameters only.

SD12-153 — Sediment sample with Loc_ID

SW12-153 — Surface Water sample with Loc_ID

Potential Release Area

100 0 100
(feet)

PARSONS
PARSONS ENGINEERING SCIENCE, INC.

SENECA ARMY DEPOT ACTIVITY
RI/FS
SEAD-12

FIGURE 4-13
SURFACE SOIL EXCEEDENCES AT
DISPOSAL PIT A/B

SCALE 1:100 | DATE NOV. 2000 | REV | Sheet 1 of 1

O:\SEN EAD-12\RI_FINAL_SS.APR

Fifty-six (56) analytes were detected in the Disposal Pit A/B area. Exceedences were limited to the one SVOC and seven metals listed above, with 14 total exceedences detected. Selenium exceeds the TAGM criteria in both the sample and duplicate from SB12-1. Only Cyanide and Thallium exceed the TAGM value by more than a factor of 2.

A full presentation of the analytical data collected for soil is provided in **Appendix G**.

4.3.3.4 Borehole Geophysical Results

Table 4-8 shows the results of the borehole geophysics survey performed in the Disposal Pit A/B area. Locations of the boreholes are shown in **Figure 2-6**. Locations GB-1, GB-2, GB-3 and GB-71 were background borehole locations, upgradient to the disposal pits. Readings taken in the background boreholes with the NaI crystal gamma scintillator range from 500 and 1800 cpm, with an average of 1107 cpm. The borehole geophysical survey did not indicate any elevated levels of Ra-226 horizontally or vertically in the Disposal Pit A/B area (**Table 4-8**, **Figure 4-14**). Readings within the boreholes ranged from background to a maximum of 3 times background. Therefore, based on this survey, no additional soil investigations were conducted.

4.3.3.5 Subsurface Soil Results

Twenty-nine subsurface soil samples (**Figure 4-15**) were collected for chemical analysis from test pits (10 samples) and the soil borings (including monitoring well borings, 19 samples) completed in this release area. Four soil borings (SB12-1, SB12-2, SB12-3, and SB12-4) and five monitoring wells (MW12-8, MW12-10, MW12-11, MW12-12, and MW12-13) were drilled, logged and sampled to investigate the vertical and horizontal impact of Disposal Pits A / B. Fill and debris were found to a depth of approximately 14 feet below the ground surface (to the top of bedrock) at Disposal Pit A (SB12-2). In Disposal Pit B, fill material and debris were recorded (SB12-3) to a depth of 10 feet, ending at the top of weathered shale. Boring logs are found in **Appendix B**.

Table 4-F located at the end of this section, presents the subsurface soil analytical data for all compounds detected in this release area. The results are summarized below.

TABLE 4-8
Borehole Geophysics - Radiological Results
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Depth (ft)	0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10
Location	Rad(CPM) by Depth																				
GB01	500	800	1050	1250	1300	1350	1350	1200	1100	1050	1050	950	1000	1100	1000	900	1100	1000	1050	1000	1150
GB02	600	900	1050	1250	1300	1150	1200	1100	1050	1000	1000	1050	1000	950	1050	1050	1000	1050	1100	1000	1200
GB03	550	900	900	1150	1200	1150	1150	1020	1080	1020	980	980	950								
GB04	600	950	1100	1200	1100	1050	1100	1100	1000	1100	1100	1100	1200	1200	1100	1000	1100	1000	1100	1200	1200
GB05	700	950	1200	1200	1200	1300	1200	1200	1100	1200	1200	1100	1200	1200	1050	1100	1200	1000	1100	1000	1100
GB06	700	1000	1300	1200	1100	1050	1100	1100	950	1000	1200	1100	1200	1000	1200	1100	1000	1200	1100	1100	1100
GB07	700	850	1100	1200	1200	1200	1150	1050	1150	1050	1100	1050	1000	1150	1050	1150	1175	1050	1000	1100	1100
GB08	700	950	1050	1200	1200	1300	1300	1200	1100	1100	1150	1200	1150	1250	1150	1100	1150	1000	1150	1150	1200
GB09	550	800	950	1000	1150	1175	1100	1050	1150	1100	1050	950	1000	1050	900	1100	1000	900	1100	1000	1000
GB10	600	900	1000	1050	1200	1200	1225	1100	1200	1200	1100	1150	1050	1000	950	1100	1050	1300	1450	1400	1400
GB11	700	900	1050	1150	1250	1350	1100	1300	1250	1200	1150	1100	1100	1050	1100	1000	1000	1100	1300	1400	1500
GB12	800	1050	1100	1050	1100	1200	1100	1200	1150	1200	1300	1400	1400	1300	1100	1100	1100	1100	1100	1300	1200
GB13	600	900	1100	1600	2200	3100	2500	1400	1200	1100	1050	1000	1050	1100	1000	1100	1100	1150	1100	1000	1150
GB14	550	800	1000	1100	1250	1200	1200	1300	1200	1100	1100	1100	1150	1150	1100	1100	1200	1200	1000	1100	1100
GB15	750	900	1050	1200	1150	1100	1250	1200	1150	1050	1150	1100	1050	600							
GB16	500	850	1100	1100	1200	1100	1100	850	1100	1000	950	1100	1000	950	1150	900	1100	1050	1100	1000	
GB17	650	825	1050	1225	1350	1300	1150	1150	1050	1150	950	975	1000	1000	1050	1025	1025	1100	1150	1000	
GB18	700	800	1100	1100	1025	1000	900	1000	1000	975	1000	950	1000	975	1000	950	1050	1150	1100	1050	1100
GB19	600	800	1000	1150	1200	1200	1000	1100	1050	1100	1100	1200	1050	1150	1050	1100	1000	1100	1000		
GB20	800	950	1175	1200	1200	1200	1200	1225	1200	1150	1100	1175	1100	1150	1100	1150	1100	1050	1100	1125	1150
GB21	650	950	1100	1150	1200	1100	1200	1100	1100	1150	1150	1100									
GB22	650	800	1050	1200	1150	1500	1450	1200	1100	1200	1200	1200	1250	1100	1150	1200	1150	1200			
GB23	600	1000	1150	1100	1150	1200	1150	1200	1150	1150	1200	1150	1100	1100	1200	1100	1050	1050	1000	1100	
GB24	750	950	1100	1100	1100	1000	900	1000	950	850	800	750	900	900	1000	1000	1050	1100	1000	1050	
GB25	850	1000	1100	1050	1100	1150	1200	1150	1150	1100	1150	1200	1200	1200	1150	1350	1200	1100	1150	1050	1200
GB26	850	950	1150	1100	1100	1250	1250	1150	1100	1150	1100	1000	1000	1050	1000	950	1100	1000	1050	1000	1000
GB27	850	1000	1200	1350	1100	1100	1050	1100	1050	1000	1000	950	1000	1000	1050	1000	1000	1050	900	1000	1000
GB28	750	1000	1200	1250	1350	1400	1250	1300	1200	1200	1200	1200	1150	1100	1150	1150	1150				
GB29	700	1000	1150	1300	1350	1350	1200	1200	1150	1150	1100	1100	1100	1200	1100	1050	1000	950	1000	1850	1000
GB30	700	850	950	1100	1150	1200	1300	1500	1500	1500	1650	1500	1450	1350	1400	1500	1500	1750	1800	1900	1800
GB31	650	750	1100	1250	1300	1600	1350	1350	1300	1200	1200	1100	1150	1100	1200	1300	1500	1500	1700	1700	1800
GB32	825	1000	1175	1300	1375	1350	1450	1200	1150	1250	1100	1200	1150	1200	1450	1700	1700	1700	1650	1800	1750
GB33	600	950	1000	1100	1100	1550	1550	1550	1500	1500	1250	1400	1350	1550	1650	1800	1750	1900	1800	1800	1700
GB33	950	1100	1100	1100	1200	1450	1500	1400	1500	1550	1450	1625	1750								
GB34	825	1000	1175	1350	1400	1400	1450	1400	1450	1450	1375	1300	1300	1350	1400	1600	1650	1800	1750	1700	1800
GB35	800	1100	1175	1375	1400	1300	1200	1200	1100	1150	1100	1050	1150	1100	1150	1150	1200	1500	1650	1500	1500
GB36	650	1050	1100	1200	1200	1200	1150	1100	1100	1100	950	1100	950	1000	1000	1050	1100	1200	1400	1550	1600
GB37	600	700	1000	1200	1425	1400	1350	1400	1200	1200	1100	1050	1100	1100	1100	1200	1000	1050	1000		

* Background Boring are Shaded

TABLE 4-8
Borehole Geophysics - Radiological Results
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Depth (ft)	10.5	11	11.5	12	12.5	13	13.5	14	14.5	15	15.5	16	16.5	17	17.5	18	18.5	19			
Location	Rad(CPM) by Depth																		Maximum	Minumum	Average
GB01	1050																		1350	500	1059
GB02	1100	1100	1200	1200	1200	1100													1300	600	1072
GB03																			1200	550	1002
GB04	1200	1100	1300	1400	1350	1400	1550	1500	1600	1600	1450	1600	1700	1800					1800	600	1233
GB05	1100	1000	1100	1100	1100	1100	1100	1200	1400	1600	1700								1700	700	1156
GB06	1000	1100	1000	1300	1200	1100	1100	1100	1300	1700	1600	1600	1500	1700	1700				1700	700	1189
GB07	1150	1100	1100	1200	1125	1150	1100	1150	1150	1350	1450	1500	1600	1700					1700	700	1154
GB08	1250	1250	1150	1050	1050	1200	1150	1150	1100	1200	1250	1600	1750	1850	1800				1850	700	1210
GB09	1100	1050	1100	1100	1200	1100	1200	1400	1450	1550	1500	1450	1450	1650	1700	1700	1800	1800	1800	550	1189
GB10	1500	1400	1450	1600	1500	1450	1600	1100											1600	600	1215
GB11	1550	1700	1600	1600	1750	1700	1600	1600											1750	700	1281
GB12	1250	1300	1500	1550															1550	800	1198
GB13	1100	1100	1400	1550	1750	1750	1700	1700											3100	600	1364
GB14	1000	1150	1050	1100	1400														1400	550	1104
GB15																			1250	600	1050
GB16																			1200	500	1010
GB17																			1350	650	1059
GB18																			1150	700	996
GB19																			1200	600	1050
GB20	1200	1150																	1225	800	1128
GB21																			1200	650	1079
GB22																			1500	650	1153
GB23																			1200	600	1095
GB24																			1100	750	963
GB25																			1350	850	1133
GB26																			1250	850	1062
GB27																			1350	850	1036
GB28																			1400	750	1176
GB29																			1850	700	1143
GB30	1800	1900	1700	1950	1900	1800													1950	700	1496
GB31	2000	1800	1900	1900	2000	1800	1850	1900											2000	650	1457
GB32	1700	1800	1950	1900	1900	1800	1800												1950	825	1476
GB33	1650	1800	1800	1700	1600	1600	1650												1900	600	1505
GB33																			1750	950	1360
GB34	1650	1800	1700	1800	1625	1600	1600												1800	825	1489
GB35	1600	1700	1750	1800	1800	1800													1800	800	1344
GB36	1650	1800	1900	1800	1900	1800	1800	1900	1700										1900	650	1333
GB37																			1425	600	1114

* Background Boring are Shaded

TABLE 4-8
Borehole Geophysics - Radiological Results
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Depth (ft)	10.5	11	11.5	12	12.5	13	13.5	14	14.5	15	15.5	16	16.5	17	17.5	18	18.5	19			
Location	Rad(CPM) by Depth																		Maximum	Minumum	Average
GB38	1100																		1200	750	1081
GB39																			1250	600	1058
GB40	1100	1100	1150	1200	1150	1100	1200												1200	650	1087
GB41	1050	1150	1100	1100	1200	1100	1300	1350	1400										1400	700	1113
GB42	1100	1050	1100	1050	1100	1050													1300	800	1088
GB43	1050	1050	1050	1200	1150	1150	1200	1400											1400	750	1091
GB44																			1100	600	1003
GB45	1150	1150	1100	1100															1700	500	1150
GB46																			1250	750	1068
GB47																			1250	800	1116
GB48	1050	1200	1100	1100	1150	1200													1300	800	1150
GB49	1300	1200	1200	1300	1350	1550	1650	1650											1650	750	1238
GB50	1050	1000	1050	1100	1100	1100	1050	1200											1300	800	1093
GB51	1200	1200	1100	1150	1200	1250	1450	1600	1550										1600	700	1132
GB52	1750	1950	1850	1900	1800	1900	1750	1900	1800										1950	800	1483
GB53	1800	1700	1950	1900	1850	1800	1700												1950	600	1545
GB54	1700	1700	1800	1800															1800	650	1502
GB54	1850	1850	1850	1800															1900	700	1620
GB55	1850	1800	1800	1850	1850	1950													1950	700	1676
GB56	1700																		1900	600	1536
GB57	1850	1750	1700	1750	1800	1800													2000	850	1676
GB58																			1900	700	1640
GB59	1750	1850	1800	1800	1800	1750	1800	1850											1850	800	1434
GB60																			1350	700	1114
GB61	1700	1650	1700	1600	1800	1850	1825	1750											1850	650	1347
GB62	1700	1900	1625	1850	1750	1800	1850	1700											1900	750	1409
GB63	1650	1900	1600	1700	1850	1900													1950	750	1545
GB64	1850	1750	1800	1850	1750	1600													2000	700	1491
GB65																			1900	750	1568
GB66	1750	1700																	1850	700	1589
GB67																			1900	700	1458
GB68																			1900	600	1480
GB69																			1800	600	1241
GB70																			1800	800	1550
GB71	1200	1100	1300	1225	1400	1550	1800	1700	1800	1700	1700	1700	1600	1800	1700	1800			1800	500	1295
Maximium	**2000**	**1950**	**1950**	**1950**	**2000**	**1950**	**1850**	**1900**	**1800**	**1700**	**1700**	**1700**	**1750**	**1850**	**1800**	**1800**	**1800**	**1800**	**3100**	**950**	**1676**
Minimum	**1000**	**1000**	**1000**	**1050**	**1050**	**1050**	**1050**	**1100**	**1100**	**1200**	**1250**	**1450**	**1450**	**1650**	**1700**	**1700**	**1800**	**1800**	**1100**	**500**	**963**
Average	**1419**	**1448**	**1459**	**1498**	**1511**	**1504**	**1514**	**1514**	**1477**	**1529**	**1521**	**1575**	**1600**	**1750**	**1725**	**1750**	**1800**	**1800**	**1616**	**692**	**1258**

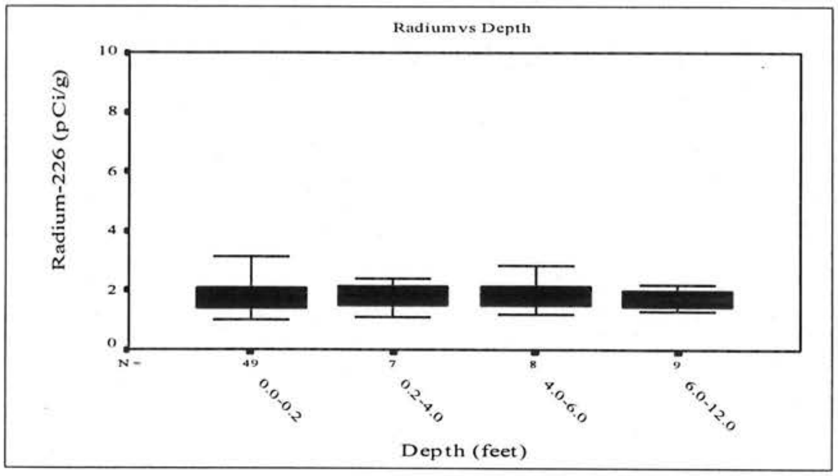
* Background Boring are Shaded

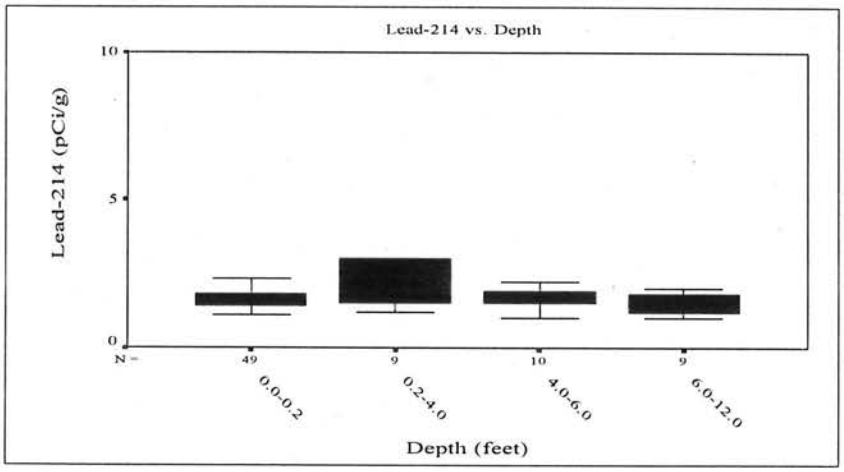
TABLE 4-8
Borehole Geophysics - Radiological Results
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

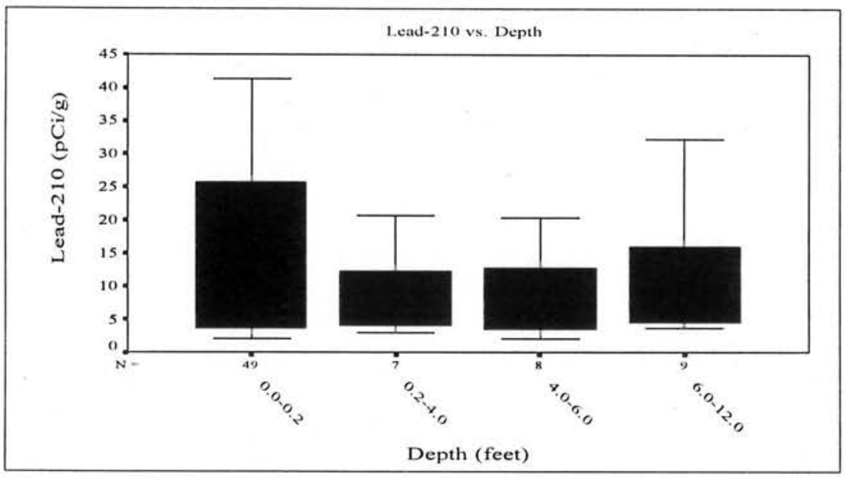
Depth (ft)	0	0.5	1	1.5	2	2.5	3	3.5	4	4.5	5	5.5	6	6.5	7	7.5	8	8.5	9	9.5	10
Location	Rad(CPM) by Depth																				
GB38	750	800	1100	1100	1200	1200	1175	1100	1100	1000	1050	1150	1100	1100	1100	1150	1100	1150	1050	1100	1100
GB39	600	800	1050	1150	1100	1150	1050	1050	1100	1050	1000	1050	1050	1050	1100	1100	1150	1150	1150	1250	
GB40	650	1000	1100	1150	1200	1200	1100	1050	1000	1050	1100	1050	1100	1050	1100	1100	1175	1000	1100	1100	1050
GB41	700	900	1050	1150	1200	1225	1150	1100	1100	1150	1050	1100	1050	1000	1150	1150	1100	1100	1000	1100	1100
GB42	800	1150	1175	1300	1250	1150	1100	1000	1100	1100	1100	1000	1150	1050	1100	1100	1000	1050	1000	1100	1150
GB43	750	1050	1175	1300	1200	1050	1100	1100	1000	1050	1100	1150	1050	1050	1000	1100	1100	1000	950	1100	1000
GB44	600	850	1100	1000	950	1100	1000	900	1000	900	1000	1100	1100	1050	1100	1100	1100	1100	1000		
GB45	500	750	1050	1000	1100	1000	1100	1150	1200	1150	1400	1600	1700	1600	1300	1200	1150	1100	1150	950	1100
GB46	750	850	1000	1100	1100	1050	1150	1200	1100	1000	1050	1050	1100	1250	1100	1050	1150	1100	1150		
GB47	800	1000	1050	1100	1150	1150	1100	1100	1200	1250	1200	1150	1200	1200	1150	1200	1050	1100	1050		
GB48	800	1000	1150	1100	1150	1100	1050	1200	1200	1300	1250	1250	1200	1200	1150	1200	1150	1150	1200	1250	1200
GB49	750	1000	1200	1350	1300	1250	1100	1100	1100	1150	1150	1200	1150	1150	1200	1400	1300	1300	1200	1200	1150
GB50	800	1050	1250	1300	1300	1300	1250	1100	1050	950	1000	1000	1050	1150	1100	1000	1150	1050	1100	1050	1050
GB51	700	1000	1100	1150	1150	1100	1000	1000	1100	950	1000	1050	1000	950	1000	1150	1100	1200	1250	1200	1100
GB52	800	900	1250	1300	1250	1250	1300	1250	1200	1150	1100	1225	1050	1150	1250	1500	1600	1800	1850	1750	1950
GB53	600	900	1150	1250	1100	1400	1500	1300	1300	1300	1300	1500	1600	1800	1700	1750	1850	1900	1750	1850	1750
GB54	650	800	1150	1100	1300	1200	1400	1400	1500	1400	1600	1500	1800	1700	1650	1700	1800	1650	1750	1800	1700
GB54	700	1000	1100	1200	1500	1450	1450	1500	1500	1550	1750	1800	1900	1850	1900	1850	1800	1750	1850	1850	1900
GB55	700	900	1050	1300	1450	1450	1500	1700	1850	1900	1800	1800	1800	1900	1850	1900	1850	1850	1900	1800	1900
GB56	600	900	1100	1200	1350	1350	1300	1500	1700	1700	1800	1750	1800	1700	1750	1800	1600	1800	1900	1800	1700
GB57	850	1150	1350	1400	1500	1550	1500	1700	1700	1800	1800	2000	1850	1800	1800	1800	1800	1800	1900	1850	1700
GB58	700	950	1100	1400	1550	1700	1750	1800	1900	1800	1800	1800	1850	1850	1900	1800	1750	1800	1750	1850	
GB59	800	1050	1150	1200	1200	1250	1300	1300	1300	1300	1350	1300	1400	1400	1350	1250	1350	1300	1450	1600	1600
GB60	700	900	1100	1225	1350	1150	1275	1200	1150	1050	1050	1150	1100	1200							
GB61	650	1000	1100	1100	1000	1100	1050	1100	1100	1050	1150	1100	1200	1050	1175	1300	1600	1600	1600	1575	1600
GB62	750	950	1175	1200	1300	1250	1300	1250	1200	1200	1350	1400	1450	1400	1250	1150	1175	1200	1450	1500	1800
GB63	750	1100	1175	1200	1350	1375	1300	1275	1300	1450	1600	1750	1600	1350	1500	1850	1800	1950	1950	1800	1700
GB64	700	950	1100	1300	1300	1300	1450	1300	1200	1250	1300	1300	1300	1400	1600	1850	1800	2000	1900	1650	1700
GB65	750	950	1175	1300	1400	1300	1400	1500	1700	1650	1800	1800	1900	1900	1900	1850	1650	1600	1800	1700	1900
GB66	700	850	1200	1400	1500	1600	1500	1700	1650	1800	1800	1700	1700	1750	1650	1700	1750	1800	1850	1800	1700
GB67	700	950	1150	1300	1400	1350	1300	1200	1300	1250	1300	1500	1800	1750	1850	1700	1900	1900	1700	1850	
GB68	600	750	1100	1300	1350	1400	1450	1400	1500	1500	1500	1750	1900	1600	1700	1800	1900	1600	1700	1800	
GB69	600	800	1050	1150	1225	1150	1200	1150	1200	1100	1050	1100	1200	1500	1500	1500	1600	1700	1800		
GB70	800	1050	1200	1450	1500	1500	1750	1500	1600	1750	1800	1550	1800	1700	1800	1600	1650	1750	1700		
GB71	500	900	1200	1150	1250	1250	1200	1150	1200	1000	1100	1000	1100	1000	1000	1150	1150	1050	1050	1250	1200
Maximium	**950**	**1150**	**1350**	**1600**	**2200**	**3100**	**2500**	**1800**	**1900**	**1900**	**1800**	**2000**	**1900**	**1900**	**1900**	**1900**	**1900**	**2000**	**1950**	**1900**	**1950**
Minimum	**500**	**700**	**900**	**1000**	**950**	**1000**	**900**	**850**	**950**	**850**	**800**	**750**	**900**	**600**	**900**	**900**	**1000**	**900**	**900**	**950**	**1000**
Average	**694**	**929**	**1111**	**1203**	**1253**	**1281**	**1259**	**1228**	**1224**	**1215**	**1225**	**1238**	**1261**	**1248**	**1264**	**1293**	**1304**	**1324**	**1347**	**1380**	**1384**

* Background Boring are Shaded

FIGURE 4-14
Radium 226, Lead-214, and Lead-210 Concentrations
as a function of Depth in Disposal Pits A/B
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity







The top of the box represents the 75th percentile while the bottom of the box represents the 25th percentile of the data set.
The dark line represets the median of the data. The largest and smallest values are located within the whiskers.
The outliers, which are values that are more than 1.5 box-lengths from the 75th percentile, are not shown. Only three outliers occurred in the three sets of data.

See Table G-25 for data values.

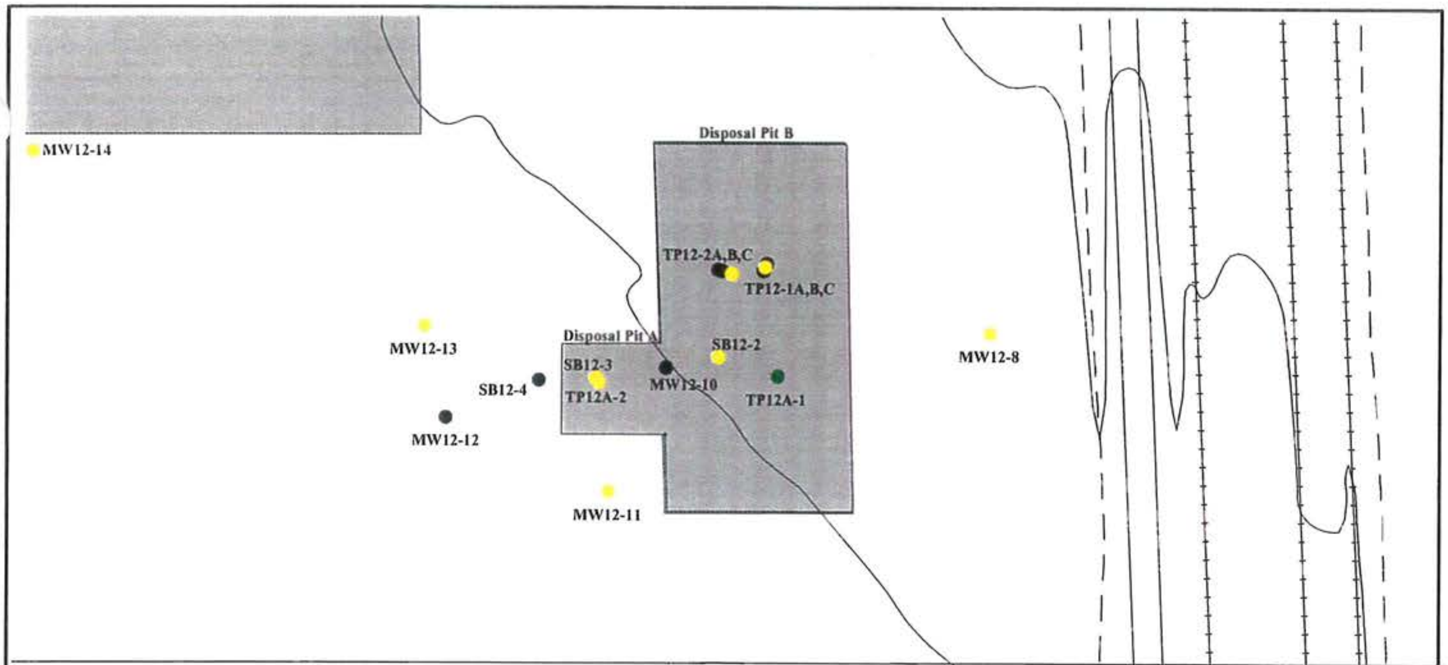
Disposal Pit A/B Subsurface Soil Constituents	Times Detected	Exceedences	Maximum Detection	TAGM
SVOCs – ug/kg				
Benzo(a)pyrene	4	1	180	61
Dibenz(a,h)anthracene	2	1	57	14
Phenol	2	2	300	30
Pesticides/PCBs – ug/kg				
Heptachlor epoxide	2	1	22	20
Metals – mg/kg				
Antimony	7	1	7.2	6
Cadmium	10	7	94.3	2.46
Calcium	28	1	142000	125300
Chromium	28	4	83.3	30
Copper	28	5	215	33
Cyanide	2	2	1.5	0.35
Lead	28	3	366	24.4
Magnesium	28	1	34300	21700
Nickel	26	2	201	50
Silver	4	2	11.9	0.8
Thallium	7	5	1.7	0.855
Zinc	28	3	424	115

Seventy-two analytes were detected in the Disposal Pit A/B area. The forty-one exceedences shown above include three SVOCs, one Pesticide/PCB, and 12 metals. As shown, all of the SVOCs, and nine of the metals exceed their TAGM value by more than a factor of 2.

A full presentation of the analytical data collected for soil is provided in **Appendix G**.

4.3.3.6 Radionuclide Soil Results

A total of 77 surface and subsurface soil samples were analyzed for radionuclides. The analytical data are presented in **Appendix G**. Summary statistics comparing the Disposal Pit A/B area radionuclide data in soils to background radionuclide data are presented in **Table 4-9** This comparison includes number of samples, frequency of detection, minimum, maximum, average, median, and standard deviation. In addition, the WRS test results comparing the site data set to the background data set are presented.



Loc_id	Parameter	Depth Range (feet)	Value	Criteria Level	Units
SB12-3	Heptachlor epoxide*	1-4	22	20	UG/KG
SB12-3	Cadmium	10-11.9	6.0	2.46	MG/KG
	Chromium		30.2	30	MG/KG
	Copper		63.2	33	MG/KG
	Lead		63.9	24.4	MG/KG
	Nickel		76.4	50	MG/KG
	Silver		1.6	0.8	MG/KG
	Zinc		160	115	MG/KG
SB12-2	Cadmium	0.2-2.0	3.9	2.46	MG/KG
	Chromium		53.5	30	MG/KG
	Lead		27.2	24.4	MG/KG
MW12-11	Copper	4-5.6	33.7	33	MG/KG
MW12-13	Magnesium	4-6	34,300	21,700	MG/KG
SB12-2	Thallium	10-12	1.1	0.855	MG/KG
TP12-1C	Thallium	6-8	0.94	0.855	MG/KG
TP12-2C	Calcium	6-6	142,000	125,300	MG/KG
MW12-8	Cyanide	4-6	1.5	0.35	MG/KG
	Thallium		1.7	0.855	MG/KG
MW12-8	Cyanide	8-10	0.72	0.35	MG/KG
	Thallium		1.5	0.855	MG/KG
TP12A-1	Phenol	2.5-2.5	300	30	UG/KG
	Cadmium		7.8	2.46	MG/KG
TP12A-1	Benzo(a)pyrene	3-3	200	61	UG/KG
	Dibenz(a,h)pyrene		57	14	UG/KG
	Phenol		48	30	UG/KG
	Cadmium		94.3	2.46	MG/KG
	Chromium		83.3	30	MG/KG
	Copper		215	33	MG/KG
	Lead		366	24.4	MG/KG
	Silver		11.9	0.8	MG/KG
	Zinc		285	115	MG/KG
TP12A-2	Antimony	6-6	7.2	6	MG/KG
	Cadmium		27.3	2.46	MG/KG
	Copper		43.6	33	MG/KG
	Thallium		0.98	0.855	MG/KG
TP12A-2	Cadmium	5-5	37.3	2.46	MG/KG
	Chromium		32.4	30	MG/KG
	Copper		128	33	MG/KG
	Nickel		201	50	MG/KG
	Zinc		424	115	MG/KG

Note: The highest value between a sample and a duplicate sample was taken

* Indicates a Pesticide/PCB parameter.
** Indicates a Volitale Organic parameter.

100 0 100
(feet)

LEGEND

- MW12-15 Sub-surface Soil sample with Loc_ID analyzed for chemical parameters. No exceedences present
- MW12-15 Sub-surface Soil sample with Loc_ID analyzed for chemical parameters. Metal exceedences present
- MW12-15 Sub-surface Soil sample with Loc_ID analyzed for chemical parameters. Semi Volatile Organic exceedences present.
- MW12-15 Sub-surface Soil sample with Loc_ID analyzed for chemical parameters. Metal and Semi Volatile Organic exceedences present
- MW12-15 Background Sub-surfacerface Soil with Loc_ID analysed for chemical parameters.
- Potential Release Area

O:\SENECA\ ...12\SUB_SOIL.APR

PARSONS
PARSONS ENGINEERING SCIENCE, INC.

SENECA ARMY DEPOT ACTIVITY
RI/FS
SEAD-12

FIGURE 4-15
SUBSURFACE SOIL EXCEEDENCES
AT DISPOSAL PIT A/B

SCALE	DATE	REV	
1:100	NOV 2000		Sheet 1 of 1

TABLE 4-9

Comparison of Summary Statistics in Background Soil to Disposal Pit A/B Soil for Radionuclides

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Parameter	Units	No. of Samples		No. of Detections		Frequency of Detections		Minimum		Maximum		Average		Median		Std Dev		Above Background using WRS?	Above Background + Residential DCGL using WRS?	Above Background+ Worker DCGL using WRS?
		BKGD	Disposal Pit A/B	BKGD	Disposal Pit A/B	BKGD	Disposal Pit A/B	BKGD	Disposal Pit A/B	BKGD	Disposal Pit A/B	BKGD	Disposal Pit A/B	BKGD	Disposal Pit A/B	BKGD	Disposal Pit A/B			
Gross Alpha	pCi/g	0	4	NA	4	NA	100%	NA	15.00	NA	74.00	NA	31.75	NA	19.00	NA	28.28	NA	NA	NA
Gross Beta	pCi/g	0	4	NA	4	NA	100%	NA	27.00	NA	52.00	NA	35.00	NA	30.50	NA	11.63	NA	NA	NA
Actinium-228	pCi/g	0	4	NA	4	NA	100%	NA	0.74	NA	0.91	NA	0.83	NA	0.83	NA	0.07	NA	NA	NA
Bismuth -214	pCi/g	35	77	27	75	77%	97%	0.60	0.65	2.60	39.80	1.35	2.64	1.40	1.70	0.47	5.16	YES	YES	NO
Cesium-137	pCi/g	35	73	12	45	34%	62%	0.05	0.05	0.70	1.30	0.32	0.35	0.30	0.30	0.22	0.32	NO	NO	NO
Cobalt-57	pCi/g	35	73	5	18	14%	25%	0.05	0.05	0.10	0.30	0.06	0.07	0.05	0.05	0.02	0.04	NO	NO	NO
Cobalt-60	pCi/g	35	73	6	20	17%	27%	0.05	0.05	0.40	0.60	0.13	0.14	0.10	0.05	0.08	0.15	NO	NO	NO
Lead-210	pCi/g	35	73	5	40	14%	55%	0.60	1.00	21.10	78.60	5.62	9.34	3.43	5.50	5.35	11.28	YES	YES	NO
Lead-211	pCi/g	35	73	4	21	11%	29%	0.40	0.30	10.75	13.40	3.20	3.28	2.15	1.40	3.13	3.52	NO	NO	NO
Lead-214	pCi/g	35	77	33	77	94%	100%	0.60	1.00	2.50	44.40	1.48	2.60	1.45	1.60	0.44	5.63	YES	YES	NO
Plutonium-239/240	pCi/g	35	73	8	15	23%	21%	0.05	0.05	0.25	0.20	0.13	0.10	0.11	0.10	0.05	0.04	NO	NO	NO
Promethium-147	pCi/g	29	3	10	0	34%	0%	2.10	4.20	17.80	4.20	6.43	4.20	4.15	4.20	4.70	0.00	NO	NO	NO
Radium-223	pCi/g	35	73	1	8	3%	11%	0.10	0.15	0.70	2.10	0.22	0.31	0.20	0.25	0.10	0.31	YES	NO	NO
Radium-226	pCi/g	35	73	27	71	77%	97%	0.60	0.65	2.60	36.80	1.36	2.29	1.40	1.70	0.47	4.54	YES	YES	NO
Radium-228	pCi/g	35	73	34	71	97%	97%	1.00	0.20	3.50	3.60	1.73	1.76	1.65	1.70	0.51	0.52	NO	NO	NO
Thallium-208	pCi/g	0	4	NA	4	NA	100%	NA	0.35	NA	0.88	NA	0.54	NA	0.46	NA	0.24	NA	NA	NA
Thorium-227	pCi/g	29	11	8	5	28%	45%	0.10	0.10	0.55	0.40	0.23	0.22	0.25	0.23	0.11	0.10	NO	NO	NO
Thorium-230	pCi/g	35	73	9	35	26%	48%	0.20	0.05	2.70	2.30	0.54	0.60	0.32	0.30	0.53	0.55	NO	NO	NO
Thorium-232	pCi/g	35	73	34	58	97%	79%	0.25	0.05	2.00	2.10	0.98	0.73	0.90	0.80	0.36	0.40	NO	NO	NO
Thorium-234	pCi/g	0	4	NA	4	NA	100%	NA	0.31	NA	1.60	NA	0.85	NA	0.74	NA	0.56	NA	NA	NA
Tritium	pCi/g	35	73	6	26	17%	36%	0.05	0.05	30.23	53.30	1.68	3.57	0.05	0.05	5.81	8.92	YES	NO	NO
Uranium-233	pCi/g	35	73	17	53	49%	73%	0.05	0.05	1.90	1.40	0.46	0.51	0.10	0.60	0.46	0.33	NO	NO	NO
Uranium-235	pCi/g	35	73	19	18	54%	25%	0.05	0.05	0.40	0.30	0.11	0.07	0.10	0.05	0.08	0.04	NO	NO	NO
Uranium-238	pCi/g	35	73	27	67	77%	92%	0.05	0.05	1.40	1.20	0.67	0.65	0.75	0.70	0.40	0.25	NO	NO	NO

For the minimum, maximum, average, median, standard deviation, and the the duplicates and samples were averaged together, the detects (no qualifier or J qualifier) were taken at full value, and all non-detects (U or UJ qualifier) were taken at half value.

Six radionuclides in the Disposal Pit A/B area soils were found to be statistically above background. The parameters exceeding background are: Bismuth-214 (Bi-214), Lead-210 (Pb-210), Lead-214 (Pb-214), Radium- 223 (Ra-223), Radium-226 (Ra-226), and Tritium.

For the six radionuclides distinguishable from background in this area, $DCGL_W$s were added to the background data set as described in MARSSIM and in **Section 4.1.2.3** above. **Table 4-10** shows the results of the WRS test when compared to both residential and worker DCGLs. When compared to residential DCGLs, Bi-214, Pb-214, Ra-226, and Pb-210 exceed DCGLs. These radionuclides are all from the Ra-226 decay chain. When compared to worker DCGLs, no radionuclides exceed DCGLs.

Seventeen samples within the Disposal Pit A/B area were re-sampled in December 1999, to clarify a reported detection of Plutonium-239/240 at these locations. Locations are shown in **Figure 2-13**. The re-sampling event as well as the re-sampling results are discussed in **Section 4.3.10** below.

4.3.3.7 Surface Water, Sediment, and Groundwater Results

No surface water or sediment samples are proximal to the Disposal Pit A/B potential release area (Figure 4-13). Locations upgradient and downgradient to this area are discussed with the Class III areas. Groundwater exceedences are limited to iron in three wells. SEAD-12 surface water, sediment, and groundwater results are discussed in detail in **Sections 4.4, 4.5, and 4.6**.

4.3.4 Disposal Pit C

Investigations in the Disposal Pit C area included: radiological scanning surveys (**Figure 4-1**, both Class I and Class II); test pits, **Figure 4-2**; surface soil and subsurface soil sampling.

4.3.4.1 Gamma Radiation Scanning Results

The Class I (100% coverage) and Class II (50% coverage) areas associated with Disposal Pit C were scanned for low energy gamma radiation as described in **Section 2**. Scanning results for SEAD-12 showing the Disposal Pit C area are shown in **Figure 4-1**. Results of the scanning survey in the Disposal Pit C area are shown below.

Location	Ave. Compared to Background	Max Compared to Background	Detects > Flag Value (2xBgd)
Disposal Pit C	-4.2%	+9.8%	0

TABLE 4-10
Wilcoxon Rank Sum Calculations for Comparison of Disposal Pits A/B to Background
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Parameter	Site Compared to Background +DCGL Value					Site Compared to Background + Residential DCGL Value (1)					Site Compared to Background + Worker DCGL Value (2)				
	Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?	Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?	Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?
	BKGD	Disposal Pit A/B				BKGD	Disposal Pit A/B				BKGD	Disposal Pit A/B			
Bismuth -214	38.42	65.42	-4.145	1.645	YES	39.97	64.65	-3.786	1.645	YES	52.92	58.27	-0.820	1.645	NO
Cesium-137	55.26	54.11	-0.183	1.645	NO										
Cobalt-57	53.77	54.88	-0.232	1.645	NO										
Cobalt-60	61.64	50.78	-1.847	1.645	NO										
Lead-210	44.28	59.82	-2.447	1.645	YES	45.35	59.27	-2.191	1.645	YES	61.68	50.76	-1.719	1.645	NO
Lead-211	54.26	54.63	-0.058	1.645	NO										
Lead-214	46.58	61.39	-2.279	1.645	YES	49.24	60.08	-1.663	1.645	YES	65.81	51.91	-2.134	1.645	NO
Plutonium-239/240	67.27	47.85	-3.378	1.645	NO										
Promethium-147	16.87	24.00	-1.211	1.645	NO										
Radium-223	44.01	59.96	-2.630	1.645	YES	81.81	40.27	-6.640	1.645	NO					
Radium-226	38.14	63.03	-3.926	1.645	YES	39.65	62.24	-3.560	1.645	YES	51.97	55.82	-0.606	1.645	NO
Radium-228	54.05	54.73	-0.107	1.645	NO										
Thorium-227	21.61	19.10	-0.583	1.645	NO										
Thorium-230	58.26	52.54	-0.903	1.645	NO										
Thorium-232	66.89	48.04	-2.987	1.645	NO										
Tritium	47.69	58.05	-2.043	1.645	YES	80.57	40.92	-6.585	1.645	NO					
Uranium-233	54.23	54.64	-0.065	1.645	NO										
Uranium-235	64.27	49.41	-2.633	1.645	NO										
Uranium-238	58.20	52.57	-0.895	1.645	NO										

Zrs= Statistic for generated from Wilcoxon Rank Sum test

Z(1-alpha)= Maximum allowed probability that WRS test incorrectly indicates that the site and background datasets are distinguishable (alpha= 0.05)

Null Hypothesis: The populations from which the two data sets have been drawn have the same mean.

WRS initially is preformed comparing site to background; it null hypothesis is accepted then no further comparisons needed. If null hypothesis is rejected then site is compared to background + residential scenerio; if null hypothesis is accepted then no further comparisons needed. If null hypothesis is rejected then the site is compared to background + worker scenerio.

(1) The most conservative DCGL value for the radionuclide in the residential scenerio was added to background.

(2) The most conservative DCGL value for the radionuclide in the worker scenerio was added to background.

NA= Not analyzed due to parameters only being requested during the Expanded Site Investigation and not the Remedial Investigation. Hence, there were no data for specific radionuclides collected for the background set to compare against the ESI data.

Both groups need to be populated to perform Wilcoxon Rank Sum test. Radionuclides with unpopulated groups not found in table.

During the first grounds scanning survey, Disposal Pit C was scanned as a class II area with 50% scanning coverage. Later during test pitting activities, the area immediately surrounding Disposal Pit C was upgraded to Class I and was rescanned at 100% coverage. The upgrade to Class I was due to the presence of several cone-shaped military items found in TP12-3.

Refer to **Appendix F** for scanning data collected from Disposal Pit C.

4.3.4.2 Test Pit Results

A total of 14 test pits were excavated during the ESI (6) and RI (8) programs in the potential release area defined as Disposal Pit C, shown on **Figure 4-2**. Test pits TP12-3 and TP12-4, completed during the RI, were excavated to investigate in detail the main area of Disposal Pit C as defined by test pits TP12A-3 and TP12A-4 completed during the ESI program. The remaining test pits were excavated to the north of Disposal Pit C to investigate geophysical anomalies found there. The ESI test pits were excavated to depths of 4.5 ft to 9 ft, while the RI test pits were excavated to bedrock, the water table, or to the maximum depth the excavation equipment was capable of reaching. Test pit logs are provided in **Appendix B.** The chemical analyses subsurface soil samples collected during these excavations are presented in **Section 4.3.4.4 (Table 4-H)**.

On the west side of Disposal Pit C, significant amounts of military-related debris were found in TP12-3, extending from the ground surface to approximately 5.5 feet to the water table. This debris included miscellaneous sheet metal fragments, metal fragments, wood, and electronic components. Several cone shaped military items were also excavated from TP12-3. Gamma readings using the Fidler from these items were as high as high as eight times background. The relatively high scanning readings were confined to the terminus of each cone where there was a large dial exposed. TP12-3 was excavated to the water table at a maximum depth 5.5 feet. Additional debris, including additional cone-shaped military related objects, were observed at the bottom of the excavation pit, indicating that the disposal pit continued below the water table. No elevated headspace or breathing zone volatile organic compound measurements were detected. All cone-shaped military items and associated soil that were removed from test pit TP12-3 were sealed in drums for later disposal.

TP12-4 was excavated on the east side of Disposal Pit C to a depth of 9.5 feet, the mechanical limit of the trenching equipment. Military-related debris, consisting of miscellaneous fragments of metal and fiberglass, was found up to a depth of approximately seven feet. At a depth of seven feet, a large stainless steel cylinder, approximately 4 to 5 feet in diameter, was found. The cylinder was oriented perpendicular to TP12-4, trending southeast to northwest. The cylinder could not be moved or excavated completely. Soil samples were collected 0.5 feet below ground surface (bgs), from immediately above (6-feet) the the cylinder, and at 8-ft bgs (beside the cylinder, Location IDs TP12-4A, TP12-4B, and TP12-4C; **Table 4-H**). These data are discussed with the subsurface soil data from this area, **Section 4.3.4.4**, below .

Additional test pits (TP12A-5, TP12A-6, TP12A-7, TP12A-8, TP12-5, TP12-6, TP12-7A, TP12-7B, TP12-8, and TP12-23) were excavated north of main Disposal Pit C area. The RI test pits were located to further investigate the small point source anomalies (EM-21, EM-22, EM-23, and EM-24 as discussed on **Table 4-2**. The ESI test pits contained little or no debris, while all six of the RI test pits contained construction-related debris consisting of concrete, re-bar, asphalt, culvert sections, wood, and steel pipe. Monitoring wells MW12-33 and MW12-34 were installed to investigate potential chemical migration from the Disposal Pit C area. As noted above, the results from chemical analyses of subsurface soil samples collected during these excavations are presented in **Section 4.3.4.4**.

4.3.4.3 Surface Soil Results

Nine surface soil samples (1 duplicate), **Figure 4-16**, were collected (including surface samples from soil borings, monitoring wells) in the Disposal Pit C potential release area for chemical characterization. Additional surface soils, collected for radiological analyses are discussed in **Section 4.3.4.5**. **Table 4-G** located at the end of this section, presents the surface soil analytical data for all compounds detected in this release area. The results are summarized below.

Disposal Pit C Surface Soil Constituents	Times Detected	Exceedences	Maximum Detection	TAGM
<u>Metals – mg/kg</u>				
Lead	9	1	24.9	24.4
Thallium	3	3	1.7	0.855

Thirty-nine (39) analytes were detected in the Disposal Pit C area. Exceedences were limited to the two metals analytes listed above, with 4 total exceedences detected. Only Thallium exceeds the TAGM value by more than a factor of 2. These exceedences occurred in soil samples collected from MW12-13, -33, and –34.

A full presentation of the analytical data collected for soil is provided in **Appendix G**.

Loc_id	Parameter	Value	Criteria Level	Units
MW12-14	Thallium	1.7	0.855	MG/KG
MW12-33	Lead	24.9	24.4	MG/KG
	Thallium	1.6	0.855	MG/KG
MW12-34	Thallium	1.5	0.855	MG/KG

LEGEND

SS12-153 — Surface Soil sample with Loc_ID analyzed for chemical and radiological parameters. No exceedences present

SS12 153 — Surface Soil sample with Loc_ID analyzed for chemical and radiological parameters. Metal exceedences present

SS12-153 — Surface Soil sample with Loc_ID analyzed for chemical and radiological parameters. Semi Volatile Organic exceedences present

SS12-153 — Surface Soil sample with Loc_ID analyzed for chemical and radiological parameters. Metal and Semi Volatile Organic exceedences present

SS12-153 — Surface Soil sample with Loc_ID analyzed radiological parameters only.

SD12-153 — Sediment sample with Loc_ID

SW12-153 — Surface Water sample with Loc_ID

Potential Release Area

100 0 100
(feet)

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FIGURE 4-16
SURFACE SOIL EXCEEDENCES AT DISPOSAL PIT C

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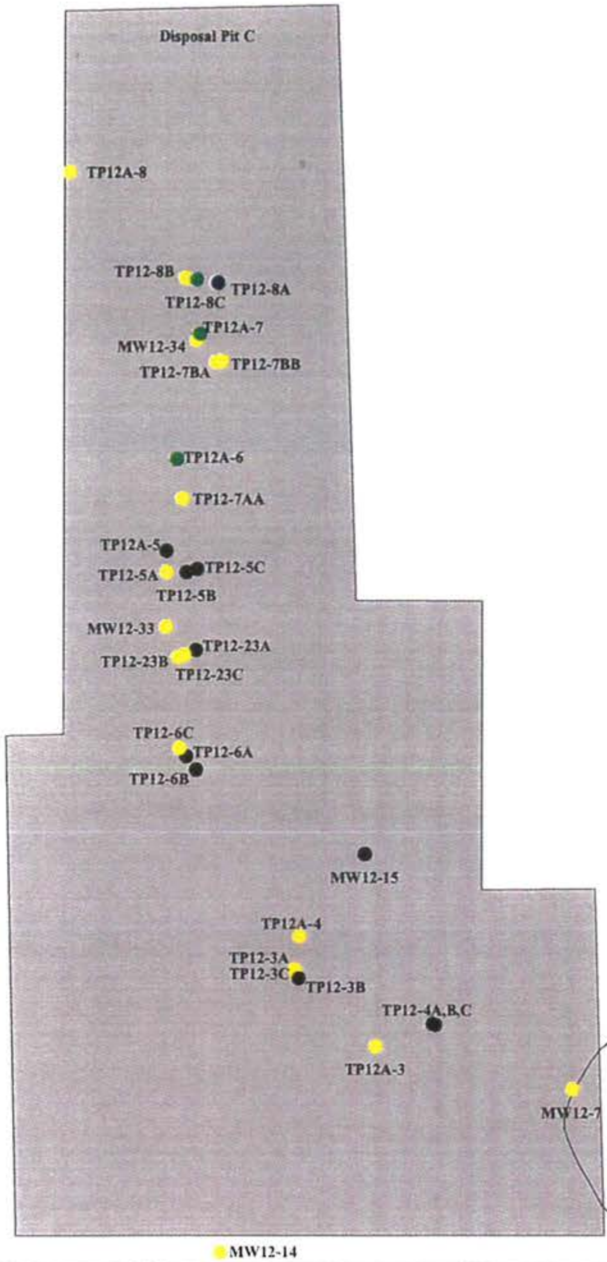
4.3.4.4 Subsurface Soil Results

Forty-two subsurface soil samples, **Figure 4-17,** were collected from test pits and monitoring well borings completed in this release area. **Table 4-H** located at the end of this section, presents the subsurface soil analytical data for all compounds detected in this release area. The results are summarized below.

Disposal Pit C Subsurface Soil Constituents	Times Detected	Exceedences	Maximum Detection	TAGM
VOCs – ug/kg				
Methylene chloride	5	1	180	100
SVOCs – ug/kg				
Benzo(a)pyrene	20	4	180	61
Dibenz(a,h)anthracene	8	4	99	14
Metals – mg/kg				
Arsenic	42	1	11.1	8.9
Cadmium	10	2	6	2.46
Calcium	42	3	224000	125300
Copper	42	3	74.5	33
Cyanide	1	1	2.2	0.35
Iron	42	1	51000	37410
Lead	42	8	431	24.4
Magnesium	42	2	36100	21700
Mercury	19	3	0.15	0.1
Potassium	42	2	3670	2623
Silver	6	1	1.8	0.8
Sodium	34	4	1420	188
Thallium	17	12	1.7	0.855
Zinc	42	7	6080	115

Sixty-five (65) analytes were detected in the Disposal Pit C area. As listed above, the analyte groups accounting for the 59 exceedences include one VOC, two SVOCs, and 14 metals. As shown, both SVOCs, and eight of the metals exceed their TAGM value by more than a factor of 2. Methylene chloride is a common laboratory contaminant and all but one of the detections of benzo(a)pyrene and dibenz(a,h)anthracene were hits reported below detection limits. The greatest frequency of TAGM exceedences occurred in sample TP12-23C. Copper, cyanide, iron, lead, mercury, sodium, and zinc were all detected above TAGMs in this sample. Steel posts and a pipe were found in this test pit and may account for some of the exceedences.

A full presentation of the analytical data collected for soil is provided in **Appendix G**.



Loc_id	Parameter	Depth Range (feet)	Value	Criteria Level	Units
TP12-3A	Methylene chloride*	0.8-0.8	180	100	UG/KG
TP12-3B	Arsenic Silver Sodium Zinc	5.5-5.5	11.1 1.8 881 208	8.9 0.8 188 115	MG/KG MG/KG MG/KG MG/KG
TP12-3A	Mercury	0.8-0.8	0.14	0.1	MG/KG
TP12-5A	Lead	0.5-0.5	36.2	24.4	MG/KG
MW12-14	Thallium	8-10	1.2	0.855	MG/KG
MW12-14	Thallium	10-12	0.92	0.855	MG/KG
TP12-7BA	Sodium Thallium Zinc	1-1	267 1.1 656	188 0.855 115	MG/KG MG/KG MG/KG
TP12-7AA	Lead Thallium Zinc	1-1	39.8 1.7 172	24.4 0.855 115	MG/KG MG/KG MG/KG
TP12-7BB	Copper Lead Thallium Zinc	2-2	33.9 34.6 1.1 411	33 24.4 0.855 115	MG/KG MG/KG MG/KG MG/KG
TP12-8A	Benzo(a)pyrene Dibenz(a,h)pyrene	1-1	100 26	61 14	UG/KG UG/KG
TP12-8C	Benzo(a)pyrene Dibenz(a,h)pyrene Calcium	2-2	67.0 19.0 224,000	61 14 125,300	UG/KG UG/KG MG/KG
TP12-8B	Calcium Sodium	3-3	139,000 205	125,300 188	MG/KG MG/KG
TP12-6C	Calcium	3.5-3.5	138,000	125,300	MG/KG
MW12-7	Thallium	4-6	1.2	0.855	MG/KG
MW12-7	Thallium	8-10	1.3	0.855	MG/KG
MW12-33	Thallium	6-8	0.98	0.855	MG/KG
MW12-33	Thallium	10-12	1.3	0.855	MG/KG
MW12-34	Thallium	10-12	1.3	0.855	MG/KG
TP12A-3	Lead	2.5-2.5	25.7	24.4	MG/KG
TP12A-4	Potassium Zinc	4-4	2880 281	2623 115	MG/KG MG/KG
TP12A-6	Benzo(a)pyrene Dibenz(a,h)pyrene	1-1	92 43	61 14	UG/KG UG/KG
TP12A-6	Lead	7-7	431	24.4	MG/KG
TP12A-7	Benzo(a)pyrene Dibenz(a,h)pyrene Copper Lead Potassium Mercury Thallium Zinc	4-4	180 99 38.4 49 3670 0.11 0.98 155	61 14 33 24.4 2623 0.1 0.855 115	UG/KG UG/KG MG/KG MG/KG MG/KG MG/KG MG/KG MG/KG
TP12A-8	Magnesium	7-7	36,100	21,700	MG/KG
TP12-23B	Magnesium Thallium	2-2	25,100 1.1	21,700 0.855	MG/KG MG/KG
TP12-23C	Copper Cyanide Iron Lead Mercury Sodium Zinc	3-3	74.5 2.2 51,000 90.9 0.15 1420 6080	33 2.0 37,410 24.4 0.1 188 115	MG/KG MG/KG MG/KG MG/KG MG/KG MG/KG MG/KG

Note: The highest value between a sample and a duplicate sample was taken

* Indicates a Pesticide/PCB parameter
** Indicates a Volitale Organic parameter.

LEGEND

MW12-15 Sub-surface Soil sample with Loc_ID analyzed for chemical parameters. No exceedences present

MW12-15 Sub-surface Soil sample with Loc_ID analyzed for chemical parameters. Metal exceedences present

MW12-15 Sub-surface Soil sample with Loc_ID analyzed for chemical parameters. Semi Volatile Organic exceedences present.

MW12-15 Sub-surface Soil sample with Loc_ID analyzed for chemical parameters. Metal and Semi Volatile Organic exceedences present

MW12-15 Background Sub-surfacerface Soil with Loc_ID analysed for chemical parameters.

Potential Release Area

100 0 100
(feet)

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FIGURE 4-17
SUBSURFACE SOIL EXCEEDENCES AT DISPOSAL PIT C

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4.3.4.5 Radionuclide Soil Results

A total of 98 surface and subsurface soil samples were analyzed for radionuclides in the Disposal Pit C area. The analytical data are presented in **Appendix G**. Summary statistics comparing the Disposal Pit C area radionuclide data in soils to background radionuclide data are presented in **Table 4-11**. This comparison includes number of samples, frequency of detection, minimum, maximum, average, median, and standard deviation. In addition, WRS test results comparing the site data set to the background data set are presented.

Six radionuclides in the Disposal Pit C area soils were found to be statistically above background. The parameters exceeding background are: Bismuth-214 (Bi-214), Lead-210 (Pb-210), Radium-223 (Ra-223), Radium-226 (Ra-226), Radium-228 (Ra-228), and Tritium. For the five radionuclides distinguishable from background in this area, $DCGL_W$s were added to the background data set as described in MARSSIM and in **Section 4.1.2.3** above. **Table 4-12** shows the results of the WRS test when compared to both residential and worker DCGLs. When compared to residential DCGLs, Bi-214, Pb-210, and Ra-226 exceed DCGLs. These radionuclides are all from the Ra-226 decay chain. When compared to worker DCGLs, no radionuclides exceed DCGLs.

Thirteen samples within the Disposal Pit C area were re-sampled in December 1999, to clarify a reported detection of Plutonium-239/240 at these locations. Locations are shown in **Figure 2-13**. The re-sampling event as well as the re-sampling results are discussed in **Section 4.3.10** below.

4.3.4.6 Surface Water, Sediment, and Groundwater Results

As shown on **Figures 4-5** through **4-9,** no surface water or sediment sampling locations are proximal to Disposal Pit C. Figure 4-10 illustrates that groundwater samples from monitoring well locations in the Disposal Pit C area, have exceedences for iron only. SEAD-12 surface water, sediment, and groundwater results are discussed in detail in **Sections 4.4, 4.5, and 4.6.** .

4.3.5 Former Dry Waste Disposal Pit Area

Investigations in the area around the Former Dry Waste Disposal Pit Area included radiological scanning surveys (Class II), **Figure 4-1**, test pits, **Figure 4-2**, surface soil and subsurface soil sampling.

Table 4-11
Comparison of Summary Statistics in Background Soil to Disposal Pit C Soil for Radionuclides
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Parameter	Units	No. of Samples		No. of Detections		Frequency of Detections		Minimum		Maximum		Average		Median		Std Dev		Above Background using WRS?	Above Background + Residential DCGL using WRS?	Above Background+ Worker DCGL using WRS?
		BKGD	Disposal Pit C	BKGD	Disposal Pit C	BKGD	Disposal Pit C	BKGD	Disposal Pit C	BKGD	Disposal Pit C	BKGD	Disposal Pit C	BKGD	Disposal Pit C	BKGD	Disposal Pit C			
Gross Alpha	pCi/g	0	9	NA	9	NA	100%	NA	5.00	NA	21.00	NA	11.89	NA	10.00	NA	5.56	NA	NA	NA
Gross Beta	pCi/g	0	9	NA	9	NA	100%	NA	17.00	NA	30.00	NA	24.44	NA	23.00	NA	4.70	NA	NA	NA
Actinium-228	pCi/g	0	9	NA	9	NA	100%	NA	0.66	NA	1.20	NA	0.86	NA	0.84	NA	0.17	NA	NA	NA
Bismuth -214	pCi/g	35	98	27	98	77%	100%	0.60	0.61	2.60	5.80	1.35	1.68	1.40	1.70	0.47	0.71	YES	YES	NO
Cesium-137	pCi/g	35	89	12	55	34%	62%	0.05	0.05	0.70	1.30	0.32	0.35	0.30	0.30	0.22	0.32	NO	NO	NO
Cobalt-57	pCi/g	35	89	5	20	14%	22%	0.05	0.05	0.10	0.38	0.06	0.07	0.05	0.05	0.02	0.05	NO	NO	NO
Cobalt-60	pCi/g	35	89	6	32	17%	36%	0.05	0.05	0.40	0.70	0.13	0.15	0.10	0.05	0.08	0.16	NO	NO	NO
Lead-210	pCi/g	35	89	5	58	14%	65%	0.60	0.60	21.10	68.90	5.62	11.12	3.43	5.20	5.35	13.66	YES	YES	NO
Lead-211	pCi/g	35	89	4	25	11%	28%	0.40	0.15	10.75	20.30	3.20	3.36	2.15	1.20	3.13	4.57	NO	NO	NO
Lead-214	pCi/g	35	98	33	98	94%	100%	0.60	0.65	2.50	3.40	1.48	1.53	1.45	1.50	0.44	0.47	NO	NO	NO
Plutonium-239/240	pCi/g	35	89	8	13	23%	15%	0.05	0.05	0.25	0.20	0.13	0.08	0.11	0.10	0.05	0.04	NO	NO	NO
Promethium-147	pCi/g	29	3	10	0	34%	0%	2.10	4.20	17.80	4.20	6.43	4.20	4.15	4.20	4.70	0.00	NO	NO	NO
Radium-223	pCi/g	35	89	1	10	3%	11%	0.10	0.10	0.70	1.70	0.22	0.32	0.20	0.25	0.10	0.31	YES	NO	NO
Radium-226	pCi/g	35	89	27	85	77%	96%	0.60	0.05	2.60	5.80	1.36	1.71	1.40	1.70	0.47	0.76	YES	YES	NO
Radium-228	pCi/g	35	89	34	86	97%	97%	1.00	0.05	3.50	5.00	1.73	1.89	1.65	1.90	0.51	0.65	YES	NO	NO
Thallium-208	pCi/g	0	9	NA	9	NA	100%	NA	0.24	NA	1.60	NA	0.63	NA	0.49	NA	0.41	NA	NA	NA
Thorium-227	pCi/g	29	0	8	NA	28%	NA	0.10	NA	0.55	NA	0.23	NA	0.25	NA	0.11	NA	NA	NA	NA
Thorium-230	pCi/g	35	89	9	45	26%	51%	0.20	0.05	2.70	4.80	0.54	0.55	0.32	0.20	0.53	0.65	NO	NO	NO
Thorium-232	pCi/g	35	89	34	88	97%	99%	0.25	0.05	2.00	4.10	0.98	0.91	0.90	0.90	0.36	0.42	NO	NO	NO
Thorium-234	pCi/g	0	9	NA	9	NA	100%	NA	0.24	NA	1.10	NA	0.56	NA	0.52	NA	0.27	NA	NA	NA
Tritium	pCi/g	35	89	6	44	17%	49%	0.05	0.05	30.23	130.00	1.68	7.15	0.05	0.10	5.81	23.65	YES	NO	NO
Uranium-233/234	pCi/g	35	89	17	70	49%	79%	0.05	0.05	1.90	1.20	0.46	0.61	0.10	0.70	0.46	0.32	NO	NO	NO
Uranium-235	pCi/g	35	89	19	29	54%	33%	0.05	0.05	0.40	0.40	0.11	0.08	0.10	0.05	0.08	0.05	NO	NO	NO
Uranium-238	pCi/g	35	89	27	85	77%	96%	0.05	0.05	1.40	1.30	0.67	0.73	0.75	0.70	0.40	0.23	NO	NO	NO

For the minimum, maximum, average, median, and standard deviation the duplicates and samples were averaged together, the 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 4-12
Wilcoxon Rank Sum Calculation for
COmparison of Disposal Pit C to Background
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Parameter	Site Compared to Background +DCGL Value					Site Compared to Background + Residential DCGL Value (1)					Site Compared to Background + Worker DCGL Value (2)				
	Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?	Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?	Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?
	BKGD	Disposal Pit C				BKGD	Disposal Pit C				BKGD	Disposal Pit C			
Bismuth -214	49.16	70.67	-2.884	1.645	YES	51.18	69.95	-2.515	1.645	YES	70.06	63.19	-0.920	1.645	NO
Cesium-137	62.24	59.81	-0.349	1.645	NO										
Cobalt-57	60.72	60.41	-0.058	1.645	NO										
Cobalt-60	67.43	57.76	-1.491	1.645	NO										
Lead-210	49.82	64.72	-2.114	1.645	YES	51.50	64.06	-1.782	1.645	YES	68.68	57.27	-1.619	1.645	NO
Lead-211	65.21	58.64	-0.932	1.645	NO										
Lead-214	61.94	66.09	-0.558	1.645	NO										
Plutonium-239/240	87.26	49.92	-5.689	1.645	NO										
Promethium-147	15.25	23.00	-1.440	1.645	NO										
Radium-223	46.91	65.87	-2.806	1.645	YES	93.41	47.49	-6.625	1.645	NO					
Radium-226	73.66	67.16	-3.342	1.645	YES	45.53	66.42	-2.968	1.645	YES	62.50	59.71	-0.397	1.645	NO
Radium-228	50.26	64.55	-2.033	1.645	YES	62.35	59.77	-0.367	1.645	NO					
Thorium-230	67.13	57.88	-1.320	1.645	NO										
Thorium-232	66.50	58.13	-1.199	1.645	NO										
Tritium	79.53	65.92	-3.032	1.645	YES	93.91	47.29	-6.809	1.645	NO					
Uranium-233/234	52.82	63.53	-1.536	1.645	NO										
Uranium-235	70.51	56.54	-2.239	1.645	NO										
Uranium-238	61.69	60.03	-0.238	1.645	NO										

Zrs= Statistic for generated from Wilcoxon Rank Sum test
Z(1-alpha)= Maximum allowed probability that WRS test incorrectly indicates that the site and background datasets are distinguishable (alpha= 0.05)
Null Hypothesis: The populations from which the two data sets have been drawn have the same mean.
WRS initially is preformed comparing site to background; it null hypothesis is accepted then no further comparisons needed. If null hypothesis is rejected then site is compared to background + residential scenerio;
if null hypothesis is accepted then no further comparisons needed. If null hypothesis is rejected then the site is compared to background + worker scenerio.
(1) The most conservative DCGL value for the radionuclide in the residential scenerio was added to background.
(2) The most conservative DCGL value for the radionuclide in the worker scenerio was added to background.

NA= Not analyzed due to parameters only being requested during the Expanded Site Investigation and not the Remedial Investigation. Hence, there were no data for specific radionuclides collected for the background set to compare against the ESI data.

Both groups need to be populated to perform Wilcoxon Rank Sum test. Radionuclides with unpopulated groups not found in table.

4.3.5.1 Gamma Radiation Scanning Results

Classified as a Class II radiological survey area, a low energy gamma radiation survey (50% coverage) was performed over the Former Dry Waste Disposal Pit Area (**Figure 4-1**). Results of the scanning survey in the Former Dry Waste Disposal Pit area are shown below.

Location	Ave. Compared to Background	Max Compared to Background	Detects > Flag Value (2xBgd)
Former Dry Waste Disposal Pit	-3.8%	+31%	0

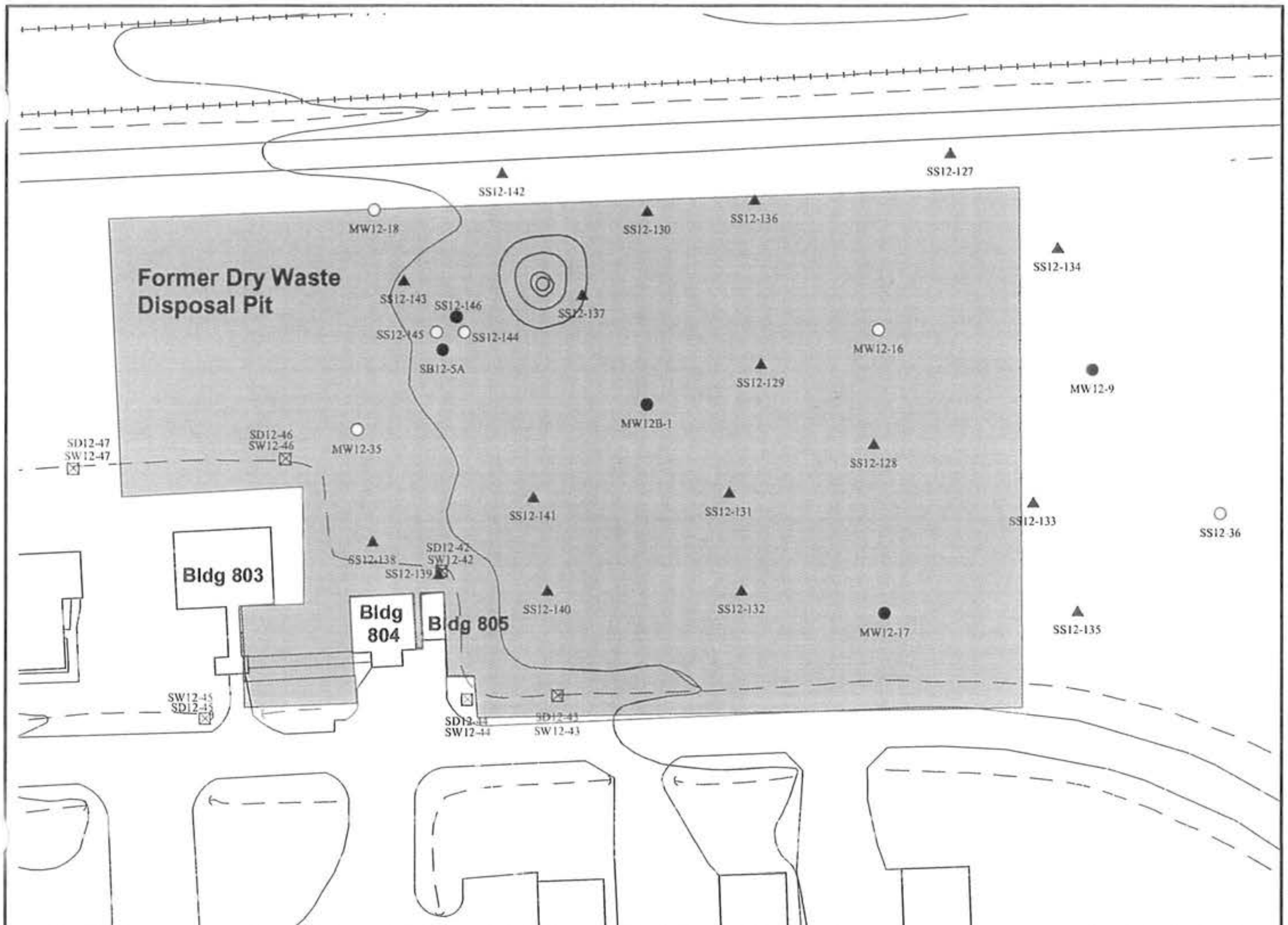
Refer to **Appendix F** for scanning data collected from the Former Dry Waste Disposal Pit Area.

4.3.5.2 Test Pit Results

Two test pits (TP12-25 and TP12-26) were excavated during the RI to further investigate areas of stressed vegetation in the vicinity of the Former Dry Waste Disposal Pit, previously investigated during the ESI (TP12B-1, TP12B-2, & TP12B-3). Both RI test pits were over 90 feet in length, parallel, and trending west to east (**Figure 2-9**). Very little debris was found within the pits as shown in **Figure 4-2** and listed in **Table 4-2**. Test pit logs are provided in **Appendix B.** No visual or olfactory evidence of chemical impacts were observed in TP12-25 or TP12-26. All soil removed from both test pits was scanned for radionuclides and organic compounds with field instruments, as described in **Section 2**. There were no elevated areas of radioactivity or organic vapors detected from these instruments in the soil removed from TP12-25 or TP12-26. Soil sampling results are discussed below.

4.3.5.3 Surface Soil Results

Eleven surface soil samples, **Figure 4-18**, were collected (includes duplicates and surface samples from soil borings and monitoring wells) in the Former Dry Waste Disposal Pit for chemical (non-radiological) characterization. . **Table 4-I** located at the end of this section, presents the surface soil analytical data for all compounds detected in this release area. The results are summarized below.



Loc_id	Parameter	Value	Criteria Level	Units
MW12-16	Thallium	1.3	0.855	MG/KG
MW12-18	Sodium	267	188	MG/KG
MW12-35	Thallium	2.0	0.855	MG/KG
SS12-144	Magnesium	23,800	21,700	MG/KG
SS12-145	Sodium	250	188	MG/KG

Note: The highest value between a sample and a duplicate sample was taken

LEGEND

- SS12-153 — Surface Soil sample with Loc_ID analyzed for chemical and radiological parameters. No exceedences present
- SS12-153 — Surface Soil sample with Loc_ID analyzed for chemical and radiological parameters. Metal exceedences present
- SS12-153 — Surface Soil sample with Loc_ID analyzed for chemical and radiological parameters. Semi Volatile Organic exceedences present
- SS12-153 — Surface Soil sample with Loc_ID analyzed for chemical and radiological parameters. Metal and Semi Volatile Organic exceedences present
- SS12-153 — Surface Soil sample with Loc_ID analyzed radiological parameters only.
- SD12-153 — Sediment sample with Loc_ID
- SW12-153 — Surface Water sample with Loc_ID
- Potential Release Area

100 0 100 (feet)

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FIGURE 4-18
SURFACE SOIL EXCEEDENCES AT FORMER DRY WASTE DISPOSAL PIT

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Dry Waste Disposal Surface Soil Constituents	Times Detected	Exceedences	Maximum Detection	TAGM
Metals – mg/kg				
Magnesium	11	1	23800	21700
Sodium	7	3	276	188
Thallium	4	3	2.0	0.855

Forty-nine (549) analytes were detected in the Former Dry Waste Disposal area. Exceedences were limited to the three metals listed above, with seven total exceedences. Thallium was the only metals to exceed their TAGM value by more than a factor of 2.

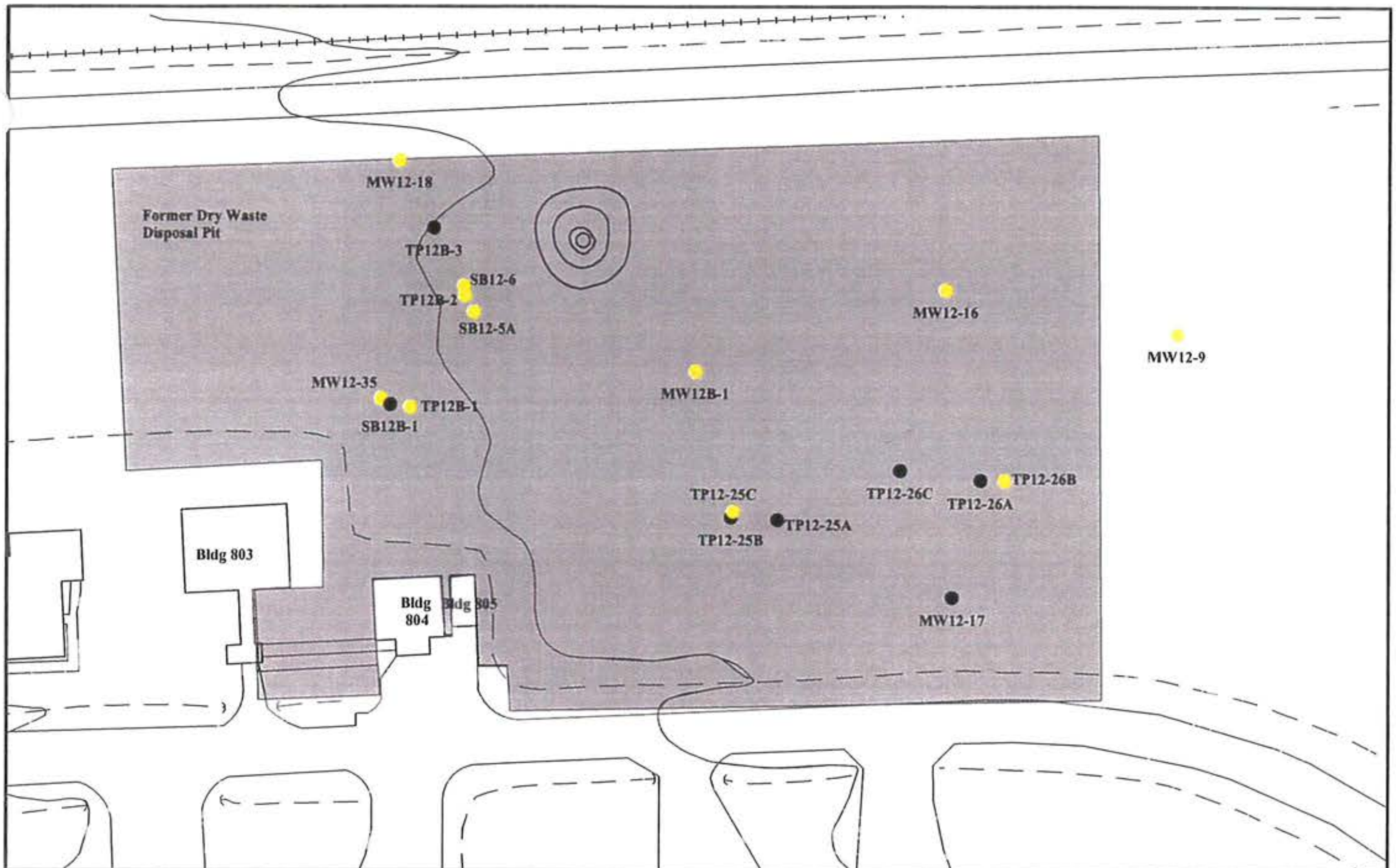
A full presentation of the analytical data collected for soil is provided in **Appendix G**.

4.3.5.4 Subsurface Soil Results

Thirty-eight subsurface soil samples, **Figure 4-19**, were collected from test pits, soil borings, and monitoring well borings completed in this potential release area (tank sampling described below). **Table 4-J** presents the subsurface soil analytical data for all compounds detected in this area. The results are summarized below.

Dry Waste Disposal Subsurface Soil Constituents	Times Detected	Exceedences	Maximum Detection	TAGM
Metals – mg/kg				
Calcium	38	1	132000	125300
Copper	38	4	41.1	33
Iron	38	1	41100	37410
Magnesium	38	2	34200	21700
Mercury	13	4	0.5	0.1
Nickel	35	1	50.9	50
Selenium	7	2	2.5	2
Sodium	27	2	252	188
Thallium	13	7	2.2	0.855
Zinc	38	1	142	115

Fifty (50) analytes were detected in the Former Dry Waste Disposal area. As listed above, these analytes were limited to nine metals accounting for 21 TAGM exceedences. Mercury and Thallium exceed the TAGM value by more than a factor of 2



Loc_id	Parameter	Depth Range (feet)	Value	Criteria Level	Units
SB12-5A	Zinc	6-8	142	115	MG/KG
SB12-5A	Copper	9-12	34.5	33	MG/KG
SB12-6	Mercury	6-9	1.3	0.1	MG/KG
SB12-6	Copper	9-12	39.2	33	MG/KG
SB12-6	Selenium Thallium	12-14.3	2.5 1.6	2.0 0.855	MG/KG MG/KG
MW12-9	Nickel	10-12	50.9	50	MG/KG
MW12-18	Thallium	10-12	2.2	0.855	MG/KG
MW12-16	Thallium	4-6	1.1	0.855	MG/KG
MW12B-1	Mercury	4-6	0.5	0.1	MG/KG
MW12-35	Thallium	14-15.5	1.6	0.855	MG/KG
TP12-25C	Copper	2-2	33.9	33	MG/KG
TP12-26B	Calcium Magnesium	1.3-1.3	132,000 34,200	125,300 21,700	MG/KG MG/KG
TP12B-1	Magnesium Sodium	4-4	122,800 252	21,700 188	MG/KG MG/KG
TP12B-2	Sodium	2.5-2.5	233	188	MG/KG

Note: The highest value between a sample and a duplicate sample was taken

LEGEND

MW12-15 Sub-surface Soil sample with Loc_ID analyzed for chemical parameters. No exceedences present

MW12-15 Sub-surface Soil sample with Loc_ID analyzed for chemical parameters. Metal exceedences present

MW12-15 Sub-surface Soil sample with Loc_ID analyzed for chemical parameters. Semi Volatile Organic exceedences present.

MW12-15 Sub-surface Soil sample with Loc_ID analyzed for chemical parameters. Metal and Semi Volatile Organic exceedences present

MW12-15 Background Sub-surfacerface Soil with Loc_ID analysed for chemical parameters.

Potential Release Area

100 0 100
(feet)

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FIGURE 4-19
SUBSURFACE SOIL EXCEEDENCES AT THE FORMER DRY WASTE DISPOSAL PIT

SCALE 1:100	DATE NOV 2000	REV	Sheet 1 of 1

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A full presentation of the analytical data collected for soil is provided in **Appendix G**.

4.3.5.5 Tank Sampling Results

One sample (SB12-10) was collected from the underground storage tank located outside Buildings 803 and 804 in the Former Dry Waste Disposal Pit area (**Figure 2-8**). As described in **Section 1**, this tank was used for drainage from Building 804 in the event of an emergency to contain any fissile material in case of an accidental release during maintenance of the nuclear capsules. No such releases were ever reported. Approximately 1.4 feet of silt was encountered in the bottom of this tank and was sampled. Sampling results are shown in **Table 4-13**. Several SVOCs and metals were detected. Copper, iron, mercury, and thallium were detected above TAGMs. Elevated levels of iron are most like due to the tank material. No radionuclides detected in the tank silt were above the maximum value of their respective radionuclide activities detected in background soil samples.

4.3.5.6 Radionuclide Soil Results

A total of 57 surface and subsurface soil samples (**Figure 4-18)** were analyzed for radionuclides. The analytical data are presented in **Appendix G**. Summary statistics comparing the Dry Waste Disposal Pit area radionuclide data in soils to background radionuclide data are presented in This comparison includes number of samples, frequency of detection, minimum, maximum, average, median, and standard deviation. In addition, WRS test results comparing the site data set to the background data set are presented.

Four radionuclides in the Dry Waste Disposal Pit Area soils were found to be statistically above background. The parameters exceeding background are: Bismuth-214, Radium- 223, Radium-226, and Tritium.

For the four radionuclides distinguishable from background in this area, $DCGL_W$s were added to the background data set as described in MARSSIM and in **Section 4.1.2.3** above. **Table 4-15** shows the results of the WRS test when compared to both residential and worker DCGLs. When compared to residential DCGLs, only Ra-226 exceeds DCGLs. When compared to worker DCGLs, no radionuclides exceed DCGLs.

Eighteen samples within the Dry Waste Disposal Pit area were re-sampled in December 1999, to clarify a reported detection of Plutonium-239/240 at these locations. Locations are shown in **Figure 2-13**. The re-sampling event as well as the re-sampling results are discussed in **Section 4.3.10** below.

Table 4-13
Sampling Results from Content of Tank Located in Dry Waste Disposal Pit Area
SEAD-12 Remedial Investigation
Seneca Army Depot Activity

FACILITY			SEAD-12
LOCATION			SB12-10
MATRIX			SOIL
SAMPLE ID			123179
TOP OF SAMPLE DEPTH			2.5
BOTTOM OF SAMPLE DEPTH			3.9
SAMPLE DATE			27-Oct-98
QC CODE			SA
PARAMETER	UNIT	NYSDEC TAGM 4046	
VOLATILE ORGANICS			
Acetone	UG/KG	200	26
SEMI VOLATILE ORGANICS			
4-Methylphenol	UG/KG	900	4.7 J
Benzo(a)anthracene	UG/KG	224	11 J
Benzo(a)pyrene	UG/KG	61	12 J
Benzo(b)fluoranthene	UG/KG	1100	13 J
Benzo(ghi)perylene	UG/KG	50000	9.6 J
Benzo(k)fluoranthene	UG/KG	1100	10 J
Chrysene	UG/KG	400	15 J
Di-n-octylphthalate	UG/KG	50000	15 J
Dibenz(a,h)anthracene	UG/KG	14	4.8 J
Fluoranthene	UG/KG	50000	18 J
Indeno(1,2,3-cd)pyrene	UG/KG	3200	7.3 J
Phenanthrene	UG/KG	50000	13 J
Pyrene	UG/KG	50000	20 J
METALS(1)			
Aluminum	MG/KG	19520	8590
Arsenic	MG/KG	8.9	5.8
Barium	MG/KG	300	90.4
Beryllium	MG/KG	1.13	0.46 J
Calcium	MG/KG	125300	73600
Chromium	MG/KG	30	18.9 J
Cobalt	MG/KG	30	9.9 J
Copper	MG/KG	33	41.1
Iron	MG/KG	37410	41100
Lead	MG/KG	24.4	5.1 J
Magnesium	MG/KG	21700	19400
Manganese	MG/KG	1100	596
Mercury	MG/KG	0.1	0.29
Potassium	MG/KG	2623	1300
Selenium	MG/KG	2	0.66 J
Sodium	MG/KG	188	112 J
Thallium	MG/KG	0.855	2.2 J
Vanadium	MG/KG	150	18.3
Zinc	MG/KG	115	80 J

FACILITY			SEAD-12		
LOCATION ID			SB12-10		
MATRIX			SOIL		
SAMPLE ID			123179		
DEPTH TO TOP OF SAMPLE			2.5		
DEPTH TO BOTTOM OF SAMPLE			3.9		
SAMPLE DATE			27-Oct-98		
QC CODE			SA		
STUDY ID			RI Phase 1 Step 1		
PARAMETER	UNIT	BACKGROUND MAXIMUM	Value	Qualifier	Error
Bismuth-214	pCi/g	2.6	2		+/-0.4
Cesium-137	pCi/g	0.7	0.2		+/-0.1
Cobalt-57	pCi/g	0.1	0.1		+/-0.1
Cobalt-60	pCi/g	0.4	0.1	U	
Lead-210	pCi/g	21.1	2.1	J	+/-1
Lead-211	pCi/g	10.75	0.8	U	
Lead-214	pCi/g	2.5	1.3		+/-0.3
Moisture (@ 104 deg. C)	%		20.2		
Plutonium-239/240	pCi/g	0.25	0.1	U	+/-0.1
Promethium-147	pCi/g	17.8	7.7	UJ	+/-4.5
Radium-223	pCi/g	0.7	0.4		+/-0.3
Radium-226	pCi/g	2.6	2		+/-0.4
Radium-228	pCi/g	3.5	1.6	J	+/-0.4
Thorium-230	pCi/g	2.7	1	J	+/-0.5
Thorium-232	pCi/g	0.98	0.5		+/-0.3
Tritium	pCi/g	30.23	0.1	UJ	+/-0.1
Uranium-233/234	pCi/g	1.9	0.7		+/-0.3
Uranium-235	pCi/g	0.4	0.1	U	+/-0.1
Uranium-238	pCi/g	1.4	0.7		+/-0.3

Table 4-14
Comparison of Summary Statistics in
Background Soil to Former Dry Waste Disposal Pit Soil for Radionuclides
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Parameter	Units	No. of Samples		No. of Hits		Frequency		Minimum		Maximum		Average		Median		Std Dev		Above Background using WRS?	Above Background + Residential DCGL using WRS?	Above Background+ Worker DCGL using WRS?
		BKGD	Former Dry Waste Disposal Pit	BKGD	Former Dry Waste Disposal Pit	BKGD	Former Dry Waste Disposal Pit	BKGD	Former Dry Waste Disposal Pit	BKGD	Former Dry Waste Disposal Pit	BKGD	Former Dry Waste Disposal Pit	BKGD	Former Dry Waste Disposal Pit	BKGD	Former Dry Waste Disposal Pit			
Gross Alpha	pCi/g	0	8	NA	8	NA	100%	NA	4.50	NA	12.00	NA	7.67	NA	7.50	NA	2.48	NA	NA	NA
Gross Beta	pCi/g	0	8	NA	8	NA	100%	NA	17.00	NA	28.00	NA	23.50	NA	25.00	NA	4.14	NA	NA	NA
Actinium-228	pCi/g	0	8	NA	8	NA	100%	NA	0.54	NA	0.74	NA	0.67	NA	0.69	NA	0.08	NA	NA	NA
Bismuth -214	pCi/g	35	65	27	61	77%	94%	0.60	0.50	2.60	3.50	1.35	1.54	1.40	1.50	0.47	0.57	YES	NO	NO
Cesium-137	pCi/g	35	57	12	40	34%	70%	0.05	0.05	0.70	1.10	0.32	0.35	0.30	0.30	0.22	0.26	NO	NO	NO
Cobalt-57	pCi/g	35	57	5	14	14%	25%	0.05	0.05	0.10	0.20	0.06	0.07	0.05	0.05	0.02	0.04	NO	NO	NO
Cobalt-60	pCi/g	35	57	6	22	17%	39%	0.05	0.05	0.40	0.60	0.13	0.14	0.10	0.05	0.08	0.13	NO	NO	NO
Lead-210	pCi/g	35	57	5	36	14%	63%	0.60	0.70	21.10	70.80	5.62	8.50	3.43	4.40	5.35	12.26	NO	NO	NO
Lead-211	pCi/g	35	57	4	21	11%	37%	0.40	0.25	10.75	19.40	3.20	3.86	2.15	1.45	3.13	4.29	NO	NO	NO
Lead-214	pCi/g	35	65	33	60	94%	92%	0.60	0.05	2.50	2.80	1.48	1.33	1.45	1.40	0.44	0.57	NO	NO	NO
Plutonium-239/240	pCi/g	35	57	8	10	23%	18%	0.05	0.05	0.25	1.00	0.13	0.10	0.11	0.05	0.05	0.13	NO	NO	NO
Promethium-147	pCi/g	29	13	10	9	34%	69%	2.10	1.40	17.80	95.70	6.43	10.49	4.15	4.20	4.70	24.57	NO	NO	NO
Radium-223	pCi/g	35	57	1	10	3%	18%	0.10	0.15	0.70	1.00	0.22	0.29	0.20	0.20	0.10	0.20	YES	NO	NO
Radium-226	pCi/g	35	57	27	53	77%	93%	0.60	0.50	2.60	3.50	1.36	1.63	1.40	1.60	0.47	0.53	YES	YES	NO
Radium-228	pCi/g	35	57	34	55	97%	96%	1.00	0.80	3.50	3.30	1.73	1.70	1.65	1.70	0.51	0.51	NO	NO	NO
Thallium-208	pCi/g	0	8	NA	8	NA	100%	NA	0.26	NA	0.44	NA	0.35	NA	0.34	NA	0.06	NA	NA	NA
Thorium-227	pCi/g	29	9	8	0	28%	0%	0.10	0.10	0.55	0.15	0.23	0.13	0.25	0.15	0.11	0.03	NO	NO	NO
Thorium-230	pCi/g	35	57	9	27	26%	47%	0.20	0.05	2.70	2.05	0.54	0.59	0.32	0.25	0.53	0.56	NO	NO	NO
Thorium-232	pCi/g	35	57	34	56	97%	98%	0.25	0.10	2.00	1.60	0.98	0.85	0.90	0.85	0.36	0.28	NO	NO	NO
Thorium-234	pCi/g	0	8	NA	8	NA	100%	NA	0.21	NA	0.39	NA	0.32	NA	0.34	NA	0.07	NA	NA	NA
Tritium	pCi/g	35	57	6	25	17%	44%	0.05	0.05	30.23	148.50	1.68	9.13	0.05	0.05	5.81	33.92	YES	NO	NO
Uranium-233/234	pCi/g	35	57	17	34	49%	60%	0.05	0.05	1.90	1.20	0.46	0.45	0.10	0.50	0.46	0.35	NO	NO	NO
Uranium-235	pCi/g	35	57	19	23	54%	40%	0.05	0.05	0.40	0.30	0.11	0.08	0.10	0.05	0.08	0.05	NO	NO	NO
Uranium-238	pCi/g	35	57	27	55	77%	96%	0.05	0.05	1.40	1.10	0.67	0.69	0.75	0.70	0.40	0.20	NO	NO	NO

For the minimum, maximum, average, median, and standard deviation the duplicates and samples were averaged together, the 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 4-15
Wilcoxon Rank Sum Calculation for
Comparison of the Dry Waste Disposal Pit to Background
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Parameter	Site Compared to Background +DCGL Value					Site Compared to Background + Residential DCGL Value (1)					Site Compared to Background + Worker DCGL Value (2)				
	Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?	Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?	Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?
	BKGD	Former Dry Waste Disposal Pit				BKGD	Former Dry Waste Disposal Pit				BKGD	Former Dry Waste Disposal Pit			
Bismuth -214	41.50	51.62	-1.720	1.645	YES	42.97	50.80	-1.329	1.645	NO					
Cesium-137	44.10	45.55	-0.259	1.645	NO										
Cobalt-57	44.51	45.30	-0.180	1.645	NO										
Cobalt-60	48.69	42.72	-1.120	1.645	NO										
Lead-210	41.37	47.25	-1.043	1.645	NO										
Lead-211	45.60	44.63	-0.173	1.645	NO										
Lead-214	51.25	46.19	-0.860	1.645	NO										
Plutonium-239/240	61.09	35.05	-4.843	1.645	NO										
Promethium-147	21.25	22.00	-0.189	1.645	NO										
Radium-223	38.19	49.21	-2.051	1.645	YES	63.44	33.60	-5.365	1.645	NO					
Radium-226	36.24	50.24	-2.523	1.645	YES	37.65	49.55	-2.113	1.645	YES	48.53	42.82	-1.014	1.645	NO
Radium-228	45.54	44.66	-0.157	1.645	NO										
Thorium-227	21.89	10.00	-2.92	1.645	NO										
Thorium-230	48.28	42.97	-0.944	1.645	NO										
Thorium-232	50.69	41.48	-1.649	1.645	NO										
Tritium	37.26	49.78	-2.566	1.645	YES	66.76	31.55	-6.459	1.645	NO					
Uranium-233/234	47.09	43.71	-0.608	1.645	NO										
Uranium-235	50.22	41.77	-1.651	1.645	NO										
Uranium-238	47.53	43.44	-0.735	1.645	NO										

Zrs= Statistic for generated from Wilcoxon Rank Sum test

Z(1-alpha)= Maximum allowed probability that WRS test incorrectly indicates that the site and background datasets are distinguishable (alpha= 0.05)

Null Hypothesis: The populations from which the two data sets have been drawn have the same mean.

WRS initially is preformed comparing site to background; it null hypothesis is accepted then no further comparisons needed. If null hypothesis is rejected then site is compared to background + residential scenerio;
if null hypothesis is accepted then no further comparisons needed. If null hypothesis is rejected then the site is compared to background + worker scenerio.

(1) The most conservative DCGL value for the radionuclide in the residential scenerio was added to background.

(2) The most conservative DCGL value for the radionuclide in the worker scenerio was added to background.

NA= Not analyzed due to parameters only being requested during the Expanded Site Investigation and not the Remedial Investigation. Hence, there were no data for specific radionuclides collected for the background set to compare against the ESI data.

Both groups need to be populated to perform Wilcoxon Rank Sum test. Radionuclides with unpopulated groups not found in table.

4.3.5.7 Surface Water, Sediment, and Groundwater Results

Of six proximal surface water and sediment locations (**Figure 4-18**), two surface water locations (SW12-44 and SW12-45) exceed criteria for SVOC or pesticide/PCB, **Figure 4-5**, **Table 4-S**, while three (SW12-43, SW12-46 and SW12-47) exceed metals criteria **Figure 4-6**. All six sediment locations exceed PAH criteria for four to six analytes (**Figure 4-7, Table 4-V**). Two sediment locations exceed criteria for pesticides/PCBs (**Figure 4-8**, **Table 4-V**), while five locations (**Figure 4-9**, **Table 4-V**) exceed metals criteria. Groundwater exceedences (**Figure 4-10, Table 4-X**)are limited Mn, Na, and Fe, with at least one exceedences from each of the seven wells. SEAD-12 surface water, sediment, and groundwater results are discussed in detail in **Sections 4.4, 4.5, and 4.6**.

4.3.6 EM-5

Investigations in the area around EM-5 included: radiological scanning surveys (Class II) (**Figure 4-1**), test pits (**Figure 4-2**), surface and subsurface soil sampling.

4.3.6.1 Gamma Radiation Screening Results

Classified as a Class II radiological survey area, a low energy gamma radiation survey (50% coverage) was performed over the EM-5 area. Scanning results are shown in **Figure 4-2**. Results of scanning survey in EM-5 are summarized below.

Location	Ave. Compared to Background	Max Compared to Background	Detects > Flag Value (2xBgd)
EM-5	-0.5%	+13.1%	0

No gamma scanning readings were above the flag value of twice background. Refer to **Appendix F** for scanning data collected from EM-5.

4.3.6.2 Test Pitting Results

Test pits TP12-15 and TP12-16, **Figure 4-2**, were excavated to investigate the EM-5 subsurface electromagnetic anomaly. Debris found in TP12-15 (**Table 4-2**), consisted of metal roofing, nails, wire, re-bar reinforced concrete, and other construction debris. There is no evidence that this debris is military-related. Debris found in TP12-16 was interpreted to be non-military related (horse shoes, square nails, broken glass, non-re-bar reinforced concrete, and other metal debris). Test pit logs are provided in **Appendix B**. No visual or olfactory evidence of chemical impacts were observed in TP12-15 or TP12-16. All soil and debris removed from both test pits were scanned with field instruments, with no elevated areas of VOCs or radioactivity detected. Samples (6) collected from test pits are included with the subsurface soil results. Two monitoring wells (MW12-22 and MW12-23) were installed downgradient from TP12-15 to investigate any potential groundwater impacts.

4.3.6.3 Surface Soil Results

Five chemical characterization surface soil samples (**Figure 4-20**) were collected (including surface samples from monitoring wells) in the EM-5 potential release area. Chemical surface soil analytical data is presented in **Table 4-K**, listing all compounds detected in this release area. Radiological results are summarized in **Section 4.3.6.5**. Chemical results are summarized below.

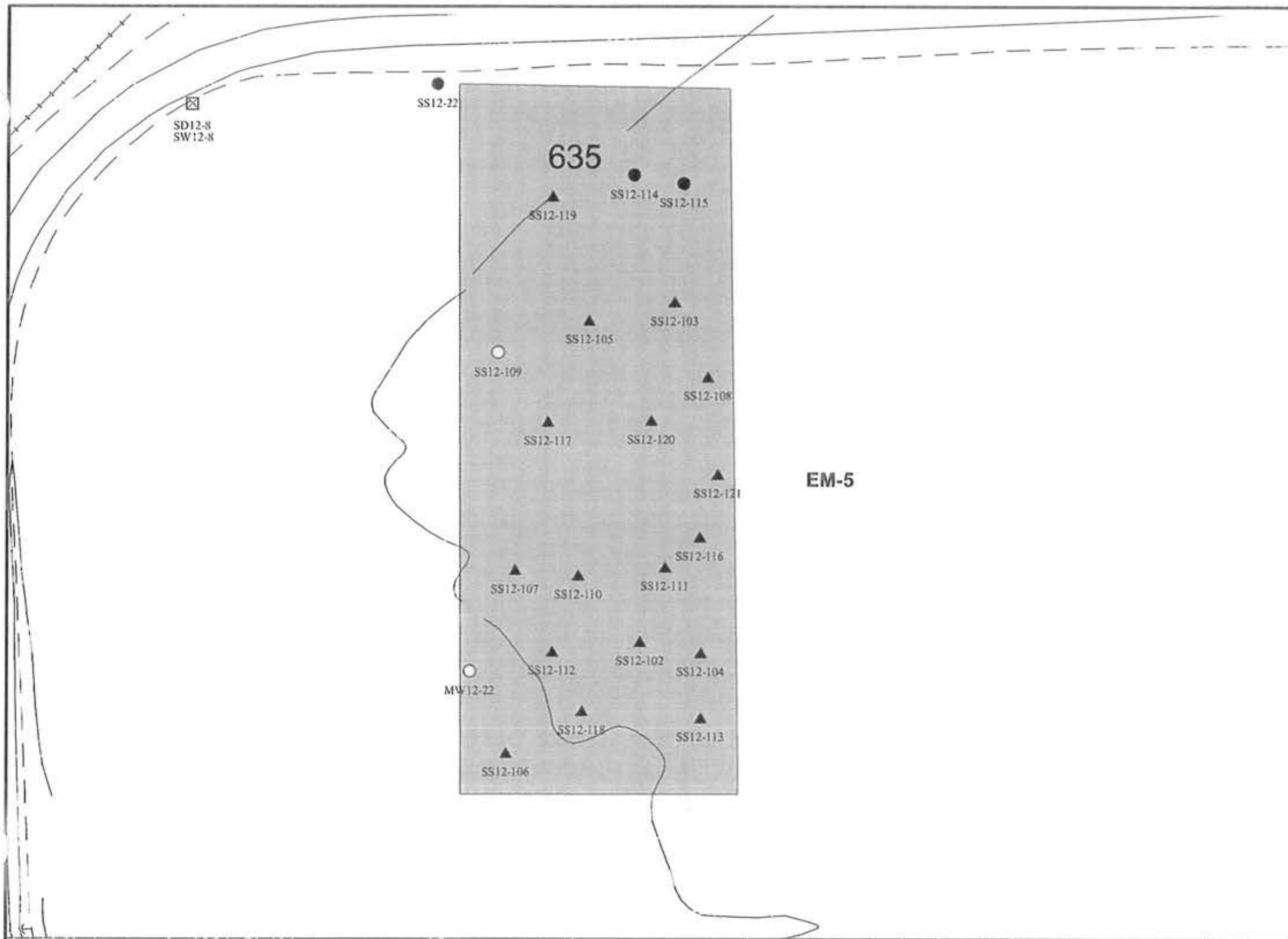
EM-5 Surface Soil Constituents	Times Detected	Exceedences	Maximum Detection	TAGM
Metals – mg/kg				
Copper	5	1	37.3	33
Lead	5	2	142	24.4
Mercury	3	1	0.27	0.1
Zinc	5	1	174	115

Thirty-seven (37) analytes were detected in the EM-5 surface soils. Exceedences were limited to the four metal analytes listed above, with five total exceedences detected. Lead and mercury are the only metals to exceed their TAGM value by more than a factor of 2.

A full presentation of the analytical data collected for soil is provided in **Appendix G**.

4.3.6.4 Subsurface Soil Results

Eight chemical characterization subsurface soil samples, **Figure 4-21**, were collected from test pits and monitoring well borings completed in this release area. **Table 4-L**, presented at the end of this section, presents the subsurface soil analytical data for all compounds detected in this release area. The results are summarized below;



Loc_id	Parameter	Value	Criteria Level	Units
MW12-22	Lead	34	33.1	MG/KG
MW12-109	Copper Lead Mercury Zinc	37.3 142 0.27 174	23.1 33.1 0.1 115	MG/KG MG/KG MG/KG MG/KG

LEGEND

- SS12-153 — Surface Soil sample with Loc_ID analyzed for chemical and radiological parameters. No exceedences present
- SS12-153 — Surface Soil sample with Loc_ID analyzed for chemical and radiological parameters. Metal exceedences present
- SS12-153 — Surface Soil sample with Loc_ID analyzed for chemical and radiological parameters. Semi Volatile Organic exceedences present
- SS12-153 — Surface Soil sample with Loc_ID analyzed for chemical and radiological parameters. Metal and Semi Volatile Organic exceedences present
- SS12-153 — Surface Soil sample with Loc_ID analyzed radiological parameters only.
- SD12-153 — Sediment sample with Loc_ID
- SW12-153 — Surface Water sample with Loc_ID
- Potential Release Area

100 0 100
(feet)

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FIGURE 4-20
SURFACE SOIL EXCEEDENCES AT EM-5

SCALE 1:100 | DATE NOV 2000 | REV | Sheet 1 of 1

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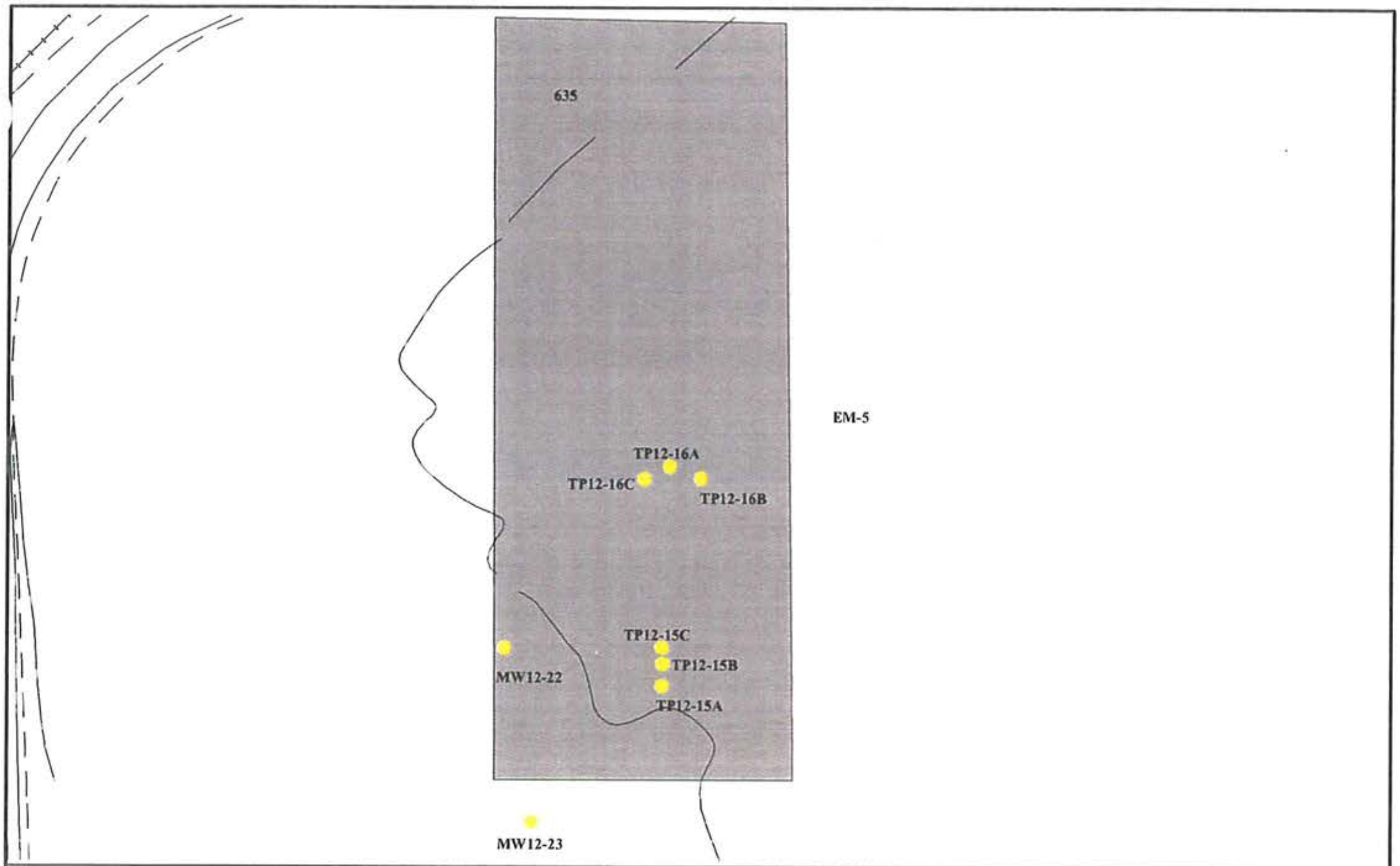

Loc_id	Parameter	Depth Range (feet)	Value	Criteria Level	Units
TP12-15A	Lead	3.5-3.5	56.7	24.4	MG/KG
	Potassium		2760	2623	MG/KG
	Zinc		280	115	MG/KG
TP12-15B	Lead	2-2	112	24.4	MG/KG
	Mercury		1.0	0.1	MG/KG
	Zinc		280	115	MG/KG
TP12-15C	Copper	0.8-0.8	35.5	33	MG/KG
	Lead		63.9	24.4	MG/KG
	Mercury		0.12	0.1	MG/KG
	Potassium		2710	2623	MG/KG
	Zinc		129	115	MG/KG
TP12-16A	Lead	0.6-0.6	99.3	24.4	MG/KG
	Zinc		140	115	MG/KG
TP12-16B	Copper	2-2	73.3	33	MG/KG
	Lead		64.7	24.4	MG/KG
	Mercury		0.11	0.1	MG/KG
	Potassium		2810	2623	MG/KG
	Zinc		123	115	MG/KG
TP12-16C	Copper	0.5-2.0	41	33	MG/KG
	Lead		88.9	24.4	MG/KG
	Zinc		256	115	MG/KG
MW12-22	Copper	2-4	33.7	33	MG/KG
MW12-23	Copper	2-4	35.4	33	MG/KG
	Nickel		52.0	50	MG/KG

Note: The highest value between a sample and a duplicate sample was taken

100 0 100
(feet)

LEGEND

MW12-15 Sub-surface Soil sample with Loc_ID analyzed for chemical parameters. No exceedences present

MW12-15 Sub-surface Soil sample with Loc_ID analyzed for chemical parameters. Metal exceedences present

MW12-15 Sub-surface Soil sample with Loc_ID analyzed for chemical parameters. Semi Volatile Organic exceedences present.

MW12-15 Sub-surface Soil sample with Loc_ID analyzed for chemical parameters. Metal and Semi Volatile Organic exceedences present

MW12-15 Background Sub-surfacerface Soil with Loc_ID analysed for chemical parameters.

Potential Release Area

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FIGURE 4-21
SUBSURFACE SOIL EXCEEDENCES
AT EM-5

SCALE	DATE	REV	
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EM-5 Subsurface Soil Constituents	Times Detected	Exceedences	Maximum Detection	TAGM
SVOCs				
Benzo(a)anthracene	5	1	3500	224
Benzo(a)pyrene	6	1	2600	61
Benzo(b)fluoranthene	6	1	2200	1100
Benzo(k)fluoranthene	6	1	2600	1100
Chrysene	7	1	3000	400
Dibenz(a,h)anthracene	1	1	710	14
Metals				
Copper	8	5	73.3	33
Lead	8	6	112	24.4
Mercury	4	3	1	0.1
Nickel	8	1	52	50
Potassium	8	3	2810	2623
Zinc	8	6	280	115

Fifty-two (52) analytes were detected in the EM-5 area. As listed above, these analytes were limited to six SVOCs and six metals accounting for the 30 exceedences. As shown, all six of the SVOCs and four of the metals exceed their TAGM value by more than a factor of 2.

All six SVOCs detected were from a single sample, TP12-15B, collected from 2 feet below the surface. Such levels may be due to the presence of charred wood found in this test pit. The greatest number of metals exceedences occurred in TP12-15C (0.8 bgs) and TP12-16B (2 feet bgs). The sample from TP12-15C was collected from soil beneath metal debris containing such things as nails. The sample from TP12-16B was collected from test pit TP12-16 where items such as horseshoes, rusty sheet metal, and pottery shards were found. Such findings were confirmed in the SEAD-12 Phase I Archaeological Survey Report (Parsons ES, 1998). This report designated the area around EM-5 an archaeological area potentially eligible for the National Register. The site was a former T. Sample Farmstead. A fair number of 19th century historic artifacts were found at this location, including such things as lead-glazed ceramics, nails, bolts, screws and chains. The presence of some of these items may contribute to the elevated metals at these locations.

A full presentation of the analytical data collected for soil is provided in **Appendix G**.

4.3.6.5 Radionuclide Soil Results

A total of 33 surface and subsurface soil samples were analyzed for radionuclides. The analytical data are presented in **Appendix G.** Summary statistics comparing the EM-5 area radionuclide data in soils to background radionuclide data are presented in **Table 4-16**. This comparison includes number of samples, frequency of detection, minimum, maximum, average, median, and standard deviation. In addition, WRS test results comparing the site data set to the background data set are presented.

Ten radionuclides in the EM-5 area soils were found to be statistically above background. The parameters exceeding background are: Bismuth-214 (Bi-214), Cesium-137 (Cs-137), Lead-210 (Pb-210), Lead-214 (Pb-214), Radium-223 (Ra-223), Radium-226 (Ra-226), Radon-228 (Ra-228), Tritium, Uranium-233/234 (U-233/234), and Uranium-238 (U-238).

For the ten radionuclides distinguishable from background in this area, $DCGL_W$s were added to the background data set as described in MARSSIM and in **Section 4.1.2.3** above. **Table 4-17** shows the results of the WRS test when compared to both residential and worker DCGLs. When compared to residential DCGLs, Bi-214, Pb-210, and Ra-226 exceed DCGLs. These three radionuclides are all part of the Ra-226 decay series. When compared to worker DCGLs, Pb-210 and Ra-226 exceeded DCGLs. Like the elevated levels of Pb detected in the chemical analyses, elevated Lead-210 levels may be due to metal debris and lead-glazed ceramics found in the area.

Five samples within the Dry Waste Disposal Pit area were re-sampled in December 1999, to clarify a reported detection of Plutonium-239/240 at these locations. Locations are shown in **Figure 2-13**. The re-sampling event as well as the re-sampling results are discussed in **Section 4.3.10** below.

4.3.6.6 Surface Water, Sediment, and Groundwater Results

No surface water or sediment locations are within or closely proximal to the EM-5 area (**Figure 4-20**, **Figure 4-3**) One location, SW/SD12-8 is downgradient to the area, exceeding aluminum and iron criteria for surface water **Figure 4-6**, **Table 4-S.** The sediment location exceeds criteria for four PAHs (**Figure 4-7, Table 4-V**), one pesticides/PCB (**Figure 4-8**, **Table 4-V**), and three (**Figure 4-9**, **Table 4-V**) metals. Groundwater exceedences (**Figure 4-10, Table 4-X**) include one SVOC, (Bis(2-Ethylhexyl)Phthalate, at MW12-22) and exceedences for Na, Fe, and Mn in both downgradient wells (MW12-22 and MW12-23). SEAD-12 surface water, sediment, and groundwater results are discussed in detail in **Sections 4.4, 4.5, and 4.6**.

TABLE 4-16
Comparison of Summary Statistics in Background Soil to EM- 5 Soil for Radionuclides
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Parameter	Units	No. of Samples		No. of Detections		Frequency of Detections		Minimum		Maximum		Average		Median		Std Dev		Above Background using WRS?	Above Background + Residential DCGL using WRS?	Above Background+ Worker DCGL using WRS?
		BKGD	EM-5	BKGD	EM-5	BKGD	EM-5	BKGD	EM-5	BKGD	EM-5	BKGD	EM-5	BKGD	EM-5	BKGD	EM-5			
Gross Alpha	pCi/g	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gross Beta	pCi/g	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Actinium-228	pCi/g	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bismuth -214	pCi/g	35	30	27	30	77%	100%	0.60	1.20	2.60	2.60	1.35	1.77	1.40	1.70	0.47	0.43	YES	YES	NO
Cesium-137	pCi/g	35	30	12	26	34%	87%	0.05	0.05	0.70	1.00	0.32	0.48	0.30	0.50	0.22	0.26	YES	NO	NO
Cobalt-57	pCi/g	35	30	5	7	14%	23%	0.05	0.05	0.10	0.20	0.06	0.07	0.05	0.05	0.02	0.03	NO	NO	NO
Cobalt-60	pCi/g	35	30	6	13	17%	43%	0.05	0.05	0.40	0.50	0.13	0.16	0.10	0.05	0.08	0.16	NO	NO	NO
Lead-210	pCi/g	35	30	5	21	14%	70%	0.60	1.00	21.10	76.90	5.62	21.29	3.43	10.88	5.35	21.16	YES	YES	YES
Lead-211	pCi/g	35	30	4	13	11%	43%	0.40	0.35	10.75	12.00	3.20	3.62	2.15	1.33	3.13	3.81	NO	NO	NO
Lead-214	pCi/g	35	30	33	30	94%	100%	0.60	1.00	2.50	2.30	1.48	1.65	1.45	1.60	0.44	0.32	YES	NO	NO
Plutonium-239	pCi/g	35	30	8	2	23%	7%	0.05	0.05	0.25	0.20	0.13	0.09	0.11	0.10	0.05	0.04	NO	NO	NO
Promethium-147	pCi/g	29	0	10	NA	34%	NA	2.10	NA	17.80	NA	6.43	NA	4.15	NA	4.70	NA	NA	NA	NA
Radium-223	pCi/g	35	30	1	4	3%	13%	0.10	0.15	0.70	1.60	0.22	0.37	0.20	0.25	0.10	0.38	YES	NO	NO
Radium-226	pCi/g	35	30	27	30	77%	100%	0.60	1.20	2.60	2.60	1.36	1.77	1.40	1.70	0.47	0.43	YES	YES	YES
Radium-228	pCi/g	35	30	34	29	97%	97%	1.00	0.15	3.50	3.40	1.73	1.99	1.65	2.05	0.51	0.63	YES	NO	NO
Thallium-208	pCi/g	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thorium-227	pCi/g	29	0	8	NA	28%	NA	0.10	NA	0.55	NA	0.23	NA	0.25	NA	0.11	NA	NA	NA	NA
Thorium-230	pCi/g	35	30	9	13	26%	43%	0.20	0.05	2.70	3.30	0.54	0.78	0.32	0.15	0.53	0.87	NO	NO	NO
Thorium-232	pCi/g	35	30	34	30	97%	100%	0.25	0.50	2.00	1.90	0.98	1.05	0.90	1.00	0.36	0.31	NO	NO	NO
Thorium-234	pCi/g	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tritium	pCi/g	35	30	6	22	17%	73%	0.05	0.05	30.23	148.50	1.68	16.85	0.05	3.40	5.81	40.47	YES	NO	NO
Uranium-233/234	pCi/g	35	30	17	29	49%	97%	0.05	0.05	1.90	1.60	0.46	0.84	0.10	0.80	0.46	0.28	YES	NO	NO
Uranium-235	pCi/g	35	30	19	15	54%	50%	0.05	0.05	0.40	0.50	0.11	0.10	0.10	0.10	0.08	0.09	NO	NO	NO
Uranium-238	pCi/g	35	30	27	30	77%	100%	0.05	0.40	1.40	1.30	0.67	0.84	0.75	0.84	0.40	0.18	YES	NO	NO

For the minimum, maximum, average, median, standard deviation, and the the duplicates and samples were averaged together, the 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 4-17
Wilcoxon Rank Sum Calculations for Comparison of EM-5 to Background
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Parameter	Site Compared to Background +DCGL Value					Site Compared to Background + Residential DCGL Value (1)					Site Compared to Background + Worker DCGL Value (2)				
	Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?	Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?	Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?
	BKGD	EM-5				BKGD	EM-5				BKGD	EM-5			
Bismuth -214	26.39	43.38	-3.561	1.645	YES	27.30	42.27	-3.130	1.645	YES	32.73	35.57	-0.593	1.645	NO
Cesium-137	28.54	40.73	-2.558	1.645	YES	49.00	15.50	-7.009	1.645	NO					
Cobalt-57	34.03	33.97	-0.017	1.645	NO										
Cobalt-60	35.24	32.47	-0.605	1.645	NO										
Lead-210	25.73	44.20	-3.859	1.645	YES	26.08	43.77	-3.695	1.645	YES	30.03	38.90	-1.854	1.645	YES
Lead-211	33.49	34.63	-0.240	1.645	NO										
Lead-214	29.95	39.00	-1.899	1.645	YES	30.97	37.73	-1.414	1.645	NO					
Plutonium-239	42.45	23.58	-4.193	1.645	NO										
Radium-223	27.14	42.47	-3.355	1.645	YES	44.57	20.97	-5.005	1.645	NO					
Radium-226	26.39	43.38	-3.561	1.645	YES	27.30	42.27	-3.130	1.645	YES	26.39	43.38	-3.561	1.645	YES
Radium-228	29.23	39.23	-2.231	1.645	YES	33.03	35.20	-0.454	1.645	NO					
Thorium-230	36.35	31.10	-1.099	1.645	NO										
Thorium-232	31.66	36.88	-1.099	1.645	NO										
Tritium	24.09	46.22	-5.028	1.645	YES	44.16	21.47	-4.996	1.645	NO					
Uranium-233/234	26.43	43.33	-3.565	1.645	YES										
Uranium-235	35.53	32.12	-0.775	1.645	NO										
Uranium-238	30.26	38.62	-1.773	1.645	YES	49.00	15.50	-7.044	1.645	NO					

Zrs= Statistic for generated from Wilcoxon Rank Sum test
Z(1-alpha)= Maximum allowed probability that WRS test incorrectly indicates that the site and background datasets are distinguishable (alpha= 0.05)
Null Hypothesis: The populations from which the two data sets have been drawn have the same mean.
WRS initially is preformed comparing site to background; it null hypothesis is accepted then no further comparisons needed. If null hypothesis is rejected then site is compared to background + residential scenerio;
if null hypothesis is accepted then no further comparisons needed. If null hypothesis is rejected then the site is compared to background + worker scenerio.
(1) The most conservative DCGL value for the radionuclide in the residential scenerio was added to background
(2) The most conservative DCGL value for the radionuclide in the worker scenerio was added to background.

NA= Not analyzed due to parameters only being requested during the Expanded Site Investigation and not the Remedial Investigation. Hence, there were no data for specific radionuclides collected for the background set to compare against the ESI data.

Both groups need to be populated to perform Wilcoxon Rank Sum test. Radionuclides with unpopulated groups not found in table.

4.3.7 EM-6

Investigations in the area around EM-6 included: radiological scanning surveys (Class II), **Figure 4-1**, test pits, **Figure 4-2**, and surface and subsurface soil sampling.

4.3.7.1 Gamma Radiation Screening Results

Classified as a Class II radiological survey area, a low energy gamma radiation survey (50% coverage) was performed over the EM-6 area. Scanning results are shown in **Figure 4-1**. Results of scanning survey in EM-5 are summarized below.

Location	Ave. Compared to Background	Max Compared to Background	Detects > Flag Value (2xBgd)
EM-6	+0.8%	+12.9%	0

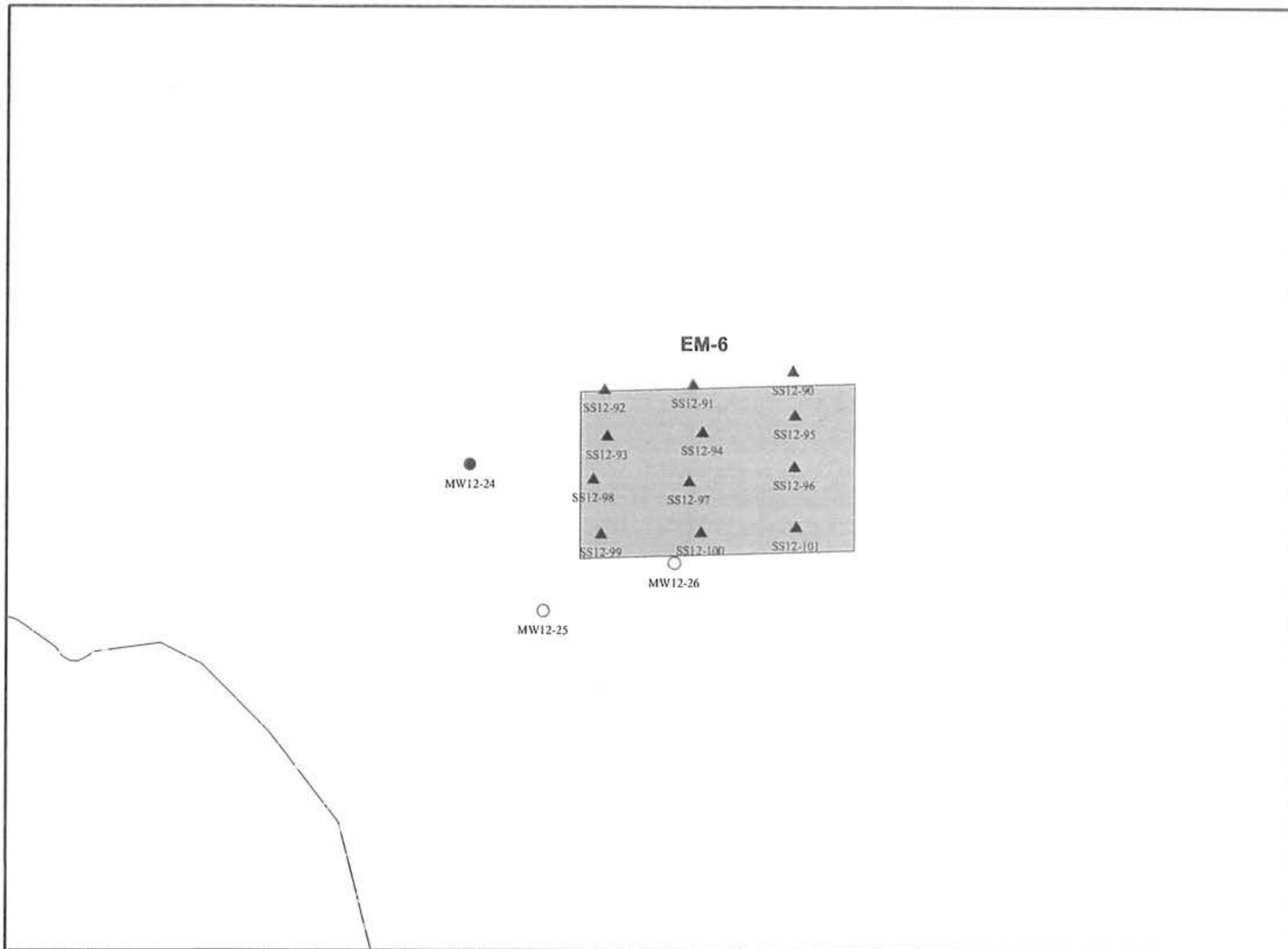
No gamma scanning readings were above the flag value twice background. Refer to **Appendix F** for scanning data collected from EM-6.

4.3.7.2 Test Pitting Results

Test pits TP12-11 and TP12-12 were excavated in the EM-6 area. Military-related debris was interpreted to be present in both test pits (**Figure 4-2**, **Table 4-2**). The debris consisted of chain link fence, brush, fence posts, heavy gauge insulated wire, concrete, steel cable, and re-bar reinforced concrete. No visual, olfactory, or scanning evidence of chemical or radiological impacts were observed in TP12-11 or TP12-12 or with the materials removed. Test pit logs are provided in **Appendix B**. The results from six soil samples from TP12-11 and TP12-12, are presented with the subsurface soil results. Surface and subsurface soil, and groundwater samples were collected from three monitoring wells installed downgradient to TP12-11 and TP12-12.

4.3.7.3 Surface Soil Results

Three chemical surface soil samples, **Figure 4-22**, were collected (surface samples from monitoring wells) in the proximity of the EM-6 area. **Table 4-M,** located at the end of this section, presents the surface soil analytical data for all compounds detected in this release area. The results are summarized below.



Loc_id	Parameter	Value	Criteria Level	Units
MW12-25	Manganese Thallium	1120 2.0	1100 0.855	MG/KG MG/KG
MW12-109	Thallium	1.1	0.855	MG/KG

LEGEND

SS12-153 Surface Soil sample with Loc_ID analyzed for chemical and radiological parameters. No exceedences present

SS12-153 Surface Soil sample with Loc_ID analyzed for chemical and radiological parameters. Metal exceedences present

SS12-153 Surface Soil sample with Loc_ID analyzed for chemical and radiological parameters. Semi Volatile Organic exceedences present

SS12-153 Surface Soil sample with Loc_ID analyzed for chemical and radiological parameters. Metal and Semi Volatile Organic exceedences present

SS12-153 Surface Soil sample with Loc_ID analyzed radiological parameters only

SD12-153 Sediment sample with Loc_ID

SW12-153 Surface Water sample with Loc_ID

Potential Release Area

100 0 100
(feet)

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FIGURE 4-22
SURFACE SOILEXCEEDENCES AT
EM-6

SCALE 1:100 DATE NOV 2000 REV Sheet 1 of 1

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EM-6 Surface Soil Constituents	Times Detected	Exceedences	Maximum Detection	TAGM
Metals – mg/kg				
Manganese	3	1	1120	1100
Thallium	2	2	2	0.855

Twenty-five (25) analytes were detected in the EM-6 surface soils. Exceedences were limited to the two metal analytes listed above, with only three exceedences detected. Only Thallium exceeds its TAGM value by more than a factor of 2.

A full presentation of the analytical data collected for soil is provided in **Appendix G**.

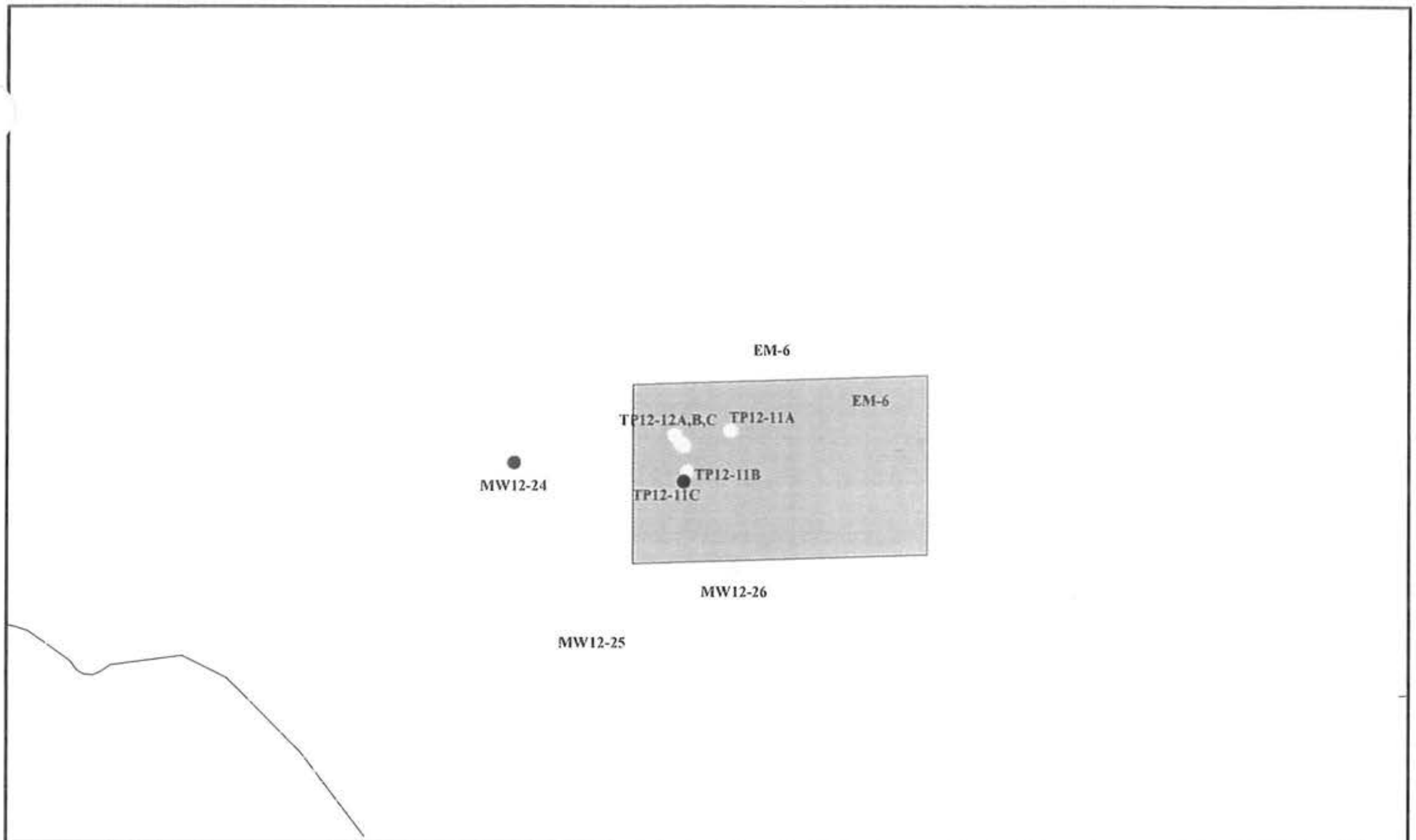
4.3.7.4 Subsurface Soil Results

Twelve subsurface soil samples, **Figure 4-23**, were collected from test pits and monitoring well borings completed in, and proximal to, this release area. **Table 4-N,** located at the end of this section, presents the subsurface soil analytical data for all compounds detected in this release area. The results are summarized below.

EM-6 Subsurface Soil Constituents	Times Detected	Exceedences	Maximum Detection	TAGM
Metals – mg/kg				
Cobalt	12	1	36.3	30
Iron	12	1	40600	37410
Lead	12	2	34	24.4
Manganese	12	1	4110	1100
Sodium	9	1	197	188
Thallium	8	7	3.8	0.855
Zinc	12	4	391	115

Forty-two (42) analytes were detected in the EM-6 area. As listed above, these analytes were limited to seven metals accounting for the 17 exceedences. As shown, manganese, thallium, and zinc exceed their TAGM value by more than a factor of 2. The greatest frequency of metals exceedences are detected in TP12-12. These samples were collected near an area where chain link fencing was found within the pit.

A full presentation of the analytical data collected for soil is provided in **Appendix G**.



Loc_id	Parameter	Depth Range (feet)	Value	Criteria Level	Units
TP12-11A	Thallium	6-6	1.3	0.855	MG/KG
TP12-11B	Thallium Zinc	6.5-6.5	1.2 125	0.855 115	MG/KG MG/KG
TP12-12A	Copper Iron Thallium Zinc	0.5-0.5	36.3 40,600 0.93 126	33 37,410 0.855 115	MG/KG MG/KG MG/KG MG/KG
TP12-12B	Lead Thallium Zinc	1.5-1.5	33.5 0.99 166	24.4 0.855 115	MG/KG MG/KG MG/KG
TP12-12C	Lead Manganese Sodium Thallium Zinc	4-4	34 4110 197 3.8 391	24.4 1100 188 0.855 115	MG/KG MG/KG MG/KG MG/KG MG/KG
MW12-25	Thallium	2-4	1.1	0.855	MG/KG
MW12-26	Thallium	2-4	1.2	0.855	MG/KG

Note: The highest value between a sample and a duplicate sample was taken

LEGEND

● MW12-15 Sub-surface Soil sample with Loc_ID analyzed for chemical parameters. No exceedences present

○ MW12-15 Sub-surface Soil sample with Loc_ID analyzed for chemical parameters. Metal exceedences present

● MW12-15 Sub-surface Soil sample with Loc_ID analyzed for chemical parameters. Semi Volatile Organic exceedences present.

● MW12-15 Sub-surface Soil sample with Loc_ID analyzed for chemical parameters. Metal and Semi Volatile Organic exceedences present

▲ MW12-15 Background Sub-surfacerface Soil with Loc_ID analysed for chemical parameters.

Potential Release Area

100 0 100
(feet)

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FIGURE 4-23
SUBSURFACE SOIL EXCEEDENCES
AT EM-6

SCALE 1:100 | DATE NOV 2000 | REV | Sheet 1 of 1

4.3.7.5 Radionuclide Soil Results

A total of 28 surface and subsurface soil samples were analyzed for radionuclides. The analytical data are presented in **Appendix G**. Summary statistics comparing the EM-6 area radionuclide data in soils to background radionuclide data in soils are presented in **Table 4-18**. This comparison includes number of samples, frequency of detection, minimum, maximum, average, median, and standard deviation. In addition, WRS test results comparing the site data set to the background data set are presented.

Seven radionuclides in the EM-6 area soils were found to be statistically above background. The parameters exceeding background are: Bismuth-214 (Bi-214), Lead-211 (Pb-211), Lead-214 (Pb-214), Radium-226 (Ra-226), Radon-228 (Ra-228), Thorium-232 (Th-232), and Uranium-233/234 (U-233/234).

For the ten radionuclides distinguishable from background in this area, $DCGL_W$s were added to the background data set as described in MARSSIM and in **Section 4.1.2.3** above. **Table 4-19** shows the results of the WRS test when compared to both residential and worker DCGLs. When compared to residential DCGLs, Ra-226 and Ra-228 exceed DCGLs. When compared to worker DCGLs, Ra-226 exceeded DCGLs.

Seven samples within the Dry Waste Disposal Pit area were re-sampled in December 1999, to clarify a reported detection of Plutonium-239/240 at these locations. Locations are shown in **Figure 2-13**. The re-sampling event as well as the re-sampling results are discussed in **Section 4.3.10** below.

4.3.7.6 Surface Water, Sediment, and Groundwater Results

No surface water or sediment samples were collected from within, or adjacent to, the EM-6 potential release area (**Figure 4-4**, **Figure 4-7**, **Figure 4-22,**). Groundwater exceedences (**Figure 4-10, Table 4-X**) include antimony, iron and manganese. SEAD-12 surface water, sediment, and groundwater results are discussed in detail in **Sections 4.4, 4.5, and 4.6**.

4.3.8 Class III Areas

The Class III potential release area includes the area within the SEAD-12 boundary not classified as Class I or Class II. Investigations in the Class III areas included: radiological scanning surveys (Class III) (**Figure 4-1**), test pits (**Figure 4-2**), surface subsurface soil sampling.

TABLE 4-18
Comparison of Summary Statistics in
Background Soil to EM-6 Soil for Radionuclides
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Parameter	Units	No. of Samples		No. of Detections		Frequency of Detections		Minimum		Maximum		Average		Median		Std Dev		Above Background using WRS?	Above Background + Residential DCGL using WRS?	Above Background+ Worker DCGL using WRS?
		BKGD	EM-6	BKGD	EM-6	BKGD	EM-6	BKGD	EM-6	BKGD	EM-6	BKGD	EM-6	BKGD	EM-6	BKGD	EM-6			
Gross Alpha	pCi/g	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gross Beta	pCi/g	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Actinium-228	pCi/g	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bismuth -214	pCi/g	35	28	27	28	77%	100%	0.60	1.00	2.60	2.40	1.35	1.69	1.40	1.60	0.47	0.40	YES	YES	NO
Cesium-137	pCi/g	35	28	12	19	34%	68%	0.05	0.05	0.70	0.70	0.32	0.29	0.30	0.20	0.22	0.22	NO	NO	NO
Cobalt-57	pCi/g	35	28	5	10	14%	36%	0.05	0.05	0.10	0.20	0.06	0.08	0.05	0.05	0.02	0.05	NO	NO	NO
Cobalt-60	pCi/g	35	28	6	16	17%	57%	0.05	0.05	0.40	0.80	0.13	0.23	0.10	0.10	0.08	0.22	NO	NO	NO
Lead-210	pCi/g	35	28	5	14	14%	50%	0.60	0.75	21.10	18.20	5.62	5.36	3.43	3.60	5.35	4.86	NO	NO	NO
Lead-211	pCi/g	35	28	4	16	11%	57%	0.40	0.40	10.75	16.70	3.20	6.01	2.15	5.10	3.13	5.23	YES	NO	NO
Lead-214	pCi/g	35	28	33	28	94%	100%	0.60	1.10	2.50	2.30	1.48	1.62	1.45	1.60	0.44	0.28	YES	NO	NO
Plutonium-239	pCi/g	35	28	8	3	23%	11%	0.05	0.05	0.25	0.20	0.13	0.07	0.11	0.05	0.05	0.04	NO	NO	NO
Promethium-147	pCi/g	29	6	10	0	34%	0%	2.10	4.20	17.80	4.20	6.43	4.20	4.15	4.20	4.70	0.00	NO	NO	NO
Radium-223	pCi/g	35	28	1	3	3%	11%	0.10	0.15	0.70	1.00	0.22	0.30	0.20	0.25	0.10	0.19	NO	NO	NO
Radium-226	pCi/g	35	28	27	28	77%	100%	0.60	1.00	2.60	2.40	1.36	1.69	1.40	1.60	0.47	0.40	YES	YES	YES
Radium-228	pCi/g	35	28	34	28	97%	100%	1.00	1.50	3.50	3.50	1.73	2.31	1.65	2.10	0.51	0.56	YES	YES	NO
Thallium-208	pCi/g	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thorium-227	pCi/g	29	0	8	NA	28%	NA	0.10	NA	0.55	NA	0.23	NA	0.25	NA	0.11	NA	NA	NA	NA
Thorium-230	pCi/g	35	27	9	13	26%	48%	0.20	0.05	2.70	1.90	0.54	0.68	0.32	0.15	0.53	0.65	NO	NO	NO
Thorium-232	pCi/g	35	27	34	28	97%	104%	0.25	0.80	2.00	3.20	0.98	1.31	0.90	1.20	0.36	0.48	YES	NO	NO
Thorium-234	pCi/g	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tritium	pCi/g	35	27	6	9	17%	33%	0.05	0.05	30.23	4.10	1.68	0.39	0.05	0.05	5.81	0.84	NO	NO	NO
Uranium-233/234	pCi/g	35	27	17	27	49%	100%	0.05	0.05	1.90	1.20	0.46	0.75	0.10	0.70	0.46	0.22	YES	NO	NO
Uranium-235	pCi/g	35	27	19	8	54%	30%	0.05	0.05	0.40	0.10	0.11	0.06	0.10	0.05	0.08	0.02	NO	NO	NO
Uranium-238	pCi/g	35	27	27	28	77%	104%	0.05	0.30	1.40	1.30	0.67	0.79	0.75	0.80	0.40	0.20	NO	NO	NO

For the minimum, maximum, average, median, standard deviation, and the the duplicates and samples were averaged together, the 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 4-19
Wilcoxon Rank Sum Calculations for
Comparison of EM-6 Soil to Background Soil
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Parameter	Site Compared to Background +DCGL Value					Site Compared to Background + Residential DCGL Value (1)					Site Compared to Background + Worker DCGL Value (2)				
	Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?	Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?	Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?
	BKGD	EM-6				BKGD	EM-6		EM-6		BKGD	EM-6		EM-6	
Bismuth -214	26.45	40.80	-3.056	1.645	YES	27.22	39.74	-2.661	1.645	YES	33.05	31.74	-0.279	1.645	NO
Cesium-137	33.61	30.98	-0.561	1.645	NO										
Cobalt-57	30.42	35.35	-1.312	1.645	NO										
Cobalt-60	30.73	34.93	-0.915	1.645	NO										
Lead-210	32.19	32.93	-0.156	1.645	NO										
Lead-211	28.20	38.39	-2.163	1.645	YES	33.03	31.78	-1.747	1.645	NO					
Lead-214	29.22	37.00	-1.658	1.645	YES	30.05	35.85	-1.232	1.645	NO					
Plutonium-239	42.80	18.39	-5.434	1.645	NO										
Promethium-147	17.74	25.50	-1.638	1.645	NO										
Radium-223	26.24	41.07	-3.274	1.645	NO										
Radium-226	26.45	40.80	-3.056	1.645	YES	27.22	39.74	-2.661	1.645	YES	26.45	40.80	-3.056	1.645	YES
Radium-228	25.12	42.61	-3.721	1.645	YES	28.24	38.33	-2.143	1.645	YES	31.43	33.96	-0.537	1.645	NO
Thorium-230	34.22	30.15	-0.865	1.645	NO										
Thorium-232	25.97	41.44	-3.300	1.645	YES	29.57	36.52	-1.478	1.645	NO					
Tritium	30.85	34.76	-1.147	1.645	NO										
Uranium-233/234	27.28	39.65	-2.655	1.645	YES	46.00	14.00	-6.829	1.645	NO					
Uranium-235	37.28	25.94	-2.684	1.645	NO										
Uranium-238	30.46	35.30	-1.036	1.645	NO										

Zrs= Statistic for generated from Wilcoxon Rank Sum test

Z(1-alpha)= Maximum allowed probability that WRS test incorrectly indicates that the site and background datasets are distinguishable (alpha= 0.05)

Null Hypothesis: The populations from which the two data sets have been drawn have the same mean.

WRS initially is preformed comparing site to background; it null hypothesis is accepted then no further comparisons needed. If null hypothesis is rejected then site is compared to background + residential scenerio; if null hypothesis is accepted then no further comparisons needed. If null hypothesis is rejected then the site is compared to background + worker scenerio.

(1) The most conservative DCGL value for the radionuclide in the residential scenerio was added to background.

(2) The most conservative DCGL value for the radionuclide in the worker scenerio was added to background.

NA= Not analyzed due to parameters only being requested during the Expanded Site Investigation and not the Remedial Investigation. Hence, there were no data for specific radionuclides collected for the background set to compare against the ESI data.

Both groups need to be populated to perform Wilcoxon Rank Sum test. Radionuclides with unpopulated groups not found in table.

4.3.8.1 Gamma Radiation Scanning Results

The low energy gamma radiation survey conducted in the Class III area included 10% coverage of the area. Scanning results are shown in **Figure 4-1**. Results of the scanning survey are summarized below.

Location	Ave. Compared to Background	Max Compared to Background	Detects > Flag Value (2xBgd)
Class III Areas	+1.8%	+30.9%	0

No gamma scanning readings were above the flag value twice background. Refer to **Appendix F** for scanning data collected from Class III areas.

4.3.8.2 Test Pitting Results

As listed on **Table 4-2**, eight test pits (**Figure 4-2**) were excavated in Class III areas (TP12-9, TP12-10, TP12-13, TP12-14, TP12-20, TP12-21, TP12-22, TP12-24) to investigate EM anomalies. Three test pits contained debris interpreted to be military-related (TP12-10, TP12-21, and TP12-24). TP12-10 contained brick, glass, steel pipe and steel wire. TP12-21 contained brick, lumber, barbed wire, and plastic sheeting. TP12-24 contained empty metal ammo boxes and iron stakes. Test pit logs are provided in **Appendix B**. Monitoring wells (MW12-27, MW12-31, and MW12-32) were installed to further investigate the observations made in TP12-21 and TP12-24.

The results from the 24 soil samples collected from the eight test pits are reported in the following soil sampling sections. Samples were collected from these test pits to investigate any potential soil impacts resulting from debris buried in these areas or to confirm the innocuous nature of the buried debris. No elevated areas of radioactivity or volatile organic compounds were no detected during the scanning of soil or debris removed from the eight test pits.

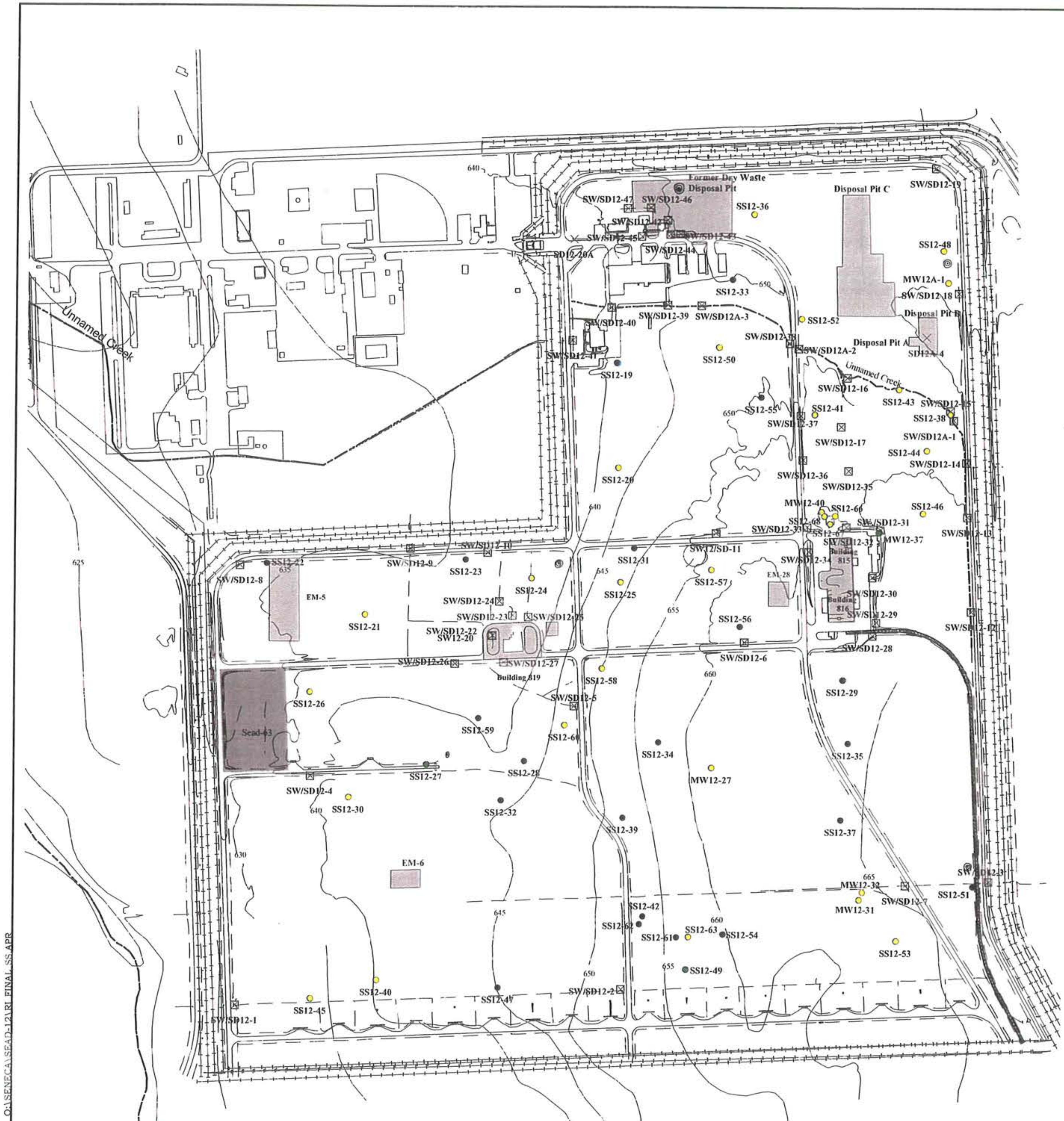
4.3.8.3 Surface Soil Sampling Results

Fifty-eight (58) chemical surface soil samples, **Figure 4-24**, were collected (includes soil boring and monitoring well surface samples) in the Class III potential release area. **Table 4-O,** located at the end of this section, presents the analytical data for all compounds detected in this release area. The results are summarized below.

Class III Surface Soil Constituents	Times Detected	Exceedences	Maximum Detection	TAGM
SVOCs – ug/kg				
4-Methylphenol	4	1	930	100
Benzo(a)anthracene	42	3	3500	224
Benzo(a)pyrene	61	5	3200	61
Benzo(b)fluoranthene	52	1	2800	1100
Benzo(k)fluoranthene	45	1	2900	1100
Chrysene	54	3	3600	400
Dibenz(a,h)anthracene	14	5	680	14
Phenol	17	2	42	30
Metals – mg/kg				
Calcium	58	1	154,000	125,300
Copper	58	3	35.4	33
Cyanide	1	1	1.4	0.35
Lead	58	16	43.8	24.4
Manganese	58	4	2370	1100
Mercury	31	6	0.17	0.1
Nickel	55	2	57.4	50
Potassium	58	2	2970	2623
Selenium	25	2	2.3	2
Thallium	18	18	2.5	0.855
Zinc	58	5	197	115

Sixty-nine (69) analytes were detected in the Class III surface soils. Eighty-one combined exceedences occurred for the 8 SVOCs and 11 metals listed. Seven of the SVOCs, and cyanide, manganese, and thallium exceed their TAGM value by more than a factor of two. SVOC exceedences occurred in seven of the 58 surface soil samples collected. The maximum SVOC values were detected in the surface sample collected from MW12-37. The duplicate sample collected from this same location detected the same SVOCs, but at less than half the concentration.

A full presentation of the analytical data collected for soil is provided in **Appendix G**



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Loc_id	Parameter	Value	Criteria Level	Units
MW12-27	Lead	27.8	24.4	MG/KG
MW12-31	Zinc	117	115	MG/KG
MW12-32	Manganese	2370	1100	MG/KG
	Selenium	2.1	2.0	MG/KG
	Thallium	1.8	0.855	MG/KG
MW12-37	Lead	25.2	24.4	MG/KG
	Benzo(a)anthracene	3500	224	UG/KG
	Benzo(a)pyrene	3200	61	UG/KG
	Benzo(b)fluoranthene	2800	1100	UG/KG
	Benzo(k)fluoranthene	2900	1100	UG/KG
	Chrysene	3600	400	UG/KG
	Dibenz(a,h)anthracene	680	14	UG/KG
MW12-40	Thallium	1.2	0.855	MG/KG
MW12A-1	Potassium	2660	2623	MG/KG
SS12-19	Benzo(a)pyrene	180	61	UG/KG
	Dibenz(a,h)anthracene	40	14	UG/KG
SS12-20	Lead	25.6	24.4	MG/KG
	Thallium	1.8	0.855	MG/KG
SS12-21	Lead	24.8	24.4	MG/KG
	Thallium	1.1	0.855	MG/KG
SS12-24	Thallium	1.5	0.855	MG/KG
SS12-25	Thallium	1.3	0.855	MG/KG
SS12-26	Lead	26.8	24.4	MG/KG
SS12-27	Mercury	0.16	0.1	MG/KG
	Thallium	2.1	0.855	MG/KG
SS12-29	Phenol	38	30	UG/KG
SS12-30	Cyanide	1.4	0.1	MG/KG
SS12-36	Manganese	2020	1100	MG/KG
SS12-38	Lead	25.8	24.4	MG/KG
	Mercury	0.11	0.1	MG/KG
	Thallium	151	115	MG/KG
SS12-40	Lead	26.5	24.4	MG/KG
	Thallium	1.6	0.855	MG/KG
SS12-41	Lead	29.3	24.4	MG/KG
	Manganese	1730	1100	MG/KG
	Mercury	0.12	0.1	MG/KG
	Thallium	2.5	0.855	MG/KG
SS12-44	Lead	24.9	24.4	MG/KG
	Mercury	0.17	0.1	MG/KG
	Thallium	1.3	0.855	MG/KG
	Zinc	197	115	MG/KG
SS12-44	Lead	31.8	24.4	MG/KG
SS12-45	Copper	33.1	33	MG/KG
SS12-46	Lead	32.1	24.4	MG/KG
SS12-48	Thallium	1.7	0.855	MG/KG
SS12-49	Lead	43.8	24.4	MG/KG
	Potassium	2970	2623	MG/KG
	4-Methylphenol	930	900	UG/KG
	Phenol	42	30	UG/KG
SS12-50	Lead	34.8	24.4	MG/KG
	Mercury	0.17	0.1	MG/KG
	Selenium	2.3	2	MG/KG
	Zinc	130	115	MG/KG
SS12-52	Lead	24.6	24.4	MG/KG
	Thallium	1.4	0.855	MG/KG
SS12-53	Mercury	0.16	0.1	MG/KG
SS12-57	Copper	33.8	33	MG/KG
	Nickel	57.4	50	MG/KG
	Thallium	1.2	0.855	UG/KG
	Zinc	131	115	UG/KG
SS12-58	Thallium	1.5	0.855	MG/KG
SS12-60	Thallium	1.6	0.855	MG/KG
SS12-63	Thallium	1.4	0.855	MG/KG
SS12-66	Thallium	1.1	0.855	MG/KG
SS12-67	Calcium	154000	125300	MG/KG
SS12-68	Copper	35.4	33	MG/KG
	Lead	31.0	24.4	MG/KG
	Nickel	53.1	50	MG/KG

SS12-153 Surface Soil sample with Loc_ID analyzed for chemical and radiological parameters. No exceedences present

SS12-153 Surface Soil sample with Loc_ID analyzed for chemical and radiological parameters. Metal exceedences present

SS12-153 Surface Soil sample with Loc_ID analyzed for chemical and radiological parameters. Semi Volatile Organic exceedences present

SS12-153 Surface Soil sample with Loc_ID analyzed for chemical and radiological parameters. Metal and Semi Volatile Organic exceedences present

SS12-153 Surface Soil sample with Loc_ID analyzed radiological parameters only.

SD12-153 Sediment sample with Loc_ID

SW12-153 Surface Water sample with Loc_ID

Note: The Former Wastewater Treatment Plant is not shown in this figure due to Class 3 surface soil samples not being located in the area.

600 0 600
(feet)

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FIGURE 4-24
SURFACE SOIL EXCEEDENCES IN THE CLASS 3 AREA

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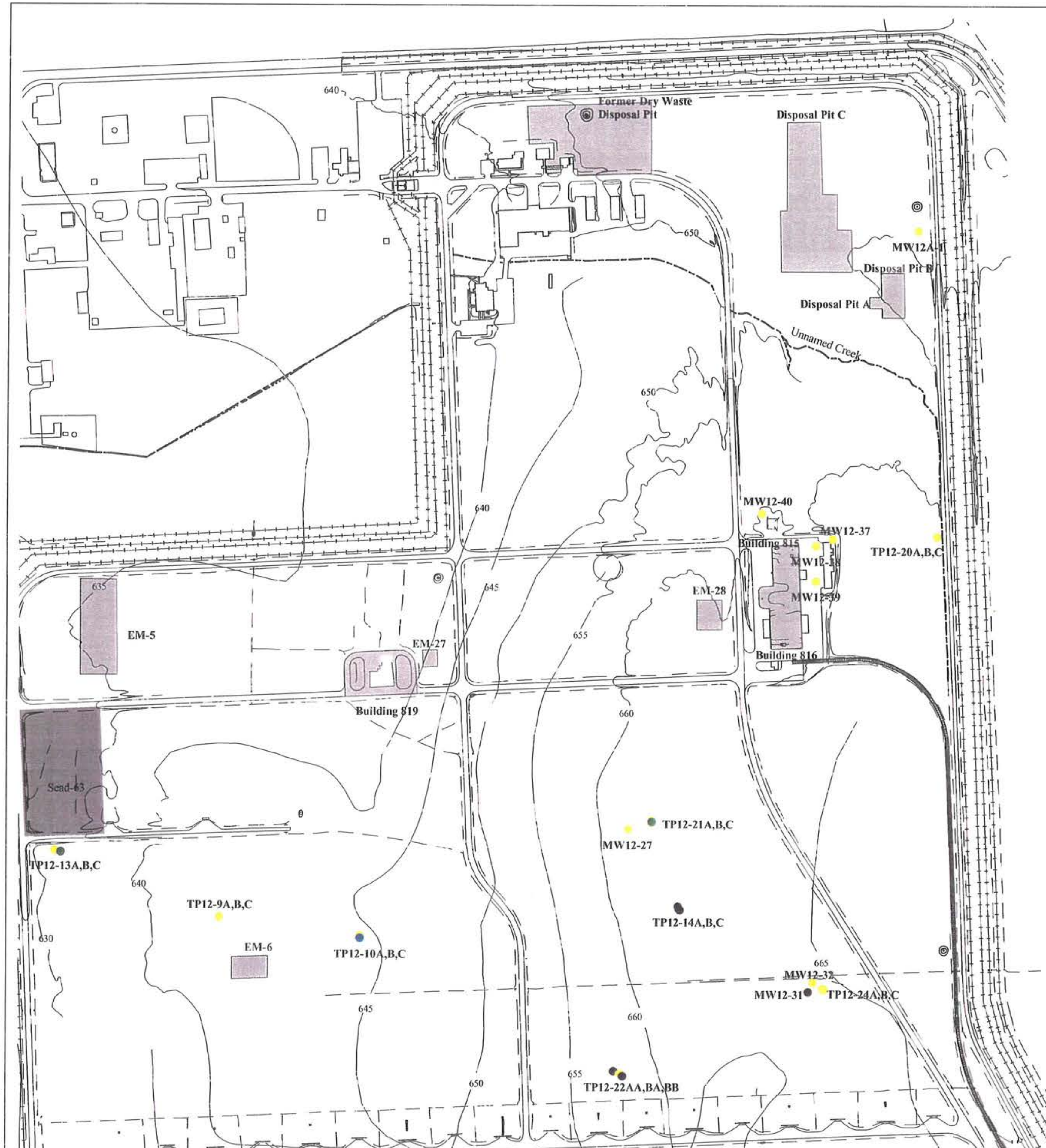
4.3.8.4 Subsurface Soil Sampling Results

Thirty-eight subsurface soil samples, **Figure 4-25**, were collected from test pits, soil borings, and monitoring well borings completed in this release area. **Table 4-P,** located at the end of this section, presents the subsurface soil analytical data for all compounds detected in this release area. The results are summarized below.

Class III Subsurface Soil Constituents	Times Detected	Exceedences	Maximum Detection	TAGM
SVOCs – ug/kg				
Benzo(a)anthracene	16	1	760	224
Benzo(a)pyrene	17	3	1000	61
Chrysene	20	1	1000	400
Dibenz(a,h)anthracene	7	4	300	14
Metals – mg/kg				
Arsenic	38	1	9.8	8.9
Cadmium	3	1	13.3	2.46
Copper	38	3	34	33
Iron	38	3	53400	37410
Lead	38	10	284	24.4
Manganese	38	3	3200	1100
Mercury	16	8	0.2	0.1
Nickel	36	1	51.3	50
Potassium	38	2	3460	2623
Sodium	18	3	748	188
Thallium	10	10	1.6	0.855
Zinc	38	4	3370	115

Fifty-six (56) analytes were detected in subsurface soils from the Class III area. As listed above, the 58 exceedences occur in 4 SVOCs and twelve (12) metals. As shown, all four of the SVOCs and five of the metals exceed their regulatory value by more than a factor of 2. The maximum detected values of the four SVOCs that exceeded TAGMs were found in TP12-21C. This sample was collected below an area where black plastic sheeting and roots and debris were observed. Maximum detected values for cadmium, copper, lead, sodium and zinc were found in a single sample, TP12-13A. Test pit TP12-13 was associated with a small point source anomaly, EM-40. The contents of test pit TP12-13 were designated as cultural debris (non-military related) and described as farm-related debris including plow and tractor parts. These items may be associated with the elevated levels observed in this sample.



Loc_id	Parameter	Depth Range (feet)	Value	Criteria Level	Units
TP12-20A	Lead	0.5-0.5	29.3	24.4	MG/KG
TP12-21A	Mercury	0.7-0.7	0.13	0.1	MG/KG
	Thallium		1.6	0.855	MG/KG
TP12-21B	Lead	3-3	84	24.4	MG/KG
	Manganese		1230	1100	MG/KG
	Mercury		0.2	0.1	MG/KG
TP12-21C	Benzo(a)anthracene	5.5-5.5	760	224	UG/KG
	Benzo(a)pyrene		1000	61	UG/KG
	Chrysene		1000	400	UG/KG
	Dibenz(a,h)anthracene		300	14	UG/KG
	Lead		25.4	24.4	MG/KG
	Mercury		0.13	0.1	MG/KG
	Zinc		120	115	MG/KG
TP12-20B	Arsenic	2.5-2.5	9.8	8.9	MG/KG
	Iron		41,400	37,410	MG/KG
	Manganese		3200	1100	MG/KG
TP12-13A	Cadmium	0.8-0.8	13.3	2.46	MG/KG
	Copper		33.5	33	MG/KG
	Lead		284	24.4	MG/KG
	Mercury		0.14	0.1	MG/KG
	Sodium		748	188	MG/KG
	Zinc		3370	115	MG/KG
TP12-13B	Benzo(a)pyrene	5.5-5.5	76	61	UG/KG
	Dibenz(a,h)anthracene		28	14	UG/KG
	Lead		151	24.4	MG/KG
	Zinc		117	115	MG/KG
TP12-13C	Dibenz(a,h)anthracene	1.5-1.5	19	14	UG/KG
	Lead		96.9	24.4	MG/KG
	Mercury		0.16	0.1	MG/KG
TP12-10B	Lead	2-2	67	24.4	MG/KG
TP12-10C	Benzo(a)pyrene	5.5-5.5	63	61	UG/KG
	Dibenz(a,h)anthracene		18	14	UG/KG
TP12-22BA	Lead	0.5-0.5	42	24.4	MG/KG
	Manganese		2240	1100	MG/KG
TP12-27	Copper	4-6	33.8	33	MG/KG
	Zinc		143	115	MG/KG
TP12-24A	Iron	0.5-0.5	42,500	37,410	MG/KG
	Mercury		0.12	0.1	MG/KG
	Thallium		1.1	0.855	MG/KG
TP12-24B	Lead	0.5-0.5	52.9	24.4	MG/KG
	Mercury		0.12	0.1	MG/KG
	Thallium		1.1	0.855	MG/KG
TP12-24C	Copper	1-1	34	33	MG/KG
	Iron		53,400	37,410	MG/KG
	Lead		111	24.4	MG/KG
	Mercury		0.15	0.1	MG/KG
MW12-40	Nickel	2-4	51.3	50	MG/KG
MW12-40	Thallium	4-6	0.98	0.855	MG/KG
TP12-9B	Thallium	1-1	0.93	0.855	MG/KG
TP12-9C	Thallium	2.5-2.5	1.3	0.855	MG/KG
MW12-32	Thallium	2-3	1.3	0.855	MG/KG
MW12-37	Thallium	2-4	1.6	0.855	MG/KG
MW12-38	Sodium	3-4	201	188	MG/KG
	Thallium		0.93	0.855	MG/KG
MW12-39	Sodium	1.5-2.4	399	188	MG/KG
MW12A-1	Potassium	4-6	3460	2623	MG/KG
MW12A-1	Potassium	8-9.5	2910	2623	MG/KG

Note: The highest value between a sample and a duplicate sample was taken

* Indicates a Pesticide/PCB parameter.
** Indicates a Volitale Organic parameter.

LEGEND

SS12-153 — Surface Soil sample with Loc_ID analyzed for chemical and radiological parameters. No exceedences present

SS12-153 — Surface Soil sample with Loc_ID analyzed for chemical and radiological parameters. Metal exceedences present

SS12-153 — Surface Soil sample with Loc_ID analyzed for chemical and radiological parameters. Semi Volatile Organic exceedences present

SS12-153 — Surface Soil sample with Loc_ID analyzed for chemical and radiological parameters. Metal and Semi Volatile Organic exceedences present

SS12-153 — Surface Soil sample with Loc_ID analyzed radiological parameters only.

SD12-153 — Sediment sample with Loc_ID

SW12-153 — Surface Water sample with Loc_ID

Note: The Former Wastewater Treatment Plant is not shown in this figure due to Class 3 surface soil samples not being located in the area.

600 0 600
(feet)

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FIGURE 4-25
SUBSURFACE SOIL EXCEEDENCES IN THE CLASS 3 AREA

SCALE	DATE	REV	
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A full presentation of the analytical data collected for soil is provided in **Appendix G**

4.3.8.5 Radionuclides in Soil Results

A total of 103 surface and subsurface soil samples were analyzed for radionuclides. The analytical data are presented in **Appendix G.** Summary statistics comparing the Class III areas radionuclide data in soils to background radionuclide data are presented in **Table 4-20**. This comparison includes number of samples, frequency of detection, minimum, maximum, average, median, and standard deviation. In addition, WRS test results comparing the site data set to the background data set are presented.

Eleven radionuclides in the Class III area soils were found to be statistically above background. The parameters exceeding background are: Bismuth-214 (Bi-214), Cesium-137 (Cs-137), Cobalt-60 (Co-60), Lead-210 (Pb-210), Lead-211 (Pb-211), Radium-223 (Ra-223), Radium-226 (Ra-226), Radium-228 (Ra-228), Tritium, Uranium-233/234 (U-233/234), and Uranium-238 (U-238).

For the eleven radionuclides distinguishable from background in this area, $DCGL_W$s were added to the background data set as described in MARSSIM and in **Section 4.1.2.3** above. **Table 4-21** shows the results of the WRS test when compared to both residential and worker DCGLs. When compared to residential DCGLs, Bi-214, Pb-210, Pb-211, and Ra-226 exceeded DCGLs. When compared to worker DCGLs, no radionuclides exceeded DCGLs.

Twenty-seven samples within the Class III areas were re-sampled in December 1999, to clarify a reported detection of Plutonium-239/240 at these locations. Locations are shown in **Figure 2-13**. The re-sampling event as well as the re-sampling results are discussed in **Section 4.3.10** below.

4.3.8.6 Soil Gas Data

As described in **Section 2**, a soil gas survey was completed in the potential paint disposal area around Buildings 813 and 814. The VOC data in **Table 4-22** indicates that toluene is the most prevalent of the VOCs, being detected in 37 of the 54 samples, with a maximum of 320 ppb. Trichloroethene (TCE) is the second most prevalent VOC detected, with a maximum value of 2407 ppb. Monitoring wells MW12-37, MW12-38, and MW12-39 were installed based on this soil gas data to further investigate potential impacts in this area.

TABLE 4-20
Comparison of Summary Statistics in Background Soil to Class 3 Soil for Radionuclides
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Parameter	Units	No. of Samples		No. of Detections		Frequency of Detections		Minimum		Maximum		Average		Median		Std Dev		Above Background using WRS?	Above Background + Residential DCGL using WRS?	Above Background + Worker DCGL using WRS?
		BKGD	Class 3 (1)	BKGD	Class 3 (1)	BKGD	Class 3 (1)	BKGD	Class 3 (1)	BKGD	Class 3 (1)	BKGD	Class 3 (1)	BKGD	Class 3 (1)	BKGD	Class 3 (1)			
Gross Alpha	pCi/g	0	3	NA	3	NA	100%	NA	6.00	NA	13.00	NA	9.00	NA	8.00	NA	3.61	NA	NA	NA
Gross Beta	pCi/g	0	3	NA	3	NA	100%	NA	21.00	NA	27.00	NA	24.00	NA	24.00	NA	3.00	NA	NA	NA
Actinium-228	pCi/g	0	3	NA	3	NA	100%	NA	0.68	NA	0.84	NA	0.77	NA	0.78	NA	0.08	NA	NA	NA
Bismuth -214	pCi/g	35	103	27	99	77%	96%	0.60	0.05	2.60	3.00	1.35	1.69	1.40	1.70	0.47	0.65	YES	YES	NO
Cesium-137	pCi/g	35	100	12	84	34%	84%	0.05	0.05	0.70	1.50	0.32	0.51	0.30	0.40	0.22	0.37	YES	NO	NO
Cobalt-57	pCi/g	35	100	5	34	14%	34%	0.05	0.05	0.10	0.30	0.06	0.08	0.05	0.05	0.02	0.05	NO	NO	NO
Cobalt-60	pCi/g	35	100	6	73	17%	73%	0.05	0.05	0.40	0.70	0.13	0.25	0.10	0.20	0.08	0.17	YES	NO	NO
Lead-210	pCi/g	35	100	5	64	14%	64%	0.60	0.60	21.10	72.30	5.62	9.25	3.43	5.60	5.35	11.60	YES	YES	NO
Lead-211	pCi/g	35	100	4	56	11%	56%	0.40	0.35	10.75	20.10	3.20	5.36	2.15	3.70	3.13	5.02	YES	YES	NO
Lead-214	pCi/g	35	103	33	96	94%	93%	0.60	0.05	2.50	2.90	1.48	1.54	1.45	1.68	0.44	0.68	NO	NO	NO
Plutonium-239	pCi/g	35	100	8	20	23%	20%	0.05	0.05	0.25	0.25	0.13	0.09	0.11	0.10	0.05	0.05	NO	NO	NO
Promethium-147	pCi/g	29	5	10	1	34%	20%	2.10	3.25	17.80	16.50	6.43	6.47	4.15	4.20	4.70	5.62	NO	NO	NO
Radium-223	pCi/g	35	100	1	11	3%	11%	0.10	0.15	0.70	1.50	0.22	0.33	0.20	0.25	0.10	0.28	YES	NO	NO
Radium-226	pCi/g	35	100	27	90	77%	90%	0.60	0.05	2.60	3.00	1.36	1.63	1.40	1.70	0.47	0.73	YES	YES	NO
Radium-228	pCi/g	35	100	34	92	97%	92%	1.00	0.05	3.50	3.60	1.73	1.91	1.65	2.00	0.51	0.76	YES	NO	NO
Thallium-208	pCi/g	0	3	NA	3	NA	100%	NA	0.26	NA	0.41	NA	0.35	NA	0.39	NA	0.08	NA	NA	NA
Thorium-227	pCi/g	29	0	8	NA	28%	NA	0.10	NA	0.55	NA	0.23	NA	0.25	NA	0.11	NA	NA	NA	NA
Thorium-230	pCi/g	35	100	9	52	26%	52%	0.20	0.05	2.70	2.30	0.54	0.73	0.32	0.70	0.53	0.64	NO	NO	NO
Thorium-232	pCi/g	35	100	34	91	97%	91%	0.25	0.05	2.00	1.90	0.98	1.05	0.90	1.20	0.36	0.43	NO	NO	NO
Thorium-234	pCi/g	0	3	NA	3	NA	100%	NA	0.30	NA	0.76	NA	0.48	NA	0.38	NA	0.25	NA	NA	NA
Tritium	pCi/g	35	100	6	56	17%	56%	0.05	0.05	30.23	418.00	1.68	28.13	0.05	0.50	5.81	64.91	YES	NO	NO
Uranium-233/234	pCi/g	35	100	17	77	49%	77%	0.05	0.05	1.90	1.90	0.46	0.74	0.10	0.80	0.46	0.41	YES	NO	NO
Uranium-235	pCi/g	35	100	19	37	54%	37%	0.05	0.05	0.40	0.40	0.11	0.09	0.10	0.05	0.08	0.06	NO	NO	NO
Uranium-238	pCi/g	35	100	27	98	77%	98%	0.05	0.05	1.40	1.80	0.67	0.87	0.75	0.90	0.40	0.28	YES	NO	NO

For the minimum, maximum, average, median, standard deviation and the the duplicates and samples were averaged together, the detects (no qualifier or J qualifier) were taken at full value, and all non-detects (U or UJ qualifier) were taken at half value

(1) The collection area includes Class 3, Building 813, Building 818, EM 11, EM-13, EM-37, EM-40, EM-7, EM-8, EM-10, EM-14, and EM-38

TABLE 4-21
Wilcoxon Rank Sum Calculations for
Comparison of Class 3 Soil to Background Soil
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Parameter	Site Compared to Background +DCGL Value					Site Compared to Background + Residential DCGL Value (1)					Site Compared to Background + Worker DCGL Value (2)				
	Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?	Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?	Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?
	BKGD	Class 3 (3)				BKGD	Class 3 (3)				BKGD	Class 3 (3)			
Bismuth -214	47.81	73.78	-3.509	1.645	YES	49.68	73.05	-3.156	1.645	YES	65.35	66.95	-0.215	1.645	NO
Cesium-137	50.80	70.71	-2.747	1.645	YES	109.59	47.07	-8.607	1.645	NO					
Cobalt-57	58.46	67.63	-1.524	1.645	NO										
Cobalt-60	44.85	73.10	-3.933	1.645	YES	95.04	52.92	-5.839	1.645	NO					
Lead-210	53.11	69.78	-2.291	1.645	YES	54.57	69.20	-2.010	1.645	YES	74.78	61.07	-1.885	1.645	NO
Lead-211	52.11	70.18	-2.484	1.645	YES	54.89	69.07	-1.948	1.645	YES	56.46	68.42	-1.640	1.645	NO
Lead-214	58.81	69.49	-1.444	1.645	NO										
Plutonium-239	86.05	56.53	-4.318	1.645	NO										
Promethium-147	17.84	22.60	-0.956	1.645	NO										
Radium-223	43.08	73.82	-4.392	1.645	YES	99.30	51.21	-6.733	1.645	NO					
Radium-226	48.38	71.68	-3.208	1.645	YES	50.16	70.97	-2.861	1.645	YES	64.70	65.12	-0.057	1.645	NO
Radium-228	53.05	69.80	-2.305	1.645	YES	64.35	65.26	-0.125	1.645	NO					
Thorium-230	66.92	64.23	-0.371	1.645	NO										
Thorium-232	56.78	68.30	-1.590	1.645	NO										
Tritium	43.81	73.52	-4.419	1.645	YES	83.65	57.50	-3.662	1.645	NO					
Uranium-233/234	49.53	71.22	-3.000	1.645	YES	111.00	46.50	-8.889	1.645	NO					
Uranium-235	73.54	61.57	-1.812	1.645	NO										
Uranium-238	51.43	70.46	-2.630	1.645	YES	111.00	46.50	-8.888	1.645	NO					

Zrs= Statistic for generated from Wilcoxon Rank Sum test

Z(1-alpha)= Maximum allowed probability that WRS test incorrectly indicates that the site and background datasets are distinguishable (alpha = 0.05)

Null Hypothesis: The populations from which the two data sets have been drawn have the same mean

WRS initially is preformed comparing site to background; if null hypothesis is accepted then no further comparisons needed. If null hypothesis is rejected then site is compared to background + residential scenerio,
if null hypothesis is accepted then no further comparisons needed. If null hypothesis is rejected then the site is compared to background + worker scenerio

(1) The most conservative DCGL value for the radionuclide in the residential scenerio was added to background

(2) The most conservative DCGL value for the radionuclide in the worker scenerio was added to background

(3) The collection area includes Class 3, Building 813, Building 818, EM 11, EM-13, EM-37, EM-40, EM-7, EM-8, EM-10, EM-14, and EM-38

NA = Not analyzed due to parameters only being requested during the Expanded Site Investigation and not the Remedial Investigation. Hence, there were no data for specific radionuclides collected for the background set to compare against the ESI data

Both groups need to be populated to perform Wilcoxon Rank Sum test. Radionuclides with unpopulated groups not found in table

TABLE 4-22
SOIL GAS SURVEY RESULTS
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

LOC_ID	EASTING	NORTHING	DCE (ppbv)	Benzene (ppbv)	TCE (ppbv)	Toluene (ppbv)	P-Xylenes (ppbv)	Total VOC's (ppm)
SG12-117	744788.15	1014017.44	0	0	6	0	0	6
SG12-118	744753.77	1014144.16	0	0	0	0	0	2.5
SG12-119	744780.51	1014135.67	0	132	461	11	0	4.5
SG12-120	744754.47	1014119.20	0	0	0	197	0	5.5
SG12-121	744783.07	1014115.95	452	3	1708	21	0	6.5
SG12-122	744716.61	1014092.63	0	0	0	250	14	8.5
SG12-123	744742.91	1014095.68	0	116	0	170	0	4
SG12-124	744740.94	1014061.87	0	0	0	0	0	5
SG12-125	744717.45	1014062.94	0	0	0	0	0	3
SG12-126	744789.48	1014089.23	0	146	0	250	141	5.5
SG12-127	744802.92	1014071.07	0	0	0	396	82	4
SG12-128	744712.63	1014027.25	0	0	0	0	0	4
SG12-129	744734.41	1014027.92	0	0	1	0	0	2
SG12-130	744740.94	1014028.57	0	0	6	12	0	10
SG12-131	744751.67	1014042.68	0	0	0	174	0	4.5
SG12-132	744781.56	1014044.11	0	0	55	123	0	5
SG12-133	744792.23	1014048.43	0	4	0	0	0	1.7
SG12-134	744769.45	1014028.58	0	0	89	190	0	10
SG12-135	744799.62	1014024.94	0	0	97	0	0	2.5
SG12-136	744806.19	1014041.64	0	0	54	281	0	3.5
SG12-137	744751.67	1014015.88	0	0	146	217	351	8.5
SG12-138	744781.31	1014015.31	0	0	138	36	0	2
SG12-139	744798.49	1014011.18	0	0	414	125	0	4.5
SG12-140	744808.85	1014019.00	0	0	206	275	0	4
SG12-141	744830.90	1014060.98	0	0	191	1.4	0	3.5
SG12-142	744838.89	1014009.81	0	43	0	147	10	4
SG12-143	744720.54	1013994.67	0	140	0	217	0	6
SG12-144	744741.82	1013995.32	4	0	39	94	0	4
SG12-145	744722.14	1013963.90	0	118	0	48	0	4.5
SG12-146	744742.26	1013964.33	0	0	0	0	0	4
SG12-147	744791.67	1013963.60	119	82	2407	22	0	6.5
SG12-148	744717.22	1013933.45	0	74	110	171	0	6
SG12-149	744737.13	1013933.49	0	0	0	0	0	3
SG12-150	744839.59	1013953.65	0	123	0	212	136	5.5
SG12-151	744797.15	1013929.76	0	0	958	32	0	4
SG12-152	744763.09	1013900.10	0	0	98	0	0	2.5
SG12-153	744787.04	1013901.07	0	0	31	0	0	2
SG12-154	744763.90	1013885.92	0	0	633	1	0	3
SG12-156	744784.73	1013889.06	0	0	224	144	0	3
SG12-156	744517.80	1013603.57	0	0	0	0	0	1.5
SG12-157	744543.15	1013604.50	0	0	0	10	0	3.5
SG12-158	744518.93	1013587.86	0	69	148	2	0	2
SG12-159	744544.70	1013589.40	0	0	0	0	0	3
SG12-160	744482.90	1013564.24	0	0	0	149	0	8.5
SG12-161	744502.90	1013567.33	0	0	193	2	0	6
SG12-162	744548.87	1013570.91	0	0	9.5	206	0	9
SG12-163	744562.91	1013571.21	0	94	0	12	0	4
SG12-164	744521.92	1013546.94	0	0	0	0	0	7
SG12-165	744550.98	1013550.80	0	0	245	180	0	3.5
SG12-166	744562.27	1013551.59	0	0	0	0	0	12.5
SG12-167	744503.80	1013538.20	0	4	0	13	0	4
SG12-168	744521.97	1013532.49	0	0	0	93	0	6.5
SG12-169	744540.29	1013540.47	0	0	0	320	0	28
SG12-170	744550.50	1013532.39	0	0	0	0	0	1

4.3.8.7 Surface Water, Sediment, and Groundwater Results

Presented in **Figure 4-5**, **Figure 4-6**, **Figure 4-7**, **Figure 4-8**, **Figure 4-9**, **Figure 4-10**, and **Figure 4-24** the Class III area surface water and sediment locations (**Table 4-S** and **Table 4-V**) are spread across the site and discussed in **Sections 4.4** and **4.5**. Similarly, **Figure 4-10** and **Table 4-X** present the groundwater exceedences and are discussed in **Section 4.6**.

4.3.9 Wastewater Treatment Plant

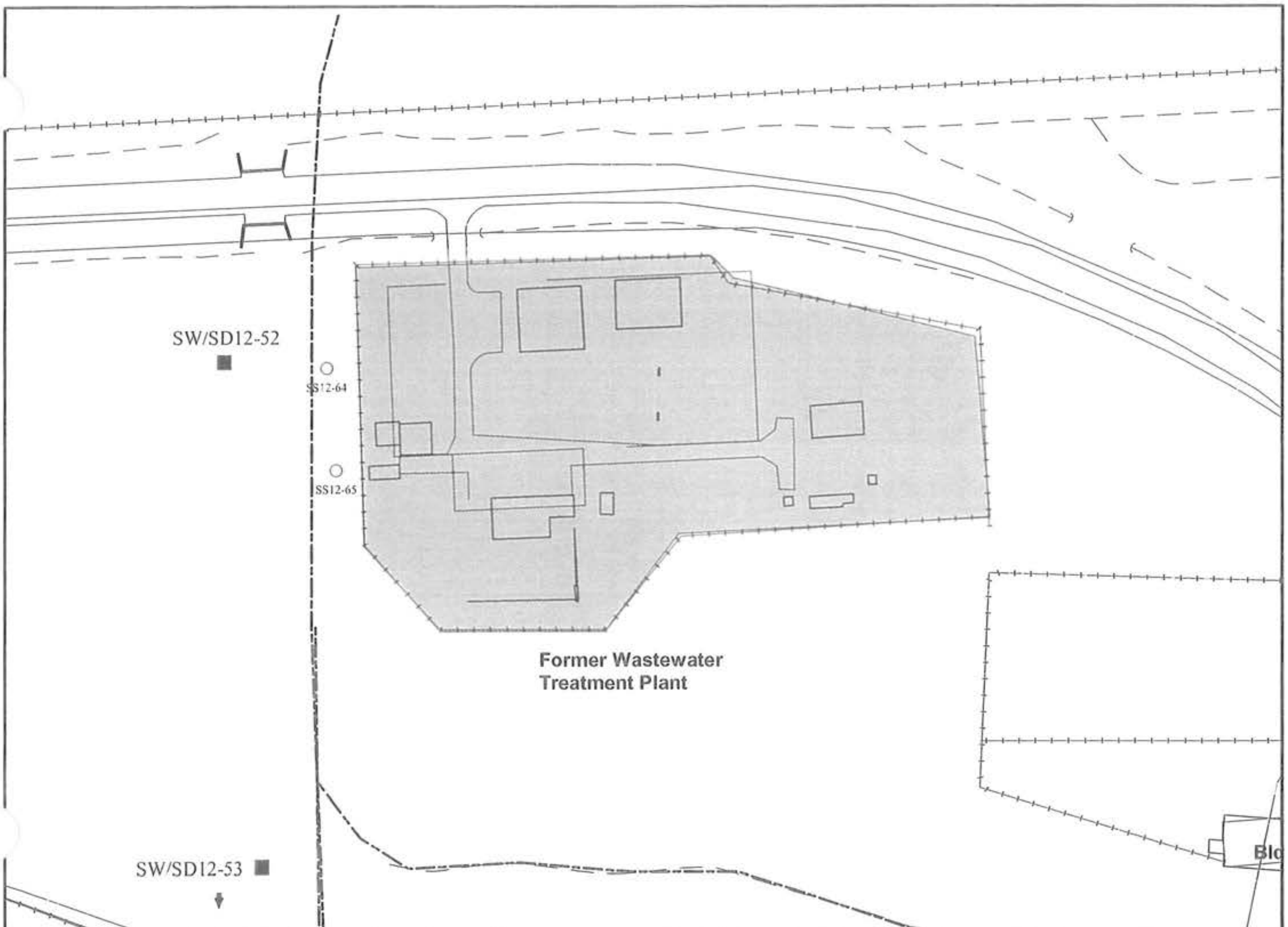
Investigations in the Wastewater Treatment Plant area included the collection of two surface soil chemical samples, with surface water and sediment samples collected downgradient to the area.

4.3.9.1 Surface Soil Results

Three surface soil chemical samples (including one duplicate) were collected at two sites downgradient of the Wastewater Treatment Plant area, **Figure 4-26**. **Table 4-Q,** located at the end of this section, presents the analytical data for all compounds detected in this release area. The results are summarized below.

Wastewater Treatment Surface Soil Constituents	Times Detected	Exceedences	Maximum Detection	TAGM
SVOCs – µg/kg				
Dibenz(a,h)anthracene	1	1	110	14
Metals – mg/kg				
Copper	3	3	60.3	33
Lead	3	3	34.4	24.4
Manganese	3	1	1240	1100
Mercury	3	3	0.48	0.1
Sodium	3	1	243	188
Thallium	1	1	1.5	0.855
Zinc	3	3	246	115

Thirty-four (34) analytes were detected in surface soils at the wastewater treatment plant. Sixteen (16) exceedences occurred from the 1 SVOC and 7 metals listed. Only dibenz(a,h)anthracene, mercury, and thallium exceed their TAGM value by more than a factor of 2. The maximum level of these three analytes were detect in SS12-64. The thallium and dibenz(a,h)anthracene detections were not confirmed in the duplicate collected for SS12-64.



Loc_id	Parameter	Value	Criteria Level	Units
SS12-64	Copper	57.3	33	MG/KG
	Lead	34.4	24.4	MG/KG
	Manganese	1240	110	MG/KG
	Mercury	0.48	0.1	MG/KG
	Thallium	1.5	0.855	MG/KG
	Zinc	206	115	MG/KG
	Dibenz(a,h)anthracene	110	14	UG/KG
SS12-65	Copper	50.3	33	MG/KG
	Lead	26.4	24.4	MG/KG
	Thallium	1.3	0.855	MG/KG
	Zinc	246	115	MG/KG

Note: The higher value between a sample and a duplicate sample was taken.

LEGEND

- SS12-153 — Surface Soil sample with Loc_ID analyzed for chemical and radiological parameters. No exceedences present
- SS12-153 — Surface Soil sample with Loc_ID analyzed for chemical and radiological parameters. Metal exceedences present
- SS12-153 — Surface Soil sample with Loc_ID analyzed for chemical and radiological parameters. Semi Volatile Organic exceedences present
- SS12-153 — Surface Soil sample with Loc_ID analyzed for chemical and radiological parameters. Metal and Semi Volatile Organic exceedences present
- SS12-153 — Surface Soil sample with Loc_ID analyzed radiological parameters only.
- SD12-153 — Sediment sample with Loc_ID
- SW12-153 — Surface Water sample with Loc_ID
- Potential Release Area

100 0 100
(feet)

PARSONS
PARSONS ENGINEERING SCIENCE, INC.

SENECA ARMY DEPOT ACTIVITY
RI/FS
SEAD-12

FIGURE 4-26
SURFACE SOIL EXCEEDENCES AT FORMER WASTEWATER TREATMENT PLANT

SCALE 1:100 | DATE NOV 2000 | REV | Sheet 1 of 1

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A full presentation of the analytical data collected for soil is provided in **Appendix G**

4.3.9.2 Subsurface Soil Results

No subsurface soils were collected from the Wastewater Treatment Plant area.

4.3.9.3 Radionuclide Soil Results

A total of three surface soil samples were analyzed for radionuclides. The analytical data are presented in **Appendix G**. Summary statistics comparing the Waste Water Treatment Plant area radionuclides in soils to background are presented in **Table 4-23**. This comparison includes number of samples, frequency of detection, minimum, maximum, average, median, and standard deviation. In addition, WRS test results comparing the site data set to the background data set are presented.

Four radionuclides in the Wastewater Treatment Plant area soils were found to be statistically above background. The parameters exceeding background are: Radium-223 (Ra-223), Thorium-230 (Th-230), Tritium, and Uranium-233/234 (U-233/234).

For the four radionuclides distinguishable from background in this area, $DCGL_W$s were added to the background data set as described in MARSSIM and in **Section 4.1.2.3** above. **Table 4-24** shows the results of the WRS test when compared to both residential and worker DCGLs. When compared to residential DCGLs, Th-230 exceeded DCGLs. When compared to worker DCGLs, no radionuclides exceeded DCGLs. .

4.3.9.4 Surface Water, Sediment, and Groundwater Results

Five collocated surface water and sediment locations (two upgradient and three downgradient) to the wastewater treatment plant were collected, **Figure 2-22** (SW/SD12-50 to –54, **Table 4-T** and **Table 4-W**). These locations are generally considered downgradient to SEAD-12 and are discussed with downgradient samples in **Section 4.5** and **Section 4.6**. No groundwater samples were collected from the area of the wastewater treatment plant.

4.3.10 Re-Sampling of Soil Locations Where Plutonium-239/240 Detected

Sixty-one surface soil locations were re-sampled for Pu-239/240 in December 1999. The re-sampling locations are shown in **Figure 2-13**. Pu-239/240 had been detected at or slightly above the laboratory reporting limit (0.1 pCi/g) at these locations. The purpose of the re-sampling

TABLE 4-23
Comparison of Summary Statistics in
Background Soil to Wastewater Plant Outfall Soil for Radionuclides
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Parameter	Units	No. of Samples		No. of Detections		Frequency of Detections		Minimum		Maximum		Average		Median		Std Dev		Above Background usin WRS?	Above Background + Residential DCGL using WRS?	Above Background+ Worker DCGL using WRS?
		BKGD	Waste Water Plant Outfall	BKGD	Waste Water Plant Outfall	BKGD	Waste Water Plant Outfall	BKGD	Waste Water Plant Outfall	BKGD	Waste Water Plant Outfall	BKGD	Waste Water Plant Outfall	BKGD	Waste Water Plant Outfall	BKGD	Waste Water Plant Outfall			
Gross Alpha	pCi/g	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gross Beta	pCi/g	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Actinium-228	pCi/g	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bismuth -214	pCi/g	35	3	27	3	77%	100%	0.60	1.60	2.60	1.90	1.35	1.75	1.40	1.75	0.47	0.21	NO	NO	NO
Cesium-137	pCi/g	35	3	12	2	34%	67%	0.05	0.05	0.70	0.50	0.32	0.28	0.30	0.28	0.22	0.32	NO	NO	NO
Cobalt-57	pCi/g	35	3	5	2	14%	67%	0.05	0.05	0.10	0.15	0.06	0.10	0.05	0.10	0.02	0.07	NO	NO	NO
Cobalt-60	pCi/g	35	3	6	2	17%	67%	0.05	0.05	0.40	0.30	0.13	0.18	0.10	0.18	0.08	0.18	NO	NO	NO
Lead-210	pCi/g	35	3	5	3	14%	100%	0.60	4.25	21.10	4.40	5.62	4.33	3.43	4.33	5.35	0.11	NO	NO	NO
Lead-211	pCi/g	35	3	4	1	11%	33%	0.40	1.60	10.75	7.78	3.20	4.69	2.15	4.69	3.13	4.37	NO	NO	NO
Lead-214	pCi/g	35	3	33	3	94%	100%	0.60	1.30	2.50	1.75	1.48	1.53	1.45	1.53	0.44	0.32	NO	NO	NO
Plutonium-239	pCi/g	35	3	8	0	23%	0%	0.05	0.05	0.25	0.10	0.13	0.08	0.11	0.08	0.05	0.04	NO	NO	NO
Promethium-147	pCi/g	29	0	10	NA	34%	NA	2.10	NA	17.80	NA	6.43	NA	4.15	NA	4.70	NA	NA	NA	NA
Radium-223	pCi/g	35	3	1	0	3%	0%	0.10	0.30	0.70	0.30	0.22	0.30	0.20	0.30	0.10	0.00	YES	NO	NO
Radium-226	pCi/g	35	3	27	3	77%	100%	0.60	0.16	2.60	1.90	1.36	1.75	1.40	1.75	0.47	0.21	NO	NO	NO
Radium-228	pCi/g	35	3	34	3	97%		1.00	1.95	1.50	2.00	1.73	1.97	1.65	1.97	0.51	0.04	NO	NO	NO
Thallium-208	pCi/g	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thorium-227	pCi/g	29	0	8	NA	28%	NA	0.10	NA	0.55	NA	0.23	NA	0.25	NA	0.11	NA	NA	NA	NA
Thorium-230	pCi/g	35	3	9	3	26%	100%	0.20	0.90	2.70	1.15	0.54	1.03	0.32	1.03	0.53	0.18	YES	YES	NO
Thorium-232	pCi/g	35	3	34	3	97%	100%	0.25	1.00	2.00	1.20	0.98	1.10	0.90	1.10	0.36	0.14	NO	NO	NO
Thorium-234	pCi/g	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tritium	pCi/g	35	3	6	3	17%	100%	0.05	4.30	30.23	41.70	1.68	23.00	0.05	23.00	5.81	26.45	YES	NO	NO
Uranium-233/234	pCi/g	35	3	17	3	49%	100%	0.05	0.80	1.90	1.10	0.46	0.95	0.10	0.95	0.46	0.21	YES	NO	NO
Uranium-235	pCi/g	35	3	19	1	54%	33%	0.05	0.05	0.40	0.10	0.11	0.08	0.10	0.08	0.08	0.04	NO	NO	NO
Uranium-238	pCi/g	35	3	27	3	77%	100%	0.05	0.90	1.40	1.10	0.67	1.00	0.75	1.00	0.40	0.14	NO	NO	NO

For the minimum, maximum, average, median, standard deviation, and the the duplicates and samples were averaged together, the 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 4-24
Wilcoxon Rank Sum Calculations for
Comparison of Wastewater Plant Outfall Soil to Background Soil for Radionuclides
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Parameter	Site Compared to Background +DCGL Value: Wilcoxon Mean Rank BKGD	Wilcoxon Mean Rank Waste Water Plant Outfall	Zrs	Z (1-alpha)	Reject Null Hypothesis?
Bismuth-214	19.34	32.25	-1.565	1.645	NO
Cesium-137	20.18	16.75	-0.416	1.645	NO
Cobalt-57	19.62	27.00	-1.174	1.645	NO
Cobalt-60	19.89	22.00	-0.262	1.645	NO
Lead-210	19.84	23.00	-0.382	1.645	NO
Lead-211	19.65	26.50	-0.829	1.645	NO
Lead-214	19.89	22.00	-0.256	1.645	NO
Plutonium-239	20.70	7.00	-1.796	1.645	NO
Radium-223	19.11	36.50	-2.199	1.645	YES
Radium-226	19.34	32.25	-1.565	1.645	NO
Radium-228	19.66	26.25	-0.798	1.645	NO
Thorium-230	19.26	33.75	-1.76	1.645	YES
Thorium-232	19.65	26.50	-0.833	1.645	NO
Tritium	19.08	37.00	-3.068	1.645	YES
Uranium-233/234	19.30	33.00	-1.701	1.645	YES
Uranium-235	16.50	20.19	-0.480	1.645	NO
Uranium-238	19.39	31.25	-1.452	1.645	NO

Parameter	Site Compared to Background + Residential DCGL Value (1): Wilcoxon Mean Rank BKGD	Wilcoxon Mean Rank Waste Water Plant Outfall	Zrs	Z (1-alpha)	Reject Null Hypothesis?
Bismuth-214					
Cesium-137					
Cobalt-57					
Cobalt-60					
Lead-210					
Lead-211					
Lead-214					
Plutonium-239					
Radium-223	20.95	2.50	-2.331	1.645	NO
Radium-226					
Radium-228					
Thorium-230	19.27	33.50	-1.729	1.645	YES
Thorium-232					
Tritium	20.00	20.00	0.000	1.645	NO
Uranium-233/234	21.00	1.50	2.419	1.645	NO
Uranium-235					
Uranium-238					

Parameter	Site Compared to Background + Worker DCGL Value (2): Wilcoxon Mean Rank BKGD	Wilcoxon Mean Rank Waste Water Plant Outfall	Zrs	Z (1-alpha)	Reject Null Hypothesis?
Bismuth-214					
Cesium-137					
Cobalt-57					
Cobalt-60					
Lead-210					
Lead-211					
Lead-214					
Plutonium-239					
Radium-223					
Radium-226					
Radium-228					
Thorium-230	20.70	7.00	-1.665	1.645	NO
Thorium-232					
Tritium					
Uranium-233/234					
Uranium-235					
Uranium-238					

Zrs= Statistic for generated from Wilcoxon Rank Sum test

Z(1-alpha)= Maximum allowed probability that WRS test incorrectly indicates that the site and background datasets are distinguishable (alpha= 0.05)

Null Hypothesis: The populations from which the two data sets have been drawn have the same mean.

WRS initially is preformed comparing site to background; it null hypothesis is accepted then no further comparisons needed. If null hypothesis is rejected then site is compared to background + residential scenerio;
if null hypothesis is accepted then no further comparisons needed. If null hypothesis is rejected then the site is compared to background + worker scenerio.

(1) The most conservative DCGL value for the radionuclide in the residential scenerio was added to background.

(2) The most conservative DCGL value for the radionuclide in the worker scenerio was added to background.

NA= Not analyzed due to parameters only being requested during the Expanded Site Investigation and not the Remedial Investigation. Hence, there were no data for specific radionuclides collected for the background set to compare against the ESI data.

Both groups need to be populated to perform Wilcoxon Rank Sum test. Radionuclides with unpopulated groups not found in table effort was to verify that the activity of Pu-239/Pu-240 were actually lower than what was initially reported and that reported detections were a function of analytical anomalies. During the re-sampling effort, a lower detection limit (0.01 pCi/g) was requested from the laboratory. A table comparing the Pu-239/240 results of the original soil sampling and the re-sampling effort are shown in **Table 4-25**. The maximum detected activity of Pu-239/240 during the re-sampling event was 0.077 pCi/g, and the average detection was 0.013 pCi/g. The re-sampling effort confirmed that the level of the Pu-239/240 detections observed during the initial sampling event were a function of the detection limit requested and not actual levels present.

4.4 SURFACE WATER RESULTS

The surface water sampling results are presented in **Figure 4-5** and **Figure 4-6**. Samples were collected from three areas: on site (**Figure 2-15**), downgradient of the site (**Figure 2-16**, off-site locations), and upgradient of the site (**Figure 2-16**, background). Samples collected from on site and downgradient of the site were analyzed for both chemical constituents (VOCs, SVOCs, pesticides/PCBs, and metals/inorganics) and radionuclides. Samples collected from upgradient of the site (background) were analyzed for metals and radionuclides only.

4.4.1 Surface Water Chemical Results

The following are the chemical analytical results for all analytes other than radionuclides. These results are presented by sample area (i.e. background, SEAD-12, or downgradient).

4.4.1.1 Background Surface Water Results

Nine surface water samples were collected from upgradient of the SEAD-12 area and analyzed for metals shown in **Figure 2-15**. **Table 4-R,** located at the end of this section, presents the analytical data for all compounds detected in background surface water. The results are summarized below.

Surface Water Background Constituents	Times Detected	Exceedences	Maximum Detection	Regulatory Standard
Metals (ug/L)				
Aluminum	9	1	140	100

Eleven (11) metals were detected in the background surface water samples. Aluminum detected in one sample exceeded the NYS AWQS Class C standard.

A full presentation of the analytical data collected for surface water is provided in **Appendix I.**

Table 4-25
Plutonium-239/240 Re-Sampling Results for Surface Soils
SEAD-12 Remedial Investigation
Seneca Army Depot Activity

			Original Sampling Event (1997/1998)			December 1999 Sampling Event		
Potential Release Area	Sample Location	QC Code	Laboratory Result - pCi/g	Qualifier	Result Error +/-	Laboratory Result - pCi/g	Qualifier	Result Error +/-
EM-5	SS12-103	SA	0.2		0.2	0.00979	J	0.01
EM-5	SS12-112	SA	0.1		0.1	0.00904	J	0
EM-5	SS12-112 (1)	DU				0.0086	J	0.01
EM-6	SS12-90	SA	0.2	J	0.2	0.00535	U	0
EM-6	SS12-94	SA	0.2	J	0.1	0.00266	U	2
EM-6	SS12-94	DU	0.1		0.2	0.3	U	0.2
EM-6	SS12-99	SA	0.2	J	0.2	0.00525	U	0
DISPOSAL_PIT_A/B	SS12-167	SA	0.1		0.1	0.00697	J	0
DISPOSAL_PIT_A/B	SS12-170	SA	0.1		0.1	0.0152		0.01
DISPOSAL_PIT_A/B	SS12-172	SA	0.1		0.1	0.0146		0.01
DISPOSAL_PIT_A/B	SS12-175	SA	0.1		0.1	0.0147		0.01
DISPOSAL_PIT_A/B	SS12-175 (1)	DU				0.0226		0.01
DISPOSAL_PIT_A/B	SS12-176	SA	0.1		0.1	0.0133		0.01
DISPOSAL_PIT_A/B	SS12-179	SA	0.1		0.1	0.00448	U	0
DISPOSAL_PIT_A/B	SS12-183	SA	0.1		0.1	0.00616	U	0
DISPOSAL_PIT_A/B	SS12-187	SA	0.1		0.1	0.00468	U	0
DISPOSAL_PIT_A/B	SS12-188	SA	0.1		0.1	0.0045	U	0
DISPOSAL_PIT_A/B	SS12-197	SA	0.1		0.1	0.0112		0.01
DISPOSAL_PIT_A/B	SS12-199	SA	0.1		0.1	0.0136		0.01
DISPOSAL_PIT_C	SS12-148	SA	0.1		0.1	0.0116		0.01
DISPOSAL_PIT_C	SS12-155	SA	0.1		0.1	0.00245	J	0
DISPOSAL_PIT_C	SS12-158	SA	0.1		0.1	0.00403	U	0
DISPOSAL_PIT_C	SS12-201	SA	0.1	UJ	0.1	0.0127		0
DISPOSAL_PIT_C	SS12-201	DU	0.1		0.1	0.0127		0
DISPOSAL_PIT_C	SS12-207	SA	0.2		0.1	0.00737	J	0
DISPOSAL_PIT_C	SS12-210	SA	0.1	UJ	0.1	0.00444	UJ	0.1
DISPOSAL_PIT_C	SS12-218	SA	0.2		0.1	0.00387	J	0
DISPOSAL_PIT_C	SS12-228	SA	0.1		0.1	0.00458	U	0
FORMER DRY WASTE DISPOSAL PIT	SS12-127	SA	0.1		0.1	0.00499	J	0
FORMER DRY WASTE DISPOSAL PIT	SS12-129	SA	0.1		0.1	0.0105		0
FORMER DRY WASTE DISPOSAL PIT	SS12-134	SA	0.1		0.1	0.0138		0.01
FORMER DRY WASTE DISPOSAL PIT	SS12-135	SA	0.1		0.1	0.00864	J	0.01
FORMER DRY WASTE DISPOSAL PIT	SS12-136	SA	0.1	J	0.1	0.0105		0.01

Table 4-25
Plutonium-239/240 Re-Sampling Results for Surface Soils
SEAD-12 Remedial Investigation
Seneca Army Depot Activity

			Original Sampling Event (1997/1998)			December 1999 Sampling Event		
Potential Release Area	Sample Location	QC Code	Laboratory Result - pCi/g	Qualifier	Result Error +/-	Laboratory Result - pCi/g	Qualifier	Result Error +/-
FORMER DRY WASTE DISPOSAL PIT	SS12-137	SA	0.1		0.1	0.00685	U	0
FORMER DRY WASTE DISPOSAL PIT	SS12-139	SA	1		0.6	0.00366	U	0
FORMER DRY WASTE DISPOSAL PIT	SS12-140	SA	0.1		0.1	0.0117		0.01
FORMER DRY WASTE DISPOSAL PIT	SS12-141	SA	0.2	UJ	0.1	0.006	U	0
FORMER DRY WASTE DISPOSAL PIT	SS12-141	DU	0.2		0.1	0.006	U	0
FORMER DRY WASTE DISPOSAL PIT	SS12-145	SA	0.1		0.1	0.00514	U	0
CLASS_3	SS12-21	SA	0.1	J	0.1	0.00972	J	0.01
CLASS_3	SS12-233	SA	0.2		0.1	0.005	U	0
CLASS_3	SS12-24	SA	0.1	J	0.1	0.00161	U	0
CLASS_3	SS12-26	SA	0.1	J	0.1	0.0139		0.01
CLASS_3	SS12-34	SA	0.1	J	0.1	0.0143		0.01
CLASS_3	SS12-36	SA	0.2	J	0.1	0.00835	J	0.01
CLASS_3	SS12-39	SA	0.1	J	0.1	0.00927	J	0
CLASS_3	SS12-42	SA	0.1	J	0.1	0.00614	J	0
CLASS_3	SS12-46	SA	0.2	J	0.1	0.0174		0.01
CLASS_3	SS12-49	SA	0.1	UJ	0.1	0.0179		0.01
CLASS_3	SS12-49	DU	0.1	J	0.1	0.0179		0.01
CLASS_3	SS12-51	SA	0.1		0.1	0.0131		0.01
CLASS_3	SS12-52	SA	0.1		0.1	0.01		0
CLASS_3	SS12-53	SA	0.1		0.1	0.0181		0.01
CLASS_3	SS12-58	SA	0.1		0.1	0.024		0.01
CLASS_3	SS12-68	SA	0.1	J	0.1	0.00522	U	0
CLASS_3	SS12-236	SA	0.2		0.1	0.0095	J	0.01
BACKGROUND	MW12-1	SA	0.2	J	0.3	0.0141		0.01
BACKGROUND	MW12-1 (1)	DU				0.0222		0.01
BACKGROUND	MW12-3	SA	0.2	J	0.2	0.00761	J	0
BACKGROUND	SS12-13	SA	0.2	U	0.1	0.077		0.02
BACKGROUND	SS12-14	SA	0.3	UJ	0.1	0.007	J	0
BACKGROUND	SS12-9	SA	0.2	U	0.1	0.009	J	0.01

4.4.1.2 SEAD-12 Surface Water Results

Fifty-two surface water samples were collected from within the SEAD-12 area, **Figure 2-1**, **Figure 4-5** and **Figure 4-6**. Locations associated with individual potential release areas were shown above with the area surface soil locations. **Table 4-S** presents the analytical data for all compounds detected in the SEAD-12 surface water. The results are summarized below.

SEAD-12 Surface Water Constituents	Times Detected	Exceedences	Maximum Detection	Regulatory Standard
SVOCs - ug/L				
Bis(2-Ethylhexyl)phthalate		2	12	0.6
Pesticides/PCBs (ug/L)				
4,4'-DDE		1	0.0056	0.000007
4,4'-DDT		1	0.062	0.00001
Aldrin		1	0.0041	0.001
Heptachlor		3	0.0063	0.0002
Heptachlor epoxide		2	0.0033	0.0003
Hexachlorobenzene		3	0.02	0.00003
Metals (ug/L)				
Aluminum		19	3430	100
Cobalt		1	6	5
Copper		2	27.6	17.4
Iron		12	6830	300
Lead		4	35.4	1.46
Mercury		5	0.11	0.0007
Silver		6	1.6	0.1

Forty-eight (48) analytes were detected in the SEAD-12 surface water samples. Sixty-two (62) exceedences occurred as a result of bis(2-Ethylhexyl) phthalate, the six pesticides, and the seven metals listed above. Bis(2-Ethylhexyl)phthalate, each of the six pesticides, and six of the metals exceed the regulatory value by more than a factor of 2.

The locations of site-wide groundwater exceedences for SVOCs and Pesticides/ PCBs, and metals exceedences are shown in **Figure 4-5** and **Figure 4-6,** respectively. Most of the pesticide exceedences that occurred in on-site samples were detected below laboratory quantitation limits. Only a few were detected above the quantitation limit and none were detected greater than two times the quantitation limit. The maximum detection of lead occurred in SW12-25 north of Building 819. The maximum detection of aluminum, cobalt and iron were detected in SW12-35 north of Building 815/816. Mercury in sediments was detected in three of six samples along the unnamed creek south of Disposal Pits A/B. A detailed discussion of these results is presented in **Section 4.7.2**

A full presentation of the analytical data collected for surface water is provided in **Appendix I.**

4.4.1.3 Downgradient Surface Water Results

Twelve surface water samples were collected downgradient of SEAD-12. **Table 4-T**, located at the end of this section, presents the analytical data for all compounds detected in the downgradient surface water. The results are summarized below.

Surface Water Downgradient Constituents	Times Detected	Exceedences	Maximum Detection	Regulatory Standard
Pesticides/PCBs - ug/L				
Hexachlorobenzene	1	1	0.013	0.00003

Sixteen (16) analytes were detected in the downgradient surface water samples. Only one exceedence occurred in one sample SW12-48. Hexachlorobenzene was detected slightly above its laboratory quantitation limit of 0.01 ug/L in this sample.

A full presentation of the analytical data collected for surface water is provided in **Appendix I.**

4.4.2 Surface Water Radiological Results

The results from the radionuclide analyses of surface water samples are discussed below. Background and SEAD-12 samples were analyzed for twenty radionuclides. Downgradient samples were analyzed for the same radionuclides except for Promethium-147 (Pm-147).

4.4.2.1 Background Surface Water Radionuclide Results

All 20 radionuclides were detected in at least one of the 9 background samples. The results of the background radionuclide analyses are presented in **Appendix I.**

4.4.2.2 SEAD-12 Surface Water Radionuclide Results

Seventeen of the 20 radionuclides analytes were detected in at least one of the 51 SEAD-12 samples. The results of the SEAD-12 radionuclide analyses are presented as **Appendix I.** Four samples from SEAD-12 exceed the proposed Federal MCL for Radon-222. The maximum detection was 401 pCi/L and the proposed MCL is 300 pCi/L.

Table 4-26 presents the summary statistics for the surface water radionuclide samples compared to the background data set. These statistics compare the SEAD-12 data set to the background data set, listing the number of samples, number of detections, minimum, maximum, average, median, standard deviation, and the comparison to background using the WRS test. Based on the WRS test, five (5) radionuclides (Radon-222, Thorium-227, Thorium-230, Thorium-232, and Uranium-233/234) have sample means statistically greater than the background data set.

4.4.2.3 Downgradient Surface Water Radionuclide Results

Fourteen of the 19 downgradient surface water radionuclide analytes were detected in at least one of the 12 background samples. The results of the downgradient radionuclide analyses are presented in **Appendix I.** No radionuclides detected in downgradient samples exceeded established guidelines or standards for radionuclides in surface water.

Table 4-27 presents the summary statistics for the downgradient surface water radionuclide samples compared to the background data set. These statistics compare the downgradient data set to the background data set, listing number of samples, number of detections, minimum, maximum, average, median, standard deviation, and the comparison to background using the WRS test. Based on the WRS test, three radionuclides (Radium-226, Uranium 233/234, and Uranium 238) from downgradient samples have populations statistically higher than the background data set.

4.5 SEDIMENT RESULTS

The sediment sampling results are presented below. Samples were collected from three areas: on site, downgradient of the site, and upgradient of the site (background). Samples collected from on site and downgradient of the site were analyzed for both chemical constituents (VOCs, SVOCs, pesticides/PCBs, and metals/inorganics) and radionuclides. Samples collected from upgradient of the site (background) were analyzed for metals and radionuclides only. The results from gamma radiation scanning in select drainage areas are also presented.

TABLE 4-26
Comparison of Summary Statistics in
Background Surface Water to SEAD-12 Surface Water for Radionuclides
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Parameter	Units	No. of Samples		No. of Detections		Frequency of Detections		Minimum		Maximum		Average		Median		Std Dev		Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?	Above Background using WRS?
		BKGD	SEAD-12	BKGD	SEAD-12	BKGD	SEAD-12	BKGD	SEAD-12	BKGD	SEAD-12	BKGD	SEAD-12	BKGD	SEAD-12	BKGD	SEAD-12	BKGD	SEAD-12				
Gross Alpha	pCi/L	9	51	4	30	44%	59%	0.40	-1.00	11.50	14.50	3.63	2.34	1.25	2.00	4.08	3.24	32.06	29.03	-0.494	-1.645	NO	NO
Gross Beta	pCi/L	9	51	5	37	56%	73%	1.10	0.10	27.40	80.80	9.57	8.43	3.10	6.00	11.45	14.42	32.00	29.04	-0.484	-1.645	NO	NO
Bismuth -214	pCi/L	9	47	9	31	100%	66%	10.40	0.95	21.90	34.60	16.60	11.38	16.70	8.60	3.47	7.48	40.00	26.65	-2.457	-1.645	NO	NO
Cesium-137	pCi/L	9	47	0	0	0%	0%	0.35	0.15	3.10	3.30	1.61	1.15	1.45	0.68	0.96	0.84	35.33	26.57	-1.502	-1.645	NO	NO
Cobalt-57	pCi/L	9	47	0	0	0%	0%	0.15	0.05	0.70	1.45	0.37	0.31	0.35	0.25	0.16	0.24	36.94	26.25	-1.848	-1.645	NO	NO
Cobalt-60	pCi/L	9	47	0	6	0%	13%	0.20	0.15	4.00	9.20	1.51	2.22	1.45	1.43	1.24	2.03	23.22	28.93	-0.979	-1.645	NO	NO
Lead-211	pCi/L	9	47	1	1	11%	2%	4.65	2.20	464.00	352.00	108.51	51.47	98.00	8.38	145.23	80.75	32.33	27.15	-0.887	-1.645	NO	NO
Lead-214	pCi/L	9	47	3	27	33%	57%	1.05	0.75	16.[illegible]	28.80	9.61	8.30	9.20	9.15	5.82	5.58	32.28	27.16	-0.876	-1.645	NO	NO
Plutonium-239/240	pCi/L	9	47	0	0	0%	0%	0.05	0.05	0.15	0.25	0.11	0.12	0.10	0.10	0.03	0.04	22.28	29.12	-1.332	-1.645	NO	NO
Promethium-147	pCi/L	7	23	2	1	29%	4%	27.40	27.40	61.30	70.60	39.13	32.80	32.85	34.90	14.08	8.69	18.36	19.93	-1.277	-1.645	NO	NO
Radium-223	pCi/L	9	47	0	13	0%	28%	0.25	0.05	0.25	3.00	0.25	0.60	0.25	0.25	0.00	0.88	28.00	28.00	0.000	-1.645	NO	NO
Radium-226	pCi/L	9	47	0	14	0%	30%	0.25	0.10	0.25	0.50	0.25	0.23	0.25	0.25	0.00	0.08	31.00	27.41	-0.644	-1.645	NO	NO
Radon-222	pCi/L	9	47	4	30	44%	64%	26.80	14.85	68.80	401.00	40.28	87.97	36.70	81.75	15.39	94.26	16.67	30.22	2.321	-1.645	YES	YES
Thorium-227	pCi/L	9	47	3	9	33%	19%	0.10	0.05	0.15	1.40	0.11	0.23	0.10	0.33	1.67	0.21	14.67	30.61	2.847	-1.645	YES	YES
Thorium-230	pCi/L	9	47	0	8	0%	17%	0.10	0.10	0.15	2.20	0.13	0.46	0.15	0.68	0.03	0.53	13.33	30.87	3.057	-1.645	YES	YES
Thorium-232	pCi/L	9	47	2	12	22%	26%	0.10	0.10	0.15	0.55	0.11	0.21	0.10	0.33	0.02	0.13	15.89	30.37	2.646	-1.645	YES	YES
Tritium	pCi/L	9	47	4	35	44%	74%	13.50	4.50	158.00	432.00	119.01	157.55	144.50	160.50	48.89	103.61	20.00	27.29	-1.335	-1.645	NO	NO
Uranium-233/234	pCi/L	9	47	0	13	0%	28%	0.10	0.10	0.15	0.15	0.11	0.12	0.10	0.15	0.02	0.02	17.89	29.98	2.212	-1.645	YES	YES
Uranium-235	pCi/L	9	47	6	12	67%	26%	0.05	0.05	0.10	0.20	0.09	0.09	0.10	0.10	0.02	0.03	28.89	27.83	-0.230	-1.645	NO	NO
Uranium-238	pCi/L	9	47	4	22	44%	47%	0.05	0.05	0.30	0.70	0.02	0.19	0.10	0.10	0.08	0.16	20.83	29.40	-1.548	-1.645	NO	NO

For the minimum, maximum, average, median, standard deviation, and the the duplicates and samples were averaged together, the detects (no qualifier or J qualifier) were taken at full value, and all non-detects (U or UJ qualifier) were taken at half value

Zrs= Statistic for radionuculide generated from Wilcoxon Rank Sum test

Z(1-alpha)= Maximum allowed probability that WRS test incorrectly indicates that the site and background datasets are distinguishable (alpha= 0.05)

Null Hypothesis: The populations from which the two data sets have been drawn have the same mean

TABLE 4-27
Comparison of Summary Statistics in
Background Surface Water to Downgradient Surface Water for Radionuclides
SEAD-12 Remedial Investigation
Seneca Army Depot Activity

Parameter	Units	No. of Samples		No. of Detections		Frequency of Detections		Minimum		Maximum		Average		Median		Std Dev		Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?	Above Background using WRS?
		BKGD	DOWNGRADIENT	BKGD	DOWNGRADIENT	BKGD	DOWNGRADIENT	BKGD	WNGRADI	BKGD	DOWNGRADIENT	BKGD	DOWNGRADIENT	BKGD	DOWNGRADIENT	BKGD	DOWNGRADIENT	BKGD	DOWNGRADIENT				
Gross Alpha	pCi/L	9	12	4	6	44%	50%	0.40	0.60	11.50	2.20	3.63	1.30	1.25	1.45	4.08	0.51	10.78	10.27	-0.191	-1.645	NO	NO
Gross Beta	pCi/L	9	12	5	8	56%	67%	1.10	1.25	27.40	24.60	9.57	8.08	3.10	8.35	11.45	7.25	9.78	11.09	-0.495	-1.645	NO	NO
Bismuth -214	pCi/L	9	12	9	10	100%	83%	10.40	6.25	21.90	6.25	16.60	20.53	16.70	18.10	3.47	8.36	8.89	11.82	-1.102	-1.645	NO	NO
Cesium-137	pCi/L	9	12	0	0	0%	0%	0.15	0.55	3.10	0.55	1.61	1.69	1.45	1.35	0.96	1.11	10.56	10.45	-0.038	-1.645	NO	NO
Cobalt-57	pCi/L	9	12	0	0	0%	0%	0.15	0.15	0.70	0.15	0.37	0.32	0.35	0.35	0.16	0.11	11.33	9.82	-0.579	-1.645	NO	NO
Cobalt-60	pCi/L	9	12	0	0	0%	0%	0.20	0.30	4.00	0.30	1.51	1.70	1.45	1.65	1.24	0.96	9.61	11.23	-0.608	-1.645	NO	NO
Lead-211	pCi/L	9	12	1	0	11%	0%	4.65	5.00	464.00	5.00	108.51	107.67	98.00	16.15	145.23	139.86	9.78	11.09	-0.494	-1.645	NO	NO
Lead-214	pCi/L	9	12	3	8	33%	67%	1.05	7.55	16.30	7.55	9.61	13.30	9.20	12.55	5.82	4.57	8.56	12.09	-1.330	-1.645	NO	NO
Plutonium-239	pCi/L	9	12	0	0	0%	0%	0.05	0.10	0.15	0.15	0.11	0.11	0.10	0.10	0.03	0.02	10.22	10.73	-0.251	-1.645	NO	NO
Promethium-147	pCi/L	7	0	2	NA	29%	NA	27.40	NA	61.30	NA	39.13	NA	32.85	NA	14.08	NA	4.00	NA	NA	-1.645	NO	NO
Radium-223	pCi/L	9	12	0	3	0%	25%	0.25	0.10	0.25	0.25	0.25	0.23	0.25	0.25	0.00	0.05	11.50	9.68	-1.312	-1.645	NO	NO
Radium-226	pCi/L	9	12	0	3	0%	25%	0.25	0.10	0.25	0.27	0.25	0.24	0.25	0.27	0.00	0.05	8.00	12.55	1.920	-1.645	YES	YES
Radon-222	pCi/L	9	12	4	12	44%	100%	26.80	11.80	68.80	106.00	40.28	44.61	36.70	36.40	15.39	27.14	10.44	10.55	-0.038	-1.645	NO	NO
Thorium-227	pCi/L	9	12	3	1	33%	8%	0.10	0.10	0.15	0.15	0.11	0.11	0.10	0.10	1.67	0.03	9.11	11.64	-1.265	-1.645	NO	NO
Thorium-230	pCi/L	9	12	0	1	0%	8%	0.10	0.10	0.15	0.80	0.13	0.20	0.15	0.15	0.03	0.20	9.83	11.05	-0.488	-1.645	NO	NO
Thorium-232	pCi/L	9	12	2	6	22%	50%	0.10	0.05	0.15	0.10	0.11	0.08	0.10	0.10	0.02	0.03	13.33	8.18	-2.416	-1.645	NO	NO
Tritium	pCi/L	9	12	4	12	44%	100%	13.50	36.00	158.00	324.00	119.01	188.92	144.50	207.00	48.89	36.00	8.11	12.45	-1.634	-1.645	NO	NO
Uranium-233/234	pCi/L	9	12	0	6	0%	50%	0.10	0.05	0.15	1.10	0.11	0.39	0.10	0.20	0.02	0.34	7.44	13.00	2.200	-1.645	YES	YES
Uranium-235	pCi/L	9	12	6	7	67%	58%	0.05	0.05	0.10	0.40	0.09	0.11	0.10	0.10	0.02	0.07	9.50	11.32	-0.848	-1.645	NO	NO
Uranium-238	pCi/L	9	12	4	12	44%	100%	0.05	0.10	0.30	0.50	0.02	0.35	0.10	0.40	0.08	0.14	5.89	14.27	3.201	-1.645	YES	YES

The Duplicate Samples and the Samples are averaged together for the minimum, maximum, average, median, standard deviation, and Wilcoxon Rank sum test.
Zrs= Statistic for radionuculide generated from Wilcoxon Rank Sum test
Z(1-alpha)= Maximum allowed probability that WRS test incorrectly indicates that the site and background datasets are distinguishable (alpha= 0.05)
Null Hypothesis: The populations from which the two data sets have been drawn have the same mean.

4.5.1 Sediment Chemical Results

Analytical results for all analytes other than radionuclides are presented in **Figure 4-7**, **Figure 4-8**, and **Figure 4-9,** and **Tables 4-U, 4-V,** and **4-W**. These results were discussed above when associated with an individual potential release area and are presented here by sample area (i.e., background, SEAD-12, and downgradient samples).

4.5.1.1 Background Sediment Results

The nine background sediment samples were analyzed for metals only. The results of detected analytes are presented in **Table 4-U,** located at the end of this section, and summarized below.

Background Sediment SEAD-12 Constituents	Times Detected	Exceedences	Maximum Detection	Regulatory Guideline
Metals - mg/kg				
Arsenic	6	1	9.3	6
Chromium	9	1	31.6	26
Copper	9	6	49.3	16
Iron	9	6	45300	20000
Lead	9	1	35.8	31
Manganese	9	5	1200	460
Nickel	9	8	67.9	16
Zinc	9	1	135	120

Twenty (20) analytes were detected in the SEAD-12 sediment samples. Twenty-nine (29) exceedences occurred in the eight metals listed. Only four of the metals, copper, iron, manganese, and nickel, exceed the NYSDEC sediment criteria by more than a factor of 2.

A full presentation of the analytical data collected for sediment is provided in **Appendix H.**

4.5.1.2 SEAD-12 Sediment Results

The fifty-four (54) SEAD-12 sediment samples were analyzed for VOCs, SVOCs, Pesticides/PCBS, and metals. The results of detected analytes are presented in **Table 4-V**, and summarized below.

Sediment SEAD-12 Constituents	Times Detected	Exceedences	Maximum Detection	Regulatory Guideline
SVOCs - ug/kg				
Benzo(a)anthracene	39	3	3100	70.2
Benzo(a)pyrene	41	21	3300	70.2
Benzo(b)fluoranthene	44	24	3200	70.2
Benzo(k)fluoranthene	29	15	2700	70.2
Chrysene	44	23	3200	70.2
Fluorene	20	5	340	0.432
Ideno(1,2,3-cd)pyrene	38	18	2000	70.2
Naphthalene	7	7	49	1.62
Pesticides/PCBs - ug/kg				
4,4'-DDD	6	6	110	0.54
4,4'-DDE	10	10	76	0.54
4,4'-DDT	7	7	200	0.54
Aroclor-1254	4	4	1200	0.0432
Aroclor-1260	2	2	37	0.0432
Endosulfan I	2	2	3.6	1.62
Heptachlor epoxide	3	3	11	0.0432
Metals - mg/kg				
Antimony	4	1	2.8	2
Arsenic	52	10	19.1	6
Cadmium	15	8	9	0.6
Chromium	54	9	130	26
Copper	54	49	1160	16
Iron	54	38	85900	20000
Lead	46	8	215	31
Manganese	49	25	14000	460
Mercury	18	7	1.7	0.15
Nickel	54	51	126	16
Silver	5	1	1.5	1
Zinc	49	35	2650	120

Sixty-nine (69) analytes were detected in the SEAD-12 sediment samples. Twenty-nine (29) exceedences occurred in the 10 SVOCs and twelve metals listed. All of the SVOCs and ten of the metals exceed the regulatory value by more than a factor of 2.

Figure 4-7, Figure 4-8, and **Figure 4-9** show the locations of SVOCs, pesticides/PCBs, and metals exceedences, respectively. The maximum detected concentration of seven PAHs and nine metals (antimony, arsenic, cadmium, chromium, copper, iron, lead, mercury, nickel and zinc) occur in sample SD12-32, located just north of Building 815/816. It should be noted that although exceedences of NYSDEC sediment criteria for metals occurs at some locations, these exceedences are not above background concentrations.

A full presentation of the analytical data collected for sediment is provided in **Appendix H.**

4.5.1.3 Downgradient Sediment Results

The eleven (11) downgradient sediment samples shown in **Figure 2-16** (locations SWSD12-48 through SWSD12-58), were analyzed for VOCs, SVOCs, Pesticides/PCBS, and metals. The results of detected analytes are presented in **Table 4-W**, located at the end of this section, and are summarized below.

Downgradient Sediment SEAD-12 Constituents	Times Detected	Exceedences	Maximum Detection	Regulatory Guideline
SVOCs - ug/kg				
Benzo(a)anthracene	8	1	1500	0.648
Benzo(a)pyrene	8	3	1300	70.2
Benzo(b)fluoranthene	10	4	1200	70.2
Chrysene	11	4	1400	70.2
Fluorene	4	1	59	0.432
Ideno(1,2,3-cd)pyrene	6	2	670	70.2
Pesticides/PCBs - ug/kg				
4,4'-DDD	2	2	3.7	0.54
4,4'-DDE	2	2	4	0.54
Metals - mg/kg				
Arsenic	11	3	7.6	6
Chromium	11	2	37.1	26
Copper	11	9	36.8	16
Iron	11	8	43000	20000
Manganese	11	4	947	460
Mercury	3	1	0.27	0.15
Nickel	11	9	58.9	16
Zinc	11	3	196	120

Forty-eight (48) analytes were detected in the downgradient sediment samples. Eighty-two (82) exceedences occurred in the 9 SVOCs, 2 pesticides, and eight metals listed. All of the SVOCs and pesticides, and four of the metals (copper, iron, manganese, and nickel) exceed the regulatory value by more than a factor of 2.

A full presentation of the analytical data collected for sediment is provided in **Appendix H.**

4.5.2 Sediment Radiological Results

The results from the radionuclide analyses of sediment samples are discussed below. Twenty radionuclides were included in the background sample analyses, with downgradient samples analyzed for the same radionuclides except for Pm-147. Twenty-six radionuclides were included in the site sample analyses. The additional analyses were due to additional radionuclides requested during the ESI.

4.5.2.1 Background Sediment Radionuclide Results

Fifteen of the 20 radionuclide analytes were detected in at least one of the 9 background sediment samples. The results of the background radionuclide analyses are presented in **Appendix H.** These background samples were used to statistically compare the SEAD-12 data set as well as those samples collected downgradient to SEAD-12. Such comparison is conducted in the following two subsections.

4.5.2.2 SEAD-12 Sediment Radionuclide Results

Twenty-four of 26 radionuclide analytes were detected in at least one of the 53 SEAD-12 sediment samples. The results of the SEAD-12 radionuclide analyses are presented as **Appendix H. Table 4-28** presents the summary statistics for the sediment radionuclide samples compared to background samples. These statistics compare the SEAD-12 data set to the background data set, listing the number of samples, number of detections, minimum, maximum, average, median, standard deviation, and the comparison to background using the WRS test. Based on the WRS test, two radionuclides (Cesium-137 and Uranium-238) have populations statistically greater than the background data set.

4.5.2.3 Downgradient Sediment Radionuclide Results

Thirteen of the 19 downgradient sediment radionuclide analytes were detected in at least one of the 11 downgradient samples. The results of the downgradient radionuclide analyses are presented as **Appendix H.**

TABLE 4-28
Comparison of Summary Statistics in
Background Sediment to SEAD-12 Sediment for Radionuclides
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Parameter	Units	No. of Samples		No. of Detections		Frequency of Detections		Minimum		Maximum		Average		Median		Std Dev		Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?	Above Background using WRS?
		BKGD	SEAD-12	BKGD	SEAD-12	BKGD	SEAD-12	BKGD	SEAD-12	BKGD	SEAD-12	BKGD	SEAD-12	BKGD	SEAD-12	BKGD	SEAD-12	BKGD	SEAD-12				
Gross Alpha	pCi/g	0	5	NA	5	NA	100%	NA	8.00	NA	17.50	NA	11.62	NA	10.50	NA	4.27	0.00	2.50	NA	NA	NA	NA
Gross Beta	pCi/g	0	5	NA	5	NA	100%	NA	26.50	NA	36.00	NA	29.63	NA	28.00	NA	4.32	0.00	2.50	NA	NA	NA	NA
Actinium-228	pCi/g	0	5	NA	5	NA	100%	NA	0.63	NA	1.01	NA	0.81	NA	0.80	NA	0.17	0.00	2.50	NA	NA	NA	NA
Bismuth -214	pCi/g	9	53	6	39	67%	74%	0.70	0.10	2.00	2.40	1.36	1.29	1.30	1.20	0.48	0.53	31.89	29.66	-0.359	1.645	NO	NO
Cesium-137	pCi/g	9	48	1	22	11%	46%	0.05	0.05	0.60	1.50	0.22	0.46	0.20	0.40	0.16	0.34	15.39	30.47	2.593	1.645	YES	YES
Cobalt-57	pCi/g	9	48	0	0	0%	0%	0.05	0.05	0.10	0.10	0.06	0.05	0.05	0.05	0.02	0.01	32.22	27.17	-1.921	1.645	NO	NO
Cobalt-60	pCi/g	9	48	0	0	0%	0%	0.05	0.05	0.15	0.25	0.09	0.10	0.05	0.10	0.05	0.06	25.78	28.43	-0.485	1.645	NO	NO
Lead-210	pCi/g	9	48	0	5	0%	10%	2.30	0.70	18.50	1300.00	9.36	42.29	9.05	5.10	5.30	196.28	34.61	26.71	-1.354	1.645	NO	NO
Lead-211	pCi/g	9	48	0	9	0%	19%	0.75	0.35	6.25	22.40	3.16	3.92	2.75	2.10	2.16	4.84	31.56	27.30	-0.728	1.645	NO	NO
Lead-214	pCi/g	9	53	8	49	89%	92%	0.20	0.10	2.10	2.90	1.54	1.51	1.70	1.40	0.58	0.54	34.11	29.26	-0.783	1.645	NO	NO
Plutonium-239/240	pCi/g	9	48	2	24	22%	50%	0.05	0.05	0.20	0.25	0.11	0.12	0.10	0.10	0.05	0.05	24.22	28.74	-0.859	1.645	NO	NO
Promethium-147	pCi/g	9	11	9	9	100%	82%	4.25	0.10	16.30	83.00	11.66	14.66	12.00	5.98	4.00	24.58	11.78	8.40	-1.307	1.645	NO	NO
Radium-223	pCi/g	9	48	0	1	0%	2%	0.15	0.15	0.30	1.10	0.23	0.24	0.25	0.20	0.04	0.13	31.72	27.27	-0.829	1.645	NO	NO
Radium-226	pCi/g	9	48	6	34	67%	71%	0.70	0.10	2.00	2.40	1.36	1.31	1.30	1.30	0.48	0.54	29.00	27.80	-0.205	1.645	NO	NO
Radium-228	pCi/g	9	48	8	44	89%	92%	1.20	0.10	2.40	3.20	1.81	1.79	1.90	1.85	0.43	0.58	28.06	27.99	-0.001	1.645	NO	NO
Thallium-208	pCi/g	0	5	NA	5	NA	100%	NA	0.26	NA	0.85	NA	0.49	NA	0.42	NA	0.25	0.00	2.80	NA	NA	NA	NA
Thorium-227	pCi/g	8	46	6	14	75%	30%	0.10	0.05	0.60	0.35	0.25	0.13	0.15	0.10	0.22	0.08	33.63	24.58	-1.659	1.645	NO	NO
Thorium-230	pCi/g	9	48	3	20	33%	42%	0.15	0.15	1.40	1.90	0.54	0.57	0.30	0.35	0.49	0.43	25.17	28.55	-0.583	1.645	NO	NO
Thorium-232	pCi/g	9	48	9	41	100%	85%	0.80	0.10	1.90	1.70	1.29	0.84	1.30	0.90	0.36	0.41	41.56	25.35	-2.786	1.645	NO	NO
Thorium-234	pCi/g	0	5	NA	5	NA	100%	NA	0.44	NA	1.08	NA	0.67	NA	0.58	NA	0.28	NA	NA	NA	NA	NA	NA
Tritium	pCi/g	9	48	2	6	22%	13%	0.05	0.05	0.20	0.60	0.09	0.07	0.10	0.05	0.05	0.08	37.33	26.17	-2.66	1.645	NO	NO
Uranium-233/234	pCi/g	9	48	3	27	33%	56%	0.05	0.05	0.90	1.50	0.32	0.53	0.10	0.60	0.36	0.44	21.89	29.20	-1.268	1.645	NO	NO
Uranium-235	pCi/g	9	48	3	22	33%	46%	0.05	0.05	0.20	0.20	0.08	0.09	0.05	0.10	0.05	0.05	26.22	28.35	-0.401	1.645	NO	NO
Uranium-238	pCi/g	9	48	1	23	11%	48%	0.05	0.05	0.10	1.00	0.06	0.37	0.05	0.08	0.02	0.35	19.17	29.73	1.979	1.645	YES	YES

For the minimum, maximum, average, median, standard deviation, and the the duplicates and samples were averaged together, the detects (no qualifier or J qualifier) were taken at full value, and all non-detects (U or UJ qualifier) were taken at half value.
Zrs= Statistic for radionuculide generated from Wilcoxon Rank Sum test
Z(1-alpha)= Maximum allowed probability that WRS test incorrectly indicates that the site and background datasets are distinguishable (alpha= 0.05)
Null Hypothesis: The populations from which the two data sets have been drawn have the same mean.

Table 4-29 presents the summary statistics for the downgradient sediment radionuclide samples compared to the background data set. These statistics compare the downgradient data set to the background data set, listing the number of samples, number of detections, minimum, maximum, average, median, standard deviation, and the comparison to background using the WRS test. Based on the WRS test, three downgradient radionuclides (Cobalt-60, Uranium-233/234, and Uranium-238) have populations statistically greater than the background data set.

4.5.2.4 Re-Sampling of Sediment Locations Where Plutonium-239/240 Detected

Twenty-three (23) sediment locations were re-sampled for Pu-239/240 in December 1999. These locations are shown in **Figure 2-13**. As described in **Section 4.3.10**, Pu-239/240 had been detected at or slightly above the laboratory reporting limit (0.1 pCi/g) at these locations. The purpose of the re-sampling effort was to verify that the activity of Pu-239/Pu-240 were actually lower than what was initially reported and that reported detections were a function of analytical anomalies. During the re-sampling effort, a lower detection limit (0.01 pCi/g) was requested from the laboratory. A table comparing the Pu-239/240 results of the original soil sampling and the re-sampling effort are shown in **Table 4-30**. The maximum detected activity of Pu-239/240 during the re-sampling event was 0.0391 pCi/g, and the average detection was 0.0133 pCi/g. The re-sampling effort confirmed the level of the Pu-239/240 detections during the initial sampling event were a function of the detection limit requested and not actual levels present.

4.5.2.5 Sediment Gamma Radiation Scanning Results

As noted in **Section 2**, the ephemeral stream west of Buildings 813 and 814 (unnamed stream south of disposal pits A/B and Building 809), is a Class II radiological survey unit. Scanning was completed with 100% coverage (rather than the required 50%) to facilitate the scanning process. Scanning with equipment as described in **Section 2**, the gamma scanning surveys found:

Location	Ave. Compared to Background	Max Compared to Background	Detects > Flag Value (2xBgd)
Class II Streambed	-+6.19%	+30.98%	0

No scanning results were detected above the flag value of twice background.

TABLE 4-29
Comparison of Summary Statistics in
Background Sediment to Downgradient Sediment for Radionuclides
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Parameter	Units	No. of Samples		No. of Detections		Frequency of Detections		Minimum		Maximum		Average		Median		Std Dev		Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?	Above Background using WRS?
		BKGD	DOWNGRADIENT	BKGD	DOWNGRADIENT	BKGD	DOWNGRADIENT	BKGD	DOWNGRADIENT	BKGD	DOWNGRADIENT	BKGD	DOWNGRADIENT	BKGD	DOWNGRADIENT	BKGD	DOWNGRADIENT	BKGD	DOWNGRADIENT				
Gross Alpha	pCi/g	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Gross Beta	pCi/g	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Actinium-228	pCi/g	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Bismuth -214	pCi/g	9	11	6	6	67%	55%	0.70	0.85	2.00	1.70	1.36	1.22	1.30	1.00	0.48	0.34	11.44	9.73	-0.647	1.645	NO	NO
Cesium-137	pCi/g	9	11	1	1	11%	9%	0.05	0.05	0.60	0.45	0.22	0.18	0.20	0.10	0.16	0.13	11.50	9.68	-0.694	1.645	NO	NO
Cobalt-57	pCi/g	9	11	0	0	0%	0%	0.05	0.05	0.10	0.10	0.06	0.05	0.05	0.05	0.02	0.02	11.22	9.91	-0.797	1.645	NO	NO
Cobalt-60	pCi/g	9	11	0	0	0%	0%	0.05	0.10	0.15	0.40	0.09	0.18	0.05	0.15	0.05	0.10	7.06	13.32	2.425	1.645	YES	YES
Lead-210	pCi/g	9	11	0	0	0%	0%	2.30	0.75	18.50	24.30	9.36	7.41	9.05	3.45	5.30	7.90	12.33	9.00	-1.255	1.645	NO	NO
Lead-211	pCi/g	9	11	0	2	0%	18%	0.75	0.50	6.25	14.50	3.16	3.98	2.75	2.45	2.16	4.10	10.44	10.55	-0.038	1.645	NO	NO
Lead-214	pCi/g	9	11	8	11	89%	100%	0.20	1.30	2.10	2.30	1.54	1.65	1.70	1.50	0.58	3.40	10.50	10.50	0.000	1.645	NO	NO
Plutonium-239	pCi/g	9	11	2	0	22%	0%	0.05	0.10	0.20	0.20	0.11	0.13	0.10	0.10	0.05	0.04	8.61	12.05	-1.423	1.645	NO	NO
Promethium-147	pCi/g	9	0	9	NA	100%	NA	4.25	NA	16.30	NA	11.66	NA	12.00	NA	4.00	NA	5.00	NA	NA	NA	NA	NA
Radium-223	pCi/g	9	11	0	0	0%	0%	0.15	0.20	0.30	0.25	0.23	0.22	0.25	0.20	0.04	0.03	11.61	9.59	-0.843	1.645	NO	NO
Radium-226	pCi/g	9	11	6	6	67%	55%	0.70	0.85	2.00	1.70	1.36	1.22	1.30	1.00	0.48	0.34	11.44	9.73	-0.647	1.645	NO	NO
Radium-228	pCi/g	9	11	8	10	89%	91%	1.20	0.75	2.40	3.20	1.81	1.99	1.90	2.20	0.43	0.70	9.44	11.36	-0.723	1.645	NO	NO
Thallium-208	pCi/g	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Thorium-227	pCi/g	8	11	6	7	75%	64%	0.10	0.10	0.60	1.00	0.25	0.28	0.15	0.20	0.22	0.27	9.25	10.55	-0.518	1.645	NO	NO
Thorium-230	pCi/g	9	11	3	1	33%	9%	0.15	0.20	1.40	3.40	0.54	0.54	0.30	0.25	0.49	0.95	11.17	9.95	-0.463	1.645	NO	NO
Thorium-232	pCi/g	9	11	9	11	100%	100%	0.80	0.50	1.90	1.60	1.29	0.97	1.30	0.80	0.36	0.41	12.83	8.59	-1.602	1.645	NO	NO
Thorium-234	pCi/g	0	0	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
Tritium	pCi/g	9	11	2	1	22%	9%	0.05	0.05	0.20	0.10	0.09	0.05	0.10	0.05	0.05	0.02	13.11	8.59	-2.227	1.645	NO	NO
Uranium-233/234	pCi/g	9	11	3	8	33%	73%	0.05	0.05	0.90	1.70	0.32	0.81	0.10	0.90	0.36	0.54	7.61	12.86	2	1.645	YES	YES
Uranium-235	pCi/g	9	11	3	0	33%	0%	0.05	0.05	0.20	0.10	0.08	0.08	0.05	0.10	0.05	0.03	10.28	10.68	-0.171	1.645	NO	NO
Uranium-238	pCi/g	9	11	1	7	11%	64%	0.05	0.05	0.10	1.20	0.06	0.53	0.05	0.60	0.02	0.42	6.94	13.41	2.608	1.645	YES	YES

For the minimum, maximum, average, median, standard deviation, and the the duplicates and samples were averaged together, the 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 4-30
Plutonium-239/240 Re-sampling Results for Surface Soils
Sead-12 Remedial Investigation
Seneca Army Depot Activity Romulus, NY

				Original Results (1997)					Re-Sampling Results (December 1999)				
Sample Location	QC_CODE	SAMP_ID	Sample Location	Laboratory Result - pCi/g		Qualifier	Result Error +/-	Parameter	Laboratory Result - pCi/g	Qualifier	DET_LIMIT	Result Error +/-	Site Background Sample
SD12-10	SA	124245	SD12-10	0.1	pCi/g		0.1	Plutonium-239/240	0.0256		0.00167	0.01	
SD12-14	SA	124098	SD12-14	0.2	pCi/g	J	0.2	Plutonium-239/240	0.00457	U	0.00457	0	
SD12-18	SA	124097	SD12-18	0.1	pCi/g		0.1	Plutonium-239/240	0.0118		0.00186	0.01	
SD12-19	SA	124096	SD12-19	0.1	pCi/g		0.1	Plutonium-239/240	0.0204		0.00458	0.01	
SD12-20	SA	124244	SD12-20 (1)					Plutonium-239/240	0.0332		0.00435	0.01	
SD12-20A	SA	124091	SD12-20A	0.1	pCi/g		0.1	Plutonium-239/240	0.0217		0.00461	0.01	
SD12-24	SA	124084	SD12-24	0.1	pCi/g		0.1	Plutonium-239/240	0.00988	J	0.00489	0.01	
SD12-25	SA	124243	SD12-25	0.1	pCi/g		0.2	Plutonium-239/240	0.0379	J	0.00344	0.01	
SD12-26	SA	124086	SD12-26	0.1	pCi/g		0.2	Plutonium-239/240	0.0045	U	0.0045	0	
SD12-27	SA	124085	SD12-27	0.1	pCi/g		0.1	Plutonium-239/240	0.00774	J	0.00397	0	
SD12-28	SA	124100	SD12-28	0.2	pCi/g	J	0.3	Plutonium-239/240	0.0391		0.00525	0.01	
SD12-32	SA	124102	SD12-32	0.2	pCi/g	J	0.2	Plutonium-239/240	0.00471	U	0.00471	0	
SD12-36	SA	124103	SD12-36	0.2	pCi/g	J	0.2	Plutonium-239/240	0.00476	J	0.00204	0	
SD12-40	SA	124090	SD12-40	0.1	pCi/g		0.2	Plutonium-239/240	0.0103		0.00171	0	
SD12-41	SA	124089	SD12-41	0.1	pCi/g		0.2	Plutonium-239/240	0.00564	J	0.00445	0	
SD12-42	SA	124242	SD12-42	0.1	pCi/g		0.1	Plutonium-239/240	0.0144		0.00392	0.01	
SD12-43	SA	124095	SD12-43	0.1	pCi/g	J	0.1	Plutonium-239/240	0.00837	J	0.00179	0	
SD12-46	SA	124093	SD12-46	0.2	pCi/g		0.2	Plutonium-239/240	0.00556	J	0.00399	0	
SD12-46	DU	124094	SD12-46 (1)					Plutonium-239/240	0.00637	J	0.00443	0	
SD12-47	SA	124092	SD12-47	0.1	pCi/g	J	0.2	Plutonium-239/240	0.0252		0.00429	0.01	
SD12-5	SA	124241	SD12-5	0.1	pCi/g	J	0.1	Plutonium-239/240	0.00539	U	0.00539	0	
SD12-60	SA	124105	SD12-60	0.1	pCi/g	J	0.1	Plutonium-239/240	0.00983	J	0.00442	0.01	yes
SD12-60	DU	124106	SD12-60 (1)					Plutonium-239/240	0.00487	J	0.00466	0	
SD12-63	SA	124104	SD12-63	0.1	pCi/g		0.1	Plutonium-239/240	0.00475	U	0.00475	0	yes
SD12-7	SA	124099	SD12-7	0.1	pCi/g	J	0.1	Plutonium-239/240	0.00658	J	0.00458	0	

(1) THESE LOCATIONS WERE SAMPLED DURING THE 1999 SAMPLING EVENT ONLY.

4.6 GROUNDWATER RESULTS

The groundwater sampling results are presented below. Samples were collected in a background area, upgradient of the site, and within the site boundary. Samples collected from on-site were analyzed for both chemical constituents (VOCs, SVOCs, Pesticides/PCBs, and metals/ inorganics) and radionuclides. Background locations were analyzed for metals and radionuclides only. **Table 2-10** provides a complete list of analyses for each of the groundwater samples collected.

4.6.1 Groundwater Chemical Results

The chemical analytical results for analytes other than radionuclides are presented in **Table 4-X** and **Figure 4-10**. These results are discussed either background and SEAD-12 sample location.

A full presentation of the analytical data collected for groundwater is provided in **Appendix J.**

4.6.1.1 Background Groundwater Results

The background groundwater data sets (**Appendix J**, Tables J-1, J-1A, and J-3) were used for risk calculations (metals) presented in detail in **Section 6**, and to establish background metals levels for TAGM calculations and background levels for radionuclides at SEAD-12. These background groundwater sample locations, collected for two or more rounds of sampling, are distributed over the entire Seneca Army Depot Activity. Monitoring wells, MW12-1, MW12-2, MW12-3, MW12-4, MW12-5, MW12-6 are proximal background wells for metal and radiological characterization, immediately up- and side- gradient to SEAD-12. There are no exceedences in any of these proximal wells.

4.6.1.2 SEAD-12 Groundwater Results

Eighty-eight samples from 38 wells were sampled for the groundwater investigation of SEAD-12. **Table 4-X** presents the analytical data for all compounds detected in the SEAD-12 groundwater samples. The results are summarized below and in **Figure 4-10**.

Groundwater SEAD-12 Constituents	Times Detected	Exceedences	Maximum Detection	Regulatory Standard
VOCs - ug/L				
1,2-Dichloroethene (total)	1	1	30	5
Trichloroethene	3	2	1600	5
SVOCs - ug/L				
Bis(2-Ethylhexyl)phthalate	3	2	230	5
Metals - μg/L				
Antimony	7	3	43.2	3
Iron	83	44	20700	300
Manganese	90	12	3280	300
Sodium	91	24	408000	20000

Forty-four (44) analytes were detected in the SEAD-12 groundwater samples. A total of 82 exceedences were detected in the analytes listed above. All of the listed analytes exceed the regulatory value by more than a factor of 2. All exceedences of Trichloroethene (TCE) and 1,2-Dichlorethene occur in well MW12-37. TCE was detected at 1600 ug/L during both rounds of sampling this well. MW12-37, **Figure 2-15** and **Figure 4-10,** is located to the northeast of Building 813, where a paint booth is located. Although TCE was not detected in wells upgradient or downgradient of MW12-37, that it may be present in groundwater along the eastern side of Building 814 as evidenced by elevated soil gas results as presented in **Section 4.3.8.6** (refer to **Table 4-22**) in soil gas locations SG12-147 and SG12-151 shown in **Figure 2-7**.

A full presentation of the analytical data collected for groundwater is provided in **Appendix J.**

4.6.2 Groundwater Radiological Results

The results from the radionuclide analyses of groundwater samples are discussed below. Background samples were analyzed for 15 radionuclides. SEAD-12 groundwater samples were analyzed for twenty-one (21) radionuclides. The additional analyses were due to additional radionuclides requested during the ESI.

4.6.2.1 Background Groundwater Radionuclide Results

All 15 of the radionuclides were detected in at least one of the 16 background samples. The results of the background radionuclide analyses are presented as **Appendix J.** These background samples were used to compare the SEAD-12 data set as described below.

4.6.2.2 SEAD-12 Groundwater Radionuclide Results

Nineteen of 21 radionuclides were detected in at least one of the 92 SEAD-12 groundwater samples collected from SEAD-12. The results of the groundwater radionuclide analyses are presented in **Appendix J. Table 4-31** presents the summary statistics for the groundwater radionuclide samples compared to background samples. These statistics compare the SEAD-12 data set to the background data set, listing the number of samples, number of detections, minimum, maximum, average, median, standard deviation, and the comparison to background using the WRS test. Based on the WRS test, only one radionuclide (Thorium-228) has a population statistically different from the background data set.

4.7 SUMMARY OF EXTENT OF IMPACTS

This section summarizes the extent of the impacts to SEAD-12 soil (surface and subsurface), surface water, sediment, and ground groundwater. The fate and transport of the specific parameters is described in detail in **Section 5**.

4.7.1 Soils

4.7.1.1 Chemical

Surface and subsurface soil chemical exceedences of NYSDEC TAGMs are summarized in **Table 4-32** and **Table 4-33.** These tables list the maximum exceedence and total number of exceedences for each analyte in each potential release area. These tables also provide a relative percentage that a parameter exceeds the applicable regulatory criteria. As shown in the tables, SVOCs in soils are limited to a few samples with the most notable occurrence being in the Building 819/ EM-27 area. While metal exceedences are present across the site in surface and subsurface soils, exceedences of significance (heavy metals greater than 2-5 times TAGM values) are limited to Disposal Pit A/B and Disposal Pit C.

MW12-37 subsurface soil sampling confirmed the presence of TCE found during soil gas sampling near the northeast corner of building 813. However, subsurface soil samples downgradient to the building 813 occurrence and the TCE soil gas occurrence east of building 814 (SG12-147 and SG12-151) did not detect TCE.

Recommendations for further investigations are presented in **Section 8**.

TABLE 4-31
Comparison of Summary Statistics in
Background Groundwater to SEAD-12 Groundwater
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Parameter	Units	No. of Samples		No. of Detections		Frequency of Detections		Minimum		Maximum		Average		Median		Std Dev		Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?	Above Background using WRS?
		BKGD	SEAD-12	BKGD	SEAD-12	BKGD	SEAD-12	BKGD	SEAD-12	BKGD	SEAD-12	BKGD	SEAD-12	BKGD	SEAD-12	BKGD	SEAD-12	BKGD	SEAD-12				
Bismuth -214	pCi/L	18	80	9	24	50%	30%	3.07	1.00	37.80	120.00	15.00	11.60	16.05	4.19	11.67	16.53	58.78	46.44	-1.617	1.645	NO	NO
Cesium-137	pCi/L	18	80	0	4	0%	5%	0.25	0.25	2.53	9.40	1.29	1.49	1.29	1.40	0.63	1.27	47.69	48.66	-0.128	1.645	NO	NO
Cobalt-57	pCi/L	18	80	3	4	17%	5%	0.25	0.15	2.62	2.60	1.05	0.96	1.20	1.16	0.67	0.65	53.69	47.46	-0.817	1.645	NO	NO
Cobalt-60	pCi/L	18	80	0	7	0%	9%	0.20	0.20	2.26	11.40	1.17	1.87	1.13	1.65	0.76	2.05	39.94	50.21	-1.347	1.645	NO	NO
Gross Alpha	pCi/L	18	82	8	49	44%	60%	0.30	0.20	5.70	12.50	2.14	2.52	1.57	2.12	1.57	1.85	42.72	49.66	-0.909	1.645	NO	NO
Gross Beta	pCi/L	18	82	16	65	89%	79%	1.00	0.40	12.60	129.00	3.84	5.89	2.92	3.39	2.92	14.45	44.78	49.24	-0.585	1.645	NO	NO
Lead-210	pCi/L	9	40	0	5	0%	13%	1.02	0.86	1.73	4.67	1.41	1.98	1.40	1.42	0.20	0.90	21.63	25.08	-0.636	1.645	NO	NO
Lead-211	pCi/L	18	80	0	3	0%	4%	1.90	7.00	49.70	774.00	27.18	46.44	25.70	39.38	18.28	98.24	43.75	49.45	-0.747	1.645	NO	NO
Lead-214	pCi/L	18	80	9	24	50%	30%	3.08	1.10	27.30	33.30	12.00	9.10	12.40	3.98	8.34	9.50	59.09	45.75	-1.765	1.645	NO	NO
Plutonium-239/240	pCi/L	18	80	0	0	0%	0%	0.001	0.001	0.15	0.20	0.07	0.06	0.05	0.03	0.07	0.06	55.22	47.16	-1.077	1.645	NO	NO
Radium-223	pCi/L	18	80	6	31	33%	39%	0.10	0.05	0.35	1.06	0.22	0.27	0.20	0.22	0.09	0.16	40.82	47.52	-0.867	1.645	NO	NO
Radium-226	pCi/L	18	80	8	41	44%	51%	0.1	0.10	0.79	1.80	0.27	0.36	0.21	0.34	0.19	0.26	39	50.4	-1.499	1.645	NO	NO
Radon-222	pCi/L	18	80	14	50	78%	63%	33.85	3.90	341.00	746.00	145.93	159.94	125.15	84.60	86.69	172.40	55.38	46.51	-1.173	1.645	NO	NO
Thorium-227	pCi/L	9	40	1	0	11%	0%	0.18	0.16	0.35	1.06	0.27	0.30	0.30	0.25	0.06	0.16	26.25	24.15	-0.387	1.645	NO	NO
Thorium-228	pCi/L	9	40	0	2	0%	5%	0.02	0.02	0.06	0.28	0.04	0.07	0.04	0.05	0.02	0.05	15.25	26.35	-2.047	1.645	YES	YES
Thorium-230	pCi/L	18	80	3	13	17%	16%	0.004	0.004	0.60	0.40	0.11	0.09	0.10	0.09	0.15	0.07	47.41	48.72	-0.174	1.645	NO	NO
Thorium-232	pCi/L	18	80	4	11	22%	14%	0.004	0.004	0.17	0.20	0.07	0.06	0.10	0.07	0.05	0.05	49.06	48.39	-0.092	1.645	NO	NO
Tritium	pCi/L	17	78	3	7	18%	9%	23.40	24.90	231.50	261.00	177.29	173.84	212.00	177.50	62.16	49.23	53.23	45.8	-0.980	1.645	NO	NO
Uranium-233/234	pCi/L	18	80	16	70	89%	88%	0.10	0.10	1.80	3.50	0.82	1.08	0.75	0.93	0.46	0.84	42.72	49.66	-0.910	1.645	NO	NO
Uranium-235	pCi/L	18	80	4	27	22%	34%	0.05	0.02	0.15	0.40	0.10	0.10	0.10	0.10	0.03	0.06	56.69	46.86	-1.313	1.645	NO	NO
Uranium-238	pCi/L	18	80	14	74	78%	93%	0.10	0.10	1.30	3.30	0.55	0.84	0.40	0.70	0.40	0.66	38.44	50.51	-1.584	1.645	NO	NO

For the minimum, maximum, average, median, standard deviation, and the the duplicates and samples were averaged together, the detects (no qualifier or J qualifier) were taken at full value, and all non-detects (U or UJ qualifier) were taken at half value.
Zrs= Statistic for radionuculide generated from Wilcoxon Rank Sum test
Z(1-alpha)= Maximum allowed probability that WRS test incorrectly indicates that the site and background datasets are distinguishable (alpha= 0.05)
Null Hypothesis: The populations from which the two data sets have been drawn have the same mean.

Table 4-32
Exceedence Summary - Surface Soils
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Surface Soils	Regulatory Criteria	Building 819/ EM27		Building 815-816/ EM-28		Disposal Pit A/B		Disposal Pit C		Former Dry Waste Disposal Pit		EM-5		EM-6		Class III		Former Wastewater Treatment Plant		Exeedences by Compound	Maximum Exceedence Factor (% Criteria)
		No. of exceed-ences	Max. Value	No. of exceed-ences	Max. Value	No. of exceed-ences	Max. Value	No. of exceed-ences	Max. Value	No. of exceed-ences	Max. Value	No. of exceed-ences	Max. Value	No. of exceed-ences	Max. Value	No. of exceed-ences	Max. Value	No. of exceed-ences	Max. Value		
Compound																					
VOCs																					
Methylene chloride	100																			0	
SVOCs																					
4-Methylphenol	900															1	**930**			1	103%
Benzo(a)anthracene	224	4	**6200**													3	3500			7	2768%
Benzo(a)pyrene	61	4	**5400**													5	3200			9	8852%
Benzo(b)fluoranthene	1100	2	**4800**													1	2800			3	436%
Benzo(k)fluoranthene	1100	2	**6100**													1	2900			3	555%
Chrysene	400	3	**6800**													3	3600			6	1700%
Dibenz(a,h)anthracene	14	4	**1500**			1	16									5	680	1	110	11	10714%
Phenol	30															2	**42**			2	140%
Pesticides/PCBs																					
Heptachlor epoxide	20																			0	
Metals																					
Aluminum	19520	1	**20800**																	1	107%
Antimony	6																			0	
Arsenic	9.8																			0	
Cadmium	2.46			1	**17.7**	1	3.2													2	720%
Calcium	125300	1	**202000**													1	**154000**			2	161%
Chromium	30																			0	
Cobalt	30																			0	
Copper	33											1	37.3			3	**35.4**	3	**60.3**	7	183%
Cyanide	0.35					2	**1.6**									1	**1.4**			3	457%
Iron	37410																			0	0%
Lead	24.4	1	33.1	1	25			1	24.9			2	**142**			16	**43.8**	3	34.4	24	582%
Magnesium	21700	1	**34800**							1	23800									2	160%
Manganese	1100					1	1420							1	1120	4	**2370**	1	1240	7	215%
Mercury	0.1					1	0.11					1	0.27			6	**0.17**	3	**0.48**	11	480%
Nickel	50															2	**57.4**			2	
Potassium	2623	1	**2660**													4	**2970**			5	113%
Selenium	2					2	**2.5**									2	**2.3**			4	125%
Silver	0.8																			0	
Sodium	188					1	207			3	**276**							1	243	5	147%
Thallium	0.855	1	**3**			5	1.8	3	1.7	3	2			2	2	18	**2.5**	1	1.5	33	351%
Zinc	115											1	174			5	**197**	3	**246**	9	214%
Total No. of exceedences by Area	31(a)	25		2		14		4		7		5		3		83		16		159	
Total No. of Maximum values (b)			11		1		2		0		1		1		0		13		3		

Notes:

(a) The number represents the number of compounds with exceedences.

(b) The number represents the number of maximum values for the entire site present at the area.

Table 4-33
Exceedence Summary - Suburface Soils
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Surface Soils	Regulatory Criteria	Building 819/ EM27		Building 815-816/ EM-28		Disposal Pit A/B		Disposal Pit C		Former Dry Waste Disposal Pit		EM-5		EM-6		Class III		Former Wastewater Treatment Plant		Exeedences by Compound	Maximum Exceedence Factor (% Criteria)
		No. of exceed-ences	Max. Value	No. of exceed-ences	Max. Value	No. of exceed-ences	Max. Value	No. of exceed-ences	Max. Value	No. of exceed-ences	Max. Value	No. of exceed-ences	Max. Value	No. of exceed-ences	Max. Value	No. of exceed-ences	Max. Value	No. of exceed-ences	Max. Value		
Compound																					
VOCs																					
Methylene chloride	100							1	**180**											1	180%
SVOCs																					
4-Methylphenol	900																			0	0%
Benzo(a)anthracene	224											1	**3500**			1	760			2	1563%
Benzo(a)pyrene	61					1	180	4	180			1	**2600**			3	1000			9	4262%
Benzo(b)fluoranthene	1100											1	**2200**							1	200%
Benzo(k)fluoranthene	1100											1	**2600**							1	236%
Chrysene	400											1	**3000**			1	1000			2	750%
Dibenz(a,h)anthracene	14					1	• 57	4	99			1	**710**			4	300			10	5071%
Phenol	30					2	**300**													2	1000%
Pesticides/PCBs																					
Heptachlor epoxide	20					1	**22**													1	110%
Metals																					
Aluminum	19520	1	**21200**																	1	109%
Antimony	6					1	**7.2**													1	120%
Arsenic	8.9							1	**11.1**							1	9.8			2	125%
Cadmium	2.46					7	**94.3**	2	6							1	13.3			10	3833%
Calcium	125300	1	151000			1	142000	3	**224000**	1	132000									6	179%
Chromium	30					3	**83.3**													3	278%
Cobalt	30													1	**36.3**					1	121%
Copper	33	1	44.7			5	**215**	3	74.5	4	41.1	5	73.3			3	34			21	652%
Cyanide	0.35					2	1.5	1	2.2			6	**112**							9	32000%
Iron	37410	1	44500					1	51000	1	41100			1	40600	3	**53400**			7	143%
Lead	24.4	1	27.1			3	366	8	**431**					2	34	10	284			24	1766%
Magnesium	21700					1	34300	2	**36100**	2	34200									5	166%
Manganese	1100													1	**4110**	3	3200			4	374%
Mercury	0.1	2	0.2					3	0.15	4	0.5	3	**1**			8	0.2			20	1000%
Nickel	50	1	64.5	1	50.5	2	**201**			1	50.9	1	52			1	51.3			7	402%
Potassium	2623							2	**3670**			3	2810			2	3460			7	140%
Selenium	2									2	**2.5**									2	125%
Silver	0.8					2	**11.9**	1	1.8											3	1488%
Sodium	188							4	**1420**	2	252			1	197	3	748			10	755%
Thallium	0.855			1	1.1	5	1.7	12	1.7	7	2.2			7	**3.8**	10	1.6			42	444%
Zinc	115	3	143			3	424	7	**6080**	1	142	6	280	4	391	4	3370			28	5287%
Total No. Exceedences by Area	31(a)	11		2		40		59		25		30		17		58		0		242	
Total No. of Maximum values (b)			1		0		8		8		1		8		3		1		0		

Notes:

(a) The number represents the number of compounds with exceedences.

(b) The number represents the number of maximum values for the entire site present at the area.

(c) Loc id SB 12-10, which has three exceedences, was taken from the top of a Underground Storage Tank.

4.7.1.2 Radiological

Soil exceedences (combines surface and subsurface soils) of radiological criteria are summarized in **Table 4-34**. This table lists the radionuclides that exceed background, background plus DCGL for residential criteria, and background plus DCGL for worker criteria. Exceedences of the residential criteria are generally related to four radionuclides; Bismuth-214, Lead-210, Lead-214, and Radium-226. All of these are natural daughters of Uranium-238. With the exception of EM-5 (Pb-210 and Ra-226) and EM-6 (Radium-226), there are no exceedences to the worker criteria for soils.

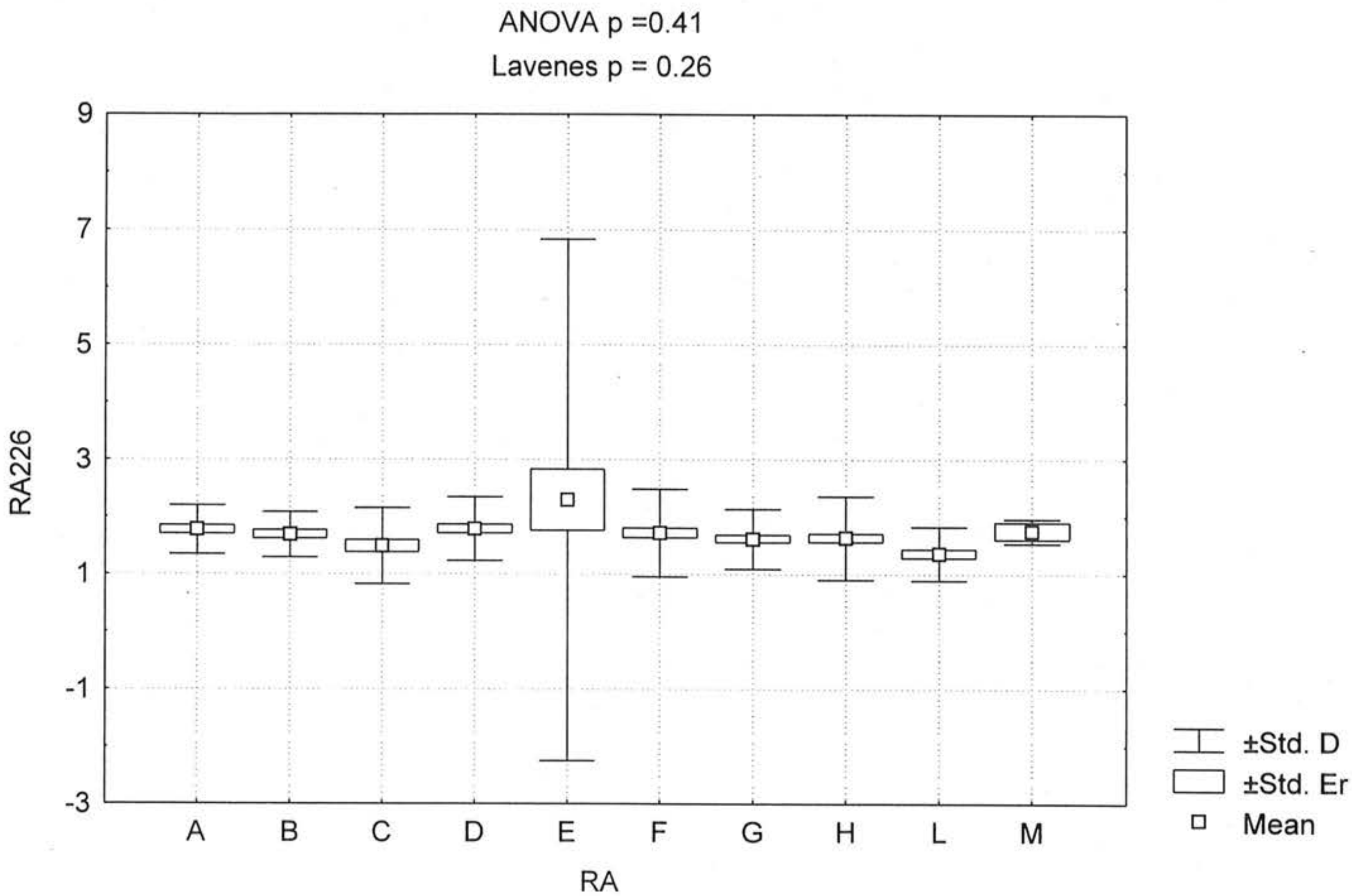
The radiological soil data for Ra-226 were evaluated further, by running a one-way parametric analysis of variance (ANOVA) test to compare the means of the potential release areas. Box-and-whisker plots for Radium-226, shown in **Figure 4-27,** illustrate that within the standard deviation of the background, Radium-226 data are not significantly different from background. The Lavenes and ANOVA tests returned "p-values" of 0.26 and 0.41, respectively. The tests were run using the commercial software STATISTICA (Statsoft, 1997). The software returns a test "p-value" between zero and one, indicating a "pass" or "fail" condition. A p-value of 0.05 or greater indicates a "pass" (meaning the distributions are similar), at a Type I error probability of 0.05, or in other words, a one-in-twenty chance of falsely identifying the distributions as similar when they really are not. The results of these tests are summarized in the box-and whisker plots of the data sets. The data sets pass the test for assumptions and also pass the ANOVA. These results indicate that Ra-226 distributions from all the sites are similar to each other as well as the background distribution. This is also evident by examining the box-and-whisker plots that show similar distributions for all the sites. Based on this analysis, it can be concluded that Ra-226 detected in soil at SEAD-12 is part of the background distribution and not associated with site activity.

In conclusion, based on the results of the statistical evaluation of site radionuclide data compared to background datasets adjusted for DCGLs derived from NYSDEC TAGMs, only two areas, EM-5 and EM-6 have radionuclides present that do not meet release criterion based on the NYSDEC TAGM (10 mrem/yr). Ra-226 and Pb-210 are present above DCGLs at EM-5 and Ra-226 is present above DCGLs at EM-6. However, based on the ANOVA analysis described above, the distribution of Ra-226 across the site is similar to that in background. Therefore, Ra-226 levels on site are not believed to be truly elevated above background. In addition, elevated levels of Pb-210 at EM-5 are not believed to be related to past military activities on the site.

Table 4-34
Radiological Exceedence Summary - Surface and Subsurface Soils
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Soils Surface and Subsurface	Building 819/ EM27			Building 815-816/ EM-28			Disposal Pit A/B			Disposal Pit C			Former Dry Waste Disposal Pit			EM-5			EM-6			Class III			WW Treatment		
	Exceed Bkgd WRS	Exceed DCGL Resd	Exceed DCGL Work	Exceed Bkgd WRS	Exceed DCGL Resd	Exceed DCGL Work	Exceed Bkgd WRS	Exceed DCGL Resd	Exceed DCGL Work	Exceed Bkgd WRS	Exceed DCGL Resd	Exceed DCGL Work	Exceed Bkgd WRS	Exceed DCGL Resd	Exceed DCGL Work	Exceed Bkgd WRS	Exceed DCGL Resd	Exceed DCGL Work	Exceed Bkgd WRS	Exceed DCGL Resd	Exceed DCGL Work	Exceed Bkgd WRS	Exceed DCGL Resd	Exceed DCGL Work	Exceed Bkgd WRS	Exceed DCGL Resd	Exceed DCGL Work
Compound																											
Gross Alpha																											
Gross Beta																											
Actinium-228																											
Bismuth-214	X	X		X	X		X	X		X	X		X			X	X		X	X		X	X				
Cesium-137	X																					X					
Cobalt-57																											
Cobalt-60																						X					
Lead-210	X	X		X	X		X	X		X	X					X	X	X				X	X				
Lead-211																X			X			X	X				
Lead-214				X	X		X	X											X								
Plutonium-239/240																											
Promethium-147																											
Radium-223				X			X			X			X									X			X		
Radium-226				X	X		X	X		X	X		X	X		X	X	X	X	X	X	X	X				
Radium-228				X						X						X	X		X	X		X					
Thallium-208																											
Thorium-227																											
Thorium-230																									X	X	
Thorium-232				X												X			X								
Thorium-234																											
Tritium	X			X			X			X			X									X			X		
Uranium-233/234				X												X			X			X			X		
Uranium-235																											
Uranium-238				X												X						X					
Total by Area	4	2	0	10	4	0	6	4	0	6	3	0	4	1	0	8	4	2	7	3	1	11	4	0	4	1	0

Figure 4-27
Box and Wisker Plot of Radiological Scanning Data
SEAD-12 Potential Release Areas
Sead-12 Remedial Investigation Report
Seneca Army Depot Activity



A- EM-5
B-EM-6
C-Building 819/ EM-27
D-Building 815-816/ EM-28
E- Disposal Pit A/B
F- Disposal Pit C
G- Former Dry Waste Disposal Pit
H- Class III Areas
L- Background
M- Wastewater Treatment Plant

4.7.2 Surface Water, Sediment, and Groundwater

The chemical exceedences for surface water, sediment, groundwater are summarized in **Table 4-35**. During the RI investigation, surface water and sediment sampling locations were designated as background, site and downgradient locations. Groundwater samples were classified as either site or background locations. The following summarizes the results presented above.

4.7.2.1 Chemical

Presented in **Section 4.4** and discussed with individual potential release areas, locations of surface water exceedences for SVOCs and pesticides/ PCBs are presented on **Figure 4-5**, with metals exceedences presented in **Figure 4-6**. SVOC exceedences are limited to bis(2-ethylhexyl)phthalate, one near the former Dry Waste Disposal Pit and the other near Building 819. With the exception of locations downgradient to the former Dry Waste Disposal Pit (SW12-45) and Building 819 (SW12-22) pesticide/ PCB exceedences are generally upgradient of distal to any of the potential release areas. While surface water exceedences occurred for 7 metals at 22 locations, only mercury (5 exceedences, at 4 locations) and lead (4 exceedences) are considered significant. Three of the four mercury locations (SW12A-2, SW12A-1, and SW12-16) occur in the unnamed creek south of disposal pits A, B, and C, while SW12-35 is approximately 350 feet south. (Surface soil locations proximal to the surface water and sediment Hg exceedences are less than twice the regulatory criteria. The implications of these exceedences will be discussed in more detail in **Section 8.**

Figure 4-7, Figure 4-8, and **Figure 4-9** show the sediment locations of SVOCs, pesticides/ PCBs, and metals exceedences, respectively. As shown, exceedences occur for SVOCs, pesticides/ PCBs, and metals, both onsite and downgradient. The incidence of exceedences in sediment decreases in the downgradient dataset. The metals sediment exceedences within the SEAD-12 area correlate weakly with locations of surface water exceedences for metals. The only downgradient surface water exceedence is for hexachlorobenzene (**Figure 4-8**, Pesticides/PCBs).

Groundwater metal exceedences, shown in **Figure 4-10**, include antimony (Sb), iron (Fe), Manganese (Mn), and sodium (Na). The Fe, Mn, and Na exceedences are spread across the and often seasonably variable. The Sb exceedences only occurred in the second round of sampling, with only MW12-39 (43.2 μg/L) being significantly above the 3.0 μg/L criteria level. SVOCs are limited to two relatively low exceedences of Bis(2-Ethylhexyl)phthalate. The most significant groundwater exceedence is for Trichloroethene (TCE), being detected at 1600 μg/L in MW12-37 (near Building 813),

TABLE 4-35
Exceedance Summary-Surface Water, Sediment, and Ground Water
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Compound	Surface Water					Sediment					Groundwater		
	Criteria	Downgradient		Site		Criteria	Downgradient		Site		Criteria	Site	
		Exceeding Std.	Max value	Exceeding Std.	Max value		Exceeding Std.	Max value	Exceeding Std.	Max value		Exceeding Std.	Max value
VOCS													
1,2-Dichloroethene (total)											5	1	30
Trichloroethene											5	2	1600
SVOCS													
Bis(2-Ethylhexyl)phthalate	0.6			2	12						50	2	230
Benzo(a)anthracene						648	1	1500	3	3100			
Benzo(a)pyrene						70.2	3	1300	21	3300			
Benzo(b)fluoranthene						70.2	4	1200	24	3200			
Benzo(k)fluoranthene						70.2			15	2700			
Chrysene						70.2	4	1400	23	3200			
Fluorene						43.2	1	59	5	340			
Ideno(1,2,3-cd)pyrene						70.2	2	670	18	2000			
Naphthalene						1.62			7	49			
PESTICIDES/PCBS													
4,4'-DDD						0.54	2	3.7	6	110			
4,4'-DDE	0.000007			1	0.0056	0.54	2	4	10	76			
4,4'-DDT	0.00001			1	0.062	0.54			7	200			
Aldrin	0.001			1	0.0041								
Arochlor-1254						0.0432			4	1200			
Arochlor-1260						0.0432			2	37			
Endosulfan I						1.62			2	3.6			
Heptachlor	0.0002			3	0.0063	0.0432			3	11			
Heptachlor epoxide	0.0003			2	0.0033								
Hexachlorobenzene	0.00003	1	0.013	3	0.02								
METALS													
Aluminum	100			19	3430								
Antimony						2			1	2.8			
Arsenic						6	3	7.6	10	19.1			
Cadmium						0.6			8	9			
Chromium						26	2	37.1	9	130			
Cobalt	5			1	6								
Copper	17.36			2	27.6	16	9	36.8	49	1160			
Iron	300			12	6830	20000	8	43000	38	85900	300	42	20700
Lead	1.462			4	35.4	31			8	215			
Manganese						460	4	947	25	14000	300	12	3280
Mercury	0.00007			5	0.11	0.15	1	0.27	7	1.7			
Nickel						16	9	58.9	51	126			
Silver	0.1			6	1.6	1			1	1.5			
Sodium											20000	23	408000
Zinc						120	3	196	35	2650			

during both rounds of groundwater sampling. However, TCE was not detected in either of the wells downgradient (MW12-38 & MW12-39) to MW12-37 or the soil gas anomalies of building 813 or building 814. There were no groundwater exceedences for pesticides/PCBs.

Recommendations for further investigations are presented in **Section 8**.

4.7.2.2 Radiological

As shown in **Table 4-36,** radiological exceedences (based on the comparison to the background data sets using the WRS test) occur in site and downgradient locations for all three media. However, there is no correlation between the data, other than the exceedences may all be associated with the naturally-occurring daughters of uranium and thorium.

TABLE 4-36
Exceedance Summary-Radiological Data for Surface Water, Sediment, and Ground Water
Sead-12 Remedial Investigation
Seneca Army Depot Activity

Compound	Surface Water Downgradient Exceeds Bkgrd WRS	Surface Water Site Exceeds Bkgrd WRS	Sediment Downgradient Exceeds Bkgrd WRS	Sediment Site Exceeds Bkgrd WRS	Ground Water Site Exceeds Bkgrd WRS
Gross Alpha					
Gross Beta					
Actinium-228					
Bismuth-214					
Cesium-137					
Cobalt-57					
Cobalt-60			x		
Lead-210					
Lead-211					
Lead-214					
Plutonium-239/240					
Promethium-147					
Radon-222		x			
Radium-223					
Radium-226	x				
Radium-228					
Thallium-208					
Thorium-227		x			
Thorium-228					x
Thorium-230		x			
Thorium-232		x			
Thorium-234					
Tritium					
Uranium-234	x	x	x		
Uranium-235					
Uranium-238	x		x	x	

SECTION 4

CHEMICAL SUMMARY TABLES

TABLE 4-A
BLDG 819/EM-27 - SURFACE SOIL CHEMICAL DATA
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12-19		MW12-20		MW12-21		SS12-88		SS12-89	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123040		123046		123049		123280		123281	
SAMPLE DEPTH TO TOP OF SAMPLE								0		0		0		0		0	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.2		0.2		0.8		0.2		0.2	
SAMPLE DATE								10/2/1998		10/3/1998		10/3/1998		17-Nov-98		17-Nov-98	
QC CODE								SA		SA		SA		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
VOLATILE ORGANICS																	
Acetone	UG/KG	64	40%	200	0	2	5	11	J	12	UJ	12	UJ	64		12	U
Toluene	UG/KG	4	40%	1500	0	2	5	12	U	4	J	12	U	2	J	12	U
SEMI VOLATILE ORGANICS																	
Acenaphthene	UG/KG	1600	100%	50000	0	5	5	82	J	11	J	4.3	J	1600	J	91	J
Acenaphthylene	UG/KG	240	40%	41000	0	2	5	240	J	14	J	84	U	2100	U	260	U
Anthracene	UG/KG	1800	80%	50000	0	4	5	480	J	23	J	84	U	1800	J	90	J
Benzo(a)anthracene	UG/KG	6200	100%	224	4	5	5	3800		260		24	J	6200		400	
Benzo(a)pyrene	UG/KG	5400	100%	61	4	5	5	3800		270		25	J	5400		390	
Benzo(b)fluoranthene	UG/KG	4800	100%	1100	2	5	5	2800		300		29	J	4800		470	
Benzo(ghi)perylene	UG/KG	3100	100%	50000	0	5	5	2200		190		23	J	3100		220	J
Benzo(k)fluoranthene	UG/KG	6100	100%	1100	2	5	5	4100		310		30	J	6100		390	
Bis(2-Ethylhexyl)phthalate	UG/KG	17	40%	50000	0	2	5	1100	U	15	J	17	J	2100	UJ	260	UJ
Carbazole	UG/KG	2600	100%		0	5	5	230	J	29	J	7	J	2600	J	180	J
Chrysene	UG/KG	6800	100%	400	3	5	5	3600		310		32	J	6800		460	
Di-n-octylphthalate	UG/KG	6.2	20%	50000	0	1	5	1100	U	81	U	6.2	J	2100	U	260	U
Dibenz(a,h)anthracene	UG/KG	1500	80%	14	4	4	5	990	J	75	J	84	U	1500	J	100	J
Dibenzofuran	UG/KG	650	60%	6200	0	3	5	1100	U	5	J	84	U	650	J	33	J
Fluoranthene	UG/KG	14000	100%	50000	0	5	5	6400		440		50	J	14000		1100	
Fluorene	UG/KG	1200	80%	50000	0	4	5	180	J	10	J	84	U	1200	J	64	J
Indeno(1,2,3-cd)pyrene	UG/KG	3000	100%	3200	0	5	5	2400		170		17	J	3000		210	J
Phenanthrene	UG/KG	11000	100%	50000	0	5	5	2200		160		38	J	11000		700	
Pyrene	UG/KG	13000	100%	50000	0	5	5	4400		440		56	J	13000	J	740	J
PESTICIDES/ PCBS																	
4,4'-DDD	UG/KG	37	60%	2900	0	3	5	6.4	J	4.1	U	4.2	U	3	J	37	
4,4'-DDE	UG/KG	490	40%	2100	0	2	5	3.9	U	4.1	U	4.2	U	58		490	
4,4'-DDT	UG/KG	110	60%	2100	0	3	5	4.8	J	4.1	U	4.2	U	110		84	J
Endosulfan II	UG/KG	18	20%	900	0	1	5	3.9	U	4.1	U	4.2	U	3.7	U	18	
Endrin	UG/KG	2.7	40%	100	0	2	5	2.7	J	4.1	U	4.2	U	2.3	J	7.8	U
Endrin aldehyde	UG/KG	8.9	40%		0	2	5	7.8		4.1	U	4.2	U	8.9	J	7.8	U
Endrin ketone	UG/KG	18	40%		0	2	5	18		4.1	U	4.2	U	11		7.8	U
Gamma-Chlordane	UG/KG	3.1	40%	540	0	2	5	1.2	J	2.1	U	2.2	U	3.1	J	4	U
Methoxychlor	UG/KG	26	20%		0	1	5	26	J	21	U	22	U	19	U	40	U

TABLE 4-A
BLDG 819/EM-27 - SURFACE SOIL CHEMICAL DATA
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12-19		MW12-20		MW12-21		SS12-88		SS12-89	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123040		123046		123049		123280		123281	
SAMPLE DEPTH TO TOP OF SAMPLE								0		0		0		0		0	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.2		0.2		0.8		0.2		0.2	
SAMPLE DATE								10/2/1998		10/3/1998		10/3/1998		17-Nov-98		17-Nov-98	
QC CODE								SA		SA		SA		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
METALS																	
Aluminum	MG/KG	20800	100%	19520	1	5	5	16000		20800		15500		4990	J	3230	J
Arsenic	MG/KG	5.4	100%	8.9	0	5	5	5.4		3.5		3.8		4.7		3	
Barium	MG/KG	116	100%	300	0	5	5	74.5		102		116		47.6		23.9	J
Beryllium	MG/KG	0.78	100%	1.13	0	5	5	0.62	J	0.78	J	0.62	J	0.06	J	0.16	J
Cadmium	MG/KG	1.6	20%	2.46	0	1	5	0.06	U	0.06	U	0.07	U	1.6		0.32	U
Calcium	MG/KG	202000	100%	125300	1	5	5	13600	J	7950	J	4020	J	118000		202000	
Chromium	MG/KG	25.1	100%	30	0	5	5	24.9		25.1	J	18.3	J	12.8		7.3	
Cobalt	MG/KG	13.6	100%	30	0	5	5	12.7		13.6		11.5	J	3.5	J	3.8	J
Copper	MG/KG	23.1	100%	33	0	5	5	18.1		21.4		23.1		22.3		17.7	
Iron	MG/KG	34000	100%	37410	0	5	5	30000		34000		24900		12000	J	9070	J
Lead	MG/KG	33.1	100%	24.4	1	5	5	9	J	17.1	J	23	J	33.1	J	18.1	J
Magnesium	MG/KG	34800	100%	21700	1	5	5	5460		6020		4280		34800		14800	
Manganese	MG/KG	629	100%	1100	0	5	5	534		629	J	554	J	614		322	
Mercury	MG/KG	0.09	20%	0.1	0	1	5	0.06	U	0.06	UJ	0.06	U	0.09	J	0.06	U
Nickel	MG/KG	35.3	100%	50	0	5	5	33.4		35.3	J	25.5	J	9.9		14.2	
Potassium	MG/KG	2660	100%	2623	1	5	5	1990		2660		2560		1160		838	J
Sodium	MG/KG	128	80%	188	0	4	5	55.3	J	71.9	J	59.7	U	119	J	128	J
Thallium	MG/KG	3	20%	0.855	1	1	5	3		1.1	UJ	1.2	U	0.78	U	0.92	U
Vanadium	MG/KG	32.2	100%	150	0	5	5	25.1		32.2		25.1		12.7		12	
Zinc	MG/KG	109	100%	115	0	5	5	108		98.2	J	83.4	J	109	J	62.1	J

TABLE 4-B
BLDG 819/EM-27 CHEMICAL DATA-SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

PARAMETER	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12-19		MW12-19		MW12-20		MW12-20		MW12-21		MW12-21	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123041		123042		123047		123048		123050		123051	
SAMPLE DEPTH TO TOP OF SAMPLE								6		8		4		6		4		6	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								8		10		6		8		6		8	
SAMPLE DATE								10/2/1998		10/2/1998		10/3/1998		10/3/1998		10/3/1998		10/3/1998	
QC CODE								SA		SA		SA		SA		SA		SA	
STUDY ID								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	
VOLATILE ORGANICS																			
Acetone	UG/KG	8	22%	200	0	2	9	6	J	8	J	12	UJ	12	UJ	11	UJ	11	UJ
Methylene chloride	UG/KG	100	33%	100	0	3	9	13	U	11	UJ	12	U	12	U	11	U	11	U
Toluene	UG/KG	13	44%	1500	0	4	9	3	J	13	J	4	J	7	J	11	U	11	U
SEMI VOLATLE ORGANICS																			
Acenaphthene	UG/KG	10	11%	50000	0	1	9	78	U	75	U	80	U	75	U	72	U	72	U
Anthracene	UG/KG	18	33%	50000	0	3	9	11	J	75	U	80	U	4.1	J	72	U	72	U
Benzo(a)anthracene	UG/KG	41	67%	224	0	6	9	34	J	11	J	80	U	22	J	72	U	72	U
Benzo(a)pyrene	UG/KG	34	67%	61	0	6	9	31	J	9.9	J	80	U	20	J	72	U	72	U
Benzo(b)fluoranthene	UG/KG	36	67%	1100	0	6	9	27	J	11	J	80	U	18	J	72	U	72	U
Benzo(ghi)perylene	UG/KG	27	78%	50000	0	7	9	23	J	11	J	80	U	17	J	11	J	72	U
Benzo(k)fluoranthene	UG/KG	41	67%	1100	0	6	9	34	J	15	J	80	U	22	J	72	U	72	U
Bis(2-Ethylhexyl)phthalate	UG/KG	16	44%	50000	0	4	9	9	J	75	U	80	UJ	14	J	16	J	12	J
Carbazole	UG/KG	22	33%		0	3	9	4.4	J	4.7	J	80	UJ	75	UJ	72	UJ	72	UJ
Chrysene	UG/KG	46	89%	400	0	8	9	36	J	18	J	80	U	24	J	4.4	J	4.3	J
Di-n-butylphthalate	UG/KG	4.5	11%	8100	0	1	9	4.5	J	75	UJ	80	U	75	U	72	U	72	U
Di-n-octylphthalate	UG/KG	21	44%	50000	0	4	9	6.5	J	75	U	80	UJ	11	J	9.5	J	21	J
Dibenz(a,h)anthracene	UG/KG	12	33%	14	0	3	9	12	J	4.2	J	80	U	75	U	72	U	72	U
Dibenzofuran	UG/KG	6.2	11%	6200	0	1	9	78	U	75	U	80	U	75	U	72	U	72	U
Fluoranthene	UG/KG	97	78%	50000	0	7	9	70	J	28	J	80	U	52	J	72	U	3.7	J
Fluorene	UG/KG	11	22%	50000	0	2	9	7.9	J	75	U	80	U	75	U	72	U	72	U
Indeno(1,2,3-cd)pyrene	UG/KG	23	67%	3200	0	6	9	21	J	7.3	J	80	U	13	J	72	U	72	U
Phenanthrene	UG/KG	94	78%	50000	0	7	9	53	J	19	J	80	U	25	J	72	U	5.4	J
Pyrene	UG/KG	80	78%	50000	0	7	9	63	J	27	J	80	U	43	J	72	U	6.8	J
METALS																			
Aluminum	MG/KG	21200	100%	19520	1	9	9	10100		12200		21200		14500		8730		3760	
Arsenic	MG/KG	5.8	100%	8.9	0	9	9	2.9		2.5		5.8		3.6		2.7		4.5	
Barium	MG/KG	127	100%	300	0	9	9	87.2		58.4		127		62		47.7		92.1	
Beryllium	MG/KG	0.96	100%	1.13	0	9	9	0.43	J	0.55	J	0.96		0.61	J	0.34	J	0.29	J
Calcium	MG/KG	151000	100%	125300	1	9	9	74200	J	24300	J	3700	J	2010	J	75500	J	151000	J
Chromium	MG/KG	30	100%	30	0	9	9	16.3		16.5	J	30	J	23.3	J	12.1	J	4.2	J
Cobalt	MG/KG	16	100%	30	0	9	9	7.6	J	10.4		16		13.3		10.8		7.3	J
Copper	MG/KG	44.7	100%	33	1	9	9	17.5		27.5		44.7		28.8		25.2		22	
Iron	MG/KG	44500	100%	37410	1	9	9	17700		25200		44500		29600		19200		17000	
Lead	MG/KG	27.1	100%	24.4	1	9	9	6	J	16.1	J	27.1	J	19.1	J	9.7	J	17.6	J
Magnesium	MG/KG	21200	100%	21700	0	9	9	21200		6380		8040		6090		14300		6630	
Manganese	MG/KG	747	100%	1100	0	9	9	359		278	J	517	J	287	J	347	J	395	J

TABLE 4-B
BLDG 819/EM-27 CHEMICAL DATA-SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12-19		MW12-19		MW12-20		MW12-20		MW12-21		MW12-21	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123041		123042		123047		123048		123050		123051	
SAMPLE DEPTH TO TOP OF SAMPLE								6		8		4		6		4		6	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								8		10		6		8		6		8	
SAMPLE DATE								10/2/1998		10/2/1998		10/3/1998		10/3/1998		10/3/1998		10/3/1998	
QC CODE								SA		SA		SA		SA		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Mercury	MG/KG	0.2	22%	0.1	2	2	9	0.05	U	0.06	UJ	0.06	UJ	0.11	J	0.05	UJ	0.05	UJ
Nickel	MG/KG	64.5	100%	50	1	9	9	21		36.4	J	64.5	J	49.1	J	28.6	J	21.5	J
Potassium	MG/KG	2320	100%	2623	0	9	9	1500		1550		2320		1640		1580		1050	
Selenium	MG/KG	1.1	22%	2	0	2	9	0.75	UJ	0.37	U	0.42	U	0.37	U	0.44	U	0.39	J
Silver	MG/KG	0.32	11%	0.8	0	1	9	0.2	U	0.19	U	0.32	J	0.19	U	0.23	U	0.2	U
Sodium	MG/KG	125	56%	188	0	5	9	67.9	J	84.2	J	125	J	103	J	48.2	U	84.6	J
Vanadium	MG/KG	33.1	100%	150	0	9	9	18.8		18.1		33.1		19.2		14.9		10.2	
Zinc	MG/KG	143	100%	115	3	9	9	48.3		56	J	124	J	120	J	69.1	J	53.1	J

TABLE 4-B
BLDG 819/EM-27 CHEMICAL DATA-SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								TP12-17A		TP12-17B		TP12-17C	
MATRIX								SOIL		SOIL		SOIL	
SAMPLE ID								123036		123034		123035	
SAMPLE DEPTH TO TOP OF SAMPLE								2		0.5		3	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								2		0.5		3	
SAMPLE DATE								10/6/1998		10/6/1998		10/6/1998	
QC CODE								SA		SA		SA	
STUDY ID								RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
PARAMETER	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
VOLATILE ORGANICS													
Acetone	UG/KG	8	22%	200	0	2	9	12	U	26	U	12	U
Methylene chloride	UG/KG	100	33%	100	0	3	9	100		99		64	
Toluene	UG/KG	13	44%	1500	0	4	9	12	U	12	U	12	U
SEMI VOLATLE ORGANICS													
Acenaphthene	UG/KG	10	11%	50000	0	1	9	78	U	10	J	78	U
Anthracene	UG/KG	18	33%	50000	0	3	9	78	U	18	J	78	U
Benzo(a)anthracene	UG/KG	41	67%	224	0	6	9	4.8	J	41	J	5.2	J
Benzo(a)pyrene	UG/KG	34	67%	61	0	6	9	5.8	J	34	J	6.4	J
Benzo(b)fluoranthene	UG/KG	36	67%	1100	0	6	9	6.6	J	36	J	8.6	J
Benzo(ghi)perylene	UG/KG	27	78%	50000	0	7	9	27	J	25	J	6.5	J
Benzo(k)fluoranthene	UG/KG	41	67%	1100	0	6	9	9.4	J	41	J	8.5	J
Bis(2-Ethylhexyl)phthalate	UG/KG	16	44%	50000	0	4	9	78	U	78	U	78	U
Carbazole	UG/KG	22	33%		0	3	9	78	UJ	22	J	78	UJ
Chrysene	UG/KG	46	89%	400	0	8	9	8.1	J	46	J	9	J
Di-n-butylphthalate	UG/KG	4.5	11%	8100	0	1	9	78	U	78	U	78	U
Di-n-octylphthalate	UG/KG	21	44%	50000	0	4	9	78	U	78	U	78	U
Dibenz(a,h)anthracene	UG/KG	12	33%	14	0	3	9	78	U	11	J	78	U
Dibenzofuran	UG/KG	6.2	11%	6200	0	1	9	78	U	6.2	J	78	U
Fluoranthene	UG/KG	97	78%	50000	0	7	9	10	J	97		13	J
Fluorene	UG/KG	11	22%	50000	0	2	9	78	U	11	J	78	U
Indeno(1,2,3-cd)pyrene	UG/KG	23	67%	3200	0	6	9	5.4	J	23	J	7	J
Phenanthrene	UG/KG	94	78%	50000	0	7	9	6.8	J	94		7.9	J
Pyrene	UG/KG	80	78%	50000	0	7	9	10	J	80		11	J
METALS													
Aluminum	MG/KG	21200	100%	19520	1	9	9	11900		14400		11600	
Arsenic	MG/KG	5.8	100%	8.9	0	9	9	3.8		5		5	
Barium	MG/KG	127	100%	300	0	9	9	117		115		107	
Beryllium	MG/KG	0.96	100%	1.13	0	9	9	0.51	J	0.53	J	0.48	J
Calcium	MG/KG	151000	100%	125300	1	9	9	3840		3930		2920	
Chromium	MG/KG	30	100%	30	0	9	9	17.7		21.1		17.4	
Cobalt	MG/KG	16	100%	30	0	9	9	9.5		11		10	
Copper	MG/KG	44.7	100%	33	1	9	9	19.3		22.2		18.9	
Iron	MG/KG	44500	100%	37410	1	9	9	20100		28500		20900	
Lead	MG/KG	27.1	100%	24.4	1	9	9	16.3		18.3		16.9	
Magnesium	MG/KG	21200	100%	21700	0	9	9	3150	J	3700	J	3180	J
Manganese	MG/KG	747	100%	1100	0	9	9	664		747		651	

TABLE 4-B
BLDG 819/EM-27 CHEMICAL DATA-SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

		FACILITY						SEAD-12		SEAD-12		SEAD-12	
		LOCATION ID						TP12-17A		TP12-17B		TP12-17C	
		MATRIX						SOIL		SOIL		SOIL	
		SAMPLE ID						123036		123034		123035	
		SAMPLE DEPTH TO TOP OF SAMPLE						2		0.5		3	
		SAMPLE DEPTH TO BOTTOM OF SAMPLE						2		0.5		3	
		SAMPLE DATE						10/6/1998		10/6/1998		10/6/1998	
		QC CODE						SA		SA		SA	
		STUDY ID						RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
PARAMETER	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Mercury	MG/KG	0.2	22%	0.1	2	2	9	0.2		0.06	U	0.06	U
Nickel	MG/KG	64.5	100%	50	1	9	9	23.4		27.7		23.1	
Potassium	MG/KG	2320	100%	2623	0	9	9	1240		1560		956	
Selenium	MG/KG	1.1	22%	2	0	2	9	1.1	J	0.99	U	0.76	U
Silver	MG/KG	0.32	11%	0.8	0	1	9	0.21	U	0.26	U	0.2	U
Sodium	MG/KG	125	56%	188	0	5	9	44.3	U	54.2	U	41.6	U
Vanadium	MG/KG	33.1	100%	150	0	9	9	19.4		23.3		19.1	
Zinc	MG/KG	143	100%	115	3	9	9	67.6		143		63.2	

TABLE 4-C
EM-28 CHEMICAL DATA-SURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12-29		MW12-30		MW12-30	
MATRIX								SOIL		SOIL		SOIL	
SAMPLE ID								123133		123148		123136	
SAMPLE DEPTH TO TOP OF SAMPLE								0		0		0	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.2		0.2		0.2	
SAMPLE DATE								15-Oct-98		16-Oct-98		16-Oct-98	
QC CODE								SA		DU		SA	
STUDY ID								RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
PARAMETER	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
VOLATILE ORGANICS													
Toluene	UG/KG	2	33%	1500	0	1	3	15	U	2	J	14	U
SEMI VOLATILE ORGANICS													
Benzo(a)anthracene	UG/KG	16	100%	224	0	3	3	16	J	11	J	8.6	J
Benzo(a)pyrene	UG/KG	17	67%	61	0	2	3	17	J	12	J	96	UJ
Benzo(b)fluoranthene	UG/KG	22	67%	1100	0	2	3	22	J	18	J	96	U
Benzo(ghi)perylene	UG/KG	10	33%	50000	0	1	3	100	UJ	10	J	96	U
Benzo(k)fluoranthene	UG/KG	20	33%	1100	0	1	3	20	J	94	U	96	U
Chrysene	UG/KG	22	100%	400	0	3	3	22	J	17	J	9.7	J
Fluoranthene	UG/KG	36	100%	50000	0	3	3	36	J	23	J	13	J
Indeno(1,2,3-cd)pyrene	UG/KG	8.2	33%	3200	0	1	3	100	UJ	8.2	J	96	U
Phenanthrene	UG/KG	25	100%	50000	0	3	3	25	J	18	J	8.3	J
Pyrene	UG/KG	34	100%	50000	0	3	3	34	J	20	J	12	J
METALS													
Aluminum	MG/KG	14900	100%	19520	0	3	3	14900	J	13500	J	12300	J
Arsenic	MG/KG	5	100%	8.9	0	3	3	5		4.1		4.6	
Barium	MG/KG	113	100%	300	0	3	3	106	J	113	J	106	J
Beryllium	MG/KG	0.76	100%	1.13	0	3	3	0.7	J	0.76	J	0.74	J
Cadmium	MG/KG	17.7	33%	2.46	1	1	3	17.7		0.08	U	0.06	U
Calcium	MG/KG	13500	100%	125300	0	3	3	13500		6010		5850	
Chromium	MG/KG	22.6	100%	30	0	3	3	22.6		18.6		17.7	
Cobalt	MG/KG	10.6	100%	30	0	3	3	10.6	J	8.8	J	8.4	J
Copper	MG/KG	23.1	100%	33	0	3	3	21.1		22.1		23.1	
Iron	MG/KG	28600	100%	37410	0	3	3	28600	J	22300	J	23500	J
Lead	MG/KG	25	100%	24.4	1	3	3	25	J	22.6	J	22.4	J
Magnesium	MG/KG	10300	100%	21700	0	3	3	10300	J	3580	J	3430	J
Manganese	MG/KG	772	100%	1100	0	3	3	733		650		772	
Mercury	MG/KG	0.1	100%	0.1	0	3	3	0.08	J	0.1	J	0.09	J
Nickel	MG/KG	30.6	100%	50	0	3	3	30.6	J	26.3	J	25.1	J
Potassium	MG/KG	1790	100%	2623	0	3	3	1790		1620		1380	
Selenium	MG/KG	1.4	100%	2	0	3	3	1.4	J	1.2	J	1.1	J
Vanadium	MG/KG	24.6	100%	150	0	3	3	24.6		22		20.4	
Zinc	MG/KG	93.3	100%	115	0	3	3	93.3	J	79.1	J	73.9	J

TABLE 4-D
EM-28 CHEMICAL DATA-SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12-30		TP12-18A		TP12-18B		TP12-18C		TP12-19A		TP12-19B		TP12-19C	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123138		123022		123023		123024		123025		123026		123027	
SAMPLE DEPTH TO TOP OF SAMPLE								2		0.5		4		4.5		0.5		2		5.5	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								3.5		0.5		4		4.5		0.5		2		5.5	
SAMPLE DATE								16-Oct-98		10/1/1998		10/1/1998		10/1/1998		10/1/1998		10/1/1998		10/1/1998	
QC CODE								SA		SA		SA		SA		SA		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
VOLATILE ORGANICS																					
Acetone	UG/KG	4	14%	200	0	1	7	4	J	12	UJ	11	UJ	11	UJ	11	UJ	11	UJ	12	UJ
Toluene	UG/KG	4	14%	1500	0	1	7	4	J	12	U	11	U	11	U	11	U	11	U	12	U
SEMI VOLATILE ORGANICS																					
2-Methylnaphthalene	UG/KG	4.4	14%	36400	0	1	7	77	UJ	4.4	J	150	U	76	UJ	76	UJ	77	UJ	76	UJ
Benzo(b)fluoranthene	UG/KG	4.7	29%	1100	0	2	7	77	U	4.7	J	150	U	76	U	4.4	J	77	U	76	U
Benzo(k)fluoranthene	UG/KG	5.2	29%	1100	0	2	7	77	U	5.2	J	150	U	76	U	4	J	77	U	76	U
Bis(2-Ethylhexyl)phthalate	UG/KG	11	43%	50000	0	3	7	77	U	11	J	150	U	76	U	5.8	J	5.6	J	76	U
Butylbenzylphthalate	UG/KG	93	14%	50000	0	1	7	77	U	77	U	93	J	76	U	76	U	77	U	76	U
Chrysene	UG/KG	6.1	29%	400	0	2	7	77	U	6.1	J	150	U	76	U	5.1	J	77	U	76	U
Di-n-butylphthalate	UG/KG	880	86%	8100	0	6	7	77	U	4	J	880		5.9	J	3.9	J	4.6	J	4.6	J
Di-n-octylphthalate	UG/KG	5.5	14%	50000	0	1	7	5.5	J	77	U	150	U	76	U	76	U	77	U	76	U
Diethyl phthalate	UG/KG	28	14%	7100	0	1	7	77	U	77	UJ	28	J	76	UJ	76	UJ	77	UJ	76	UJ
Dimethylphthalate	UG/KG	29	14%	2000	0	1	7	77	U	77	U	29	J	76	U	76	U	77	U	76	U
Fluoranthene	UG/KG	7.6	29%	50000	0	2	7	77	U	7.6	J	150	U	76	U	7.4	J	77	U	76	U
Phenanthrene	UG/KG	7.7	29%	50000	0	2	7	77	U	7.7	J	150	U	76	U	5.6	J	77	U	76	U
Phenol	UG/KG	7.2	14%	30	0	1	7	77	U	7.2	J	150	U	76	U	76	U	77	U	76	U
Pyrene	UG/KG	6.9	29%	50000	0	2	7	77	UJ	6.9	J	150	U	76	U	5.6	J	77	U	76	U
PESTICIDES/PCBS																					
4,4'-DDT	UG/KG	21	29%	2100	0	2	7	3.8	U	3.8	U	3.7	U	3.8	U	2.9	J	21		3.8	U
Aroclor-1260	UG/KG	440	29%	10000	0	2	7	38	U	38	U	37	U	38	U	52		440		38	U
Dieldrin	UG/KG	5.9	14%	44	0	1	7	3.8	U	3.8	U	3.7	U	3.8	U	3.8	U	5.9	J	3.8	U
Endrin	UG/KG	3.8	14%	100	0	1	7	3.8	U	3.8	U	3.7	U	3.8	U	3.8	U	3.8	J	3.8	U
METALS																					
Aluminum	MG/KG	15300	100%	19520	0	7	7	12700	J	12800		13500		14800		12200		12300		15300	
Antimony	MG/KG	1.8	29%	6	0	2	7	1.1	R	1.8	J	1.2	R	1.1	R	1.2	R	1.3	R	1.1	J
Arsenic	MG/KG	4.7	100%	8.9	0	7	7	4.7		3.4		4.4		4.1		3.1		3.5		4	
Barium	MG/KG	104	100%	300	0	7	7	104	J	95.8		84.8		79.3		80.6		88.8		99.6	
Beryllium	MG/KG	0.71	100%	1.13	0	7	7	0.47	J	0.55	J	0.55	J	0.54	J	0.52	J	0.53	J	0.71	J
Calcium	MG/KG	13800	100%	125300	0	7	7	2710		13800	J	2550	J	3280	J	13100	J	2480	J	4810	J
Chromium	MG/KG	26	100%	30	0	7	7	19		19.3		23.7		26		18.8		17.4		25.9	
Cobalt	MG/KG	18	100%	30	0	7	7	12.2		10.7		13.8		16.2		10.5		9	J	18	
Copper	MG/KG	30.2	100%	33	0	7	7	28.3		19.8		30.2		27.2		20.7		12.9		28.8	
Iron	MG/KG	33800	100%	37410	0	7	7	21900	J	23200		29200		33800		22600		21400		31600	
Lead	MG/KG	14.7	100%	24.4	0	7	7	11.8	J	12.6	J	12.2	J	14.7	J	11.8	J	11	J	10.8	J
Magnesium	MG/KG	5960	100%	21700	0	7	7	4940	J	5910		5300		5960		5230		3070		5720	
Manganese	MG/KG	667	100%	1100	0	7	7	589		667		632		657		549		519		513	
Mercury	MG/KG	0.07	43%	0.1	0	3	7	0.06	J	0.07	J	0.05	U	0.05	U	0.05	U	0.06	U	0.07	J

TABLE 4-D
EM-28 CHEMICAL DATA-SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12-30		TP12-18A		TP12-18B		TP12-18C		TP12-19A		TP12-19B		TP12-19C	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123138		123022		123023		123024		123025		123026		123027	
SAMPLE DEPTH TO TOP OF SAMPLE								2		0.5		4		4.5		0.5		2		5.5	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								3.5		0.5		4		4.5		0.5		2		5.5	
SAMPLE DATE								16-Oct-98		10/1/1998		10/1/1998		10/1/1998		10/1/1998		10/1/1998		10/1/1998	
QC CODE								SA		SA		SA		SA		SA		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Nickel	MG/KG	50.5	100%	50	1	7	7	36	J	29.1		48.7		50.5		30.1		21.4		47.7	
Potassium	MG/KG	1330	100%	2623	0	7	7	1090		1330		1140		1140		1020		821	J	1110	
Sodium	MG/KG	66.7	43%	188	0	3	7	46	U	63.9	J	66.7	J	46.6	U	50.9	U	52.6	U	54.5	J
Thallium	MG/KG	1.1	14%	0.855	1	1	7	1.1	J	1.4	U	1.4	U	1.5	U	1.4	U	1.3	U	1.3	U
Vanadium	MG/KG	21.2	100%	150	0	7	7	20.2		20.7		19.9		20.9		18.3		19.4		21.2	
Zinc	MG/KG	113	100%	115	0	7	7	68.1	J	79.5		99.2		113		81.8		62.1		109	

TABLE 4-E
DISPOSAL PIT A/B CHEMICAL DATA-SURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12-10		MW12-11		MW12-12		MW12-13		MW12-8		SB12-1	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123007		123010		123013		123016		123183		12209	
SAMPLE DEPTH TO TOP OF SAMPLE								0		0		0		0		0		0	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.2		0.2		0.2		0.2		0.2		0.2	
SAMPLE DATE								29-Sep-98		29-Sep-98		30-Sep-98		01-Oct-98		28-Oct-98		11-Nov-97	
QC CODE								SA		SA		SA		SA		SA		DU	
STUDY ID								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	
PARAMETER	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
VOLATILE ORGANICS																			
Acetone	UG/KG	52	47%	200	0	7	15	11	U	11	U	12	U	12	UJ	52		3	J
Methyl butyl ketone	UG/KG	1	7%		0	1	15	11	U	11	U	12	U	12	U	13	U	12	U
Methylene chloride	UG/KG	1	7%	100	0	1	15	11	U	11	U	1	J	12	U	13	U	12	U
Toluene	UG/KG	4	27%	1500	0	4	15	11	U	11	U	12	U	12	U	13	U	12	U
SEMI VOLATILE ORGANICS																			
Benzo(a)anthracene	UG/KG	27	33%	224	0	5	15	77	U	72	U	80	U	4.5	J	6.4	J	11	J
Benzo(a)pyrene	UG/KG	18	33%	61	0	5	15	77	UJ	72	UJ	80	UJ	5	J	8	J	15	J
Benzo(b)fluoranthene	UG/KG	36	40%	1100	0	6	15	77	U	72	U	80	U	5.9	J	9.7	J	30	J
Benzo(ghi)perylene	UG/KG	23	33%	50000	0	5	15	77	U	72	U	80	U	4	J	6.6	J	23	J
Benzo(k)fluoranthene	UG/KG	26	27%	1100	0	4	15	77	U	72	U	80	U	7.6	J	7.4	J	78	U
Bis(2-Ethylhexyl)phthalate	UG/KG	210	20%	50000	0	3	15	77	U	72	U	210		11	J	83	U	78	U
Butylbenzylphthalate	UG/KG	6.7	7%	50000	0	1	15	77	U	72	U	80	U	78	U	83	U	6.7	J
Carbazole	UG/KG	16	7%		0	1	15	77	UJ	72	UJ	80	UJ	78	UJ	83	U	16	J
Chrysene	UG/KG	51	47%	400	0	7	15	4.3	J	72	UJ	80	UJ	6.8	J	9.1	J	17	J
Di-n-butylphthalate	UG/KG	68	20%	8100	0	3	15	77	UJ	72	UJ	80	UJ	78	UJ	83	U	68	J
Di-n-octylphthalate	UG/KG	7.8	13%	50000	0	2	15	77	U	72	U	80	U	78	U	83	U	7.8	J
Dibenz(a,h)anthracene	UG/KG	16	13%	14	1	2	15	77	U	72	U	80	U	78	U	83	U	16	J
Dibenzofuran	UG/KG	5.6	7%	6200	0	1	15	77	UJ	72	UJ	80	UJ	78	U	83	U	5.6	J
Fluoranthene	UG/KG	24	53%	50000	0	8	15	5.5	J	72	UJ	80	UJ	9.1	J	14	J	9.7	J
Fluorene	UG/KG	5.4	7%	50000	0	1	15	77	U	72	U	80	U	78	U	83	U	5.4	J
Indeno(1,2,3-cd)pyrene	UG/KG	18	27%	3200	0	4	15	77	U	72	U	80	U	78	U	6.1	J	18	J
Phenanthrene	UG/KG	8.5	33%	50000	0	5	15	77	U	72	U	80	U	6.5	J	7.8	J	8.5	J
Pyrene	UG/KG	22	53%	50000	0	8	15	4.2	J	72	U	80	U	9.1	J	22	J	10	J
PESTICIDES/PCBS																			
4,4'-DDE	UG/KG	15	13%	2100	0	2	15	3.8	U	3.6	U	4	U	4	U	4.2	U	3.9	U
4,4'-DDT	UG/KG	42	13%	2100	0	2	15	3.8	U	3.6	U	4	U	4	U	4.2	U	3.9	U
Aroclor-1254	UG/KG	670	20%	10000	0	3	15	38	U	36	U	40	U	40	U	42	U	39	U
Dieldrin	UG/KG	14	13%	44	0	2	15	3.8	U	3.6	U	4	U	4	U	4.2	U	3.9	U
Endosulfan I	UG/KG	1.8	7%	900	0	1	15	2	U	1.9	U	2	U	2	U	2.2	U	2	U
Endosulfan II	UG/KG	2.7	7%	900	0	1	15	3.8	U	3.6	U	4	U	4	U	4.2	U	3.9	U
Endrin	UG/KG	4.2	13%	100	0	2	15	3.8	U	3.6	U	4	U	4	U	4.2	U	3.9	U
Endrin aldehyde	UG/KG	5.6	13%		0	2	15	3.8	U	3.6	U	4	U	4	U	4.2	U	3.9	U
Gamma-Chlordane	UG/KG	11	20%	540	0	3	15	2	U	1.9	U	2	U	2	U	2.2	U	3.2	
Heptachlor epoxide	UG/KG	4.6	13%	20	0	2	15	2	U	1.9	U	2	U	2	U	2.2	U	2	U
METALS																			
Aluminum	MG/KG	15800	100%	19520	0	15	15	10100		10600		11800		9960		11700		10200	

TABLE 4-E
DISPOSAL PIT A/B CHEMICAL DATA-SURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12-10		MW12-11		MW12-12		MW12-13		MW12-8		SB12-1	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123007		123010		123013		123016		123183		12209	
SAMPLE DEPTH TO TOP OF SAMPLE								0		0		0		0		0		0	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.2		0.2		0.2		0.2		0.2		0.2	
SAMPLE DATE								29-Sep-98		29-Sep-98		30-Sep-98		01-Oct-98		28-Oct-98		11-Nov-97	
QC CODE								SA		SA		SA		SA		SA		DU	
STUDY ID								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	
PARAMETER	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Antimony	MG/KG	0.87	13%	6	0	2	15	1.1	UR	1.1	UR	1.3	UR	1.2	UR	1.5	UR	0.81	J
Arsenic	MG/KG	4.9	100%	8.9	0	15	15	3.5		4		3.3		3.2		3.1		4.9	
Barium	MG/KG	89.2	100%	300	0	15	15	64.5		50.3		58.9		78.6		76.1		89.2	
Beryllium	MG/KG	0.59	100%	1.13	0	15	15	0.38	J	0.39	J	0.44	J	0.32	J	0.58	J	0.38	
Cadmium	MG/KG	3.2	20%	2.46	1	3	15	0.06	U	0.05	U	0.06	U	0.06	U	0.43	U	1.1	
Calcium	MG/KG	77600	100%	125300	0	15	15	46500		1230		11800		1640	J	4240		30600	
Chromium	MG/KG	23.3	100%	30	0	15	15	15.2		14.4		21.5		13		15.1	J	22.8	
Cobalt	MG/KG	17.5	100%	30	0	15	15	8.9	J	8.2	J	13.1		8	J	8.6	J	9.5	
Copper	MG/KG	32.5	100%	33	0	15	15	20.1		14.9		32.5		13.4		15.1		27.5	
Cyanide	MG/KG	1.6	13%	0.35	2	2	15	0.58	U	0.56	U	0.64	U	1.2	J	1.6		0.66	UJ
Iron	MG/KG	27100	100%	37410	0	15	15	20800	J	19700	J	27100	J	16300		19500		22700	
Lead	MG/KG	22.2	100%	24.4	0	15	15	11.4		13.1		15.5		15.2	J	15.7	J	16.3	J
Magnesium	MG/KG	21500	100%	21700	0	15	15	9420		3150		6460		2340		3120		7050	
Manganese	MG/KG	1420	100%	1100	1	15	15	478		327		501		783		701		536	
Mercury	MG/KG	0.11	20%	0.1	1	3	15	0.11	J	0.05	UJ	0.06	UJ	0.09	J	0.06	U	0.05	U
Nickel	MG/KG	39.9	93%	50	0	14	15	24		17.6		39.9		16.2		16.3	UJ	30.4	
Potassium	MG/KG	1740	100%	2623	0	15	15	1190		925		1270		806	J	1170	J	1320	
Selenium	MG/KG	2.5	13%	2	2	2	15	0.86	U	0.83	U	0.94	U	0.89	UJ	0.55	U	2.1	
Silver	MG/KG	0.2	7%	0.8	0	1	15	0.22	U	0.22	U	0.25	U	0.23	U	0.29	U	0.48	U
Sodium	MG/KG	207	27%	188	1	4	15	47	U	45.7	U	51.7	U	48.9	U	60	U	115	
Thallium	MG/KG	1.8	33%	0.855	5	5	15	0.97	U	0.94	U	1.1	U	1.6	U	1.8	J	1.5	
Vanadium	MG/KG	24	100%	150	0	15	15	17.6		18.3		17.7		17.6		20.8		17.6	
Zinc	MG/KG	83.7	100%	115	0	15	15	50.1		45		81.4		46.1		53.6	J	64.2	

TABLE 4-E
DISPOSAL PIT A/B CHEMICAL DATA-SURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								SB12-1		SB12-2		SB12-2B		SB12-3		SB12-4		SS12-15	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								12534		123112		123064		12524		12530		123211	
SAMPLE DEPTH TO TOP OF SAMPLE								0		0		0		0		0		0	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.2		0.2		0.2		0.2		0.2		0.2	
SAMPLE DATE								11-Nov-97		14-Oct-98		04-Oct-98		09-Nov-97		10-Nov-97		03-Nov-98	
QC CODE								SA		SA		SA		SA		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
VOLATILE ORGANICS																			
Acetone	UG/KG	52	47%	200	0	7	15	10	J	12	U	12	UJ	4	J	5	J	12	U
Methyl butyl ketone	UG/KG	1	7%		0	1	15	12	U	11	U	12	U	12	U	1	J	12	U
Methylene chloride	UG/KG	1	7%	100	0	1	15	12	U	11	U	12	U	12	U	12	U	12	U
Toluene	UG/KG	4	27%	1500	0	4	15	12	U	11	U	12	U	3	J	4	J	12	U
SEMI VOLATILE ORGANICS																			
Benzo(a)anthracene	UG/KG	27	33%	224	0	5	15	78	U	75	U	4	J	82	U	84	U	80	UJ
Benzo(a)pyrene	UG/KG	18	33%	61	0	5	15	78	U	75	U	5.7	J	82	U	84	U	80	UJ
Benzo(b)fluoranthene	UG/KG	36	40%	1100	0	6	15	78	U	75	U	6.2	J	82	U	84	U	4.2	J
Benzo(ghi)perylene	UG/KG	23	33%	50000	0	5	15	78	U	75	UJ	4.6	J	82	U	84	U	80	U
Benzo(k)fluoranthene	UG/KG	26	27%	1100	0	4	15	78	U	75	U	7	J	82	U	84	U	80	U
Bis(2-Ethylhexyl)phthalate	UG/KG	210	20%	50000	0	3	15	78	U	75	U	73	UJ	82	U	84	U	80	UJ
Butylbenzylphthalate	UG/KG	6.7	7%	50000	0	1	15	78	U	75	U	73	UJ	82	U	84	U	80	UJ
Carbazole	UG/KG	16	7%		0	1	15	78	U	75	UJ	73	UJ	82	U	84	U	80	UJ
Chrysene	UG/KG	51	47%	400	0	7	15	78	U	75	U	7	J	82	U	5.1	J	80	UJ
Di-n-butylphthalate	UG/KG	68	20%	8100	0	3	15	78	U	75	U	73	U	82	U	84	U	7.2	J
Di-n-octylphthalate	UG/KG	7.8	13%	50000	0	2	15	78	U	6	J	73	UJ	82	U	84	U	80	U
Dibenz(a,h)anthracene	UG/KG	16	13%	14	1	2	15	78	U	75	UJ	73	U	82	U	84	U	80	U
Dibenzofuran	UG/KG	5.6	7%	6200	0	1	15	78	U	75	U	73	U	82	U	84	U	80	UJ
Fluoranthene	UG/KG	24	53%	50000	0	8	15	78	U	75	U	8.2	J	82	U	7	J	80	UJ
Fluorene	UG/KG	5.4	7%	50000	0	1	15	78	U	75	U	73	U	82	U	84	U	80	U
Indeno(1,2,3-cd)pyrene	UG/KG	18	27%	3200	0	4	15	78	U	75	UJ	4.3	J	82	U	84	U	80	U
Phenanthrene	UG/KG	8.5	33%	50000	0	5	15	78	U	75	U	5.8	J	82	U	84	U	80	UJ
Pyrene	UG/KG	22	53%	50000	0	8	15	4.5	J	75	U	10	J	82	U	6.1	J	80	U
PESTICIDES/PCBS																			
4,4'-DDE	UG/KG	15	13%	2100	0	2	15	3.9	U	3.8	U	4.1	U	4.8	J	4.2	U	4	U
4,4'-DDT	UG/KG	42	13%	2100	0	2	15	1.8	J	3.8	U	4.1	U	4.1	U	4.2	U	4	U
Aroclor-1254	UG/KG	670	20%	10000	0	3	15	39	U	38	U	41	U	440		24	J	40	U
Dieldrin	UG/KG	14	13%	44	0	2	15	3.9	U	3.8	U	4.1	U	5.8	J	4.2	U	4	U
Endosulfan I	UG/KG	1.8	7%	900	0	1	15	2	U	1.9	U	2.1	U	2.1	U	2.2	U	2.1	U
Endosulfan II	UG/KG	2.7	7%	900	0	1	15	3.9	U	3.8	U	4.1	U	2.7	J	4.2	U	4	U
Endrin	UG/KG	4.2	13%	100	0	2	15	3.9	U	3.8	U	4.1	U	2.6	J	4.2	U	4	U
Endrin aldehyde	UG/KG	5.6	13%		0	2	15	3.9	U	3.8	U	4.1	U	3.5	J	4.2	U	4	U
Gamma-Chlordane	UG/KG	11	20%	540	0	3	15	2	U	1.9	U	2.1	U	9	J	2.2	U	2.1	U
Heptachlor epoxide	UG/KG	4.6	13%	20	0	2	15	2	U	1.9	U	2.1	U	3.3	J	2.2	U	2.1	U
METALS																			
Aluminum	MG/KG	15800	100%	19520	0	15	15	8590		7160	J	15800		10500		14400		10200	

TABLE 4-E
DISPOSAL PIT A/B CHEMICAL DATA-SURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								SB12-1		SB12-2		SB12-2B		SB12-3		SB12-4		SS12-15	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								12534		123112		123064		12524		12530		123211	
SAMPLE DEPTH TO TOP OF SAMPLE								0		0		0		0		0		0	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.2		0.2		0.2		0.2		0.2		0.2	
SAMPLE DATE								11-Nov-97		14-Oct-98		04-Oct-98		09-Nov-97		10-Nov-97		03-Nov-98	
QC CODE								SA		SA		SA		SA		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Antimony	MG/KG	0.87	13%	6	0	2	15	0.87	J	0.96	UR	1.4	UR	0.83	UJ	0.86	UJ	1.2	UJ
Arsenic	MG/KG	4.9	100%	8.9	0	15	15	3.9		4	J	4.9		3.6		4.2		3.5	
Barium	MG/KG	89.2	100%	300	0	15	15	74.2		75.2		86.2		67.4		84		67.5	
Beryllium	MG/KG	0.59	100%	1.13	0	15	15	0.38		0.25	J	0.43	J	0.35	J	0.38		0.44	J
Cadmium	MG/KG	3.2	20%	2.46	1	3	15	0.86		3.2		0.07	U	0.07	U	0.07	U	0.06	U
Calcium	MG/KG	77600	100%	125300	0	15	15	52700		77600	J	3140		32300		12800		30700	
Chromium	MG/KG	23.3	100%	30	0	15	15	16.7		18.2		23.3		16.9		18.7		15.8	
Cobalt	MG/KG	17.5	100%	30	0	15	15	8.3		9.2		17.5		9.5		10.7		9.1	J
Copper	MG/KG	32.5	100%	33	0	15	15	21.3		23.6		13.4		19.3		16.7		22.3	
Cyanide	MG/KG	1.6	13%	0.35	2	2	15	0.67	UJ	0.56	U	0.63	UJ	0.75	U	0.68	U	0.62	U
Iron	MG/KG	27100	100%	37410	0	15	15	17900		16400		26900		18400		20900		20500	J
Lead	MG/KG	22.2	100%	24.4	0	15	15	13.4	J	12	J	22.2		11.3		15.9		13.2	
Magnesium	MG/KG	21500	100%	21700	0	15	15	7270		21500	J	3820	J	6950		5420		7330	
Manganese	MG/KG	1420	100%	1100	1	15	15	499		417		1420		584		781		555	J
Mercury	MG/KG	0.11	20%	0.1	1	3	15	0.05	U	0.06	U	0.06	U	0.06	U	0.06	U	0.06	U
Nickel	MG/KG	39.9	93%	50	0	14	15	22.7		24.4	J	27.1		25.4		23.2		27.2	
Potassium	MG/KG	1740	100%	2623	0	15	15	993		1540		1020	J	1660	J	1740	J	1210	
Selenium	MG/KG	2.5	13%	2	2	2	15	2.5		0.72	U	1.1	U	1.1	U	1.2	U	0.89	U
Silver	MG/KG	0.2	7%	0.8	0	1	15	0.49	U	0.2	J	0.28	U	0.5	U	0.52	U	0.23	U
Sodium	MG/KG	207	27%	188	1	4	15	207		56.1	J	59.8	U	144	U	150	U	48.5	U
Thallium	MG/KG	1.8	33%	0.855	5	5	15	1.5	U	1.2	J	1.2	U	1.5	U	1.6	U	1.2	J
Vanadium	MG/KG	24	100%	150	0	15	15	14.7		13.6		23.4		17.7		24		18.3	
Zinc	MG/KG	83.7	100%	115	0	15	15	60.7		83.7	J	66.5		61.9	J	63.5	J	54.3	J

TABLE 4-E
DISPOSAL PIT A/B CHEMICAL DATA-SURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

		FACILITY						SEAD-12		SEAD-12		SEAD-12	
		LOCATION ID						SS12-16		SS12-17		SS12-183	
		MATRIX						SOIL		SOIL		SOIL	
		SAMPLE ID						123102		123212		123377	
		SAMPLE DEPTH TO TOP OF SAMPLE						0		0		0	
		SAMPLE DEPTH TO BOTTOM OF SAMPLE						0.2		0.2		0.2	
		SAMPLE DATE						13-Oct-98		03-Nov-98		17-Nov-98	
		QC CODE						SA		SA		SA	
		STUDY ID						RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
PARAMETER	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
VOLATILE ORGANICS													
Acetone	UG/KG	52	47%	200	0	7	15	12	U	9	J	7	J
Methyl butyl ketone	UG/KG	1	7%		0	1	15	12	U	12	U	12	U
Methylene chloride	UG/KG	1	7%	100	0	1	15	12	U	12	U	12	U
Toluene	UG/KG	4	27%	1500	0	4	15	1	J	12	U	2	J
SEMI VOLATILE ORGANICS													
Benzo(a)anthracene	UG/KG	27	33%	224	0	5	15	80	U	80	UJ	27	J
Benzo(a)pyrene	UG/KG	18	33%	61	0	5	15	80	UJ	80	UJ	18	J
Benzo(b)fluoranthene	UG/KG	36	40%	1100	0	6	15	80	U	80	U	36	J
Benzo(ghi)perylene	UG/KG	23	33%	50000	0	5	15	80	U	80	U	14	J
Benzo(k)fluoranthene	UG/KG	26	27%	1100	0	4	15	80	U	80	U	26	J
Bis(2-Ethylhexyl)phthalate	UG/KG	210	20%	50000	0	3	15	80	U	10	J	82	UJ
Butylbenzylphthalate	UG/KG	6.7	7%	50000	0	1	15	80	U	80	UJ	82	UJ
Carbazole	UG/KG	16	7%		0	1	15	80	U	80	UJ	82	U
Chrysene	UG/KG	51	47%	400	0	7	15	80	U	80	UJ	51	J
Di-n-butylphthalate	UG/KG	68	20%	8100	0	3	15	80	U	6	J	82	U
Di-n-octylphthalate	UG/KG	7.8	13%	50000	0	2	15	80	U	80	U	82	U
Dibenz(a,h)anthracene	UG/KG	16	13%	14	1	2	15	80	U	80	U	6.3	J
Dibenzofuran	UG/KG	5.6	7%	6200	0	1	15	80	U	80	UJ	82	U
Fluoranthene	UG/KG	24	53%	50000	0	8	15	80	U	4.1	J	24	J
Fluorene	UG/KG	5.4	7%	50000	0	1	15	80	U	80	U	82	U
Indeno(1,2,3-cd)pyrene	UG/KG	18	27%	3200	0	4	15	80	U	80	UJ	12	J
Phenanthrene	UG/KG	8.5	33%	50000	0	5	15	80	U	80	U	5.1	J
Pyrene	UG/KG	22	53%	50000	0	8	15	80	U	80	U	21	J
PESTICIDES/PCBS													
4,4'-DDE	UG/KG	15	13%	2100	0	2	15	4	U	15		4.1	U
4,4'-DDT	UG/KG	42	13%	2100	0	2	15	4	U	42		4.1	U
Aroclor-1254	UG/KG	670	20%	10000	0	3	15	40	U	670	J	41	U
Dieldrin	UG/KG	14	13%	44	0	2	15	4	U	14	J	4.1	U
Endosulfan I	UG/KG	1.8	7%	900	0	1	15	2	U	1.8	J	2.1	U
Endosulfan II	UG/KG	2.7	7%	900	0	1	15	4	U	4	U	4.1	U
Endrin	UG/KG	4.2	13%	100	0	2	15	4	U	4.2	J	4.1	U
Endrin aldehyde	UG/KG	5.6	13%		0	2	15	4	U	5.6	J	4.1	U
Gamma-Chlordane	UG/KG	11	20%	540	0	3	15	2	U	11	J	2.1	U
Heptachlor epoxide	UG/KG	4.6	13%	20	0	2	15	2	U	4.6	J	2.1	U
METALS													
Aluminum	MG/KG	15800	100%	19520	0	15	15	11900		10500		13900	J

TABLE 4-E
DISPOSAL PIT A/B CHEMICAL DATA-SURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								SS12-16		SS12-17		SS12-183	
MATRIX								SOIL		SOIL		SOIL	
SAMPLE ID								123102		123212		123377	
SAMPLE DEPTH TO TOP OF SAMPLE								0		0		0	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.2		0.2		0.2	
SAMPLE DATE								13-Oct-98		03-Nov-98		17-Nov-98	
QC CODE								SA		SA		SA	
STUDY ID								RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
PARAMETER	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Antimony	MG/KG	0.87	13%	6	0	2	15	1.4	UR	1.1	UJ	1.4	UR
Arsenic	MG/KG	4.9	100%	8.9	0	15	15	3.8		2.8		3.9	J
Barium	MG/KG	89.2	100%	300	0	15	15	85.9		70.8		86.2	
Beryllium	MG/KG	0.59	100%	1.13	0	15	15	0.44	J	0.4	J	0.59	J
Cadmium	MG/KG	3.2	20%	2.46	1	3	15	0.07	U	0.05	U	0.4	U
Calcium	MG/KG	77600	100%	125300	0	15	15	15200	J	23600		16200	
Chromium	MG/KG	23.3	100%	30	0	15	15	17.5		15.6		19.4	
Cobalt	MG/KG	17.5	100%	30	0	15	15	9.8	J	10.7		15	
Copper	MG/KG	32.5	100%	33	0	15	15	19.6		21.4		23.7	
Cyanide	MG/KG	1.6	13%	0.35	2	2	15	0.62	U	0.6	U	0.66	U
Iron	MG/KG	27100	100%	37410	0	15	15	21700	J	19900	J	26000	J
Lead	MG/KG	22.2	100%	24.4	0	15	15	14.6		13.6		13.6	
Magnesium	MG/KG	21500	100%	21700	0	15	15	5160		7070		5780	
Manganese	MG/KG	1420	100%	1100	1	15	15	641		607	J	663	
Mercury	MG/KG	0.11	20%	0.1	1	3	15	0.07	J	0.06	U	0.06	U
Nickel	MG/KG	39.9	93%	50	0	14	15	24.7		26.3		29.2	J
Potassium	MG/KG	1740	100%	2623	0	15	15	1250		1260		1310	
Selenium	MG/KG	2.5	13%	2	2	2	15	1	U	0.82	U	0.52	UJ
Silver	MG/KG	0.2	7%	0.8	0	1	15	0.27	U	0.21	U	0.27	U
Sodium	MG/KG	207	27%	188	1	4	15	60.2	J	44.8	U	56.6	U
Thallium	MG/KG	1.8	33%	0.855	5	5	15	1.2	U	1.4	J	1.2	U
Vanadium	MG/KG	24	100%	150	0	15	15	20.2		18.1		21.2	
Zinc	MG/KG	83.7	100%	115	0	15	15	57	J	58	J	63.8	J

TABLE 4-F
DISPOSAL PIT A/B CHEMICAL DATA-SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

		FACILITY						SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
		LOCATION ID						MW12-10		MW12-10		MW12-11		MW12-11		MW12-12		MW12-12	
		MATRIX						SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
		SAMPLE ID						123008		123009		123011		123012		123014		123015	
		SAMPLE DEPTH TO TOP OF SAMPLE						4		8		4		8		4		9	
		SAMPLE DEPTH TO BOTTOM OF SAMPLE						5.7		9.8		5.6		10		6		11	
		SAMPLE DATE						09/29/98		09/29/98		09/29/98		09/29/98		09/30/98		09/30/98	
		QC CODE						SA		SA		SA		SA		SA		SA	
		STUDY ID						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	
PARAMETER	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
VOLATILE ORGANICS																			
Acetone	UG/KG	34	41%	200	0	12	29	3	J	4	J	4	J	4	J	12	U	12	U
Benzene	UG/KG	6	3%	60	0	1	29	11	U	12	U	11	U	11	U	12	U	12	U
Ethyl benzene	UG/KG	66	10%	5500	0	3	29	11	U	12	U	11	U	11	U	12	U	12	U
Methylene chloride	UG/KG	3	7%	100	0	2	29	11	U	12	U	11	U	11	U	12	U	12	U
Styrene	UG/KG	33	3%		0	1	29	11	U	12	U	11	U	11	U	12	U	12	U
Toluene	UG/KG	15	34%	1500	0	10	29	11	U	12	U	11	U	11	U	12	U	12	U
Total Xylenes	UG/KG	520	10%	1200	0	3	29	11	U	12	U	11	U	11	U	12	U	12	U
Trichloroethene	UG/KG	26	14%	700	0	4	29	11	U	12	U	11	U	11	U	12	U	12	U
SEMI VOLATILE ORGANICS																			
2,4-Dimethylphenol	UG/KG	25	4%		0	1	28	73	UJ	74	UJ	72	UJ	70	UJ	81	UJ	81	UJ
2-Methylnaphthalene	UG/KG	56	11%	36400	0	3	28	73	UJ	74	UJ	72	UJ	70	UJ	81	UJ	81	UJ
4-Methylphenol	UG/KG	140	4%	900	0	1	28	73	U	74	U	72	U	70	U	81	U	81	U
Acenaphthene	UG/KG	23	4%	50000	0	1	28	73	UJ	74	UJ	72	UJ	70	UJ	81	UJ	81	UJ
Acenaphthylene	UG/KG	33	4%	41000	0	1	28	73	UJ	74	UJ	72	UJ	70	UJ	81	UJ	81	UJ
Anthracene	UG/KG	96	11%	50000	0	3	28	73	UJ	74	UJ	72	UJ	70	UJ	81	UJ	81	UJ
Benzo(a)anthracene	UG/KG	180	14%	224	0	4	28	73	UJ	74	U	72	U	70	U	81	U	81	U
Benzo(a)pyrene	UG/KG	200	14%	61	1	4	28	73	U	74	UJ	72	UJ	70	UJ	81	UJ	81	UJ
Benzo(b)fluoranthene	UG/KG	190	14%	1100	0	4	28	73	UJ	74	U	72	U	70	U	81	U	81	U
Benzo(ghi)perylene	UG/KG	120	7%	50000	0	2	28	73	U	74	U	72	U	70	U	81	U	81	U
Benzo(k)fluoranthene	UG/KG	160	11%	1100	0	3	28	73	U	74	U	72	U	70	U	81	U	81	U
Bis(2-Ethylhexyl)phthalate	UG/KG	930	25%	50000	0	7	28	73	U	74	U	72	U	180		81	U	81	U
Butylbenzylphthalate	UG/KG	5.1	4%	50000	0	1	28	73	U	74	U	72	U	70	U	81	U	81	U
Chrysene	UG/KG	240	14%	400	0	4	28	73	UJ	74	UJ	72	UJ	70	UJ	81	UJ	81	UJ
Di-n-butylphthalate	UG/KG	1700	11%	8100	0	3	28	73	UJ	74	UJ	72	UJ	70	UJ	81	UJ	81	UJ
Di-n-octylphthalate	UG/KG	54	43%	50000	0	12	28	73	U	74	U	72	U	13	J	81	U	4.9	J
Dibenz(a,h)anthracene	UG/KG	57	7%	14	1	2	28	73	U	74	U	72	U	70	U	81	U	81	U
Fluoranthene	UG/KG	420	21%	50000	0	6	28	73	UJ	74	UJ	72	UJ	70	UJ	81	UJ	81	UJ
Fluorene	UG/KG	52	7%	50000	0	2	28	73	U	74	U	72	U	70	U	81	U	81	U
Indeno(1,2,3-cd)pyrene	UG/KG	120	7%	3200	0	2	28	73	U	74	U	72	U	70	U	81	U	81	U
Naphthalene	UG/KG	600	7%	13000	0	2	28	73	UJ	74	UJ	72	UJ	70	UJ	81	UJ	81	UJ
Phenanthrene	UG/KG	340	18%	50000	0	5	28	73	U	74	U	72	U	4.6	J	81	U	81	U
Phenol	UG/KG	300	7%	30	2	2	28	73	U	74	U	72	U	70	U	81	U	81	U
Pyrene	UG/KG	380	18%	50000	0	5	28	73	U	74	U	72	U	70	U	81	U	81	U
PESTICIDES/PCBS																			
4,4'-DDE	UG/KG	42	11%	2100	0	3	28	3.7	U	3.7	U	3.6	U	3.5	U	4.1	U	4.1	U
4,4'-DDT	UG/KG	2.1	4%	2100	0	1	28	3.7	U	3.7	U	3.6	U	3.5	U	4.1	U	4.1	U

TABLE 4-F
DISPOSAL PIT A/B CHEMICAL DATA-SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12-10		MW12-10		MW12-11		MW12-11		MW12-12		MW12-12	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123008		123009		123011		123012		123014		123015	
SAMPLE DEPTH TO TOP OF SAMPLE								4		8		4		8		4		9	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								5.7		9.8		5.6		10		6		11	
SAMPLE DATE								09/29/98		09/29/98		09/29/98		09/29/98		09/30/98		09/30/98	
QC CODE								SA		SA		SA		SA		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Aldrin	UG/KG	0.79	4%	41	0	1	28	1.9	U	1.9	U	1.9	U	1.8	U	2.1	U	2.1	U
Alpha-BHC	UG/KG	24	7%	110	0	2	28	1.9	U	1.9	U	1.9	U	1.8	U	2.1	U	2.1	U
Alpha-Chlordane	UG/KG	4.6	7%		0	2	28	1.9	U	1.9	U	1.9	U	1.8	U	2.1	U	2.1	U
Aroclor-1254	UG/KG	3000	21%	10000	0	6	28	37	U	37	U	36	U	35	U	41	U	41	U
Aroclor-1260	UG/KG	150	7%	10000	0	2	28	37	U	37	U	36	U	35	U	41	U	41	U
Beta-BHC	UG/KG	2.2	4%	200	0	1	28	1.9	U	1.9	U	1.9	U	1.8	U	2.1	U	2.1	U
Dieldrin	UG/KG	40	7%	44	0	2	28	3.7	U	3.7	U	3.6	U	3.5	U	4.1	U	4.1	U
Endosulfan II	UG/KG	19	7%	900	0	2	28	3.7	U	3.7	U	3.6	U	3.5	U	4.1	U	4.1	U
Endrin	UG/KG	20	14%	100	0	4	28	3.7	U	3.7	U	3.6	U	3.5	U	4.1	U	4.1	U
Gamma-Chlordane	UG/KG	58	11%	540	0	3	28	1.9	U	1.9	U	1.9	U	1.8	U	2.1	U	2.1	U
Heptachlor	UG/KG	13	7%	100	0	2	28	1.9	U	1.9	U	1.9	U	1.8	U	2.1	U	2.1	U
Heptachlor epoxide	UG/KG	22	7%	20	1	2	28	1.9	U	1.9	U	1.9	U	1.8	U	2.1	U	2.1	U
METALS																			
Aluminum	MG/KG	17100	100%	19520	0	28	28	8370		7210		10900		4460		14200		11200	
Antimony	MG/KG	7.2	25%	6	1	7	28	1.3	UR	1.2	UR	1	UR	0.9	UR	1.5	UR	1.3	UR
Arsenic	MG/KG	5.9	100%	8.9	0	28	28	3.5		3.4		2.9		0.88	J	5.9		5.8	
Barium	MG/KG	125	100%	300	0	28	28	63.9		68.7		55		17	J	112		100	
Beryllium	MG/KG	0.74	100%	1.13	0	28	28	0.31	J	0.27	J	0.44	J	0.17	J	0.51	J	0.38	J
Cadmium	MG/KG	94.3	36%	2.46	7	10	28	0.06	U	0.06	U	0.05	U	0.04	U	0.07	U	0.06	U
Calcium	MG/KG	142000	100%	125300	1	28	28	83200		73900		46100		6980		54600		42900	
Chromium	MG/KG	83.3	100%	30	4	28	28	13.9		12.4		20.4		8.5		21.1		16.2	
Cobalt	MG/KG	26.5	100%	30	0	28	28	7.7	J	7	J	12.9		9.1		14.3		12.9	
Copper	MG/KG	215	100%	33	5	28	28	20.3		20.5		33.7		11.5		28.4		23.9	
Cyanide	MG/KG	1.5	7%	0.35	2	2	28	0.55	U	0.6	U	0.53	U	0.53	U	0.63	U	0.64	U
Iron	MG/KG	35700	100%	37410	0	28	28	19100	J	18100	J	27000	J	11000	J	27800	J	22800	J
Lead	MG/KG	366	100%	24.4	3	28	28	7.3		6.6		16		9		11.9		9.1	
Magnesium	MG/KG	34300	100%	21700	1	28	28	13200		17200		9010		2090		13200		13700	
Manganese	MG/KG	631	100%	1100	0	28	28	408		364		383		169		631		540	
Mercury	MG/KG	0.06	18%	0.1	0	5	28	0.05	UJ	0.06	UJ	0.05	UJ	0.06	J	0.06	UJ	0.06	UJ
Nickel	MG/KG	201	93%	50	2	26	28	23.2		20.3		44		20		34.1	J	25.8	J
Potassium	MG/KG	2090	100%	2623	0	28	28	1270		1250		1240		397	J	1980		1770	
Selenium	MG/KG	1.2	18%	2	0	5	28	0.95	U	0.92	U	0.76	U	0.68	U	1.1	U	0.97	U
Silver	MG/KG	11.9	14%	0.8	2	4	28	0.25	U	0.24	U	0.2	U	0.18	U	0.29	U	0.25	U
Sodium	MG/KG	134	57%	188	0	16	28	96.5	J	84.9	J	81.8	J	37.1	U	61.3	U	53	U
Thallium	MG/KG	1.7	25%	0.855	5	7	28	1.1	U	1	U	0.86	U	0.77	U	1.3	U	1.1	U
Vanadium	MG/KG	25.6	100%	150	0	28	28	14.7		13.1		16.5		5.8	J	25.6		21.3	
Zinc	MG/KG	424	100%	115	3	28	28	50.3		51.6		94.9		41.5		66.8		52.4	

TABLE 4-F
DISPOSAL PIT A/B CHEMICAL DATA-SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12-13		MW12-13		MW12-8		MW12-8		SB12-2		SB12-2	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123017		123018		123184		123185		12532		123113	
SAMPLE DEPTH TO TOP OF SAMPLE								4		8		4		8		0.2		6	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								6		9.6		6		10		2		8	
SAMPLE DATE								10/01/98		10/01/98		10/28/98		10/28/98		11/10/97		10/14/98	
QC CODE								SA		SA		SA		SA		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
VOLATILE ORGANICS																			
Acetone	UG/KG	34	41%	200	0	12	29	11	UJ	12	UJ	11	U	12		5	J	11	U
Benzene	UG/KG	6	3%	60	0	1	29	11	U	12	U	11	U	11	U	12	U	11	U
Ethyl benzene	UG/KG	66	10%	5500	0	3	29	11	U	12	U	11	U	11	U	12	U	11	U
Methylene chloride	UG/KG	3	7%	100	0	2	29	11	U	12	U	11	U	11	U	12	U	11	U
Styrene	UG/KG	33	3%		0	1	29	11	U	12	U	11	U	11	U	12	U	11	U
Toluene	UG/KG	15	34%	1500	0	10	29	8	J	14		11	U	11	U	15		11	U
Total Xylenes	UG/KG	520	10%	1200	0	3	29	11	U	12	U	11	U	11	U	12	U	11	U
Trichloroethene	UG/KG	26	14%	700	0	4	29	11	U	12	U	11	U	11	U	12	U	11	U
SEMI VOLATILE ORGANICS																			
2,4-Dimethylphenol	UG/KG	25	4%		0	1	28	73	UJ	76	UJ	73	U	72	U	77	U	72	UJ
2-Methylnaphthalene	UG/KG	56	11%	36400	0	3	28	73	UJ	76	UJ	73	U	72	U	77	U	72	U
4-Methylphenol	UG/KG	140	4%	900	0	1	28	73	U	76	U	73	U	72	U	77	U	72	UJ
Acenaphthene	UG/KG	23	4%	50000	0	1	28	73	U	76	U	73	U	72	U	77	U	72	U
Acenaphthylene	UG/KG	33	4%	41000	0	1	28	73	UJ	76	UJ	73	U	72	U	77	U	72	U
Anthracene	UG/KG	96	11%	50000	0	3	28	73	U	76	U	73	U	72	U	77	U	72	U
Benzo(a)anthracene	UG/KG	180	14%	224	0	4	28	73	U	76	U	73	U	72	U	77	U	72	U
Benzo(a)pyrene	UG/KG	200	14%	61	1	4	28	73	U	76	U	73	U	72	U	77	U	72	U
Benzo(b)fluoranthene	UG/KG	190	14%	1100	0	4	28	73	U	76	U	73	U	72	U	77	U	72	U
Benzo(ghi)perylene	UG/KG	120	7%	50000	0	2	28	73	U	76	U	73	U	72	U	77	U	72	UJ
Benzo(k)fluoranthene	UG/KG	160	11%	1100	0	3	28	73	U	76	U	73	U	72	U	77	U	72	U
Bis(2-Ethylhexyl)phthalate	UG/KG	930	25%	50000	0	7	28	83		11	J	73	U	72	U	77	U	72	UJ
Butylbenzylphthalate	UG/KG	5.1	4%	50000	0	1	28	73	U	76	U	73	U	72	U	77	U	72	UJ
Chrysene	UG/KG	240	14%	400	0	4	28	73	U	76	U	73	U	72	U	77	U	72	U
Di-n-butylphthalate	UG/KG	1700	11%	8100	0	3	28	73	UJ	4	J	73	U	72	U	77	U	72	UJ
Di-n-octylphthalate	UG/KG	54	43%	50000	0	12	28	12	J	6.9	J	19	J	45	J	77	U	6.2	J
Dibenz(a,h)anthracene	UG/KG	57	7%	14	1	2	28	73	U	76	U	73	U	72	U	77	U	72	UJ
Fluoranthene	UG/KG	420	21%	50000	0	6	28	73	U	76	U	73	U	72	U	4	J	72	U
Fluorene	UG/KG	52	7%	50000	0	2	28	73	U	76	U	73	U	72	U	77	U	72	U
Indeno(1,2,3-cd)pyrene	UG/KG	120	7%	3200	0	2	28	73	U	76	U	73	U	72	U	77	U	72	UJ
Naphthalene	UG/KG	600	7%	13000	0	2	28	73	U	76	U	73	U	72	U	77	U	72	U
Phenanthrene	UG/KG	340	18%	50000	0	5	28	73	U	76	U	73	U	72	U	77	U	72	U
Phenol	UG/KG	300	7%	30	2	2	28	73	U	76	U	73	U	72	U	77	U	72	UJ
Pyrene	UG/KG	380	18%	50000	0	5	28	73	U	76	U	73	U	72	U	77	U	72	U
PESTICIDES/PCBS																			
4,4'-DDE	UG/KG	42	11%	2100	0	3	28	3.7	U	3.8	U	3.7	U	3.6	U	3.8	U	3.6	U
4,4'-DDT	UG/KG	2.1	4%	2100	0	1	28	3.7	U	3.8	U	3.7	U	3.6	U	3.8	U	3.6	U

TABLE 4-F
DISPOSAL PIT A/B CHEMICAL DATA-SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12-13		MW12-13		MW12-8		MW12-8		SB12-2		SB12-2	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123017		123018		123184		123185		12532		123113	
SAMPLE DEPTH TO TOP OF SAMPLE								4		8		4		8		0.2		6	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								6		9.6		6		10		2		8	
SAMPLE DATE								10/01/98		10/01/98		10/28/98		10/28/98		11/10/97		10/14/98	
QC CODE								SA		SA		SA		SA		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Aldrin	UG/KG	0.79	4%	41	0	1	28	1.9	U	2	U	1.9	U	1.9	U	2	U	1.9	U
Alpha-BHC	UG/KG	24	7%	110	0	2	28	1.9	U	2	U	1.9	U	1.9	U	2	U	1.9	U
Alpha-Chlordane	UG/KG	4.6	7%		0	2	28	1.9	U	2	U	1.9	U	1.9	U	2	U	1.9	U
Aroclor-1254	UG/KG	3000	21%	10000	0	6	28	37	U	38	U	37	U	36	U	38	U	36	U
Aroclor-1260	UG/KG	150	7%	10000	0	2	28	37	U	38	U	37	U	36	U	38	U	36	U
Beta-BHC	UG/KG	2.2	4%	200	0	1	28	1.9	U	2	U	1.9	U	1.9	U	2	U	1.9	U
Dieldrin	UG/KG	40	7%	44	0	2	28	3.7	U	3.8	U	3.7	U	3.6	U	3.8	U	3.6	U
Endosulfan II	UG/KG	19	7%	900	0	2	28	3.7	U	3.8	U	3.7	U	3.6	U	3.8	U	3.6	U
Endrin	UG/KG	20	14%	100	0	4	28	3.7	U	3.8	U	3.7	U	3.6	U	3.8	U	3.6	U
Gamma-Chlordane	UG/KG	58	11%	540	0	3	28	1.9	U	2	U	1.9	U	1.9	U	2	U	1.9	U
Heptachlor	UG/KG	13	7%	100	0	2	28	1.9	U	2	U	1.9	U	1.9	U	2	U	1.9	U
Heptachlor epoxide	UG/KG	22	7%	20	1	2	28	1.9	U	2	U	1.9	U	1.9	U	2	U	1.9	U
METALS																			
Aluminum	MG/KG	17100	100%	19520	0	28	28	4820		11200		7440		7550		13200		7890	J
Antimony	MG/KG	7.2	25%	6	1	7	28	1.2	UR	1.2	UR	1.2	UR	1.2	UR	0.73	J	1.1	UR
Arsenic	MG/KG	5.9	100%	8.9	0	28	28	2.5		3.9		3.1		3.3		4.3		3.8	J
Barium	MG/KG	125	100%	300	0	28	28	51.3		63.4		73.2		65.8		125		63.3	
Beryllium	MG/KG	0.74	100%	1.13	0	28	28	0.14	J	0.46	J	0.45	J	0.43	J	0.39		0.3	J
Cadmium	MG/KG	94.3	36%	2.46	7	10	28	0.06	U	0.06	U	0.36	U	0.35	U	3.9		0.05	U
Calcium	MG/KG	142000	100%	125300	1	28	28	75600	J	43100	J	87500		64400		46100		97000	J
Chromium	MG/KG	83.3	100%	30	4	28	28	8.2		20.5		12	J	13.3	J	53.5		14.2	
Cobalt	MG/KG	26.5	100%	30	0	28	28	5.1	J	15.2		8.1	J	12.1		9.9		7.6	J
Copper	MG/KG	215	100%	33	5	28	28	13.3		31.5		20		21.9		24.9		22.5	
Cyanide	MG/KG	1.5	7%	0.35	2	2	28	0.57	UJ	0.64	UJ	1.5		0.72		0.68	U	0.58	U
Iron	MG/KG	35700	100%	37410	0	28	28	10100		25500		16500		17300		22300		16300	
Lead	MG/KG	366	100%	24.4	3	28	28	3.4	J	11.5	J	5.9	J	7.6	J	27.2		9.4	J
Magnesium	MG/KG	34300	100%	21700	1	28	28	34300		8350		16500		13400		12500		16400	J
Manganese	MG/KG	631	100%	1100	0	28	28	339		393		406		416		507		448	
Mercury	MG/KG	0.06	18%	0.1	0	5	28	0.05	U	0.06	U	0.05	U	0.05	U	0.06	U	0.05	U
Nickel	MG/KG	201	93%	50	2	26	28	12.1		44.2		22.9	UJ	27.6	UJ	42.5		22.7	J
Potassium	MG/KG	2090	100%	2623	0	28	28	760	J	1340		1300		1260		1840	J	1120	
Selenium	MG/KG	1.2	18%	2	0	5	28	0.94	UJ	0.92	UJ	0.46	U	0.57	J	0.94	U	0.84	U
Silver	MG/KG	11.9	14%	0.8	2	4	28	0.24	U	0.24	U	0.24	U	0.23	U	0.42	U	0.22	U
Sodium	MG/KG	134	57%	188	0	16	28	51.4	U	84	J	99	J	49.2	U	121	U	134	J
Thallium	MG/KG	1.7	25%	0.855	5	7	28	1.4	U	1.2	U	1.7	J	1.5	J	1.3	U	0.95	U
Vanadium	MG/KG	25.6	100%	150	0	28	28	10.5		17		13.9		13.5		22.4		13.5	
Zinc	MG/KG	424	100%	115	3	28	28	31.6		105		45.4	J	57.2	J	104	J	45.3	J

TABLE 4-F
DISPOSAL PIT A/B CHEMICAL DATA-SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								SB12-2		SB12-2		SB12-3		SB12-3		SB12-3		SB12-4	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								12533		123114		12525		12527		12526		12528	
SAMPLE DEPTH TO TOP OF SAMPLE								8		10		1		8		10		2	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								10		12		4		10		11.9		4	
SAMPLE DATE								11/10/97		10/14/98		11/09/97		11/09/97		11/09/97		11/09/97	
QC CODE								SA		SA		SA		SA		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
VOLATILE ORGANICS																			
Acetone	UG/KG	34	41%	200	0	12	29	17	J	11	U	9	J	30	J	20	J	17	J
Benzene	UG/KG	6	3%	60	0	1	29	11	U	11	U	12	U	6	J	12	U	12	U
Ethyl benzene	UG/KG	66	10%	5500	0	3	29	11	U	11	U	12	U	66		12	U	12	U
Methylene chloride	UG/KG	3	7%	100	0	2	29	1	J	11	U	12	U	3	J	12	U	12	U
Styrene	UG/KG	33	3%		0	1	29	11	U	11	U	12	U	33		12	U	12	U
Toluene	UG/KG	15	34%	1500	0	10	29	10	J	11	U	12	U	2	J	6	J	6	J
Total Xylenes	UG/KG	520	10%	1200	0	3	29	11	U	11	U	12	U	10	J	12	U	12	U
Trichloroethene	UG/KG	26	14%	700	0	4	29	11	U	11	U	12	U	16	U	12	U	12	U
SEMI VOLATILE ORGANICS																			
2,4-Dimethylphenol	UG/KG	25	4%		0	1	28	74	U	73	UJ	85	U			77	U	80	U
2-Methylnaphthalene	UG/KG	56	11%	36400	0	3	28	74	U	73	U	85	U			77	U	80	U
4-Methylphenol	UG/KG	140	4%	900	0	1	28	74	U	73	U	85	U			77	U	80	U
Acenaphthene	UG/KG	23	4%	50000	0	1	28	74	U	73	U	85	U			77	U	80	U
Acenaphthylene	UG/KG	33	4%	41000	0	1	28	74	U	73	U	85	U			77	U	80	U
Anthracene	UG/KG	96	11%	50000	0	3	28	74	U	73	U	85	U			77	U	80	U
Benzo(a)anthracene	UG/KG	180	14%	224	0	4	28	74	U	73	U	85	U			77	U	80	U
Benzo(a)pyrene	UG/KG	200	14%	61	1	4	28	74	U	73	U	85	U			77	U	80	U
Benzo(b)fluoranthene	UG/KG	190	14%	1100	0	4	28	74	U	73	U	85	U			77	U	80	U
Benzo(ghi)perylene	UG/KG	120	7%	50000	0	2	28	74	U	73	U	85	U			77	U	80	U
Benzo(k)fluoranthene	UG/KG	160	11%	1100	0	3	28	74	U	73	U	85	U			77	U	80	U
Bis(2-Ethylhexyl)phthalate	UG/KG	930	25%	50000	0	7	28	74	U	73	UJ	85	U			390		80	U
Butylbenzylphthalate	UG/KG	5.1	4%	50000	0	1	28	74	U	73	UJ	85	U			77	U	80	U
Chrysene	UG/KG	240	14%	400	0	4	28	74	U	73	U	85	U			77	U	80	U
Di-n-butylphthalate	UG/KG	1700	11%	8100	0	3	28	74	U	73	U	85	U			77	U	80	U
Di-n-octylphthalate	UG/KG	54	43%	50000	0	12	28	74	U	10	J	7.9	J			54	J	5.2	J
Dibenz(a,h)anthracene	UG/KG	57	7%	14	1	2	28	74	U	73	U	85	U			77	U	80	U
Fluoranthene	UG/KG	420	21%	50000	0	6	28	74	U	73	U	4.5	J			77	U	80	U
Fluorene	UG/KG	52	7%	50000	0	2	28	74	U	73	U	85	U			77	U	80	U
Indeno(1,2,3-cd)pyrene	UG/KG	120	7%	3200	0	2	28	74	U	73	U	85	U			77	U	80	U
Naphthalene	UG/KG	600	7%	13000	0	2	28	74	U	73	U	85	U			77	U	80	U
Phenanthrene	UG/KG	340	18%	50000	0	5	28	74	U	73	U	85	U			77	U	80	U
Phenol	UG/KG	300	7%	30	2	2	28	74	U	73	U	85	U			77	U	80	U
Pyrene	UG/KG	380	18%	50000	0	5	28	74	U	73	U	4.6	J			77	U	80	U
PESTICIDES/PCBS																			
4,4'-DDE	UG/KG	42	11%	2100	0	3	28	3.7	U	3.7	U	42	J			26	J	4	U
4,4'-DDT	UG/KG	2.1	4%	2100	0	1	28	3.7	U	3.7	U	13	U			3.8	U	4	U

TABLE 4-F
DISPOSAL PIT A/B CHEMICAL DATA-SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								SB12-2		SB12-2		SB12-3		SB12-3		SB12-3		SB12-4	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								12533		123114		12525		12527		12526		12528	
SAMPLE DEPTH TO TOP OF SAMPLE								8		10		1		8		10		2	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								10		12		4		10		11.9		4	
SAMPLE DATE								11/10/97		10/14/98		11/09/97		11/09/97		11/09/97		11/09/97	
QC CODE								SA		SA		SA		SA		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Aldrin	UG/KG	0.79	4%	41	0	1	28	1.9	U	1.9	U	6.5	U			2	U	2	U
Alpha-BHC	UG/KG	24	7%	110	0	2	28	1.9	U	1.9	U	6.5	U			2	U	2	U
Alpha-Chlordane	UG/KG	4.6	7%		0	2	28	1.9	U	1.9	U	6.5	U			4.6	J	2	U
Aroclor-1254	UG/KG	3000	21%	10000	0	6	28	37	U	37	U	3000				1900		40	U
Aroclor-1260	UG/KG	150	7%	10000	0	2	28	37	U	37	U	130	U			38	U	40	U
Beta-BHC	UG/KG	2.2	4%	200	0	1	28	1.9	U	1.9	U	6.5	U			2	U	2	U
Dieldrin	UG/KG	40	7%	44	0	2	28	3.7	U	3.7	U	40	J			25	J	4	U
Endosulfan II	UG/KG	19	7%	900	0	2	28	3.7	U	3.7	U	19	J			9.5	J	4	U
Endrin	UG/KG	20	14%	100	0	4	28	3.7	U	3.7	U	16	J			8.6	J	4	U
Gamma-Chlordane	UG/KG	58	11%	540	0	3	28	1.9	U	1.9	U	58	J			44	J	2	U
Heptachlor	UG/KG	13	7%	100	0	2	28	1.9	U	1.9	U	6.5	U			2	U	2	U
Heptachlor epoxide	UG/KG	22	7%	20	1	2	28	1.9	U	1.9	U	22	J			2	U	2	U
METALS																			
Aluminum	MG/KG	17100	100%	19520	0	28	28	9570		7010	J	12900				15700		11900	
Antimony	MG/KG	7.2	25%	6	1	7	28	0.74	UJ	1.2	UR	1.3	J			0.76	UJ	0.75	UJ
Arsenic	MG/KG	5.9	100%	8.9	0	28	28	4		3.7	J	4.3				3.6		5.5	
Barium	MG/KG	125	100%	300	0	28	28	90.5		76.4		86.1				74.5		67.4	
Beryllium	MG/KG	0.74	100%	1.13	0	28	28	0.36		0.24	J	0.43	J			0.72	J	0.36	
Cadmium	MG/KG	94.3	36%	2.46	7	10	28	0.06	U	0.06	U	1.1				6		0.06	U
Calcium	MG/KG	142000	100%	125300	1	28	28	90900		82100	J	37200				5510		35900	
Chromium	MG/KG	83.3	100%	30	4	28	28	14.9		11.8		19.5				30.2		16.6	
Cobalt	MG/KG	26.5	100%	30	0	28	28	7.5		7.9	J	11				15.4		11.9	
Copper	MG/KG	215	100%	33	5	28	28	19.6		24.6		27.8				63.2		18.6	
Cyanide	MG/KG	1.5	7%	0.35	2	2	28	0.64	U	0.59	U	0.76	U			0.7	U	0.73	U
Iron	MG/KG	35700	100%	37410	0	28	28	18400		16500		21900				35700		20500	
Lead	MG/KG	366	100%	24.4	3	28	28	7.4		7.2	J	15				63.9		11.8	
Magnesium	MG/KG	34300	100%	21700	1	28	28	18200		17100	J	8000				7120		8050	
Manganese	MG/KG	631	100%	1100	0	28	28	375		451		619				395		561	
Mercury	MG/KG	0.06	18%	0.1	0	5	28	0.05	U	0.05	U	0.06	U			0.05	U	0.06	U
Nickel	MG/KG	201	93%	50	2	26	28	21		24.4	J	29				76.4		23.6	
Potassium	MG/KG	2090	100%	2623	0	28	28	2090	J	1220		1650	J			1740	J	1380	J
Selenium	MG/KG	1.2	18%	2	0	5	28	1	U	0.89	U	1.1	U			1	U	1	U
Silver	MG/KG	11.9	14%	0.8	2	4	28	0.45	U	0.23	U	0.5	U			1.6		0.45	U
Sodium	MG/KG	134	57%	188	0	16	28	129	U	78.9	J	145	U			131	U	129	U
Thallium	MG/KG	1.7	25%	0.855	5	7	28	1.3	U	1.1	J	1.5	U			1.4	U	1.3	U
Vanadium	MG/KG	25.6	100%	150	0	28	28	18.2		12.7		21.2				21		20.3	
Zinc	MG/KG	424	100%	115	3	28	28	45.3	J	51.3	J	79.4	J			160	J	61.7	J

TABLE 4-F
DISPOSAL PIT A/B CHEMICAL DATA-SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								SB12-4		TP12-1A		TP12-1B		TP12-1C		TP12-2A		TP12-2B	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								12529		123142		123143		123144		123145		123146	
SAMPLE DEPTH TO TOP OF SAMPLE								4		0.5		3		6		3		3.5	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								6		0.5		3		6		3		3.5	
SAMPLE DATE								11/09/97		10/16/98		10/16/98		10/16/98		10/16/98		10/16/98	
QC CODE								SA		SA		SA		SA		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
VOLATILE ORGANICS																			
Acetone	UG/KG	34	41%	200	0	12	29	34	J	11	UJ	11	UJ	12	UJ	11	UJ	28	UJ
Benzene	UG/KG	6	3%	60	0	1	29	12	U	11	U	11	U	12	U	11	U	28	U
Ethyl benzene	UG/KG	66	10%	5500	0	3	29	12	U	11	U	11	U	12	U	11	U	49	
Methylene chloride	UG/KG	3	7%	100	0	2	29	12	U	11	U	11	U	12	U	11	U	28	U
Styrene	UG/KG	33	3%		0	1	29	12	U	11	U	11	U	12	U	11	U	28	U
Toluene	UG/KG	15	34%	1500	0	10	29	2	J	11	U	11	U	12	U	11	U	15	J
Total Xylenes	UG/KG	520	10%	1200	0	3	29	12	U	11	U	11	U	12	U	11	U	520	
Trichloroethene	UG/KG	26	14%	700	0	4	29	1	J	11	U	11	U	12	U	11	U	11	J
SEMI VOLATILE ORGANICS																			
2,4-Dimethylphenol	UG/KG	25	4%		0	1	28	75	U	77	UJ	73	UJ	75	UJ	74	UJ	75	UJ
2-Methylnaphthalene	UG/KG	56	11%	36400	0	3	28	75	U	77	UJ	73	UJ	75	UJ	74	UJ	56	J
4-Methylphenol	UG/KG	140	4%	900	0	1	28	75	U	77	U	73	U	75	U	74	U	75	U
Acenaphthene	UG/KG	23	4%	50000	0	1	28	75	U	77	U	73	U	75	U	74	U	75	U
Acenaphthylene	UG/KG	33	4%	41000	0	1	28	75	U	77	U	73	U	75	U	74	U	75	U
Anthracene	UG/KG	96	11%	50000	0	3	28	4.4	J	77	UJ	73	UJ	75	UJ	74	UJ	75	UJ
Benzo(a)anthracene	UG/KG	180	14%	224	0	4	28	5.8	J	77	U	73	U	75	U	74	U	75	UJ
Benzo(a)pyrene	UG/KG	200	14%	61	1	4	28	7.1	J	77	UJ	73	UJ	75	UJ	74	UJ	75	UJ
Benzo(b)fluoranthene	UG/KG	190	14%	1100	0	4	28	6	J	77	U	73	U	75	U	74	U	75	UJ
Benzo(ghi)perylene	UG/KG	120	7%	50000	0	2	28	6.7	J	77	U	73	U	75	U	74	U	75	UJ
Benzo(k)fluoranthene	UG/KG	160	11%	1100	0	3	28	6.4	J	77	U	73	U	75	U	74	U	75	UJ
Bis(2-Ethylhexyl)phthalate	UG/KG	930	25%	50000	0	7	28	75	U	77	U	73	U	75	U	74	U	930	J
Butylbenzylphthalate	UG/KG	5.1	4%	50000	0	1	28	5.1	J	77	U	73	U	75	U	74	U	75	UJ
Chrysene	UG/KG	240	14%	400	0	4	28	5.7	J	77	U	73	U	75	U	74	U	75	UJ
Di-n-butylphthalate	UG/KG	1700	11%	8100	0	3	28	75	U	77	U	73	U	75	U	74	U	75	U
Di-n-octylphthalate	UG/KG	54	43%	50000	0	12	28	7	J	77	UJ	73	UJ	75	UJ	74	UJ	75	UJ
Dibenz(a,h)anthracene	UG/KG	57	7%	14	1	2	28	6	J	77	U	73	U	75	U	74	U	75	UJ
Fluoranthene	UG/KG	420	21%	50000	0	6	28	5.1	J	77	U	73	U	75	U	74	U	75	U
Fluorene	UG/KG	52	7%	50000	0	2	28	75	U	77	U	73	U	75	U	74	U	75	U
Indeno(1,2,3-cd)pyrene	UG/KG	120	7%	3200	0	2	28	5.7	J	77	U	73	U	75	U	74	U	75	UJ
Naphthalene	UG/KG	600	7%	13000	0	2	28	75	U	77	UJ	73	UJ	75	UJ	74	UJ	600	J
Phenanthrene	UG/KG	340	18%	50000	0	5	28	4.7	J	77	U	73	U	75	U	74	U	75	U
Phenol	UG/KG	300	7%	30	2	2	28	75	U	77	U	73	U	75	U	74	U	75	U
Pyrene	UG/KG	380	18%	50000	0	5	28	4.4	J	77	UJ	73	UJ	75	UJ	74	UJ	75	UJ
PESTICIDES/PCBS																			
4,4'-DDE	UG/KG	42	11%	2100	0	3	28	3.8	U	3.8	U	3.6	U	3.7	U	3.7	U	3.8	U
4,4'-DDT	UG/KG	2.1	4%	2100	0	1	28	3.8	U	3.8	U	3.6	U	3.7	U	3.7	U	3.8	U

TABLE 4-F
DISPOSAL PIT A/B CHEMICAL DATA-SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								SB12-4		TP12-1A		TP12-1B		TP12-1C		TP12-2A		TP12-2B	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								12529		123142		123143		123144		123145		123146	
SAMPLE DEPTH TO TOP OF SAMPLE								4		0.5		3		6		3		3.5	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								6		0.5		3		6		3		3.5	
SAMPLE DATE								11/09/97		10/16/98		10/16/98		10/16/98		10/16/98		10/16/98	
QC CODE								SA		SA		SA		SA		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Aldrin	UG/KG	0.79	4%	41	0	1	28	1.9	U	2	U	1.9	U	1.9	U	1.9	U	1.9	U
Alpha-BHC	UG/KG	24	7%	110	0	2	28	1.9	U	2	U	1.9	U	1.9	U	1.9	U	2.8	
Alpha-Chlordane	UG/KG	4.6	7%		0	2	28	1.9	U	2	U	1.9	U	1.9	U	1.9	U	1.9	U
Aroclor-1254	UG/KG	3000	21%	10000	0	6	28	38	U	38	U	36	U	37	U	37	U	38	U
Aroclor-1260	UG/KG	150	7%	10000	0	2	28	38	U	38	U	36	U	37	U	37	U	38	U
Beta-BHC	UG/KG	2.2	4%	200	0	1	28	1.9	U	2	U	1.9	U	1.9	U	1.9	U	1.9	U
Dieldrin	UG/KG	40	7%	44	0	2	28	3.8	U	3.8	U	3.6	U	3.7	U	3.7	U	3.8	U
Endosulfan II	UG/KG	19	7%	900	0	2	28	3.8	U	3.8	U	3.6	U	3.7	U	3.7	U	3.8	U
Endrin	UG/KG	20	14%	100	0	4	28	3.8	U	3.8	U	3.6	U	3.7	U	3.7	U	3.8	U
Gamma-Chlordane	UG/KG	58	11%	540	0	3	28	1.9	U	2	U	1.9	U	1.9	U	1.9	U	1.9	U
Heptachlor	UG/KG	13	7%	100	0	2	28	1.9	U	2	U	1.9	U	1.9	U	1.9	U	2.6	
Heptachlor epoxide	UG/KG	22	7%	20	1	2	28	1.9	U	2	U	1.9	U	1.9	U	1.9	U	1.9	U
METALS																			
Aluminum	MG/KG	17100	100%	19520	0	28	28	13100		8910	J	6100	J	6650	J	9100	J	7410	J
Antimony	MG/KG	7.2	25%	6	1	7	28	0.81	J	1.2	UR	1.2	UR	84	UR	1.2	UR	1.1	UR
Arsenic	MG/KG	5.9	100%	8.9	0	28	28	3.8		3.7		3.4		3.2		3.4		3	
Barium	MG/KG	125	100%	300	0	28	28	82.1		65	J	79.2	J	58.2	J	70.7	J	65.3	J
Beryllium	MG/KG	0.74	100%	1.13	0	28	28	0.52		0.33	J	0.24	J	0.29	J	0.37	J	0.3	J
Cadmium	MG/KG	94.3	36%	2.46	7	10	28	0.07	U	0.06	U	0.06	U	3		0.06	U	1.3	
Calcium	MG/KG	142000	100%	125300	1	28	28	52000		43000		102000		88400		59900		106000	
Chromium	MG/KG	83.3	100%	30	4	28	28	23.4		13		9.5		10.9		13.8		15.7	
Cobalt	MG/KG	26.5	100%	30	0	28	28	15		9.4	J	7.5	J	8.6		7.8	J	8.4	J
Copper	MG/KG	215	100%	33	5	28	28	32.2		20.2		21.4		31.5		18.1		22.6	
Cyanide	MG/KG	1.5	7%	0.35	2	2	28	0.66	U	0.59	U	0.57	U	0.57	U	0.56	U	0.57	U
Iron	MG/KG	35700	100%	37410	0	28	28	27800		19600	J	15800		17300	J	18000	J	26700	J
Lead	MG/KG	366	100%	24.4	3	28	28	17.9		11	J	6.9	J	12.8	J	9	J	8.9	J
Magnesium	MG/KG	34300	100%	21700	1	28	28	9610		8410	J	14400	J	11700	J	11900	J	12400	J
Manganese	MG/KG	631	100%	1100	0	28	28	430		569		358		427		402		411	
Mercury	MG/KG	0.06	18%	0.1	0	5	28	0.04	U	0.06	U	0.06	U	0.05	U	0.06	U	0.05	U
Nickel	MG/KG	201	93%	50	2	26	28	48.9		24.9	J	21.1	J	34.1	J	23.3	J	24.7	J
Potassium	MG/KG	2090	100%	2623	0	28	28	1740	J	897	J	945	J	801		1010	J	951	
Selenium	MG/KG	1.2	18%	2	0	5	28	1.1	U	0.88	UJ	0.94	UJ	0.63	UJ	0.93	UJ	0.81	UJ
Silver	MG/KG	11.9	14%	0.8	2	4	28	0.48	U	0.23	U	0.25	U	0.17	U	0.24	U	0.21	U
Sodium	MG/KG	134	57%	188	0	16	28	138	U	48.4	U	70.1	J	70.2	J	69.9	J	107	J
Thallium	MG/KG	1.7	25%	0.855	5	7	28	1.4	U	1	U	1.1	U	0.94	J	1.1	U	0.91	U
Vanadium	MG/KG	25.6	100%	150	0	28	28	19.5		14.7		11.3		11.8		14.7		12.4	
Zinc	MG/KG	424	100%	115	3	28	28	110	J	50.9	J	42.4	J	54.5	J	51.9	J	56.6	J

TABLE 4-F
DISPOSAL PIT A/B CHEMICAL DATA-SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

		FACILITY						SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
		LOCATION ID						TP12-2C		TP12A-1		TP12A-1		TP12A-2		TP12A-2	
		MATRIX						SOIL		SOIL		SOIL		SOIL		SOIL	
		SAMPLE ID						123147		TP12A-1-1		TP12A-1-2		TP12A-2-2		TP12A-2-1	
SAMPLE DEPTH TO TOP OF SAMPLE								6		2.5		3		5		6	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								6		2.5		3		5		6	
		SAMPLE DATE						10/16/98		06/24/94		06/24/94		06/22/94		06/22/94	
		QC CODE						SA		SA		SA		SA		SA	
		STUDY ID						RI PHASE 1 STEP 1		ESI		ESI		ESI		ESI	
PARAMETER	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
VOLATILE ORGANICS																	
Acetone	UG/KG	34	41%	200	0	12	29	30	UJ	12	U	11	U	12	U	14	U
Benzene	UG/KG	6	3%	60	0	1	29	30	U	12	U	11	U	12	U	14	U
Ethyl benzene	UG/KG	66	10%	5500	0	3	29	24	J	12	U	11	U	12	U	14	U
Methylene chloride	UG/KG	3	7%	100	0	2	29	30	U	12	U	11	U	12	U	14	U
Styrene	UG/KG	33	3%		0	1	29	30	U	12	U	11	U	12	U	14	U
Toluene	UG/KG	15	34%	1500	0	10	29	6	J	12	U	11	U	12	U	14	U
Total Xylenes	UG/KG	520	10%	1200	0	3	29	260		12	U	11	U	12	U	14	U
Trichloroethene	UG/KG	26	14%	700	0	4	29	30	U	3	J	26		12	U	14	U
SEMI VOLATILE ORGANICS																	
2,4-Dimethylphenol	UG/KG	25	4%		0	1	28	79	UJ	25	J	380	U	390	U	4500	U
2-Methylnaphthalene	UG/KG	56	11%	36400	0	3	28	10	J	400	U	21	J	390	U	4500	U
4-Methylphenol	UG/KG	140	4%	900	0	1	28	79	U	140	J	380	U	390	U	4500	U
Acenaphthene	UG/KG	23	4%	50000	0	1	28	23	J	400	U	380	U	390	U	4500	U
Acenaphthylene	UG/KG	33	4%	41000	0	1	28	79	U	400	U	33	J	390	U	4500	U
Anthracene	UG/KG	96	11%	50000	0	3	28	40	J	400	U	96	J	390	U	4500	U
Benzo(a)anthracene	UG/KG	180	14%	224	0	4	28	74	J	21	J	180	J	390	U	4500	U
Benzo(a)pyrene	UG/KG	200	14%	61	1	4	28	41	J	30	J	**200**	J	390	U	4500	U
Benzo(b)fluoranthene	UG/KG	190	14%	1100	0	4	28	23	J	28	J	190	J	390	U	4500	U
Benzo(ghi)perylene	UG/KG	120	7%	50000	0	2	28	79	U	400	U	120	J	390	U	4500	U
Benzo(k)fluoranthene	UG/KG	160	11%	1100	0	3	28	79	U	32	J	160	J	390	U	4500	U
Bis(2-Ethylhexyl)phthalate	UG/KG	930	25%	50000	0	7	28	79	U	230	J	860		390	U	4500	U
Butylbenzylphthalate	UG/KG	5.1	4%	50000	0	1	28	79	U	400	U	380	U	390	U	4500	U
Chrysene	UG/KG	240	14%	400	0	4	28	98		28	J	240	J	390	U	4500	U
Di-n-butylphthalate	UG/KG	1700	11%	8100	0	3	28	79	U	79	J	1700		390	U	4500	U
Di-n-octylphthalate	UG/KG	54	43%	50000	0	12	28	79	U	400	U	380	U	390	U	4500	U
Dibenz(a,h)anthracene	UG/KG	57	7%	14	1	2	28	79	U	400	U	**57**	J	390	U	4500	U
Fluoranthene	UG/KG	420	21%	50000	0	6	28	69	J	40	J	420		390	U	4500	U
Fluorene	UG/KG	52	7%	50000	0	2	28	10	J	400	U	52	J	390	U	4500	U
Indeno(1,2,3-cd)pyrene	UG/KG	120	7%	3200	0	2	28	79	U	400	U	120	J	390	U	4500	U
Naphthalene	UG/KG	600	7%	13000	0	2	28	72	J	400	U	380	U	390	U	4500	U
Phenanthrene	UG/KG	340	18%	50000	0	5	28	130		27	J	340	J	390	U	4500	U
Phenol	UG/KG	300	7%	30	2	2	28	79	U	**300**	J	**48**	J	390	U	4500	U
Pyrene	UG/KG	380	18%	50000	0	5	28	260		37	J	380		390	U	4500	U
PESTICIDES/PCBS																	
4,4'-DDE	UG/KG	42	11%	2100	0	3	28	4	U	4	U	2.2	J	3.9	U	9	U
4,4'-DDT	UG/KG	2.1	4%	2100	0	1	28	4	U	4	U	3.8	U	2.1	J	9	U

TABLE 4-F
DISPOSAL PIT A/B CHEMICAL DATA-SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								TP12-2C		TP12A-1		TP12A-1		TP12A-2		TP12A-2	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123147		TP12A-1-1		TP12A-1-2		TP12A-2-2		TP12A-2-1	
SAMPLE DEPTH TO TOP OF SAMPLE								6		2.5		3		5		6	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								6		2.5		3		5		6	
SAMPLE DATE								10/16/98		06/24/94		06/24/94		06/22/94		06/22/94	
QC CODE								SA		SA		SA		SA		SA	
STUDY ID								RI PHASE 1 STEP 1		ESI		ESI		ESI		ESI	
PARAMETER	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Aldrin	UG/KG	0.79	4%	41	0	1	28	2	U	0.79	J	2	U	2	U	4.7	U
Alpha-BHC	UG/KG	24	7%	110	0	2	28	24		2.1	U	2	U	2	U	4.7	U
Alpha-Chlordane	UG/KG	4.6	7%		0	2	28	2	U	2.1	U	1.5	J	2	U	4.7	U
Aroclor-1254	UG/KG	3000	21%	10000	0	6	28	40	U	49		73		500		2300	
Aroclor-1260	UG/KG	150	7%	10000	0	2	28	40	U	40	U	38	U	31	J	150	
Beta-BHC	UG/KG	2.2	4%	200	0	1	28	2.2	J	2.1	U	2	U	2	U	4.7	U
Dieldrin	UG/KG	40	7%	44	0	2	28	4	U	4	U	3.8	U	3.9	U	9	U
Endosulfan II	UG/KG	19	7%	900	0	2	28	4	U	4	U	3.8	U	3.9	U	9	U
Endrin	UG/KG	20	14%	100	0	4	28	4	U	4	U	3.8	U	3.8	J	20	J
Gamma-Chlordane	UG/KG	58	11%	540	0	3	28	2	U	2.1	U	2	U	2.1	J	4.7	U
Heptachlor	UG/KG	13	7%	100	0	2	28	13		2.1	U	2	U	2	U	4.7	U
Heptachlor epoxide	UG/KG	22	7%	20	1	2	28	1.7	J	2.1	U	2	U	2	U	4.7	U
METALS																	
Aluminum	MG/KG	17100	100%	19520	0	28	28	6500	J	11400		11400		17100		10900	
Antimony	MG/KG	7.2	25%	6	1	7	28	1.3	UR	0.31	J	1.9	J	1.9	J	7.2	J
Arsenic	MG/KG	5.9	100%	8.9	0	28	28	2.9		3.8		5.2		4.9		4.7	
Barium	MG/KG	125	100%	300	0	28	28	55.3	J	96.3		93.3		73.6		81	
Beryllium	MG/KG	0.74	100%	1.13	0	28	28	0.26	J	0.5	J	0.62	J	0.74	J	0.74	J
Cadmium	MG/KG	94.3	36%	2.46	7	10	28	1.2		7.8		94.3		37.3		27.3	
Calcium	MG/KG	142000	100%	125300	1	28	28	142000		38900	J	81800	J	10900		77700	
Chromium	MG/KG	83.3	100%	30	4	28	28	12.5		27.5		83.3		32.4		16.5	
Cobalt	MG/KG	26.5	100%	30	0	28	28	8	J	9.9		9.4	J	26.5		13.1	
Copper	MG/KG	215	100%	33	5	28	28	16.9		25.7		215		128		43.6	
Cyanide	MG/KG	1.5	7%	0.35	2	2	28	0.65	U	0.48	U	0.54	U	0.48	U	0.63	U
Iron	MG/KG	35700	100%	37410	0	28	28	18300	J	20100		24200		27500		19000	
Lead	MG/KG	366	100%	24.4	3	28	28	8.7	J	18.9	J	366	J	20.2		20	
Magnesium	MG/KG	34300	100%	21700	1	28	28	11300	J	8390		9310		5290		5360	
Manganese	MG/KG	631	100%	1100	0	28	28	394		518		495		428		502	
Mercury	MG/KG	0.06	18%	0.1	0	5	28	0.06	U	0.04	J	0.05	J	0.03	J	0.04	J
Nickel	MG/KG	201	93%	50	2	26	28	22.2	J	25.3		29.9		201		39	
Potassium	MG/KG	2090	100%	2623	0	28	28	887	J	1640	J	1490	J	1370	J	1530	J
Selenium	MG/KG	1.2	18%	2	0	5	28	0.98	UJ	1.1		0.6	J	1		1.2	
Silver	MG/KG	11.9	14%	0.8	2	4	28	0.25	U	0.1	U	11.9		0.33	J	0.49	J
Sodium	MG/KG	134	57%	188	0	16	28	108	J	45.2	J	101	J	66.8	J	46.2	J
Thallium	MG/KG	1.7	25%	0.855	5	7	28	1.1	U	0.37	U	0.44	J	0.59	J	0.98	J
Vanadium	MG/KG	25.6	100%	150	0	28	28	11.2		17.9		19.2		19.6		17.9	
Zinc	MG/KG	424	100%	115	3	28	28	58.6	J	95.4		285		424		93.3	

TABLE 4-G
DISPOSAL PIT C CHEMICAL DATA-SURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12-14		MW12-15		MW12-33		MW12-34		MW12-7		SS12-150	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123099		123028		123195		123198		123180		123345	
SAMPLE DEPTH TO TOP OF SAMPLE								0		0		0		0		0		0	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.2		0.2		0.2		0.2		0.2		0.2	
SAMPLE DATE								14-Oct-98		01-Oct-98		31-Oct-98		31-Oct-98		28-Oct-98		17-Nov-98	
QC CODE								SA		SA		SA		SA		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
VOLATILE ORGANICS																			
Acetone	UG/KG	15	56%	200	0	5	9	14	U	11	UJ	15		8	J	7	J	7	J
SEMI VOLATILE ORGANICS																			
Anthracene	UG/KG	4.6	11%	50000	0	1	9	85	U	73	U	4.6	J	81	U	85	U	84	U
Benzo(a)anthracene	UG/KG	20	56%	224	0	5	9	85	U	73	U	20	J	9.8	J	5.4	J	9.5	J
Benzo(a)pyrene	UG/KG	20	67%	61	0	6	9	85	U	73	U	20	J	10	J	6.7	J	9.7	J
Benzo(b)fluoranthene	UG/KG	28	67%	1100	0	6	9	85	U	73	U	28	J	12	J	7.4	J	12	J
Benzo(ghi)perylene	UG/KG	18	44%	50000	0	4	9	85	U	73	U	18	J	9	J	7.5	J	84	U
Benzo(k)fluoranthene	UG/KG	19	56%	1100	0	5	9	85	U	73	U	19	J	11	J	7.7	J	9.3	J
Bis(2-Ethylhexyl)phthalate	UG/KG	5.8	11%	50000	0	1	9	85	UJ	5.8	J	86	U	100	U	85	U	84	UJ
Carbazole	UG/KG	6.4	11%		0	1	9	85	UJ	73	UJ	86	UJ	81	UJ	85	U	84	UJ
Chrysene	UG/KG	27	89%	400	0	8	9	5.9	J	4.5	J	27	J	13	J	7.7	J	13	J
Di-n-butylphthalate	UG/KG	4.5	22%	8100	0	2	9	85	U	4.5	J	86	U	81	U	85	U	4.2	J
Di-n-octylphthalate	UG/KG	7.3	11%	50000	0	1	9	85	UJ	73	U	86	U	7.3	J	85	U	84	UJ
Dibenz(a,h)anthracene	UG/KG	5.8	22%	14	0	2	9	85	U	73	U	5.8	J	81	U	85	U	84	U
Fluoranthene	UG/KG	40	67%	50000	0	6	9	85	U	73	U	40	J	19	J	11	J	22	J
Indeno(1,2,3-cd)pyrene	UG/KG	15	44%	3200	0	4	9	85	U	73	U	15	J	8.9	J	6	J	84	U
Phenanthrene	UG/KG	21	78%	50000	0	7	9	6	J	73	U	21	J	9.4	J	6.6	J	19	J
Pyrene	UG/KG	40	67%	50000	0	6	9	85	U	73	U	40	J	20	J	13	J	20	J
PESTICIDES/PCBS																			
4,4'-DDD	UG/KG	8.6	11%	2900	0	1	9	8.6		3.7	U	4.3	U	4.1	U	4.3	U	4.2	U
4,4'-DDT	UG/KG	2.2	11%	2100	0	1	9	4.2	U	3.7	U	2.2	J	4.1	U	4.3	U	4.2	U
METALS																			
Aluminum	MG/KG	14100	100%	19520	0	9	9	12000	J	6480		14100		10200		12400		12800	J
Arsenic	MG/KG	4.3	100%	8.9	0	9	9	4.3	J	3.1		3.9		2.9		4.1		3.9	J
Barium	MG/KG	108	100%	300	0	9	9	90.7		58		94.6		93.8		81.6		102	
Beryllium	MG/KG	0.69	100%	1.13	0	9	9	0.51	J	0.26	J	0.69	J	0.47	J	0.63	J	0.52	J
Calcium	MG/KG	75900	100%	125300	0	9	9	2620	J	75900	J	7570		11000		3720		16200	
Chromium	MG/KG	21.6	100%	30	0	9	9	16.5		11.2		21.6	J	15.1		16.5	J	16.4	
Cobalt	MG/KG	11	100%	30	0	9	9	11		7.7	J	10.7	J	9.5	J	9	J	7.7	J
Copper	MG/KG	22.1	100%	33	0	9	9	14.6		17.2		20.8		15.8		15.7		16.1	
Iron	MG/KG	23200	100%	37410	0	9	9	23200		15400		22700	J	20800	J	20300		20300	J
Lead	MG/KG	24.9	100%	24.4	1	9	9	18.6	J	6.7	J	**24.9**	J	16.3	J	16	J	15	
Magnesium	MG/KG	18600	100%	21700	0	9	9	3070	J	18600		4570		4930		3200		5130	
Manganese	MG/KG	700	100%	1100	0	9	9	693		389		700		632	J	640		502	
Mercury	MG/KG	0.06	11%	0.1	0	1	9	0.06	U	0.05	U	0.06	U	0.06	J	0.06	U	0.05	U
Nickel	MG/KG	27.6	78%	50	0	7	9	19.5	J	21.9		22.1	UJ	21.4		17.2	UJ	18.7	
Potassium	MG/KG	1980	100%	2623	0	9	9	1110	J	891	J	1980		1010	J	1280		1500	
Selenium	MG/KG	0.95	56%	2	0	5	9	1	U	0.9	UJ	0.95	J	1.1	UJ	0.84	J	0.43	J
Sodium	MG/KG	92.4	33%	188	0	3	9	57.5	U	92.4	J	53.8	U	58.5	U	64.2	U	72.3	J
Thallium	MG/KG	1.7	33%	0.855	3	3	9	**1.7**	J	1.3	U	**1.6**	J	**1.5**	J	1.3	U	0.88	U
Vanadium	MG/KG	24.6	100%	150	0	9	9	21.8		12.2		24.6		18.9		21.8		21.8	
Zinc	MG/KG	97.3	100%	115	0	9	9	57.6	J	43.5		97.3	J	55.6	J	54.2	J	52.5	J

TABLE 4-G
DISPOSAL PIT C CHEMICAL DATA-SURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

		FACILITY						SEAD-12		SEAD-12		SEAD-12	
		LOCATION ID						SS12-155		SS12-155		SS12-18	
		MATRIX						SOIL		SOIL		SOIL	
		SAMPLE ID						123350		123479		123103	
		SAMPLE DEPTH TO TOP OF SAMPLE						0		0		0	
		SAMPLE DEPTH TO BOTTOM OF SAMPLE						0.2		0.2		0.2	
		SAMPLE DATE						17-Nov-98		17-Nov-98		13-Oct-98	
		QC CODE						SA		SA		SA	
		STUDY ID						RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
VOLATILE ORGANICS													
Acetone	UG/KG	15	56%	200	0	5	9	13	U	8	J	12	U
SEMI VOLATILE ORGANICS													
Anthracene	UG/KG	4.6	11%	50000	0	1	9	82	U	81	U	75	U
Benzo(a)anthracene	UG/KG	20	56%	224	0	5	9	82	U	11	J	75	U
Benzo(a)pyrene	UG/KG	20	67%	61	0	6	9	4.2	J	13	J	75	UJ
Benzo(b)fluoranthene	UG/KG	28	67%	1100	0	6	9	9	J	12	J	75	U
Benzo(ghi)perylene	UG/KG	18	44%	50000	0	4	9	82	U	12	J	75	U
Benzo(k)fluoranthene	UG/KG	19	56%	1100	0	5	9	82	U	14	J	75	U
Bis(2-Ethylhexyl)phthalate	UG/KG	5.8	11%	50000	0	1	9	82	UJ	81	UJ	75	U
Carbazole	UG/KG	6.4	11%		0	1	9	82	UJ	6.4	J	75	U
Chrysene	UG/KG	27	89%	400	0	8	9	5.1	J	13	J	75	U
Di-n-butylphthalate	UG/KG	4.5	22%	8100	0	2	9	82	U	81	U	75	U
Di-n-octylphthalate	UG/KG	7.3	11%	50000	0	1	9	82	UJ	81	U	75	U
Dibenz(a,h)anthracene	UG/KG	5.8	22%	14	0	2	9	82	U	5.6	J	75	U
Fluoranthene	UG/KG	40	67%	50000	0	6	9	7.2	J	20	J	75	U
Indeno(1,2,3-cd)pyrene	UG/KG	15	44%	3200	0	4	9	82	U	12	J	75	U
Phenanthrene	UG/KG	21	78%	50000	0	7	9	4.6	J	11	J	75	U
Pyrene	UG/KG	40	67%	50000	0	6	9	7.5	J	15	J	75	U
PESTICIDES/PCBS													
4,4'-DDD	UG/KG	8.6	11%	2900	0	1	9	4.1	U	4.1	U	3.8	U
4,4'-DDT	UG/KG	2.2	11%	2100	0	1	9	4.1	U	4.1	U	3.8	U
METALS													
Aluminum	MG/KG	14100	100%	19520	0	9	9	13900	J	11600	J	9760	
Arsenic	MG/KG	4.3	100%	8.9	0	9	9	3.8	J	3.5	J	3.8	
Barium	MG/KG	108	100%	300	0	9	9	108		96.8		90.2	
Beryllium	MG/KG	0.69	100%	1.13	0	9	9	0.47	J	0.45	J	0.46	J
Calcium	MG/KG	75900	100%	125300	0	9	9	4400		3960		35700	J
Chromium	MG/KG	21.6	100%	30	0	9	9	17.7		15.4		15.6	
Cobalt	MG/KG	11	100%	30	0	9	9	8.6	J	8.2	J	8.9	J
Copper	MG/KG	22.1	100%	33	0	9	9	15.8		15.2		22.1	
Iron	MG/KG	23200	100%	37410	0	9	9	21700	J	20400	J	20200	J
Lead	MG/KG	24.9	100%	24.4	1	9	9	14		14		9.8	
Magnesium	MG/KG	18600	100%	21700	0	9	9	3640		3190		8070	
Manganese	MG/KG	700	100%	1100	0	9	9	690		607		408	
Mercury	MG/KG	0.06	11%	0.1	0	1	9	0.06	U	0.06	U	0.05	U
Nickel	MG/KG	27.6	78%	50	0	7	9	19.6		18.3	J	27.6	
Potassium	MG/KG	1980	100%	2623	0	9	9	1510		1030		989	J
Selenium	MG/KG	0.95	56%	2	0	5	9	0.9	J	0.65	J	0.92	U
Sodium	MG/KG	92.4	33%	188	0	3	9	50.6	U	43.8	U	91.6	J
Thallium	MG/KG	1.7	33%	0.855	3	3	9	1	U	0.9	U	1	U
Vanadium	MG/KG	24.6	100%	150	0	9	9	22.5		19.1		16.9	
Zinc	MG/KG	97.3	100%	115	0	9	9	58.2	J	51.4	J	54.1	J

TABLE 4-H
DISPOSAL PIT C- CHEMICAL DATA- SUBSURFACE SOIL (COLLAPSED)
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12-14		MW12-14		MW12-15		MW12-15		MW12-33	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123100		123101		123029		123030		123196	
SAMPLE DEPTH TO TOP OF SAMPLE								8		10		6		8		6	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								10		12		8		10		8	
SAMPLE DATE								14-Oct-98		14-Oct-98		01-Oct-98		01-Oct-98		31-Oct-98	
QC CODE								SA		SA		SA		SA		SA	
STUDY ID			FREQUENC OF	NYSDEC TAGM	UMBE ABOVE	NUMBER OF	NUMBER 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	
PARAMETER	UNIT	AXIMU	DETECTION	4046	TAGM	DETECT	ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Volatile Organics																	
Acetone	UG/K	61	21%	200	0	9	42	14	UJ	14	UJ	9	J	11	UJ	15	
Chlorobenzene	UG/K	5	5%	1700	0	2	42	11	UJ	11	UJ	11	UR	11	UJ	11	U
Methylene chloride	UG/K	180	12%	100	1	5	42	11	U	11	UJ	11	U	11	U	11	U
Tetrachloroethene	UG/K	2	2%	1400	0	1	42	11	UJ	11	UJ	11	UJ	11	U	11	U
Toluene	UG/K	62	14%	1500	0	6	42	11	UJ	7	J	10	J	62		11	U
Total Xylenes	UG/K	14	2%	1200	0	1	42	11	UJ	11	UJ	11	UR	11	UJ	11	U
Trichloroethene	UG/K	2	2%	700	0	1	42	11	UJ	11	UJ	11	UJ	11	U	11	U
Semi-Volatile Organics																	
2-Methylnaphthalene	UG/K	22	10%	36400	0	4	42	72	U	73	U	72	UJ	72	UJ	74	U
Acenaphthene	UG/K	44	12%	50000	0	5	42	72	U	73	U	72	U	72	U	74	U
Anthracene	UG/K	63	21%	50000	0	9	42	72	U	73	U	72	U	72	U	74	U
Benzo(a)anthracene	UG/K	200	45%	224	0	19	42	72	U	73	U	72	U	72	U	74	U
Benzo(a)pyrene	UG/K	180	48%	61	4	20	42	72	U	73	U	72	U	72	U	74	U
Benzo(b)fluoranthene	UG/K	320	48%	1100	0	20	42	72	U	73	U	72	U	72	U	74	U
Benzo(ghi)perylene	UG/K	98	43%	50000	0	18	42	72	UJ	73	UJ	72	U	72	U	4.3	J
Benzo(k)fluoranthene	UG/K	170	38%	1100	0	16	42	72	U	73	U	72	U	72	U	74	U
Bis(2-Ethylhexyl)phthalate	UG/K	16	14%	50000	0	6	42	74	UJ	73	UJ	12	J	14	J	74	U
Butylbenzylphthalate	UG/K	30	12%	50000	0	5	42	72	UJ	73	UJ	72	U	72	U	74	U
Carbazole	UG/K	40	14%		0	6	42	72	UJ	73	UJ	72	UJ	72	U	74	UJ
Chrysene	UG/K	310	50%	400	0	21	42	72	U	73	U	72	U	72	UJ	74	U
Di-n-butylphthalate	UG/K	52	19%	8100	0	8	42	72	U	73	U	11	J	10	J	74	U
Di-n-octylphthalate	UG/K	20	24%	50000	0	10	42	11	J	9.1	J	3.8	J	8.4	J	74	U
Dibenz(a,h)anthracene	UG/K	99	19%	14	4	8	42	72	UJ	73	UJ	72	U	72	U	74	U
Dibenzofuran	UG/K	4.1	2%	6200	0	1	42	72	U	73	U	72	U	72	U	74	U
Fluoranthene	UG/K	320	45%	50000	0	19	42	72	U	73	U	72	U	72	U	74	U
Fluorene	UG/K	35	5%	50000	0	2	42	72	U	73	U	72	U	72	U	74	U
Indeno(1,2,3-cd)pyrene	UG/K	140	31%	3200	0	13	42	72	UJ	73	UJ	72	U	72	U	74	U
N-Nitrosodiphenylamine	UG/K	9500	2%		0	1	42	72	U	73	U	72	U	72	U	74	U
Naphthalene	UG/K	13	2%	13000	0	1	42	72	U	73	U	72	U	72	U	74	U
Phenanthrene	UG/K	280	43%	50000	0	18	42	72	U	73	U	72	U	72	U	74	U
Pyrene	UG/K	310	48%	50000	0	20	42	72	U	73	U	72	U	72	U	74	U
Pesticides/ PCBs																	
4,4'-DDD	UG/K	25	10%	2900	0	4	42	3.6	U	3.7	U	3.6	U	3.6	U	3.7	U
4,4'-DDE	UG/K	6.4	17%	2100	0	7	42	3.6	U	3.7	U	3.6	U	3.6	U	3.7	U
4,4'-DDT	UG/K	4.9	19%	2100	0	8	42	3.6	U	3.7	U	3.6	U	3.6	U	3.7	U

TABLE 4-H
DISPOSAL PIT C- CHEMICAL DATA- SUBSURFACE SOIL (COLLAPSED)
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12-14		MW12-14		MW12-15		MW12-15		MW12-33	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123100		123101		123029		123030		123196	
SAMPLE DEPTH TO TOP OF SAMPLE								8		10		6		8		6	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								10		12		8		10		8	
SAMPLE DATE								14-Oct-98		14-Oct-98		01-Oct-98		01-Oct-98		31-Oct-98	
QC CODE								SA		SA		SA		SA		SA	
STUDY ID			FREQUENC OF	NYSDEC TAGM	UMBE ABOVE	NUMBER OF	NUMBER 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	
PARAMETER	UNIT	AXIMU	DETECTION	4046	TAGM	DETECT	ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Volatile Organics																	
Alpha-BHC	UG/K	5.8	2%	110	0	1	42	1.8	U	1.9	U	1.8	U	1.8	U	1.9	U
Alpha-Chlordane	UG/K	2.6	2%		0	1	42	1.8	U	1.9	U	1.8	U	1.8	U	1.9	U
Aroclor-1254	UG/K	28	2%	10000	0	1	42	36	U	37	U	36	U	36	U	37	U
Aroclor-1260	UG/K	25	2%	10000	0	1	42	36	U	37	U	25	J	36	U	37	U
Beta-BHC	UG/K	1.7	2%	200	0	1	42	1.8	U	1.9	U	1.8	U	1.8	U	1.9	U
Gamma-Chlordane	UG/K	2.3	5%	540	0	2	42	1.8	U	1.9	U	1.8	U	1.8	U	1.9	U
Heptachlor	UG/K	8.4	7%	100	0	3	42	1.8	U	1.9	U	1.8	U	1.8	U	1.9	U
Heptachlor epoxide	UG/K	2	2%	20	0	1	42	1.8	U	1.9	U	1.8	U	1.8	U	1.9	U
Metals																	
Aluminum	MG/K	18600	100%	19520	0	42	42	6380	J	5990	J	7220		5330		8690	
Antimony	MG/K	0.39	7%	6	0	3	42	1	UR	0.83	UR	1.2	UR	1.1	UR	1.1	UR
Arsenic	MG/K	11.1	100%	8.9	1	42	42	3.1	J	3.1	J	3.1		1.9		3.3	
Barium	MG/K	135	100%	300	0	42	42	69.8		76.7		71.8		63		74.7	
Beryllium	MG/K	0.83	100%	1.13	0	42	42	0.23	J	0.23	J	0.28	J	0.18	J	0.47	J
Cadmium	MG/K	6	24%	2.46	2	10	42	0.05	U	0.04	U	0.06	U	0.05	U	0.32	U
Calcium	MG/K	224000	100%	125300	3	42	42	96500	J	84000	J	66500	J	65000	J	94800	
Chromium	MG/K	29.7	100%	30	0	42	42	11.4		11		12.5		9.1		14.2	J
Cobalt	MG/K	16.3	100%	30	0	42	42	7	J	8	J	7.6	J	6.1	J	10.5	
Copper	MG/K	74.5	100%	33	3	42	42	16.7		15.2		17.7		13.4		22.1	
Cyanide	MG/K	2.2	2%	0.35	1	1	42	0.57	U	0.57	U	0.56	UJ	0.55	UJ	0.61	U
Iron	MG/K	51000	100%	37410	1	42	42	15500		15300		16400		12400		17600	J
Lead	MG/K	431	100%	24.4	8	42	42	6.7	J	6	J	4.9	J	3.8	J	5.2	J
Magnesium	MG/K	36100	100%	21700	2	42	42	21000	J	21200	J	14500		19700		20200	
Manganese	MG/K	857	100%	1100	0	42	42	385		359		350		341		493	
Mercury	MG/K	0.15	45%	0.1	3	19	42	0.05	U	0.05	U	0.05	U	0.05	U	0.06	U
Nickel	MG/K	45.5	93%	50	0	39	42	19.3	J	21.4	J	23.2		15.6		23.3	UJ
Potassium	MG/K	3670	100%	2623	2	42	42	1200		1110		1180		979		1830	
Selenium	MG/K	1.9	26%	2	0	11	42	0.77	U	0.63	U	0.93	UJ	0.82	UJ	0.41	U
Silver	MG/K	1.8	14%	0.8	1	6	42	0.23	J	0.16	U	0.24	U	0.21	U	0.21	U
Sodium	MG/K	1420	81%	188	4	34	42	113	J	113	J	73	J	93.4	J	79.7	J
Thallium	MG/K	1.7	40%	0.855	12	17	42	1.2	J	0.92	J	1.3	U	1.2	U	0.98	J
Vanadium	MG/K	36.4	100%	150	0	42	42	11.8		10.9		12.4		10.1		15.7	
Zinc	MG/K	6080	100%	115	7	42	42	33.5	J	38.9	J	53.2		29.6		51.1	J

TABLE 4-H
DISPOSAL PIT C- CHEMICAL DATA- SUBSURFACE SOIL (COLLAPSED)
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12-33		MW12-34		MW12-34		MW12-7		MW12-7	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123197		123199		123200		123181		123182	
SAMPLE DEPTH TO TOP OF SAMPLE								10		4		10		4		8	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0		6		12		6		10	
SAMPLE DATE								31-Oct-98		31-Oct-98		31-Oct-98		28-Oct-98		28-Oct-98	
QC CODE								SA		SA		SA		SA		SA	
STUDY ID			FREQUENC OF	NYSDEC TAGM	UMBE ABOVE	NUMBER OF	NUMBER 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	
PARAMETER	UNIT	AXIMU	DETECTION	4046	TAGM	DETECT	ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Volatile Organics																	
Acetone	UG/K	61	21%	200	0	9	42	10	J	13		9	J	6	J	5	J
Chlorobenzene	UG/K	5	5%	1700	0	2	42	11	UJ	12	U	11	U	12	U	11	U
Methylene chloride	UG/K	180	12%	100	1	5	42	11	UJ	12	U	11	U	12	U	11	U
Tetrachloroethene	UG/K	2	2%	1400	0	1	42	11	UJ	12	U	11	U	12	U	11	U
Toluene	UG/K	62	14%	1500	0	6	42	11	UJ	12	U	11	U	12	U	11	U
Total Xylenes	UG/K	14	2%	1200	0	1	42	11	UJ	12	U	11	U	12	U	11	U
Trichloroethene	UG/K	2	2%	700	0	1	42	11	UJ	12	U	11	U	12	U	11	U
Semi-Volatile Organics																	
2-Methylnaphthalene	UG/K	22	10%	36400	0	4	42	72	U	74	U	72	U	76	U	72	U
Acenaphthene	UG/K	44	12%	50000	0	5	42	72	U	74	U	72	U	76	U	72	U
Anthracene	UG/K	63	21%	50000	0	9	42	72	U	74	U	72	U	76	U	72	U
Benzo(a)anthracene	UG/K	200	45%	224	0	19	42	6.3	J	4.4	J	72	U	76	U	72	U
Benzo(a)pyrene	UG/K	180	48%	61	4	20	42	8.8	J	5.1	J	72	U	76	U	72	U
Benzo(b)fluoranthene	UG/K	320	48%	1100	0	20	42	12	J	7	J	72	U	76	U	72	U
Benzo(ghi)perylene	UG/K	98	43%	50000	0	18	42	8.1	J	5.6	J	5	J	76	U	72	U
Benzo(k)fluoranthene	UG/K	170	38%	1100	0	16	42	10	J	4.2	J	72	U	76	U	72	U
Bis(2-Ethylhexyl)phthalate	UG/K	16	14%	50000	0	6	42	100	U	74	U	130	U	76	U	72	U
Butylbenzylphthalate	UG/K	30	12%	50000	0	5	42	72	U	74	U	72	U	76	U	72	U
Carbazole	UG/K	40	14%		0	6	42	72	UJ	74	UJ	72	U	76	U	72	U
Chrysene	UG/K	310	50%	400	0	21	42	13	J	8.4	J	9.2	J	76	U	72	U
Di-n-butylphthalate	UG/K	52	19%	8100	0	8	42	72	U	74	U	72	U	76	U	72	U
Di-n-octylphthalate	UG/K	20	24%	50000	0	10	42	15	J	6.1	J	20	J	14	J	6.9	J
Dibenz(a,h)anthracene	UG/K	99	19%	14	4	8	42	72	U	74	U	72	U	76	U	72	U
Dibenzofuran	UG/K	4.1	2%	6200	0	1	42	72	U	74	U	72	U	76	U	72	U
Fluoranthene	UG/K	320	45%	50000	0	19	42	11	J	6.1	J	72	U	76	U	72	U
Fluorene	UG/K	35	5%	50000	0	2	42	72	U	74	U	72	U	76	U	72	U
Indeno(1,2,3-cd)pyrene	UG/K	140	31%	3200	0	13	42	6.3	J	74	U	72	U	76	U	72	U
N-Nitrosodiphenylamine	UG/K	9500	2%		0	1	42	72	U	74	U	72	U	76	U	72	U
Naphthalene	UG/K	13	2%	13000	0	1	42	72	U	74	U	72	U	76	U	72	U
Phenanthrene	UG/K	280	43%	50000	0	18	42	6.8	J	74	U	4.6	J	76	U	72	U
Pyrene	UG/K	310	48%	50000	0	20	42	17	J	6.2	J	7	J	76	U	72	U
Pesticides/ PCBs																	
4,4'-DDD	UG/K	25	10%	2900	0	4	42	3.6	U	3.7	U	3.6	U	3.8	U	3.6	U
4,4'-DDE	UG/K	6.4	17%	2100	0	7	42	3.6	U	3.7	U	3.6	U	3.8	U	3.6	U
4,4'-DDT	UG/K	4.9	19%	2100	0	8	42	3.6	U	3.7	U	3.6	U	3.8	U	3.6	U

TABLE 4-H
DISPOSAL PIT C- CHEMICAL DATA- SUBSURFACE SOIL (COLLAPSED)
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12-33		MW12-34		MW12-34		MW12-7		MW12-7	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123197		123199		123200		123181		123182	
SAMPLE DEPTH TO TOP OF SAMPLE								10		4		10		4		8	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0		6		12		5		10	
SAMPLE DATE								31-Oct-98		31-Oct-98		31-Oct-98		28-Oct-98		28-Oct-98	
QC CODE								SA		SA		SA		SA		SA	
STUDY ID			FREQUENC OF	NYSDEC TAGM	UMBE ABOVE	NUMBER OF	NUMBER 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	
PARAMETER	UNIT	AXIMU	DETECTION	4046	TAGM	DETECT	ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Volatile Organics																	
Alpha-BHC	UG/K	5.8	2%	110	0	1	42	1.9	U	1.9	U	1.9	U	2	U	1.8	U
Alpha-Chlordane	UG/K	2.6	2%		0	1	42	1.9	U	1.9	U	1.9	U	2	U	1.8	U
Aroclor-1254	UG/K	28	2%	10000	0	1	42	36	U	37	U	36	U	38	U	36	U
Aroclor-1260	UG/K	25	2%	10000	0	1	42	36	U	37	U	36	U	38	U	36	U
Beta-BHC	UG/K	1.7	2%	200	0	1	42	1.9	U	1.9	U	1.9	U	2	U	1.8	U
Gamma-Chlordane	UG/K	2.3	5%	540	0	2	42	1.9	U	1.9	U	1.9	U	2	U	1.8	U
Heptachlor	UG/K	8.4	7%	100	0	3	42	1.9	U	1.9	U	1.9	U	2	U	1.8	U
Heptachlor epoxide	UG/K	2	2%	20	0	1	42	1.9	U	1.9	U	1.9	U	2	U	1.8	U
Metals																	
Aluminum	MG/K	18600	100%	19520	0	42	42	6170		6380		6930		7400		7700	
Antimony	MG/K	0.39	7%	6	0	3	42	1.1	UJ	1	UJ	0.95	UJ	1.2	UR	0.89	UR
Arsenic	MG/K	11.1	100%	8.9	1	42	42	2.1		1.3	J	2.5		3		3.3	
Barium	MG/K	135	100%	300	0	42	42	90.8		51.9		76.8		62.7		68.2	
Beryllium	MG/K	0.83	100%	1.13	0	42	42	0.32	J	0.32	J	0.29	J	0.39	J	0.38	J
Cadmium	MG/K	6	24%	2.46	2	10	42	0.05	U	0.05	U	0.05	U	0.35	U	0.26	U
Calcium	MG/K	224000	100%	125300	3	42	42	65100		16500		72700		72400		62500	
Chromium	MG/K	29.7	100%	30	0	42	42	10.7		12.5		13.4		12.4	J	13.3	J
Cobalt	MG/K	16.3	100%	30	0	42	42	6.8	J	5	J	9.8		8.2	J	8.4	
Copper	MG/K	74.5	100%	33	3	42	42	19		11		24.3		19.4		18.5	
Cyanide	MG/K	2.2	2%	0.35	1	1	42	0.55	U	0.6	U	0.57	U	0.58	U	0.54	U
Iron	MG/K	51000	100%	37410	1	42	42	15400	J	14200	J	18100	J	16500		17200	
Lead	MG/K	431	100%	24.4	8	42	42	8	J	9.6	J	12.1	J	5	J	4.7	J
Magnesium	MG/K	36100	100%	21700	2	42	42	16800		3590		14200		15300		13800	
Manganese	MG/K	857	100%	1100	0	42	42	312	J	143	J	377	J	378		387	
Mercury	MG/K	0.15	45%	0.1	3	19	42	0.06	U	0.05	U	0.05	U	0.05	U	0.05	U
Nickel	MG/K	45.5	93%	50	0	39	42	20.9		21.4		29.3		21.7	UJ	21.3	UJ
Potassium	MG/K	3670	100%	2623	2	42	42	1080		404	J	893		1160		1290	
Selenium	MG/K	1.9	26%	2	0	11	42	0.8	UJ	0.77	UJ	1.5	J	0.45	U	0.34	U
Silver	MG/K	1.8	14%	0.8	1	6	42	0.21	U	0.2	U	0.19	U	0.23	U	0.18	U
Sodium	MG/K	1420	81%	188	4	34	42	43.8	U	42.5	U	64.9	J	75.1	J	103	J
Thallium	MG/K	1.7	40%	0.855	12	17	42	1.3	J	0.88	U	1.3	J	1.2	J	1.3	J
Vanadium	MG/K	36.4	100%	150	0	42	42	11.7		9.3		12.8		13.6		13.6	
Zinc	MG/K	6080	100%	115	7	42	42	41	J	37.7	J	85.4	J	49.6	J	50.5	J

TABLE 4-H
DISPOSAL PIT C- CHEMICAL DATA- SUBSURFACE SOIL (COLLAPSED)
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								TP12-23A		TP12-23B		TP12-23C		TP12-3A		TP12-3A	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123139		123140		123141		123085		123082	
SAMPLE DEPTH TO TOP OF SAMPLE								1		2		3		0.8		0.8	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								1		2		3		0.8		0.8	
SAMPLE DATE								17-Oct-98		17-Oct-98		17-Oct-98		07-Oct-98		07-Oct-98	
QC CODE								SA		SA		SA		DU		SA	
STUDY ID			FREQUENC OF	NYSDEC TAGM	UMBE ABOVE	NUMBER OF	NUMBER 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	
PARAMETER	UNIT	AXIMU	DETECTION	4046	TAGM	DETECT	ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Volatile Organics																	
Acetone	UG/K	61	21%	200	0	9	42	11	U	18		12	U	11	U	61	
Chlorobenzene	UG/K	5	5%	1700	0	2	42	11	U	11	U	12	U	11	U	11	U
Methylene chloride	UG/K	180	12%	100	1	5	42	11	U	11	U	12	U	2	J	180	
Tetrachloroethene	UG/K	2	2%	1400	0	1	42	11	U	11	U	12	U	11	U	11	U
Toluene	UG/K	62	14%	1500	0	6	42	11	U	11	U	12	U	6	J	11	U
Total Xylenes	UG/K	14	2%	1200	0	1	42	11	U	11	U	12	U	11	U	11	U
Trichloroethene	UG/K	2	2%	700	0	1	42	11	U	11	U	12	U	11	U	11	U
Semi-Volatile Organics																	
2-Methylnaphthalene	UG/K	22	10%	36400	0	4	42	77	U	4.4	J	770	UR	72	U	72	U
Acenaphthene	UG/K	44	12%	50000	0	5	42	77	U	76	U	770	UR	72	U	72	U
Anthracene	UG/K	63	21%	50000	0	9	42	77	U	5.4	J	770	UR	72	U	72	U
Benzo(a)anthracene	UG/K	200	45%	224	0	19	42	7.2	J	16	J	770	UR	72	U	5.3	J
Benzo(a)pyrene	UG/K	180	48%	61	4	20	42	8.3	J	13	J	39	J	72	U	4.8	J
Benzo(b)fluoranthene	UG/K	320	48%	1100	0	20	42	13	J	14	J	770	UR	72	U	5	J
Benzo(ghi)perylene	UG/K	98	43%	50000	0	18	42	77	U	11	J	39	J	72	U	72	U
Benzo(k)fluoranthene	UG/K	170	38%	1100	0	16	42	77	U	12	J	770	UR	72	U	5.1	J
Bis(2-Ethylhexyl)phthalate	UG/K	16	14%	50000	0	6	42	77	U	5	J	770	UJ	72	U	72	U
Butylbenzylphthalate	UG/K	30	12%	50000	0	5	42	77	U	76	U	770	UR	4.1	J	72	U
Carbazole	UG/K	40	14%		0	6	42	77	UJ	7.4	J	770	UR	72	UJ	72	UJ
Chrysene	UG/K	310	50%	400	0	21	42	12	J	17	J	770	UR	72	U	6.6	J
Di-n-butylphthalate	UG/K	52	19%	8100	0	8	42	280	UJ	440	UJ	770	UR	72	U	72	U
Di-n-octylphthalate	UG/K	20	24%	50000	0	10	42	77	U	76	U	770	UR	72	U	72	U
Dibenz(a,h)anthracene	UG/K	99	19%	14	4	8	42	77	U	76	U	770	UR	72	U	72	U
Dibenzofuran	UG/K	4.1	2%	6200	0	1	42	77	U	4.1	J	770	UR	72	U	72	U
Fluoranthene	UG/K	320	45%	50000	0	19	42	77	U	36	J	88	J	72	U	5.1	J
Fluorene	UG/K	35	5%	50000	0	2	42	77	U	76	U	770	UR	72	U	72	U
Indeno(1,2,3-cd)pyrene	UG/K	140	31%	3200	0	13	42	77	U	8.7	J	770	UR	72	U	72	U
N-Nitrosodiphenylamine	UG/K	9500	2%		0	1	42	77	U	76	U	770	UR	72	U	72	U
Naphthalene	UG/K	13	2%	13000	0	1	42	77	U	76	U	770	UR	72	U	72	U
Phenanthrene	UG/K	280	43%	50000	0	18	42	77	U	30	J	770	UR	72	U	6.6	J
Pyrene	UG/K	310	48%	50000	0	20	42	77	U	32	J	52	J	72	U	10	J
Pesticides/ PCBs																	
4,4'-DDD	UG/K	25	10%	2900	0	4	42	3.8	U	3.8	U	3.8	U	3.6	U	3.6	U
4,4'-DDE	UG/K	6.4	17%	2100	0	7	42	3.8	U	3.8	U	3.8	U	3.6	U	3.6	U
4,4'-DDT	UG/K	4.9	19%	2100	0	8	42	3.8	U	3.8	U	3.8	U	3.6	U	3.6	U

TABLE 4-H
DISPOSAL PIT C- CHEMICAL DATA- SUBSURFACE SOIL (COLLAPSED)
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								TP12-23A		TP12-23B		TP12-23C		TP12-3A		TP12-3A	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123139		123140		123141		123085		123082	
SAMPLE DEPTH TO TOP OF SAMPLE								1		2		3		0.8		0.8	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								1		2		3		0.8		0.8	
SAMPLE DATE								17-Oct-98		17-Oct-98		17-Oct-98		07-Oct-98		07-Oct-98	
QC CODE								SA		SA		SA		DU		SA	
STUDY ID			FREQUENC OF	NYSDEC TAGM	UMBE ABOVE	NUMBER OF	NUMBER 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	
PARAMETER	UNIT	AXIMU	DETECTION	4046	TAGM	DETECT	ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Volatile Organics																	
Alpha-BHC	UG/K	5.8	2%	110	0	1	42	2	U	2	U	2	U	1.8	U	1.8	U
Alpha-Chlordane	UG/K	2.6	2%		0	1	42	2	U	2	U	2	U	1.8	U	1.8	U
Aroclor-1254	UG/K	28	2%	10000	0	1	42	38	U	38	U	38	U	36	U	36	U
Aroclor-1260	UG/K	25	2%	10000	0	1	42	38	U	38	U	38	U	36	U	36	U
Beta-BHC	UG/K	1.7	2%	200	0	1	42	2	U	2	U	2	U	1.8	U	1.8	U
Gamma-Chlordane	UG/K	2.3	5%	540	0	2	42	2	U	2	U	2	U	1.8	U	1.8	U
Heptachlor	UG/K	8.4	7%	100	0	3	42	2	U	2	U	2	U	1.1	J	1	J
Heptachlor epoxide	UG/K	2	2%	20	0	1	42	2	U	2	U	2	U	1.8	U	1.8	U
Metals																	
Aluminum	MG/K	18600	100%	19520	0	42	42	12500		11000		11000		9100		8520	
Antimony	MG/K	0.39	7%	6	0	3	42	1.3	UR	1	UR	1.3	UR	1.3	UR	1.1	UR
Arsenic	MG/K	11.1	100%	8.9	1	42	42	4.5		6.7		3.9		3.9		4	
Barium	MG/K	135	100%	300	0	42	42	88.2		77.3		73		73.6		71.9	
Beryllium	MG/K	0.83	100%	1.13	0	42	42	0.43	J	0.33	J	0.43	J	0.33	J	0.35	J
Cadmium	MG/K	6	24%	2.46	2	10	42	0.06	U	0.05	U	0.06	U	0.06	U	0.06	U
Calcium	MG/K	224000	100%	125300	3	42	42	34700		90700		32100		46900	J	44300	J
Chromium	MG/K	29.7	100%	30	0	42	42	17.5		16.4		29.7		13.6		12	
Cobalt	MG/K	16.3	100%	30	0	42	42	10.6		7.9	J	11.5		7.7	J	7.4	J
Copper	MG/K	74.5	100%	33	3	42	42	20.9		16.2		74.5		17.5		18	
Cyanide	MG/K	2.2	2%	0.35	1	1	42	0.61	U	0.59	U	2.2		0.57	U	0.56	U
Iron	MG/K	51000	100%	37410	1	42	42	23800		18000		51000		17400	J	15500	J
Lead	MG/K	431	100%	24.4	8	42	42	14.8		9.3		[illegible]	J	10.4		9.3	
Magnesium	MG/K	36100	100%	21700	2	42	42	8710		25100		9450		6930		8790	
Manganese	MG/K	857	100%	1100	0	42	42	629		497		331		431		422	
Mercury	MG/K	0.15	45%	0.1	3	19	42	0.06	U	0.05	U	0.15	J	0.14	J	0.06	J
Nickel	MG/K	45.5	93%	50	0	39	42	25.2		20.7		36.9		22.5		20.7	
Potassium	MG/K	3670	100%	2623	2	42	42	1560		1330		1940		897	J	770	J
Selenium	MG/K	1.9	26%	2	0	11	42	0.95	UJ	0.78	UJ	0.99	UJ	0.94	U	0.86	U
Silver	MG/K	1.8	14%	0.8	1	6	42	0.25	U	0.2	U	0.27	J	0.34	J	0.26	J
Sodium	MG/K	1420	81%	188	4	34	42	52.1	U	42.5	U	1420		67.5	J	61.5	J
Thallium	MG/K	1.7	40%	0.855	12	17	42	1.1	U	[illegible]	J	1.1	U	1.1	U	0.97	U
Vanadium	MG/K	36.4	100%	150	0	42	42	21.3		17.7		17.6		15.9		15.2	
Zinc	MG/K	6080	100%	115	7	42	42	63		69.6		6080		46.3	J	44.2	J

TABLE 4-H
DISPOSAL PIT C- CHEMICAL DATA- SUBSURFACE SOIL (COLLAPSED)
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								TP12-3B		TP12-3C		TP12-4A		TP12-4B		TP12-4C	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123083		123084		123086		123087		123088	
SAMPLE DEPTH TO TOP OF SAMPLE								5.5		4		0.5		6		8	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								5.5		4		0.5		6		8	
SAMPLE DATE								07-Oct-98		07-Oct-98		12-Oct-98		12-Oct-98		12-Oct-98	
QC CODE								SA		SA		SA		SA		SA	
STUDY ID			FREQUENC OF	NYSDEC TAGM	UMBE ABOVE	NUMBER OF	NUMBER 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	
PARAMETER	UNIT	AXIMU	DETECTION	4046	TAGM	DETECT	ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Volatile Organics																	
Acetone	UG/K	61	21%	200	0	9	42	35	U	17	U	12	U	11	U	11	U
Chlorobenzene	UG/K	5	5%	1700	0	2	42	13	U	12	U	12	U	11	U	11	U
Methylene chloride	UG/K	180	12%	100	1	5	42	2	J	12	U	12	U	11	U	11	U
Tetrachloroethene	UG/K	2	2%	1400	0	1	42	2	J	12	U	12	U	11	U	11	U
Toluene	UG/K	62	14%	1500	0	6	42	3	J	12	U	12	U	11	U	11	U
Total Xylenes	UG/K	14	2%	1200	0	1	42	14		12	U	12	U	11	U	11	U
Trichloroethene	UG/K	2	2%	700	0	1	42	13	U	12	U	12	U	11	U	11	U
Semi-Volatile Organics																	
2-Methylnaphthalene	UG/K	22	10%	36400	0	4	42	22	J	74	U	74	U	75	U	75	U
Acenaphthene	UG/K	44	12%	50000	0	5	42	170	U	74	U	74	U	75	U	75	U
Anthracene	UG/K	63	21%	50000	0	9	42	170	U	74	U	74	U	75	U	75	U
Benzo(a)anthracene	UG/K	200	45%	224	0	19	42	170	U	74	U	74	U	75	U	3.9	J
Benzo(a)pyrene	UG/K	180	48%	61	4	20	42	170	U	74	U	10	J	75	UJ	75	UJ
Benzo(b)fluoranthene	UG/K	320	48%	1100	0	20	42	170	U	74	U	74	U	75	U	5.9	J
Benzo(ghi)perylene	UG/K	98	43%	50000	0	18	42	170	U	74	U	74	U	75	U	75	U
Benzo(k)fluoranthene	UG/K	170	38%	1100	0	16	42	170	U	74	U	74	U	75	U	5.6	J
Bis(2-Ethylhexyl)phthalate	UG/K	16	14%	50000	0	6	42	170	U	74	U	74	U	75	U	75	U
Butylbenzylphthalate	UG/K	30	12%	50000	0	5	42	170	U	74	U	74	U	75	U	75	U
Carbazole	UG/K	40	14%		0	6	42	170	UJ	74	UJ	74	U	75	U	75	U
Chrysene	UG/K	310	50%	400	0	21	42	170	U	74	U	74	U	75	U	6.8	J
Di-n-butylphthalate	UG/K	52	19%	8100	0	8	42	170	U	74	U	74	U	75	U	75	U
Di-n-octylphthalate	UG/K	20	24%	50000	0	10	42	170	U	74	U	74	U	75	U	75	U
Dibenz(a,h)anthracene	UG/K	99	19%	14	4	8	42	170	U	74	U	74	U	75	U	75	U
Dibenzofuran	UG/K	4.1	2%	6200	0	1	42	170	U	74	U	74	U	75	U	75	U
Fluoranthene	UG/K	320	45%	50000	0	19	42	170	U	74	U	74	U	75	U	75	U
Fluorene	UG/K	35	5%	50000	0	2	42	170	U	74	U	74	U	75	U	75	U
Indeno(1,2,3-cd)pyrene	UG/K	140	31%	3200	0	13	42	170	U	74	U	74	U	75	U	75	U
N-Nitrosodiphenylamine	UG/K	9500	2%		0	1	42	9500		74	U	74	U	75	U	75	U
Naphthalene	UG/K	13	2%	13000	0	1	42	13	J	74	U	74	U	75	U	75	U
Phenanthrene	UG/K	280	43%	50000	0	18	42	170	U	74	U	74	U	75	U	75	U
Pyrene	UG/K	310	48%	50000	0	20	42	170	U	74	U	74	U	75	U	75	U
Pesticides/ PCBs																	
4,4'-DDD	UG/K	25	10%	2900	0	4	42	4.2	U	3.7	U	3.7	U	3.8	U	3.8	U
4,4'-DDE	UG/K	6.4	17%	2100	0	7	42	4.2	U	3.7	U	3.7	U	2.7	J	3.8	U
4,4'-DDT	UG/K	4.9	19%	2100	0	8	42	4.2	U	3.7	U	3.7	U	4.9		3.8	U

TABLE 4-H
DISPOSAL PIT C- CHEMICAL DATA- SUBSURFACE SOIL (COLLAPSED)
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								TP12-3B		TP12-3C		TP12-4A		TP12-4B		TP12-4C	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123083		123084		123086		123087		123088	
SAMPLE DEPTH TO TOP OF SAMPLE								5.5		4		0.5		6		8	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								5.5		4		0.5		6		8	
SAMPLE DATE								07-Oct-98		07-Oct-98		12-Oct-98		12-Oct-98		12-Oct-98	
QC CODE								SA		SA		SA		SA		SA	
STUDY ID			FREQUENC OF	NYSDEC TAGM	UMBE ABOVE	NUMBER OF	NUMBER 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	
PARAMETER	UNIT	AXIMU	DETECTION	4046	TAGM	DETECT	ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Volatile Organics																	
Alpha-BHC	UG/K	5.8	2%	110	0	1	42	2.2	U	1.9	U	1.9	U	5.8		1.9	U
Alpha-Chlordane	UG/K	2.6	2%		0	1	42	2.2	U	1.9	U	1.9	U	1.9	U	1.9	U
Aroclor-1254	UG/K	28	2%	10000	0	1	42	28	J	37	U	37	U	38	U	38	U
Aroclor-1260	UG/K	25	2%	10000	0	1	42	42	U	37	U	37	U	38	U	38	U
Beta-BHC	UG/K	1.7	2%	200	0	1	42	2.2	U	1.9	U	1.9	U	1.7	J	1.9	U
Gamma-Chlordane	UG/K	2.3	5%	540	0	2	42	2.2	U	1.9	U	1.9	U	1	J	1.9	U
Heptachlor	UG/K	8.4	7%	100	0	3	42	2.2	U	1.9	U	1.9	U	8.4		1.9	U
Heptachlor epoxide	UG/K	2	2%	20	0	1	42	2.2	U	1.9	U	1.9	U	2	J	1.9	U
Metals																	
Aluminum	MG/K	18600	100%	19520	0	42	42	9140		6550		9170		7650		7360	
Antimony	MG/K	0.39	7%	6	0	3	42	1.3	UR	1.3	UR	1	UR	1.2	UR	1.1	UR
Arsenic	MG/K	11.1	100%	8.9	1	42	42	11.1		4.3		3.4		2.7		3.7	
Barium	MG/K	135	100%	300	0	42	42	71.7		53.3		69.3		56.4		66.7	
Beryllium	MG/K	0.83	100%	1.13	0	42	42	0.4	J	0.23	J	0.41	J	0.34	J	0.28	J
Cadmium	MG/K	6	24%	2.46	2	10	42	6		0.07	U	0.05	U	0.06	U	0.05	U
Calcium	MG/K	224000	100%	125300	3	42	42	51900	J	78500	J	67200	J	14200	J	78600	J
Chromium	MG/K	29.7	100%	30	0	42	42	29.4		13.5		15.4		10.8		12.4	
Cobalt	MG/K	16.3	100%	30	0	42	42	8.3	J	8	J	9.5		6.4	J	8.5	J
Copper	MG/K	74.5	100%	33	3	42	42	26.4		18.8		21		11.3		18.3	
Cyanide	MG/K	2.2	2%	0.35	1	1	42	0.7	U	0.57	U	0.58	U	0.6	U	0.56	U
Iron	MG/K	51000	100%	37410	1	42	42	18800	J	18500	J	20200	J	15300	J	17200	J
Lead	MG/K	431	100%	24.4	8	42	42	15.8		8.3		9		9.3		7	
Magnesium	MG/K	36100	100%	21700	2	42	42	12200		8290		8840		3960		15300	
Manganese	MG/K	857	100%	1100	0	42	42	379		354		398		158		382	
Mercury	MG/K	0.15	45%	0.1	3	19	42	0.08	J	0.05	U	0.05	U	0.05	U	0.05	U
Nickel	MG/K	45.5	93%	50	0	39	42	27.5		24		29		15.6		24.8	
Potassium	MG/K	3670	100%	2623	2	42	42	875	J	898	J	787	J	755	J	1110	
Selenium	MG/K	1.9	26%	2	0	11	42	0.97	U	1	U	0.76	U	0.93	U	0.8	U
Silver	MG/K	1.8	14%	0.8	1	6	42	1.8	J	0.39	J	0.2	U	0.24	U	0.21	U
Sodium	MG/K	1420	81%	188	4	34	42	881	J	109	J	105	J	70.4	J	127	J
Thallium	MG/K	1.7	40%	0.855	12	17	42	1.4	U	1.1	U	0.86	U	1	U	0.91	U
Vanadium	MG/K	36.4	100%	150	0	42	42	17.3		12.1		15.8		14		12.7	
Zinc	MG/K	6080	100%	115	7	42	42	208	J	44.8	J	49.7	J	36.7	J	51.7	J

TABLE 4-H
DISPOSAL PIT C- CHEMICAL DATA- SUBSURFACE SOIL (COLLAPSED)
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								TP12-5A		TP12-5A		TP12-5B		TP12-5C		TP12-6A	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123092		123089		123090		123091		123158	
SAMPLE DEPTH TO TOP OF SAMPLE								0.5		0.5		2		8		2.5	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.5		0.5		2		8		2.5	
SAMPLE DATE								13-Oct-98		13-Oct-98		13-Oct-98		13-Oct-98		17-Oct-98	
QC CODE								DU		SA		SA		SA		SA	
STUDY ID			FREQUENC OF	NYSDEC TAGM	UMBE ABOVE	NUMBER OF	NUMBER 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	
PARAMETER	UNIT	AXIMU	DETECTION	4046	TAGM	DETECT	ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Volatile Organics																	
Acetone	UG/K	61	21%	200	0	9	42	11	U	12	U	12	U	11	U	13	U
Chlorobenzene	UG/K	5	5%	1700	0	2	42	11	U	12	U	12	U	11	U	13	U
Methylene chloride	UG/K	180	12%	100	1	5	42	11	U	12	U	12	U	11	U	13	U
Tetrachloroethene	UG/K	2	2%	1400	0	1	42	11	U	12	U	12	U	11	U	13	U
Toluene	UG/K	62	14%	1500	0	6	42	11	U	12	U	12	U	11	U	13	U
Total Xylenes	UG/K	14	2%	1200	0	1	42	11	U	12	U	12	U	11	U	13	U
Trichloroethene	UG/K	2	2%	700	0	1	42	11	U	12	U	12	U	11	U	13	U
Semi-Volatile Organics																	
2-Methylnaphthalene	UG/K	22	10%	36400	0	4	42	77	U	75	U	78	U	74	U	85	U
Acenaphthene	UG/K	44	12%	50000	0	5	42	7.6	J	75	U	78	U	74	U	85	U
Anthracene	UG/K	63	21%	50000	0	9	42	9.8	J	75	U	78	UJ	74	U	85	U
Benzo(a)anthracene	UG/K	200	45%	224	0	19	42	32	J	20	J	7.7	J	74	U	85	U
Benzo(a)pyrene	UG/K	180	48%	61	4	20	42	34	J	26	J	8	J	74	UJ	85	U
Benzo(b)fluoranthene	UG/K	320	48%	1100	0	20	42	33	J	23	J	11	J	74	U	5.1	J
Benzo(ghi)perylene	UG/K	98	43%	50000	0	18	42	26	J	16	J	13	J	74	U	4.9	J
Benzo(k)fluoranthene	UG/K	170	38%	1100	0	16	42	33	J	26	J	10	J	74	U	85	U
Bis(2-Ethylhexyl)phthalate	UG/K	16	14%	50000	0	6	42	77	U	75	U	78	U	74	U	12	J
Butylbenzylphthalate	UG/K	30	12%	50000	0	5	42	77	U	75	U	78	UJ	74	U	15	J
Carbazole	UG/K	40	14%		0	6	42	14	J	75	UJ	78	UJ	74	U	85	U
Chrysene	UG/K	310	50%	400	0	21	42	45	J	28	J	11	J	74	U	5.2	J
Di-n-butylphthalate	UG/K	52	19%	8100	0	8	42	77	U	75	U	5.8	J	74	U	640	UJ
Di-n-octylphthalate	UG/K	20	24%	50000	0	10	42	77	U	75	U	78	U	74	U	85	U
Dibenz(a,h)anthracene	UG/K	99	19%	14	4	8	42	9	J	6.8	J	78	U	74	U	85	U
Dibenzofuran	UG/K	4.1	2%	6200	0	1	42	77	U	75	U	78	U	74	U	85	U
Fluoranthene	UG/K	320	45%	50000	0	19	42	62	J	40	J	17	J	74	U	7.7	J
Fluorene	UG/K	35	5%	50000	0	2	42	77	U	75	U	78	U	74	U	85	U
Indeno(1,2,3-cd)pyrene	UG/K	140	31%	3200	0	13	42	25	J	18	J	8.1	J	74	U	85	U
N-Nitrosodiphenylamine	UG/K	9500	2%		0	1	42	77	U	75	U	78	U	74	U	85	U
Naphthalene	UG/K	13	2%	13000	0	1	42	77	U	75	U	78	U	74	U	85	U
Phenanthrene	UG/K	280	43%	50000	0	18	42	51	J	36	J	12	J	74	U	5	J
Pyrene	UG/K	310	48%	50000	0	20	42	66	J	35	J	11	J	74	U	8.2	J
Pesticides/ PCBs																	
4,4'-DDD	UG/K	25	10%	2900	0	4	42	2.9	J	25	J	3.9	U	3.7	UJ	4.2	U
4,4'-DDE	UG/K	6.4	17%	2100	0	7	42	3.8	UJ	5.7	J	3.9	U	3.7	UJ	4.2	U
4,4'-DDT	UG/K	4.9	19%	2100	0	8	42	3.3	J	2.4	J	3.9	U	3.7	UJ	4.2	U

TABLE 4-H
DISPOSAL PIT C- CHEMICAL DATA- SUBSURFACE SOIL (COLLAPSED)
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								TP12-5A		TP12-5A		TP12-5B		TP12-5C		TP12-6A	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123092		123089		123090		123091		123158	
SAMPLE DEPTH TO TOP OF SAMPLE								0.5		0.5		2		8		2.5	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.5		0.5		2		8		2.5	
SAMPLE DATE								13-Oct-98		13-Oct-98		13-Oct-98		13-Oct-98		17-Oct-98	
QC CODE								DU		SA		SA		SA		SA	
STUDY ID			FREQUENC OF	NYSDEC TAGM	UMBE ABOVE	NUMBER OF	NUMBER 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	
PARAMETER	UNIT	AXIMU	DETECTION	4046	TAGM	DETECT	ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Volatile Organics																	
Alpha-BHC	UG/K	5.8	2%	110	0	1	42	2	U	1.9	U	2	U	1.9	UJ	2.2	U
Alpha-Chlordane	UG/K	2.6	2%		0	1	42	2	U	1.9	U	2	U	1.9	UJ	2.2	U
Aroclor-1254	UG/K	28	2%	10000	0	1	42	38	U	38	U	39	U	37	UJ	42	U
Aroclor-1260	UG/K	25	2%	10000	0	1	42	38	U	38	U	39	U	37	UJ	42	U
Beta-BHC	UG/K	1.7	2%	200	0	1	42	2	U	1.9	U	2	U	1.9	UJ	2.2	U
Gamma-Chlordane	UG/K	2.3	5%	540	0	2	42	2	U	1.9	U	2	U	1.9	UJ	2.2	U
Heptachlor	UG/K	8.4	7%	100	0	3	42	2	U	1.9	U	2	U	1.9	UJ	2.2	U
Heptachlor epoxide	UG/K	2	2%	20	0	1	42	2	U	1.9	U	2	U	[illegible]	UJ	2.2	U
Metals																	
Aluminum	MG/K	18600	100%	19520	0	42	42	11100		11300		10300		7130		11300	
Antimony	MG/K	0.39	7%	6	0	3	42	1.4	UR	0.9	UR	1.3	UR	1.2	UR	1.3	UR
Arsenic	MG/K	11.1	100%	8.9	1	42	42	3		3.2		4.4		3.3		4.3	
Barium	MG/K	135	100%	300	0	42	42	77.2		79.7		74.3		77.5		82.2	
Beryllium	MG/K	0.83	100%	1.13	0	42	42	0.49	J	0.45	J	0.47	J	0.26	J	0.47	J
Cadmium	MG/K	6	24%	2.46	2	10	42	0.07	U	0.04	U	0.06	U	0.06	U	0.07	U
Calcium	MG/K	224000	100%	125300	3	42	42	30800	J	22300	J	49800	J	91300	J	24600	
Chromium	MG/K	29.7	100%	30	0	42	42	25.4		23.6		15.4		12		16.5	
Cobalt	MG/K	16.3	100%	30	0	42	42	9.2	J	9.4		8.6	J	10.5		10.2	J
Copper	MG/K	74.5	100%	33	3	42	42	23.5		23.2		21.2		20		20.3	
Cyanide	MG/K	2.2	2%	0.35	1	1	42	0.59	U	0.57	U	0.59	U	0.56	U	0.67	U
Iron	MG/K	51000	100%	37410	1	42	42	20000	J	20300	J	19600	J	16100	J	22700	
Lead	MG/K	431	100%	24.4	8	42	42	36.2		32.7		13.8		8.1		15.4	J
Magnesium	MG/K	36100	100%	21700	2	42	42	7700		6830		9720		15500		6520	
Manganese	MG/K	857	100%	1100	0	42	42	289		363		403		423		545	
Mercury	MG/K	0.15	45%	0.1	3	19	42	0.06	J	0.05	U	0.1	J	0.1	J	0.06	U
Nickel	MG/K	45.5	93%	50	0	39	42	28.3		26.8		24		25.5		24.1	
Potassium	MG/K	3670	100%	2623	2	42	42	1090	J	1090		1220		1290		978	J
Selenium	MG/K	1.9	26%	2	0	11	42	1.1	U	0.68	U	0.96	U	0.89	U	1	UJ
Silver	MG/K	1.8	14%	0.8	1	6	42	0.28	U	0.18	U	0.25	U	0.23	U	0.27	U
Sodium	MG/K	1420	81%	188	4	34	42	79.7	J	88.7	J	80.4	J	148	J	55.7	U
Thallium	MG/K	1.7	40%	0.855	12	17	42	1.2	U	0.77	U	1.1	U	1	U	1.1	U
Vanadium	MG/K	36.4	100%	150	0	42	42	18.4		19.2		19		12.8		19.7	
Zinc	MG/K	6080	100%	115	7	42	42	104	J	88.4	J	62.3	J	53.1	J	59	

TABLE 4-H
DISPOSAL PIT C- CHEMICAL DATA- SUBSURFACE SOIL (COLLAPSED)
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								TP12-6B		TP12-6C		TP12-7AA		TP12-7BA		TP12-7BB	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123159		123160		123128		123127		123129	
SAMPLE DEPTH TO TOP OF SAMPLE								3		3.5		1		1		2	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								3		3.5		1		1		2	
SAMPLE DATE								17-Oct-98		17-Oct-98		15-Oct-98		15-Oct-98		15-Oct-98	
QC CODE								SA		SA		SA		SA		SA	
STUDY ID			FREQUENC OF	NYSDEC TAGM	UMBE ABOVE	NUMBER OF	NUMBER 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	
PARAMETER	UNIT	AXIMU	DETECTION	4046	TAGM	DETECT	ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Volatile Organics																	
Acetone	UG/K	61	21%	200	0	9	42	16	UJ	13	UJ	11	UJ	13	UJ	12	UJ
Chlorobenzene	UG/K	5	5%	1700	0	2	42	16	U	13	U	11	U	11	U	12	U
Methylene chloride	UG/K	180	12%	100	1	5	42	16	U	13	U	11	U	11	U	12	U
Tetrachloroethene	UG/K	2	2%	1400	0	1	42	16	U	13	U	11	U	11	U	12	U
Toluene	UG/K	62	14%	1500	0	6	42	16	U	13	U	11	U	11	U	12	U
Total Xylenes	UG/K	14	2%	1200	0	1	42	16	U	13	U	11	U	11	U	12	U
Trichloroethene	UG/K	2	2%	700	0	1	42	16	U	13	U	11	U	11	U	12	U
Semi-Volatile Organics																	
2-Methylnaphthalene	UG/K	22	10%	36400	0	4	42	84	U	78	U	7.8	J	73	U	6.8	J
Acenaphthene	UG/K	44	12%	50000	0	5	42	84	U	78	U	7.6	J	5	J	76	U
Anthracene	UG/K	63	21%	50000	0	9	42	84	U	78	U	8.3	J	5.4	J	17	J
Benzo(a)anthracene	UG/K	200	45%	224	0	19	42	15	J	7.4	J	38	J	19	J	7.7	J
Benzo(a)pyrene	UG/K	180	48%	61	4	20	42	15	J	7.8	J	43	J	20	J	8.6	J
Benzo(b)fluoranthene	UG/K	320	48%	1100	0	20	42	16	J	11	J	49	J	18	J	13	J
Benzo(ghi)perylene	UG/K	98	43%	50000	0	18	42	13	J	9.7	J	28	J	14	J	76	UJ
Benzo(k)fluoranthene	UG/K	170	38%	1100	0	16	42	16	J	8.6	J	42	J	24	J	76	U
Bis(2-Ethylhexyl)phthalate	UG/K	16	14%	50000	0	6	42	13	J	16	J	76	UJ	73	UJ	76	U
Butylbenzylphthalate	UG/K	30	12%	50000	0	5	42	27	J	30	J	76	UJ	73	UJ	76	U
Carbazole	UG/K	40	14%		0	6	42	84	U	78	U	12	J	6.7	J	76	UJ
Chrysene	UG/K	310	50%	400	0	21	42	19	J	11	J	55	J	26	J	16	J
Di-n-butylphthalate	UG/K	52	19%	8100	0	8	42	850	UJ	680	UJ	76	UJ	73	UJ	76	U
Di-n-octylphthalate	UG/K	20	24%	50000	0	10	42	84	U	78	U	8	J	73	UJ	76	UJ
Dibenz(a,h)anthracene	UG/K	99	19%	14	4	8	42	84	U	78	U	11	J	7	J	76	UJ
Dibenzofuran	UG/K	4.1	2%	6200	0	1	42	84	U	78	U	76	U	73	U	76	U
Fluoranthene	UG/K	320	45%	50000	0	19	42	31	J	17	J	85		48	J	22	J
Fluorene	UG/K	35	5%	50000	0	2	42	84	U	78	U	76	U	73	U	76	U
Indeno(1,2,3-cd)pyrene	UG/K	140	31%	3200	0	13	42	9.4	J	7.6	J	26	J	13	J	76	UJ
N-Nitrosodiphenylamine	UG/K	9500	2%		0	1	42	84	U	78	U	76	U	73	U	76	U
Naphthalene	UG/K	13	2%	13000	0	1	42	84	U	78	U	76	U	73	U	76	U
Phenanthrene	UG/K	280	43%	50000	0	18	42	13	J	8.3	J	67	J	39	J	16	J
Pyrene	UG/K	310	48%	50000	0	20	42	30	J	16	J	85		40	J	15	J
Pesticides/ PCBs																	
4,4'-DDD	UG/K	25	10%	2900	0	4	42	4.2	U	3.9	U	2.2	J	3.7	U	3.8	U
4,4'-DDE	UG/K	6.4	17%	2100	0	7	42	4.2	U	3.9	U	2.5	J	3.7	U	3.3	J
4,4'-DDT	UG/K	4.9	19%	2100	0	8	42	3.4	J	3.9	U	2.6	J	3.7	U	2.9	J

TABLE 4-H
DISPOSAL PIT C- CHEMICAL DATA- SUBSURFACE SOIL (COLLAPSED)
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								TP12-6B		TP12-6C		TP12-7AA		TP12-7BA		TP12-7BB	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123159		123160		123128		123127		123129	
SAMPLE DEPTH TO TOP OF SAMPLE								3		3.5		1		1		2	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								3		3.5		1		1		2	
SAMPLE DATE								17-Oct-98		17-Oct-98		15-Oct-98		15-Oct-98		15-Oct-98	
QC CODE								SA		SA		SA		SA		SA	
STUDY ID			FREQUENC OF	NYSDEC TAGM	UMBE ABOVE	NUMBER OF	NUMBER 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	
PARAMETER	UNIT	AXIMU	DETECTION	4046	TAGM	DETECT	ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Volatile Organics																	
Alpha-BHC	UG/K	5.8	2%	110	0	1	42	2.2	U	2	U	2	U	1.9	U	2	U
Alpha-Chlordane	UG/K	2.6	2%		0	1	42	2.2	U	2	U	2	U	1.9	U	2	U
Aroclor-1254	UG/K	28	2%	10000	0	1	42	42	U	39	U	38	U	37	U	38	U
Aroclor-1260	UG/K	25	2%	10000	0	1	42	42	U	39	U	38	U	37	U	38	U
Beta-BHC	UG/K	1.7	2%	200	0	1	42	2.2	U	2	U	2	U	1.9	U	2	U
Gamma-Chlordane	UG/K	2.3	5%	540	0	2	42	2.2	U	2	U	2	U	1.9	U	2	U
Heptachlor	UG/K	8.4	7%	100	0	3	42	2.2	U	2	U	2	U	1.9	U	2	U
Heptachlor epoxide	UG/K	2	2%	20	0	1	42	2.2	U	2	U	2	U	1.9	U	2	U
Metals																	
Aluminum	MG/K	18600	100%	19520	0	42	42	7180		7690		9980	J	8110	J	11000	J
Antimony	MG/K	0.39	7%	6	0	3	42	1	UR	1.4	UR	1.1	UR	1.3	UR	1.2	UR
Arsenic	MG/K	11.1	100%	8.9	1	42	42	4.1		3.8		5.8	J	3.6	J	4.3	
Barium	MG/K	135	100%	300	0	42	42	63.2		62.2		69.9		51.8		49.9	J
Beryllium	MG/K	0.83	100%	1.13	0	42	42	0.31	J	0.35	J	0.32	J	0.31	J	0.46	J
Cadmium	MG/K	6	24%	2.46	2	10	42	0.05	U	0.07	U	0.06	U	0.06	U	0.06	U
Calcium	MG/K	224000	100%	125300	3	42	42	114000		138000		51400	J	39000	J	27400	
Chromium	MG/K	29.7	100%	30	0	42	42	11.2		13.1		24.6		13.8		20.9	
Cobalt	MG/K	16.3	100%	30	0	42	42	8.5	J	7.8	J	10.8		11.6		11.7	
Copper	MG/K	74.5	100%	33	3	42	42	18.5		19.3		26		20.9		33.9	
Cyanide	MG/K	2.2	2%	0.35	1	1	42	0.64	U	0.62	U	0.63	U	0.56	U	0.65	U
Iron	MG/K	51000	100%	37410	1	42	42	14600		17400		25500	J	23100	J	11300	J
Lead	MG/K	431	100%	24.4	8	42	42	15.1	J	14.8	J	39.8	J	17.2	J	34.6	J
Magnesium	MG/K	36100	100%	21700	2	42	42	9930		13500		18400	J	7820	J	9900	J
Manganese	MG/K	857	100%	1100	0	42	42	314		359		656		378		167	
Mercury	MG/K	0.15	45%	0.1	3	19	42	0.06	U	0.09	J	0.06	J	0.05	U	0.05	U
Nickel	MG/K	45.5	93%	50	0	39	42	21.2		22.6		28.1	J	34.9	J	39	J
Potassium	MG/K	3670	100%	2623	2	42	42	920		977	J	961		985	J	1210	
Selenium	MG/K	1.9	26%	2	0	11	42	0.78	UJ	1.1	UJ	0.85	U	0.95	U	0.93	J
Silver	MG/K	1.8	14%	0.8	1	6	42	0.2	U	0.28	U	0.22	U	0.25	U	0.24	U
Sodium	MG/K	1420	81%	188	4	34	42	42.9	U	82.5	J	48.4	J	267	J	140	J
Thallium	MG/K	1.7	40%	0.855	12	17	42	0.89	U	1.2	U	1.7	J	1.1	J	1.1	J
Vanadium	MG/K	36.4	100%	150	0	42	42	17.5		14.6		19.3		14.9		19.9	
Zinc	MG/K	6080	100%	115	7	42	42	61.5		94.5		172	J	656	J	411	J

TABLE 4-H
DISPOSAL PIT C- CHEMICAL DATA- SUBSURFACE SOIL (COLLAPSED)
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								TP12-8A		TP12-8B		TP12-8C		TP12A-3		TP12A-3		TP12A-4		TP12A-4	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123130		123132		123131		TP12A-3-1		TP12A-3-2		TP12A-4-1		TP12A-4-2	
SAMPLE DEPTH TO TOP OF SAMPLE								1		3		2		2.5		6		4		4	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								1		3		2		2.5		6		4		4	
SAMPLE DATE								15-Oct-98		15-Oct-98		15-Oct-98		22-Jun-94		22-Jun-94		21-Jun-94		21-Jun-94	
QC CODE								SA		SA		SA		SA		SA		SA		SA	
STUDY ID			FREQUENC OF	NYSDEC TAGM	UMBE ABOVE	NUMBER OF	NUMBER OF	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		ESI		ESI		ESI		ESI	
PARAMETER	UNIT	AXIMU	DETECTION	4046	TAGM	DETECT	ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Volatile Organics																					
Acetone	UG/K	61	21%	200	0	9	42	12	UJ	11	UJ	12	UJ	13	U	11	U	12	U	12	U
Chlorobenzene	UG/K	5	5%	1700	0	2	42	12	U	11	U	12	U	13	U	11	U	5	J	1	J
Methylene chloride	UG/K	180	12%	100	1	5	42	12	U	11	U	12	U	1	J	1	J	12	U	12	U
Tetrachloroethene	UG/K	2	2%	1400	0	1	42	12	U	11	U	12	U	13	U	11	U	12	U	12	U
Toluene	UG/K	62	14%	1500	0	6	42	12	U	11	U	12	U	13	U	11	U	2	J	12	U
Total Xylenes	UG/K	14	2%	1200	0	1	42	12	U	11	U	12	U	13	U	11	U	12	U	12	U
Trichloroethene	UG/K	2	2%	700	0	1	42	12	U	11	U	12	U	13	U	11	U	2	J	12	U
Semi-Volatile Organics																					
2-Methylnaphthalene	UG/K	22	10%	36400	0	4	42	78	U	120	U	74	U	430	U	370	U	390	U	400	U
Acenaphthene	UG/K	44	12%	50000	0	5	42	78	U	120	U	13	J	430	U	370	U	390	U	400	U
Anthracene	UG/K	63	21%	50000	0	9	42	57	J	120	U	20	J	430	U	370	U	390	U	400	U
Benzo(a)anthracene	UG/K	200	45%	224	0	19	42	200		26	J	68	J	430	U	370	U	390	U	400	U
Benzo(a)pyrene	UG/K	180	48%	61	4	20	42	100		24	J	67	J	430	U	370	U	390	U	400	U
Benzo(b)fluoranthene	UG/K	320	48%	1100	0	20	42	200		33	J	82	J	430	U	370	U	390	U	400	U
Benzo(ghi)perylene	UG/K	98	43%	50000	0	18	42	35	J	120	UJ	43	J	430	U	370	U	390	U	400	U
Benzo(k)fluoranthene	UG/K	170	38%	1100	0	16	42	170		29	J	84	J	430	U	370	U	390	U	400	U
Bis(2-Ethylhexyl)phthalate	UG/K	16	14%	50000	0	6	42	78	U	120	U	74	U	430	U	370	U	390	U	400	U
Butylbenzylphthalate	UG/K	30	12%	50000	0	5	42	78	U	120	U	11	J	430	U	370	U	390	U	400	U
Carbazole	UG/K	40	14%		0	6	42	78	UJ	120	UJ	18	J	430	U	370	U	390	U	400	U
Chrysene	UG/K	310	50%	400	0	21	42	310		36	J	88		430	U	370	U	390	U	400	U
Di-n-butylphthalate	UG/K	52	19%	8100	0	8	42	78	U	120	U	74	U	430	U	370	U	390	U	400	U
Di-n-octylphthalate	UG/K	20	24%	50000	0	10	42	78	UJ	120	UJ	74	UJ	430	U	370	U	390	U	400	U
Dibenz(a,h)anthracene	UG/K	99	19%	14	4	8	42	26	J	120	UJ	19	J	430	U	370	U	390	U	400	U
Dibenzofuran	UG/K	4.1	2%	6200	0	1	42	78	U	120	U	74	U	430	U	370	U	390	U	400	U
Fluoranthene	UG/K	320	45%	50000	0	19	42	220		51	J	140		430	U	370	U	390	U	400	U
Fluorene	UG/K	35	5%	50000	0	2	42	78	U	120	U	12	J	430	U	370	U	390	U	400	U
Indeno(1,2,3-cd)pyrene	UG/K	140	31%	3200	0	13	42	44	J	120	UJ	42	J	430	U	370	U	390	U	400	U
N-Nitrosodiphenylamine	UG/K	9500	2%		0	1	42	78	U	120	U	74	U	430	U	370	U	390	U	400	U
Naphthalene	UG/K	13	2%	13000	0	1	42	78	U	120	U	74	U	430	U	370	U	390	U	400	U
Phenanthrene	UG/K	280	43%	50000	0	18	42	20	J	16	J	100		430	U	370	U	390	U	400	U
Pyrene	UG/K	310	48%	50000	0	20	42	310		53	J	140		430	U	370	U	390	U	400	U
Pesticides/ PCBs																					
4,4'-DDD	UG/K	25	10%	2900	0	4	42	3.9	U	6.1	U	3.7	U	4.3	U	3.7	U	3.9	U	4	U
4,4'-DDE	UG/K	6.4	17%	2100	0	7	42	3.9	U	6.1	U	2.1	J	4.3	U	3.7	U	3.9	U	4	U
4,4'-DDT	UG/K	4.9	19%	2100	0	8	42	3.9	U	6.1	U	4.4		4.3	U	3.7	U	3.9	U	4	U

TABLE 4-H
DISPOSAL PIT C- CHEMICAL DATA- SUBSURFACE SOIL (COLLAPSED)
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								TP12-8A		TP12-8B		TP12-8C		TP12A-3		TP12A-3		TP12A-4		TP12A-4	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123130		123132		123131		TP12A-3-1		TP12A-3-2		TP12A-4-1		TP12A-4-2	
SAMPLE DEPTH TO TOP OF SAMPLE								1		3		2		2.5		6		4		4	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								1		3		2		2.5		6		4		4	
SAMPLE DATE								15-Oct-98		15-Oct-98		15-Oct-98		22-Jun-94		22-Jun-94		21-Jun-94		21-Jun-94	
QC CODE								SA		SA		SA		SA		SA		SA		SA	
STUDY ID			FREQUENC OF	NYSDEC TAGM	UMBE ABOVE	NUMBER OF	NUMBER OF	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		ESI		ESI		ESI		ESI	
PARAMETER	UNIT	AXIMU	DETECTION	4046	TAGM	DETECT	ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Volatile Organics																					
Alpha-BHC	UG/K	5.8	2%	110	0	1	42	2	U	3.1	U	1.9	U	2.2	U	1.9	U	2	U	2	U
Alpha-Chlordane	UG/K	2.6	2%		0	1	42	2	U	3.1	U	1.9	U	2.2	U	1.9	U	2	U	2	U
Aroclor-1254	UG/K	28	2%	10000	0	1	42	39	U	61	U	37	U	43	U	37	U	39	U	40	U
Aroclor-1260	UG/K	25	2%	10000	0	1	42	39	U	61	U	37	U	43	U	37	U	39	U	40	U
Beta-BHC	UG/K	1.7	2%	200	0	1	42	2	U	3.1	U	1.9	U	2.2	U	1.9	U	2	U	2	U
Gamma-Chlordane	UG/K	2.3	5%	540	0	2	42	2	U	3.1	U	1.9	U	2.2	U	1.9	U	2	U	2	U
Heptachlor	UG/K	8.4	7%	100	0	3	42	2	U	3.1	U	1.9	U	2.2	U	1.9	U	2	U	2	U
Heptachlor epoxide	UG/K	2	2%	20	0	1	42	2	U	3.1	U	1.9	U	2.2	U	1.9	U	2	U	2	U
Metals																					
Aluminum	MG/K	18600	100%	19520	0	42	42	10300	J	14000	J	4140	J	13200		9720		9600		13400	
Antimony	MG/K	0.39	7%	6	0	3	42	1.3	UR	2	UR	1.2	UR	0.25	UJ	0.27	UJ	0.25	UJ	0.18	UJ
Arsenic	MG/K	11.1	100%	8.9	1	42	42	3.2		5.8		2.6		5		3.7		4.2		4.9	
Barium	MG/K	135	100%	300	0	42	42	106	J	113	J	38.9	J	89		73.6		72		102	
Beryllium	MG/K	0.83	100%	1.13	0	42	42	0.44	J	0.6	J	0.21	J	0.71	J	0.49	J	0.48	J	0.63	J
Cadmium	MG/K	6	24%	2.46	2	10	42	0.06	U	0.1	U	0.06	U	3.6		0.68	J	0.57	J	0.82	
Calcium	MG/K	224000	100%	125300	3	42	42	6830		139000		224000		5600		85400		82800		39100	
Chromium	MG/K	29.7	100%	30	0	42	42	14		24.1		6.7		18.1		14.8		14.1		18.5	
Cobalt	MG/K	16.3	100%	30	0	42	42	9	J	16.3	J	4.9	J	10.2		8.3	J	8.6	J	9.6	
Copper	MG/K	74.5	100%	33	3	42	42	14.7		32.5		14		18.6		18		21.2		24.2	
Cyanide	MG/K	2.2	2%	0.35	1	1	42	0.67	U	1	U	0.57	U	0.58	U	0.45	U	0.46	U	0.5	U
Iron	MG/K	51000	100%	37410	1	42	42	20800	J	33500	J	13000	J	24100		19400		18700		23300	
Lead	MG/K	431	100%	24.4	8	42	42	12.8	J	21.8	J	18.1	J	25.7		10		8.9		16.8	
Magnesium	MG/K	36100	100%	21700	2	42	42	4390	J	14300	J	11900	J	4530		12700		15700		9930	
Manganese	MG/K	857	100%	1100	0	42	42	597		786		515		490		429		395		419	
Mercury	MG/K	0.15	45%	0.1	3	19	42	0.06	J	0.09	U	0.06	U	0.06	J	0.02	J	0.03	J	0.03	J
Nickel	MG/K	45.5	93%	50	0	39	42	18.7	J	45.5	J	12.3	J	27.2		25		24.8		30.9	
Potassium	MG/K	3670	100%	2623	2	42	42	881	J	1340	J	731	J	1290	J	1700	J	1990	J	2880	J
Selenium	MG/K	1.9	26%	2	0	11	42	0.98	J	1.5	J	0.9	J	1.9		0.65	J	0.95	J	1.6	
Silver	MG/K	1.8	14%	0.8	1	6	42	0.26	U	0.39	U	0.24	U	0.1	U	0.1	U	0.1	U	0.07	U
Sodium	MG/K	1420	81%	188	4	34	42	53.6	U	205	J	114	J	30.3	J	129	J	124	J	107	J
Thallium	MG/K	1.7	40%	0.855	12	17	42	1.1	U	1.7	U	1	U	0.56	J	0.7	J	0.41	J	0.56	J
Vanadium	MG/K	36.4	100%	150	0	42	42	17.5		23.7		11.1		22.5		15.4		16.2		21.5	
Zinc	MG/K	6080	100%	115	7	42	42	49.2	J	108	J	90.2	J	112		53.8		79.3		281	

TABLE 4-H
DISPOSAL PIT C- CHEMICAL DATA- SUBSURFACE SOIL (COLLAPSED)
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								TP12A-5		TP12A-6		TP12A-6		TP12A-7		TP12A-8	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								TP12A-5-1		TP12A-6-1		TP12A-6-2		TP12A-7-1		TP12A-8-1	
SAMPLE DEPTH TO TOP OF SAMPLE								3		1		7		4		7	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								3		1		7		4		7	
SAMPLE DATE								23-Jun-94		23-Jun-94		23-Jun-94		23-Jun-94		24-Jun-94	
QC CODE								SA		SA		SA		SA		SA	
STUDY ID			FREQUENC OF	NYSDEC TAGM	UMBE ABOVE	NUMBER OF	NUMBER OF	ESI		ESI		ESI		ESI		ESI	
PARAMETER	UNIT	AXIMU	DETECTION	4046	TAGM	DETECT	ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Volatile Organics																	
Acetone	UG/K	61	21%	200	0	9	42	11	U	11	U	11	U	15	UJ	11	U
Chlorobenzene	UG/K	5	5%	1700	0	2	42	11	U	11	U	11	U	15	UJ	11	U
Methylene chloride	UG/K	180	12%	100	1	5	42	11	U	11	U	11	U	15	UJ	11	U
Tetrachloroethene	UG/K	2	2%	1400	0	1	42	11	U	11	U	11	U	15	UJ	11	U
Toluene	UG/K	62	14%	1500	0	6	42	11	U	11	U	11	U	15	UJ	11	U
Total Xylenes	UG/K	14	2%	1200	0	1	42	11	U	11	U	11	U	15	UJ	11	U
Trichloroethene	UG/K	2	2%	700	0	1	42	11	U	11	U	11	U	15	UJ	11	U
Semi-Volatile Organics																	
2-Methylnaphthalene	UG/K	22	10%	36400	0	4	42	370	U	380	U	370	U	540	U	370	U
Acenaphthene	UG/K	44	12%	50000	0	5	42	370	U	44	J	370	U	540	U	370	U
Anthracene	UG/K	63	21%	50000	0	9	42	370	U	63	J	370	U	43	J	370	U
Benzo(a)anthracene	UG/K	200	45%	224	0	19	42	370	U	99	J	370	U	150	J	370	U
Benzo(a)pyrene	UG/K	180	48%	61	4	20	42	370	U	92	J	370	U	180	J	370	U
Benzo(b)fluoranthene	UG/K	320	48%	1100	0	20	42	370	U	95	J	370	U	320	J	370	U
Benzo(ghi)perylene	UG/K	98	43%	50000	0	18	42	370	U	29	J	370	U	98	J	370	U
Benzo(k)fluoranthene	UG/K	170	38%	1100	0	16	42	370	U	76	J	370	U	540	UJ	370	U
Bis(2-Ethylhexyl)phthalate	UG/K	16	14%	50000	0	6	42	370	U	380	U	370	U	540	U	370	U
Butylbenzylphthalate	UG/K	30	12%	50000	0	5	42	370	U	380	U	370	U	540	U	370	U
Carbazole	UG/K	40	14%		0	6	42	370	U	40	J	370	U	540	U	370	U
Chrysene	UG/K	310	50%	400	0	21	42	370	U	130	J	370	U	210	J	370	U
Di-n-butylphthalate	UG/K	52	19%	8100	0	8	42	28	J	47	J	32	J	50	J	52	J
Di-n-octylphthalate	UG/K	20	24%	50000	0	10	42	370	U	380	U	370	U	540	U	370	U
Dibenz(a,h)anthracene	UG/K	99	19%	14	4	8	42	370	U	43	J	370	U	99	J	370	U
Dibenzofuran	UG/K	4.1	2%	6200	0	1	42	370	U	380	U	370	U	540	U	370	U
Fluoranthene	UG/K	320	45%	50000	0	19	42	370	U	300	J	370	U	320	J	370	U
Fluorene	UG/K	35	5%	50000	0	2	42	370	U	35	J	370	U	540	U	370	U
Indeno(1,2,3-cd)pyrene	UG/K	140	31%	3200	0	13	42	370	U	69	J	370	U	140	J	370	U
N-Nitrosodiphenylamine	UG/K	9500	2%		0	1	42	370	U	380	U	370	U	540	U	370	U
Naphthalene	UG/K	13	2%	13000	0	1	42	370	U	380	U	370	U	540	U	370	U
Phenanthrene	UG/K	280	43%	50000	0	18	42	370	U	280	J	370	U	120	J	370	U
Pyrene	UG/K	310	48%	50000	0	20	42	370	U	230	J	370	U	230	J	370	U
Pesticides/ PCBs																	
4,4'-DDD	UG/K	25	10%	2900	0	4	42	3.7	U	5.1		3.7	U	5.4	U	3.7	U
4,4'-DDE	UG/K	6.4	17%	2100	0	7	42	3.7	U	6.4		3.7	U	2.3	J	3.7	U
4,4'-DDT	UG/K	4.9	19%	2100	0	8	42	3.7	U	3.8		3.7	U	5.4	U	3.7	U

TABLE 4-H
DISPOSAL PIT C- CHEMICAL DATA- SUBSURFACE SOIL (COLLAPSED)
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								TP12A-5		TP12A-6		TP12A-6		TP12A-7		TP12A-8	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								TP12A-5-1		TP12A-6-1		TP12A-6-2		TP12A-7-1		TP12A-8-1	
SAMPLE DEPTH TO TOP OF SAMPLE								3		1		7		4		7	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								3		1		7		4		7	
SAMPLE DATE								23-Jun-94		23-Jun-94		23-Jun-94		23-Jun-94		24-Jun-94	
QC CODE								SA		SA		SA		SA		SA	
STUDY ID			FREQUENC OF	NYSDEC TAGM	UMBE ABOVE	NUMBER OF	NUMBER OF	ESI		ESI		ESI		ESI		ESI	
PARAMETER	UNIT	AXIMU	DETECTION	4046	TAGM	DETECT	ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Volatile Organics																	
Alpha-BHC	UG/K	5.8	2%	110	0	1	42	1.9	U	2	U	1.9	U	2.8	U	1.9	U
Alpha-Chlordane	UG/K	2.6	2%		0	1	42	1.9	U	2	U	1.9	U	2.6	J	1.9	U
Aroclor-1254	UG/K	28	2%	10000	0	1	42	37	U	38	U	37	U	54	U	37	U
Aroclor-1260	UG/K	25	2%	10000	0	1	42	37	U	38	U	37	U	54	U	37	U
Beta-BHC	UG/K	1.7	2%	200	0	1	42	1.9	U	2	U	1.9	U	2.8	U	1.9	U
Gamma-Chlordane	UG/K	2.3	5%	540	0	2	42	1.9	U	2	U	1.9	U	2.3	J	1.9	U
Heptachlor	UG/K	8.4	7%	100	0	3	42	1.9	U	2	U	1.9	U	2.8	U	1.9	U
Heptachlor epoxide	UG/K	2	2%	20	0	1	42	1.9	U	2	U	1.9	U	2.8	U	1.9	U
Metals																	
Aluminum	MG/K	18600	100%	19520	0	42	42	9750		14000		8460		18600		6610	
Antimony	MG/K	0.39	7%	6	0	3	42	0.26	UJ	0.25	J	0.28	J	0.39	J	0.26	UJ
Arsenic	MG/K	11.1	100%	8.9	1	42	42	3.8		5.2		2.9		7.7		3.1	
Barium	MG/K	135	100%	300	0	42	42	94.5		78.7		76.2		135		67.4	
Beryllium	MG/K	0.83	100%	1.13	0	42	42	0.45	J	0.61	J	0.4	J	0.83	J	0.31	J
Cadmium	MG/K	6	24%	2.46	2	10	42	0.4	J	0.7	J	0.35	J	1	J	0.5	J
Calcium	MG/K	224000	100%	125300	3	42	42	78800	J	22000	J	62000	J	25400	J	86700	J
Chromium	MG/K	29.7	100%	30	0	42	42	15.1		20.7		14		25		10.6	
Cobalt	MG/K	16.3	100%	30	0	42	42	8.2	J	10.1		6.8	J	15.7		7.1	J
Copper	MG/K	74.5	100%	33	3	42	42	19.5		21.2		16.4		38.4		17.7	
Cyanide	MG/K	2.2	2%	0.35	1	1	42	0.52	U	0.48	U	0.48	U	0.8	U	0.49	U
Iron	MG/K	51000	100%	37410	1	42	42	18900		26100		17100		34500		14400	
Lead	MG/K	431	100%	24.4	8	42	42	15.5	J	22.7	J	431	J	49	J	12.3	J
Magnesium	MG/K	36100	100%	21700	2	42	42	19100		6840		11600		10600		36100	
Manganese	MG/K	857	100%	1100	0	42	42	394		524		358		857		326	
Mercury	MG/K	0.15	45%	0.1	3	19	42	0.04	J	0.08	J	0.03	J	0.11		0.02	J
Nickel	MG/K	45.5	93%	50	0	39	42	24		28.4		22		39.4		18.9	
Potassium	MG/K	3670	100%	2623	2	42	42	2350	J	1430	J	1700	J	3670	J	1480	J
Selenium	MG/K	1.9	26%	2	0	11	42	0.54	U	1.2		0.48	U	1.2	J	0.54	U
Silver	MG/K	1.8	14%	0.8	1	6	42	0.1	U	0.08	U	0.09	U	0.13	U	0.1	U
Sodium	MG/K	1420	81%	188	4	34	42	115	J	51.5	J	95	J	26.5	U	112	J
Thallium	MG/K	1.7	40%	0.855	12	17	42	0.38	U	0.48	J	0.34	U	0.98	J	0.38	U
Vanadium	MG/K	36.4	100%	150	0	42	42	17.5		22.7		14.1		36.4		11	
Zinc	MG/K	6080	100%	115	7	42	42	51.1		78.8		53.8		155		42.6	

TABLE 4-I
FORMER DRY WASTE DISPOSAL PIT CHEMICAL DATA-SURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

		FACILITY						SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
		LOCATION ID						MW12-16		MW12-17		MW12-18		MW12-18		MW12-35		MW12-9	
		MATRIX						SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
		SAMPLE ID						123149		123152		123043		123037		123186		123155	
SAMPLE DEPTH TO TOP OF SAMPLE								0		0		0		0		0		0	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.2		0.2		0.2		0.2		0.2		0.2	
		SAMPLE DATE						17-Oct-98		16-Oct-98		02-Oct-98		02-Oct-98		29-Oct-98		17-Oct-98	
		QC CODE						SA		SA		DU		SA		SA		SA	
		STUDY ID						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	
PARAMETER	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
VOLATILE ORGANICS																			
Acetone	UG/KG	7	9%	200	0	1	11	12	U	12	UJ	11	UJ	11	U	12	U	12	U
Toluene	UG/KG	26	18%	1500	0	2	11	12	U	12	U	26	J	3	J	12	U	12	U
SEMI VOLATILE ORGANICS																			
1,2,4-Trichlorobenzene	UG/KG	11	9%	3400	0	1	11	89	UJ	84	U	72	U	11	J	76	U	82	U
2-Methylnaphthalene	UG/KG	5.5	9%	36400	0	1	11	89	U	84	UJ	72	U	72	UJ	76	U	82	U
Benzo(a)anthracene	UG/KG	26	45%	224	0	5	11	89	U	84	U	8	J	5.7	J	9.3	J	82	U
Benzo(a)pyrene	UG/KG	20	55%	61	0	6	11	89	U	84	UJ	9.4	J	6.2	J	8.8	J	82	U
Benzo(b)fluoranthene	UG/KG	34	55%	1100	0	6	11	89	U	84	U	10	J	9	J	11	J	82	U
Benzo(ghi)perylene	UG/KG	11	18%	50000	0	2	11	89	U	84	U	11	J	72	U	6.6	J	82	U
Benzo(k)fluoranthene	UG/KG	20	55%	1100	0	6	11	89	U	84	U	11	J	7.5	J	9.2	J	82	U
Bis(2-Ethylhexyl)phthalate	UG/KG	36	27%	50000	0	3	11	36	J	84	U	72	U	9.9	J	76	UJ	11	J
Butylbenzylphthalate	UG/KG	5.9	9%	50000	0	1	11	89	U	84	U	72	UJ	72	UJ	76	UJ	5.9	J
Chrysene	UG/KG	32	64%	400	0	7	11	9.2	J	84	U	11	J	7.5	J	13	J	82	U
Di-n-butylphthalate	UG/KG	4.5	27%	8100	0	3	11	610	UJ	84	U	72	UJ	4.1	J	76	U	570	UJ
Di-n-octylphthalate	UG/KG	15	36%	50000	0	4	11	89	U	15	J	7.4	J	15	J	76	U	82	U
Diethyl phthalate	UG/KG	11	9%	7100	0	1	11	89	U	84	U	72	U	72	UJ	76	U	82	U
Fluoranthene	UG/KG	64	82%	50000	0	9	11	89	U	11	J	16	J	11	J	17	J	5.6	J
Indeno(1,2,3-cd)pyrene	UG/KG	7.5	36%	3200	0	4	11	89	U	84	U	7.5	J	4.8	J	5.8	J	82	U
Naphthalene	UG/KG	5.4	9%	13000	0	1	11	89	U	84	UJ	72	U	72	U	76	U	82	U
Phenanthrene	UG/KG	34	64%	50000	0	7	11	12	J	84	U	8.2	J	6.2	J	8.8	J	82	U
Pyrene	UG/KG	51	82%	50000	0	9	11	89	U	8.9	J	14	J	13	J	17	J	5.2	J
PESTICIDES/PCBS																			
4,4'-DDE	UG/KG	2	9%	2100	0	1	11	4.4	U	4.2	U	3.6	U	3.6	U	3.8	U	4.1	U
4,4'-DDT	UG/KG	4.2	9%	2100	0	1	11	4.4	U	4.2	U	3.6	U	3.6	U	3.8	U	4.1	U
Aroclor-1242	UG/KG	17	9%		0	1	11	44	U	42	U	36	U	36	U	38	U	41	U
Aroclor-1254	UG/KG	23	9%	10000	0	1	11	44	U	42	U	36	U	36	U	38	U	41	U
Aroclor-1260	UG/KG	25	9%	10000	0	1	11	44	U	42	U	36	U	36	U	38	U	41	U
Endrin aldehyde	UG/KG	2.2	9%		0	1	11	4.4	U	4.2	U	3.6	U	3.6	U	3.8	U	4.1	U
METALS																			
Aluminum	MG/KG	13600	100%	19520	0	11	11	13600		11600	J	7580		8220		10300		11800	
Antimony	MG/KG	1.2	9%	6	0	1	11	1.2	UR	1.4	UR	1.1	UR	1.2	J	1.2	UR	1.2	UR
Arsenic	MG/KG	6.6	100%	8.9	0	11	11	3.9		4.3		3.7		4.5		4.2		4.4	
Barium	MG/KG	102	100%	300	0	11	11	95.4		86.5	J	58.1		63.5		76.4		63.1	
Beryllium	MG/KG	0.56	100%	1.13	0	11	11	0.5	J	0.56	J	0.23	J	0.32	J	0.54	J	0.43	J
Cadmium	MG/KG	0.63	9%	2.46	0	1	11	0.06	U	0.07	U	0.05	U	0.06	U	0.36	U	0.06	U
Calcium	MG/KG	116000	100%	125300	0	11	11	8330		4870		88500	J	68900	J	45600		2820	

TABLE 4-I
FORMER DRY WASTE DISPOSAL PIT CHEMICAL DATA-SURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12-16		MW12-17		MW12-18		MW12-18		MW12-35		MW12-9	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123149		123152		123043		123037		123186		123155	
SAMPLE DEPTH TO TOP OF SAMPLE								0		0		0		0		0		0	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.2		0.2		0.2		0.2		0.2		0.2	
SAMPLE DATE								17-Oct-98		16-Oct-98		02-Oct-98		02-Oct-98		29-Oct-98		17-Oct-98	
QC CODE								SA		SA		DU		SA		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Chromium	MG/KG	17.3	100%	30	0	11	11	17.3		15.4		9.4	J	13.5		15.7	J	15.4	
Cobalt	MG/KG	10.4	100%	30	0	11	11	9.1	J	8.6	J	8.6	J	8.6	J	9.7	J	9.6	J
Copper	MG/KG	30.4	100%	33	0	11	11	22.8		16.9		19.3		21.2		23.8		15.9	
Iron	MG/KG	23400	100%	37410	0	11	11	20500		21500	J	15900		17400		20600		20100	
Lead	MG/KG	20.5	100%	24.4	0	11	11	20.5		15.7	J	8.5	J	7.7		8.9	J	14	J
Magnesium	MG/KG	23800	100%	21700	1	11	11	4290		3640	J	13000		12900		9060		3280	
Manganese	MG/KG	551	100%	1100	0	11	11	551		445		517	J	409		431		469	
Mercury	MG/KG	0.04	9%	0.1	0	1	11	0.07	U	0.06	U	0.05	UJ	0.05	U	0.05	U	0.06	U
Nickel	MG/KG	30.3	91%	50	0	10	11	23.3		20.8	J	21.4	J	24.4		25.4	UJ	19.3	
Potassium	MG/KG	1870	100%	2623	0	11	11	1770		1010	J	1600		1530		1510		1030	
Selenium	MG/KG	1.3	27%	2	0	3	11	0.91	UJ	1.1	UJ	0.41	U	0.86	U	0.68	J	0.91	UJ
Silver	MG/KG	0.39	18%	0.8	0	2	11	0.24	U	0.28	U	0.27	J	0.22	U	0.39	J	0.24	U
Sodium	MG/KG	276	64%	188	3	7	11	49.6	U	59.7	U	276	J	259	J	49.8	U	49.9	U
Thallium	MG/KG	2	36%	0.855	3	4	11	1.3	J	1.2	U	0.92	UJ	1.3	U	2	J	1	U
Vanadium	MG/KG	22.8	100%	150	0	11	11	22.8		19.9		14.5		15.6		18.7		19.5	
Zinc	MG/KG	72.5	100%	115	0	11	11	72.5		47	J	40.6	J	52.2		60.3	J	48	

TABLE 4-I
FORMER DRY WASTE DISPOSAL PIT CHEMICAL DATA-SURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

PARAMETER	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12B-1		SB12-5A		SS12-144		SS12-145		SS12-146	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								W12B-1-00		123096		123339		123340		123341	
SAMPLE DEPTH TO TOP OF SAMPLE								0		0		0		0		0	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.2		0.2		0.2		0.2		0.2	
SAMPLE DATE								13-Jun-94		14-Oct-98		17-Nov-98		17-Nov-98		17-Nov-98	
QC CODE								SA		SA		SA		SA		SA	
STUDY ID								ESI		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
VOLATILE ORGANICS																	
Acetone	UG/KG	7	9%	200	0	1	11	11	U	11	U	7	J	11	U	11	U
Toluene	UG/KG	26	18%	1500	0	2	11	11	U	11	U	12	U	11	U	11	U
SEMI VOLATILE ORGANICS																	
1,2,4-Trichlorobenzene	UG/KG	11	9%	3400	0	1	11	360	U	75	U	77	U	73	U	73	U
2-Methylnaphthalene	UG/KG	5.5	9%	36400	0	1	11	360	U	5.5	J	77	U	73	U	73	U
Benzo(a)anthracene	UG/KG	26	45%	224	0	5	11	26	J	8.3	J	77	U	73	U	73	U
Benzo(a)pyrene	UG/KG	20	55%	61	0	6	11	20	J	7.7	J	3.9	J	73	U	73	U
Benzo(b)fluoranthene	UG/KG	34	55%	1100	0	6	11	34	J	9.9	J	5.6	J	73	U	73	U
Benzo(ghi)perylene	UG/KG	11	18%	50000	0	2	11	360	U	75	UJ	77	U	73	U	73	U
Benzo(k)fluoranthene	UG/KG	20	55%	1100	0	6	11	20	J	9.8	J	3.9	J	73	U	73	U
Bis(2-Ethylhexyl)phthalate	UG/KG	36	27%	50000	0	3	11	360	U	75	UJ	77	UJ	73	UJ	73	UJ
Butylbenzylphthalate	UG/KG	5.9	9%	50000	0	1	11	360	U	75	UJ	77	UJ	73	UJ	73	UJ
Chrysene	UG/KG	32	64%	400	0	7	11	32	J	14	J	6.1	J	73	UJ	73	UJ
Di-n-butylphthalate	UG/KG	4.5	27%	8100	0	3	11	360	U	75	UJ	4.1	J	4.5	J	73	U
Di-n-octylphthalate	UG/KG	15	36%	50000	0	4	11	360	U	9.8	J	77	UJ	73	UJ	73	UJ
Diethyl phthalate	UG/KG	11	9%	7100	0	1	11	360	U	11	J	77	U	73	U	73	U
Fluoranthene	UG/KG	64	82%	50000	0	9	11	64	J	16	J	8.5	J	3.9	J	73	U
Indeno(1,2,3-cd)pyrene	UG/KG	7.5	36%	3200	0	4	11	360	U	5.2	J	77	U	73	U	73	U
Naphthalene	UG/KG	5.4	9%	13000	0	1	11	360	U	5.4	J	77	U	73	U	73	U
Phenanthrene	UG/KG	34	64%	50000	0	7	11	34	J	14	J	6.7	J	73	U	73	U
Pyrene	UG/KG	51	82%	50000	0	9	11	51	J	20	J	9.2	J	4.6	J	73	U
PESTICIDES/PCBS																	
4,4'-DDE	UG/KG	2	9%	2100	0	1	11	2	J	3.8	U	3.8	U	3.7	U	3.7	U
4,4'-DDT	UG/KG	4.2	9%	2100	0	1	11	3.6	U	3.8	U	4.2		3.7	U	3.7	U
Aroclor-1242	UG/KG	17	9%		0	1	11	17	J	38	U	38	U	37	U	37	U
Aroclor-1254	UG/KG	23	9%	10000	0	1	11	36	U	38	U	23	J	37	U	37	U
Aroclor-1260	UG/KG	25	9%	10000	0	1	11	36	U	38	U	25	J	37	U	37	U
Endrin aldehyde	UG/KG	2.2	9%		0	1	11	3.6	U	3.8	U	2.2	J	3.7	U	3.7	U
METALS																	
Aluminum	MG/KG	13600	100%	19520	0	11	11	10800		6760	J	7700	J	7840	J	8140	J
Antimony	MG/KG	1.2	9%	6	0	1	11	0.23	UJ	1	UR	0.96	UR	1.2	UR	1.1	UR
Arsenic	MG/KG	6.6	100%	8.9	0	11	11	6.6		5.2	J	3.1		3.3		3.7	J
Barium	MG/KG	102	100%	300	0	11	11	102		77.9		56.2		74.9		53.8	
Beryllium	MG/KG	0.56	100%	1.13	0	11	11	0.53	J	0.28	J	0.3	J	0.36	J	0.32	J
Cadmium	MG/KG	0.63	9%	2.46	0	1	11	0.63	J	0.05	U	0.28	U	0.36	U	0.32	U
Calcium	MG/KG	116000	100%	125300	0	11	11	45900		72100	J	95600		116000		96600	

TABLE 4-I
FORMER DRY WASTE DISPOSAL PIT CHEMICAL DATA-SURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12B-1		SB12-5A		SS12-144		SS12-145		SS12-146	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								W12B-1-00		123096		123339		123340		123341	
SAMPLE DEPTH TO TOP OF SAMPLE								0		0		0		0		0	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.2		0.2		0.2		0.2		0.2	
SAMPLE DATE								13-Jun-94		14-Oct-98		17-Nov-98		17-Nov-98		17-Nov-98	
QC CODE								SA		SA		SA		SA		SA	
STUDY ID								ESI		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
PARAMETER	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Chromium	MG/KG	17.3	100%	30	0	11	11	16		12.3		12.8		14.2		13.3	
Cobalt	MG/KG	10.4	100%	30	0	11	11	9.2		10.4	J	6.7	J	5.2	J	7.5	J
Copper	MG/KG	30.4	100%	33	0	11	11	30.4		20.7		18.3		20.6		19.9	
Iron	MG/KG	23400	100%	37410	0	11	11	23400		20600		16700	J	17700	J	17300	J
Lead	MG/KG	20.5	100%	24.4	0	11	11	17.1		14.7	J	10.5	J	9.2	J	8.8	
Magnesium	MG/KG	23800	100%	21700	1	11	11	11400		10900	J	23800		11400		11800	
Manganese	MG/KG	551	100%	1100	0	11	11	418		392		393		374		395	
Mercury	MG/KG	0.04	9%	0.1	0	1	11	0.04	J	0.06	U	0.05	U	0.05	U	0.05	U
Nickel	MG/KG	30.3	91%	50	0	10	11	28		30.3	J	20.7		21.2		23.2	
Potassium	MG/KG	1870	100%	2623	0	11	11	1870	J	932		1560		1500		1650	
Selenium	MG/KG	1.3	27%	2	0	3	11	1.3		0.77	U	0.45	J	0.45	UJ	0.41	UJ
Silver	MG/KG	0.39	18%	0.8	0	2	11	0.09	U	0.2	U	0.19	U	0.24	U	0.21	U
Sodium	MG/KG	276	64%	188	3	7	11	76.2	J	97.5	J	96	J	250	J	126	J
Thallium	MG/KG	2	36%	0.855	3	4	11	0.41	J	1	J	0.82	U	1	U	0.93	U
Vanadium	MG/KG	22.8	100%	150	0	11	11	20.9		12.8		14.6		13.9		14.9	
Zinc	MG/KG	72.5	100%	115	0	11	11	62.7		59.2	J	42.7	J	44.2	J	48.9	J

TABLE 4-J
FORMER DRY WASTE DISPOSAL PIT - CHEMICAL DATA - SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12-16		MW12-16		MW12-17		MW12-17		MW12-18	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123150		123151		123153		123154		123038	
SAMPLE DEPTH TO TOP OF SAMPLE								4		6		6		10		6	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								6		8		8		12		8	
SAMPLE DATE								17-Oct-98		17-Oct-98		16-Oct-98		16-Oct-98		02-Oct-98	
QC CODE								SA		SA		SA		SA		SA	
STUDY ID			FREQUENC	NYSDEC	UMBE	NUMBER	NUMBER	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	
			OF	TAGM	ABOVE	OF	OF										
PARAMETER	UNIT	AXIMU	DETECTION	4046	TAGM	DETECT	ANALYSE	VALUE		(Q) VALUE		(Q) VALUE		(Q) VALUE		(Q) VALUE	(Q)
Volatile Organics																	
Acetone	UG/K	98	39%	200	0	15	38	11	U	11	U	11	UJ	19	J	11	UJ
Benzene	UG/K	2	3%	60	0	1	38	11	U	11	U	11	U	11	U	11	U
Carbon disulfide	UG/K	3	5%	2700	0	2	38	11	U	11	U	11	U	11	U	11	U
Methyl ethyl ketone	UG/K	3	3%	300	0	1	38	11	U	11	U	11	UJ	11	UJ	11	U
Methylene chloride	UG/K	2	11%	100	0	4	38	11	U	11	U	11	U	11	U	11	U
Toluene	UG/K	15	24%	1500	0	9	38	11	U	11	U	15		11	UJ	11	U
Semi-Volatile Organics																	
4-Methylphenol	UG/K	4.7	3%	900	0	1	38	72	U	69	U	72	U	72	U	71	UJ
Benzo(a)anthracene	UG/K	11	5%	224	0	2	38	5.8	J	69	U	72	U	72	U	71	U
Benzo(a)pyrene	UG/K	12	5%	61	0	2	38	5.4	J	69	U	72	UJ	72	UJ	71	U
Benzo(b)fluoranthene	UG/K	13	11%	1100	0	4	38	6	J	69	U	72	U	72	U	5	J
Benzo(ghi)perylene	UG/K	9.6	5%	50000	0	2	38	5.2	J	69	U	72	U	72	U	71	U
Benzo(k)fluoranthene	UG/K	10	5%	1100	0	2	38	6	J	69	U	72	U	72	U	71	U
Bis(2-Ethylhexyl)phthalate	UG/K	83	29%	50000	0	11	38	29	J	31	J	130	U	110	U	14	J
Butylbenzylphthalate	UG/K	7.2	5%	50000	0	2	38	72	U	7.2	J	72	U	72	U	71	UJ
Chrysene	UG/K	15	18%	400	0	7	38	8.3	J	69	U	72	U	72	U	4.9	J
Di-n-butylphthalate	UG/K	53	13%	8100	0	5	38	500	UJ	610	UJ	72	U	72	U	9.2	J
Di-n-octylphthalate	UG/K	34	21%	50000	0	8	38	4	J	69	U	11	J	34	J	14	J
Dibenz(a,h)anthracene	UG/K	4.8	3%	14	0	1	38	72	U	69	U	72	U	72	U	71	U
Diethyl phthalate	UG/K	5.8	3%	7100	0	1	38	72	U	69	U	72	U	72	U	71	UJ
Fluoranthene	UG/K	18	11%	50000	0	4	38	13	J	69	U	72	U	72	U	71	U
Indeno(1,2,3-cd)pyrene	UG/K	7.3	5%	3200	0	2	38	4.2	J	69	U	72	U	72	U	71	U
Phenanthrene	UG/K	13	16%	50000	0	6	38	9.2	J	69	U	72	U	72	U	4.5	J
Pyrene	UG/K	20	13%	50000	0	5	38	12	J	69	U	72	U	72	U	71	U
Pesticides/ PCBs																	
Aroclor-1242	UG/K	16	3%		0	1	38	35	U	35	U	36	U	36	U	35	U
Metals																	
Aluminum	MG/K	14500	100%	19520	0	38	38	9510		7620		7390	J	6630	J	7240	
Antimony	MG/K	0.67	3%	6	0	1	38	1.1	UR	1	UR	1.2	UR	1.1	UR	0.96	UR
Arsenic	MG/K	8.1	100%	8.9	0	38	38	3.8		3.3		4.6		3.3		3.5	
Barium	MG/K	138	100%	300	0	38	38	65.2		66.9		87.3	J	89.6	J	82	
Beryllium	MG/K	0.62	100%	1.13	0	38	38	0.34	J	0.31	J	0.3	J	0.26	J	0.31	J
Cadmium	MG/K	0.52	21%	2.46	0	8	38	0.06	U	0.05	U	0.06	U	0.05	U	0.05	U
Calcium	MG/K	132000	100%	125300	1	38	38	83800		80000		69200		95600		75900	J
Chromium	MG/K	20.8	100%	30	0	38	38	14.7		13.1		10.8		11.2		13.3	

TABLE 4-J
FORMER DRY WASTE DISPOSAL PIT - CHEMICAL DATA - SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12-16		MW12-16		MW12-17		MW12-17		MW12-18	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123150		123151		123153		123154		123038	
SAMPLE DEPTH TO TOP OF SAMPLE								4		6		6		10		6	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								6		8		8		12		8	
SAMPLE DATE								17-Oct-98		17-Oct-98		16-Oct-98		16-Oct-98		02-Oct-98	
QC CODE								SA		SA		SA		SA		SA	
STUDY ID			FREQUENC OF	NYSDEC TAGM	UMBE ABOVE	NUMBER OF	NUMBER 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	
PARAMETER	UNIT	AXIMU	DETECTION	4046	TAGM	DETECT	ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Cobalt	MG/K	14.5	100%	30	0	38	38	11.5		7.3	J	10.3		8	J	9.7	
Copper	MG/K	41.1	100%	33	4	38	38	21.2		18.3		18.3		17.5		23.6	
Iron	MG/K	41100	100%	37410	1	38	38	18800		17200		15000	J	16000	J	18300	
Lead	MG/K	16.4	100%	24.4	0	38	38	8.4		7.8	J	7.7	J	8	J	6.9	J
Magnesium	MG/K	34200	100%	21700	2	38	38	12000		10700		14600	J	16800	J	14600	
Manganese	MG/K	596	100%	1100	0	38	38	473		363		410		407		392	
Mercury	MG/K	0.5	34%	0.1	4	13	38	0.05	U	0.07	J	0.05	U	0.05	U	0.05	U
Nickel	MG/K	50.9	92%	50	1	35	38	28.8		23.8		20.6	J	22.4	J	30	
Potassium	MG/K	2330	100%	2623	0	38	38	1520		1170		1280		1240		1170	
Selenium	MG/K	2.5	18%	2	2	7	38	0.85	UJ	0.77	UJ	0.92	UJ	0.9	J	0.72	UJ
Silver	MG/K	0.27	8%	0.8	0	3	38	0.22	U	0.2	U	0.24	U	0.22	U	0.19	J
Sodium	MG/K	252	71%	188	2	27	38	111	J	97.2	J	50.6	U	54.9	J	129	J
Thallium	MG/K	2.2	34%	0.855	7	13	38	1.1	J	0.87	U	1	U	0.94	U	1.2	U
Vanadium	MG/K	23.8	100%	150	0	38	38	16.5		12.7		13.5		11.8		12.9	
Zinc	MG/K	142	100%	115	1	38	38	52.4		41		44	J	35.7	J	42.6	

TABLE 4-J
FORMER DRY WASTE DISPOSAL PIT - CHEMICAL DATA - SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12-18		MW12-35		MW12-35		MW12-9		MW12-9		MW12B-1	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123039		123187		123188		123156		123157		MW12B-1-20	
SAMPLE DEPTH TO TOP OF SAMPLE								10		10		14		6		10		4	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								12		12		15.5		8		12		6	
SAMPLE DATE								02-Oct-98		29-Oct-98		29-Oct-98		17-Oct-98		17-Oct-98		13-Jun-94	
QC CODE								SA		SA		SA		SA		SA		DU	
STUDY ID			FREQUENC OF	NYSDEC TAGM	UMBE ABOVE	NUMBER OF	NUMBER 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	
PARAMETER	UNIT	AXIMU	DETECTION	4046	TAGM	DETECT	ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Volatile Organics																			
Acetone	UG/K	98	39%	200	0	15	38	8	J	30	U	12	U	11	U	12		11	U
Benzene	UG/K	2	3%	60	0	1	38	11	U	12	U	12	U	11	U	11	U	11	U
Carbon disulfide	UG/K	3	5%	2700	0	2	38	11	U	12	U	12	U	11	U	11	U	11	U
Methyl ethyl ketone	UG/K	3	3%	300	0	1	38	11	U	12	U	12	U	11	U	11	U	11	U
Methylene chloride	UG/K	2	11%	100	0	4	38	11	U	12	U	12	U	11	U	11	U	11	U
Toluene	UG/K	15	24%	1500	0	9	38	4	J	12	U	12	U	11	U	11	U	11	U
Semi-Volatile Organics																			
4-Methylphenol	UG/K	4.7	3%	900	0	1	38	78	UJ	78	U	75	U	72	U	74	U	360	U
Benzo(a)anthracene	UG/K	11	5%	224	0	2	38	78	U	78	U	75	U	72	U	74	U	360	U
Benzo(a)pyrene	UG/K	12	5%	61	0	2	38	78	U	78	U	75	U	72	U	74	U	360	U
Benzo(b)fluoranthene	UG/K	13	11%	1100	0	4	38	78	UJ	78	U	75	U	72	U	74	U	360	U
Benzo(ghi)perylene	UG/K	9.6	5%	50000	0	2	38	78	U	78	U	75	U	72	U	74	U	360	U
Benzo(k)fluoranthene	UG/K	10	5%	1100	0	2	38	78	U	78	U	75	U	72	U	74	U	360	U
Bis(2-Ethylhexyl)phthalate	UG/K	83	29%	50000	0	11	38	16	J	78	UJ	75	U	10	J	22	J	45	J
Butylbenzylphthalate	UG/K	7.2	5%	50000	0	2	38	78	UJ	78	UJ	75	UJ	5.4	J	74	U	360	U
Chrysene	UG/K	15	18%	400	0	7	38	5.7	J	4	J	75	U	72	U	74	U	360	U
Di-n-butylphthalate	UG/K	53	13%	8100	0	5	38	9	J	78	U	75	U	400	UJ	1100	UJ	360	U
Di-n-octylphthalate	UG/K	34	21%	50000	0	8	38	8.7	J	78	U	75	U	72	U	74	U	360	U
Dibenz(a,h)anthracene	UG/K	4.8	3%	14	0	1	38	78	U	78	UJ	75	UJ	72	U	74	U	360	U
Diethyl phthalate	UG/K	5.8	3%	7100	0	1	38	78	UJ	78	U	75	U	72	U	74	U	360	U
Fluoranthene	UG/K	18	11%	50000	0	4	38	78	U	6	J	75	U	72	U	74	U	360	U
Indeno(1,2,3-cd)pyrene	UG/K	7.3	5%	3200	0	2	38	78	U	78	UJ	75	UJ	72	U	74	U	360	U
Phenanthrene	UG/K	13	16%	50000	0	6	38	5.9	J	4.1	J	75	U	72	U	74	U	360	U
Pyrene	UG/K	20	13%	50000	0	5	38	7.9	J	5.9	J	75	U	72	U	74	U	360	U
Pesticides/ PCBs																			
Aroclor-1242	UG/K	16	3%		0	1	38	39	U	39	U	38	U	36	U	37	U	36	U
Metals																			
Aluminum	MG/K	14500	100%	19520	0	38	38	6730		10100		8970		7010		6810		7510	
Antimony	MG/K	0.67	3%	6	0	1	38	1.3	UR	1.2	UR	1.1	UR	1.1	UR	1.2	UR	0.25	UJ
Arsenic	MG/K	8.1	100%	8.9	0	38	38	3.2		4.1		8.1		3.8		2.7		4.6	
Barium	MG/K	138	100%	300	0	38	38	82.7		84.2		85.4		80.1		72.7		88.3	
Beryllium	MG/K	0.62	100%	1.13	0	38	38	0.23	J	0.59	J	0.48	J	0.27	J	0.22	J	0.38	J
Cadmium	MG/K	0.52	21%	2.46	0	8	38	0.06	U	0.35	U	0.32	U	0.06	U	0.06	U	0.46	J
Calcium	MG/K	132000	100%	125300	1	38	38	99200	J	51600		96500		93000		91000		79400	
Chromium	MG/K	20.8	100%	30	0	38	38	12.1		15.4	J	15.9	J	11.9		11		12.6	

TABLE 4-J
FORMER DRY WASTE DISPOSAL PIT - CHEMICAL DATA - SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12-18		MW12-35		MW12-35		MW12-9		MW12-9		MW12B-1	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123039		123187		123188		123156		123157		MW12B-1-20	
SAMPLE DEPTH TO TOP OF SAMPLE								10		10		14		6		10		4	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								12		12		15.5		8		12		6	
SAMPLE DATE								02-Oct-98		29-Oct-98		29-Oct-98		17-Oct-98		17-Oct-98		13-Jun-94	
QC CODE								SA		SA		SA		SA		SA		DU	
STUDY ID			FREQUENC OF	NYSDEC TAGM	UMBE ABOVE	NUMBER OF	NUMBER 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	
PARAMETER	UNIT	AXIMU	DETECTION	4046	TAGM	DETECT	ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Cobalt	MG/K	14.5	100%	30	0	38	38	8.1	J	9.6	J	9.6		9.3	J	7.5	J	8.6	J
Copper	MG/K	41.1	100%	33	4	38	38	18		23		26.2		20.5		23.1		20.3	
Iron	MG/K	41100	100%	37410	1	38	38	16400		19100		21900		17000		14100		17000	
Lead	MG/K	16.4	100%	24.4	0	38	38	5.5	J	9.8	J	13.3	J	7.5	J	6.3		8.4	
Magnesium	MG/K	34200	100%	21700	2	38	38	11500		12600		19100		16900		16100		16000	
Manganese	MG/K	596	100%	1100	0	38	38	499		463		470		413		432		388	
Mercury	MG/K	0.5	34%	0.1	4	13	38	0.06	U	0.06	U	0.06	U	0.05	U	0.05	U	0.11	
Nickel	MG/K	50.9	92%	50	1	35	38	23.5		24.7	UJ	28.4	UJ	25.8		50.9		23.6	
Potassium	MG/K	2330	100%	2623	0	38	38	1200		1410		1490		1010		1430		1390	J
Selenium	MG/K	2.5	18%	2	2	7	38	0.98	UJ	0.44	U	0.93		0.87	UJ	0.87	UJ	0.54	J
Silver	MG/K	0.27	8%	0.8	0	3	38	0.26	U	0.23	U	0.21	U	0.23	U	0.23	U	0.1	U
Sodium	MG/K	252	71%	188	2	27	38	147	J	58.1	J	74	J	73.2	UJ	59.3	J	120	J
Thallium	MG/K	2.2	34%	0.855	7	13	38	2.2		2.1		1.6	J	0.98	U	1	J	0.64	J
Vanadium	MG/K	23.8	100%	150	0	38	38	11.2		18.9		16.5		12		13.2		13.2	
Zinc	MG/K	142	100%	115	1	38	38	68.8		57.5	J	60.5	J	49.1		46.8		46.9	

TABLE 4-J
FORMER DRY WASTE DISPOSAL PIT - CHEMICAL DATA - SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12B-1		MW12B-1		SB12-10		SB12-5A		SB12-5A		SB12-5A	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								MW12B-1-03		MW12B-1-07		123179		12519		12520		123097	
SAMPLE DEPTH TO TOP OF SAMPLE								4		12		0		0		3		6	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								6		13.5		0		3		6		8	
SAMPLE DATE								13-Jun-94		13-Jun-94		27-Oct-98		08-Nov-97		08-Nov-97		14-Oct-98	
QC CODE								SA		SA		SA		SA		SA		SA	
STUDY ID			FREQUENC OF	NYSDEC TAGM	UMBE ABOVE	NUMBER OF	NUMBER OF	ESI		ESI		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
PARAMETER	UNIT	AXIMU	DETECTION	4046	TAGM	DETECT	ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Volatile Organics																			
Acetone	UG/K	98	39%	200	0	15	38	11	U	11	U	26		8	J	98		16	U
Benzene	UG/K	2	3%	60	0	1	38	11	U	11	U	12	U	11	U	12	U	11	U
Carbon disulfide	UG/K	3	5%	2700	0	2	38	11	U	11	U	12	U	11	U	12	U	11	U
Methyl ethyl ketone	UG/K	3	3%	300	0	1	38	11	U	11	U	12	U	11	U	12	U	11	U
Methylene chloride	UG/K	2	11%	100	0	4	38	11	U	11	U	12	U	11	U	12	U	11	U
Toluene	UG/K	15	24%	1500	0	9	38	11	U	11	U	12	U	3	J	12	U	11	U
Semi-Volatile Organics																			
4-Methylphenol	UG/K	4.7	3%	900	0	1	38	360	U	360	U	4.7	J	74	U	77	U	72	U
Benzo(a)anthracene	UG/K	11	5%	224	0	2	38	360	U	360	U	11	J	74	U	77	U	72	U
Benzo(a)pyrene	UG/K	12	5%	61	0	2	38	360	U	360	U	12	J	74	U	77	U	72	U
Benzo(b)fluoranthene	UG/K	13	11%	1100	0	4	38	360	U	360	U	13	J	74	U	77	U	72	U
Benzo(ghi)perylene	UG/K	9.6	5%	50000	0	2	38	360	U	360	U	9.6	J	74	U	77	U	72	UJ
Benzo(k)fluoranthene	UG/K	10	5%	1100	0	2	38	360	U	360	U	10	J	74	U	77	U	72	U
Bis(2-Ethylhexyl)phthalate	UG/K	83	29%	50000	0	11	38	360	U	83	J	85	U	74	U	77	U	72	UJ
Butylbenzylphthalate	UG/K	7.2	5%	50000	0	2	38	360	U	360	U	85	U	74	U	77	U	72	UJ
Chrysene	UG/K	15	18%	400	0	7	38	360	U	360	U	15	J	74	U	77	U	72	U
Di-n-butylphthalate	UG/K	53	13%	8100	0	5	38	360	U	360	U	85	U	74	U	77	U	72	U
Di-n-octylphthalate	UG/K	34	21%	50000	0	8	38	360	U	360	U	15	J	74	U	77	U	13	J
Dibenz(a,h)anthracene	UG/K	4.8	3%	14	0	1	38	360	U	360	U	4.8	J	74	U	77	U	72	UJ
Diethyl phthalate	UG/K	5.8	3%	7100	0	1	38	360	U	360	U	85	U	74	U	77	U	72	U
Fluoranthene	UG/K	18	11%	50000	0	4	38	360	U	360	U	18	J	74	U	77	U	72	U
Indeno(1,2,3-cd)pyrene	UG/K	7.3	5%	3200	0	2	38	360	U	360	U	7.3	J	74	U	77	U	72	UJ
Phenanthrene	UG/K	13	16%	50000	0	6	38	360	U	360	U	13	J	74	U	77	U	72	U
Pyrene	UG/K	20	13%	50000	0	5	38	360	U	360	U	20	J	74	U	77	U	72	U
Pesticides/ PCBs																			
Aroclor-1242	UG/K	16	3%		0	1	38	16	J	36	U	42	U	37	U	38	U	36	U
Metals																			
Aluminum	MG/K	14500	100%	19520	0	38	38	8060		5940		8590		9170		9790		7920	J
Antimony	MG/K	0.67	3%	6	0	1	38	0.2	UJ	0.26	UJ	1.5	UR	0.76	UJ	0.71	UJ	1.3	UR
Arsenic	MG/K	8.1	100%	8.9	0	38	38	4.6		2.9		5.8		4.5		3.7		3.6	J
Barium	MG/K	138	100%	300	0	38	38	89.1		43.8		90.4		97.9		71		108	
Beryllium	MG/K	0.62	100%	1.13	0	38	38	0.4	J	0.27	J	0.46	J	0.33		0.36		0.33	J
Cadmium	MG/K	0.52	21%	2.46	0	8	38	0.52	J	0.32	J	0.45	U	0.07	U	0.06	U	0.07	U
Calcium	MG/K	132000	100%	125300	1	38	38	74200		51100		73600		74500		71600		85500	J
Chromium	MG/K	20.8	100%	30	0	38	38	12.7		12		18.9	J	14.3		14.9		14.1	

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TABLE 4-J
FORMER DRY WASTE DISPOSAL PIT - CHEMICAL DATA - SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12B-1		MW12B-1		SB12-10		SB12-5A		SB12-5A		SB12-5A	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								MW12B-1-03		MW12B-1-07		123179		12519		12520		123097	
SAMPLE DEPTH TO TOP OF SAMPLE								4		12		0		0		3		6	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								6		13.5		0		3		6		8	
SAMPLE DATE								13-Jun-94		13-Jun-94		27-Oct-98		08-Nov-97		08-Nov-97		14-Oct-98	
QC CODE								SA		SA		SA		SA		SA		SA	
STUDY ID			FREQUENC OF	NYSDEC TAGM	UMBE ABOVE	NUMBER OF	NUMBER OF	ESI		ESI		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1	
PARAMETER	UNIT	AXIMU	DETECTION	4046	TAGM	DETECT	ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Cobalt	MG/K	14.5	100%	30	0	38	38	8.3		5.2	J	9.9	J	10.9		9.2		8	J
Copper	MG/K	41.1	100%	33	4	38	38	22.5		17.3		[redacted]		24.6		23.3		21.9	
Iron	MG/K	41100	100%	37410	1	38	38	17200		13500		[redacted]		19900		19000		14500	
Lead	MG/K	16.4	100%	24.4	0	38	38	10.3		7.3		5.1	J	12.9		11.2		8	J
Magnesium	MG/K	34200	100%	21700	2	38	38	16300		8320		19400		12300		12500		15400	J
Manganese	MG/K	596	100%	1100	0	38	38	369		244		596		526		454		349	
Mercury	MG/K	0.5	34%	0.1	4	13	38	0.5		0.03	J	[redacted]		0.06		0.06	U	0.05	U
Nickel	MG/K	50.9	92%	50	1	35	38	23.5		19		31.4	UJ	28.7		26.8		24.5	J
Potassium	MG/K	2330	100%	2623	0	38	38	1660	J	1040	J	1300		1470	J	1830	J	1470	
Selenium	MG/K	2.5	18%	2	2	7	38	0.72	J	2.1		0.66	J	1	UJ	0.95	UJ	1	U
Silver	MG/K	0.27	8%	0.8	0	3	38	0.08	U	0.1	U	0.3	U	0.46	U	0.43	U	0.26	U
Sodium	MG/K	252	71%	188	2	27	38	135	J	77.3	J	112	J	133	U	123	U	116	J
Thallium	MG/K	2.2	34%	0.855	7	13	38	0.37	J	0.39	J	[redacted]	J	1.4	U	1.3	U	1.1	U
Vanadium	MG/K	23.8	100%	150	0	38	38	13.8		11.5		18.3		16.3		18		14.2	
Zinc	MG/K	142	100%	115	1	38	38	50.5		36.2		80	J	56.5		52.8		142	J

TABLE 4-J
FORMER DRY WASTE DISPOSAL PIT - CHEMICAL DATA - SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								SB12-5A		SB12-5A		SB12-5A		SB12-5A		SB12-6	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								12521		12522		12523		123098		12514	
SAMPLE DEPTH TO TOP OF SAMPLE								6		9		12		12		0	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								9		12		14		14		3	
SAMPLE DATE								08-Nov-97		08-Nov-97		08-Nov-97		14-Oct-98		08-Nov-97	
QC CODE								SA		SA		SA		SA		SA	
STUDY ID			FREQUENC OF	NYSDEC TAGM	UMBE ABOVE	NUMBER OF	NUMBER 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	
PARAMETER	UNIT	AXIMU	DETECTION	4046	TAGM	DETECT	ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Volatile Organics																	
Acetone	UG/K	98	39%	200	0	15	38	35		8	J	20		12	U	11	J
Benzene	UG/K	2	3%	60	0	1	38	11	U	11	U	2	J	12	U	11	U
Carbon disulfide	UG/K	3	5%	2700	0	2	38	11	U	11	U	3	J	12	U	11	U
Methyl ethyl ketone	UG/K	3	3%	300	0	1	38	11	U	11	U	11	UJ	12	U	11	U
Methylene chloride	UG/K	2	11%	100	0	4	38	11	U	11	U	2	J	12	U	11	U
Toluene	UG/K	15	24%	1500	0	9	38	11	U	11	U	13	UJ	12	U	11	U
Semi-Volatile Organics																	
4-Methylphenol	UG/K	4.7	3%	900	0	1	38	74	U	73	U	72	U	73	U	75	U
Benzo(a)anthracene	UG/K	11	5%	224	0	2	38	74	U	73	U	72	U	73	U	75	U
Benzo(a)pyrene	UG/K	12	5%	61	0	2	38	74	U	73	U	72	U	73	U	75	U
Benzo(b)fluoranthene	UG/K	13	11%	1100	0	4	38	74	U	73	U	72	U	73	U	75	U
Benzo(ghi)perylene	UG/K	9.6	5%	50000	0	2	38	74	U	73	U	72	U	73	UJ	75	U
Benzo(k)fluoranthene	UG/K	10	5%	1100	0	2	38	74	U	73	U	72	U	73	U	75	U
Bis(2-Ethylhexyl)phthalate	UG/K	83	29%	50000	0	11	38	74	U	73	U	72	U	73	UJ	33	J
Butylbenzylphthalate	UG/K	7.2	5%	50000	0	2	38	74	U	73	U	72	U	73	UJ	75	U
Chrysene	UG/K	15	18%	400	0	7	38	74	U	73	U	72	U	73	U	4.5	J
Di-n-butylphthalate	UG/K	53	13%	8100	0	5	38	74	U	73	U	72	U	73	U	75	U
Di-n-octylphthalate	UG/K	34	21%	50000	0	8	38	74	U	73	U	72	U	6.4	J	75	U
Dibenz(a,h)anthracene	UG/K	4.8	3%	14	0	1	38	74	U	73	U	72	U	73	UJ	75	U
Diethyl phthalate	UG/K	5.8	3%	7100	0	1	38	74	U	73	U	72	U	73	U	75	U
Fluoranthene	UG/K	18	11%	50000	0	4	38	74	U	73	U	72	U	73	U	5.3	J
Indeno(1,2,3-cd)pyrene	UG/K	7.3	5%	3200	0	2	38	74	U	73	U	72	U	73	UJ	75	U
Phenanthrene	UG/K	13	16%	50000	0	6	38	74	U	73	U	72	U	73	U	4.5	J
Pyrene	UG/K	20	13%	50000	0	5	38	74	U	73	U	72	U	73	U	5.9	J
Pesticides/ PCBs																	
Aroclor-1242	UG/K	16	3%		0	1	38	37	U	37	U	36	U	37	U	38	U
Metals																	
Aluminum	MG/K	14500	100%	19520	0	38	38	10400		9060		8460		6080	J	14500	
Antimony	MG/K	0.67	3%	6	0	1	38	0.76	UJ	0.64	UJ	0.67	J	1.2	UR	0.76	UJ
Arsenic	MG/K	8.1	100%	8.9	0	38	38	3.9		4.6		3.3		5	J	4.6	
Barium	MG/K	138	100%	300	0	38	38	71.1		60		42.4		52.7		110	
Beryllium	MG/K	0.62	100%	1.13	0	38	38	0.34		0.36	J	0.31	J	0.17	J	0.62	
Cadmium	MG/K	0.52	21%	2.46	0	8	38	0.06	U	0.06	U	0.05	U	0.06	U	0.07	U
Calcium	MG/K	132000	100%	125300	1	38	38	82300		79400		95800		105000	J	23300	
Chromium	MG/K	20.8	100%	30	0	38	38	16.3		16.9		14.9		11.3		20.8	

TABLE 4-J
FORMER DRY WASTE DISPOSAL PIT - CHEMICAL DATA - SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								SB12-5A		SB12-5A		SB12-5A		SB12-5A		SB12-6	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								12521		12522		12523		123098		12514	
SAMPLE DEPTH TO TOP OF SAMPLE								6		9		12		12		0	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								9		12		14		14		3	
SAMPLE DATE								08-Nov-97		08-Nov-97		08-Nov-97		14-Oct-98		08-Nov-97	
QC CODE								SA		SA		SA		SA		SA	
STUDY ID			FREQUENC OF	NYSDEC TAGM	UMBE ABOVE	NUMBER OF	NUMBER 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	
PARAMETER	UNIT	AXIMU	DETECTION	4046	TAGM	DETECT	ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Cobalt	MG/K	14.5	100%	30	0	38	38	10.2		14.5		9		8.9		10.2	
Copper	MG/K	41.1	100%	33	4	38	38	22.9		34.5		22.2		16.7		26.9	
Iron	MG/K	41100	100%	37410	1	38	38	21300		25000		19600		16600		24500	
Lead	MG/K	16.4	100%	24.4	0	38	38	11.1		16.4		9.5		6.7	J	11.1	
Magnesium	MG/K	34200	100%	21700	2	38	38	13900		9080		12500		12700	J	6860	
Manganese	MG/K	596	100%	1100	0	38	38	573		478		415		541		513	
Mercury	MG/K	0.5	34%	0.1	4	13	38	0.05	U	0.04	U	0.05	U	0.06	U	0.06	
Nickel	MG/K	50.9	92%	50	1	35	38	31.1		44.6		27.1		23	J	31.9	
Potassium	MG/K	2330	100%	2623	0	38	38	1980	J	1230	J	1460	J	1000		1950	J
Selenium	MG/K	2.5	18%	2	2	7	38	1	UJ	0.87	U	0.83	U	0.88	U	1	UJ
Silver	MG/K	0.27	8%	0.8	0	3	38	0.45	U	0.39	U	0.37	U	0.23	U	0.46	U
Sodium	MG/K	252	71%	188	2	27	38	131	U	132	J	140	J	169	J	132	U
Thallium	MG/K	2.2	34%	0.855	7	13	38	1.4	U	1.2	U	1.1	U	0.99	U	1.4	U
Vanadium	MG/K	23.8	100%	150	0	38	38	17.5		14.9		14.2		10.5		23.8	
Zinc	MG/K	142	100%	115	1	38	38	56.1		73.5	J	64.7	J	40.6	J	70	

TABLE 4-J
FORMER DRY WASTE DISPOSAL PIT - CHEMICAL DATA - SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								SB12-6		SB12-6		SB12-6		SB12-6		SB12B-1		TP12-25A	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								12515		12516		12517		12518		SB12B-1-1		123077	
SAMPLE DEPTH TO TOP OF SAMPLE								3		6		9		12		18		0.5	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								6		9		12		14.3		21		0.5	
SAMPLE DATE								08-Nov-97		08-Nov-97		08-Nov-97		08-Nov-97		29-Jun-94		05-Oct-98	
QC CODE								SA		SA		SA		SA		SA		DU	
STUDY ID			FREQUENC OF	NYSDEC TAGM	UMBE ABOVE	NUMBER OF	NUMBER OF	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		ESI		RI PHASE 1 STEP 1	
PARAMETER	UNIT	AXIMU	DETECTION	4046	TAGM	DETECT	ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Volatile Organics																			
Acetone	UG/K	98	39%	200	0	15	38	7	J	17		7	J	17		11	U	6	J
Benzene	UG/K	2	3%	60	0	1	38	11	U	11	U	11	U	11	U	11	U	11	U
Carbon disulfide	UG/K	3	5%	2700	0	2	38	11	U	11	U	11	U	11	U	1	J	11	U
Methyl ethyl ketone	UG/K	3	3%	300	0	1	38	11	U	11	U	11	U	11	U	3	J	11	U
Methylene chloride	UG/K	2	11%	100	0	4	38	11	U	2	J	11	U	2	J	11	U	11	U
Toluene	UG/K	15	24%	1500	0	9	38	11	U	3	J	11	U	3	J	11	U	11	U
Semi-Volatile Organics																			
4-Methylphenol	UG/K	4.7	3%	900	0	1	38	76	U	76	U	75	U	75	U	380	U	73	U
Benzo(a)anthracene	UG/K	11	5%	224	0	2	38	76	U	76	U	75	U	75	U	380	U	73	UR
Benzo(a)pyrene	UG/K	12	5%	61	0	2	38	76	U	76	U	75	U	75	U	380	U	73	UR
Benzo(b)fluoranthene	UG/K	13	11%	1100	0	4	38	76	U	76	U	75	U	75	U	380	U	73	UR
Benzo(ghi)perylene	UG/K	9.6	5%	50000	0	2	38	76	U	76	U	75	U	75	U	380	U	73	UR
Benzo(k)fluoranthene	UG/K	10	5%	1100	0	2	38	76	U	76	U	75	U	75	U	380	U	73	UR
Bis(2-Ethylhexyl)phthalate	UG/K	83	29%	50000	0	11	38	76	U	76	U	75	U	75	U	380	U	7.8	J
Butylbenzylphthalate	UG/K	7.2	5%	50000	0	2	38	76	U	76	U	75	U	75	U	380	U	73	UR
Chrysene	UG/K	15	18%	400	0	7	38	76	U	76	U	75	U	75	U	380	U	73	UR
Di-n-butylphthalate	UG/K	53	13%	8100	0	5	38	4.1	J	76	U	75	U	75	U	380	U	73	UJ
Di-n-octylphthalate	UG/K	34	21%	50000	0	8	38	76	U	76	U	75	U	75	U	380	U	73	UR
Dibenz(a,h)anthracene	UG/K	4.8	3%	14	0	1	38	76	U	76	U	75	U	75	U	380	U	73	UR
Diethyl phthalate	UG/K	5.8	3%	7100	0	1	38	5.8	J	76	U	75	U	75	U	380	U	73	UJ
Fluoranthene	UG/K	18	11%	50000	0	4	38	76	U	76	U	75	U	75	U	380	U	73	UR
Indeno(1,2,3-cd)pyrene	UG/K	7.3	5%	3200	0	2	38	76	U	76	U	75	U	75	U	380	U	73	UR
Phenanthrene	UG/K	13	16%	50000	0	6	38	76	U	76	U	75	U	75	U	380	U	73	UR
Pyrene	UG/K	20	13%	50000	0	5	38	76	U	76	U	75	U	75	U	380	U	73	UR
Pesticides/ PCBs																			
Aroclor-1242	UG/K	16	3%		0	1	38	38	U	38	U	38	U	38	U	38	U	37	U
Metals																			
Aluminum	MG/K	14500	100%	19520	0	38	38	10900		9160		8890		8230		9050	J	7270	
Antimony	MG/K	0.67	3%	6	0	1	38	0.74	UJ	0.69	UJ	0.73	UJ	0.77	UJ	0.26	UJ	1.1	UR
Arsenic	MG/K	8.1	100%	8.9	0	38	38	4.7		3.8		3.7		2.8		1.9	J	3.9	
Barium	MG/K	138	100%	300	0	38	38	76.8		65.9		61.2		39.1		138	J	51.4	
Beryllium	MG/K	0.62	100%	1.13	0	38	38	0.46		0.34		0.3		0.3		0.44	J	0.21	J
Cadmium	MG/K	0.52	21%	2.46	0	8	38	0.06	U	0.06	U	0.06	U	0.07	U	0.29	J	0.06	U
Calcium	MG/K	132000	100%	125300	1	38	38	56800		70500		92400		98600		83400	J	60100	
Chromium	MG/K	20.8	100%	30	0	38	38	17.2		13.2		14.8		14.2		13.8	J	11.3	

TABLE 4-J
FORMER DRY WASTE DISPOSAL PIT - CHEMICAL DATA - SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								SB12-6		SB12-6		SB12-6		SB12-6		SB12B-1		TP12-25A	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								12515		12516		12517		12518		SB12B-1-1		123077	
SAMPLE DEPTH TO TOP OF SAMPLE								3		6		9		12		18		0.5	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								6		9		12		14.3		21		0.5	
SAMPLE DATE								08-Nov-97		08-Nov-97		08-Nov-97		08-Nov-97		29-Jun-94		05-Oct-98	
QC CODE								SA		SA		SA		SA		SA		DU	
STUDY ID			FREQUENC	NYSDEC	UMBE	NUMBER	NUMBER	RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		ESI		RI PHASE 1 STEP 1	
			OF	TAGM	ABOVE	OF	OF												
PARAMETER	UNIT	AXIMU	DETECTION	4046	TAGM	DETECT	ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Cobalt	MG/K	14.5	100%	30	0	38	38	10.7		9.3		11		9.1		4.6	J	7	J
Copper	MG/K	41.1	100%	33	4	38	38	26.6		20.9		39.2		22		15.6	J	20.5	
Iron	MG/K	41100	100%	37410	1	38	38	23500		17600		20800		18900		14100	J	14600	
Lead	MG/K	16.4	100%	24.4	0	38	38	12.8		8.1		12.3		8.2		7.5		6.9	
Magnesium	MG/K	34200	100%	21700	2	38	38	8890		12000		15100		11700		12200	J	11600	J
Manganese	MG/K	596	100%	1100	0	38	38	432		418		526		418		366	J	398	
Mercury	MG/K	0.5	34%	0.1	4	13	38	0.04	U	0.13		0.05	U	0.05	U	0.03	J	0.05	U
Nickel	MG/K	50.9	92%	50	1	35	38	32.1		25.5		37.1		26.7		18.2	J	18.9	
Potassium	MG/K	2330	100%	2623	0	38	38	1870	J	1500	J	1520	J	1550	J	1650	J	970	
Selenium	MG/K	2.5	18%	2	2	7	38	1	UJ	0.92	UJ	0.98	UJ	2.5	J	0.53	U	0.85	U
Silver	MG/K	0.27	8%	0.8	0	3	38	0.45	U	0.41	U	0.44	U	0.46	U	0.1	U	0.22	U
Sodium	MG/K	252	71%	188	2	27	38	129	U	119	U	127	U	133	U	115	J	69	J
Thallium	MG/K	2.2	34%	0.855	7	13	38	1.3	U	1.2	U	1.3	U	1.6		0.37	U	0.96	U
Vanadium	MG/K	23.8	100%	150	0	38	38	19.2		15.6		15		13.9		13.5	J	12.9	
Zinc	MG/K	142	100%	115	1	38	38	62.4		52.6		54.8		61.8		46.7	J	39.2	

TABLE 4-J
FORMER DRY WASTE DISPOSAL PIT - CHEMICAL DATA - SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								TP12-25A		TP12-25B		TP12-25C		TP12-26A		TP12-26B	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123071		123072		123073		123074		123075	
SAMPLE DEPTH TO TOP OF SAMPLE								0.5		1		2		0.5		1.3	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.5		1		2		0.5		1.3	
SAMPLE DATE								05-Oct-98		05-Oct-98		05-Oct-98		05-Oct-98		05-Oct-98	
QC CODE								SA		SA		SA		SA		SA	
STUDY ID			FREQUENC OF	NYSDEC TAGM	UMBE ABOVE	NUMBER OF	NUMBER 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	
PARAMETER	UNIT	AXIMU	DETECTION	4046	TAGM	DETECT	ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Volatile Organics																	
Acetone	UG/K	98	39%	200	0	15	38	11	UJ	11	UJ	11	UJ	11	UJ	11	UJ
Benzene	UG/K	2	3%	60	0	1	38	11	U	11	U	11	U	11	U	11	U
Carbon disulfide	UG/K	3	5%	2700	0	2	38	11	U	11	U	11	U	11	U	11	U
Methyl ethyl ketone	UG/K	3	3%	300	0	1	38	11	U	11	U	11	U	11	U	11	U
Methylene chloride	UG/K	2	11%	100	0	4	38	11	U	11	U	11	U	11	U	11	U
Toluene	UG/K	15	24%	1500	0	9	38	4	J	3	J	5	J	11	U	3	J
Semi-Volatile Organics																	
4-Methylphenol	UG/K	4.7	3%	900	0	1	38	74	U	72	UR	72	U	72	U	73	U
Benzo(a)anthracene	UG/K	11	5%	224	0	2	38	74	U	72	U	72	U	72	UR	73	UR
Benzo(a)pyrene	UG/K	12	5%	61	0	2	38	74	U	72	U	72	U	72	UR	73	UR
Benzo(b)fluoranthene	UG/K	13	11%	1100	0	4	38	74	U	3.7	J	72	U	72	UR	73	UR
Benzo(ghi)perylene	UG/K	9.6	5%	50000	0	2	38	74	U	72	U	72	U	72	UR	73	UR
Benzo(k)fluoranthene	UG/K	10	5%	1100	0	2	38	74	U	72	U	72	U	72	UR	73	UR
Bis(2-Ethylhexyl)phthalate	UG/K	83	29%	50000	0	11	38	3.8	J	72	UJ	72	UJ	10	R	13	R
Butylbenzylphthalate	UG/K	7.2	5%	50000	0	2	38	74	UJ	72	UJ	72	UJ	72	UR	73	UR
Chrysene	UG/K	15	18%	400	0	7	38	4.6	J	72	U	72	U	72	UR	73	UR
Di-n-butylphthalate	UG/K	53	13%	8100	0	5	38	74	UJ	72	U	72	U	72	UR	73	UR
Di-n-octylphthalate	UG/K	34	21%	50000	0	8	38	74	UJ	72	UJ	72	UJ	72	UR	73	UR
Dibenz(a,h)anthracene	UG/K	4.8	3%	14	0	1	38	74	U	72	U	72	U	72	UR	73	UR
Diethyl phthalate	UG/K	5.8	3%	7100	0	1	38	74	U	72	U	72	U	72	UJ	73	UJ
Fluoranthene	UG/K	18	11%	50000	0	4	38	74	U	72	U	72	U	72	UR	73	UR
Indeno(1,2,3-cd)pyrene	UG/K	7.3	5%	3200	0	2	38	74	U	72	U	72	U	72	UR	73	UR
Phenanthrene	UG/K	13	16%	50000	0	6	38	74	U	72	U	72	U	72	UR	73	UR
Pyrene	UG/K	20	13%	50000	0	5	38	74	U	72	U	72	U	72	UR	73	UR
Pesticides/ PCBs																	
Aroclor-1242	UG/K	16	3%		0	1	38	37	U	36	U	36	U	36	U	37	U
Metals																	
Aluminum	MG/K	14500	100%	19520	0	38	38	9330		7910		6790		7030		6970	
Antimony	MG/K	0.67	3%	6	0	1	38	1.2	UR	1.3	UR	1	UR	1.3	UR	1.2	UR
Arsenic	MG/K	8.1	100%	8.9	0	38	38	4.1		4.6		4		4		3.8	
Barium	MG/K	138	100%	300	0	38	38	64.7		63.7		63		65.4		58.8	
Beryllium	MG/K	0.62	100%	1.13	0	38	38	0.34	J	0.3	J	0.36	J	0.21	J	0.29	J
Cadmium	MG/K	0.52	21%	2.46	0	8	38	0.06	U	0.06	U	0.05	U	0.06	U	0.06	U
Calcium	MG/K	132000	100%	125300	1	38	38	46100		84900		117000		81600		132000	
Chromium	MG/K	20.8	100%	30	0	38	38	13.5		12.9		10.9		10.7		12	

TABLE 4-J

FORMER DRY WASTE DISPOSAL PIT - CHEMICAL DATA - SUBSURFACE SOIL

SEAD-12 REMEDIAL INVESTIGATION

SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								TP12-25A		TP12-25B		TP12-25C		TP12-26A		TP12-26B	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123071		123072		123073		123074		123075	
SAMPLE DEPTH TO TOP OF SAMPLE								0.5		1		2		0.5		1.3	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.5		1		2		0.5		1.3	
SAMPLE DATE								05-Oct-98		05-Oct-98		05-Oct-98		05-Oct-98		05-Oct-98	
QC CODE								SA		SA		SA		SA		SA	
STUDY ID			FREQUENC OF	NYSDEC TAGM	UMBE ABOVE	NUMBER OF	NUMBER 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	
PARAMETER	UNIT	AXIMU	DETECTION	4046	TAGM	DETECT	ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Cobalt	MG/K	14.5	100%	30	0	38	38	7.3	J	8.3	J	5.3	J	6.2	J	6.9	J
Copper	MG/K	41.1	100%	33	4	38	38	20.4		21.1		33.9		16.6		17.7	
Iron	MG/K	41100	100%	37410	1	38	38	16600		17200		13300	J	13000		14900	J
Lead	MG/K	16.4	100%	24.4	0	38	38	7		8.3		8.1		6.3		7.7	
Magnesium	MG/K	34200	100%	21700	2	38	38	7660	J	15900	J	6550	J	17300	J	34200	J
Manganese	MG/K	596	100%	1100	0	38	38	372		373		319		352		327	
Mercury	MG/K	0.5	34%	0.1	4	13	38	0.05	U	0.05	U	0.06	U	0.05	U	0.05	U
Nickel	MG/K	50.9	92%	50	1	35	38	20.7		25.7		17.3		16.4		20.7	
Potassium	MG/K	2330	100%	2623	0	38	38	1060		1010	J	983		1120		1310	
Selenium	MG/K	2.5	18%	2	2	7	38	0.92	U	0.99	U	0.79	U	0.98	U	0.93	U
Silver	MG/K	0.27	8%	0.8	0	3	38	0.24	U	0.26	U	0.21	U	0.27	J	0.24	U
Sodium	MG/K	252	71%	188	2	27	38	65.4	J	54.3	U	106	J	61.3	J	112	J
Thallium	MG/K	2.2	34%	0.855	7	13	38	1	U	1.1	U	0.89	U	1.1	U	1.1	U
Vanadium	MG/K	23.8	100%	150	0	38	38	15.1		13.8		13.4		12.5		13.2	
Zinc	MG/K	142	100%	115	1	38	38	42.5		44.1		41.1		36.1		37.6	

TABLE 4-J
FORMER DRY WASTE DISPOSAL PIT - CHEMICAL DATA - SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								TP12-26C		TP12B-1		TP12B-2		TP12B-3		TP12B-3	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123076		TP12B-1-1		TP12B-2-1		TP12B-53-1		TP12B-3-1	
SAMPLE DEPTH TO TOP OF SAMPLE								3		4		2.5		2.5		2.5	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								3		4		2.5		2.5		2.5	
SAMPLE DATE								05-Oct-98		25-Jun-94		24-Jun-94		25-Jun-94		25-Jun-94	
QC CODE								SA		SA		SA		DU		SA	
STUDY ID			FREQUENC OF	NYSDEC TAGM	UMBE ABOVE	NUMBER OF	NUMBER OF	RI PHASE 1 STEP 1		ESI		ESI		ESI		ESI	
PARAMETER	UNIT	AXIMU	DETECTION	4046	TAGM	DETECT	ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Volatile Organics																	
Acetone	UG/K	98	39%	200	0	15	38	11	UJ	11	U	12	U	11	U	11	U
Benzene	UG/K	2	3%	60	0	1	38	11	U	11	U	12	U	11	U	11	U
Carbon disulfide	UG/K	3	5%	2700	0	2	38	11	U	11	U	12	U	11	U	11	U
Methyl ethyl ketone	UG/K	3	3%	300	0	1	38	11	U	11	U	12	U	11	U	11	U
Methylene chloride	UG/K	2	11%	100	0	4	38	11	U	1	J	12	U	11	U	11	U
Toluene	UG/K	15	24%	1500	0	9	38	11	U	11	U	12	U	11	U	11	U
Semi-Volatile Organics																	
4-Methylphenol	UG/K	4.7	3%	900	0	1	38	72	U	360	U	380	U	370	U	370	U
Benzo(a)anthracene	UG/K	11	5%	224	0	2	38	72	U	360	U	380	U	370	U	370	U
Benzo(a)pyrene	UG/K	12	5%	61	0	2	38	72	U	360	U	380	U	370	U	370	U
Benzo(b)fluoranthene	UG/K	13	11%	1100	0	4	38	72	U	360	U	380	U	370	U	370	U
Benzo(ghi)perylene	UG/K	9.6	5%	50000	0	2	38	72	U	360	U	380	U	370	U	370	U
Benzo(k)fluoranthene	UG/K	10	5%	1100	0	2	38	72	U	360	U	380	U	370	U	370	U
Bis(2-Ethylhexyl)phthalate	UG/K	83	29%	50000	0	11	38	72	UJ	360	U	380	U	370	U	370	U
Butylbenzylphthalate	UG/K	7.2	5%	50000	0	2	38	72	UJ	360	U	380	U	370	U	370	U
Chrysene	UG/K	15	18%	400	0	7	38	72	U	360	U	380	U	370	U	370	U
Di-n-butylphthalate	UG/K	53	13%	8100	0	5	38	72	UJ	44	J	380	U	53	J	370	U
Di-n-octylphthalate	UG/K	34	21%	50000	0	8	38	72	UJ	360	U	380	U	370	U	370	U
Dibenz(a,h)anthracene	UG/K	4.8	3%	14	0	1	38	72	U	360	U	380	U	370	U	370	U
Diethyl phthalate	UG/K	5.8	3%	7100	0	1	38	72	U	360	U	380	U	370	U	370	U
Fluoranthene	UG/K	18	11%	50000	0	4	38	72	U	360	U	380	U	370	U	370	U
Indeno(1,2,3-cd)pyrene	UG/K	7.3	5%	3200	0	2	38	72	U	360	U	380	U	370	U	370	U
Phenanthrene	UG/K	13	16%	50000	0	6	38	72	U	360	U	380	U	370	U	370	U
Pyrene	UG/K	20	13%	50000	0	5	38	72	U	360	U	380	U	370	U	370	U
Pesticides/ PCBs																	
Aroclor-1242	UG/K	16	3%		0	1	38	36	U	36	UJ	38	U	37	U	37	U
Metals																	
Aluminum	MG/K	14500	100%	19520	0	38	38	8350		7400		10300		6120		6850	
Antimony	MG/K	0.67	3%	6	0	1	38	1.2	UR	0.23	UJ	0.24	UJ	0.22	UJ	0.26	UJ
Arsenic	MG/K	8.1	100%	8.9	0	38	38	4.1		4.4	J	4.6	J	2.8	J	3.3	J
Barium	MG/K	138	100%	300	0	38	38	64.4		78.3		90.5		32.5	J	36.5	J
Beryllium	MG/K	0.62	100%	1.13	0	38	38	0.32	J	0.37	J	0.52	J	0.24	J	0.26	J
Cadmium	MG/K	0.52	21%	2.46	0	8	38	0.06	U	0.36	J	0.43	J	0.17	J	0.18	J
Calcium	MG/K	132000	100%	125300	1	38	38	89400		85300		76400		45500		44100	
Chromium	MG/K	20.8	100%	30	0	38	38	14.1		11.4		15.9		8		9.1	

TABLE 4-J
FORMER DRY WASTE DISPOSAL PIT - CHEMICAL DATA - SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								TP12-26C		TP12B-1		TP12B-2		TP12B-3		TP12B-3	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123076		TP12B-1-1		TP12B-2-1		TP12B-53-1		TP12B-3-1	
SAMPLE DEPTH TO TOP OF SAMPLE								3		4		2.5		2.5		2.5	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								3		4		2.5		2.5		2.5	
SAMPLE DATE								05-Oct-98		25-Jun-94		24-Jun-94		25-Jun-94		25-Jun-94	
QC CODE								SA		SA		SA		DU		SA	
STUDY ID			FREQUENC OF	NYSDEC TAGM	UMBE ABOVE	NUMBER OF	NUMBER OF	RI PHASE 1 STEP 1		ESI		ESI		ESI		ESI	
PARAMETER	UNIT	AXIMU	DETECTION	4046	TAGM	DETECT	ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Cobalt	MG/K	14.5	100%	30	0	38	38	8.2	J	7.6	J	9.7		4.3	J	4.2	J
Copper	MG/K	41.1	100%	33	4	38	38	20.3		22.1		21.9		12.9		13.8	
Iron	MG/K	41100	100%	37410	1	38	38	18500		15600		20100		11000		11700	
Lead	MG/K	16.4	100%	24.4	0	38	38	8.3		7.9		10.6		4.3		4.8	
Magnesium	MG/K	34200	100%	21700	2	38	38	13200	J	22800		16900		18300		15800	
Manganese	MG/K	596	100%	1100	0	38	38	384		340		383		337		316	
Mercury	MG/K	0.5	34%	0.1	4	13	38	0.05	U	0.03	J	0.02	J	0.03	J	0.03	J
Nickel	MG/K	50.9	92%	50	1	35	38	26		19.9		29		8.7		9.2	
Potassium	MG/K	2330	100%	2623	0	38	38	1250		1940	J	2330	J	1840	J	2150	J
Selenium	MG/K	2.5	18%	2	2	7	38	0.89	U	0.48	U	0.5	U	0.45	U	0.54	U
Silver	MG/K	0.27	8%	0.8	0	3	38	0.24	J	0.09	U	0.09	U	0.08	U	0.1	U
Sodium	MG/K	252	71%	188	2	27	38	121	J	252	J	233	J	144	J	157	J
Thallium	MG/K	2.2	34%	0.855	7	13	38	1	U	0.39	J	0.79	J	0.32	U	0.46	J
Vanadium	MG/K	23.8	100%	150	0	38	38	14.5		14.8		18.5		13.5		15.4	
Zinc	MG/K	142	100%	115	1	38	38	47.5		40.7	J	51.7	J	26	J	28.9	J

TABLE 4-K
EM-5 CHEMICAL DATA-SURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12-22		MW12-23		SS12-109		SS12-114		SS12-115	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123068		123079		123303		123308		123309	
SAMPLE DEPTH TO TOP OF SAMPLE								0		0		0		0		0	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.2		2		0.2		0.2		0.2	
SAMPLE DATE								10/4/1998		10/5/1998		17-Nov-98		17-Nov-98		17-Nov-98	
QC CODE								SA		SA		SA		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
VOLATILE ORGANICS																	
Acetone	UG/KG	5	20%	200	0	1	5	11	UJ	5	J	15	U	12	U	12	U
Toluene	UG/KG	3	20%	1500	0	1	5	3	J	12	U	15	U	12	U	12	U
SEMI VOLATILE ORGANICS																	
Benzo(a)anthracene	UG/KG	16	60%	224	0	3	5	10	J	5.2	J	16	J	80	U	160	U
Benzo(a)pyrene	UG/KG	19	60%	61	0	3	5	11	J	6.1	J	19	J	80	U	160	U
Benzo(b)fluoranthene	UG/KG	20	60%	1100	0	3	5	17	J	9	J	20	J	80	U	160	U
Benzo(ghi)perylene	UG/KG	20	40%	50000	0	2	5	9.8	J	77	U	20	J	80	U	160	U
Benzo(k)fluoranthene	UG/KG	20	60%	1100	0	3	5	13	J	8.4	J	20	J	80	U	160	U
Bis(2-Ethylhexyl)phthalate	UG/KG	900	60%	50000	0	3	5	8.3	J	10	J	97	UJ	80	UJ	900	J
Carbazole	UG/KG	7.6	20%		0	1	5	80	UJ	77	UJ	7.6	J	80	U	160	UJ
Chrysene	UG/KG	23	60%	400	0	3	5	17	J	9.8	J	23	J	80	UJ	160	UJ
Di-n-octylphthalate	UG/KG	5.3	20%	50000	0	1	5	80	UJ	5.3	J	97	U	80	U	160	UJ
Dibenz(a,h)anthracene	UG/KG	6.8	20%	14	0	1	5	80	U	77	U	6.8	J	80	U	160	U
Fluoranthene	UG/KG	36	60%	50000	0	3	5	20	J	13	J	36	J	80	U	160	U
Indeno(1,2,3-cd)pyrene	UG/KG	16	40%	3200	0	2	5	8.8	J	77	U	16	J	80	U	160	U
Phenanthrene	UG/KG	22	60%	50000	0	3	5	14	J	7.9	J	22	J	80	U	160	U
Pyrene	UG/KG	37	60%	50000	0	3	5	25	J	12	J	37	J	80	U	160	U
PESTICIDES/PCBS																	
Endrin	UG/KG	2.8	20%	100	0	1	5	2.8	J	3.8	U	4.8	U	4	U	4	U
METALS																	
Aluminum	MG/KG	18100	100%	19520	0	5	5	11100		11900		12300	J	16200	J	18100	J
Arsenic	MG/KG	4.4	100%	8.9	0	5	5	4.4		4.1		4.1		4		4.2	
Barium	MG/KG	150	100%	300	0	5	5	89.7		60.2		150		45.9		45.7	
Beryllium	MG/KG	0.74	100%	1.13	0	5	5	0.34	J	0.42	J	0.42	J	0.53	J	0.74	J
Calcium	MG/KG	14700	100%	125300	0	5	5	3150		2020		14700		1320		981	J
Chromium	MG/KG	26.9	100%	30	0	5	5	15.4		17.3		18.2		22.8		26.9	
Cobalt	MG/KG	15.6	100%	30	0	5	5	9.5	J	8.8	J	8.4	J	9	J	15.6	
Copper	MG/KG	37.3	100%	33	1	5	5	15.8		17.4		**37.3**		22.6		29	
Iron	MG/KG	37000	100%	37410	0	5	5	18300		19900		21200	J	27900	J	37000	J
Lead	MG/KG	142	100%	24.4	2	5	5	**34**		23.8		**142**	J	17.8	J	22.9	J
Magnesium	MG/KG	5250	100%	21700	0	5	5	2540	J	3220	J	3900		4990		5250	
Manganese	MG/KG	835	100%	1100	0	5	5	835		374		499		225		359	
Mercury	MG/KG	0.27	60%	0.1	1	3	5	0.06	J	0.06	U	**0.27**		0.05	J	0.06	U
Nickel	MG/KG	36.6	100%	50	0	5	5	17		21.3		23.4		28.3		36.6	
Potassium	MG/KG	2570	100%	2623	0	5	5	1590		1730		2570		1620		1430	
Selenium	MG/KG	1.4	60%	2	0	3	5	1.1	U	0.83	U	1.4	J	0.52	J	0.56	J
Silver	MG/KG	0.35	20%	0.8	0	1	5	0.35	J	0.22	U	0.33	U	0.27	U	0.26	U
Sodium	MG/KG	70.9	20%	188	0	1	5	59	U	45.7	U	70.2	U	55.9	U	70.9	J
Vanadium	MG/KG	25.4	100%	150	0	5	5	19.8		20.1		19.5		25.4		25.2	
Zinc	MG/KG	174	100%	115	1	5	5	65.7		69.5		**174**	J	71.2	J	77.2	J

TABLE 4-L
EM-5 CHEMICAL DATA-SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12-22		MW12-23		TP12-15A		TP12-15B		TP12-15C		TP12-16A	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123069		123080		123031		123032		123033		123044	
SAMPLE DEPTH TO TOP OF SAMPLE								2		2		3.5		2		0.8		0.6	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								4		4		3.5		2		0.8		0.6	
SAMPLE DATE								10/4/1998		10/5/1998		10/2/1998		10/2/1998		10/2/1998		10/3/1998	
QC CODE								SA		SA		SA		SA		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
VOLATILE ORGANICS																			
Toluene	UG/KG	20	63%	1500	0	5	8	4	J	12	U	14	U	7	J	7	J	3	J
SEMI VOLATILE ORGANICS																			
2-Methylnaphthalene	UG/KG	520	13%	36400	0	1	8	72	U	72	U	88	UJ	520	J	78	UJ	73	U
Acenaphthene	UG/KG	1300	13%	50000	0	1	8	72	U	72	U	88	U	1300		78	U	73	U
Anthracene	UG/KG	2700	13%	50000	0	1	8	72	U	72	U	88	U	2700		78	U	73	U
Benzo(a)anthracene	UG/KG	3500	63%	224	1	5	8	72	U	72	U	15	J	3500		9.2	J	15	J
Benzo(a)pyrene	UG/KG	2600	75%	61	1	6	8	72	U	72	U	16	J	2600		11	J	16	J
Benzo(b)fluoranthene	UG/KG	2200	75%	1100	1	6	8	72	U	72	U	22	J	2200		13	J	20	J
Benzo(ghi)perylene	UG/KG	1400	63%	50000	0	5	8	72	U	72	U	54	J	1400		9.5	J	16	J
Benzo(k)fluoranthene	UG/KG	2600	75%	1100	1	6	8	72	U	72	U	18	J	2600		10	J	18	J
Bis(2-Ethylhexyl)phthalate	UG/KG	16	75%	50000	0	6	8	16	J	72	UJ	5.2	J	1200	U	6	J	10	J
Carbazole	UG/KG	1600	13%		0	1	8	72	UJ	72	UJ	88	UJ	1600	J	78	UJ	73	UJ
Chrysene	UG/KG	3000	88%	400	1	7	8	3.7	J	72	U	28	J	3000		12	J	22	J
Di-n-butylphthalate	UG/KG	6.6	50%	8100	0	4	8	72	UJ	72	UJ	6.6	J	1200	UJ	4.4	J	4.2	J
Di-n-octylphthalate	UG/KG	11	25%	50000	0	2	8	11	J	4.2	J	88	U	1200	U	78	U	73	U
Dibenz(a,h)anthracene	UG/KG	710	13%	14	1	1	8	72	U	72	U	88	U	710	J	78	U	73	U
Dibenzofuran	UG/KG	1000	13%	6200	0	1	8	72	U	72	U	88	U	1000	J	78	U	73	U
Fluoranthene	UG/KG	7400	75%	50000	0	6	8	72	U	72	U	27	J	7400		17	J	31	J
Fluorene	UG/KG	1500	13%	50000	0	1	8	72	U	72	U	88	U	1500		78	U	73	U
Indeno(1,2,3-cd)pyrene	UG/KG	1500	63%	3200	0	5	8	72	U	72	U	20	J	1500		7.3	J	14	J
Naphthalene	UG/KG	860	25%	13000	0	2	8	72	U	72	U	4.5	J	860	J	78	U	73	U
Phenanthrene	UG/KG	8500	63%	50000	0	5	8	72	U	72	U	15	J	8500		12	J	16	J
Pyrene	UG/KG	5900	75%	50000	0	6	8	72	U	72	U	37	J	5900		19	J	33	J
PESTICIDES/PCBS																			
4,4'-DDD	UG/KG	4	13%	2900	0	1	8	3.6	U	3.6	U	4.4	U	4	J	3.8	U	3.7	U
4,4'-DDE	UG/KG	3	13%	2100	0	1	8	3.6	U	3.6	U	4.4	U	3	J	3.8	U	3.7	U
4,4'-DDT	UG/KG	4.5	13%	2100	0	1	8	3.6	U	3.6	U	4.4	U	4.5	J	3.8	U	3.7	U
Endosulfan I	UG/KG	1.5	13%	900	0	1	8	1.8	U	1.8	U	2.3	U	1.5	J	2	U	1.9	U
Endosulfan sulfate	UG/KG	18	13%	1000	0	1	8	3.6	U	3.6	U	4.4	U	18	J	3.8	U	3.7	U
Endrin aldehyde	UG/KG	7.5	13%		0	1	8	3.6	U	3.6	U	4.4	U	7.5	J	3.8	U	3.7	U
Endrin ketone	UG/KG	13	13%		0	1	8	3.6	U	3.6	U	4.4	U	13		3.8	U	3.7	U
Gamma-Chlordane	UG/KG	3.8	13%	540	0	1	8	1.8	U	1.8	U	2.3	U	3.8	J	2	U	1.9	U
Methoxychlor	UG/KG	42	13%		0	1	8	18	U	18	U	23	U	42	J	20	U	19	U
METALS																			
Aluminum	MG/KG	15000	100%	19520	0	8	8	14200		13100		13200		12100		14500		15000	
Arsenic	MG/KG	5	100%	8.9	0	8	8	3.8		4.1		4.8		4.4		5		3.6	

TABLE 4-L
EM-5 CHEMICAL DATA-SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

		FACILITY						SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
		LOCATION ID						MW12-22		MW12-23		TP12-15A		TP12-15B		TP12-15C		TP12-16A	
		MATRIX						SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
		SAMPLE ID						123069		123080		123031		123032		123033		123044	
		SAMPLE DEPTH TO TOP OF SAMPLE						2		2		3.5		2		0.8		0.6	
		SAMPLE DEPTH TO BOTTOM OF SAMPLE						4		4		3.5		2		0.8		0.6	
		SAMPLE DATE						10/4/1998		10/5/1998		10/2/1998		10/2/1998		10/2/1998		10/3/1998	
		QC CODE						SA		SA		SA		SA		SA		SA	
		STUDY ID						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	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Barium	MG/KG	116	100%	300	0	8	8	54.9		55.7		97.4		115		116		105	
Beryllium	MG/KG	0.6	100%	1.13	0	8	8	0.57	J	0.5	J	0.55	J	0.52	J	0.53	J	0.53	J
Cadmium	MG/KG	0.12	13%	2.46	0	1	8	0.06	U	0.06	U	0.07	U	0.07	U	0.05	U	0.05	U
Calcium	MG/KG	28900	100%	125300	0	8	8	28900		15900		8170	J	15400	J	16300	J	13500	J
Chromium	MG/KG	24.8	100%	30	0	8	8	24.8		23.9		19.7		20.8		21.4		18	J
Cobalt	MG/KG	15.4	100%	30	0	8	8	13.3		15.4		10.4	J	10.6	J	11.5		10.8	
Copper	MG/KG	73.3	100%	33	5	8	8	33.7		35.4		24.8		32.6		35.5		27.3	
Iron	MG/KG	35800	100%	37410	0	8	8	27600		27300		24300		35800		28400		27400	
Lead	MG/KG	112	100%	24.4	6	8	8	19.7		22.3		56.7		112		63.9		99.3	J
Magnesium	MG/KG	8210	100%	21700	0	8	8	6910	J	5500	J	4220		4420		8210		4930	
Manganese	MG/KG	723	100%	1100	0	8	8	422		487		463		359		639		479	J
Mercury	MG/KG	1	50%	0.1	3	4	8	0.05	U	0.05	U	0.07	U	1		0.12		0.05	UJ
Nickel	MG/KG	52	100%	50	1	8	8	48.5		52		26.1		30.7		29.2		27.7	J
Potassium	MG/KG	2810	100%	2623	3	8	8	1570		1290		2760		2490		2710		2280	
Selenium	MG/KG	1.2	38%	2	0	3	8	0.98	U	0.88	U	1.1	U	1.1	U	1.2		0.43	J
Silver	MG/KG	0.32	13%	0.8	0	1	8	0.32	J	0.23	U	0.28	U	0.3	U	0.19	U	0.21	U
Sodium	MG/KG	102	50%	188	0	4	8	75.4	J	66.8	J	58.2	U	102	J	39.8	U	44.8	U
Vanadium	MG/KG	25.1	100%	150	0	8	8	20.7		18.4		24.2		22.2		25.1		23.4	
Zinc	MG/KG	280	100%	115	6	8	8	95.8		84.8		127		280		129		140	J

TABLE 4-L
EM-5 CHEMICAL DATA-SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

		FACILITY						SEAD-12		SEAD-12	
		LOCATION ID						TP12-16B		TP12-16C	
		MATRIX						SOIL		SOIL	
		SAMPLE ID						123045		123078	
		SAMPLE DEPTH TO TOP OF SAMPLE						2		0.5	
		SAMPLE DEPTH TO BOTTOM OF SAMPLE						2		2	
		SAMPLE DATE						10/3/1998		10/3/1998	
		QC CODE						SA		SA	
		STUDY ID						RI Phase 1 Step 1		RI Phase 1 Step 1	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)
VOLATILE ORGANICS											
Toluene	UG/KG	20	63%	1500	0	5	8	20		8	UJ
SEMI VOLATILE ORGANICS											
2-Methylnaphthalene	UG/KG	520	13%	36400	0	1	8	77	U	72	U
Acenaphthene	UG/KG	1300	13%	50000	0	1	8	77	U	72	U
Anthracene	UG/KG	2700	13%	50000	0	1	8	77	U	72	U
Benzo(a)anthracene	UG/KG	3500	63%	224	1	5	8	77	U	13	J
Benzo(a)pyrene	UG/KG	2600	75%	61	1	6	8	4.4	J	13	J
Benzo(b)fluoranthene	UG/KG	2200	75%	1100	1	6	8	5.8	J	19	J
Benzo(ghi)perylene	UG/KG	1400	63%	50000	0	5	8	77	U	26	J
Benzo(k)fluoranthene	UG/KG	2600	75%	1100	1	6	8	4.7	J	16	J
Bis(2-Ethylhexyl)phthalate	UG/KG	16	75%	50000	0	6	8	13	J	8	J
Carbazole	UG/KG	1600	13%		0	1	8	77	UJ	72	UJ
Chrysene	UG/KG	3000	88%	400	1	7	8	5.4	J	26	J
Di-n-butylphthalate	UG/KG	6.6	50%	8100	0	4	8	77	U	4.3	J
Di-n-octylphthalate	UG/KG	11	25%	50000	0	2	8	77	UJ	72	U
Dibenz(a,h)anthracene	UG/KG	710	13%	14	1	1	8	77	U	72	U
Dibenzofuran	UG/KG	1000	13%	6200	0	1	8	77	U	72	U
Fluoranthene	UG/KG	7400	75%	50000	0	6	8	5.3	J	30	J
Fluorene	UG/KG	1500	13%	50000	0	1	8	77	U	72	U
Indeno(1,2,3-cd)pyrene	UG/KG	1500	63%	3200	0	5	8	77	U	14	J
Naphthalene	UG/KG	860	25%	13000	0	2	8	77	U	72	U
Phenanthrene	UG/KG	8500	63%	50000	0	5	8	77	U	20	J
Pyrene	UG/KG	5900	75%	50000	0	6	8	5.8	J	30	J
PESTICIDES/PCBS											
4,4'-DDD	UG/KG	4	13%	2900	0	1	8	3.8	U	3.6	U
4,4'-DDE	UG/KG	3	13%	2100	0	1	8	3.8	U	3.6	U
4,4'-DDT	UG/KG	4.5	13%	2100	0	1	8	3.8	U	3.6	U
Endosulfan I	UG/KG	1.5	13%	900	0	1	8	1.9	U	1.8	U
Endosulfan sulfate	UG/KG	18	13%	1000	0	1	8	3.8	U	3.6	U
Endrin aldehyde	UG/KG	7.5	13%		0	1	8	3.8	U	3.6	U
Endrin ketone	UG/KG	13	13%		0	1	8	3.8	U	3.6	U
Gamma-Chlordane	UG/KG	3.8	13%	540	0	1	8	1.9	U	1.8	U
Methoxychlor	UG/KG	42	13%		0	1	8	19	U	18	U
METALS											
Aluminum	MG/KG	15000	100%	19520	0	8	8	14900		9600	
Arsenic	MG/KG	5	100%	8.9	0	8	8	4.8		3.2	

TABLE 4-L
EM-5 CHEMICAL DATA-SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

		FACILITY						SEAD-12		SEAD-12	
		LOCATION ID						TP12-16B		TP12-16C	
		MATRIX						SOIL		SOIL	
		SAMPLE ID						123045		123078	
		SAMPLE DEPTH TO TOP OF SAMPLE						2		0.5	
		SAMPLE DEPTH TO BOTTOM OF SAMPLE						2		2	
		SAMPLE DATE						10/3/1998		10/3/1998	
		QC CODE						SA		SA	
		STUDY ID						RI Phase 1 Step 1		RI Phase 1 Step 1	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)
Barium	MG/KG	116	100%	300	0	8	8	70.1		76.3	
Beryllium	MG/KG	0.6	100%	1.13	0	8	8	0.6	J	0.27	J
Cadmium	MG/KG	0.12	13%	2.46	0	1	8	0.05	U	0.12	J
Calcium	MG/KG	28900	100%	125300	0	8	8	20000	J	16400	J
Chromium	MG/KG	24.8	100%	30	0	8	8	19.1	J	15.3	J
Cobalt	MG/KG	15.4	100%	30	0	8	8	11.7		14.9	
Copper	MG/KG	73.3	100%	33	5	8	8	73.3		41	
Iron	MG/KG	35800	100%	37410	0	8	8	29200		23500	
Lead	MG/KG	112	100%	24.4	6	8	8	64.7	J	88.9	J
Magnesium	MG/KG	8210	100%	21700	0	8	8	6190		5780	
Manganese	MG/KG	723	100%	1100	0	8	8	351	J	723	J
Mercury	MG/KG	1	50%	0.1	3	4	8	0.11		0.08	J
Nickel	MG/KG	52	100%	50	1	8	8	36.4	J	36.4	J
Potassium	MG/KG	2810	100%	2623	3	8	8	2810		1340	
Selenium	MG/KG	1.2	38%	2	0	3	8	0.36	U	0.46	J
Silver	MG/KG	0.32	13%	0.8	0	1	8	0.19	U	0.21	U
Sodium	MG/KG	102	50%	188	0	4	8	39.4	U	97.6	J
Vanadium	MG/KG	25.1	100%	150	0	8	8	22.4		15.3	
Zinc	MG/KG	280	100%	115	6	8	8	123	J	256	J

TABLE 4-M
EM-6 CHEMICAL DATA-SURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12-24		MW12-25		MW12-26	
MATRIX								SOIL		SOIL		SOIL	
SAMPLE ID								123161		123164		123167	
SAMPLE DEPTH TO TOP OF SAMPLE								0		0		0	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.2		0.2		0.2	
SAMPLE DATE								19-Oct-98		18-Oct-98		18-Oct-98	
QC CODE								SA		SA		SA	
STUDY ID								RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
SEMI VOLATILE ORGANICS													
Benzo(b)fluoranthene	UG/KG	4.3	33%	1100	0	1	3	76	U	4.3	J	77	U
Bis(2-Ethylhexyl)phthalate	UG/KG	46	100%	50000	0	3	3	36	J	43	J	46	J
Butylbenzylphthalate	UG/KG	67	67%	50000	0	2	3	76	U	55	J	67	J
Chrysene	UG/KG	4.4	33%	400	0	1	3	76	U	4.4	J	77	U
Di-n-octylphthalate	UG/KG	4.2	33%	50000	0	1	3	76	U	80	U	4.2	J
Fluoranthene	UG/KG	5.8	33%	50000	0	1	3	76	U	5.8	J	77	U
Pyrene	UG/KG	6.3	33%	50000	0	1	3	76	U	6.3	J	77	U
METALS													
Aluminum	MG/KG	13300	100%	19520	0	3	3	12100		13300		12500	
Arsenic	MG/KG	5.4	100%	8.9	0	3	3	4.1		5.4		4.3	
Barium	MG/KG	84	100%	300	0	3	3	68.2		70.5		84	
Beryllium	MG/KG	0.5	100%	1.13	0	3	3	0.47	J	0.46	J	0.5	J
Calcium	MG/KG	23900	100%	125300	0	3	3	20000		2480		23900	
Chromium	MG/KG	19.1	100%	30	0	3	3	18.3		18.7		19.1	
Cobalt	MG/KG	17.7	100%	30	0	3	3	10.9		17.7		12.6	
Copper	MG/KG	26.2	100%	33	0	3	3	21.2		26.2		23.6	
Iron	MG/KG	27100	100%	37410	0	3	3	23200		25600		27100	
Lead	MG/KG	16.2	100%	24.4	0	3	3	10.4	J	16.2	J	14.8	J
Magnesium	MG/KG	6560	100%	21700	0	3	3	6560		4350		5450	
Manganese	MG/KG	1120	100%	1100	1	3	3	495		1120		644	
Nickel	MG/KG	40.8	100%	50	0	3	3	29.8		40.8		30.8	
Potassium	MG/KG	1120	100%	2623	0	3	3	1120		894	J	1020	J
Selenium	MG/KG	1.1	33%	2	0	1	3	0.96	UJ	1.1	J	1	UJ
Thallium	MG/KG	2	67%	0.855	2	2	3	1.1	U	2		1.1	J
Vanadium	MG/KG	20.1	100%	150	0	3	3	18.3		20.1		19.7	
Zinc	MG/KG	75.8	100%	115	0	3	3	64.1		71.5		75.8	

TABLE 4-N
EM-6 CHEMICAL DATA-SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12-25		MW12-25		MW12-26		MW12-26		TP12-11A		TP12-11B	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123165		123166		123168		123169		123109		123110	
SAMPLE DEPTH TO TOP OF SAMPLE								2		6		2		6		6		6.5	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								4		8		4		8		6		6.5	
SAMPLE DATE								18-Oct-98		18-Oct-98		18-Oct-98		18-Oct-98		14-Oct-98		14-Oct-98	
QC CODE								SA		SA		SA		SA		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
VOLATILE ORGANICS																			
Acetone	UG/KG	160	33%	200	0	4	12	12		5	J	160		11	UJ	98		44	U
Ethyl benzene	UG/KG	3	8%	5500	0	1	12	11	U	11	U	3	J	11	U	13	U	12	U
Methyl ethyl ketone	UG/KG	34	17%	300	0	2	12	11	U	11	U	34		11	UJ	28		12	U
Toluene	UG/KG	8	25%	1500	0	3	12	11	U	11	U	12	U	11	U	8	J	12	U
SEMI VOLATILE ORGANICS																			
Anthracene	UG/KG	23	8%	50000	0	1	12	70	U	70	U	75	U	74	U	81	U	23	J
Benzo(a)anthracene	UG/KG	56	17%	224	0	2	12	70	U	70	U	75	U	74	U	81	U	56	J
Benzo(a)pyrene	UG/KG	55	8%	61	0	1	12	70	U	70	U	75	U	74	U	81	U	55	J
Benzo(b)fluoranthene	UG/KG	56	8%	1100	0	1	12	70	U	70	U	75	U	74	U	81	U	56	J
Benzo(ghi)perylene	UG/KG	32	8%	50000	0	1	12	70	U	70	U	75	U	74	U	81	UJ	32	J
Benzo(k)fluoranthene	UG/KG	61	8%	1100	0	1	12	70	U	70	U	75	U	74	U	81	U	61	J
Bis(2-Ethylhexyl)phthalate	UG/KG	120	25%	50000	0	3	12	19	J	70	U	84		120		81	U	78	U
Butylbenzylphthalate	UG/KG	160	17%	50000	0	2	12	70	U	70	U	100		160		81	U	78	U
Carbazole	UG/KG	27	8%		0	1	12	70	UJ	70	UJ	75	U	74	U	81	UJ	27	J
Chrysene	UG/KG	55	17%	400	0	2	12	70	U	70	U	75	U	74	U	81	U	55	J
Di-n-octylphthalate	UG/KG	6.8	17%	50000	0	2	12	70	U	70	U	4.5	J	6.8	J	81	UJ	78	UJ
Dibenz(a,h)anthracene	UG/KG	13	8%	14	0	1	12	70	U	70	U	75	U	74	U	81	UJ	13	J
Fluoranthene	UG/KG	150	25%	50000	0	3	12	70	U	70	U	4.5	J	74	U	81	U	150	
Fluorene	UG/KG	19	8%	50000	0	1	12	70	U	70	U	75	U	74	U	81	U	19	J
Indeno(1,2,3-cd)pyrene	UG/KG	36	8%	3200	0	1	12	70	U	70	U	75	U	74	U	81	UJ	36	J
Phenanthrene	UG/KG	120	25%	50000	0	3	12	70	U	70	U	75	U	74	U	8	J	120	
Pyrene	UG/KG	100	25%	50000	0	3	12	70	U	70	U	4.6	J	74	U	81	U	100	
METALS																			
Aluminum	MG/KG	16500	100%	19520	0	12	12	12400		9690		12300		12300		11500	J	13800	J
Arsenic	MG/KG	6.4	100%	8.9	0	12	12	4.3		3.5		3.6		4.9		3.6	J	4	J
Barium	MG/KG	130	100%	300	0	12	12	57.8		53.4		74.8		63.5		78.8		75.7	
Beryllium	MG/KG	0.68	92%	1.13	0	11	12	0.48	J	0.36	J	0.44	J	0.45	J	0.46	J	0.56	J
Calcium	MG/KG	76300	100%	125300	0	12	12	76300		52700		9490		36200		24500	J	38200	J
Chromium	MG/KG	29.6	100%	30	0	12	12	21.4		17.1		19.5		21.5		18.8		22.7	
Cobalt	MG/KG	36.3	100%	30	1	12	12	12.4		9.9		12.6		12.6		10.6	J	12.9	
Copper	MG/KG	28.7	100%	33	0	12	12	26.8		19.4		21.6		28.7		21.4		24.2	
Iron	MG/KG	40600	100%	37410	1	12	12	27300		21300		24800		28900		24700		28100	
Lead	MG/KG	34	100%	24.4	2	12	12	7.9		8.9		11.4	J	7.9	J	14	J	10.7	J
Magnesium	MG/KG	15400	100%	21700	0	12	12	15400		8450		5400		7390		7020		8820	J
Manganese	MG/KG	4110	100%	1100	1	12	12	459		372		559		522		479		447	
Mercury	MG/KG	0.06	8%	0.1	0	1	12	0.05	U	0.05	U	0.05	UJ	0.05	UJ	0.06	J	0.05	U

TABLE 4-N
EM-6 CHEMICAL DATA-SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

		FACILITY						SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
		LOCATION ID						MW12-25		MW12-25		MW12-26		MW12-26		TP12-11A		TP12-11B	
		MATRIX						SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
		SAMPLE ID						123165		123166		123168		123169		123109		123110	
		SAMPLE DEPTH TO TOP OF SAMPLE						2		6		2		6		6		6.5	
		SAMPLE DEPTH TO BOTTOM OF SAMPLE						4		8		4		8		6		6.5	
		SAMPLE DATE						18-Oct-98		18-Oct-98		18-Oct-98		18-Oct-98		14-Oct-98		14-Oct-98	
		QC CODE						SA		SA		SA		SA		SA		SA	
		STUDY ID						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	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Nickel	MG/KG	47.2	83%	50	0	10	12	36.3		29		32.5		37.3		32.6	J	38.5	J
Potassium	MG/KG	1570	100%	2623	0	12	12	1220		1100		1150		1140		946	J	1570	
Selenium	MG/KG	1.6	17%	2	0	2	12	0.79	UJ	0.79	UJ	0.89	UJ	0.98	UJ	0.97	U	1	U
Silver	MG/KG	0.2	8%	0.8	0	1	12	0.21	U	0.21	U	0.23	U	0.26	U	0.25	U	0.27	U
Sodium	MG/KG	197	75%	188	1	9	12	102	J	55.7	J	48.5	U	53.6	U	74.2	J	88.8	J
Thallium	MG/KG	3.8	67%	0.855	7	8	12	**1.1**	J	0.89	U	**1.2**	J	1.1	U	**1.3**	J	**1.2**	J
Vanadium	MG/KG	23.8	100%	150	0	12	12	17.8		13.4		18.3		17.5		18.2		20.8	
Zinc	MG/KG	391	100%	115	4	12	12	87.7		68.2		69.3		82.2		88.7	J	**125**	J

TABLE 4-N
EM-6 CHEMICAL DATA-SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								TP12-11C		TP12-12A		TP12-12B		TP12-12C		MW12-24		MW12-24	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123111		123118		123119		123120		123162		123163	
SAMPLE DEPTH TO TOP OF SAMPLE								0.5		0.5		1.5		4		2		6	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.5		0.5		1.5		4		4		8	
SAMPLE DATE								14-Oct-98		14-Oct-98		14-Oct-98		14-Oct-98		19-Oct-98		19-Oct-98	
QC CODE								SA		SA		SA		SA		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
VOLATILE ORGANICS																			
Acetone	UG/KG	160	33%	200	0	4	12	12	U	15	UJ	17	UJ	12	UJ	11	UJ	12	UJ
Ethyl benzene	UG/KG	3	8%	5500	0	1	12	12	U	12	U	11	U	12	U	11	U	12	U
Methyl ethyl ketone	UG/KG	34	17%	300	0	2	12	12	U	12	UJ	11	UJ	12	UJ	11	UJ	12	UJ
Toluene	UG/KG	8	25%	1500	0	3	12	6	J	12	U	11	U	12	U	11	U	4	J
SEMI VOLATILE ORGANICS																			
Anthracene	UG/KG	23	8%	50000	0	1	12	77	U	74	U	77	UJ	78	U	240	U	250	U
Benzo(a)anthracene	UG/KG	56	17%	224	0	2	12	4.2	J	74	U	77	UJ	78	U	240	U	250	U
Benzo(a)pyrene	UG/KG	55	8%	61	0	1	12	77	U	74	U	77	UJ	78	U	240	U	250	U
Benzo(b)fluoranthene	UG/KG	56	8%	1100	0	1	12	77	U	74	U	77	UJ	78	U	240	U	250	U
Benzo(ghi)perylene	UG/KG	32	8%	50000	0	1	12	77	UJ	74	U	77	UJ	78	U	240	U	250	U
Benzo(k)fluoranthene	UG/KG	61	8%	1100	0	1	12	77	U	74	U	77	UJ	78	U	240	U	250	U
Bis(2-Ethylhexyl)phthalate	UG/KG	120	25%	50000	0	3	12	77	U	74	UJ	77	UJ	78	UJ	240	U	250	U
Butylbenzylphthalate	UG/KG	160	17%	50000	0	2	12	77	U	74	UJ	77	UJ	78	UJ	240	U	250	U
Carbazole	UG/KG	27	8%		0	1	12	77	UJ	74	UJ	77	UJ	78	UJ	240	UJ	250	UJ
Chrysene	UG/KG	55	17%	400	0	2	12	5.6	J	74	U	77	UJ	78	U	240	U	250	U
Di-n-octylphthalate	UG/KG	6.8	17%	50000	0	2	12	77	UJ	74	UJ	77	UJ	78	UJ	240	U	250	U
Dibenz(a,h)anthracene	UG/KG	13	8%	14	0	1	12	77	UJ	74	U	77	UJ	78	U	240	U	250	U
Fluoranthene	UG/KG	150	25%	50000	0	3	12	9.8	J	74	U	77	UJ	78	U	240	U	250	U
Fluorene	UG/KG	19	8%	50000	0	1	12	77	U	74	U	77	UJ	78	U	240	U	250	U
Indeno(1,2,3-cd)pyrene	UG/KG	36	8%	3200	0	1	12	77	UJ	74	U	77	UJ	78	U	240	U	250	U
Phenanthrene	UG/KG	120	25%	50000	0	3	12	8	J	74	U	77	UJ	78	U	240	U	250	U
Pyrene	UG/KG	100	25%	50000	0	3	12	7.7	J	74	U	77	UJ	78	U	240	U	250	U
METALS																			
Aluminum	MG/KG	16500	100%	19520	0	12	12	14300	J	12900	J	13200	J	13700	J	9860	J	16500	
Arsenic	MG/KG	6.4	100%	8.9	0	12	12	4.5	J	4.2	J	4.4	J	6.4	J	4.4		6.2	
Barium	MG/KG	130	100%	300	0	12	12	78.4		61.4		69.8		130		47.4		68.8	
Beryllium	MG/KG	0.68	92%	1.13	0	11	12	0.61	J	0.56	J	0.56	J	0.02	U	0.36	J	0.68	J
Calcium	MG/KG	76300	100%	125300	0	12	12	23400	J	21400	J	19400	J	7370	J	20000		8240	
Chromium	MG/KG	29.6	100%	30	0	12	12	23.1		22.5		23.1		24.9		13.2	J	29.6	J
Cobalt	MG/KG	36.3	100%	30	1	12	12	11.6		36.3		11.7		10.1	J	7.8	J	17.2	
Copper	MG/KG	28.7	100%	33	0	12	12	23.8		21.4		26		25.8		23.2		28.3	
Iron	MG/KG	40600	100%	37410	1	12	12	27000		40600	J	32000	J	30400	J	17400	J	34600	J
Lead	MG/KG	34	100%	24.4	2	12	12	9.5	J	9.2	J	33.5	J	34	J	5	J	2.6	J
Magnesium	MG/KG	15400	100%	21700	0	12	12	6970	J	5790	J	5910	J	5000	J	10500		6590	
Manganese	MG/KG	4110	100%	1100	1	12	12	411		422		458		4110		424		564	
Mercury	MG/KG	0.06	8%	0.1	0	1	12	0.06	U	0.05	U	0.05	U	0.06	U	0.05	U	0.06	U

TABLE 4-N
EM-6 CHEMICAL DATA-SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								TP12-11C		TP12-12A		TP12-12B		TP12-12C		MW12-24		MW12-24	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123111		123118		123119		123120		123162		123163	
SAMPLE DEPTH TO TOP OF SAMPLE								0.5		0.5		1.5		4		2		6	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.5		0.5		1.5		4		4		8	
SAMPLE DATE								14-Oct-98		14-Oct-98		14-Oct-98		14-Oct-98		19-Oct-98		19-Oct-98	
QC CODE								SA		SA		SA		SA		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Nickel	MG/KG	47.2	83%	50	0	10	12	33.3	J	47.2	J	37.8	J	28.7	J	12.5	UJ	36.8	UJ
Potassium	MG/KG	1570	100%	2623	0	12	12	1180		879	J	839	J	809	J	1160		1260	
Selenium	MG/KG	1.6	17%	2	0	2	12	0.94	U	0.81	U	0.79	U	1.6		0.48	U	0.43	J
Silver	MG/KG	0.2	8%	0.8	0	1	12	0.25	U	0.21	U	0.21	U	0.21	U	0.25	U	0.2	J
Sodium	MG/KG	197	75%	188	1	9	12	51.5	U	109	J	147	J	197	J	98.9	J	148	J
Thallium	MG/KG	3.8	67%	0.855	7	8	12	1.1	U	0.93	J	0.99	J	3.8		1.1	U	0.75	J
Vanadium	MG/KG	23.8	100%	150	0	12	12	21		17.9		19.5		22.5		18.7		23.8	
Zinc	MG/KG	391	100%	115	4	12	12	81.2	J	126	J	166	J	391	J	47.6	J	80.2	J

TABLE 4-O
CLASS III CHEMICAL DATA-SURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12A-1		MW12-27		MW12-31		MW12-32		MW12-32		MW12-37	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								MW12A-1-00		123061		123172		123178		123175		123201	
SAMPLE DEPTH TO TOP OF SAMPLE								0		0		0		0		0		0	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.2		0.2		0.2		0.2		0.2		0.2	
SAMPLE DATE								6/10/1994		10/4/1998		26-Oct-98		26-Oct-98		26-Oct-98		01-Nov-98	
QC CODE								SA		SA		SA		DU		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
VOLATILE ORGANICS																			
Acetone	UG/KG	55	29%	200	0	17	58	13	U	12	UJ	13	UJ	12	UJ	11	UJ	8	J
Toluene	UG/KG	14	10%	1500	0	6	58	13	U	12	U	13	U	4	J	11	U	14	
SEMI VOLATILE ORGANICS																			
2-Methylnaphthalene	UG/KG	160	10%	36400	0	6	58	430	U	85	U	90	U	90	U	87	U	160	J
2-Methylphenol	UG/KG	36	3%	100	0	2	58	430	U	85	U	90	U	5.8	J	87	U	1500	U
4-Methylphenol	UG/KG	930	7%	900	1	4	58	430	U	85	U	15	J	90	U	87	U	1500	U
Acenaphthene	UG/KG	1200	9%	50000	0	5	58	1000	U	85	U	90	U	90	U	87	U	1200	J
Acenaphthylene	UG/KG	22	5%	41000	0	3	58	430	U	85	U	90	U	90	U	87	U	1500	U
Anthracene	UG/KG	1500	16%	50000	0	9	58	430	U	85	U	90	U	5.1	J	87	U	1500	J
Benzo(a)anthracene	UG/KG	3500	72%	224	3	42	58	430	U	6.8	J	12	J	24	J	19	J	**3500**	
Benzo(a)pyrene	UG/KG	3200	78%	61	5	45	58	430	U	8.1	J	11	J	23	J	17	J	**3200**	
Benzo(b)fluoranthene	UG/KG	2800	90%	1100	1	52	58	430	U	10	J	15	J	38	J	28	J	**2800**	
Benzo(ghi)perylene	UG/KG	2000	57%	50000	0	33	58	430	U	85	UJ	13	J	20	J	16	J	2000	
Benzo(k)fluoranthene	UG/KG	2900	78%	1100	1	45	58	430	U	10	J	12	J	31	J	22	J	**2900**	
Bis(2-Ethylhexyl)phthalate	UG/KG	10000	14%	50000	0	8	58	430	U	85	UJ	90	U	90	U	87	U	1500	UJ
Butylbenzylphthalate	UG/KG	23	3%	50000	0	2	58	430	U	85	UJ	90	U	90	U	87	U	1500	UJ
Carbazole	UG/KG	1100	22%		0	13	58	430	U	85	UJ	90	U	9.2	J	5.6	J	1100	J
Chrysene	UG/KG	3600	93%	400	3	54	58	430	U	11	J	18	J	42	J	31	J	**3600**	
Di-n-butylphthalate	UG/KG	23	55%	8100	0	32	58	430	U	85	U	90	U	90	U	87	U	1500	U
Di-n-octylphthalate	UG/KG	15	3%	50000	0	2	58	430	U	85	UJ	90	U	13	J	87	U	1500	U
Dibenz(a,h)anthracene	UG/KG	680	17%	14	5	10	58	430	U	85	UJ	90	U	6.9	J	4.6	J	**680**	J
Dibenzofuran	UG/KG	500	9%	6200	0	5	58	430	U	85	U	90	U	90	U	87	U	500	J
Diethyl phthalate	UG/KG	92	5%	7100	0	3	58	430	U	85	U	90	U	90	U	87	U	1500	U
Fluoranthene	UG/KG	8500	97%	50000	0	56	58	430	U	13	J	24	J	59	J	48	J	8500	
Fluorene	UG/KG	830	9%	50000	0	5	58	430	U	85	U	90	U	90	U	87	U	830	J
Indeno(1,2,3-cd)pyrene	UG/KG	1700	57%	3200	0	33	58	430	U	85	UJ	8.1	J	19	J	14	J	1700	
Naphthalene	UG/KG	540	9%	13000	0	5	58	430	U	85	U	90	U	90	U	87	U	540	J
Phenanthrene	UG/KG	7500	86%	50000	0	50	58	430	U	10	J	9	J	27	J	16	J	7500	
Phenol	UG/KG	42	29%	30	2	17	58	430	U	19	J	90	U	90	U	87	U	1500	U
Pyrene	UG/KG	7000	93%	50000	0	54	58	430	U	16	J	25	J	61	J	46	J	7000	
PESTICIDES/PCBS																			
4,4'-DDD	UG/KG	51	10%	2900	0	6	58	4.3	U	4.2	U	4.5	U	4.5	U	4.3	U	3.9	U
4,4'-DDE	UG/KG	5	12%	2100	0	7	58	4.3	U	4.2	U	4.5	U	4.5	U	4.3	U	3.2	J
4,4'-DDT	UG/KG	5.1	10%	2100	0	6	58	4.3	U	4.2	U	4.5	U	4.5	U	4.3	U	4	J
Alpha-BHC	UG/KG	51	5%	110	0	3	58	2.2	U	2.2	U	2.4		24		51		2	U
Alpha-Chlordane	UG/KG	2.8	3%		0	2	58	2.2	U	2.2	U	2.3	U	2.3	U	2.2	U	2	U

TABLE 4-O
CLASS III CHEMICAL DATA-SURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12A-1		MW12-27		MW12-31		MW12-32		MW12-32		MW12-37	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								MW12A-1-00		123061		123172		123178		123175		123201	
SAMPLE DEPTH TO TOP OF SAMPLE								0		0		0		0		0		0	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.2		0.2		0.2		0.2		0.2		0.2	
SAMPLE DATE								6/10/1994		10/4/1998		26-Oct-98		26-Oct-98		26-Oct-98		01-Nov-98	
QC CODE								SA		SA		SA		DU		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Aroclor-1254	UG/KG	64	2%	10000	0	1	58	43	U	42	U	45	U	45	U	43	U	39	U
Beta-BHC	UG/KG	6.1	5%	200	0	3	58	2.2	U	2.2	U	2.3	U	3.9		6.1		2	U
Dieldrin	UG/KG	3.2	2%	44	0	1	58	4.3	U	4.2	U	4.5	U	4.5	U	4.3	U	3.9	U
Endosulfan I	UG/KG	1.9	3%	900	0	2	58	2.2	U	2.2	U	2.3	U	2.3	U	2.2	U	2	U
Endosulfan II	UG/KG	3	3%	900	0	2	58	4.3	U	4.2	U	4.5	U	4.5	U	4.3	U	3.9	U
Endosulfan sulfate	UG/KG	5.6	5%	1000	0	3	58	4.3	U	4.2	U	4.5	U	4.5	U	4.3	U	3.9	U
Endrin	UG/KG	5.8	5%	100	0	3	58	4.3	U	4.2	U	4.5	U	4.5	U	4.3	U	3.9	U
Gamma-BHC/Lindane	UG/KG	17	2%	60	0	1	58	2.2	U	2.2	U	2.3	U	2.3	U	17		2	U
Gamma-Chlordane	UG/KG	1.5	3%	540	0	2	58	2.2	U	2.2	U	2.3	U	2.3	U	2.2	U	1.2	J
Heptachlor epoxide	UG/KG	6.5	3%	20	0	2	58	2.2	U	2.2	U	2.3	U	2.3	U	2.2	U	6.5	
METALS																			
Aluminum	MG/KG	18700	100%	19520	0	58	58	18700		14800		16700		14500		12300		6440	
Antimony	MG/KG	1.6	3%	6	0	2	58	0.22	UJ	1.2	R	1.5	R	1.5	R	1.3	R	1.1	UJ
Arsenic	MG/KG	6.2	100%	8.9	0	58	58	5.2		5.2		4.6		2.5		3.9		1.9	
Barium	MG/KG	146	100%	300	0	58	58	125		77.3		86.2		126		111		36.8	
Beryllium	MG/KG	0.96	100%	1.13	0	58	58	0.8	J	0.47	J	0.67	J	0.71	J	0.61	J	0.22	J
Cadmium	MG/KG	0.86	2%	2.46	0	1	58	0.86		0.06	U	0.44	U	0.43	U	0.37	U	0.05	U
Calcium	MG/KG	154000	100%	125300	1	58	58	3370		1690		4800		8100		7610		21700	
Chromium	MG/KG	26.8	100%	30	0	58	58	23.1		22.8		23.1	J	21.3	J	19.8	J	13.1	
Cobalt	MG/KG	17.1	100%	30	0	58	58	10.9		13		9.4	J	12.2		11.7		6.8	J
Copper	MG/KG	35.4	100%	33	3	58	58	19.1		16.9		18.5		26.2		21.1		13	
Cyanide	MG/KG	1.4	2%	0.35	1	1	58	0.6	U	0.62	U	0.71	U	0.69	U	0.66	U	0.59	U
Iron	MG/KG	31500	100%	37410	0	58	58	23500		25200		25100	J	24500		22400	J	13100	J
Lead	MG/KG	43.8	100%	24.4	16	58	58	21.6		27.8		17.1	J	15.9	J	14.6	J	25.2	J
Magnesium	MG/KG	15700	100%	21700	0	58	58	3880		3790	J	3620		4440		3750		7410	
Manganese	MG/KG	2370	100%	1100	4	58	58	939		936		408		2280		2370		401	J
Mercury	MG/KG	0.17	53%	0.1	6	31	58	0.06	J	0.06	U	0.07	U	0.07	U	0.07	J	0.05	U
Nickel	MG/KG	57.4	95%	50	2	55	58	25.7		28.2		19.9	UJ	28	UJ	23.6	UJ	15.1	
Potassium	MG/KG	2970	100%	2623	2	58	58	2660	J	1220		1810		1610		1110		628	J
Selenium	MG/KG	2.3	43%	2	2	25	58	1.2		1.5	J	0.56	U	2.1		1.6		0.83	U
Silver	MG/KG	0.25	3%	0.8	0	2	58	0.09	U	0.24	U	0.29	U	0.29	U	0.25	U	0.22	U
Sodium	MG/KG	153	22%	188	0	13	58	16.9	U	50.7	U	153	J	60.4	U	82.7	J	45.7	U
Thallium	MG/KG	2.5	31%	0.855	18	18	58	0.32	U	1	U	1.3	UJ	1.8	J	1.1	UJ	0.94	U
Vanadium	MG/KG	33.1	100%	150	0	58	58	33.1		22.5		24.2		22.8		20.3		11	
Zinc	MG/KG	197	100%	115	5	58	58	77.8		73.1		117	J	110	J	98.8	J	52.5	J

TABLE 4-O
CLASS III CHEMICAL DATA-SURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12-37		MW12-40		SS12-19		SS12-20		SS12-21		SS12-22	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123210		123121		123104		123214		123215		123216	
SAMPLE DEPTH TO TOP OF SAMPLE								0		0		0		0		0		0	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.2		0.2		0.2		0.2		0.2		0.2	
SAMPLE DATE								01-Nov-98		14-Oct-98		13-Oct-98		03-Nov-98		03-Nov-98		03-Nov-98	
QC CODE								SA		SA		SA		SA		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
VOLATILE ORGANICS																			
Acetone	UG/KG	55	29%	200	0	17	58	15		12	U	12	U	5	J	13	UJ	12	UJ
Toluene	UG/KG	14	10%	1500	0	6	58	12	U	12	U	12	UJ	14	U	13	U	12	U
SEMI VOLATILE ORGANICS																			
2-Methylnaphthalene	UG/KG	160	10%	36400	0	6	58	36	J	86	U	8.9	J	88	UJ	88	UJ	81	UJ
2-Methylphenol	UG/KG	36	3%	100	0	2	58	390	U	86	U	78	U	88	U	88	U	81	U
4-Methylphenol	UG/KG	930	7%	900	1	4	58	390	U	86	U	78	U	88	U	88	U	81	U
Acenaphthene	UG/KG	1200	9%	50000	0	5	58	280	J	86	U	73	J	88	UJ	88	UJ	81	UJ
Acenaphthylene	UG/KG	22	5%	41000	0	3	58	390	U	86	U	78	U	88	UJ	88	UJ	81	UJ
Anthracene	UG/KG	1500	16%	50000	0	9	58	270	J	86	U	84		88	UJ	88	UJ	81	UJ
Benzo(a)anthracene	UG/KG	3500	72%	224	3	42	58	**980**		6	J	220		8	J	7.6	J	81	UJ
Benzo(a)pyrene	UG/KG	3200	78%	61	5	45	58	**890**		86	U	**180**	J	10	J	9.6	J	81	UJ
Benzo(b)fluoranthene	UG/KG	2800	90%	1100	1	52	58	870		86	U	190		13	J	11	J	4.5	J
Benzo(ghi)perylene	UG/KG	2000	57%	50000	0	33	58	520		86	UJ	96		7.4	J	8.3	J	81	U
Benzo(k)fluoranthene	UG/KG	2900	78%	1100	1	45	58	900		86	U	180		10	J	10	J	81	U
Bis(2-Ethylhexyl)phthalate	UG/KG	10000	14%	50000	0	8	58	390	UJ	86	U	78	U	7.6	J	7.1	J	81	UJ
Butylbenzylphthalate	UG/KG	23	3%	50000	0	2	58	390	UJ	86	U	78	U	88	UJ	88	UJ	81	UJ
Carbazole	UG/KG	1100	22%		0	13	58	260	J	86	UJ	94	J	88	UJ	88	UJ	81	UJ
Chrysene	UG/KG	3600	93%	400	3	54	58	**1000**		17	J	250		11	J	11	J	81	UJ
Di-n-butylphthalate	UG/KG	23	55%	8100	0	32	58	390	U	86	U	78	U	7	J	6.7	J	5.5	J
Di-n-octylphthalate	UG/KG	15	3%	50000	0	2	58	390	U	15	J	78	U	88	U	88	U	81	U
Dibenz(a,h)anthracene	UG/KG	680	17%	14	5	10	58	**190**	J	86	UJ	**40**	J	88	U	88	U	81	U
Dibenzofuran	UG/KG	500	9%	6200	0	5	58	110	J	86	U	25	J	88	UJ	88	UJ	81	UJ
Diethyl phthalate	UG/KG	92	5%	7100	0	3	58	390	U	86	U	78	U	88	UJ	88	UJ	81	UJ
Fluoranthene	UG/KG	8500	97%	50000	0	56	58	2200		19	J	490		19	J	19	J	5.8	J
Fluorene	UG/KG	830	9%	50000	0	5	58	190	J	86	U	48	J	88	U	88	U	81	U
Indeno(1,2,3-cd)pyrene	UG/KG	1700	57%	3200	0	33	58	500		86	UJ	94		7.3	J	9.2	J	81	U
Naphthalene	UG/KG	540	9%	13000	0	5	58	100	J	86	U	20	J	88	UJ	88	UJ	81	UJ
Phenanthrene	UG/KG	7500	86%	50000	0	50	58	1800		9.6	J	500		11	J	9.6	J	81	U
Phenol	UG/KG	42	29%	30	2	17	58	390	U	86	U	78	U	88	U	88	U	81	U
Pyrene	UG/KG	7000	93%	50000	0	54	58	2200		15	J	370		16	J	15	J	5.4	J
PESTICIDES/PCBS																			
4,4'-DDD	UG/KG	51	10%	2900	0	6	58	3.9	U	4.3	U	3.9	U	4.4	U	4.4	U	4.1	U
4,4'-DDE	UG/KG	5	12%	2100	0	7	58	3.1	J	4.3	U	3.9	U	4.4	U	4.4	U	4.1	U
4,4'-DDT	UG/KG	5.1	10%	2100	0	6	58	3.5	J	4.3	U	5.1		4.4	U	4.4	U	4.1	U
Alpha-BHC	UG/KG	51	5%	110	0	3	58	2	U	2.2	U	2	U	2.3	U	2.3	U	2.1	U
Alpha-Chlordane	UG/KG	2.8	3%		0	2	58	2	U	2.2	U	2	U	2.3	U	2.3	U	2.1	U

TABLE 4-O
CLASS III CHEMICAL DATA-SURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12-37		MW12-40		SS12-19		SS12-20		SS12-21		SS12-22	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123210		123121		123104		123214		123215		123216	
SAMPLE DEPTH TO TOP OF SAMPLE								0		0		0		0		0		0	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.2		0.2		0.2		0.2		0.2		0.2	
SAMPLE DATE								01-Nov-98		14-Oct-98		13-Oct-98		03-Nov-98		03-Nov-98		03-Nov-98	
QC CODE								SA		SA		SA		SA		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Aroclor-1254	UG/KG	64	2%	10000	0	1	58	39	U	43	U	64		44	U	44	U	41	U
Beta-BHC	UG/KG	6.1	5%	200	0	3	58	2	U	2.2	U	2	U	2.3	U	2.3	U	2.1	U
Dieldrin	UG/KG	3.2	2%	44	0	1	58	3.9	U	4.3	U	3.9	U	4.4	U	4.4	U	4.1	U
Endosulfan I	UG/KG	1.9	3%	900	0	2	58	2	U	2.2	U	2	U	2.3	U	2.3	U	2.1	U
Endosulfan II	UG/KG	3	3%	900	0	2	58	3.9	U	4.3	U	3.9	U	4.4	U	4.4	U	4.1	U
Endosulfan sulfate	UG/KG	5.6	5%	1000	0	3	58	3.5	J	4.3	U	3.9	U	4.4	U	4.4	U	4.1	U
Endrin	UG/KG	5.8	5%	100	0	3	58	3.9	U	4.3	U	3.9	U	4.4	U	4.4	U	4.1	U
Gamma-BHC/Lindane	UG/KG	17	2%	60	0	1	58	2	U	2.2	U	2	U	2.3	U	2.3	U	2.1	U
Gamma-Chlordane	UG/KG	1.5	3%	540	0	2	58	2	U	2.2	U	2	U	2.3	U	2.3	U	2.1	U
Heptachlor epoxide	UG/KG	6.5	3%	20	0	2	58	5.4	J	2.2	U	2	U	2.3	U	2.3	U	2.1	U
METALS																			
Aluminum	MG/KG	18700	100%	19520	0	58	58	6610		13500	J	10300		13800		13800		12200	
Antimony	MG/KG	1.6	3%	6	0	2	58	0.96	UJ	1	R	1.4	R	1.3	UJ	1.3	UJ	1.1	UJ
Arsenic	MG/KG	6.2	100%	8.9	0	58	58	2.6		4.3	J	2.7		3.6		3.3		3	
Barium	MG/KG	146	100%	300	0	58	58	40.4		80		58.1		100		106		50.5	
Beryllium	MG/KG	0.96	100%	1.13	0	58	58	0.23	J	0.56	J	0.45	J	0.63	J	0.65	J	0.5	J
Cadmium	MG/KG	0.86	2%	2.46	0	1	58	0.05	U	0.05	U	0.07	U	0.06	U	0.06	U	0.06	U
Calcium	MG/KG	154000	100%	125300	1	58	58	34200		13200	J	53100	J	4600		4880		3170	
Chromium	MG/KG	26.8	100%	30	0	58	58	13.5		22.3		18.7		19.7		19.2		18.4	
Cobalt	MG/KG	17.1	100%	30	0	58	58	6.5	J	12.9		9.7	J	10.9		9.9	J	10	
Copper	MG/KG	35.4	100%	33	3	58	58	15.6		24.3		25		21.9		20.7		22.1	
Cyanide	MG/KG	1.4	2%	0.35	1	1	58	0.64	U	0.69	U	0.61	U	0.69	U	0.65	U	0.62	U
Iron	MG/KG	31500	100%	37410	0	58	58	14000	J	30900		21700	J	23200	J	22800	J	23500	J
Lead	MG/KG	43.8	100%	24.4	16	58	58	**24.8**	J	18.3	J	19.4		**25.6**		**24.8**		20.3	
Magnesium	MG/KG	15700	100%	21700	0	58	58	10600		5710	J	5860		3800		4120		3990	
Manganese	MG/KG	2370	100%	1100	4	58	58	423	J	475		393		667	J	456	J	333	J
Mercury	MG/KG	0.17	53%	0.1	6	31	58	0.05	U	0.06	U	0.07	J	0.1	J	0.06	U	0.06	J
Nickel	MG/KG	57.4	95%	50	2	55	58	16.1		40.6	J	33.5		29.2		25.7		28.1	
Potassium	MG/KG	2970	100%	2623	2	58	58	627	J	1320		1210		1380		1940		1200	
Selenium	MG/KG	2.3	43%	2	2	25	58	0.72	U	0.76	J	1	U	0.96	U	0.98	U	0.86	U
Silver	MG/KG	0.25	3%	0.8	0	2	58	0.19	U	0.24	J	0.27	U	0.25	U	0.25	U	0.23	U
Sodium	MG/KG	153	22%	188	0	13	58	39.6	U	68.5	J	121	J	52.5	U	53.5	U	47.3	U
Thallium	MG/KG	2.5	31%	0.855	18	18	58	0.82	U	**1.2**	J	1.2	U	**1.8**	J	**1.1**	J	0.98	U
Vanadium	MG/KG	33.1	100%	150	0	58	58	11.4		21.1		17.3		23.1		25		20.4	
Zinc	MG/KG	197	100%	115	5	58	58	56.9	J	90.6	J	85.1	J	81.2	J	79.2	J	72.9	J

TABLE 4-O
CLASS III CHEMICAL DATA-SURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								SS12-23		SS12-24		SS12-25		SS12-26		SS12-27		SS12-27	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123217		123218		123219		123220		123224		123223	
SAMPLE DEPTH TO TOP OF SAMPLE								0		0		0		0		0		0	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.2		0.2		0.2		0.2		0.2		0.2	
SAMPLE DATE								03-Nov-98		03-Nov-98		03-Nov-98		03-Nov-98		09-Nov-98		04-Nov-98	
QC CODE								SA		SA		SA		SA		DU		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
VOLATILE ORGANICS																			
Acetone	UG/KG	55	29%	200	0	17	58	14	UJ	12	UJ	7	J	11	J	13	UJ	15	UJ
Toluene	UG/KG	14	10%	1500	0	6	58	14	U	12	U	12	U	13	U	13	U	15	U
SEMI VOLATILE ORGANICS																			
2-Methylnaphthalene	UG/KG	160	10%	36400	0	6	58	88	UJ	78	UJ	87	UJ	85	UJ	11	J	6.8	J
2-Methylphenol	UG/KG	36	3%	100	0	2	58	88	U	78	U	87	U	85	U	190	U	96	U
4-Methylphenol	UG/KG	930	7%	900	1	4	58	88	U	78	U	87	U	85	U	190	U	96	U
Acenaphthene	UG/KG	1200	9%	50000	0	5	58	88	UJ	78	UJ	87	UJ	85	UJ	13	J	8.6	J
Acenaphthylene	UG/KG	22	5%	41000	0	3	58	88	UJ	78	UJ	87	UJ	85	UJ	22	J	9.5	J
Anthracene	UG/KG	1500	16%	50000	0	9	58	88	UJ	78	UJ	87	UJ	85	UJ	38	J	28	J
Benzo(a)anthracene	UG/KG	3500	72%	224	3	42	58	10	J	78	UJ	4.4	J	6.5	J	520	UJ	**260**	J
Benzo(a)pyrene	UG/KG	3200	78%	61	5	45	58	14	J	78	UJ	5.6	J	8.2	J	**830**	J	**380**	J
Benzo(b)fluoranthene	UG/KG	2800	90%	1100	1	52	58	20	J	4	J	6.3	J	12	J	1000	J	470	J
Benzo(ghi)perylene	UG/KG	2000	57%	50000	0	33	58	12	J	78	U	87	U	5.7	J	550	J	230	J
Benzo(k)fluoranthene	UG/KG	2900	78%	1100	1	45	58	14	J	78	U	7.4	J	9.4	J	970	J	420	J
Bis(2-Ethylhexyl)phthalate	UG/KG	10000	14%	50000	0	8	58	9.1	J	78	UJ	87	UJ	17	J	190	UJ	96	U
Butylbenzylphthalate	UG/KG	23	3%	50000	0	2	58	88	UJ	78	UJ	87	UJ	85	UJ	190	U	96	U
Carbazole	UG/KG	1100	22%		0	13	58	88	UJ	78	UJ	87	UJ	85	UJ	50	J	54	J
Chrysene	UG/KG	3600	93%	400	3	54	58	17	J	78	UJ	6.7	J	11	J	**760**	J	370	J
Di-n-butylphthalate	UG/KG	23	55%	8100	0	32	58	7.5	J	6	J	4.6	J	7.9	J	190	U	96	U
Di-n-octylphthalate	UG/KG	15	3%	50000	0	2	58	88	U	78	U	87	U	85	U	190	U	96	U
Dibenz(a,h)anthracene	UG/KG	680	17%	14	5	10	58	88	U	78	U	87	U	85	U	**220**	J	**80**	J
Dibenzofuran	UG/KG	500	9%	6200	0	5	58	88	UJ	78	UJ	87	UJ	85	UJ	13	J	8.4	J
Diethyl phthalate	UG/KG	92	5%	7100	0	3	58	88	UJ	78	UJ	87	UJ	85	UJ	190	U	96	U
Fluoranthene	UG/KG	8500	97%	50000	0	56	58	30	J	4.5	J	12	J	16	J	1300	J	720	J
Fluorene	UG/KG	830	9%	50000	0	5	58	88	U	78	U	87	U	85	U	19	J	11	J
Indeno(1,2,3-cd)pyrene	UG/KG	1700	57%	3200	0	33	58	10	J	78	U	4.5	J	6	J	590	J	230	J
Naphthalene	UG/KG	540	9%	13000	0	5	58	88	UJ	78	UJ	87	UJ	85	UJ	190	U	5.5	J
Phenanthrene	UG/KG	7500	86%	50000	0	50	58	15	J	78	U	6	J	7.8	J	320		220	
Phenol	UG/KG	42	29%	30	2	17	58	88	U	78	U	87	U	85	U	190	U	5.4	J
Pyrene	UG/KG	7000	93%	50000	0	54	58	22	J	78	U	8.8	J	13	J	980	J	520	J
PESTICIDES/PCBS																			
4,4'-DDD	UG/KG	51	10%	2900	0	6	58	4.4	U	3.9	U	2.8	J	4.3	UJ	4.7	U	4.8	U
4,4'-DDE	UG/KG	5	12%	2100	0	7	58	4.4	U	3.9	U	4.3	U	4.3	UJ	4.7	U	4.8	U
4,4'-DDT	UG/KG	5.1	10%	2100	0	6	58	4.4	U	3.9	U	4.3	U	4.3	UJ	4.7	U	4.8	U
Alpha-BHC	UG/KG	51	5%	110	0	3	58	2.3	U	2	U	2.2	U	2.2	UJ	2.4	U	2.5	U
Alpha-Chlordane	UG/KG	2.8	3%		0	2	58	2.3	U	2	U	2.2	U	2.2	UJ	2.4	U	2.5	U

TABLE 4-O
CLASS III CHEMICAL DATA-SURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

		FACILITY						SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
		LOCATION ID						SS12-23		SS12-24		SS12-25		SS12-26		SS12-27		SS12-27	
		MATRIX						SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
		SAMPLE ID						123217		123218		123219		123220		123224		123223	
SAMPLE DEPTH TO TOP OF SAMPLE								0		0		0		0		0		0	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.2		0.2		0.2		0.2		0.2		0.2	
		SAMPLE DATE						03-Nov-98		03-Nov-98		03-Nov-98		03-Nov-98		09-Nov-98		04-Nov-98	
		QC CODE						SA		SA		SA		SA		DU		SA	
		STUDY ID						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	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Aroclor-1254	UG/KG	64	2%	10000	0	1	58	44	U	39	U	43	U	43	UJ	47	U	48	U
Beta-BHC	UG/KG	6.1	5%	200	0	3	58	2.3	U	2	U	2.2	U	2.2	UJ	2.4	U	2.5	U
Dieldrin	UG/KG	3.2	2%	44	0	1	58	4.4	U	3.9	U	4.3	U	4.3	UJ	4.7	U	4.8	U
Endosulfan I	UG/KG	1.9	3%	900	0	2	58	2.3	U	2	U	2.2	U	2.2	UJ	2.4	U	2.5	U
Endosulfan II	UG/KG	3	3%	900	0	2	58	4.4	U	3.9	U	4.3	U	4.3	UJ	4.7	U	4.8	U
Endosulfan sulfate	UG/KG	5.6	5%	1000	0	3	58	4.4	U	3.9	U	4.3	U	4.3	UJ	5.4	J	5.6	J
Endrin	UG/KG	5.8	5%	100	0	3	58	4.4	U	3.9	U	3	J	4.3	UJ	4.7	U	4.8	U
Gamma-BHC/Lindane	UG/KG	17	2%	60	0	1	58	2.3	U	2	U	2.2	U	2.2	UJ	2.4	U	2.5	U
Gamma-Chlordane	UG/KG	1.5	3%	540	0	2	58	2.3	U	2	U	2.2	U	2.2	UJ	2.4	U	2.5	U
Heptachlor epoxide	UG/KG	6.5	3%	20	0	2	58	2.3	U	2	U	2.2	U	2.2	UJ	2.4	U	2.5	U
METALS																			
Aluminum	MG/KG	18700	100%	19520	0	58	58	14500		12600		11300		13800		11200		11800	J
Antimony	MG/KG	1.6	3%	6	0	2	58	1.2	UJ	1	UJ	1.3	UJ	1.6	UJ	1.5	UJ	1.7	UJ
Arsenic	MG/KG	6.2	100%	8.9	0	58	58	2		3.1		4		3.7		3.8		4.5	
Barium	MG/KG	146	100%	300	0	58	58	145		75.2		83		88.8		69.7		66.4	
Beryllium	MG/KG	0.96	100%	1.13	0	58	58	0.84	J	0.58	J	0.5	J	0.59	J	0.44	J	0.44	J
Cadmium	MG/KG	0.86	2%	2.46	0	1	58	0.06	U	0.05	U	0.07	U	0.08	U	0.07	U	0.08	U
Calcium	MG/KG	154000	100%	125300	1	58	58	6120		2960		3200		2720		51500		57400	
Chromium	MG/KG	26.8	100%	30	0	58	58	19.6		19.8		18		19.2		19.9		20.4	
Cobalt	MG/KG	17.1	100%	30	0	58	58	8.2	J	12.4		11.1		9.7	J	13.5		12.7	J
Copper	MG/KG	35.4	100%	33	3	58	58	29		23.1		26.7		18.6		28.3		27	
Cyanide	MG/KG	1.4	2%	0.35	1	1	58	0.68	U	0.6	U	0.67	U	0.68	U	0.77	UJ	0.8	UJ
Iron	MG/KG	31500	100%	37410	0	58	58	20400	J	23200	J	22600	J	23900	J	24200	J	22500	J
Lead	MG/KG	43.8	100%	24.4	16	58	58	23.7		16.1	J	22.9	J	26.8	J	20.6		18.1	J
Magnesium	MG/KG	15700	100%	21700	0	58	58	4160		4320		3790		3490		7510		7720	
Manganese	MG/KG	2370	100%	1100	4	58	58	220	J	420	J	659	J	623	J	657		630	
Mercury	MG/KG	0.17	53%	0.1	6	31	58	0.07	J	0.06	U	0.07	J	0.1	J	0.08	J	0.16	J
Nickel	MG/KG	57.4	95%	50	2	55	58	26.8		32.5		33.6		21.5		37.5	J	36.6	J
Potassium	MG/KG	2970	100%	2623	2	58	58	1780		1270		1670		1220	J	1540		2080	
Selenium	MG/KG	2.3	43%	2	2	25	58	0.89	U	0.78	UJ	1	UJ	1.2	UJ	1.4		0.63	J
Silver	MG/KG	0.25	3%	0.8	0	2	58	0.23	U	0.2	U	0.26	U	0.31	U	0.29	U	0.33	U
Sodium	MG/KG	153	22%	188	0	13	58	70.5	J	42.5	U	55	U	65.7	U	60.8	U	116	J
Thallium	MG/KG	2.5	31%	0.855	18	18	58	1	U	1.5	J	1.3	J	1.4	U	1.3	U	2.1	J
Vanadium	MG/KG	33.1	100%	150	0	58	58	23.9		20.5		20		24.9		21		21.6	
Zinc	MG/KG	197	100%	115	5	58	58	74.3	J	58.4	J	82.4	J	59.2	J	107		107	

TABLE 4-O
CLASS III CHEMICAL DATA-SURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								SS12-28		SS12-29		SS12-30		SS12-31		SS12-32		SS12-33	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123225		123226		123227		123228		123229		123230	
SAMPLE DEPTH TO TOP OF SAMPLE								0		0		0		0		0		0	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.2		0.2		0.2		0.2		0.2		0.2	
SAMPLE DATE								09-Nov-98		09-Nov-98		09-Nov-98		09-Nov-98		09-Nov-98		10-Nov-98	
QC CODE								SA		SA		SA		SA		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
VOLATILE ORGANICS																			
Acetone	UG/KG	55	29%	200	0	17	58	13	UJ	17	UJ	14	UJ	12	UJ	14	UJ	14	UJ
Toluene	UG/KG	14	10%	1500	0	6	58	13	U	17	U	14	U	12	U	14	U	14	U
SEMI VOLATILE ORGANICS																			
2-Methylnaphthalene	UG/KG	160	10%	36400	0	6	58	13	R	11	J	81	U	80	U	88	U	87	U
2-Methylphenol	UG/KG	36	3%	100	0	2	58	8.8	R	92	U	81	U	80	U	88	U	87	U
4-Methylphenol	UG/KG	930	7%	900	1	4	58	17	R	92	U	81	U	80	U	88	U	87	U
Acenaphthene	UG/KG	1200	9%	50000	0	5	58	16	R	92	U	81	U	80	U	88	U	87	U
Acenaphthylene	UG/KG	22	5%	41000	0	3	58	15	R	92	U	81	U	80	U	88	U	87	U
Anthracene	UG/KG	1500	16%	50000	0	9	58	16	R	92	U	81	U	80	U	88	U	4.4	J
Benzo(a)anthracene	UG/KG	3500	72%	224	3	42	58	7	J	6.3	J	8	J	80	U	7.5	J	14	J
Benzo(a)pyrene	UG/KG	3200	78%	61	5	45	58	11	J	18	J	8.2	J	80	U	8.7	J	13	J
Benzo(b)fluoranthene	UG/KG	2800	90%	1100	1	52	58	18	J	12	J	9.8	J	5.4	J	9.8	J	15	J
Benzo(ghi)perylene	UG/KG	2000	57%	50000	0	33	58	27	R	37	J	7.3	J	80	U	12	J	10	J
Benzo(k)fluoranthene	UG/KG	2900	78%	1100	1	45	58	26	R	10	J	10	J	5.1	J	13	J	15	J
Bis(2-Ethylhexyl)phthalate	UG/KG	10000	14%	50000	0	8	58	80	UJ	92	UJ	81	UJ	80	UJ	88	UJ	87	UJ
Butylbenzylphthalate	UG/KG	23	3%	50000	0	2	58	19	R	92	UJ	81	UJ	80	UJ	88	UJ	87	UJ
Carbazole	UG/KG	1100	22%		0	13	58	34	R	92	U	81	U	80	U	88	U	5.8	J
Chrysene	UG/KG	3600	93%	400	3	54	58	26	J	13	J	11	J	6.3	J	12	J	17	J
Di-n-butylphthalate	UG/KG	23	55%	8100	0	32	58	24	R	4.8	J	81	U	80	U	6.1	J	4.4	J
Di-n-octylphthalate	UG/KG	15	3%	50000	0	2	58	19	R	92	UJ	81	UJ	80	U	88	UJ	87	UJ
Dibenz(a,h)anthracene	UG/KG	680	17%	14	5	10	58	24	R	92	U	81	U	80	UJ	88	U	87	U
Dibenzofuran	UG/KG	500	9%	6200	0	5	58	15	R	92	U	81	U	80	U	88	U	87	U
Diethyl phthalate	UG/KG	92	5%	7100	0	3	58	19	R	92	U	81	U	80	U	88	U	87	U
Fluoranthene	UG/KG	8500	97%	50000	0	56	58	16	J	15	J	19	J	9.7	J	20	J	35	J
Fluorene	UG/KG	830	9%	50000	0	5	58	16	R	92	U	81	U	80	U	88	U	87	U
Indeno(1,2,3-cd)pyrene	UG/KG	1700	57%	3200	0	33	58	27	R	12	J	6.8	J	80	U	8.1	J	11	J
Naphthalene	UG/KG	540	9%	13000	0	5	58	12	R	7.3	J	81	U	80	U	88	U	87	U
Phenanthrene	UG/KG	7500	86%	50000	0	50	58	9.3	J	13	J	11	J	5.2	J	10	J	23	J
Phenol	UG/KG	42	29%	30	2	17	58	23	J	38	J	81	U	80	U	17	J	87	U
Pyrene	UG/KG	7000	93%	50000	0	54	58	12	J	15	J	16	J	7.4	J	16	J	27	J
PESTICIDES/PCBS																			
4,4'-DDD	UG/KG	51	10%	2900	0	6	58	4	U	51		4.1	U	4	U	4.4	U	23	
4,4'-DDE	UG/KG	5	12%	2100	0	7	58	4	U	4.6	U	4.1	U	4	U	4.4	U	4.3	U
4,4'-DDT	UG/KG	5.1	10%	2100	0	6	58	4	U	4.6	U	4.1	U	4	U	4.4	U	4.3	U
Alpha-BHC	UG/KG	51	5%	110	0	3	58	2.1	U	2.4	U	2.1	U	2.1	U	2.3	U	2.2	U
Alpha-Chlordane	UG/KG	2.8	3%		0	2	58	2.1	U	2.8		2.1	U	2.1	U	2.3	U	2.2	U

TABLE 4-O
CLASS III CHEMICAL DATA-SURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								SS12-28		SS12-29		SS12-30		SS12-31		SS12-32		SS12-33	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123225		123226		123227		123228		123229		123230	
SAMPLE DEPTH TO TOP OF SAMPLE								0		0		0		0		0		0	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.2		0.2		0.2		0.2		0.2		0.2	
SAMPLE DATE								09-Nov-98		09-Nov-98		09-Nov-98		09-Nov-98		09-Nov-98		10-Nov-98	
QC CODE								SA		SA		SA		SA		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Aroclor-1254	UG/KG	64	2%	10000	0	1	58	40	U	46	U	41	U	40	U	44	U	43	U
Beta-BHC	UG/KG	6.1	5%	200	0	3	58	2.1	U	2.4	U	2.1	U	2.1	U	2.3	U	2.2	U
Dieldrin	UG/KG	3.2	2%	44	0	1	58	4	U	3.2	J	4.1	U	4	U	4.4	U	4.3	U
Endosulfan I	UG/KG	1.9	3%	900	0	2	58	2.1	U	1.9	J	2.1	U	2.1	U	2.3	U	2.2	U
Endosulfan II	UG/KG	3	3%	900	0	2	58	4	U	4.6	U	4.1	U	4	U	4.4	U	4.3	U
Endosulfan sulfate	UG/KG	5.6	5%	1000	0	3	58	4	U	4.6	U	4.1	U	4	U	4.4	U	4.3	U
Endrin	UG/KG	5.8	5%	100	0	3	58	4	U	5.8	J	4.1	U	4	U	4.4	U	3.3	J
Gamma-BHC/Lindane	UG/KG	17	2%	60	0	1	58	2.1	U	2.4	U	2.1	U	2.1	U	2.3	U	2.2	U
Gamma-Chlordane	UG/KG	1.5	3%	540	0	2	58	2.1	U	1.5	J	2.1	U	2.1	U	2.3	U	2.2	U
Heptachlor epoxide	UG/KG	6.5	3%	20	0	2	58	2.1	U	2.4	U	2.1	U	2.1	U	2.3	U	2.2	U
METALS																			
Aluminum	MG/KG	18700	100%	19520	0	58	58	15800		14900		16300		11000		14000		8670	
Antimony	MG/KG	1.6	3%	6	0	2	58	1.4	J	1.6	J	1.4	UJ	1.3	UJ	1.6	UJ	1.4	UJ
Arsenic	MG/KG	6.2	100%	8.9	0	58	58	4.3		4		6.2		5.2		3.7		3.6	
Barium	MG/KG	146	100%	300	0	58	58	93.7		107		104		66.3		111		73.4	
Beryllium	MG/KG	0.96	100%	1.13	0	58	58	0.57	J	0.64	J	0.47	J	0.5	J	0.66	J	0.39	J
Cadmium	MG/KG	0.86	2%	2.46	0	1	58	0.07	U	0.08	U	0.07	U	0.06	U	0.08	U	0.07	U
Calcium	MG/KG	154000	100%	125300	1	58	58	16800		4810		2060		15500		3100		3480	
Chromium	MG/KG	26.8	100%	30	0	58	58	25.1		19.1		20.6		18.9		21.1		13.1	
Cobalt	MG/KG	17.1	100%	30	0	58	58	13		7.1	J	13.1		11.6		10.1	J	8.4	J
Copper	MG/KG	35.4	100%	33	3	58	58	25.2		18.4		15.9		30.2		20.3		17.1	
Cyanide	MG/KG	1.4	2%	0.35	1	1	58	0.63	UJ	0.77	UJ	1.4	J	0.66	UJ	0.68	UJ	0.68	UJ
Iron	MG/KG	31500	100%	37410	0	58	58	28800		20400		26600		24500		25000		17100	
Lead	MG/KG	43.8	100%	24.4	16	58	58	15.4		21.4		19.9		20		21.4		17.8	
Magnesium	MG/KG	15700	100%	21700	0	58	58	7180		3400		3460		6580		4050		2760	
Manganese	MG/KG	2370	100%	1100	4	58	58	567		420		1010		463		446		521	
Mercury	MG/KG	0.17	53%	0.1	6	31	58	0.05	J	0.1	J	0.07	J	0.06	UJ	0.07	UJ	0.06	UJ
Nickel	MG/KG	57.4	95%	50	2	55	58	39.2	J	21	J	19	J	35.5	J	25.5	J	17.3	J
Potassium	MG/KG	2970	100%	2623	2	58	58	2420		1940		1510		1240		1350		1070	J
Selenium	MG/KG	2.3	43%	2	2	25	58	1.1	U	1.2	U	1.1	U	0.99	U	1.2	U	1.1	U
Silver	MG/KG	0.25	3%	0.8	0	2	58	0.28	U	0.32	U	0.27	U	0.26	U	0.31	U	0.28	U
Sodium	MG/KG	153	22%	188	0	13	58	72.1	J	67.4	U	57.7	U	54.3	U	65.4	U	57.8	U
Thallium	MG/KG	2.5	31%	0.855	18	18	58	1.2	U	1.4	U	1.2	U	1.1	U	1.3	U	1.2	U
Vanadium	MG/KG	33.1	100%	150	0	58	58	24.1		24.2		29.9		19		22		16.2	
Zinc	MG/KG	197	100%	115	5	58	58	94.4		88		66.3		81.2		66.3		46.2	

TABLE 4-O
CLASS III CHEMICAL DATA-SURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

		FACILITY						SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
		LOCATION ID						SS12-34		SS12-35		SS12-36		SS12-37		SS12-38		SS12-39	
		MATRIX						SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
		SAMPLE ID						123231		123232		123233		123234		123235		123236	
SAMPLE DEPTH TO TOP OF SAMPLE								0		0		0		0		0		0	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.2		0.2		0.2		0.2		0.2		0.2	
		SAMPLE DATE						09-Nov-98		09-Nov-98		10-Nov-98		09-Nov-98		10-Nov-98		09-Nov-98	
		QC CODE						SA		SA		SA		SA		SA		SA	
		STUDY ID						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	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
VOLATILE ORGANICS																			
Acetone	UG/KG	55	29%	200	0	17	58	15	J	12	UJ	13	UJ	15	UJ	8	J	14	UJ
Toluene	UG/KG	14	10%	1500	0	6	58	13	U	12	U	13	U	15	U	15	U	14	U
SEMI VOLATILE ORGANICS																			
2-Methylnaphthalene	UG/KG	160	10%	36400	0	6	58	90	U	94	U	86	U	100	U	100	U	87	U
2-Methylphenol	UG/KG	36	3%	100	0	2	58	90	U	94	U	86	U	100	U	100	U	87	U
4-Methylphenol	UG/KG	930	7%	900	1	4	58	90	U	94	U	86	U	100	U	100	U	87	U
Acenaphthene	UG/KG	1200	9%	50000	0	5	58	90	U	94	U	86	U	100	U	100	U	87	U
Acenaphthylene	UG/KG	22	5%	41000	0	3	58	90	U	94	U	86	U	100	U	100	U	87	U
Anthracene	UG/KG	1500	16%	50000	0	9	58	90	U	94	U	86	U	100	U	100	U	87	U
Benzo(a)anthracene	UG/KG	3500	72%	224	3	42	58	6.6	J	5.9	J	86	U	7.4	J	17	J	7.4	J
Benzo(a)pyrene	UG/KG	3200	78%	61	5	45	58	8	J	8	J	4.8	J	12	J	21	J	9.4	J
Benzo(b)fluoranthene	UG/KG	2800	90%	1100	1	52	58	8.9	J	8	J	6.3	J	10	J	26	J	9.9	J
Benzo(ghi)perylene	UG/KG	2000	57%	50000	0	33	58	90	U	19	J	86	U	30	J	22	J	18	J
Benzo(k)fluoranthene	UG/KG	2900	78%	1100	1	45	58	8.3	J	8.6	J	5.9	J	11	J	21	J	9	J
Bis(2-Ethylhexyl)phthalate	UG/KG	10000	14%	50000	0	8	58	90	UJ	94	UJ	95	J	100	UJ	10000		87	UJ
Butylbenzylphthalate	UG/KG	23	3%	50000	0	2	58	90	UJ	94	UJ	86	UJ	100	UJ	9.5	J	87	UJ
Carbazole	UG/KG	1100	22%		0	13	58	90	U	94	U	86	U	100	U	14	J	87	U
Chrysene	UG/KG	3600	93%	400	3	54	58	9.4	J	8.3	J	5.8	J	11	J	23	J	10	J
Di-n-butylphthalate	UG/KG	23	55%	8100	0	32	58	6.1	J	94	U	86	U	6.7	J	12	J	4.6	J
Di-n-octylphthalate	UG/KG	15	3%	50000	0	2	58	90	UJ	94	UJ	86	UJ	100	UJ	100	UJ	87	UJ
Dibenz(a,h)anthracene	UG/KG	680	17%	14	5	10	58	90	U	94	U	86	U	100	U	14	J	87	U
Dibenzofuran	UG/KG	500	9%	6200	0	5	58	90	U	94	U	86	U	100	U	100	U	87	U
Diethyl phthalate	UG/KG	92	5%	7100	0	3	58	90	U	94	U	86	U	100	U	5.4	J	87	U
Fluoranthene	UG/KG	8500	97%	50000	0	56	58	16	J	14	J	9.9	J	18	J	32	J	19	J
Fluorene	UG/KG	830	9%	50000	0	5	58	90	U	94	U	86	U	100	U	100	U	87	U
Indeno(1,2,3-cd)pyrene	UG/KG	1700	57%	3200	0	33	58	90	U	6	J	86	U	9.2	J	21	J	6.8	J
Naphthalene	UG/KG	540	9%	13000	0	5	58	90	U	94	U	86	U	100	U	100	U	87	U
Phenanthrene	UG/KG	7500	86%	50000	0	50	58	9	J	8.4	J	6	J	10	J	17	J	9.2	J
Phenol	UG/KG	42	29%	30	2	17	58	90	U	94	U	11	J	100	U	100	U	87	U
Pyrene	UG/KG	7000	93%	50000	0	54	58	13	J	11	J	8.7	J	16	J	28	J	14	J
PESTICIDES/PCBS																			
4,4'-DDD	UG/KG	51	10%	2900	0	6	58	4	J	4.7	U	4.3	U	5.2	U	5	U	18	
4,4'-DDE	UG/KG	5	12%	2100	0	7	58	4.5	U	4.7	U	4.3	U	5.2	U	5	U	4.3	U
4,4'-DDT	UG/KG	5.1	10%	2100	0	6	58	4.5	U	4.7	U	4.3	U	5.2	U	5	U	2.2	J
Alpha-BHC	UG/KG	51	5%	110	0	3	58	2.3	U	2.4	U	2.2	U	2.6	U	2.6	U	2.2	U
Alpha-Chlordane	UG/KG	2.8	3%		0	2	58	2.3	U	2.4	U	2.2	U	2.6	U	2.6	U	2.2	U

TABLE 4-O
CLASS III CHEMICAL DATA-SURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								SS12-34		SS12-35		SS12-36		SS12-37		SS12-38		SS12-39	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123231		123232		123233		123234		123235		123236	
SAMPLE DEPTH TO TOP OF SAMPLE								0		0		0		0		0		0	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.2		0.2		0.2		0.2		0.2		0.2	
SAMPLE DATE								09-Nov-98		09-Nov-98		10-Nov-98		09-Nov-98		10-Nov-98		09-Nov-98	
QC CODE								SA		SA		SA		SA		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Aroclor-1254	UG/KG	64	2%	10000	0	1	58	45	U	47	U	43	U	52	U	50	U	43	U
Beta-BHC	UG/KG	6.1	5%	200	0	3	58	2.3	U	2.4	U	2.2	U	2.6	U	2.6	U	2.2	U
Dieldrin	UG/KG	3.2	2%	44	0	1	58	4.5	U	4.7	U	4.3	U	5.2	U	5	U	4.3	U
Endosulfan I	UG/KG	1.9	3%	900	0	2	58	2.3	U	2.4	U	2.2	U	2.6	U	2.6	U	2.2	U
Endosulfan II	UG/KG	3	3%	900	0	2	58	2.7	J	4.7	U	4.3	U	5.2	U	5	U	3	J
Endosulfan sulfate	UG/KG	5.6	5%	1000	0	3	58	4.5	U	4.7	U	4.3	U	5.2	U	5	U	4.3	U
Endrin	UG/KG	5.8	5%	100	0	3	58	4.5	U	4.7	U	4.3	U	5.2	U	5	U	4.3	U
Gamma-BHC/Lindane	UG/KG	17	2%	60	0	1	58	2.3	U	2.4	U	2.2	U	2.6	U	2.6	U	2.2	U
Gamma-Chlordane	UG/KG	1.5	3%	540	0	2	58	2.3	U	2.4	U	2.2	U	2.6	U	2.6	U	2.2	U
Heptachlor epoxide	UG/KG	6.5	3%	20	0	2	58	2.3	U	2.4	U	2.2	U	2.6	U	2.6	U	2.2	U
METALS																			
Aluminum	MG/KG	18700	100%	19520	0	58	58	11900		11600	J	12200	J	11200	J	14200	J	11300	J
Antimony	MG/KG	1.6	3%	6	0	2	58	1.5	UJ	1.7	UJ	1.3	UJ	1.8	UJ	1.7	R	1.3	UJ
Arsenic	MG/KG	6.2	100%	8.9	0	58	58	4.7		3		4.5		2.1	J	4.9		3.9	
Barium	MG/KG	146	100%	300	0	58	58	112		101		107		126		137		94.7	
Beryllium	MG/KG	0.96	100%	1.13	0	58	58	0.57	J	0.74	J	0.11	J	0.6	J	0.57	J	0.48	J
Cadmium	MG/KG	0.86	2%	2.46	0	1	58	0.08	U	0.08	U	0.06	U	0.09	U	0.08	U	0.06	U
Calcium	MG/KG	154000	100%	125300	1	58	58	4110		5270		2420		7560		7850		3240	
Chromium	MG/KG	26.8	100%	30	0	58	58	18.6		16.4		15.5		13.6		21.3		16.3	
Cobalt	MG/KG	17.1	100%	30	0	58	58	10.3	J	5.3	J	10.6		4	J	10.3	J	9.3	J
Copper	MG/KG	35.4	100%	33	3	58	58	18.3		17.5		13.8		15.5		16		18.2	
Cyanide	MG/KG	1.4	2%	0.35	1	1	58	0.73	UJ	0.72	UJ	0.68	UJ	0.8	UJ	0.86	U	0.67	UJ
Iron	MG/KG	31500	100%	37410	0	58	58	22600		15500		21300		14200		29400	J	19400	
Lead	MG/KG	43.8	100%	24.4	16	58	58	18.7		21.5		17.6		19.8		25.8	J	18.3	
Magnesium	MG/KG	15700	100%	21700	0	58	58	3540		2800		2830		2650		4060		3220	
Manganese	MG/KG	2370	100%	1100	4	58	58	730		272		2020		90		633		665	
Mercury	MG/KG	0.17	53%	0.1	6	31	58	0.06	J	0.08	UJ	0.07	UJ	0.07	UJ	0.11	J	0.06	UJ
Nickel	MG/KG	57.4	95%	50	2	55	58	25.4	J	18.4	J	18.5	J	16.1	J	25.3		21.7	J
Potassium	MG/KG	2970	100%	2623	2	58	58	1280		1030	J	977	J	811	J	1820		1130	
Selenium	MG/KG	2.3	43%	2	2	25	58	1.3	J	1.3	U	1.3		1.7		1.8	J	0.98	U
Silver	MG/KG	0.25	3%	0.8	0	2	58	0.3	U	0.33	U	0.25	U	0.35	U	0.34	U	0.26	U
Sodium	MG/KG	153	22%	188	0	13	58	63.6	U	68.7	U	51.7	U	73.4	U	70.9	U	53.8	U
Thallium	MG/KG	2.5	31%	0.855	18	18	58	1.3	U	1.4	UJ	1.7	J	1.5	UJ	1.5	U	1.1	UJ
Vanadium	MG/KG	33.1	100%	150	0	58	58	19.7		17.2		22.6		17.1		23.8		18.9	
Zinc	MG/KG	197	100%	115	5	58	58	64.7		78.8		47.9		51.2		151	J	63.4	

TABLE 4-O
CLASS III CHEMICAL DATA-SURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

		FACILITY						SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
		LOCATION ID						SS12-40		SS12-41		SS12-42		SS12-43		SS12-44		SS12-45	
		MATRIX						SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
		SAMPLE ID						123237		123238		123239		123105		123240		123241	
		SAMPLE DEPTH TO TOP OF SAMPLE						0		0		0		0		0		0	
		SAMPLE DEPTH TO BOTTOM OF SAMPLE						0.2		0.2		0.2		0.2		0.2		0.2	
		SAMPLE DATE						09-Nov-98		10-Nov-98		09-Nov-98		13-Oct-98		10-Nov-98		09-Nov-98	
		QC CODE						SA		SA		SA		SA		SA		SA	
		STUDY ID						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	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
VOLATILE ORGANICS																			
Acetone	UG/KG	55	29%	200	0	17	58	13	J	13	U	12	UJ	14	U	7	J	11	U
Toluene	UG/KG	14	10%	1500	0	6	58	13	U	13	U	12	U	14	U	15	UJ	11	U
SEMI VOLATILE ORGANICS																			
2-Methylnaphthalene	UG/KG	160	10%	36400	0	6	58	87	U	84	U	80	U	100	U	96	U	80	U
2-Methylphenol	UG/KG	36	3%	100	0	2	58	87	U	84	U	80	U	100	U	96	U	80	U
4-Methylphenol	UG/KG	930	7%	900	1	4	58	87	U	84	U	80	U	100	U	96	U	80	U
Acenaphthene	UG/KG	1200	9%	50000	0	5	58	87	U	84	U	80	U	100	U	96	U	80	U
Acenaphthylene	UG/KG	22	5%	41000	0	3	58	87	U	84	U	80	U	100	U	96	U	80	U
Anthracene	UG/KG	1500	16%	50000	0	9	58	87	U	84	U	80	U	100	U	96	U	80	U
Benzo(a)anthracene	UG/KG	3500	72%	224	3	42	58	7.9	J	11	J	80	U	5.8	J	9.4	J	12	J
Benzo(a)pyrene	UG/KG	3200	78%	61	5	45	58	9.3	J	14	J	80	U	10	J	11	J	14	J
Benzo(b)fluoranthene	UG/KG	2800	90%	1100	1	52	58	11	J	23	J	80	U	12	J	14	J	17	J
Benzo(ghi)perylene	UG/KG	2000	57%	50000	0	33	58	10	J	15	J	9.5	J	100	U	9.6	J	80	UJ
Benzo(k)fluoranthene	UG/KG	2900	78%	1100	1	45	58	12	J	14	J	80	U	11	J	13	J	16	J
Bis(2-Ethylhexyl)phthalate	UG/KG	10000	14%	50000	0	8	58	87	UJ	84	UJ	80	UJ	100	U	96	UJ	80	UJ
Butylbenzylphthalate	UG/KG	23	3%	50000	0	2	58	87	UJ	84	UJ	80	UJ	100	U	96	UJ	80	UJ
Carbazole	UG/KG	1100	22%		0	13	58	87	UJ	7.6	J	80	U	100	UJ	96	U	80	UJ
Chrysene	UG/KG	3600	93%	400	3	54	58	11	J	19	J	4.6	J	12	J	15	J	16	J
Di-n-butylphthalate	UG/KG	23	55%	8100	0	32	58	6.7	J	10	J	5.4	J	100	U	96	U	9.4	J
Di-n-octylphthalate	UG/KG	15	3%	50000	0	2	58	87	UJ	84	UJ	80	UJ	100	U	96	UJ	80	UJ
Dibenz(a,h)anthracene	UG/KG	680	17%	14	5	10	58	87	UJ	6	J	80	U	100	U	96	U	80	UJ
Dibenzofuran	UG/KG	500	9%	6200	0	5	58	87	U	84	U	80	U	100	U	96	U	80	U
Diethyl phthalate	UG/KG	92	5%	7100	0	3	58	87	U	84	U	80	U	100	U	96	U	80	U
Fluoranthene	UG/KG	8500	97%	50000	0	56	58	21	J	33	J	7	J	14	J	24	J	28	J
Fluorene	UG/KG	830	9%	50000	0	5	58	87	U	84	U	80	U	100	U	96	U	80	U
Indeno(1,2,3-cd)pyrene	UG/KG	1700	57%	3200	0	33	58	9.7	J	14	J	80	U	100	U	9	J	80	UJ
Naphthalene	UG/KG	540	9%	13000	0	5	58	87	U	84	U	80	U	100	U	96	U	80	U
Phenanthrene	UG/KG	7500	86%	50000	0	50	58	10	J	17	J	4.4	J	8.5	J	13	J	13	J
Phenol	UG/KG	42	29%	30	2	17	58	87	U	84	U	80	U	100	U	96	U	13	J
Pyrene	UG/KG	7000	93%	50000	0	54	58	17	J	23	J	5.6	J	17	J	19	J	24	J
PESTICIDES/PCBS																			
4,4'-DDD	UG/KG	51	10%	2900	0	6	58	12	J	4.2	U	4	U	5	U	4.8	U	4	U
4,4'-DDE	UG/KG	5	12%	2100	0	7	58	4.3	U	2.3	J	4	U	5	U	2.4	J	4	U
4,4'-DDT	UG/KG	5.1	10%	2100	0	6	58	4.3	U	4.2	U	4	U	5	U	4.8	U	4	U
Alpha-BHC	UG/KG	51	5%	110	0	3	58	2.2	U	2.2	U	2.1	U	2.6	U	2.4	U	2	U
Alpha-Chlordane	UG/KG	2.8	3%		0	2	58	2.2	U	2.2	U	2.1	U	2.6	U	2.4	U	2	U

TABLE 4-O
CLASS III CHEMICAL DATA-SURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								SS12-40		SS12-41		SS12-42		SS12-43		SS12-44		SS12-45	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123237		123238		123239		123105		123240		123241	
SAMPLE DEPTH TO TOP OF SAMPLE								0		0		0		0		0		0	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.2		0.2		0.2		0.2		0.2		0.2	
SAMPLE DATE								09-Nov-98		10-Nov-98		09-Nov-98		13-Oct-98		10-Nov-98		09-Nov-98	
QC CODE								SA		SA		SA		SA		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Aroclor-1254	UG/KG	64	2%	10000	0	1	58	43	U	42	U	40	U	50	U	48	U	40	U
Beta-BHC	UG/KG	6.1	5%	200	0	3	58	2.2	U	2.2	U	2.1	U	2.6	U	2.4	U	2	U
Dieldrin	UG/KG	3.2	2%	44	0	1	58	4.3	U	4.2	U	4	U	5	U	4.8	U	4	U
Endosulfan I	UG/KG	1.9	3%	900	0	2	58	1.6	J	2.2	U	2.1	U	2.6	U	2.4	U	2	U
Endosulfan II	UG/KG	3	3%	900	0	2	58	4.3	U	4.2	U	4	U	5	U	4.8	U	4	U
Endosulfan sulfate	UG/KG	5.6	5%	1000	0	3	58	4.3	U	4.2	U	4	U	5	U	4.8	U	4	U
Endrin	UG/KG	5.8	5%	100	0	3	58	4.3	U	4.2	U	4	U	5	U	4.8	U	4	U
Gamma-BHC/Lindane	UG/KG	17	2%	60	0	1	58	2.2	U	2.2	U	2.1	U	2.6	U	2.4	U	2	U
Gamma-Chlordane	UG/KG	1.5	3%	540	0	2	58	2.2	U	2.2	U	2.1	U	2.6	U	2.4	U	2	U
Heptachlor epoxide	UG/KG	6.5	3%	20	0	2	58	2.2	U	2.2	U	2.1	U	2.6	U	2.4	U	2	U
METALS																			
Aluminum	MG/KG	18700	100%	19520	0	58	58	13000	J	11100	J	13800	J	15600		11400	J	13500	J
Antimony	MG/KG	1.6	3%	6	0	2	58	1.4	R	1.2	R	1.3	UJ	1.4	R	1.6	UJ	1.1	R
Arsenic	MG/KG	6.2	100%	8.9	0	58	58	4.2		4.1		3.9		3.4		3.5		4.2	
Barium	MG/KG	146	100%	300	0	58	58	68.6		129		74		133		99.6		63.7	
Beryllium	MG/KG	0.96	100%	1.13	0	58	58	0.41	J	0.17	J	0.56	J	0.77	J	0.42	J	0.51	J
Cadmium	MG/KG	0.86	2%	2.46	0	1	58	0.07	U	0.06	U	0.06	U	0.07	U	0.08	U	0.06	U
Calcium	MG/KG	154000	100%	125300	1	58	58	2380		3380		18500		8900	J	4270		17400	
Chromium	MG/KG	26.8	100%	30	0	58	58	17.8		14.1		23.4		22.7		14.9		24.1	
Cobalt	MG/KG	17.1	100%	30	0	58	58	9.6	J	11		11.9		8.8	J	8.5	J	13.5	
Copper	MG/KG	35.4	100%	33	3	58	58	18.7		12.7		27		27.6		12.8		33.1	
Cyanide	MG/KG	1.4	2%	0.35	1	1	58	0.75	U	0.67	U	0.62	UJ	0.77	U	0.74	UJ	0.66	U
Iron	MG/KG	31500	100%	37410	0	58	58	20800	J	18800	J	27700		23700	J	19800		29100	J
Lead	MG/KG	43.8	100%	24.4	16	58	58	26.5	J	29.3	J	17		24.9		31.8		22	J
Magnesium	MG/KG	15700	100%	21700	0	58	58	3580		2530		5850		4570		2660		6680	
Manganese	MG/KG	2370	100%	1100	4	58	58	512		1730		502		672		513		573	
Mercury	MG/KG	0.17	53%	0.1	6	31	58	0.09	J	0.12		0.06	UJ	0.17	J	0.06	UJ	0.05	U
Nickel	MG/KG	57.4	95%	50	2	55	58	22.1		21.3		39.2	J	32.7		16.5	J	44	
Potassium	MG/KG	2970	100%	2623	2	58	58	1350		875	J	2060		1260		1060	J	1250	
Selenium	MG/KG	2.3	43%	2	2	25	58	1.3	J	1.9	J	0.95	U	1.3		1.2	U	0.85	U
Silver	MG/KG	0.25	3%	0.8	0	2	58	0.27	U	0.23	U	0.25	U	0.27	U	0.32	U	0.22	U
Sodium	MG/KG	153	22%	188	0	13	58	56.5	U	49.3	U	52.3	U	98	J	66.8	U	58.5	J
Thallium	MG/KG	2.5	31%	0.855	18	18	58	1.6	J	2.5		1.1	UJ	1.3	J	1.4	UJ	0.97	U
Vanadium	MG/KG	33.1	100%	150	0	58	58	21.5		18.8		21.1		22.4		21.8		20	
Zinc	MG/KG	197	100%	115	5	58	58	67.5	J	78.5	J	84.1		197	J	72.6		92.9	J

TABLE 4-O
CLASS III CHEMICAL DATA-SURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								SS12-46		SS12-47		SS12-48		SS12-49		SS12-49		SS12-50	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123242		123243		123244		123245		123246		123247	
SAMPLE DEPTH TO TOP OF SAMPLE								0		0		0		0		0		0	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.2		0.2		0.2		0.2		0.2		0.2	
SAMPLE DATE								09-Nov-98		09-Nov-98		10-Nov-98		10-Nov-98		09-Nov-98		11-Nov-98	
QC CODE								SA		SA		SA		DU		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
VOLATILE ORGANICS																			
Acetone	UG/KG	55	29%	200	0	17	58	12	UJ	14	U	8	J	15	UJ	8	J	16	U
Toluene	UG/KG	14	10%	1500	0	6	58	12	U	14	U	17	U	15	U	14	U	16	U
SEMI VOLATILE ORGANICS																			
2-Methylnaphthalene	UG/KG	160	10%	36400	0	6	58	84	U	85	U	92	U	17	R	180	U	100	U
2-Methylphenol	UG/KG	36	3%	100	0	2	58	84	U	85	U	92	U	16	R	36	J	100	U
4-Methylphenol	UG/KG	930	7%	900	1	4	58	84	U	85	U	92	U	42	R	930		100	U
Acenaphthene	UG/KG	1200	9%	50000	0	5	58	84	U	85	U	92	U	21	R	180	U	100	U
Acenaphthylene	UG/KG	22	5%	41000	0	3	58	84	U	85	U	92	U	19	R	180	U	100	U
Anthracene	UG/KG	1500	16%	50000	0	9	58	4.4	J	85	U	92	U	19	R	180	U	100	U
Benzo(a)anthracene	UG/KG	3500	72%	224	3	42	58	19	J	13	J	11	J	6.7	J	180	U	17	J
Benzo(a)pyrene	UG/KG	3200	78%	61	5	45	58	22	J	15	J	12	J	10	J	180	U	22	J
Benzo(b)fluoranthene	UG/KG	2800	90%	1100	1	52	58	22	J	22	J	18	J	26	J	180	U	28	J
Benzo(ghi)perylene	UG/KG	2000	57%	50000	0	33	58	49	J	13	J	30	J	24	R	180	U	23	J
Benzo(k)fluoranthene	UG/KG	2900	78%	1100	1	45	58	23	J	19	J	12	J	25	R	180	U	23	J
Bis(2-Ethylhexyl)phthalate	UG/KG	10000	14%	50000	0	8	58	84	UJ	85	UJ	110	J	93	UJ	180	U	100	UJ
Butylbenzylphthalate	UG/KG	23	3%	50000	0	2	58	84	UJ	85	UJ	92	UJ	23	J	180	U	100	UJ
Carbazole	UG/KG	1100	22%		0	13	58	84	U	85	UJ	92	U	26	R	180	U	10	J
Chrysene	UG/KG	3600	93%	400	3	54	58	24	J	19	J	16	J	10	J	14	J	29	J
Di-n-butylphthalate	UG/KG	23	55%	8100	0	32	58	6.1	J	7.7	J	8.5	J	28	R	180	U	5.6	J
Di-n-octylphthalate	UG/KG	15	3%	50000	0	2	58	84	UJ	85	UJ	92	U	22	R	180	U	100	UJ
Dibenz(a,h)anthracene	UG/KG	680	17%	14	5	10	58	84	U	6	J	92	U	23	R	180	U	100	UJ
Dibenzofuran	UG/KG	500	9%	6200	0	5	58	84	U	85	U	92	U	19	R	180	U	100	U
Diethyl phthalate	UG/KG	92	5%	7100	0	3	58	84	U	85	U	92	U	22	R	180	U	100	U
Fluoranthene	UG/KG	8500	97%	50000	0	56	58	37	J	35	J	28	J	16	J	20	J	47	J
Fluorene	UG/KG	830	9%	50000	0	5	58	84	U	85	U	92	U	21	R	180	U	100	U
Indeno(1,2,3-cd)pyrene	UG/KG	1700	57%	3200	0	33	58	15	J	14	J	11	J	27	R	180	U	20	J
Naphthalene	UG/KG	540	9%	13000	0	5	58	84	U	85	U	92	U	15	R	180	U	100	U
Phenanthrene	UG/KG	7500	86%	50000	0	50	58	24	J	15	J	13	J	9.8	J	13	J	26	J
Phenol	UG/KG	42	29%	30	2	17	58	14	J	12	J	92	U	38	R	42	J	100	U
Pyrene	UG/KG	7000	93%	50000	0	54	58	32	J	28	J	24	J	14	J	12	J	38	J
PESTICIDES/PCBS																			
4,4'-DDD	UG/KG	51	10%	2900	0	6	58	4.1	U	4.2	U	4.5	U	4.6	U	4.5	U	5.1	U
4,4'-DDE	UG/KG	5	12%	2100	0	7	58	4.1	U	4.2	U	4.5	U	4.6	U	4.5	U	5.1	U
4,4'-DDT	UG/KG	5.1	10%	2100	0	6	58	4.1	U	4.2	U	4.5	U	4.6	U	4.5	U	5.1	U
Alpha-BHC	UG/KG	51	5%	110	0	3	58	2.1	U	2.2	U	2.3	U	2.4	U	2.3	U	2.6	U
Alpha-Chlordane	UG/KG	2.8	3%		0	2	58	2.1	U	2.2	U	2.3	U	2.4	U	2.3	U	2.6	U

TABLE 4-O
CLASS III CHEMICAL DATA-SURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

		FACILITY						SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
		LOCATION ID						SS12-46		SS12-47		SS12-48		SS12-49		SS12-49		SS12-50	
		MATRIX						SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
		SAMPLE ID						123242		123243		123244		123245		123246		123247	
		SAMPLE DEPTH TO TOP OF SAMPLE						0		0		0		0		0		0	
		SAMPLE DEPTH TO BOTTOM OF SAMPLE						0.2		0.2		0.2		0.2		0.2		0.2	
		SAMPLE DATE						09-Nov-98		09-Nov-98		10-Nov-98		10-Nov-98		09-Nov-98		11-Nov-98	
		QC CODE						SA		SA		SA		DU		SA		SA	
		STUDY ID						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	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Aroclor-1254	UG/KG	64	2%	10000	0	1	58	41	U	42	U	45	U	46	U	45	U	51	U
Beta-BHC	UG/KG	6.1	5%	200	0	3	58	2.1	U	2.2	U	2.3	U	2.4	U	2.3	U	2.6	U
Dieldrin	UG/KG	3.2	2%	44	0	1	58	4.1	U	4.2	U	4.5	U	4.6	U	4.5	U	5.1	U
Endosulfan I	UG/KG	1.9	3%	900	0	2	58	2.1	U	2.2	U	2.3	U	2.4	U	2.3	U	2.6	U
Endosulfan II	UG/KG	3	3%	900	0	2	58	4.1	U	4.2	U	4.5	U	4.6	U	4.5	U	5.1	U
Endosulfan sulfate	UG/KG	5.6	5%	1000	0	3	58	4.1	U	4.2	U	4.5	U	4.6	U	4.5	U	5.1	U
Endrin	UG/KG	5.8	5%	100	0	3	58	4.1	U	4.2	U	4.5	U	4.6	U	4.5	U	5.1	U
Gamma-BHC/Lindane	UG/KG	17	2%	60	0	1	58	2.1	U	2.2	U	2.3	U	2.4	U	2.3	U	2.6	U
Gamma-Chlordane	UG/KG	1.5	3%	540	0	2	58	2.1	U	2.2	U	2.3	U	2.4	U	2.3	U	2.6	U
Heptachlor epoxide	UG/KG	6.5	3%	20	0	2	58	2.1	U	2.2	U	2.3	U	2.4	U	2.3	U	2.6	U
METALS																			
Aluminum	MG/KG	18700	100%	19520	0	58	58	13600	J	12100	J	15900	J	12100		17000	J	15600	J
Antimony	MG/KG	1.6	3%	6	0	2	58	1.1	UJ	1.4	R	1.6	UJ	1.5	UJ	1.3	R	1.9	R
Arsenic	MG/KG	6.2	100%	8.9	0	58	58	3.1		3.8		5.7		3.7		4.4		4.1	
Barium	MG/KG	146	100%	300	0	58	58	100		102		146		132		131		143	
Beryllium	MG/KG	0.96	100%	1.13	0	58	58	0.55	J	0.55	J	0.69	J	0.65	J	0.59	J	0.96	J
Cadmium	MG/KG	0.86	2%	2.46	0	1	58	0.06	U	0.07	U	0.08	U	0.07	U	0.06	U	0.09	U
Calcium	MG/KG	154000	100%	125300	1	58	58	3250		4120		4730		4850		6090		8350	
Chromium	MG/KG	26.8	100%	30	0	58	58	18.8		18.2		20.5		17		23.4		22.9	
Cobalt	MG/KG	17.1	100%	30	0	58	58	14.6		9	J	9.3	J	8.6	J	11		6.7	J
Copper	MG/KG	35.4	100%	33	3	58	58	14.6		21.1		22.9		20.1		18		27.8	
Cyanide	MG/KG	1.4	2%	0.35	1	1	58	0.63	UJ	0.71	U	0.71	UJ	0.8	UJ	0.79	U	0.81	U
Iron	MG/KG	31500	100%	37410	0	58	58	24400		21600	J	23500	J	21000	J	27000	J	22200	J
Lead	MG/KG	43.8	100%	24.4	16	58	58	32.1		22.8	J	21	J	20.3		43.8	J	34.8	
Magnesium	MG/KG	15700	100%	21700	0	58	58	3320		3600		3800		3290		4380		4330	
Manganese	MG/KG	2370	100%	1100	4	58	58	771		428		779		698		787		293	
Mercury	MG/KG	0.17	53%	0.1	6	31	58	0.06	UJ	0.09	J	0.06	J	0.08	J	0.07	J	0.17	
Nickel	MG/KG	57.4	95%	50	2	55	58	21.2	J	24.6		22.9	J	21.2	J	27.2		33.3	
Potassium	MG/KG	2970	100%	2623	2	58	58	1170		1290		1840		1140	J	2970		1660	
Selenium	MG/KG	2.3	43%	2	2	25	58	0.85	U	1.6	J	0.67	J	1.3		1	J	2.3	J
Silver	MG/KG	0.25	3%	0.8	0	2	58	0.22	U	0.28	U	0.32	U	0.3	U	0.26	U	0.37	U
Sodium	MG/KG	153	22%	188	0	13	58	46.6	U	57.8	U	68.2	U	62.4	U	54.3	U	78	U
Thallium	MG/KG	2.5	31%	0.855	18	18	58	0.96	UJ	1.2	U	1.7	J	1.3	U	1.1	U	1.6	U
Vanadium	MG/KG	33.1	100%	150	0	58	58	21.6		21.1		27		21.3		29.1		23.2	
Zinc	MG/KG	197	100%	115	5	58	58	67.4		71.4	J	67.7		57.4		97	J	130	J

TABLE 4-O
CLASS III CHEMICAL DATA-SURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								SS12-51		SS12-52		SS12-53		SS12-54		SS12-55		SS12-56	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123248		123249		123250		123251		123106		123252	
SAMPLE DEPTH TO TOP OF SAMPLE								0		0		0		0		0		0	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.2		0.2		0.2		0.2		0.2		0.2	
SAMPLE DATE								11-Nov-98		11-Nov-98		11-Nov-98		11-Nov-98		13-Oct-98		11-Nov-98	
QC CODE								SA		SA		SA		SA		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
VOLATILE ORGANICS																			
Acetone	UG/KG	55	29%	200	0	17	58	8	J	8	J	16	U	12	U	12	U	13	U
Toluene	UG/KG	14	10%	1500	0	6	58	14	U	14	U	16	U	12	U	12	U	13	U
SEMI VOLATILE ORGANICS																			
2-Methylnaphthalene	UG/KG	160	10%	36400	0	6	58	96	U	97	U	110	U	80	U	80	U	86	U
2-Methylphenol	UG/KG	36	3%	100	0	2	58	96	U	97	U	110	U	80	U	80	U	86	U
4-Methylphenol	UG/KG	930	7%	900	1	4	58	96	U	97	U	110	U	80	U	80	U	86	U
Acenaphthene	UG/KG	1200	9%	50000	0	5	58	96	U	97	U	110	U	80	U	80	U	86	U
Acenaphthylene	UG/KG	22	5%	41000	0	3	58	10	J	97	U	110	U	80	U	80	U	86	U
Anthracene	UG/KG	1500	16%	50000	0	9	58	7.9	J	97	U	110	U	80	U	80	U	86	U
Benzo(a)anthracene	UG/KG	3500	72%	224	3	42	58	59	J	10	J	9.4	J	80	U	80	U	86	U
Benzo(a)pyrene	UG/KG	3200	78%	61	5	45	58	52	J	11	J	12	J	4.5	J	80	UJ	86	U
Benzo(b)fluoranthene	UG/KG	2800	90%	1100	1	52	58	88	J	14	J	15	J	5.3	J	80	U	6.5	J
Benzo(ghi)perylene	UG/KG	2000	57%	50000	0	33	58	47	J	11	J	12	J	80	UJ	80	U	86	UJ
Benzo(k)fluoranthene	UG/KG	2900	78%	1100	1	45	58	76	J	14	J	13	J	80	U	80	U	4.5	J
Bis(2-Ethylhexyl)phthalate	UG/KG	10000	14%	50000	0	8	58	96	UJ	97	UJ	110	UJ	80	UJ	80	U	86	UJ
Butylbenzylphthalate	UG/KG	23	3%	50000	0	2	58	96	UJ	97	UJ	110	UJ	80	UJ	80	U	86	UJ
Carbazole	UG/KG	1100	22%		0	13	58	22	J	97	UJ	110	UJ	80	UJ	80	UJ	86	UJ
Chrysene	UG/KG	3600	93%	400	3	54	58	85	J	15	J	16	J	4.2	J	80	U	5.8	J
Di-n-butylphthalate	UG/KG	23	55%	8100	0	32	58	6.3	J	97	U	7.4	J	4.1	J	80	U	4.8	J
Di-n-octylphthalate	UG/KG	15	3%	50000	0	2	58	96	UJ	97	UJ	110	UJ	80	UJ	80	U	86	UJ
Dibenz(a,h)anthracene	UG/KG	680	17%	14	5	10	58	96	UJ	97	UJ	110	UJ	80	UJ	80	U	86	UJ
Dibenzofuran	UG/KG	500	9%	6200	0	5	58	96	U	97	U	110	U	80	U	80	U	86	U
Diethyl phthalate	UG/KG	92	5%	7100	0	3	58	96	U	97	U	92	J	80	U	80	U	86	U
Fluoranthene	UG/KG	8500	97%	50000	0	56	58	160	J	26	J	26	J	4.8	J	80	U	9.6	J
Fluorene	UG/KG	830	9%	50000	0	5	58	96	U	97	U	110	U	80	U	80	U	86	U
Indeno(1,2,3-cd)pyrene	UG/KG	1700	57%	3200	0	33	58	48	J	10	J	10	J	80	UJ	80	U	86	UJ
Naphthalene	UG/KG	540	9%	13000	0	5	58	96	U	97	U	110	U	80	U	80	U	86	U
Phenanthrene	UG/KG	7500	86%	50000	0	50	58	32	J	14	J	14	J	80	U	80	U	5	J
Phenol	UG/KG	42	29%	30	2	17	58	96	U	97	U	16	J	10	J	80	U	86	U
Pyrene	UG/KG	7000	93%	50000	0	54	58	110	J	22	J	20	J	4.3	J	80	U	8.2	J
PESTICIDES/PCBS																			
4,4'-DDD	UG/KG	51	10%	2900	0	6	58	4.8	U	4.8	U	5.5	U	4	U	4	U	4.3	U
4,4'-DDE	UG/KG	5	12%	2100	0	7	58	4.8	U	4.8	U	5.5	U	4	U	4	U	4.3	U
4,4'-DDT	UG/KG	5.1	10%	2100	0	6	58	4.8	U	4.8	U	5.5	U	4	U	4	U	4.3	U
Alpha-BHC	UG/KG	51	5%	110	0	3	58	2.5	U	2.5	U	2.8	U	2.1	U	2.1	U	2.2	U
Alpha-Chlordane	UG/KG	2.8	3%		0	2	58	2.5	U	2.5	U	2.8	U	2.1	U	2.1	U	2.2	U

TABLE 4-O
CLASS III CHEMICAL DATA-SURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								SS12-51		SS12-52		SS12-53		SS12-54		SS12-55		SS12-56	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123248		123249		123250		123251		123106		123252	
SAMPLE DEPTH TO TOP OF SAMPLE								0		0		0		0		0		0	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.2		0.2		0.2		0.2		0.2		0.2	
SAMPLE DATE								11-Nov-98		11-Nov-98		11-Nov-98		11-Nov-98		13-Oct-98		11-Nov-98	
QC CODE								SA		SA		SA		SA		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Aroclor-1254	UG/KG	64	2%	10000	0	1	58	48	U	48	U	55	U	40	U	40	U	43	U
Beta-BHC	UG/KG	6.1	5%	200	0	3	58	2.5	U	2.5	U	2.8	U	2.1	U	2.1	U	2.2	U
Dieldrin	UG/KG	3.2	2%	44	0	1	58	4.8	U	4.8	U	5.5	U	4	U	4	U	4.3	U
Endosulfan I	UG/KG	1.9	3%	900	0	2	58	2.5	U	2.5	U	2.8	U	2.1	U	2.1	U	2.2	U
Endosulfan II	UG/KG	3	3%	900	0	2	58	4.8	U	4.8	U	5.5	U	4	U	4	U	4.3	U
Endosulfan sulfate	UG/KG	5.6	5%	1000	0	3	58	4.8	U	4.8	U	5.5	U	4	U	4	U	4.3	U
Endrin	UG/KG	5.8	5%	100	0	3	58	4.8	U	4.8	U	5.5	U	4	U	4	U	4.3	U
Gamma-BHC/Lindane	UG/KG	17	2%	60	0	1	58	2.5	U	2.5	U	2.8	U	2.1	U	2.1	U	2.2	U
Gamma-Chlordane	UG/KG	1.5	3%	540	0	2	58	2.5	U	2.5	U	2.8	U	2.1	U	2.1	U	2.2	U
Heptachlor epoxide	UG/KG	6.5	3%	20	0	2	58	2.5	U	2.5	U	2.8	U	2.1	U	2.1	U	2.2	U
METALS																			
Aluminum	MG/KG	18700	100%	19520	0	58	58	10300	J	14900	J	12600	J	11500	J	13300		15700	J
Antimony	MG/KG	1.6	3%	6	0	2	58	1.6	R	1.4	R	1.9	R	1.3	R	1	R	1.4	R
Arsenic	MG/KG	6.2	100%	8.9	0	58	58	3.8		4.4		2.8	J	2.6		2.6		4.8	
Barium	MG/KG	146	100%	300	0	58	58	80.9		115		116		60		46.6		80.4	
Beryllium	MG/KG	0.96	100%	1.13	0	58	58	0.52	J	0.7	J	0.55	J	0.51	J	0.56	J	0.56	J
Cadmium	MG/KG	0.86	2%	2.46	0	1	58	0.08	U	0.07	U	0.09	U	0.06	U	0.05	U	0.07	U
Calcium	MG/KG	154000	100%	125300	1	58	58	15500		4060		7880		25400		2520	J	3210	
Chromium	MG/KG	26.8	100%	30	0	58	58	16.9		22.5		15.7		19.8		24.1		23.5	
Cobalt	MG/KG	17.1	100%	30	0	58	58	9.2	J	10.3	J	4.5	J	12.6		12.1		11.9	
Copper	MG/KG	35.4	100%	33	3	58	58	20.6		22.8		14.9		25.6		28.9		12.1	
Cyanide	MG/KG	1.4	2%	0.35	1	1	58	0.87	U	0.85	U	0.9	U	0.63	U	0.64	U	0.75	U
Iron	MG/KG	31500	100%	37410	0	58	58	20500	J	26100	J	12800	J	22200	J	28000	J	28600	J
Lead	MG/KG	43.8	100%	24.4	16	58	58	17.7		24.6		23.8		12.8		20.6		13.5	
Magnesium	MG/KG	15700	100%	21700	0	58	58	5240		4330		2880		7630		5270		4220	
Manganese	MG/KG	2370	100%	1100	4	58	58	511		571		390		377		384		691	
Mercury	MG/KG	0.17	53%	0.1	6	31	58	0.08	J	0.08	J	0.16		0.06	U	0.1	J	0.08	J
Nickel	MG/KG	57.4	95%	50	2	55	58	26.5		30.5		16.8		32.4		42.8		26	
Potassium	MG/KG	2970	100%	2623	2	58	58	1280	J	1630		1450	J	1270		957		1020	J
Selenium	MG/KG	2.3	43%	2	2	25	58	1.2	U	2	J	1.6	J	0.98	U	0.78	U	1.3	J
Silver	MG/KG	0.25	3%	0.8	0	2	58	0.31	U	0.27	U	0.38	U	0.26	U	0.2	U	0.27	U
Sodium	MG/KG	153	22%	188	0	13	58	64.4	U	55.9	U	79	U	53.9	U	42.7	U	57.5	U
Thallium	MG/KG	2.5	31%	0.855	18	18	58	1.3	U	1.4	J	1.6	U	1.1	U	0.88	U	1.2	U
Vanadium	MG/KG	33.1	100%	150	0	58	58	16.6		25		15	J	18.2		19		23.2	
Zinc	MG/KG	197	100%	115	5	58	58	69.2	J	96.8	J	90.9	J	69.6	J	65.2	J	65.5	J

TABLE 4-O
CLASS III CHEMICAL DATA-SURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								SS12-57		SS12-58		SS12-59		SS12-60		SS12-61		SS12-62	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123253		123254		123255		123256		123257		123258	
SAMPLE DEPTH TO TOP OF SAMPLE								0		0		0		0		0		0	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.2		0.2		0.2		0.2		0.2		0.2	
SAMPLE DATE								11-Nov-98		11-Nov-98		11-Nov-98		12-Nov-98		10-Nov-98		11-Nov-98	
QC CODE								SA		SA		SA		SA		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
VOLATILE ORGANICS																			
Acetone	UG/KG	55	29%	200	0	17	58	8	J	14	U	12	U	6	J	17		14	U
Toluene	UG/KG	14	10%	1500	0	6	58	12	U	14	U	12	U	13	U	2	J	14	U
SEMI VOLATILE ORGANICS																			
2-Methylnaphthalene	UG/KG	160	10%	36400	0	6	58	77	U	80	U	81	U	85	U	78	U	87	U
2-Methylphenol	UG/KG	36	3%	100	0	2	58	77	U	80	U	81	U	85	U	78	U	87	U
4-Methylphenol	UG/KG	930	7%	900	1	4	58	9.9	J	80	U	4.3	J	85	U	78	U	87	U
Acenaphthene	UG/KG	1200	9%	50000	0	5	58	77	U	80	U	81	U	85	U	78	U	87	U
Acenaphthylene	UG/KG	22	5%	41000	0	3	58	77	U	80	U	81	U	85	U	78	U	87	U
Anthracene	UG/KG	1500	16%	50000	0	9	58	77	U	80	U	81	U	85	U	78	U	87	U
Benzo(a)anthracene	UG/KG	3500	72%	224	3	42	58	77	U	4.9	J	4.6	J	85	U	78	U	87	U
Benzo(a)pyrene	UG/KG	3200	78%	61	5	45	58	77	U	5.1	J	5.4	J	4.7	J	78	U	87	U
Benzo(b)fluoranthene	UG/KG	2800	90%	1100	1	52	58	77	U	7.4	J	6.3	J	6	J	4.8	J	4.5	J
Benzo(ghi)perylene	UG/KG	2000	57%	50000	0	33	58	77	UJ	80	U	81	UJ	85	UJ	78	U	87	UJ
Benzo(k)fluoranthene	UG/KG	2900	78%	1100	1	45	58	77	U	6.7	J	6.2	J	85	U	78	U	5	J
Bis(2-Ethylhexyl)phthalate	UG/KG	10000	14%	50000	0	8	58	77	UJ	80	UJ	81	UJ	85	UJ	78	UJ	87	UJ
Butylbenzylphthalate	UG/KG	23	3%	50000	0	2	58	77	UJ	80	UJ	81	UJ	85	UJ	78	UJ	87	UJ
Carbazole	UG/KG	1100	22%		0	13	58	77	UJ	80	UJ	81	UJ	85	UJ	78	UJ	87	UJ
Chrysene	UG/KG	3600	93%	400	3	54	58	3.9	J	8.3	J	7.2	J	5.4	J	4.5	J	5	J
Di-n-butylphthalate	UG/KG	23	55%	8100	0	32	58	5	J	6.1	J	81	U	85	U	78	U	87	U
Di-n-octylphthalate	UG/KG	15	3%	50000	0	2	58	77	UJ	80	UJ	81	UJ	85	UJ	78	UJ	87	UJ
Dibenz(a,h)anthracene	UG/KG	680	17%	14	5	10	58	77	UJ	80	UJ	81	UJ	85	UJ	78	UJ	87	UJ
Dibenzofuran	UG/KG	500	9%	6200	0	5	58	77	U	80	U	81	U	85	U	78	U	87	U
Diethyl phthalate	UG/KG	92	5%	7100	0	3	58	77	U	80	U	81	U	85	U	78	U	87	U
Fluoranthene	UG/KG	8500	97%	50000	0	56	58	4	J	20	J	11	J	10	J	6.2	J	8.2	J
Fluorene	UG/KG	830	9%	50000	0	5	58	77	U	80	U	81	U	85	U	78	U	87	U
Indeno(1,2,3-cd)pyrene	UG/KG	1700	57%	3200	0	33	58	77	UJ	80	U	81	UJ	85	UJ	78	U	87	UJ
Naphthalene	UG/KG	540	9%	13000	0	5	58	77	U	80	U	81	U	85	U	78	U	87	U
Phenanthrene	UG/KG	7500	86%	50000	0	50	58	77	U	10	J	5.8	J	4.9	J	78	U	87	U
Phenol	UG/KG	42	29%	30	2	17	58	12	J	20	J	10	J	85	U	8.7	J	87	U
Pyrene	UG/KG	7000	93%	50000	0	54	58	77	UJ	14	J	9.2	J	7.6	J	5.2	J	6.6	J
PESTICIDES/PCBS																			
4,4'-DDD	UG/KG	51	10%	2900	0	6	58	3.9	U	4	U	4.1	U	4.2	U	3.9	U	4.3	U
4,4'-DDE	UG/KG	5	12%	2100	0	7	58	3.9	U	4	U	4.1	U	4.2	U	3.9	U	4.3	U
4,4'-DDT	UG/KG	5.1	10%	2100	0	6	58	3.9	U	4	U	4.1	U	4.2	U	3.9	U	4.3	U
Alpha-BHC	UG/KG	51	5%	110	0	3	58	2	U	2.1	U	2.1	U	2.2	U	2	U	2.2	U
Alpha-Chlordane	UG/KG	2.8	3%		0	2	58	2	U	2.1	U	2.1	U	1.2	J	2	U	2.2	U

TABLE 4-O
CLASS III CHEMICAL DATA-SURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

		FACILITY						SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
		LOCATION ID						SS12-57		SS12-58		SS12-59		SS12-60		SS12-61		SS12-62	
		MATRIX						SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
		SAMPLE ID						123253		123254		123255		123256		123257		123258	
		SAMPLE DEPTH TO TOP OF SAMPLE						0		0		0		0		0		0	
		SAMPLE DEPTH TO BOTTOM OF SAMPLE						0.2		0.2		0.2		0.2		0.2		0.2	
		SAMPLE DATE						11-Nov-98		11-Nov-98		11-Nov-98		12-Nov-98		10-Nov-98		11-Nov-98	
		QC CODE						SA		SA		SA		SA		SA		SA	
		STUDY ID						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	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Aroclor-1254	UG/KG	64	2%	10000	0	1	58	39	U	40	U	41	U	42	U	39	U	43	U
Beta-BHC	UG/KG	6.1	5%	200	0	3	58	2	U	2.1	U	2.1	U	2.2	U	2	U	2.2	U
Dieldrin	UG/KG	3.2	2%	44	0	1	58	3.9	U	4	U	4.1	U	4.2	U	3.9	U	4.3	U
Endosulfan I	UG/KG	1.9	3%	900	0	2	58	2	U	2.1	U	2.1	U	2.2	U	2	U	2.2	U
Endosulfan II	UG/KG	3	3%	900	0	2	58	3.9	U	4	U	4.1	U	4.2	U	3.9	U	4.3	U
Endosulfan sulfate	UG/KG	5.6	5%	1000	0	3	58	3.9	U	4	U	4.1	U	4.2	U	3.9	U	4.3	U
Endrin	UG/KG	5.8	5%	100	0	3	58	3.9	U	4	U	4.1	U	4.2	U	3.9	U	4.3	U
Gamma-BHC/Lindane	UG/KG	17	2%	60	0	1	58	2	U	2.1	U	2.1	U	2.2	U	2	U	2.2	U
Gamma-Chlordane	UG/KG	1.5	3%	540	0	2	58	2	U	2.1	U	2.1	U	2.2	U	2	U	2.2	U
Heptachlor epoxide	UG/KG	6.5	3%	20	0	2	58	2	U	2.1	U	2.1	U	2.2	U	2	U	2.2	U
METALS																			
Aluminum	MG/KG	18700	100%	19520	0	58	58	14800	J	12600	J	12300	J	13700	J	13200	J	13300	J
Antimony	MG/KG	1.6	3%	6	0	2	58	1.2	R	1.3	R	1.4	R	1.2	R	1.2	R	1.4	R
Arsenic	MG/KG	6.2	100%	8.9	0	58	58	3.5		3.7		4.2		3.9		2.4		4.3	
Barium	MG/KG	146	100%	300	0	58	58	77.3		99.9		62		85		49.9		89.7	
Beryllium	MG/KG	0.96	100%	1.13	0	58	58	0.6	J	0.49	J	0.5	J	0.48	J	0.48	J	0.49	J
Cadmium	MG/KG	0.86	2%	2.46	0	1	58	0.06	U	0.06	U	0.07	U	0.06	U	0.06	U	0.07	U
Calcium	MG/KG	154000	100%	125300	1	58	58	3490		6650		13000		2800		2880		12000	
Chromium	MG/KG	26.8	100%	30	0	58	58	26.8		20		20.6		20.7		23.9		22.5	
Cobalt	MG/KG	17.1	100%	30	0	58	58	16		11.5		11	J	12.6		14.5		12.4	
Copper	MG/KG	35.4	100%	33	3	58	58	33.8		22.5		18.6		20.5		24.9		28.7	
Cyanide	MG/KG	1.4	2%	0.35	1	1	58	0.7	U	0.59	U	0.64	U	0.71	U	0.62	U	0.78	U
Iron	MG/KG	31500	100%	37410	0	58	58	31500	J	24700	J	24200	J	25100	J	27300	J	27000	J
Lead	MG/KG	43.8	100%	24.4	16	58	58	23.2		12.7	J	8.9	J	21.3		15.4	J	20.1	
Magnesium	MG/KG	15700	100%	21700	0	58	58	6390		4900		5360		4090		5640		5630	
Manganese	MG/KG	2370	100%	1100	4	58	58	436		541		386		717		573		740	
Mercury	MG/KG	0.17	53%	0.1	6	31	58	0.06	U	0.06	J	0.05	U	0.07	J	0.06	U	0.06	U
Nickel	MG/KG	57.4	95%	50	2	55	58	57.4		33.2		31.8		28.3		42.6		40.1	
Potassium	MG/KG	2970	100%	2623	2	58	58	1600		1560		1200		1160		1350		1900	
Selenium	MG/KG	2.3	43%	2	2	25	58	0.92	U	1.7	J	1.1	U	0.91	U	0.94	U	1.1	U
Silver	MG/KG	0.25	3%	0.8	0	2	58	0.24	U	0.25	U	0.28	U	0.24	U	0.25	U	0.28	U
Sodium	MG/KG	153	22%	188	0	13	58	53.8	J	52	U	58.7	U	50	U	51.5	U	59.6	U
Thallium	MG/KG	2.5	31%	0.855	18	18	58	1.2	J	1.5	J	1.2	U	1.6	J	1.1	U	1.2	U
Vanadium	MG/KG	33.1	100%	150	0	58	58	21		19.3		17.9		22.1		17.3		21.7	
Zinc	MG/KG	197	100%	115	5	58	58	131	J	79.1	J	74.5	J	84.5	J	84.7	J	92.7	J

TABLE 4-O
CLASS III CHEMICAL DATA-SURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

		FACILITY						SEAD-12		SEAD-12		SEAD-12		SEAD-12	
		LOCATION ID						SS12-63		SS12-66		SS12-67		SS12-68	
		MATRIX						SOIL		SOIL		SOIL		SOIL	
		SAMPLE ID						123259		123260		123108		123213	
		SAMPLE DEPTH TO TOP OF SAMPLE						0		0		0		0	
		SAMPLE DEPTH TO BOTTOM OF SAMPLE						0.2		0.2		0.2		0.2	
		SAMPLE DATE						10-Nov-98		11-Nov-98		12-Oct-98		03-Nov-98	
		QC CODE						SA		SA		SA		SA	
		STUDY ID						RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
VOLATILE ORGANICS															
Acetone	UG/KG	55	29%	200	0	17	58	55		11	U	12	U	17	UJ
Toluene	UG/KG	14	10%	1500	0	6	58	13	U	4	J	5	J	4	J
SEMI VOLATILE ORGANICS															
2-Methylnaphthalene	UG/KG	160	10%	36400	0	6	58	82	U	73	U	71	U	72	UJ
2-Methylphenol	UG/KG	36	3%	100	0	2	58	82	U	73	U	71	U	72	U
4-Methylphenol	UG/KG	930	7%	900	1	4	58	82	U	73	U	71	U	72	U
Acenaphthene	UG/KG	1200	9%	50000	0	5	58	82	U	73	U	71	U	72	UJ
Acenaphthylene	UG/KG	22	5%	41000	0	3	58	82	U	73	U	71	U	72	UJ
Anthracene	UG/KG	1500	16%	50000	0	9	58	82	U	73	U	71	U	72	UJ
Benzo(a)anthracene	UG/KG	3500	72%	224	3	42	58	82	U	6.3	J	9.5	J	5.6	J
Benzo(a)pyrene	UG/KG	3200	78%	61	5	45	58	82	U	6	J	10	J	5.4	J
Benzo(b)fluoranthene	UG/KG	2800	90%	1100	1	52	58	6.6	J	13	J	16	J	8	J
Benzo(ghi)perylene	UG/KG	2000	57%	50000	0	33	58	82	U	73	UJ	8.5	J	5	J
Benzo(k)fluoranthene	UG/KG	2900	78%	1100	1	45	58	4.8	J	8	J	11	J	7.1	J
Bis(2-Ethylhexyl)phthalate	UG/KG	10000	14%	50000	0	8	58	82	UJ	73	UJ	71	U	7.9	J
Butylbenzylphthalate	UG/KG	23	3%	50000	0	2	58	82	UJ	73	UJ	71	U	72	UJ
Carbazole	UG/KG	1100	22%		0	13	58	82	UJ	3.8	J	71	UJ	72	UJ
Chrysene	UG/KG	3600	93%	400	3	54	58	6.3	J	13	J	17	J	12	J
Di-n-butylphthalate	UG/KG	23	55%	8100	0	32	58	5.4	J	3.8	J	23	J	3.8	J
Di-n-octylphthalate	UG/KG	15	3%	50000	0	2	58	82	UJ	73	UJ	71	U	72	U
Dibenz(a,h)anthracene	UG/KG	680	17%	14	5	10	58	82	UJ	73	UJ	71	U	72	U
Dibenzofuran	UG/KG	500	9%	6200	0	5	58	82	U	73	U	71	U	72	UJ
Diethyl phthalate	UG/KG	92	5%	7100	0	3	58	82	U	4.1	J	71	U	72	UJ
Fluoranthene	UG/KG	8500	97%	50000	0	56	58	9.8	J	17	J	18	J	17	J
Fluorene	UG/KG	830	9%	50000	0	5	58	82	U	73	U	71	U	72	U
Indeno(1,2,3-cd)pyrene	UG/KG	1700	57%	3200	0	33	58	82	U	73	UJ	7.6	J	3.8	J
Naphthalene	UG/KG	540	9%	13000	0	5	58	82	U	73	U	71	U	72	UJ
Phenanthrene	UG/KG	7500	86%	50000	0	50	58	6.7	J	9.7	J	11	J	14	J
Phenol	UG/KG	42	29%	30	2	17	58	12	J	73	U	71	U	72	U
Pyrene	UG/KG	7000	93%	50000	0	54	58	7.5	J	13	J	18	J	13	J
PESTICIDES/PCBS															
4,4'-DDD	UG/KG	51	10%	2900	0	6	58	4.1	U	3.7	U	3.5	U	3.6	U
4,4'-DDE	UG/KG	5	12%	2100	0	7	58	4.1	U	4		5		2.3	J
4,4'-DDT	UG/KG	5.1	10%	2100	0	6	58	4.1	U	3.6	J	3.4	J	3.6	U
Alpha-BHC	UG/KG	51	5%	110	0	3	58	2.1	U	1.9	U	1.8	U	1.8	U
Alpha-Chlordane	UG/KG	2.8	3%		0	2	58	2.1	U	1.9	U	1.8	U	1.8	U

TABLE 4-O
CLASS III CHEMICAL DATA-SURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								SS12-63		SS12-66		SS12-67		SS12-68	
MATRIX								SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123259		123260		123108		123213	
SAMPLE DEPTH TO TOP OF SAMPLE								0		0		0		0	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.2		0.2		0.2		0.2	
SAMPLE DATE								10-Nov-98		11-Nov-98		12-Oct-98		03-Nov-98	
QC CODE								SA		SA		SA		SA	
STUDY ID								RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSE	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
Aroclor-1254	UG/KG	64	2%	10000	0	1	58	41	U	37	U	35	U	36	U
Beta-BHC	UG/KG	6.1	5%	200	0	3	58	2.1	U	1.9	U	1.8	U	1.3	J
Dieldrin	UG/KG	3.2	2%	44	0	1	58	4.1	U	3.7	U	3.5	U	3.6	U
Endosulfan I	UG/KG	1.9	3%	900	0	2	58	2.1	U	1.9	U	1.8	U	1.8	U
Endosulfan II	UG/KG	3	3%	900	0	2	58	4.1	U	3.7	U	3.5	U	3.6	U
Endosulfan sulfate	UG/KG	5.6	5%	1000	0	3	58	4.1	U	3.7	U	3.5	U	3.6	U
Endrin	UG/KG	5.8	5%	100	0	3	58	4.1	U	3.7	U	3.5	U	3.6	U
Gamma-BHC/Lindane	UG/KG	17	2%	60	0	1	58	2.1	U	1.9	U	1.8	U	1.8	U
Gamma-Chlordane	UG/KG	1.5	3%	540	0	2	58	2.1	U	1.9	U	1.8	U	1.8	U
Heptachlor epoxide	UG/KG	6.5	3%	20	0	2	58	2.1	U	1.9	U	1.8	U	1.8	U
METALS															
Aluminum	MG/KG	18700	100%	19520	0	58	58	14500	J	9540	J	3040	J	8820	
Antimony	MG/KG	1.6	3%	6	0	2	58	1.2	R	1.1	R	1.2	R	1.2	UJ
Arsenic	MG/KG	6.2	100%	8.9	0	58	58	2.6		4.7		3.4		4.1	
Barium	MG/KG	146	100%	300	0	58	58	57.1		41.7		19.6	J	24.3	J
Beryllium	MG/KG	0.96	100%	1.13	0	58	58	0.46	J	0.41	J	0.14	J	0.39	J
Cadmium	MG/KG	0.86	2%	2.46	0	1	58	0.06	U	0.06	U	0.06	U	0.06	U
Calcium	MG/KG	154000	100%	125300	1	58	58	3260		80400		154000	J	53900	
Chromium	MG/KG	26.8	100%	30	0	58	58	26.2		17.9		6.1		17.9	
Cobalt	MG/KG	17.1	100%	30	0	58	58	17.1		11.3		5.6	J	11.9	
Copper	MG/KG	35.4	100%	33	3	58	58	29.4		25.8		17.7		35.4	
Cyanide	MG/KG	1.4	2%	0.35	1	1	58	0.65	U	0.63	U	0.53	U	0.54	U
Iron	MG/KG	31500	100%	37410	0	58	58	30600	J	21600	J	8760	J	23200	J
Lead	MG/KG	43.8	100%	24.4	16	58	58	21.9	J	16		13.7		31	
Magnesium	MG/KG	15700	100%	21700	0	58	58	6000		7490		15700		6210	
Manganese	MG/KG	2370	100%	1100	4	58	58	852		400		340		316	J
Mercury	MG/KG	0.17	53%	0.1	6	31	58	0.06	U	0.05	U	0.05	J	0.05	U
Nickel	MG/KG	57.4	95%	50	2	55	58	44.9		36.3		14.7		53.1	
Potassium	MG/KG	2970	100%	2623	2	58	58	1450		1270		743	J	1080	
Selenium	MG/KG	2.3	43%	2	2	25	58	1.2	J	0.72	J	0.93	U	0.9	U
Silver	MG/KG	0.25	3%	0.8	0	2	58	0.23	U	0.22	U	0.24	U	0.25	J
Sodium	MG/KG	153	22%	188	0	13	58	49.2	U	65.5	J	132	J	55.8	J
Thallium	MG/KG	2.5	31%	0.855	18	18	58	1.4	J	1.1	J	1	U	1	U
Vanadium	MG/KG	33.1	100%	150	0	58	58	19.7		15.7		7.5	J	15.6	
Zinc	MG/KG	197	100%	115	5	58	58	83.8	J	106	J	95.8	J	76.3	J

TABLE 4-P
CLASS III CHEMICAL DATA-SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12A-1		MW12A-1		MW12-27		MW12-27		MW12-31		MW12-32	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								MW12A-1-03		MW12A-1-05		123062		123063		123174		123177	
SAMPLE DEPTH TO TOP OF SAMPLE								4		8		2		4		2		2	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								6		9.5		4		6		4		3	
SAMPLE DATE								6/10/1994		6/10/1994		10/4/1998		10/4/1998		26-Oct-98		26-Oct-98	
QC CODE								SA		SA		SA		SA		SA		SA	
STUDY ID								ESI		ESI		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
VOLATILE ORGANICS																			
Acetone	UG/KG	100	26%	200	0	10	38	11	U	11	U	11	UJ	4	J	10	J	12	UJ
Methyl ethyl ketone	UG/KG	35	3%	300	0	1	38	11	U	11	U	11	U	11	U	11	UJ	12	UJ
Toluene	UG/KG	10	21%	1500	0	8	38	11	U	11	U	9	J	5	J	11	U	12	U
Total Xylenes	UG/KG	2	3%	1200	0	1	38	11	U	11	U	11	U	11	U	11	U	12	U
Trichloroethene	UG/KG	54	3%	700	0	1	38	11	U	11	U	11	U	11	U	11	U	12	U
SEMI VOLATILE ORGANICS																			
4-Methylphenol	UG/KG	8.6	5%	900	0	2	38	370	U	350	U	74	U	73	U	74	U	72	U
Acenaphthene	UG/KG	28	5%	50000	0	2	38	890	U	860	U	74	U	73	U	74	U	72	U
Acenaphthylene	UG/KG	21	8%	41000	0	3	38	370	U	350	U	74	U	73	U	74	U	72	U
Anthracene	UG/KG	74	16%	50000	0	6	38	370	U	350	U	74	U	73	U	74	U	72	U
Benzo(a)anthracene	UG/KG	760	42%	224	1	16	38	370	U	350	U	74	U	73	U	74	U	5.9	J
Benzo(a)pyrene	UG/KG	1000	45%	61	3	17	38	370	U	350	U	74	U	73	U	74	U	4.5	J
Benzo(b)fluoranthene	UG/KG	1100	45%	1100	0	17	38	370	U	350	U	74	U	73	U	74	U	5.9	J
Benzo(ghi)perylene	UG/KG	820	34%	50000	0	13	38	370	U	350	U	74	U	73	U	74	U	4.3	J
Benzo(k)fluoranthene	UG/KG	1100	39%	1100	0	15	38	370	U	350	U	74	U	73	U	74	U	5.6	J
Bis(2-Ethylhexyl)phthalate	UG/KG	73	24%	50000	0	9	38	73	J	350	U	13	J	16	J	74	U	72	UJ
Butylbenzylphthalate	UG/KG	6.2	5%	50000	0	2	38	370	U	350	U	74	UJ	73	UJ	74	U	72	UJ
Carbazole	UG/KG	120	13%		0	5	38	370	U	350	U	74	UJ	73	UJ	74	U	72	U
Chrysene	UG/KG	1000	53%	400	1	20	38	370	U	350	U	74	U	4.1	J	74	U	8.1	J
Di-n-octylphthalate	UG/KG	34	16%	50000	0	6	38	370	U	350	U	23	J	34	J	74	U	4.1	J
Dibenz(a,h)anthracene	UG/KG	300	18%	14	4	7	38	370	U	350	U	74	U	73	U	74	U	72	U
Dibenzofuran	UG/KG	16	5%	6200	0	2	38	370	U	350	U	74	U	73	U	74	U	72	U
Diethyl phthalate	UG/KG	4.3	3%	7100	0	1	38	370	U	350	U	74	U	73	U	74	U	72	U
Fluoranthene	UG/KG	1900	47%	50000	0	18	38	370	U	350	U	74	U	73	U	74	U	8.2	J
Fluorene	UG/KG	44	8%	50000	0	3	38	370	U	350	U	74	U	73	U	74	U	72	U
Indeno(1,2,3-cd)pyrene	UG/KG	830	34%	3200	0	13	38	370	U	350	U	74	U	73	U	74	U	72	U
Naphthalene	UG/KG	8.6	3%	13000	0	1	38	370	U	350	U	74	U	73	U	74	U	72	U
Phenanthrene	UG/KG	680	45%	50000	0	17	38	370	U	350	U	74	U	73	U	74	U	5.5	J
Pyrene	UG/KG	1500	47%	50000	0	18	38	370	U	350	U	74	U	73	U	74	U	6	J
PESTICIDES/PCBS																			
4,4'-DDD	UG/KG	3.2	3%	2900	0	1	38	3.7	U	3.5	U	3.7	U	3.7	U	3.7	U	3.6	U
4,4'-DDE	UG/KG	2.1	3%	2100	0	1	38	3.7	U	3.5	U	3.7	U	3.7	U	3.7	U	3.6	U
4,4'-DDT	UG/KG	2.6	3%	2100	0	1	38	3.7	U	3.5	U	3.7	U	3.7	U	3.7	U	3.6	U
Alpha-Chlordane	UG/KG	7.5	3%		0	1	38	1.9	U	1.8	U	1.9	U	1.9	U	1.9	U	1.8	U
Endosulfan sulfate	UG/KG	3	3%	1000	0	1	38	3.7	U	3.5	U	3.7	U	3.7	U	3.7	U	3.6	U
Endrin	UG/KG	20	3%	100	0	1	38	3.7	U	3.5	U	3.7	U	3.7	U	3.7	U	3.6	U

TABLE 4-P
CLASS III CHEMICAL DATA-SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12A-1		MW12A-1		MW12-27		MW12-27		MW12-31		MW12-32	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								MW12A-1-03		MW12A-1-05		123062		123063		123174		123177	
SAMPLE DEPTH TO TOP OF SAMPLE								4		8		2		4		2		2	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								6		9.5		4		6		4		3	
SAMPLE DATE								6/10/1994		6/10/1994		10/4/1998		10/4/1998		26-Oct-98		26-Oct-98	
QC CODE								SA		SA		SA		SA		SA		SA	
STUDY ID								ESI		ESI		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	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	16700	100%	19520	0	38	38	11000		12400		14200		13600		9860		14800	
Arsenic	MG/KG	9.8	100%	8.9	1	38	38	3.5		3.6		6.4		8.4		1.7		2.3	
Barium	MG/KG	186	100%	300	0	38	38	82.8		78.3		61		61.4		30.4		57.9	
Beryllium	MG/KG	1.1	97%	1.13	0	37	38	0.46	J	0.58	J	0.45	J	0.36	J	0.46	J	0.67	
Cadmium	MG/KG	13.3	8%	2.46	1	3	38	0.52	J	0.85		0.05	U	0.06	U	0.26	U	0.23	U
Calcium	MG/KG	73300	100%	125300	0	38	38	71200		70300		21900		3510		1470		7850	
Chromium	MG/KG	26	100%	30	0	38	38	15.3		19.7		25.2		24.1		18.2	J	25.9	J
Cobalt	MG/KG	19.6	100%	30	0	38	38	10.1		10.8		15.5		19.6		12.6		17	
Copper	MG/KG	34	100%	33	3	38	38	20.6		29.6		30.7		33.8		9.3		20.9	
Iron	MG/KG	53400	100%	37410	3	38	38	17400		22600		29200		30700		21900	J	32000	
Lead	MG/KG	284	100%	24.4	10	38	38	7.6		10.8		13.2		9.2		2.7	J	3.8	J
Magnesium	MG/KG	19200	100%	21700	0	38	38	19200		12000		5830	J	5590	J	4500		6580	
Manganese	MG/KG	3200	100%	1100	3	38	38	414		409		696		706		383		550	
Mercury	MG/KG	0.2	42%	0.1	8	16	38	0.02	J	0.03	J	0.05	U	0.05	U	0.05	U	0.05	U
Nickel	MG/KG	51.3	95%	50	1	36	38	23.7		35.5		46.2		46		28.1	UJ	41.2	UJ
Potassium	MG/KG	3460	100%	2623	2	38	38	3460	J	2910	J	1150		1010	J	531	J	1020	
Selenium	MG/KG	1.8	21%	2	0	8	38	0.5	U	0.41	U	0.75	U	0.96	U	0.34	U	0.7	
Silver	MG/KG	0.26	8%	0.8	0	3	38	0.09	U	0.08	U	0.2	J	0.25	U	0.18	U	0.15	U
Sodium	MG/KG	748	47%	188	3	18	38	79.9	J	136	J	82.4	J	107	J	57.1	J	57.2	J
Thallium	MG/KG	1.6	26%	0.855	10	10	38	0.35	U	0.29	U	0.85	U	1.1	U	0.77	UJ	1.3	J
Vanadium	MG/KG	29.3	100%	150	0	38	38	21.7		20.2		20.2		16.6		12.4		19.8	
Zinc	MG/KG	3370	100%	115	4	38	38	41.4		82.1		91.8		143		70.9	J	98.7	J

TABLE 4-P
CLASS III CHEMICAL DATA-SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12-37		MW12-38		MW12-38		MW12-39		MW12-40		MW12-40	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123203		123204		123206		123207		123122		123123	
SAMPLE DEPTH TO TOP OF SAMPLE								2		1		3		1.5		2		4	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								4		1.2		4		2.4		4		6	
SAMPLE DATE								01-Nov-98		01-Nov-98		01-Nov-98		01-Nov-98		14-Oct-98		14-Oct-98	
QC CODE								SA		SA		SA		SA		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
VOLATILE ORGANICS																			
Acetone	UG/KG	100	26%	200	0	10	38	14		30		45		11		11	U	11	U
Methyl ethyl ketone	UG/KG	35	3%	300	0	1	38	11	U	11	U	11	U	11	U	11	U	11	U
Toluene	UG/KG	10	21%	1500	0	8	38	11	U	2	J	11	U	11	U	5	J	11	U
Total Xylenes	UG/KG	2	3%	1200	0	1	38	11	U	2	J	11	U	11	U	11	U	11	U
Trichloroethene	UG/KG	54	3%	700	0	1	38	54		11	U	11	U	11	U	11	U	11	U
SEMI VOLATILE ORGANICS																			
4-Methylphenol	UG/KG	8.6	5%	900	0	2	38	72	U	71	U	76	U	69	U	72	U	71	U
Acenaphthene	UG/KG	28	5%	50000	0	2	38	72	U	71	U	76	U	69	U	72	U	71	U
Acenaphthylene	UG/KG	21	8%	41000	0	3	38	72	U	71	U	76	U	69	U	72	U	71	U
Anthracene	UG/KG	74	16%	50000	0	6	38	72	U	71	U	76	U	69	U	72	U	71	U
Benzo(a)anthracene	UG/KG	760	42%	224	1	16	38	72	U	71	U	76	U	69	U	72	U	71	U
Benzo(a)pyrene	UG/KG	1000	45%	61	3	17	38	72	U	71	U	76	U	69	U	72	U	71	U
Benzo(b)fluoranthene	UG/KG	1100	45%	1100	0	17	38	72	U	71	U	76	U	69	U	72	U	71	U
Benzo(ghi)perylene	UG/KG	820	34%	50000	0	13	38	72	U	71	U	76	U	69	U	72	U	71	U
Benzo(k)fluoranthene	UG/KG	1100	39%	1100	0	15	38	72	U	71	U	76	U	69	U	72	U	71	U
Bis(2-Ethylhexyl)phthalate	UG/KG	73	24%	50000	0	9	38	72	UJ	71	UJ	76	UJ	69	UJ	72	UJ	71	UJ
Butylbenzylphthalate	UG/KG	6.2	5%	50000	0	2	38	72	U	71	U	76	U	69	UJ	72	UJ	71	UJ
Carbazole	UG/KG	120	13%		0	5	38	72	U	71	U	76	U	69	UJ	72	UJ	71	UJ
Chrysene	UG/KG	1000	53%	400	1	20	38	72	U	71	U	76	U	69	U	72	U	71	U
Di-n-octylphthalate	UG/KG	34	16%	50000	0	6	38	72	U	3.9	J	76	U	69	U	7.3	J	8.7	J
Dibenz(a,h)anthracene	UG/KG	300	18%	14	4	7	38	72	UJ	71	UJ	76	UJ	69	U	72	U	71	U
Dibenzofuran	UG/KG	16	5%	6200	0	2	38	72	U	71	U	76	U	69	U	72	U	71	U
Diethyl phthalate	UG/KG	4.3	3%	7100	0	1	38	72	U	71	U	76	U	69	U	4.3	J	71	U
Fluoranthene	UG/KG	1900	47%	50000	0	18	38	72	U	71	U	76	U	69	U	72	U	71	U
Fluorene	UG/KG	44	8%	50000	0	3	38	72	U	71	U	76	U	69	U	72	U	71	U
Indeno(1,2,3-cd)pyrene	UG/KG	830	34%	3200	0	13	38	72	U	71	U	76	U	69	U	72	U	71	U
Naphthalene	UG/KG	8.6	3%	13000	0	1	38	72	U	71	U	76	U	69	U	72	U	71	U
Phenanthrene	UG/KG	680	45%	50000	0	17	38	3.7	J	71	U	76	U	69	U	72	U	6.1	J
Pyrene	UG/KG	1500	47%	50000	0	18	38	72	U	71	U	76	U	69	U	72	U	71	U
PESTICIDES/PCBS																			
4,4'-DDD	UG/KG	3.2	3%	2900	0	1	38	3.6	U	3.5	U	3.7	U	3.5	U	3.6	U	3.5	U
4,4'-DDE	UG/KG	2.1	3%	2100	0	1	38	3.6	U	3.5	U	3.7	U	3.5	U	3.6	U	3.5	U
4,4'-DDT	UG/KG	2.6	3%	2100	0	1	38	3.6	U	3.5	U	3.7	U	3.5	U	3.6	U	3.5	U
Alpha-Chlordane	UG/KG	7.5	3%		0	1	38	1.8	U	1.8	U	1.9	U	1.8	U	1.8	U	1.8	U
Endosulfan sulfate	UG/KG	3	3%	1000	0	1	38	3.6	U	3.5	U	3.7	U	3.5	U	3.6	U	3.5	U
Endrin	UG/KG	20	3%	100	0	1	38	3.6	U	3.5	U	3.7	U	3.5	U	3.6	U	3.5	U

TABLE 4-P
CLASS III CHEMICAL DATA-SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12-37		MW12-38		MW12-38		MW12-39		MW12-40		MW12-40	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123203		123204		123206		123207		123122		123123	
SAMPLE DEPTH TO TOP OF SAMPLE								2		1		3		1.5		2		4	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								4		1.2		4		2.4		4		6	
SAMPLE DATE								01-Nov-98		01-Nov-98		01-Nov-98		01-Nov-98		14-Oct-98		14-Oct-98	
QC CODE								SA		SA		SA		SA		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	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	16700	100%	19520	0	38	38	10600		3120		10700		9350		10100	J	10900	J
Arsenic	MG/KG	9.8	100%	8.9	1	38	38	3.2		1.8	J	2.7		2.8		2.9	J	3.5	J
Barium	MG/KG	186	100%	300	0	38	38	74.7		24.1	J	76.7		37.8		60.2		66.5	
Beryllium	MG/KG	1.1	97%	1.13	0	37	38	0.46	J	0.05	J	0.54	J	0.26	J	0.48	J	0.5	J
Cadmium	MG/KG	13.3	8%	2.46	1	3	38	0.06	U	0.06	U	0.05	U	0.05	U	0.06	U	0.05	U
Calcium	MG/KG	73300	100%	125300	0	38	38	49100		60800		20000		73300		30900	J	41700	J
Chromium	MG/KG	26	100%	30	0	38	38	19.6		4.5		19		16.5		18.2		20	
Cobalt	MG/KG	19.6	100%	30	0	38	38	14.3		3.4	J	10.2		10.7		13.8		11.5	
Copper	MG/KG	34	100%	33	3	38	38	24.8		21.3		26.3		17.6		22.9		27	
Iron	MG/KG	53400	100%	37410	3	38	38	25300	J	7350	J	24000	J	20800	J	30900		25600	
Lead	MG/KG	284	100%	24.4	10	38	38	17.2	J	3.5	J	14.2	J	5.7	J	14.7	J	17.4	J
Magnesium	MG/KG	19200	100%	21700	0	38	38	8150		14400		5760		18100		4820	J	7480	J
Manganese	MG/KG	3200	100%	1100	3	38	38	422	J	349	J	387	J	612	J	364		307	
Mercury	MG/KG	0.2	42%	0.1	8	16	38	0.05	U	0.05	U	0.06	J	0.05	U	0.05	U	0.05	U
Nickel	MG/KG	51.3	95%	50	1	36	38	41.2		7.5	J	38.2		25.9		51.3	J	40.5	J
Potassium	MG/KG	3460	100%	2623	2	38	38	876	J	597	J	635	J	1320		817	J	1240	
Selenium	MG/KG	1.8	21%	2	0	8	38	0.86	U	0.87	U	0.82	U	0.81	U	0.98	U	0.78	U
Silver	MG/KG	0.26	8%	0.8	0	3	38	0.22	U	0.23	U	0.21	U	0.21	U	0.25	U	0.2	U
Sodium	MG/KG	748	47%	188	3	18	38	71.3	J	53.5	J	201	J	399	J	53.4	U	61.3	J
Thallium	MG/KG	1.6	26%	0.855	10	10	38	1.6	J	0.98	U	0.93	J	0.92	U	1.1	U	0.98	J
Vanadium	MG/KG	29.3	100%	150	0	38	38	16.1		6.2	J	16.8		14.5		14.3		16.2	
Zinc	MG/KG	3370	100%	115	4	38	38	54.8	J	36.6	J	60.7	J	48.6	J	71.4	J	57.3	J

TABLE 4-P
CLASS III CHEMICAL DATA-SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								TP12-9A		TP12-9B		TP12-9C		TP12-10A		TP12-10A		TP12-10B	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123124		123125		123126		123067		123055		123056	
SAMPLE DEPTH TO TOP OF SAMPLE								0.5		1		2.5		1		1		2	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.5		1		2.5		1		1		2	
SAMPLE DATE								15-Oct-98		15-Oct-98		15-Oct-98		10/4/1998		10/4/1998		10/4/1998	
QC CODE								SA		SA		SA		DU		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
VOLATILE ORGANICS																			
Acetone	UG/KG	100	26%	200	0	10	38	13	UJ	13	J	12	UJ	12	UJ	12	UJ	13	UJ
Methyl ethyl ketone	UG/KG	35	3%	300	0	1	38	13	UJ	12	UJ	12	UJ	12	U	12	UJ	13	UJ
Toluene	UG/KG	10	21%	1500	0	8	38	13	U	12	U	12	U	3	J	12	U	13	U
Total Xylenes	UG/KG	2	3%	1200	0	1	38	13	U	12	U	12	U	12	U	12	UJ	13	UJ
Trichloroethene	UG/KG	54	3%	700	0	1	38	13	U	12	U	12	U	12	U	12	U	13	U
SEMI VOLATILE ORGANICS																			
4-Methylphenol	UG/KG	8.6	5%	900	0	2	38	86	U	76	U	78	U	78	U	77	U	8.6	J
Acenaphthene	UG/KG	28	5%	50000	0	2	38	86	U	76	U	78	U	78	U	77	U	81	U
Acenaphthylene	UG/KG	21	8%	41000	0	3	38	86	U	76	U	78	U	78	U	77	U	81	U
Anthracene	UG/KG	74	16%	50000	0	6	38	86	UJ	76	UJ	78	UJ	78	U	77	U	81	U
Benzo(a)anthracene	UG/KG	760	42%	224	1	16	38	8.5	J	76	U	78	U	78	U	77	U	14	J
Benzo(a)pyrene	UG/KG	1000	45%	61	3	17	38	9.1	J	76	UJ	78	UJ	78	U	77	U	15	J
Benzo(b)fluoranthene	UG/KG	1100	45%	1100	0	17	38	10	J	76	U	78	U	78	U	77	U	19	J
Benzo(ghi)perylene	UG/KG	820	34%	50000	0	13	38	86	U	76	U	78	U	78	U	77	U	14	J
Benzo(k)fluoranthene	UG/KG	1100	39%	1100	0	15	38	86	U	76	U	78	U	78	U	77	U	17	J
Bis(2-Ethylhexyl)phthalate	UG/KG	73	24%	50000	0	9	38	86	U	76	U	78	U	78	UJ	9.2	J	81	U
Butylbenzylphthalate	UG/KG	6.2	5%	50000	0	2	38	86	U	76	U	78	U	78	UJ	6.2	J	5.2	J
Carbazole	UG/KG	120	13%		0	5	38	86	UJ	76	UJ	78	UJ	78	UJ	77	UJ	81	UJ
Chrysene	UG/KG	1000	53%	400	1	20	38	12	J	76	U	78	U	4.6	J	77	U	20	J
Di-n-octylphthalate	UG/KG	34	16%	50000	0	6	38	86	UJ	76	UJ	78	UJ	78	UJ	77	UJ	81	U
Dibenz(a,h)anthracene	UG/KG	300	18%	14	4	7	38	86	U	76	U	78	U	78	U	77	U	6.7	J
Dibenzofuran	UG/KG	16	5%	6200	0	2	38	86	UJ	76	UJ	78	UJ	78	U	77	U	81	U
Diethyl phthalate	UG/KG	4.3	3%	7100	0	1	38	86	U	76	U	78	U	78	U	77	U	81	U
Fluoranthene	UG/KG	1900	47%	50000	0	18	38	16	J	76	U	78	U	4.9	J	77	U	28	J
Fluorene	UG/KG	44	8%	50000	0	3	38	86	U	76	U	78	U	78	U	77	U	81	U
Indeno(1,2,3-cd)pyrene	UG/KG	830	34%	3200	0	13	38	86	U	76	U	78	U	78	U	77	U	12	J
Naphthalene	UG/KG	8.6	3%	13000	0	1	38	86	UJ	76	UJ	78	UJ	78	U	77	U	81	U
Phenanthrene	UG/KG	680	45%	50000	0	17	38	12	J	76	U	78	U	78	U	77	U	17	J
Pyrene	UG/KG	1500	47%	50000	0	18	38	17	J	76	UJ	78	UJ	5.3	J	77	U	28	J
PESTICIDES/PCBS																			
4,4'-DDD	UG/KG	3.2	3%	2900	0	1	38	4.3	U	3.8	U	3.8	U	3.9	U	3.8	U	4.1	U
4,4'-DDE	UG/KG	2.1	3%	2100	0	1	38	4.3	U	3.8	U	3.8	U	3.9	U	3.8	U	4.1	U
4,4'-DDT	UG/KG	2.6	3%	2100	0	1	38	4.3	U	3.8	U	3.8	U	3.9	U	3.8	U	4.1	U
Alpha-Chlordane	UG/KG	7.5	3%		0	1	38	2.2	U	2	U	2	U	2	U	2	U	2.1	U
Endosulfan sulfate	UG/KG	3	3%	1000	0	1	38	4.3	U	3.8	U	3.8	U	3.9	U	3.8	U	4.1	U
Endrin	UG/KG	20	3%	100	0	1	38	4.3	U	3.8	U	3.8	U	3.9	U	3.8	U	4.1	U

TABLE 4-P
CLASS III CHEMICAL DATA-SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								TP12-9A		TP12-9B		TP12-9C		TP12-10A		TP12-10A		TP12-10B	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123124		123125		123126		123067		123055		123056	
SAMPLE DEPTH TO TOP OF SAMPLE								0.5		1		2.5		1		1		2	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.5		1		2.5		1		1		2	
SAMPLE DATE								15-Oct-98		15-Oct-98		15-Oct-98		10/4/1998		10/4/1998		10/4/1998	
QC CODE								SA		SA		SA		DU		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	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	16700	100%	19520	0	38	38	13400	J	15500	J	16400	J	13400		13500		13100	
Arsenic	MG/KG	9.8	100%	8.9	1	38	38	4.8		4.3		5.3		4.3		3		3.2	
Barium	MG/KG	186	100%	300	0	38	38	90.2	J	69.4	J	181	J	136		121		130	
Beryllium	MG/KG	1.1	97%	1.13	0	37	38	0.53	J	0.55	J	1.1		0.52	J	0.54	J	0.46	J
Cadmium	MG/KG	13.3	8%	2.46	1	3	38	0.07	U	0.05	U	0.05	U	0.05	U	0.05	U	0.05	U
Calcium	MG/KG	73300	100%	125300	0	38	38	2940		1160		2780		5920		9190	J	4990	J
Chromium	MG/KG	26	100%	30	0	38	38	17		19		20.3		20.3		18.6	J	15.7	J
Cobalt	MG/KG	19.6	100%	30	0	38	38	8.9	J	7.5	J	12.7		11.3		12.6		11.7	
Copper	MG/KG	34	100%	33	3	38	38	15.2		15.4		26.1		24.6		27.4		16.1	
Iron	MG/KG	53400	100%	37410	3	38	38	22100	J	27700	J	28300	J	23500		26700		28600	
Lead	MG/KG	284	100%	24.4	10	38	38	23.1	J	12	J	11.1	J	13.5		13.8	J	67	J
Magnesium	MG/KG	19200	100%	21700	0	38	38	3290	J	3940	J	5120	J	4540	J	5220		4010	
Manganese	MG/KG	3200	100%	1100	3	38	38	666		139		713		537		487	J	882	J
Mercury	MG/KG	0.2	42%	0.1	8	16	38	0.07	J	0.06	U	0.06	U	0.05	U	0.06	UJ	0.05	UJ
Nickel	MG/KG	51.3	95%	50	1	36	38	18.8	J	20.2	J	32.5	J	32.5		35.4	J	25.2	J
Potassium	MG/KG	3460	100%	2623	2	38	38	905	J	771	J	1070		1080		1110		1170	
Selenium	MG/KG	1.8	21%	2	0	8	38	1.1	J	0.79	UJ	0.75	UJ	0.79	U	0.42	U	0.43	J
Silver	MG/KG	0.26	8%	0.8	0	3	38	0.29	U	0.21	U	0.2	U	0.21	U	0.22	U	0.25	J
Sodium	MG/KG	748	47%	188	3	18	38	61.4	U	43.4	U	41	U	43.2	U	46.1	U	45.9	U
Thallium	MG/KG	1.6	26%	0.855	10	10	38	1.3	U	0.93	J	1.3	J	0.89	U	0.95	U	0.95	U
Vanadium	MG/KG	29.3	100%	150	0	38	38	22.8		24.7		24.5		19.7		19.7		21.3	
Zinc	MG/KG	3370	100%	115	4	38	38	62.1	J	47.7	J	61.4	J	76		79.8	J	77.6	J

TABLE 4-P
CLASS III CHEMICAL DATA-SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								TP12-10C		TP12-13A		TP12-13B		TP12-13C		TP12-14A		TP12-14B	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123057		123052		123053		123054		123004		123005	
SAMPLE DEPTH TO TOP OF SAMPLE								5.5		0.8		5.5		1.5		0.5		1.5	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								5.5		0.8		5.5		1.5		0.5		1.5	
SAMPLE DATE								10/4/1998		10/3/1998		10/3/1998		10/3/1998		9/30/1998		9/30/1998	
QC CODE								SA		SA		SA		SA		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
VOLATILE ORGANICS																			
Acetone	UG/KG	100	26%	200	0	10	38	12	UJ	11	UJ	11	UJ	11	UJ	11	U	12	U
Methyl ethyl ketone	UG/KG	35	3%	300	0	1	38	12	UJ	11	U	11	U	11	UJ	11	U	12	U
Toluene	UG/KG	10	21%	1500	0	8	38	12	U	4	J	11	U	6	J	11	U	12	U
Total Xylenes	UG/KG	2	3%	1200	0	1	38	12	U	11	U	11	U	11	U	11	U	12	U
Trichloroethene	UG/KG	54	3%	700	0	1	38	12	U	11	U	11	U	11	U	11	U	12	U
SEMI VOLATILE ORGANICS																			
4-Methylphenol	UG/KG	8.6	5%	900	0	2	38	6.6	J	76	U	76	U	73	U	78	UJ	78	UJ
Acenaphthene	UG/KG	28	5%	50000	0	2	38	15	J	76	U	76	U	73	U	78	UJ	78	UJ
Acenaphthylene	UG/KG	21	8%	41000	0	3	38	66	U	76	U	7.2	J	73	U	78	UJ	78	UJ
Anthracene	UG/KG	74	16%	50000	0	6	38	21	J	4.8	J	17	J	5.8	J	78	UJ	78	UJ
Benzo(a)anthracene	UG/KG	760	42%	224	1	16	38	60	J	27	J	78		38	J	78	U	78	U
Benzo(a)pyrene	UG/KG	1000	45%	61	3	17	38	63	J	30	J	76		44	J	78	UJ	78	UJ
Benzo(b)fluoranthene	UG/KG	1100	45%	1100	0	17	38	66		29	J	66	J	49	J	5.6	J	78	UJ
Benzo(ghi)perylene	UG/KG	820	34%	50000	0	13	38	43	J	48	J	63	J	58	J	78	U	78	U
Benzo(k)fluoranthene	UG/KG	1100	39%	1100	0	15	38	65	J	41	J	89		45	J	78	U	78	U
Bis(2-Ethylhexyl)phthalate	UG/KG	73	24%	50000	0	9	38	66	UJ	12	J	9.8	J	8.5	J	78	UJ	78	UJ
Butylbenzylphthalate	UG/KG	6.2	5%	50000	0	2	38	66	UJ	76	U	76	UJ	73	UJ	78	UJ	78	UJ
Carbazole	UG/KG	120	13%		0	5	38	27	J	5.4	J	15	J	7.2	J	78	UJ	78	UJ
Chrysene	UG/KG	1000	53%	400	1	20	38	72		38	J	87		49	J	4	J	78	UJ
Di-n-octylphthalate	UG/KG	34	16%	50000	0	6	38	66	UJ	76	U	76	UJ	73	UJ	78	U	78	U
Dibenz(a,h)anthracene	UG/KG	300	18%	14	4	7	38	18	J	11	J	28	J	19	J	78	U	78	U
Dibenzofuran	UG/KG	16	5%	6200	0	2	38	7.1	J	76	U	76	U	73	U	78	UJ	78	UJ
Diethyl phthalate	UG/KG	4.3	3%	7100	0	1	38	66	U	76	U	76	U	73	U	78	UJ	78	UJ
Fluoranthene	UG/KG	1900	47%	50000	0	18	38	170		64	J	180		71	J	5.2	J	78	UJ
Fluorene	UG/KG	44	8%	50000	0	3	38	14	J	76	U	10	J	73	U	78	U	78	U
Indeno(1,2,3-cd)pyrene	UG/KG	830	34%	3200	0	13	38	45	J	27	J	62	J	45	J	78	U	78	U
Naphthalene	UG/KG	8.6	3%	13000	0	1	38	8.6	J	76	U	76	U	73	U	78	UJ	78	UJ
Phenanthrene	UG/KG	680	45%	50000	0	17	38	140		39	J	110		38	J	78	U	78	U
Pyrene	UG/KG	1500	47%	50000	0	18	38	160		64	J	180		81		6.4	J	78	U
PESTICIDES/PCBS																			
4,4'-DDD	UG/KG	3.2	3%	2900	0	1	38	4.1	U	3.8	U	3.8	U	3.7	U	3.9	U	3.9	U
4,4'-DDE	UG/KG	2.1	3%	2100	0	1	38	4.1	U	3.8	U	3.8	U	3.7	U	3.9	U	3.9	U
4,4'-DDT	UG/KG	2.6	3%	2100	0	1	38	4.1	U	3.8	U	3.8	U	3.7	U	3.9	U	3.9	U
Alpha-Chlordane	UG/KG	7.5	3%		0	1	38	2.1	U	2	U	1.9	U	1.9	U	2	U	2	U
Endosulfan sulfate	UG/KG	3	3%	1000	0	1	38	4.1	U	3.8	U	3.8	U	3.7	U	3.9	U	3.9	U
Endrin	UG/KG	20	3%	100	0	1	38	4.1	U	3.8	U	3.8	U	3.7	U	3.9	U	3.9	U

TABLE 4-P
CLASS III CHEMICAL DATA-SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								TP12-10C		TP12-13A		TP12-13B		TP12-13C		TP12-14A		TP12-14B	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123057		123052		123053		123054		123004		123005	
SAMPLE DEPTH TO TOP OF SAMPLE								5.5		0.8		5.5		1.5		0.5		1.5	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								5.5		0.8		5.5		1.5		0.5		1.5	
SAMPLE DATE								10/4/1998		10/3/1998		10/3/1998		10/3/1998		9/30/1998		9/30/1998	
QC CODE								SA		SA		SA		SA		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	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	16700	100%	19520	0	38	38	11400		9630		8880		10000		16700		15600	
Arsenic	MG/KG	9.8	100%	8.9	1	38	38	1.8	J	3.9		3.2		4.2		3.8		4	
Barium	MG/KG	186	100%	300	0	38	38	87.4		86.6		79.7		99		55.9		52.5	
Beryllium	MG/KG	1.1	97%	1.13	0	37	38	0.58	J	0.29	J	0.32	J	0.34	J	0.63	J	0.58	J
Cadmium	MG/KG	13.3	8%	2.46	1	3	38	0.06	U	13.3		0.06	U	0.06	U	0.06	U	0.06	U
Calcium	MG/KG	73300	100%	125300	0	38	38	8680	J	11600	J	31800	J	7320	J	653	J	415	J
Chromium	MG/KG	26	100%	30	0	38	38	13.3	J	11.8	J	11.7	J	11.4	J	25		23.9	
Cobalt	MG/KG	19.6	100%	30	0	38	38	9	J	10.4		8.5	J	8.7	J	9.4	J	7.5	J
Copper	MG/KG	34	100%	33	3	38	38	19.6		33.5		23.8		26.8		24.6		23.7	
Iron	MG/KG	53400	100%	37410	3	38	38	20300		34500		17600		19300		31400	J	30100	J
Lead	MG/KG	284	100%	24.4	10	38	38	16.8	J	284	J	151	J	96.9	J	10.7		11.9	
Magnesium	MG/KG	19200	100%	21700	0	38	38	3920		5250		15200		4380		4510		3900	
Manganese	MG/KG	3200	100%	1100	3	38	38	296	J	792	J	430	J	541	J	267		223	
Mercury	MG/KG	0.2	42%	0.1	8	16	38	0.08	J	0.14	J	0.1	J	0.16	J	0.05	UJ	0.06	J
Nickel	MG/KG	51.3	95%	50	1	36	38	23.8	J	24.5	J	19	J	16.4	J	29.6		26.9	
Potassium	MG/KG	3460	100%	2623	2	38	38	1060		1470		1200		1630		1140		1000	J
Selenium	MG/KG	1.8	21%	2	0	8	38	0.43	U	0.36	U	0.45	U	0.52	J	0.96	U	0.98	U
Silver	MG/KG	0.26	8%	0.8	0	3	38	0.22	U	0.19	U	0.24	U	0.24	U	0.25	U	0.26	U
Sodium	MG/KG	748	47%	188	3	18	38	46.9	U	748	J	49.6	U	50.4	U	52.8	U	53.7	U
Thallium	MG/KG	1.6	26%	0.855	10	10	38	0.97	U	0.81	U	1	U	1	U	1.1	U	1.1	U
Vanadium	MG/KG	29.3	100%	150	0	38	38	18		17.2		15.3		17.5		24.2		24.7	
Zinc	MG/KG	3370	100%	115	4	38	38	74.9	J	3370	J	117	J	114	J	70.2		66	

TABLE 4-P
CLASS III CHEMICAL DATA-SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

		FACILITY						SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
		LOCATION ID						TP12-14C		TP12-20A		TP12-20A		TP12-20B		TP12-20C		TP12-21A	
		MATRIX						SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
		SAMPLE ID						123006		123000		123019		123020		123021		123001	
SAMPLE DEPTH TO TOP OF SAMPLE								2		0.5		0.5		2.5		6		0.7	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								2		0.5		0.5		2.5		6		0.7	
		SAMPLE DATE						9/30/1998		9/30/1998		9/30/1998		9/30/1998		9/30/1998		9/29/1998	
		QC CODE						SA		DU		SA		SA		SA		SA	
		STUDY ID						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	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
VOLATILE ORGANICS																			
Acetone	UG/KG	100	26%	200	0	10	38	11	U	12	U	12	U	11	U	4	J	14	
Methyl ethyl ketone	UG/KG	35	3%	300	0	1	38	11	U	12	U	12	U	11	U	11	U	11	U
Toluene	UG/KG	10	21%	1500	0	8	38	11	U	12	U	12	U	11	U	11	U	11	U
Total Xylenes	UG/KG	2	3%	1200	0	1	38	11	U	12	U	12	UJ	11	U	11	U	11	U
Trichloroethene	UG/KG	54	3%	700	0	1	38	11	U	12	U	12	U	11	U	11	U	11	U
SEMI VOLATILE ORGANICS																			
4-Methylphenol	UG/KG	8.6	5%	900	0	2	38	73	U	78	U	77	U	76	U	72	U	74	UJ
Acenaphthene	UG/KG	28	5%	50000	0	2	38	73	UJ	78	UJ	77	UJ	76	UJ	72	UJ	74	UJ
Acenaphthylene	UG/KG	21	8%	41000	0	3	38	73	UJ	78	UJ	77	UJ	76	UJ	72	UJ	74	UJ
Anthracene	UG/KG	74	16%	50000	0	6	38	73	UJ	78	UJ	77	UJ	76	UJ	72	UJ	74	UJ
Benzo(a)anthracene	UG/KG	760	42%	224	1	16	38	73	U	6.7	J	5.9	J	5.2	J	72	U	74	U
Benzo(a)pyrene	UG/KG	1000	45%	61	3	17	38	5.8	J	9.8	J	9.6	J	5.2	J	72	UJ	74	UJ
Benzo(b)fluoranthene	UG/KG	1100	45%	1100	0	17	38	6.6	J	13	J	15	J	76	U	72	U	74	UJ
Benzo(ghi)perylene	UG/KG	820	34%	50000	0	13	38	6.2	J	7.9	J	16	J	76	U	72	U	74	U
Benzo(k)fluoranthene	UG/KG	1100	39%	1100	0	15	38	5.9	J	11	J	14	J	76	U	72	U	74	U
Bis(2-Ethylhexyl)phthalate	UG/KG	73	24%	50000	0	9	38	73	U	78	U	77	U	76	U	72	U	74	UJ
Butylbenzylphthalate	UG/KG	6.2	5%	50000	0	2	38	73	U	78	U	77	U	76	U	72	U	74	UJ
Carbazole	UG/KG	120	13%		0	5	38	73	UJ	78	UJ	77	UJ	76	UJ	72	UJ	74	UJ
Chrysene	UG/KG	1000	53%	400	1	20	38	5.1	J	12	J	14	J	5.4	J	72	UJ	74	UJ
Di-n-octylphthalate	UG/KG	34	16%	50000	0	6	38	73	U	78	U	77	U	76	U	72	U	74	U
Dibenz(a,h)anthracene	UG/KG	300	18%	14	4	7	38	73	U	78	U	77	U	76	U	72	U	74	U
Dibenzofuran	UG/KG	16	5%	6200	0	2	38	73	UJ	78	UJ	77	UJ	76	UJ	72	UJ	74	UJ
Diethyl phthalate	UG/KG	4.3	3%	7100	0	1	38	73	UJ	78	UJ	77	UJ	76	UJ	72	UJ	74	UJ
Fluoranthene	UG/KG	1900	47%	50000	0	18	38	4.9	J	15	J	15	J	76	UJ	72	UJ	74	UJ
Fluorene	UG/KG	44	8%	50000	0	3	38	73	U	78	U	77	U	76	U	72	U	74	U
Indeno(1,2,3-cd)pyrene	UG/KG	830	34%	3200	0	13	38	5.5	J	7.2	J	10	J	5.7	J	72	U	74	U
Naphthalene	UG/KG	8.6	3%	13000	0	1	38	73	UJ	78	UJ	77	UJ	76	UJ	72	UJ	74	UJ
Phenanthrene	UG/KG	680	45%	50000	0	17	38	73	U	8.8	J	8.9	J	76	U	72	U	74	U
Pyrene	UG/KG	1500	47%	50000	0	18	38	4.9	J	13	J	18	J	76	U	72	U	74	U
PESTICIDES/PCBS																			
4,4'-DDD	UG/KG	3.2	3%	2900	0	1	38	3.7	U	3.9	U	3.8	U	3.8	U	3.6	U	3.7	U
4,4'-DDE	UG/KG	2.1	3%	2100	0	1	38	3.7	U	3.9	U	3.8	U	2.1	J	3.6	U	3.7	U
4,4'-DDT	UG/KG	2.6	3%	2100	0	1	38	3.7	U	3.9	U	3.8	U	3.8	U	3.6	U	3.7	U
Alpha-Chlordane	UG/KG	7.5	3%		0	1	38	1.9	U	2	U	2	U	7.5		1.9	U	1.9	U
Endosulfan sulfate	UG/KG	3	3%	1000	0	1	38	3.7	U	3.9	U	3.8	U	3.8	U	3.6	U	3.7	U
Endrin	UG/KG	20	3%	100	0	1	38	3.7	U	3.9	U	3.8	U	20	J	3.6	U	3.7	U

TABLE 4-P
CLASS III CHEMICAL DATA-SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								TP12-14C		TP12-20A		TP12-20A		TP12-20B		TP12-20C		TP12-21A	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123006		123000		123019		123020		123021		123001	
SAMPLE DEPTH TO TOP OF SAMPLE								2		0.5		0.5		2.5		6		0.7	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								2		0.5		0.5		2.5		6		0.7	
SAMPLE DATE								9/30/1998		9/30/1998		9/30/1998		9/30/1998		9/30/1998		9/29/1998	
QC CODE								SA		DU		SA		SA		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	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	16700	100%	19520	0	38	38	13000		10300		12000		12000		10500		15800	
Arsenic	MG/KG	9.8	100%	8.9	1	38	38	2.7		3.4		3		9.8		3.6		4.9	
Barium	MG/KG	186	100%	300	0	38	38	47		109		113		186		78.6		60.8	
Beryllium	MG/KG	1.1	97%	1.13	0	37	38	0.41	J	0.52	J	0.52	J	0.02	U	0.41	J	0.64	J
Cadmium	MG/KG	13.3	8%	2.46	1	3	38	0.05	U	0.07	U	0.06	U	0.06	U	0.06	U	0.06	U
Calcium	MG/KG	73300	100%	125300	0	38	38	430	J	5170		4190		3970		66000		3730	
Chromium	MG/KG	26	100%	30	0	38	38	16.4		14		15.8		20.7		18.5		26	
Cobalt	MG/KG	19.6	100%	30	0	38	38	8.7		6.8	J	8.5	J	12		11.3		13.3	
Copper	MG/KG	34	100%	33	3	38	38	12.9		20.8		15.1		33		29.2		22	
Iron	MG/KG	53400	100%	37410	3	38	38	22200	J	19100	J	19900	J	41400	J	25000	J	33800	J
Lead	MG/KG	284	100%	24.4	10	38	38	10.4		29.3		21.2		15.1		11.8		11.2	
Magnesium	MG/KG	19200	100%	21700	0	38	38	2970		2680		2890		4340		12300		5080	
Manganese	MG/KG	3200	100%	1100	3	38	38	371		419		605		3200		426		512	
Mercury	MG/KG	0.2	42%	0.1	8	16	38	0.05	UJ	0.08	J	0.06	U	0.05	U	0.06	U	0.13	J
Nickel	MG/KG	51.3	95%	50	1	36	38	18		16.6		18.2	J	40.5	J	36.4	J	38.3	
Potassium	MG/KG	3460	100%	2623	2	38	38	745	J	880	J	1090		908	J	1540		1290	
Selenium	MG/KG	1.8	21%	2	0	8	38	0.8	U	1.1	U	0.99	U	0.96	U	0.87	U	0.97	U
Silver	MG/KG	0.26	8%	0.8	0	3	38	0.21	U	0.28	U	0.26	U	0.25	U	0.23	U	0.25	U
Sodium	MG/KG	748	47%	188	3	18	38	43.6	U	59.1	UJ	54.9	J	70.2	J	78.1	J	53	U
Thallium	MG/KG	1.6	26%	0.855	10	10	38	0.9	U	1.2	U	1.1	U	1.1	U	0.99	U	1.6	J
Vanadium	MG/KG	29.3	100%	150	0	38	38	20.7		17.8		19.7		27.4		16.7		22.6	
Zinc	MG/KG	3370	100%	115	4	38	38	48.6		58.5		58.3		99.4		71.6		82.3	

TABLE 4-P
CLASS III CHEMICAL DATA-SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								TP12-21B		TP12-21C		TP12-22AA		TP12-22BA		TP12-22BB		TP12-24A	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123002		123003		123058		123059		123060		123093	
SAMPLE DEPTH TO TOP OF SAMPLE								3		5.5		0.5		0.5		1.5		0.5	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								3		5.5		0.5		0.5		1.5		0.5	
SAMPLE DATE								9/29/1998		9/29/1998		10/4/1998		10/4/1998		10/4/1998		13-Oct-98	
QC CODE								SA		SA		SA		SA		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
VOLATILE ORGANICS																			
Acetone	UG/KG	100	26%	200	0	10	38	12	U	100		12	UJ	12	UJ	12	UJ	11	U
Methyl ethyl ketone	UG/KG	35	3%	300	0	1	38	12	U	35		12	UJ	12	UJ	12	UJ	11	U
Toluene	UG/KG	10	21%	1500	0	8	38	12	U	14	U	10	J	12	UJ	12	U	11	U
Total Xylenes	UG/KG	2	3%	1200	0	1	38	12	U	14	U	12	UJ	12	UJ	12	U	11	U
Trichloroethene	UG/KG	54	3%	700	0	1	38	12	U	14	U	12	UJ	12	UJ	12	U	11	U
SEMI VOLATILE ORGANICS																			
4-Methylphenol	UG/KG	8.6	5%	900	0	2	38	77	UJ	280	U	80	U	80	U	72	U	77	U
Acenaphthene	UG/KG	28	5%	50000	0	2	38	77	UJ	28	J	80	U	80	U	72	U	77	U
Acenaphthylene	UG/KG	21	8%	41000	0	3	38	4.4	J	21	J	80	U	80	U	72	U	77	U
Anthracene	UG/KG	74	16%	50000	0	6	38	4.2	J	74	J	80	U	80	U	72	U	77	U
Benzo(a)anthracene	UG/KG	760	42%	224	1	16	38	45	J	760		8.9	J	6.4	J	72	U	77	U
Benzo(a)pyrene	UG/KG	1000	45%	61	3	17	38	50	J	1000	J	10	J	8.5	J	72	U	77	UJ
Benzo(b)fluoranthene	UG/KG	1100	45%	1100	0	17	38	58	J	1100		12	J	12	J	72	U	77	U
Benzo(ghi)perylene	UG/KG	820	34%	50000	0	13	38	42	J	820		11	J	7.6	J	72	U	77	U
Benzo(k)fluoranthene	UG/KG	1100	39%	1100	0	15	38	42	J	1100		14	J	9.9	J	72	U	77	U
Bis(2-Ethylhexyl)phthalate	UG/KG	73	24%	50000	0	9	38	77	UJ	280	U	14	J	11	J	72	U	77	U
Butylbenzylphthalate	UG/KG	6.2	5%	50000	0	2	38	77	UJ	280	U	80	U	80	U	72	U	77	U
Carbazole	UG/KG	120	13%		0	5	38	77	UJ	120	J	80	UJ	80	UJ	72	UJ	77	U
Chrysene	UG/KG	1000	53%	400	1	20	38	55	J	1000	J	14	J	12	J	72	U	77	U
Di-n-octylphthalate	UG/KG	34	16%	50000	0	6	38	77	U	280	U	80	U	80	U	72	U	77	U
Dibenz(a,h)anthracene	UG/KG	300	18%	14	4	7	38	12	J	300		80	U	80	U	72	U	77	U
Dibenzofuran	UG/KG	16	5%	6200	0	2	38	77	UJ	16	J	80	U	80	U	72	U	77	U
Diethyl phthalate	UG/KG	4.3	3%	7100	0	1	38	77	UJ	280	UJ	80	U	80	U	72	U	77	U
Fluoranthene	UG/KG	1900	47%	50000	0	18	38	71	J	1900	J	18	J	16	J	72	U	77	U
Fluorene	UG/KG	44	8%	50000	0	3	38	77	U	44	J	80	U	80	U	72	U	77	U
Indeno(1,2,3-cd)pyrene	UG/KG	830	34%	3200	0	13	38	36	J	830		9.4	J	6.9	J	72	U	77	U
Naphthalene	UG/KG	8.6	3%	13000	0	1	38	77	UJ	280	UJ	80	U	80	U	72	U	77	U
Phenanthrene	UG/KG	680	45%	50000	0	17	38	28	J	680		12	J	11	J	72	U	77	U
Pyrene	UG/KG	1500	47%	50000	0	18	38	90		1500		18	J	14	J	72	U	77	U
PESTICIDES/PCBS																			
4,4'-DDD	UG/KG	3.2	3%	2900	0	1	38	3.8	U	4.2	U	3.2	J	3.9	U	3.6	U	3.8	U
4,4'-DDE	UG/KG	2.1	3%	2100	0	1	38	3.8	U	4.2	U	4	U	3.9	U	3.6	U	3.8	U
4,4'-DDT	UG/KG	2.6	3%	2100	0	1	38	3.8	U	4.2	U	4	U	3.9	U	3.6	U	3.8	U
Alpha-Chlordane	UG/KG	7.5	3%		0	1	38	2	U	2.2	U	2	U	2	U	1.9	U	2	U
Endosulfan sulfate	UG/KG	3	3%	1000	0	1	38	3.8	U	3	J	4	U	3.9	U	3.6	U	3.8	U
Endrin	UG/KG	20	3%	100	0	1	38	3.8	U	4.2	U	4	U	3.9	U	3.6	U	3.8	U

TABLE 4-P
CLASS III CHEMICAL DATA-SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								TP12-21B		TP12-21C		TP12-22AA		TP12-22BA		TP12-22BB		TP12-24A	
MATRIX								SOIL		SOIL		SOIL		SOIL		SOIL		SOIL	
SAMPLE ID								123002		123003		123058		123059		123060		123093	
SAMPLE DEPTH TO TOP OF SAMPLE								3		5.5		0.5		0.5		1.5		0.5	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								3		5.5		0.5		0.5		1.5		0.5	
SAMPLE DATE								9/29/1998		9/29/1998		10/4/1998		10/4/1998		10/4/1998		13-Oct-98	
QC CODE								SA		SA		SA		SA		SA		SA	
STUDY ID								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	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	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	16700	100%	19520	0	38	38	13200		12100		14800		13200		13100		14400	
Arsenic	MG/KG	9.8	100%	8.9	1	38	38	5.5		4.1		3.1		2.8		3.7		3.8	
Barium	MG/KG	186	100%	300	0	38	38	105		73.8		128		135		70.9		91.5	
Beryllium	MG/KG	1.1	97%	1.13	0	37	38	0.29	J	0.46	J	0.76	J	0.09	J	0.59	J	0.64	J
Cadmium	MG/KG	13.3	8%	2.46	1	3	38	0.06	U	0.08	U	0.05	U	0.07	U	0.06	U	0.06	U
Calcium	MG/KG	73300	100%	125300	0	38	38	19100		18000		5610	J	3330	J	1550	J	7080	J
Chromium	MG/KG	26	100%	30	0	38	38	21		18.7		13.1	J	15.9	J	23.4	J	23.4	
Cobalt	MG/KG	19.6	100%	30	0	38	38	15.1		10.2	J	7.8	J	16.6		9.6	J	11.6	
Copper	MG/KG	34	100%	33	3	38	38	29.8		24.7		29.2		12.8		14.7		25.1	
Iron	MG/KG	53400	100%	37410	3	38	38	30300	J	24200	J	20200		24800		24800		**42500**	J
Lead	MG/KG	284	100%	24.4	10	38	38	**84**		**25.4**		21.1	J	**42**	J	10.3	J	13.7	
Magnesium	MG/KG	19200	100%	21700	0	38	38	5220		6110		3510		3160		4290		5100	
Manganese	MG/KG	3200	100%	1100	3	38	38	**1230**		492		558	J	**2240**	J	367	J	469	
Mercury	MG/KG	0.2	42%	0.1	8	16	38	**0.2**	J	**0.13**	J	0.06	UJ	0.06	UJ	0.05	UJ	**0.12**	J
Nickel	MG/KG	51.3	95%	50	1	36	38	32.6		28.8		22.7	J	21.9	J	20.5	J	42.2	
Potassium	MG/KG	3460	100%	2623	2	38	38	1420		1460		1990		1350		1290		1400	
Selenium	MG/KG	1.8	21%	2	0	8	38	0.93	U	1.2	U	0.59	J	1.8		0.47	U	0.93	J
Silver	MG/KG	0.26	8%	0.8	0	3	38	0.24	U	0.31	U	0.2	U	0.27	U	0.26	J	0.24	U
Sodium	MG/KG	748	47%	188	3	18	38	51	U	64.4	U	41.5	U	55.9	U	51	U	86.2	J
Thallium	MG/KG	1.6	26%	0.855	10	10	38	1.1	U	1.3	U	0.86	U	1.2	U	1.1	U	**1.1**	J
Vanadium	MG/KG	29.3	100%	150	0	38	38	21.4		26.2		20.4		23.5		29.3		22.7	
Zinc	MG/KG	3370	100%	115	4	38	38	109		**120**		75.2	J	60.9	J	38.8	J	109	J

TABLE 4-P
CLASS III CHEMICAL DATA-SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

		FACILITY						SEAD-12		SEAD-12	
		LOCATION ID						TP12-24B		TP12-24C	
		MATRIX						SOIL		SOIL	
		SAMPLE ID						123094		123095	
SAMPLE DEPTH TO TOP OF SAMPLE								0.5		1	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.5		1	
		SAMPLE DATE						13-Oct-98		13-Oct-98	
		QC CODE						SA		SA	
		STUDY ID						RI Phase 1 Step 1		RI Phase 1 Step 1	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)
VOLATILE ORGANICS											
Acetone	UG/KG	100	26%	200	0	10	38	11	U	11	U
Methyl ethyl ketone	UG/KG	35	3%	300	0	1	38	11	U	11	U
Toluene	UG/KG	10	21%	1500	0	8	38	11	U	11	U
Total Xylenes	UG/KG	2	3%	1200	0	1	38	11	U	11	U
Trichloroethene	UG/KG	54	3%	700	0	1	38	11	U	11	U
SEMI VOLATILE ORGANICS											
4-Methylphenol	UG/KG	8.6	5%	900	0	2	38	80	U	78	U
Acenaphthene	UG/KG	28	5%	50000	0	2	38	80	U	78	U
Acenaphthylene	UG/KG	21	8%	41000	0	3	38	80	U	78	U
Anthracene	UG/KG	74	16%	50000	0	6	38	80	U	78	U
Benzo(a)anthracene	UG/KG	760	42%	224	1	16	38	9.2	J	9.6	J
Benzo(a)pyrene	UG/KG	1000	45%	61	3	17	38	9.4	J	9.2	J
Benzo(b)fluoranthene	UG/KG	1100	45%	1100	0	17	38	14	J	15	J
Benzo(ghi)perylene	UG/KG	820	34%	50000	0	13	38	80	U	78	U
Benzo(k)fluoranthene	UG/KG	1100	39%	1100	0	15	38	13	J	17	J
Bis(2-Ethylhexyl)phthalate	UG/KG	73	24%	50000	0	9	38	80	U	78	U
Butylbenzylphthalate	UG/KG	6.2	5%	50000	0	2	38	80	U	78	U
Carbazole	UG/KG	120	13%		0	5	38	80	U	78	U
Chrysene	UG/KG	1000	53%	400	1	20	38	15	J	18	J
Di-n-octylphthalate	UG/KG	34	16%	50000	0	6	38	80	U	78	U
Dibenz(a,h)anthracene	UG/KG	300	18%	14	4	7	38	80	U	78	U
Dibenzofuran	UG/KG	16	5%	6200	0	2	38	80	U	78	U
Diethyl phthalate	UG/KG	4.3	3%	7100	0	1	38	80	U	78	U
Fluoranthene	UG/KG	1900	47%	50000	0	18	38	16	J	26	J
Fluorene	UG/KG	44	8%	50000	0	3	38	80	U	78	U
Indeno(1,2,3-cd)pyrene	UG/KG	830	34%	3200	0	13	38	80	U	78	U
Naphthalene	UG/KG	8.6	3%	13000	0	1	38	80	U	78	U
Phenanthrene	UG/KG	680	45%	50000	0	17	38	6.3	J	14	J
Pyrene	UG/KG	1500	47%	50000	0	18	38	14	J	19	J
PESTICIDES/PCBS											
4,4'-DDD	UG/KG	3.2	3%	2900	0	1	38	4	U	3.9	U
4,4'-DDE	UG/KG	2.1	3%	2100	0	1	38	4	U	3.9	U
4,4'-DDT	UG/KG	2.6	3%	2100	0	1	38	4	U	2.6	J
Alpha-Chlordane	UG/KG	7.5	3%		0	1	38	2	U	2	U
Endosulfan sulfate	UG/KG	3	3%	1000	0	1	38	4	U	3.9	U
Endrin	UG/KG	20	3%	100	0	1	38	4	U	3.9	U

TABLE 4-P
CLASS III CHEMICAL DATA-SUBSURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12	
LOCATION ID								TP12-24B		TP12-24C	
MATRIX								SOIL		SOIL	
SAMPLE ID								123094		123095	
SAMPLE DEPTH TO TOP OF SAMPLE								0.5		1	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.5		1	
SAMPLE DATE								13-Oct-98		13-Oct-98	
QC CODE								SA		SA	
STUDY ID								RI Phase 1 Step 1		RI Phase 1 Step 1	
PARAMETER	UNIT	MAXIMU	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)
METALS											
Aluminum	MG/KG	16700	100%	19520	0	38	38	12200		12100	
Arsenic	MG/KG	9.8	100%	8.9	1	38	38	3.2		3.6	
Barium	MG/KG	186	100%	300	0	38	38	79.4		85.3	
Beryllium	MG/KG	1.1	97%	1.13	0	37	38	0.5	J	0.54	J
Cadmium	MG/KG	13.3	8%	2.46	1	3	38	0.05	U	0.07	U
Calcium	MG/KG	73300	100%	125300	0	38	38	11300	J	6560	J
Chromium	MG/KG	26	100%	30	0	38	38	19.7		22.5	
Cobalt	MG/KG	19.6	100%	30	0	38	38	10.3		10.6	J
Copper	MG/KG	34	100%	33	3	38	38	20.6		34	
Iron	MG/KG	53400	100%	37410	3	38	38	30600	J	53400	J
Lead	MG/KG	284	100%	24.4	10	38	38	52.9		111	
Magnesium	MG/KG	19200	100%	21700	0	38	38	4290		3710	
Manganese	MG/KG	3200	100%	1100	3	38	38	520		588	
Mercury	MG/KG	0.2	42%	0.1	8	16	38	0.12	J	0.15	J
Nickel	MG/KG	51.3	95%	50	1	36	38	30.4		38.4	
Potassium	MG/KG	3460	100%	2623	2	38	38	1060		1060	J
Selenium	MG/KG	1.8	21%	2	0	8	38	0.77	U	1.2	
Silver	MG/KG	0.26	8%	0.8	0	3	38	0.2	U	0.26	U
Sodium	MG/KG	748	47%	188	3	18	38	68.8	J	59.7	J
Thallium	MG/KG	1.6	26%	0.855	10	10	38	1.1	J	1.6	J
Vanadium	MG/KG	29.3	100%	150	0	38	38	19.2		19.3	
Zinc	MG/KG	3370	100%	115	4	38	38	84.6	J	87.6	J

TABLE 4-Q
WASTE WATER TREATMENT PLANT CHEMICAL DATA-SURFACE SOIL
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

		FACILITY						SEAD-12		SEAD-12		SEAD-12	
		LOCATION ID						SS12-64		SS12-64		SS12-65	
		MATRIX						SOIL		SOIL		SOIL	
		SAMPLE ID						123171		123170		123107	
SAMPLE DEPTH TO TOP OF SAMPLE								0		0		0	
SAMPLE DEPTH TO BOTTOM OF SAMPLE								0.5		0.5		0.2	
		SAMPLE DATE						20-Oct-98		20-Oct-98		7-Jan-99	
		QC CODE						DU		SA		SA	
		STUDY ID						RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
PARAMETER	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC TAGM 4046	NUMBER ABOVE TAGM	NUMBER OF DETECTS	NUMBER OF ANALYSES						
VOLATILE ORGANICS													
Acetone	UG/KG	110	33%	200	0	1	3	14	U	17	U	110	
SEMI VOLATILE ORGANICS													
Benzo(a)anthracene	UG/KG	14	67%	224	0	2	3	7.8	J	14	J	150	U
Benzo(a)pyrene	UG/KG	16	100%	61	0	3	3	9.3	J	16	J	14	J
Benzo(b)fluoranthene	UG/KG	21	67%	1100	0	2	3	12	J	21	J	25	UJ
Benzo(k)fluoranthene	UG/KG	15	67%	1100	0	2	3	11	J	15	J	150	U
Bis(2-Ethylhexyl)phthalate	UG/KG	37	33%	50000	0	1	3	100	U	110	UJ	37	J
Butylbenzylphthalate	UG/KG	130	33%	50000	0	1	3	100	U	130	J	150	U
Chrysene	UG/KG	20	67%	400	0	2	3	13	J	20	J	150	U
Di-n-octylphthalate	UG/KG	12	33%	50000	0	1	3	100	U	110	UJ	12	J
Dibenz(a,h)anthracene	UG/KG	110	33%	14	1	1	3	100	U	**110**	J	150	U
Fluoranthene	UG/KG	25	100%	50000	0	3	3	18	J	25	J	22	J
N-Nitrosodiphenylamine	UG/KG	49	33%		0	1	3	49	J	110	U	150	U
Phenanthrene	UG/KG	17	100%	50000	0	3	3	9.9	J	17	J	16	J
Pyrene	UG/KG	30	100%	50000	0	3	3	18	J	30	J	20	J
METALS													
Aluminum	MG/KG	13600	100%	19520	0	3	3	13100		11600		13600	
Arsenic	MG/KG	6.4	100%	8.9	0	3	3	4.6		3.5		6.4	
Barium	MG/KG	114	100%	300	0	3	3	114		114		55.1	J
Beryllium	MG/KG	0.54	100%	1.13	0	3	3	0.54	J	0.4	J	0.54	J
Calcium	MG/KG	29000	100%	125300	0	3	3	25200		29000		21900	
Chromium	MG/KG	25	100%	30	0	3	3	23.2	J	19.3		25	
Cobalt	MG/KG	13.6	100%	30	0	3	3	13.6	J	10.7	J	13.4	J
Copper	MG/KG	60.3	100%	33	3	3	3	**60.3**		**57.3**		**50.3**	
Iron	MG/KG	32100	100%	37410	0	3	3	27700	J	23300		32100	
Lead	MG/KG	34.4	100%	24.4	3	3	3	**29.5**	J	**34.4**	J	**26.4**	
Magnesium	MG/KG	7320	100%	21700	0	3	3	5750		5910		7320	
Manganese	MG/KG	1240	100%	1100	1	3	3	**1240**		658		331	
Mercury	MG/KG	0.48	100%	0.1	3	3	3	**0.48**		**0.34**	J	**0.15**	J
Nickel	MG/KG	40.5	67%	50	0	2	3	29.7	UJ	33.5		40.5	
Potassium	MG/KG	1470	100%	2623	0	3	3	1400	J	1090	J	1470	J
Selenium	MG/KG	1.8	67%	2	0	2	3	1.6		1.8	J	1.3	U
Sodium	MG/KG	243	100%	188	1	3	3	85.4	J	90.8	J	**243**	J
Thallium	MG/KG	1.5	33%	0.855	1	1	3	**1.5**	J	1.6	U	1.3	U
Vanadium	MG/KG	22.1	100%	150	0	3	3	22.1		17.8		21.1	
Zinc	MG/KG	246	100%	115	3	3	3	**206**	J	**186**		**246**	

TABLE 4-R
BACKGROUND METALS DATA-SURFACE WATER
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY									SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOC_ID = LOCATION									SW12-59		SW12-60		SW12-61		SW12-63	
MATRIX									SURFACE WATER		SURFACE WATER		SURFACE WATER		SURFACE WATER	
SAMP_ID = SAMPLE ID									12053		12054		12055		12048	
SAMP_DEPTH_TOP = TOP OF SAMPLE DEPTH									0		0		0		0	
SAMP_DEPTH_BOT = BOTTOM OF SAMPLE DEPTH									N/A		N/A		N/A		N/A	
SAMP_DATE = SAMPLE DATE									10-Nov-97		10-Nov-97		11-Nov-97		9-Nov-97	
QC_CODE = QC CODE									SA		SA		SA		SA	
STUDY_ID = STUDY ID									RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYS AWQS CLASS C (AQUATIC)	NUMBER ABOVE STD.	NUMBER OF DETECTS	NUMBER OF ANALYSES								
METALS																
Aluminum	UG/L	140	60.1	100%	100	1	9	9	90		62.9		**140**		57.6	
Barium	UG/L	48.3	38.1	100%		0	9	9	36.1		37.9		43.9		25.1	
Cadmium	UG/L	0.88	0.26	22%	3.845011	0	2	9	0.3	U	0.3	U	0.3	U	0.3	U
Calcium	UG/L	85500	64122	100%		0	9	9	56400		59600		85500		54800	
Copper	UG/L	3	1.36	11%	17.362284	0	1	9	2.3	U	2.3	U	2.3	U	2.3	U
Iron	UG/L	184	116	100%	300	0	9	9	161		128		174		86.7	
Magnesium	UG/L	12900	9454	100%		0	9	9	8650		9020		12900		7310	
Manganese	UG/L	69.4	19	100%		0	9	9	15.7		6.7		5		3	
Potassium	UG/L	3710	3029	100%		0	9	9	3490		3300		2950		2160	
Sodium	UG/L	29300	11460	100%		0	9	9	8030		9350		29300		4780	
Zinc	UG/L	14.3	7.43	100%	159.63864	0	9	9	5.4		9.6		10		5	

TABLE 4-R
BACKGROUND METALS DATA-SURFACE WATER
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY									SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOC_ID = LOCATION									SW12-63		SW12-64		SW12-65		SW12-66	
MATRIX									SURFACE WATER		SURFACE WATER		SURFACE WATER		SURFACE WATER	
SAMP_ID = SAMPLE ID									12049		12056		12057		12058	
SAMP_DEPTH_TOP = TOP OF SAMPLE DEPTH									0		0		0		0	
SAMP_DEPTH_BOT = BOTTOM OF SAMPLE DEPTH									N/A		N/A		N/A		N/A	
SAMP_DATE = SAMPLE DATE									10-Nov-97		11-Nov-97		11-Nov-97		11-Nov-97	
QC_CODE = QC CODE									SA		SA		SA		SA	
STUDY_ID = STUDY ID									RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYS AWQS CLASS C (AQUATIC)	NUMBER ABOVE STD.	NUMBER OF DETECTS	NUMBER OF ANALYSES								
METALS																
Aluminum	UG/L	140	60.1	100%	100	1	9	9	12.8		23.1		21.2		97.3	
Barium	UG/L	48.3	38.1	100%		0	9	9	48.3		43.4		48		30.7	
Cadmium	UG/L	0.88	0.26	22%	3.845011	0	2	9	0.3	U	0.3	U	0.88		0.43	
Calcium	UG/L	85500	64122	100%		0	9	9	70800		68800		67900		58100	
Copper	UG/L	3	1.36	11%	17.362284	0	1	9	2.3	U	2.3	U	2.3	U	2.3	U
Iron	UG/L	184	116	100%	300	0	9	9	43.7		93.7		106		184	
Magnesium	UG/L	12900	9454	100%		0	9	9	10200		10700		10400		8270	
Manganese	UG/L	69.4	19	100%		0	9	9	10.6		69.4		21		32.9	
Potassium	UG/L	3710	3029	100%		0	9	9	2260		3240		3120		3030	
Sodium	UG/L	29300	11460	100%		0	9	9	6260		11700		12000		15000	
Zinc	UG/L	14.3	7.43	100%	159.63864	0	9	9	6.5		4.8		5		14.3	

TABLE 4-R
BACKGROUND METALS DATA-SURFACE WATER
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYS AWQS CLASS C (AQUATIC)	NUMBER ABOVE STD.	NUMBER OF DETECTS	NUMBER OF ANALYSES		
FACILITY									RI Phase	
LOC_ID = LOCATION									67359	
MATRIX									SW12-67	
SAMP_ID = SAMPLE ID									12047	
SAMP_DEPTH_TOP = TOP OF SAMPLE DEPTH									SA	
SAMP_DEPTH_BOT = BOTTOM OF SAMPLE DEPTH									0	
SAMP_DATE = SAMPLE DATE									0.2	
QC_CODE = QC CODE									SURFACE	
STUDY_ID = STUDY ID									9-Nov-97	
METALS										
Aluminum	UG/L	140	60.1	100%	100	1	9	9	36.4	
Barium	UG/L	48.3	38.1	100%		0	9	9	29.7	
Cadmium	UG/L	0.88	0.26	22%	3.845011	0	2	9	0.3	U
Calcium	UG/L	85500	64122	100%		0	9	9	55200	
Copper	UG/L	3	1.36	11%	17.362284	0	1	9	3	
Iron	UG/L	184	116	100%	300	0	9	9	71.3	
Magnesium	UG/L	12900	9454	100%		0	9	9	7640	
Manganese	UG/L	69.4	19	100%		0	9	9	2.2	
Potassium	UG/L	3710	3029	100%		0	9	9	3710	
Sodium	UG/L	29300	11460	100%		0	9	9	6720	
Zinc	UG/L	14.3	7.43	100%	159.63864	0	9	9	6.3	

TABLE 4-S
SITE CHEMICAL DATA-SURFACE WATER
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY									SEAD-12	SEAD-12	SEAD-12	SEAD-12	SEAD-12
LOC_ID = LOCATION									SW12A-1	SW12A-1	SW12A-2	SW12A-3	SW12-1
MATRIX									SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER
SAMP_ID = SAMPLE ID									SW12A-20	SW12A-1	SW12A-2	SW12A-3	12039
SAMP_DEPTH_TOP = TOP OF SAMPLE DEPTH									0	0	0	0	0
SAMP_DEPTH_BOT = BOTTOM OF SAMPLE DEPTH									N/A	N/A	N/A	N/A	N/A
SAMP_DATE = SAMPLE DATE									24-Jun-94	24-Jun-94	11-Jun-94	11-Jun-94	5-Nov-97
QC_CODE = QC CODE									DU	SA	SA	SA	SA
STUDY_ID = STUDY ID									ESI	ESI	ESI	ESI	RI Phase 1 Step 1
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYS AWQS CLASS C (AQUATIC)	NUMBER ABOVE STD	NUMBER OF DETECTS	NUMBER OF ANALYSES					
VOLATILE ORGANICS													
Acetone	UG/L	10	2.93	6%		0	3	52	10 U	10 U	10 U	10 U	5 UJ
Toluene	UG/L	0.4	0.77	2%	6000	0	1	52	10 U	10 U	10 U	10 U	1 U
Trichloroethene	UG/L	1	0.79	2%	40	0	1	52	10 U	10 U	10 U	10 U	1 U
SEMI VOLATILE ORGANICS													
Benzo(a)anthracene	UG/L	0.5	0.75	2%		0	1	52	0.5 J	10 U	10 U	10 U	1 U
Benzo(a)pyrene	UG/L	0.6	0.75	2%		0	1	52	0.6 J	10 U	10 U	10 U	1 U
Benzo(k)fluoranthene	UG/L	1	0.75	2%		0	1	52	1 J	10 U	10 U	10 U	1 U
Bis(2-Ethylhexyl)phthalate	UG/L	12	1.02	8%	0.6	2	4	52	10 U	10 U	10 U	10 U	1 U
Butylbenzylphthalate	UG/L	0.2	0.72	19%		0	10	52	10 U	10 U	10 U	10 U	1 U
Chrysene	UG/L	0.5	0.75	2%		0	1	52	0.5 J	10 U	10 U	10 U	1 UJ
Di-n-butylphthalate	UG/L	2	0.73	12%		0	6	52	0.9 J	1 J	2 J	10 U	1 U
Diethyl phthalate	UG/L	0.46	0.71	21%		0	11	52	10 U	10 U	10 U	10 U	1 U
Pentachlorophenol	UG/L	2	1.90	2%	12.6	0	1	52	25 U	2 J	25 U	26 U	2.5 U
Pyrene	UG/L	1	0.75	2%		0	1	52	10 U	1 J	10 U	10 U	1 U
PESTICIDES/PCBS													
4,4'-DDE	UG/L	0.0056	0.0081	2%	0.000007	1	1	52	0.1 U	0.1 U	0.11 U	0.1 U	0.01 U
4,4'-DDT	UG/L	0.062	0.0093	2%	0.00001	1	1	52	0.1 U	0.1 U	0.11 U	0.1 U	0.01 U
Aldrin	UG/L	0.0041	0.0041	2%	0.001	1	1	52	0.051 U	0.052 U	0.054 U	0.052 U	0.0051 U
Alpha-BHC	UG/L	0.09	0.0073	19%		0	10	52	0.051 U	0.052 U	0.054 U	0.052 U	0.0051 U
Alpha-Chlordane	UG/L	0.0036	0.0047	2%		0	1	52	0.051 U	0.052 U	0.054 U	0.052 U	0.0051 U
Aroclor-1242	UG/L	0.44	0.0945	4%		0	2	52	1 U	1 U	1.1 U	1 U	0.1 U
Beta-BHC	UG/L	0.017	0.0046	10%		0	5	52	0.051 U	0.052 U	0.054 U	0.052 U	0.0051 U
Delta-BHC	UG/L	0.0046	0.0041	6%		0	3	52	0.051 U	0.052 U	0.054 U	0.052 U	0.0051 U
Endrin aldehyde	UG/L	0.012	0.0083	4%		0	2	52	0.1 U	0.1 U	0.11 U	0.1 U	0.01 U
Endrin ketone	UG/L	0.015	0.0083	2%		0	1	52	0.1 U	0.1 U	0.11 U	0.1 U	0.01 U
Gamma-BHC/Lindane	UG/L	0.092	0.0061	10%		0	5	52	0.051 U	0.052 U	0.054 U	0.052 U	0.0051 U
Heptachlor	UG/L	0.0063	0.0042	6%	0.0002	3	3	52	0.051 U	0.052 U	0.054 U	0.052 U	0.0051 U
Heptachlor epoxide	UG/L	0.0033	0.0041	4%	0.0003	2	2	52	0.051 U	0.052 U	0.054 U	0.052 U	0.0051 U
Hexachlorobenzene	UG/L	0.02	0.0053	6%	0.00003	3	3	48					0.01 U
METALS													

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TABLE 4-S
SITE CHEMICAL DATA-SURFACE WATER
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY									SEAD-12	SEAD-12	SEAD-12	SEAD-12	SEAD-12
LOC_ID = LOCATION									SW12A-1	SW12A-1	SW12A-2	SW12A-3	SW12-1
MATRIX									SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER
SAMP_ID = SAMPLE ID									SW12A-20	SW12A-1	SW12A-2	SW12A-3	12039
SAMP_DEPTH_TOP = TOP OF SAMPLE DEPTH									0	0	0	0	0
SAMP_DEPTH_BOT = BOTTOM OF SAMPLE DEPTH									N/A	N/A	N/A	N/A	N/A
SAMP_DATE = SAMPLE DATE									24-Jun-94	24-Jun-94	11-Jun-94	11-Jun-94	5-Nov-97
QC_CODE = QC CODE									DU	SA	SA	SA	SA
STUDY_ID = STUDY ID				FREQUENCY OF DETECTION	NYS AWQS CLASS C (AQUATIC)	NUMBER ABOVE STD.	NUMBER OF DETECTS	NUMBER OF ANALYSES	ESI	ESI	ESI	ESI	RI Phase 1 Step 1
PARAMETER	UNIT	MAXIMUM	AVERAGE										
Aluminum	UG/L	3430	281	83%	100	19	43	52	**153** J	**175** J	86.7 J	**879**	21.9 U
Arsenic	UG/L	3.8	1.5	10%	150	0	5	52	2 U	2 U	2 U	2 U	2.5 U
Barium	UG/L	115	41	100%		0	52	52	27.9 J	28.6 J	30.9 J	41.2 J	28.3
Beryllium	UG/L	0.18	0.06	8%	1100	0	4	52	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Cadmium	UG/L	2.1	0.27	13%	3.84	0	7	52	0.2 U	0.2 U	0.2 U	0.2 U	0.4 U
Calcium	UG/L	130000	70586	98%		0	51	52	84600	85700	77400	83700	69900
Chromium	UG/L	3.3	0.69	21%	139.8	0	11	52	0.85 J	0.89 J	0.56 J	1.5 J	0.9 U
Cobalt	UG/L	6	0.86	13%	5	1	7	52	0.53 J	0.5 U	0.81 J	0.73 J	1.3 U
Copper	UG/L	27.6	2.9	56%	17.36	2	29	52	1.2 J	1.2 J	1.6 J	2 J	1.7
Iron	UG/L	6830	470	92%	300	12	48	52	221	250	126	**966**	20.4 U
Lead	UG/L	35.4	1.8	8%	1.462	4	4	52	0.89 U	0.9 U	0.9 U	0.89 U	1.7 U
Magnesium	UG/L	18600	9966	100%		0	52	52	14700	15000	17600	18100	10200
Manganese	UG/L	1320	102	96%		0	50	52	18.2	20.1	492	104	0.6
Mercury	UG/L	0.11	0.23	10%	0.00007	5	5	52	**0.03** J	**0.11** J	**0.08** J	0.03 U	0.1 U
Nickel	UG/L	19.7	1.7	52%	100.2	0	27	52	0.69 U	0.7 U	0.7 U	1.3 J	0.9 U
Potassium	UG/L	11800	3807	98%		0	51	52	1550 J	1610 J	3360 J	1650 J	3220
Silver	UG/L	1.6	0.68	12%	0.1	6	6	52	**0.57** J	0.5 U	**0.58** J	0.5 U	1.1 U
Sodium	UG/L	114000	21517	98%		0	51	52	6830	7030	70700	6940	12800
Thallium	UG/L	6.5	3.0	4%	8	0	2	52	1.9 U	1.9 U	2 J	1.9 U	6 U
Vanadium	UG/L	7.2	0.92	13%	14	0	7	52	0.89 J	0.98 J	0.86 J	1.6 J	1.2 U
Zinc	UG/L	105	21.9	100%	159.6	0	52	52	3.4 J	5.4 J	2.2 J	12.9 J	5

TABLE 4-S
SITE CHEMICAL DATA-SURFACE WATER
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOC_ID = LOCATION								SW12-2		SW12-3		SW12-4		SW12-5		SW12-6	
MATRIX								SURFACE WATER		SURFACE WATER		SURFACE WATER		SURFACE WATER		SURFACE WATER	
SAMP_ID = SAMPLE ID								12001		12072		12038		12036		12022	
SAMP_DEPTH_TOP = TOP OF SAMPLE DEPTH								0		0		0		0		0	
SAMP_DEPTH_BOT = BOTTOM OF SAMPLE DEPTH								N/A		N/A		N/A		N/A		N/A	
SAMP_DATE = SAMPLE DATE								26-Oct-97		13-Dec-97		5-Nov-97		5-Nov-97		3-Nov-97	
QC_CODE = QC CODE								SA		SA		SA		SA		SA	
STUDY_ID = STUDY ID								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	
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYS AWQS CLASS C (AQUATIC)	NUMBER ABOVE STD.	NUMBER OF DETECTS										
VOLATILE ORGANICS																	
Acetone	UG/L	10	2.93	6%		0	3	5	UJ	5	U	5	UJ	5	U	5	U
Toluene	UG/L	0.4	0.77	2%	6000	0	1	1	U	1	U	1	U	1	U	1	U
Trichloroethene	UG/L	1	0.79	2%	40	0	1	1	U	1	U	1	U	1	U	1	U
SEMI VOLATILE ORGANICS																	
Benzo(a)anthracene	UG/L	0.5	0.75	2%		0	1	1	U	1	U	1	U	1	U	1	U
Benzo(a)pyrene	UG/L	0.6	0.75	2%		0	1	1	U	1	U	1	U	1	U	1	U
Benzo(k)fluoranthene	UG/L	1	0.75	2%		0	1	1	U	1	U	1	U	1	U	1	U
Bis(2-Ethylhexyl)phthalate	UG/L	12	1.02	8%	0.6	2	4	1	U	1	U	1	U	1	U	1	U
Butylbenzylphthalate	UG/L	0.2	0.72	19%		0	10	1	U	0.13	J	1	U	0.16	J	1	U
Chrysene	UG/L	0.5	0.75	2%		0	1	1	U	1	U	1	U	1	UJ	1	U
Di-n-butylphthalate	UG/L	2	0.73	12%		0	6	1	U	0.067	J	1	U	1	U	1	U
Diethyl phthalate	UG/L	0.46	0.71	21%		0	11	0.23	J	1	U	1	U	1	U	1	U
Pentachlorophenol	UG/L	2	1.90	2%	12.6	0	1	2.6	U	2.6	UJ	2.5	U	2.5	U	2.5	U
Pyrene	UG/L	1	0.75	2%		0	1	1	U	1	U	1	U	1	U	1	U
PESTICIDES/PCBS																	
4,4'-DDE	UG/L	0.0056	0.0081	2%	0.000007	1	1	0.011	U	0.01	U	0.01	U	0.01	U	0.01	U
4,4'-DDT	UG/L	0.062	0.0093	2%	0.00001	1	1	0.011	U	0.01	UJ	0.01	U	0.01	U	0.01	U
Aldrin	UG/L	0.0041	0.0041	2%	0.001	1	1	0.0054	U	0.0052	UJ	0.005	U	0.005	U	0.005	U
Alpha-BHC	UG/L	0.09	0.0073	19%		0	10	0.0054	U	0.0052	U	0.005	U	0.005	U	0.005	U
Alpha-Chlordane	UG/L	0.0036	0.0047	2%		0	1	0.0054	U	0.0052	U	0.005	U	0.005	U	0.005	U
Aroclor-1242	UG/L	0.44	0.0945	4%		0	2	0.11	U	0.1	U	0.1	U	0.1	U	0.33	
Beta-BHC	UG/L	0.017	0.0046	10%		0	5	0.0054	U	0.0052	U	0.005	U	0.005	U	0.003	J
Delta-BHC	UG/L	0.0046	0.0041	6%		0	3	0.0054	U	0.0052	U	0.005	U	0.005	U	0.005	U
Endrin aldehyde	UG/L	0.012	0.0083	4%		0	2	0.011	U	0.01	U	0.01	U	0.01	U	0.01	U
Endrin ketone	UG/L	0.015	0.0083	2%		0	1	0.011	U	0.01	U	0.01	U	0.01	U	0.01	U
Gamma-BHC/Lindane	UG/L	0.092	0.0061	10%		0	5	0.0054	U	0.0052	UJ	0.005	U	0.005	U	0.005	U
Heptachlor	UG/L	0.0063	0.0042	6%	0.0002	3	3	0.0054	U	0.0052	UJ	0.005	U	0.005	U	0.005	U
Heptachlor epoxide	UG/L	0.0033	0.0041	4%	0.0003	2	2	0.0054	U	0.0052	U	0.005	U	0.005	U	0.0033	J
Hexachlorobenzene	UG/L	0.02	0.0053	6%	0.00003	3	3	0.011	U	0.01	UJ	0.01	U	0.01	U	0.01	U
METALS																	

TABLE 4-S
SITE CHEMICAL DATA-SURFACE WATER
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12	SEAD-12	SEAD-12	SEAD-12	SEAD-12
LOC_ID = LOCATION								SW12-2	SW12-3	SW12-4	SW12-5	SW12-6
MATRIX								SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER
SAMP_ID = SAMPLE ID								12001	12072	12038	12036	12022
SAMP_DEPTH_TOP = TOP OF SAMPLE DEPTH								0	0	0	0	0
SAMP_DEPTH_BOT = BOTTOM OF SAMPLE DEPTH								N/A	N/A	N/A	N/A	N/A
SAMP_DATE = SAMPLE DATE								26-Oct-97	13-Dec-97	5-Nov-97	5-Nov-97	3-Nov-97
QC_CODE = QC CODE								SA	SA	SA	SA	SA
STUDY_ID = STUDY ID								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
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYS AWQS CLASS C (AQUATIC)	NUMBER ABOVE STD.	NUMBER OF DETECTS					
Aluminum	UG/L	3430	281	83%	100	19	43	40.1	12.3 U	45.5	**417**	21.9 U
Arsenic	UG/L	3.8	1.5	10%	150	0	5	2.5 U	3.6 U	2.5 U	2.5 U	2.5 U
Barium	UG/L	115	41	100%		0	52	55.6	23.8 J	54.7	75.4	17
Beryllium	UG/L	0.18	0.06	8%	1100	0	4	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Cadmium	UG/L	2.1	0.27	13%	3.84	0	7	0.4 U	0.3 U	0.4 U	0.4 U	0.4 U
Calcium	UG/L	130000	70586	98%		0	51	91100	71100	98100	113000	52200
Chromium	UG/L	3.3	0.69	21%	139.8	0	11	0.9 U	1.1 U	0.9 U	1.3	0.9 U
Cobalt	UG/L	6	0.86	13%	5	1	7	1.3 U	1.7 U	1.3 U	1.5	1.3 U
Copper	UG/L	27.6	2.9	56%	17.36	2	29	1.1 U	2.3 U	3	2.8	1.1 U
Iron	UG/L	6830	470	92%	300	12	48	181	42.9 J	160	**1230** J	20.4 U
Lead	UG/L	35.4	1.8	8%	1.462	4	4	1.7 U	1.8 U	1.7 U	1.7 U	1.7 U
Magnesium	UG/L	18600	9966	100%		0	52	14100	11800	13200	13300	5380
Manganese	UG/L	1320	102	96%		0	50	48.9	3.7 J	277	504	0.4 U
Mercury	UG/L	0.11	0.23	10%	0.00007	5	5	1 U	0.1 U	0.1 U	0.1 U	1 U
Nickel	UG/L	19.7	1.7	52%	100.2	0	27	1.1	2.1 U	0.9 U	1.8	0.93
Potassium	UG/L	11800	3807	98%		0	51	2100	2010 J	3910	1950	3420
Silver	UG/L	1.6	0.68	12%	0.1	6	6	1.1 U	2.1 U	1.1 U	1.1 U	1.1 U
Sodium	UG/L	114000	21517	98%		0	51	47500	2780 J	17300	22900	12200
Thallium	UG/L	6.5	3.0	4%	8	0	2	6 U	6.3 U	6 U	6 U	6 U
Vanadium	UG/L	7.2	0.92	13%	14	0	7	1.2 U	1.6 U	1.2 U	1.2 U	1.2 U
Zinc	UG/L	105	21.9	100%	159.6	0	52	3.6	19.5 J	4.9	18.8	49.4

TABLE 4-S
SITE CHEMICAL DATA-SURFACE WATER
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOC_ID = LOCATION								SW12-7		SW12-8		SW12-9		SW12-10		SW12-11	
MATRIX								SURFACE	WATER	SURFACE	WATER	SURFACE	WATER	SURFACE	WATER	SURFACE	WATER
SAMP_ID = SAMPLE ID								12021		12007		12037		12025		12073	
SAMP_DEPTH_TOP = TOP OF SAMPLE DEPTH								0		0		0		0		0	
SAMP_DEPTH_BOT = BOTTOM OF SAMPLE DEPTH								N/A		N/A		N/A		N/A		N/A	
SAMP_DATE = SAMPLE DATE								3-Nov-97		27-Oct-97		5-Nov-97		3-Nov-97		13-Dec-97	
QC_CODE = QC CODE								SA		SA		SA		SA		SA	
STUDY_ID = STUDY ID								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
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYS AWQS CLASS C (AQUATIC)	NUMBER ABOVE STD.	NUMBER OF DETECTS										
VOLATILE ORGANICS																	
Acetone	UG/L	10	2.93	6%		0	3	5	U	5	UJ	5	UJ	5	U	5	U
Toluene	UG/L	0.4	0.77	2%	6000	0	1	1	U	1	U	1	U	1	U	1	U
Trichloroethene	UG/L	1	0.79	2%	40	0	1	1	U	1	U	1	U	1	U	1	U
SEMI VOLATILE ORGANICS																	
Benzo(a)anthracene	UG/L	0.5	0.75	2%		0	1	1	U	1	U	1	U	1	U	1.1	U
Benzo(a)pyrene	UG/L	0.6	0.75	2%		0	1	1	U	1	U	1	U	1	U	1.1	U
Benzo(k)fluoranthene	UG/L	1	0.75	2%		0	1	1	U	1	U	1	U	1	U	1.1	U
Bis(2-Ethylhexyl)phthalate	UG/L	12	1.02	8%	0.6	2	4	1	U	1	U	1	U	1	U	1.1	U
Butylbenzylphthalate	UG/L	0.2	0.72	19%		0	10	1	U	1	U	1	U	1	U	1.1	U
Chrysene	UG/L	0.5	0.75	2%		0	1	1	U	1	U	1	U	1	U	1.1	U
Di-n-butylphthalate	UG/L	2	0.73	12%		0	6	1	U	1	U	1	U	1	U	0.12	J
Diethyl phthalate	UG/L	0.46	0.71	21%		0	11	0.056	J	1	U	0.1	J	1	U	1.1	U
Pentachlorophenol	UG/L	2	1.90	2%	12.6	0	1	2.6	U	2.6	U	2.5	U	2.5	U	2.8	UJ
Pyrene	UG/L	1	0.75	2%		0	1	1	U	1	U	1	U	1	U	1.1	U
PESTICIDES/PCBS																	
4,4'-DDE	UG/L	0.0056	0.0081	2%	0.000007	1	1	0.01	U	0.011	U	0.01	U	0.011	U	0.01	U
4,4'-DDT	UG/L	0.062	0.0093	2%	0.00001	1	1	0.01	U	0.011	U	0.01	U	0.011	U	0.01	UJ
Aldrin	UG/L	0.0041	0.0041	2%	0.001	1	1	0.0052	U	0.0055	U	0.005	U	0.0057	U	0.0052	UJ
Alpha-BHC	UG/L	0.09	0.0073	19%		0	10	0.0082		0.0055	U	0.003	J	0.014		0.0052	U
Alpha-Chlordane	UG/L	0.0036	0.0047	2%		0	1	0.0052	U	0.0055	U	0.005	U	0.0057	U	0.0052	U
Aroclor-1242	UG/L	0.44	0.0945	4%		0	2	0.1	U	0.11	U	0.1	U	0.11	U	0.1	U
Beta-BHC	UG/L	0.017	0.0046	10%		0	5	0.0052	U	0.0036	J	0.005	U	0.0057	U	0.0052	U
Delta-BHC	UG/L	0.0046	0.0041	6%		0	3	0.0052	U	0.0055	U	0.005	U	0.0057	U	0.0052	U
Endrin aldehyde	UG/L	0.012	0.0083	4%		0	2	0.01	U	0.011	U	0.0073	J	0.011	U	0.01	U
Endrin ketone	UG/L	0.015	0.0083	2%		0	1	0.01	U	0.011	U	0.01	U	0.011	U	0.01	U
Gamma-BHC/Lindane	UG/L	0.092	0.0061	10%		0	5	0.0028	J	0.0055	U	0.005	U	0.0057	U	0.0052	UJ
Heptachlor	UG/L	0.0063	0.0042	6%	0.0002	3	3	**0.0063**		0.0055	U	0.005	U	**0.0039**	J	0.0052	UJ
Heptachlor epoxide	UG/L	0.0033	0.0041	4%	0.0003	2	2	0.0052	U	0.0055	U	0.005	U	0.0057	U	0.0052	U
Hexachlorobenzene	UG/L	0.02	0.0053	6%	0.00003	3	3	0.01	U	0.011	U	0.01	U	**0.02**		0.01	UJ
METALS																	

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TABLE 4-S
SITE CHEMICAL DATA-SURFACE WATER
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOC_ID = LOCATION								SW12-7		SW12-8		SW12-9		SW12-10		SW12-11	
MATRIX								SURFACE WATER		SURFACE WATER		SURFACE WATER		SURFACE WATER		SURFACE WATER	
SAMP_ID = SAMPLE ID								12021		12007		12037		12025		12073	
SAMP_DEPTH_TOP = TOP OF SAMPLE DEPTH								0		0		0		0		0	
SAMP_DEPTH_BOT = BOTTOM OF SAMPLE DEPTH								N/A		N/A		N/A		N/A		N/A	
SAMP_DATE = SAMPLE DATE								3-Nov-97		27-Oct-97		5-Nov-97		3-Nov-97		13-Dec-97	
QC_CODE = QC CODE								SA		SA		SA		SA		SA	
STUDY_ID = STUDY ID								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	
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYS AWQS CLASS C (AQUATIC)	NUMBER ABOVE STD.	NUMBER OF DETECTS										
Aluminum	UG/L	3430	281	83%	100	19	43	**173**	J	**239**		72.4		58.9		12.3	U
Arsenic	UG/L	3.8	1.5	10%	150	0	5	2.5	U	2.5	U	2.5	U	2.5	U	3.6	U
Barium	UG/L	115	41	100%		0	52	15.7		51.3		41.1		29.9		24.4	J
Beryllium	UG/L	0.18	0.06	8%	1100	0	4	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Cadmium	UG/L	2.1	0.27	13%	3.84	0	7	0.4	U	0.4	U	0.4	U	0.4	U	0.3	U
Calcium	UG/L	130000	70586	98%		0	51	36000		130000		83400		58000		79400	
Chromium	UG/L	3.3	0.69	21%	139.8	0	11	0.9	U	0.9	U	0.9	U	0.9	U	1.1	U
Cobalt	UG/L	6	0.86	13%	5	1	7	1.3	U	1.3	U	1.3	U	1.3	U	1.7	U
Copper	UG/L	27.6	2.9	56%	17.36	2	29	1.1	U	1.1	U	3.6		1.1	U	2.3	U
Iron	UG/L	6830	470	92%	300	12	48	221		**1050**		122		108		25.6	U
Lead	UG/L	35.4	1.8	8%	1.462	4	4	1.7	U	1.7	U	1.7	U	1.7	U	1.8	U
Magnesium	UG/L	18600	9966	100%		0	52	5740		12700		10600		8030		7880	
Manganese	UG/L	1320	102	96%		0	50	20.5		144		6.3		13		7.1	J
Mercury	UG/L	0.11	0.23	10%	0.00007	5	5	1	U	1	U	0.1	U	1	U	0.1	U
Nickel	UG/L	19.7	1.7	52%	100.2	0	27	1.6		2.7		2		1.2		2.1	U
Potassium	UG/L	11800	3807	98%		0	51	3340		5550		5900		7500		2800	J
Silver	UG/L	1.6	0.68	12%	0.1	6	6	1.1	U	1.1	U	1.1	U	1.1	U	2.1	U
Sodium	UG/L	114000	21517	98%		0	51	9370		47400		24400		14600		25700	
Thallium	UG/L	6.5	3.0	4%	8	0	2	6	U	6	U	6	U	6	U	6.3	U
Vanadium	UG/L	7.2	0.92	13%	14	0	7	1.2	U	1.2	U	1.2	U	1.2	U	1.6	U
Zinc	UG/L	105	21.9	100%	159.6	0	52	16.1		38.5		26.5		46.9		51.6	

TABLE 4-S
SITE CHEMICAL DATA-SURFACE WATER
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12	SEAD-12	SEAD-12	SEAD-12	SEAD-12
LOC_ID = LOCATION								SW12-12	SW12-13	SW12-14	SW12-15	SW12-16
MATRIX								SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER
SAMP_ID = SAMPLE ID								12042	12041	12035	12034	12028
SAMP_DEPTH_TOP = TOP OF SAMPLE DEPTH								0	0	0	0	0
SAMP_DEPTH_BOT = BOTTOM OF SAMPLE DEPTH								N/A	N/A	N/A	N/A	N/A
SAMP_DATE = SAMPLE DATE								6-Nov-97	6-Nov-97	4-Nov-97	4-Nov-97	4-Nov-97
QC_CODE = QC CODE								SA	SA	SA	SA	SA
STUDY_ID = STUDY ID								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
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYS AWQS CLASS C (AQUATIC)	NUMBER ABOVE STD.	NUMBER OF DETECTS					
VOLATILE ORGANICS												
Acetone	UG/L	10	2.93	6%		0	3	5 UJ	5 UJ	5 U	5 U	5 U
Toluene	UG/L	0.4	0.77	2%	6000	0	1	1 U	1 U	1 U	1 U	1 U
Trichloroethene	UG/L	1	0.79	2%	40	0	1	1 U	1 U	1 U	1 U	1 U
SEMI VOLATILE ORGANICS												
Benzo(a)anthracene	UG/L	0.5	0.75	2%		0	1	1 U	1 U	1 U	1 U	1 U
Benzo(a)pyrene	UG/L	0.6	0.75	2%		0	1	1 U	1 U	1 U	1 U	1 U
Benzo(k)fluoranthene	UG/L	1	0.75	2%		0	1	1 U	1 U	1 U	1 U	1 U
Bis(2-Ethylhexyl)phthalate	UG/L	12	1.02	8%	0.6	2	4	1 U	1 U	1 U	1 U	1 U
Butylbenzylphthalate	UG/L	0.2	0.72	19%		0	10	1 U	1 U	1 U	0.13 J	0.14 J
Chrysene	UG/L	0.5	0.75	2%		0	1	1 U	1 U	1 U	1 U	1 U
Di-n-butylphthalate	UG/L	2	0.73	12%		0	6	1 U	1 U	1 U	1 U	1 U
Diethyl phthalate	UG/L	0.46	0.71	21%		0	11	1 U	1 U	1 U	1 U	1 U
Pentachlorophenol	UG/L	2	1.90	2%	12.6	0	1	2.5 U	2.5 U	2.5 U	2.6 U	2.5 U
Pyrene	UG/L	1	0.75	2%		0	1	1 U	1 U	1 U	1 U	1 U
PESTICIDES/PCBS												
4,4'-DDE	UG/L	0.0056	0.0081	2%	0.000007	1	1	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
4,4'-DDT	UG/L	0.062	0.0093	2%	0.00001	1	1	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Aldrin	UG/L	0.0041	0.0041	2%	0.001	1	1	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Alpha-BHC	UG/L	0.09	0.0073	19%		0	10	0.005 U	0.005 U	0.005 U	0.005 U	0.022
Alpha-Chlordane	UG/L	0.0036	0.0047	2%		0	1	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Aroclor-1242	UG/L	0.44	0.0945	4%		0	2	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Beta-BHC	UG/L	0.017	0.0046	10%		0	5	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Delta-BHC	UG/L	0.0046	0.0041	6%		0	3	0.005 U	0.005 U	0.005 U	0.005 U	0.0031 J
Endrin aldehyde	UG/L	0.012	0.0083	4%		0	2	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Endrin ketone	UG/L	0.015	0.0083	2%		0	1	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Gamma-BHC/Lindane	UG/L	0.092	0.0061	10%		0	5	0.005 U	0.005 U	0.005 U	0.005 U	0.0091
Heptachlor	UG/L	0.0063	0.0042	6%	0.0002	3	3	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Heptachlor epoxide	UG/L	0.0033	0.0041	4%	0.0003	2	2	0.005 U	0.005 U	0.005 U	0.005 U	0.005 U
Hexachlorobenzene	UG/L	0.02	0.0053	6%	0.00003	3	3	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
METALS												

TABLE 4-S
SITE CHEMICAL DATA-SURFACE WATER
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOC_ID = LOCATION								SW12-12		SW12-13		SW12-14		SW12-15		SW12-16	
MATRIX								SURFACE WATER		SURFACE WATER		SURFACE WATER		SURFACE WATER		SURFACE WATER	
SAMP_ID = SAMPLE ID								12042		12041		12035		12034		12028	
SAMP_DEPTH_TOP = TOP OF SAMPLE DEPTH								0		0		0		0		0	
SAMP_DEPTH_BOT = BOTTOM OF SAMPLE DEPTH								N/A		N/A		N/A		N/A		N/A	
SAMP_DATE = SAMPLE DATE								6-Nov-97		6-Nov-97		4-Nov-97		4-Nov-97		4-Nov-97	
QC_CODE = QC CODE								SA		SA		SA		SA		SA	
STUDY_ID = STUDY ID				FREQUENCY OF	NYS AWQS CLASS C	NUMBER ABOVE	NUMBER 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	
PARAMETER	UNIT	MAXIMUM	AVERAGE	DETECTION	(AQUATIC)	STD.	DETECTS										
Aluminum	UG/L	3430	281	83%	100	19	43	29.4		**129**		**209**		71.6		72.2	
Arsenic	UG/L	3.8	1.5	10%	150	0	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Barium	UG/L	115	41	100%		0	52	23		28.4		23.1		22.3		22.1	
Beryllium	UG/L	0.18	0.06	8%	1100	0	4	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Cadmium	UG/L	2.1	0.27	13%	3.84	0	7	0.4	U	0.4	U	0.4	U	0.4	U	0.4	U
Calcium	UG/L	130000	70586	98%		0	51	77400		71500		56200		54900		45900	
Chromium	UG/L	3.3	0.69	21%	139.8	0	11	0.9	U	0.9	U	1.2		0.9	U	0.9	U
Cobalt	UG/L	6	0.86	13%	5	1	7	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U
Copper	UG/L	27.6	2.9	56%	17.36	2	29	3.6		3.4		2.4		1.7		1.3	
Iron	UG/L	6830	470	92%	300	12	48	59.5		192		**353**		91.3		97.7	
Lead	UG/L	35.4	1.8	8%	1.462	4	4	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U
Magnesium	UG/L	18600	9966	100%		0	52	10600		9090		8960		9520		8320	
Manganese	UG/L	1320	102	96%		0	50	5		41.1		29.7		2.9		2.8	
Mercury	UG/L	0.11	0.23	10%	0.00007	5	5	0.1	U	0.1	U	0.1	U	0.1	U	**0.11**	
Nickel	UG/L	19.7	1.7	52%	100.2	0	27	0.9	U	1.3		1.8		0.9	U	0.9	U
Potassium	UG/L	11800	3807	98%		0	51	2120		3590		2310		2810		2980	
Silver	UG/L	1.6	0.68	12%	0.1	6	6	1.1	U	**1.2**		**1.3**		1.1	U	1.1	U
Sodium	UG/L	114000	21517	98%		0	51	12500		15800		13000		10200		5320	
Thallium	UG/L	6.5	3.0	4%	8	0	2	6	U	6	U	6	U	6	U	6	U
Vanadium	UG/L	7.2	0.92	13%	14	0	7	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
Zinc	UG/L	105	21.9	100%	159.6	0	52	12.5		9.6		28.8		8.1		6.8	

TABLE 4-S
SITE CHEMICAL DATA-SURFACE WATER
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYS AWQS CLASS C (AQUATIC)	NUMBER ABOVE STD.	NUMBER OF DETECTS					
FACILITY								SEAD-12	SEAD-12	SEAD-12	SEAD-12	SEAD-12
LOC_ID = LOCATION								SW12-17	SW12-18	SW12-19	SW12-20	SW12-22
MATRIX								SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER
SAMP_ID = SAMPLE ID								12032	12052	12040	12045	12024
SAMP_DEPTH_TOP = TOP OF SAMPLE DEPTH								0	0	0	0	0
SAMP_DEPTH_BOT = BOTTOM OF SAMPLE DEPTH								N/A	N/A	N/A	N/A	N/A
SAMP_DATE = SAMPLE DATE								4-Nov-97	10-Nov-97	6-Nov-97	6-Nov-97	3-Nov-97
QC_CODE = QC CODE								SA	SA	SA	SA	SA
STUDY_ID = STUDY ID								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
VOLATILE ORGANICS												
Acetone	UG/L	10	2.93	6%		0	3	10	5 U	5 UJ	5 U	5 U
Toluene	UG/L	0.4	0.77	2%	6000	0	1	1 U	1 U	1 U	0.4 J	1 U
Trichloroethene	UG/L	1	0.79	2%	40	0	1	1 U	1 U	1 U	1 U	1 U
SEMI VOLATILE ORGANICS												
Benzo(a)anthracene	UG/L	0.5	0.75	2%		0	1	1 U	1 U	1 U	1 U	1.1 U
Benzo(a)pyrene	UG/L	0.6	0.75	2%		0	1	1 U	1 U	1 U	1 U	1.1 U
Benzo(k)fluoranthene	UG/L	1	0.75	2%		0	1	1 U	1 U	1 U	1 U	1.1 U
Bis(2-Ethylhexyl)phthalate	UG/L	12	1.02	8%	0.6	2	4	1 U	1 U	1 U	0.16 J	1 U
Butylbenzylphthalate	UG/L	0.2	0.72	19%		0	10	1 U	1 U	1 U	1 U	1.1 U
Chrysene	UG/L	0.5	0.75	2%		0	1	1 U	1 U	1 U	1 U	1.1 U
Di-n-butylphthalate	UG/L	2	0.73	12%		0	6	1 U	1 U	1 U	1 U	1.1 U
Diethyl phthalate	UG/L	0.46	0.71	21%		0	11	1 U	1 U	1 U	0.46 J	1.1 U
Pentachlorophenol	UG/L	2	1.90	2%	12.6	0	1	2.5 U	2.5 U	2.5 U	2.5 U	2.7 U
Pyrene	UG/L	1	0.75	2%		0	1	1 U	1 U	1 U	1 U	1.1 U
PESTICIDES/PCBS												
4,4'-DDE	UG/L	0.0056	0.0081	2%	0.000007	1	1	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
4,4'-DDT	UG/L	0.062	0.0093	2%	0.00001	1	1	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Aldrin	UG/L	0.0041	0.0041	2%	0.001	1	1	0.0041 J	0.005 U	0.0051 U	0.0051 U	0.005 U
Alpha-BHC	UG/L	0.09	0.0073	19%		0	10	0.01 U	0.005 U	0.0051 U	0.0051 U	0.022
Alpha-Chlordane	UG/L	0.0036	0.0047	2%		0	1	0.06 U	0.005 U	0.0051 U	0.0051 U	0.005 U
Aroclor-1242	UG/L	0.44	0.0945	4%		0	2	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Beta-BHC	UG/L	0.017	0.0046	10%		0	5	0.005 U	0.005 U	0.0051 U	0.0051 U	0.0079
Delta-BHC	UG/L	0.0046	0.0041	6%		0	3	0.005 U	0.005 U	0.0051 U	0.0051 U	0.005 U
Endrin aldehyde	UG/L	0.012	0.0083	4%		0	2	0.01 U	0.01 U	0.012	0.01 U	0.01 U
Endrin ketone	UG/L	0.015	0.0083	2%		0	1	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
Gamma-BHC/Lindane	UG/L	0.092	0.0061	10%		0	5	0.005 U	0.005 U	0.0051 U	0.0051 U	0.0047 J
Heptachlor	UG/L	0.0063	0.0042	6%	0.0002	3	3	0.005 U	0.005 U	0.0051 U	0.0051 U	0.0054 J
Heptachlor epoxide	UG/L	0.0033	0.0041	4%	0.0003	2	2	0.005 U	0.005 U	0.0051 U	0.0051 U	0.0025
Hexachlorobenzene	UG/L	0.02	0.0053	6%	0.00003	3	3	0.01 U	0.01 U	0.01 U	0.01 U	0.01 U
METALS												

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TABLE 4-S
SITE CHEMICAL DATA-SURFACE WATER
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12	SEAD-12	SEAD-12	SEAD-12	SEAD-12
LOC_ID = LOCATION								SW12-17	SW12-18	SW12-19	SW12-20	SW12-22
MATRIX								SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER
SAMP_ID = SAMPLE ID								12032	12052	12040	12045	12024
SAMP_DEPTH_TOP = TOP OF SAMPLE DEPTH								0	0	0	0	0
SAMP_DEPTH_BOT = BOTTOM OF SAMPLE DEPTH								N/A	N/A	N/A	N/A	N/A
SAMP_DATE = SAMPLE DATE								4-Nov-97	10-Nov-97	6-Nov-97	6-Nov-97	3-Nov-97
QC_CODE = QC CODE								SA	SA	SA	SA	SA
STUDY_ID = STUDY ID				FREQUENCY OF	NYS AWQS CLASS C	NUMBER ABOVE	NUMBER 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
PARAMETER	UNIT	MAXIMUM	AVERAGE	DETECTION	(AQUATIC)	STD.	DETECTS					
Aluminum	UG/L	3430	281	83%	100	19	43	**817**	**1880**	**170**	21.9 U	73.3
Arsenic	UG/L	3.8	1.5	10%	150	0	5	2.5 U	3.6 U	2.6	2.5 U	2.5 U
Barium	UG/L	115	41	100%		0	52	47.2	31.7	28.2	48.1	22.2
Beryllium	UG/L	0.18	0.06	8%	1100	0	4	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Cadmium	UG/L	2.1	0.27	13%	3.84	0	7	0.4	0.3 U	0.4 U	0.4 U	0.4 U
Calcium	UG/L	130000	70586	98%		0	51	26100	64100	69000	84700	35500
Chromium	UG/L	3.3	0.69	21%	139.8	0	11	1.6	1.1 U	0.9 U	0.9 U	0.9 U
Cobalt	UG/L	6	0.86	13%	5	1	7	2.3	1.7 U	1.3 U	1.3 U	1.3 U
Copper	UG/L	27.6	2.9	56%	17.36	2	29	7.1	5.1	4.1	1.8	1.1 U
Iron	UG/L	6830	470	92%	300	12	48	1140 UJ	**2350**	212	48.4	125
Lead	UG/L	35.4	1.8	8%	1.462	4	4	1.7 U	1.8 U	1.7 U	1.7 U	1.7 U
Magnesium	UG/L	18600	9966	100%		0	52	5870	7370	8430	14500	4440
Manganese	UG/L	1320	102	96%		0	50	1320	38.4	4.4	4	13.2
Mercury	UG/L	0.11	0.23	10%	0.00007	5	5	0.1 U	0.1 U	0.1 U	0.1 U	1 U
Nickel	UG/L	19.7	1.7	52%	100.2	0	27	3.8	5.5	0.9 U	0.9 U	1.1
Potassium	UG/L	11800	3807	98%		0	51	11800	4820	2580	1220	8780
Silver	UG/L	1.6	0.68	12%	0.1	6	6	**1.6**	2.1 U	1.1 U	1.1 U	1.1 U
Sodium	UG/L	114000	21517	98%		0	51	1170	9310	7370	29000	6720
Thallium	UG/L	6.5	3.0	4%	8	0	2	6 U	6.3 U	6 U	6 U	6 U
Vanadium	UG/L	7.2	0.92	13%	14	0	7	1.2 U	4.4	1.2 U	1.2 U	1.2 U
Zinc	UG/L	105	21.9	100%	159.6	0	52	31.2	15	9.4	12	25.8

TABLE 4-S
SITE CHEMICAL DATA-SURFACE WATER
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12	SEAD-12	SEAD-12	SEAD-12	SEAD-12
LOC_ID = LOCATION								SW12-23	SW12-24	SW12-25	SW12-26	SW12-27
MATRIX								SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER
SAMP_ID = SAMPLE ID								12020	12019	12006	12005	12023
SAMP_DEPTH_TOP = TOP OF SAMPLE DEPTH								0	0	0	0	0
SAMP_DEPTH_BOT = BOTTOM OF SAMPLE DEPTH								N/A	N/A	N/A	N/A	N/A
SAMP_DATE = SAMPLE DATE								3-Nov-97	3-Nov-97	27-Oct-97	27-Oct-97	3-Nov-97
QC_CODE = QC CODE								SA	SA	SA	SA	SA
STUDY_ID = STUDY ID								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
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYS AWQS CLASS C (AQUATIC)	NUMBER ABOVE STD.	NUMBER OF DETECTS					
VOLATILE ORGANICS												
Acetone	UG/L	10	2.93	6%		0	3	5 U	5 U	5 UJ	6 J	5 U
Toluene	UG/L	0.4	0.77	2%	6000	0	1	1 U	1 U	1 U	1 U	1 U
Trichloroethene	UG/L	1	0.79	2%	40	0	1	1 U	1 U	1 U	1 U	1 U
SEMI VOLATILE ORGANICS												
Benzo(a)anthracene	UG/L	0.5	0.75	2%		0	1	1.2 U	1.1 U	1.1 U	1 U	1 U
Benzo(a)pyrene	UG/L	0.6	0.75	2%		0	1	1.2 U	1.1 U	1.1 U	1 U	1 U
Benzo(k)fluoranthene	UG/L	1	0.75	2%		0	1	1.2 U	1.1 U	1.1 U	1 U	1 U
Bis(2-Ethylhexyl)phthalate	UG/L	12	1.02	8%	0.6	2	4	1.2 U	1.1 U	1.2	1 U	1 U
Butylbenzylphthalate	UG/L	0.2	0.72	19%		0	10	0.2 J	1.1 U	1.1 U	1 U	1 U
Chrysene	UG/L	0.5	0.75	2%		0	1	1.2 UJ	1.1 UJ	1.1 U	1 U	1 U
Di-n-butylphthalate	UG/L	2	0.73	12%		0	6	1.2 U	1.1 U	1.1 U	1 U	1 U
Diethyl phthalate	UG/L	0.46	0.71	21%		0	11	0.088 J	0.12 J	1.1 U	1 U	1 U
Pentachlorophenol	UG/L	2	1.90	2%	12.6	0	1	2.9 U	2.7 U	2.6 U	2.6 U	2.6 U
Pyrene	UG/L	1	0.75	2%		0	1	1.2 U	1.1 U	1.1 U	1 U	1 U
PESTICIDES/PCBS												
4,4'-DDE	UG/L	0.0056	0.0081	2%	0.000007	1	1	0.011 U	0.01 U	0.011 U	0.01 U	0.01 U
4,4'-DDT	UG/L	0.062	0.0093	2%	0.00001	1	1	0.011 U	0.01 U	0.011 U	0.01 U	0.01 U
Aldrin	UG/L	0.0041	0.0041	2%	0.001	1	1	0.0054 U	0.005 U	0.0054 U	0.005 U	0.005 U
Alpha-BHC	UG/L	0.09	0.0073	19%		0	10	0.0054 U	0.005 U	0.0054 U	0.005 U	0.005 U
Alpha-Chlordane	UG/L	0.0036	0.0047	2%		0	1	0.0054 U	0.005 U	0.0054 U	0.005 U	0.005 U
Aroclor-1242	UG/L	0.44	0.0945	4%		0	2	0.44	0.1 U	0.11 U	0.1 U	0.1 U
Beta-BHC	UG/L	0.017	0.0046	10%		0	5	0.0054 U	0.005 U	0.0054 U	0.005 U	0.005 U
Delta-BHC	UG/L	0.0046	0.0041	6%		0	3	0.0054 U	0.005 U	0.0054 U	0.005 U	0.005 U
Endrin aldehyde	UG/L	0.012	0.0083	4%		0	2	0.011 U	0.01 U	0.011 U	0.01 U	0.01 U
Endrin ketone	UG/L	0.015	0.0083	2%		0	1	0.011 U	0.01 U	0.011 U	0.01 U	0.01 U
Gamma-BHC/Lindane	UG/L	0.092	0.0061	10%		0	5	0.0054 U	0.005 U	0.0054 U	0.005 U	0.005 U
Heptachlor	UG/L	0.0063	0.0042	6%	0.0002	3	3	0.0054 U	0.005 U	0.0054 U	0.005 U	0.005 U
Heptachlor epoxide	UG/L	0.0033	0.0041	4%	0.0003	2	2	0.0054 U	0.005 U	0.0054 U	0.005 U	0.005 U
Hexachlorobenzene	UG/L	0.02	0.0053	6%	0.00003	3	3	0.011 U	0.01 U	0.011 U	0.01 U	0.01 U
METALS												

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TABLE 4-S
SITE CHEMICAL DATA-SURFACE WATER
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12	SEAD-12	SEAD-12	SEAD-12	SEAD-12
LOC_ID = LOCATION								SW12-23	SW12-24	SW12-25	SW12-26	SW12-27
MATRIX								SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER
SAMP_ID = SAMPLE ID								12020	12019	12006	12005	12023
SAMP_DEPTH_TOP = TOP OF SAMPLE DEPTH								0	0	0	0	0
SAMP_DEPTH_BOT = BOTTOM OF SAMPLE DEPTH								N/A	N/A	N/A	N/A	N/A
SAMP_DATE = SAMPLE DATE								3-Nov-97	3-Nov-97	27-Oct-97	27-Oct-97	3-Nov-97
QC_CODE = QC CODE								SA	SA	SA	SA	SA
STUDY_ID = STUDY ID								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
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYS AWQS CLASS C (AQUATIC)	NUMBER ABOVE STD.	NUMBER OF DETECTS					
Aluminum	UG/L	3430	281	83%	100	19	43	76.7	89.1	78.6	**189** J	29.6
Arsenic	UG/L	3.8	1.5	10%	150	0	5	2.5 U	2.5 U	2.5 U	2.5 U	2.5 U
Barium	UG/L	115	41	100%		0	52	44.1	29	18.3	47.2	40
Beryllium	UG/L	0.18	0.06	8%	1100	0	4	0.1 U	0.1 U	0.1 U	0.1 U	0.1 U
Cadmium	UG/L	2.1	0.27	13%	3.84	0	7	0.4 U	0.4 U	0.9	0.4 U	0.4 U
Calcium	UG/L	130000	70586	98%		0	51	75900	57800	25400	70600 U	71800
Chromium	UG/L	3.3	0.69	21%	139.8	0	11	0.9 U	0.9 U	0.9 U	0.9 U	0.9 U
Cobalt	UG/L	6	0.86	13%	5	1	7	1.3 U	1.3 U	1.3 U	1.3 U	1.3 U
Copper	UG/L	27.6	2.9	56%	17.36	2	29	1.1 U	1.1 U	**27.6**	1.1 U	1.1 U
Iron	UG/L	6830	470	92%	300	12	48	109	95.9	222	**404** J	26.7
Lead	UG/L	35.4	1.8	8%	1.462	4	4	1.7 U	**2**	**35.4**	1.7 U	1.7 U
Magnesium	UG/L	18600	9966	100%		0	52	8800	7450	4280	6520	7340
Manganese	UG/L	1320	102	96%		0	50	6.4	2.4	19.6	70.9 U	2
Mercury	UG/L	0.11	0.23	10%	0.00007	5	5	1 U	1 U	1 U	1 U	1 U
Nickel	UG/L	19.7	1.7	52%	100.2	0	27	1.6	1.2	1.4	1.7	0.9 U
Potassium	UG/L	11800	3807	98%		0	51	4780	4430	1610	7410 U	2010
Silver	UG/L	1.6	0.68	12%	0.1	6	6	1.1 U	1.1 U	1.1 U	1.1 U	1.1 U
Sodium	UG/L	114000	21517	98%		0	51	23800	17400	2460	12900 U	25200
Thallium	UG/L	6.5	3.0	4%	8	0	2	6 U	6 U	6 U	6 U	6 U
Vanadium	UG/L	7.2	0.92	13%	14	0	7	1.2 U	1.2 U	1.2 U	1.2 U	1.2 U
Zinc	UG/L	105	21.9	100%	159.6	0	52	19.5	6.7	105	14.5	8.4

TABLE 4-S
SITE CHEMICAL DATA-SURFACE WATER
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12	SEAD-12	SEAD-12	SEAD-12	SEAD-12
LOC_ID = LOCATION								SW12-28	SW12-28	SW12-29	SW12-30	SW12-31
MATRIX								SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER
SAMP_ID = SAMPLE ID								12017	12016	12063	12015	12014
SAMP_DEPTH_TOP = TOP OF SAMPLE DEPTH								0	0	0	0	0
SAMP_DEPTH_BOT = BOTTOM OF SAMPLE DEPTH								N/A	N/A	N/A	N/A	N/A
SAMP_DATE = SAMPLE DATE								29-Oct-97	29-Oct-97	4-Dec-97	28-Oct-97	28-Oct-97
QC_CODE = QC CODE								DU	SA	SA	SA	SA
STUDY_ID = STUDY ID								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
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYS AWQS CLASS C (AQUATIC)	NUMBER ABOVE STD.	NUMBER OF DETECTS					
VOLATILE ORGANICS												
Acetone	UG/L	10	2.93	6%		0	3	5 U	5 U	5 U	5 UJ	5 UJ
Toluene	UG/L	0.4	0.77	2%	6000	0	1	1 U	1 U	1 U	1 U	1 U
Trichloroethene	UG/L	1	0.79	2%	40	0	1	1 U	1 U	1 U	1	1 U
SEMI VOLATILE ORGANICS												
Benzo(a)anthracene	UG/L	0.5	0.75	2%		0	1	1 U	1 U	1.1 U	1 U	1 U
Benzo(a)pyrene	UG/L	0.6	0.75	2%		0	1	1 U	1 U	1.1 U	1 U	1 U
Benzo(k)fluoranthene	UG/L	1	0.75	2%		0	1	1 U	1 U	1.1 U	1 U	1 U
Bis(2-Ethylhexyl)phthalate	UG/L	12	1.02	8%	0.6	2	4	1 U	1 U	1.1 U	1 U	1 U
Butylbenzylphthalate	UG/L	0.2	0.72	19%		0	10	1 U	1 U	0.088 J	1 U	1 U
Chrysene	UG/L	0.5	0.75	2%		0	1	1 U	1 U	1.1 U	1 U	1 U
Di-n-butylphthalate	UG/L	2	0.73	12%		0	6	1 U	1 U	0.058 J	1 U	1 U
Diethyl phthalate	UG/L	0.46	0.71	21%		0	11	1 U	1 U	0.061 J	1 U	1 U
Pentachlorophenol	UG/L	2	1.90	2%	12.6	0	1	2.5 U	2.5 U	2.7 UJ	2.6 U	2.6 U
Pyrene	UG/L	1	0.75	2%		0	1	1 U	1 U	1.1 U	1 U	1 U
PESTICIDES/PCBS												
4,4'-DDE	UG/L	0.0056	0.0081	2%	0.000007	1	1	0.01 U	0.01 U	0.01 U	0.011 U	0.012 U
4,4'-DDT	UG/L	0.062	0.0093	2%	0.00001	1	1	0.01 U	0.01 U	0.01 U	0.011 U	0.012 U
Aldrin	UG/L	0.0041	0.0041	2%	0.001	1	1	0.0052 U	0.005 U	0.005 U	0.0056 U	0.006 U
Alpha-BHC	UG/L	0.09	0.0073	19%		0	10	0.0052 U	0.005 U	0.005 U	0.005 U	0.005 J
Alpha-Chlordane	UG/L	0.0036	0.0047	2%		0	1	0.0052 U	0.005 U	0.005 U	0.0056 U	0.0036 J
Aroclor-1242	UG/L	0.44	0.0945	4%		0	2	0.1 U	0.1 U	0.1 U	0.11 U	0.12 U
Beta-BHC	UG/L	0.017	0.0046	10%		0	5	0.0052 U	0.005 U	0.005 U	0.005 U	0.005 U
Delta-BHC	UG/L	0.0046	0.0041	6%		0	3	0.0052 U	0.005 U	0.005 U	0.005 U	0.005 U
Endrin aldehyde	UG/L	0.012	0.0083	4%		0	2	0.01 U	0.01 U	0.01 U	0.011 U	0.012 U
Endrin ketone	UG/L	0.015	0.0083	2%		0	1	0.01 U	0.01 U	0.01 U	0.011 U	0.012 U
Gamma-BHC/Lindane	UG/L	0.092	0.0061	10%		0	5	0.0052 U	0.005 U	0.005 U	0.005 U	0.005 U
Heptachlor	UG/L	0.0063	0.0042	6%	0.0002	3	3	0.0052 U	0.005 U	0.005 U	0.0056 U	0.006 U
Heptachlor epoxide	UG/L	0.0033	0.0041	4%	0.0003	2	2	0.0052 U	0.005 U	0.005 U	0.0056 U	0.006 U
Hexachlorobenzene	UG/L	0.02	0.0053	6%	0.00003	3	3	0.01 U	0.01 U	0.0072 J	0.011 U	0.012 U
METALS												

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TABLE 4-S
SITE CHEMICAL DATA-SURFACE WATER
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOC_ID = LOCATION								SW12-28		SW12-28		SW12-29		SW12-30		SW12-31	
MATRIX								SURFACE WATER		SURFACE WATER		SURFACE WATER		SURFACE WATER		SURFACE WATER	
SAMP_ID = SAMPLE ID								12017		12016		12063		12015		12014	
SAMP_DEPTH_TOP = TOP OF SAMPLE DEPTH								0		0		0		0		0	
SAMP_DEPTH_BOT = BOTTOM OF SAMPLE DEPTH								N/A		N/A		N/A		N/A		N/A	
SAMP_DATE = SAMPLE DATE								29-Oct-97		29-Oct-97		4-Dec-97		28-Oct-97		28-Oct-97	
QC_CODE = QC CODE								DU		SA		SA		SA		SA	
STUDY_ID = STUDY ID								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	
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYS AWQS CLASS C (AQUATIC)	NUMBER ABOVE STD.	NUMBER OF DETECTS										
Aluminum	UG/L	3430	281	83%	100	19	43	**189**	J	**209**	J	32.3	J	**633**	J	21.9	U
Arsenic	UG/L	3.8	1.5	10%	150	0	5	2.5	U	3.6		3.6	U	2.5	U	2.5	U
Barium	UG/L	115	41	100%		0	52	63.4		63.8		45.4	J	22.8		59.3	
Beryllium	UG/L	0.18	0.06	8%	1100	0	4	0.1	U	0.1	U	0.13	J	0.1	U	0.1	U
Cadmium	UG/L	2.1	0.27	13%	3.84	0	7	0.4	U	0.4	U	0.46	J	0.4	U	0.4	U
Calcium	UG/L	130000	70586	98%		0	51	112000		111000		77900		40500		88800	
Chromium	UG/L	3.3	0.69	21%	139.8	0	11	0.9	U	0.9	U	1.1	U	1.5		0.9	U
Cobalt	UG/L	6	0.86	13%	5	1	7	1.3	U	1.3	U	1.7	U	1.3	U	1.3	U
Copper	UG/L	27.6	2.9	56%	17.36	2	29	1.1	U	1.1	U	2.3	U	1.1	U	1.1	U
Iron	UG/L	6830	470	92%	300	12	48	**365**		**399**		42.8	J	**610**		155	
Lead	UG/L	35.4	1.8	8%	1.462	4	4	1.7	U	1.7	U	1.8	U	1.7	U	1.7	U
Magnesium	UG/L	18600	9966	100%		0	52	16300		16200		12900		4450		13100	
Manganese	UG/L	1320	102	96%		0	50	43.8		50		3.6	J	25.1		31.8	
Mercury	UG/L	0.11	0.23	10%	0.00007	5	5	1	U	1	U	0.1	U	1	U	1	U
Nickel	UG/L	19.7	1.7	52%	100.2	0	27	1.8		1.2		2.3	U	1.3		0.9	U
Potassium	UG/L	11800	3807	98%		0	51	1760		1680		1290	J	2180		5910	
Silver	UG/L	1.6	0.68	12%	0.1	6	6	1.1	U	1.1	U	2.1	U	1.1	U	1.1	U
Sodium	UG/L	114000	21517	98%		0	51	29800		29400		11600		42000		52400	
Thallium	UG/L	6.5	3.0	4%	8	0	2	6	U	6	U	6.3	U	6	U	6	U
Vanadium	UG/L	7.2	0.92	13%	14	0	7	1.2	U	1.2	U	1.6	U	1.2	U	1.2	U
Zinc	UG/L	105	21.9	100%	159.6	0	52	19.7		16.2		6.2	J	57.8		20.6	

TABLE 4-S
SITE CHEMICAL DATA-SURFACE WATER
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12	SEAD-12	RI Phase	SEAD-12	SEAD-12
LOC_ID = LOCATION								SW12-32	SW12-33	67190	SW12-35	SW12-36
MATRIX								SURFACE WATER	SURFACE WATER	SW12-34	SURFACE WATER	SURFACE WATER
SAMP_ID = SAMPLE ID								12013	12012	12018	12033	12030
SAMP_DEPTH_TOP = TOP OF SAMPLE DEPTH								0	0	SA	0	0
SAMP_DEPTH_BOT = BOTTOM OF SAMPLE DEPTH								N/A	N/A	0	N/A	N/A
SAMP_DATE = SAMPLE DATE								28-Oct-97	28-Oct-97	0.1	4-Nov-97	4-Nov-97
QC_CODE = QC CODE								SA	SA	SURFACE	SA	SA
STUDY_ID = STUDY ID								RI Phase 1 Step 1	RI Phase 1 Step 1	3-Nov-97	RI Phase 1 Step 1	RI Phase 1 Step 1
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYS AWQS CLASS C (AQUATIC)	NUMBER ABOVE STD.	NUMBER OF DETECTS					
VOLATILE ORGANICS												
Acetone	UG/L	10	2.93	6%		0	3	5 UJ	5 UJ	5 U	5	5 U
Toluene	UG/L	0.4	0.77	2%	6000	0	1	1 U	1 U	1 U	1 U	1 U
Trichloroethene	UG/L	1	0.79	2%	40	0	1	1 U	1 U	1 U	1 U	1 U
SEMI VOLATILE ORGANICS												
Benzo(a)anthracene	UG/L	0.5	0.75	2%		0	1	1 U	1 U	1 U	1 U	1 U
Benzo(a)pyrene	UG/L	0.6	0.75	2%		0	1	1 U	1 U	1 U	1 U	1 U
Benzo(k)fluoranthene	UG/L	1	0.75	2%		0	1	1 U	1 U	1 U	1 U	1 U
Bis(2-Ethylhexyl)phthalate	UG/L	12	1.02	8%	0.6	2	4	1 U	1 U	1 U	1 U	1 U
Butylbenzylphthalate	UG/L	0.2	0.72	19%		0	10	1 U	1 U	0.11 J	1 U	0.065 J
Chrysene	UG/L	0.5	0.75	2%		0	1	1 U	1 U	1 UJ	1 U	1 U
Di-n-butylphthalate	UG/L	2	0.73	12%		0	6	11 U	1 U	1 U	1 U	1 U
Diethyl phthalate	UG/L	0.46	0.71	21%		0	11	1 U	1 U	0.13 J	1 U	1 U
Pentachlorophenol	UG/L	2	1.90	2%	12.6	0	1	2.6 U	2.5 U	2.5 U	2.6 U	2.5 U
Pyrene	UG/L	1	0.75	2%		0	1	1 U	1 U	1 U	1 U	1 U
PESTICIDES/PCBS												
4,4'-DDE	UG/L	0.0056	0.0081	2%	0.000007	1	1	0.011 U	0.011 U	0.01 U	0.02 U	0.01 U
4,4'-DDT	UG/L	0.062	0.0093	2%	0.00001	1	1	0.011 U	0.011 U	0.01 U	0.02 U	0.01 U
Aldrin	UG/L	0.0041	0.0041	2%	0.001	1	1	0.0054 U	0.0054 U	0.005 U	0.01 U	0.005 U
Alpha-BHC	UG/L	0.09	0.0073	19%		0	10	0.0054 U	0.0054 U	0.0066	0.09	0.0027 J
Alpha-Chlordane	UG/L	0.0036	0.0047	2%		0	1	0.0054 U	0.0054 U	0.005 U	0.01 U	0.005 U
Aroclor-1242	UG/L	0.44	0.0945	4%		0	2	0.11 U	0.11 U	0.1 U	0.2 U	0.1 U
Beta-BHC	UG/L	0.017	0.0046	10%		0	5	0.0054 U	0.0054 U	0.0088	0.017 J	0.005 U
Delta-BHC	UG/L	0.0046	0.0041	6%		0	3	0.0054 U	0.0054 U	0.005 U	0.005 U	0.005 U
Endrin aldehyde	UG/L	0.012	0.0083	4%		0	2	0.011 U	0.011 U	0.01 U	0.02 U	0.01 U
Endrin ketone	UG/L	0.015	0.0083	2%		0	1	0.011 U	0.011 U	0.01 U	0.02 U	0.01 U
Gamma-BHC/Lindane	UG/L	0.092	0.0061	10%		0	5	0.0054 U	0.0054 U	0.005 U	0.092	0.005 U
Heptachlor	UG/L	0.0063	0.0042	6%	0.0002	3	3	0.0054 U	0.0054 U	0.005 U	0.0079 U	0.005 U
Heptachlor epoxide	UG/L	0.0033	0.0041	4%	0.0003	2	2	0.0054 U	0.0054 U	0.005 U	0.01 U	0.005 U
Hexachlorobenzene	UG/L	0.02	0.0053	6%	0.00003	3	3	0.011 U	0.011 U	0.01 U	**0.013** J	0.01 U
METALS												

TABLE 4-S
SITE CHEMICAL DATA-SURFACE WATER
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		RI Phase		SEAD-12		SEAD-12	
LOC_ID = LOCATION								SW12-32		SW12-33		67190		SW12-35		SW12-36	
MATRIX								SURFACE WATER		SURFACE WATER		SW12-34		SURFACE WATER		SURFACE WATER	
SAMP_ID = SAMPLE ID								12013		12012		12018		12033		12030	
SAMP_DEPTH_TOP = TOP OF SAMPLE DEPTH								0		0		SA		0		0	
SAMP_DEPTH_BOT = BOTTOM OF SAMPLE DEPTH								N/A		N/A		0		N/A		N/A	
SAMP_DATE = SAMPLE DATE								28-Oct-97		28-Oct-97		0.1		4-Nov-97		4-Nov-97	
QC_CODE = QC CODE								SA		SA		SURFACE		SA		SA	
STUDY_ID = STUDY ID				FREQUENCY OF DETECTION	NYS AWQS CLASS C (AQUATIC)	NUMBER ABOVE STD.	NUMBER OF DETECTS	RI Phase 1 Step 1		RI Phase 1 Step 1		3-Nov-97		RI Phase 1 Step 1		RI Phase 1 Step 1	
PARAMETER	UNIT	MAXIMUM	AVERAGE														
Aluminum	UG/L	3430	281	83%	100	19	43	89.2		41.2		58		**3430**		36	
Arsenic	UG/L	3.8	1.5	10%	150	0	5	2.5	U	2.5	U	2.5	U	2.5	U	2.5	U
Barium	UG/L	115	41	100%		0	52	61.9		74.3		24.1		115		34.7	
Beryllium	UG/L	0.18	0.06	8%	1100	0	4	0.1	U	0.1	U	0.1	U	0.18		0.1	U
Cadmium	UG/L	2.1	0.27	13%	3.84	0	7	0.4	U	0.4	U	0.4	U	2.1		0.4	U
Calcium	UG/L	130000	70586	98%		0	51	93000		124000		50200		29300		59200	
Chromium	UG/L	3.3	0.69	21%	139.8	0	11	0.9	U	0.9	U	0.9	U	3.3		0.9	U
Cobalt	UG/L	6	0.86	13%	5	1	7	1.3	U	1.3	U	1.3	U	**6**		1.3	U
Copper	UG/L	27.6	2.9	56%	17.36	2	29	1.1	U	1.1	U	1.1	U	**21.2**		1.6	
Iron	UG/L	6830	470	92%	300	12	48	273		191		86.2		**6830**	J	67	
Lead	UG/L	35.4	1.8	8%	1.462	4	4	1.7	U	1.7	U	1.7	U	**12.8**		1.7	U
Magnesium	UG/L	18600	9966	100%		0	52	12200		14500		5560		4990		7180	
Manganese	UG/L	1320	102	96%		0	50	42.9		43.5		2.3		1000		1.1	
Mercury	UG/L	0.11	0.23	10%	0.00007	5	5	1	U	1	U	1	U	**0.1**		0.1	U
Nickel	UG/L	19.7	1.7	52%	100.2	0	27	1.3		0.9	U	1.7		19.7		0.9	U
Potassium	UG/L	11800	3807	98%		0	51	5610		10900		4040		6140		3130	
Silver	UG/L	1.6	0.68	12%	0.1	6	6	1.1	U	1.1	U	1.1	U	1.1	U	1.1	U
Sodium	UG/L	114000	21517	98%		0	51	50100		114000		24800		955		29000	
Thallium	UG/L	6.5	3.0	4%	8	0	2	6	U	6	U	6	U	6	U	6	U
Vanadium	UG/L	7.2	0.92	13%	14	0	7	1.2	U	1.2	U	1.2	U	7.2		1.2	U
Zinc	UG/L	105	21.9	100%	159.6	0	52	11.7		13.4		12.7		104		15.2	

TABLE 4-S
SITE CHEMICAL DATA-SURFACE WATER
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOC_ID = LOCATION								SW12-36		SW12-37		SW12-38		SW12-39		SW12-40	
MATRIX								SURFACE WATER		SURFACE WATER		SURFACE WATER		SURFACE WATER		SURFACE WATER	
SAMP_ID = SAMPLE ID								12031		12029		12027		12026		12010	
SAMP_DEPTH_TOP = TOP OF SAMPLE DEPTH								0		0		0		0		0	
SAMP_DEPTH_BOT = BOTTOM OF SAMPLE DEPTH								N/A		N/A		N/A		N/A		N/A	
SAMP_DATE = SAMPLE DATE								4-Nov-97		4-Nov-97		4-Nov-97		4-Nov-97		28-Oct-97	
QC_CODE = QC CODE								DU		SA		SA		SA		SA	
STUDY_ID = STUDY ID								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	
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYS AWQS CLASS C (AQUATIC)	NUMBER ABOVE STD.	NUMBER OF DETECTS										
VOLATILE ORGANICS																	
Acetone	UG/L	10	2.93	6%		0	3	5	U	5	U	5	U	5	U	5	UJ
Toluene	UG/L	0.4	0.77	2%	6000	0	1	1	U	1	U	1	U	1	U	1	U
Trichloroethene	UG/L	1	0.79	2%	40	0	1	1	U	1	U	1	U	1	U	1	U
SEMI VOLATILE ORGANICS																	
Benzo(a)anthracene	UG/L	0.5	0.75	2%		0	1	1	U	1	U	1	U	1	U	1	U
Benzo(a)pyrene	UG/L	0.6	0.75	2%		0	1	1	U	1	U	1	U	1	U	1	U
Benzo(k)fluoranthene	UG/L	1	0.75	2%		0	1	1	U	1	U	1	U	1	U	1	U
Bis(2-Ethylhexyl)phthalate	UG/L	12	1.02	8%	0.6	2	4	1	U	1	U	1	U	1	U	1	U
Butylbenzylphthalate	UG/L	0.2	0.72	19%		0	10	0.11	J	1	U	0.16	J	1	U	1	U
Chrysene	UG/L	0.5	0.75	2%		0	1	1	U	1	U	1	U	1	U	1	U
Di-n-butylphthalate	UG/L	2	0.73	12%		0	6	1	U	1	U	1	U	1	U	1	U
Diethyl phthalate	UG/L	0.46	0.71	21%		0	11	1	U	1	U	1	U	1	U	0.068	J
Pentachlorophenol	UG/L	2	1.90	2%	12.6	0	1	2.5	U	2.5	U	2.5	U	2.5	U	2.6	U
Pyrene	UG/L	1	0.75	2%		0	1	1	U	1	U	1	U	1	U	1	U
PESTICIDES/PCBS																	
4,4'-DDE	UG/L	0.0056	0.0081	2%	0.000007	1	1	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
4,4'-DDT	UG/L	0.062	0.0093	2%	0.00001	1	1	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
Aldrin	UG/L	0.0041	0.0041	2%	0.001	1	1	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
Alpha-BHC	UG/L	0.09	0.0073	19%		0	10	0.005	U	0.005	U	0.005	U	0.012		0.005	U
Alpha-Chlordane	UG/L	0.0036	0.0047	2%		0	1	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
Aroclor-1242	UG/L	0.44	0.0945	4%		0	2	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Beta-BHC	UG/L	0.017	0.0046	10%		0	5	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
Delta-BHC	UG/L	0.0046	0.0041	6%		0	3	0.005	U	0.005	U	0.005	U	0.0046	J	0.005	U
Endrin aldehyde	UG/L	0.012	0.0083	4%		0	2	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
Endrin ketone	UG/L	0.015	0.0083	2%		0	1	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
Gamma-BHC/Lindane	UG/L	0.092	0.0061	10%		0	5	0.005	U	0.005	U	0.005	U	0.0058		0.005	U
Heptachlor	UG/L	0.0063	0.0042	6%	0.0002	3	3	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
Heptachlor epoxide	UG/L	0.0033	0.0041	4%	0.0003	2	2	0.005	U	0.005	U	0.005	U	0.005	U	0.005	U
Hexachlorobenzene	UG/L	0.02	0.0053	6%	0.00003	3	3	0.01	U	0.01	U	0.01	U	0.01	U	0.01	U
METALS																	

TABLE 4-S
SITE CHEMICAL DATA-SURFACE WATER
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOC_ID = LOCATION								SW12-36		SW12-37		SW12-38		SW12-39		SW12-40	
MATRIX								SURFACE WATER		SURFACE WATER		SURFACE WATER		SURFACE WATER		SURFACE WATER	
SAMP_ID = SAMPLE ID								12031		12029		12027		12026		12010	
SAMP_DEPTH_TOP = TOP OF SAMPLE DEPTH								0		0		0		0		0	
SAMP_DEPTH_BOT = BOTTOM OF SAMPLE DEPTH								N/A		N/A		N/A		N/A		N/A	
SAMP_DATE = SAMPLE DATE								4-Nov-97		4-Nov-97		4-Nov-97		4-Nov-97		28-Oct-97	
QC_CODE = QC CODE								DU		SA		SA		SA		SA	
STUDY_ID = STUDY ID				FREQUENCY OF DETECTION	NYS AWQS CLASS C (AQUATIC)	NUMBER ABOVE STD.	NUMBER OF DETECTS	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	
PARAMETER	UNIT	MAXIMUM	AVERAGE														
Aluminum	UG/L	3430	281	83%	100	19	43	41.5		24.2		42.7		38.5		73.4	
Arsenic	UG/L	3.8	1.5	10%	150	0	5	2.5	U	2.5	U	2.5	U	2.5	U	3	
Barium	UG/L	115	41	100%		0	52	34.9		33.9		27.6		29.4		46.4	
Beryllium	UG/L	0.18	0.06	8%	1100	0	4	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Cadmium	UG/L	2.1	0.27	13%	3.84	0	7	0.4	U	0.4	U	0.4		0.4	U	0.4	U
Calcium	UG/L	130000	70586	98%		0	51	59700		58700		51100		52800		66000	
Chromium	UG/L	3.3	0.69	21%	139.8	0	11	0.9	U	0.9	U	0.9	U	0.9	U	0.9	U
Cobalt	UG/L	6	0.86	13%	5	1	7	1.3	U	1.3	U	1.3	U	1.3	U	1.3	U
Copper	UG/L	27.6	2.9	56%	17.36	2	29	2.5		1.9		3.3		1.8		1.1	U
Iron	UG/L	6830	470	92%	300	12	48	76.7		60.6		77.6		64.5		206	
Lead	UG/L	35.4	1.8	8%	1.462	4	4	1.7	U	1.7	U	1.7	U	1.7	U	1.7	U
Magnesium	UG/L	18600	9966	100%		0	52	7230		7070		7500		7790		11400	
Manganese	UG/L	1320	102	96%		0	50	1.2		1.5		2.1		2.4		57.8	
Mercury	UG/L	0.11	0.23	10%	0.00007	5	5	0.1	U	0.1	U	0.1	U	0.1	U	1	U
Nickel	UG/L	19.7	1.7	52%	100.2	0	27	1.1		0.9	U	0.9	U	0.9	U	1.8	
Potassium	UG/L	11800	3807	98%		0	51	3170		3100		3000		3470		6260	
Silver	UG/L	1.6	0.68	12%	0.1	6	6	**1.2**		1.1	U	1.1	U	1.1	U	1.1	U
Sodium	UG/L	114000	21517	98%		0	51	29300		28000		18300		17100		51600	
Thallium	UG/L	6.5	3.0	4%	8	0	2	6	U	6	U	6	U	6	U	6	U
Vanadium	UG/L	7.2	0.92	13%	14	0	7	1.2	U	1.2	U	1.2	U	1.2	U	1.2	U
Zinc	UG/L	105	21.9	100%	159.6	0	52	16.1		12.7		20.4		9		24.5	

TABLE 4-S
SITE CHEMICAL DATA-SURFACE WATER
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOC_ID = LOCATION								SW12-41		SW12-42		SW12-43		SW12-44		SW12-45	
MATRIX								SURFACE	WATER	SURFACE	WATER	SURFACE	WATER	SURFACE	WATER	SURFACE	WATER
SAMP_ID = SAMPLE ID								12009		12044		12051		12064		12050	
SAMP_DEPTH_TOP = TOP OF SAMPLE DEPTH								0		0		0		0		0	
SAMP_DEPTH_BOT = BOTTOM OF SAMPLE DEPTH								N/A		N/A		N/A		N/A		N/A	
SAMP_DATE = SAMPLE DATE								28-Oct-97		6-Nov-97		9-Nov-97		5-Dec-97		9-Nov-97	
QC_CODE = QC CODE								SA		SA		SA		SA		SA	
STUDY_ID = STUDY ID				FREQUENCY	NYS AWQS	NUMBER	NUMBER	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
				OF	CLASS C	ABOVE	OF										
PARAMETER	UNIT	MAXIMUM	AVERAGE	DETECTION	(AQUATIC)	STD.	DETECTS										
VOLATILE ORGANICS																	
Acetone	UG/L	10	2.93	6%		0	3	5	UJ	5	U	5	U	5	U	5	U
Toluene	UG/L	0.4	0.77	2%	6000	0	1	1	U	1	U	1	U	1	U	1	U
Trichloroethene	UG/L	1	0.79	2%	40	0	1	1	U	1	U	1	U	1	U	1	U
SEMI VOLATILE ORGANICS																	
Benzo(a)anthracene	UG/L	0.5	0.75	2%		0	1	1	U	1	U	1	U	2.1	U	1	U
Benzo(a)pyrene	UG/L	0.6	0.75	2%		0	1	1	U	1	U	1	U	2.1	U	1	U
Benzo(k)fluoranthene	UG/L	1	0.75	2%		0	1	1	U	1	U	1	U	2.1	U	1	U
Bis(2-Ethylhexyl)phthalate	UG/L	12	1.02	8%	0.6	2	4	1	U	0.28	J	1	U	**12**	J	1	U
Butylbenzylphthalate	UG/L	0.2	0.72	19%		0	10	1	U	1	U	1	UJ	2.1	U	1	UJ
Chrysene	UG/L	0.5	0.75	2%		0	1	1	U	1	U	1	U	2.1	U	1	U
Di-n-butylphthalate	UG/L	2	0.73	12%		0	6	1	U	1	U	1	U	2.1	U	1	U
Diethyl phthalate	UG/L	0.46	0.71	21%		0	11	1	U	0.11	J	1	U	2.1	U	1	U
Pentachlorophenol	UG/L	2	1.90	2%	12.6	0	1	2.6	U	2.5	U	2.6	U	5.3	UJ	2.5	U
Pyrene	UG/L	1	0.75	2%		0	1	1	U	1	U	1	U	2.1	U	1	U
PESTICIDES/PCBS																	
4,4'-DDE	UG/L	0.0056	0.0081	2%	0.000007	1	1	0.011	U	0.01	U	0.01	U	0.01	U	**0.0056**	J
4,4'-DDT	UG/L	0.062	0.0093	2%	0.00001	1	1	0.011	U	0.01	U	0.01	U	0.01	U	**0.062**	
Aldrin	UG/L	0.0041	0.0041	2%	0.001	1	1	0.0055	U	0.0051	U	0.005	U	0.0053	U	0.0051	U
Alpha-BHC	UG/L	0.09	0.0073	19%		0	10	0.0055	U	0.0051	U	0.005	U	0.0053	U	0.0051	U
Alpha-Chlordane	UG/L	0.0036	0.0047	2%		0	1	0.0055	U	0.0051	U	0.005	U	0.0053	U	0.0051	U
Aroclor-1242	UG/L	0.44	0.0945	4%		0	2	0.11	U	0.1	U	0.1	U	0.1	U	0.1	U
Beta-BHC	UG/L	0.017	0.0046	10%		0	5	0.0055	U	0.0051	U	0.005	U	0.0053	U	0.0051	U
Delta-BHC	UG/L	0.0046	0.0041	6%		0	3	0.0029	J	0.0051	U	0.005	U	0.0053	U	0.0051	U
Endrin aldehyde	UG/L	0.012	0.0083	4%		0	2	0.011	U	0.01	U	0.01	U	0.01	U	0.01	U
Endrin ketone	UG/L	0.015	0.0083	2%		0	1	0.011	U	0.01	U	0.01	U	0.015		0.01	U
Gamma-BHC/Lindane	UG/L	0.092	0.0061	10%		0	5	0.0055	U	0.0051	U	0.005	U	0.0053	U	0.0051	U
Heptachlor	UG/L	0.0063	0.0042	6%	0.0002	3	3	0.0055	U	0.0051	U	0.005	U	0.0053	U	0.0051	U
Heptachlor epoxide	UG/L	0.0033	0.0041	4%	0.0003	2	2	0.0055	U	0.0051	U	0.005	U	0.0053	U	0.0051	U
Hexachlorobenzene	UG/L	0.02	0.0053	6%	0.00003	3	3	0.011	U	0.01	U	0.01	U	0.01	U	0.01	U
METALS																	

TABLE 4-S
SITE CHEMICAL DATA-SURFACE WATER
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOC_ID = LOCATION								SW12-41		SW12-42		SW12-43		SW12-44		SW12-45	
MATRIX								SURFACE WATER		SURFACE WATER		SURFACE WATER		SURFACE WATER		SURFACE WATER	
SAMP_ID = SAMPLE ID								12009		12044		12051		12064		12050	
SAMP_DEPTH_TOP = TOP OF SAMPLE DEPTH								0		0		0		0		0	
SAMP_DEPTH_BOT = BOTTOM OF SAMPLE DEPTH								N/A		N/A		N/A		N/A		N/A	
SAMP_DATE = SAMPLE DATE								28-Oct-97		6-Nov-97		9-Nov-97		5-Dec-97		9-Nov-97	
QC_CODE = QC CODE								SA		SA		SA		SA		SA	
STUDY_ID = STUDY ID				FREQUENCY OF	NYS AWQS CLASS C	NUMBER ABOVE	NUMBER 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	
PARAMETER	UNIT	MAXIMUM	AVERAGE	DETECTION	(AQUATIC)	STD.	DETECTS										
Aluminum	UG/L	3430	281	83%	100	19	43	21.9	U	21.9	U	144		12.3	U	16.3	
Arsenic	UG/L	3.8	1.5	10%	150	0	5	2.5	U	2.5	U	3.6	U	3.6	U	3.6	U
Barium	UG/L	115	41	100%		0	52	111		48.3		25.7		37.2	J	20.3	
Beryllium	UG/L	0.18	0.06	8%	1100	0	4	0.1	U	0.1	U	0.1	U	0.15	J	0.1	U
Cadmium	UG/L	2.1	0.27	13%	3.84	0	7	0.4	U	0.4	U	0.34		0.3	U	0.3	U
Calcium	UG/L	130000	70586	98%		0	51	110000		88900		47800		79200		46500	
Chromium	UG/L	3.3	0.69	21%	139.8	0	11	0.9	U	0.9	U	1.1	U	2.4	J	1.1	U
Cobalt	UG/L	6	0.86	13%	5	1	7	1.3	U	1.3	U	1.7	U	1.7	U	1.7	U
Copper	UG/L	27.6	2.9	56%	17.36	2	29	1.1	U	3.9		3		2.3	U	3	
Iron	UG/L	6830	470	92%	300	12	48	22.2		31.8		185		49.2	J	38	
Lead	UG/L	35.4	1.8	8%	1.462	4	4	1.7	U	1.7	U	1.8	U	1.8	U	1.8	U
Magnesium	UG/L	18600	9966	100%		0	52	18600		10300		5360		9240		5170	
Manganese	UG/L	1320	102	96%		0	50	5.1		4.2		2.2		0.5	J	0.72	
Mercury	UG/L	0.11	0.23	10%	0.00007	5	5	1	U	0.1	U	0.1	U	0.1	U	0.1	U
Nickel	UG/L	19.7	1.7	52%	100.2	0	27	0.9	U	0.9	U	2.1	U	2.3	U	2.1	U
Potassium	UG/L	11800	3807	98%		0	51	4430		4030		3660		2640	J	1640	
Silver	UG/L	1.6	0.68	12%	0.1	6	6	1.1	U	1.1	U	2.1	U	2.1	U	2.1	U
Sodium	UG/L	114000	21517	98%		0	51	47700		7060		2960		5630		6370	
Thallium	UG/L	6.5	3.0	4%	8	0	2	6	U	6	U	6.3	U	6.3	U	6.3	U
Vanadium	UG/L	7.2	0.92	13%	14	0	7	1.2	U	1.2	U	1.6	U	1.6	U	1.6	U
Zinc	UG/L	105	21.9	100%	159.6	0	52	9.9		11.6		8.5		8.9	J	23.8	

TABLE 4-S
SITE CHEMICAL DATA-SURFACE WATER
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12	
LOC_ID = LOCATION								SW12-46		SW12-47	
MATRIX								SURFACE WATER		SURFACE WATER	
SAMP_ID = SAMPLE ID								12043		12046	
SAMP_DEPTH_TOP = TOP OF SAMPLE DEPTH								0		0	
SAMP_DEPTH_BOT = BOTTOM OF SAMPLE DEPTH								N/A		N/A	
SAMP_DATE = SAMPLE DATE								6-Nov-97		7-Nov-97	
QC_CODE = QC CODE								SA		SA	
STUDY_ID = STUDY ID								RI Phase 1 Step 1		RI Phase 1 Step 1	
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYS AWQS CLASS C (AQUATIC)	NUMBER ABOVE STD.	NUMBER OF DETECTS				
VOLATILE ORGANICS											
Acetone	UG/L	10	2.93	6%		0	3	5	UJ	5	U
Toluene	UG/L	0.4	0.77	2%	6000	0	1	1	U	1	U
Trichloroethene	UG/L	1	0.79	2%	40	0	1	1	U	1	U
SEMI VOLATILE ORGANICS											
Benzo(a)anthracene	UG/L	0.5	0.75	2%		0	1	1.1	U	1	U
Benzo(a)pyrene	UG/L	0.6	0.75	2%		0	1	1.1	U	1	U
Benzo(k)fluoranthene	UG/L	1	0.75	2%		0	1	1.1	U	1	U
Bis(2-Ethylhexyl)phthalate	UG/L	12	1.02	8%	0.6	2	4	1	U	1	U
Butylbenzylphthalate	UG/L	0.2	0.72	19%		0	10	1.1	U	1	U
Chrysene	UG/L	0.5	0.75	2%		0	1	1.1	U	1	U
Di-n-butylphthalate	UG/L	2	0.73	12%		0	6	1.1	U	1	U
Diethyl phthalate	UG/L	0.46	0.71	21%		0	11	0.065	J	1	U
Pentachlorophenol	UG/L	2	1.90	2%	12.6	0	1	2.7	U	2.6	U
Pyrene	UG/L	1	0.75	2%		0	1	1.1	U	1	U
PESTICIDES/PCBS											
4,4'-DDE	UG/L	0.0056	0.0081	2%	0.000007	1	1	0.012	U	0.01	U
4,4'-DDT	UG/L	0.062	0.0093	2%	0.00001	1	1	0.012	U	0.01	U
Aldrin	UG/L	0.0041	0.0041	2%	0.001	1	1	0.006	U	0.0052	U
Alpha-BHC	UG/L	0.09	0.0073	19%		0	10	0.006	U	0.0052	U
Alpha-Chlordane	UG/L	0.0036	0.0047	2%		0	1	0.006	U	0.0052	U
Aroclor-1242	UG/L	0.44	0.0945	4%		0	2	0.12	U	0.1	U
Beta-BHC	UG/L	0.017	0.0046	10%		0	5	0.006	U	0.0052	U
Delta-BHC	UG/L	0.0046	0.0041	6%		0	3	0.006	U	0.0052	U
Endrin aldehyde	UG/L	0.012	0.0083	4%		0	2	0.012	U	0.01	U
Endrin ketone	UG/L	0.015	0.0083	2%		0	1	0.012	U	0.01	U
Gamma-BHC/Lindane	UG/L	0.092	0.0061	10%		0	5	0.006	U	0.0052	U
Heptachlor	UG/L	0.0063	0.0042	6%	0.0002	3	3	0.006	U	0.0052	U
Heptachlor epoxide	UG/L	0.0033	0.0041	4%	0.0003	2	2	0.006	U	0.0052	U
Hexachlorobenzene	UG/L	0.02	0.0053	6%	0.00003	3	3	0.012	U	0.01	U
METALS											

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TABLE 4-S
SITE CHEMICAL DATA-SURFACE WATER
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY								SEAD-12		SEAD-12	
LOC_ID = LOCATION								SW12-46		SW12-47	
MATRIX								SURFACE WATER		SURFACE WATER	
SAMP_ID = SAMPLE ID								12043		12046	
SAMP_DEPTH_TOP = TOP OF SAMPLE DEPTH								0		0	
SAMP_DEPTH_BOT = BOTTOM OF SAMPLE DEPTH								N/A		N/A	
SAMP_DATE = SAMPLE DATE								6-Nov-97		7-Nov-97	
QC_CODE = QC CODE								SA		SA	
STUDY_ID = STUDY ID				FREQUENCY OF	NYS AWQS CLASS C	NUMBER ABOVE	NUMBER OF	RI Phase 1 Step 1		RI Phase 1 Step 1	
PARAMETER	UNIT	MAXIMUM	AVERAGE	DETECTION	(AQUATIC)	STD.	DETECTS				
Aluminum	UG/L	3430	281	83%	100	19	43	**1050**		**1660**	
Arsenic	UG/L	3.8	1.5	10%	150	0	5	2.8		3.8	
Barium	UG/L	115	41	100%		0	52	64.8		52.7	
Beryllium	UG/L	0.18	0.06	8%	1100	0	4	0.1	U	0.12	
Cadmium	UG/L	2.1	0.27	13%	3.84	0	7	0.4	U	0.91	
Calcium	UG/L	130000	70586	98%		0	51	97100		106000	
Chromium	UG/L	3.3	0.69	21%	139.8	0	11	1.5		1.1	U
Cobalt	UG/L	6	0.86	13%	5	1	7	1.5		1.7	U
Copper	UG/L	27.6	2.9	56%	17.36	2	29	7.2		7.1	
Iron	UG/L	6830	470	92%	300	12	48	**2030**	J	**2210**	
Lead	UG/L	35.4	1.8	8%	1.462	4	4	1.7	U	**2.3**	
Magnesium	UG/L	18600	9966	100%		0	52	13100		16700	
Manganese	UG/L	1320	102	96%		0	50	410		158	
Mercury	UG/L	0.11	0.23	10%	0.00007	5	5	0.1	U	0.1	U
Nickel	UG/L	19.7	1.7	52%	100.2	0	27	3.3		4.4	
Potassium	UG/L	11800	3807	98%		0	51	1760		3800	
Silver	UG/L	1.6	0.68	12%	0.1	6	6	1.1	U	2.1	U
Sodium	UG/L	114000	21517	98%		0	51	3420		4360	
Thallium	UG/L	6.5	3.0	4%	8	0	2	6.5		6.3	U
Vanadium	UG/L	7.2	0.92	13%	14	0	7	1.2	U	3.1	
Zinc	UG/L	105	21.9	100%	159.6	0	52	37.8		33.6	

TABLE 4-T
DOWNGRADIENT CHEMICAL DATA-SURFACE WATER
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY LOC_ID = LOCATION MATRIX SAMP_ID = SAMPLE ID SAMP_DEPTH_TOP = TOP OF SAMPLE DEPTH SAMP_DEPTH_BOT = BOTTOM OF SAMPLE DEPTH SAMP_DATE = SAMPLE DATE QC_CODE = QC CODE STUDY_ID = STUDY ID									SEAD-12 SW12-48 SURFACE WATER 12062 0 N/A 11-Nov-97 SA RI Phase 1 Step 1	SEAD-12 SW12-49 SURFACE WATER 12061 0 N/A 11-Nov-97 SA RI Phase 1 Step 1	SEAD-12 SW12-50 SURFACE WATER 12060 0 N/A 11-Nov-97 SA RI Phase 1 Step 1	SEAD-12 SW12-51 SURFACE WATER 12059 0 N/A 11-Nov-97 SA RI Phase 1 Step 1	SEAD-12 SW12-51 SURFACE WATER 12210 0 N/A 11-Nov-97 DU RI Phase 1 Step 1
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYS AWQS CLASS C (AQUATIC)	NUMBER ABOVE CLASS C	NUMBER OF DETECTS	NUMBER OF ANALYSES					4.05E-01
Bis(2-Ethylhexyl)phthalate	UG/L	0.26	0.477	17%	0.6	0	2	12	0.14 J	1.1 U	1 U	1.1 U	0.26 J
Butylbenzylphthalate	UG/L	0.12	0.450	17%		0	2	12	1 UJ	1.1 U	1 U	1.1 U	1 U
Diethyl phthalate	UG/L	0.072	0.437	17%		0	2	12	1 UJ	1.1 U	1 U	1.1 U	1 U
Hexachlorobenzene	UG/L	0.013	0.006	8%	0.00003	1	1	12	**0.013**	0.01 U	0.01 U	0.01 U	0.01 U
Aluminum	UG/L	79.9	24.1	42%	100	0	5	12	12.3 U	79.9	28.5	54.1	74.5
Barium	UG/L	53.2	47.7	100%		0	12	12	43	42.9	40.4	42.5	42.2
Beryllium	UG/L	0.21	0.121	67%	1100	0	8	12	0.1	0.21	0.18	0.11	0.1 U
Cadmium	UG/L	1.2	0.37	42%	3.85	0	5	12	0.3 U	1.2	0.78	0.45	0.3 U
Calcium	UG/L	98400	91755	100%		0	12	12	88300	84100	82500	85600	83800
Copper	UG/L	2.6	1.28	8%	17.4	0	1	12	2.6	2.3 U	2.3 U	2.3 U	2.3 U
Iron	UG/L	140	51.7	75%	300	0	9	12	25.6 U	140	56.1	97.1	113
Magnesium	UG/L	15600	13918	100%		0	12	12	11800	12600	12400	12800	12600
Manganese	UG/L	16.9	7.02	100%		0	12	12	1	4.2	2	12	11.8
Potassium	UG/L	2930	2207	100%		0	12	12	2930	2870	2650	2720	2790
Sodium	UG/L	32400	21741	100%		0	12	12	32400	28600	28000	29200	28900
Zinc	UG/L	15.4	7.78	92%	159.6	0	11	12	13.1	10.8	12.5	10	9.6

TABLE 4-T
DOWNGRADIENT CHEMICAL DATA-SURFACE WATER
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY									SEAD-12	SEAD-12	SEAD-12	SEAD-12	SEAD-12
LOC_ID = LOCATION									SW12-52	SW12-53	SW12-54	SW12-55	SW12-56
MATRIX									SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER	SURFACE WATER
SAMP_ID = SAMPLE ID									12069	12070	12071	12068	12067
SAMP_DEPTH_TOP = TOP OF SAMPLE DEPTH									0	0	0	0	0
SAMP_DEPTH_BOT = BOTTOM OF SAMPLE DEPTH									N/A	N/A	N/A	N/A*	N/A
SAMP_DATE = SAMPLE DATE									10-Dec-97	10-Dec-97	10-Dec-97	09-Dec-97	09-Dec-97
QC_CODE = QC CODE									SA	SA	SA	SA	SA
STUDY_ID = STUDY ID									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
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYS AWQS CLASS C (AQUATIC)	NUMBER ABOVE CLASS C	NUMBER OF DETECTS	NUMBER OF ANALYSES					
Bis(2-Ethylhexyl)phthalate	UG/L	0.26	0.477	17%	0.6	0	2	12	1 U	1.1 U	1.1 UJ	1 U	1 U
Butylbenzylphthalate	UG/L	0.12	0.450	17%		0	2	12	0.11 J	1.1 U	1.1 U	1 U	1 U
Diethyl phthalate	UG/L	0.072	0.437	17%		0	2	12	1 U	1.1 U	0.072 J	0.06 J	1 U
Hexachlorobenzene	UG/L	0.013	0.006	8%	0.00003	1	1	12	0.01 U	0.011 U	0.01 U	0.01 U	0.01 U
Aluminum	UG/L	79.9	24.1	42%	100	0	5	12	49.6 J	12.3 U	12.3 U	12.3 U	12.3 U
Barium	UG/L	53.2	47.7	100%		0	12	12	53.2 J	50.5 J	50.6 J	50.8 J	49.6 J
Beryllium	UG/L	0.21	0.121	67%	1100	0	8	12	0.1 U	0.1 U	0.16 J	0.1 U	0.15 J
Cadmium	UG/L	1.2	0.37	42%	3.85	0	5	12	0.3 U	0.3 U	0.3 U	0.3 U	0.45 J
Calcium	UG/L	98400	91755	100%		0	12	12	98400	97100	92700	93800	93700
Copper	UG/L	2.6	1.28	8%	17.4	0	1	12	2.3 U	2.3 U	2.3 U	2.3 U	2.3 U
Iron	UG/L	140	51.7	75%	300	0	9	12	79 J	26.3 J	36.8 J	36.6 J	50 J
Magnesium	UG/L	15600	13918	100%		0	12	12	15100	14600	13800	14600	14700
Manganese	UG/L	16.9	7.02	100%		0	12	12	9.5 J	7.3 J	8.2 J	5.4 J	8.8 J
Potassium	UG/L	2930	2207	100%		0	12	12	1810 J	1660 J	1630 J	1970 J	1990 J
Sodium	UG/L	32400	21741	100%		0	12	12	18300	15900	12700	18000	18300
Zinc	UG/L	15.4	7.78	92%	159.6	0	11	12	6.2 J	3.1 U	3.8 J	4 J	15.4 J

TABLE 4-T
DOWNGRADIENT CHEMICAL DATA-SURFACE WATER
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY									SEAD-12		RI Phase	
LOC_ID = LOCATION									SW12-57		67669	
MATRIX									SURFACE	WATER	SW12-58	
SAMP_ID = SAMPLE ID									12066		12065	
SAMP_DEPTH_TOP = TOP OF SAMPLE DEPTH									0		SA	
SAMP_DEPTH_BOT = BOTTOM OF SAMPLE DEPTH									N/A		0	
SAMP_DATE = SAMPLE DATE									09-Dec-97		00-Jan-00	
QC_CODE = QC CODE									SA		SURFACE	
STUDY_ID = STUDY ID				FREQUENCY	NYS AWQS	NUMBER	NUMBER	NUMBER	RI Phase 1	Step 1	9-Dec-97	
				OF	CLASS C	ABOVE	OF	OF				
PARAMETER	UNIT	MAXIMUM	AVERAGE	DETECTION	(AQUATIC)	CLASS C	DETECTS	ANALYSES				
Bis(2-Ethylhexyl)phthalate	UG/L	0.26	0.477	17%	0.6	0	2	12	1	U	1.1	U
Butylbenzylphthalate	UG/L	0.12	0.450	17%		0	2	12	0.12	J	1.1	U
Diethyl phthalate	UG/L	0.072	0.437	17%		0	2	12	1	U	1.1	U
Hexachlorobenzene	UG/L	0.013	0.006	8%	0.00003	1	1	12	0.01	U	0.011	U
Aluminum	UG/L	79.9	24.1	42%	100	0	5	12	12.3	U	12.3	U
Barium	UG/L	53.2	47.7	100%		0	12	12	49.4	J	52.2	J
Beryllium	UG/L	0.21	0.121	67%	1100	0	8	12	0.16	J	0.14	J
Cadmium	UG/L	1.2	0.37	42%	3.85	0	5	12	0.44	J	0.3	U
Calcium	UG/L	98400	91755	100%		0	12	12	95700		98300	
Copper	UG/L	2.6	1.28	8%	17.4	0	1	12	2.3	U	2.3	U
Iron	UG/L	140	51.7	75%	300	0	9	12	25.6	U	25.6	U
Magnesium	UG/L	15600	13918	100%		0	12	12	15200		15600	
Manganese	UG/L	16.9	7.02	100%		0	12	12	2	J	16.9	
Potassium	UG/L	2930	2207	100%		0	12	12	1990	J	2020	J
Sodium	UG/L	32400	21741	100%		0	12	12	18700		19200	
Zinc	UG/L	15.4	7.78	92%	159.6	0	11	12	3.7	J	4.7	J

TABLE 4-U
BACKGROUND METALS DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY									RI Phase	SEAD-12	SEAD-12	SEAD-12	SEAD-12
LOC_ID									67393	SD12-59	SD12-65	SD12-63	SD12-63
MATRIX									SD12-67	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT
SAMP_ID									12447	12453	12457	12448	12449
DEPTH_TOP									SA	0.8	0.2	0.2	0.3
DEPTH_BOT									0.2	1	0.5	0.4	0.5
SAMP_DATE									0.4	10-Nov-97	11-Nov-97	9-Nov-97	10-Nov-97
QC_CODE									SEDIMEN	SA	SA	SA	SA
STUDY_ID									9-Nov-97	RI Phase 1 Step 1	RI Phase 1 Step 1	RI Phase 1 Step 1	RI Phase 1 Step 1
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC HEALTH ACCUMULATION	NUMBER ABOVE STD.	NUMBER OF DETECTS	NUMBER OF ANALYSES					
METALS													
Aluminum	MG/KG	17900	11135.56	100%		0	9	9	12200	10800	10600	12100	7370
Arsenic	MG/KG	9.3	4.53	67%	6	1	6	9	4.1	2	2.3 U	4.2	1.7 U
Barium	MG/KG	150	84.19	100%		0	9	9	87.9	49.6	108	55.5	72.7
Beryllium	MG/KG	0.65	0.39	89%		0	8	9	0.45	0.42	0.44	0.54	0.34
Calcium	MG/KG	96900	45385.56	100%		0	9	9	54600	20100	23900	8410	29700
Chromium	MG/KG	31.6	25.21	100%	26	1	9	9	20.2	19.1	16.2	21.4	12.5
Cobalt	MG/KG	35	14.08	100%		0	9	9	12.2	9.8	8.8	15.1	7.6
Copper	MG/KG	49.3	24.14	100%	16	6	9	9	**20.3**	**19.4**	13.7	**23.2**	14.2
Iron	MG/KG	45300	19382.22	100%	20000	6	9	9	**24700**	**22000**	14600	**28600**	13100
Lead	MG/KG	35.8	40.97	100%	31	1	9	9	11.1 J	11.2 J	9.3 J	16.6 J	8.5 J
Magnesium	MG/KG	9840	6749.78	100%		0	9	9	8600	5100	5910	7370	4780
Manganese	MG/KG	1200	1954.44	100%	460	5	9	9	**638**	381	266	368	243
Mercury	MG/KG	0.09	0.11	11%	0.15	0	1	9	0.11 U	0.09	0.14 U	0.08 U	0.1 U
Nickel	MG/KG	67.9	34.04	100%	16	8	9	9	**33**	**30.8**	**23.2**	**36.6**	**20.8**
Potassium	MG/KG	2100	1176.67	100%		0	9	9	1760	1610	2100	1390	1410
Selenium	MG/KG	4.2	1.04	89%		0	8	9	2.6	2.3	3.2	3.3	3.5
Sodium	MG/KG	476	335.06	100%		0	9	9	438	148	430	249	282
Thallium	MG/KG	2.5	1.20	11%		0	1	9	3.3 U	1.8 U	4.1 U	2.5 U	3 U
Vanadium	MG/KG	28.4	18.96	100%		0	9	9	20	14.8	16.5	21	11.9
Zinc	MG/KG	135	81.54	100%	120	1	9	9	80.9	77.8	77.8	98.8	65.8

TABLE 4-U
BACKGROUND METALS DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY									RI Phase	SEAD-12	SEAD-12	SEAD-12	SEAD-12
LOC_ID									67393	SD12-59	SD12-65	SD12-63	SD12-63
MATRIX									SD12-67	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT
SAMP_ID									12447	12453	12457	12448	12449
DEPTH_TOP									SA	0.8	0.2	0.2	0.3
DEPTH_BOT									0.2	1	0.5	0.4	0.5
SAMP_DATE									0.4	10-Nov-97	11-Nov-97	9-Nov-97	10-Nov-97
QC_CODE									SEDIMEN	SA	SA	SA	SA
STUDY_ID									9-Nov-97	RI Phase 1 Step 1	RI Phase 1 Step 1	RI Phase 1 Step 1	RI Phase 1 Step 1
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC HEALTH ACCUMULATION	NUMBER ABOVE STD	NUMBER OF DETECTS	NUMBER OF ANALYSES					

TABLE 4-U
BACKGROUND METALS DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY									RI Phase	SEAD-12	SEAD-12	SEAD-12	SEAD-12
LOC_ID									67393	SD12-59	SD12-65	SD12-63	SD12-63
MATRIX									SD12-67	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT
SAMP_ID									12447	12453	12457	12448	12449
DEPTH_TOP									SA	0.8	0.2	0.2	0.3
DEPTH_BOT									0.2	1	0.5	0.4	0.5
SAMP_DATE									0.4	10-Nov-97	11-Nov-97	9-Nov-97	10-Nov-97
QC_CODE									SEDIMEN	SA	SA	SA	SA
STUDY_ID									9-Nov-97	RI Phase 1 Step 1	RI Phase 1 Step 1	RI Phase 1 Step 1	RI Phase 1 Step 1
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC HEALTH ACCUMULATION	NUMBER ABOVE STD	NUMBER OF DETECTS	NUMBER OF ANALYSES					

TABLE 4-U
BACKGROUND METALS DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY									RI Phase	SEAD-12	SEAD-12	SEAD-12	SEAD-12
LOC_ID									67393	SD12-59	SD12-65	SD12-63	SD12-63
MATRIX									SD12-67	SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT
SAMP_ID									12447	12453	12457	12448	12449
DEPTH_TOP									SA	0.8	0.2	0.2	0.3
DEPTH_BOT									0.2	1	0.5	0.4	0.5
SAMP_DATE									0.4	10-Nov-97	11-Nov-97	9-Nov-97	10-Nov-97
QC_CODE									SEDIMEN	SA	SA	SA	SA
STUDY_ID									9-Nov-97	RI Phase 1 Step 1	RI Phase 1 Step 1	RI Phase 1 Step 1	RI Phase 1 Step 1
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC HEALTH ACCUMULATION	NUMBER ABOVE STD.	NUMBER OF DETECTS	NUMBER OF ANALYSES					

TABLE 4-U
BACKGROUND METALS DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY									SEAD-12	SEAD-12	SEAD-12	SEAD-12
LOC_ID									SD12-64	SD12-61	SD12-60	SD12-66
MATRIX									SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT
SAMP_ID									12456	12455	12454	12458
DEPTH_TOP									0.6	0.7	1	2.5
DEPTH_BOT									0.8	0.9	1.2	2.8
SAMP_DATE									11-Nov-97	11-Nov-97	10-Nov-97	11-Nov-97
QC_CODE									SA	SA	SA	SA
STUDY_ID									RI Phase 1 Step 1	RI Phase 1 Step 1	RI Phase 1 Step 1	RI Phase 1 Step 1
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC HEALTH ACCUMULATION	NUMBER ABOVE STD	NUMBER OF DETECTS	NUMBER OF ANALYSES				
METALS												
Aluminum	MG/KG	17900	11135.56	100%		0	9	9	4270	17900	9280	15700
Arsenic	MG/KG	9.3	4.53	67%	6	1	6	9	3.5 U	**9.3**	2.7	4
Barium	MG/KG	150	84.19	100%		0	9	9	74.9	150	69.9	116
Beryllium	MG/KG	0.65	0.39	89%		0	8	9	0.1 U	0.65	0.32	0.59
Calcium	MG/KG	96900	45385.56	100%		0	9	9	77600	96900	25600	2590
Chromium	MG/KG	31.6	25.21	100%	26	1	9	9	7.5	**31.6**	15.9	24.5
Cobalt	MG/KG	35	14.08	100%		0	9	9	4.8	35	11	13.8
Copper	MG/KG	49.3	24.14	100%	16	6	9	9	9.1	**49.3**	**18**	**16.9**
Iron	MG/KG	45300	19382.22	100%	20000	6	9	9	7820	**45300**	**20300**	**29000**
Lead	MG/KG	35.8	40.97	100%	31	1	9	9	4.4 J	**35.8** J	11.4 J	11.4 J
Magnesium	MG/KG	9840	6749.78	100%		0	9	9	3140	9840	5500	5160
Manganese	MG/KG	1200	1954.44	100%	460	5	9	9	**1200**	**1150**	**527**	**725**
Mercury	MG/KG	0.09	0.11	11%	0.15	0	1	9	0.2 U	0.05 U	0.11 U	0.06 U
Nickel	MG/KG	67.9	34.04	100%	16	8	9	9	11.7	**67.9**	**27.8**	**35.9**
Potassium	MG/KG	2100	1176.67	100%		0	9	9	1270	1850	1010	1990
Selenium	MG/KG	4.2	1.04	89%		0	8	9	4.5 U	4.2	3.8	3.5
Sodium	MG/KG	476	335.06	100%		0	9	9	476	194	160	81
Thallium	MG/KG	2.5	1.20	11%		0	1	9	6.1 U	2.5	2.7 U	1.4 U
Vanadium	MG/KG	28.4	18.96	100%		0	9	9	7.8	28.4	13.9	25.3
Zinc	MG/KG	135	81.54	100%	120	1	9	9	40.6	**135**	72.5	84.7

TABLE 4-U
BACKGROUND METALS DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY									SEAD-12	SEAD-12	SEAD-12	SEAD-12
LOC_ID									SD12-64	SD12-61	SD12-60	SD12-66
MATRIX									SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT
SAMP_ID									12456	12455	12454	12458
DEPTH_TOP									0.6	0.7	1	2.5
DEPTH_BOT									0.8	0.9	1.2	2.8
SAMP_DATE									11-Nov-97	11-Nov-97	10-Nov-97	11-Nov-97
QC_CODE									SA	SA	SA	SA
STUDY_ID									RI Phase 1 Step 1	RI Phase 1 Step 1	RI Phase 1 Step 1	RI Phase 1 Step 1
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC HEALTH ACCUMULATION	NUMBER ABOVE STD	NUMBER OF DETECTS	NUMBER OF ANALYSES				

TABLE 4-U
BACKGROUND METALS DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY LOC_ID MATRIX SAMP_ID DEPTH_TOP DEPTH_BOT SAMP_DATE QC_CODE STUDY_ID PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC HEALTH ACCUMULATION	NUMBER ABOVE STD.	NUMBER OF DETECTS	NUMBER OF ANALYSES	SEAD-12 SD12-64 SEDIMENT 12456 0.6 0.8 11-Nov-97 SA RI Phase 1 Step 1	SEAD-12 SD12-61 SEDIMENT 12455 0.7 0.9 11-Nov-97 SA RI Phase 1 Step 1	SEAD-12 SD12-60 SEDIMENT 12454 1 1.2 10-Nov-97 SA RI Phase 1 Step 1	SEAD-12 SD12-66 SEDIMENT 12458 2.5 2.8 11-Nov-97 SA RI Phase 1 Step 1

TABLE 4-U
BACKGROUND METALS DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY									SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOC_ID									SD12-64		SD12-61		SD12-60		SD12-66	
MATRIX									SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
SAMP_ID									12456		12455		12454		12458	
DEPTH_TOP									0.6		0.7		1		2.5	
DEPTH_BOT									0.8		0.9		1.2		2.8	
SAMP_DATE									11-Nov-97		11-Nov-97		10-Nov-97		11-Nov-97	
QC_CODE									SA		SA		SA		SA	
STUDY_ID									RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC HEALTH ACCUMULATION	NUMBER ABOVE STD.	NUMBER OF DETECTS	NUMBER OF ANALYSES								

TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12	SEAD-12	SEAD-12	SEAD-12
LOC_ID										SD12A-1	SD12A-1	SD12A-2	SD12A-3
MATRIX										SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT
SAMP_ID										SD12A-20	SD12A-1	SD12A-2	SD12A-3
DEPTH_TOP										0	0	0	0
DEPTH_BOT										0.2	0.2	0.2	0.2
SAMP_DATE										22-Jun-94	22-Jun-94	11-Jun-94	11-Jun-94
QC_CODE										DU	SA	SA	SA
STUDY_ID										ESI	ESI	ESI	ESI
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACCUMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD.	NUMBER OF DETECTS	NUMBER OF ANALYSES				
VOLATILE ORGANICS													
1,1,1-Trichloroethane	UG/KG	3	15.4	2%			0	1	54	12 U	13 U	20 U	19 U
Acetone	UG/KG	95	23.2	37%			0	20	54	12 U	13 U	20 U	24 U
Methyl chloride	UG/KG	17	15.1	4%			0	2	54	12 U	13 U	20 U	19 U
Methyl ethyl ketone	UG/KG	11	15.6	2%			0	1	54	12 U	13 U	20 U	19 U
Tetrachloroethene	UG/KG	4	15.3	4%	43.2	NYSDEC HHB	0	2	54	12 U	13 U	20 U	19 U
Toluene	UG/KG	20	15.4	9%	2646	BENTHIC-CHRONIC	0	5	54	12 U	13 U	20 U	19 U
Trichloroethene	UG/KG	18	15.2	7%	108	NYSDEC HHB	0	4	54	12 U	13 U	20 U	19 U
2-Methylnaphthalene	UG/KG	36	106.4	22%			0	12	54	450 U	430 U	610 U	450 U
4-Chlorophenyl phenyl ether	UG/KG	6	130.8	2%			0	1	54	450 U	430 U	610 U	450 U
4-Methylphenol	UG/KG	150	126.4	9%			0	5	54	450 U	430 U	610 U	450 U
Acenaphthene	UG/KG	500	91.3	41%	7560	BENTHIC-CHRONIC	0	22	54	450 U	430 U	610 U	450 U
Acenaphthylene	UG/KG	15	126.4	6%			0	3	54	450 U	430 U	610 U	450 U
Anthracene	UG/KG	830	98.2	48%	5778	BENTHIC-CHRONIC	0	26	54	450 U	430 U	610 U	450 U
Benzo(a)anthracene	UG/KG	3100	205.9	72%	648	BENTHIC-CHRONIC	3	39	54	450 U	430 U	610 U	450 U
Benzo(a)pyrene	UG/KG	3300	213.6	76%	70.2	NYSDEC HHB	21	41	54	450 U	430 U	610 U	450 U
Benzo(b)fluoranthene	UG/KG	3200	240.7	81%	70.2	NYSDEC HHB	24	44	54	450 U	430 U	610 U	450 U
Benzo(ghi)perylene	UG/KG	2100	168.4	70%			0	38	54	450 U	430 U	610 U	450 U
Benzo(k)fluoranthene	UG/KG	2700	190.0	54%	70.2	NYSDEC HHB	15	29	54	450 U	430 U	610 U	450 U
Bis(2-Ethylhexyl)phthalate	UG/KG	5000	220.9	13%	10800	BENTHIC-CHRONIC	0	7	54	450 U	430 U	610 U	450 U
Butylbenzylphthalate	UG/KG	42	117.7	17%			0	9	54	450 U	430 U	610 U	450 U
Carbazole	UG/KG	910	112.1	52%			0	28	54	450 U	430 U	610 U	450 U
Chrysene	UG/KG	3200	228.9	81%	70.2	NYSDEC HHB	23	44	54	450 U	430 U	610 U	450 U
Di-n-butylphthalate	UG/KG	53	103.4	28%			0	15	54	53 J	430 U	610 U	450 U
Di-n-octylphthalate	UG/KG	140	101.5	20%			0	11	54	450 U	430 U	610 U	450 U
Dibenz(a,h)anthracene	UG/KG	860	101.2	56%			0	30	54	450 U	430 U	610 U	450 U
Dibenzofuran	UG/KG	64	99.1	30%			0	16	54	450 U	430 U	610 U	450 U
Diethyl phthalate	UG/KG	23	120.0	13%			0	7	54	450 U	430 U	610 U	450 U
Fluoranthene	UG/KG	6200	391.1	87%	55080	BENTHIC-CHRONIC	0	47	54	450 U	430 U	610 U	26 J
Fluorene	UG/KG	340	89.0	37%	43.2	BENTHIC-CHRONIC	5	20	54	450 U	430 U	610 U	450 U
Hexachlorobenzene	UG/KG	6.2	130.8	2%	8.1	NYSDEC HHB	0	1	54	450 U	430 U	610 U	450 U
Indeno(1,2,3-cd)pyrene	UG/KG	2000	155.4	70%	70.2	NYSDEC HHB	18	38	54	450 U	430 U	610 U	450 U
Naphthalene	UG/KG	49	116.7	13%	1.62	BENTHIC-CHRONIC	7	7	54	450 U	430 U	610 U	450 U
Phenanthrene	UG/KG	3100	232.6	83%	6480	BENTHIC-CHRONIC	0	45	54	450 U	430 U	610 U	450 U
Pyrene	UG/KG	5400	336.3	85%	51894	BENTHIC-CHRONIC	0	46	54	450 U	430 U	610 U	450 U

TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOC_ID										SD12A-1		SD12A-1		SD12A-2		SD12A-3	
MATRIX										SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
SAMP_ID										SD12A-20		SD12A-1		SD12A-2		SD12A-3	
DEPTH_TOP										0		0		0		0	
DEPTH_BOT										0.2		0.2		0.2		0.2	
SAMP_DATE										22-Jun-94		22-Jun-94		11-Jun-94		11-Jun-94	
QC_CODE										DU		SA		SA		SA	
STUDY_ID										ESI		ESI		ESI		ESI	
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACCUMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD	NUMBER OF DETECTS	NUMBER OF ANALYSES								
PESTICIDES/PCBS			8.8			NYSDEC HHB											
4,4'-DDD	UG/KG	110	8.7	11%	0.54	NYSDEC HHB	6	6	54	4.5	U	4.3	U	6.1	U	4.5	U
4,4'-DDE	UG/KG	76	9.4	19%	0.54	NYSDEC HHB	10	10	54	4.5	U	4.3	U	6.1	U	4.5	U
4,4'-DDT	UG/KG	200	2.6	13%	0.54		7	7	54	4.5	U	4.3	U	6.1	U	4.5	U
Alpha-Chlordane	UG/KG	3.2	74.0	4%		NYSDEC HHB	0	2	54	2.3	U	2.2	U	3.1	U	2.3	U
Aroclor-1254	UG/KG	1200	50.4	7%	0.0432	NYSDEC HHB	4	4	54	45	U	43	U	61	U	45	U
Aroclor-1260	UG/KG	37	2.6	4%	0.0432	NYSDEC HHB	2	2	54	45	U	43	U	61	U	45	U
Endosulfan I	UG/KG	3.6	5.1	4%	1.62	BENTHIC-CHRONIC	2	2	54	2.3	U	2.2	U	3.1	U	2.3	U
Endrin	UG/KG	5.6	5.1	2%	43.2		0	1	54	4.5	U	4.3	U	6.1	U	4.5	U
Endrin aldehyde	UG/KG	7.6	5.4	4%			0	2	54	4.5	U	4.3	U	6.1	U	4.5	U
Endrin ketone	UG/KG	22	2.9	4%		NYSDEC HHB	0	2	54	4.5	U	4.3	U	6.1	U	4.5	U
Heptachlor epoxide	UG/KG	11	12356.3	6%	0.0432		3	3	54	2.3	U	2.2	U	3.1	U	2.3	U
METALS			0.9														
Aluminum	MG/KG	38700	5.4	100%			0	54	54	16600		17400		11800		13600	
Antimony	MG/KG	2.8	116.1	7%	2		1	4	54	0.34	UJ	0.34	UJ	0.3	UJ	0.23	UJ
Arsenic	MG/KG	19.1	0.4	96%	6		10	52	54	**15.8**		**8**		4		5.8	
Barium	MG/KG	885	0.7	100%			0	54	54	848		349		84.1		83.7	
Beryllium	MG/KG	1.7	63385.0	87%			0	47	54	1.2	J	1	J	0.62	J	0.66	J
Cadmium	MG/KG	9	22.9	28%	0.6		8	15	54	**3.8**		**1.5**		**0.62**	J	**0.65**	J
Calcium	MG/KG	280000	11.5	100%			0	54	54	5560		8060		8630		18200	
Chromium	MG/KG	130	51.4	100%	26		9	54	54	**26.3**		25.2		19.1	J	22.2	J
Cobalt	MG/KG	75.3	0.9	80%			0	43	54	71.3		26.1		10.3	J	12.6	
Copper	MG/KG	1160	25717.0	100%	16		49	54	54	**17.5**		14.1		**29.7**		**28.9**	
Cyanide	MG/KG	2.6	26.5	4%			0	2	54	0.62	U	0.57	U	0.87	U	0.67	U
Iron	MG/KG	85900	10563.0	100%	20000		38	54	54	**76200**		**46900**		**21800**		**30400**	
Lead	MG/KG	215	1079.8	85%	31		8	46	54	22.9		21.4		18.8	R	15.6	R
Magnesium	MG/KG	48100	0.1	100%			0	54	54	4450		5210		4900		7620	
Manganese	MG/KG	14000	34.4	91%	460		25	49	54	**13500**	J	**4200**	J	340		**478**	
Mercury	MG/KG	1.7	1864.1	33%	0.15		7	18	54	0.05	J	0.07		**0.25**		0.06	J
Nickel	MG/KG	126	1.7	100%	16		51	54	54	**52.8**		**35.7**		**31.8**		**38.8**	
Potassium	MG/KG	5500	0.4	100%			0	54	54	1810	J	1810	J	1450	J	1830	J
Selenium	MG/KG	6.2	204.1	46%			0	25	54	4.3		3.3		0.82	J	0.89	
Silver	MG/KG	1.5	1.7	9%	1		1	5	54	0.44	J	0.13	U	0.12	U	0.09	U
Sodium	MG/KG	1550	23.8	48%			0	26	54	87.1	J	96.2	J	136	J	139	J
Thallium	MG/KG	4	239.1	11%			0	6	54	0.49	U	0.49	U	0.44	U	0.33	U

TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12	SEAD-12	SEAD-12	SEAD-12
LOC_ID										SD12A-1	SD12A-1	SD12A-2	SD12A-3
MATRIX										SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT
SAMP_ID										SD12A-20	SD12A-1	SD12A-2	SD12A-3
DEPTH_TOP										0	0	0	0
DEPTH_BOT										0.2	0.2	0.2	0.2
SAMP_DATE										22-Jun-94	22-Jun-94	11-Jun-94	11-Jun-94
QC_CODE										DU	SA	SA	SA
STUDY_ID										ESI	ESI	ESI	ESI
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACC-UMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD	NUMBER OF DETECTS	NUMBER OF ANALYSES				
Vanadium	MG/KG	70.3		100%			0	54	54	40.1	31.7	21.7	23.7
Zinc	MG/KG	2650		91%	120		35	49	54	**170**	**158**	**172**	**147**

TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										ESI		SEAD-12		SEAD-12		SEAD-12	
LOC_ID										ESI-12S		SD12-1		SD12-2		SD12-3	
MATRIX										SD12A-4		SEDIMENT		SEDIMENT		SEDIMENT	
SAMP_ID										SD12A-4		12439		12002		12472	
DEPTH_TOP										SA		0.3		1		0.2	
DEPTH_BOT										0		0.5		1.2		0.4	
SAMP_DATE										########		09-Nov-97		26-Oct-97		13-Dec-97	
QC_CODE										SEDIME		SA		SA		SA	
STUDY_ID										########		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACC-UMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD	NUMBER OF DETECTS	NUMBER OF ANALYSES								
VOLATILE ORGANICS																	
1,1,1-Trichloroethane	UG/KG	3	15.4	2%			0	1	54	13	U	14	U	18	U	12	U
Acetone	UG/KG	95	23.2	37%			0	20	54	13	U	10	J	25		20	J
Methyl chloride	UG/KG	17	15.1	4%			0	2	54	13	U	14	U	18	U	12	U
Methyl ethyl ketone	UG/KG	11	15.6	2%			0	1	54	13	U	14	UJ	18	U	12	U
Tetrachloroethene	UG/KG	4	15.3	4%	43.2	NYSDEC HHB	0	2	54	13	U	14	U	2	J	12	U
Toluene	UG/KG	20	15.4	9%	2646	BENTHIC-CHRONIC	0	5	54	13	U	14	U	18	U	4	J
Trichloroethene	UG/KG	18	15.2	7%	108	NYSDEC HHB	0	4	54	13	U	14	U	10	J	12	U
2-Methylnaphthalene	UG/KG	36	106.4	22%			0	12	54	400	U	120	U	89	U	100	U
4-Chlorophenyl phenyl ether	UG/KG	6	130.8	2%			0	1	54	400	U	120	U	89	U	100	U
4-Methylphenol	UG/KG	150	126.4	9%			0	5	54	400	U	120	U	46	J	100	U
Acenaphthene	UG/KG	500	91.3	41%	7560	BENTHIC-CHRONIC	0	22	54	400	U	120	U	89	U	100	U
Acenaphthylene	UG/KG	15	126.4	6%			0	3	54	400	U	120	U	89	U	100	U
Anthracene	UG/KG	830	98.2	48%	5778	BENTHIC-CHRONIC	0	26	54	400	U	8	J	89	U	100	U
Benzo(a)anthracene	UG/KG	3100	205.9	72%	648	BENTHIC-CHRONIC	3	39	54	400	U	48	J	89	U	54	J
Benzo(a)pyrene	UG/KG	3300	213.6	76%	70.2	NYSDEC HHB	21	41	54	400	U	53	J	89	U	70	J
Benzo(b)fluoranthene	UG/KG	3200	240.7	81%	70.2	NYSDEC HHB	24	44	54	400	U	64	J	9.6	J	**110**	
Benzo(ghi)perylene	UG/KG	2100	168.4	70%			0	38	54	400	U	34	J	4.7	J	66	J
Benzo(k)fluoranthene	UG/KG	2700	190.0	54%	70.2	NYSDEC HHB	15	29	54	400	U	50	J	89	U	**71**	J
Bis(2-Ethylhexyl)phthalate	UG/KG	5000	220.9	13%	10800	BENTHIC-CHRONIC	0	7	54	400	U	120	U	89	U	100	U
Butylbenzylphthalate	UG/KG	42	117.7	17%			0	9	54	400	U	120	U	89	U	100	U
Carbazole	UG/KG	910	112.1	52%			0	28	54	400	U	120	U	89	U	100	U
Chrysene	UG/KG	3200	228.9	81%	70.2	NYSDEC HHB	23	44	54	400	U	59	J	7.2	J	**100**	J
Di-n-butylphthalate	UG/KG	53	103.4	28%			0	15	54	400	U	120	U	89	U	5.9	J
Di-n-octylphthalate	UG/KG	140	101.5	20%			0	11	54	400	U	120	U	89	U	100	U
Dibenz(a,h)anthracene	UG/KG	860	101.2	56%			0	30	54	400	U	13	J	89	U	18	J
Dibenzofuran	UG/KG	64	99.1	30%			0	16	54	400	U	120	U	89	U	100	U
Diethyl phthalate	UG/KG	23	120.0	13%			0	7	54	400	U	120	U	89	U	8.5	J
Fluoranthene	UG/KG	6200	391.1	87%	55080	BENTHIC-CHRONIC	0	47	54	400	U	98	J	8.4	J	90	J
Fluorene	UG/KG	340	89.0	37%	43.2	BENTHIC-CHRONIC	5	20	54	400	U	120	U	89	U	100	U
Hexachlorobenzene	UG/KG	6.2	130.8	2%	8.1	NYSDEC HHB	0	1	54	400	U	120	U	89	U	100	U
Indeno(1,2,3-cd)pyrene	UG/KG	2000	155.4	70%	70.2	NYSDEC HHB	18	38	54	400	U	34	J	89	U	46	J
Naphthalene	UG/KG	49	116.7	13%	1.62	BENTHIC-CHRONIC	7	7	54	400	U	120	U	89	U	100	U
Phenanthrene	UG/KG	3100	232.6	83%	6480	BENTHIC-CHRONIC	0	45	54	400	U	40	J	5.3	J	16	J
Pyrene	UG/KG	5400	336.3	85%	51894	BENTHIC-CHRONIC	0	46	54	400	U	80	J	7.4	J	77	J

TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										ESI	SEAD-12	SEAD-12	SEAD-12
LOC_ID										ESI-12S	SD12-1	SD12-2	SD12-3
MATRIX										SD12A-4	SEDIMENT	SEDIMENT	SEDIMENT
SAMP_ID										SD12A-4	12439	12002	12472
DEPTH_TOP										SA	0.3	1	0.2
DEPTH_BOT										0	0.5	1.2	0.4
SAMP_DATE										########	09-Nov-97	26-Oct-97	13-Dec-97
QC_CODE										SEDIME	SA	SA	SA
STUDY_ID										########	RI Phase 1 Step 1	RI Phase 1 Step 1	RI Phase 1 Step 1
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACC-UMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD	NUMBER OF DETECTS	NUMBER OF ANALYSES				
PESTICIDES/PCBS			8.8			NYSDEC HHB							
4,4'-DDD	UG/KG	110	8.7	11%	0.54	NYSDEC HHB	6	6	54	4 U	5.9 U	4.4 U	5.2 U
4,4'-DDE	UG/KG	76	9.4	19%	0.54	NYSDEC HHB	10	10	54	4 U	5.9 U	4.4 U	5.2 U
4,4'-DDT	UG/KG	200	2.6	13%	0.54		7	7	54	4 U	5.9 U	4.4 U	5.2 U
Alpha-Chlordane	UG/KG	3.2	74.0	4%		NYSDEC HHB	0	2	54	2 U	3 U	2.3 U	2.6 U
Aroclor-1254	UG/KG	1200	50.4	7%	0.0432	NYSDEC HHB	4	4	54	40 U	59 U	44 U	52 U
Aroclor-1260	UG/KG	37	2.6	4%	0.0432	NYSDEC HHB	2	2	54	40 U	59 U	44 U	52 U
Endosulfan I	UG/KG	3.6	5.1	4%	1.62	BENTHIC-CHRONIC	2	2	54	2 U	3 U	2.3 U	2.6 U
Endrin	UG/KG	5.6	5.1	2%	43.2		0	1	54	4 U	5.9 U	4.4 U	5.2 U
Endrin aldehyde	UG/KG	7.6	5.4	4%			0	2	54	4 U	5.9 U	4.4 U	5.2 U
Endrin ketone	UG/KG	22	2.9	4%		NYSDEC HHB	0	2	54	4 U	5.9 U	4.4 U	5.2 U
Heptachlor epoxide	UG/KG	11	12356.3	6%	0.0432		3	3	54	2 U	3 U	2.3 U	2.6 U
METALS			0.9										
Aluminum	MG/KG	38700	5.4	100%			0	54	54	11700	16700	10500 J	8300
Antimony	MG/KG	2.8	116.1	7%	2		1	4	54	0.29 UJ	1.7 J	0.68 UJ	0.83 UJ
Arsenic	MG/KG	19.1	0.4	96%	6		10	52	54	4.1	**6.4**	4.4	3.9
Barium	MG/KG	885	0.7	100%			0	54	54	108	95.5	64.1	47.8
Beryllium	MG/KG	1.7	63385.0	87%			0	47	54	0.54 J	0.58 J	0.1 U	0.3
Cadmium	MG/KG	9	22.9	28%	0.6		8	15	54	**6.9**	0.1 U	0.09 U	0.07 U
Calcium	MG/KG	280000	11.5	100%			0	54	54	29800	49000	40600 J	35000
Chromium	MG/KG	130	51.4	100%	26		9	54	54	18.9 J	**29**	18.5 J	16.1
Cobalt	MG/KG	75.3	0.9	80%			0	43	54	9.8 J	17	1.3 U	7.6
Copper	MG/KG	1160	25717.0	100%	16		49	54	54	**22.3**	**45.6**	**22.9** J	**18.8**
Cyanide	MG/KG	2.6	26.5	4%			0	2	54	0.6 U	0.91 U	0.67 UJ	0.9 UJ
Iron	MG/KG	85900	10563.0	100%	20000		38	54	54	**21600**	**36200**	**21800** J	**22500**
Lead	MG/KG	215	1079.8	85%	31		8	46	54	14.2 UR	**35.2**	12.8 UJ	18.5
Magnesium	MG/KG	48100	0.1	100%			0	54	54	6300	10200	7350 J	9920
Manganese	MG/KG	14000	34.4	91%	460		25	49	54	408	**859**	417 UJ	449 J
Mercury	MG/KG	1.7	1864.1	33%	0.15		7	18	54	0.03 J	0.07 U	0.1 U	0.08 U
Nickel	MG/KG	126	1.7	100%	16		51	54	54	**26**	**55.2**	**35** J	**19.3**
Potassium	MG/KG	5500	0.4	100%			0	54	54	1490 J	2160 J	1560	894
Selenium	MG/KG	6.2	204.1	46%			0	25	54	0.63 J	1.6 U	0.94 UJ	1.6
Silver	MG/KG	1.5	1.7	9%	1		1	5	54	0.11 U	0.7 U	0.26 U	0.5 U
Sodium	MG/KG	1550	23.8	48%			0	26	54	47.9 J	207	115 U	214
Thallium	MG/KG	4	239.1	11%			0	6	54	0.42 U	2.1 U	1.4 U	2.5

TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										ESI		SEAD-12		SEAD-12		SEAD-12	
LOC_ID										ESI-12S		SD12-1		SD12-2		SD12-3	
MATRIX										SD12A-4		SEDIMENT		SEDIMENT		SEDIMENT	
SAMP_ID										SD12A-4		12439		12002		12472	
DEPTH_TOP										SA		0.3		1		0.2	
DEPTH_BOT										0		0.5		1.2		0.4	
SAMP_DATE										########		09-Nov-97		26-Oct-97		13-Dec-97	
QC_CODE										SEDIME		SA		SA		SA	
STUDY_ID										########		RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACC-UMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD.	NUMBER OF DETECTS	NUMBER OF ANALYSES								
Vanadium	MG/KG	70.3		100%			0	54	54	20		27.2		16.8		14.9	
Zinc	MG/KG	2650		91%	120		35	49	54	**222**		**145**	J	85.6	UJ	**470**	

TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOC_ID										SD12-4		SD12-5		SD12-6		SD12-7	
MATRIX										SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
SAMP_ID										12438		12436		12422		12421	
DEPTH_TOP										0.2		0.2		0.2		0.3	
DEPTH_BOT										0.4		0.4		0.4		0.5	
SAMP_DATE										09-Nov-97		07-Nov-97		09-Nov-97		09-Nov-97	
QC_CODE										SA		SA		SA		SA	
STUDY_ID										RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACC-UMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD	NUMBER OF DETECTS	NUMBER OF ANALYSES								
VOLATILE ORGANICS																	
1,1,1-Trichloroethane	UG/KG	3	15.4	2%			0	1	54	24	U	24	U	15	U	21	U
Acetone	UG/KG	95	23.2	37%			0	20	54	24	U	81		31		25	
Methyl chloride	UG/KG	17	15.1	4%			0	2	54	24	U	11	J	15	U	21	U
Methyl ethyl ketone	UG/KG	11	15.6	2%			0	1	54	24	UJ	24	U	15	UJ	21	UJ
Tetrachloroethene	UG/KG	4	15.3	4%	43.2	NYSDEC HHB	0	2	54	24	U	24	U	15	U	21	U
Toluene	UG/KG	20	15.4	9%	2646	BENTHIC-CHRONIC	0	5	54	24	U	24	U	15	U	21	U
Trichloroethene	UG/KG	18	15.2	7%	108	NYSDEC HHB	0	4	54	24	U	24	U	15	U	21	U
2-Methylnaphthalene	UG/KG	36	106.4	22%			0	12	54	280	U	140	U	110	U	87	U
4-Chlorophenyl phenyl ether	UG/KG	6	130.8	2%			0	1	54	280	U	140	U	110	U	87	U
4-Methylphenol	UG/KG	150	126.4	9%			0	5	54	280	U	140	U	110	U	87	U
Acenaphthene	UG/KG	500	91.3	41%	7560	BENTHIC-CHRONIC	0	22	54	25	J	140	U	110	U	87	U
Acenaphthylene	UG/KG	15	126.4	6%			0	3	54	280	U	140	U	110	U	87	U
Anthracene	UG/KG	830	98.2	48%	5778	BENTHIC-CHRONIC	0	26	54	67	J	140	U	110	U	87	U
Benzo(a)anthracene	UG/KG	3100	205.9	72%	648	BENTHIC-CHRONIC	3	39	54	480		12	J	15	J	87	U
Benzo(a)pyrene	UG/KG	3300	213.6	76%	70.2	NYSDEC HHB	21	41	54	**750**		14	J	14	J	87	U
Benzo(b)fluoranthene	UG/KG	3200	240.7	81%	70.2	NYSDEC HHB	24	44	54	**770**		17	J	33	J	87	U
Benzo(ghi)perylene	UG/KG	2100	168.4	70%			0	38	54	610		140	U	19	J	87	U
Benzo(k)fluoranthene	UG/KG	2700	190.0	54%	70.2	NYSDEC HHB	15	29	54	**850**		16	J	11	J	87	U
Bis(2-Ethylhexyl)phthalate	UG/KG	5000	220.9	13%	10800	BENTHIC-CHRONIC	0	7	54	280	U	140	U	110	U	87	U
Butylbenzylphthalate	UG/KG	42	117.7	17%			0	9	54	280	U	140	U	110	U	87	U
Carbazole	UG/KG	910	112.1	52%			0	28	54	280	U	140	U	110	U	87	U
Chrysene	UG/KG	3200	228.9	81%	70.2	NYSDEC HHB	23	44	54	**690**		19	J	28	J	87	U
Di-n-butylphthalate	UG/KG	53	103.4	28%			0	15	54	280	U	140	U	110	U	87	U
Di-n-octylphthalate	UG/KG	140	101.5	20%			0	11	54	280	U	8.1	J	110	U	87	U
Dibenz(a,h)anthracene	UG/KG	860	101.2	56%			0	30	54	170	J	140	U	110	U	87	U
Dibenzofuran	UG/KG	64	99.1	30%			0	16	54	18	J	140	U	110	U	87	U
Diethyl phthalate	UG/KG	23	120.0	13%			0	7	54	280	U	140	U	110	U	87	U
Fluoranthene	UG/KG	6200	391.1	87%	55080	BENTHIC-CHRONIC	0	47	54	1300		30	J	35	J	5.2	J
Fluorene	UG/KG	340	89.0	37%	43.2	BENTHIC-CHRONIC	5	20	54	38	J	140	U	110	U	87	U
Hexachlorobenzene	UG/KG	6.2	130.8	2%	8.1	NYSDEC HHB	0	1	54	280	U	140	U	110	U	87	U
Indeno(1,2,3-cd)pyrene	UG/KG	2000	155.4	70%	70.2	NYSDEC HHB	18	38	54	**560**		14	J	11	J	87	U
Naphthalene	UG/KG	49	116.7	13%	1.62	BENTHIC-CHRONIC	7	7	54	280	U	140	U	110	U	87	U
Phenanthrene	UG/KG	3100	232.6	83%	6480	BENTHIC-CHRONIC	0	45	54	520		19	J	17	J	87	U
Pyrene	UG/KG	5400	336.3	85%	51894	BENTHIC-CHRONIC	0	46	54	940		24	J	30	J	4.9	J

TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOC_ID										SD12-4		SD12-5		SD12-6		SD12-7	
MATRIX										SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
SAMP_ID										12438		12436		12422		12421	
DEPTH_TOP										0.2		0.2		0.2		0.3	
DEPTH_BOT										0.4		0.4		0.4		0.5	
SAMP_DATE										09-Nov-97		07-Nov-97		09-Nov-97		09-Nov-97	
QC_CODE										SA		SA		SA		SA	
STUDY_ID										RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACC-UMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD	NUMBER OF DETECTS	NUMBER OF ANALYSES								
PESTICIDES/PCBS			8.8			NYSDEC HHB											
4,4'-DDD	UG/KG	110	8.7	11%	0.54	NYSDEC HHB	6	6	54	8.2	U	6.9	U	5.4	U	4.3	U
4,4'-DDE	UG/KG	76	9.4	19%	0.54	NYSDEC HHB	10	10	54	8.2	U	6.9	U	5.4	U	4.3	U
4,4'-DDT	UG/KG	200	2.6	13%	0.54		7	7	54	8.2	U	6.9	U	5.4	U	4.3	U
Alpha-Chlordane	UG/KG	3.2	74.0	4%		NYSDEC HHB	0	2	54	4.2	U	3.5	U	2.8	U	2.2	U
Aroclor-1254	UG/KG	1200	50.4	7%	0.0432	NYSDEC HHB	4	4	54	82	U	69	U	54	U	43	U
Aroclor-1260	UG/KG	37	2.6	4%	0.0432	NYSDEC HHB	2	2	54	82	U	69	U	54	U	43	U
Endosulfan I	UG/KG	3.6	5.1	4%	1.62	BENTHIC-CHRONIC	2	2	54	4.2	U	3.5	U	2.8	U	2.2	U
Endrin	UG/KG	5.6	5.1	2%	43.2		0	1	54	8.2	U	6.9	U	5.4	U	4.3	U
Endrin aldehyde	UG/KG	7.6	5.4	4%			0	2	54	8.2	U	6.9	U	5.4	U	4.3	U
Endrin ketone	UG/KG	22	2.9	4%		NYSDEC HHB	0	2	54	8.2	U	6.9	U	5.4	U	4.3	U
Heptachlor epoxide	UG/KG	11	12356.3	6%	0.0432		3	3	54	4.2	U	3.5	U	2.8	U	2.2	U
METALS			0.9														
Aluminum	MG/KG	38700	5.4	100%			0	54	54	12400		7830		9050		13900	
Antimony	MG/KG	2.8	116.1	7%	2		1	4	54	1.6	UJ	0.97	J	0.81	UJ	0.77	UJ
Arsenic	MG/KG	19.1	0.4	96%	6		10	52	54	3.9		3.7		4.1		4.6	
Barium	MG/KG	885	0.7	100%			0	54	54	114		63.9		55.3		64.2	
Beryllium	MG/KG	1.7	63385.0	87%			0	47	54	0.28	J	0.19		0.34	J	0.49	J
Cadmium	MG/KG	9	22.9	28%	0.6		8	15	54	0.14	U	0.08	U	0.07	U	0.07	U
Calcium	MG/KG	280000	11.5	100%			0	54	54	63100		43800		138000		12900	
Chromium	MG/KG	130	51.4	100%	26		9	54	54	19.4		12.8		13.4		24.1	
Cobalt	MG/KG	75.3	0.9	80%			0	43	54	10.9		9.2		11.3		15.4	
Copper	MG/KG	1160	25717.0	100%	16		49	54	54	**26.8**		**18.2**		**19.2**		**21.4**	
Cyanide	MG/KG	2.6	26.5	4%			0	2	54	1.5	U	1.2	U	0.89	U	0.74	U
Iron	MG/KG	85900	10563.0	100%	20000		38	54	54	**24100**		16700		15800		**33900**	
Lead	MG/KG	215	1079.8	85%	31		8	46	54	27.6		11.2		13.2		12.6	
Magnesium	MG/KG	48100	0.1	100%			0	54	54	7540		8230		12100		5800	
Manganese	MG/KG	14000	34.4	91%	460		25	49	54	**1150**		**648**		393		**880**	
Mercury	MG/KG	1.7	1864.1	33%	0.15		7	18	54	0.12	U	0.1	U	0.07	U	0.06	U
Nickel	MG/KG	126	1.7	100%	16		51	54	54	**31.7**		**24.8**		**24.8**		**44.8**	
Potassium	MG/KG	5500	0.4	100%			0	54	54	1910	J	986	J	1020	J	903	J
Selenium	MG/KG	6.2	204.1	46%			0	25	54	2.1		1.3	UJ	1.1	U	1	U
Silver	MG/KG	1.5	1.7	9%	1		1	5	54	0.95	U	0.57	U	0.48	U	0.46	U
Sodium	MG/KG	1550	23.8	48%			0	26	54	275	U	166	U	153		133	U
Thallium	MG/KG	4	239.1	11%			0	6	54	2.8	U	1.7	U	1.4	U	1.4	U

TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOC_ID										SD12-4		SD12-5		SD12-6		SD12-7	
MATRIX										SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
SAMP_ID										12438		12436		12422		12421	
DEPTH_TOP										0.2		0.2		0.2		0.3	
DEPTH_BOT										0.4		0.4		0.4		0.5	
SAMP_DATE										09-Nov-97		07-Nov-97		09-Nov-97		09-Nov-97	
QC_CODE										SA		SA		SA		SA	
STUDY_ID										RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACC-UMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD.	NUMBER OF DETECTS	NUMBER OF ANALYSES								
Vanadium	MG/KG	70.3		100%			0	54	54	23.1		13		17.1		19.8	
Zinc	MG/KG	2650		91%	120		35	49	54	**142**	J	72.7		72.1	J	**136**	J

TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12	SEAD-12	SEAD-12	SEAD-12
LOC_ID										SD12-8	SD12-9	SD12-10	SD12-11
MATRIX										SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT
SAMP_ID										12402	12437	12425	12473
DEPTH_TOP										0.2	0.3	0.2	0.2
DEPTH_BOT										0.4	0.5	0.4	0.4
SAMP_DATE										27-Oct-97	07-Nov-97	07-Nov-97	13-Dec-97
QC_CODE										SA	SA	SA	SA
STUDY_ID										RI Phase 1 Step 1	RI Phase 1 Step 1	RI Phase 1 Step 1	RI Phase 1 Step 1
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACCUMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD	NUMBER OF DETECTS	NUMBER OF ANALYSES				
VOLATILE ORGANICS													
1,1,1-Trichloroethane	UG/KG	3	15.4	2%			0	1	54	14 U	16 U	15 U	16 U
Acetone	UG/KG	95	23.2	37%			0	20	54	14 U	16 U	10 J	27 J
Methyl chloride	UG/KG	17	15.1	4%			0	2	54	14 U	16 U	15 U	16 U
Methyl ethyl ketone	UG/KG	11	15.6	2%			0	1	54	14 U	16 U	15 U	16 U
Tetrachloroethene	UG/KG	4	15.3	4%	43.2	NYSDEC HHB	0	2	54	14 U	16 U	15 U	16 U
Toluene	UG/KG	20	15.4	9%	2646	BENTHIC-CHRONIC	0	5	54	14 U	16 U	15 U	9 J
Trichloroethene	UG/KG	18	15.2	7%	108	NYSDEC HHB	0	4	54	14 U	16 U	15 U	16 U
2-Methylnaphthalene	UG/KG	36	106.4	22%			0	12	54	130 U	120 U	100 U	190 U
4-Chlorophenyl phenyl ether	UG/KG	6	130.8	2%			0	1	54	130 U	120 U	100 U	190 U
4-Methylphenol	UG/KG	150	126.4	9%			0	5	54	130 U	120 U	100 U	190 U
Acenaphthene	UG/KG	500	91.3	41%	7560	BENTHIC-CHRONIC	0	22	54	130 U	120 U	100 U	190 U
Acenaphthylene	UG/KG	15	126.4	6%			0	3	54	7.5 J	120 U	100 U	190 U
Anthracene	UG/KG	830	98.2	48%	5778	BENTHIC-CHRONIC	0	26	54	11 J	120 U	100 U	190 U
Benzo(a)anthracene	UG/KG	3100	205.9	72%	648	BENTHIC-CHRONIC	3	39	54	65 J	13 J	22 J	56 J
Benzo(a)pyrene	UG/KG	3300	213.6	76%	70.2	NYSDEC HHB	21	41	54	**92** J	20 J	20 J	69 J
Benzo(b)fluoranthene	UG/KG	3200	240.7	81%	70.2	NYSDEC HHB	24	44	54	**78** J	46 J	56 J	**160** J
Benzo(ghi)perylene	UG/KG	2100	168.4	70%			0	38	54	81 J	21 J	21 J	71 J
Benzo(k)fluoranthene	UG/KG	2700	190.0	54%	70.2	NYSDEC HHB	15	29	54	**89** J	120 U	100 U	190 U
Bis(2-Ethylhexyl)phthalate	UG/KG	5000	220.9	13%	10800	BENTHIC-CHRONIC	0	7	54	130 U	120	100 U	190 U
Butylbenzylphthalate	UG/KG	42	117.7	17%			0	9	54	130 U	120 U	100 U	12 J
Carbazole	UG/KG	910	112.1	52%			0	28	54	19 J	9.4 J	13 J	24 J
Chrysene	UG/KG	3200	228.9	81%	70.2	NYSDEC HHB	23	44	54	**91** J	32 J	49 J	58 J
Di-n-butylphthalate	UG/KG	53	103.4	28%			0	15	54	130 U	120 U	100 U	190 U
Di-n-octylphthalate	UG/KG	140	101.5	20%			0	11	54	130 U	120 U	100 U	190 U
Dibenz(a,h)anthracene	UG/KG	860	101.2	56%			0	30	54	27 J	120 U	100 U	190 U
Dibenzofuran	UG/KG	64	99.1	30%			0	16	54	130 U	120 U	100 U	190 U
Diethyl phthalate	UG/KG	23	120.0	13%			0	7	54	130 U	13 J	9.2 J	190 U
Fluoranthene	UG/KG	6200	391.1	87%	55080	BENTHIC-CHRONIC	0	47	54	110 J	42 J	78 J	150 J
Fluorene	UG/KG	340	89.0	37%	43.2	BENTHIC-CHRONIC	5	20	54	130 U	120 U	100 U	190 U
Hexachlorobenzene	UG/KG	6.2	130.8	2%	8.1	NYSDEC HHB	0	1	54	130 U	120 U	100 U	190 U
Indeno(1,2,3-cd)pyrene	UG/KG	2000	155.4	70%	70.2	NYSDEC HHB	18	38	54	69 J	12 J	17 J	46 J
Naphthalene	UG/KG	49	116.7	13%	1.62	BENTHIC-CHRONIC	7	7	54	130 U	120 U	100 U	190 U
Phenanthrene	UG/KG	3100	232.6	83%	6480	BENTHIC-CHRONIC	0	45	54	57 J	18 J	32 J	64 J
Pyrene	UG/KG	5400	336.3	85%	51894	BENTHIC-CHRONIC	0	46	54	130	36 J	58 J	100 J

TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12	SEAD-12	SEAD-12	SEAD-12
LOC_ID										SD12-8	SD12-9	SD12-10	SD12-11
MATRIX										SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT
SAMP_ID										12402	12437	12425	12473
DEPTH_TOP										0.2	0.3	0.2	0.2
DEPTH_BOT										0.4	0.5	0.4	0.4
SAMP_DATE										27-Oct-97	07-Nov-97	07-Nov-97	13-Dec-97
QC_CODE										SA	SA	SA	SA
STUDY_ID										RI Phase 1 Step 1	RI Phase 1 Step 1	RI Phase 1 Step 1	RI Phase 1 Step 1
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACC-UMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD	NUMBER OF DETECTS	NUMBER OF ANALYSES				
PESTICIDES/PCBS			8.8			NYSDEC HHB							
4,4'-DDD	UG/KG	110	8.7	11%	0.54	NYSDEC HHB	6	6	54	6.3 U	5.9 U	5 U	4.8 U
4,4'-DDE	UG/KG	76	9.4	19%	0.54	NYSDEC HHB	10	10	54	6.3 U	5.9 U	**3.3** J	**3.5** J
4,4'-DDT	UG/KG	200	2.6	13%	0.54		7	7	54	6.3 U	5.9 U	5 U	4.8 U
Alpha-Chlordane	UG/KG	3.2	74.0	4%		NYSDEC HHB	0	2	54	3.3 U	3 U	2.6 U	2.5 U
Aroclor-1254	UG/KG	1200	50.4	7%	0.0432	NYSDEC HHB	4	4	54	**50** J	59 U	50 U	48 U
Aroclor-1260	UG/KG	37	2.6	4%	0.0432	NYSDEC HHB	2	2	54	63 U	59 U	50 U	48 U
Endosulfan I	UG/KG	3.6	5.1	4%	1.62	BENTHIC-CHRONIC	2	2	54	3.3 U	3 U	2.6 U	2.5 U
Endrin	UG/KG	5.6	5.1	2%	43.2		0	1	54	6.3 U	5.9 U	5 U	4.8 U
Endrin aldehyde	UG/KG	7.6	5.4	4%			0	2	54	6.3 U	5.9 U	5 U	4.8 U
Endrin ketone	UG/KG	22	2.9	4%		NYSDEC HHB	0	2	54	6.3 U	5.9 U	5 U	4.8 U
Heptachlor epoxide	UG/KG	11	12356.3	6%	0.0432		3	3	54	3.3 U	3 U	2.6 U	2.5 U
METALS			0.9										
Aluminum	MG/KG	38700	5.4	100%			0	54	54	13800 J	13300	11500	5930
Antimony	MG/KG	2.8	116.1	7%	2		1	4	54	0.85 UJ	1.2 UJ	0.88 UJ	0.88 UJ
Arsenic	MG/KG	19.1	0.4	96%	6		10	52	54	4.5	5.8	4.2	3.6
Barium	MG/KG	885	0.7	100%			0	54	54	78.8	83.2	65	38.9
Beryllium	MG/KG	1.7	63385.0	87%			0	47	54	0.1 U	0.61	0.48	0.18
Cadmium	MG/KG	9	22.9	28%	0.6		8	15	54	0.12 U	0.1 U	0.08 U	0.08 U
Calcium	MG/KG	280000	11.5	100%			0	54	54	49200 J	71800	90200	136000
Chromium	MG/KG	130	51.4	100%	26		9	54	54	22.1 J	19.5	17.3	11.5
Cobalt	MG/KG	75.3	0.9	80%			0	43	54	1.3 U	9.3	8.8	7.7
Copper	MG/KG	1160	25717.0	100%	16		49	54	54	**29.6** J	**29.2**	**22.9**	**16.1**
Cyanide	MG/KG	2.6	26.5	4%			0	2	54	1 UJ	1 U	0.84 U	0.78 UJ
Iron	MG/KG	85900	10563.0	100%	20000		38	54	54	**22600** J	**23000**	**20200**	14200
Lead	MG/KG	215	1079.8	85%	31		8	46	54	20.3 UJ	17.6	**41.5**	**33.7**
Magnesium	MG/KG	48100	0.1	100%			0	54	54	11700 J	10700	8420	26200
Manganese	MG/KG	14000	34.4	91%	460		25	49	54	394 UJ	240	356	**528** J
Mercury	MG/KG	1.7	1864.1	33%	0.15		7	18	54	0.15	0.07 U	0.08 U	0.07 U
Nickel	MG/KG	126	1.7	100%	16		51	54	54	**39** J	**25.9**	**28**	**17.6**
Potassium	MG/KG	5500	0.4	100%			0	54	54	2520	2350 J	1690 J	936
Selenium	MG/KG	6.2	204.1	46%			0	25	54	1.2 UJ	1.6 UJ	1.9 J	1.4
Silver	MG/KG	1.5	1.7	9%	1		1	5	54	0.32 U	0.72 U	0.53 U	0.53 U
Sodium	MG/KG	1550	23.8	48%			0	26	54	126 U	209 U	153 U	152 U
Thallium	MG/KG	4	239.1	11%			0	6	54	1.8 U	2.2 U	1.6 U	1.6 U

TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOC_ID										SD12-8		SD12-9		SD12-10		SD12-11	
MATRIX										SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
SAMP_ID										12402		12437		12425		12473	
DEPTH_TOP										0.2		0.3		0.2		0.2	
DEPTH_BOT										0.4		0.5		0.4		0.4	
SAMP_DATE										27-Oct-97		07-Nov-97		07-Nov-97		13-Dec-97	
QC_CODE										SA		SA		SA		SA	
STUDY_ID										RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACCUMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD.	NUMBER OF DETECTS	NUMBER OF ANALYSES								
Vanadium	MG/KG	70.3		100%			0	54	54	28.9		23.6		21.4		24.1	
Zinc	MG/KG	2650		91%	120		35	49	54	96.3	UJ	286		179		71.2	

TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOC_ID										SD12-12		SD12-13		SD12-14		SD12-15	
MATRIX										SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
SAMP_ID										12442		12441		12435		12434	
DEPTH_TOP										0.3		0.3		0.5		0.4	
DEPTH_BOT										0.5		0.5		0.7		0.6	
SAMP_DATE										09-Nov-97		09-Nov-97		09-Nov-97		09-Nov-97	
QC_CODE										SA		SA		SA		SA	
STUDY_ID										RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACC-UMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD	NUMBER OF DETECTS	NUMBER OF ANALYSES								
VOLATILE ORGANICS																	
1,1,1-Trichloroethane	UG/KG	3	15.4	2%			0	1	54	16	U	22	U	12	U	14	U
Acetone	UG/KG	95	23.2	37%			0	20	54	34		22	U	12	U	14	U
Methyl chloride	UG/KG	17	15.1	4%			0	2	54	16	U	22	U	12	U	14	U
Methyl ethyl ketone	UG/KG	11	15.6	2%			0	1	54	16	U	22	UJ	12	UJ	14	UJ
Tetrachloroethene	UG/KG	4	15.3	4%	43.2	NYSDEC HHB	0	2	54	16	U	22	U	12	U	14	U
Toluene	UG/KG	20	15.4	9%	2646	BENTHIC-CHRONIC	0	5	54	16	U	22	U	12	U	14	U
Trichloroethene	UG/KG	18	15.2	7%	108	NYSDEC HHB	0	4	54	16	U	22	U	12	U	14	U
2-Methylnaphthalene	UG/KG	36	106.4	22%			0	12	54	6.3	J	100	U	86	U	100	U
4-Chlorophenyl phenyl ether	UG/KG	6	130.8	2%			0	1	54	110	U	6	J	86	U	100	U
4-Methylphenol	UG/KG	150	126.4	9%			0	5	54	110	U	100	U	86	U	100	U
Acenaphthene	UG/KG	500	91.3	41%	7560	BENTHIC-CHRONIC	0	22	54	110	U	6.4	J	86	U	100	U
Acenaphthylene	UG/KG	15	126.4	6%			0	3	54	110	U	100	U	86	U	100	U
Anthracene	UG/KG	830	98.2	48%	5778	BENTHIC-CHRONIC	0	26	54	6.9	J	6.4	J	86	U	100	U
Benzo(a)anthracene	UG/KG	3100	205.9	72%	648	BENTHIC-CHRONIC	3	39	54	25	J	14	J	86	U	100	U
Benzo(a)pyrene	UG/KG	3300	213.6	76%	70.2	NYSDEC HHB	21	41	54	28	J	16	J	86	U	100	U
Benzo(b)fluoranthene	UG/KG	3200	240.7	81%	70.2	NYSDEC HHB	24	44	54	47	J	18	J	12	J	100	U
Benzo(ghi)perylene	UG/KG	2100	168.4	70%			0	38	54	32	J	26	J	86	U	100	U
Benzo(k)fluoranthene	UG/KG	2700	190.0	54%	70.2	NYSDEC HHB	15	29	54	22	J	21	J	86	U	100	U
Bis(2-Ethylhexyl)phthalate	UG/KG	5000	220.9	13%	10800	BENTHIC-CHRONIC	0	7	54	110	U	100	U	86	U	100	U
Butylbenzylphthalate	UG/KG	42	117.7	17%			0	9	54	9	J	11	J	86	U	100	U
Carbazole	UG/KG	910	112.1	52%			0	28	54	20	J	100	U	86	U	100	U
Chrysene	UG/KG	3200	228.9	81%	70.2	NYSDEC HHB	23	44	54	45	J	19	J	86	U	100	U
Di-n-butylphthalate	UG/KG	53	103.4	28%			0	15	54	10	J	100	U	86	U	100	U
Di-n-octylphthalate	UG/KG	140	101.5	20%			0	11	54	110	U	7.5	J	86	U	100	U
Dibenz(a,h)anthracene	UG/KG	860	101.2	56%			0	30	54	11	J	12	J	86	U	100	U
Dibenzofuran	UG/KG	64	99.1	30%			0	16	54	110	U	100	U	86	U	100	U
Diethyl phthalate	UG/KG	23	120.0	13%			0	7	54	110	U	100	U	86	U	100	U
Fluoranthene	UG/KG	6200	391.1	87%	55080	BENTHIC-CHRONIC	0	47	54	55	J	17	J	6.5	J	100	U
Fluorene	UG/KG	340	89.0	37%	43.2	BENTHIC-CHRONIC	5	20	54	110	U	6.6	J	86	U	100	U
Hexachlorobenzene	UG/KG	6.2	130.8	2%	8.1	NYSDEC HHB	0	1	54	110	U	6.2	J	86	U	100	U
Indeno(1,2,3-cd)pyrene	UG/KG	2000	155.4	70%	70.2	NYSDEC HHB	18	38	54	23	J	14	J	86	U	100	U
Naphthalene	UG/KG	49	116.7	13%	1.62	BENTHIC-CHRONIC	7	7	54	110	U	100	U	86	U	100	U
Phenanthrene	UG/KG	3100	232.6	83%	6480	BENTHIC-CHRONIC	0	45	54	33	J	12	J	5.7	J	100	U
Pyrene	UG/KG	5400	336.3	85%	51894	BENTHIC-CHRONIC	0	46	54	45	J	18	J	6	J	100	U

TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOC_ID										SD12-12		SD12-13		SD12-14		SD12-15	
MATRIX										SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
SAMP_ID										12442		12441		12435		12434	
DEPTH_TOP										0.3		0.3		0.5		0.4	
DEPTH_BOT										0.5		0.5		0.7		0.6	
SAMP_DATE										09-Nov-97		09-Nov-97		09-Nov-97		09-Nov-97	
QC_CODE										SA		SA		SA		SA	
STUDY_ID										RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACC-UMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD.	NUMBER OF DETECTS	NUMBER OF ANALYSES								
PESTICIDES/PCBS			8.8			NYSDEC HHB											
4,4'-DDD	UG/KG	110	8.7	11%	0.54	NYSDEC HHB	6	6	54	5.7	U	5.2	U	4.3	U	5.1	U
4,4'-DDE	UG/KG	76	9.4	19%	0.54	NYSDEC HHB	10	10	54	5.7	U	5.2	U	4.3	U	5.1	U
4,4'-DDT	UG/KG	200	2.6	13%	0.54		7	7	54	5.7	U	5.2	U	4.3	U	5.1	U
Alpha-Chlordane	UG/KG	3.2	74.0	4%		NYSDEC HHB	0	2	54	2.9	U	2.7	U	2.2	U	2.6	U
Aroclor-1254	UG/KG	1200	50.4	7%	0.0432	NYSDEC HHB	4	4	54	57	U	52	U	43	U	51	U
Aroclor-1260	UG/KG	37	2.6	4%	0.0432	NYSDEC HHB	2	2	54	57	U	52	U	43	U	51	U
Endosulfan I	UG/KG	3.6	5.1	4%	1.62	BENTHIC-CHRONIC	2	2	54	2.9	U	2.7	U	2.2	U	2.6	U
Endrin	UG/KG	5.6	5.1	2%	43.2		0	1	54	5.7	U	5.2	U	4.3	U	5.1	U
Endrin aldehyde	UG/KG	7.6	5.4	4%			0	2	54	5.7	U	5.2	U	4.3	U	5.1	U
Endrin ketone	UG/KG	22	2.9	4%		NYSDEC HHB	0	2	54	5.7	U	5.2	U	4.3	U	5.1	U
Heptachlor epoxide	UG/KG	11	12356.3	6%	0.0432		3	3	54	2.9	U	2.7	U	2.2	U	2.6	U
METALS			0.9														
Aluminum	MG/KG	38700	5.4	100%			0	54	54	10900		13700		4290		16200	
Antimony	MG/KG	2.8	116.1	7%	2		1	4	54	1.1	UJ	1	UJ	0.69	UJ	0.83	UJ
Arsenic	MG/KG	19.1	0.4	96%	6		10	52	54	3.1		**6.5**		5.8		**16.9**	
Barium	MG/KG	885	0.7	100%			0	54	54	65.8		64.2		18.5		885	
Beryllium	MG/KG	1.7	63385.0	87%			0	47	54	0.5		0.61	J	0.18	J	0.02	UJ
Cadmium	MG/KG	9	22.9	28%	0.6		8	15	54	0.09	U	0.09	U	0.06	U	0.07	U
Calcium	MG/KG	280000	11.5	100%			0	54	54	118000		33800		160000		5080	
Chromium	MG/KG	130	51.4	100%	26		9	54	54	17.4		22.7		8.7		25.7	
Cobalt	MG/KG	75.3	0.9	80%			0	43	54	12.2		13.2		9.3		75.3	
Copper	MG/KG	1160	25717.0	100%	16		49	54	54	**21.1**		**19.5**		**24**		**18.6**	
Cyanide	MG/KG	2.6	26.5	4%			0	2	54	0.97	UJ	0.87	U	0.78		0.82	U
Iron	MG/KG	85900	10563.0	100%	20000		38	54	54	**20200**		**30600**		**22800**		**72500**	
Lead	MG/KG	215	1079.8	85%	31		8	46	54	14.1	J	11		21.3		30.8	
Magnesium	MG/KG	48100	0.1	100%			0	54	54	11100		7900		25300		4360	
Manganese	MG/KG	14000	34.4	91%	460		25	49	54	433		**467**		384		**14000**	
Mercury	MG/KG	1.7	1864.1	33%	0.15		7	18	54	0.07	U	0.06	U	0.04	U	0.07	U
Nickel	MG/KG	126	1.7	100%	16		51	54	54	**31.6**		**35.4**		**26.4**		**54.5**	
Potassium	MG/KG	5500	0.4	100%			0	54	54	1600		1200	J	875	J	1840	J
Selenium	MG/KG	6.2	204.1	46%			0	25	54	2.4		1.4	U	0.93	U	6.2	
Silver	MG/KG	1.5	1.7	9%	1		1	5	54	0.63	U	0.62	U	0.42	U	0.5	U
Sodium	MG/KG	1550	23.8	48%			0	26	54	263		178	U	229		144	U
Thallium	MG/KG	4	239.1	11%			0	6	54	1.9	U	1.8	U	1.2	U	1.5	U

TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOC_ID										SD12-12		SD12-13		SD12-14		SD12-15	
MATRIX										SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
SAMP_ID										12442		12441		12435		12434	
DEPTH_TOP										0.3		0.3		0.5		0.4	
DEPTH_BOT										0.5		0.5		0.7		0.6	
SAMP_DATE										09-Nov-97		09-Nov-97		09-Nov-97		09-Nov-97	
QC_CODE										SA		SA		SA		SA	
STUDY_ID										RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACC-UMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD	NUMBER OF DETECTS	NUMBER OF ANALYSES								
Vanadium	MG/KG	70.3		100%			0	54	54	24.4		24		11.2		39.9	
Zinc	MG/KG	2650		91%	120		35	49	54	82		74.8	J	**560**	J	**192**	J

TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOC_ID										SD12-16		SD12-17		SD12-18		SD12-19	
MATRIX										SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
SAMP_ID										12428		12432		12452		12440	
DEPTH_TOP										0.3		0.2		0.2		0.2	
DEPTH_BOT										0.5		0.4		0.4		0.4	
SAMP_DATE										08-Nov-97		08-Nov-97		10-Nov-97		06-Nov-97	
QC_CODE										SA		SA		SA		SA	
STUDY_ID										RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACC-UMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD	NUMBER OF DETECTS	NUMBER OF ANALYSES								
VOLATILE ORGANICS																	
1,1,1-Trichloroethane	UG/KG	3	15.4	2%			0	1	54	15	U	31	U	18	U	17	U
Acetone	UG/KG	95	23.2	37%			0	20	54	15	U	31	U	18	U	17	UJ
Methyl chloride	UG/KG	17	15.1	4%			0	2	54	15	U	31	U	18	U	17	U
Methyl ethyl ketone	UG/KG	11	15.6	2%			0	1	54	15	U	31	U	18	U	17	U
Tetrachloroethene	UG/KG	4	15.3	4%	43.2	NYSDEC HHB	0	2	54	15	U	31	U	18	UJ	17	U
Toluene	UG/KG	20	15.4	9%	2646	BENTHIC-CHRONIC	0	5	54	15	U	31	U	18	UJ	17	U
Trichloroethene	UG/KG	18	15.2	7%	108	NYSDEC HHB	0	4	54	15	U	31	U	18	UJ	17	U
2-Methylnaphthalene	UG/KG	36	106.4	22%			0	12	54	110	U	210	U	110	U	93	U
4-Chlorophenyl phenyl ether	UG/KG	6	130.8	2%			0	1	54	110	U	210	U	110	U	93	U
4-Methylphenol	UG/KG	150	126.4	9%			0	5	54	110	U	210	U	110	U	93	U
Acenaphthene	UG/KG	500	91.3	41%	7560	BENTHIC-CHRONIC	0	22	54	110	U	210	U	110	U	93	U
Acenaphthylene	UG/KG	15	126.4	6%			0	3	54	110	U	210	U	110	U	93	U
Anthracene	UG/KG	830	98.2	48%	5778	BENTHIC-CHRONIC	0	26	54	110	U	210	U	110	U	93	U
Benzo(a)anthracene	UG/KG	3100	205.9	72%	648	BENTHIC-CHRONIC	3	39	54	110	U	210	U	17	J	5.2	J
Benzo(a)pyrene	UG/KG	3300	213.6	76%	70.2	NYSDEC HHB	21	41	54	110	U	15	J	40	J	93	U
Benzo(b)fluoranthene	UG/KG	3200	240.7	81%	70.2	NYSDEC HHB	24	44	54	110	U	18	J	51	J	93	U
Benzo(ghi)perylene	UG/KG	2100	168.4	70%			0	38	54	110	U	210	U	31	J	93	U
Benzo(k)fluoranthene	UG/KG	2700	190.0	54%	70.2	NYSDEC HHB	15	29	54	110	U	19	J	110	U	93	U
Bis(2-Ethylhexyl)phthalate	UG/KG	5000	220.9	13%	10800	BENTHIC-CHRONIC	0	7	54	110	U	210	U	110	U	93	U
Butylbenzylphthalate	UG/KG	42	117.7	17%			0	9	54	110	U	210	U	110	U	93	U
Carbazole	UG/KG	910	112.1	52%			0	28	54	110	U	210	U	110	U	93	U
Chrysene	UG/KG	3200	228.9	81%	70.2	NYSDEC HHB	23	44	54	110	U	20	J	38	J	26	J
Di-n-butylphthalate	UG/KG	53	103.4	28%			0	15	54	110	U	210	U	15	J	93	U
Di-n-octylphthalate	UG/KG	140	101.5	20%			0	11	54	110	U	210	U	110	U	93	U
Dibenz(a,h)anthracene	UG/KG	860	101.2	56%			0	30	54	110	U	210	U	110	U	93	U
Dibenzofuran	UG/KG	64	99.1	30%			0	16	54	110	U	210	U	110	U	93	U
Diethyl phthalate	UG/KG	23	120.0	13%			0	7	54	110	U	210	U	110	U	93	U
Fluoranthene	UG/KG	6200	391.1	87%	55080	BENTHIC-CHRONIC	0	47	54	110	U	27	J	33	J	10	J
Fluorene	UG/KG	340	89.0	37%	43.2	BENTHIC-CHRONIC	5	20	54	110	U	210	U	110	U	93	U
Hexachlorobenzene	UG/KG	6.2	130.8	2%	8.1	NYSDEC HHB	0	1	54	110	U	210	U	110	U	93	U
Indeno(1,2,3-cd)pyrene	UG/KG	2000	155.4	70%	70.2	NYSDEC HHB	18	38	54	110	U	210	U	22	J	93	U
Naphthalene	UG/KG	49	116.7	13%	1.62	BENTHIC-CHRONIC	7	7	54	110	U	210	U	110	U	93	U
Phenanthrene	UG/KG	3100	232.6	83%	6480	BENTHIC-CHRONIC	0	45	54	110	U	18	J	18	J	8	J
Pyrene	UG/KG	5400	336.3	85%	51894	BENTHIC-CHRONIC	0	46	54	110	U	28	J	29	J	11	J

TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12	SEAD-12	SEAD-12	SEAD-12
LOC_ID										SD12-16	SD12-17	SD12-18	SD12-19
MATRIX										SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT
SAMP_ID										12428	12432	12452	12440
DEPTH_TOP										0.3	0.2	0.2	0.2
DEPTH_BOT										0.5	0.4	0.4	0.4
SAMP_DATE										08-Nov-97	08-Nov-97	10-Nov-97	06-Nov-97
QC_CODE										SA	SA	SA	SA
STUDY_ID										RI Phase 1 Step 1	RI Phase 1 Step 1	RI Phase 1 Step 1	RI Phase 1 Step 1
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACC-UMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD	NUMBER OF DETECTS	NUMBER OF ANALYSES				
PESTICIDES/PCBS			8.8			NYSDEC HHB							
4,4'-DDD	UG/KG	110	8.7	11%	0.54	NYSDEC HHB	6	6	54	5.6 U	11 U	5.6 U	4.6 U
4,4'-DDE	UG/KG	76	9.4	19%	0.54	NYSDEC HHB	10	10	54	5.6 U	11 U	5.6 U	4.6 U
4,4'-DDT	UG/KG	200	2.6	13%	0.54		7	7	54	5.6 U	11 U	5.6 U	4.6 U
Alpha-Chlordane	UG/KG	3.2	74.0	4%		NYSDEC HHB	0	2	54	2.9 U	5.5 U	2.9 U	2.4 U
Aroclor-1254	UG/KG	1200	50.4	7%	0.0432	NYSDEC HHB	4	4	54	56 U	110 U	56 U	46 U
Aroclor-1260	UG/KG	37	2.6	4%	0.0432	NYSDEC HHB	2	2	54	56 U	110 U	56 U	46 U
Endosulfan I	UG/KG	3.6	5.1	4%	1.62	BENTHIC-CHRONIC	2	2	54	2.9 U	5.5 U	2.9 U	2.4 U
Endrin	UG/KG	5.6	5.1	2%	43.2		0	1	54	5.6 U	11 U	5.6 U	4.6 U
Endrin aldehyde	UG/KG	7.6	5.4	4%			0	2	54	5.6 U	11 U	5.6 U	4.6 U
Endrin ketone	UG/KG	22	2.9	4%		NYSDEC HHB	0	2	54	5.6 U	11 U	5.6 U	4.6 U
Heptachlor epoxide	UG/KG	11	12356.3	6%	0.0432		3	3	54	2.9 U	5.5 U	2.9 U	2.4 U
METALS			0.9										
Aluminum	MG/KG	38700	5.4	100%			0	54	54	15900	18300	11000	4690 J
Antimony	MG/KG	2.8	116.1	7%	2		1	4	54	0.88 UJ	2.2 UJ	0.94 UJ	0.7 UJ
Arsenic	MG/KG	19.1	0.4	96%	6		10	52	54	**12.3**	2.7	4.5	3
Barium	MG/KG	885	0.7	100%			0	54	54	410	172	61.6	35.9
Beryllium	MG/KG	1.7	63385.0	87%			0	47	54	0.03 U	0.81	0.49	0.25
Cadmium	MG/KG	9	22.9	28%	0.6		8	15	54	0.08 U	0.19 U	0.08 U	0.1 U
Calcium	MG/KG	280000	11.5	100%			0	54	54	6230	6600	84600	133000 J
Chromium	MG/KG	130	51.4	100%	26		9	54	54	24.4	21.2	17.9	7.5 J
Cobalt	MG/KG	75.3	0.9	80%			0	43	54	44.6	9.5	12.9	4.9
Copper	MG/KG	1160	25717.0	100%	16		49	54	54	**20.6**	**22.8**	**25**	12.2 J
Cyanide	MG/KG	2.6	26.5	4%			0	2	54	0.85 U	1.8 U	0.84 UJ	0.8 UJ
Iron	MG/KG	85900	10563.0	100%	20000		38	54	54	**53600**	**23900**	**20200**	8540 J
Lead	MG/KG	215	1079.8	85%	31		8	46	54	30.9	28.9	16.2 J	7 J
Magnesium	MG/KG	48100	0.1	100%			0	54	54	4910	3800	11700	12800 J
Manganese	MG/KG	14000	34.4	91%	460		25	49	54	**6700**	**844**	**530**	258 J
Mercury	MG/KG	1.7	1864.1	33%	0.15		7	18	54	0.08 U	**0.27**	0.08 U	0.06 U
Nickel	MG/KG	126	1.7	100%	16		51	54	54	**48**	**29.3**	**34.1**	14.6 J
Potassium	MG/KG	5500	0.4	100%			0	54	54	1750	2720 J	2030	1060
Selenium	MG/KG	6.2	204.1	46%			0	25	54	3.1 J	3 UJ	2.9	1.1 J
Silver	MG/KG	1.5	1.7	9%	1		1	5	54	0.53 J	1.3 U	0.56 U	0.27 U
Sodium	MG/KG	1550	23.8	48%			0	26	54	152 U	384 U	196	105 U
Thallium	MG/KG	4	239.1	11%			0	6	54	4	4 U	1.8	1.5 U

TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOC_ID										SD12-16		SD12-17		SD12-18		SD12-19	
MATRIX										SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
SAMP_ID										12428		12432		12452		12440	
DEPTH_TOP										0.3		0.2		0.2		0.2	
DEPTH_BOT										0.5		0.4		0.4		0.4	
SAMP_DATE										08-Nov-97		08-Nov-97		10-Nov-97		06-Nov-97	
QC_CODE										SA		SA		SA		SA	
STUDY_ID										RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACC-UMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD	NUMBER OF DETECTS	NUMBER OF ANALYSES								
Vanadium	MG/KG	70.3		100%			0	54	54	35.8		25.9		26.6		19.6	
Zinc	MG/KG	2650		91%	120		35	49	54	**169**		**137**		78.4		64.7	J

TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12	SEAD-12	SEAD-12	SEAD-12
LOC_ID										SD12-20A	SD12-22	SD12-23	SD12-24
MATRIX										SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT
SAMP_ID										12445	12424	12420	12419
DEPTH_TOP										0.3	0.5	0.15	0.2
DEPTH_BOT										0.5	0.7	0.3	0.4
SAMP_DATE										07-Nov-97	07-Nov-97	07-Nov-97	07-Nov-97
QC_CODE										SA	SA	SA	SA
STUDY_ID										RI Phase 1 Step 1	RI Phase 1 Step 1	RI Phase 1 Step 1	RI Phase 1 Step 1
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACC-UMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD.	NUMBER OF DETECTS	NUMBER OF ANALYSES				
VOLATILE ORGANICS													
1,1,1-Trichloroethane	UG/KG	3	15.4	2%			0	1	54	16 U	26 U	14 U	20 U
Acetone	UG/KG	95	23.2	37%			0	20	54	16 UJ	65 J	14 U	20 UJ
Methyl chloride	UG/KG	17	15.1	4%			0	2	54	16 U	26 U	14 U	20 U
Methyl ethyl ketone	UG/KG	11	15.6	2%			0	1	54	16 U	26 UJ	14 U	20 U
Tetrachloroethene	UG/KG	4	15.3	4%	43.2	NYSDEC HHB	0	2	54	16 U	26 U	14 U	20 U
Toluene	UG/KG	20	15.4	9%	2646	BENTHIC-CHRONIC	0	5	54	16 U	26 U	14 U	20 U
Trichloroethene	UG/KG	18	15.2	7%	108	NYSDEC HHB	0	4	54	16 U	26 U	14 U	20 U
2-Methylnaphthalene	UG/KG	36	106.4	22%			0	12	54	100 U	120 U	7.3 J	17 J
4-Chlorophenyl phenyl ether	UG/KG	6	130.8	2%			0	1	54	100 U	120 U	97 U	130 U
4-Methylphenol	UG/KG	150	126.4	9%			0	5	54	100 U	120 U	97 U	130 U
Acenaphthene	UG/KG	500	91.3	41%	7560	BENTHIC-CHRONIC	0	22	54	8.2 J	11 J	19 J	18 J
Acenaphthylene	UG/KG	15	126.4	6%			0	3	54	100 U	120 U	8 J	15 J
Anthracene	UG/KG	830	98.2	48%	5778	BENTHIC-CHRONIC	0	26	54	14 J	14 J	36 J	27 J
Benzo(a)anthracene	UG/KG	3100	205.9	72%	648	BENTHIC-CHRONIC	3	39	54	100 J	97 J	210	170
Benzo(a)pyrene	UG/KG	3300	213.6	76%	70.2	NYSDEC HHB	21	41	54	**120**	**120**	**260**	**200**
Benzo(b)fluoranthene	UG/KG	3200	240.7	81%	70.2	NYSDEC HHB	24	44	54	**120**	**170**	**430**	**410**
Benzo(ghi)perylene	UG/KG	2100	168.4	70%			0	38	54	110	89 J	170	220
Benzo(k)fluoranthene	UG/KG	2700	190.0	54%	70.2	NYSDEC HHB	15	29	54	**110**	**110** J	97 U	130 U
Bis(2-Ethylhexyl)phthalate	UG/KG	5000	220.9	13%	10800	BENTHIC-CHRONIC	0	7	54	100 U	130 U	97 U	130 U
Butylbenzylphthalate	UG/KG	42	117.7	17%			0	9	54	100 U	120 U	97 U	130 U
Carbazole	UG/KG	910	112.1	52%			0	28	54	20 J	37 J	60 J	68 J
Chrysene	UG/KG	3200	228.9	81%	70.2	NYSDEC HHB	23	44	54	**130**	**190**	**250**	**250**
Di-n-butylphthalate	UG/KG	53	103.4	28%			0	15	54	100 U	130 U	97 U	130 U
Di-n-octylphthalate	UG/KG	140	101.5	20%			0	11	54	100 U	120 U	97 U	130 U
Dibenz(a,h)anthracene	UG/KG	860	101.2	56%			0	30	54	29 J	31 J	75 J	93 J
Dibenzofuran	UG/KG	64	99.1	30%			0	16	54	100 U	120 U	7.4 J	8.4 J
Diethyl phthalate	UG/KG	23	120.0	13%			0	7	54	100 U	120 U	5.6 J	130 U
Fluoranthene	UG/KG	6200	391.1	87%	55080	BENTHIC-CHRONIC	0	47	54	200	280	420	340
Fluorene	UG/KG	340	89.0	37%	43.2	BENTHIC-CHRONIC	5	20	54	6.1 J	7.5 J	18 J	14 J
Hexachlorobenzene	UG/KG	6.2	130.8	2%	8.1	NYSDEC HHB	0	1	54	100 U	120 U	97 U	130 U
Indeno(1,2,3-cd)pyrene	UG/KG	2000	155.4	70%	70.2	NYSDEC HHB	18	38	54	**91** J	**82** J	**160**	**170**
Naphthalene	UG/KG	49	116.7	13%	1.62	BENTHIC-CHRONIC	7	7	54	100 U	120 U	97 U	130 U
Phenanthrene	UG/KG	3100	232.6	83%	6480	BENTHIC-CHRONIC	0	45	54	86 J	110 J	190	170
Pyrene	UG/KG	5400	336.3	85%	51894	BENTHIC-CHRONIC	0	46	54	180	230	340	310

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TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12	SEAD-12	SEAD-12	SEAD-12
LOC_ID										SD12-20A	SD12-22	SD12-23	SD12-24
MATRIX										SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT
SAMP_ID										12445	12424	12420	12419
DEPTH_TOP										0.3	0.5	0.15	0.2
DEPTH_BOT										0.5	0.7	0.3	0.4
SAMP_DATE										07-Nov-97	07-Nov-97	07-Nov-97	07-Nov-97
QC_CODE										SA	SA	SA	SA
STUDY_ID										RI Phase 1 Step 1	RI Phase 1 Step 1	RI Phase 1 Step 1	RI Phase 1 Step 1
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACC-UMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD	NUMBER OF DETECTS	NUMBER OF ANALYSES				
PESTICIDES/PCBS			8.8			NYSDEC HHB							
4,4'-DDD	UG/KG	110	8.7	11%	0.54	NYSDEC HHB	6	6	54	5.2 U	**11** J	**2.9** J	6.5 U
4,4'-DDE	UG/KG	76	9.4	19%	0.54	NYSDEC HHB	10	10	54	5.2 U	**55**	**3.2** J	**4.2** J
4,4'-DDT	UG/KG	200	2.6	13%	0.54		7	7	54	5.2 U	**9.6**	**3.4** J	6.5 U
Alpha-Chlordane	UG/KG	3.2	74.0	4%		NYSDEC HHB	0	2	54	2.7 U	2.6 J	2.5 U	3.3 U
Aroclor-1254	UG/KG	1200	50.4	7%	0.0432	NYSDEC HHB	4	4	54	52 U	59 U	48 U	65 U
Aroclor-1260	UG/KG	37	2.6	4%	0.0432	NYSDEC HHB	2	2	54	52 U	59 U	48 U	65 U
Endosulfan I	UG/KG	3.6	5.1	4%	1.62	BENTHIC-CHRONIC	2	2	54	2.7 U	3 U	2.5 U	3.3 U
Endrin	UG/KG	5.6	5.1	2%	43.2		0	1	54	5.2 U	5.9 U	4.8 U	6.5 U
Endrin aldehyde	UG/KG	7.6	5.4	4%			0	2	54	5.2 U	5.9 U	4.8 U	6.5 U
Endrin ketone	UG/KG	22	2.9	4%		NYSDEC HHB	0	2	54	5.2 U	5.9 U	6.5	6.5 U
Heptachlor epoxide	UG/KG	11	12356.3	6%	0.0432		3	3	54	2.7 U	**3.8**	2.5 U	3.3 U
METALS			0.9										
Aluminum	MG/KG	38700	5.4	100%			0	54	54	8660 J	12800	12800 J	15800 J
Antimony	MG/KG	2.8	116.1	7%	2		1	4	54	0.79 UJ	1.3 J	0.74 UJ	0.93 UJ
Arsenic	MG/KG	19.1	0.4	96%	6		10	52	54	4.6	3.8	5.6	**9.4**
Barium	MG/KG	885	0.7	100%			0	54	54	78.7	69.5	94.5	81.5
Beryllium	MG/KG	1.7	63385.0	87%			0	47	54	0.39	0.54	0.45	0.65
Cadmium	MG/KG	9	22.9	28%	0.6		8	15	54	0.12	0.08 U	0.1 U	0.13 U
Calcium	MG/KG	280000	11.5	100%			0	54	54	67500 J	7400	28600 J	65100 J
Chromium	MG/KG	130	51.4	100%	26		9	54	54	14 J	19.2	20.3 J	**27.3** J
Cobalt	MG/KG	75.3	0.9	80%			0	43	54	6.3	9.5	11.5	14.1
Copper	MG/KG	1160	25717.0	100%	16		49	54	54	**17.5** J	**24**	**29.4** J	**32.7** J
Cyanide	MG/KG	2.6	26.5	4%			0	2	54	0.91 UJ	1.1 U	0.8 UJ	1.1 UJ
Iron	MG/KG	85900	10563.0	100%	20000		38	54	54	14000 J	**21700**	**21700** J	**34700** J
Lead	MG/KG	215	1079.8	85%	31		8	46	54	20.4 J	23.9	17.6 J	27.6 J
Magnesium	MG/KG	48100	0.1	100%			0	54	54	8090 J	5090	6360 J	10500 J
Manganese	MG/KG	14000	34.4	91%	460		25	49	54	307 J	260	**587** J	443 J
Mercury	MG/KG	1.7	1864.1	33%	0.15		7	18	54	0.07 U	0.12	0.06 U	0.08 U
Nickel	MG/KG	126	1.7	100%	16		51	54	54	**21.2** J	**31.3**	**33.8** J	**48.9** J
Potassium	MG/KG	5500	0.4	100%			0	54	54	1880	2400 J	2000	2300
Selenium	MG/KG	6.2	204.1	46%			0	25	54	2.1 J	1.3 UJ	1.2 J	1.8 J
Silver	MG/KG	1.5	1.7	9%	1		1	5	54	0.3 U	0.56 U	0.28 U	0.35 U
Sodium	MG/KG	1550	23.8	48%			0	26	54	198	163 U	150	138 U
Thallium	MG/KG	4	239.1	11%			0	6	54	2	1.7 U	1.5 U	1.9 U

TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOC_ID										SD12-20A		SD12-22		SD12-23		SD12-24	
MATRIX										SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
SAMP_ID										12445		12424		12420		12419	
DEPTH_TOP										0.3		0.5		0.15		0.2	
DEPTH_BOT										0.5		0.7		0.3		0.4	
SAMP_DATE										07-Nov-97		07-Nov-97		07-Nov-97		07-Nov-97	
QC_CODE										SA		SA		SA		SA	
STUDY_ID										RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACC-UMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD.	NUMBER OF DETECTS	NUMBER OF ANALYSES								
Vanadium	MG/KG	70.3		100%			0	54	54	21.6		22.4		21.6		44.3	
Zinc	MG/KG	2650		91%	120		35	49	54	**138**	J	**188**		**135**	J	**142**	J

TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACCUMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD	NUMBER OF DETECTS	NUMBER OF ANALYSES				
FACILITY										SEAD-12	SEAD-12	SEAD-12	SEAD-12
LOC_ID										SD12-25	SD12-26	SD12-27	SD12-28
MATRIX										SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT
SAMP_ID										12401	12400	12423	12410
DEPTH_TOP										0.3	0.2	0.3	0.4
DEPTH_BOT										0.5	0.3	0.5	0.6
SAMP_DATE										27-Oct-97	27-Oct-97	07-Nov-97	29-Oct-97
QC_CODE										SA	SA	SA	DU
STUDY_ID										RI Phase 1 Step 1	RI Phase 1 Step 1	RI Phase 1 Step 1	RI Phase 1 Step 1
VOLATILE ORGANICS													
1,1,1-Trichloroethane	UG/KG	3	15.4	2%			0	1	54	25 U	17 U	21 U	24 U
Acetone	UG/KG	95	23.2	37%			0	20	54	30	41	15 J	24 U
Methyl chloride	UG/KG	17	15.1	4%			0	2	54	25 U	17 U	21 U	24 U
Methyl ethyl ketone	UG/KG	11	15.6	2%			0	1	54	25 U	17 U	21 UJ	24 U
Tetrachloroethene	UG/KG	4	15.3	4%	43.2	NYSDEC HHB	0	2	54	25 U	17 U	21 U	24 U
Toluene	UG/KG	20	15.4	9%	2646	BENTHIC-CHRONIC	0	5	54	25 U	17 U	21 U	24 U
Trichloroethene	UG/KG	18	15.2	7%	108	NYSDEC HHB	0	4	54	25 U	17 U	21 U	24 U
2-Methylnaphthalene	UG/KG	36	106.4	22%			0	12	54	16 J	120 U	130 U	10 J
4-Chlorophenyl phenyl ether	UG/KG	6	130.8	2%			0	1	54	240 U	120 U	130 U	150 U
4-Methylphenol	UG/KG	150	126.4	9%			0	5	54	240 U	22 J	130 U	150 U
Acenaphthene	UG/KG	500	91.3	41%	7560	BENTHIC-CHRONIC	0	22	54	140 J	120 U	61 J	31 J
Acenaphthylene	UG/KG	15	126.4	6%			0	3	54	240 U	120 U	130 U	150 U
Anthracene	UG/KG	830	98.2	48%	5778	BENTHIC-CHRONIC	0	26	54	160 J	120 U	61 J	45 J
Benzo(a)anthracene	UG/KG	3100	205.9	72%	648	BENTHIC-CHRONIC	3	39	54	**690**	36 J	340	220
Benzo(a)pyrene	UG/KG	3300	213.6	76%	70.2	NYSDEC HHB	21	41	54	**730**	46 J	**360**	**260**
Benzo(b)fluoranthene	UG/KG	3200	240.7	81%	70.2	NYSDEC HHB	24	44	54	**750**	55 J	**390**	**240**
Benzo(ghi)perylene	UG/KG	2100	168.4	70%			0	38	54	580	38 J	230	160
Benzo(k)fluoranthene	UG/KG	2700	190.0	54%	70.2	NYSDEC HHB	15	29	54	**600**	42 J	**340**	**260**
Bis(2-Ethylhexyl)phthalate	UG/KG	5000	220.9	13%	10800	BENTHIC-CHRONIC	0	7	54	240 U	120 U	130 U	150 U
Butylbenzylphthalate	UG/KG	42	117.7	17%			0	9	54	240 U	120 U	130 U	158 U
Carbazole	UG/KG	910	112.1	52%			0	28	54	330	20 J	140	120 J
Chrysene	UG/KG	3200	228.9	81%	70.2	NYSDEC HHB	23	44	54	**880**	57 J	**470**	**290**
Di-n-butylphthalate	UG/KG	53	103.4	28%			0	15	54	240 U	6.9 J	130 U	150 U
Di-n-octylphthalate	UG/KG	140	101.5	20%			0	11	54	240 U	120 U	130 U	11 J
Dibenz(a,h)anthracene	UG/KG	860	101.2	56%			0	30	54	220 J	14 J	74 J	52 J
Dibenzofuran	UG/KG	64	99.1	30%			0	16	54	54 J	120 U	23 J	17 J
Diethyl phthalate	UG/KG	23	120.0	13%			0	7	54	240 U	120 U	11 J	150 U
Fluoranthene	UG/KG	6200	391.1	87%	55080	BENTHIC-CHRONIC	0	47	54	1600	85 J	910	500
Fluorene	UG/KG	340	89.0	37%	43.2	BENTHIC-CHRONIC	5	20	54	**99** J	120 U	41 J	33 J
Hexachlorobenzene	UG/KG	6.2	130.8	2%	8.1	NYSDEC HHB	0	1	54	240 U	120 U	130 U	150 U
Indeno(1,2,3-cd)pyrene	UG/KG	2000	155.4	70%	70.2	NYSDEC HHB	18	38	54	**540**	33 J	**230**	**150** J
Naphthalene	UG/KG	49	116.7	13%	1.62	BENTHIC-CHRONIC	7	7	54	**28** J	120 U	130 U	**12** J
Phenanthrene	UG/KG	3100	232.6	83%	6480	BENTHIC-CHRONIC	0	45	54	1100	56 J	520	280
Pyrene	UG/KG	5400	336.3	85%	51894	BENTHIC-CHRONIC	0	46	54	1400	92 J	790	440

TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12	SEAD-12	SEAD-12	SEAD-12
LOC_ID										SD12-25	SD12-26	SD12-27	SD12-28
MATRIX										SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT
SAMP_ID										12401	12400	12423	12410
DEPTH_TOP										0.3	0.2	0.3	0.4
DEPTH_BOT										0.5	0.3	0.5	0.6
SAMP_DATE										27-Oct-97	27-Oct-97	07-Nov-97	29-Oct-97
QC_CODE										SA	SA	SA	DU
STUDY_ID										RI Phase 1 Step 1	RI Phase 1 Step 1	RI Phase 1 Step 1	RI Phase 1 Step 1
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACC-UMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD.	NUMBER OF DETECTS	NUMBER OF ANALYSES				
PESTICIDES/PCBS			8.8			NYSDEC HHB							
4,4'-DDD	UG/KG	110	8.7	11%	0.54	NYSDEC HHB	6	6	54	**74**	6.2 U	8.6 U	7.7 U
4,4'-DDE	UG/KG	76	9.4	19%	0.54	NYSDEC HHB	10	10	54	**30**	6.2 U	**46**	7.7 U
4,4'-DDT	UG/KG	200	2.6	13%	0.54		7	7	54	**15**	6.2 U	**13**	7.7 U
Alpha-Chlordane	UG/KG	3.2	74.0	4%		NYSDEC HHB	0	2	54	3.2 U	3.2 U	3.3 U	4 U
Aroclor-1254	UG/KG	1200	50.4	7%	0.0432	NYSDEC HHB	4	4	54	62 U	62 U	63 U	77 U
Aroclor-1260	UG/KG	37	2.6	4%	0.0432	NYSDEC HHB	2	2	54	62 U	62 U	63 U	77 U
Endosulfan I	UG/KG	3.6	5.1	4%	1.62	BENTHIC-CHRONIC	2	2	54	**3.6**	3.2 U	3.3 U	4 U
Endrin	UG/KG	5.6	5.1	2%	43.2		0	1	54	5.6 J	6.2 U	6.3 U	7.7 U
Endrin aldehyde	UG/KG	7.6	5.4	4%			0	2	54	7.6	6.2 U	6.3 U	7.7 U
Endrin ketone	UG/KG	22	2.9	4%		NYSDEC HHB	0	2	54	22	6.2 U	6.3 U	7.7 U
Heptachlor epoxide	UG/KG	11	12356.3	6%	0.0432		3	3	54	**6.4**	3.2 U	3.3 U	4 U
METALS			0.9										
Aluminum	MG/KG	38700	5.4	100%			0	54	54	15200 J	15400 J	12300	15100 J
Antimony	MG/KG	2.8	116.1	7%	2		1	4	54	0.83 UJ	0.86 UJ	1.1 UJ	1 UJ
Arsenic	MG/KG	19.1	0.4	96%	6		10	52	54	4.2	3.1	2.6	2.8
Barium	MG/KG	885	0.7	100%			0	54	54	109	104	91.7	127
Beryllium	MG/KG	1.7	63385.0	87%			0	47	54	0.1 U	0.1 U	0.5	0.63
Cadmium	MG/KG	9	22.9	28%	0.6		8	15	54	**2.9**	0.12 U	0.09 U	0.3
Calcium	MG/KG	280000	11.5	100%			0	54	54	7670 J	33900 J	57000	50200 J
Chromium	MG/KG	130	51.4	100%	26		9	54	54	**45.1** J	22.4 J	18.3	**28.4** J
Cobalt	MG/KG	75.3	0.9	80%			0	43	54	1.3 U	1.3 U	10.5	14.2
Copper	MG/KG	1160	25717.0	100%	16		49	54	54	**180** J	**19.1** J	**26.6**	**29.9** J
Cyanide	MG/KG	2.6	26.5	4%			0	2	54	0.94 UJ	0.94 UJ	1.2 U	1.2 UJ
Iron	MG/KG	85900	10563.0	100%	20000		38	54	54	**24200** J	**22400** J	20000	**23600** J
Lead	MG/KG	215	1079.8	85%	31		8	46	54	116 UJ	14.9 UJ	20	**32.9** J
Magnesium	MG/KG	48100	0.1	100%			0	54	54	5260 J	4950 J	7350	8090 J
Manganese	MG/KG	14000	34.4	91%	460		25	49	54	321 UJ	404 UJ	424	412 J
Mercury	MG/KG	1.7	1864.1	33%	0.15		7	18	54	**0.62**	**0.16**	0.1 U	**0.17**
Nickel	MG/KG	126	1.7	100%	16		51	54	54	**33.8** J	**32.2** J	**30**	**41.1** J
Potassium	MG/KG	5500	0.4	100%			0	54	54	2030	2050	1970 J	1970
Selenium	MG/KG	6.2	204.1	46%			0	25	54	1.8 J	1.2 UJ	1.5 UJ	1.6 J
Silver	MG/KG	1.5	1.7	9%	1		1	5	54	1	0.33 U	0.66 U	0.38 U
Sodium	MG/KG	1550	23.8	48%			0	26	54	157 U	128 U	190 U	182 J
Thallium	MG/KG	4	239.1	11%			0	6	54	1.9	1.8 U	2 U	2.1 U

TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOC_ID										SD12-25		SD12-26		SD12-27		SD12-28	
MATRIX										SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
SAMP_ID										12401		12400		12423		12410	
DEPTH_TOP										0.3		0.2		0.3		0.4	
DEPTH_BOT										0.5		0.3		0.5		0.6	
SAMP_DATE										27-Oct-97		27-Oct-97		07-Nov-97		29-Oct-97	
QC_CODE										SA		SA		SA		DU	
STUDY_ID										RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACC-UMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD.	NUMBER OF DETECTS	NUMBER OF ANALYSES								
Vanadium	MG/KG	70.3		100%			0	54	54	27.1		24		20.7		29.8	
Zinc	MG/KG	2650		91%	120		35	49	54	547	UJ	95.3	UJ	113		145	J

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TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOC_ID										SD12-28		SD12-29		SD12-30		SD12-31	
MATRIX										SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
SAMP_ID										12409		12463		12408		12407	
DEPTH_TOP										0.4		0.5		0.5		0.3	
DEPTH_BOT										0.6		0.7		0.7		0.5	
SAMP_DATE										29-Oct-97		04-Dec-97		28-Oct-97		28-Oct-97	
QC_CODE										SA		SA		SA		SA	
STUDY_ID										RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACC-UMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD	NUMBER OF DETECTS	NUMBER OF ANALYSES								
VOLATILE ORGANICS																	
1,1,1-Trichloroethane	UG/KG	3	15.4	2%			0	1	54	24	U	18	U	17	U	48	U
Acetone	UG/KG	95	23.2	37%			0	20	54	24	U	40	J	17	U	95	
Methyl chloride	UG/KG	17	15.1	4%			0	2	54	24	U	18	U	17	U	17	J
Methyl ethyl ketone	UG/KG	11	15.6	2%			0	1	54	24	U	18	UJ	17	U	48	U
Tetrachloroethene	UG/KG	4	15.3	4%	43.2	NYSDEC HHB	0	2	54	24	U	18	U	17	U	48	U
Toluene	UG/KG	20	15.4	9%	2646	BENTHIC-CHRONIC	0	5	54	24	U	18	U	17	U	48	U
Trichloroethene	UG/KG	18	15.2	7%	108	NYSDEC HHB	0	4	54	24	U	18	U	2	J	48	U
2-Methylnaphthalene	UG/KG	36	106.4	22%			0	12	54	9.4	J	36	J	5.3	J	6.2	J
4-Chlorophenyl phenyl ether	UG/KG	6	130.8	2%			0	1	54	170	U	210	U	89	U	80	U
4-Methylphenol	UG/KG	150	126.4	9%			0	5	54	170	U	210	U	89	U	80	U
Acenaphthene	UG/KG	500	91.3	41%	7560	BENTHIC-CHRONIC	0	22	54	25	J	100	J	7.2	J	21	J
Acenaphthylene	UG/KG	15	126.4	6%			0	3	54	170	U	210	U	89	U	80	U
Anthracene	UG/KG	830	98.2	48%	5778	BENTHIC-CHRONIC	0	26	54	42	J	170	J	7.7	J	27	J
Benzo(a)anthracene	UG/KG	3100	205.9	72%	648	BENTHIC-CHRONIC	3	39	54	200		**670**		30	J	73	J
Benzo(a)pyrene	UG/KG	3300	213.6	76%	70.2	NYSDEC HHB	21	41	54	**240**		**520**		38	J	**74**	J
Benzo(b)fluoranthene	UG/KG	3200	240.7	81%	70.2	NYSDEC HHB	24	44	54	**220**		**700**		42	J	68	J
Benzo(ghi)perylene	UG/KG	2100	168.4	70%			0	38	54	160	J	350		40	J	52	J
Benzo(k)fluoranthene	UG/KG	2700	190.0	54%	70.2	NYSDEC HHB	15	29	54	**240**		**340**		39	J	59	J
Bis(2-Ethylhexyl)phthalate	UG/KG	5000	220.9	13%	10800	BENTHIC-CHRONIC	0	7	54	170	U	46	J	89	U	80	U
Butylbenzylphthalate	UG/KG	42	117.7	17%			0	9	54	170	U	36	J	89	U	80	U
Carbazole	UG/KG	910	112.1	52%			0	28	54	100	J	200	J	89	U	37	J
Chrysene	UG/KG	3200	228.9	81%	70.2	NYSDEC HHB	23	44	54	**270**		**730**		44	J	**84**	
Di-n-butylphthalate	UG/KG	53	103.4	28%			0	15	54	9.8	J	22	J	89	U	80	U
Di-n-octylphthalate	UG/KG	140	101.5	20%			0	11	54	13	J	210	U	20	J	6.4	J
Dibenz(a,h)anthracene	UG/KG	860	101.2	56%			0	30	54	54	J	140	J	12	J	15	J
Dibenzofuran	UG/KG	64	99.1	30%			0	16	54	15	J	64	J	89	U	10	J
Diethyl phthalate	UG/KG	23	120.0	13%			0	7	54	170	U	210	U	89	U	80	U
Fluoranthene	UG/KG	6200	391.1	87%	55080	BENTHIC-CHRONIC	0	47	54	440		1500		77	J	160	
Fluorene	UG/KG	340	89.0	37%	43.2	BENTHIC-CHRONIC	5	20	54	26	J	**110**	J	89	U	18	J
Hexachlorobenzene	UG/KG	6.2	130.8	2%	8.1	NYSDEC HHB	0	1	54	170	U	210	U	89	U	80	U
Indeno(1,2,3-cd)pyrene	UG/KG	2000	155.4	70%	70.2	NYSDEC HHB	18	38	54	**150**	J	**300**		28	J	50	J
Naphthalene	UG/KG	49	116.7	13%	1.62	BENTHIC-CHRONIC	7	7	54	**8.9**	J	**49**	J	89	U	**7**	J
Phenanthrene	UG/KG	3100	232.6	83%	6480	BENTHIC-CHRONIC	0	45	54	250		1000		54	J	120	
Pyrene	UG/KG	5400	336.3	85%	51894	BENTHIC-CHRONIC	0	46	54	410		1100		65	J	140	

TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOC_ID										SD12-28		SD12-29		SD12-30		SD12-31	
MATRIX										SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
SAMP_ID										12409		12463		12408		12407	
DEPTH_TOP										0.4		0.5		0.5		0.3	
DEPTH_BOT										0.6		0.7		0.7		0.5	
SAMP_DATE										29-Oct-97		04-Dec-97		28-Oct-97		28-Oct-97	
QC_CODE										SA		SA		SA		SA	
STUDY_ID										RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACC-UMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD.	NUMBER OF DETECTS	NUMBER OF ANALYSES								
PESTICIDES/PCBS			8.8			NYSDEC HHB											
4,4'-DDD	UG/KG	110	8.7	11%	0.54	NYSDEC HHB	6	6	54	8.7	U	11	U	**14**		**3.3**	J
4,4'-DDE	UG/KG	76	9.4	19%	0.54	NYSDEC HHB	10	10	54	8.7	U	11	U	**3.2**	J	4	U
4,4'-DDT	UG/KG	200	2.6	13%	0.54		7	7	54	8.7	U	11	U	**3.3**	J	4	U
Alpha-Chlordane	UG/KG	3.2	74.0	4%		NYSDEC HHB	0	2	54	4.5	U	5.5	U	2.3	U	2	U
Aroclor-1254	UG/KG	1200	50.4	7%	0.0432	NYSDEC HHB	4	4	54	87	U	110	U	44	U	40	U
Aroclor-1260	UG/KG	37	2.6	4%	0.0432	NYSDEC HHB	2	2	54	87	U	110	U	44	U	40	U
Endosulfan I	UG/KG	3.6	5.1	4%	1.62	BENTHIC-CHRONIC	2	2	54	4.5	U	5.5	U	2.3	U	2	U
Endrin	UG/KG	5.6	5.1	2%	43.2		0	1	54	8.7	U	11	U	4.4	U	4	U
Endrin aldehyde	UG/KG	7.6	5.4	4%			0	2	54	8.7	U	11	U	4.4	U	4	U
Endrin ketone	UG/KG	22	2.9	4%		NYSDEC HHB	0	2	54	8.7	U	11	U	4.4	U	4	U
Heptachlor epoxide	UG/KG	11	12356.3	6%	0.0432		3	3	54	4.5	U	5.5	U	2.3	U	2	U
METALS			0.9														
Aluminum	MG/KG	38700	5.4	100%			0	54	54	8800	J	20000		8100	J	1670	J
Antimony	MG/KG	2.8	116.1	7%	2		1	4	54	1.1	UJ	2.1	UJ	0.66	UJ	0.61	UJ
Arsenic	MG/KG	19.1	0.4	96%	6		10	52	54	2.5		**8.6**		4.8		0.53	U
Barium	MG/KG	885	0.7	100%			0	54	54	77.3		98.7	J	32.9		13.3	
Beryllium	MG/KG	1.7	63385.0	87%			0	47	54	0.41		0.85	J	0.31		0.1	
Cadmium	MG/KG	9	22.9	28%	0.6		8	15	54	0.16	U	0.18	U	**5.9**		0.17	
Calcium	MG/KG	280000	11.5	100%			0	54	54	31900	J	59200		107000	J	6180	J
Chromium	MG/KG	130	51.4	100%	26		9	54	54	16.5	J	**36.7**		17.3	J	3.4	J
Cobalt	MG/KG	75.3	0.9	80%			0	43	54	1.3	U	19.3	J	1.3	U	1.3	U
Copper	MG/KG	1160	25717.0	100%	16		49	54	54	**20.7**	J	**42.5**		**25.1**	J	4.3	J
Cyanide	MG/KG	2.6	26.5	4%			0	2	54	1.4	UJ	2	UJ	0.68	UJ	0.64	UJ
Iron	MG/KG	85900	10563.0	100%	20000		38	54	54	14300	J	**39900**		16300	J	2690	J
Lead	MG/KG	215	1079.8	85%	31		8	46	54	19.7	J	15.9	J	22.5	J	3.8	J
Magnesium	MG/KG	48100	0.1	100%			0	54	54	5270	J	10900		48100	J	814	J
Manganese	MG/KG	14000	34.4	91%	460		25	49	54	272	J	**574**		290	J	43.2	J
Mercury	MG/KG	1.7	1864.1	33%	0.15		7	18	54	0.12		0.11	UJ	0.14		0.05	U
Nickel	MG/KG	126	1.7	100%	16		51	54	54	**24.3**	J	**56.8**		**19.6**	J	4.3	J
Potassium	MG/KG	5500	0.4	100%			0	54	54	1290		2390	J	1210		349	
Selenium	MG/KG	6.2	204.1	46%			0	25	54	1.6	UJ	2.8	U	0.9	UJ	0.85	UJ
Silver	MG/KG	1.5	1.7	9%	1		1	5	54	0.43	U	**1.5**	J	0.25	U	0.23	U
Sodium	MG/KG	1550	23.8	48%			0	26	54	168	U	635	J	334		91.9	
Thallium	MG/KG	4	239.1	11%			0	6	54	2.3	U	3.7	UJ	1.4	U	1.3	U

TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOC_ID										SD12-28		SD12-29		SD12-30		SD12-31	
MATRIX										SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
SAMP_ID										12409		12463		12408		12407	
DEPTH_TOP										0.4		0.5		0.5		0.3	
DEPTH_BOT										0.6		0.7		0.7		0.5	
SAMP_DATE										29-Oct-97		04-Dec-97		28-Oct-97		28-Oct-97	
QC_CODE										SA		SA		SA		SA	
STUDY_ID										RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACC-UMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD	NUMBER OF DETECTS	NUMBER OF ANALYSES								
Vanadium	MG/KG	70.3		100%			0	54	54	17.5		30.8		15.1		2.8	
Zinc	MG/KG	2650		91%	120		35	49	54	87.8	J	**155**	J	**659**	J	18.9	J

p:\pit\projects\seneca\s12ri\draft\report\tables\s12sed.xls

TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12	SEAD-12	RI Phase	RI Phase
LOC_ID										SD12-32	SD12-33	67356	67356
MATRIX										SEDIMENT	SEDIMENT	SD12-34	SD12-34
SAMP_ID										12406	12405	12202	12418
DEPTH_TOP										0.2	0.3	DU	SA
DEPTH_BOT										0.4	0.5	0.6	0.6
SAMP_DATE										28-Oct-97	28-Oct-97	00-Jan-00	00-Jan-00
QC_CODE										SA	SA	SEDIMEN	SEDIMEN
STUDY_ID										RI Phase 1 Step 1	RI Phase 1 Step 1	8-Nov-97	8-Nov-97
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACCUMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD	NUMBER OF DETECTS	NUMBER OF ANALYSES				
VOLATILE ORGANICS													
1,1,1-Trichloroethane	UG/KG	3	15.4	2%			0	1	54	3 J	14 U	19 U	16 U
Acetone	UG/KG	95	23.2	37%			0	20	54	22 U	32	19 U	16 U
Methyl chloride	UG/KG	17	15.1	4%			0	2	54	22 U	14 U	19 U	16 U
Methyl ethyl ketone	UG/KG	11	15.6	2%			0	1	54	22 U	14 U	19 U	16 U
Tetrachloroethene	UG/KG	4	15.3	4%	43.2	NYSDEC HHB	0	2	54	4 J	14 U	19 U	16 U
Toluene	UG/KG	20	15.4	9%	2646	BENTHIC-CHRONIC	0	5	54	22 U	14 U	19 U	16 U
Trichloroethene	UG/KG	18	15.2	7%	108	NYSDEC HHB	0	4	54	18 J	2 J	19 U	16 U
2-Methylnaphthalene	UG/KG	36	106.4	22%			0	12	54	870 U	110 U	110 U	120 U
4-Chlorophenyl phenyl ether	UG/KG	6	130.8	2%			0	1	54	870 U	110 U	110 U	120 U
4-Methylphenol	UG/KG	150	126.4	9%			0	5	54	870 U	8.4 J	110 U	120 U
Acenaphthene	UG/KG	500	91.3	41%	7560	BENTHIC-CHRONIC	0	22	54	500 J	110 U	110 U	120 U
Acenaphthylene	UG/KG	15	126.4	6%			0	3	54	870 U	110 U	110 U	120 U
Anthracene	UG/KG	830	98.2	48%	5778	BENTHIC-CHRONIC	0	26	54	830 J	110 U	110 U	120 U
Benzo(a)anthracene	UG/KG	3100	205.9	72%	648	BENTHIC-CHRONIC	3	39	54	**3100**	18 J	44 J	32 J
Benzo(a)pyrene	UG/KG	3300	213.6	76%	70.2	NYSDEC HHB	21	41	54	**3300**	23 J	57 J	41 J
Benzo(b)fluoranthene	UG/KG	3200	240.7	81%	70.2	NYSDEC HHB	24	44	54	**3200**	26 J	**73** J	**78** J
Benzo(ghi)perylene	UG/KG	2100	168.4	70%			0	38	54	2100	22 J	60 J	50 J
Benzo(k)fluoranthene	UG/KG	2700	190.0	54%	70.2	NYSDEC HHB	15	29	54	**2700**	21 J	46 J	120 U
Bis(2-Ethylhexyl)phthalate	UG/KG	5000	220.9	13%	10800	BENTHIC-CHRONIC	0	7	54	5000	110 U	76 J	120 U
Butylbenzylphthalate	UG/KG	42	117.7	17%			0	9	54	870 U	110 U	11 J	120 U
Carbazole	UG/KG	910	112.1	52%			0	28	54	910	110 U	11 J	7.8 J
Chrysene	UG/KG	3200	228.9	81%	70.2	NYSDEC HHB	23	44	54	**3200**	30 J	**71** J	55 J
Di-n-butylphthalate	UG/KG	53	103.4	28%			0	15	54	870 U	10 J	9.5 J	120 U
Di-n-octylphthalate	UG/KG	140	101.5	20%			0	11	54	140 J	7.2 J	110 U	120 U
Dibenz(a,h)anthracene	UG/KG	860	101.2	56%			0	30	54	860 J	110 U	15 J	19 J
Dibenzofuran	UG/KG	64	99.1	30%			0	16	54	870 U	110 U	110 U	120 U
Diethyl phthalate	UG/KG	23	120.0	13%			0	7	54	870 U	110 U	20 J	120 U
Fluoranthene	UG/KG	6200	391.1	87%	55080	BENTHIC-CHRONIC	0	47	54	6200	40 J	93 J	71 J
Fluorene	UG/KG	340	89.0	37%	43.2	BENTHIC-CHRONIC	5	20	54	**340** J	110 U	110 U	120 U
Hexachlorobenzene	UG/KG	6.2	130.8	2%	8.1	NYSDEC HHB	0	1	54	870 U	110 U	110 U	120 U
Indeno(1,2,3-cd)pyrene	UG/KG	2000	155.4	70%	70.2	NYSDEC HHB	18	38	54	**2000**	20 J	40 J	34 J
Naphthalene	UG/KG	49	116.7	13%	1.62	BENTHIC-CHRONIC	7	7	54	870 U	110 U	110 U	120 U
Phenanthrene	UG/KG	3100	232.6	83%	6480	BENTHIC-CHRONIC	0	45	54	3100	22 J	48 J	32 J
Pyrene	UG/KG	5400	336.3	85%	51894	BENTHIC-CHRONIC	0	46	54	5400	37 J	93 J	62 J

TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12		SEAD-12		RI Phase		RI Phase	
LOC_ID										SD12-32		SD12-33		67356		67356	
MATRIX										SEDIMENT		SEDIMENT		SD12-34		SD12-34	
SAMP_ID										12406		12405		12202		12418	
DEPTH_TOP										0.2		0.3		DU		SA	
DEPTH_BOT										0.4		0.5		0.6		0.6	
SAMP_DATE										28-Oct-97		28-Oct-97		00-Jan-00		00-Jan-00	
QC_CODE										SA		SA		SEDIMEN		SEDIMEN	
STUDY_ID										RI Phase 1 Step 1		RI Phase 1 Step 1		8-Nov-97		8-Nov-97	
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACC-UMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD	NUMBER OF DETECTS	NUMBER OF ANALYSES								
PESTICIDES/PCBS			8.8			NYSDEC HHB											
4,4'-DDD	UG/KG	110	8.7	11%	0.54	NYSDEC HHB	6	6	54	17	U	5.5	U	5.4	U	6.2	U
4,4'-DDE	UG/KG	76	9.4	19%	0.54	NYSDEC HHB	10	10	54	17	U	5.5	U	5.4	U	6.2	U
4,4'-DDT	UG/KG	200	2.6	13%	0.54		7	7	54	17	U	5.5	U	5.4	U	6.2	U
Alpha-Chlordane	UG/KG	3.2	74.0	4%		NYSDEC HHB	0	2	54	8.9	U	2.8	U	2.8	U	3.2	U
Aroclor-1254	UG/KG	1200	50.4	7%	0.0432	NYSDEC HHB	4	4	54	**150**	J	55	U	54	U	62	U
Aroclor-1260	UG/KG	37	2.6	4%	0.0432	NYSDEC HHB	2	2	54	170	U	55	U	54	U	**32**	J
Endosulfan I	UG/KG	3.6	5.1	4%	1.62	BENTHIC-CHRONIC	2	2	54	8.9	U	2.8	U	2.8	U	3.2	U
Endrin	UG/KG	5.6	5.1	2%	43.2		0	1	54	17	U	5.5	U	5.4	U	6.2	U
Endrin aldehyde	UG/KG	7.6	5.4	4%			0	2	54	17	U	5.5	U	5.4	U	6.2	U
Endrin ketone	UG/KG	22	2.9	4%		NYSDEC HHB	0	2	54	17	U	5.5	U	5.4	U	6.2	U
Heptachlor epoxide	UG/KG	11	12356.3	6%	0.0432		3	3	54	8.9	U	2.8	U	2.8	U	3.2	U
METALS			0.9														
Aluminum	MG/KG	38700	5.4	100%			0	54	54	38700	J	12600	J	9670		13000	
Antimony	MG/KG	2.8	116.1	7%	2		1	4	54	**2.8**		0.76	UJ	0.78	UJ	1.2	UJ
Arsenic	MG/KG	19.1	0.4	96%	6		10	52	54	**19.1**		4.8		3.4		5.3	
Barium	MG/KG	885	0.7	100%			0	54	54	303		77.4		45.1		58.8	
Beryllium	MG/KG	1.7	63385.0	87%			0	47	54	1.7		0.56		0.45		0.55	
Cadmium	MG/KG	9	22.9	28%	0.6		8	15	54	**9**		0.11	U	0.07	U	0.11	U
Calcium	MG/KG	280000	11.5	100%			0	54	54	199000	J	74700	J	78800		81300	
Chromium	MG/KG	130	51.4	100%	26		9	54	54	**130**	J	25.5	J	17.3		22.9	
Cobalt	MG/KG	75.3	0.9	80%			0	43	54	1.3	U	1.3	U	8.8		12.3	
Copper	MG/KG	1160	25717.0	100%	16		49	54	54	**1160**	J	3	J	**35.3**		**42.8**	
Cyanide	MG/KG	2.6	26.5	4%			0	2	54	3	UJ	0.93	UJ	0.98	U	1.1	U
Iron	MG/KG	85900	10563.0	100%	20000		38	54	54	**85900**	J	**24300**	J	19300		**28300**	
Lead	MG/KG	215	1079.8	85%	31		8	46	54	**215**	J	20.7	J	20.7		26.4	
Magnesium	MG/KG	48100	0.1	100%			0	54	54	35300	J	10700	J	12600		13300	
Manganese	MG/KG	14000	34.4	91%	460		25	49	54	**1300**	J	385	J	261		**487**	
Mercury	MG/KG	1.7	1864.1	33%	0.15		7	18	54	**1.7**		0.08		0.06	U	0.08	U
Nickel	MG/KG	126	1.7	100%	16		51	54	54	**126**	J	**40.8**	J	**29.2**		**40.6**	
Potassium	MG/KG	5500	0.4	100%			0	54	54	5500		1970		1890	J	2380	J
Selenium	MG/KG	6.2	204.1	46%			0	25	54	3.8	UJ	2.1	J	1.1	UJ	1.7	UJ
Silver	MG/KG	1.5	1.7	9%	1		1	5	54	1	U	0.29	U	0.47	U	0.74	U
Sodium	MG/KG	1550	23.8	48%			0	26	54	1550		304		158		215	U
Thallium	MG/KG	4	239.1	11%			0	6	54	5.7	U	1.6	U	1.4	U	2.2	U

TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12	SEAD-12	RI Phase	RI Phase
LOC_ID										SD12-32	SD12-33	67356	67356
MATRIX										SEDIMENT	SEDIMENT	SD12-34	SD12-34
SAMP_ID										12406	12405	12202	12418
DEPTH_TOP										0.2	0.3	DU	SA
DEPTH_BOT										0.4	0.5	0.6	0.6
SAMP_DATE										28-Oct-97	28-Oct-97	00-Jan-00	00-Jan-00
QC_CODE										SA	SA	SEDIMEN	SEDIMEN
STUDY_ID										RI Phase 1 Step 1	RI Phase 1 Step 1	8-Nov-97	8-Nov-97
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACC-UMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD	NUMBER OF DETECTS	NUMBER OF ANALYSES				
Vanadium	MG/KG	70.3		100%			0	54	54	70.3	22.4	21.8	25.5
Zinc	MG/KG	2650		91%	120		35	49	54	**2650** J	**380** J	**144**	**157**

TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12	SEAD-12	SEAD-12	SEAD-12
LOC_ID										SD12-35	SD12-36	SD12-36	SD12-37
MATRIX										SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT
SAMP_ID										12433	12431	12430	12429
DEPTH_TOP										0.2	0.4	0.4	0.2
DEPTH_BOT										0.4	0.6	0.6	0.4
SAMP_DATE										08-Nov-97	09-Nov-97	09-Nov-97	08-Nov-97
QC_CODE										SA	DU	SA	SA
STUDY_ID										RI Phase 1 Step 1	RI Phase 1 Step 1	RI Phase 1 Step 1	RI Phase 1 Step 1
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACC-UMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD	NUMBER OF DETECTS	NUMBER OF ANALYSES				
VOLATILE ORGANICS													
1,1,1-Trichloroethane	UG/KG	3	15.4	2%			0	1	54	45 U	13 U	16 U	16 U
Acetone	UG/KG	95	23.2	37%			0	20	54	53	13 U	16 U	16 U
Methyl chloride	UG/KG	17	15.1	4%			0	2	54	45 U	13 U	16 U	16 U
Methyl ethyl ketone	UG/KG	11	15.6	2%			0	1	54	45 U	13 U	16 U	16 U
Tetrachloroethene	UG/KG	4	15.3	4%	43.2	NYSDEC HHB	0	2	54	45 U	13 UJ	16 UJ	16 U
Toluene	UG/KG	20	15.4	9%	2646	BENTHIC-CHRONIC	0	5	54	45 U	13 U	16 U	16 U
Trichloroethene	UG/KG	18	15.2	7%	108	NYSDEC HHB	0	4	54	45 U	13 U	16 U	4 J
2-Methylnaphthalene	UG/KG	36	106.4	22%			0	12	54	220 U	96 U	100 U	16 U
4-Chlorophenyl phenyl ether	UG/KG	6	130.8	2%			0	1	54	220 U	96 U	100 U	87 U
4-Methylphenol	UG/KG	150	126.4	9%			0	5	54	220 U	96 U	100 U	87 U
Acenaphthene	UG/KG	500	91.3	41%	7560	BENTHIC-CHRONIC	0	22	54	220 U	96 U	100 U	87 U
Acenaphthylene	UG/KG	15	126.4	6%			0	3	54	220 U	96 U	100 U	87 U
Anthracene	UG/KG	830	98.2	48%	5778	BENTHIC-CHRONIC	0	26	54	220 U	96 U	100 U	87 U
Benzo(a)anthracene	UG/KG	3100	205.9	72%	648	BENTHIC-CHRONIC	3	39	54	220 U	96 U	6.3 J	87 U
Benzo(a)pyrene	UG/KG	3300	213.6	76%	70.2	NYSDEC HHB	21	41	54	16 J	96 U	8.9 J	8.1 J
Benzo(b)fluoranthene	UG/KG	3200	240.7	81%	70.2	NYSDEC HHB	24	44	54	22 J	15 J	12 J	8.2 J
Benzo(ghi)perylene	UG/KG	2100	168.4	70%			0	38	54	20 J	96 U	100 U	87 U
Benzo(k)fluoranthene	UG/KG	2700	190.0	54%	70.2	NYSDEC HHB	15	29	54	18 J	96 U	9.2 J	87 U
Bis(2-Ethylhexyl)phthalate	UG/KG	5000	220.9	13%	10800	BENTHIC-CHRONIC	0	7	54	220 U	96 U	100 U	87 U
Butylbenzylphthalate	UG/KG	42	117.7	17%			0	9	54	220 U	96 U	100 U	87 U
Carbazole	UG/KG	910	112.1	52%			0	28	54	220 U	96 U	100 U	87 U
Chrysene	UG/KG	3200	228.9	81%	70.2	NYSDEC HHB	23	44	54	22 J	15 J	15 J	7.6 J
Di-n-butylphthalate	UG/KG	53	103.4	28%			0	15	54	220 U	96 U	100 U	87 U
Di-n-octylphthalate	UG/KG	140	101.5	20%			0	11	54	220 U	96 U	100 U	87 U
Dibenz(a,h)anthracene	UG/KG	860	101.2	56%			0	30	54	220 U	96 U	100 U	87 U
Dibenzofuran	UG/KG	64	99.1	30%			0	16	54	220 U	96 U	100 U	87 U
Diethyl phthalate	UG/KG	23	120.0	13%			0	7	54	23 J	96 U	100 U	87 U
Fluoranthene	UG/KG	6200	391.1	87%	55080	BENTHIC-CHRONIC	0	47	54	37 J	16 J	16 J	7 J
Fluorene	UG/KG	340	89.0	37%	43.2	BENTHIC-CHRONIC	5	20	54	220 U	96 U	100 U	87 U
Hexachlorobenzene	UG/KG	6.2	130.8	2%	8.1	NYSDEC HHB	0	1	54	220 U	96 U	100 U	87 U
Indeno(1,2,3-cd)pyrene	UG/KG	2000	155.4	70%	70.2	NYSDEC HHB	18	38	54	16 J	96 U	100 U	87 U
Naphthalene	UG/KG	49	116.7	13%	1.62	BENTHIC-CHRONIC	7	7	54	220 U	96 U	100 U	87 U
Phenanthrene	UG/KG	3100	232.6	83%	6480	BENTHIC-CHRONIC	0	45	54	24 J	10 J	11 J	6.5 J
Pyrene	UG/KG	5400	336.3	85%	51894	BENTHIC-CHRONIC	0	46	54	34 J	14 J	16 J	7 J

TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12	SEAD-12	SEAD-12	SEAD-12
LOC_ID										SD12-35	SD12-36	SD12-36	SD12-37
MATRIX										SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT
SAMP_ID										12433	12431	12430	12429
DEPTH_TOP										0.2	0.4	0.4	0.2
DEPTH_BOT										0.4	0.6	0.6	0.4
SAMP_DATE										08-Nov-97	09-Nov-97	09-Nov-97	08-Nov-97
QC_CODE										SA	DU	SA	SA
STUDY_ID										RI Phase 1 Step 1	RI Phase 1 Step 1	RI Phase 1 Step 1	RI Phase 1 Step 1
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACCUMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD	NUMBER OF DETECTS	NUMBER OF ANALYSES				
PESTICIDES/PCBS			8.8			NYSDEC HHB							
4,4'-DDD	UG/KG	110	8.7	11%	0.54	NYSDEC HHB	6	6	54	11 U	4.8 U	5 U	4.3 U
4,4'-DDE	UG/KG	76	9.4	19%	0.54	NYSDEC HHB	10	10	54	11 U	4.8 U	5 U	4.3 U
4,4'-DDT	UG/KG	200	2.6	13%	0.54		7	7	54	11 U	4.8 U	5 U	4.3 U
Alpha Chlordane	UG/KG	3.2	74.0	4%		NYSDEC HHB	0	2	54	5.7 U	2.5 U	2.6 U	2.2 U
Aroclor-1254	UG/KG	1200	50.4	7%	0.0432	NYSDEC HHB	4	4	54	110 U	48 U	50 U	43 U
Aroclor-1260	UG/KG	37	2.6	4%	0.0432	NYSDEC HHB	2	2	54	110 U	48 U	50 U	43 U
Endosulfan I	UG/KG	3.6	5.1	4%	1.62	BENTHIC-CHRONIC	2	2	54	5.7 U	2.5 U	2.6 U	2.2 U
Endrin	UG/KG	5.6	5.1	2%	43.2		0	1	54	11 U	4.8 U	5 U	4.3 U
Endrin aldehyde	UG/KG	7.6	5.4	4%			0	2	54	11 U	4.8 U	5 U	4.3 U
Endrin ketone	UG/KG	22	2.9	4%		NYSDEC HHB	0	2	54	11 U	4.8 U	5 U	4.3 U
Heptachlor epoxide	UG/KG	11	12356.3	6%	0.0432		3	3	54	5.7 U	2.5 U	2.6 U	2.2 U
METALS			0.9										
Aluminum	MG/KG	38700	5.4	100%			0	54	54	15800	9350	9010	9050
Antimony	MG/KG	2.8	116.1	7%	2		1	4	54	1.8 UJ	0.99 UJ	1 UJ	0.77 UJ
Arsenic	MG/KG	19.1	0.4	96%	6		10	52	54	1.9 U	4.8	2.2	4
Barium	MG/KG	885	0.7	100%			0	54	54	129	50.8	57	46.3
Beryllium	MG/KG	1.7	63385.0	87%			0	47	54	0.7	0.41 J	0.37 J	0.26
Cadmium	MG/KG	9	22.9	28%	0.6		8	15	54	0.17	0.08 U	0.09 U	0.07 U
Calcium	MG/KG	280000	11.5	100%			0	54	54	5100	198000	36700	108000
Chromium	MG/KG	130	51.4	100%	26		9	54	54	18.8	17.9	16.1	16.5
Cobalt	MG/KG	75.3	0.9	80%			0	43	54	12.1	10.7	9.2	9.5
Copper	MG/KG	1160	25717.0	100%	16		49	54	54	**21.7**	**28.7**	**32.8**	**20**
Cyanide	MG/KG	2.6	26.5	4%			0	2	54	2 U	0.87 U	0.86 U	0.82 U
Iron	MG/KG	85900	10563.0	100%	20000		38	54	54	**20100**	**24100**	17900	**22600**
Lead	MG/KG	215	1079.8	85%	31		8	46	54	28.9	16.2	17.7	14.2
Magnesium	MG/KG	48100	0.1	100%			0	54	54	3040	12600	6170	22500
Manganese	MG/KG	14000	34.4	91%	460		25	49	54	**753**	**486**	422	**633**
Mercury	MG/KG	1.7	1864.1	33%	0.15		7	18	54	0.13 U	0.07 U	0.07 U	0.06 U
Nickel	MG/KG	126	1.7	100%	16		51	54	54	**25.7**	**33**	**28.9**	**28.1**
Potassium	MG/KG	5500	0.4	100%			0	54	54	2750 J	1280 J	1280 J	1410 J
Selenium	MG/KG	6.2	204.1	46%			0	25	54	2.4 UJ	1.3 U	1.4 U	1 UJ
Silver	MG/KG	1.5	1.7	9%	1		1	5	54	1.1 U	0.59 U	0.62 U	0.46 U
Sodium	MG/KG	1550	23.8	48%			0	26	54	316 U	171 U	180 U	134 U
Thallium	MG/KG	4	239.1	11%			0	6	54	3.3 U	1.8 U	1.9 U	1.4 U

TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOC_ID										SD12-35		SD12-36		SD12-36		SD12-37	
MATRIX										SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
SAMP_ID										12433		12431		12430		12429	
DEPTH_TOP										0.2		0.4		0.4		0.2	
DEPTH_BOT										0.4		0.6		0.6		0.4	
SAMP_DATE										08-Nov-97		09-Nov-97		09-Nov-97		08-Nov-97	
QC_CODE										SA		DU		SA		SA	
STUDY_ID										RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACC-UMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD.	NUMBER OF DETECTS	NUMBER OF ANALYSES								
Vanadium	MG/KG	70.3		100%			0	54	54	23.2		17.6		15.3		16.5	
Zinc	MG/KG	2650		91%	120		35	49	54	92.5		**190**	J	**238**	J	**147**	

p:\pit\projects\seneca\s12ri\draft\report\tables\s12sed.xls

TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOC_ID										SD12-38		SD12-39		SD12-40		SD12-41	
MATRIX										SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
SAMP_ID										12427		12426		12404		12403	
DEPTH_TOP										0.4		0.5		0.4		0.3	
DEPTH_BOT										0.6		0.7		0.6		0.5	
SAMP_DATE										08-Nov-97		07-Nov-97		28-Oct-97		28-Oct-97	
QC_CODE										SA		SA		SA		SA	
STUDY_ID										RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACC-UMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD	NUMBER OF DETECTS	NUMBER OF ANALYSES								
VOLATILE ORGANICS																	
1,1,1-Trichloroethane	UG/KG	3	15.4	2%			0	1	54	17	U	18	U	17	U	17	U
Acetone	UG/KG	95	23.2	37%			0	20	54	17	U	18	UJ	48		17	U
Methyl chloride	UG/KG	17	15.1	4%			0	2	54	17	U	18	U	17	U	17	U
Methyl ethyl ketone	UG/KG	11	15.6	2%			0	1	54	17	U	18	U	11	J	17	U
Tetrachloroethene	UG/KG	4	15.3	4%	43.2	NYSDEC HHB	0	2	54	17	U	18	U	17	U	17	U
Toluene	UG/KG	20	15.4	9%	2646	BENTHIC-CHRONIC	0	5	54	17	U	18	U	20		17	U
Trichloroethene	UG/KG	18	15.2	7%	108	NYSDEC HHB	0	4	54	17	U	18	U	17	U	17	U
2-Methylnaphthalene	UG/KG	36	106.4	22%			0	12	54	130	U	140	U	11	J	14	J
4-Chlorophenyl phenyl ether	UG/KG	6	130.8	2%			0	1	54	130	U	140	U	120	U	120	U
4-Methylphenol	UG/KG	150	126.4	9%			0	5	54	130	U	140	U	150		24	J
Acenaphthene	UG/KG	500	91.3	41%	7560	BENTHIC-CHRONIC	0	22	54	130	U	49	J	7.9	J	24	J
Acenaphthylene	UG/KG	15	126.4	6%			0	3	54	130	U	140	U	120	U	120	U
Anthracene	UG/KG	830	98.2	48%	5778	BENTHIC-CHRONIC	0	26	54	130	U	50	J	9.5	J	43	J
Benzo(a)anthracene	UG/KG	3100	205.9	72%	648	BENTHIC-CHRONIC	3	39	54	130	U	200		43	J	150	
Benzo(a)pyrene	UG/KG	3300	213.6	76%	70.2	NYSDEC HHB	21	41	54	130	U	**200**		49	J	**180**	
Benzo(b)fluoranthene	UG/KG	3200	240.7	81%	70.2	NYSDEC HHB	24	44	54	130	U	**370**		48	J	**200**	
Benzo(ghi)perylene	UG/KG	2100	168.4	70%			0	38	54	130	U	160		41	J	120	
Benzo(k)fluoranthene	UG/KG	2700	190.0	54%	70.2	NYSDEC HHB	15	29	54	130	U	140	U	43	J	**140**	
Bis(2-Ethylhexyl)phthalate	UG/KG	5000	220.9	13%	10800	BENTHIC-CHRONIC	0	7	54	130	U	57	J	120	U	120	U
Butylbenzylphthalate	UG/KG	42	117.7	17%			0	9	54	130	U	140	U	42	J	40	J
Carbazole	UG/KG	910	112.1	52%			0	28	54	130	U	100	J	17	J	22	J
Chrysene	UG/KG	3200	228.9	81%	70.2	NYSDEC HHB	23	44	54	130	U	**260**		56	J	**180**	
Di-n-butylphthalate	UG/KG	53	103.4	28%			0	15	54	130	U	11	J	7.9	J	6.8	J
Di-n-octylphthalate	UG/KG	140	101.5	20%			0	11	54	130	U	140	U	12	J	120	U
Dibenz(a,h)anthracene	UG/KG	860	101.2	56%			0	30	54	130	U	73	J	15	J	50	J
Dibenzofuran	UG/KG	64	99.1	30%			0	16	54	130	U	20	J	120	U	14	J
Diethyl phthalate	UG/KG	23	120.0	13%			0	7	54	130	U	140	U	120	U	120	U
Fluoranthene	UG/KG	6200	391.1	87%	55080	BENTHIC-CHRONIC	0	47	54	130	U	460		76	J	270	
Fluorene	UG/KG	340	89.0	37%	43.2	BENTHIC-CHRONIC	5	20	54	130	U	32	J	120	U	26	J
Hexachlorobenzene	UG/KG	6.2	130.8	2%	8.1	NYSDEC HHB	0	1	54	130	U	140	U	120	U	120	U
Indeno(1,2,3-cd)pyrene	UG/KG	2000	155.4	70%	70.2	NYSDEC HHB	18	38	54	130	U	**140**	J	34	J	**110**	J
Naphthalene	UG/KG	49	116.7	13%	1.62	BENTHIC-CHRONIC	7	7	54	130	U	140	U	120	U	120	U
Phenanthrene	UG/KG	3100	232.6	83%	6480	BENTHIC-CHRONIC	0	45	54	130	U	330		60	J	120	
Pyrene	UG/KG	5400	336.3	85%	51894	BENTHIC-CHRONIC	0	46	54	130	U	380		97	J	280	

TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12	SEAD-12	SEAD-12	SEAD-12
LOC_ID										SD12-38	SD12-39	SD12-40	SD12-41
MATRIX										SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT
SAMP_ID										12427	12426	12404	12403
DEPTH_TOP										0.4	0.5	0.4	0.3
DEPTH_BOT										0.6	0.7	0.6	0.5
SAMP_DATE										08-Nov-97	07-Nov-97	28-Oct-97	28-Oct-97
QC_CODE										SA	SA	SA	SA
STUDY_ID										RI Phase 1 Step 1	RI Phase 1 Step 1	RI Phase 1 Step 1	RI Phase 1 Step 1
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACC-UMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD	NUMBER OF DETECTS	NUMBER OF ANALYSES				
PESTICIDES/PCBS			8.8			NYSDEC HHB							
4,4'-DDD	UG/KG	110	8.7	11%	0.54	NYSDEC HHB	6	6	54	6.5 U	7.2 U	5.9 U	5.8 U
4,4'-DDE	UG/KG	76	9.4	19%	0.54	NYSDEC HHB	10	10	54	6.5 U	7.2 U	5.9 U	5.8 U
4,4'-DDT	UG/KG	200	2.6	13%	0.54		7	7	54	6.5 U	7.2 U	5.9 U	5.8 U
Alpha-Chlordane	UG/KG	3.2	74.0	4%		NYSDEC HHB	0	2	54	3.3 U	3.7 U	3 U	3 U
Aroclor-1254	UG/KG	1200	50.4	7%	0.0432	NYSDEC HHB	4	4	54	65 U	72 U	59 U	**72**
Aroclor-1260	UG/KG	37	2.6	4%	0.0432	NYSDEC HHB	2	2	54	65 U	72 U	59 U	58 U
Endosulfan I	UG/KG	3.6	5.1	4%	1.62	BENTHIC-CHRONIC	2	2	54	3.3 U	**2** J	3 U	3 U
Endrin	UG/KG	5.6	5.1	2%	43.2		0	1	54	6.5 U	7.2 U	5.9 U	5.8 U
Endrin aldehyde	UG/KG	7.6	5.4	4%			0	2	54	6.5 U	7.2 U	5.9 U	7.6
Endrin ketone	UG/KG	22	2.9	4%		NYSDEC HHB	0	2	54	6.5 U	7.2 U	5.9 U	5.8 U
Heptachlor epoxide	UG/KG	11	12356.3	6%	0.0432		3	3	54	3.3 U	3.7 U	3 U	3 U
METALS			0.9										
Aluminum	MG/KG	38700	5.4	100%			0	54	54	13100	15000 J	12400 J	11200 J
Antimony	MG/KG	2.8	116.1	7%	2		1	4	54	1.2 UJ	1 UJ	0.91 UJ	0.88 UJ
Arsenic	MG/KG	19.1	0.4	96%	6		10	52	54	5.8	6	4.9	3.5
Barium	MG/KG	885	0.7	100%			0	54	54	91.1	105	72.6	82.7
Beryllium	MG/KG	1.7	63385.0	87%			0	47	54	0.52	0.59	0.52	0.1 U
Cadmium	MG/KG	9	22.9	28%	0.6		8	15	54	0.1 U	0.14 U	0.13 U	0.58
Calcium	MG/KG	280000	11.5	100%			0	54	54	74300	16000 J	17000 J	46400 J
Chromium	MG/KG	130	51.4	100%	26		9	54	54	20.3	23.4 J	21.1 J	18.4 J
Cobalt	MG/KG	75.3	0.9	80%			0	43	54	12.1	12.4	1.3 U	1.3 U
Copper	MG/KG	1160	25717.0	100%	16		49	54	54	**23.4**	**27.9** J	**28.6** J	**27.6** J
Cyanide	MG/KG	2.6	26.5	4%			0	2	54	1.2 U	1.2 UJ	0.89 UJ	0.9 UJ
Iron	MG/KG	85900	10563.0	100%	20000		38	54	54	**27900**	**25600** J	**24200** J	17000 J
Lead	MG/KG	215	1079.8	85%	31		8	46	54	20.5	22.7 J	20 J	27.3 UJ
Magnesium	MG/KG	48100	0.1	100%			0	54	54	8150	6220 J	5550 J	7020 J
Manganese	MG/KG	14000	34.4	91%	460		25	49	54	**617**	**613** J	422 J	249 UJ
Mercury	MG/KG	1.7	1864.1	33%	0.15		7	18	54	0.08 U	0.09 U	0.11	0.1 U
Nickel	MG/KG	126	1.7	100%	16		51	54	54	**31.4**	**37.3** J	**37.3** J	**29.3** J
Potassium	MG/KG	5500	0.4	100%			0	54	54	2050 J	2450	1860	2270
Selenium	MG/KG	6.2	204.1	46%			0	25	54	1.6 UJ	2.1 J	1.3 UJ	2 J
Silver	MG/KG	1.5	1.7	9%	1		1	5	54	0.73 U	0.38 U	0.35 U	0.33 U
Sodium	MG/KG	1550	23.8	48%			0	26	54	214	150 U	140	186 U
Thallium	MG/KG	4	239.1	11%			0	6	54	2.2 U	2.1 U	1.9 U	1.8 U

TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOC_ID										SD12-38		SD12-39		SD12-40		SD12-41	
MATRIX										SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
SAMP_ID										12427		12426		12404		12403	
DEPTH_TOP										0.4		0.5		0.4		0.3	
DEPTH_BOT										0.6		0.7		0.6		0.5	
SAMP_DATE										08-Nov-97		07-Nov-97		28-Oct-97		28-Oct-97	
QC_CODE										SA		SA		SA		SA	
STUDY_ID										RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACC-UMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD	NUMBER OF DETECTS	NUMBER OF ANALYSES								
Vanadium	MG/KG	70.3		100%			0	54	54	23.6		28.2		21.3		22.6	
Zinc	MG/KG	2650		91%	120		35	49	54	**278**		**192**	J	**242**	J	232	UJ

TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOC_ID										SD12-42		SD12-43		SD12-44		SD12-45	
MATRIX										SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
SAMP_ID										12444		12451		12464		12450	
DEPTH_TOP										0.3		0.1		0.3		0.2	
DEPTH_BOT										0.5		0.3		0.5		0.4	
SAMP_DATE										07-Nov-97		09-Nov-97		05-Dec-97		09-Nov-97	
QC_CODE										SA		SA		SA		SA	
STUDY_ID										RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACC-UMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD	NUMBER OF DETECTS	NUMBER OF ANALYSES								
VOLATILE ORGANICS																	
1,1,1-Trichloroethane	UG/KG	3	15.4	2%			0	1	54	16	U	16	U	11	U	18	U
Acetone	UG/KG	95	23.2	37%			0	20	54	16	UJ	16	U	19	J	6	J
Methyl chloride	UG/KG	17	15.1	4%			0	2	54	16	U	16	U	11	U	18	U
Methyl ethyl ketone	UG/KG	11	15.6	2%			0	1	54	16	U	16	U	11	UJ	18	U
Tetrachloroethene	UG/KG	4	15.3	4%	43.2	NYSDEC HHB	0	2	54	16	U	16	U	11	U	18	U
Toluene	UG/KG	20	15.4	9%	2646	BENTHIC-CHRONIC	0	5	54	16	U	16	U	5	J	18	U
Trichloroethene	UG/KG	18	15.2	7%	108	NYSDEC HHB	0	4	54	16	U	16	U	11	U	18	U
2-Methylnaphthalene	UG/KG	36	106.4	22%			0	12	54	100	U	12	J	82	U	130	U
4-Chlorophenyl phenyl ether	UG/KG	6	130.8	2%			0	1	54	100	U	100	U	82	U	130	U
4-Methylphenol	UG/KG	150	126.4	9%			0	5	54	100	U	100	U	82	U	130	U
Acenaphthene	UG/KG	500	91.3	41%	7560	BENTHIC-CHRONIC	0	22	54	73	J	80	J	45	J	36	J
Acenaphthylene	UG/KG	15	126.4	6%			0	3	54	100	U	100	U	82	U	130	U
Anthracene	UG/KG	830	98.2	48%	5778	BENTHIC-CHRONIC	0	26	54	97	J	93	J	66	J	45	J
Benzo(a)anthracene	UG/KG	3100	205.9	72%	648	BENTHIC-CHRONIC	3	39	54	350		270		220		280	
Benzo(a)pyrene	UG/KG	3300	213.6	76%	70.2	NYSDEC HHB	21	41	54	**340**		**270**		**210**		**320**	
Benzo(b)fluoranthene	UG/KG	3200	240.7	81%	70.2	NYSDEC HHB	24	44	54	**350**		**290**		**360**		**400**	
Benzo(ghi)perylene	UG/KG	2100	168.4	70%			0	38	54	220		180		120		220	
Benzo(k)fluoranthene	UG/KG	2700	190.0	54%	70.2	NYSDEC HHB	15	29	54	**350**		**230**		82	U	**230**	
Bis(2-Ethylhexyl)phthalate	UG/KG	5000	220.9	13%	10800	BENTHIC-CHRONIC	0	7	54	100	U	100	U	200	J	540	
Butylbenzylphthalate	UG/KG	42	117.7	17%			0	9	54	100	U	100	U	27	J	35	J
Carbazole	UG/KG	910	112.1	52%			0	28	54	160		170		73	J	91	J
Chrysene	UG/KG	3200	228.9	81%	70.2	NYSDEC HHB	23	44	54	**400**		**330**		**240**		**380**	
Di-n-butylphthalate	UG/KG	53	103.4	28%			0	15	54	100	U	21	J	12	J	15	J
Di-n-octylphthalate	UG/KG	140	101.5	20%			0	11	54	100	U	100	U	13	J	29	J
Dibenz(a,h)anthracene	UG/KG	860	101.2	56%			0	30	54	110		48	J	57	J	67	J
Dibenzofuran	UG/KG	64	99.1	30%			0	16	54	23	J	34	J	20	J	13	J
Diethyl phthalate	UG/KG	23	120.0	13%			0	7	54	100	U	100	U	82	U	130	U
Fluoranthene	UG/KG	6200	391.1	87%	55080	BENTHIC-CHRONIC	0	47	54	800		680		590		650	
Fluorene	UG/KG	340	89.0	37%	43.2	BENTHIC-CHRONIC	5	20	54	**52**	J	**53**	J	36	J	22	J
Hexachlorobenzene	UG/KG	6.2	130.8	2%	8.1	NYSDEC HHB	0	1	54	100	U	100	U	82	U	130	U
Indeno(1,2,3-cd)pyrene	UG/KG	2000	155.4	70%	70.2	NYSDEC HHB	18	38	54	**200**		**160**		**110**		**200**	
Naphthalene	UG/KG	49	116.7	13%	1.62	BENTHIC-CHRONIC	7	7	54	100	U	**18**	J	**14**	J	130	U
Phenanthrene	UG/KG	3100	232.6	83%	6480	BENTHIC-CHRONIC	0	45	54	520		560		400		310	
Pyrene	UG/KG	5400	336.3	85%	51894	BENTHIC-CHRONIC	0	46	54	620		550		390		590	

TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12	SEAD-12	SEAD-12	SEAD-12
LOC_ID										SD12-42	SD12-43	SD12-44	SD12-45
MATRIX										SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT
SAMP_ID										12444	12451	12464	12450
DEPTH_TOP										0.3	0.1	0.3	0.2
DEPTH_BOT										0.5	0.3	0.5	0.4
SAMP_DATE										07-Nov-97	09-Nov-97	05-Dec-97	09-Nov-97
QC_CODE										SA	SA	SA	SA
STUDY_ID										RI Phase 1 Step 1	RI Phase 1 Step 1	RI Phase 1 Step 1	RI Phase 1 Step 1
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACCUMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD.	NUMBER OF DETECTS	NUMBER OF ANALYSES				
PESTICIDES/PCBS			8.8			NYSDEC HHB							
4,4'-DDD	UG/KG	110	8.7	11%	0.54	NYSDEC HHB	6	6	54	5.1 U	5.2 U	4.1 U	**110** J
4,4'-DDE	UG/KG	76	9.4	19%	0.54	NYSDEC HHB	10	10	54	5.1 U	5.2 U	**6**	**76**
4,4'-DDT	UG/KG	200	2.6	13%	0.54		7	7	54	5.1 U	5.2 U	**9.3**	**200** J
Alpha-Chlordane	UG/KG	3.2	74.0	4%		NYSDEC HHB	0	2	54	2.6 U	2.6 U	2.1 U	3.2 J
Aroclor-1254	UG/KG	1200	50.4	7%	0.0432	NYSDEC HHB	4	4	54	51 U	52 U	41 U	**1200**
Aroclor-1260	UG/KG	37	2.6	4%	0.0432	NYSDEC HHB	2	2	54	51 U	52 U	**37** J	53 U
Endosulfan I	UG/KG	3.6	5.1	4%	1.62	BENTHIC-CHRONIC	2	2	54	2.6 U	2.6 U	2.1 U	2.7 U
Endrin	UG/KG	5.6	5.1	2%	43.2		0	1	54	5.1 U	5.2 U	4.1 U	6.7 R
Endrin aldehyde	UG/KG	7.6	5.4	4%			0	2	54	5.1 U	5.2 U	4.1 U	5.3 U
Endrin ketone	UG/KG	22	2.9	4%		NYSDEC HHB	0	2	54	5.1 U	5.2 U	4.1 U	5.3 U
Heptachlor epoxide	UG/KG	11	12356.3	6%	0.0432		3	3	54	2.6 U	2.6 U	2.1 U	**11** J
METALS			0.9										
Aluminum	MG/KG	38700	5.4	100%			0	54	54	7680 J	10200	1200	10300
Antimony	MG/KG	2.8	116.1	7%	2		1	4	54	0.82 UJ	0.91 UJ	0.79 UJ	0.9 UJ
Arsenic	MG/KG	19.1	0.4	96%	6		10	52	54	5.3	4.7	2.9	5.2
Barium	MG/KG	885	0.7	100%			0	54	54	69.4	70.1	15.4 J	78.9
Beryllium	MG/KG	1.7	63385.0	87%			0	47	54	0.31	0.39	0.12 J	0.41
Cadm..um	MG/KG	9	22.9	28%	0.6		8	15	54	0.15	0.08 U	0.12 J	0.08 U
Calcium	MG/KG	280000	11.5	100%			0	54	54	43500 J	77900	280000	84200
Chromium	MG/KG	130	51.4	100%	26		9	54	54	**56.7** J	15.8	3.3	17.8
Cobalt	MG/KG	75.3	0.9	80%			0	43	54	9.1	8.7	2.4 J	9.4
Copper	MG/KG	1160	25717.0	100%	16		49	54	54	**87.8** J	**24.7**	8.6	**29.8**
Cyanide	MG/KG	2.6	26.5	4%			0	2	54	0.91 UJ	0.93 UJ	2.6 J	0.85 UJ
Iron	MG/KG	85900	10563.0	100%	20000		38	54	54	18500 J	18500	3720 J	19700
Lead	MG/KG	215	1079.8	85%	31		8	46	54	**32.9** J	21.3 J	4.5 J	**35.1** J
Magnesium	MG/KG	48100	0.1	100%			0	54	54	10800 J	14300	7490	13500
Manganese	MG/KG	14000	34.4	91%	460		25	49	54	368 J	**462**	204	**480**
Mercury	MG/KG	1.7	1864.1	33%	0.15		7	18	54	**0.74**	0.06 U	0.05 UJ	0.06 U
Nickel	MG/KG	126	1.7	100%	16		51	54	54	**48.7** J	**25.2**	6.4 J	**27.5**
Potassium	MG/KG	5500	0.4	100%			0	54	54	1580	2250	409 J	2070
Selenium	MG/KG	6.2	204.1	46%			0	25	54	0.9 UJ	2.4	1.1 U	2.3
Silver	MG/KG	1.5	1.7	9%	1		1	5	54	0.25 U	0.54 U	0.74 J	0.54 U
Sodium	MG/KG	1550	23.8	48%			0	26	54	110	227	324 J	348
Thallium	MG/KG	4	239.1	11%			0	6	54	1.4 U	1.6 U	1.4 UJ	1.6 U

TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOC_ID										SD12-42		SD12-43		SD12-44		SD12-45	
MATRIX										SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
SAMP_ID										12444		12451		12464		12450	
DEPTH_TOP										0.3		0.1		0.3		0.2	
DEPTH_BOT										0.5		0.3		0.5		0.4	
SAMP_DATE										07-Nov-97		09-Nov-97		05-Dec-97		09-Nov-97	
QC_CODE										SA		SA		SA		SA	
STUDY_ID										RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACC-UMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD.	NUMBER OF DETECTS	NUMBER OF ANALYSES								
Vanadium	MG/KG	70.3		100%			0	54	54	16.6		20.4		5	J	24.9	
Zinc	MG/KG	2650		91%	120		35	49	54	**451**	J	67.3		24.9	J	**292**	

TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12		SEAD-12	
LOC_ID										SD12-46		SD12-47	
MATRIX										SEDIMENT		SEDIMENT	
SAMP_ID										12443		12446	
DEPTH_TOP										0.15		0.2	
DEPTH_BOT										0.3		0.4	
SAMP_DATE										06-Nov-97		07-Nov-97	
QC_CODE										SA		SA	
STUDY_ID										RI Phase 1 Step 1		RI Phase 1 Step 1	
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACC-UMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD	NUMBER OF DETECTS	NUMBER OF ANALYSES				
VOLATILE ORGANICS													
1,1,1-Trichloroethane	UG/KG	3	15.4	2%			0	1	54	18	U	18	U
Acetone	UG/KG	95	23.2	37%			0	20	54	18	UJ	18	UJ
Methyl chloride	UG/KG	17	15.1	4%			0	2	54	18	U	18	U
Methyl ethyl ketone	UG/KG	11	15.6	2%			0	1	54	18	U	18	U
Tetrachloroethene	UG/KG	4	15.3	4%	43.2	NYSDEC HHB	0	2	54	18	U	18	U
Toluene	UG/KG	20	15.4	9%	2646	BENTHIC-CHRONIC	0	5	54	18	U	18	U
Trichloroethene	UG/KG	18	15.2	7%	108	NYSDEC HHB	0	4	54	18	U	18	U
2-Methylnaphthalene	UG/KG	36	106.4	22%			0	12	54	100	U	130	U
4-Chlorophenyl phenyl ether	UG/KG	6	130.8	2%			0	1	54	100	U	130	U
4-Methylphenol	UG/KG	150	126.4	9%			0	5	54	100	U	130	U
Acenaphthene	UG/KG	500	91.3	41%	7560	BENTHIC-CHRONIC	0	22	54	30	J	130	U
Acenaphthylene	UG/KG	15	126.4	6%			0	3	54	100	U	130	U
Anthracene	UG/KG	830	98.2	48%	5778	BENTHIC-CHRONIC	0	26	54	38	J	13	J
Benzo(a)anthracene	UG/KG	3100	205.9	72%	648	BENTHIC-CHRONIC	3	39	54	110		76	J
Benzo(a)pyrene	UG/KG	3300	213.6	76%	70.2	NYSDEC HHB	21	41	54	**120**		**110**	J
Benzo(b)fluoranthene	UG/KG	3200	240.7	81%	70.2	NYSDEC HHB	24	44	54	**210**		**180**	
Benzo(ghi)perylene	UG/KG	2100	168.4	70%			0	38	54	90	J	80	J
Benzo(k)fluoranthene	UG/KG	2700	190.0	54%	70.2	NYSDEC HHB	15	29	54	100	U	130	U
Bis(2-Ethylhexyl)phthalate	UG/KG	5000	220.9	13%	10800	BENTHIC-CHRONIC	0	7	54	100	U	130	U
Butylbenzylphthalate	UG/KG	42	117.7	17%			0	9	54	100	U	130	U
Carbazole	UG/KG	910	112.1	52%			0	28	54	60	J	24	J
Chrysene	UG/KG	3200	228.9	81%	70.2	NYSDEC HHB	23	44	54	**130**		**110**	J
Di-n-butylphthalate	UG/KG	53	103.4	28%			0	15	54	100	U	130	U
Di-n-octylphthalate	UG/KG	140	101.5	20%			0	11	54	100	U	130	U
Dibenz(a,h)anthracene	UG/KG	860	101.2	56%			0	30	54	43	J	34	J
Dibenzofuran	UG/KG	64	99.1	30%			0	16	54	9.2	J	130	U
Diethyl phthalate	UG/KG	23	120.0	13%			0	7	54	100	U	130	U
Fluoranthene	UG/KG	6200	391.1	87%	55080	BENTHIC-CHRONIC	0	47	54	250		170	
Fluorene	UG/KG	340	89.0	37%	43.2	BENTHIC-CHRONIC	5	20	54	18	J	130	U
Hexachlorobenzene	UG/KG	6.2	130.8	2%	8.1	NYSDEC HHB	0	1	54	100	U	130	U
Indeno(1,2,3-cd)pyrene	UG/KG	2000	155.4	70%	70.2	NYSDEC HHB	18	38	54	**73**	J	60	J
Naphthalene	UG/KG	49	116.7	13%	1.62	BENTHIC-CHRONIC	7	7	54	100	U	130	U
Phenanthrene	UG/KG	3100	232.6	83%	6480	BENTHIC-CHRONIC	0	45	54	170		71	J
Pyrene	UG/KG	5400	336.3	85%	51894	BENTHIC-CHRONIC	0	46	54	210		140	

TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12		SEAD-12	
LOC_ID										SD12-46		SD12-47	
MATRIX										SEDIMENT		SEDIMENT	
SAMP_ID										12443		12446	
DEPTH_TOP										0.15		0.2	
DEPTH_BOT										0.3		0.4	
SAMP_DATE										06-Nov-97		07-Nov-97	
QC_CODE										SA		SA	
STUDY_ID										RI Phase 1	Step 1	RI Phase 1	Step 1
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACC-UMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD	NUMBER OF DETECTS	NUMBER OF ANALYSES				
PESTICIDES/PCBS			8.8			NYSDEC HHB							
4,4'-DDD	UG/KG	110	8.7	11%	0.54	NYSDEC HHB	6	6	54	5	U	6.6	U
4,4'-DDE	UG/KG	76	9.4	19%	0.54	NYSDEC HHB	10	10	54	5	U	6.6	U
4,4'-DDT	UG/KG	200	2.6	13%	0.54		7	7	54	5	U	6.6	U
Alpha-Chlordane	UG/KG	3.2	74.0	4%		NYSDEC HHB	0	2	54	2.6	U	3.4	U
Aroclor-1254	UG/KG	1200	50.4	7%	0.0432	NYSDEC HHB	4	4	54	50	U	66	U
Aroclor-1260	UG/KG	37	2.6	4%	0.0432	NYSDEC HHB	2	2	54	50	U	66	U
Endosulfan I	UG/KG	3.6	5.1	4%	1.62	BENTHIC-CHRONIC	2	2	54	2.6	U	3.4	U
Endrin	UG/KG	5.6	5.1	2%	43.2		0	1	54	5	U	6.6	U
Endrin aldehyde	UG/KG	7.6	5.4	4%			0	2	54	5	U	6.6	U
Endrin ketone	UG/KG	22	2.9	4%		NYSDEC HHB	0	2	54	5	U	6.6	U
Heptachlor epoxide	UG/KG	11	12356.3	6%	0.0432		3	3	54	2.6	U	3.4	U
METALS			0.9										
Aluminum	MG/KG	38700	5.4	100%			0	54	54	13000	J	20100	J
Antimony	MG/KG	2.8	116.1	7%	2		1	4	54	0.79	UJ	0.99	UJ
Arsenic	MG/KG	19.1	0.4	96%	6		10	52	54	4.6		**8.6**	
Barium	MG/KG	885	0.7	100%			0	54	54	101		221	
Beryllium	MG/KG	1.7	63385.0	87%			0	47	54	0.6		0.18	
Cadmium	MG/KG	9	22.9	28%	0.6		8	15	54	0.11	U	0.14	U
Calcium	MG/KG	280000	11.5	100%			0	54	54	42800	J	82000	J
Chromium	MG/KG	130	51.4	100%	26		9	54	54	20.3	J	**37.7**	J
Cobalt	MG/KG	75.3	0.9	80%			0	43	54	11		17.7	
Copper	MG/KG	1160	25717.0	100%	16		49	54	54	**26.4**	J	**53.4**	J
Cyanide	MG/KG	2.6	26.5	4%			0	2	54	0.83	UJ	1.1	UJ
Iron	MG/KG	85900	10563.0	100%	20000		38	54	54	**21800**	J	**36000**	J
Lead	MG/KG	215	1079.8	85%	31		8	46	54	17.9	J	**38.1**	J
Magnesium	MG/KG	48100	0.1	100%			0	54	54	9270	J	14200	J
Manganese	MG/KG	14000	34.4	91%	460		25	49	54	348	J	**2730**	J
Mercury	MG/KG	1.7	1864.1	33%	0.15		7	18	54	0.11		0.08	U
Nickel	MG/KG	126	1.7	100%	16		51	54	54	**32.4**	J	**52.3**	J
Potassium	MG/KG	5500	0.4	100%			0	54	54	2350		4080	
Selenium	MG/KG	6.2	204.1	46%			0	25	54	1.6	J	1.4	UJ
Silver	MG/KG	1.5	1.7	9%	1		1	5	54	0.3	U	0.37	U
Sodium	MG/KG	1550	23.8	48%			0	26	54	117	U	147	U
Thallium	MG/KG	4	239.1	11%			0	6	54	2.3		2	U

TABLE 4-V
SITE CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12		SEAD-12	
LOC_ID										SD12-46		SD12-47	
MATRIX										SEDIMENT		SEDIMENT	
SAMP_ID										12443		12446	
DEPTH_TOP										0.15		0.2	
DEPTH_BOT										0.3		0.4	
SAMP_DATE										06-Nov-97		07-Nov-97	
QC_CODE										SA		SA	
STUDY_ID										RI Phase 1 Step 1		RI Phase 1 Step 1	
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIED CRITERIA (HUMAN HEALTH ACC-UMULATION) AND (BENTHIC AQUATIC CHRONIC)	NUMBER ABOVE STD	NUMBER OF DETECTS	NUMBER OF ANALYSES				
Vanadium	MG/KG	70.3		100%			0	54	54	24.5		38.3	
Zinc	MG/KG	2650		91%	120		35	49	54	105	J	**402**	J

TABLE 4-W
DOWNGRADIENT CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIC CRITERIA USED	NUMBER ABOVE STD.	NUMBER OF DETECTS	NUMBER OF ANALYSES				
FACILITY										SEAD-12	SEAD-12	SEAD-12	SEAD-12
LOC_ID										SD12-48	SD12-49	SD12-50	SD12-51
MATRIX										SEDIMENT	SEDIMENT	SEDIMENT	SEDIMENT
SAMP_ID										12462	12461	12460	12459
DEPTH_TOP										0.4	0.8	0.2	0.6
DEPTH_BOT										0.6	1	0.4	0.7
SAMP_DATE										11-Nov-97	11-Nov-97	11-Nov-97	11-Nov-97
QC_CODE										SA	SA	SA	SA
STUDY_ID										RI Phase 1 Step 1	RI Phase 1 Step 1	RI Phase 1 Step 1	RI Phase 1 Step 1
VOLATILE ORGANICS													
Acetone	UG/KG	190	69.7	91%			0	10	11	85	29	35	8 J
2-Methylnaphthalene	UG/KG	33	46.3	27%			0	3	11	140 U	98 U	96 U	110 U
4-Methylphenol	UG/KG	14	51.8	9%			0	1	11	140 U	98 U	96 U	110 U
Acenaphthene	UG/KG	19	42.3	36%	7560	BCT	0	4	11	140 U	98 U	16 J	110 U
Acenaphthylene	UG/KG	54	51.6	18%			0	2	11	140 U	98 U	96 U	110 U
Anthracene	UG/KG	160	51.2	45%	5778	HHB	0	5	11	140 U	98 U	21 J	110 U
Benzo(a)anthracene	UG/KG	1500	185.6	73%	648	HHB	1	8	11	140 U	5.6 J	54 J	110 U
Benzo(a)pyrene	UG/KG	1300	165.3	73%	70.2	HHB	3	8	11	140 U	5.4 J	52 J	7.2 J
Benzo(b)fluoranthene	UG/KG	1200	169.7	91%	70.2	HHB	4	10	11	12 J	6 J	49 J	7.1 J
Benzo(ghi)perylene	UG/KG	640	106.5	55%			0	6	11	140 U	98 U	31 J	110 U
Benzo(k)fluoranthene	UG/KG	49	43.9	36%	70.2	HHB	0	4	11	140 U	5.7 J	49 J	5.7 J
Bis(2-Ethylhexyl)phthalate	UG/KG	110	61.0	9%	10800	BCT	0	1	11	140 U	98 U	96 U	110 J
Carbazole	UG/KG	68	38.4	55%			0	6	11	140 U	98 U	27 J	110 U
Chrysene	UG/KG	1400	171.4	100%	70.2	HHB	4	11	11	9.2 J	6.7 J	62 J	6.4 J
Di-n-octylphthalate	UG/KG	200	64.0	18%			0	2	11	200	98 U	5.5 J	110 U
Dibenz(a,h)anthracene	UG/KG	260	61.2	45%			0	5	11	140 U	98 U	12 J	110 U
Dibenzofuran	UG/KG	24	41.5	36%			0	4	11	140 U	98 U	6.5 J	110 U
Fluoranthene	UG/KG	2600	316.5	91%	55080	BCT	0	10	11	11 J	6.8 J	130	11 J
Fluorene	UG/KG	59	47.2	36%	43.2	BCT	1	4	11	140 U	98 U	12 J	110 U
Indeno(1,2,3-cd)pyrene	UG/KG	670	104.1	55%	70.2	HHB	2	6	11	140 U	98 U	28 J	110 U
N-Nitrosodiphenylamine	UG/KG	220	68.7	9%			0	1	11	140 U	98 U	96 U	110 U
Naphthalene	UG/KG	16	41.8	36%	1620	BCT	0	4	11	140 U	98 U	96 U	110 U
Phenanthrene	UG/KG	840	125.3	91%	6480	BCT	0	10	11	7.9 J	98 U	97	6.8 J
Pyrene	UG/KG	2000	244.2	91%	51894	BCT	0	10	11	10 J	6.1 J	98	9.4 J
PESTICIDES/PCBS			3.0			HHB							
4,4'-DDD	UG/KG	3.7	3.0	18%	0.54	HHB	2	2	11	7 U	4.8 U	3.7 J	5.5 U
4,4'-DDE	UG/KG	4	10551.8	18%	0.54		2	2	11	7 U	4.8 U	2.7 J	5.5 U
METALS			5.1										
Aluminum	MG/KG	21300	74.0	100%			0	11	11	8360	10100	11500	21300

TABLE 4-W
DOWNGRADIENT CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOC_ID										SD12-48		SD12-49		SD12-50		SD12-51	
MATRIX										SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
SAMP_ID										12462		12461		12460		12459	
DEPTH_TOP										0.4		0.8		0.2		0.6	
DEPTH_BOT										0.6		1		0.4		0.7	
SAMP_DATE										11-Nov-97		11-Nov-97		11-Nov-97		11-Nov-97	
QC_CODE										SA		SA		SA		SA	
STUDY_ID										RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1		RI Phase 1 Step 1	
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIC CRITERIA USED	NUMBER ABOVE STD.	NUMBER OF DETECTS	NUMBER OF ANALYSES								
Arsenic	MG/KG	7.6	0.5	100%	6		3	11	11	4.4		3.5		4.6		**7.6**	
Barium	MG/KG	143	0.1	100%			0	11	11	96.7		64.1		58.7		143	
Beryllium	MG/KG	0.81	56902.7	100%			0	11	11	0.41		0.46		0.51		0.81	
Cadmium	MG/KG	0.16	18.7	9%	0.6		0	1	11	0.11	U	0.07	U	0.08	U	0.09	U
Calcium	MG/KG	352000	11.4	100%			0	11	11	50200		25100		24000		3660	
Chromium	MG/KG	37.1	24.4	100%	26		2	11	11	13.2		18		21.6		**37.1**	
Cobalt	MG/KG	21.5	23584.5	100%			0	11	11	8.6		10.1		13.3		21.5	
Copper	MG/KG	36.8	17.6	100%	16		9	11	11	**20.4**		**29.7**		**33.2**		**26.9**	
Iron	MG/KG	43000	8015.3	100%	20000		8	11	11	16800		**22300**		**26200**		**43000**	
Lead	MG/KG	30.9	424.9	100%	31		0	11	11	8.8	J	16.2	J	21.9	J	13.5	J
Magnesium	MG/KG	23900	0.1	100%			0	11	11	12600		5450		6680		7930	
Manganese	MG/KG	947	32.9	100%	460		4	11	11	299		286		312		**947**	
Mercury	MG/KG	0.27	1324.6	27%	0.15		1	3	11	0.1	U	0.06	U	0.05	U	0.08	U
Nickel	MG/KG	58.9	1.7	100%	16		9	11	11	**20.7**		**35.9**		**41.3**		**58.9**	
Potassium	MG/KG	2510	0.3	100%			0	11	11	1200		1460		1380		2510	
Selenium	MG/KG	4.3	306.1	55%			0	6	11	2.5		2.4		3.1		4.3	
Silver	MG/KG	0.52	1.1	9%	1		0	1	11	0.79	U	0.48	U	0.57	U	0.6	U
Sodium	MG/KG	486	17.8	100%			0	11	11	317		248		194		136	
Thallium	MG/KG	2.5	97.4	18%			0	2	11	2.4	U	1.4	U	1.7	U	2.2	
Vanadium	MG/KG	34.7		100%			0	11	11	17.7		16.7		19.2		34.7	
Zinc	MG/KG	196		100%	120		3	11	11	80.8		85.7		**196**		**125**	

TABLE 4-W
DOWNGRADIENT CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOC_ID										SD12-52		SD12-53		SD12-54		SD12-55	
MATRIX										SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
SAMP_ID										12469		12470		12471		12468	
DEPTH_TOP										0.4		0.6		0.4		0.7	
DEPTH_BOT										0.6		0.8		0.5		0.9	
SAMP_DATE										10-Dec-97		10-Dec-97		10-Dec-97		9-Dec-97	
QC_CODE										SA		SA		SA		SA	
STUDY_ID										RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIC CRITERIA USED	NUMBER ABOVE STD.	NUMBER OF DETECTS	NUMBER OF ANALYSES								
VOLATILE ORGANICS																	
Acetone	UG/KG	190	69.7	91%			0	10	11	190	J	18	J	36	J	16	UJ
2-Methylnaphthalene	UG/KG	33	46.3	27%			0	3	11	33	J	120	U	80	U	100	U
4-Methylphenol	UG/KG	14	51.8	9%			0	1	11	90	U	14	J	80	U	100	U
Acenaphthene	UG/KG	19	42.3	36%	7560	BCT	0	4	11	15	J	120	U	80	U	100	U
Acenaphthylene	UG/KG	54	51.6	18%			0	2	11	90	U	120	U	80	U	100	U
Anthracene	UG/KG	160	51.2	45%	5778	HHB	0	5	11	20	J	120	U	80	U	100	U
Benzo(a)anthracene	UG/KG	1500	185.6	73%	648	HHB	1	8	11	63	J	18	J	80	U	5.7	J
Benzo(a)pyrene	UG/KG	1300	165.3	73%	70.2	HHB	3	8	11	59	J	16	J	80	U	100	U
Benzo(b)fluoranthene	UG/KG	1200	169.7	91%	70.2	HHB	4	10	11	**110**		24	J	80	U	19	J
Benzo(ghi)perylene	UG/KG	640	106.5	55%			0	6	11	52	J	16	J	80	U	100	U
Benzo(k)fluoranthene	UG/KG	49	43.9	36%	70.2	HHB	0	4	11	90	U	18	J	80	U	100	U
Bis(2-Ethylhexyl)phthalate	UG/KG	110	61.0	9%	10800	BCT	0	1	11	90	U	120	U	80	U	100	U
Carbazole	UG/KG	68	38.4	55%			0	6	11	13	J	14	J	80	UJ	100	UJ
Chrysene	UG/KG	1400	171.4	100%	70.2	HHB	4	11	11	**78**	J	26	J	4.3	J	8.5	J
Di-n-octylphthalate	UG/KG	200	64.0	18%			0	2	11	90	U	120	U	80	U	100	U
Dibenz(a,h)anthracene	UG/KG	260	61.2	45%			0	5	11	16	J	120	U	80	U	100	U
Dibenzofuran	UG/KG	24	41.5	36%			0	4	11	9.7	J	120	U	80	U	100	U
Fluoranthene	UG/KG	2600	316.5	91%	55080	BCT	0	10	11	140		49	J	80	U	14	J
Fluorene	UG/KG	59	47.2	36%	43.2	BCT	1	4	11	18	J	120	U	80	U	100	U
Indeno(1,2,3-cd)pyrene	UG/KG	670	104.1	55%	70.2	HHB	2	6	11	36	J	13	J	80	U	100	U
N-Nitrosodiphenylamine	UG/KG	220	68.7	9%			0	1	11	90	U	120	U	80	U	100	U
Naphthalene	UG/KG	16	41.8	36%	1620	BCT	0	4	11	13	J	120	U	4.5	J	100	U
Phenanthrene	UG/KG	840	125.3	91%	6480	BCT	0	10	11	100		34	J	8.1	J	7.5	J
Pyrene	UG/KG	2000	244.2	91%	51894	BCT	0	10	11	110		35	J	80	U	8.9	J
PESTICIDES/PCBS			3.0			HHB											
4,4'-DDD	UG/KG	3.7	3.0	18%	0.54	HHB	2	2	11	**3.1**	J	6	U	4	U	5.2	U
4,4'-DDE	UG/KG	4	10551.8	18%	0.54		2	2	11	**4**	J	6	U	4	U	5.2	U
METALS			5.1														
Aluminum	MG/KG	21300	74.0	100%			0	11	11	1220		1830		8660		17600	

TABLE 4-W
DOWNGRADIENT CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOC_ID										SD12-52		SD12-53		SD12-54		SD12-55	
MATRIX										SEDIMENT		SEDIMENT		SEDIMENT		SEDIMENT	
SAMP_ID										12469		12470		12471		12468	
DEPTH_TOP										0.4		0.6		0.4		0.7	
DEPTH_BOT										0.6		0.8		0.5		0.9	
SAMP_DATE										10-Dec-97		10-Dec-97		10-Dec-97		9-Dec-97	
QC_CODE										SA		SA		SA		SA	
STUDY_ID										RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1	RI Phase 1	Step 1
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIC CRITERIA USED	NUMBER ABOVE STD.	NUMBER OF DETECTS	NUMBER OF ANALYSES								
Arsenic	MG/KG	7.6	0.5	100%	6		3	11	11	5		2	J	4.6		**6.3**	
Barium	MG/KG	143	0.1	100%			0	11	11	20.3	J	16.1	J	35.5	J	129	
Beryllium	MG/KG	0.81	56902.7	100%			0	11	11	0.03	J	0.06	J	0.34	J	0.81	J
Cadmium	MG/KG	0.16	18.7	9%	0.6		0	1	11	0.06	U	0.16	J	0.07	U	0.07	U
Calcium	MG/KG	352000	11.4	100%			0	11	11	352000		3740		16500		7630	
Chromium	MG/KG	37.1	24.4	100%	26		2	11	11	3.5		3.7		17.4		**28.6**	
Cobalt	MG/KG	21.5	23584.5	100%			0	11	11	4.9	J	2.6	J	7.5	J	15.2	
Copper	MG/KG	36.8	17.6	100%	16		9	11	11	8		9.1		**19.2**		**36.4**	
Iron	MG/KG	43000	8015.3	100%	20000		8	11	11	6060		3270		**24400**		**33500**	
Lead	MG/KG	30.9	424.9	100%	31		0	11	11	17.3	J	4.3	J	16.6	J	30.9	J
Magnesium	MG/KG	23900	0.1	100%			0	11	11	23900		838	J	4540		6040	
Manganese	MG/KG	947	32.9	100%	460		4	11	11	**544**		169		321		409	
Mercury	MG/KG	0.27	1324.6	27%	0.15		1	3	11	0.07	UJ	0.1	J	0.06	UJ	0.07	J
Nickel	MG/KG	58.9	1.7	100%	16		9	11	11	11		5.7	J	**28.1**		**52**	
Potassium	MG/KG	2510	0.3	100%			0	11	11	456	J	431	J	664	J	1580	
Selenium	MG/KG	4.3	306.1	55%			0	6	11	0.98	U	1.6	U	1.3		1.4	
Silver	MG/KG	0.52	1.1	9%	1		0	1	11	0.52	J	0.72	UJ	0.5	U	0.48	U
Sodium	MG/KG	486	17.8	100%			0	11	11	377	J	396	J	239	J	258	J
Thallium	MG/KG	2.5	97.4	18%			0	2	11	1.3	UJ	2.2	UJ	1.5	UJ	1.4	UJ
Vanadium	MG/KG	34.7		100%			0	11	11	7.2	J	3.4	J	12.4		26.3	
Zinc	MG/KG	196		100%	120		3	11	11	20.1	J	36.5	J	75.6	J	114	J

TABLE 4-W
DOWNGRADIENT CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12		SEAD-12		RI Phase	
LOC_ID										SD12-56		SD12-57		67668	
MATRIX										SEDIMENT		SEDIMENT		SD12-58	
SAMP_ID										12467		12466		12465	
DEPTH_TOP										0.5		0.5		SA	
DEPTH_BOT										0.7		0.7		0.7	
SAMP_DATE										9-Dec-97		9-Dec-97		0.9	
QC_CODE										SA		SA		SEDIMEN	
STUDY_ID										RI Phase 1	Step 1	RI Phase 1	Step 1	9-Dec-97	
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIC CRITERIA USED	NUMBER ABOVE STD.	NUMBER OF DETECTS	NUMBER OF ANALYSES						
VOLATILE ORGANICS															
Acetone	UG/KG	190	69.7	91%			0	10	11	180	J	130	J	48	J
2-Methylnaphthalene	UG/KG	33	46.3	27%			0	3	11	160	U	11	J	13	J
4-Methylphenol	UG/KG	14	51.8	9%			0	1	11	160	U	150	U	88	U
Acenaphthene	UG/KG	19	42.3	36%	7560	BCT	0	4	11	160	U	11	J	19	J
Acenaphthylene	UG/KG	54	51.6	18%			0	2	11	160	U	17	J	54	J
Anthracene	UG/KG	160	51.2	45%	5778	HHB	0	5	11	12	J	26	J	160	
Benzo(a)anthracene	UG/KG	1500	185.6	73%	648	HHB	1	8	11	60	J	170		**1500**	
Benzo(a)pyrene	UG/KG	1300	165.3	73%	70.2	HHB	3	8	11	**89**	J	**130**	J	**1300**	
Benzo(b)fluoranthene	UG/KG	1200	169.7	91%	70.2	HHB	4	10	11	**130**		**270**		**1200**	
Benzo(ghi)perylene	UG/KG	640	106.5	55%			0	6	11	59	J	110	J	640	
Benzo(k)fluoranthene	UG/KG	49	43.9	36%	70.2	HHB	0	4	11	160	U	150	U	88	U
Bis(2-Ethylhexyl)phthalate	UG/KG	110	61.0	9%	10800	BCT	0	1	11	160	U	150	U	88	U
Carbazole	UG/KG	68	38.4	55%			0	6	11	12	J	24	J	68	J
Chrysene	UG/KG	1400	171.4	100%	70.2	HHB	4	11	11	**74**	J	**210**		**1400**	J
Di-n-octylphthalate	UG/KG	200	64.0	18%			0	2	11	160	U	150	U	88	U
Dibenz(a,h)anthracene	UG/KG	260	61.2	45%			0	5	11	18	J	43	J	260	J
Dibenzofuran	UG/KG	24	41.5	36%			0	4	11	160	U	12	J	24	J
Fluoranthene	UG/KG	2600	316.5	91%	55080	BCT	0	10	11	120	J	360		2600	J
Fluorene	UG/KG	59	47.2	36%	43.2	BCT	1	4	11	160	U	26	J	**59**	J
Indeno(1,2,3-cd)pyrene	UG/KG	670	104.1	55%	70.2	HHB	2	6	11	34	J	**100**	J	**670**	
N-Nitrosodiphenylamine	UG/KG	220	68.7	9%			0	1	11	220		150	U	88	U
Naphthalene	UG/KG	16	41.8	36%	1620	BCT	0	4	11	160	U	16	J	14	J
Phenanthrene	UG/KG	840	125.3	91%	6480	BCT	0	10	11	58	J	170		840	
Pyrene	UG/KG	2000	244.2	91%	51894	BCT	0	10	11	99	J	270		2000	J
PESTICIDES/PCBS			3.0			HHB									
4,4'-DDD	UG/KG	3.7	3.0	18%	0.54	HHB	2	2	11	8	U	7.5	U	4.4	U
4,4'-DDE	UG/KG	4	10551.8	18%	0.54		2	2	11	8	U	7.5	U	4.4	U
METALS			5.1												
Aluminum	MG/KG	21300	74.0	100%			0	11	11	11700		13300		10500	

TABLE 4-W
DOWNGRADIENT CHEMICAL DATA-SEDIMENT
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY ROMULUS, NY

FACILITY										SEAD-12		SEAD-12		RI Phase	
LOC_ID										SD12-56		SD12-57		67668	
MATRIX										SEDIMENT		SEDIMENT		SD12-58	
SAMP_ID										12467		12466		12465	
DEPTH_TOP										0.5		0.5		SA	
DEPTH_BOT										0.7		0.7		0.7	
SAMP_DATE										9-Dec-97		9-Dec-97		0.9	
QC_CODE										SA		SA		SEDIMEN	
STUDY_ID										RI Phase 1 Step 1		RI Phase 1 Step 1		9-Dec-97	
PARAMETER	UNIT	MAXIMUM	AVERAGE	FREQUENCY OF DETECTION	NYSDEC CRITERIA	SPECIFIC CRITERIA USED	NUMBER ABOVE STD.	NUMBER OF DETECTS	NUMBER OF ANALYSES						
Arsenic	MG/KG	7.6	0.5	100%	6		3	11	11	5.6		**6.5**		5.5	
Barium	MG/KG	143	0.1	100%			0	11	11	90.5		106		54	
Beryllium	MG/KG	0.81	56902.7	100%			0	11	11	0.49	J	0.65	J	0.48	J
Cadmium	MG/KG	0.16	18.7	9%	0.6		0	1	11	0.11	U	0.12	U	0.08	U
Calcium	MG/KG	352000	11.4	100%			0	11	11	29300		54700		59100	
Chromium	MG/KG	37.1	24.4	100%	26		2	11	11	20.3		23.2		19.5	
Cobalt	MG/KG	21.5	23584.5	100%			0	11	11	14.2	J	14.1	J	13.2	
Copper	MG/KG	36.8	17.6	100%	16		9	11	11	**36.8**		**30.9**	J	**18.3**	
Iron	MG/KG	43000	8015.3	100%	20000		8	11	11	**26500**		**28500**		**28900**	
Lead	MG/KG	30.9	424.9	100%	31		0	11	11	26.3	J	24.1	J	13.7	J
Magnesium	MG/KG	23900	0.1	100%			0	11	11	5570		7640		6980	
Manganese	MG/KG	947	32.9	100%	460		4	11	11	**483**		**498**		406	
Mercury	MG/KG	0.27	1324.6	27%	0.15		1	3	11	**0.27**	J	0.11	UJ	0.07	UJ
Nickel	MG/KG	58.9	1.7	100%	16		9	11	11	**34.4**		**38.5**		**35.5**	
Potassium	MG/KG	2510	0.3	100%			0	11	11	1520	J	1950	J	1420	
Selenium	MG/KG	4.3	306.1	55%			0	6	11	1.7	U	1.9	U	1.2	U
Silver	MG/KG	0.52	1.1	9%	1		0	1	11	0.78	U	0.85	U	0.54	U
Sodium	MG/KG	486	17.8	100%			0	11	11	380	J	486	J	336	J
Thallium	MG/KG	2.5	97.4	18%			0	2	11	2.3	UJ	2.5	J	1.6	UJ
Vanadium	MG/KG	34.7		100%			0	11	11	19.5		21.9		16.4	
Zinc	MG/KG	196		100%	120		3	11	11	**135**	J	116	J	86.8	J

TABLE 4-X
SITE CHEMICAL DATA - GROUNDWATER
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								DW12-815		DW12-815		MW12-10		MW12-10		MW12-11		MW12-11		MW12-12	
MATRIX								GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER	
SAMPLE ID								122018		122255		122040		122261		122038		122259		122041	
DEPTH TO TOP OF SAMPLE								20		20		13.5		15		13		13		13.5	
DEPTH TO BOTTOM OF SAMPLE								20		20		13.5		15		13		13		13.5	
SAMPLE DATE								19-Apr-99		14-Dec-99		6-May-99		15-Dec-99		25-Apr-99		15-Dec-99		4-May-99	
QC CODE								SA		SA		SA		SA		SA		SA		SA	
STUDY ID								RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1	
SAMPLE ROUND			FREQUENCY OF	NYSDEC CLASS GA	NUMBER ABOVE	NUMBER OF	NUMBER OF	1		2		1		2		1		2		1	
PARAMETER	UNIT	MAXIMUM	DETECTION	STD.	STD.	DETECTS	ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
1,1,1-Trichloroethane	UG/L	1.7	1.12%	5	0	1	89	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	1	U
1,2-Dichloroethene (total)	UG/L	30	14.29%	5	1	1	7														
Acetone	UG/L	9	6.74%		0	6	89	5	U	5	U	5	U	5	U	5	U	5	U	5	U
Toluene	UG/L	3.1	5.62%	5	0	5	89	1	U	3.1		1	U	0.5	U	1	U	0.5	U	1	U
Trichloroethene	UG/L	1600	3.37%	5	2	3	89	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	1	U
1,4-Dichlorobenzene	UG/L	0.093	8.99%	3	0	8	89	1	U	1.1	U	1	U	1.3	U	1.1	UJ	0.063	J	1	U
Benzo(a)pyrene	UG/L	0.097	2.25%	0	0	2	89	1	U	1.1	U	1	U	1.3	U	1.1	U	1.1	U	1	U
Benzo(b)fluoranthene	UG/L	0.076	1.12%		0	1	89	1	U	1.1	U	1	U	1.3	U	1.1	U	1.1	U	1	U
Benzo(ghi)perylene	UG/L	0.18	4.49%		0	4	89	0.052	J	1.1	U	1	U	1.3	U	1.1	U	1.1	U	1	U
Benzo(k)fluoranthene	UG/L	0.091	1.12%		0	1	89	1	U	1.1	U	1	U	1.3	U	1.1	U	1.1	U	1	U
Bis(2-Ethylhexyl)phthalate	UG/L	230	3.37%	5	2	3	89	1	U	1.1	U	1.7	U	1.3	U	1.1	U	1.1	U	1	U
Butylbenzylphthalate	UG/L	0.064	1.12%		0	1	89	1	U	1.1	U	1	U	1.3	U	1.1	U	1.1	U	1	U
Di-n-butylphthalate	UG/L	0.21	8.99%		0	8	89	1	U	1.1	U	1	U	1.3	U	1.1	U	1.1	U	1	U
Di-n-octylphthalate	UG/L	0.41	6.74%		0	6	89	1	U	1.1	U	1	U	1.3	U	1.1	U	1.1	U	1	U
Diethyl phthalate	UG/L	4.3	13.48%		0	12	89	1	U	1.1	U	1	U	1.3	U	1.1	U	1.1	U	0.053	J
Indeno(1,2,3-cd)pyrene	UG/L	0.1	1.12%		0	1	89	1	U	1.1	U	1	U	1.3	U	1.1	U	1.1	U	1	U
Phenol	UG/L	0.43	5.62%	1	0	5	89	1	U	1.1	U	1	U	1.3	U	1.1	U	1.1	U	1	U
Pyrene	UG/L	0.08	2.25%		0	2	89	1	U	1.1	U	1	U	1.3	UJ	1.1	U	1.1	U	1	U
4,4'-DDT	UG/L	0.018	1.12%	0.2	0	1	89	0.01	U	0.011	U	0.01	U	0.012	U	0.011	U	0.01	U	0.011	U
Beta-BHC	UG/L	0.0034	1.12%	0.04	0	1	89	0.0052	U	0.0054	U	0.0053	U	0.0061	U	0.0056	UJ	0.0052	U	0.0053	U
Gamma-Chlordane	UG/L	0.0056	1.12%		0	1	89	0.0052	U	0.0054	U	0.0053	U	0.0061	U	0.0056	U	0.0052	U	0.0053	U
Heptachlor	UG/L	0.0029	1.12%	0.04	0	1	89	0.0052	U	0.0054	U	0.0053	U	0.0061	U	0.0056	U	0.0052	U	0.0053	U
Aluminum	UG/L	9880	97.80%		0	89	91	114	J	62.6	J	42.8	J	80.4	J	65.9	J	90.9	J	600	
Antimony	UG/L	43.2	7.69%	3	3	7	91	2.2	U	2.2	U	5.2	U	2.7	J	2.2	U	2.2	U	5.2	U
Arsenic	UG/L	5.1	14.29%	25	0	13	91	1.8	U	2.5	U	4.7	J	2.5	U	1.8	U	2.5	U	4.5	J
Barium	UG/L	189	100.00%	1000	0	91	91	35.1	J	52.5	J	80.8	J	129	J	37.5	J	69.7	J	76.4	J
Beryllium	UG/L	1.6	19.78%		0	18	91	0.1	U	0.18	J	0.34	J	0.1	U	0.1	U	0.19	J	0.36	J
Cadmium	UG/L	3.3	28.57%	5	0	26	91	0.3	U	0.21	J	0.81	J	0.2	U	0.3	U	0.28	J	0.93	J
Calcium	UG/L	260000	100.00%		0	91	91	64800		91300		91500		100000		49400	J	96500		109000	
Chromium	UG/L	18.5	43.96%	50	0	40	91	2.1	J	1	U	1.2	U	1	U	1.2	U	1	U	2.3	J
Cobalt	UG/L	15.2	19.78%		0	18	91	1.5	U	1.7	J	3.3	U	1.3	U	1.5	U	1.4	J	3.3	U
Copper	UG/L	25.1	52.75%	200	0	48	91	2.4	J	7.2	J	4.1	J	1.9	U	1	U	1.9	U	4.7	J
Iron	UG/L	20700	91.21%	300	44	83	91	178	J	**355**	J	79.4	J	107		30	J	150	J	**836**	
Lead	UG/L	18.8	13.19%	25	0	12	91	0.9	U	1.3	UJ	0.9	U	1.3	UJ	0.9	U	1.3	UJ	0.9	U
Magnesium	UG/L	72800	100.00%		0	91	91	11400		15600		12900		15700		6680	J	12800		24700	
Manganese	UG/L	3280	98.90%	300	12	90	91	1.4	J	5.1	J	44		101		23.9	J	107		116	
Mercury	UG/L	0.17	9.89%	0.7	0	9	91	0.1	UJ	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Nickel	UG/L	38.8	52.75%	100	0	48	91	1.4	U	1.7	U	10.2	U	29.5	J	1.4	U	1.7	U	10.2	U
Potassium	UG/L	14200	100.00%		0	91	91	7260		6640		3860	J	4200	J	968	J	2250	J	1240	J
Selenium	UG/L	6.5	21.98%	10	0	20	91	3.5	J	2.2	U	2.5	J	2.2	U	1.8	UJ	2.2	U	1.8	J
Silver	UG/L	5.2	38.46%	50	0	35	91	0.9	U	2.8	J	4.5	J	1.3	UJ	0.9	U	2.4	J	3.1	J
Sodium	UG/L	408000	100.00%	20000	24	91	91	**20200**		19500		6190		6450		2700	J	5330		2960	J
Thallium	UG/L	7	41.76%		0	38	91	4.5	J	3.2	U	4.4	J	3.9	J	1.9	U	3.2	U	2.7	J
Vanadium	UG/L	18.3	28.57%		0	26	91	1.6	U	2.9	J	3.8	U	1.8	U	1.6	U	2.3	J	4	J
Zinc	UG/L	2640	93.41%		0	85	91	22.7		33.8		2.6	J	5.7	J	3.1	U	79.6		3.2	J

TABLE 4-X
SITE CHEMICAL DATA - GROUNDWATER
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12-12		MW12-13		MW12-13		MW12-14		MW12-14		MW12-15		MW12-15	
MATRIX								GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER	
SAMPLE ID								122262		122047		122260		122049		122273		122023		122271	
DEPTH TO TOP OF SAMPLE								12		13.5		13		14.5		13		14		14	
DEPTH TO BOTTOM OF SAMPLE								12		13.5		13		14.5		13		14		14	
SAMPLE DATE								16-Dec-99		6-May-99		15-Dec-99		6-May-99		18-Dec-99		21-Apr-99		18-Dec-99	
QC CODE								SA		SA		SA		SA		SA		SA		SA	
STUDY ID								RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS	
SAMPLE ROUND			FREQUENCY OF	NYSDEC CLASS GA	NUMBER ABOVE	NUMBER OF	NUMBER OF	2		1		2		1		2		1		2	
PARAMETER	UNIT	MAXIMUM	DETECTION	STD.	STD.	DETECTS	ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
1,1,1-Trichloroethane	UG/L	1.7	1.12%	5	0	1	89	0.5	U	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U
1,2-Dichloroethene (total)	UG/L	30	14.29%	5	1	1	7														
Acetone	UG/L	9	6.74%		0	6	89	5	U	5	U	5	U	5	U	5	U	5	U	5	U
Toluene	UG/L	3.1	5.62%	5	0	5	89	0.5	U	1	U	0.26	J	1	U	0.5	U	1	U	0.5	U
Trichloroethene	UG/L	1600	3.37%	5	2	3	89	0.5	U	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U
1,4-Dichlorobenzene	UG/L	0.093	8.99%	3	0	8	89	1.2	U	1.1	U	1.2	U	1	U	0.065	J	1	U	1	U
Benzo(a)pyrene	UG/L	0.097	2.25%	0	0	2	89	1.2	U	1.1	U	1.2	U	1	U	1.1	U	1	U	1	U
Benzo(b)fluoranthene	UG/L	0.076	1.12%		0	1	89	1.2	U	1.1	U	1.2	U	1	U	1.1	U	1	U	1	U
Benzo(ghi)perylene	UG/L	0.18	4.49%		0	4	89	1.2	U	1.1	U	1.2	U	1	U	1.1	U	1	U	1	U
Benzo(k)fluoranthene	UG/L	0.091	1.12%		0	1	89	1.2	U	1.1	U	1.2	U	1	UJ	1.1	U	1	U	1	U
Bis(2-Ethylhexyl)phthalate	UG/L	230	3.37%	5	2	3	89	1.2	U	1.1	U	1.2	U	1	U	1.1	U	1	U	1	U
Butylbenzylphthalate	UG/L	0.064	1.12%		0	1	89	1.2	U	1.1	U	1.2	U	1	U	1.1	U	1	U	1	U
Di-n-butylphthalate	UG/L	0.21	8.99%		0	8	89	1.2	U	1.1	U	1.2	U	1	U	1.1	U	1	U	1	U
Di-n-octylphthalate	UG/L	0.41	6.74%		0	6	89	1.2	U	1.1	U	1.2	U	1	U	1.1	U	1	U	1	U
Diethyl phthalate	UG/L	4.3	13.48%		0	12	89	1.2	U	0.12	J	1.2	U	1	U	1.1	U	1	U	1	U
Indeno(1,2,3-cd)pyrene	UG/L	0.1	1.12%		0	1	89	1.2	U	1.1	U	1.2	U	1	U	1.1	U	1	U	1	U
Phenol	UG/L	0.43	5.62%	1	0	5	89	1.2	U	1.1	U	1.2	U	1	U	1.1	U	1	U	1	U
Pyrene	UG/L	0.08	2.25%		0	2	89	1.2	U	1.1	U	1.2	U	1	U	1.1	U	1	U	1	U
4,4'-DDT	UG/L	0.018	1.12%	0.2	0	1	89	0.012	U	0.013	U	0.012	U	0.01	U	0.012	U	0.01	U	0.01	U
Beta-BHC	UG/L	0.0034	1.12%	0.04	0	1	89	0.0062	U	0.0034	J	0.0061	U	0.0051	U	0.0058	U	0.005	UJ	0.0053	U
Gamma-Chlordane	UG/L	0.0056	1.12%		0	1	89	0.0062	U	0.0064	U	0.0061	U	0.0051	U	0.0058	U	0.005	U	0.0053	U
Heptachlor	UG/L	0.0029	1.12%	0.04	0	1	89	0.0062	U	0.0064	U	0.0061	U	0.0051	U	0.0058	U	0.005	U	0.0053	U
Aluminum	UG/L	9880	97.80%		0	89	91	53.6	J	46.4	J	200		1400		570		1210	J	314	
Antimony	UG/L	43.2	7.69%	3	3	7	91	2.2	U	5.2	U	2.2	U	5.2	U	2.2	U	2.2	U	2.2	U
Arsenic	UG/L	5.1	14.29%	25	0	13	91	2.5	U	2.9	U	2.5	U	2.9	U	2.5	U	1.8	U	2.5	U
Barium	UG/L	189	100.00%	1000	0	91	91	76.5	J	76.6	J	72.2	J	141	J	164	J	140	J	157	J
Beryllium	UG/L	1.6	19.78%		0	18	91	0.1	U	0.3	U	0.19	J	0.31	J	0.32	J	0.1	U	0.1	U
Cadmium	UG/L	3.3	28.57%	5	0	26	91	0.2	U	1.3	J	0.2	U	1.2	J	0.45	J	0.3	U	0.2	U
Calcium	UG/L	260000	100.00%		0	91	91	113000		80300		81900		111000		98500		104000	J	112000	
Chromium	UG/L	18.5	43.96%	50	0	40	91	1	U	1.2	U	1.1	J	2.8	J	3	J	2.5	J	1	U
Cobalt	UG/L	15.2	19.78%		0	18	91	1.3	U	3.3	U	1.5	J	3.3	U	3.3	J	1.5	U	1.3	U
Copper	UG/L	25.1	52.75%	200	0	48	91	1.9	U	3.9	J	1.9	U	6.1	J	4	J	1.6	J	1.9	U
Iron	UG/L	20700	91.21%	300	44	83	91	64.8	J	47.2	J	256	J	**1710**		**426**		**1610**	J	**538**	
Lead	UG/L	18.8	13.19%	25	0	12	91	1.3	UJ	0.9	U	1.3	UJ	0.9	U	1.3	UJ	0.9	U	1.3	UJ
Magnesium	UG/L	72800	100.00%		0	91	91	24500		16700		17200		28300		24800		29900	J	28200	
Manganese	UG/L	3280	98.90%	300	12	90	91	98.8		14.5	J	27.9		75.7		53.1		53.7	J	45	
Mercury	UG/L	0.17	9.89%	0.7	0	9	91	0.1	U	0.1	U	0.1	U	0.14	J	0.1	U	0.1	U	0.1	U
Nickel	UG/L	38.8	52.75%	100	0	48	91	2.9	J	10.2	U	1.7	U	10.2	U	3.8	J	3	J	1.7	U
Potassium	UG/L	14200	100.00%		0	91	91	646	J	3280	J	2670	J	2570	J	1970	J	1820	J	1990	J
Selenium	UG/L	6.5	21.98%	10	0	20	91	2.2	U	1.8	J	2.2	U	1.8	J	2.5	U	1.8	U	2.2	U
Silver	UG/L	5.2	38.46%	50	0	35	91	1.3	UJ	4.6	J	2.3	J	3.9	J	4.7	J	0.9	U	1.3	UJ
Sodium	UG/L	408000	100.00%	20000	24	91	91	2770	J	5950		5320		7420		6690		5170	J	7310	
Thallium	UG/L	7	41.76%		0	38	91	3.2	U	2.7	J	3.2	U	2.6	U	5.3	J	1.9	U	3.9	J
Vanadium	UG/L	18.3	28.57%		0	26	91	1.8	U	3.8	U	3.2	J	4.4	J	3.5	J	2.5	J	1.8	U
Zinc	UG/L	2640	93.41%		0	85	91	23.4		5.5	J	10	J	33.2		5.1	J	7.1	J	6.2	J

TABLE 4-X
SITE CHEMICAL DATA - GROUNDWATER
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

		FACILITY						SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
		LOCATION ID						MW12-16		MW12-16		MW12-17		MW12-17		MW12-18		MW12-18		MW12-18	
		MATRIX						GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER	
		SAMPLE ID						122015		122267		122016		122242		122019		122017		122237	
		DEPTH TO TOP OF SAMPLE						14		14		18		15		12.5		12.5		12.5	
		DEPTH TO BOTTOM OF SAMPLE						14		14		18		15		12.5		12.5		12.5	
		SAMPLE DATE						19-Apr-99		17-Dec-99		19-Apr-99		7-Dec-99		20-Apr-99		20-Apr-99		6-Dec-99	
		QC CODE						SA		SA		SA		SA		DU		SA		SA	
		STUDY ID						RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI P1S1 - Pu RS	
SAMPLE ROUND			FREQUENCY OF	NYSDEC CLASS GA	NUMBER ABOVE	NUMBER OF	NUMBER OF	1		2		1		2		1		1		2	
PARAMETER	UNIT	MAXIMUM	DETECTION	STD.	STD.	DETECTS	ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q).
1,1,1-Trichloroethane	UG/L	1.7	1.12%	5	0	1	89	1	U	0.5	U	1	U	0.5	U	1	U	1	U	0.5	U
1,2-Dichloroethene (total)	UG/L	30	14.29%	5	1	1	7														
Acetone	UG/L	9	6.74%		0	6	89	5	U	5	U	5	U	5	UJ	5	U	5	U	5	U
Toluene	UG/L	3.1	5.62%	5	0	5	89	1	U	0.5	U	1	U	0.5	U	1	U	1	U	0.5	U
Trichloroethene	UG/L	1600	3.37%	5	2	3	89	1	U	0.5	U	1	U	0.5	U	1	U	1	U	0.5	U
1,4-Dichlorobenzene	UG/L	0.093	8.99%	3	0	8	89	1	U	1.1	U	1	U	0.075	J	1.1	U	1	U	1.1	U
Benzo(a)pyrene	UG/L	0.097	2.25%	0	0	2	89	1	U	1.1	U	1	U	1	U	1.1	U	1	U	1.1	U
Benzo(b)fluoranthene	UG/L	0.076	1.12%		0	1	89	1	U	1.1	U	1	U	1	U	1.1	U	1	U	1.1	U
Benzo(ghi)perylene	UG/L	0.18	4.49%		0	4	89	1	U	1.1	U	1	U	1	U	1.1	U	1	U	1.1	U
Benzo(k)fluoranthene	UG/L	0.091	1.12%		0	1	89	1	U	1.1	U	1	U	1	U	1.1	U	1	U	1.1	U
Bis(2-Ethylhexyl)phthalate	UG/L	230	3.37%	5	2	3	89	1	U	1.1	U	1	U	2.9	U	1.1	U	1	U	1.1	U
Butylbenzylphthalate	UG/L	0.064	1.12%		0	1	89	1	U	1.1	U	1	U	1	U	1.1	U	1	U	1.1	U
Di-n-butylphthalate	UG/L	0.21	8.99%		0	8	89	1	U	1.1	U	1	U	1	U	1.1	U	0.083	J	1.1	U
Di-n-octylphthalate	UG/L	0.41	6.74%		0	6	89	1	U	1.1	U	1	U	1	U	1.1	U	1	U	1.1	U
Diethyl phthalate	UG/L	4.3	13.48%		0	12	89	1	U	1.1	U	1	U	1	U	1.1	U	1	U	1.1	U
Indeno(1,2,3-cd)pyrene	UG/L	0.1	1.12%		0	1	89	1	U	1.1	U	1	U	1	U	1.1	U	1	U	1.1	U
Phenol	UG/L	0.43	5.62%	1	0	5	89	1	U	1.1	U	1	U	1	U	1.1	U	1	U	1.1	U
Pyrene	UG/L	0.08	2.25%		0	2	89	1	U	1.1	U	1	U	1	U	1.1	U	1	U	1.1	U
4,4'-DDT	UG/L	0.018	1.12%	0.2	0	1	89	0.011	U	0.01	U	0.011	U	0.01	U	0.018	J	0.01	UJ	0.011	U
Beta-BHC	UG/L	0.0034	1.12%	0.04	0	1	89	0.0056	U	0.0053	U	0.0057	U	0.0053	U	0.0051	UJ	0.0051	U	0.0055	U
Gamma-Chlordane	UG/L	0.0056	1.12%		0	1	89	0.0056	U	0.0053	U	0.0057	U	0.0053	U	0.0051	U	0.0051	U	0.0055	U
Heptachlor	UG/L	0.0029	1.12%	0.04	0	1	89	0.0056	U	0.0053	U	0.0057	U	0.0053	U	0.0051	U	0.0051	U	0.0055	U
Aluminum	UG/L	9880	97.80%		0	89	91	400		40.9	J	1060		125	J	707	J	492	J	198	J
Antimony	UG/L	43.2	7.69%	3	3	7	91	2.2	U	2.2	U	2.2	U	2.7	U	2.2	U	2.2	U	2.7	U
Arsenic	UG/L	5.1	14.29%	25	0	13	91	1.8	U	2.5	U	1.8	U	1.9	U	1.8	U	1.8	U	1.9	U
Barium	UG/L	189	100.00%	1000	0	91	91	100	J	122	J	57.5	J	60.8	J	82	J	90.9	J	73.1	J
Beryllium	UG/L	1.6	19.78%		0	18	91	0.1	U	0.1	U	0.1	U	0.2	U	0.1	U	0.1	U	0.2	U
Cadmium	UG/L	3.3	28.57%	5	0	26	91	0.3	U	0.2	U	1.1	J	0.3	U	0.3	UJ	1.4	J	0.3	U
Calcium	UG/L	260000	100.00%		0	91	91	134000		150000		105000		103000		176000	J	192000		179000	
Chromium	UG/L	18.5	43.96%	50	0	40	91	1	J	1	U	1.5	J	0.9	U	1.5	J	1.6	J	0.9	U
Cobalt	UG/L	15.2	19.78%		0	18	91	1.5	U	1.3	U	1.5	U	2	U	1.5	UJ	1.8	J	2	U
Copper	UG/L	25.1	52.75%	200	0	48	91	1.6	J	1.9	U	2	J	1.7	U	1	UJ	2.5	J	1.7	U
Iron	UG/L	20700	91.21%	300	44	83	91	**612**	J	20.3	U	**1350**	J	151		**1530**	J	**1370**	J	**762**	
Lead	UG/L	18.8	13.19%	25	0	12	91	0.9	U	1.3	UJ	0.9	U	1	U	0.9	U	0.9	U	1	U
Magnesium	UG/L	72800	100.00%		0	91	91	29700		34300		27900		27100		72800	J	72500		67400	
Manganese	UG/L	3280	98.90%	300	12	90	91	9.3	J	5.7	J	66.6		52.9		73.6	J	74		73.3	
Mercury	UG/L	0.17	9.89%	0.7	0	9	91	0.1	UJ	0.1	U	0.1	UJ	0.1	U	0.1	U	0.1	UJ	0.1	U
Nickel	UG/L	38.8	52.75%	100	0	48	91	2.6	J	2	J	4.2	J	1.7	U	2.7	J	4	J	1.7	U
Potassium	UG/L	14200	100.00%		0	91	91	1380	J	1090	J	3080	J	1830	J	3730	J	3330	J	4040	J
Selenium	UG/L	6.5	21.98%	10	0	20	91	1.8	U	2.2	U	1.8	U	2.4	U	1.8	U	1.8	U	2.6	J
Silver	UG/L	5.2	38.46%	50	0	35	91	0.9	U	1.3	UJ	0.9	U	1.9	U	0.9	UJ	1.5	J	1.9	U
Sodium	UG/L	408000	100.00%	20000	24	91	91	11700		17300		4480	J	4630	J	**31700**	J	**32700**		**32900**	
Thallium	UG/L	7	41.76%		0	38	91	3.4	J	3.4	J	1.9	U	4.2	J	1.9	UJ	4.2	J	2.7	U
Vanadium	UG/L	18.3	28.57%		0	26	91	1.6	U	1.8	U	1.7	J	1.5	U	1.6	UJ	1.7	J	1.5	U
Zinc	UG/L	2640	93.41%		0	85	91	4	J	7.8	J	5.6	J	2.8	J	3.1	UJ	6	J	2.7	J

TABLE 4-X
SITE CHEMICAL DATA - GROUNDWATER
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12-19		MW12-19		MW12-20		MW12-20		MW12-20		MW12-21		MW12-21	
MATRIX								GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER	
SAMPLE ID								122005		122235		122006		122233		122232		122004		122236	
DEPTH TO TOP OF SAMPLE								11		11		14		12		12		11		11	
DEPTH TO BOTTOM OF SAMPLE								11		11		14		12		12		11		11	
SAMPLE DATE								12-Apr-99		5-Dec-99		12-Apr-99		5-Dec-99		5-Dec-99		12-Apr-99		5-Dec-99	
QC CODE								SA		SA		SA		DU		SA		SA		SA	
STUDY ID								RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS	
SAMPLE ROUND			FREQUENCY OF	NYSDEC CLASS GA	NUMBER ABOVE	NUMBER OF	NUMBER OF	1		2		1		2		2		1		2	
PARAMETER	UNIT	MAXIMUM	DETECTION	STD.	STD.	DETECTS	ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
1,1,1-Trichloroethane	UG/L	1.7	1.12%	5	0	1	89	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
1,2-Dichloroethene (total)	UG/L	30	14.29%	5	1	1	7														
Acetone	UG/L	9	6.74%		0	6	89	2	J	5	U	2	J	5	U	5	U	5	U	5	U
Toluene	UG/L	3.1	5.62%	5	0	5	89	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
Trichloroethene	UG/L	1600	3.37%	5	2	3	89	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
1,4-Dichlorobenzene	UG/L	0.093	8.99%	3	0	8	89	1	U	1	U	1	U	1.1	U	1	U	1	U	1.2	U
Benzo(a)pyrene	UG/L	0.097	2.25%	0	0	2	89	1	U	1	U	1	U	1.1	U	1	U	1	U	1.2	U
Benzo(b)fluoranthene	UG/L	0.076	1.12%		0	1	89	1	U	1	U	1	U	1.1	U	1	U	1	U	1.2	U
Benzo(ghi)perylene	UG/L	0.18	4.49%		0	4	89	1	U	1	U	1	U	1.1	U	1	U	1	U	1.2	U
Benzo(k)fluoranthene	UG/L	0.091	1.12%		0	1	89	1	U	1	U	1	U	1.1	U	1	U	1	U	1.2	U
Bis(2-Ethylhexyl)phthalate	UG/L	230	3.37%	5	2	3	89	1	U	230		1	U	1.1	U	1	U	1	U	1.5	U
Butylbenzylphthalate	UG/L	0.064	1.12%		0	1	89	1	U	1	U	1	U	1.1	U	1	U	1	U	1.2	U
Di-n-butylphthalate	UG/L	0.21	8.99%		0	8	89	1	U	1	U	1	U	1.1	U	1	U	0.09	J	1.2	U
Di-n-octylphthalate	UG/L	0.41	6.74%		0	6	89	0.06	J	1	U	1	U	1.1	U	1	U	1	U	1.2	U
Diethyl phthalate	UG/L	4.3	13.48%		0	12	89	1	U	1	U	1	U	0.067	J	0.096	J	1	U	1.2	U
Indeno(1,2,3-cd)pyrene	UG/L	0.1	1.12%		0	1	89	1	U	1	U	1	U	1.1	U	1	U	1	U	1.2	U
Phenol	UG/L	0.43	5.62%	1	0	5	89	1	U	1	U	0.15	J	1.1	U	1	U	1	U	1.2	U
Pyrene	UG/L	0.08	2.25%		0	2	89	1	U	1	U	1	U	1.1	U	1	U	1	U	1.2	U
4,4'-DDT	UG/L	0.018	1.12%	0.2	0	1	89	0.01	U	0.01	U	0.01	U	0.011	U	0.01	U	0.01	U	0.01	U
Beta-BHC	UG/L	0.0034	1.12%	0.04	0	1	89	0.005	U	0.005	U	0.005	U	0.0054	U	0.005	U	0.005	U	0.0053	U
Gamma-Chlordane	UG/L	0.0056	1.12%		0	1	89	0.005	U	0.005	U	0.005	U	0.0054	U	0.005	U	0.005	U	0.0053	U
Heptachlor	UG/L	0.0029	1.12%	0.04	0	1	89	0.005	U	0.005	U	0.005	U	0.0029	J	0.005	U	0.005	U	0.0053	U
Aluminum	UG/L	9880	97.80%		0	89	91	1590		168	J	657		1050		1430		35.3	J	63.3	J
Antimony	UG/L	43.2	7.69%	3	3	7	91	2.2	U	2.7	U	2.2	U	2.7	U	2.7	U	2.2	U	2.7	J
Arsenic	UG/L	5.1	14.29%	25	0	13	91	1.8	U	1.9	U	1.8	U	1.9	U	1.9	U	1.8	U	1.9	U
Barium	UG/L	189	100.00%	1000	0	91	91	81.4	J	72.1	J	74.9	J	74.7	J	79	J	87.4	J	101	J
Beryllium	UG/L	1.6	19.78%		0	18	91	0.1	U	0.2	U	0.1	U	0.2	U	0.2	U	0.1	U	0.2	U
Cadmium	UG/L	3.3	28.57%	5	0	26	91	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U	0.3	U
Calcium	UG/L	260000	100.00%		0	91	91	102000		94800		114000		103000		107000		93400		102000	
Chromium	UG/L	18.5	43.96%	50	0	40	91	1.7	J	0.9	U	0.7	U	0.9	U	1.4	J	0.7	U	0.9	U
Cobalt	UG/L	15.2	19.78%		0	18	91	1.5	U	2	U	1.5	U	2	U	2	U	1.5	U	2	U
Copper	UG/L	25.1	52.75%	200	0	48	91	2.2	J	1.7	U	1	U	2.1	J	1.7	U	1	U	5.5	J
Iron	UG/L	20700	91.21%	300	44	83	91	1830		129		825		848		1360		17.4	J	86.2	J
Lead	UG/L	18.8	13.19%	25	0	12	91	0.9	U	1	U	0.9	U	1	UJ	1	U	0.9	U	1	U
Magnesium	UG/L	72800	100.00%		0	91	91	12100		10600		22500		21400		23200		19400		20900	
Manganese	UG/L	3280	98.90%	300	12	90	91	158		119		128		94.4		97.3		54.2		61.9	
Mercury	UG/L	0.17	9.89%	0.7	0	9	91	0.1	UJ	0.1	U	0.1	UJ	0.1	U	0.1	U	0.1	UJ	0.1	U
Nickel	UG/L	38.8	52.75%	100	0	48	91	4.1	J	1.7	U	2	J	1.7	U	1.9	J	1.4	U	1.7	U
Potassium	UG/L	14200	100.00%		0	91	91	1780	J	989	J	2440	J	2440	J	2490	J	3380	J	3310	J
Selenium	UG/L	6.5	21.98%	10	0	20	91	1.8	U	2.4	U	1.8	U	2.4	U	2.4	U	1.9	J	2.4	U
Silver	UG/L	5.2	38.46%	50	0	35	91	0.9	U	1.9	U	0.9	U	1.9	U	1.9	U	0.9	U	1.9	U
Sodium	UG/L	408000	100.00%	20000	24	91	91	43000		43000		100000		88900		85600		7940		7880	
Thallium	UG/L	7	41.76%		0	38	91	2.3	J	2.7	U	1.9	U	2.8	J	2.7	U	5	J	2.7	U
Vanadium	UG/L	18.3	28.57%		0	26	91	2.6	J	1.5	U	1.6	U	2.8	J	2.8	J	1.6	U	1.5	U
Zinc	UG/L	2640	93.41%		0	85	91	8.8	J	4.4	J	11.6	J	5.3	J	9.5	J	1.8	J	5.3	J

TABLE 4-X
SITE CHEMICAL DATA - GROUNDWATER
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12-22		MW12-22		MW12-23		MW12-23		MW12-24		MW12-24		MW12-25	
MATRIX								GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER	
SAMPLE ID								122007		122228		122008		122229		122002		122264		122043	
DEPTH TO TOP OF SAMPLE								12		12		12.3		12.3		9.5		10.5		11	
DEPTH TO BOTTOM OF SAMPLE								12		12		12.3		12.3		9.5		10.5		11	
SAMPLE DATE								12-Apr-99		3-Dec-99		12-Apr-99		3-Dec-99		11-Apr-99		17-Dec-99		4-May-99	
QC CODE								SA		SA		SA		SA		SA		SA		DU	
STUDY ID								RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1	
SAMPLE ROUND			FREQUENCY OF	NYSDEC CLASS GA	NUMBER ABOVE	NUMBER OF	NUMBER OF	1		2		1		2		1		2		1	
PARAMETER	UNIT	MAXIMUM	DETECTION	STD.	STD.	DETECTS	ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
1,1,1-Trichloroethane	UG/L	1.7	1.12%	5	0	1	89	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	1	U
1,2-Dichloroethene (total)	UG/L	30	14.29%	5	1	1	7														
Acetone	UG/L	9	6.74%		0	6	89	5	U	5	U	5	U	5	U	5	U	5	U	5	U
Toluene	UG/L	3.1	5.62%	5	0	5	89	1	U	0.5	UJ	1	U	0.5	UJ	1	U	0.5	U	1	U
Trichloroethene	UG/L	1600	3.37%	5	2	3	89	1	U	0.5	UJ	1	U	0.5	UJ	1	U	0.5	U	1	U
1,4-Dichlorobenzene	UG/L	0.093	8.99%	3	0	8	89	1	U	1	U	1.1	U	1	U	1	U	1.1	U	1	U
Benzo(a)pyrene	UG/L	0.097	2.25%	0	0	2	89	1	U	1	U	1.1	U	1	U	1	U	1.1	U	1	U
Benzo(b)fluoranthene	UG/L	0.076	1.12%		0	1	89	1	U	1	U	1.1	U	1	U	1	U	1.1	U	1	U
Benzo(ghi)perylene	UG/L	0.18	4.49%		0	4	89	1	U	1	U	1.1	U	1	U	1	U	1.1	U	1	U
Benzo(k)fluoranthene	UG/L	0.091	1.12%		0	1	89	1	U	1	U	1.1	U	1	U	1	U	1.1	U	1	U
Bis(2-Ethylhexyl)phthalate	UG/L	230	3.37%	5	2	3	89	1	U	210		1.1	U	1	U	1	U	1.1	UJ	1	U
Butylbenzylphthalate	UG/L	0.064	1.12%		0	1	89	1	U	1	U	1.1	U	1	U	1	U	1.1	U	1	U
Di-n-butylphthalate	UG/L	0.21	8.99%		0	8	89	1	U	0.1	U	1.1	U	1	U	1	U	1.1	U	1	U
Di-n-octylphthalate	UG/L	0.41	6.74%		0	6	89	1	U	0.06	J	1.1	U	1	U	1	U	1.1	U	1	U
Diethyl phthalate	UG/L	4.3	13.48%		0	12	89	1	U	0.065	J	1.1	U	1	U	1	U	1.1	U	1	U
Indeno(1,2,3-cd)pyrene	UG/L	0.1	1.12%		0	1	89	1	U	1	U	1.1	U	1	U	1	U	1.1	U	1	U
Phenol	UG/L	0.43	5.62%	1	0	5	89	1	U	1	U	1.1	U	1	U	1	U	1.1	U	1	U
Pyrene	UG/L	0.08	2.25%		0	2	89	1	U	1	U	1.1	U	1	U	1	U	1.1	U	1	U
4,4'-DDT	UG/L	0.018	1.12%	0.2	0	1	89	0.012	U	0.01	U	0.01	U	0.01	U	0.01	U	0.011	U	0.01	U
Beta-BHC	UG/L	0.0034	1.12%	0.04	0	1	89	0.0062	U	0.005	U	0.0051	U	0.005	U	0.0051	U	0.0053	U	0.0052	U
Gamma-Chlordane	UG/L	0.0056	1.12%		0	1	89	0.0062	U	0.005	U	0.0051	U	0.005	U	0.0051	U	0.0053	U	0.0052	U
Heptachlor	UG/L	0.0029	1.12%	0.04	0	1	89	0.0062	U	0.005	U	0.0051	U	0.005	U	0.0051	U	0.0053	U	0.0052	U
Aluminum	UG/L	9880	97.80%		0	89	91	99.6	J	222		289		971		69.3	J	49.6	J	15.8	U
Antimony	UG/L	43.2	7.69%	3	3	7	91	2.2	U	2.7	U	2.2	U	2.7	U	2.2	U	2.2	U	5.2	U
Arsenic	UG/L	5.1	14.29%	25	0	13	91	1.8	U	1.9	U	2.1	J	1.9	U	1.8	U	2.5	U	3.1	J
Barium	UG/L	189	100.00%	1000	0	91	91	72.9	J	52	J	47.1	J	86.4	J	76.4	J	64.6	J	166	J
Beryllium	UG/L	1.6	19.78%		0	18	91	0.1	U	0.2	U	0.1	U	0.2	U	0.1	U	0.1	U	0.35	J
Cadmium	UG/L	3.3	28.57%	5	0	26	91	0.58	J	0.3	U	0.3	U	0.3	U	0.3	U	0.2	U	0.7	J
Calcium	UG/L	260000	100.00%		0	91	91	158000		172000		148000		162000		102000		95900		151000	
Chromium	UG/L	18.5	43.96%	50	0	40	91	0.7	U	0.9	U	0.7	U	1	J	0.73	J	1	U	1.6	J
Cobalt	UG/L	15.2	19.78%		0	18	91	1.5	U	2	U	1.5	U	2	U	1.5	U	1.3	U	3.3	U
Copper	UG/L	25.1	52.75%	200	0	48	91	1.1	J	1.7	U	1	U	1.7	U	1.4	J	1.9	U	4.4	J
Iron	UG/L	20700	91.21%	300	44	83	91	**540**		**310**		**474**		**1210**		66	J	20.3	U	17.1	U
Lead	UG/L	18.8	13.19%	25	0	12	91	1.1	J	1	J	0.9	U	1	U	1	J	1.3	UJ	0.9	U
Magnesium	UG/L	72800	100.00%		0	91	91	23700		32700		28000		25000		22000		20900		40300	
Manganese	UG/L	3280	98.90%	300	12	90	91	**501**		125		114		**415**		44.5		10.6	J	**586**	
Mercury	UG/L	0.17	9.89%	0.7	0	9	91	0.1	UJ	0.1	U	0.1	UJ	0.1	U	0.1	U	0.1	U	0.1	U
Nickel	UG/L	38.8	52.75%	100	0	48	91	2.3	J	1.7	U	2.6	J	2	J	1.8	J	1.7	U	10.2	U
Potassium	UG/L	14200	100.00%		0	91	91	3720	J	3190	J	3020	J	4290	J	1060	J	767	J	1390	J
Selenium	UG/L	6.5	21.98%	10	0	20	91	1.8	U	2.4	U	3	J	2.4	U	1.8	U	2.2	U	2.1	J
Silver	UG/L	5.2	38.46%	50	0	35	91	0.99	J	1.9	U	0.9	U	1.9	U	1.1	J	1.3	UJ	4.3	J
Sodium	UG/L	408000	100.00%	20000	24	91	91	15200		**21000**		17300		**61700**		8780		13700		4600	J
Thallium	UG/L	7	41.76%		0	38	91	5.6	J	2.7	U	2.5	J	2.7	U	3	J	3.5	J	6.1	J
Vanadium	UG/L	18.3	28.57%		0	26	91	1.6	U	1.5	U	1.6	U	1.5	J	1.6	U	1.8	U	3.8	U
Zinc	UG/L	2640	93.41%		0	85	91	2.8	J	3	J	16.2	J	5.2	J	3.2	J	7.1	J	2.3	J

TABLE 4-X
SITE CHEMICAL DATA - GROUNDWATER
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12-25		MW12-25		MW12-26		MW12-26		MW12-26		MW12-27		MW12-27	
MATRIX								GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER	
SAMPLE ID								122039		122263		122003		122265		122266		122012		122230	
DEPTH TO TOP OF SAMPLE								11		11		11		11		11		10.25		10.25	
DEPTH TO BOTTOM OF SAMPLE								11		11		11		11		11		10.25		10.25	
SAMPLE DATE								4-May-99		16-Dec-99		11-Apr-99		17-Dec-99		17-Dec-99		14-Apr-99		3-Dec-99	
QC CODE								SA		SA		SA		DU		SA		SA		SA	
STUDY ID								RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS	
SAMPLE ROUND			FREQUENCY OF	NYSDEC CLASS GA	NUMBER ABOVE	NUMBER OF	NUMBER OF	1		2		1		2		2		1		2	
PARAMETER	UNIT	MAXIMUM	DETECTION	STD.	STD.	DETECTS	ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
1,1,1-Trichloroethane	UG/L	1.7	1.12%	5	0	1	89	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
1,2-Dichloroethene (total)	UG/L	30	14.29%	5	1	1	7														
Acetone	UG/L	9	6.74%		0	6	89	5	U	5	U	5	U	5	U	3.4	J	2	J	5	U
Toluene	UG/L	3.1	5.62%	5	0	5	89	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
Trichloroethene	UG/L	1600	3.37%	5	2	3	89	1	U	0.5	U	1	U	0.5	U	0.5	U	1	U	0.5	U
1,4-Dichlorobenzene	UG/L	0.093	8.99%	3	0	8	89	1.1	U	1.1	U	1	U	1	U	1.1	U	1.2	U	1	U
Benzo(a)pyrene	UG/L	0.097	2.25%	0	0	2	89	1.1	U	1.1	U	1	U	1	U	1.1	U	1.2	U	1	U
Benzo(b)fluoranthene	UG/L	0.076	1.12%		0	1	89	1.1	U	1.1	U	1	U	1	U	1.1	U	1.2	U	1	U
Benzo(ghi)perylene	UG/L	0.18	4.49%		0	4	89	1.1	U	1.1	U	1	U	1	U	1.1	U	1.2	U	1	U
Benzo(k)fluoranthene	UG/L	0.091	1.12%		0	1	89	1.1	U	1.1	U	1	U	1	U	1.1	U	1.2	U	1	U
Bis(2-Ethylhexyl)phthalate	UG/L	230	3.37%	5	2	3	89	2.8	U	1.9	U	1	U	1	U	1.1	U	1.2	U	1	U
Butylbenzylphthalate	UG/L	0.064	1.12%		0	1	89	1.1	U	1.1	U	0.064	J	1	U	1.1	U	1.2	U	1	U
Di-n-butylphthalate	UG/L	0.21	8.99%		0	8	89	1.1	U	1.1	U	1	U	1	U	1.1	U	1.2	U	1	U
Di-n-octylphthalate	UG/L	0.41	6.74%		0	6	89	1.1	U	1.1	U	1	U	1	U	1.1	U	1.2	U	1	U
Diethyl phthalate	UG/L	4.3	13.48%		0	12	89	1.1	U	1.1	U	1	U	1	U	1.1	U	1.2	U	1	U
Indeno(1,2,3-cd)pyrene	UG/L	0.1	1.12%		0	1	89	1.1	U	1.1	U	1	U	1	U	1.1	U	1.2	U	1	U
Phenol	UG/L	0.43	5.62%	1	0	5	89	1.1	U	1.1	U	1	U	1	U	1.1	U	1.2	U	1	U
Pyrene	UG/L	0.08	2.25%		0	2	89	1.1	U	1.1	U	1	U	1	U	1.1	U	0.08	J	1	U
4,4'-DDT	UG/L	0.018	1.12%	0.2	0	1	89	0.011	U	0.011	U	0.01	U	0.01	U	0.011	U	0.012	U	0.01	U
Beta-BHC	UG/L	0.0034	1.12%	0.04	0	1	89	0.0053	U	0.0053	U	0.0051	U	0.0051	U	0.0053	U	0.0061	U	0.005	U
Gamma-Chlordane	UG/L	0.0056	1.12%		0	1	89	0.0053	U	0.0056		0.0051	U	0.0051	U	0.0053	U	0.0061	U	0.005	U
Heptachlor	UG/L	0.0029	1.12%	0.04	0	1	89	0.0053	U	0.0053	U	0.0051	U	0.0051	U	0.0053	U	0.0061	U	0.005	U
Aluminum	UG/L	9880	97.80%		0	89	91	15.8	U	46.5	J	791		37.9	J	44.5	J	540		182	J
Antimony	UG/L	43.2	7.69%	3	3	7	91	5.2	U	2.2	U	2.2	U	2.2	U	3.2	J	2.2	U	2.7	U
Arsenic	UG/L	5.1	14.29%	25	0	13	91	2.9	U	2.5	U	1.8	U	2.9	J	2.5	U	1.8	U	1.9	U
Barium	UG/L	189	100.00%	1000	0	91	91	165	J	160	J	117	J	137	J	134	J	39.7	J	27.7	J
Beryllium	UG/L	1.6	19.78%		0	18	91	0.3	U	0.1	U	0.1	U	0.86	J	1.6	J	0.1	U	0.2	U
Cadmium	UG/L	3.3	28.57%	5	0	26	91	0.91	J	0.2	U	0.3	U	0.2	U	0.39	J	0.43	J	0.3	U
Calcium	UG/L	260000	100.00%		0	91	91	156000		143000		145000		148000		149000		97000		80300	
Chromium	UG/L	18.5	43.96%	50	0	40	91	1.3	J	1	U	1.8	J	1	U	2.9	J	1.4	J	0.9	U
Cobalt	UG/L	15.2	19.78%		0	18	91	3.3	U	1.3	U	2.4	J	1.3	U	2.7	J	1.7	J	2	U
Copper	UG/L	25.1	52.75%	200	0	48	91	4.4	J	1.9	U	1	U	1.9	U	1.9	U	2.3	J	18	J
Iron	UG/L	20700	91.21%	300	44	83	91	17.1	U	20.3	U	1430		1840		1710		692	J	214	
Lead	UG/L	18.8	13.19%	25	0	12	91	0.9	U	1.3	UJ	0.9	U	1.3	UJ	1.3	UJ	0.9	U	1	U
Magnesium	UG/L	72800	100.00%		0	91	91	41700		37500		29800		29300		29700		15400		12300	
Manganese	UG/L	3280	98.90%	300	12	90	91	642		450		3280		3200		3120		130		109	
Mercury	UG/L	0.17	9.89%	0.7	0	9	91	0.1	U	0.1	U	0.1	UJ	0.1	U	0.1	U	0.1	UJ	0.1	U
Nickel	UG/L	38.8	52.75%	100	0	48	91	10.2	U	1.7	U	2.1	J	2	J	2.6	J	3.6	J	1.7	U
Potassium	UG/L	14200	100.00%		0	91	91	1260	J	1410	J	1640	J	1510	J	1850	J	3940	J	2710	J
Selenium	UG/L	6.5	21.98%	10	0	20	91	6.5	J	2.2	U	1.8	U	2.2	U	2.5	U	1.8	U	2.4	U
Silver	UG/L	5.2	38.46%	50	0	35	91	4.6	J	1.3	UJ	0.9	U	1.3	UJ	3	J	1.5	J	1.9	U
Sodium	UG/L	408000	100.00%	20000	24	91	91	4480	J	4680	J	4590	J	6760		6360		11000		34800	
Thallium	UG/L	7	41.76%		0	38	91	6	J	3.2	U	4.2	J	4.8	J	7	J	4.5	J	2.7	U
Vanadium	UG/L	18.3	28.57%		0	26	91	3.8	U	1.8	U	1.6	U	1.8	U	1.8	U	1.6	U	1.5	U
Zinc	UG/L	2640	93.41%		0	85	91	17.7	J	4.3	J	7	J	7.5	J	4.1	J	5.7	J	15.7	J

TABLE 4-X
SITE CHEMICAL DATA - GROUNDWATER
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12-29		MW12-29		MW12-30		MW12-30		MW12-31		MW12-31		MW12-32	
MATRIX								GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER	
SAMPLE ID								122014		122251		122013		122252		122032		122234		122020	
DEPTH TO TOP OF SAMPLE								14		14		13.7		14		10.5		0		11	
DEPTH TO BOTTOM OF SAMPLE								14		14		13.7		14		10.5		0		11	
SAMPLE DATE								14-Apr-99		13-Dec-99		14-Apr-99		13-Dec-99		24-Apr-99		3-Dec-99		20-Apr-99	
QC CODE								SA		SA		SA		SA		SA		SA		SA	
STUDY ID								RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1	
SAMPLE ROUND								1		2		1		2		1		2		1	
PARAMETER	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC CLASS GA STD.	NUMBER ABOVE STD.	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
1,1,1-Trichloroethane	UG/L	1.7	1.12%	5	0	1	89	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	1	U
1,2-Dichloroethene (total)	UG/L	30	14.29%	5	1	1	7														
Acetone	UG/L	9	6.74%		0	6	89	5	U	5	U	5	U	5	U	5	U	5	U	2	J
Toluene	UG/L	3.1	5.62%	5	0	5	89	1	U	0.4	J	1	U	0.28	J	1	U	0.5	U	1	U
Trichloroethene	UG/L	1600	3.37%	5	2	3	89	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U	1	U
1,4-Dichlorobenzene	UG/L	0.093	8.99%	3	0	8	89	1.1	U	1.1	U	1.2	U	1.1	U	1	UJ	1.1	UJ	1.2	U
Benzo(a)pyrene	UG/L	0.097	2.25%	0	0	2	89	1.1	U	1.1	U	1.2	U	1.1	U	1	U	1.1	UJ	1.2	U
Benzo(b)fluoranthene	UG/L	0.076	1.12%		0	1	89	1.1	U	1.1	U	1.2	U	1.1	U	1	U	1.1	UJ	1.2	U
Benzo(ghi)perylene	UG/L	0.18	4.49%		0	4	89	1.1	U	1.1	U	1.2	U	1.1	U	1	U	1.1	UJ	1.2	U
Benzo(k)fluoranthene	UG/L	0.091	1.12%		0	1	89	1.1	U	1.1	U	1.2	U	1.1	U	1	U	1.1	UJ	1.2	U
Bis(2-Ethylhexyl)phthalate	UG/L	230	3.37%	5	2	3	89	1.1	U	1.1	U	3.8	U	1.1	U	1	U	1.1	UJ	1.2	U
Butylbenzylphthalate	UG/L	0.064	1.12%		0	1	89	1.1	U	1.1	U	1.2	U	1.1	U	1	U	1.1	UJ	1.2	U
Di-n-butylphthalate	UG/L	0.21	8.99%		0	8	89	0.15	J	1.1	U	0.079	J	1.1	U	1	U	1.1	UJ	0.15	J
Di-n-octylphthalate	UG/L	0.41	6.74%		0	6	89	1.1	U	0.016	J	1.2	U	0.38	J	1	U	1.1	UJ	1.2	U
Diethyl phthalate	UG/L	4.3	13.48%		0	12	89	4.3		1.1	U	0.48	J	1.1	U	1	U	1.1	UJ	1.2	U
Indeno(1,2,3-cd)pyrene	UG/L	0.1	1.12%		0	1	89	1.1	U	1.1	U	1.2	U	1.1	U	1	U	1.1	UJ	1.2	U
Phenol	UG/L	0.43	5.62%	1	0	5	89	1.1	U	1.1	U	1.2	U	1.1	U	1	U	1.1	UJ	1.2	U
Pyrene	UG/L	0.08	2.25%		0	2	89	1.1	U	1.1	UJ	1.2	U	1.1	UJ	1	U	1.1	UJ	1.2	U
4,4'-DDT	UG/L	0.018	1.12%	0.2	0	1	89	0.01	U	0.011	U	0.01	U	0.011	U	0.01	U	0.01	U	0.01	U
Beta-BHC	UG/L	0.0034	1.12%	0.04	0	1	89	0.0051	U	0.0055	U	0.0052	U	0.0056	U	0.005	UJ	0.0053	U	0.0051	U
Gamma-Chlordane	UG/L	0.0056	1.12%		0	1	89	0.0051	U	0.0055	U	0.0052	U	0.0056	U	0.005	U	0.0053	U	0.0051	U
Heptachlor	UG/L	0.0029	1.12%	0.04	0	1	89	0.0051	U	0.0055	U	0.0052	U	0.0056	U	0.005	U	0.0053	U	0.0051	U
Aluminum	UG/L	9880	97.80%		0	89	91	30.8	J	101	J	200	J	662		57.3	J	491		67	J
Antimony	UG/L	43.2	7.69%	3	3	7	91	2.2	U	3.6	J	2.2	U	2.2	U	2.4	J	2.7	U	2.2	U
Arsenic	UG/L	5.1	14.29%	25	0	13	91	1.8	U	2.5	U	1.8	U	2.5	U	1.8	U	1.9	J	1.8	U
Barium	UG/L	189	100.00%	1000	0	91	91	78.2	J	84.1	J	53	J	56.9	J	39	J	51.8	J	54	J
Beryllium	UG/L	1.6	19.78%		0	18	91	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.2	U	0.1	U
Cadmium	UG/L	3.3	28.57%	5	0	26	91	0.3	U	0.2	U	0.3	U	0.2	U	0.3	U	0.3	U	0.3	U
Calcium	UG/L	260000	100.00%		0	91	91	102000		102000		92500		84900		112000	J	125000		112000	
Chromium	UG/L	18.5	43.96%	50	0	40	91	0.7	U	1	U	0.91	J	1	U	1.2	U	0.9	U	0.7	U
Cobalt	UG/L	15.2	19.78%		0	18	91	1.5	U	1.3	U	1.5	U	1.3	U	1.5	U	2	U	1.5	U
Copper	UG/L	25.1	52.75%	200	0	48	91	1	U	13.7	J	1.9	J	1.9	U	1.5	J	1.7	U	1.2	J
Iron	UG/L	20700	91.21%	300	44	83	91	46.7	J	134		252	J	630		43.7	J	490		80.5	J
Lead	UG/L	18.8	13.19%	25	0	12	91	0.9	U	1.3	UJ	0.9	U	1.3	UJ	0.9	U	1	UJ	1.3	J
Magnesium	UG/L	72800	100.00%		0	91	91	21600		21800		21500		20600		23300	J	24500		22500	
Manganese	UG/L	3280	98.90%	300	12	90	91	177		194		184		167		45.7	J	22.9		34.2	
Mercury	UG/L	0.17	9.89%	0.7	0	9	91	0.1	UJ	0.17	J	0.1	UJ	0.15	J	0.1	U	0.1	U	0.1	U
Nickel	UG/L	38.8	52.75%	100	0	48	91	2.6	J	1.7	U	3.9	J	2.1	J	2.7	J	1.7	U	1.6	J
Potassium	UG/L	14200	100.00%		0	91	91	4410	J	3640	J	6710		5030		2800	J	2100	J	3460	J
Selenium	UG/L	6.5	21.98%	10	0	20	91	1.8	U	2.2	U	1.8	U	2.2	U	1.8	UJ	2.4	U	2	J
Silver	UG/L	5.2	38.46%	50	0	35	91	0.9	U	1.3	UJ	0.9	U	1.3	UJ	0.9	U	1.9	U	1.2	J
Sodium	UG/L	408000	100.00%	20000	24	91	91	9100		9290		12300		13700		10100	J	12100		20700	
Thallium	UG/L	7	41.76%		0	38	91	5.2	J	3.2	U	5.6	J	3.2	U	1.9	U	2.7	U	5.7	J
Vanadium	UG/L	18.3	28.57%		0	26	91	1.6	U	1.8	U	1.6	U	1.8	U	1.6	U	1.5	U	1.6	U
Zinc	UG/L	2640	93.41%		0	85	91	10	J	18.9	J	20.5		9.9	J	8.4	J	5.3	J	5.3	J

TABLE 4-X
SITE CHEMICAL DATA - GROUNDWATER
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12-32		MW12-33		MW12-33		MW12-34		MW12-34		MW12-35		MW12-35	
MATRIX								GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER	
SAMPLE ID								122231		122022		122243		122045		122246		122028		122241	
DEPTH TO TOP OF SAMPLE								11.5		15.5		14		15		0		35		35	
DEPTH TO BOTTOM OF SAMPLE								11.5		15.5		14		15		0		35		35	
SAMPLE DATE								3-Dec-99		21-Apr-99		7-Dec-99		5-May-99		7-Dec-99		23-Apr-99		5-Dec-99	
QC CODE								SA		SA		SA		SA		SA		SA		SA	
STUDY ID								RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS	
SAMPLE ROUND			FREQUENCY OF	NYSDEC CLASS GA	NUMBER ABOVE	NUMBER OF	NUMBER OF	2		1		2		1		2		1		2	
PARAMETER	UNIT	MAXIMUM	DETECTION	STD.	STD.	DETECTS	ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
1,1,1-Trichloroethane	UG/L	1.7	1.12%	5	0	1	89	0.5	U	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U
1,2-Dichloroethene (total)	UG/L	30	14.29%	5	1	1	7														
Acetone	UG/L	9	6.74%		0	6	89	5	U	5	U	5	UJ	5	U	5	UJ	5	U	5	U
Toluene	UG/L	3.1	5.62%	5	0	5	89	0.5	UJ	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U
Trichloroethene	UG/L	1600	3.37%	5	2	3	89	0.5	UJ	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U
1,4-Dichlorobenzene	UG/L	0.093	8.99%	3	0	8	89	1.1	UJ	1.1	U	0.056	J	1	U	2.2	U	1.1	U	0.055	J
Benzo(a)pyrene	UG/L	0.097	2.25%	0	0	2	89	1.1	UJ	1.1	U	1	U	1	U	2.2	U	1.1	U	1	U
Benzo(b)fluoranthene	UG/L	0.076	1.12%		0	1	89	1.1	UJ	1.1	U	1	U	1	U	2.2	U	1.1	U	1	U
Benzo(ghi)perylene	UG/L	0.18	4.49%		0	4	89	1.1	UJ	1.1	U	1	U	1	U	2.2	U	1.1	U	1	U
Benzo(k)fluoranthene	UG/L	0.091	1.12%		0	1	89	1.1	UJ	1.1	U	1	U	1	U	2.2	U	1.1	U	1	U
Bis(2-Ethylhexyl)phthalate	UG/L	230	3.37%	5	2	3	89	1.1	UJ	1.1	U	1	U	1	U	13	U	1.1	U	1	U
Butylbenzylphthalate	UG/L	0.064	1.12%		0	1	89	1.1	UJ	1.1	U	1	U	1	U	2.2	U	1.1	U	1	U
Di-n-butylphthalate	UG/L	0.21	8.99%		0	8	89	1.1	UJ	1.1	U	1	U	1	U	2.2	U	1.1	U	1	U
Di-n-octylphthalate	UG/L	0.41	6.74%		0	6	89	1.1	UJ	1.1	U	1	U	1	U	2.2	U	1.1	U	1	U
Diethyl phthalate	UG/L	4.3	13.48%		0	12	89	1.1	UJ	1.1	U	1	U	0.067	J	2.2	U	1.1	U	1	U
Indeno(1,2,3-cd)pyrene	UG/L	0.1	1.12%		0	1	89	1.1	UJ	1.1	U	1	U	1	U	2.2	U	1.1	U	1	U
Phenol	UG/L	0.43	5.62%	1	0	5	89	1.1	UJ	1.1	U	1	U	1	U	2.2	U	1.1	U	1	U
Pyrene	UG/L	0.08	2.25%		0	2	89	1.1	UJ	1.1	U	1	U	1	U	2.2	U	1.1	U	1	UJ
4,4'-DDT	UG/L	0.018	1.12%	0.2	0	1	89	0.011	U	0.01	U	0.01	U	0.016	U	0.01	U	0.01	U	0.01	U
Beta-BHC	UG/L	0.0034	1.12%	0.04	0	1	89	0.0055	U	0.005	UJ	0.005	U	0.0081	U	0.005	U	0.0051	UJ	0.0051	U
Gamma-Chlordane	UG/L	0.0056	1.12%		0	1	89	0.0055	U	0.005	U	0.005	U	0.0081	U	0.005	U	0.0051	U	0.0051	U
Heptachlor	UG/L	0.0029	1.12%	0.04	0	1	89	0.0055	U	0.005	U	0.005	U	0.0081	U	0.005	U	0.0051	U	0.0051	U
Aluminum	UG/L	9880	97.80%		0	89	91	6670		513	J	71.5	J	65.4	J	246		174	J	48.6	J
Antimony	UG/L	43.2	7.69%	3	3	7	91	2.7	U	2.2	U	2.7	U	5.2	U	2.7	U	2.2	U	2.7	U
Arsenic	UG/L	5.1	14.29%	25	0	13	91	3.6	J	1.8	U	1.9	U	3.9	J	1.9	U	1.8	U	1.9	U
Barium	UG/L	189	100.00%	1000	0	91	91	97.6	J	144	J	137	J	83.7	J	49.5	J	84.6	J	77.1	J
Beryllium	UG/L	1.6	19.78%		0	18	91	0.2	U	0.1	U	0.2	U	0.3	U	0.2	U	0.1	U	0.2	U
Cadmium	UG/L	3.3	28.57%	5	0	26	91	0.3	U	0.3	U	0.3	U	1.1	J	0.3	U	0.3	U	0.3	U
Calcium	UG/L	260000	100.00%		0	91	91	132000		110000	J	113000		138000		153000		71200	J	70000	
Chromium	UG/L	18.5	43.96%	50	0	40	91	8.3	J	2.2	J	0.9	U	1.3	J	0.9	U	1.5	J	0.9	U
Cobalt	UG/L	15.2	19.78%		0	18	91	3.1	J	1.5	U	2	U	3.3	U	2	U	1.5	U	2	U
Copper	UG/L	25.1	52.75%	200	0	48	91	2.4	J	1.2	J	1.7	U	4.4	J	1.7	U	1.7	J	1.7	U
Iron	UG/L	20700	91.21%	300	44	83	91	**6930**		**1120**	J	69.1	J	68.9	J	**317**		211	J	126	
Lead	UG/L	18.8	13.19%	25	0	12	91	1	UJ	0.9	U	1	U	0.9	U	1	U	0.9	U	1	U
Magnesium	UG/L	72800	100.00%		0	91	91	24400		29100	J	30300		43000		45700		51200	J	49500	
Manganese	UG/L	3280	98.90%	300	12	90	91	112		57.8	J	36.3		161		218		22.1	J	24.2	
Mercury	UG/L	0.17	9.89%	0.7	0	9	91	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Nickel	UG/L	38.8	52.75%	100	0	48	91	8.3	J	1.6	J	1.7	U	10.2	U	4.6	J	1.4	U	1.7	U
Potassium	UG/L	14200	100.00%		0	91	91	3520	J	2130	J	1120	J	7260		5280		4810	J	4280	J
Selenium	UG/L	6.5	21.98%	10	0	20	91	2.4	U	1.8	U	2.4	U	1.8	J	2.4	U	1.8	U	2.4	U
Silver	UG/L	5.2	38.46%	50	0	35	91	2.3	J	0.9	U	1.9	U	4.8	J	1.9	U	0.9	U	1.9	J
Sodium	UG/L	408000	100.00%	20000	24	91	91	9020		6300	J	5750		18400		10900		**36400**	J	**39000**	
Thallium	UG/L	7	41.76%		0	38	91	2.7	U	1.9	U	2.7	U	4.8	J	2.7	U	1.9	U	2.7	U
Vanadium	UG/L	18.3	28.57%		0	26	91	12.6	J	1.6	U	1.5	U	3.8	U	1.5	U	1.6	U	1.5	U
Zinc	UG/L	2640	93.41%		0	85	91	17.6	J	4.6	J	3.2	J	8.9	J	9.9	J	3.1	U	4.1	J

TABLE 4-X
SITE CHEMICAL DATA - GROUNDWATER
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12-37		MW12-37		MW12-38		MW12-38		MW12-39		MW12-39		MW12-40	
MATRIX								GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER	
SAMPLE ID								122025		122257		122026		122253		122027		122250		122024	
DEPTH TO TOP OF SAMPLE								11		11		8.5		9		8.2		8.5		11.5	
DEPTH TO BOTTOM OF SAMPLE								11		11		8.5		9		8.2		8.5		11.5	
SAMPLE DATE								22-Apr-99		14-Dec-99		22-Apr-99		13-Dec-99		22-Apr-99		13-Dec-99		22-Apr-99	
QC CODE								SA		SA		SA		SA		SA		SA		SA	
STUDY ID								RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1	
SAMPLE ROUND			FREQUENCY OF	NYSDEC CLASS GA	NUMBER ABOVE	NUMBER OF	NUMBER OF	1		2		1		2		1		2		1	
PARAMETER	UNIT	MAXIMUM	DETECTION	STD.	STD.	DETECTS	ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
1,1,1-Trichloroethane	UG/L	1.7	1.12%	5	0	1	89	83	U	120	U	1	U	0.5	U	1	U	0.5	U	1	U
1,2-Dichloroethene (total)	UG/L	30	14.29%	5	1	1	7			30	J										
Acetone	UG/L	9	6.74%		0	6	89	420	U	120	U	5	U	5	U	6	U	5	U	5	U
Toluene	UG/L	3.1	5.62%	5	0	5	89	83	U	120	U	1	U	0.5	U	1	U	0.5	U	1	U
Trichloroethene	UG/L	1600	3.37%	5	2	3	89	1600		1600		1	U	0.5	U	1	U	0.5	U	0.5	J
1,4-Dichlorobenzene	UG/L	0.093	8.99%	3	0	8	89	1.2	U	1	U	1.1	U	1.1	U	1.1	U	1.2	U	1.1	U
Benzo(a)pyrene	UG/L	0.097	2.25%	0	0	2	89	1.2	U	1	U	1.1	U	1.1	U	0.058	J	1.2	U	0.097	J
Benzo(b)fluoranthene	UG/L	0.076	1.12%		0	1	89	1.2	U	1	U	1.1	U	1.1	U	1.1	U	1.2	U	0.076	J
Benzo(ghi)perylene	UG/L	0.18	4.49%		0	4	89	1.2	U	1	U	1.1	U	1.1	U	0.072	J	1.2	U	0.18	J
Benzo(k)fluoranthene	UG/L	0.091	1.12%		0	1	89	1.2	U	1	U	1.1	U	1.1	U	1.1	U	1.2	U	0.091	J
Bis(2-Ethylhexyl)phthalate	UG/L	230	3.37%	5	2	3	89	4.2	U		U	1.1	U	1.1	U	1.8	U	1.2	U	2.4	UJ
Butylbenzylphthalate	UG/L	0.064	1.12%		0	1	89	1.2	U	1	U	1.1	U	1.1	U	1.1	U	1.2	U	1.1	U
Di-n-butylphthalate	UG/L	0.21	8.99%		0	8	89	1.2	U	1	U	1.1	U	1.1	U	1.1	U	0.21	J	1.1	U
Di-n-octylphthalate	UG/L	0.41	6.74%		0	6	89	1.2	U	1	U	0.074	J	1.1	U	1.1	U	0.41	J	1.1	UJ
Diethyl phthalate	UG/L	4.3	13.48%		0	12	89	1.2	U	1	U	1.1	U	1.1	U	1.1	U	1.2	U	1.1	U
Indeno(1,2,3-cd)pyrene	UG/L	0.1	1.12%		0	1	89	1.2	U	1	U	1.1	U	1.1	U	1.1	U	1.2	U	0.1	J
Phenol	UG/L	0.43	5.62%	1	0	5	89	0.13	J	1	U	1.1	U	1.1	U	0.12	J	0.43	J	1.1	U
Pyrene	UG/L	0.08	2.25%		0	2	89	1.2	U	1	U	1.1	U	1.1	UJ	1.1	U	1.2	UJ	1.1	U
4,4'-DDT	UG/L	0.018	1.12%	0.2	0	1	89	0.01	U	0.012	U	0.01	U	0.011	U	0.01	U	0.012	U	0.01	U
Beta-BHC	UG/L	0.0034	1.12%	0.04	0	1	89	0.005	UJ	0.006	U	0.0052	UJ	0.0055	U	0.0051	UJ	0.0059	U	0.0052	UJ
Gamma-Chlordane	UG/L	0.0056	1.12%		0	1	89	0.005	U	0.006	U	0.0052	U	0.0055	U	0.0051	U	0.0059	U	0.0052	U
Heptachlor	UG/L	0.0029	1.12%	0.04	0	1	89	0.005	U	0.006	U	0.0052	U	0.0055	U	0.0051	U	0.0059	U	0.0052	U
Aluminum	UG/L	9880	97.80%		0	89	91	482	J	78.9	J	29.2	J	259		356	J	1550		309	J
Antimony	UG/L	43.2	7.69%	3	3	7	91	2.2	U	2.2	U	2.2	U	2.2	U	2.2	U	43.2	J	2.2	U
Arsenic	UG/L	5.1	14.29%	25	0	13	91	1.8	U	2.5	U	1.8	U	2.5	U	1.8	U	2.5	U	1.8	U
Barium	UG/L	189	100.00%	1000	0	91	91	95.4	J	90.7	J	108	J	128	J	48.8	J	80.4	J	47.7	J
Beryllium	UG/L	1.6	19.78%		0	18	91	0.1	U	0.17	J	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Cadmium	UG/L	3.3	28.57%	5	0	26	91	0.3	U	0.2	U	0.3	U	0.2	U	0.3	U	1.1	J	0.3	U
Calcium	UG/L	260000	100.00%		0	91	91	120000	J	103000		171000	J	169000		26000	J	34200		97600	J
Chromium	UG/L	18.5	43.96%	50	0	40	91	1.5	J	1	U	1.2	U	1	U	2.3	J	3.2	J	1.2	U
Cobalt	UG/L	15.2	19.78%		0	18	91	1.5	U	1.3	U	1.5	U	1.3	U	1.5	U	1.3	U	1.5	U
Copper	UG/L	25.1	52.75%	200	0	48	91	1.8	J	1.9	U	1	U	1.9	U	1.7	J	3.1	J	1	U
Iron	UG/L	20700	91.21%	300	44	83	91	677	J	69.5	J	18.9	J	289		182	J	2220		387	J
Lead	UG/L	18.8	13.19%	25	0	12	91	0.9	U	1.3	UJ	0.9	U	1.3	UJ	0.9	U	16.6	J	0.9	U
Magnesium	UG/L	72800	100.00%		0	91	91	22600	J	17300		35100	J	33400		3900	J	6790		19600	J
Manganese	UG/L	3280	98.90%	300	12	90	91	131	J	53.9		306	J	246		0.4	U	164		23.9	J
Mercury	UG/L	0.17	9.89%	0.7	0	9	91	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Nickel	UG/L	38.8	52.75%	100	0	48	91	8.6	J	1.7	U	9.9	J	8	J	2	J	4.1	J	2.6	J
Potassium	UG/L	14200	100.00%		0	91	91	4790	J	2620	J	6250	J	3420	J	14200	J	4720	J	2260	J
Selenium	UG/L	6.5	21.98%	10	0	20	91	1.8	U	2.2	U	1.8	U	2.2	U	1.8	U	2.2	U	1.8	U
Silver	UG/L	5.2	38.46%	50	0	35	91	1.5	J	2.4	J	0.9	U	1.3	UJ	0.9	U	1.3	UJ	0.9	U
Sodium	UG/L	408000	100.00%	20000	24	91	91	35600	J	48600		178000	J	234000		310000	J	408000		2870	J
Thallium	UG/L	7	41.76%		0	38	91	1.9	U	3.2	U	1.9	U	4.3	J	1.9	U	5.3	J	1.9	U
Vanadium	UG/L	18.3	28.57%		0	26	91	2.2	J	1.8	U	1.6	U	1.8	U	5.3	J	2.4	J	1.6	U
Zinc	UG/L	2640	93.41%		0	85	91	3.3	J	7.6	J	3.1	U	11.6	J	8.4	J	2640		11	J

TABLE 4-X
SITE CHEMICAL DATA - GROUNDWATER
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12-40		MW12-6		MW12A-1		MW12A-1		MW12A-1		MW12A-2		MW12A-2	
MATRIX								GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER	
SAMPLE ID								122254		122042		MW12A-1		122009		122256		MW12A-2		122010	
DEPTH TO TOP OF SAMPLE								12.3		9.5		4		13		9		4.3		11	
DEPTH TO BOTTOM OF SAMPLE								12.3		9.5		13		13		9		11.1		11	
SAMPLE DATE								13-Dec-99		4-May-99		20-Jul-94		13-Apr-99		14-Dec-99		20-Jul-94		13-Apr-99	
QC CODE								SA		SA		SA		SA		SA		SA		SA	
STUDY ID								RI P1S1 - Pu RS		RI PHASE 1 STEP 1		ESI		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		ESI		RI PHASE 1 STEP 1	
SAMPLE ROUND								2		1		0		1		2		0		1	
PARAMETER	UNIT	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC CLASS GA STD.	NUMBER ABOVE STD.	NUMBER OF DETECTS	NUMBER OF ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
1,1,1-Trichloroethane	UG/L	1.7	1.12%	5	0	1	89	1.7				10	U	1	U	0.5	U	10	U	1	U
1,2-Dichloroethene (total)	UG/L	30	14.29%	5	1	1	7					10	U					10	U		
Acetone	UG/L	9	6.74%		0	6	89	5	U			10	U	5	U	5	U	10	U	5	U
Toluene	UG/L	3.1	5.62%	5	0	5	89	0.5	U			10	U	1	U	0.26	J	10	U	1	U
Trichloroethene	UG/L	1600	3.37%	5	2	3	89	0.5	U			10	U	1	U	0.5	U	10	U	1	U
1,4-Dichlorobenzene	UG/L	0.093	8.99%	3	0	8	89	1.1	U			10	U	1.1	U	0.093	J	10	U	1.1	U
Benzo(a)pyrene	UG/L	0.097	2.25%	0	0	2	89	1.1	U			10	U	1.1	U	1.1	U	10	U	1.1	U
Benzo(b)fluoranthene	UG/L	0.076	1.12%		0	1	89	1.1	U			10	U	1.1	U	1.1	U	10	U	1.1	U
Benzo(ghi)perylene	UG/L	0.18	4.49%		0	4	89	1.1	U			10	U	1.1	U	1.1	U	10	U	1.1	U
Benzo(k)fluoranthene	UG/L	0.091	1.12%		0	1	89	1.1	U			10	U	1.1	U	1.1	U	10	U	1.1	U
Bis(2-Ethylhexyl)phthalate	UG/L	230	3.37%	5	2	3	89	1.1	U			10	U	1	U	1.1	U	10	U	1	U
Butylbenzylphthalate	UG/L	0.064	1.12%		0	1	89	1.1	U			10	U	1.1	U	1.1	U	10	U	1.1	U
Di-n-butylphthalate	UG/L	0.21	8.99%		0	8	89	1.1	U			10	U	1.1	U	1.1	U	10	U	1.1	U
Di-n-octylphthalate	UG/L	0.41	6.74%		0	6	89	1.1	U			10	U	1.1	U	1.1	U	10	U	1.1	U
Diethyl phthalate	UG/L	4.3	13.48%		0	12	89	1.1	U			10	U	1.1	U	1.1	U	10	U	1.1	U
Indeno(1,2,3-cd)pyrene	UG/L	0.1	1.12%		0	1	89	1.1	U			10	U	1.1	U	1.1	U	10	U	1.1	U
Phenol	UG/L	0.43	5.62%	1	0	5	89	1.1	U			10	U	1.1	U	1	UJ	10	U	1.1	U
Pyrene	UG/L	0.08	2.25%		0	2	89	1.1	U			10	U	1.1	U	1.1	U	10	U	1.1	U
4,4'-DDT	UG/L	0.018	1.12%	0.2	0	1	89	0.011	U			0.1	U	0.01	U	0.011	U	0.11	U	0.011	U
Beta-BHC	UG/L	0.0034	1.12%	0.04	0	1	89	0.0057	U			0.052	U	0.0052	U	0.0056	U	0.054	U	0.0056	U
Gamma-Chlordane	UG/L	0.0056	1.12%		0	1	89	0.0057	U			0.052	U	0.0052	U	0.0056	U	0.054	U	0.0056	U
Heptachlor	UG/L	0.0029	1.12%	0.04	0	1	89	0.0057	U			0.052	U	0.0052	U	0.0056	U	0.054	U	0.0056	U
Aluminum	UG/L	9880	97.80%		0	89	91	359		340		5840		348		142	J	2910		1190	
Antimony	UG/L	43.2	7.69%	3	3	7	91	2.2	U	5.2	U	1.3	U	2.2	U	2.2	U	1.3	U	2.2	U
Arsenic	UG/L	5.1	14.29%	25	0	13	91	2.5	U	4	J	2	U	1.8	U	2.5	U	2	U	1.8	U
Barium	UG/L	189	100.00%	1000	0	91	91	33	J	42.7	J	94.2	J	71.9	J	80.1	J	79.1	J	76.4	J
Beryllium	UG/L	1.6	19.78%		0	18	91	0.18	J	0.31	J	0.1	U	0.1	U	0.18	J	0.1	U	0.1	U
Cadmium	UG/L	3.3	28.57%	5	0	26	91	0.22	J	0.8	J	0.2	U	1.2	J	0.2	U	0.2	U	0.3	U
Calcium	UG/L	260000	100.00%		0	91	91	55800		100000		123000		134000		126000		108000		108000	
Chromium	UG/L	18.5	43.96%	50	0	40	91	1.5	J	1.2	U	9.4	J	0.7	U	1	U	4.1	J	1.3	J
Cobalt	UG/L	15.2	19.78%		0	18	91	2.1	J	3.3	U	6.2	J	1.5	U	1.5	J	2.4	J	1.5	U
Copper	UG/L	25.1	52.75%	200	0	48	91	1.9	J	5.2	J	11.7	J	1.9	J	1.9	U	4.5	J	2.1	J
Iron	UG/L	20700	91.21%	300	44	83	91	407	J	1060		9830	J	356	J	68.3	J	4030	J	1110	J
Lead	UG/L	18.8	13.19%	25	0	12	91	1.3	UJ	0.9	U	4.5		0.9	U	1.3	UJ	2	J	1	J
Magnesium	UG/L	72800	100.00%		0	91	91	6280		47800		32800		35700		34300		17500		16600	
Manganese	UG/L	3280	98.90%	300	12	90	91	8.8	J	41.2		223		7.9	J	5.3	J	237		51.8	
Mercury	UG/L	0.17	9.89%	0.7	0	9	91	0.1	U	0.1	U	0.08	J	0.1	UJ	0.1	U	0.05	J	0.1	UJ
Nickel	UG/L	38.8	52.75%	100	0	48	91	1.7	U	10.2	U	17.3	J	2.2	J	1.7	U	6.9	J	4.5	J
Potassium	UG/L	14200	100.00%		0	91	91	3120	J	2540	J	4180	J	1280	J	1380	J	2470	J	1440	J
Selenium	UG/L	6.5	21.98%	10	0	20	91	2.2	U	1.8	J	2.7	U	3.2	J	2.2	U	2.7	U	1.8	U
Silver	UG/L	5.2	38.46%	50	0	35	91	3.4	J	5.2	J	0.5	U	1.3	J	2.2	J	0.7	J	0.9	U
Sodium	UG/L	408000	100.00%	20000	24	91	91	13200		8740		9020		12800		19000		5120		5780	
Thallium	UG/L	7	41.76%		0	38	91	3.2	U	2.6	U	1.9	U	5.2	J	3.2	U	1.9	U	4.5	J
Vanadium	UG/L	18.3	28.57%		0	26	91	2.6	J	3.8	U	10	J	1.6	U	2	J	4.9	J	1.6	U
Zinc	UG/L	2640	93.41%		0	85	91	11.7	J	7.2	J	50.3		4	J	4.4	J	18.7	J	9.2	J

TABLE 4-X
SITE CHEMICAL DATA - GROUNDWATER
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

		FACILITY						SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
		LOCATION ID						MW12A-2		MW12A-3		MW12A-3		MW12A-3		MW12B-1		MW12B-1		MW12B-1	
		MATRIX						GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER	
		SAMPLE ID						122268		MW12A-3		122011		122249		MW12B-1		122021		122240	
		DEPTH TO TOP OF SAMPLE						9		3.4		13		12		5.3		17		17	
		DEPTH TO BOTTOM OF SAMPLE						9		14		13		12		17		17		17	
		SAMPLE DATE						17-Dec-99		20-Jul-94		13-Apr-99		8-Dec-99		19-Jul-94		21-Apr-99		6-Dec-99	
		QC CODE						SA		SA		SA		SA		SA		SA		SA	
		STUDY ID						RI P1S1 - Pu RS		ESI		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		ESI		RI PHASE 1 STEP 1		RI P1S1 - Pu RS	
SAMPLE ROUND			FREQUENCY OF	NYSDEC CLASS GA	NUMBER ABOVE	NUMBER OF	NUMBER OF	2		0		1		2		0		1		2	
PARAMETER	UNIT	MAXIMUM	DETECTION	STD.	STD.	DETECTS	ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
1,1,1-Trichloroethane	UG/L	1.7	1.12%	5	0	1	89	0.5	U	10	U	1	U	0.5	U	10	U	1	U	0.5	U
1,2-Dichloroethene (total)	UG/L	30	14.29%	5	1	1	7			10	U					10	U				
Acetone	UG/L	9	6.74%		0	6	89	5	U	9	J	5	U	5	UJ	10	U	5	U	5	U
Toluene	UG/L	3.1	5.62%	5	0	5	89	0.5	U	10	U	1	U	0.5	U	10	U	1	U	0.5	U
Trichloroethene	UG/L	1600	3.37%	5	2	3	89	0.5	U	10	U	1	U	0.5	U	10	U	1	U	0.5	U
1,4-Dichlorobenzene	UG/L	0.093	8.99%	3	0	8	89	0.068	J	11	U	1.1	U	1	U	11	U	1	U	1	U
Benzo(a)pyrene	UG/L	0.097	2.25%	0	0	2	89	1	U	11	U	1.1	U	1	U	11	U	1	U	1	U
Benzo(b)fluoranthene	UG/L	0.076	1.12%		0	1	89	1	U	11	U	1.1	U	1	U	11	U	1	U	1	U
Benzo(ghi)perylene	UG/L	0.18	4.49%		0	4	89	1	U	11	U	1.1	U	1	U	11	U	1	U	1	U
Benzo(k)fluoranthene	UG/L	0.091	1.12%		0	1	89	1	U	11	U	1.1	U	1	U	11	U	1	U	1	U
Bis(2-Ethylhexyl)phthalate	UG/L	230	3.37%	5	2	3	89	1	U	11	U	1	U	1	U	11	U	1.3	U	1	U
Butylbenzylphthalate	UG/L	0.064	1.12%		0	1	89	1	U	11	U	1.1	U	1	U	11	U	1	U	1	U
Di-n-butylphthalate	UG/L	0.21	8.99%		0	8	89	1	U	11	U	1.1	U	1	U	11	U	1	U	1	U
Di-n-octylphthalate	UG/L	0.41	6.74%		0	6	89	1	U	11	U	1.1	U	1	U	11	U	1	U	1	U
Diethyl phthalate	UG/L	4.3	13.48%		0	12	89	1	U	11	U	1.1	U	0.08	J	11	U	1	U	1	U
Indeno(1,2,3-cd)pyrene	UG/L	0.1	1.12%		0	1	89	1	U	11	U	1.1	U	1	U	11	U	1	U	1	U
Phenol	UG/L	0.43	5.62%	1	0	5	89	1	U	11	U	0.12	J	1	U	11	U	1	U	1	U
Pyrene	UG/L	0.08	2.25%		0	2	89	1	U	11	U	0.057	J	1	U	11	U	1	U	1	UJ
4,4'-DDT	UG/L	0.018	1.12%	0.2	0	1	89	0.011	U	0.11	U	0.01	U	0.01	U	0.12	U	0.01	U	0.011	U
Beta-BHC	UG/L	0.0034	1.12%	0.04	0	1	89	0.0053	U	0.054	U	0.0052	U	0.005	U	0.058	U	0.005	UJ	0.0054	U
Gamma-Chlordane	UG/L	0.0056	1.12%		0	1	89	0.0053	U	0.054	U	0.0052	U	0.005	U	0.058	U	0.005	U	0.0054	U
Heptachlor	UG/L	0.0029	1.12%	0.04	0	1	89	0.0053	U	0.054	U	0.0052	U	0.005	U	0.058	U	0.005	U	0.0054	U
Aluminum	UG/L	9880	97.80%		0	89	91	1180		1040		230		174	J	4860	J	103	J	136	J
Antimony	UG/L	43.2	7.69%	3	3	7	91	2.2	U	1.3	U	2.2	U	2.7	U	1.4	J	2.2	U	2.7	U
Arsenic	UG/L	5.1	14.29%	25	0	13	91	2.5	U	2	U	1.8	U	1.9	U	3.2	J	1.8	U	1.9	U
Barium	UG/L	189	100.00%	1000	0	91	91	79.5	J	146	J	151	J	151	J	102	J	64.4	J	89.3	J
Beryllium	UG/L	1.6	19.78%		0	18	91	0.1	U	0.1	U	0.1	U	0.2	U	0.21	J	0.1	U	0.2	U
Cadmium	UG/L	3.3	28.57%	5	0	26	91	0.2	U	0.2	U	1.1	J	0.3	U	0.2	U	0.3	U	0.3	U
Calcium	UG/L	260000	100.00%		0	91	91	104000		109000		114000		115000		183000		142000	J	159000	
Chromium	UG/L	18.5	43.96%	50	0	40	91	1	U	1.7	J	0.7	U	0.9	U	9.8	J	1.2	U	0.9	U
Cobalt	UG/L	15.2	19.78%		0	18	91	1.3	U	1.1	J	1.5	U	2	U	8	J	1.5	U	2	U
Copper	UG/L	25.1	52.75%	200	0	48	91	1.9	U	1.3	J	1.1	J	1.7	U	16.8	J	1	U	1.7	U
Iron	UG/L	20700	91.21%	300	44	83	91	**740**		**2140**	J	292	J	246		**10500**		161	J	90	J
Lead	UG/L	18.8	13.19%	25	0	12	91	1.3	UJ	0.89	U	0.9	U	1	U	11		0.9	U	1	U
Magnesium	UG/L	72800	100.00%		0	91	91	15800		29900		29500		29500		46800		45900	J	46400	
Manganese	UG/L	3280	98.90%	300	12	90	91	58.2		77		38.1		37.2		**536**		22.4	J	24.8	
Mercury	UG/L	0.17	9.89%	0.7	0	9	91	0.1	U	0.06	J	0.1	UJ	0.1	U	0.08	J	0.1	U	0.1	U
Nickel	UG/L	38.8	52.75%	100	0	48	91	3.7	J	2.6	J	1.4	U	1.7	U	24.4	J	4.2	J	4.3	J
Potassium	UG/L	14200	100.00%		0	91	91	1320	J	4730	J	1770	J	1630	J	13000	J	1890	J	1970	J
Selenium	UG/L	6.5	21.98%	10	0	20	91	2.2	U	2.7	U	2	J	2.4	U	2.7	U	1.8	U	2.4	U
Silver	UG/L	5.2	38.46%	50	0	35	91	1.3	UJ	0.5	U	0.9	U	1.9	U	2.7	J	0.9	U	1.9	U
Sodium	UG/L	408000	100.00%	20000	24	91	91	8930		8770		6590		7020		18500		**31400**	J	**43500**	
Thallium	UG/L	7	41.76%		0	38	91	3.2	U	1.9	U	4	J	2.7	U	2.8	J	1.9	U	2.7	U
Vanadium	UG/L	18.3	28.57%		0	26	91	1.8	U	2.2	J	1.6	U	1.5	U	9.5	J	1.6	U	1.5	U
Zinc	UG/L	2640	93.41%		0	85	91	13.4	J	18.6	J	3.9	J	3.1	J	32.8		3.1	U	5.2	J

TABLE 4-X
SITE CHEMICAL DATA - GROUNDWATER
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12B-2		MW12B-2		MW12B-2		MW12B-3		MW12B-3		MW12B-3		MW12-6	
MATRIX								GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER	
SAMPLE ID								MW12B-2		122031		122239		MW12B-3		122030		122238		122220	
DEPTH TO TOP OF SAMPLE								3.9		14		14		4.6		14		10		9.5	
DEPTH TO BOTTOM OF SAMPLE								12.9		14		14		13.5		14		10		9.5	
SAMPLE DATE								19-Jul-94		23-Apr-99		6-Dec-99		19-Jul-94		23-Apr-99		6-Dec-99		12/7/1999	
QC CODE								SA		SA		SA		SA		SA		SA		SA	
STUDY ID								ESI		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		ESI		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI P1S1 - Pu RS	
SAMPLE ROUND			FREQUENCY OF	NYSDEC CLASS GA	NUMBER ABOVE	NUMBER OF	NUMBER OF	0		1		2		0		1		2		2	
PARAMETER	UNIT	MAXIMUM	DETECTION	STD.	STD.	DETECTS	ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
1,1,1-Trichloroethane	UG/L	1.7	1.12%	5	0	1	89	10	U	1	U	0.5	U	10	U	1	U	0.5	U		
1,2-Dichloroethene (total)	UG/L	30	14.29%	5	1	1	7	10	U					10	U						
Acetone	UG/L	9	6.74%		0	6	89	10	U	5	U	5	U	10	U	5	U	5	U		
Toluene	UG/L	3.1	5.62%	5	0	5	89	10	U	1	U	0.5	U	10	U	1	U	0.5	U		
Trichloroethene	UG/L	1600	3.37%	5	2	3	89	10	U	1	U	0.5	U	10	U	1	U	0.5	U		
1,4-Dichlorobenzene	UG/L	0.093	8.99%	3	0	8	89	11	U	1	U	1	U	10	U	1	U	1	U		
Benzo(a)pyrene	UG/L	0.097	2.25%	0	0	2	89	11	U	1	U	1	U	10	U	1	U	1	U		
Benzo(b)fluoranthene	UG/L	0.076	1.12%		0	1	89	11	U	1	U	1	U	10	U	1	U	1	U		
Benzo(ghi)perylene	UG/L	0.18	4.49%		0	4	89	11	U	1	U	1	U	10	U	0.075	J	1	U		
Benzo(k)fluoranthene	UG/L	0.091	1.12%		0	1	89	11	U	1	U	1	U	10	U	1	U	1	U		
Bis(2-Ethylhexyl)phthalate	UG/L	230	3.37%	5	2	3	89	11	U	1.6	U	1	U	10	U	1	U	1	U		
Butylbenzylphthalate	UG/L	0.064	1.12%		0	1	89	11	U	1	U	1	U	10	U	1	U	1	U		
Di-n-butylphthalate	UG/L	0.21	8.99%		0	8	89	11	U	1	U	1	U	10	U	1	U	1	U		
Di-n-octylphthalate	UG/L	0.41	6.74%		0	6	89	11	U	1	U	1	U	10	U	1	U	1	U		
Diethyl phthalate	UG/L	4.3	13.48%		0	12	89	11	U	1	U	1	U	10	U	1	U	0.074	J		
Indeno(1,2,3-cd)pyrene	UG/L	0.1	1.12%		0	1	89	11	U	1	U	1	U	10	U	1	U	1	U		
Phenol	UG/L	0.43	5.62%	1	0	5	89	11	U	1	U	1	U	10	U	1	U	1	U		
Pyrene	UG/L	0.08	2.25%		0	2	89	11	U	1	U	1	UJ	10	U	1	U	1	U		
4,4'-DDT	UG/L	0.018	1.12%	0.2	0	1	89	0.12	U	0.01	U	0.011	U	0.11	U	0.01	U	0.01	U		
Beta-BHC	UG/L	0.0034	1.12%	0.04	0	1	89	0.058	U	0.0051	UJ	0.0053	U	0.056	U	0.005	UJ	0.0051	U		
Gamma-Chlordane	UG/L	0.0056	1.12%		0	1	89	0.058	U	0.0051	U	0.0053	U	0.056	U	0.005	U	0.0051	U		
Heptachlor	UG/L	0.0029	1.12%	0.04	0	1	89	0.058	U	0.0051	U	0.0053	U	0.056	U	0.005	U	0.0051	U		
Aluminum	UG/L	9880	97.80%		0	89	91	9880	J	23.9	J	28.3	J	6940	J	201	J	168	J	260	
Antimony	UG/L	43.2	7.69%	3	3	7	91	1.3	U	2.2	U	2.7	U	1.3	U	2.2	U	2.7	U	2.7	U
Arsenic	UG/L	5.1	14.29%	25	0	13	91	3	J	1.8	U	1.9	U	2	U	1.8	U	1.9	U	3.6	J
Barium	UG/L	189	100.00%	1000	0	91	91	171	J	68.3	J	70.7	J	189	J	134	J	133	J	46.2	J
Beryllium	UG/L	1.6	19.78%		0	18	91	0.71	J	0.1	U	0.2	U	0.41	J	0.1	U	0.2	U	0.2	U
Cadmium	UG/L	3.3	28.57%	5	0	26	91	0.26	J	0.3	U	0.3	U	0.27	J	0.3	U	0.3	U	0.3	U
Calcium	UG/L	260000	100.00%		0	91	91	260000		164000	J	168000		169000		130000	J	117000		108000	
Chromium	UG/L	18.5	43.96%	50	0	40	91	18.5		1.4	J	0.9	U	13.5		1.3	J	0.9	U	0.9	U
Cobalt	UG/L	15.2	19.78%		0	18	91	15.2	J	1.5	U	2	U	12	J	1.5	U	2	U	2	U
Copper	UG/L	25.1	52.75%	200	0	48	91	25.1		1	U	1.7	U	19	J	1	U	2.1	J	1.7	U
Iron	UG/L	20700	91.21%	300	44	83	91	20700		14.9	U	25.4	U	14700		207	J	118		985	J
Lead	UG/L	18.8	13.19%	25	0	12	91	18.6		0.9	U	1	UJ	18.8		0.9	U	1	U	1	U
Magnesium	UG/L	72800	100.00%		0	91	91	71100		62400	J	57500		37900		39900	J	31700		49200	
Manganese	UG/L	3280	98.90%	300	12	90	91	800		52.6	J	40.8		522		6.3	J	5.1	J	38.6	
Mercury	UG/L	0.17	9.89%	0.7	0	9	91	0.05	J	0.1	U	0.1	U	0.05	J	0.1	U	0.1	U	0.1	UJ
Nickel	UG/L	38.8	52.75%	100	0	48	91	38.8	J	2.4	J	2.1	J	32.5	J	1.4	U	1.7	U	1.7	U
Potassium	UG/L	14200	100.00%		0	91	91	5510	J	2220	J	2060	J	2900	J	1290	J	909	J	2800	J
Selenium	UG/L	6.5	21.98%	10	0	20	91	2.7	U	1.8	U	2.4	U	2.7	U	1.8	U	3	J	2.4	UJ
Silver	UG/L	5.2	38.46%	50	0	35	91	0.59	J	0.9	U	1.9	U	0.62	J	0.9	U	1.9	U	1.9	UJ
Sodium	UG/L	408000	100.00%	20000	24	91	91	16400		19200	J	21500		4510	J	9120	J	5850		9100	
Thallium	UG/L	7	41.76%		0	38	91	1.9	U	1.9	U	3.5	J	5	J	1.9	U	2.7	U	2.7	U
Vanadium	UG/L	18.3	28.57%		0	26	91	18.3	J	1.6	U	1.5	U	12.7	J	1.6	U	1.5	U	1.5	U
Zinc	UG/L	2640	93.41%		0	85	91	55.7		7.8	J	2.6	J	41.1		3.1	U	3.9	J	4.4	J

TABLE 4-X
SITE CHEMICAL DATA - GROUNDWATER
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY

FACILITY								SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12		SEAD-12	
LOCATION ID								MW12-7		MW12-7		MW12-7		MW12-8		MW12-8		MW12-9		MW12-9	
MATRIX								GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER		GROUND WATER	
SAMPLE ID								122048		122044		122272		122046		122258		122050		122245	
DEPTH TO TOP OF SAMPLE								14		14		13		13		13.86		15		16	
DEPTH TO BOTTOM OF SAMPLE								14		14		13		13		13.86		15		16	
SAMPLE DATE								5/5/1999		5/5/1999		12/18/1999		5/6/1999		12/14/1999		5/6/1999		12/7/1999	
QC CODE								DU		SA		SA		SA		SA		SA		SA	
STUDY ID								RI PHASE 1 STEP 1		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS		RI PHASE 1 STEP 1		RI P1S1 - Pu RS	
SAMPLE ROUND			FREQUENCY OF	NYSDEC CLASS GA	NUMBER ABOVE	NUMBER OF	NUMBER OF	1		1		2		1		2		1		2	
PARAMETER	UNIT	MAXIMUM	DETECTION	STD.	STD.	DETECTS	ANALYSES	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)	VALUE	(Q)
1,1,1-Trichloroethane	UG/L	1.7	1.12%	5	0	1	89	1	U	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U
1,2-Dichloroethene (total)	UG/L	30	14.29%	5	1	1	7														
Acetone	UG/L	9	6.74%		0	6	89	5	U	5	U	5	U	5	U	5	U	5	U	5	UJ
Toluene	UG/L	3.1	5.62%	5	0	5	89	1	U	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U
Trichloroethene	UG/L	1600	3.37%	5	2	3	89	1	U	1	U	0.5	U	1	U	0.5	U	1	U	0.5	U
1,4-Dichlorobenzene	UG/L	0.093	8.99%	3	0	8	89	1	U	1	U	1.2	U	1	U	1.2	U	1	U	0.063	J
Benzo(a)pyrene	UG/L	0.097	2.25%	0	0	2	89	1	U	1	U	1.2	U	1	U	1.2	U	1	U	1.2	U
Benzo(b)fluoranthene	UG/L	0.076	1.12%		0	1	89	1	U	1	U	1.2	U	1	U	1.2	U	1	U	1.2	U
Benzo(ghi)perylene	UG/L	0.18	4.49%		0	4	89	1	U	1	U	1.2	U	1	U	1.2	U	1	U	1.2	U
Benzo(k)fluoranthene	UG/L	0.091	1.12%		0	1	89	1	U	1	U	1.2	U	1	UJ	1.2	U	1	UJ	1.2	U
Bis(2-Ethylhexyl)phthalate	UG/L	230	3.37%	5	2	3	89	1.1	U	1	U	1.2	U	1	U	1.6		1	U	1.2	U
Butylbenzylphthalate	UG/L	0.064	1.12%		0	1	89	1	U	1	U	1.2	U	1	U	1.2	U	1	U	1.2	U
Di-n-butylphthalate	UG/L	0.21	8.99%		0	8	89	1	U	1	U	1.2	U	0.16	J	0.08	J	1	U	1.2	U
Di-n-octylphthalate	UG/L	0.41	6.74%		0	6	89	1	U	1	U	1.2	U	1	U	1.2	U	1	U	1.2	U
Diethyl phthalate	UG/L	4.3	13.48%		0	12	89	1	U	1	U	1.2	U	0.055	J	1.2	U	0.05	J	1.2	U
Indeno(1,2,3-cd)pyrene	UG/L	0.1	1.12%		0	1	89	1	U	1	U	1.2	U	1	U	1.2	U	1	U	1.2	U
Phenol	UG/L	0.43	5.62%	1	0	5	89	1	U	1	U	1.2	U	1	U	1.2	U	1	U	1.2	U
Pyrene	UG/L	0.08	2.25%		0	2	89	1	U	1	U	1.2	U	1	U	1.2	U	1	U	1.2	U
4,4'-DDT	UG/L	0.018	1.12%	0.2	0	1	89	0.01	U	0.01	U	0.01	U	0.017	U	0.011	U	0.014	U	0.01	U
Beta-BHC	UG/L	0.0034	1.12%	0.04	0	1	89	0.005	U	0.0051	U	0.0051	U	0.0085	U	0.0054	U	0.007	U	0.0052	U
Gamma-Chlordane	UG/L	0.0056	1.12%		0	1	89	0.005	U	0.0051	U	0.0051	U	0.0085	U	0.0054	U	0.007	U	0.0052	U
Heptachlor	UG/L	0.0029	1.12%	0.04	0	1	89	0.005	U	0.0051	U	0.0051	U	0.0085	U	0.0054	U	0.007	U	0.0052	U
Aluminum	UG/L	9880	97.80%		0	89	91	74.6	J	65.3	J	34.2	J	259		146	J	25.1	J	89.1	J
Antimony	UG/L	43.2	7.69%	3	3	7	91	5.2	U	5.2	U	2.2	U	5.2	U	2.2	U	5.2	U	2.7	U
Arsenic	UG/L	5.1	14.29%	25	0	13	91	2.9	U	2.9	U	2.5	U	5.1	J	2.5	U	2.9	U	1.9	U
Barium	UG/L	189	100.00%	1000	0	91	91	49.9	J	49.6	J	64.5	J	66.1	J	60.7	J	67	J	55.3	J
Beryllium	UG/L	1.6	19.78%		0	18	91	0.3	U	0.3	U	0.1	U	0.3	U	0.16	J	0.3	U	0.2	U
Cadmium	UG/L	3.3	28.57%	5	0	26	91	2	J	0.9	J	0.2	U	3.3	J	0.2	U	0.77	J	0.3	U
Calcium	UG/L	260000	100.00%		0	91	91	113000		113000		104000		86500		80600		116000		125000	
Chromium	UG/L	18.5	43.96%	50	0	40	91	1.2	U	1.2	U	1	U	1.4	J	1.4	J	1.2	U	1	J
Cobalt	UG/L	15.2	19.78%		0	18	91	3.3	U	3.3	U	1.3	U	3.3	U	1.9	J	3.3	U	2	U
Copper	UG/L	25.1	52.75%	200	0	48	91	3.2	J	4.1	J	15.8	J	4.2	J	1.9	U	3.8	J	1.7	U
Iron	UG/L	20700	91.21%	300	44	83	91	94.4	J	86.2	J	20.3	U	384		166	J	19.3	J	197	
Lead	UG/L	18.8	13.19%	25	0	12	91	0.99	J	0.9	U	1.3	UJ	0.9	U	1.3	UJ	0.9	U	1	U
Magnesium	UG/L	72800	100.00%		0	91	91	27000		26900		24200		20600		17300		29400		28100	
Manganese	UG/L	3280	98.90%	300	12	90	91	90.4		92.2		21.2		21.7		7.6	J	138		27.4	
Mercury	UG/L	0.17	9.89%	0.7	0	9	91	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U	0.1	U
Nickel	UG/L	38.8	52.75%	100	0	48	91	10.2	U	10.2	U	1.9	J	10.2	U	1.7	U	10.2	U	1.7	U
Potassium	UG/L	14200	100.00%		0	91	91	2740	J	2620	J	2310	J	4640	J	2120	J	5710		2650	J
Selenium	UG/L	6.5	21.98%	10	0	20	91	1.8	J	1.8	J	2.2	U	1.8	J	2.2	U	1.9	J	2.4	U
Silver	UG/L	5.2	38.46%	50	0	35	91	3.9	J	5	J	1.3	UJ	4.1	J	3.7	J	4.2	J	2.6	J
Sodium	UG/L	408000	100.00%	20000	24	91	91	13500		13400		14000		9340		7700		12000		8310	
Thallium	UG/L	7	41.76%		0	38	91	2.6	U	2.6	U	3.2	U	4.5	J	3.2	U	2.6	U	3.3	J
Vanadium	UG/L	18.3	28.57%		0	26	91	3.8	U	3.8	U	1.8	U	3.8	U	3	J	3.8	U	1.5	U
Zinc	UG/L	2640	93.41%		0	85	91	22.9		13.4	J	3.3	J	8.1	J	18.5	J	2.7	J	3.8	J

5.0 CONTAMINANT FATE AND TRANSPORT

This section 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 two sections. The first section addresses physical, chemical, and radiological characteristics as a conceptual model of SEAD-12 and the second section deals with the fate and transport of individual contaminants.

5.1 CONCEPTUAL SITE MODEL OF SEAD-12

The conceptual site model defines the physical, chemical, and radiological setting. This conceptual site model combines historical site information with the data collected during the remedial investigation field activities. This includes geophysical and radiological survey data, field observations, and analytical data associated with the nine (9) primary potential source areas and other select areas within SEAD-12.

5.1.1 Summary of Physical Site Characteristics

The site-wide physical characteristics of SEAD-12 have been described in the preceding sections. In summary, SEAD-12 encompasses approximately 360 acres located in the northern portion of SEDA (see **Figure 1-1**). Beginning immediately north of the northern most row of storage igloos, SEAD-12 covers the majority of the area formerly known as the Weapons Storage Area (WSA) or Q Area, which occupies the northern most portion of the ammo area. A total of 16 buildings of various size and construction are within the site. The remaining area is predominantly open fields, with randomly scattered small evergreen and deciduous trees, an eastern grove of hardwood trees, and a small grove of mixed soft and hardwood trees in the north. A network of paved roads provides access to buildings and parking areas across the area. The SEDA railroad tracks lead into the site from the southeast and terminate south of Building 816. A small seasonal wetland exits in the east-central portion of the site.

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 16.5 feet. In developed area, and areas of past disposal activity, fill overlies the till. At disposal pit locations, the till layer may be completely removed, having been replaced with fill. Till, including the weathered shale immediately below the till, and the underlying competent shale/limestone are the two distinct geologic units at SEAD-12 that store and transmit groundwater. The till and weathered shale behave as a single unconfined hydrological unit. The groundwater flow direction in the SEAD-12 till/weathered shale aquifer is generally toward the west (1999 gauging events). It is apparent from the groundwater contours and saturated thickness of the till/weathered shale aquifer that seasonal precipitation events and depth to bedrock influence the groundwater flow direction.

Meteorological and physical site conditions that may impact the fate and transport at SEAD-12 have been described in **Section 1** and **Section 3**.

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, subsurface soils), impacts associated with inorganics (i.e., metals), VOCs, SVOCs, and pesticide/PCB compounds occur at SEAD-12.

The SEAD-12 chemical analyses found that subsurface soils (207 samples) were impacted primarily by metals, and to a lesser degree by SVOCs (refer to **Table 4-33**). Twenty-one inorganic compounds (metals and cyanide) exceeded the TAGM values for the site, with at least one TAGM exceedence for metals in each of the nine potential release areas where samples were collected (no subsurface samples were collect in the Waste Water Treatment plant area). However, only cadmium, copper, chromium, lead, mercury, silver and zinc were detected at significant frequency and concentration above their respective TAGM values. Specific areas with the SVOCs and metals of concern include:

- Disposal Pit A/B – Phenol, Cadmium, Chromium, Copper, Lead, Silver, and Zinc;
- Disposal Pit C – Lead; and
- EM-5 – Polycyclic Aromatic Hydrocarbons (PAHs), Lead.

Other constituents that were detected, but are considered to pose little impact, include metals not listed above, volatile organic compounds, and pesticides and PCBs. These constituents were infrequently detected above their respective TAGM values.

The surface soil chemical analyses (115 samples) found four potential release areas to be potentially impacted by SVOCs or metals (refer to **Table 4- 32**). These are:

- Building 819/ EM-27 – PAHs;
- Building 815, Building 816/ EM-28 – Cadmium;
- EM-5 – Lead; and
- Class III
    - near Building 813 – PAHs.
    - Unnamed Creek - Hg

Other constituents that were detected, but are considered to pose little impact, include metals not listed above. Such metals were infrequently detected above their respective TAGM values.

As summarized in **Section 4.6.1.2**, groundwater at the site has been impacted by VOCs, SVOCs, and metals. Iron, manganese, and sodium exceed the AWQS GA standard on numerous occasions. The most significant impact on groundwater is due to the presence of two VOCs (1,2-Dichloroethene-total and Trichloroethene). TCE was detected at 1600 μg/L and 1,2-Dichloroethene was detected at 30 ug/L at MW 12-37. These detections were confirmed in both rounds of sampling. Bis(2-Ethylhexyl)phthalate was the only semivolatile compound found in the groundwater. Two exceedences occurred at different well locations.

In the surface water samples, seven metals were found at concentrations above the respective NYS AWQS Class C standard. Other constituents were detected such as SVOCs and pesticides/PCBs, but are considered to pose little impact.

Sediment at the site has been impacted by SVOCs, pesticides/PCBs, and metals. For the metals, the exceedences were often only slightly above their respective TAGM values. Of the twelve metals found at concentrations above the NYSDEC sediment criteria values, cadmium, chromium, copper, lead, nickel, and zinc were detected most frequently at concentrations greater than the criteria value.

5.1.3 Summary of Radiological Impacts

Radionuclide data for the soils within each potential release area were presented and discussed in detail in **Section 4.3**. **Table 4-34** summarized the various radionuclides in surface and subsurface soils that exceed background, and residential or worker derived concentration guideline levels (DCGLs) within each of the potential release areas. Among the nine areas, fourteen different radionuclides were found to have an average activity that statistically exceeded background radiation levels using the Wilcoxon Rank Sum (WRS) test. When statistically (WRS test) compared to the DCGL for a residential use scenario, six radionuclides (Bismuth-214, Lead-210, Lead-214, Lead-211, Thorium-230, and Thorium-232) exceed the criteria, with at least one exceedence within each of the potential release areas. Using the worker scenario, only Pb-210 and Radium-226 exceed exposure criteria in two areas. These worker scenario exceedences occur at EM-5 for both Ra-226 and Pb-210 and EM-6 potential release areas for Ra-226 only. Based on additional statistical analysis of the Ra-226 detected both in background and within each of the nine potential release areas and discussed in **Section 4.7**, Ra-226 was not considered to be distinguishable from background concentrations.

Surface water, sediment, and groundwater radiological analytical results were compared to background data sets for the same media for the entire site (**Table 4-36**). For surface water and sediment samples, background data were compared to on-site samples and downgradient samples. Groundwater and surface water samples were also compared to available groundwater standards. Radionuclides statistically elevated above background for each media are as follows:

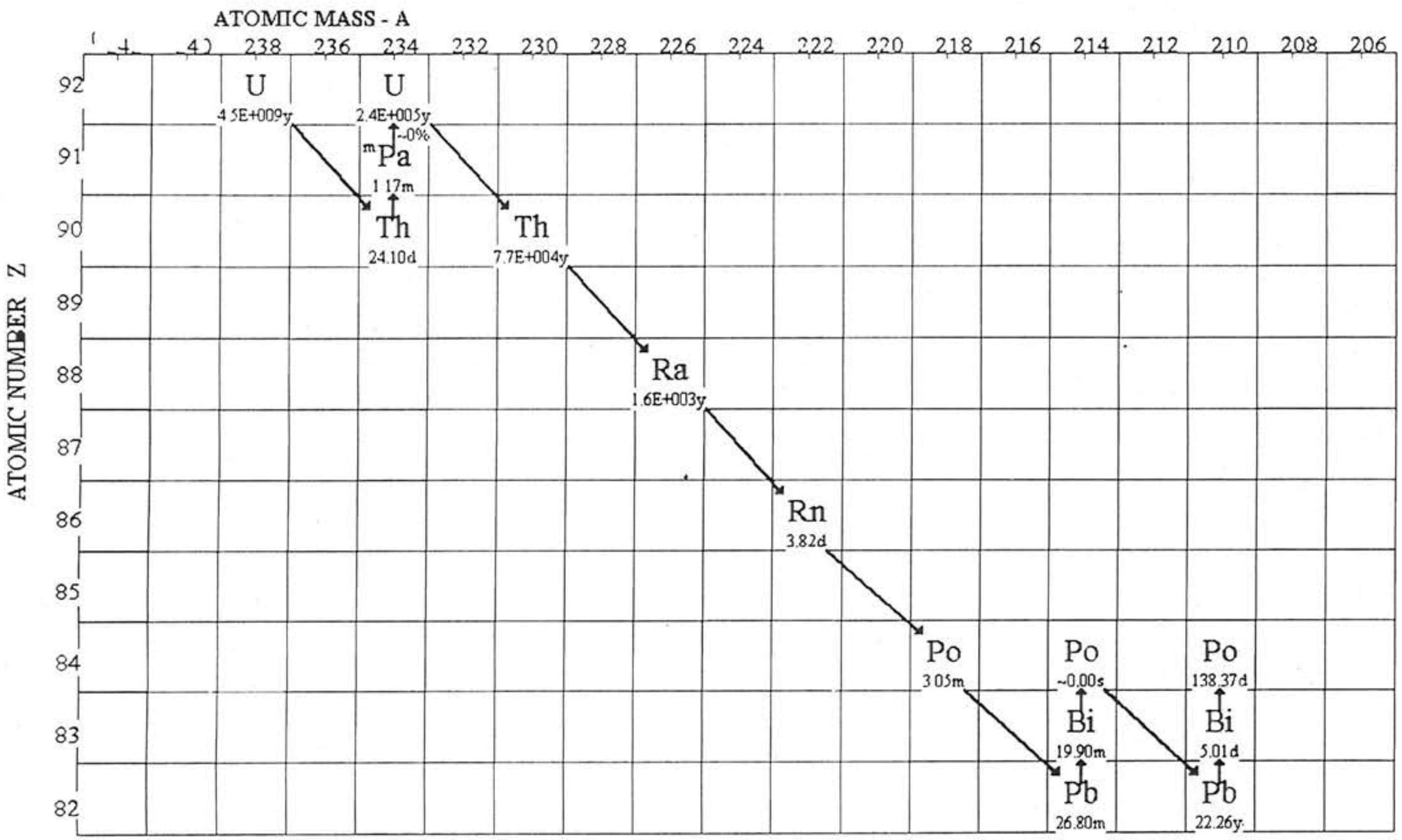
- Site Surface Water: Radon 222, Thorium 227, Thorium-230, Thorium-232, and Uranium 233/234;
- Downgradient Surface Water: Radium-226, Uranium 233/234, and Uranium-238;
- Site Sediment: Cesium-137 and Uranium 238;
- Downgradient Sediment: Cobalt-60, Uranium 233/234, and Uranium-238; and
- Groundwater: Thorium-228.

Groundwater samples and surface water samples were also compared to available NYSDEC GA and EPA MCL levels as discussed in **Section 4**. Groundwater exceedences were limited to gross alpha (2 exceedences) and Radon-222 (18 exceedences). For surface water, Radon-222 was he only radionuclide to exceed the given criteria. It should be noted that the Radon-222 standard used for the comparison is actually a proposed Federal MCL (300 pCi/L).

With the exception of Cobalt-60, Cesium-137, and tritium, all of the radionuclides exceeding background levels in the various media within SEAD-12 are radionuclides within the uranium and thorium decay-chain series. As shown in **Figures 5-1 to 5-4**, the majority of the radionuclides distinguishable from background are the daughters of Uranium-238, Uranium-235, Thorium-230, and Thorium-232. These are naturally occurring radionuclides and are also found in the environment as a result of activities such as mining (Gee, 1983). Other radionuclides found at levels at SEAD-12 distinguishable from background are also present in the environment due to fallout (Cesium-137 and Plutonium-239/240), or with industrial waste operations (Cobalt-60, Cesium-137, Plutonium239/240, and others) (Gee, 1998).

5.1.4 Conceptual Model Summary

Based on the analysis of chemical and radiological data performed in **Section 4**, site impacts occur within relative small areas of the site and are primarily due to the presence of metals, SVOCs, and VOC compounds and potentially radionuclides.. These impacts are generally associated buried debris (soil) and the subsequent physical and chemical migration of constituents from that debris. The following fate and transport section focuses on those processes that control the movement of metals, organic compounds and radionuclides that are the associated with these impacts.



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SEAD-12

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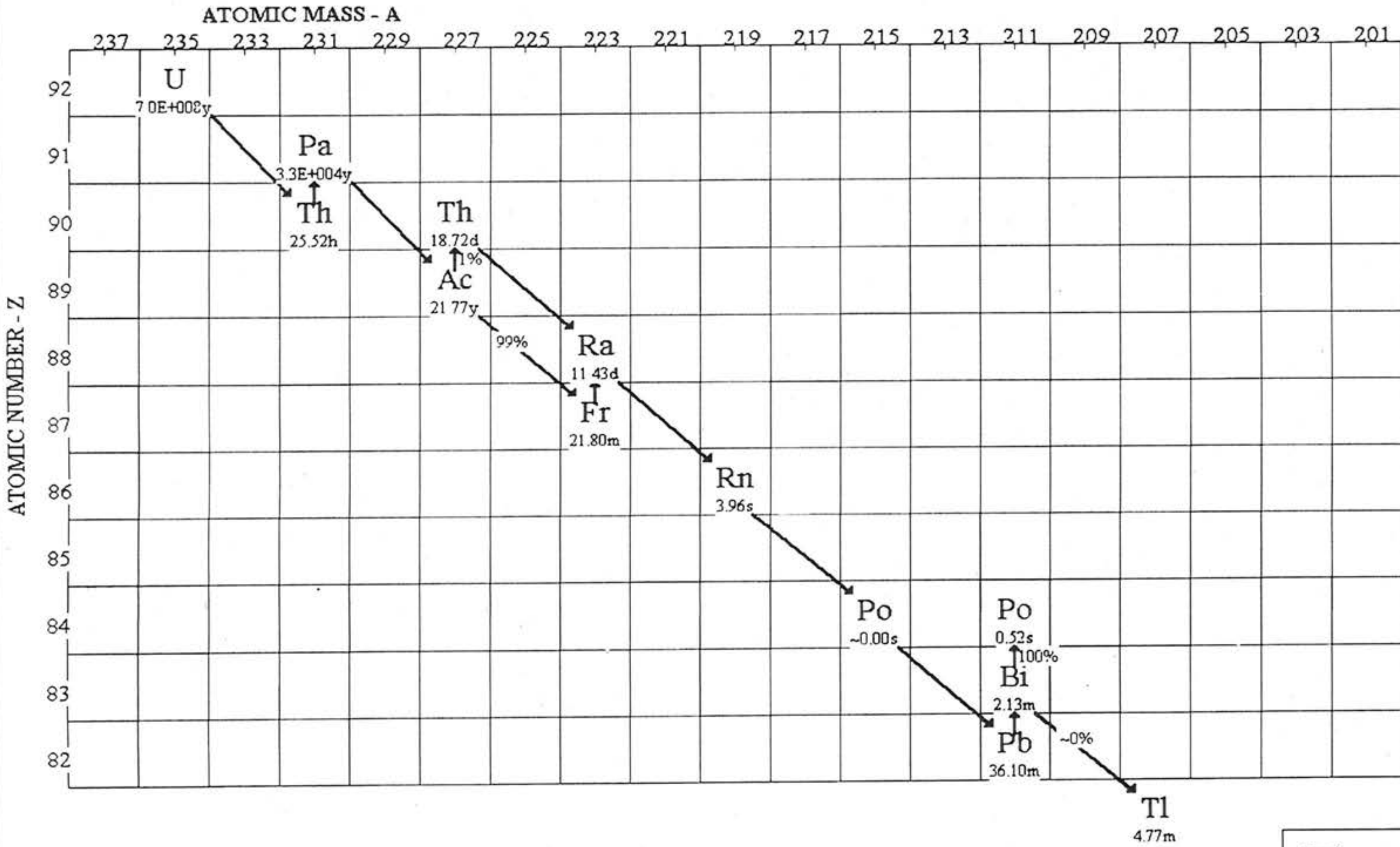
FIGURE 5-1

DECAY SERIES
URANIUM-238

SCALE NA | DATE MAY 2000

DECAYFIG.CDR



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SEAD-12

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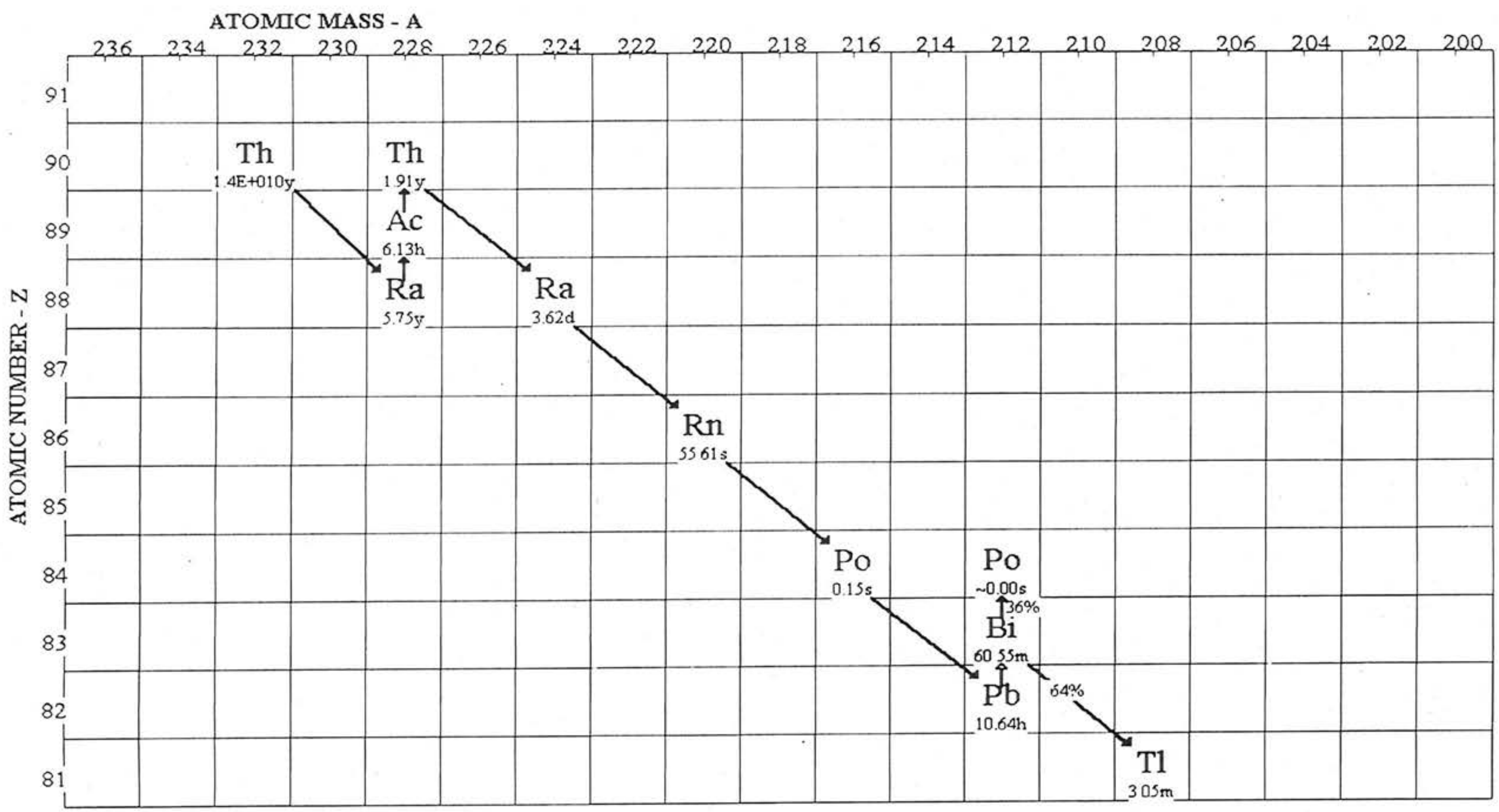
FIGURE 5-2

DECAY SERIES
URANIUM-235

SCALE	NA	DATE	MAY 2000

DECAYFIG.CDR



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DEPT ENVIRONMENTAL ENGINEERING	DWG NO.

FIGURE 5-3

DECAY SERIES
THORIUM-232

SCALE	NA	DATE	MAY 2000

DECAYFIG.CDR

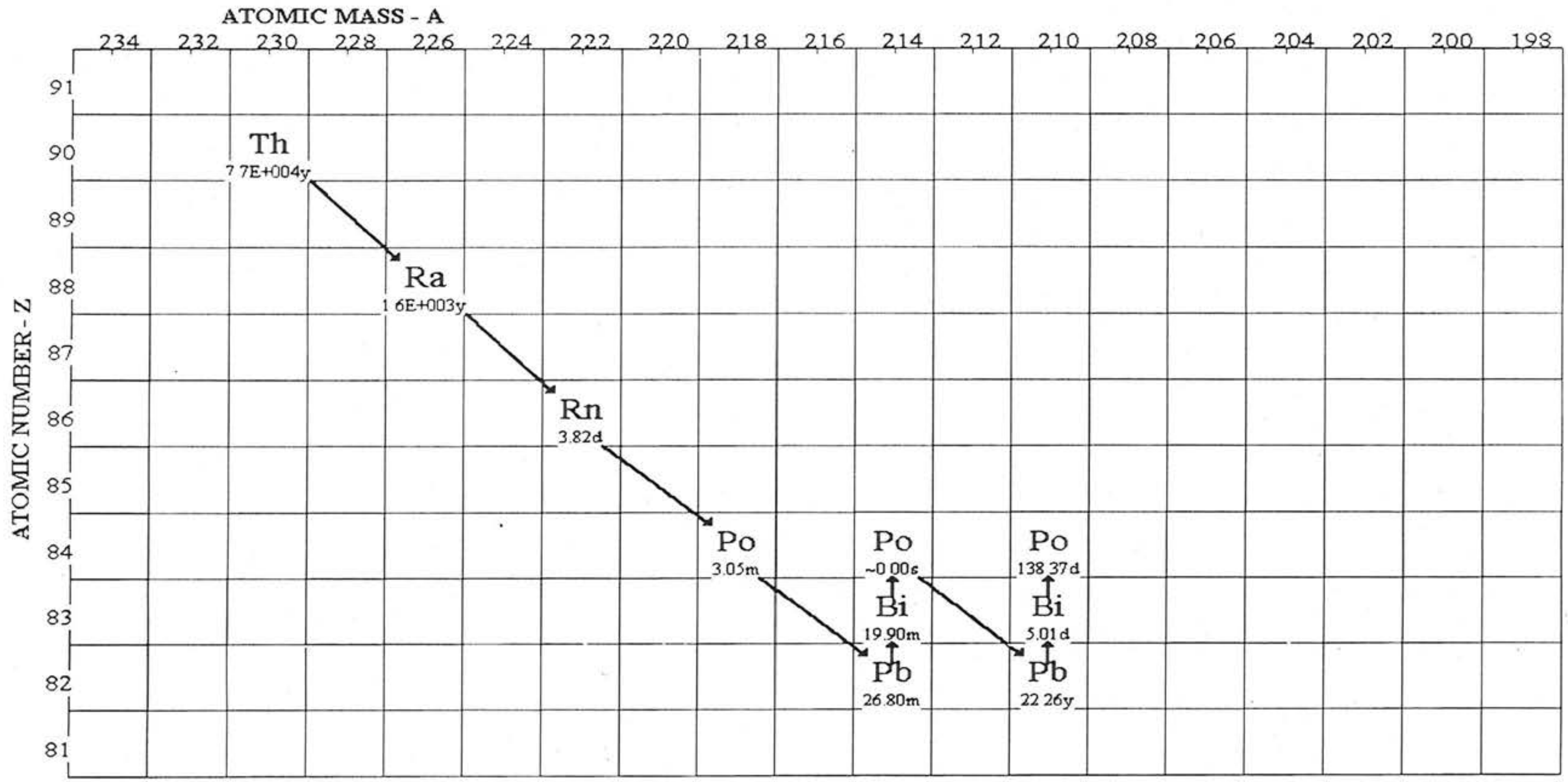

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FIGURE 5-4

DECAY SERIES
THORIUM-230

SCALE NA | DATE MAY 2000

DECAYFIG.CDR

5.2 SEAD-12 CONTAMINANT FATE AND TRANSPORT

Contaminant fate refers to the chemical characteristics and predictable behaviors of a constituent of concern within different media at a site. This section first presents an overview discussion of natural environmental controls at SEAD-12, and how these apply to the occurrence and movement of chemicals. Subsequently, the chemical-specific fate and transport characteristics are presented. Fate and transport considerations within specific potential release areas are discussed where applicable. The analytical results (chemical and radiological) for SEAD-12 are summarized in **Section 4** and presented in full in **Appendices G, H, I, and J**.

Anomalies and environmental impacts within SEAD-12 appear to be isolated within the soil or sediment matrix. The primary impact to groundwater (i.e. the detection of chlorinated solvents in MW12-37 outside of Building 813) also appears to be isolated. For these reasons, no transport modeling was performed as part of the chemical fate and transport analysis.

5.2.1 Overview of Compound Fate

5.2.1.1 Fate of Inorganics (metals and radionuclides)

This section is intended to provide background information that helpful to the evaluation of the fate of metals in soils at SEAD-12. The major fate mechanisms for metals are complexation, adsorption, precipitation, oxidation and reduction. Radionuclides behave in the environment in the same manner as non-radioactive metals within their periodic group.

All soils naturally contain trace levels of metals, including naturally-occurring radionuclides. 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 as discussed in **Section 4.1** (background sample data are included in Appendix G).

The mobility of metals within a soil system is primarily associated with the movement of water through that system. This mobility is associated with the solubility of the metal and its compounds, as well as chemical parameters affecting the oxidation state of the metal in solution. 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). Metals, unlike hazardous organic compounds, can not be degraded (McLean and Bledsoe, 1992). Metals become immobile due to mechanisms of adsorption and precipitation.

Mechanisms of adsorption and precipitation inhibit the mobility of metals in groundwater. Metal-soil interactions are 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, oxidation-reduction 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:

- dissolved in the soil solution;
- occupying exchange sites on inorganic soil constituents;
- specifically adsorbed on inorganic soil constituents;
- associated with insoluble soil organic matter;
- precipitated as pure or mixed solids;
- present in the structure of secondary minerals; and/or
- present in the structure of primary minerals.

In situations where metals have been introduced into the environment through human activities (as at SEAD-12), 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, the clay minerals within most soils possess a negative charge (Dragun, 1988). This is due the polarity of the clays and their interactions with soil moisture (water), as well as other cations and anions present in the soil. These negatively charged positions on clay minerals are responsible for attracting cationic species of elements at the soil surface.

In addition, humus is also responsible for the accumulation of ionic 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 a cation (positively charged ion) in water is attracted to a 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. The K_d values are dependant such characteristics as ionic size and valence, varying with these characteristics for each metal.

The chemistry and migration of all cationic metals in soil is controlled by pH At soil pH of greater than 6.5, those metals normally present as cations, are fairly immobile. At higher pH values, cationic metals often form insoluble carbonate and hydroxide complexes. However, some metals (e.g., arsenic and uranium) may form mobile anionic complexes. Cationic metals are most mobile in highly acidic soils, e.g., those with a pH of 5 or less. Anionic metals are most mobile where the soil pH is greater than 7.0.

Direct measurements of soil pH are not available for SEAD-12, however, the average groundwater pH for two rounds of sampling is 7.2. By association the pH of the soil is approximately 7.2, assuming the soil pH to be similar to that of the groundwater. To support this assumption, Hutton (1972) indicates that Darian soils, like those found at SEAD-12, have soil pH values that vary depending on the depth:

- pH of 5.1 to 7.0 from 0 to 10 inches below the ground surface;
- pH of 6.1 to 7.5 from 10 to 24 inches below the ground surface; and
- pH of 7.0 to 8.4 from 24 to 50 inches below the ground surface (calcareous soil).

General trends of element mobility using the published results for studies of 10 soils (Dragun, 1988) include:

- 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-12 would tend to reduce the mobility of cations in soil.]
- Cations usually exhibit moderate to high mobility in sandy, loamy sand, and sandy loam soil.
- Cations can exhibit low, moderate, or high mobility in soils with intermediate textures. and
- 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-12 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 leaching of metals is the chemical form (base metal or cation) present in the soil. However, at SEAD-12, 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. For example, barium nitrate, lead stearate, lead carbonate, and mercury fulminate are likely metal salts or complexes that may have been incinerated at the sites. During the burning of these materials, a portion of these salts were likely oxidized to their metallic oxide forms. In general, metallic oxides are considered to be less likely to leach metallic ions than metallic salts.

The discussion of the individual metals in **Section 5.2.2.1** provides an overview of the characteristics that affect the fate of each of the metals present above criteria levels within SEAD-12, and is not restricted to discussion of metal oxides only. Much of the information below was obtained from McLean and Bledsoe (1992).

5.2.1.2 Fate of Organic Compounds

On the basis of the chemical data at SEAD-12, the organic compounds that will be addressed in this section include: volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides/PCBs. However, as noted in the previous sections, impacts from these chemicals are not believed to be as significant as those for inorganics at SEAD-12. 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 VOC, SVOCs, and pesticides/PCBs are discussed.

Important soil properties to consider include the fraction of organic carbon, the mineralogy, and the porosity. Many organic compounds adsorb more strongly to the organic fraction in the soil or sediment. Therefore, the larger the amount of organic compounds in the soil, the less mobile organic constituents will be. (i.e., soils with higher organic content will adsorb more organic compounds than soils with more clays.) Generally, surface soils will have higher organic content than deeper soils, due to the presence of live and dead plant matter at the surface.

One measure of the affinity of a compound for the organic fraction of the soil is the organic carbon partition coefficient, K_{OC}. The K_{OC} is the ratio of the amount of the compound present in the organic fraction to that present in the aqueous fraction. K_{OC} values are presented in **Table 5-1** for the contaminants of concern at the SEAD-12. The units used in **Table 5-1** are milliliters per gram (ml/g). **Table 5-2** describes the relative relationship between K_{OC} and mobility. As can be seen, compounds with a K_{OC} between 500 ml/g and 2000 ml/g are generally considered to have low mobility compounds greater than 2000 ml/g are considered to be immobile (Dragun, 1988).

Some organic compounds adsorb more strongly to the clay fraction of a soil or sediment. Understanding the type and amount of clays present is crucial to estimating the mobility of the compounds. Most of the soils at SEDA are classified as clay loam. These soils generally have low permeability and high water retention capabilities. Because of these properties, contaminants tend to move slowly through these soils.

<u>**Volatile Organic Compounds**</u>

Volatile organic compounds are characterized by relatively high vapor pressures and Henry's Law constants, indicating a strong potential for volatilization (**Table 5-1**). Volatile constituents will enter the air in void spaces in the soil above the saturated zone. These constituents may then leave the system through the ground surface. The tendency of compound to volatilize is usually expressed in terms of a Henry's Law constant K_H. Henry's Law holds in cases where the solute

TABLE 5-1
SUMMARY OF FATE AND TRANSPORT PARAMETERS FOR ORGANIC COMPOUNDS OF CONCERN

SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY
ROMULUS, NEW YORK

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)
Volatile Organic Compounds							
Methylene Chloride	20000	438	0.00203	8.8	20	1-3	0.8
1,2-Dichloroethene (total)	6300	5.3	0.0066	59	123		4.5
1,2-Dichloroethane	8520	80	0.000978	14	30.2	2-18	1.4-2
Trichloroethene	1100	75	0.0091	126	240	3-300	13-39
Vinyl chloride	2670	2300	0.0819	57	24		
1,1-Dichlroethene	2250	500	0.034	65	53		
Tetrachloroethene	150	19	0.0259	364	398	1-13	49-66
Semivolatile Organic Compounds							
Phenol	93000	0.341	0.000000454	14.2	28.8	3-5	1.4-2
1,4-dichlorobenzene	79	1.18	0.00289	1700	3980		60-117
2-Methylphenol	25000	0.24	0.0000015	274	89.1	1-3	
4-Methylphenol		0.11	0.000000443	267	85.1	1-3	
2,4-Dimethylphenol	4200	0.0573	0.00000238	222	263	1-3	9.5-150
Naphthalene	31.7	0.23	0.00115	1300	2760	1-110	44-95
2-Methylnaphthalene	25.4	0.0083	0.000058	8500	13000	1-3	
2,4-Dinitrotoluene	240	0.0051	0.00000509	45	100	5	
Diethylphthalate	896	0.0035	0.00000114	142	316	1-3	14-117
Fluorene	1.69	0.00071	0.0000642	7300	15800	32-60	
Hexachlorobenzene	0.006	0.000019	0.000681	3900	170000		
Phenanthrene	1	0.00021	0.000159	14000	28800	1-200	
Anthracene	0.045	0.000195	0.00102	14000	28200	200-460	
Fluoranthene	0.206	0.0177	0.00000646	38000	79400	140-440	
Pyrene	0.132	0.0000025	0.00000504	38000	75900	9-1900	
Benzo(a)anthracene	0.0057	0.00000015	0.00000116	1380000	398000	240-680	
Chrysene	0.0018	6.3E-09	0.00000105	200000	407000	160-1900	
Bis(2-Ethylhexyl)phthalate	0.285	0.0000002	0.000000361	5900	9500	Neg. Deg.	
Benzo(b)fluoranthene	0.014	0.0000005	0.0000119	550000	1150000	360-610	
Benzo(k)fluoranthene	0.0043	0.00000051	0.0000394	550000	1150000	910-1400	
Benzo(a)pyrene	0.0012	0.000568	0.00000155	5500000	1150000	220-530	
Indeno(1,2,3-cd)pyrene	0.00053	1E-10	6.86E-08	1600000	3160000	600-730	
Dibenz(a,h)anthracene	0.0005	5.2E-11	7.33E-08	3300000	6310000	750-940	

TABLE 5-1
SUMMARY OF FATE AND TRANSPORT PARAMETERS FOR ORGANIC COMPOUNDS OF CONCERN

SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY
ROMULUS, NEW YORK

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)
Pesticides/PCBs							
Heptachlor	0.18	0.0003	0.000819	0.00012	25100	Neg. Deg.	3600-37000
Aldrin	0.18	0.000006	0.000016	96000	200000	Neg. Deg.	3890-12260
Endosulfan I	0.16	0.00001	0.0000335	2030	3550		
Heptachlor epoxide	0.35	0.0003	0.000439	220	501	Neg. Deg.	851-66000
Dieldrin	0.195	0.000000178	0.000000458	1700	3160	Neg. Deg.	3-10000
4,4'-DDE	0.04	0.0000065	0.000068	4400000	10000000	Neg. Deg.	110000
4,4'-DDD	0.16	0.000000002	0.000031	240000	360000	Neg. Deg.	
Endosulfan sulfate	0.16			2330	4570		
4,4'-DDT	0.005	0.0000055	0.000513	243000	1550000	Neg. Deg.	38642-110000
Aroclor-1254	0.012	0.00008	0.0027	42500	1070000	42	10E4-10E6
Aroclor-1260	0.0027	0.000041	0.0071	1300000	13800000	Neg. Deg.	10E4-10E6

References:
1. IRP Toxicology Guide
2. Basics of Pump-and-Treat Ground-Water Remediation Technology (EPA, 1990).
3. Handbook of Environmental Fate and Exposure Data (Howard, 1989).
4. Soil Chemistry of Hazardous Materials (Dragun, 1988)
5. Hazardous Waste Treatment, Storage, and Disposal Facilities, Air Emissions Models (EPA, 1989).
6. USATHAMA, 1985
7. Values for Koc not found were estimated by: logKoc = 0.544logKow + 1.377 (Dragun, 1988).

TABLE 5-2

RELATIVE RELATIONSHIPS BETWEEN K_{oc} AND MOBILITY

K_{oc}	Mobility Class
>2000	I - Immobile
500-2000	II - Low Mobility
150-500	III - Intermediate Mobility
50-150	IV - Mobile
<50	V - Very Mobile

K_{OC} - Organic carbon partition coefficient

Source: <u>The Soil Chemistry of Hazardous Materials</u>; James Dragun, Ph.D; The Hazardous Materials Control Research Institute; 1988.

concentration is very low, which is applicable to most constituents found at hazardous waste sites. Henry's Law states that the concentration of a constituent in the vapor phase is directly proportional to the concentration of that constituent in the aqueous phase. The proportionality factor is the Henry's Law constant. Generally, for compounds with a Henry's Law constant less than 5×10^{-3}, volatilization from the soils will not be a major pathway (Dragun, 1988).

The organic partition coefficients, K_{OC}, for volatile organic compounds vary from being highly mobile (methylene chloride) to being only moderately mobile (xylene). The VOCs detected at SEAD-12 are methylene chloride (K_{OC} – 8.8) and Trichloroethene (K_{OC} – 126).

Semivolatile Organic Compounds

Semivolatile organic compounds 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.

Polycyclic 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. 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 particulate. Thus, soil, sediment and suspended particulate matter (in air) represent important media for the transport of the chemicals.

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 1242, 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.

5.2.3 Site-Specific Compound Fate and Transport

The following sections discuss the fate and transport mechanisms specific to elements and compounds found at SEAD-12.

5.2.3.1 Metals

Chromium

Chromium occurs naturally in soils and rocks. It may occur in either of two oxidation states; trivalent, Cr(III), or hexavalent, Cr(VI). While Cr (III) is the more stable and common form, hexavalent chromium is the more toxic. Chromium was found to exceed the TAGM values in soils from the Disposal Pit A/B potential release area. The maximum detected concentration of chromium in this area was 83 mg/kg (TAGM = 30 mg/kg).

Trivalent chromium is readily adsorbed by soils, exhibiting typical cation sorption behavior. Under normal pH and oxidation-reduction conditions, chromium (III) minerals of oxides and hydroxides are stable and insoluble. Hexavalent chromium can be reduced to Cr(III) under normal soil pH and oxidation-reduction 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.

Forms of Cr(VI) in soil are immobilized 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 compounds are readily soluble, however, they are expected to only occur 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.

Copper

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 and Bledsoe, 1992). 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 preferentially adsorbed by soils and soil constituents than other metals (arsenic, cadmium, nickel, zinc, mercury, silver, and selenium), with the exception of lead. However, copper has a high affinity for soluble organic ligands and the formation of these complexes may enhance copper mobility in soil. Copper is not expected to volatilize from soil.

Copper exceedences were found in several areas, however, only the exceedences within Disposal Pit A/B are noted to be of potential concern due to the magnitude of detections in this area. A maximum concentration of copper of 215 mg/kg was detected. The TAGM for copper is 34 mg/kg. For the other areas, the exceedences were less than 100 mg/kg.

Lead (Lead-207,Lead-210, Lead-211, and Lead 214)

Lead is one of the least mobile of the common metal contaminants in the environment. Lead is generally present in the +2 oxidation state, and will form lead oxides, although the lead itself is not degraded. Lead occurs naturally, primarily as sulfides, carbonates, and phosphates. Lead contamination may be associated with organometallic complexes associated with historical gasoline releases. Other anthropogenic sources of lead include paints, solders, and military uses. Lead exceedences were noted at Disposal Pit A/B, Disposal Pit C, and EM-5.

Radionuclides of lead will behave in the same manner as non-radioactive lead. Lead-210 and Lead-214 are part of the decay chain from Uranium-238. Lead-211 is a radionuclide daughter of Thorium 230, and Uranium-235. Therefore, the occurrence may be natural. Radionuclide occurrences of lead were noted at EM-5, exceeding the background plus DCGL criteria for the residential use criteria. As discussed in **Section 4**, this may be related to historic uses at the homestead.

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.

Thallium

Thallium is a soft, heavy metal that is insoluble in water and organic solvents. Various thallium salts are extremely poisonous, and often used in rodenticides, fungicides and insecticides. Thallium occurs naturally in trace amounts, as a Group III metal, it is often associated with lead and zinc. Thallium is generally univalent, and may form sulfate, nitrate and acetate salts that are moderately soluble in water. Thallium-208 is a daughter of Uranium-235 and Thorium-232.

Though present above the TAGM value for soil, (0.855 mg/kg), (the maximum value in surface soil is 3 mg/kg and the maximum in subsurface soil is 3.8 mg/kg), values of thallium are usually less than twice the TAGM. Even though the TAGM is occasionally exceeded in soil, no exceedences of thallium in surface water, sediment or groundwater occurred. For this reason and the fact that there is no suspected use of thallium within the SEAD-12 area, thallium is considered to be of little concern at this site.

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 hydrolyzed 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.

5.2.3.2 Organic Compounds

The mobility characteristic of the organic groups were discussed above. The following discusses the current fate and potential transport of the organic compounds found in SEAD-12.

Volatile Organic Compounds

Volatile organic compounds detected within SEAD-12 were limited to 1,2-Dichloroethene (total) and Trichloroethene (TCE) detected in groundwater, and Methylene chloride in soils. TCE was detected at elevated levels (1600 µg/L) in MW12-37 in both rounds of groundwater sampling.. TCE was not detected in wells downgradient or upgradient of this well. The low gradients and low hydraulic conductivity of the aquifer in addition to the absence of TCE detected in nearby wells indicates that this impact to groundwater is most likely limited.

Methylene chloride, though extremely mobile, was detected in only one sample and at less than double the TAGM for soil. This presence of this VOC is not considered to have impacted soils at the site.

Semivolatile Organic Compounds and Pesticides/PCBs

Bis(2-Ethylhexyl)phthalate was the only SVOC to occur in groundwater. Its two exceedences were from unrelated locations. This phthalate was detected at relatively low concentrations (230 µg/L) and could be due to laboratory or sampling artifacts.. A similar conclusion was reached for this compound in soils.

The PAHs, Anthracene, Benzo(a)anthracene, Benzo(a)pyrene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Chrysene, Dibenz(a,h)anthracene, Fluorene, Ideno(1,2,3-cd)pyrene, Naphthalene, and Pyrene, were found in soils and in localized groundwater sampling locations. As described above, PAHs are relatively immobile, having a high affinity for organic matter. This low mobility explains their presence at SEAD-12 being primarily in surface soils and sediments. The immobile nature of the compounds, and the lack of PAHs in groundwater indicates limited transport of these compounds.

Pesticides and PCBs were found primarily in the sediments with occasional surface water sample exceedences being detected at the same location. Hexachlorobenzene was found in one subsurface soil sample (22 μg/kg compared to the soil TAGM of 20 μg/kg). Like the SVOCs, with high K_{OC} values, these compounds are relatively immobile. Heptachlor epoxide is the most mobile, having the smallest K_{OC}. The Pesticides and PCBs found at SEAD-12 include: 4,4'-DDD, 4,4'-DDE, 4,4'-DDT, Aroclor-1242, Aroclor-1254, Aroclor-1260, Endosulfan I, Heptachlor epoxide, Aldrin, Heptachlor, and Hexachlorobenzene.

The location and extent of detections and exceedences in the sediment and surface water samples indicates the potential use of pesticides across the site. The fact that pesticides are not as prevalent in surface water at the site demonstrates the relative immobility of these compounds. In addition, there are no groundwater exceedences for pesticides.

Based on the data presented above and the chemical nature of SVOCs, pesticides and PCBs, these compounds appear to be fairly immobile at SEAD-12, and limited to the sediments on site. Transport may occur at low levels by the limited physical transport of the sediment.

5.2.3.3 Radionuclides

The discussion of radionuclides below is limited to those found to exceed background values using the Wilcoxon Rank Sum (WRS) test as discussed in **Section 4**. These radionuclides were Tritium, Cobalt-60, Cesium-137, Lead-210, Lead-211, Lead-214, Bismuth-214, Radon-222, Radium-223, Radium-226, Radium-228, Thorium-230, Thorium-232, Uranium 233/234, and Uranium-238. With the exception of Tritium, these radionuclides are metals and will behave according to chemical constraints of pH, oxidation and reduction, complex formation and adsorption as described above. Lead radionuclides were discussed with elemental lead in the preceding metals section.

__Tritium__

Tritium (^3H) is the radioactive isotope of hydrogen, formed from the interaction of gases with cosmic radiation (gamma radiation) in the upper atmosphere. It was also produced as a result of the manufacture and explosion of nuclear weapons, and the operation of nuclear reactors. A β-particle emitter with a half-life of 12.3 years, tritium exists and moves in the environment principally as water via the hydrological cycle. Surface and groundwater flow are the primary paths of movement at SEAD-12.

Cesium-137

Cesium-137 occurs in the environment principally as a product of fallout from weapons testing and industrial wastes. A β-particle emitter with a half-life of 30.2 years, Cesium displays strong adsorption characteristics, and is so tightly bound by clay minerals that root uptake is slight (Eisenbud, 1997, Gee, 1983). Groundwater mobility is controlled by pH, organic content in the soil, the presence of soil hydrous oxides, and the oxidation reduction potential.

Cobalt-60

Cobalt-60 occurs in the environment principally as a product of industrial wastes associated with nuclear weapons testing and reactors. A β- and γ- particle emitter with a half-life of 5.7 years, cobalt is generally unreactive. Cobalt displays adsorption characteristics similar to other bivalent metals forming Cobalt oxide. Cobalt is adsorbed preferentially to zinc in organo-enzymes, and is associated with coenzymes of vitamin B_{12}. The mobility of Cobalt has been found to be increased by the presence of humic acids. Groundwater mobility is controlled by pH, soil organic content, the presence of soil hydrous oxides, and the oxidation reduction potential.

Bismuth-214

A naturally occurring daughter Uranium-238, Bismuth-214 is a short lived, 19.9 minutes, γ- and β- particle emitter (see **Figure 5-x**). Moving in nature, primarily in the trivalent cationic state, Bismuth movement in the environment is controlled by pH, organic content in the soil, the presence of soil hydrous oxides, and the oxidation reduction potential.

Radon-222

Occurring as a gas, sometimes dissolved in water, Radon-222 is an α- and γ- particle emitter with a half-life of only 3.8 days. As shown in **Figure 5-x**, Radon-222 in a daughter of naturally occurring Uranium-238. Transport of Radon-222 is limited because of its short half-life.

Radium –223, -226, -228

These three radium isotopes are naturally-occurring daughters of Uranium-238, and Uranium – 235 and Thorium 232, as shown in **Figure 5-x**. Radium-223 and Radium-226 are α- and γ- particle emitters, with Radium-228 a β-particle emitter. The half life of Radium-226 is 1,600 years, making it the Radium isotope of the greatest concern.

Dissolved radium sorbs quickly to solids and does not migrate far from where it was introduced into the groundwater. However, radium forms anionic completes, making it mobile in neutral to alkaline groundwater. It has been suggested (Eisenbud, 1997) that radium transport in water is even less than that of Radon-222. Radium is chemically similar to calcium and is absorbed from the soil by plants, and therefore passed into the food chain.

Thorium-230, -232

Thorium-232 is the more common of the naturally-occurring forms of Thorium. The decay series for both radionuclides were presented as **Figures 5-3** and **5-4**. Because of its low relative solubility and low specific gravity thorium is generally insignificant in biological materials. Thorium concentrations found at SEAD-12 in sediments and soils are less than the published averages for shale or soil (NCRP Report No.94, 1987).

Uranium-235, -238

Uranium itself was not a radionuclide of concern at SEAD-12 when exposure criteria above background are considered.

Uranium-238 is the primary form of uranium in nature (99.28% by weight), with lesser amounts of Uranium-235 (0.71%) and Uranium-234 (<0.01%). The decay chains for Uranium-238 and Uranium-235 were presented as **Figures-5-1** and **5-2**. Uranium materials have been enriched, or depleted for specific isotopes depending on the application within the nuclear power or weapons industry. Uranium is primarily an α-particle emitter, its daughters emitting β- and γ-particles.

Uranium moves in groundwater, generally as an anionic carbonate complex, being less mobile in low pH environments. Uranium compounds are subject to oxidation-reduction processes, reducing the uranium to an immobile oxide form in the presence of sulfide or organic material.

5.2.4 Summary

In summary, the metals, radionuclides, and organic compounds found in SEAD-12 occur in sufficiently low concentrations that natural processes control their mobility for further dispersion. The primary impacts at SEAD-12 include:

- The presence of source materials responsible for continued metals dissolution in the Disposal Pit A/B, Disposal Pit C, and Dry Waste Disposal areas.
- TCE contamination present at MW12-37, potentially requiring further delineation (migration potential is limited).

- The presence of PAHs, pesticides, and metals in sediment north of Building 815 near sediment sample SD12-32.

Radionuclide contamination appears to be limited to low level point-source contamination with an overprint of naturally occurring radionuclides and those associated with fallout from historical weapons testing. Statistical evaluation of radionuclide data in soil presented in **Section 4** and in accordance with MARSSIM guidance, indicates that the NYSDEC TAGM of 10 mrem/yr is achieved in all areas of the site, except for Lead-210 at EM-5. However, elevated levels of Lead-210 are not believed to be associated with former military operations at SEAD-12 and are more likely due to cultural debris found at the site.

6.0 HUMAN HEALTH BASELINE RISK ASSESSMENT

This section of the SEAD-12 Remedial Investigation report will present the human health baseline risk assessment (BRA) that was performed for the Former Weapons Storage Area (SEAD-12). The ecological risk assessment is presented in **Section 7.0**. 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 outdoor 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
- exposure of an off-site wader to downstream contaminants.

As described previously, SEAD-12 was split into the nine potential release areas for the RI investigation. The potential release areas are shown in **Figure 2-5**. Due to the size of the SEAD-12 area (over 600 acres), a large portion has not been impacted. The human health BRA was completed on three of the nine potential release areas:

- Disposal Pit A/B;
- Disposal Pit C; and
- Former Dry Waste Disposal Pit.

These three areas were selected on the basis of site evaluation criteria, including; areas of documented activity associated with WSA activities; areas where RI investigations (geophysical surveys and test pitting operations) confirmed significant "military" activity; and proximity to buildings associated with activities of potential concern. Overall, the Former Dry Waste Disposal Pit area, Disposal Pits A/B, and Disposal Pit C were impacted to the greatest extent by former activities in the Former Weapons Storage Area (SEAD-12). Therefore, each of these areas was evaluated separately. Three sets of soil exposure point concentrations were derived for each of these areas in evaluating soil exposure pathways. For surface water, sediment, and groundwater, exposure point concentrations were derived from all site data and added to the risk generated from the area-specific soil risk.

Human health BRA was not completed for where RI investigations did not find significant evidence of "military" activity or where debris predates SEDA operations.

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 Former Weapons Storage Area (SEAD-12) 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 and radiological 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 EPA 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 General Sampling Locations and Media

During the RI and previous investigations, samples of soil, groundwater, surface water and sediment were collected. Soil samples were collected from random surface soil locations, biased surface soil locations where contaminants were likely to accumulate, and soil borings and test pit locations. Groundwater samples were collected from groundwater monitoring wells situated throughout the site. Surface water and sediment samples were collected from the drainage ditches throughout SEAD-12. Details of all sampling locations are provided in **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. Metal 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 (on and off-site).

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. Ingestion, dermal contact, and inhalation of groundwater.

All on-site surface water and sediment data collected from SEAD-12 were used to estimate the EPC, for future land use scenarios only. Current surface water and sediment scenarios on-site were not considered plausible because it is unlikely that the current site worker would wade in the on-site drainage swales. All surface water and sediment data collected downstream of SEAD-12 were used to estimate the EPC for the downstream wader scenario.

All on-site groundwater data collected from SEAD-12 were used to estimate the EPCs for future land use scenario only. Groundwater is not currently used, as drinking water at all of SEDA is delivered by pressure pipe from an off-site water supply.

All on-site surface soil samples from the 0 to 0.2 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.

6.1.2 Methodology and Organization of Document

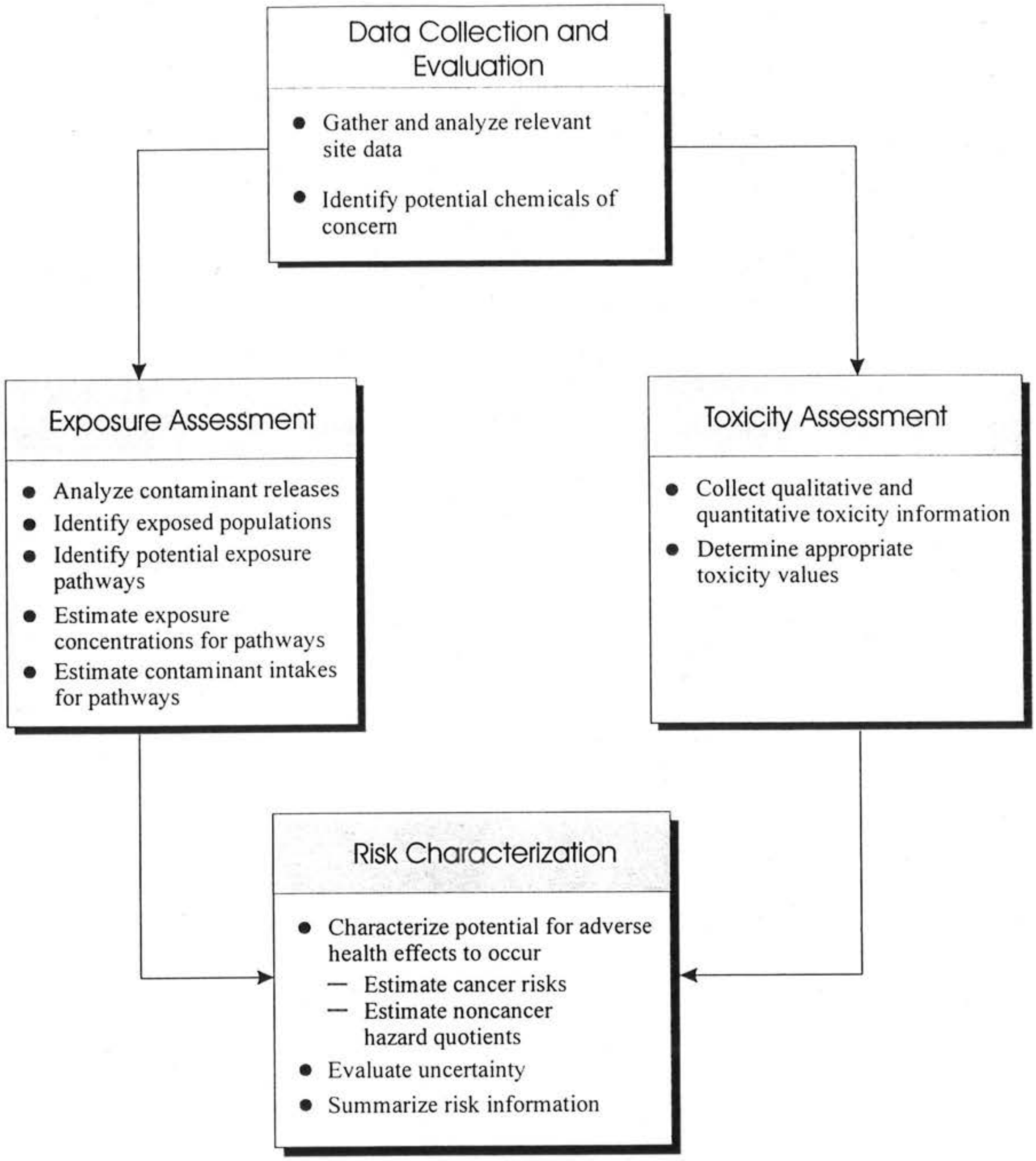
The methodology employed for this baseline risk assessment follows EPA guidance as described below and in the following subsections. The relationships of the major steps involved are presented in flowchart form in **Figure 6-1**.

1. Identification of Chemicals and Radionuclides of Concern (**Section 6.2**)
   This section provides site-related data along with background chemical and radiological 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 and radionuclides 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 L**.

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.

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



Source: USEPA, 1989a

PARSONS

PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY

SEAD-12 Remedial Investigation

DEPT ENVIRONMENTAL ENGINEERING DWG NO 730047

FIGURE 6-1

BASELINE RISK ASSESSMENT PROCESS

SCALE Not Applicable DATE MAY 2000

summarized for each receptor and exposure pathway. Detailed Hazard Quotients and Carcinogenic Risk calculations are included in **Appendix L.**

5. Uncertainty (**Section 6.5.3**)
   This section discusses the potential uncertainties of the methodology, assumptions, judgments, and data used in the risk assessment.

6. Summary (**Section 6.6**)
   In this final section, all conclusions and results are summarized for the human health chemical and radiological risk assessments.

Each of the exposure scenarios above is evaluated with respect to chemical exposure (i.e. chemical toxicity) as well as exposure radionuclides (i.e. radiotoxicity) present on site. The chemical toxicity of radionuclides has not been evaluated, as per OSWER directive 9200.4-31P.

A full discussion on the identification of potential chemicals and radionuclides of concern, the screening of on-site inorganic and element concentrations in all media, and determining reasonable and conservative exposure concentrations are presented below. 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.

6.2 IDENTIFICATION OF CHEMICALS AND RADIONUCLIDES OF POTENTIAL CONCERN

The usability of site-related chemical data is a critical factor in assessing the human health effects of chemical and radiological 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 and radiological 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 (USEPA, 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

SEDA and SEAD-12 background soil, groundwater, sediment, and surface water samples were compiled for this RI. Only inorganic and radionuclide 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**. For metal constituents, background soil and groundwater samples from the SEAD 25 RI, 25 ESIs, the Ash Landfill, the OB Grounds site, as well as the SEAD-12 area 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 derived 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. For surface water and sediment, a background data set for metal constituents was derived from samples collected upstream of the SEAD-12 area as discussed further in **Section 6.2.3**.

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 EPA'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 USEPA 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

Four media were sampled during the SEAD-12 RI: soil, surface water, sediment, and groundwater. The Study Area Investigation, SEAD-12 section of this report (**Section 2.0**) presents detailed descriptions of all media samples that have been collected from SEAD-12.

6.2.1.3 Sampling Methods

Detailed sampling methods for soil, groundwater, sediment and surface water are described in **Section 2.0.**

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 USEPA 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 was used for the analysis of organic and inorganic constituents in soil, sediment, groundwater, and surface water. The Environmental Measurement Laboratory's (EMLs) HASL 300 methods and USEPA methods were used for the analysis of radionuclides in these same media. Specific analyses are discussed in **Section 2** of this report.

6.2.2 <u>Data Usability</u>

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-12 ESI and the SEAD-12 RI. The ESI began in the fall of 1993 and the RI began in the fall of 1997.

The data used for the risk assessment were grouped into eleven 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 0.2 feet) for each of the three potential release areas, surface and subsurface soils (i.e. all soils data) for each of the three potential release areas, groundwater, on-site surface water and sediments, and off-site surface water and sediments.

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 human health BRA.

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. Level I field screening data, collected as part of the RI, 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 USEPA 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. unusually high SQLs,
3. when only some samples in a medium test positive for a chemical or radionuclide,
4. when SQLs are not available, and
5. when chemicals or radionuclides 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, 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-12 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 or radionuclide. In the other samples the chemical or radionuclide 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 or radionuclides 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 or radionuclide identity, chemical or radionuclide 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 or Radionuclides 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, was 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 and radionuclide 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 or radiological methods for sample analyses. Appropriate chemical and radiological 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 EPA 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.

6.2.3 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 (including radionuclides) and consisted of determining if any analytes were present in the SEAD-12 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-12 was to create the eleven 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 and radionuclides that were deleted from each of the databases for SEAD-12.

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 concentration" (USEPA, 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 and radionuclides, 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 all four media: soil, groundwater, sediment and surface water.

For each inorganic constituent (including radionuclides), the site data were compared to the background data set using Wilcoxon Rank Sum (WRS) test. The Wilcoxon Rank Sum test (WRS test) is the statistical method that was used to compare the on-site media- and area-specific datasets to background media-specific datasets. The basis for this statistical comparison was obtained from the USEPA Guidance document *Statistical Methods For Evaluating The Attainment Of Cleanup Standards* (USEPA, 1994) and *Statistical Methods For Environmental Pollution Monitoring* (Gilbert, 1987). This form of evaluation is consistent with guidance cited in RAGS (USEPA 1989a).

The hypotheses used in the application of the WRS test are:

H_0 (the null hypothesis):	The populations from which the two data sets have been drawn have the same mean.
H_a (the alternative hypothesis):	The measurements from the site population tend to exceed those from the background populations.

where Ho is assumed to be true unless the test indicates Ho should be rejected in favor of Ha. If Ho cannot be rejected, then it is accepted that the distribution of measurements in the background area is very similar in shape and central tendency (average) to the distribution of measurements in the area being investigated. The WRS test does not require that either data set by normally distributed.

The WRS test is performed by first listing the combined background and on-site measurements from smallest to largest and assigning the ranks 1,2 etc., to the ordered values. The test handles non-detect values by treating them as ties. The methodology for treatment of ties recommended by Gilbert (1987) was followed. The ranks of the measurements from the cleanup unit are summed and used to compute the statistic Z_{rs}, which is compared to a critical value ($Z_{1-\alpha}$) from the standard normal distribution. The Z_{rs} statistic is calculated from the following formula:

$$Z_{RS} = \frac{W_{RS} - n(N+1)/2}{\left\{\frac{mn}{12}\left[N + 1 - \frac{\sum_{j=1}^{g} t_j\left(t_j^2 - 1\right)}{N(N-1)}\right]\right\}^{1/2}}$$

where:

m	= number of samples in the background dataset
n	= number of samples in the on-site dataset
N	= m+n
W_{rs}	= the Wilcoxon Rank Sum of the on-site dataset
g	= the number of tied groups
t_j	= the number of tied data in the jth group

The critical value $Z_{1-\alpha}$ defines the maximum allowed probability that the WRS test will incorrectly indicate that the site and background datasets are distinguishable. This type of error is called a Type I error and it denotes a 'false positive' evaluation. The overall Type I error rate (α) was selected as 0.05, which represents the 95% confidence interval. $Z_{1-\alpha}$ is found from Cumulative Standard Normal Distribution statistical tables. For a Type I error rate of 0.05, $Z_{1-\alpha}$ (or $Z_{.95}$) is equal to 1.645. For four (4) analytes in groundwater, arsenic, cadmium, selenium, and thallium, an α of 0.025 is used because these analytes were subjected to additional statistical testing. The smaller α is required so that the overall α (or cumulative α) for all statistical testing is equal to 0.05. The corresponding $Z_{1-\alpha}$ for an α of 0.025 is 1.96. If the calculated Z_{rs} statistic for a particular analyte is less than $Z_{1-\alpha}$ (1.645 or 1.96), the null hypothesis can not be rejected. It is therefore concluded that, at the 95% confidence level, the measurements of that analyte in the on-site population do not tend to exceed the measurements of that analyte in the background population and that analyte is eliminated from the database.

TABLE 6-1
Analytes Not Detected in any Sample
SEAD-12 Remedial Investigation
Seneca Army Depot Activty

PARAMETERS	DISPOSAL PIT A/B SURFACE SOIL	DISPOSAL PIT A/B SUB-SURFACE SOIL	DISPOSAL PIT C SURFACE SOIL	DISPOSAL PIT C SUB-SURFACE SOIL	FORMER DRY WASTE DISPOSAL PIT SURFACE SOIL	FORMER DRY WASTE DISPOSAL PIT SUB-SURFACE SOIL	SEDIMENT SITE	SEDIMENT DOWN-GRADIENT	GROUND WATER SITE	SURFACE WATER SITE	SURFACE WATER DOWN-GRADIENT
CHEMICAL PARAMETERS											
1,1,1-Trichloroethane	X	X	X	X	X	X	X	X		X	X
1,1,1,2-Tetrachloroethane									X		X
1,1,2,2-Tetrachloroethane	X	X	X	X	X	X	X	X	X	X	
1,1,2-Trichloroethane	X	X	X	X	X	X		X	X	X	X
1,1-Dichloroethane	X	X	X	X	X	X	X	X	X	X	X
1,1-Dichloroethene	X	X	X	X	X	X	X	X	X	X	X
1,1-Dichloropropene									X		
1,2,3-Trichlorobenzene									X		
1,2,3-Trichloropropane									X		
1,2,4-Trichlorobenzene	X	X	X	X		X	X	X	X	X	X
1,2,4-Trimethylbenzene									X		
1,2-Dibromo-3-chloropropane									X	X	X
1,2-Dibromoethane							X		X	X	X
1,2-Dichlorobenzene	X	X	X	X	X	X	X	X	X	X	X
1,2-Dichloroethane	X	X	X	X	X	X	X	X	X	X	X
1,2-Dichloroethene (total)	X	X	X	X	X	X	X	X		X	
1,2-Dichloropropane		X	X	X	X	X	X	X	X	X	X
1,3,5-Trimethylbenzene									X		
1,3-Dichlorobenzene	X	X	X	X	X	X	X	X	X	X	X
1,3-Dichloropropane									X		
1,4-Dichlorobenzene	X	X	X	X	X	X	X	X	X	X	X
2,2-Dichloropropane									X		
2,2'-oxybis(1-Chloropropane)		X		X		X	X		X	X	
2,4,5-Trichlorophenol	X	X	X	X	X	X	X	X	X	X	X
2,4,6-Trichlorophenol	X	X	X	X	X	X	X	X	X	X	X
2,4-Dichlorophenol	X	X	X	X	X	X	X	X	X	X	X
2,4-Dimethylphenol	X	X	X	X	X	X	X	X	X	X	X
2,4-Dinitrophenol	X	X	X	X	X	X	X	X	X	X	X
2,4-Dinitrotoluene	X	X	X	X	X	X	X	X	X	X	X
2,6-Dinitrotoluene	X	X	X	X	X	X	X	X	X	X	X
2-Chloronaphthalene	X	X	X	X	X	X	X	X	X	X	X
2-Chlorophenol	X	X	X	X	X	X	X	X	X	X	X
2-Chlorotoluene									X		
2-Methylnaphthalene	X		X			X			X	X	X
2-Methylphenol	X	X	X	X	X		X	X	X	X	X
2-Nitroaniline	X	X	X	X	X	X	X	X	X	X	X
2-Nitrophenol	X	X	X	X	X	X	X	X	X		X
2-Nitropropane									X		
3,3'-Dichlorobenzidine	X	X	X	X	X	X	X	X	X		X
3-Nitroaniline	X	X	X	X	X	X	X	X	X		X
4,4'-DDD	X	X			X	X			X	X	X
4,4'-DDE			X			X			X		X

TABLE 6-1
Analytes Not Detected in any Sample
SEAD-12 Remedial Investigation
Seneca Army Depot Activty

PARAMETERS	DISPOSAL PIT A/B SURFACE SOIL	DISPOSAL PIT A/B SUB-SURFACE SOIL	DISPOSAL PIT C SURFACE SOIL	DISPOSAL PIT C SUB-SURFACE SOIL	FORMER DRY WASTE DISPOSAL PIT SURFACE SOIL	FORMER DRY WASTE DISPOSAL PIT SUB-SURFACE SOIL	SEDIMENT SITE	SEDIMENT DOWN-GRADIENT	GROUND WATER SITE	SURFACE WATER SITE	SURFACE WATER DOWN-GRADIENT
4,4'-DDT						X		X	X		X
4,6-Dinitro-2-methylphenol	X	X	X	X	X	X	X	X	X	X	X
4-Bromophenyl phenyl ether	X	X	X	X	X	X	X	X	X	X	X
4-Chloro-3-methylphenol	X	X	X	X	X	X	X	X	X	X	X
4-Chloroaniline	X	X	X	X	X	X	X	X	X	X	X
4-Chlorophenyl phenyl ether	X	X	X	X	X	X		X	X	X	X
4-Methylphenol	X		X	X	X	X			X	X	X
4-Nitroaniline	X	X	X	X	X	X	X	X	X	X	X
4-Nitrophenol	X	X	X	X	X	X	X	X	X	X	X
Acenaphthene	X		X		X	X			X	X	X
Acenaphthylene	X		X	X	X	X			X	X	X
Acetone											X
Acrylonitrile									X		
Aldrin	X		X	X	X	X	X	X	X		X
Allyl chloride									X		
Alpha-BHC	X		X		X	X	X	X	X		X
Alpha-Chlordane	X		X		X	X		X	X		X
Anthracene	X				X	X			X	X	X
Antimony			X					X		X	X
Aroclor-1016	X	X	X	X	X	X	X	X	X	X	X
Aroclor-1221	X	X	X	X	X	X	X	X	X	X	X
Aroclor-1232	X	X	X	X	X	X	X	X	X	X	X
Aroclor-1242	X	X	X	X			X	X	X		X
Aroclor-1248	X	X	X	X	X	X	X	X	X	X	X
Aroclor-1254	X		X			X		X	X	X	X
Aroclor-1260	X		X			X		X	X	X	X
Arsenic											X
Benzene	X		X	X	X		X	X	X	X	X
Benzo(a)anthracene									X		X
Benzo(a)pyrene											X
Benzo(b)fluoranthene										X	X
Benzo(ghi)perylene										X	X
Benzo(k)fluoranthene											X
Beta-BHC	X		X		X	X	X	X			X
Bis(2-Chloroethoxy)methane	X	X	X	X	X	X	X	X	X	X	X
Bis(2-Chloroethyl)ether	X	X	X	X	X	X	X	X	X	X	X
Bis(2-Chloroisopropyl)ether	X	X	X	X	X	X	X	X	X	X	X
Bromobenzene									X		
Bromochloromethane	X								X	X	X
Bromodichloromethane		X	X	X	X	X	X	X	X	X	X
Bromoform	X	X	X	X	X	X	X	X	X	X	X
Butyl chloride									X		
Butylbenzylphthalate			X					X			

TABLE 6-1
Analytes Not Detected in any Sample
SEAD-12 Remedial Investigation
Seneca Army Depot Activty

PARAMETERS	DISPOSAL PIT A/B SURFACE SOIL	DISPOSAL PIT A/B SUB-SURFACE SOIL	DISPOSAL PIT C SURFACE SOIL	DISPOSAL PIT C SUB-SURFACE SOIL	FORMER DRY WASTE DISPOSAL PIT SURFACE SOIL	FORMER DRY WASTE DISPOSAL PIT SUB-SURFACE SOIL	SEDIMENT SITE	SEDIMENT DOWN-GRADIENT	GROUND WATER SITE	SURFACE WATER SITE	SURFACE WATER DOWN-GRADIENT
Cadmium			X								
Carbazole					X	X			X	X	X
Carbon disulfide	X	X	X	X	X		X	X	X	X	X
Carbon tetrachloride	X	X	X	X	X	X	X	X	X	X	X
Chloracetonitrile									X		
Chlorobenzene	X	X	X		X	X	X	X	X	X	X
Chlorodibromomethane	X	X	X	X	X	X	X	X	X	X	X
Chloroethane	X	X	X	X	X	X	X	X	X	X	X
Chloroform	X	X	X	X	X	X	X	X	X	X	X
Chromium					X						X
Chrysene									X		X
Cis-1,2-Dichloroethene									X	X	X
Cis-1,3-Dichloropropene	X	X	X	X	X	X	X	X	X	X	X
Cobalt											X
Cyanide			X	X	X			X	X	X	X
Delta-BHC	X	X	X	X	X	X	X	X	X		X
Dibenz(a,h)anthracene					X				X	X	X
Dibenzofuran			X		X	X			X	X	X
Dichlorodifluoromethane									X		
Dichloromethyl methyl ketone									X		
Dieldrin			X	X	X	X	X	X	X	X	X
Diethyl phthalate	X	X	X	X				X			
Dimethylphthalate	X	X	X	X	X	X	X	X	X	X	X
Di-n-butylphthalate											X
Di-n-octylphthalate										X	X
Endosulfan I			X	X	X	X		X	X	X	X
Endosulfan II			X	X	X	X	X	X	X	X	X
Endosulfan sulfate	X	X	X	X	X	X	X	X	X	X	X
Endrin			X	X	X	X		X	X	X	X
Endrin aldehyde			X	X		X		X	X		X
Endrin ketone	X	X	X	X	X	X		X	X		X
Ethyl benzene	X		X	X	X	X	X	X	X	X	X
Ethyl ether									X		
Ethyl methacrylate									X		
Fluoranthene									X	X	X
Fluorene			X		X	X			X	X	X
Gamma-BHC/Lindane	X	X	X	X	X	X	X	X	X		X
Gamma-Chlordane			X		X	X	X	X		X	X
Heptachlor	X		X		X	X	X	X			X
Heptachlor epoxide			X		X	X		X	X		X
Hexachlorobenzene	X	X	X	X	X	X		X	X	X	X
Hexachlorobutadiene	X	X	X	X	X	X	X	X	X	X	X
Hexachlorocyclopentadiene	X	X	X	X	X	X	X	X	X	X	X

TABLE 6-1
Analytes Not Detected in any Sample
SEAD-12 Remedial Investigation
Seneca Army Depot Activty

PARAMETERS	DISPOSAL PIT A/B SURFACE SOIL	DISPOSAL PIT A/B SUB-SURFACE SOIL	DISPOSAL PIT C SURFACE SOIL	DISPOSAL PIT C SUB-SURFACE SOIL	FORMER DRY WASTE DISPOSAL PIT SURFACE SOIL	FORMER DRY WASTE DISPOSAL PIT SUB-SURFACE SOIL	SEDIMENT SITE	SEDIMENT DOWN-GRADIENT	GROUND WATER SITE	SURFACE WATER SITE	SURFACE WATER DOWN-GRADIENT
Hexachloroethane	X	X	X	X	X	X	X	X	X	X	X
Indeno(1,2,3-cd)pyrene										X	X
Isophorone	X	X	X	X	X	X	X	X	X		X
Isopropylbenzene									X		
Lead											X
Mercury											X
Meta/Para Xylene									X		
Methacrylonitrile									X		
Methoxychlor	X	X	X	X	X	X	X	X	X	X	X
Methyl bromide	X	X	X	X	X	X	X	X	X	X	X
Methyl butyl ketone				X	X	X	X	X	X	X	X
Methyl chloride		X		X	X	X		X	X	X	X
Methyl ethyl ketone	X	X	X	X	X			X	X	X	X
Methyl iodide									X		
Methyl isobutyl ketone	X	X	X	X	X	X	X	X	X	X	X
Methylene bromide									X		
Methyl mathacrylate									X		
Methyl Tert Butyl Ether									X		
Methyl-2-propenoate									X		
Methylene chloride			X		X		X	X		X	X
Naphthalene	X		X			X			X	X	X
n-Butylbenzene									X		
Nickel											X
Nitrobenzene	X	X	X	X	X	X	X	X	X	X	X
N-Nitrosodiphenylamine	X	X	X		X	X	X		X	X	X
N-Nitrosodipropylamine	X	X	X	X	X	X	X	X	X	X	X
Ortho Xylene									X		
p-Chlorotoluene									X		
Pentachloroethane									X		
Pentachlorophenol	X	X	X	X	X	X	X	X	X		X
Phenanthrene									X	X	X
Phenol	X		X	X	X	X	X	X		X	X
p-Isopropyltoluene									X		
Propionitrile									X		
Propylbenzene									X		
Pyrene											X
sec-Butylbenzene									X		
Selenium										X	X
Silver			X								X
Sodium											
Styrene	X		X	X	X	X	X	X	X	X	X
tert-Butylbenzene									X		
Tetrachloroethene	X	X	X		X	X		X	X	X	X

TABLE 6-1
Analytes Not Detected in any Sample
SEAD-12 Remedial Investigation
Seneca Army Depot Activty

PARAMETERS	DISPOSAL PIT A/B SURFACE SOIL	DISPOSAL PIT A/B SUB-SURFACE SOIL	DISPOSAL PIT C SURFACE SOIL	DISPOSAL PIT C SUB-SURFACE SOIL	FORMER DRY WASTE DISPOSAL PIT SURFACE SOIL	FORMER DRY WASTE DISPOSAL PIT SUB-SURFACE SOIL	SEDIMENT SITE	SEDIMENT DOWN-GRADIENT	GROUND WATER SITE	SURFACE WATER SITE	SURFACE WATER DOWN-GRADIENT
Tetrahydrofuran									X		
Thallium											X
Toluene			X					X			X
Total Xylenes	X		X		X	X	X	X	X	X	X
Toxaphene	X	X	X	X	X	X	X	X	X	X	X
Trans-1,2-Dichloroethene									X	X	X
Trans-1,3-Dichloropropene	X	X	X	X	X	X	X	X	X	X	X
Trans-1,4-Dichloro-2-butene									X		
Trichloroethene	X		X		X	X		X			X
Trichlorofluoromethane									X		
Vanadium											X
Vinyl chloride	X	X	X	X	X	X	X	X	X	X	X
RADIOLOGICAL PARAMETERS											
Cesium-137										X	X
Cobalt-57							X	X		X	X
Cobalt-60							X	X			X
Lead-210								X			
Lead-211											X
Plutonium-239/240						X		X	X	X	X
Promethium-147	X	X	X	X	X						
Radium-223								X			
Thorium-227						X			X		
Uranium-235								X			

Tables 6-2A and 6-2B list the metals and radionuclides found to occur in the SEAD-12 media at concentrations that tent to be above those observed in the background media. The specific results the Z_{rs} statistic calculations and the Z_{rs} to $Z_{1-\alpha}$ comparisons for the WRS test for metals and radionuclides in the three soil areas, groundwater, sediment, and surface water are presented in **Tables 6-2C, 6-2D, 6-2E,** and **6-2F**.

Inorganic constituents which were not detected in any sample were eliminated from further consideration, consistent with RAGS (USEPA, 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 **Appendices G, H, I, and J**.

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-12. 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 (USEPA, May 1992).

Background samples were not included in the calculation of EPCs.

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.

TABLE 6-2A
Rationale for Inorganic Constituents Retained for Human Risk Assessment
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Media	Constituent Greater than Background Dataset	Rationale	Reference
Soil in Former Dry Waste Disposal Pit	Calcium	WRS	TABLE 6-2C
	Copper	WRS	
	Magnesium	WRS	
	Thallium	WRS	
	Selenium	WRS	
Soil in Disposal Pits A/B	Copper	WRS	TABLE 6-2C
	Cyanide	WRS	
	Selenium	WRS	
	Thallium	WRS	
Soil in Disposal Pit C	Calcium	WRS	TABLE 6-2C
	Cyanide	WRS	
	Selenium	WRS	
	Thallium	WRS	
Groundwater	Barium	WRS	TABLE 6-2D
	Cobalt	WRS	
On-Site Surface Water	Cadmium	WRS	TABLE 6-2F
	Mercury	WRS	
	Zinc	WRS	
On-Site Sediment	Arsenic	WRS	TABLE 6-2E
	Copper	WRS	
	Lead	WRS	
	Magnesium	WRS	
	Vanadium	WRS	
	Zinc	WRS	
Downgradient Surface Water	Barium	WRS	TABLE 6-2F
	Beryllium	WRS	
	Calcium	WRS	
	Magnesium	WRS	
	Nickel	WRS	
	Sodium	WRS	
Downgradient Sediment	Arsenic	WRS	TABLE H-3

TABLE H-3 is found in Appendix H

WRS= Wilcoxon Rank Sum test.

TABLE6-2B
Rationale for Radionuclide Constituents Retained for Human Risk Assessment
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Media	Constituent Greater than Background Dataset	Rationale	Reference
Soil in Former Dry Waste Disposal Pit	Bismuth-214	WRS	TABLE 6-2C
	Radium-223	WRS	
	Radium-226	WRS (1)	
	Thallium-208	(2)	
	Tritium	WRS	
Soil in Disposal Pits A/B	Lead-210	WRS	TABLE 6-2C
	Bismuth-214	WRS (1)	
	Lead-214	WRS (1)	
	Radium-223	WRS	
	Thallium-208	(2)	
	Radium-226	WRS (1)	
	Tritium	WRS	
Soil in Disposal Pit C	Lead-210	WRS	TABLE 6-2C
	Bismuth-214	WRS	
	Radium-223	WRS	
	Radium-226	WRS (1)	
	Radium-228	WRS (3)	
	Thallium-208	(2)	
	Tritium	WRS	
Groundwater	Thorium-228	WRS	TABLE 6-2D
On-Site Surface Water	Radon-222	WRS	TABLE 6-2F
	Thorium-227	WRS	
	Thorium-230	WRS	
	Thorium-232	WRS	
	Uranium-233/234	WRS	
On-Site Sediment	Cesium-137	WRS	TABLE 6-2E
	Uranium-238	WRS	
Downgradient Surface Water	Radium-226	WRS	TABLE 6-2F
	Thallium-208	(2)	
	Thorium-234	(2)	
	Uranium-233/234	WRS	
	Uranium-238	WRS	
Downgradient Sediment	Cobalt-60	WRS	TABLE 6-2E
	Uranium-233/234	WRS	
	Uranium-238	WRS	

(1) ANOVA test shows Ra-226 to be at background levels. It is assumed that short-lived daughters (Bi-214, Pb-214) are also at background levels; therefore, these radionuclides were not included in the Human Risk Assessment.
(2) Included in the Human Risk Assessment because there was no background data set.
(3) Included in Human Risk Assessment although the site and the background datasets were drawn from the same mean.

See TABLE 6-3B for rationale for not including certain radionuclides that had significantly different means from background according to the Wilcoxon Rank Sum test from the Human Risk Assessment.

TABLE 6-2C
Wilcoxon Rank Sum Calculation for Comparison of Soil Potential Release Areas to Background
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Parameter	Former Dry Waste Disposal Pit					Disposal Pits A/B					Disposal Pit C				
	Site Compared to Background +DCGL Value					Site Compared to Background +DCGL Value					Site Compared to Background +DCGL Value				
	Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?	Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?	Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?
	BKGD	Former Dry Waste Disposal Pit				BKGD	Disposal Pit A/B				BKGD	Disposal Pit C			
Bismuth -214	41.50	51.62	-1.720	1.645	YES	38.42	65.42	-4.145	1.645	YES	49.16	70.67	-2.884	1.645	YES
Cesium-137	44.10	45.55	-0.259	1.645	NO	55.26	54.11	-0.183	1.645	NO	62.24	59.81	-0.349	1.645	NO
Cobalt-57	44.51	45.30	-0.180	1.645	NO	53.77	54.88	-0.232	1.645	NO	60.72	60.41	-0.058	1.645	NO
Cobalt-60	48.69	42.72	-1.120	1.645	NO	61.64	50.78	-1.847	1.645	NO	67.43	57.76	-1.491	1.645	NO
Lead-210	41.37	47.25	-1.043	1.645	NO	44.28	59.82	-2.447	1.645	YES	49.82	64.72	-2.114	1.645	YES
Lead-211	45.60	44.63	-0.173	1.645	NO	54.26	54.63	-0.058	1.645	NO	65.21	58.64	-0.932	1.645	NO
Lead-214	51.25	46.19	-0.860	1.645	NO	46.58	61.39	-2.279	1.645	YES	61.94	66.09	-0.558	1.645	NO
Plutonium-239/240	61.09	35.05	-4.843	1.645	NO	67.27	47.85	-3.378	1.645	NO	87.26	49.92	-5.689	1.645	NO
Promethium-147	21.25	22.00	-0.189	1.645	NO	16.87	24.00	-1.211	1.645	NO	15.25	23.00	-1.440	1.645	NO
Radium-223	38.19	49.21	-2.051	1.645	YES	44.01	59.96	-2.630	1.645	YES	46.91	65.87	-2.806	1.645	YES
Radium-226	36.24	50.24	-2.523	1.645	YES	38.14	63.03	-3.926	1.645	YES	73.66	67.16	-3.342	1.645	YES
Radium-228	45.54	44.66	-0.157	1.645	NO	54.05	54.73	-0.107	1.645	NO	50.26	64.55	-2.033	1.645	YES
Thorium-227	21.89	10.00	-2.92	1.645	NO	21.61	19.10	-0.583	1.645	NO	NA	NA	NA	NA	NA
Thorium-230	48.28	42.97	-0.944	1.645	NO	58.26	52.54	-0.903	1.645	NO	67.13	57.88	-1.320	1.645	NO
Thorium-232	50.69	41.48	-1.649	1.645	NO	66.89	48.04	-2.987	1.645	NO	66.50	58.13	-1.199	1.645	NO
Tritium	37.26	49.78	-2.566	1.645	YES	47.69	58.05	-2.043	1.645	YES	79.53	65.92	-3.032	1.645	YES
Uranium-233/234	47.09	43.71	-0.608	1.645	NO	54.23	54.64	-0.065	1.645	NO	52.82	63.53	-1.536	1.645	NO
Uranium-235	50.22	41.77	-1.651	1.645	NO	64.27	49.41	-2.633	1.645	NO	70.51	56.54	-2.239	1.645	NO
Uranium-238	47.53	43.44	-0.735	1.645	NO	58.20	52.57	-0.895	1.645	NO	61.69	60.03	-0.238	1.645	NO

Parameter	Former Dry Waste Disposal Pit					Disposal Pits A/B					Disposal Pit C				
	Site Compared to Background + Residential DCGL Value					Site Compared to Background					Site Compared to Background				
	Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?	Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?	Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?
	BKGD	Former Dry Waste Disposal Pit				BKGD	Disposal Pit A/B				BKGD	Disposal Pit C			
Aluminum	66.12	32.98	-5.618	1.645	NO	58.94	37.87	-3.608	1.645	NO	65.45	38.22	-4.564	1.645	NO
Antimony	61.75	38.51	-3.942	1.645	NO	56.86	40.69	-2.771	1.645	NO	63.74	40.25	-3.940	1.645	NO
Arsenic	59.39	39.63	-3.391	1.645	NO	59.58	35.14	-4.240	1.645	NO	63.22	39.15	-4.082	1.645	NO
Barium	52.74	49.93	-0.475	1.645	NO	50.88	48.81	-0.354	1.645	NO	52.46	53.65	-0.199	1.645	NO
Beryllium	69.77	28.36	-7.021	1.645	NO	63.92	31.11	-5.620	1.645	NO	68.47	34.63	-5.675	1.645	NO
Cadmium	64.89	34.54	-5.167	1.645	NO	56.16	41.64	-2.492	1.645	NO	64.36	39.51	-4.175	1.645	NO
Calcium	40.06	65.99	-4.394	1.645	YES	47.00	54.07	-1.211	1.645	NO	47.29	59.78	-2.094	1.645	YES
Chromium	66.13	32.97	-5.622	1.645	NO	55.89	42.01	-2.376	1.645	NO	63.93	40.02	-4.008	1.645	NO
Cobalt	60.29	40.37	-3.377	1.645	NO	51.98	47.31	-0.800	1.645	NO	60.92	43.59	-2.905	1.645	NO
Copper	46.35	58.02	-1.978	1.645	YES	44.46	57.52	-2.237	1.645	YES	54.14	51.65	-0.418	1.645	NO
Cyanide	45.30	52.12	-1.199	1.645	NO	38.76	57.00	-3.247	1.645	YES	45.35	54.94	-1.662	1.645	YES
Iron	64.32	35.26	-4.927	1.645	NO	56.92	40.61	-2.793	1.645	NO	64.32	39.56	-4.149	1.645	NO
Lead	58.29	40.06	-3.145	1.645	NO	46.60	50.94	-0.757	1.645	NO	48.79	54.55	-0.982	1.645	NO
Magnesium	43.90	61.12	-2.918	1.645	YES	48.97	51.39	-0.414	1.645	NO	49.34	57.34	-1.341	1.645	NO
Manganese	60.94	36.87	-4.153	1.645	NO	53.76	41.74	-2.098	1.645	NO	62.39	39.25	-3.942	1.645	NO
Mercury	49.38	49.64	-0.047	1.645	NO	47.62	48.48	-0.120	1.645	NO	47.79	54.54	-1.166	1.645	NO
Nickel	59.24	40.74	-3.153	1.645	NO	53.73	43.86	-1.701	1.645	NO	62.86	40.42	-3.782	1.645	NO
Potassium	51.39	51.64	-0.044	1.645	NO	53.83	44.80	-1.547	1.645	NO	60.13	44.53	-2.616	1.645	NO
Selenium	41.32	64.39	-3.910	1.645	YES	39.79	63.86	-4.122	1.645	YES	40.63	67.69	-4.536	1.645	YES
Silver	62.56	34.93	-4.766	1.645	NO	57.56	36.86	-3.613	1.645	NO	65.56	35.68	-5.094	1.645	NO
Sodium	49.45	54.10	-0.789	1.645	NO	56.37	41.36	-2.570	1.645	NO	53.78	52.07	-0.286	1.645	NO
Thallium	31.68	71.99	-6.956	1.645	YES	31.03	70.96	-6.971	1.645	YES	32.18	73.24	-6.999	1.645	YES
Vanadium	64.07	35.58	-4.830	1.645	NO	57.94	39.23	-3.204	1.645	NO	63.11	41	-3.705	1.645	NO
Zinc	62.90	34.52	-4.895	1.645	NO	52.93	42.81	-1.765	1.645	NO	56.19	46.23	-1.696	1.645	NO

Zrs= Statistic for generated from Wilcoxon Rank Sum test
Z(1-alpha)= Maximum allowed probability that WRS test incorrectly indicates that the site and background datasets are distinguishable (alpha= 0.05)
Null Hypothesis: The populations from which the two data sets have been drawn have the same mean.

NA= Not analyzed due to parameters only being requested during the Expanded Site Investigation and not the Remedial Investigation. Hence, there were no data for specific radionuclides collected for the background set to compare against the ESI data.

Both groups need to be populated to perform Wilcoxon Rank Sum test.

TA 6-2D
Wilcoxon Rank Sum Calculations for
Comparison of Background Groundwater to SEAD-12 Groundwater
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Site Compared to Background (Radionuclides)

Parameter	Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?
	BKGD	SEAD-12			
Bismuth -214	58.78	46.44	-1.617	1.645	NO
Cesium-137	47.69	48.66	-0.128	1.645	NO
Cobalt-57	53.69	47.46	-0.817	1.645	NO
Cobalt-60	39.94	50.21	-1.347	1.645	NO
Gross Alpha	42.72	49.66	-0.909	1.645	NO
Gross Beta	44.78	49.24	-0.585	1.645	NO
Lead-210	21.63	25.08	-0.636	1.645	NO
Lead-211	43.75	49.45	-0.747	1.645	NO
Lead-214	59.09	45.75	-1.765	1.645	NO
Plutonium-239/240	55.22	47.16	-1.077	1.645	NO
Radium-223	40.82	47.52	-0.867	1.645	NO
Radium-226	39	50.4	-1.499	1.645	NO
Radon-222	55.38	46.51	-1.173	1.645	NO
Thorium-227	26.25	24.15	-0.387	1.645	NO
Thorium-228	15.25	26.35	-2.047	1.645	YES
Thorium-230	47.41	48.72	-0.174	1.645	NO
Thorium-232	49.06	48.39	-0.092	1.645	NO
Tritium	53.23	45.8	-0.980	1.645	NO
Uranium-233/234	42.72	49.66	-0.910	1.645	NO
Uranium-235	56.69	46.86	-1.313	1.645	NO
Uranium-238	38.44	50.51	-1.584	1.645	NO

Site Compared to Background (Metals)

Parameter	Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?
	BKGD	SEAD-12			
Aluminum	76.85	70.39	-0.871	1.645	NO
Antimony	93.16	62.49	-4.304	1.645	NO
Arsenic	87.93	65.03	-3.150	1.645	NO
Barium	60.90	78.12	-2.322	1.645	YES
Beryllium	90.79	63.64	-3.863	1.645	NO
Cadmium	94.57	61.80	-4.658	1.645	NO
Calcium	69.06	74.16	-0.688	1.645	NO
Chromium	79.04	69.33	-1.317	1.645	NO
Cobalt	68.20	81.37	-1.805	1.645	YES
Copper	75.66	70.97	-0.635	1.645	NO
Iron	80.36	68.69	-1.574	1.645	NO
Lead	95.53	61.34	-4.737	1.645	NO
Magnesium	70.29	73.57	-0.443	1.645	NO
Manganese	70.65	73.40	-0.371	1.645	NO
Mercury	68.07	74.64	-1.178	1.645	NO
Nickel	74.03	71.76	-0.309	1.645	NO
Potassium	67.66	74.85	-0.969	1.645	NO
Selenium	91.99	63.06	-3.958	1.645	NO
Silver	76.93	70.36	-0.897	1.645	NO
Sodium	66.70	75.31	-1.161	1.645	NO
Thallium	73.42	71.32	-0.285	1.645	NO
Vanadium	71.94	73.65	-0.233	1.645	NO
Zinc	76.43	70.60	-0.786	1.645	NO

Zrs= Statistic for metal generated from Wilcoxon Rank Sum test
Z(1-alpha)= Maximum allowed probability that WRS test incorrectly indicates that the site
and background datasets are distinguishable (alpha= 0.05)
Null Hypothesis: The populations from which the two data sets have been drawn have the same mean.

TABLE 6-2E
Wilcoxon Rank Sum Calculations for
Comparison of Background Sediment to SEAD-12 and Downgradient Sediment
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Site Compared to Background (Radionuclides)					
Parameter	Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?
	BKGD	SEAD-12			
Gross Alpha	0.00	2.50	NA	NA	NA
Gross Beta	0.00	2.50	NA	NA	NA
Actinium-228	0.00	2.50	NA	NA	NA
Bismuth -214	31.89	29.66	-0.359	1.645	NO
Cesium-137	15.39	30.47	2.593	1.645	YES
Cobalt-57	32.22	27.17	-1.921	1.645	NO
Cobalt-60	25.78	28.43	-0.485	1.645	NO
Lead-210	34.61	26.71	-1.354	1.645	NO
Lead-211	31.56	27.30	-0.728	1.645	NO
Lead-214	34.11	29.26	-0.783	1.645	NO
Plutonium-239	24.22	28.74	-0.859	1.645	NO
Promethium-147	11.78	8.40	-1.307	1.645	NO
Radium-223	31.72	27.27	-0.829	1.645	NO
Radium-226	29.00	27.80	-0.205	1.645	NO
Radium-228	28.06	27.99	-0.001	1.645	NO
Thallium-208	0.00	2.80	NA	NA	NA
Thorium-227	33.63	24.58	-1.659	1.645	NO
Thorium-230	25.17	28.55	-0.583	1.645	NO
Thorium-232	41.56	25.35	-2.786	1.645	NO
Thorium-234	NA	NA	NA	NA	NA
Tritium	37.33	26.17	-2.66	1.645	NO
Uranium-233/234	21.89	29.20	-1.268	1.645	NO
Uranium-235	26.22	28.35	-0.401	1.645	NO
Uranium-238	19.17	29.73	1.979	1.645	YES

Downgradient Compared to Background (Radionuclides)					
Parameter	Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?
	BKGD	DOWNGRADIENT			
Gross Alpha	NA	NA	NA	NA	NA
Gross Beta	NA	NA	NA	NA	NA
Actinium-228	NA	NA	NA	NA	NA
Bismuth -214	11.44	9.73	-0.647	1.645	NO
Cesium-137	11.50	9.68	-0.694	1.645	NO
Cobalt-57	11.22	9.91	-0.797	1.645	NO
Cobalt-60	7.06	13.32	2.425	1.645	YES
Lead-210	12.33	9.00	-1.255	1.645	NO
Lead-211	10.44	10.55	-0.038	1.645	NO
Lead-214	10.50	10.50	0.000	1.645	NO
Plutonium-239	8.61	12.05	-1.423	1.645	NO
Promethium-147	5.00	NA	NA	NA	NA
Radium-223	11.61	9.59	-0.843	1.645	NO
Radium-226	11.44	9.73	-0.647	1.645	NO
Radium-228	9.44	11.36	-0.723	1.645	NO
Thallium-208	NA	NA	NA	NA	NA
Thorium-227	9.25	10.55	-0.518	1.645	NO
Thorium-230	11.17	9.95	-0.463	1.645	NO
Thorium-232	12.83	8.59	-1.602	1.645	NO
Thorium-234	NA	NA	NA	NA	NA
Tritium	13.11	8.59	-2.227	1.645	NO
Uranium-233/234	7.61	12.86	2	1.645	YES
Uranium-235	10.28	10.68	-0.171	1.645	NO
Uranium-238	6.94	13.41	2.608	1.645	YES

Site Compared to Background (Metals)					
Parameter	Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?
	BKGD	SEAD-12			
Aluminum	25.67	30.78	-0.822	1.645	NO
Antimony	42.83	27.69	-2.436	1.645	NO
Arsenic	17.61	32.23	-2.352	1.645	YES
Barium	31.83	29.67	-0.348	1.645	NO
Beryllium	30.83	29.85	-0.158	1.645	NO
Cadmium	29.72	30.05	-0.053	1.645	NO
Calcium	22.89	31.28	-1.349	1.645	NO
Chromium	26.44	30.64	-0.675	1.645	NO
Cobalt	35.17	29.07	-0.983	1.645	NO
Copper	18.11	32.14	-2.256	1.645	YES
Cyanide	38.78	28.42	-1.666	1.645	NO
Iron	28.78	30.22	-0.232	1.645	NO
Lead	18.50	32.07	-2.182	1.645	YES
Magnesium	18.44	32.08	-2.193	1.645	YES
Manganese	33.11	29.44	-0.590	1.645	NO
Mercury	31.72	29.69	-0.328	1.645	NO
Nickel	27.00	30.54	-0.569	1.645	NO
Potassium	23.83	31.11	-1.170	1.645	NO
Selenium	51.89	26.06	-4.155	1.645	NO
Silver	44.39	27.41	-2.731	1.645	NO
Sodium	43.89	27.50	-2.635	1.645	NO
Thallium	42.33	27.78	-2.345	1.645	NO
Vanadium	19.33	31.92	-2.024	1.645	YES
Zinc	15.72	32.57	-2.709	1.645	YES

Downgradient Compared to Background (Metals)					
Parameter	Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?
	BKGD	SEAD-12			
Aluminum	25.67	30.78	-0.418	1.645	NO
Antimony	42.83	27.69	2.171	1.645	YES
Arsenic	17.61	32.23	-2.357	1.645	NO
Barium	31.83	29.67	-0.798	1.645	NO
Beryllium	30.83	29.85	-0.570	1.645	NO
Cadmium	29.72	30.05	-1.648	1.645	NO
Calcium	22.89	31.28	-0.190	1.645	NO
Chromium	26.44	30.64	-0.190	1.645	NO
Cobalt	35.17	29.07	-0.038	1.645	NO
Copper	18.11	32.14	-1.216	1.645	NO
Cyanide	38.78	28.42	-1.484	1.645	NO
Iron	28.78	30.22	-0.342	1.645	NO
Lead	18.50	32.07	-1.597	1.645	NO
Magnesium	18.44	32.08	-0.798	1.645	NO
Manganese	33.11	29.44	-1.026	1.645	NO
Mercury	31.72	29.69	-0.535	1.645	NO
Nickel	27.00	30.54	-0.456	1.645	NO
Potassium	23.83	31.11	-1.102	1.645	NO
Selenium	51.89	26.06	-2.546	1.645	NO
Silver	44.39	27.41	-1.712	1.645	NO
Sodium	43.89	27.50	-0.532	1.645	NO
Thallium	42.33	27.78	-1.903	1.645	NO
Vanadium	19.33	31.92	-0.038	1.645	NO
Zinc	15.72	32.57	-1.064	1.645	NO

Zrs= Statistic for metal generated from Wilcoxon Rank Sum test

Z(1-alpha)= Maximum allowed probability that WRS test incorrectly indicates that the site and background datasets are distinguishable (alpha= 0.05)

Null Hypothesis: The populations from which the two data sets have been drawn have the same mean.

TABLE 6-2F
Wilcoxon Rank Sum Calculations for Comparison of Background Surface Water to SEAD-12 and Downgradient Surface Water
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Site Compared to Background (Radionuclides)

Parameter	Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?
	BKGD	SEAD-12			
Gross Alpha	32.06	29.03	-0.494	-1.645	NO
Gross Beta	32.00	29.04	-0.484	-1.645	NO
Bismuth -214	40.00	26.65	-2.457	-1.645	NO
Cesium-137	35.33	26.57	-1.502	-1.645	NO
Cobalt-57	36.94	26.25	-1.848	-1.645	NO
Cobalt-60	23.22	28.93	-0.979	-1.645	NO
Lead-211	32.33	27.15	-0.887	-1.645	NO
Lead-214	32.28	27.16	-0.876	-1.645	NO
Plutonium-239/240	22.28	29.12	-1.332	-1.645	NO
Promethium-147	18.36	19.93	-1.277	-1.645	NO
Radium-223	28.00	28.00	0.000	-1.645	NO
Radium-226	31.00	27.41	-0.644	-1.645	NO
Radon-222	16.67	30.22	2.321	-1.645	YES
Thorium-227	14.67	30.61	2.847	-1.645	YES
Thorium-230	13.33	30.87	3.057	-1.645	YES
Thorium-232	15.89	30.37	2.646	-1.645	YES
Tritium	20.00	27.29	-1.335	-1.645	NO
Uranium-233/234	17.89	29.98	2.212	-1.645	YES
Uranium-235	28.89	27.83	-0.230	-1.645	NO
Uranium-238	20.83	29.40	-1.548	-1.645	NO

Downgradient Compared to Background (Radionuclides)

Parameter	Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?
	BKGD	DOWNGRADIENT			
Gross Alpha	10.78	10.27	-0.191	-1.645	NO
Gross Beta	9.78	11.09	-0.495	-1.645	NO
Bismuth -214	8.89	11.82	-1.102	-1.645	NO
Cesium-137	10.56	10.45	-0.038	-1.645	NO
Cobalt-57	11.33	9.82	-0.579	-1.645	NO
Cobalt-60	9.61	11.23	-0.608	-1.645	NO
Lead-211	9.78	11.09	-0.494	-1.645	NO
Lead-214	8.56	12.09	-1.330	-1.645	NO
Plutonium-239/240	10.22	10.73	-0.251	-1.645	NO
Promethium-147	4.00	NA	NA	-1.645	NO
Radium-223	11.50	9.68	-1.312	-1.645	NO
Radium-226	8.00	12.55	1.920	-1.645	YES
Radon-222	10.44	10.55	-0.038	-1.645	NO
Thorium-227	9.11	11.64	-1.265	-1.645	NO
Thorium-230	9.83	11.05	-0.488	-1.645	NO
Thorium-232	13.33	8.18	-2.416	-1.645	NO
Tritium	8.11	12.45	-1.634	-1.645	NO
Uranium-233/234	7.44	13.00	2.200	-1.645	YES
Uranium-235	9.50	11.32	-0.848	-1.645	NO
Uranium-238	5.89	14.27	3.201	-1.645	YES

Site Compared to Background (Metals)

Parameter	Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?
	BKGD	SEAD-12			
Aluminum	34.78	35.61	-0.806	1.645	NO
Antimony	56.00	32.48	-4.757	1.645	NO
Arsenic	51.50	33.14	-3.507	1.645	NO
Barium	33.94	35.73	-0.430	1.645	NO
Beryllium	29.50	36.39	-0.880	1.645	NO
Cadmium	24.11	37.18	2.199	1.645	YES
Calcium	26.22	36.87	-0.698	1.645	NO
Chromium	46.50	33.88	-2.361	1.645	NO
Cobalt	52.00	33.07	-3.626	1.645	NO
Copper	32.94	35.88	-0.548	1.645	NO
Cyanide	35.50	35.50	0.000	1.645	NO
Iron	35.44	35.51	0.762	1.645	NO
Lead	52.50	32.99	-3.770	1.645	NO
Magnesium	29.89	36.33	-0.032	1.645	NO
Manganese	36.89	35.30	-0.097	1.645	NO
Mercury	24.50	34.12	2.433	1.645	YES
Nickel	28.50	36.53	-0.687	1.645	NO
Potassium	37.67	35.18	-0.526	1.645	NO
Selenium	56.00	32.48	-4.757	1.645	NO
Silver	53.00	32.92	-3.846	1.645	NO
Sodium	24.61	37.11	-1.203	1.645	NO
Thallium	55.00	32.62	-4.456	1.645	NO
Vanadium	51.00	33.21	-3.523	1.645	NO
Zinc	20.61	37.70	2.942	1.645	YES

Downgradient Compared to Background (Metals)

Parameter	Wilcoxon Mean Rank		Zrs	Z (1-alpha)	Reject Null Hypothesis?
	BKGD	SEAD-12			
Aluminum	13.89	7.73	-2.368	1.645	NO
Antimony	10.50	10.50	0.000	1.645	NO
Arsenic	10.50	10.50	0.000	1.645	NO
Barium	6.78	13.55	2.545	1.645	YES
Beryllium	6.50	13.77	3.089	1.645	YES
Cadmium	9.22	11.55	-1.025	1.645	NO
Calcium	5.33	14.73	3.533	1.645	YES
Chromium	10.50	10.50	0.000	1.645	NO
Cobalt	1.50	10.50	0.000	1.645	NO
Copper	10.67	10.36	-0.219	1.645	NO
Cyanide	10.50	10.50	0.000	1.645	NO
Iron	14.44	7.27	-2.701	1.645	NO
Lead	10.50	10.50	0.000	1.645	NO
Magnesium	5.44	14.64	3.458	1.645	YES
Manganese	12.44	8.91	-1.330	1.645	NO
Mercury	10.50	10.50	0.000	1.645	NO
Nickel	7.00	13.36	2.893	1.645	YES
Potassium	15.11	6.73	-3.154	1.645	NO
Selenium	10.50	10.50	0.000	1.645	NO
Silver	10.50	10.50	0.000	1.645	NO
Sodium	6.22	14.00	2.926	1.645	YES
Thallium	10.50	10.50	0.000	1.645	NO
Vanadium	10.50	10.50	0.000	1.645	NO
Zinc	11.11	10.00	-0.418	1.645	NO

Zrs= Statistic for metal generated from Wilcoxon Rank Sum test

Z(1-alpha)= Maximum allowed probability that WRS test incorrectly indicates that the site and background datasets are distinguishable (alpha= 0.05)

Null Hypothesis: The populations from which the two data sets have been drawn have the same mean.

- If an analyte was not detected in either the sample or duplicate sample, then 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 chemical 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). For chemical constituents, 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.

For radionuclides, the procedure above was modified. In step 2 above, both a test for normality and lognormality was conducted. If both tests failed, the distribution was considered nonparametric. For nonparametric distributions, the UCLs were calculated using the bootstrap method (Efron, 1981). The bootstrap is a computer-based method for assigning measures of accuracy to statistical estimates (Efron and Tibshirani, 1993). A 95% UCL for a data set is estimated as follows:

(1) randomly re-sampling data set having n data points with replacement (i.e. same data point may be selected more than once);

(2) estimate the mean of the re-sampled data set having n data points;

(3) perform first two steps 3000 times and creating new data set of 3000 re-sampled 95th percentile;

(4) Estimate 95th percentile of data set of 3000 re-sampled means

(5) The 95th percentile estimated in step 4 is the 95 percent bootstrap UCL of the original data set.

No iteration of the calculation was performed based on unusually high SQLs. However, the 95% UCL was compared to the maximum value, with the lower value used as the EPC.

EPCs for radionuclides were adjusted for background concentrations. Radionuclides have background distributions in most environmental media due to either natural causes or radioactive fallout (Eisenbud and Gesell, 1997). In order to estimate incremental lifetime cancer risk (ILCR) (or above background risk) from radionuclides, background levels of radionuclides were subtracted from site-related source term concentrations. This was achieved by subtracting the background 95% UCL from site media specific 95% UCLs estimated as described above. The source-term of a radionuclide at times would be less than zero if its background UCL is greater than its site UCL. A source-term less than zero is meaningless; therefore, radionuclides whose site 95% UCLs were less than background 95% UCLs were also eliminated as radionuclides of potential concern (ROPC).

Table 6-3A and 3B list the chemicals and radionuclides of potential concern for the baseline human health risk assessments in all soils, surface soils (0 to 0.2 feet), 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

Table 6-3A
Total Soil Exposure Point Concentrations for
Chemicals of Potential Concern in Disposal Pits A/B

SEAD-12 Remedial Investigation
Seneca Army Depot Activity

ANALYTE	No. of Valid Analyses	No. of Rejects	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	43	0	18	0.42	9.43E-03	9.31E-03	5.20E-02	FALSE	1.07E-02	1.07E-02
Benzene	43	0	1	0.02	6.24E-03	1.88E-03	6.00E-03	FALSE	6.55E-03	6.00E-03
Ethyl benzene	43	0	3	0.07	8.66E-03	1.14E-02	6.60E-02	FALSE	9.00E-03	9.00E-03
Methyl butyl ketone	43	0	1	0.02	6.17E-03	2.06E-03	1.00E-03	FALSE	6.86E-03	1.00E-03
Methylene chloride	43	0	3	0.07	5.95E-03	2.23E-03	3.00E-03	FALSE	6.92E-03	3.00E-03
Styrene	43	0	1	0.02	6.87E-03	4.49E-03	3.30E-02	FALSE	7.31E-03	7.31E-03
Toluene	43	0	14	0.33	6.10E-03	2.83E-03	1.50E-02	FALSE	7.16E-03	7.16E-03
Total Xylenes	43	0	3	0.07	2.38E-02	8.66E-02	5.20E-01	FALSE	1.44E-02	1.44E-02
Trichloroethene	43	0	4	0.09	6.51E-03	3.58E-03	2.60E-02	FALSE	7.32E-03	7.32E-03
Semi Volatile Organics										
2,4-Dimethylphenol	41	1	1	0.02	4.55E-02	3.38E-02	2.50E-02	FALSE	4.86E-02	2.50E-02
2-Methylnaphthalene	41	1	3	0.07	4.54E-02	3.54E-02	5.60E-02	FALSE	5.00E-02	5.00E-02
4-Methylphenol	42	0	1	0.02	1.01E-01	3.42E-01	1.40E-01	FALSE	7.78E-02	7.78E-02
Acenaphthene	41	1	1	0.02	4.94E-02	4.15E-02	2.30E-02	FALSE	5.35E-02	2.30E-02
Acenaphthylene	41	1	1	0.02	4.60E-02	3.48E-02	3.30E-02	FALSE	4.90E-02	3.30E-02
Anthracene	42	0	3	0.07	9.92E-02	3.42E-01	9.60E-02	FALSE	8.06E-02	8.06E-02
Benzo(a)anthracene	42	0	9	0.21	9.47E-02	3.42E-01	1.80E-01	FALSE	8.48E-02	8.48E-02
Benzo(a)pyrene	42	0	9	0.21	9.45E-02	3.43E-01	2.00E-01	FALSE	8.04E-02	8.04E-02
Benzo(b)fluoranthene	42	0	10	0.24	9.36E-02	3.43E-01	1.90E-01	FALSE	8.20E-02	8.20E-02
Benzo(ghi)perylene	42	0	7	0.17	9.65E-02	3.43E-01	1.20E-01	FALSE	8.83E-02	8.83E-02
Benzo(k)fluoranthene	42	0	7	0.17	9.41E-02	3.42E-01	1.60E-01	FALSE	7.79E-02	7.79E-02
Bis(2-Ethylhexyl)phthalate	42	0	10	0.24	1.55E-01	3.83E-01	9.30E-01	FALSE	1.66E-01	1.66E-01
Butylbenzylphthalate	41	1	2	0.05	4.86E-02	4.21E-02	2.29E-02	FALSE	5.60E-02	2.29E-02
Carbazole	41	1	1	0.02	4.95E-02	4.15E-02	2.75E-02	FALSE	5.35E-02	2.75E-02
Chrysene	42	0	11	0.26	9.60E-02	3.43E-01	2.40E-01	FALSE	8.98E-02	8.98E-02
Di-n-butylphthalate	42	0	6	0.14	1.33E-01	4.22E-01	1.70E+00	FALSE	1.10E-01	1.10E-01
Di-n-octylphthalate	41	1	14	0.34	4.23E-02	4.56E-02	5.40E-02	FALSE	5.99E-02	5.40E-02
Dibenz(a,h)anthracene	41	1	4	0.1	4.47E-02	3.60E-02	5.70E-02	FALSE	5.26E-02	5.26E-02
Dibenzofuran	41	1	1	0.02	4.94E-02	4.15E-02	2.23E-02	FALSE	5.35E-02	2.23E-02
Fluoranthene	42	0	14	0.33	9.68E-02	3.47E-01	4.20E-01	FALSE	9.57E-02	9.57E-02
Fluorene	41	1	3	0.07	4.53E-02	3.54E-02	5.20E-02	FALSE	4.98E-02	4.98E-02
Indeno(1,2,3-cd)pyrene	42	0	6	0.14	9.72E-02	3.42E-01	1.20E-01	FALSE	8.60E-02	8.60E-02
Naphthalene	42	0	2	0.05	1.16E-01	3.50E-01	6.00E-01	FALSE	9.76E-02	9.76E-02
Phenanthrene	42	0	10	0.24	9.88E-02	3.45E-01	3.40E-01	FALSE	9.61E-02	9.61E-02
Phenol	42	0	2	0.05	1.01E-01	3.43E-01	3.00E-01	FALSE	7.71E-02	7.71E-02
Pyrene	42	0	12	0.29	1.02E-01	3.46E-01	3.80E-01	FALSE	1.02E-01	1.02E-01
Pesticides/PCBS										
4,4'-DDE	42	0	5	0.12	3.90E-03	7.34E-03	4.20E-02	FALSE	3.86E-03	3.86E-03
4,4'-DDT	42	0	3	0.07	3.05E-03	6.21E-03	4.20E-02	FALSE	2.91E-03	2.91E-03
Aldrin	42	0	1	0.02	1.07E-03	4.07E-04	7.90E-04	FALSE	1.13E-03	7.90E-04
Alpha-BHC	42	0	2	0.05	1.67E-03	3.56E-03	2.40E-02	FALSE	1.59E-03	1.59E-03
Alpha-Chlordane	42	0	2	0.05	1.18E-03	6.79E-04	4.60E-03	FALSE	1.26E-03	1.26E-03
Aroclor-1254	42	0	9	0.21	2.28E-01	6.37E-01	3.00E+00	FALSE	2.09E-01	2.09E-01
Aroclor-1260	42	0	2	0.05	2.37E-02	2.13E-02	1.50E-01	FALSE	2.50E-02	2.50E-02
Beta-BHC	42	0	1	0.02	1.11E-03	4.40E-04	2.20E-03	FALSE	1.18E-03	1.18E-03
Dieldrin	42	0	4	0.1	3.82E-03	6.98E-03	4.00E-02	FALSE	3.82E-03	3.82E-03
Endosulfan I	42	0	1	0.02	1.10E-03	4.20E-04	1.80E-03	FALSE	1.16E-03	1.16E-03
Endosulfan II	42	0	3	0.07	2.59E-03	2.87E-03	1.90E-02	FALSE	2.72E-03	2.72E-03
Endrin	42	0	6	0.14	2.96E-03	3.61E-03	2.00E-02	FALSE	3.15E-03	3.15E-03
Endrin aldehyde	42	0	2	0.05	2.22E-03	9.92E-04	5.60E-03	FALSE	2.37E-03	2.37E-03
Gamma-Chlordane	42	0	6	0.14	3.88E-03	1.10E-02	5.80E-02	FALSE	3.19E-03	3.19E-03
Heptachlor	42	0	2	0.05	1.40E-03	1.89E-03	1.30E-02	FALSE	1.45E-03	1.45E-03
Heptachlor epoxide	42	0	4	0.1	1.68E-03	3.28E-03	2.20E-02	FALSE	1.64E-03	1.64E-03
Metals										
Copper	42	0	42	1	3.05E+01	3.45E+01	2.15E+02	FALSE	3.33E+01	3.33E+01
Cyanide	42	0	4	0.1	3.96E-01	3.03E-01	1.60E+00	FALSE	4.31E-01	4.31E-01
Selenium	42	0	6	0.14	5.44E-01	3.36E-01	2.30E+00	FALSE	5.98E-01	5.98E-01
Thallium	42	0	12	0.29	7.47E-01	3.58E-01	1.80E+00	FALSE	8.48E-01	8.48E-01

Table 6-3A
Total Soil Exposure Point Concentrations for Chemicals of Potential Concern in Disposal Pit C

SEAD-12 Remedial Investigation
Seneca Army Depot Activity

ANALYTE	No. of Valid Analyses	No. of Rejects	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	46	0	14	0.3	7.84E-03	4.70E-03	3.33E-02	FALSE	8.49E-03	8.49E-03
Chlorobenzene	46	0	2	0.04	5.85E-03	9.52E-04	5.00E-03	FALSE	6.38E-03	5.00E-03
Methylene chloride	46	0	4	0.09	7.52E-03	1.26E-02	9.10E-02	FALSE	8.01E-03	8.01E-03
Tetrachloroethene	46	0	1	0.02	5.88E-03	8.30E-04	2.00E-03	FALSE	6.19E-03	2.00E-03
Toluene	46	0	6	0.13	7.18E-03	8.34E-03	6.20E-02	FALSE	7.50E-03	7.50E-03
Total Xylenes	46	0	1	0.02	6.14E-03	1.32E-03	1.40E-02	FALSE	6.38E-03	6.38E-03
Trichloroethene	46	0	1	0.02	5.89E-03	8.34E-04	2.00E-03	FALSE	6.20E-03	2.00E-03
Semi Volatile Organics										
2-Methylnaphthalene	46	0	3	0.07	6.90E-02	6.74E-02	2.20E-02	FALSE	8.60E-02	2.20E-02
Acenaphthene	46	0	5	0.11	6.63E-02	6.52E-02	4.40E-02	FALSE	8.43E-02	4.40E-02
Anthracene	46	0	9	0.2	6.11E-02	5.81E-02	6.30E-02	FALSE	8.02E-02	6.30E-02
Benzo(a)anthracene	46	0	22	0.48	6.12E-02	6.68E-02	2.00E-01	FALSE	9.85E-02	9.85E-02
Benzo(a)pyrene	46	0	22	0.48	5.96E-02	6.47E-02	1.80E-01	FALSE	8.97E-02	8.97E-02
Benzo(b)fluoranthene	46	0	23	0.5	6.52E-02	7.58E-02	3.20E-01	FALSE	9.85E-02	9.85E-02
Benzo(ghi)perylene	46	0	20	0.43	5.51E-02	6.20E-02	9.80E-02	FALSE	8.31E-02	8.31E-02
Benzo(k)fluoranthene	46	0	20	0.43	6.43E-02	7.04E-02	1.70E-01	FALSE	9.61E-02	9.61E-02
Bis(2-Ethylhexyl)phthalate	46	0	6	0.13	6.94E-02	6.80E-02	1.60E-02	FALSE	9.09E-02	1.60E-02
Butylbenzylphthalate	46	0	5	0.11	6.96E-02	6.74E-02	3.00E-02	FALSE	8.40E-02	3.00E-02
Carbazole	46	0	7	0.15	6.54E-02	6.57E-02	4.00E-02	FALSE	8.31E-02	4.00E-02
Chrysene	46	0	26	0.57	6.48E-02	7.68E-02	3.10E-01	FALSE	1.04E-01	1.04E-01
Di-n-butylphthalate	46	0	10	0.22	7.17E-02	9.19E-02	5.20E-02	FALSE	9.78E-02	5.20E-02
Di-n-octylphthalate	46	0	11	0.24	6.52E-02	7.04E-02	2.00E-02	FALSE	9.97E-02	2.00E-02
Dibenz(a,h)anthracene	46	0	10	0.22	6.02E-02	5.92E-02	9.90E-02	FALSE	8.15E-02	8.15E-02
Fluoranthene	46	0	22	0.48	7.61E-02	8.23E-02	3.20E-01	FALSE	1.08E-01	1.08E-01
Fluorene	46	0	2	0.04	6.77E-02	6.42E-02	3.50E-02	FALSE	7.88E-02	3.50E-02
Indeno(1,2,3-cd)pyrene	46	0	16	0.35	5.96E-02	6.13E-02	1.40E-01	FALSE	8.38E-02	8.38E-02
N-Nitrosodiphenylamine	46	0	1	0.02	2.76E-01	1.39E+00	9.50E+00	FALSE	1.43E-01	1.43E-01
Naphthalene	46	0	1	0.02	7.01E-02	6.66E-02	1.30E-02	FALSE	8.20E-02	1.30E-02
Phenanthrene	46	0	23	0.5	6.18E-02	7.10E-02	2.80E-01	FALSE	9.71E-02	9.71E-02
Pyrene	46	0	23	0.5	7.36E-02	7.91E-02	3.10E-01	FALSE	1.08E-01	1.08E-01
Pesticides/PCBS										
4,4'-DDD	46	0	4	0.09	2.45E-03	2.05E-03	1.40E-02	FALSE	2.60E-03	2.60E-03
4,4'-DDE	46	0	7	0.15	2.16E-03	7.56E-04	6.40E-03	FALSE	2.28E-03	2.28E-03
4,4'-DDT	46	0	8	0.17	2.22E-03	6.90E-04	4.90E-03	FALSE	2.35E-03	2.35E-03
Alpha-BHC	46	0	1	0.02	1.12E-03	7.16E-04	5.80E-03	FALSE	1.17E-03	1.17E-03
Alpha-Chlordane	46	0	1	0.02	1.04E-03	2.58E-04	2.60E-03	FALSE	1.08E-03	1.08E-03
Aroclor-1254	46	0	1	0.02	1.98E-02	2.58E-03	2.80E-02	FALSE	2.04E-02	2.04E-02
Aroclor-1260	46	0	1	0.02	1.98E-02	2.39E-03	2.50E-02	FALSE	2.04E-02	2.04E-02
Beta-BHC	46	0	1	0.02	1.03E-03	1.56E-04	1.70E-03	FALSE	1.06E-03	1.06E-03
Gamma-Chlordane	46	0	2	0.04	1.03E-03	2.18E-04	2.30E-03	FALSE	1.07E-03	1.07E-03
Heptachlor	46	0	2	0.04	1.18E-03	1.10E-03	8.40E-03	FALSE	1.22E-03	1.22E-03
Heptachlor epoxide	46	0	1	0.02	1.03E-03	1.88E-04	2.00E-03	FALSE	1.07E-03	1.07E-03
Metals										
Calcium	46	0	46	1	5.68E+04	4.40E+04	2.24E+05	FALSE	1.02E+05	1.02E+05
Selenium	46	0	16	0.35	6.31E-01	3.99E-01	1.90E+00	FALSE	7.38E-01	7.38E-01
Thallium	46	0	19	0.41	7.43E-01	4.02E-01	1.70E+00	FALSE	8.76E-01	8.76E-01

Table 6-3A
Total Soil Exposure Point Concentrations for Chemicals of Potential Concern in the Former Dry Waste Disposal Area

SEAD-12 Remedial Investigation
Seneca Army Depot Activity

Analyte	No. of Valid Analyses	No. of Rejects	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	47	0	16	0.34	1.03E-02	1.43E-02	9.80E-02	FALSE	1.10E-02	1.10E-02
Benzene	47	0	1	0.02	5.54E-03	5.69E-04	2.00E-03	FALSE	5.78E-03	2.00E-03
Carbon disulfide	47	0	2	0.04	5.47E-03	7.97E-04	3.00E-03	FALSE	5.94E-03	3.00E-03
Methyl ethyl ketone	47	0	1	0.02	5.56E-03	4.38E-04	3.00E-03	FALSE	5.71E-03	3.00E-03
Methylene chloride	47	0	4	0.09	5.30E-03	1.12E-03	2.00E-03	FALSE	5.93E-03	2.00E-03
Toluene	47	0	10	0.21	5.71E-03	2.12E-03	1.50E-02	FALSE	6.14E-03	6.14E-03
Semi Volatile Organics										
1,2,4-Trichlorobenzene	46	1	1	0.02	5.93E-02	5.33E-02	2.35E-02	FALSE	6.65E-02	2.35E-02
2-Methylnaphthalene	46	1	2	0.04	5.82E-02	5.42E-02	5.50E-03	FALSE	7.24E-02	5.50E-03
Anthracene	46	1	1	0.02	5.89E-02	5.37E-02	5.40E-03	FALSE	6.92E-02	5.40E-03
Benzo(a)anthracene	46	1	7	0.15	5.26E-02	5.25E-02	2.60E-02	FALSE	6.74E-02	2.60E-02
Benzo(a)pyrene	47	0	9	0.19	5.13E-02	5.25E-02	3.90E-02	FALSE	6.87E-02	3.90E-02
Benzo(b)fluoranthene	47	0	10	0.21	5.80E-02	7.19E-02	3.40E-02	FALSE	8.06E-02	3.40E-02
Benzo(ghi)perylene	47	0	5	0.11	5.70E-02	5.41E-02	3.90E-02	FALSE	7.03E-02	3.90E-02
Benzo(k)fluoranthene	46	1	7	0.15	5.24E-02	5.26E-02	2.00E-02	FALSE	6.84E-02	2.00E-02
Bis(2-Ethylhexyl)phthalate	47	0	14	0.3	5.82E-02	7.00E-02	1.13E-01	FALSE	7.90E-02	7.90E-02
Butylbenzylphthalate	46	1	3	0.07	5.76E-02	5.46E-02	7.20E-03	FALSE	7.28E-02	7.20E-03
Carbazole	46	1	1	0.02	5.89E-02	5.36E-02	7.40E-03	FALSE	6.82E-02	7.40E-03
Chrysene	47	0	14	0.3	5.52E-02	7.32E-02	3.20E-02	FALSE	8.18E-02	3.20E-02
Di-n-butylphthalate	47	0	8	0.17	1.00E-01	1.18E-01	1.19E-01	FALSE	1.66E-01	1.19E-01
Di-n-octylphthalate	47	0	10	0.21	6.14E-02	7.38E-02	3.40E-02	FALSE	8.23E-02	3.40E-02
Dibenzofuran	46	1	1	0.02	5.89E-02	5.37E-02	4.10E-03	FALSE	7.04E-02	4.10E-03
Diethyl phthalate	46	1	2	0.04	5.83E-02	5.40E-02	1.10E-02	FALSE	6.95E-02	1.10E-02
Fluoranthene	47	0	13	0.28	5.17E-02	5.33E-02	8.80E-02	FALSE	7.17E-02	7.17E-02
Indeno(1,2,3-cd)pyrene	47	0	5	0.11	6.32E-02	7.29E-02	8.70E-03	FALSE	8.66E-02	8.70E-03
Naphthalene	46	1	1	0.02	5.89E-02	5.37E-02	5.40E-03	FALSE	6.93E-02	5.40E-03
Phenanthrene	47	0	12	0.26	5.68E-02	7.25E-02	3.40E-02	FALSE	8.21E-02	3.40E-02
Pyrene	47	0	14	0.3	5.00E-02	5.34E-02	5.20E-02	FALSE	6.90E-02	5.20E-02
Pesticides/PCBS										
4,4'-DDE	47	0	1	0.02	1.87E-03	8.70E-05	2.00E-03	FALSE	1.92E-03	1.92E-03
4,4'-DDT	47	0	1	0.02	1.91E-03	3.51E-04	4.20E-03	FALSE	1.97E-03	1.97E-03
Aroclor-1242	47	0	2	0.04	1.86E-02	9.10E-04	1.70E-02	FALSE	1.92E-02	1.70E-02
Aroclor-1254	47	0	1	0.02	1.87E-02	1.06E-03	2.30E-02	FALSE	1.93E-02	1.93E-02
Aroclor-1260	47	0	1	0.02	1.88E-02	1.26E-03	2.50E-02	FALSE	1.93E-02	1.93E-02
Endrin aldehyde	47	0	1	0.02	1.87E-03	9.83E-05	2.20E-03	FALSE	1.93E-03	1.93E-03
Metals										
Calcium	47	0	47	1	7.39E+04	2.88E+04	1.32E+05	FALSE	1.06E+05	1.06E+05
Copper	47	0	47	1	2.29E+01	9.18E+00	7.45E+01	FALSE	2.44E+01	2.44E+01
Magnesium	47	0	47	1	1.33E+04	5.59E+03	3.42E+04	FALSE	1.52E+04	1.52E+04
Selenium	47	0	8	0.17	5.45E-01	4.21E-01	2.50E+00	FALSE	6.05E-01	6.05E-01
Thallium	47	0	16	0.34	7.35E-01	4.64E-01	2.20E+00	FALSE	8.33E-01	8.33E-01

Table 6-3A
Surface Soil Exposure Point Concentrations for Chemicls of Potential Concern in Disposal Pits A/B

SEAD-12 Remedial Investigation
Seneca Army Depot Activity

ANALYTE	No. of Valid Analyses	No. of Rejects	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	14	0	6	0.43	9.32E-03	1.23E-02	5.20E-02	FALSE	1.21E-02	1.21E-02
Methyl butyl ketone	14	0	1	0.07	5.57E-03	1.34E-03	1.00E-03	FALSE	7.68E-03	1.00E-03
Methylene chloride	14	0	1	0.07	5.57E-03	1.34E-03	1.00E-03	FALSE	7.68E-03	1.00E-03
Toluene	14	0	4	0.29	4.93E-03	1.73E-03	4.00E-03	FALSE	7.14E-03	4.00E-03
Semi Volatile Organics										
Benzo(a)anthracene	14	0	5	0.36	3.01E-02	1.45E-02	2.70E-02	FALSE	6.57E-02	2.70E-02
Benzo(a)pyrene	14	0	5	0.36	2.99E-02	1.44E-02	2.70E-02	FALSE	5.68E-02	2.70E-02
Benzo(b)fluoranthene	14	0	6	0.43	2.94E-02	1.52E-02	3.60E-02	FALSE	6.27E-02	3.60E-02
Benzo(ghi)perylene	14	0	5	0.36	2.97E-02	1.51E-02	3.10E-02	FALSE	6.48E-02	3.10E-02
Benzo(k)fluoranthene	14	0	4	0.29	3.16E-02	1.37E-02	2.60E-02	FALSE	5.45E-02	2.60E-02
Bis(2-Ethylhexyl)phthalate	14	0	3	0.21	4.74E-02	4.80E-02	2.10E-01	FALSE	7.32E-02	7.32E-02
Butylbenzylphthalate	14	0	1	0.07	3.83E-02	4.79E-03	2.29E-02	FALSE	4.14E-02	2.29E-02
Carbazole	14	0	1	0.07	3.86E-02	3.67E-03	2.75E-02	FALSE	4.07E-02	2.75E-02
Chrysene	14	0	7	0.5	2.76E-02	1.70E-02	5.10E-02	FALSE	6.26E-02	5.10E-02
Di-n-butylphthalate	14	0	3	0.21	3.57E-02	1.30E-02	5.35E-02	FALSE	5.94E-02	5.35E-02
Di-n-octylphthalate	14	0	2	0.14	3.61E-02	9.82E-03	2.34E-02	FALSE	5.14E-02	2.34E-02
Dibenz(a,h)anthracene	14	0	2	0.14	3.61E-02	9.31E-03	2.75E-02	FALSE	5.05E-02	2.75E-02
Dibenzofuran	14	0	1	0.07	3.82E-02	4.93E-03	2.23E-02	FALSE	4.15E-02	2.23E-02
Fluoranthene	14	0	8	0.57	2.36E-02	1.51E-02	2.44E-02	FALSE	4.70E-02	2.44E-02
Fluorene	14	0	1	0.07	3.82E-02	4.95E-03	2.22E-02	FALSE	4.15E-02	2.22E-02
Indeno(1,2,3-cd)pyrene	14	0	4	0.29	3.18E-02	1.37E-02	2.85E-02	FALSE	5.97E-02	2.85E-02
Phenanthrene	14	0	5	0.36	2.89E-02	1.54E-02	2.38E-02	FALSE	5.97E-02	2.38E-02
Pyrene	14	0	7	0.5	2.53E-02	1.53E-02	2.20E-02	FALSE	5.00E-02	2.20E-02
Pesticides/PCBS										
4,4'-DDE	14	0	2	0.14	3.12E-03	3.50E-03	1.50E-02	FALSE	4.08E-03	4.08E-03
4,4'-DDT	14	0	2	0.14	4.84E-03	1.07E-02	4.20E-02	FALSE	6.09E-03	6.09E-03
Aroclor-1254	14	0	3	0.21	9.65E-02	1.99E-01	6.70E-01	FALSE	1.90E-01	1.90E-01
Dieldrin	14	0	2	0.14	3.12E-03	3.29E-03	1.40E-02	FALSE	4.13E-03	4.13E-03
Endosulfan I	14	0	1	0.07	1.08E-03	2.13E-04	1.80E-03	FALSE	1.17E-03	1.17E-03
Endosulfan II	14	0	1	0.07	2.04E-03	2.07E-04	2.70E-03	FALSE	2.14E-03	2.14E-03
Endrin	14	0	2	0.14	2.19E-03	6.07E-04	4.20E-03	FALSE	2.43E-03	2.43E-03
Endrin aldehyde	14	0	2	0.14	2.35E-03	1.02E-03	5.60E-03	FALSE	2.75E-03	2.75E-03
Gamma-Chlordane	14	0	3	0.21	2.38E-03	3.26E-03	1.10E-02	FALSE	3.76E-03	3.76E-03
Heptachlor epoxide	14	0	2	0.14	1.44E-03	1.09E-03	4.60E-03	FALSE	1.85E-03	1.85E-03
Metals										
Copper	14	0	14	1	2.00E+01	5.25E+00	3.25E+01	TRUE	2.25E+01	2.25E+01
Cyanide	14	0	2	0.14	4.70E-01	4.02E-01	1.60E+00	FALSE	6.25E-01	6.25E-01
Selenium	14	0	1	0.07	5.72E-01	5.07E-01	2.30E+00	FALSE	7.39E-01	7.39E-01
Thallium	14	0	5	0.36	8.84E-01	4.00E-01	1.80E+00	TRUE	1.07E+00	1.07E+00

Table 6-3A
Surface Soil Exposure Point Concentrations for Chemicals of Potential Concern in Disposal Pit C

SEAD-12 - Remedial Investigation
Seneca Army Depot Activity

ANALYTE	No. of Valid Analyses	No. of Rejects	No. of Hit	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	9	0	6	0.67	7.86E-03	2.80E-03	1.50E-02	FALSE	9.62E-03	9.62E-03
Semi Volatile Organics										
Anthracene	9	0	1	0.11	3.64E-02	1.21E-02	4.60E-03	FALSE	8.24E-02	4.60E-03
Benzo(a)anthracene	9	0	6	0.67	2.20E-02	1.41E-02	2.60E-02	TRUE	3.06E-02	2.60E-02
Benzo(a)pyrene	9	0	6	0.67	2.05E-02	1.43E-02	2.00E-02	FALSE	4.15E-02	2.00E-02
Benzo(b)fluoranthene	9	0	6	0.67	2.20E-02	1.39E-02	2.80E-02	FALSE	4.18E-02	2.80E-02
Benzo(ghi)perylene	9	0	5	0.56	2.57E-02	1.44E-02	2.65E-02	TRUE	3.45E-02	2.65E-02
Benzo(k)fluoranthene	9	0	6	0.67	2.28E-02	1.35E-02	2.75E-02	TRUE	3.10E-02	2.75E-02
Bis(2-Ethylhexyl)phthalate	9	0	1	0.11	3.83E-02	1.26E-02	5.80E-03	FALSE	7.78E-02	5.80E-03
Carbazole	9	0	2	0.22	3.50E-02	1.23E-02	2.37E-02	FALSE	6.56E-02	2.37E-02
Chrysene	9	0	8	0.89	1.45E-02	1.09E-02	2.70E-02	FALSE	2.77E-02	2.70E-02
Di-n-butylphthalate	9	0	2	0.22	3.29E-02	1.63E-02	4.50E-03	FALSE	1.28E-01	4.50E-03
Di-n-octylphthalate	9	0	1	0.11	3.70E-02	1.13E-02	7.30E-03	FALSE	6.48E-02	7.30E-03
Dibenz(a,h)anthracene	9	0	3	0.33	3.07E-02	1.54E-02	2.33E-02	FALSE	8.52E-02	2.33E-02
Fluoranthene	9	0	6	0.67	2.69E-02	1.22E-02	4.00E-02	TRUE	3.43E-02	4.00E-02
Indeno(1,2,3-cd)pyrene	9	0	5	0.56	2.52E-02	1.49E-02	2.65E-02	TRUE	3.43E-02	2.65E-02
Phenanthrene	9	0	7	0.78	1.72E-02	1.24E-02	2.10E-02	FALSE	3.43E-02	2.10E-02
Pyrene	9	0	6	0.67	2.62E-02	1.27E-02	4.00E-02	TRUE	3.40E-02	3.40E-02
Pesticides/PCBS										
4,4'-DDD	9	0	1	0.11	2.77E-03	2.19E-03	8.60E-03	FALSE	3.96E-03	3.96E-03
4,4'-DDT	9	0	1	0.11	2.05E-03	1.12E-04	2.20E-03	TRUE	2.12E-03	2.12E-03
Metals										
Calcium	9	0	9	1	1.79E+04	2.41E+04	7.59E+04	FALSE	7.84E+04	7.59E+04
Selenium	9	0	5	0.56	6.23E-01	1.91E-01	9.50E-01	TRUE	7.40E-01	7.40E-01
Thallium	9	0	3	0.33	8.85E-01	5.44E-01	1.70E+00	FALSE	1.47E+00	1.47E+00

Table 6-3A
Surface Soil Exposure Point Concentrations for
Chemicals of Potential Concern in the Former Dry Waste Disposal Area

SEAD-12 Remedial Investigation
Seneca Army Depot Activity

ANALYTE	No. of Valid Analyses	No. of Rejects	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	10	0	1	0.1	5.85E-03	4.74E-04	7.00E-03	FALSE	6.23E-03	6.23E-03
Toluene	10	0	1	0.1	6.65E-03	2.77E-03	1.45E-02	FALSE	8.02E-03	8.02E-03
Semi Volatile Organics										
1,2,4-Trichlorobenzene	10	0	1	0.1	5.18E-02	4.54E-02	2.35E-02	FALSE	7.44E-02	2.35E-02
2-Methylnaphthalene	10	0	1	0.1	4.99E-02	4.70E-02	5.50E-03	FALSE	1.13E-01	5.50E-03
Benzo(a)anthracene	10	0	4	0.4	2.89E-02	1.52E-02	2.60E-02	FALSE	6.11E-02	2.60E-02
Benzo(a)pyrene	10	0	5	0.5	2.49E-02	1.67E-02	2.00E-02	FALSE	6.76E-02	2.00E-02
Benzo(b)fluoranthene	10	0	5	0.5	2.71E-02	1.59E-02	3.40E-02	FALSE	6.01E-02	3.40E-02
Benzo(ghi)perylene	10	0	2	0.2	4.87E-02	4.75E-02	2.35E-02	FALSE	1.03E-01	2.35E-02
Benzo(k)fluoranthene	10	0	5	0.5	2.53E-02	1.63E-02	2.00E-02	FALSE	6.36E-02	2.00E-02
Bis(2-Ethylhexyl)phthalate	10	0	3	0.3	4.79E-02	4.73E-02	3.60E-02	FALSE	8.33E-02	3.60E-02
Butylbenzylphthalate	10	0	1	0.1	4.95E-02	4.71E-02	5.90E-03	FALSE	1.09E-01	5.90E-03
Chrysene	10	0	6	0.6	2.40E-02	1.48E-02	3.20E-02	FALSE	4.80E-02	3.20E-02
Di-n-butylphthalate	10	0	3	0.3	9.53E-02	1.17E-01	2.01E-02	FALSE	1.10E+00	2.01E-02
Di-n-octylphthalate	10	0	3	0.3	4.51E-02	4.92E-02	1.50E-02	FALSE	9.84E-02	1.50E-02
Diethyl phthalate	10	0	1	0.1	5.04E-02	4.65E-02	1.10E-02	FALSE	8.64E-02	1.10E-02
Fluoranthene	10	0	8	0.8	2.21E-02	1.98E-02	6.40E-02	FALSE	5.55E-02	5.55E-02
Indeno(1,2,3-cd)pyrene	10	0	3	0.3	4.36E-02	5.06E-02	6.15E-03	FALSE	1.82E-01	6.15E-03
Naphthalene	10	0	1	0.1	4.98E-02	4.70E-02	5.40E-03	FALSE	1.14E-01	5.40E-03
Phenanthrene	10	0	6	0.6	2.39E-02	1.52E-02	3.40E-02	FALSE	5.00E-02	3.40E-02
Pyrene	10	0	8	0.8	2.10E-02	1.69E-02	5.10E-02	TRUE	3.07E-02	3.07E-02
Pesticides/PCBS										
4,4'-DDE	10	0	1	0.1	1.96E-03	1.28E-04	2.00E-03	TRUE	2.03E-03	2.00E-03
4,4'-DDT	10	0	1	0.1	2.17E-03	7.28E-04	4.20E-03	FALSE	2.54E-03	2.54E-03
Aroclor-1242	10	0	1	0.1	1.93E-02	1.50E-03	1.70E-02	TRUE	2.01E-02	1.70E-02
Aroclor-1254	10	0	1	0.1	1.98E-02	1.77E-03	2.30E-02	TRUE	2.08E-02	2.08E-02
Aroclor-1260	10	0	1	0.1	2.00E-02	2.23E-03	2.50E-02	FALSE	2.13E-02	2.13E-02
Endrin aldehyde	10	0	1	0.1	1.97E-03	1.58E-04	2.20E-03	TRUE	2.06E-03	2.06E-03
Metals										
Calcium	10	0	10	1	5.67E+04	4.15E+04	1.16E+05	TRUE	8.04E+04	8.04E+04
Copper	10	0	10	1	2.10E+01	4.10E+00	3.04E+01	TRUE	2.33E+01	2.33E+01
Magnesium	10	0	10	1	1.03E+04	6.01E+03	2.38E+04	TRUE	1.37E+04	1.37E+04
Selenium	10	0	3	0.3	5.02E-01	3.15E-01	1.30E+00	FALSE	7.56E-01	7.56E-01
Thallium	10	0	4	0.4	7.74E-01	5.19E-01	2.00E+00	FALSE	1.16E+00	1.16E+00

Table 6-[illegible]
Groundwater Exposure Point Concentrations Summary
for Chemicals of Potential Concern

SEAD-12 - Remedial Investigation
Seneca Army Depot Activity

ANALYTE	No. of Valid Analyses	No. of Rejects	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										
1,1,1-Trichloroethane	84	0	1	0.01	1.92E-03	7.90E-03	1.70E-03	FALSE	1.13E-03	1.13E-03
1,2-Dichloroethene (total)	7	0	1	0.14	8.57E-03	9.45E-03	3.00E-02	FALSE	1.79E-02	1.79E-02
Acetone	84	0	6	0.07	5.87E-03	2.34E-02	9.00E-03	FALSE	3.99E-03	3.99E-03
Toluene	84	0	5	0.06	1.94E-03	7.90E-03	3.10E-03	FALSE	1.16E-03	1.16E-03
Trichloroethene	84	0	3	0.04	3.88E-02	2.45E-01	1.60E+00	FALSE	2.41E-03	2.41E-03
Semi Volatile Organics										
1,4-Dichlorobenzene	78	6	8	0.1	4.94E-04	1.63E-04	9.30E-05	FALSE	6.20E-04	9.30E-05
Benzo(a)pyrene	78	6	2	0.03	5.29E-04	1.05E-04	9.70E-05	FALSE	5.78E-04	9.70E-05
Benzo(b)fluoranthene	78	6	1	0.01	5.35E-04	9.11E-05	7.60E-05	FALSE	5.67E-04	7.60E-05
Benzo(ghi)perylene	78	6	4	0.05	5.19E-04	1.24E-04	1.80E-04	FALSE	5.90E-04	1.80E-04
Benzo(k)fluoranthene	78	6	1	0.01	5.35E-04	9.02E-05	9.10E-05	FALSE	5.64E-04	9.10E-05
Bis(2-Ethylhexyl)phthalate	83	0	3	0.04	6.33E-03	3.38E-02	2.30E-01	FALSE	2.06E-03	2.06E-03
Butylbenzylphthalate	78	6	1	0.01	5.36E-04	9.19E-05	6.40E-05	FALSE	5.71E-04	6.40E-05
Di-n-butylphthalate	78	6	8	0.1	4.91E-04	1.55E-04	2.10E-04	FALSE	5.83E-04	2.10E-04
Di-n-octylphthalate	78	6	6	0.08	5.13E-04	1.33E-04	4.10E-04	FALSE	6.28E-04	4.10E-04
Diethyl phthalate	84	0	11	0.13	8.74E-04	1.30E-03	4.30E-03	FALSE	1.03E-03	1.03E-03
Indeno(1,2,3-cd)pyrene	78	6	1	0.01	5.36E-04	8.96E-05	1.00E-04	FALSE	5.62E-04	1.00E-04
Phenol	78	6	5	0.06	5.17E-04	1.17E-04	4.30E-04	FALSE	5.61E-04	4.30E-04
Pyrene	78	6	2	0.03	5.28E-04	1.05E-04	8.00E-05	FALSE	5.80E-04	8.00E-05
Pesticides/PCBS										
Beta-BHC	80	4	1	0.01	3.31E-06	3.75E-06	3.40E-06	FALSE	3.30E-06	3.30E-06
Gamma-Chlordane	84	0	1	0.01	4.53E-06	6.48E-06	5.60E-06	FALSE	4.41E-06	4.41E-06
Heptachlor	78	6	1	0.01	2.71E-06	3.05E-07	2.70E-06	FALSE	2.76E-06	2.70E-06
Metals										
Barium	85	0	85	1	8.74E-02	3.74E-02	1.89E-01	TRUE	9.42E-02	9.42E-02
Cobalt	85	0	18	0.21	1.54E-03	2.18E-03	1.52E-02	FALSE	1.57E-03	1.57E-03

Table 6-3A
Site Surface Water Exposure Point Concentration Summary
for Chemicals of Potential Concern

SEAD-12 Remedial Investigation
Seneca Army Depot Activity

ANALYTE	No. of Valid Analyses	No. of Rejects	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	49	0	3	0.06	2.93E-03	1.33E-03	1.00E-02	FALSE	3.11E-03	3.11E-03
Toluene	46	3	1	0.02	4.98E-04	1.47E-05	4.00E-04	FALSE	5.13E-04	4.00E-04
Trichloroethene	49	0	1	0.02	7.86E-04	1.09E-03	1.00E-03	FALSE	8.00E-04	8.00E-04
Semi Volatile Organics										
Benzo(a)anthracene	49	0	1	0.02	7.49E-04	9.45E-04	2.75E-03	FALSE	7.73E-04	7.73E-04
Benzo(a)pyrene	49	0	1	0.02	7.50E-04	9.47E-04	2.80E-03	FALSE	7.74E-04	7.74E-04
Benzo(k)fluoranthene	49	0	1	0.02	7.54E-04	9.56E-04	3.00E-03	FALSE	7.78E-04	7.78E-04
Bis(2-Ethylhexyl)phthalate	49	0	4	0.08	1.02E-03	1.94E-03	1.20E-02	FALSE	1.00E-03	1.00E-03
Butylbenzylphthalate	46	3	9	0.2	4.46E-04	1.76E-04	2.00E-04	FALSE	5.51E-04	2.00E-04
Chrysene	49	0	1	0.02	7.49E-04	9.45E-04	2.75E-03	FALSE	7.73E-04	7.73E-04
Di-n-butylphthalate	49	0	5	0.1	7.25E-04	9.80E-04	2.00E-03	FALSE	8.39E-04	8.39E-04
Diethyl phthalate	46	3	11	0.24	4.28E-04	1.93E-04	4.60E-04	FALSE	5.89E-04	4.60E-04
Pentachlorophenol	49	0	1	0.02	1.90E-03	2.42E-03	7.25E-03	FALSE	1.96E-03	1.96E-03
Pyrene	49	0	1	0.02	7.54E-04	9.56E-04	3.00E-03	FALSE	7.78E-04	7.78E-04
Pesticides/PCBS										
4,4'-DDE	46	3	1	0.02	5.26E-06	7.66E-07	5.60E-06	FALSE	5.41E-06	5.41E-06
4,4'-DDT	49	0	1	0.02	9.26E-06	1.36E-05	6.20E-05	FALSE	9.46E-06	9.46E-06
Aldrin	48	1	1	0.02	3.64E-06	4.70E-06	4.10E-06	FALSE	3.72E-06	3.72E-06
Alpha-BHC	49	0	10	0.2	7.34E-06	1.39E-05	9.00E-05	FALSE	7.76E-06	7.76E-06
Alpha-Chlordane	46	3	1	0.02	3.16E-06	3.43E-06	3.60E-06	FALSE	3.25E-06	3.25E-06
Aroclor-1242	49	0	2	0.04	9.45E-05	1.28E-04	4.40E-04	FALSE	9.94E-05	9.94E-05
Beta-BHC	49	0	5	0.1	4.58E-06	6.06E-06	1.70E-05	FALSE	4.83E-06	4.83E-06
Delta-BHC	49	0	3	0.06	4.08E-06	5.73E-06	4.60E-06	FALSE	4.14E-06	4.14E-06
Endrin aldehyde	49	0	2	0.04	8.28E-06	1.13E-05	1.20E-05	FALSE	8.51E-06	8.51E-06
Endrin ketone	49	0	1	0.02	8.30E-06	1.13E-05	1.50E-05	FALSE	8.54E-06	8.54E-06
Gamma-BHC/Lindane	49	0	5	0.1	6.10E-06	1.38E-05	9.20E-05	FALSE	5.70E-06	5.70E-06
Heptachlor	49	0	3	0.06	4.22E-06	5.73E-06	6.30E-06	FALSE	4.35E-06	4.35E-06
Heptachlor epoxide	47	2	2	0.04	3.15E-06	3.39E-06	3.30E-06	FALSE	3.23E-06	3.23E-06
Hexachlorobenzene	46	0	3	0.07	5.68E-06	2.48E-06	2.00E-05	FALSE	5.98E-06	5.98E-06
Metals										
Cadmium	49	0	7	0.14	2.73E-04	3.08E-04	2.10E-03	FALSE	2.92E-04	2.92E-04
Mercury	49	0	4	0.08	2.27E-04	2.20E-04	1.10E-04	FALSE	3.60E-04	1.10E-04
Zinc	49	0	49	1	2.19E-02	2.17E-02	1.05E-01	FALSE	2.81E-02	2.81E-02

Table 6-3A
Site Sediment Exposure Point Concentrations Summary
for Chemicals of Potential Concern

SEAD-12 - Remedial Investigation
Seneca Army Depot Activity

ANALYTE	No. of Valid Analyses	No. of Rejects	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										
1,1,1-Trichloroethane	50	0	1	0.02	9.24E-03	3.59E-03	3.00E-03	FALSE	1.00E-02	3.00E-03
Acetone	50	0	20	0.4	1.95E-02	1.97E-02	9.50E-02	FALSE	2.32E-02	2.32E-02
Methyl chloride	50	0	2	0.04	9.24E-03	2.97E-03	1.70E-02	FALSE	9.84E-03	9.84E-03
Methyl ethyl ketone	50	0	1	0.02	9.45E-03	3.49E-03	1.10E-02	FALSE	1.01E-02	1.01E-02
Tetrachloroethene	50	0	2	0.04	9.12E-03	3.70E-03	4.00E-03	FALSE	1.01E-02	4.00E-03
Toluene	50	0	5	0.1	9.52E-03	3.92E-03	2.00E-02	FALSE	1.04E-02	1.04E-02
Trichloroethene	50	0	4	0.08	9.33E-03	3.96E-03	1.80E-02	FALSE	1.05E-02	1.05E-02
Semi Volatile Organics										
2-Methylnaphthalene	50	0	11	0.22	7.24E-02	7.90E-02	3.60E-02	FALSE	1.04E-01	3.60E-02
4-Chlorophenyl phenyl ether	50	0	1	0.02	8.33E-02	7.43E-02	6.00E-03	FALSE	9.78E-02	6.00E-03
4-Methylphenol	50	0	5	0.1	8.35E-02	7.57E-02	1.50E-01	FALSE	9.85E-02	9.85E-02
Acenaphthene	50	0	21	0.42	7.49E-02	8.51E-02	5.00E-01	FALSE	1.01E-01	1.01E-01
Acenaphthylene	50	0	3	0.06	8.12E-02	7.56E-02	1.50E-02	FALSE	9.97E-02	1.50E-02
Anthracene	50	0	25	0.5	8.31E-02	1.24E-01	8.30E-01	FALSE	1.14E-01	1.14E-01
Benzo(a)anthracene	50	0	37	0.74	1.97E-01	4.47E-01	3.10E+00	FALSE	2.86E-01	2.86E-01
Benzo(a)pyrene	50	0	39	0.78	2.09E-01	4.77E-01	3.30E+00	FALSE	2.99E-01	2.99E-01
Benzo(b)fluoranthene	50	0	41	0.82	2.36E-01	4.69E-01	3.20E+00	FALSE	3.89E-01	3.89E-01
Benzo(ghi)perylene	50	0	36	0.72	1.60E-01	3.08E-01	2.10E+00	FALSE	2.13E-01	2.13E-01
Benzo(k)fluoranthene	50	0	28	0.56	1.76E-01	3.97E-01	2.70E+00	FALSE	2.12E-01	2.12E-01
Bis(2-Ethylhexyl)phthalate	50	0	7	0.14	1.88E-01	7.00E-01	5.00E+00	FALSE	1.42E-01	1.42E-01
Butylbenzylphthalate	50	0	9	0.18	7.74E-02	7.66E-02	4.20E-02	FALSE	9.32E-02	4.20E-02
Carbazole	50	0	26	0.52	9.86E-02	1.39E-01	9.10E-01	FALSE	1.29E-01	1.29E-01
Chrysene	50	0	41	0.82	2.26E-01	4.71E-01	3.20E+00	FALSE	3.45E-01	3.45E-01
Di-n-butylphthalate	50	0	15	0.3	6.97E-02	7.77E-02	1.34E-01	FALSE	9.93E-02	9.93E-02
Di-n-octylphthalate	50	0	10	0.2	7.04E-02	5.96E-02	1.40E-01	FALSE	9.82E-02	9.82E-02
Dibenz(a,h)anthracene	50	0	28	0.56	8.85E-02	1.29E-01	8.60E-01	FALSE	1.13E-01	1.13E-01
Dibenzofuran	50	0	15	0.3	6.98E-02	7.85E-02	6.40E-02	FALSE	9.12E-02	6.40E-02
Diethyl phthalate	50	0	7	0.14	7.75E-02	7.71E-02	4.00E-02	FALSE	1.02E-01	4.00E-02
Fluoranthene	50	0	44	0.88	3.88E-01	9.20E-01	6.20E+00	FALSE	8.07E-01	8.07E-01
Fluorene	50	0	19	0.38	7.06E-02	6.98E-02	3.40E-01	FALSE	9.30E-02	9.30E-02
Hexachlorobenzene	50	0	1	0.02	8.33E-02	7.43E-02	6.20E-03	FALSE	9.76E-02	6.20E-03
Indeno(1,2,3-cd)pyrene	50	0	36	0.72	1.47E-01	2.93E-01	2.00E+00	FALSE	1.94E-01	1.94E-01
Naphthalene	50	0	6	0.12	7.79E-02	7.59E-02	4.90E-02	FALSE	9.52E-02	4.90E-02
Phenanthrene	50	0	42	0.84	2.29E-01	4.77E-01	3.10E+00	FALSE	4.36E-01	4.36E-01
Pyrene	50	0	43	0.86	3.33E-01	7.90E-01	5.40E+00	FALSE	6.64E-01	6.64E-01
Pesticides/PCBS										
4,4'-DDD	50	0	6	0.12	7.04E-03	1.80E-02	1.10E-01	FALSE	6.14E-03	6.14E-03
4,4'-DDE	50	0	10	0.2	7.10E-03	1.42E-02	7.60E-02	FALSE	6.86E-03	6.86E-03
4,4'-DDT	50	0	7	0.14	7.73E-03	2.79E-02	2.00E-01	FALSE	5.89E-03	5.89E-03
Alpha-Chlordane	50	0	2	0.04	1.61E-03	6.47E-04	3.20E-03	FALSE	1.73E-03	1.73E-03
Aroclor-1254	50	0	4	0.08	5.62E-02	1.66E-01	*1.20E+00*	FALSE	4.75E-02	4.75E-02
Aroclor-1260	50	0	2	0.04	3.06E-02	1.13E-02	3.70E-02	FALSE	3.26E-02	3.26E-02
Endosulfan I	50	0	2	0.04	1.59E-03	6.56E-04	3.60E-03	FALSE	1.71E-03	1.71E-03
Endrin	50	0	2	0.04	3.15E-03	1.30E-03	6.70E-03	FALSE	3.40E-03	3.40E-03
Endrin aldehyde	50	0	2	0.04	3.21E-03	1.45E-03	7.60E-03	FALSE	3.47E-03	3.47E-03
Endrin ketone	50	0	2	0.04	3.48E-03	2.94E-03	2.20E-02	FALSE	3.73E-03	3.73E-03
Heptachlor epoxide	50	0	3	0.06	1.89E-03	1.62E-03	1.10E-02	FALSE	2.04E-03	2.04E-03
Metals										
Arsenic	50	0	48	0.96	5.35E+00	3.44E+00	1.91E+01	FALSE	6.64E+00	6.64E+00
Copper	50	0	50	1	5.14E+01	1.62E+02	1.16E+03	FALSE	4.58E+01	4.58E+01
Lead	50	0	42	0.84	2.45E+01	2.95E+01	2.15E+02	FALSE	2.85E+01	2.85E+01
Magnesium	50	0	50	1	1.06E+04	8.22E+03	4.81E+04	FALSE	1.27E+04	1.27E+04
Vanadium	50	0	50	1	2.38E+01	1.02E+01	7.03E+01	FALSE	2.77E+01	2.77E+01
Zinc	50	0	45	0.9	2.30E+02	3.75E+02	2.65E+03	FALSE	2.77E+02	2.77E+02

Table 6-3A
Downgradient Surface Water Exposure Point Concentration Summary for Chemicals of Potential Concern

SEAD-12 Remedial Investigation
Seneca Army Depot Activity

ANALYTE	No. of Valid Analyses	No. of Rejects	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)
Semi Volatile Organics										
Bis(2-Ethylhexyl)phthalate	11	0	1	0.09	4.90E-04	1.19E-04	1.40E-04	FALSE	6.54E-04	1.40E-04
Butylbenzylphthalate	11	0	2	0.18	4.53E-04	1.69E-04	1.20E-04	FALSE	7.66E-04	1.20E-04
Diethyl phthalate	11	0	2	0.18	4.39E-04	1.86E-04	7.20E-05	FALSE	1.05E-03	7.20E-05
Hexachlorobenzene	11	0	1	0.09	5.82E-06	2.39E-06	1.30E-05	FALSE	6.88E-06	6.88E-06
Metals										
Barium	11	0	11	1	4.77E-02	4.56E-03	5.32E-02	TRUE	5.02E-02	5.02E-02
Beryllium	11	0	8	0.73	1.24E-04	5.59E-05	2.10E-04	TRUE	1.54E-04	1.54E-04
Calcium	11	0	11	1	9.18E+01	5.78E+00	9.84E+01	TRUE	9.50E+01	9.50E+01
Magnesium	11	0	11	1	1.39E+01	1.31E+00	1.56E+01	TRUE	1.46E+01	1.46E+01
Sodium	11	0	11	1	2.18E+01	6.52E+00	3.24E+01	TRUE	2.53E+01	2.53E+01

Table 6-3A
Downgradient Sediment Exposure Point Concentration Summary
for Chemicals of Potential Concern

SEAD-12 - Remedial Investigation
Seneca Army Depot Activity

ANALYTE	No. of Valid Analyses	No. of Rejects	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	11	0	10	0.91	6.97E-02	6.73E-02	1.90E-01	FALSE	2.52E-01	1.90E-01
Semi Volatile Organics										
2-Methylnaphthalene	11	0	3	0.27	4.63E-02	2.13E-02	3.30E-02	TRUE	5.78E-02	3.30E-02
4-Methylphenol	11	0	1	0.09	5.18E-02	1.84E-02	1.40E-02	TRUE	6.18E-02	1.40E-02
Acenaphthene	11	0	4	0.36	4.23E-02	2.39E-02	1.90E-02	TRUE	5.52E-02	1.90E-02
Acenaphthylene	11	0	2	0.18	5.16E-02	1.62E-02	5.40E-02	TRUE	6.04E-02	5.40E-02
Anthracene	11	0	5	0.45	5.12E-02	4.06E-02	1.60E-01	FALSE	9.20E-02	9.20E-02
Benzo(a)anthracene	11	0	8	0.73	1.86E-01	4.38E-01	1.50E+00	FALSE	1.25E+00	1.25E+00
Benzo(a)pyrene	11	0	8	0.73	1.65E-01	3.78E-01	1.30E+00	FALSE	9.77E-01	9.77E-01
Benzo(b)fluoranthene	11	0	10	0.91	1.70E-01	3.51E-01	1.20E+00	FALSE	1.58E+00	1.20E+00
Benzo(ghi)perylene	11	0	6	0.55	1.07E-01	1.79E-01	6.40E-01	FALSE	2.12E-01	2.12E-01
Benzo(k)fluoranthene	11	0	4	0.36	4.39E-02	2.57E-02	4.90E-02	TRUE	5.78E-02	4.90E-02
Bis(2-Ethylhexyl)phthalate	11	0	1	0.09	6.10E-02	2.11E-02	1.10E-01	TRUE	7.24E-02	7.24E-02
Carbazole	11	0	6	0.55	3.84E-02	2.16E-02	6.80E-02	TRUE	5.01E-02	5.01E-02
Chrysene	11	0	11	1	1.71E-01	4.12E-01	1.40E+00	FALSE	2.33E+00	1.40E+00
Di-n-octylphthalate	11	0	2	0.18	6.40E-02	4.91E-02	2.00E-01	FALSE	1.49E-01	1.49E-01
Dibenz(a,h)anthracene	11	0	5	0.45	6.12E-02	6.86E-02	2.60E-01	FALSE	1.25E-01	1.25E-01
Dibenzofuran	11	0	4	0.36	4.15E-02	2.52E-02	2.40E-02	TRUE	5.51E-02	2.40E-02
Fluoranthene	11	0	10	0.91	3.17E-01	7.64E-01	2.60E+00	FALSE	4.34E+00	2.60E+00
Fluorene	11	0	4	0.36	4.72E-02	2.14E-02	5.90E-02	TRUE	5.88E-02	5.88E-02
Indeno(1,2,3-cd)pyrene	11	0	6	0.55	1.04E-01	1.89E-01	6.70E-01	FALSE	2.23E-01	2.23E-01
N-Nitrosodiphenylamine	11	0	1	0.09	6.87E-02	5.13E-02	2.20E-01	FALSE	9.23E-02	9.23E-02
Naphthalene	11	0	4	0.36	4.18E-02	2.56E-02	1.60E-02	TRUE	5.57E-02	1.60E-02
Phenanthrene	11	0	10	0.91	1.25E-01	2.43E-01	8.40E-01	FALSE	1.07E+00	8.40E-01
Pyrene	11	0	10	0.91	2.44E-01	5.87E-01	2.00E+00	FALSE	3.04E+00	2.00E+00
Pesticides/PCBS										
4,4'-DDD	11	0	2	0.18	3.00E-03	6.73E-04	3.70E-03	TRUE	3.36E-03	3.36E-03
4,4'-DDE	11	0	2	0.18	2.99E-03	7.16E-04	4.00E-03	TRUE	3.38E-03	3.38E-03
Metals										
Arsenic	11	0	11	1	5.05E+00	1.52E+00	7.60E+00	TRUE	5.88E+00	5.88E+00

Table 6-3B
Total Soil Source-Term Concentrations - Onsite, Disposal Pits A/B
SEAD-12 Remedial Investigation
Seneca Army Depot Activity

Chemical	Detection Frequency		Range of values, pCi/g Detected Concentrations Minimum	Detected Concentrations Maximum	Detection Limits Minimum	Detection Limits Maximum	Statistical Distribution	BOOT	95% UCL pCi/g	Background UCL pCi/g	ROPC?	Source-Term Concentration pCi/g
Actinium-228	4	4	0.74	0.91	0	0	N	0.875	0.9079261		No(f)	
Bismuth-214	73	75	1	39.8	1.3	1.5	L	3.52823333	2.4981275	1.481076939	No(d)	
Cesium-137	44	71	0.1	1.3	0.1	0.5	L	0.40492958	0.5222446	0.360294118	No(a)	
Cobalt-57	18	71	0.1	0.3	0.1	0.1	L	0.07605634	0.072811	0.066176471	No(a)	
Cobalt-60	20	71	0.1	0.6	0.1	0.8	L	0.16623239	0.1616126	0.15	No(a)	
Lead-210	40	71	2.6	78.6	2	40.8	L	11.4186092	11.409319	10.06499421	Yes	1.344324905
Lead-211	21	71	1.7	13.4	0.6	11.6	L	3.94195423	4.5691563	3.763676471	No(a)	
Lead-214	75	75	1	44.4	0	0	L	3.54216667	2.363188	1.635574687	No(d)	
Plutonium-239	15	71	0.1	0.2	0.1	0.4	L	0.10985915	0.1128954	0.147058824	No(a)	
Radium-223	7	71	0.4	2.1	0.3	1.7	L	0.37464789	0.3285638	0.247058824	Yes	0.081504991
Radium-226	69	71	1	39.8	1.3	1.5	L	3.30073944	2.1971399	1.481076939	No(d)	
Radium-228	69	71	0.7	3.6	0.4	4.5	N	1.84647887	1.8654638	1.972654807	No(a)	
Thallium-208	4	4	0.35	0.88	0	0	L	0.7475	1.1434048		Yes	*0.88*
Thorium-227	5	24	0.1	0.4	0.25	1.1	L	0.28541667	0.3010654	0.289149965	No(a)	
Thorium-230	34	71	0.5	2.3	0.1	0.7	L	0.68980634	1.0000307	0.713970588	No(a)	
Thorium-232	56	71	0.5	2.1	0.1	0.6	N	0.8078169	0.8076615	1.099890784	No(a)	
Thorium-234	4	4	0.31	1.6	0	0	L	1.255	6.318319		No(e)	
Tritium	25	71	0.2	53.3	0.1	0.1	L	5.17535211	8.6892945	2.752426471	Yes	5.936868003
Uranium-234	51	71	0.3	1.4	0.1	0.3	N	0.56838028	0.5736343	0.585294118	No(a)	
Uranium-235	18	71	0.075	0.3	0.1	0.2	L	0.08028169	0.0783728	0.135294118	No(a)	
Uranium-238	65	71	0.3	1.2	0.1	0.2	N	0.68802817	0.6943899	0.744191176	No(a)	

No(a) - Contaminant did not pass Wilcoxon Rank Sum test against background.
No(d) - ANOVA test shows Ra-226 to be at background levels. It is assumed that short-lived daughters (Bi-214, Pb-214) are also at background.
No(e) - Parent radionuclide (U-238) below background.
Italicized Source-Term Concentrations indicate background background subtraction was not performed because there is no background data for the isotope
N= Normal
L= Lognormal
NP= Nonparametric
1) When the statistical distribution is N or L, use the value in the column labelled 95% UCL.
2) When the statistical distribution is NP, use the value in the column labelled 'BOOT'.
3) If the 95 % UCL or BOOT value exceeds the max detected value - use the max detected value.
4) Duplicate samples are not reflected in the detection frequency.
ROPC -radionuclide of potential concern

Table 6-3B
Total Soil Source-Term Concentrations - Onsite, Disposal Pit C
SEAD-12 Remedial Investigation
Seneca Army Depot Activity

Chemical	Detection Frequency		Range of values, pCi/g: Detected Concentrations Minimum	Detected Concentrations Maximum	Detection Limits Minimum	Detection Limits Maximum	Statistical Distribution	BOOT	95% UCL pCi/g	Background UCL pCi/g	COPC?	Source-Term Concentration pCi/g
Actinium-228	9	9	0.66	1.2	0	0	L	0.96	0.983567		No(c)	
Bismuth-214	95	95	0.61	5.8	0	0	L	1.7898105	1.784506	1.481076939	No(d)	
Cesium-137	52	86	0.1	1.3	0.1	0.3	N	0.4011919	0.409936	0.360294118	No(a)	
Cobalt-57	20	86	0.1	0.375	0.1	0.2	L	0.077907	0.07387	0.066176471	No(a)	
Cobalt-60	31	86	0.1	0.7	0.1	0.15	L	0.1811192	0.17772	0.15	No(a)	
Lead-210	56	86	1.9	68.9	1.2	41.05	L	13.33218	15.30374	10.06499421	Yes	5.2387
Lead-211	24	86	1.9	20.3	0.3	3.9	L	4.1727326	4.304844	3.763676471	No(a)	
Lead-214	95	95	0.65	3.4	0	0	L	1.6044316	1.621353	1.635574687	No(a)	
Plutonium-239	11	83	0.1	0.2	0.1	0.4	L	0.0900602	0.09135	0.147058824	No(a)	
Radium-223	10	86	0.4	1.7	0.2	0.7	L	0.3686337	0.338636	0.247058824	Yes	0.0916
Radium-226	83	86	0.9	5.8	0.1	0.2	N	1.8413372	1.845506	1.481076939	No(d)	
Radium-228	83	86	1	5	0.1	0.2	N	1.9901453	2.00981	1.972654807	Yes	0.0372
Thallium-208	9	9	0.24	1.6	0	0	L	0.8745556	1.010799		Yes	*1.0108*
Thorium-230	43	86	0.2	4.8	0.1	1.6	L	0.6527035	0.92632	0.713970588	No(a)	
Thorium-232	85	86	0.1	4.1	0.1	0.1	L	0.9790698	1.0304	1.099890784	No(a)	
Thorium-234	9	9	0.24	1.1	0	0	L	0.7112222	0.815447		No(e)	
Tritium	43	86	0.1	130	0.1	5.75	L	10.564186	14.31429	2.752426471	Yes	11.5619
Uranium-234	69	86	0.3	1.2	0.1	0.2	N	0.6558285	0.665606	0.585294118	No(a)	
Uranium-235	28	86	0.1	0.4	0.1	0.2	L	0.0837209	0.081181	0.135294118	No(a)	
Uranium-238	82	86	0.3	1.3	0.1	0.1	N	0.7563953	0.765654	0.744191176	No(a)	

No(a) - Contaminant did not pass Wilcoxon Rank Sum test against background.
No(b) - 95th percentile UCL for contaminant was below background UCL.
No(c) - Included in Ra-228 RESRAD analysis.
No(d) - ANOVA test shows Ra-226 to be at background levels. It is assumed that short-lived daughters (Bi-214, Pb-214) are also at background.
No(e) - Parent radionuclide (U-238) below background.
Italicized Source-Term Concentrations indicate background subtraction was not performed because there is no background data for the isotope.
N = Normal
L = Lognormal
NP = Nonparametric
1) When the statistical distribution is N or L, use the value in the column labelled 95% UCL.
2) When the statistical distribution is NP, use the value in the column labelled 'BOOT'.
3) If the 95 % UCL or BOOT value exceeds the max detected value - use the max detected value.
4) Duplicate samples are not reflected in the detection frequency.
ROPC - radionuclide of potential concern

Table 6-3B
Total Soil Source-Term Concentrations - Onsite, Former Dry Waste Disposal Pit
SEAD-12 Remedial Investigation
Seneca Army Depot Activity

Chemical	Detection Frequency		Range of values, pCi/g Detected Concentrations Minimum	Range of values, pCi/g Detected Concentrations Maximum	Range of values, pCi/g Detection Limits Minimum	Range of values, pCi/g Detection Limits Maximum	Statistical Distribution	BOOT	95% UCL pCi/g	Background UCL pCi/g	COPC?	Source-Term Concentration pCi/g
Actinium-228	2	2	0.63	0.74	0	0	N	NA	1.032256			
Bismuth-214	57	61	0.505	3.5	1	1.9	L	1.6384754	1.699905	1.48108	Yes	0.2188
Cesium-137	38	55	0.1	1.1	0.1	0.5	L	0.4009091	0.487444	0.36029	No(a)	
Cobalt-57	14	55	0.1	0.2	0.1	0.15	L	0.0763636	0.074458	0.06618	No(a)	
Cobalt-60	20	55	0.1	0.6	0.1	0.3	L	0.1681818	0.166322	0.15	No(a)	
Lead-210	34	55	1.7	70.8	1.4	39.9	L	10.787682	10.878258	10.06499	No(a)	
Lead-211	18	55	3.3	19.4	0.5	17.8	L	4.7231818	6.689800	3.76368	No(a)	
Lead-214	56	61	0.55	2.8	0.1	0.2	N	1.4405164	1.456283	1.63557	No(a)	
Plutonium-239/240	9	55	0.1	1	0.1	0.5	L	0.1313636	0.105691	0.14706	No(a)	
Promethium-147	14	14	1.4	95.7	0	0	NP	23.239286	Calculate NP	15.20356	No(a)	
Radium-223	11	55	0.2	1	0.3	0.6	L	0.3391136	0.322612	0.24706	Yes	0.0756
Radium-226	51	55	1	3.5	1	1.9	L	1.7263636	1.772025	1.48108	No(d)	
Radium-228	53	55	0.8	3.3	1.7	1.7	L	1.8018182	1.830154	1.97265	No(a)	
Thallium-208	6	6	0.255	0.44	0	0	N	0.3866667	0.398553		Yes	*0.3986*
Thorium-227	9	9	0.1	0.15	0	0	NP	0.1388889	Calculate NP	0.28915	No(a)	
Thorium-230	26	55	0.7	2.05	0.1	0.7	L	0.7272727	1.143633	0.71397	No(a)	
Thorium-232	54	55	0.2	1.6	0.2	0.2	N	0.9081818	0.913712	1.09989	No(a)	
Thorium-234	6	6	0.21	0.385	0	0	N	0.3691667	0.383272			
Tritium	27	55	0.1	148.5	0.1	0.1	L	17.230045	8.437146	2.75243	Yes	5.6847
Uranium-234	33	55	0.475	1.2	0.1	0.2	N	0.5313864	0.528751	0.58529	No(a)	
Uranium-235	22	55	0.075	0.3	0.1	0.4	L	0.0918182	0.090097	0.13529	No(a)	
Uranium-238	53	55	0.4	1.1	0.1	0.1	N	0.7318636	0.739922	0.74419	No(a)	

No(a) - Contaminant did not pass Wilcoxon Rank Sum test against background.
No(b) - 95th percentile UCL for contaminant was below background UCL.
No(c) - Included in Ra-228 RESRAD analysis.
No(d) - ANOVA test shows Ra-226 to be at background levels. It is assumed that short-lived daughters (Bi-214, Pb-214) are also at background.
No(e) - Parent radionuclide (U-238) below background.
Italicized Source-Term Concentrations indicate background subtraction was not performed because there is no background data for the isotope.
N = Normal
L = Lognormal
NP = Nonparametric
1) When the statistical distribution is N or L, use the value in the column labelled 95% UCL.
2) When the statistical distribution is NP, use the value in the column labelled 'BOOT'.
3) If the 95 % UCL or BOOT value exceeds the max detected value - use the max detected value.
4) Location ID SB12-10 taken from the top of a UST and duplicate samples are not reflected in the detection frequency.
ROPC - radionuclide of potential concern

Table 6-3B
Surface Soil Source-Term Concentrations - Onsite, Disposal Pits A/B
SEAD-12 Remedial Investigation
Seneca Army Depot Activity

Chemical	Detection Frequency		Range of values, pCi/g Detected Concentrations Minimum	Detected Concentrations Maximum	Detection Limits Minimum	Detection Limits Maximum	Statistical Distribution	BOOT	95% UCL pCi/g	Background UCL pCi/g	ROPC?	Source-Term Concentration pCi/g
Bismuth-214	46	47	1	39.8	1.3	1.3	NP	4.1712766	Calculate NP	1.521402065	No(d)	
Cesium-137	30	47	0.2	1.3	0.1	0.5	NP	0.5202128	Calculate NP	0.506531702	No(a)	
Cobalt-57	9	47	0.1	0.2	0.1	0.1	NP	0.0723404	Calculate NP		No(a)	
Cobalt-60	8	47	0.1	0.5	0.1	0.8	NP	0.1255319	Calculate NP		No(a)	
Lead-210	25	47	2.6	78.6	2	39.1	L	13.665213	13.7111662	16.29284108	No(b)	
Lead-211	12	47	4.3	12.7	0.6	11.6	NP	4.0096543	Calculate NP	8.66510993	No(a)	
Lead-214	47	47	1.1	44.4	0	0	NP	4.3342553	Calculate NP	1.777135915	No(d)	
Plutonium-239	13	47	0.1	0.2	0.1	0.4	NP	0.1164894	Calculate NP	0.163157895	No(a)	
Radium-223	3	47	0.4	1.3	0.3	1.7	NP	0.3330319	Calculate NP	0.289539474	Yes	0.043492441
Radium-226	46	47	1	39.8	1.3	1.3	NP	4.1182979	Calculate NP	1.521402065	No(d)	
Radium-228	45	47	1	3.6	0.4	4.5	NP	1.906383	Calculate NP	1.877307859	No(a)	
Thorium-227	2	18	0.3	0.4	0.25	1.1	L	0.3125	0.323271199	0.469332543	No(a)	
Thorium-230	25	47	0.5	2.3	0.1	0.6	NP	0.8016223	Calculate NP	0.87375	No(a)	
Thorium-232	41	47	0.6	2.1	0.1	0.5	NP	0.9	Calculate NP	1.129721118	No(a)	
Tritium	25	47	0.2	53.3	0.1	0.1	NP	7.6728191	Calculate NP	5.340789474	Yes	2.332029675
Uranium-234	35	47	0.3	1.4	0.1	0.2	NP	0.5968085	Calculate NP	0.739473684	No(a)	
Uranium-235	12	47	0.075	0.3	0.1	0.2	NP	0.0856649	Calculate NP	0.178947368	No(a)	
Uranium-238	45	47	0.3	1	0.1	0.1	NP	0.7265957	Calculate NP	0.8	No(a)	

No(a) - Contaminant did not pass Wilcoxon Rank Sum test against background.
No(b) - 95th percentile UCL for contaminant was below background UCL.
No(c) - Included in Ra-228 RESRAD analysis.
No(d) - ANOVA test shows Ra-226 to be at background levels. It is assumed that short-lived daughters (Bi-214, Pb-214) are also at background.
No(e) - Parent radionuclide (U-238) below background.
Italicized Source-Term Concentrations indicate background background subtraction was not performed because there is no background data for the isotope
N= Normal
L= Lognormal
NP= Nonparametric
1) When the statistical distribution is N or L, use the value in the column labelled 95% UCL.
2) When the statistical distribution is NP, use the value in the column labelled 'BOOT'.
3) If the 95 % UCL or BOOT value exceeds the max detected value - use the max detected value.
4) Duplicate samples are not reflected in the detection frequency.
ROPC -radionuclide of potential concern

Table 6-3B
Surface Soil Source-Term Concentrations - Onsite, Disposal Pit C
SEAD-12 Remedial Investigation
Seneca Army Depot Activity

Chemical	Detection Frequency		Range of values, pCi/g: Detected Concentrations Minimum	Detected Concentrations Maximum	Detection Limits Minimum	Detection Limits Maximum	Statistical Distribution	BOOT	95% UCL pCi/g	Background UCL pCi/g	ROPC?	Source-Term Concentration pCi/g
Bismuth-214	55	55	0.9	5.8	0	0	L	2.0164545	1.9959114	1.521402065	Yes	0.474509349
Cesium-137	32	55	0.2	1.3	0.1	0.1	N	0.4527273	0.4619668	0.506531702	No(a)	
Cobalt-57	10	55	0.1	0.2	0.1	0.1	L	0.0690909	0.0671156		No(a)	
Cobalt-60	6	55	0.3	0.7	0.1	0.1	L	0.1118182	0.0896718		No(a)	
Lead-210	29	55	2.2	68.9	1.2	38.1	L	14.260682	17.52403	16.29284108	Yes	1.231188617
Lead-211	7	55	4.3	20.3	0.3	3.9	L	3.0448182	2.5793229	8.66510993	No(a)	
Lead-214	55	55	0.9	3.4	0	0	L	1.7164545	1.7232357	1.777135915	No(a)	
Plutonium-239	6	55	0.1	0.2	0.1	0.4	L	0.0991136	0.1015751	0.163157895	No(a)	
Radium-223	7	55	0.6	1.7	0.3	0.7	L	0.4195682	0.3780217	0.289539474	Yes	0.088482255
Radium-226	55	55	0.9	5.8	0	0	L	2.0182273	1.9959114	1.521402065	No(d)	
Radium-228	52	55	1.1	3.5	0.1	0.2	N	1.9718636	1.9776614	1.877307859	Yes	0.100353567
Thorium-230	27	55	0.4	1.4	0.1	0.4	N	0.6090909	0.6093595	0.87375	No(a)	
Thorium-232	54	55	0.1	1.3	0.1	0.1	N	0.9300455	0.9390429	1.129721118	No(a)	
Tritium	36	55	0.1	130	0.1	0.1	L	17.023136	83.6487	5.340789474	Yes	78.30791102
Uranium-234	44	55	0.3	1.2	0.1	0.2	N	0.665	0.6700297	0.739473684	No(a)	
Uranium-235	22	55	0.1	0.4	0.1	0.2	L	0.0936364	0.0909493	0.178947368	No(a)	
Uranium-238	54	55	0.3	1.3	0.1	0.1	N	0.7909091	0.799022	0.8	No(a)	

No(a) - Contaminant did not pass Wilcoxon Rank Sum test against background.
No(d) - ANOVA test shows Ra-226 to be at background levels. It is assumed that short-lived daughters (Bi-214, Pb-214) are also at background.
Italicized Source-Term Concentrations indicate background background subtraction was not performed because there is no background data for the isotope
N= Normal
L= Lognormal
NP= Nonparametric
1) When the statistical distribution is N or L, use the value in the column labelled 95% UCL.
2) When the statistical distribution is NP, use the value in the column labelled 'BOOT'.
3) If the 95 % UCL or BOOT value exceeds the max detected value - use the max detected value.
4) Duplicate samples are not reflected in the detection frequency.
ROPC -radionuclide of potential concern

Table 6-3B
Surface Soil Source-Term Concentrations - Onsite, Former Dry Waste Disposal Pit
SEAD-12 Remedial Investigation
Seneca Army Depot Activity

Chemical	Detection Frequency		Range of values, pCi/g: Detected Concentrations Minimum	Detected Concentrations Maximum	Detection Limits Minimum	Detection Limits Maximum	Statistical Distribution	BOOT	95% UCL pCi/g	Background UCL pCi/g	ROPC?	Source-Term Concentration pCi/g
Bismuth-214	27	27	1	3.5	0	0	NP	1.848333	Calculate NP	1.521402065	No(d)	
Cesium-137	22	27	0.2	1.1	0.1	0.1	N	0.566759	0.580109217	0.506531702	No(a)	
Cobalt-57	9	27	0.1	0.2	0.1	0.1	NP	0.087037	Calculate NP		No(a)	
Cobalt-60	5	27	0.15	0.4	0.1	0.1	NP	0.114815	Calculate NP		No(a)	
Lead-210	18	27	2.1	70.8	1.9	39.9	L	15.99083	16.91621406	16.29284108	No(a)	
Lead-211	8	27	3.3	19.4	0.5	13.05	L	5.18	8.241928585	8.66510993	No(a)	
Lead-214	27	27	0.9	2.8	0	0	L	1.722222	1.758089477	1.777135915	No(a)	
Plutonium-239/240	9	27	0.1	1	0.1	0.3	NP	0.18338	Calculate NP	0.163157895	No(a)	
Radium-223	4	27	0.2	0.4	0.3	0.6	NP	0.258333	Calculate NP	0.289539474	No(b)	
Radium-226	27	27	1	3.5	0	0	NP	1.866667	Calculate NP	1.521402065	No(d)	
Radium-228	27	27	0.8	3.3	0	0	L	1.88537	1.927518035	1.877307859	No(a)	
Thorium-230	7	27	0.725	2.05	0.1	0.3	NP	0.55375	Calculate NP	0.87375	No(a)	
Thorium-232	27	27	0.2	1.2	0	0	NP	0.872222	Calculate NP	1.129721118	No(a)	
Tritium	16	27	0.1	148.5	0.1	0.1	NP	17.1788	Calculate NP	5.340789474	Yes	11.83800682
Uranium-234	14	27	0.475	0.9	0.1	0.2	NP	0.486157	Calculate NP	0.739473684	No(a)	
Uranium-235	13	27	0.075	0.3	0.1	0.3	NP	0.110231	Calculate NP	0.178947368	No(a)	
Uranium-238	27	27	0.4	1	0	0	N	0.774074	0.785340752	0.8	No(a)	

No(a) - Contaminant did not pass Wilcoxon Rank Sum test against background.
No(b) - 95th percentile UCL for contaminant was below background UCL.
No(d) - ANOVA test shows Ra-226 to be at background levels. It is assumed that short-lived daughters (Bi-214, Pb-214) are also at background.
N= Normal
L= Lognormal
NP= Nonparametric
1) When the statistical distribution is N or L, use the value in the column labelled 95% UCL.
2) When the statistical distribution is NP, use the value in the column labelled 'BOOT'.
3) If the 95 % UCL or BOOT value exceeds the max detected value - use the max detected value.
4) Duplicate samples are not reflected in the detection frequency.
ROPC -radionuclide of potential concern

Table 6-3B
Groundwater Source-Term Concentrations - Onsite
SEAD-12 Remedial Investigation
Seneca Army Depot Activity

Chemical	Detection Frequency		Range of values, pCi/L: Detected Concentrations Minimum	Detected Concentrations Maximum	Detection Limits Minimum	Detection Limits Maximum	Statistical Distribution	BOOT	95% UCL pCi/L	Background UCL pCi/L	ROPC?	Source-Term Concentration pCi/L
Bismuth-214	25	80	9.05	120	1.6	13.1	L	14.1675344	14.90042244	19.0578125	No(a)	
Cesium-137	3	80	4.1	9.4	0.5	6	L	1.70559688	1.722793913	1.347800159	No(a)	
Cobalt-57	3	80	2.1	2.6	0.3	4.35	L	1.07355938	1.229248357	1.347800159	No(a)	
Cobalt-60	7	80	3.1	11.4	0.3	5.15	L	2.19185625	2.282482032		No(a)	
Lead-210	4	40	2.64	4.67	1.72	6.13	NP	2.1970625	Calculate NP		No(a)	
Lead-211	4	80	52.3	774	14	190	L	64.0389375	48.84104131		No(a)	
Lead-214	24	79	12	33.3	2.2	12.1	L	10.6303608	11.76656387	15.635	No(a)	
Radium-223	34	78	0.1	1.06	0.1	1.26	L	0.29557756	0.302515528	0.257436369	No(a)	
Radium-226	41	80	0.1	1.8	0.2	1.05	L	0.40602219	0.414186551	0.396983681	No(a)	
Radon-222	47	79	3.9	746	40	116	L	187.925253	233.544695	223.747042	No(a)	
Thorium-227	1	40	1.06	1.06	0.323	1.26	NP	0.34457	Calculate NP		No(a)	
Thorium-228	2	40	0.188	0.28	0.0448	0.363	L	0.08747444	0.088378133		Yes	*0.088378133*
Thorium-230	11	80	0.0395	0.4	0.00773	0.3	L	0.09928694	0.121906136	0.460003976	No(a)	
Thorium-232	9	80	0.0096	0.1	0.0072	0.4	L	0.07207723	0.095003363	0.0880125	No(a)	
Tritium	7	78	24.9	234	261	522	N	181.578654	183.1233328	199.5013333	No(a)	
Uranium-233/234	70	80	0.1	3.5	0.0475	0.5	L	1.22186	1.521463121	1.017786033	No(a)	
Uranium-235	29	80	0.1	0.4	0.0431	0.4	L	0.10639925	0.108569067	0.110432933	No(a)	
Uranium-238	74	80	0.1	3.3	0.0424	0.4	L	0.93526156	1.102579563	0.967052003	No(a)	

No(a) - Contaminant did not pass Wilcoxon Rank Sum test against background.
Italicized Source-Term Concentrations indicate background background subtraction was not performed because there is no background data for the isotope
N= Normal
L= Lognormal
NP= Nonparametric
1) When the statistical distribution is N or L, use the value in the column labelled 95% UCL.
2) When the statistical distribution is NP, use the value in the column labelled 'BOOT'.
3) If the 95 % UCL or BOOT value exceeds the max detected value - use the max detected value.
4) Duplicate samples are not reflected in the detection frequency.
ROPC -radionuclide of potential concern

Table 6-3B
Surface Water Source-Term Concentrations, Onsite
SEAD-12 Remedial Investigation
Seneca Army Depot Activity

Chemical	Detection Frequency		Range of values, pCi/L Detected Concentrations Minimum	Detected Concentrations Maximum	Detection Limits Minimum	Detection Limits Maximum	Statistical Distribution	BOOT	95% UCL pCi/L	Background UCL pCi/L	ROPC?	Source-Term Concentration pCi/L
Bismuth-214	30	46	4.9	34.6	1.9	31.8	NP	13.0045109	Calculate NP	18.7496804	No(a)	
Cobalt-60	6	46	3.6	9.2	0.3	9.7	L	2.69570652	3.385406476		No(a)	
Lead-211	1	46	352	352	4.4	704	NP	70.9652717	Calculate NP	3107.393441	No(a)	
Lead-214	26	46	5.5	28.8	1.5	28.1	NP	9.49396739	Calculate NP	13.21706817	No(a)	
Promethium-147	1	22	70.6	70.6	54.8	69.8	NP	36.4618182	Calculate NP	52.85397716	No(a)	
Radium-223	13	46	0.05	0.4	0.1	6	NP	0.80559783	Calculate NP		No(a)	
Radium-226	14	46	0.1	0.5	0.4	0.6	NP	0.24891304	Calculate NP		No(a)	
Radon-222	29	46	27.4	401	29.7	172	NP	109.960543	Calculate NP	53.15902755	Yes	56.8015
Thorium-227	9	46	0.1	1.4	0.1	1.1	NP	0.2826087	Calculate NP	0.116666667	Yes	0.1659
Thorium-230	8	46	0.9	2.2	0.2	1.4	NP	0.58369565	Calculate NP		Yes	*0.5837*
Thorium-232	12	46	0.1	0.4	0.2	1.1	NP	0.24021739	Calculate NP	0.116666667	Yes	0.1236
Tritium	34	42	4.5	432	299	326	N	182.742321	184.4552303	142.3333333	No(a)	
Uranium-234	13	46	0.1	1	0.2	1.4	NP	0.42991848	Calculate NP		Yes	*0.4299*
Uranium-235	12	46	0.1	0.2	0.1	0.2	NP	0.0951087	Calculate NP	0.1	No(a)	
Uranium-238	22	46	0.1	0.7	0.1	0.3	NP	0.22505435	Calculate NP	0.20409095	No(a)	

No(a) - Contaminant did not pass Wilcoxon Rank Sum test against background.
Italicized Source-Term Concentrations indicate background background subtraction was not performed because there is no background data for the isotope
N= Normal
L= Lognormal
NP= Nonparametric
1) When the statistical distribution is N or L, use the value in the column labelled 95% UCL.
2) When the statistical distribution is NP, use the value in the column labelled 'BOOT'.
3) If the 95 % UCL or BOOT value exceeds the max detected value - use the max detected value.
4) Duplicate samples are not reflected in the detection frequency.
ROPC -radionuclide of potential concern

Table 6-3B
Sediment Source-Term Concentrations - Onsite
SEAD-12 Remedial Investigation
Seneca Army Depot Activity

Chemical	Detection Frequency		Range of values, pCi/g: Detected Concentrations Minimum	Detected Concentrations Maximum	Detection Limits Minimum	Detection Limits Maximum	Statistical Distribution	BOOT	95% UCL pCi/g	Background UCL pCi/g	ROPC?	Source-Term Concentration pCi/g
Actinium-228	4	4	0.82	0.92	0	0	L	1.0100	1.094583625		No(f)	
Bismuth-214	37	50	0.82	2.4	0.2	2.3	N	1.4070	1.418248654	1.813990614	No(a)	
Cesium-137	21	46	0.3	1.5	0.1	1.4	L	0.5457	0.613813214	0.510909827	Yes	0.1029
Lead-210	5	46	4.5	6.1	1.4	2600	NP	92.1078	Calculate NP		No(a)	
Lead-211	9	46	5	22.4	0.7	21.9	L	5.0028	6.111353399		No(a)	
Lead-214	46	50	0.83	2.9	0.2	2.5	N	1.6338	1.636673016	1.822222222	No(a)	
Plutonium-239/240	23	46	0.1	0.2	0.1	0.5	NP	0.1283	Calculate NP	0.151838778	No(a)	
Promethium-147	8	10	0.1	83	8.2	8.2	NP	29.5450	Calculate NP	14.15870966	No(a)	
Radium-223	1	46	1.1	1.1	0.3	0.6	NP	0.2734	Calculate NP		No(a)	
Radium-226	33	46	0.9	2.4	0.2	2.3	N	1.4343	1.445902221	1.813990614	No(a)	
Radium-228	42	46	0.9	3.2	0.2	2	N	1.9217	1.931438471	2.076715772	No(a)	
Thallium-208	4	4	0.26	0.85	0	0	L	0.6200	1.395510863		Yes	*0.85*
Thorium-227	13	43	0.1	0.3	0.1	0.7	NP	0.1453	Calculate NP	0.375	No(a)	
Thorium-230	19	46	0.5	1.9	0.3	0.8	NP	0.6815	Calculate NP	1.418647568	No(a)	
Thorium-232	39	46	0.3	1.7	0.2	1.2	N	0.9327	0.940014769	1.574941425	No(a)	
Thorium-234	4	4	0.44	1.6	0	0	L	1.3100	3.228592066		Yes	*1.6*
Tritium	6	46	0.1	0.6	0.1	0.2	NP	0.0870	Calculate NP	0.116666667	No(a)	
Uranium-234	26	46	0.4	1.5	0.1	0.2	NP	0.6414	Calculate NP	0.516666667	No(a)	
Uranium-235	22	46	0.1	0.2	0.1	0.2	NP	0.1011	Calculate NP	0.111111111	No(a)	
Uranium-238	22	46	0.4	1	0.1	0.2	NP	0.4511	Calculate NP	0.305555556	Yes	0.1456

No(a) - Contaminant did not pass Wilcoxon Rank Sum test against background.
No(f) - Parent radionuclide (Ra-226) below background.
Italicized Source-Term Concentrations indicate background background subtraction was not performed because there is no background data for the isotope
N= Normal
L= Lognormal
NP= Nonparametric
1) When the statistical distribution is N or L, use the value in the column labelled 95% UCL.
2) When the statistical distribution is NP, use the value in the column labelled 'BOOT'.
3) If the 95 % UCL or BOOT value exceeds the max detected value - use the max detected value.
4) Duplicate samples are not reflected in the detection frequency.
ROPC -radionuclide of potential concern

Table 6-3B
Surface Water Source-Term Concentrations - Downgradient
SEAD-12 Remedial Investigation
Seneca Army Depot Activity

Chemical	Detection Frequency		Range of values, pCI/L: Detected Concentrations Minimum	Detected Concentrations Maximum	Detection Limits Minimum	Detection Limits Maximum	Statistical Distribution	BOOT	95% UCL pCI/L	Background UCL pCi/L	ROPC?	Source-Term Concentration pCi/L
Bismuth-214	9	11	15.9	33.7	12.5	25.05	N	24.47386	25.09607042	18.7496804	No (a)	
Radium-223	2	11	0.1	0.2	0.5	0.5	NP	0.25	Calculate NP		No (a)	
Radium-226	2	11	0.1	0.2	0.5	0.53	NP	0.262273	Calculate NP		Yes	*0.2*
Radon-222	11	11	11.8	106	0	0	L	58.85091	72.64607694	53.15902755	No (a)	
Thorium-227	1	11	0.1	0.1	0.2	0.3	NP	0.131818	Calculate NP	0.116666667	No (a)	
Thorium-230	1	11	0.8	0.8	0.2	0.5	NP	0.322727	Calculate NP		No (a)	
Thorium-232	6	11	0.1	0.1	0.1	0.1	NP	0.090909	Calculate NP	0.116666667	No (a)	
Tritium	11	11	36	324	0	0	N	231.8336	236.8730544	142.3333333	No (a)	
Uranium-234	5	11	0.5	1.1	0.1	0.4	L	0.540909	1.101889717		Yes	*1.1*
Uranium-235	7	11	0.1	0.3	0.1	0.3	NP	0.15	Calculate NP	0.1	No (a)	
Uranium-238	11	11	0.1	0.5	0	0	N	0.409091	0.420238722	0.20409095	Yes	0.216147772

No(a) - Contaminant did not pass Wilcoxon Rank Sum test against background.
Italicized Source-Term Concentrations indicate background background subtraction was not performed because there is no background data for the isotope
N= Normal
L= Lognormal
NP= Nonparametric
1) When the statistical distribution is N or L, use the value in the column labelled 95% UCL.
2) When the statistical distribution is NP, use the value in the column labelled 'BOOT'.
3) If the 95 % UCL or BOOT value exceeds the max detected value - use the max detected value.
4) Duplicate samples are not reflected in the detection frequency.
ROPC -radionuclide of potential concern

Table 6-3B
Sediment Source-Term Concentrations - Downgradient
SEAD-12 Remedial Investigation
Seneca Army Depot Activity

Chemical	Detection Frequency		Range of values, pCi/g Detected Concentrations Minimum	Detected Concentrations Maximum	Detection Limits Minimum	Detection Limits Maximum	Statistical Distribution	BOOT	95% UCL pCi/g	Background UCL - onsite pCi/g	ROPC?	Source-Term Concentration pCi/g
Bismuth-214	6	11	1	1.7	1.7	2	NP	1.3818	Calculate NP	1.81399	No(a)	
Cesium-137	1	11	0.4	0.4	0.1	0.9	L	0.2455	0.307234042	0.51091	No(a)	
Lead-211	2	11	7	14.5	1	11.7	L	6.0141	11.37336608		No(a)	
Lead-214	11	11	1.3	2.3	0	0	L	1.8364	1.860975767	1.82222	No(a)	
Radium-226	6	11	1	1.7	1.7	2	NP	1.3909	Calculate NP	1.81399	No(a)	
Radium-228	10	11	1.1	3.2	1.5	1.5	N	2.3091	2.36852525	2.07672	No(a)	
Thorium-227	7	11	0.1	1	0.4	0.6	L	0.4136	0.510685796	0.37500	No(a)	
Thorium-230	1	11	3.4	3.4	0.4	0.8	NP	1.1091	Calculate NP	1.41865	No(a)	
Thorium-232	11	11	0.5	1.6	0	0	L	1.1727	1.308915421	1.57494	No(a)	
Tritium	1	11	0.1	0.1	0.1	0.1	NP	0.0636	Calculate NP	0.11667	No(a)	
Uranium-234	8	11	0.8	1.7	0.1	0.2	N	1.0775	1.101550487	0.51667	Yes	0.58488382
Uranium-238	7	11	0.6	1.2	0.1	0.2	N	0.7364	0.760188569	0.30556	Yes	0.454633014

No(a) - Contaminant did not pass Wilcoxon Rank Sum test against background.
N= Normal
L= Lognormal
NP= Nonparametric
1) When the statistical distribution is N or L, use the value in the column labelled 95% UCL.
2) When the statistical distribution is NP, use the value in the column labelled 'BOOT'.
3) If the 95 % UCL or BOOT value exceeds the max detected value - use the max detected value.
4) Duplicate samples are not reflected in the detection frequency.
ROPC -radionuclide of potential concern

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 and radionuclides 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.

6.3 EXPOSURE ASSESSMENT

Sections 6.3 through **6.6** focus on the exposure assessment, toxicity assessment, and risk characterization for chemicals of potential concern (COPCs) and radionuclides of potential concern (ROPCs).

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 and ROPC 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, and surface and groundwater hydrology. All potentially exposed populations and subpopulations therein (receptors) are assessed relative to their potential for exposure. Additionally, locations relative to the site along with the current and potential future land use of the site are considered. This step is a qualitative one aimed at providing a general site perspective and offering insight on the surrounding population. The exposure setting for SEAD-12 is characterized in **Sections 1, 2 and 3** of this report.
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

TABLE 6-4
List of Chemical and Radiological Parameters Quantified in the Human Health Risk Assessment
SEAD-12 Remedial Investigation
Seneca Army Depot Activity Romulus, NY

PARAMETERS	DISPOSAL PIT A/B SURFACE SOIL	DISPOSAL PIT A/B TOTAL SOIL	DISPOSAL PIT C SURFACE SOIL	DISPOSAL PIT C TOTAL SOIL	FORMER DRY WASTE DISPOSAL PIT SURFACE SOIL	FORMER DR WASTE DISPOSAL PIT TOTAL SOIL	SEDIMENT SITE	SEDIMENT DOWN-GRADIENT	GROUND WATER SITE	SURFACE WATER SITE	SURFACE WATER DOWN-GRADIENT
Volatile Organics											
1,1,1-Trichloroethane							X		X		
1,2-Dichloroethane(total)									X		
Acetone	X	X	X	X	X	X	X	X	X	X	
Benzene		X				X					
Carbon disulfide						X					
Chlorobenzene				X							
Ethyl benzene		X									
Methyl butyl ketone	X	X									
Methyl chloride							X				
Methyl ethyl ketone						X	X				
Methylene chloride	X	X		X		X					
Styrene		X									
Tetrachloroethene				X			X				
Toluene	X	X		X	X	X	X		X	X	
Trichloroethene		X		X			X		X	X	
Xylenes (total)		X		X							
Semi Volatile Organics											
1,2,4-Trichlorobenzene					X	X					
1,4-Dichlorobenzene									X		
2,4-Dimethylphenol		X									
2-Methylnaphthalene		X		X	X	X	X	X			
4-Chlorophenyl phenyl ether							X				
4-Methylphenol		X					X	X			
Acenaphthene		X		X			X	X			
Acenaphthylene		X					X	X			
Anthracene		X	X	X		X		X			
Benzo(a)anthracene	X	X	X	X	X	X	X	X		X	
Benzo(a)pyrene	X	X	X	X	X	X	X	X	X	X	
Benzo(b)fluoranthene	X	X	X	X	X	X	X	X	X		
Benzo(ghi)perylene	X	X	X	X	X	X	X	X	X		
Benzo(k)fluoranthene	X	X	X	X	X	X	X	X	X	X	
Bis(2-Ethylhexyl)phthalate	X	X	X	X	X	X	X	X	X	X	X
Butylbenzylphthalate	X	X		X			X		X	X	X
Carbazole	X	X	X	X		X	X	X			
Chrysene	X	X	X	X	X	X	X	X		X	
Dibenz(a,h)anthracene	X	X	X	X			X	X			
Dibenzofuran	X	X		X			X	X			
Diethyl phthalate	X	X			X	X	X		X	X	X
Di-n-butylphthalate	X	X	X	X	X	X	X		X	X	
Di-n-octylphthalate	X	X	X	X	X	X	X	X	X		
Fluoranthene	X	X	X	X	X	X	X	X			
Fluorene	X	X		X			X	X			
Indeno(1,2,3-cd)pyrene	X	X	X	X	X	X	X	X	X		
Naphthalene		X		X	X	X	X	X			
N-Nitrosodiphenylamine				X				X			
Pentachlorophenol										X	
Phenanthrene	X	X	X	X	X	X	X	X			
Phenol		X							X		
Pyrene	X	X	X	X	X	X	X	X	X	X	
Pesticides/PCBs											
4,4'-DDD			X	X			X	X		X	
4,4'-DDE	X	X		X	X	X	X	X			
4,4'-DDT	X	X	X	X	X	X	X			X	
Aldrin		X								X	
Alpha-BHC		X		X						X	
Alpha-Chlordane		X		X			X			X	
Aroclor-1242					X	X				X	
Aroclor-1254	X	X		X	X	X	X				
Aroclor-1260		X		X	X	X	X				
Beta-BHC		X		X					X	X	
Delta-BHC										X	
Dieldrin											
Endosulfan I	X	X					X				
Endosulfan II	X	X									
Endrin	X	X					X				
Endrin aldehyde	X	X			X	X	X			X	
Endrin ketone							X			X	
Gamma-BHC Lindane										X	
Gamma-chlordane	X	X		X					X		
Heptachlor		X		X					X	X	
Heptachlor epoxide	X	X		X			X			X	
Hexachlorobenzene							X			X	X
Metals											
Aluminum	X	X									
Antimony											
Arsenic								X			
Barium									X		X
Beryllium											X
Cadmium										X	
Calcium			X	X	X	X					X
Chromium			X	X	X	X					
Cobalt									X		
Copper	X	X			X	X	X				
Cyanide	X	X		X		X					
Iron											
Lead						X					
Magnesium					X	X	X				X
Manganese											
Mercury										X	
Nickel											
Potassium	X	X									
Selenium	X	X	X	X	X	X					
Silver											
Sodium											X
Thallium	X	X	X	X	X	X					
Vanadium							X				
Zinc							X			X	
Bismuth-214			X			X					
Cesium-137							X				
Lead-210		X	X	X							
Radiological Parameters											
Radium-223	X	X	X	X		X					
Radium-226											X
Radium-228			X	X							
Radon-222										X	
Thallium-208		X		X		X	X				
Thorium-227										X	
Thorium-228									X		
Thorium-230										X	
Thorium-232										X	
Thorium-234							X				
Tritium	X	X	X	X	X	X					
Uranium-234								X		X	X
Uranium-238							X	X			X

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 USEPA guidance for assumptions of intake variables or exposure factors for each exposure pathway and USEPA-recommended calculation methods.

Figure 6-2 illustrates the exposure assessment process.

6.3.3 Land Use and Potentially Exposed Populations

6.3.3.1 Current Land Use

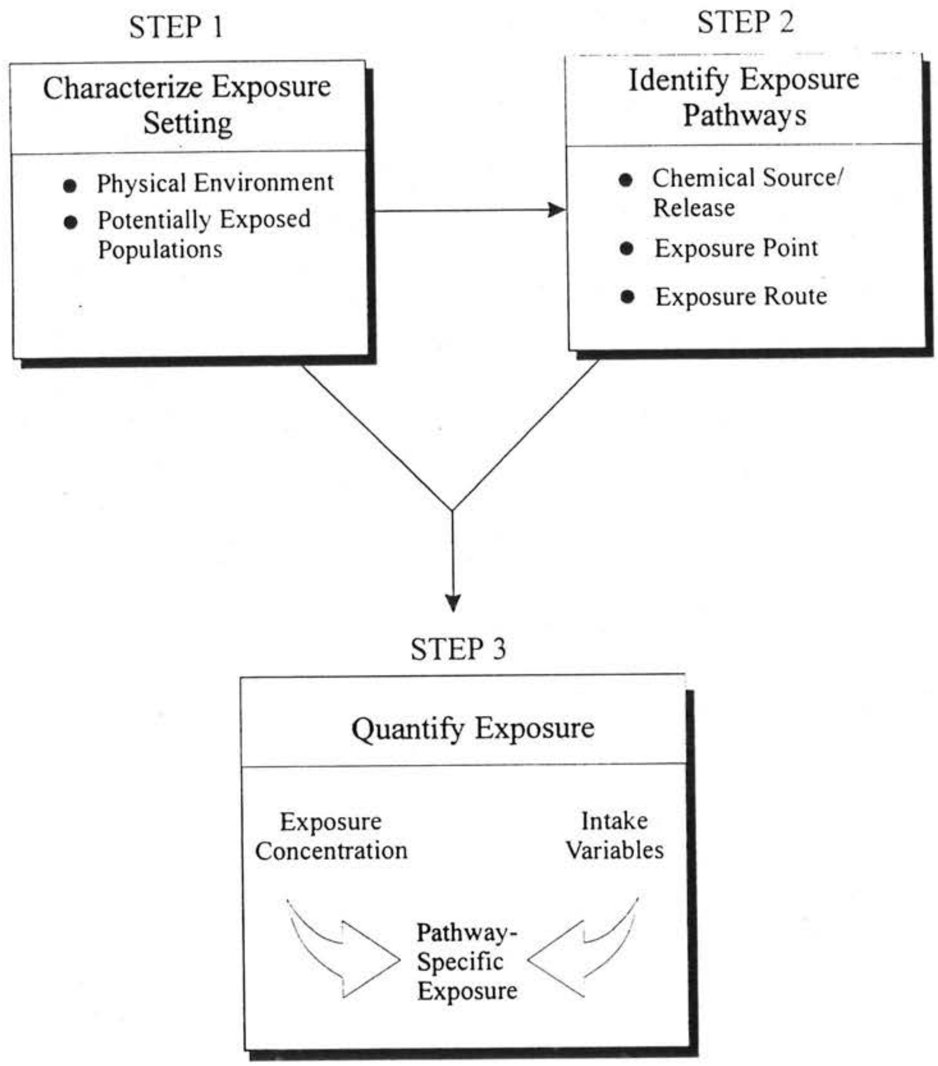
Access to SEAD-12 is restricted by high security fencing. This site has no actual site workers but is occasionally patrolled by site security personnel. Buildings on site have been de-militarized and are no longer in active use. As a result, it is unrealistic to assume that the workers from nearby sites 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.

Off-site residents are not considered to be potential receptors due to the distances between off-site residences and SEAD-12. There is one drinking water supply well at SEAD-12 that is not in use.

6.3.3.2 Potential Future Land Use

USEPA 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.



Source: USEPA, 1989a

PARSONS

PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY

SEAD-12 Remedial Investigation

DEPT	DWG NO
ENVIRONMENTAL ENGINEERING	730047

FIGURE 6-2

EXPOSURE ASSESSMENT PROCESS

SCALE	DATE
Not Applicable	May 2000

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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 that was produced designated various uses for different parcels of SEDA ranging from conservation/recreation to institutional, industrial and residential. The area which contains SEAD-12 was designated "Conservation/Recreation Area".

In this human health assessment the future land use of SEAD-12 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, six 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-12 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.

In addition, two other exposed populations were considered:

1) Residents (for pre-disposal goal evaluation);
2) Off-site wader.

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 or radionuclide release,
- an environmental transport medium,
- an exposure point, and
- a human receptor and a feasible route of exposure at the exposure point.

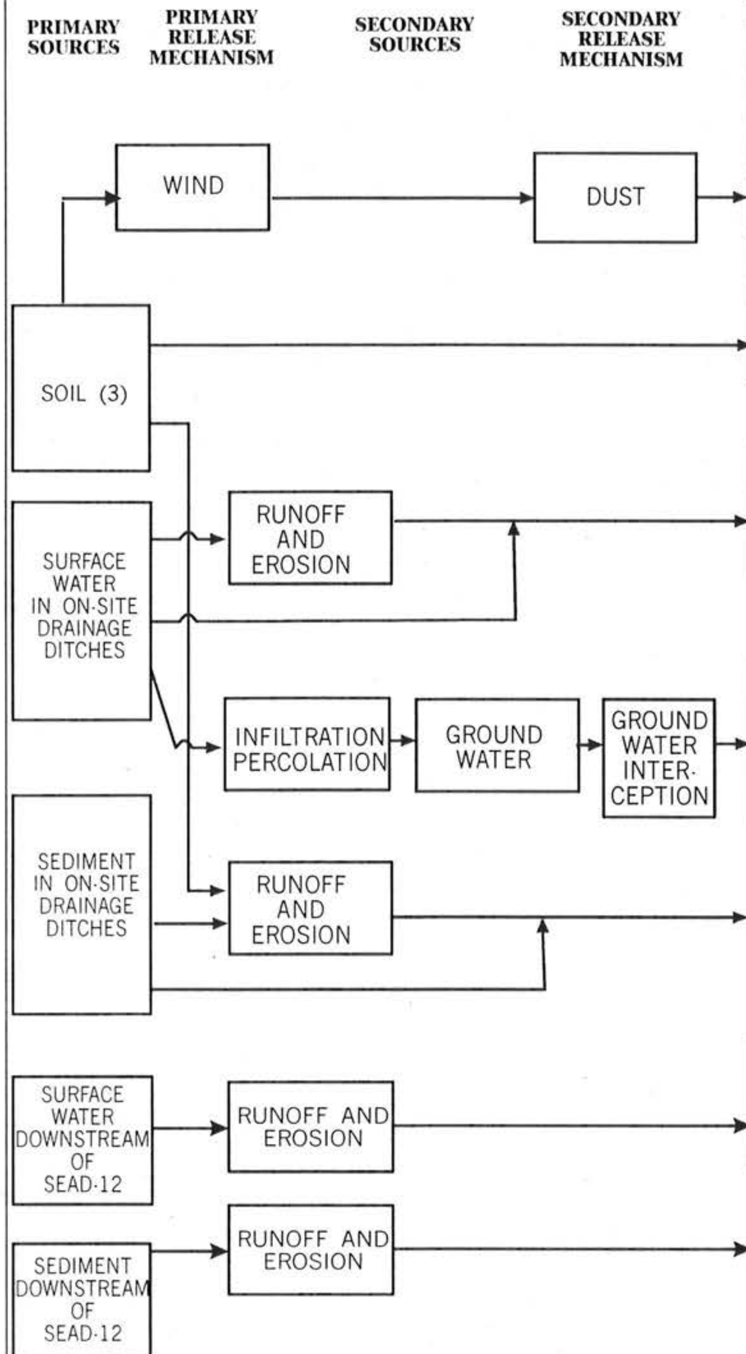
A pathway cannot be completed unless each of these elements is present. The sources and mechanisms for release of chemicals and the environmental transport mediums are described in **Section 5**, Contaminant Fate and Transport. **Figure 6-3** illustrates the completed exposure pathways for SEAD-12.

6.3.4.1 Sources and Receiving Media

Former disposal operations at SEAD-12 are the source of potential contaminants at SEAD-12. Soil may be impacted directly from these operations. Groundwater may be affected due to leaching of potential contaminants in the soil. Groundwater also appears to be affected by past practices in Building 813 (Paint Booth). Sediment and surface water may be affected due to run off from disposal areas.

6.3.4.2 Fate and Transport

The environmental fate associated with COPCs found at SEAD-12 is discussed in detail in **Section 5**.



EXPOSURE ROUTE	RECEPTOR – HUMAN: CURRENT SITE WORKER	FUTURE PARK WORKER OUTDOOR	OFF SITE WADER	FUTURE RECREATIONAL VISITOR	FUTURE CONSTRUCTION WORKER	RESIDENTIAL (2)
INHALATION	C/R	C/R	NA	C/R	C/R	C/R
INGESTION	C/R	C/R	NA	C/R	C/R	C/R
DERMAL CONTACT	C	C	NA	C	C	C
DIRECT EXPOSURE	R	R	NA	R	R	R
INGESTION	NA	NA	NA	NA	NA	NA
DERMAL CONTACT(1)	NA	C/R	NA	C/R	NA	C/R
DIRECT EXPOSURE	NA	R	NA	R	R	R
INGESTION	NA	C/R	NA	C/R	NA	C/R
INHALATION	NA	NA	NA	C	NA	C
DERMAL CONTACT(1)	NA	NA	NA	C/R	NA	C/R
INGESTION	NA	NA	NA	NA	NA	C/R
DERMAL CONTACT	NA	C	NA	C	NA	C
DIRECT EXPOSURE	NA	R	NA	R	R	R
INGESTION	NA	NA	NA	NA	NA	NA
DERMAL CONTACT(1)	NA	NA	C/R	NA	NA	NA
DIRECT EXPOSURE	NA	NA	R	NA	NA	NA
INGESTION	NA	NA	NA	NA	NA	NA
DERMAL CONTACT	NA	NA	C	NA	NA	NA
DIRECT EXPOSURE	NA	NA	R	NA	NA	NA

C PATHWAY CONSIDERED TO POSE POTENTIAL CHEMICAL RISK

R PATHWAY CONSIDERED TO POSE POTENTIAL RADIOLOGICAL RISK

NA NOT APPLICABLE TO RECEPTOR

Notes:

(1) For radiological parameters, submersion rather than dermal contact is considered.

(2) Additional soil parameters considered for radiological parameters (using RESRAD) are plant, meat, and milk ingestion.

(3) The Future Construction Worker receptor considers both surface soil and subsurface soil. All other receptors consider only surface soil.

PARSONS

PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT

SEAD-12 RI/FS

ENVIRONMENTAL ENGINEERING | DWG NO 730047-01002

FIGURE 6-3

EXPOSURE PATHWAY SUMMARY

SCALE NA | DATE February 2001

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-12 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 on-site were considered to be unrealistic pathways of exposure because the depth of drainage ditches is at most only a few inches. (Occasional, incidental contact with surface water and sediment are evaluated.) However, exposure to surface water and sediment while wading were evaluated for a downstream receptor in Reeder Creek.

2. Ingestion and dermal contact with soil by current off-site area residents was eliminated from the risk assessment based on the unlikely occurrence of a trespasser at SEAD-12. Security remains in place and 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 Weapons Storage Area. This section presents the rationale for including these exposure pathways in this risk assessment.

Inhalation of Particulate Matter in Ambient Air

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

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 to on-site surface-soils via dermal contact and soil ingestion was assessed for all current and future onsite receptors.

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 (Submersion) to Surface Water and Sediment

There are drainage ditches throughout SEAD-12. This surface water and the associated wet soil, or sediment, may contain chemicals or radionuclides 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, a future outdoor park worker and a future resident.

In addition, an off-site wader was considered. This receptor would be exposed to surface water and sediment in Reeder Creek downstream of SEAD-12 and SEDA.

For radionuclides, submersion in surface water is considered in place of dermal contact. Submersion is direct radiation from all angles (i.e. as in a cloud) not just one surface plane.

Slope factors for radionuclides are established for submersion from surface water and not dermal contact. Dermal contact from sediment was not considered for radionuclides.

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 resident only.

Ingestion of Groundwater

The groundwater beneath the SEAD-12 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 at 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. Exposure via ingestion of groundwater was assessed for a future outdoor park worker, a future recreational visitor, and a future resident.

Inhalation and Dermal Contact (Submersion) 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. Exposure via inhalation of groundwater and dermal contact (submersion) was assessed for a future recreational visitor and a future resident.

As described above for surface water, submersion rather than dermal contact is quantified for radionuclides in groundwater. Submersion is direct radiation from a "cloud" of groundwater around a receptor. Carcinogenic slope factors for radionuclides have been established for submersion and not for dermal contact.

Direct Radiation from Soil Surface, Surface Water Surface and Sediment Surface

All receptors may be exposed to direct radiation from soil surfaces, surface water surfaces or sediment surfaces. The direct radiation exposure pathway applies only to radionuclides. The ionizing radiation of certain radionuclides may penetrate skin surfaces of receptors in contact with soil, surface water, or sediment surfaces.

6.3.5 Quantification of Exposure

In this section, each receptor's potential exposures to COPCs and ROPCs are quantified for each of the exposure pathways described above. **Section 6.3.5.1** and **6.3.5.2** discuss exposure assumptions and scenarios for the both the chemical and radiological risk assessments. **Sections 6.3.5.3** through **6.3.5.11** discuss actual equations used to quantify chemical intake for each pathway of concern. **Section 6.3.4.12** discussed the equations used to quantify incremental excess cancer risk for radionuclides of concern.

In each receptor and exposure pathway, the exposures are calculated following methods recommended in USEPA guidance documents, such as the Risk Assessment Guidance for Superfund (USEPA 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 or radionuclide that an exposed person may take into his/her body is then calculated. This value is referred to as either the Human Intake or the Absorbed Dose, depending on the exposure route.

This section describes the exposure scenarios, exposure assumptions and exposure calculation methods used in this risk assessment. All calculations are shown in the tables included in **Appendix L.**

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 USEPA 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. EPA guidance on exposure factors is extensive and was followed throughout this exposure assessment. Standard scenarios and USEPA-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, future resident, and off-site wader. 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 for chemical exposure: RME and CT. For exposure to radionuclides, only an exposure estimate for RME was performed. 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 6-5A** for chemical exposure and **Table 6-5B** for radiological exposure.

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 that show the human intake or absorbed dose values calculated for each exposure scenario are contained in **Appendix L**. 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 six exposure scenarios and their respective exposure assumptions in this assessment are described below.

Current Site Worker. Current workers at the site spend their time throughout the entire SEDA. Therefore, the current site worker is assumed to visit SEAD-12 infrequently. During these visits, this worker inhales the ambient air at SEAD-12 and may ingest or dermally contact the surface soil there. Based on professional judgment, it was assumed that the current site worker visits SEAD-12 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 USEPA guidance documents, as noted in **Table 6-5A**. For exposure factor assumptions used for radiological risk determination, refer to **Table 6-5B**.

Future Construction Worker. Future construction workers are assumed to spend one year working at SEAD-12, which is a typical duration for a significant construction project. These workers spend each working day at SEAD-12 (5 days/week for 50 weeks, RME; slightly less for the CT). During this time, this worker inhales the ambient air at SEAD-12 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 USEPA guidance documents, as noted in **Table 6-5A**. For exposure factor assumptions used for radiological risk determination, refer to **Table 6-5B**.

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. 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. For exposure factor assumptions used for radiological risk determination, refer to **Table 6-5B.**

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 a 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

Two types of exposure estimates are presented in this risk assessment for chemical exposure: RME and CT. For exposure to radionuclides, only an exposure estimate for RME was performed. 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 6-5A** for chemical exposure and **Table 6-5B** for radiological exposure.

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
- USEPA, 1999: Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Supplement Guidance: Dermal Risk Assessment, Interim Guidance

In the following sections, the methods used to calculate exposures by each pathway are explained. Tables that show the human intake or absorbed dose values calculated for each exposure scenario are contained in **Appendix L**. 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 six exposure scenarios and their respective exposure assumptions in this assessment are described below.

Current Site Worker. Current workers at the site spend their time throughout the entire SEDA. Therefore, the current site worker is assumed to visit SEAD-12 infrequently. During these visits, this worker inhales the ambient air at SEAD-12 and may ingest or dermally contact the surface soil there. Based on professional judgment, it was assumed that the current site worker visits SEAD-12 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 USEPA guidance documents, as noted in **Table 6-5A**. For exposure factor assumptions used for radiological risk determination, refer to **Table 6-5B**.

Table 6-5A

EXPOSURE FACTOR ASSUMPTIONS

SEAD 12-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**		Inhalation Rate	9.6	m3/day	Average inhalation rate for moderate activity is 1.2 m3/hr, 8 hr work day	USEPA, 1997
		RME & CT	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
	(Air EPC Calculated from Surface Soil Only)		Exposure Frequency	20	days/yr	Assumed	BPJ
		RME	Exposure Duration	25	years	Upper bound time for employment at a job	USEPA, 1991, 1993
			Averaging Time - Nc	9125	days	25 years	USEPA, 1989
			Exposure Frequency	10	days/yr	Assumed	BPJ
		CT	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		Body Weight	70	kg	Standard reference weight for adult males	USEPA, 1991
		RME & CT	Fraction Ingested	1	(unitless)	100% ingestion, conservative assumption	BPJ
	(Soil EPC Calculated from Surface Soil Only)		Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
			Ingestion Rate	100	mg soil/day	Upper bound worker exposure to dirt and dust	USEPA, 1993
		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
			Ingestion Rate	50	mg soil/day	Average worker exposure to dirt and dust	USEPA, 1993
		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
	Dermal Contact - Soil		Body Weight	70	kg	Standard reference weight for adult males	USEPA, 1991
		RME & CT	Absorption Factor	Compound	Specific		USEPA, 1999
	(Soil EPC Calculated from Surface Soil Only)		Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
			Skin Contact Surface Area	3300	cm2	RME value for dermal soil contact under industrial scenario	USEPA, 1999
			Soil to Skin Adherence Facto	0.2	mg/cm2	RME value for dermal soil contact under industrial scenario	USEPA, 1999
		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
			Skin Contact Surface Area	3300	cm2	CT value for dermal soil contact under industrial scenario	USEPA, 1999
			Soil to Skin Adherence Facto	0.02	mg/cm2	CT value for dermal soil contact under industrial scenario	USEPA, 1999
		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

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, 1993: Superfund's Standard Default Exposure for the Central Tendency and Reasonable Maximum Exposure
USEPA, 1997: Exposure Factors Handbook, Update to 1990 handbook
USEPA, 1999: Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Supplemental Guidance: Dermal Risk Assessment, Interim Guidance

Table 6-5A

EXPOSURE FACTOR ASSUMPTIONS

SEAD 12-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**		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
		RME & CT	Exposure Duration	1	year	Upper bound time of employment for constr. worker	USEPA, 1991
	(Air EPC Calculated from Surface and Subsurface Soils)		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		Body Weight	70	kg	Standard reference weight for adult males	USEPA, 1991
			Fraction Ingested	1	(unitless)	100% ingestion, conservative assumption	BPJ
	(Soil EPC Calculated from Surface and Subsurface Soils)	RME & CT	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		Body Weight	70	kg	Standard reference weight for adult males	USEPA, 1991
			Absorption Factor	Compound	Specific		USEPA, 1999
	(Soil EPC Calculated from Surface and Subsurface Soils)	RME & CT	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	3300	cm2	RME value for dermal soil contact under industrial scenario	USEPA, 1999
			Soil to Skin Adherence Fact	0.3	mg/cm2	95th upper value for construction worker	USEPA, 1999
			Exposure Frequency	250	days/yr	Assumes works 5 days/wk and 10 days/yr vacation	USEPA, 1991
		CT	Skin Contact Surface Area	3300	cm2	CT value for dermal soil contact under industrial scenario	USEPA, 1999
			Soil to Skin Adherence Fact	0.1	mg/cm2	50th percentile value for construction worker	USEPA, 1999
			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, 1993: Superfund's Standard Default Exposure for the Central Tendency and Reasonable Maximum Exposure
USEPA, 1997: Exposure Factors Handbook, Update to 1990 handbook
USEPA, 1999: Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Supplemental Guidance: Dermal Risk Assessment, Interim Guidance

Table 6-5A

EXPOSURE FACTOR ASSUMPTIONS

SEAD 12-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, 1999
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Skin Contact Surface Area	2800	cm2	RME value for dermal soil contact under residential child scenario	USEPA, 1999
			Soil to Skin Adherence Facto	0.2	mg/cm2	RME value for dermal soil contact under residential child scenario	USEPA, 1999
			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	2800	cm2	CT value for dermal soil contact under residential child scenario	USEPA, 1999
			Soil to Skin Adherence Facto	0.06	mg/cm2	CT value for dermal soil contact under residential child scenario	USEPA, 1999
			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	event/day	RME and CT value for residential child (0-6) showering/bathing	USEPA, 1999
			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	60	min/event	RME value for residential child (0-6) showering/bathing	USEPA, 1999
			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	20	min/event	CT value for residential child (0-6) showering/bathing	USEPA, 1999
			Exposure Duration	1	year	Assumed	BPJ
			Averaging Time - Nc	365	days	1 year	USEPA, 1989

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EXPOSURE FACTOR ASSUMPTIONS

SEAD 12-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
			Ingestion Rate	1	liter/day	Approximate 90th percentile value for children 1-11 years old	USEPA, 1997
		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
			Ingestion Rate	0.74	liters/day	Average IR for a child 1-10 years old	USEPA, 1997
		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
	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
			Skin Contact Surface Area	6600	cm2	RME value for residential child (0-6) showering/bathing	USEPA, 1999
		RME	Exposure Frequency	14	days/yr	Assumes 2 weeks.	BPJ
			Exposure Time	1.0	hours/day	RME value for residential child (0-6) showering/bathing	USEPA, 1999
			Exposure Duration	5	years	Assumed	BPJ
			Averaging Time - Nc	1825	days	5 years	USEPA, 1989
			Skin Contact Surface Area	6600	cm2	CT value for residential child (0-6) showering/bathing	USEPA, 1999
		CT	Exposure Frequency	7	days/yr	Assumes 1 week.	BPJ
			Exposure Time	0.33	hours/day	CT value for residential child (0-6) showering/bathing	USEPA, 1999
			Exposure Duration	1	year	Assumed	BPJ
			Averaging Time - Nc	365	days	1 year	USEPA, 1989
	Dermal Contact - Surface Water		Body Weight	15	kg	Standard reference weight for children less than 6 years old.	USEPA, 1991,1993
		RME & CT	Exposure Time	1	hour/day	RME value for residential child (0-6) showering/bathing	USEPA, 1999
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
			Skin Contact Surface Area	6600	cm2	RME value for residential child (0-6) showering/bathing	USEPA, 1991
		RME	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
			Skin Contact Surface Area	6600	cm2	CT value for residential child (0-6) showering/bathing	USEPA, 1999
		CT	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		Body Weight	15	kg	Standard reference weight for children less than 6 years old.	USEPA, 1991,1993
		RME & CT	Absorption Factor	Compound	Specific		USEPA, 1999
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
			Skin Contact Surface Area	2800	cm2	RME value for residential child (0-6) dermal soil contact	USEPA, 1999
			Soil to Skin Adherence Facto	2.7	mg/cm2	95th upper value for wet soil contact	USEPA, 1999
		RME	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
			Skin Contact Surface Area	2800	cm2	CT value for residential child (0-6) dermal soil contact	USEPA, 1999
			Soil to Skin Adherence Facto	0.2	mg/cm2	50th percentile value for wet soil contact	USEPA, 1999
		CT	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, 1993: Superfund's Standard Default Exposure for the Central Tendency and Reasonable Maximum Exposure
USEPA, 1997: Exposure Factors Handbook, Update to 1990 handbook
USEPA, 1999: Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Supplemental Guidance: Dermal Risk Assessment, Interim Guidance

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EXPOSURE FACTOR ASSUMPTIONS

SEAD 12-Remedial Investigation
Seneca Army Depot Activity

RECEPTOR	EXPOSURE ROUTE	RME/CT	PARAMETER	VALUE	UNITS	BASIS	SOURCE
FUTURE PARK	Inhalation of Dust in		Inhalation Rate	8	m3/day	Average inhalation rate for light activity is 1 m3/hr, 8 hr work day	USEPA, 1997
WORKER	Ambient Air	RME & CT	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
	(Air EPC Calculated		Exposure Frequency	175	days/yr	Works on-site 5 days/wk, 8 months/yr (35 weeks).	BPJ
	from Surface Soil Only)	RME	Exposure Duration	25	years	Upper bound time for employment at a job	USEPA, 1991, 1993
			Averaging Time - Nc	9125	days	25 years	USEPA, 1989
			Exposure Frequency	153	days/yr	Adjusted for 8 months per year	USEPA, 1993
		CT	Exposure Duration	7	years	Mean time for employment at a job	USEPA, 1997
			Averaging Time - Nc	2555	days	7 years	USEPA, 1989
Future Park	Ingestion of Soil		Body Weight	70	kg	Standard reference weight for adult males	USEPA, 1991
Worker		RME & CT	Fraction Ingested	1	(unitless)	100% ingestion, conservative assumption	BPJ
	(Soil EPC Calculated		Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
	from Surface Soil Only)		Ingestion Rate	100	mg soil/day	Upper bound worker exposure to dirt and dust	USEPA, 1993
		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
			Ingestion Rate	50	mg soil/day	Average worker exposure to dirt and dust	USEPA, 1993
		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
	Dermal Contact - Soil		Body Weight	70	kg	Standard reference weight for adult males	USEPA, 1991
		RME & CT	Absorption Factor	Compound	Specific		USEPA, 1999
	(Soil EPC Calculated		Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
	from Surface Soil Only)		Skin Contact Surface Area	3300	cm2	RME value for dermal soil contact for industrial worker	USEPA, 1999
			Soil to Skin Adherence Facto	0.2	mg/cm2	RME value for dermal soil contact for industrial worker	USEPA, 1999
		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
			Skin Contact Surface Area	3300	cm2	CT value for dermal soil contact for industrial worker	USEPA, 1999
			Soil to Skin Adherence Facto	0.02	mg/cm2	CT value for dermal soil contact for industrial worker	USEPA, 1999
		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	2,555	days	7 years	USEPA, 1989
	Ingestion of		Body Weight	70	kg	Standard reference weight for adult males	USEPA, 1991
	Groundwater	RME & CT	Ingestion Rate	1	liters/day	Standard occupational ingestion rate.	USEPA, 1991
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
			Exposure Frequency	175	days/yr	Works on-site 5 days/wk, 8 months/yr (35 weeks)	BPJ
		RME	Exposure Duration	25	years	Upper bound time for employment at a job	USEPA, 1991, 1993
			Averaging Time - Nc	9125	days	25 years	USEPA, 1989
			Exposure Frequency	153	days/yr	Adjusted for 8 months per year	USEPA, 1993
		CT	Exposure Duration	7	years	Mean time for employment at a job	USEPA, 1997
			Averaging Time - Nc	2555	days	7 years	USEPA, 1989

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EXPOSURE FACTOR ASSUMPTIONS

SEAD 12-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, 1999
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Skin Contact Surface Area	2830	cm2	Adult male hands and forearms - 95th upper value	USEPA, 1997
			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
		CT	Skin Contact Surface Area	2300	cm2	Adult male hands and forearms - 50th percentile value	USEPA, 1997
			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, 1999
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Skin Contact Surface Area	3300	cm2	RME value for dermal soil contact for industrial worker	USEPA, 1999
			Soil to Skin Adherence Facto	0.2	mg/cm2	RME value for dermal soil contact for industrial worker	USEPA, 1999
			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
		CT	Skin Contact Surface Area	3300	cm2	CT value for dermal soil contact for industrial worker	USEPA, 1999
			Soil to Skin Adherence Facto	0.02	mg/cm2	CT value for dermal soil contact for industrial worker	USEPA, 1999
			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, 1993: Superfund's Standard Default Exposure for the Central Tendency and Reasonable Maximum Exposure
USEPA, 1997: Exposure Factors Handbook, Update to 1990 handbook
USEPA, 1999: Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Supplemental Guidance: Dermal Risk Assessment, Interim Guidance

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EXPOSURE FACTOR ASSUMPTIONS

SEAD 12-Remedial Investigation
Seneca Army Depot Activity

RECEPTOR	EXPOSURE ROUTE	RME/CT	PARAMETER	VALUE	UNITS	BASIS	SOURCE
RESIDENT (ADULT)	**Inhalation of Dust in**		Inhalation Rate	20	m3/day	Assumed inhalation rate for adult receptors.	USEPA, 1991, 1993
	Ambient Air	RME & CT	Body Weight	70	kg	Standard reference wieght for adult males.	USEPA, 1991
	(Air EPC Calculated		Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
	from Surface Soil Only)		Exposure Frequency	350	days/yr	Standard upper bound residential default	USEPA, 1993
		RME	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
			Exposure Frequency	234	days/yr	Standard residential CT (average) default.	USEPA, 1993
		CT	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		Body Weight	70	kg	Standard reference wieght for adult males.	USEPA, 1991
		RME & CT	Fraction Ingested	1	(unitless)	100% ingestion, conservative assumption	BPJ
	(Soil EPC Calculated		Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
	from Surface Soil Only)		Ingestion Rate	100	mg soil/day	Upper bound residential adult exposure to indoor and outdoor dirt and dust.	USEPA, 1991
		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
			Ingestion Rate	50	mg soil/day	Average residential adult exposure to indoor and outdoor dirt and dust.	USEPA, 1993
		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
	Dermal Contact - Soil		Body Weight	70	kg	Standard reference wieght for adult males.	USEPA, 1991
		RME & CT	Absorption Factor	Compound	Specific		
	(Soil EPC Calculated		Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
	from Surface Soil Only)		Skin Contact Surface Area	5700	cm2	RME value for residential adult soil contact	USEPA, 1999
			Soil to Skin Adherence Fact	0.07	mg/cm2	RME value for residential adult soil contact	USEPA, 1999
		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
			Skin Contact Surface Area	5700	cm2	CT value for residential adult soil contact	USEPA, 1999
			Soil to Skin Adherence Fact	0.01	mg/cm2	CT value for residential adult soil contact	USEPA, 1999
		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
	Inhalation of		Inhalation Rate	0.5	m3/hr	Inhalation rate for sedentary adults	USEPA, 1997.
	Groundwater	RME & CT	Body Weight	70	kg	Standard reference wieght for adult males.	USEPA, 1991
			Event Frequency	1	event/day	Typical showering frequency for 90% of American population	USEPA, 1999
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
			Exposure Frequency	350	days/yr	Standard upper bound residential default	USEPA, 1993
		RME	Event Duration	35	min/event	RME value for showering/bathing	USEPA, 1999
			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
			Exposure Frequency	234	days/yr	Standard residential CT (average) default.	USEPA, 1993
		CT	Event Duration	15	min/event	CT value for showering/bathing	USEPA, 1999
			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 12-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	18,000	cm2	RME value for adult showering/bathing	USEPA, 1999
			Exposure Frequency	350	days/yr	Standard upper bound residential default	USEPA, 1993
			Exposure Time	0.58	hours/day	RME value for adult showering/bathing	USEPA, 1999
			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	18,000	cm2	CT value for adult showering/bathing	USEPA, 1999
			Exposure Frequency	234	days/yr	Standard residential CT (average) default	USEPA, 1993
			Exposure Time	0.25	hours/day	CT value for adult showering/bathing	USEPA, 1999
			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	Assumption	BPJ
			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, 1999
			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, 1999
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Skin Contact Surface Area	5700	cm2	RME value for residential adult soil contact	USEPA, 1999
			Soil to Skin Adherence Fact	0.07	mg/cm2	RME value for residential adult soil contact	USEPA, 1999
			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	5700	cm2	CT value for residential adult soil contact	USEPA, 1997
			Soil to Skin Adherence Fact	0.01	mg/cm2	CT value for residential adult soil contact	USEPA, 1999
			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 12-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, 1993: Superfund's Standard Default Exposure for the Central Tendency and Reasonable Maximum Exposure
USEPA, 1997: Exposure Factors Handbook, Draft update to 1990 handbook
USEPA, 1999: Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Supplemental Guidance: Dermal Risk Assessment, Interim Guidance

Table 6-5A

EXPOSURE FACTOR ASSUMPTIONS

SEAD 12-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)		Inhalation Rate	8.7	m3/day	Average inhalation rate for a child 1-12 years old.	USEPA, 1997
		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
			Exposure Frequency	350	days/yr	Standard upper bound residential default	USEPA, 1993
		RME	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
			Exposure Frequency	234	days/yr	Standard residential CT (average) default.	USEPA, 1993
		CT	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		Body Weight	15	kg	Standard reference weight for children less than 6 years old.	USEPA, 1991,1993
		RME & CT	Fraction Ingested	1	(unitless)	100% ingestion, conservative assumption	BPJ
	(Soil EPC Calculated from Surface Soil Only)		Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
			Ingestion Rate	200	mg soil/day	Maximum IR for a child	USEPA, 1993
		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
			Ingestion Rate	100	mg soil/day	Average IR for a child	USEPA, 1993
		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
	Dermal Contact - Soil		Body Weight	15	kg	Standard reference weight for children less than 6 years old.	USEPA, 1991,1993
		RME & CT	Absorption Factor	Compound	Specific		USEPA, 1999
	(Soil EPC Calculated from Surface Soil Only)		Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
			Skin Contact Surface Area	2800	cm2	RME value for residential child (0-6) soil contact	USEPA, 1999
			Soil to Skin Adherence Fact	0.2	mg/cm2	RME value for residential child (0-6) soil contact	USEPA, 1999
		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
			Skin Contact Surface Area	2800	cm2	CT value for residential child (0-6) soil contact	USEPA, 1999
			Soil to Skin Adherence Fact	0.06	mg/cm2	CT value for residential child (0-6) soil contact	USEPA, 1999
		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
	Inhalation of Groundwater		Inhalation Rate	0.3	m3/hr	Inhalation rate for sedentary children ages 3-10	USEPA, 1997
		RME & CT	Body Weight	15	kg	Standard reference weight for children less than 6 years old.	USEPA, 1991,1993
			Event Frequency	1	event/day	Typical showering frequency for 90% of American population	USEPA, 1999
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
			Exposure Frequency	350	days/yr	Standard upper bound residential default	USEPA, 1993
		RME	Event Duration	60	min/event	RME value for residential child (0-6) showering/bathing	USEPA, 1999
			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
			Exposure Frequency	234	days/yr	Standard residential CT (average) default.	USEPA, 1993
		CT	Event Duration	20	min/event	CT value for residential child (0-6) showering/bathing	USEPA, 1999
			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 6-5A

EXPOSURE FACTOR ASSUMPTIONS

SEAD 12-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	6600	cm2	RME value for residential child (0-6) showering/bathing	USEPA, 1999
			Exposure Frequency	350	days/yr	Standard upper bound residential default	USEPA, 1993
			Exposure Time	1.0	hours/day	RME value for residential child (0-6) showering/bathing	USEPA, 1999
			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	6600	cm2	CT value for residential child (0-6) showering/bathing	USEPA, 1999
			Exposure Frequency	234	days/yr	Standard residential CT (average) default.	USEPA, 1993
			Exposure Time	0.33	hours/day	CT value for residential child (0-6) showering/bathing	USEPA, 1999
			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	RME value for residential child (0-6) showering/bathing	USEPA, 1999
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
		RME	Skin Contact Surface Area	6600	cm2	RME value for residential child (0-6) showering/bathing	USEPA, 1999
			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	6600	cm2	CT value for residential child (0-6) showering/bathing	USEPA, 1999
			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 6-5A

EXPOSURE FACTOR ASSUMPTIONS

SEAD 12-Remedial Investigation
Seneca Army Depot Activity

RECEPTOR	EXPOSURE ROUTE	RME/CT	PARAMETER	VALUE	UNITS	BASIS	SOURCE
RESIDENT (CHILD)	Dermal Contact - Sediment		Body Weight	15	kg	Standard reference weight for children less than 6 years old.	USEPA, 1991,1993
		RME & CT	Absorption Factor	Compound	Specific		USEPA, 1999
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
			Skin Contact Surface Area	2800	cm2	RME value for residential child (0-6) soil contact	USEPA, 1999
			Soil to Skin Adherence Fact	2.7	mg/cm2	95th upper value for wet soil contact	USEPA, 1999
		RME	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
			Skin Contact Surface Area	2800	cm2	CT value for residential child (0-6) sediment contact	USEPA, 1999
			Soil to Skin Adherence Fact	0.2	mg/cm2	50th percentile value for wet soil contact	USEPA, 1999
		CT	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		Body Weight	15	kg	Standard reference weight for children less than 6 years old.	USEPA, 1991,1993
		RME & CT	Fraction Ingested	1	(unitless)	100% ingestion, conservative assumption	BPJ
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
			Ingestion Rate	200	mg/day	Maximum IR for a child	USEPA, 1993
		RME	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
			Ingestion Rate	100	mg/day	Average IR for a child	USEPA, 1993
		CT	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, 1993: Superfund's Standard Default Exposure for the Central Tendency and Reasonable Maximum Exposure
USEPA, 1997: Exposure Factors Handbook, Update to 1990 handbook
USEPA, 1999: Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Supplemental Guidance: Dermal Risk Assessment, Interim Guidance

Table 6-5A

EXPOSURE FACTOR ASSUMPTIONS

SEAD 12-Remedial Investigation
Seneca Army Depot Activity

RECEPTOR	EXPOSURE ROUTE	RME/CT	PARAMETER	VALUE	UNITS	BASIS	SOURCE
OFF-SITE WADER (CHILD)	**Dermal Contact - Surface Water**		Body Weight	15	kg	Standard reference weight for children less than 6 years old.	USEPA, 1991,1993
		RME & CT	Exposure Time	1	hour/day	Upper bound water contact period.	BPJ, USEPA, 1992
			Averaging Time - Car	25550	days	70 years, conventional human life span	USEPA, 1989
			Skin Contact Surface Area	4625	cm2	Feet and legs exposed; 25% of upper bound body skin area of a 12-15 year old	USEPA, 1992
		RME	Exposure Frequency	14	days/yr	Assumes contact occurs once per week over 14 weeks of warm weather.	BPJ
			Exposure Duration	5	years	Assumed	BPJ
			Averaging Time - Nc	1825	days	5 years	USEPA, 1989
			Skin Contact Surface Area	3725	cm2	Feet and legs exposed; 25% of average body skin area of a 12-15 year old	USEPA, 1992
		CT	Exposure Frequency	7	days/yr	Assumes contact occurs every other week over 14 weeks of warm weather.	BPJ
			Exposure Duration	1	year	Assumed	BPJ
			Averaging Time - Nc	365	days	1 year	USEPA, 1989
	Dermal Contact - Sediment		Body Weight	15	kg	Standard reference weight for children less than 6 years old.	USEPA, 1991,1993
		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	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
		RME	Exposure Frequency	14	days/yr	Assumes contact occurs once per week over 14 weeks of warm weather.	BPJ
			Exposure Duration	5	years	Assumed	BPJ
			Averaging Time - Nc	1825	days	5 years	USEPA, 1989
			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
		CT	Exposure Frequency	7	days/yr	Assumes contact occurs every other week over 14 weeks of warm weather.	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 6-5B
Exposure Factor Assumptions for Assessing Radiological Risk
SEAD-12 Remedial Investigation
Seneca Army Depot Activity

Scenario	Exposture Route and Parameter	RME Value	RME Units	Basis	Source
Future Resident (Adult)	**Ingestion of Sediment**				
	Sediment Ingestion Rate	0.1	g/day	Max IR for adult.	USEPA, 1993
	Fraction of Time Exposed to Sediment	0.0051		Based on 1 hour/day, 45 day/yr (every other day during summer months).	BPJ
	Exposure Duration	24	yrs	Upper bound time in 1 residence: 6 yrs as child, 24 yrs as adult.	USEPA, 1991, 1993
	Ingestion of Groundwater				
	Groundwater Ingestion Rate	2	L/day	90th percentile for adult residents	USEPA, 1989
	Fraction of Time Exposed to Groundwater	0.959		350 days/yr : Standard upper bound residential default	USEPA, 1993
	Exposure Duration	24	yrs	Upper bound time in 1 residence: 6 yrs as child, 24 yrs as adult.	USEPA, 1991, 1993
	Direct Radiation from Surface Water				
	Depth of Stream	0.3	m	Assumed.	BPJ
	Fraction of Time Exposed to Surface Waters	0.123		Based on 45 day/yr (every other day during summer months).	BPJ
	Exposure Duration	24	yrs	Upper bound time in 1 residence: 6 yrs as child, 24 yrs as adult.	USEPA, 1991, 1993
	Direct Radiation from Sediment				
	Fraction of Time Exposed to Sediment	0.0051		Based on 1 hour/day, 45 day/yr (every other day during summer months).	BPJ.
	Exposure Duration	24	yrs	Upper bound time in 1 residence: 6 yrs as child, 24 yrs as adult.	USEPA, 1991, 1993
	Submersion in Surface Water				
	Fraction of Body Submerged	0.377		Ratio of feet, legs, arms, and hand surface area to total surface area for adults	USEPA, 1992, 1997
	Fraction of Time Exposed	0.0051		Based on 1 hour/day, 45 day/yr (every other day during summer months).	BPJ.
	Exposure Duration	24	yrs	Upper bound time in 1 residence: 6 yrs as child, 24 yrs as adult.	USEPA, 1991, 1993
	Submersion in Groundwater			Performed for adult residents only	
	Fraction of Body Submerged	1		Assumed.	BPJ
	Fraction of Time Exposed	1.00E-02		Based on 15 min/shower, 1 shower/day, 350 day/yr	USEPA, 1992.
	Exposure duration	30	yrs	Upper bound time in 1 residence: 30 years as adult and child	BPJ
	Selected RESRAD parameters				
	Inhalation rate	7300	m3/yr	Assumed inhalation rate for adult receptor, 20 m3/day, 365 day/yr.	USEPA, 1991, 1993
	Soil ingestion rate	0.1	g/day	Max IR for adult.	USEPA, 1993
	Outdoor fraction	0.08		Assumed time spent oudoors by resident	USEPA, 1997
	Exposure duration	24	yr	Upper bound time in 1 residence: 6 yrs as child, 24 yrs as adult.	USEPA, 1991, 1993

Table 6-5B

Exposure Factor Assumptions for Assessing Radiological Risk

SEAD-12 Remedial Investigation

Seneca Army Depot Activity

Scenario	Exposure Route and Parameter	RME Value	RME Units	Basis	Source
Future Resident (Child)	**Ingestion of Sediment**				
	Sediment Ingestion Rate	0.2	g/day	Max IR for child.	USEPA, 1993
	Fraction of Time Exposed to Sediment	0.0051		Based on 1 hour/day, 45 day/yr (every other day during summer months).	BPJ.
	Exposure Duration	6	yrs	Upper bound time in 1 residence: 6 yrs as child, 24 yrs as adult.	USEPA, 1991, 1993
	Ingestion of Groundwater				
	Groundwater Ingestion Rate	1	L/day	Approx. 90th percentile value for children 1-11 years old.	USEPA, 1997
	Fraction of Time Exposed to Groundwater	0.959		350 days/yr : Standard upper bound residential default	USEPA, 1993
	Exposure Duration	6	yrs	Upper bound time in 1 residence: 6 yrs as child, 24 yrs as adult.	USEPA, 1991, 1993
	Direct Radiation from Surface Water				
	Length of Area	68	m	See calculation	
	Width of Stream	3	m	Assumed.	BPJ
	Depth of Stream	0.3	m	Assumed.	BPJ
	Fraction of Time Exposed to Surface Waters	0.123		Based on 45 day/yr (every other day during summer months).	BPJ.
	Exposure Duration	6	yrs	Upper bound time in 1 residence: 6 yrs as child, 24 yrs as adult.	USEPA, 1991, 1993
	Direct Radiation from Sediment				
	Fraction of Time Exposed to Sediment	0.0051		Based on 1 hour/day, 45 day/yr (every other day during summer months).	BPJ.
	Exposure Duration	6	yrs	Upper bound time in 1 residence: 6 yrs as child, 24 yrs as adult.	USEPA, 1991, 1993
	Submersion in Surface Water				
	Fraction of Body Submerged	0.236		Ratio of feet, legs, arms, and hand surface area to total surface area for children	USEPA, 1992, 1997
	Fraction of Time Exposed	0.0051		Based on 1 hour/day, 45 day/yr (every other day during summer months).	BPJ.
	Exposure Duration	6	yrs	Upper bound time in 1 residence: 6 yrs as child, 24 yrs as adult.	USEPA, 1991, 1993
	Submersion in Groundwater			Performed for adult residents only	
	Fraction of Body Submerged	---			
	Fraction of Time Exposed	---			
	Exposure duration	---			
	Selected RESRAD parameters				
	Inhalation rate	3175.5	m3/yr	Average inhalation rate for child receptor, 8.7 m3/day, 365 day/yr.	USEPA, 1997
	Soil ingestion rate	0.2	g/day	Max IR for child	USEPA, 1993
	Outdoor fraction	0.08		Assumed time spent oudoors by resident	USEPA, 1997
	Exposure duration	6	yr	Upper bound time in 1 residence: 6 yrs as child, 24 yrs as adult.	USEPA, 1991, 1993

Table 6-5B
Exposure Factor Assumptions for Assessing Radiological Risk
SEAD-12 Remedial Investigation
Seneca Army Depot Activity

Scenario	Exposure Route and Parameter	RME Value	RME Units	Basis	Source
Current Site Worker	**Selected RESRAD parameters**				
	Inhalation rate	3504	m3/yr	Average inhalation rate for moderate activity is 1.2 m3/hr, 8 hr work day	USEPA, 1997
	Soil ingestion rate	36.5	g/yr	Upper bound worker exposure to dirt and dust.	USEPA, 1993
	Outdoor fraction	0.0183		8 hrs/day, 20 days/yr	BPJ
	Exposure duration	25	years	Upper bound time for employment at a job	USEPA, 1991, 1993
Future Park Worker	**Ingestion of Groundwater**				
	Groundwater Ingestion Rate	1	L/day	Standard occupational ingestion rate	USEPA, 1991
	Fraction of Time Exposed to Groundwater	0.160		8 hour/day, 175 day/yr (works onsite 5 day/wk, 35 weeks/yr)	BPJ
	Exposure Duration	25	yrs	Upper bound time for employment at a job.	USEPA, 1991, 1993
	Direct Radiation from Surface Water				
	Depth of Stream	0.3	m	Assumed.	BPJ
	Fraction of Time Exposed to Surface Waters	0.049		Based on 18 day/yr (Activity during 10% of work days).	BPJ
	Exposure Duration	25	yrs	Upper bound time for employment at a job.	USEPA, 1991, 1993
	Direct Radiation from Sediment				
	Fraction of Time Exposed to Sediment	0.049		Based on 18 day/yr (Activity during 10% of work days).	BPJ.
	Exposure Duration	25	yrs	Upper bound time for employment at a job.	USEPA, 1991, 1993
	Submersion in Surface Water				
	Fraction of Body Submerged	0.1083		Ratio of arm and hand surface area to total surface area for adults.	USEPA, 1992, 1997
	Fraction of Time Exposed	0.0021		Based on 1 hour/day, 18 day/yr (Activity during 10% of work days).	BPJ.
	Exposure Duration	25	yrs	Upper bound time for employment at a job.	USEPA, 1991, 1993
	Selected RESRAD parameters				
	Inhalation rate	2920	m3/yr	Average inhalation rate for light activity is 1 m3/hr, 8 hr work day.	USEPA, 1997
	Soil ingestion rate	36.5	g/yr	Upper bound worker exposure to dirt and dust.	USEPA, 1993
	Fraction of time outdoors	0.16		8 hour/day, 175 day/yr (works onsite 5 day/wk, 35 weeks/yr)	BPJ
	Exposure Duration	25	yr	Upper bound time for employment at a job	USEPA, 1991, 1993
Future Construction Worker	**Direct Radiation from Surface Water**				
	Depth of Stream (m)	0.3	m	Assumed.	BPJ
	Fraction of Time Exposed to Surface Waters	0.23		8 hour/day, 250 day/yr.	USEPA, 1991
	Exposure Duration (yrs)	1	yr	Upper bound time limit of construction worker employment.	USEPA, 1991
	Direct Radiation from Sediment				
	Fraction of Time Exposed to Sediment	0.23		8 hour/day, 250 day/yr.	USEPA, 1991
	Exposure Duration (yrs)	1	yr	Upper bound time limit of construction worker employment.	USEPA, 1991
	Selected RESRAD parameters				
	Inhalation rate	11000	m3/yr	Assumed upper bound inhalation rate for heavy outdoor activity	USDOE, 1993
	Soil ingestion rate	0.48	g/day	Assumed soil IR for intrusive construction work.	USEPA, 1991, 1993
	Fraction of time outdoors	0.23		Based on 8 hour/day, 250 day/yr.	USEPA, 1991
	Exposure Duration	1	yr	Upper bound time limit of construction worker employment.	USEPA, 1991

Table 6-5B
Exposure Factor Assumptions for Assessing Radiological Risk
SEAD-12 Remedial Investigation
Seneca Army Depot Activity

Scenario	Exposture Route and Parameter	RME		Basis	Source
		Value	Units		
Future Recreational User (Child)	**Ingestion of Groundwater**				
	Groundwater Ingestion Rate	1	L/day	Approx. 90th percentile value for children 1-11 years old.	USEPA, 1997
	Fraction of Time Exposed to Groundwater	0.038		Based on 14 day/yr (duration of vacation).	BPJ
	Exposure Duration	5	yrs	Assumed.	BPJ.
	Direct Radiation from Surface Water				
	Depth of Stream	0.3	m	Assumed.	BPJ
	Fraction of Time Exposed to Surface Waters	0.019		Based on 7 day/yr (every second day during vacation).	BPJ.
	Exposure Duration	5	yrs	Assumed.	BPJ.
	Direct Radiation from Sediment				
	Fraction of Time Exposed to Sediment	0.0008		Based on 1 hour/day, 7 day/yr (every second day during vacation).	BPJ.
	Exposure Duration	5	yrs	Assumed.	BPJ.
	Submersion in Surface Water				
	Fraction of Body Submerged	0.236		Ratio of feet, legs, arms, and hand surface area to total surface area for children	USEPA, 1992, 1997
	Fraction of Time Exposed	0.0008		Based on 1 hour/day, 7 day/yr (every second day during vacation).	BPJ.
	Exposure Duration	5	yrs	Assumed.	BPJ.
	Submersion in Groundwater				
	Fraction of Body Submerged	1		Upper bound showering/bathing submersion.	USEPA, 1992.
	Fraction of Time Exposed	4.00E-04		Based on 15 min/shower, 1 shower/day, 14 days/yr	USEPA, 1992.
	Exposure duration	5	yrs	Assumed.	BPJ.
	Selected RESRAD parameters				
	Inhalation rate	3175.5	m3/yr	Average inhalation rate for child receptor, 8.7 m3/day, 365 day/yr.	USEPA, 1997
	Soil ingestion rate	72	g/yr	Maximum IR for a child.	USEPA, 1993.
	Exposure duration	5	yr	Assumed.	BPJ.
	Outdoor fraction	0.0384		Based on 14 day/yr.	BPJ.

Table 6-5B
Exposure Factor Assumptions for Assessing Radiological Risk
SEAD-12 Remedial Investigation
Seneca Army Depot Activity

Scenario	Exposture Route and Parameter	RME		Basis	Source
		Value	Units		
Offsite Recreational User (Child)	**Ingestion of Surface Water**				
	Surface Water Ingestion Rate	1	L/day	Approx. 90th percentile value for children 1-11 years old.	USEPA, 1997
	Fraction of Time Exposed to Surface Water	0.0042		Based on 2.6 hour/day, 14 day/yr (every day during vacation).	USEPA, 1992.
	Exposure Duration	5	yrs	Assumed.	BPJ.
	Direct Radiation from Surface Water				
	Depth of Stream	1	m	Assumed.	BPJ
	Fraction of Time Exposed to Surface Waters	0.038		Based on 14 day/yr (every day during vacation).	BPJ.
	Exposure Duration	5	yrs	Assumed.	BPJ.
	Direct Radiation from Sediment				
	Fraction of Time Exposed to Sediment	0.0042		Based on 2.6 hour/day, 14 day/yr (every day during vacation).	BPJ.
	Exposure Duration	5	yrs	Assumed.	BPJ.
	Submersion in Surface Water				
	Fraction of Body Submerged	0.504		Ratio of exposed feet and legs and 25% of upper bound body skin area to upper bound surface area for children	USEPA, 1992, 1997
	Fraction of Time Exposed	0.0042		Based on 2.6 hour/day, 14 day/yr (every day during vacation).	USEPA, 1992.
	Exposure Duration	5	yrs	Assumed.	BPJ.

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
USDOE. 1993. Data Collection Handbook to Support Modeling the Impacts of Radioactive Material in Soil. Argonne National Laboratory. April.
USEPA, 1993: Superfund's Standard Default Exposure for the Central Tendency and Reasonable Maximum Exposure
USEPA, 1997: Exposure Factors Handbook, Update to 1990 Handbook

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. For exposure factor assumptions used for radiological risk determination, refer to **Table 6-5B.**

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. For exposure factor assumptions used for radiological risk determination, refer to **Table 6-5B.**

Off-Site Wader. The off-site wader is assumed to be a child, who periodically wades in Reeder Creek (downgradient from SEAD-12 and SEDA) over a 5-year period for the RME or a 1 year period for the CT. It is assumed for the RME that the child visits the creek once per week in the summer (estimated to be 14 weeks) or, for the CT, once every other week. The off-site wader is exposed dermally to surface water and sediment. Because Reeder Creek is relatively shallow, it is assumed that approximately 25% of the body is in contact with the water. For exposure factor assumptions used for radiological risk determination, refer to **Table 6-5B.**

6.3.5.3 Inhalation of Particulate Matter in Ambient Air

The following discussion applies to the inhalation of particulate matter in ambient air derived from chemicals present in soil. The discussion for radionuclides is presented in **Section 6.3.5.12**.

This inhalation of particulate matter pathway consists of particulate matter (PM) being released from soils to the air and then being inhaled by current and future receptors. For the chemical risk assessment, ambient PM concentrations for a construction worker were estimated using an emission and dispersion model for chemical constituents. PM concentrations for the future site worker, the future park worker, the future recreational visitor, and the future resident 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

TABLE 6-6
SUSPENDED PARTICULATE CONCENTRATIONS MEASURED AT SEDA
SEAD - 12 Risk Assessment
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 suspended particulate matter (PM), originating from the soils being removed. This dust would contain the chemicals present in the soil. Construction workers in the construction area would breathe this PM in the ambient air.

Air concentrations of site chemicals of concern were estimated for this exposure pathway using excavation models recommended in the EPA's "Models for Estimating Air Emission Rates from Superfund Remedial Actions" (USEPA 451/R-93-001).

Particulate emissions from soil excavation and loading into trucks are estimated with the following equation:

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

where:

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

The construction worker receptor is assumed to work at SEAD-12 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-12 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

$$= 76{,}225 \text{ square meters} \times 2 \text{ meters} \times 1.5\ g/cm^3 \times 10^6\ cm^3/m^3$$
$$= 2.29 \times 10^{11} \text{ grams}$$
$$= 2.29 \times 10^{8}\ kg$$

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 factors, 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 occurs only during workdays: 250 days/yr, 8 hr/day.

Much greater short-term emissions are estimated for site grading with a bulldozer or tractor. This type of activity is assumed to occur for 30 workdays (8-hour day) over the course of a year. The model equation for grading emissions is:

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

where:
E = emission rate (g/sec)
0.094 = empirical constant (g/sec)
s = percent silt content (%)
X = percent moisture content (%)

Assuming the USEPA-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-12 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 L-1 (in Appendix L)** 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-12. The entire particulate loading was assumed to be airborne soil released from SEAD-12 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. **Table L-5 (Appendix L)** shows the ambient air exposure point concentrations used in the intake calculations.

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

$$\textbf{Intake (mg/kg/day)} = \frac{\mathbf{CA \times IR \times EF \times ED}}{\mathbf{BW \times AT}}$$

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 L-1 and L-2** for RME and CT, respectively.

6.3.5.4 Incidental Ingestion of Soil (current and future land use)

The following discussion applies to chemical exposure only. Exposure to radionuclides in soil was calculated using RESRAD as described in **Section 6.3.5.12**.

Due to the present limited access to the SEAD-12, 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, the future park worker, the future recreational visitor, and the future resident exposures, only surface soil data collected from the 0 to 0.2 foot interval was 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 (USEPA 1989a):

$$\textbf{Intake (mg/kg-day)} = \frac{\textbf{CS x IR x CF x FI x EF x ED}}{\textbf{BW x AT}}$$

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 L-6 and L-7.**

6.3.5.5 Dermal Contact with Soils

The following discussion applies to chemical exposure only. Exposure to radionuclides in soil was calculated using RESRAD as described in **Section 6.3.5.12**.

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, the future construction worker, the future outdoor park worker, the future recreational visitor and the future resident receptors.

As with the soil ingestion scenarios, the chemical concentration of the soils were taken from the 0 to 0.2 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:

$$\textbf{Absorbed Dose (mg/kg-day)} = \frac{\textbf{CS x CF x AF x ABS x SA x EF x ED}}{\textbf{BW x AT}}$$

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 L-3 and L-4**.

6.3.5.4 Incidental Ingestion of Soil (current and future land use)

The following discussion applies to chemical exposure only. Exposure to radionuclides in soil was calculated using RESRAD as described in **Section 6.3.5.12**.

Due to the present limited access to the SEAD-12, 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, the future park worker, the future recreational visitor, and the future resident exposures, only surface soil data collected from the 0 to 0.2 foot interval was 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 (USEPA 1989a):

$$\textbf{Intake (mg/kg-day)} = \frac{\textbf{CS x IR x CF x FI x EF x ED}}{\textbf{BW x AT}}$$

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 L-6 and L-7.**

6.3.5.5 Dermal Contact with Soils

The following discussion applies to chemical exposure only. Exposure to radionuclides in soil was calculated using RESRAD as described in **Section 6.3.5.12**.

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, the future construction worker, the future outdoor park worker, the future recreational visitor and the future 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:

$$\textbf{Absorbed Dose (mg/kg-day)} = \frac{\textbf{CS x CF x AF x ABS x SA x EF x ED}}{\textbf{BW x AT}}$$

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 L-3 and L-4**.

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

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

The following assumptions were made regarding skin surface areas for dermal exposure, according to USEPA's guidance (USEPA, 1999e):

Current Site Worker, Future Park Worker, Future Construction Worker (Soil/Sediment): The construction worker, future park worker, or current site worker was assumed to wear a short-sleeved shirt, long pants, and shoes; therefore, the exposed skin surface is limited to the head, hands, and forearms. The USEPA's recommended surface area exposed to contaminated soil for the adult commercial/industrial receptor, 3300 cm^2 (USEPA, 1999e), was used to represent the RME or CT scenario for these receptors.

Future Adult Resident (Soil/Sediment): The adult resident was assumed to wear a short-sleeved shirt, shorts and shoes. Therefore, the exposed skin surface is limited to the head, hands, forearms, and lower legs. The USEPA (1999e) recommended value of 5700 cm^2 was used to represent the RME or CT scenario for the future adult resident.

Future Recreational Visitor and Future Resident – Child (Soil): The recreational child or future residential child was assumed to wear a short-sleeved shirt and shorts (no shoes) and therefore, the exposed skin is limited to the head, hands, forearms, lower legs, and feet. The recommended surface area exposed to contaminated soil for the child is 2800 cm^2 for the RME or CT scenario (USEPA, 1999e).

Future Recreational Visitor – Child (Groundwater): The entire body surface may be exposed during showering/bathing. USEPA guidance (1999e) recommends a surface area value of 6,600 cm^2 for the RME or CT scenario.

The potential magnitude of exposure depends on the amount of soil that adheres to the exposed skin. Certain chemicals may be readily absorbed through the skin while others penetrate much more slowly or not at all. In the case of soil, some chemicals may be strongly bound to the matrix, which reduces their ability to absorb through the skin. Chemical-specific absorption factors as provided by USEPA (1999e) were used in this assessment. USEPA (1999e) recommends dermal absorption fraction from soil for cadmium, arsenic, chlordane, DDT, Lindane, PAHs, PCBs, dioxins/furans, 2,4-Dichlorophenoxyacetic acid, and pentachorophenol. The USEPA 1999 guidance also provides default dermal absorption factors for semivolatile organic compounds of 10% as a screening method for the majority of SVOCs without dermal absorption factors. There are no default dermal absorption values presented for volatile organic compounds nor inorganic classes of compounds. The uncertainty related to the dermal exposure route will be addressed in the uncertainty assessment section (Section 6.5.3).

6.3.5.6 Groundwater Ingestion (Future)

The following discussion applies only to chemical exposure to groundwater. Radiological exposure to groundwater is discussed in **Section 6.3.5.12**.

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.

For COPCs, 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 L-6E and L-7E**.

6.3.5.7 Dermal Contact to Groundwater while Showering/Bathing

The following discussion applies only to chemical exposure to groundwater. Radiological exposure to groundwater is discussed in **Section 6.3.5.12**.

The future recreational visitor and the future resident may be exposed to groundwater while showering. The EPCs developed for ingestion of groundwater are also used for this exposure route. For chemicals in groundwater, the equation for the absorbed dose, taken from RAGS (USEPA, 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)

DA (mg/cm^2 - event) was calculated as described in USEPAs Risk Assessment Guidance for Superfund, Volume I: Human Health Evaluation Manual, Supplemental Guidance: Dermal Risk Assessment Interim Guidance (USEPA, 1999). The following equations were used to evaluate the dermal absorbed dose per event per area of skin exposed:

For organic compounds:

If ET ≤ t*, then:

$$\mathbf{DA = 2\ K_p\ x\ CW\ x\ CF}\ \sqrt{\frac{6 \times \tau \times ET}{\pi}}$$

If ET > t*, then:

$$\mathbf{DA_{event} = K_p\ x\ CW\ x\ CF}\left[\frac{ET}{1+B} + 2\tau\left(\frac{1+3B+3B^2}{(1+B)^2}\right)\right]$$

Where for both equations:

K_p	=	Dermal permeability coefficient (cm/hr)
CW	=	Chemical Concentration in Water (mg/l)
ET	=	Exposure Time (hours/event)
B	=	Dimensionless ratio of the permeability of the stratum corneum relative to the permeability across the viable epidermis (and any other limitations to chemical transfer through the skin, including clearance into the cutaneous blood).
τ	=	Lag time per event (hours/event)
t*	=	Time to reach steady-state (hr) = 2.4τ
CF	=	Volume Conversion Factor = $0.001 L/cm^3$

Lag times per event (τ), B, and Kp were taken from a list in Table B.2 of the Dermal Risk Assessment Interim Guidance. All chemicals not having lag times were derived using the following equation:

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

where:

l_{sc}	=	Apparent thickness of skin, assumes 0.001 cm
D_{sc}	=	Effective diffusivity for chemical transfer through the skin (cm^2/hr), $D_{sc} = l_{sc} \times 10^{(-2.80-0.0056MW)}$
MW	=	Molecular weight of the compound.

When no organic K_p value was available, a value was calculated using the following equation:

$$\text{Log } K_p = -2.80 + 0.67 \log K_{ow} - 0.0056 \text{ MW}$$

Where:

Kow = Octanol/water partition coefficient

For inorganics, DA was calculated by:

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

Kp values for inorganic chemicals were taken from Table 3.1 of the Dermal Risk Assessment Interim Guidance (USEPA, 1999e). As recommended by USEPA (1999e), a default value of 1×10^{-3} cm/hr was used for all inorganics with no specific Kp values.

The exposure time for showering was assumed to be 0.58 hour/day and 1.0 hour/day for the adult and child receptors, respectively, for the RME scenario. As recommended in the Dermal Risk Assessment Interim Guidance (USEPA, 1999e) for the showering scenario, the exposure time for showering was assumed to be 0.25 hour/day and 0.33 hour/day for the adult and child receptors, respectively, for the CT scenario.

Exposure to chemicals in groundwater during showering occurs via two routes: inhalation of volatile chemicals that partition into the air from the hot shower water, and dermal contact. The analysis of these two exposure routes assumes that release of volatile chemicals to the air occurs quickly, and that only the quantities that 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 that partitions into the air. This adjusted EPC, referred to as C_{derm} , is calculated as:

$$\mathbf{C_{derm} = EPC_{gw} (1\text{-}f_e)}$$

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:

$$\mathbf{f_e = (EPC_{air} \times F_a) / (EPC_{gw} \times F_w)}$$

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 L-3E and L-4E**.

The dermal exposure calculations are summarized in **Appendix L**.

6.3.5.8 Inhalation of Groundwater while Showering/Bathing

The following discussion applies only to chemical exposure to groundwater. Radiological exposure to groundwater is discussed in **Section 6.3.5.12**.

Exposure to inhalation of groundwater while showering/bathing is quantified for the future recreational visitor and the future resident. 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:

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

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 35 minutes (min) as recommended by USEPA (1999e)

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 L-8 and L-9.**

The equation for the intake, taken from RAGS (USEPA, 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 L-8 and L-9**.

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 (USEPA 1997) as representative of sedentary children.

6.3.5.9 Dermal Contact to Surface Water while Wading

The following discussion applies only to chemical exposure to surface water. Radiological exposure to surface water is discussed in **Section 6.3.5.12**.

At SEAD-12, located in the Conservation/Recreation area, the future park worker, the future recreational visitor, and the future 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 chemicals in surface water are the same as those used for dermal contact with ground water during showering. See Section **6.3.5.7**, above, for a complete discussion of this methodology.

The exposure time for contact with surface water is assumed to be one hour per day for each receptor. The exposure time, one hour, is less than t* for all compounds except acetone and toluene.

The dermal exposure calculations for surface water are summarized in **Tables L-3F and L-4F**.

6.3.5.10 Dermal Exposure to Sediment

The following discussion applies only to chemical exposure to sediment. Radiological exposure to sediment is discussed in **Section 6.3.5.12**.

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 future park worker, the future child recreational visitor, and the future 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 6.3.5.5, above, for a complete discussion of this methodology.

Similar to soil, the sediment dermal exposure calculation considers the amount of exposed skin, the amount of soil that adheres to the skin and the degree to which a chemical may be adsorbed through the skin. As with soil, this assessment followed EPA guidance regarding the values assigned to each of these exposure parameters. USEPA recommended soil adherence factors for wet soil were adopted for child receptors.

Chemical-specific absorption factors as provided by USEPA (1999e) were used in this assessment. USEPA (1999e) recommends dermal absorption fraction from soil for cadmium, arsenic, chlordane, DDT, Lindane, PAHs, PCBs, dioxins/furans, 2,4-Dichlorophenoxyacetic acid, and pentachorophenol. The USEPA 1999 guidance also provides default dermal absorption factors for semivolatile organic compounds of 10% as a screening method for the majority of SVOCs without dermal absorption factors. There are no default dermal absorption values presented for volatile organic compounds nor inorganic classes of compounds. The uncertainty related to the dermal exposure route will be addressed in the uncertainty assessment section (Section 6.5.3).

The dermal exposure calculations for sediment are summarized in **Tables L-3D and L-4D.**

6.3.5.11 Incidental Ingestion of Sediment

The following discussion applies only to chemical exposure to sediment. Radiological exposure to sediment is discussed in **Section 6.3.5.12**.

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 future resident is 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):

$$\textbf{Intake (mg/kg-day)} = \frac{\textbf{CS x IR x CF x FI x EF x ED}}{\textbf{BW x AT}}$$

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 L-6D and L-7D**.

6.3.5.12 Exposure Assessment and Risk Characterization Methodology for Radionuclides of Potential Concern

For radionuclides present in soil, RESRAD (DOE, 1993) was used to estimate risks to receptors from soil pathways including inhalation of dust. A detailed description of RESRAD and its use is provided in **Section 4**. The site-specific input parameters used in RESRAD are also listed in **Appendix E, Table E-1**. The receptor-specific exposure parameters used in RESRAD are listed in **Table 6-5B**. Risks from groundwater, surface water and sediments are not estimated within RESRAD. Therefore, these risks were estimated using USEPA (1989, 1998) methodology and added to soil risks obtained from RESRAD to obtain total risks for each receptor. RESRAD also uses USEPA's (1989) methodology to estimate risks, therefore, adding soil risks from RESRAD to other pathway risks is a consistent approach. Pathway- and radionuclide-specific risk equations for pathways not modeled in RESRAD are presented in this section. The parameters used in these equations for all the receptors, and their rationale, are detailed in **Table 6-5B**.

All the following risk equations are modified based on USEPA (1989, 1998) guidance.

Incidental Ingestion of ROPCs in Sediment. The general equation for estimating incremental lifetime cancer risk (ILCR) by incidental soil ingestion (USEPA, 1989) is used as adapted for sediment ingestion and is given by:

$$ILCR_i = (C_{ised})(FE_{sed})(IR_{sed})(ED)(SF_i)$$

where:

$ILCR_i$	=	Incremental lifetime cancer risk resulting from ingestion of radionuclide i in sediment i (unitless)
C_{ised}	=	concentration in soil of radionuclide i (pCi/g)
IR_{sed}	=	sediment ingestion rate (g/yr)
FE_{sed}	=	fraction of time exposed to sediment (unitless)
ED	=	exposure duration (yr)
SF_i	=	slope factor for ingestion for radionuclide i (risk/pCi)

Ingestion of Surface Water. The general equation for estimating ILCR by surface water ingestion is given:

$$ILCR_i = (C_{SW})(IR_{SW})(EF)(ED)(SF_i)$$

where:

$ILCR_i$	=	Incremental lifetime cancer risk resulting from ingestion of radionuclide i in surface water (unitless)
C_{isw}	=	concentration of radionuclide i in surface water (pCi/L)
IR_{sw}	=	recreational surface water ingestion rate (L/d)
FE_{sw}	=	fraction of time exposed to surface water (unitless)
ED	=	exposure duration (yr)
SF_i	=	slope factor for ingestion of radionuclide i (risk/pCi)

Ingestion of Fish. The general equation for estimating ICLR by ingestion of contaminated fish is derived by analogy to equations presented by USEPA (1991, 1995) as follows:

$$ILCR_i = (C_{isw})(IR_{rf})(BAF_i)(ED)(SF_i)$$

where:

$ILCR_i$	=	Incremental lifetime cancer risk resulting from ingestion of radionuclide i in fish (unitless)
C_{isw}	=	concentration of radionuclide in surface water (pCi/L)
IR_{rf}	=	ingestion rate of recreationally caught fish (kg/yr)
BAFi	=	fish water bioaccumulation factor (L/kg)
ED	=	exposure duration (yr)
SF_i	=	slope factor for ingestion of radionuclide i (risk/pCi)

Ingestion of Groundwater. The general equation for estimating ILCR caused by ingestion of groundwater is given by USEPA (1991, 1995) as follows:

$$ILCR_i = (C_{igw})(FE_{gw})(IR_{gw})(ED)(SF_I)$$

where:

$ILCR_i$	=	Incremental lifetime cancer risk resulting from ingestion of radionuclide i in groundwater (unitless)
C_{isw}	=	concentration of radionuclide in groundwater (pCi/L)
FE_{gw}	=	fraction of time exposed to groundwater (unitless)
IR_{gw}	=	groundwater ingestion rate (L/yr)
ED	=	exposure duration (yr)
SF_i	=	slope factor for ingestion of radionuclide i (risk/pCi)

Submersion in Groundwater. The general equation for estimating ILCR caused by submersion in groundwater (typically bathing or showering) is adapted from USEPA (1989) as follows:

$$ILCR_i = (C_{igw})(FB)(FE_{gw})(ED)(SF_i)$$

where:

$ILCR_i$	=	Incremental lifetime cancer risk resulting from submersion in radionuclide i in groundwater (unitless)
C_{igw}	=	concentration of radionuclide in groundwater (pCi/m^3)
FB	=	fraction of body submerged in groundwater (unitless)
FE_{gw}	=	fraction of time exposed to groundwater (unitless)
ED	=	exposure duration (yr)
SF_i	=	slope factor for submersion in radionuclide i (risk/yr per pCi/m^3)

Submersion in Surface Water. The general equation for estimating ILCR caused by submersion in surface water (typically swimming) is given by:

$$ILCR_i = (C_{igw})(FB)(FE_{gw})(ED)(SF_i)$$

where:

$ILCR_i$	=	Incremental lifetime cancer risk resulting from submersion of radionuclide i in surface water (unitless)
C_{isw}	=	concentration of radionuclide in surface water (pCi/m^3)
FB	=	fraction of body submerged in surface water (unitless)
FE_{sw}	=	fraction of time exposed to surface water (unitless)
ED	=	exposure duration (yr)
SF_i	=	slope factor for submersion in radionuclide i (risk/yr per pCi/m^3)

External Radiation from Sediment. The equation for estimating external exposure from direct penetrating radiation from surface soil (to a depth of 15cm) for a given radionuclide (USEPA, 1991; 1995) is used as a surrogate for estimating direct radiation exposure from sediment as follows:

$$ILCR_i = (C_{ised})(FE_{sed})(ED)(SF_i)$$

where:

$ILCR_i$	=	Incremental lifetime cancer risk resulting from exposure to direct radiation from radionuclide i in sediment i (unitless)
C_{ised}	=	sediment concentration of radionuclide i (pCi/g)
FE_{sed}	=	fraction of time exposed to sediment (unitless)
ED	=	exposure duration (yr)
SF_i	=	slope factor for external exposure to soils for radionuclide i (risk/yr per pCi/g)

External Radiation from Surface Water. The equation for estimating external exposure from direct penetrating radiation from surface water (to a depth of 100 cm) is adopted from exposure to a ground plane (USEPA, 1998) is as follows:

$$ILCR_i = (C_{isw})(D_{sw})(FE_{sw})(ED)(SF_i)$$

where:

$ILCR_i$	=	Incremental lifetime cancer risk resulting from exposure to direct radiation from radionuclide i in surface water i (unitless)
C_{isw}	=	surface water concentration of radionuclide i (pCi/m^3)
D_{sw}	=	penetration depth of surface water (m)
FE_{sw}	=	fraction of time exposed to surface water (unitless)
ED	=	exposure duration (yr)

SF_i	=	slope factor for external exposure to a ground plane for radionuclide i (risk/yr per pCi/m^2)

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 toxicity values withdrawn from IRIS and other values quoted by EPA Region III RBC table USEPA were consulted to provide any additional values not included in these two sources. USEPA Federal Guidance Report No. 13 was also consulted for slope factors for radionuclides. The toxicity factors used in this evaluation are summarized in **Table 6-7A** for both noncarcinogenic and carcinogenic effects of chemicals. Slope factors used for calculating carcinogenic risk from radionuclides are provided in **Table 6-7B**.

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 EPA RfDs and RfCs developed by the RfD/RfC Work Group and included in the IRIS. In general, the RfD/RfC is an estimate of an average daily exposure to an individual (including sensitive individuals) below which there will not be an appreciable risk of adverse health effects. The RfD/RfC is derived using uncertainty factors (e.g., to adjust from animals to humans and to protect sensitive subpopulations) to ensure that it is unlikely to

TABLE 6-7A
TOXICITY VALUES
SEAD-12 - 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-001	b	4.00E-002	b	NA		C	NA		1.00E-001	f	NA		1.00	j
1,2-Dichloroethene (total)	9.00E-003	b	NA	b	NA	e	D	NA	e	9.00E-003	g	NA	h	1.00	j
1,1,1-Trichloroethane	2.80E-001	e	6.28E-001	e	NA	a	D	NA	a	2.80E-001	f	NA		1.00	j
1,1,2,2-Tetrachloroethane	NA	a	NA	a	2.00E-001	a	C	2.03E-001	a	NA		2.00E-001	g	1.00	j
1,2,4-Trichlorobenzene	1.00E-002		NA		NA		NA	NA		5.00E-003		NA		1.00	j
2-Butanone	6.00E-001	a	2.86E-001	a	NA	a	D	NA	a	6.00E-001	f	NA		1.00	j
Acetone	1.00E-001	a	NA	a	NA	a	D	NA	a	1.00E-001	f	NA		1.00	j
Benzene	3.00E-003	i	1.71E-003	i	2.90E-002	a	A	2.73E-002	a	3.00E-003	f	2.90E-002	g	1.00	j
Carbon disulfide	1.00E-001	a	2.00E-001	a	NA	a	NA	NA	a	1.00E-001	f	NA		1.00	j
Bromomethane	1.40E-003	a	1.43E-003	a	NA	a	D	NA	a	1.40E-003	f	NA		1.00	j
Chlorobenzene	2.00E-002	a	5.70E-003	b	NA	a	D	NA	a	2.00E-002	f	NA		1.00	j
Chloroform	1.00E-002	a	NA	a	6.10E-003	a	B2	8.05E-002	a	1.00E-002	f	6.10E-003	g	1.00	j
Chloromethane	NA	a	NA	a	1.30E-002	b	C	6.33E-003	b	NA		1.30E-002	g	1.00	j
Ethyl benzene	1.00E-001	a	2.86E-001	a	NA	a	D	NA	a	1.00E-001	f	NA		1.00	j
Methyl butyl ketone	NA	b	NA	b	NA	a	NA	NA	a	NA		NA	a	1.00	j
Methyl chloride	NA	a	NA	a	1.30E-002	b	C	6.33E-003	b	NA		1.30E-002	g	1.00	j
Methylene chloride	6.00E-002	a	8.57E-001	b	7.50E-003	a	B2	1.65E-003	a	6.00E-002	f	7.50E-003	g	1.00	j
Methyl ethyl ketone	6.00E-001	a	2.86E-001	a	NA	a	D	NA	a	6.00E-001	f	NA		1.00	j
Methyl isobutyl ketone	8.00E-002	b	2.30E-002	b	NA	a	NA	NA	a	8.00E-002	f	NA		1.00	j
Styrene	2.00E-001	a	2.86E-001	e	NA	a	NR	NA	a	2.00E-001	f	NA	a	1.00	j
Tetrachloroethene	1.00E-002	a	NA	e	5.20E-002	e	NR	2.00E-003	e	1.00E-002	f	5.20E-002	g	1.00	j
Toluene	2.00E-001	a	1.14E-001	a	NA	a	D	NA	a	2.00E-001	f	NA		1.00	j
Trichloroethene	NA	a	NA	e	1.10E-002	e	NA	6.00E-003	e	NA		1.10E-002	g	1.00	j
Total Xylenes	2.00E+000	a	NA	e	NA	a	D	NA	a	2.00E+000	f	NA		1.00	j
Semivolatiles*															
1,3-Dinitrobenzene	1.00E-004	a	NA	a	NA	a	D	NA	a	1.00E-004	f	NA		1.00	j
1,4-Dichlorobenzene	NA	a	2.28E-001	e	2.40E-002	b	B2	NA	a	NA	a	2.40E-002	a	1.00	j
2,4-Dimethylphenol	2.00E-002	a	NA	a	NA	a	NA	NA	a	2.00E-002	f	NA		1.00	j
2,4-Dinitrotoluene	2.00E-003	a	NA	a	6.80E-001	h	B2	NA	a	2.00E-003	f	6.80E-001	g	1.00	j
2,6-Dinitrotoluene	1.00E-003	b	NA	a	6.80E-001	h	NA	NA	a	1.00E-003	f	6.80E-001	g	1.00	j
2-Methylnaphthalene	4.00E-002	i	NA	a	NA	a	NA	NA	a	4.00E-002	f	NA		1.00	j
2-Methylphenol	5.00E-002	a	NA	a	NA	a	C	NA	a	5.00E-002	f	NA		1.00	j
3,3'-Dichlorobenzidine	NA	a	NA	a	4.50E-001	a	B2	NA	a	NA		4.50E-001	g	1.00	j
3-Nitroaniline	NA	a	NA	a	NA	a	NA	NA	a	NA		NA		1.00	j
4-Chloroaniline	4.00E-003	a	NA	a	NA	a	NA	NA	a	4.00E-003	f	NA		1.00	j
4-Methylphenol	5.00E-003	b	NA	a	NA	a	C	NA	a	5.00E-003	f	NA		1.00	j
4-Nitroaniline	NA	a	NA	a	NA	a	NA	NA	a	NA		NA		1.00	j
Acenaphthene	6.00E-002	a	NA	a	NA	a	NA	NA	a	6.00E-002	f	NA		1.00	j
Acenaphthylene	NA	e	NA	a	NA	a	D	NA	a	NA		NA		1.00	j
Anthracene	3.00E-001	a	NA	a	NA	a	D	NA	a	3.00E-001	f	NA		1.00	j
Benzoic Acid	4.00E+000	a	NA	a	NA	a	D	NA	a	4.00E+000	f	NA		1.00	j
Benzo(a)anthracene	NA	a	NA	a	7.30E-001	c	B2	NA	a	NA		7.30E-001	g	1.00	j
Benzo(a)pyrene	NA	a	NA	a	7.30E+000	a	B2	NA	a	NA		7.30E+000	g	1.00	j
Benzo(b)fluoranthene	NA	a	NA	a	7.30E-001	c	B2	NA	a	NA		7.30E-001	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-002	c	B2	NA	a	NA		7.30E-002	g	1.00	j
bis(2-Chloroisopropyl) ether	4.00E-002	b	NA	a	7.00E-002	b	C	3.50E-002	b	4.00E-002	f	7.00E-002	g	1.00	j
Bis(2-Ethylhexyl)phthalate	2.00E-002	a	NA	a	1.40E-002	a	B2	NA	a	2.00E-002	f	1.40E-002	g	1.00	j
Butylbenzylphthalate	2.00E-001	b	NA	a	NA	a	C	NA	a	2.00E-001	f	NA		1.00	j
Carbazole	NA	a	NA	a	2.00E-002	b	B2	NA	a	NA		2.00E-002	g	1.00	j
Chrysene	NA	a	NA	a	7.30E-003	c	B2	NA	a	NA		7.30E-003	g	1.00	j
Dibenz(a,h)anthracene	NA	a	NA	a	7.30E+000	c	B2	NA	a	NA		7.30E+000	g	1.00	j
Dibenzofuran	NA	a	NA	a	NA	a	D	NA	a	NA		NA		1.00	j
Diethyl phthalate	8.00E-001	b	NA	a	NA	a	D	NA	a	8.00E-001	f	NA		1.00	j
Di-n-butylphthalate	1.00E-001	a	NA	a	NA	a	D	NA	a	1.00E-001	f	NA		1.00	j
Di-n-octylphthalate	2.00E-002	b	NA	a	NA	a	NA	NA	a	2.00E-002	f	NA		1.00	j
Fluoranthene	4.00E-002	a	NA	a	NA	a	D	NA	a	4.00E-002	f	NA		1.00	j
Fluorene	4.00E-002	a	NA	a	NA	a	D	NA	a	4.00E-002	f	NA		1.00	j
Hexachlorobenzene	8.00E-004	a	NA	a	1.60E+000	a	B2	1.61E+000	a	8.00E-004	f	1.60E+000	g	1.00	j
Indeno(1,2,3-cd)pyrene	NA	a	NA	a	7.30E-001	c	B2	NA	a	NA		7.30E-001	g	1.00	j
Methylnaphthalene	4.00E-002	i	NA	a	NA	a	NA	NA	a	4.00E-002	f	NA		1.00	j
N-Nitrosodiphenylamine	NA	a	NA	a	4.90E-003	a	B2	NA	a	NA		4.90E-003	g	1.00	j
N-Nitrosodipropylamine	NA	a	NA	a	7.00E+000	a	B2	NA	a	NA		7.00E+000	g	1.00	j
Naphthalene	2.00E-002	a	8.60E-004	a	NA	a	C	NA	a	2.00E-002	f	NA		1.00	j
Pentachlorophenol	3.00E-002	a	NA	a	1.20E-001	a	B2	NA	a	3.00E-002	f	1.20E-001	g	1.00	j
Phenanthrene	NA	a	NA	a	NA	a	D	NA	a	NA		NA		1.00	j
Phenol	6.00E-001	a	NA	a	NA	a	D	NA	a	6.00E-001	f	NA		1.00	j

TABLE 6-7A
TOXICITY VALUES
SEAD-12 - 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	
Pyrene	3.00E-002	a	NA	a	NA	a	D	NA	a	3.00E-002	f	NA		1.00	j
Pesticides/PCBs															
4,4'-DDD	NA	a	NA	a	2.40E-001	a	B2	NA	a	NA		2.40E-001	g	1.00	j
4,4'-DDE	NA	a	NA	a	3.40E-001	a	B2	NA	a	NA		3.40E-001	g	1.00	j
4,4'-DDT	5.00E-004	a	NA	a	3.40E-001	a	B2	3.40E-001	a	5.00E-004	f	3.40E-001	g	1.00	j
Aldrin	3.00E-005	a	NA	a	1.70E+001	a	B2	1.72E+001	a	3.00E-005	f	1.70E+001	g	1.00	j
Aroclor-1242	2.00E-005		NA		2.00E+000		B2	NA		2.00E-005		2.00E+000		1.00	j
Aroclor-1248	NA	a	NA	a	NA		NR	NA		NA		NA		1.00	j
Aroclor-1254	2.00E-005	a	NA	a	2.00E+000	a	B2	4.00E-001	a	2.00E-005	f	2.00E+000	g	1.00	j
Aroclor-1260	2.00E-005	m	NA	a	2.00E+000	a	B2	4.00E-001	a	2.00E-005	f	2.00E+000	g	1.00	j
Dieldrin	5.00E-005	a	NA	a	1.60E+001	a	B2	1.61E+001	a	5.00E-005	f	1.60E+001	g	1.00	j
Endosulfan I	6.00E-003	n	NA	a	NA	a	NA	NA	a	6.00E-003	f	NA		1.00	j
Endosulfan II	6.00E-003	n	NA	a	NA	a	NA	NA	a	6.00E-003	f	NA		1.00	j
Endosulfan sulfate	6.00E-003	n	NA	a	NA	a	NA	NA	a	6.00E-003	f	NA		1.00	j
Endrin	3.00E-004	a	NA	a	NA	a	D	NA	a	3.00E-004	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-004	a	NA	a	4.50E+000	a	B2	4.55E+000	a	5.00E-004	f	4.50E+000	g	1.00	j
Heptachlor epoxide	1.30E-005	a	NA	a	9.10E+000	a	B2	9.10E+000	a	1.30E-005	f	9.10E+000	g	1.00	j
Methoxychlor	5.00E-003	a	NA	a	NA	a	D	NA	a	5.00E-003	f	NA		1.00	j
Toxaphene	NA	a	NA	a	1.10E+000	a	B2	1.12E+000	a	NA		1.10E+000	g	1.00	j
Alpha-BHC	NA	a	NA	a	6.30E+000	a	B2	6.30E+000	a	NA		6.30E+000	g	1.00	j
Alpha-Chlordane	5.00E-004	o	2.00E-004	o	3.50E-001	o	B2	3.50E-001	o	5.00E-004	f	3.50E-001	g	1.00	j
Beta-BHC	NA	a	NA	a	1.80E+000	a	C	1.86E+000	a	NA		1.80E+000	g	1.00	j
gamma-BHC (Lindane)	3.00E-004	a	NA	a	1.30E+000	a	B2/C	NA	a	3.00E-004	f	1.30E+000	x	1.00	j
Gamma-Chlordane	5.00E-004	o	2.00E-004	o	3.50E-001	o	B2	3.50E-001	o	5.00E-004	f	3.50E-001	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-002	b	NA	b	NA	b	NR	NA	b	1.00E-002	f	NA	b	1.00	j
3-Nitrotoluene	1.00E-002	b	NA	b	NA	b	NR	NA	b	1.00E-002	f	NA	b	1.00	j
4-Nitrotoluene	1.00E-002	b	NA	b	NA	b	NR	NA	b	1.00E-002	f	NA	b	1.00	j
1,3,5-Trinitrobenzene	3.00E-002	a	NA	a	NA	a	NA	NA	a	5.00E-005	f	NA		1.00	j
2,4-Dinitrotoluene	2.00E-003	a	NA	a	6.80E-001	a	B2	NA	a	2.00E-003	f	6.80E-001	g	1.00	j
2,6-Dinitrotoluene	1.00E-003	b	NA	a	6.80E-001	a	B2	NA	a	1.00E-003	f	6.80E-001	g	1.00	j
2,4,6-Trinitrotoluene	5.00E-004	a	NA	a	3.00E-002	a	C	NA	a	5.00E-004	f	3.00E-002	g	1.00	j
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-004	a	5.71E-004	b	NA	a	D	NA	a	5.00E-004	f	NA	g	1.00	j
Tetryl	1.00E-002	b	NA	a	NA	a	NA	NA	a	1.00E-002	f	NA	g	1.00	j
RDX	3.00E-003	a	NA	a	1.10E-001	a	C	NA	a	3.00E-003	f	1.10E-001	g	1.00	j
Metals															
Aluminum	1.00E+000	i	1.00E-003	i	NA	a	D	NA	a	1.00E+000	f	NA		1.00	j
Antimony	4.00E-004	a	NA	e	NA	a	B1	NA	a	6.00E-005	f	NA		0.15	j
Arsenic	3.00E-004	a	NA	e	1.50E+000	d	A	1.51E+001	a	3.00E-004	f	1.50E+000	g	1.00	j
Barium	7.00E-002	a	1.43E-004	b	NA	a	D	NA	a	4.90E-003	f	NA		0.07	j
Beryllium	2.00E-003	a	6.00E-006	a	NA	a	B2	8.40E+000	a	1.40E-005	f	NA		0.01	j
Cadmium	5.00E-004	p	NA	a	NA	a	B1	6.30E+000	a	1.25E-005	f	NA		0.03	j
Calcium	NA	a	NA	a	NA	a	NA	NA	a	NA		NA		1.00	j
Chromium, Hexavalent	3.00E-003	a	2.80E-005	q	NA	a	A	4.20E+001	q	7.50E-005	f	NA		0.03	j
Chromium	1.50E+000	a	NA	a	NA	a	D	NA	a	1.50E+000	f	NA		1.00	j
Cobalt	6.00E-002	m	NA	a	NA	a	NA	NA	a	6.00E-002	f	NA		1.00	j
Copper	4.00E-002	b	NA	a	NA	a	D	NA	a	4.00E-002	f	NA		1.00	j
Cyanide	2.00E-002	a	NA	a	NA	a	D	NA	a	2.00E-002	f	NA		1.00	j
Iron	3.00E-001	e	NA	a	NA	a	NA	NA	a	3.00E-001	f	NA		1.00	j
Lead	NA	a	NA	a	NA	a	B2	NA	a	NA		NA		1.00	j
Magnesium	NA	a	NA	a	NA	a	D	NA	a	NA		NA		1.00	j
Manganese	5.00E-002	r	1.40E-005	a	NA	a	D	NA	a	2.00E-003	f	NA		0.04	j
Mercury	3.00E-004	s	8.57E-005	a	NA	a	D	NA	a	2.10E-005	f	NA		0.07	j
Nickel	2.00E-002	a	NA	a	NA	a	NA	NA	a	8.00E-004	f	NA		0.04	j
Potassium	NA	a	NA	a	NA	a	NA	NA	a	NA		NA		1.00	j
Selenium	5.00E-003	a	NA	a	NA	a	D	NA	a	5.00E-003	f	NA		1.00	j
Silver	5.00E-003	a	NA	a	NA	a	D	NA	a	2.00E-004	f	NA		0.04	j
Sodium	NA	a	NA	a	NA	a	NA	NA	a	NA		NA		1.00	j
Thallium	8.00E-005	t	NA	a	NA	a	D	NA	a	8.00E-005	f	NA		1.00	j
Vanadium	7.00E-003	b	NA	a	NA	a	D	NA	a	1.82E-004	f	NA		0.03	j
Zinc	3.00E-001	a	NA	a	NA	a	D	NA	a	3.00E-001	f	NA		1.00	j
Herbicides															

TABLE 6-7A
TOXICITY VALUES
SEAD-12 - 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	
2,4,5-T	1.00E-002	a	NA	a	NA	a	NA	NA	a	1.00E-002	f	NA	1.00	j
2,4,5-TP (Silvex)	8.00E-003	a	NA	a	NA	a	D	NA	a	8.00E-003	f	NA	1.00	j
2,4-D	1.00E-002	a	NA	a	NA	a	NA	NA	a	1.00E-002	f	NA	1.00	j
2,4-DB	8.00E-003	a	NA	a	NA	a	NA	NA	a	8.00E-003	f	NA	1.00	j
Dalapon	3.00E-002	a	NA	a	NA	a	NA	NA	a	3.00E-002	f	NA	1.00	j
Dicamba	3.00E-002	a	NA	a	NA	a	NA	NA	a	3.00E-002	f	NA	1.00	j
Dichloroprop	NA	a	NA	a	NA	a	NA	NA	a	NA		NA	1.00	j
MCPA	5.00E-004	a	NA	a	NA	a	NA	NA	a	5.00E-004	f	NA	1.00	j
MCPP	1.00E-003	a	NA	a	NA	a	NA	NA	a	1.00E-003	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 = Based upon EPA Human Health Evaluation Manual Supplemental Guidance: Dermal Risk Assessment Interim Guidance, 1999
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.

Table 6-7B
Risk Slope Factors
SEAD-12 Remedial Investigation
Seneca Army Depot Activity

Radionuclide	Ingestion[1] (Risk/pCi)	Inhalation[1] (Risk/pCi)	External Exposure[1] (Risk/yr per pCi/g soil)	Ground Plane Exposure[2] (Risk/sec per pCi/m**2)	Submersion[2] (Risk/sec per pCi/m**3)
Ac-227[3]	6.26E-10	7.87E-08	9.30E-07	3.53E-17	1.35E-15
Co-57	9.71E-13	2.88E-12	2.07E-07	8.63E-18	3.89E-16
Co-60	1.89E-11	6.88E-11	9.76E-06	1.87E-16	9.63E-15
Cs-137	3.16E-11	1.91E-11	2.09E-06	4.60E-17	2.21E-15
H-3	7.15E-14	9.59E-14	0	0	0.00E+00
Pa-231	1.49E-10	2.42E-08	2.71E-08	2.92E-18	1.24E-16
Pb-210	1.01E-09	3.86E-09	1.45E-10	5.57E-19	7.77E-18
Pu-239	3.16E-10	2.78E-08	1.26E-11	1.63E-20	2.56E-19
Pm-147	1.41E-12	7.49E-12	6.35E-12	1.93E-21	1.23E-19
Ra-226	2.96E-10	2.75E-09	6.74E-06	1.31E-16	6.73E-15
Ra-228	2.46E-10	9.61E-10	0	7.33E-17	3.61E-15
Rn-222	0.00E+00	7.57E-12	0	3.08E-20	1.42E-18
Th-227	4.04E-11	4.31E-09	1.74E-07	7.81E-18	3.24E-16
Th-228	2.31E-10	9.68E-08	6.20E-06	2.63E-16	6.16E-15
Th-230	3.75E-11	1.72E-08	4.40E-11	4.17E-20	1.12E-18
Th-232	3.28E-11	1.93E-08	1.97E-11	2.74E-20	5.35E-19
U-234	4.44E-11	1.40E-08	2.14E-11	3.29E-20	4.37E-19
U-235	4.52E-11	1.30E-08	2.63E-07	1.23E-17	5.43E-16
U-238	6.20E-11	1.24E-08	6.57E-08	1.47E-16	9.52E-17

1. USEPA. 1997. Health Effects Assessment Summary Tables (HEAST). Table 4. Office of Radiation and Indoor Air Radiation Protection Division. October.
2. USEPA. 1999. Federal Guidance Report No.13. Cancer Risk Coefficients for Environmental Exposure to Radionuclides. September.
3. Radionuclides in bold include decay chain.

Table 6-7C Determination of Submersion Morbidity Slope Factors for Parent Radionuclides and Decay Products in Surface Water SEAD-12 Remedial Investigation Seneca Army Depot Activity			
	Radionuclide	**Individual Nuclide Slope Factor (Risk/s per pCi/m**2)**	**Sum of Decay Chain***
Uranium Series	**U-238****	1.66E-19	
	Th-234	2.23E-17	
	Pa-234m	5.87E-17	
	Pa-234	1.40E-17	9.52E-17
	U-234	4.37E-19	
	Th-230	1.12E-18	
	Ra-226	2.23E-17	
	Rn-222	1.42E-18	
	Po-218	3.38E-20	
	At-218	1.428E-21	
	Rn-218	2.73E-18	
	Pb-214	8.61828E-16	
	Bi-214	5.84883E-15	
	Po-214	3.06939E-19	6.73745E-15
	Pb-210	3.22E-18	
	Bi-210	4.52E-18	
	Po-210	3.13E-20	7.7713E-18
Thorium Series	**Th-232**	5.35E-19	
	Ra-228	0	
	Ac-228	3.61E-15	3.61E-15
	Th-228	6.29E-18	
	Ra-224	3.4E-17	
	Rn-220	1.38E-18	
	Po-216	6.24E-20	
	Pb-212	4.89E-16	
	Bi-212	7.02E-16	
	Po-212	0	
	Tl-208	4.932E-15	6.16473E-15
Actinium Series	**U-235**	5.09E-16	
	Th-231	3.36E-17	5.426E-16
	Pa-231	1.24E-16	
	Ac-227	3.96E-19	
	Th-227	3.451E-16	
	Fr-223	2.198E-18	
	Ra-223	4.3E-16	
	Rn-219	1.96E-16	
	Po-215	6.24E-19	
	Pb-211	1.89E-16	
	Bi-211	1.62E-16	
	Po-211	2.85199E-17	
	Tl-207	4.172E-20	1.35388E-15
Cesium	**Cs-137**	5.4E-17	
	Ba-137m	2.16E-15	2.214E-15

* Includes branching ratios

** Radionuclides listed in bold are considered "principal" radionuclides by RESRAD.

Table 6-7D
Determination of Ground Plane Morbidity Slope Factors
for Parent Radionuclides and Decay Products in Surface Water
SEAD-12 Remedial Investigation
Seneca Army Depot Activity

	Radionuclide	**Individual Nuclide Slope Factor (Risk/s per pCi/m**2)**	**Sum of Decay Chain***
Uranium Series	**U-238****	2.25E-20	
	Th-234	5.74E-19	
	Pa-234m	2.11E-18	
	Pa-234	1.44E-16	2.99E-18
	U-234	3.29E-20	3.29E-20
	Th-230	4.17E-20	4.17E-20
	Ra-226	4.89E-19	
	Rn-222	3.08E-20	
	Po-218	6.99E-22	
	At-218	2.59E-19	
	Rn-218	5.83E-20	
	Pb-214	1.89E-17	
	Bi-214	1.12E-16	
	Po-214	6.39E-21	1.31E-16
	Pb-210	1.43E-19	
	Bi-210	4.13E-19	
	Po-210	6.52E-22	5.57E-19
Thorium Series	**Th-232**	2.74E-20	2.74E-20
	Ra-228	0	
	Ac-228	7.33E-17	7.33E-17
	Th-228	1.60E-19	
	Ra-224	7.35E-19	
	Rn-220	2.97E-20	
	Po-216	1.30E-21	
	Pb-212	1.08E-17	
	Bi-212	1.46E-17	
	Po-212	0	
	Tl-208	2.37E-16	1.12E-16
Actinium Series	**U-235**	1.12E-17	
	Th-231	1.08E-18	1.23E-17
	Pa-231	2.92E-18	2.92E-18
	Ac-227	1.04E-20	
	Th-227	7.81E-18	
	Fr-223	4.23E-18	
	Ra-223	9.64E-18	
	Rn-219	4.25E-18	
	Po-215	1.36E-20	
	Pb-211	4.42E-18	
	Bi-211	3.54E-18	
	Po-211	5.98E-19	
	Tl-207	8.01E-19	3.02E-17
Cesium	**Cs-137**	4.57E-20	
	Ba-137m	4.60E-17	4.60E-17
Promethium	**Pm-147**	1.93E-21	
	Sm-147	0.00E+00	1.93E-21

* Includes branching ratios
** Radionuclides listed in bold are considered "principal" radionuclides by RESRAD.

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.

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

At this time, chemical specific dermal toxicity factors are not available. This risk assessment evaluated risks from dermal contact with contaminants according to the most recent EPA guidance on dermal risk assessment (USEPA, 1999). The guidance provides an approach which accounts for the fact that most oral RfDs are expressed as the amount of substance administered per unit time and body weight, whereas exposure estimates for the dermal pathway are expressed as absorbed dose. Primarily, a dermal RfD was estimated from the oral RfD by adjusting for the gastrointestinal absorption efficiency. For compounds recommended by Table 4.1 of the guidance for adjustment of toxicity factors, the GI absorption efficiency values in the table were used to calculate the dermal RfD. For all other compounds, oral RfDs were used to evaluate dermal exposure risks, i.e., a GI absorption efficiency value of 1 was used. Oral absorption factors and the calculated dermal RfDs are shown in **Table 6-7A**.

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

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

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

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

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

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

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

A number of the chemicals of potential concern have been classified as carcinogens or potential carcinogens by EPA, and each of these has also been assigned a carcinogenicity weight-of-evidence category, as shown in **Table 6-7A and 6-7B**. These chemicals are:

Group A - Human Carcinogens

Arsenic

Benzene

Chromium VI

Radionuclides

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-12 with potential carcinogenic effects are shown in **Table 6-7A** along with their cancer slope factors. Radionuclides of potential concern found at SEAD-12 are shown in **Table 6-7B** 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, EPA has not derived toxicity values for the dermal route of exposure. In the absence of dermal reference toxicity values, EPA has suggested (USEPA, 1999e) that, in some cases, it is appropriate to modify an oral slope factor so it can be used to estimate the risk incurred by dermal exposure. The oral slope factors were converted to dermal slope factors by dividing by the oral absorption efficiency recommended by EPA (USEPA, 1999e). The same values presented in Section 6.4.1.2 were used, however, if chemical specific modification factors were unavailable, oral values were used without adjustment. As discussed previously any valuation of the contribution of dermal exposure to the overall risk needs to be viewed as highly tentative at best. This is particularly true for 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. EPA 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.

6.4.2.4 Cancer Slope Factors for Radionuclides of Potential Concern

The cancer slope factors for ROPCs were chosen using the following hierarchy:

- The latest version of the annual HEAST, including all supplements (USEPA, 1997)
- Federal Guidance Report No. 13 (USEPA, 1998).

These slope factors are presented in **Table 6-7B**. It may be noted the inhalation, ingestion, and external exposure slope factors from USEPA (1997) include radiogenic progeny. The slope factors for ground plane exposure and submersion are obtained from USEPA (1998) and do not include the effects of progeny. Slope factors for the parent radionuclides that included the effects of the progeny were estimated by adding the slope factors for each individual radionuclide in the decay chain, taking into account the relative weights of each daughter appropriate to the branching ratio. This was based on the assumption that the long-lived parents (such as U-238, U-235, Th-232, Ra-226, and Pb-210) are in secular equilibrium with the short-lived progeny.

The derivation of parent radionuclide slope factors for submersion and ground plane are presented, respectively, in **Tables 6-7C and 6-7D**. This is consistent with the approach used in RESRAD (DOE, 1993).

Tl-208 was selected as a ROPC for soils at the three potential release areas, however RESRAD does not include Tl-208 as a radionuclide to model. RESRAD only models radionuclides that have half-lives greater than 6 months and Tl-208 has a half-life of 3 minutes. Because RESRAD includes the slope factor of Tl-208 while estimating risks for Th-228, Th-228 was modeled with the source-term for Tl-208 in RESRAD.

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.

Table 6-7C
Determination of Submersion Morbidity Slope Factors
for Parent Radionuclides and Decay Products in Surface Water
SEAD-12 Remedial Investigation
Seneca Army Depot Activity

	Radionuclide	Individual Nuclide Slope Factor (Risk/s per pCi/m**2)	Sum of Decay Chain*
Uranium Series	**U-238****	1.66E-19	
	Th-234	2.23E-17	
	Pa-234m	5.87E-17	
	Pa-234	1.40E-17	9.52E-17
	U-234	4.37E-19	
	Th-230	1.12E-18	
	Ra-226	2.23E-17	
	Rn-222	1.42E-18	
	Po-218	3.38E-20	
	At-218	1.428E-21	
	Rn-218	2.73E-18	
	Pb-214	8.61828E-16	
	Bi-214	5.84883E-15	
	Po-214	3.06939E-19	6.73745E-15
	Pb-210	3.22E-18	
	Bi-210	4.52E-18	
	Po-210	3.13E-20	7.7713E-18
Thorium Series	**Th-232**	5.35E-19	
	Ra-228	0	
	Ac-228	3.61E-15	3.61E-15
	Th-228	6.29E-18	
	Ra-224	3.4E-17	
	Rn-220	1.38E-18	
	Po-216	6.24E-20	
	Pb-212	4.89E-16	
	Bi-212	7.02E-16	
	Po-212	0	
	Tl-208	4.932E-15	6.16473E-15
Actinium Series	**U-235**	5.09E-16	
	Th-231	3.36E-17	5.426E-16
	Pa-231	1.24E-16	
	Ac-227	3.96E-19	
	Th-227	3.451E-16	
	Fr-223	2.198E-18	
	Ra-223	4.3E-16	
	Rn-219	1.96E-16	
	Po-215	6.24E-19	
	Pb-211	1.89E-16	
	Bi-211	1.62E-16	
	Po-211	2.85199E-17	
	Tl-207	4.172E-20	1.35388E-15
Cesium	**Cs-137**	5.4E-17	
	Ba-137m	2.16E-15	2.214E-15

* Includes branching ratios

** Radionuclides listed in bold are considered "principal" radionuclides by RESRAD.

Table 6-7D
Determination of Ground Plane Morbidity Slope Factors
for Parent Radionuclides and Decay Products in Surface Water
SEAD-12 Remedial Investigation
Seneca Army Depot Activity

	Radionuclide	Individual Nuclide Slope Factor (Risk/s per pCi/m**2)	Sum of Decay Chain*
Uranium Series	**U-238****	2.25E-20	
	Th-234	5.74E-19	
	Pa-234m	2.11E-18	
	Pa-234	1.44E-16	2.99E-18
	U-234	3.29E-20	3.29E-20
	Th-230	4.17E-20	4.17E-20
	Ra-226	4.89E-19	
	Rn-222	3.08E-20	
	Po-218	6.99E-22	
	At-218	2.59E-19	
	Rn-218	5.83E-20	
	Pb-214	1.89E-17	
	Bi-214	1.12E-16	
	Po-214	6.39E-21	1.31E-16
	Pb-210	1.43E-19	
	Bi-210	4.13E-19	
	Po-210	6.52E-22	5.57E-19
Thorium Series	**Th-232**	2.74E-20	2.74E-20
	Ra-228	0	
	Ac-228	7.33E-17	7.33E-17
	Th-228	1.60E-19	
	Ra-224	7.35E-19	
	Rn-220	2.97E-20	
	Po-216	1.30E-21	
	Pb-212	1.08E-17	
	Bi-212	1.46E-17	
	Po-212	0	
	Tl-208	2.37E-16	1.12E-16
Actinium Series	**U-235**	1.12E-17	
	Th-231	1.08E-18	1.23E-17
	Pa-231	2.92E-18	2.92E-18
	Ac-227	1.04E-20	
	Th-227	7.81E-18	
	Fr-223	4.23E-18	
	Ra-223	9.64E-18	
	Rn-219	4.25E-18	
	Po-215	1.36E-20	
	Pb-211	4.42E-18	
	Bi-211	3.54E-18	
	Po-211	5.98E-19	
	Tl-207	8.01E-19	3.02E-17
Cesium	**Cs-137**	4.57E-20	
	Ba-137m	4.60E-17	4.60E-17
Promethium	**Pm-147**	1.93E-21	
	Sm-147	0.00E+00	1.93E-21

* Includes branching ratios

** Radionuclides listed in bold are considered "principal" radionuclides by RESRAD.

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 EPA. This approach assumes that simultaneous sub-threshold exposures to several chemicals could result in an adverse health effect. It also assumes that the magnitude of the adverse effect will be proportional to the sum of the ratios of the subthreshold exposures to respective acceptable exposures.

This is expressed as:

$$HI = E_1/RfD_1 + E_2/RfD_2 + ... + E_i/RfD_i$$

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 EPA assumes that the risks are additive. That is to say:

$$\mathbf{Risk_T = Risk1 + Risk2 + ... + Risk_i}$$

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 OSWER Directive 9200.4-31P (USEPA 540/R/99/006), cancer risk from radionuclides and chemical carcinogens should be summed to provide an estimate of the combined risk presented by all carcinogenic contaminants.

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}.

6.5.2 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 construction worker
- Future recreational visitor
- Future resident
- Off-site wader.

The potential exposure routes associated with each exposure scenario are as follows:

Current Site Worker: Inhalation of ambient air, ingestion of soil, dermal contact with soil, and direct exposure from radiation in soil.

Outdoor Park Worker: Inhalation of ambient air, ingestion of soil, dermal contact with soil, direct exposure from radiation in soil, ingestion of groundwater, dermal contact (submersion) with surface water, dermal contact with sediment, and direct exposure from radiation in surface water and sediment.

Construction Worker: Inhalation of ambient air, ingestion of soil, dermal contact with soil, and direct exposure from radiation in soils, surface water, and sediment.

Recreational visitor (child): Inhalation of ambient air, ingestion of soil, dermal contact with soil, direct exposure from radiation in soil, ingestion of groundwater, dermal contact (submersion) with and inhalation of groundwater while showering, dermal contact (submersion) with surface water, dermal contact with sediment, and direct exposure from radiation in surface water and sediment.

Resident: Inhalation of ambient air, ingestion of soil, dermal contact with soil, direct exposure from radiation in soil, ingestion of groundwater, dermal contact (submersion) with and inhalation of groundwater while showering, dermal contact (submersion) with surface water, dermal contact with sediment, direct exposure from radiation in surface water and sediment, and ingestion of sediment.

Off-Site Wader: Dermal contact (submersion) with surface water, dermal contact with sediment, and direct exposure from radiation to surface water and sediment.

Tables 6-8A, B, C, and D and 6-9A, B, C, and D summarize the calculated cancer and noncancer risks from chemicals for all exposure scenarios considered in this risk assessment for the three potential areas of concern (Disposal Pits A/B, Disposal Pit C, and the Former Dry Waste Disposal Pit), and the off-site wader. **Tables 6-8A, B, C and D** summarize the reasonable maximum exposure (RME) scenarios and **Tables 6-9A, B, C, and D** summarize the central tendency (CT) scenarios. The risk calculations for each exposure scenario and exposure route are discussed in the following sections. **Tables 6-8A, B, C, and D and Tables 6-9A, B, C, and D** also serve as a guide to tables in **Appendix L,** which show risk calculations for each exposure route. **Tables 6-10 through 6-15** summarize the calculated cancer risks from radionuclides for all exposure scenarios. **Table 6-16** provides the sum of chemical and radiological cancer risks at each of the three areas of potential concern. The following sections highlight the exposure scenarios at each site which result in risks that exceed the EPA defined targets (lifetime cancer risk range of 10^{-4} to 10^{-6}; non-cancer hazard index less than one).

6.5.2.1 Disposal Pit A/B

Current Site Worker

Three chemical exposure routes and three radiological exposure routes were evaluated for the site worker. The total cancer risk from all chemical and radiological exposure routes is below the USEPA 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 6-8A (Disposal Pits A/B)
CALCULATION OF TOTAL NONCARCINOGENIC AND CARCINOGENIC RISKS
REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-12
SEAD- 12 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 L-1A	2E-009	7E-012
	Ingestion of Soil	TABLE L-6A	2E-003	3E-008
	Dermal Contact to Soil	TABLE L-3A	7E-004	2E-008
	TOTAL RECEPTOR RISK (Nc & Car)		*3E-003*	*5E-008*
FUTURE OUTDOOR PARK WORKER	Inhalation of Dust in Ambient Air	TABLE L-1A	2E-008	5E-011
	Ingestion of Soil	TABLE L-6A	2E-002	2E-007
	Dermal Contact to Soil	TABLE L-3A	6E-003	2E-007
	Ingestion of Ground Water	TABLE L-6E	1E-002	2E-006
	Dermal Contact to Surface Water	TABLE L-3F	5E-002	2E-005
	Dermal Contact to Sediment	TABLE L-3D	6E-004	1E-007
	TOTAL RECEPTOR RISK (Nc & Car)		*9E-002*	*2E-005*
FUTURE RECREATIONAL VISITOR (CHILD)	Inhalation of Dust Ambient Air	TABLE L-1A	7E-009	4E-012
	Ingestion of Soil	TABLE L-6A	1E-002	3E-008
	Dermal Contact to Soil	TABLE L-3A	2E-003	1E-008
	Inhalation of Ground Water	TABLE L-8	2E-007	4E-011
	Ingestion of Ground Water	TABLE L-6E	5E-003	2E-007
	Dermal Contact to Ground Water	TABLE L-3E	2E-002	4E-006
	Dermal Contact to Surface Water	TABLE L-3F	2E-001	1E-005
	Dermal Contact to Sediment	TABLE L-3D	1E-002	6E-007
	TOTAL RECEPTOR RISK (Nc & Car)		*3E-001*	*2E-005*
FUTURE CONSTRUCTION WORKER	Inhalation of Dust in Ambient Air	TABLE L-1A	2E-006	4E-011
	Ingestion of Soil	TABLE L-6A	1E-001	1E-007
	Dermal Contact to Soil	TABLE L-3A	2E-002	3E-008
	TOTAL RECEPTOR RISK (Nc & Car)		*1E-001*	*1E-007*

TABLE 6-8A (Disposal Pits A/B) (cont.)
CALCULATION OF TOTAL NONCARCINOGENIC AND CARCINOGENIC RISKS
REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-12
SEAD- 12 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 L-1A	9E-008	2E-007	4E-010
	Ingestion of Soil	TABLE L-6A	3E-002	3E-001	1E-006
	Dermal Contact to Soil	TABLE L-3A	7E-003	5E-002	6E-007
	Inhalation of Ground Water	TABLE L-8	1E-006	5E-006	2E-009
	Ingestion of Ground Water	TABLE L-6E	6E-002	1E-001	1E-005
	Dermal Contact to Ground Water	TABLE L-3E	2E-001	4E-001	4E-004
	Dermal Contact to Surface Water	TABLE L-3F	4E-001	1E+000	2E-004
	Ingestion of Sediment	TABLE L-6D	6E-003	5E-002	3E-006
	Dermal Contact to Sediment	TABLE L-3D	9E-004	8E-002	4E-006
	TOTAL RECEPTOR RISK (Nc & Car)		*7E-001*	*2E+000*	*7E-004*

TABLE 6-8B (Dispoal Pit C)
CALCULATION OF TOTAL NONCARCINOGENIC AND CARCINOGENIC RISKS
REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-12
SEAD- 12 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 L-1B	0E+000	3E-014
	Ingestion of Soil	TABLE L-6B	1E-003	1E-008
	Dermal Contact to Soil	TABLE L-3B	8E-007	9E-009
	TOTAL RECEPTOR RISK (Nc & Car)		*1E-003*	*2E-008*
FUTURE OUTDOOR PARK WORKER	Inhalation of Dust in Ambient Air	TABLE L-1B	0E+000	2E-013
	Ingestion of Soil	TABLE L-6B	1E-002	9E-008
	Dermal Contact to Soil	TABLE L-3B	7E-006	8E-008
	Ingestion of Ground Water	TABLE L-6E	1E-002	2E-006
	Dermal Contact to Surface Water	TABLE L-3F	5E-002	2E-005
	Dermal Contact to Sediment	TABLE L-3D	6E-004	1E-007
	TOTAL RECEPTOR RISK (Nc & Car)		*8E-002*	*2E-005*
FUTURE RECREATIONAL VISITOR (CHILD)	Inhalation of Dust Ambient Air	TABLE L-1B	0E+000	2E-014
	Ingestion of Soil	TABLE L-6B	9E-003	1E-008
	Dermal Contact to Soil	TABLE L-3B	2E-006	5E-009
	Inhalation of Ground Water	TABLE L-8	2E-007	4E-011
	Ingestion of Ground Water	TABLE L-6E	5E-003	2E-007
	Dermal Contact to Ground Water	TABLE L-3E	2E-002	4E-006
	Dermal Contact to Surface Water	TABLE L-3F	2E-001	1E-005
	Dermal Contact to Sediment	TABLE L-3D	1E-002	6E-007
	TOTAL RECEPTOR RISK (Nc & Car)		*2E-001*	*2E-005*
FUTURE CONSTRUCTION WORKER	Inhalation of Dust in Ambient Air	TABLE L-1B	4E-007	9E-012
	Ingestion of Soil	TABLE L-6B	6E-002	1E-007
	Dermal Contact to Soil	TABLE L-3B	3E-003	3E-008
	TOTAL RECEPTOR RISK (Nc & Car)		*6E-002*	*1E-007*

TABLE 6-8B (Disposal Pit C) (cont.)
CALCULATION OF TOTAL NONCARCINOGENIC AND CARCINOGENIC RISKS
REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-12
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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 L-1B	0E+000	0E+000	2E-012
	Ingestion of Soil	TABLE L-6B	3E-002	2E-001	6E-007
	Dermal Contact to Soil	TABLE L-3B	9E-006	6E-005	2E-007
	Inhalation of Ground Water	TABLE L-8	1E-006	5E-006	2E-009
	Ingestion of Ground Water	TABLE L-6E	6E-002	1E-001	1E-005
	Dermal Contact to Ground Water	TABLE L-3E	2E-001	4E-001	4E-004
	Dermal Contact to Surface Water	TABLE L-3F	4E-001	1E+000	2E-004 **
	Ingestion of Sediment	TABLE L-6D	6E-003	5E-002	3E-006
	Dermal Contact to Sediment	TABLE L-3D	9E-004	8E-002	4E-006
	TOTAL RECEPTOR RISK (Nc & Car)		*7E-001*	*2E+000*	*7E-004*

TABLE 6-8C (Former Dry Waste Disposal Pit)
CALCULATION OF TOTAL NONCARCINOGENIC AND CARCINOGENIC RISKS
REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-12
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RECEPTOR	EXPOSURE ROUTE	EXPOSURE/RISK CALCULATIONS Table Number	HAZARD INDEX	CANCER RISK
CURRENT SITE WORKER	Inhalation of Dust in Ambient Air	TABLE L-1C	8E-009	8E-013
	Ingestion of Soil	TABLE L-6C	1E-003	9E-009
	Dermal Contact to Soil	TABLE L-3C	2E-004	8E-009
	TOTAL RECEPTOR RISK (Nc & Car)		*2E-003*	*2E-008*
FUTURE OUTDOOR PARK WORKER	Inhalation of Dust in Ambient Air	TABLE L-1C	6E-008	6E-012
	Ingestion of Soil	TABLE L-6C	1E-002	8E-008
	Dermal Contact to Soil	TABLE L-3C	2E-003	7E-008
	Ingestion of Ground Water	TABLE L-6E	1E-002	2E-006
	Dermal Contact to Surface Water	TABLE L-3F	5E-002	2E-005
	Dermal Contact to Sediment	TABLE L-3D	6E-004	1E-007
	TOTAL RECEPTOR RISK (Nc & Car)		*8E-002*	*2E-005*
FUTURE RECREATIONAL VISITOR (CHILD)	Inhalation of Dust Ambient Air	TABLE L-1C	2E-008	5E-013
	Ingestion of Soil	TABLE L-6C	9E-003	1E-008
	Dermal Contact to Soil	TABLE L-3C	6E-004	4E-009
	Inhalation of Ground Water	TABLE L-8	2E-007	4E-011
	Ingestion of Ground Water	TABLE L-6E	5E-003	2E-007
	Dermal Contact to Ground Water	TABLE L-3E	2E-002	4E-006
	Dermal Contact to Surface Water	TABLE L-3F	2E-001	1E-005
	Dermal Contact to Sediment	TABLE L-3D	1E-002	6E-007
	TOTAL RECEPTOR RISK (Nc & Car)		*2E-001*	*2E-005*
FUTURE CONSTRUCTION WORKER	Inhalation of Dust in Ambient Air	TABLE L-1C	1E-006	3E-012
	Ingestion of Soil	TABLE L-6C	7E-002	3E-008
	Dermal Contact to Soil	TABLE L-3C	4E-003	8E-009
	TOTAL RECEPTOR RISK (Nc & Car)		*7E-002*	*4E-008*

TABLE 6-8C (Former Dry Waste Disposal Pit) (cont.)
CALCULATION OF TOTAL NONCARCINOGENIC AND CARCINOGENIC RISKS
REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-12
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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 L-1C	3E-007	6E-007	4E-011
	Ingestion of Soil	TABLE L-6C	2E-002	2E-001	5E-007
	Dermal Contact to Soil	TABLE L-3C	2E-003	1E-002	2E-007
	Inhalation of Ground Water	TABLE L-8	1E-006	5E-006	2E-009
	Ingestion of Ground Water	TABLE L-6E	6E-002	1E-001	1E-005
	Dermal Contact to Ground Water	TABLE L-3E	2E-001	4E-001	4E-004
	Dermal Contact to Surface Water	TABLE L-3F	4E-001	1E+000	2E-004
	Ingestion of Sediment	TABLE L-6D	6E-003	5E-002	3E-006
	Dermal Contact to Sediment	TABLE L-3D	9E-004	8E-002	4E-006
	TOTAL RECEPTOR RISK (Nc & Car)		*7E-001*	*2E+000*	*7E-004*

TABLE 6-8D (Downgradient)
CALCULATION OF TOTAL NONCARCINOGENIC AND CARCINOGENIC RISKS
REASONABLE MAXIMUM EXPOSURE (RME) - SEAD-12
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RECEPTOR	EXPOSURE ROUTE	EXPOSURE/RISK CALCULATIONS Table Number	HAZARD INDEX	CANCER RISK
OFF-SITE WADER (CHILD)	Dermal Contact to Surface Water	TABLE L-3H	3E-003	5E-008
	Dermal Contact to Sediment	TABLE L-3G	2E-004	9E-007
	TOTAL RECEPTOR RISK (Nc & Car)		*3E-003*	*1E-006*

TABLE 6-9A (Disposal Pits A/B)
CALCULATION OF TOTAL NONCARCINOGENIC AND CARCINOGENIC RISKS
CENTRAL TENDENCY (CT) - SEAD-12
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RECEPTOR	EXPOSURE ROUTE	EXPOSURE/RISK CALCULATIONS Table Number	HAZARD INDEX	CANCER RISK
CURRENT SITE WORKER	Inhalation of Dust in Ambient Air	TABLE L-2A	1E-009	1E-012
	Ingestion of Soil	TABLE L-7A	5E-004	2E-009
	Dermal Contact to Soil	TABLE L-4A	3E-005	3E-010
	TOTAL RECEPTOR RISK (Nc & Car)		*5E-004*	*2E-009*
FUTURE OUTDOOR PARK WORKER	Inhalation of Dust in Ambient Air	TABLE L-2A	2E-008	1E-011
	Ingestion of Soil	TABLE L-7A	7E-003	3E-008
	Dermal Contact to Soil	TABLE L-4A	5E-004	5E-009
	Ingestion of Ground Water	TABLE L-7E	2E-002	5E-007
	Dermal Contact to Surface Water	TABLE L-4F	1E-001	2E-006
	Dermal Contact to Sediment	TABLE L-4D	2E-004	2E-009
	TOTAL RECEPTOR RISK (Nc & Car)		*2E-001*	*2E-006*
FUTURE RECREATIONAL VISITOR (CHILD)	Inhalation of Dust Ambient Air	TABLE L-2A	4E-009	4E-013
	Ingestion of Soil	TABLE L-7A	3E-003	2E-009
	Dermal Contact to Soil	TABLE L-4A	3E-004	4E-010
	Inhalation of Ground Water	TABLE L-9	2E-008	7E-013
	Ingestion of Ground Water	TABLE L-7E	3E-003	1E-008
	Dermal Contact to Ground Water	TABLE L-4E	5E-003	2E-007
	Dermal Contact to Surface Water	TABLE L-4F	1E-001	2E-006
	Dermal Contact to Sediment	TABLE L-4D	5E-004	5E-009
	TOTAL RECEPTOR RISK (Nc & Car)		*1E-001*	*2E-006*
FUTURE CONSTRUCTION WORKER	Inhalation of Dust in Ambient Air	TABLE L-2A	2E-006	4E-011
	Ingestion of Soil	TABLE L-7A	2E-002	2E-008
	Dermal Contact to Soil	TABLE L-4A	5E-003	9E-009
	TOTAL RECEPTOR RISK (Nc & Car)		*2E-002*	*3E-008*

TABLE 6-9A (Disposal Pits A/B) (cont.)
CALCULATION OF TOTAL NONCARCINOGENIC AND CARCINOGENIC RISKS
CENTRAL TENDENCY (CT) - SEAD-12
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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 L-2A	6E-008	1E-007	8E-011
	Ingestion of Soil	TABLE L-7A	1E-002	1E-001	2E-007
	Dermal Contact to Soil	TABLE L-4A	7E-004	1E-002	3E-008
	Inhalation of Ground Water	TABLE L-9	2E-007	6E-007	9E-011
	Ingestion of Ground Water	TABLE L-7E	4E-002	1E-001	2E-006
	Dermal Contact to Ground Water	TABLE L-4E	9E-002	2E-001	5E-005
	Dermal Contact to Surface Water	TABLE L-4F	9E-002	4E-001	2E-005
	Ingestion of Sediment	TABLE L-7D	1E-003	9E-003	1E-007
	Dermal Contact to Sediment	TABLE L-4D	4E-005	2E-003	4E-008
	TOTAL RECEPTOR RISK (Nc & Car)		*2E-001*	*8E-001*	*7E-005*

TABLE 6-9B (Disposal Pit C)
CALCULATION OF TOTAL NONCARCINOGENIC AND CARCINOGENIC RISKS
CENTRAL TENDENCY (CT) - SEAD-12
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RECEPTOR	EXPOSURE ROUTE	EXPOSURE/RISK CALCULATIONS Table Number	HAZARD INDEX	CANCER RISK
CURRENT SITE WORKER	Inhalation of Dust in Ambient Air	TABLE L-2B	0E+000	0E+000
	Ingestion of Soil	TABLE L-7B	4E-004	7E-010
	Dermal Contact to Soil	TABLE L-4B	4E-008	1E-010
	TOTAL RECEPTOR RISK (Nc & Car)		*4E-004*	*9E-010*
FUTURE OUTDOOR PARK WORKER	Inhalation of Dust in Ambient Air	TABLE L-2B	0E+000	0E+000
	Ingestion of Soil	TABLE L-7B	6E-003	1E-008
	Dermal Contact to Soil	TABLE L-4B	6E-007	2E-009
	Ingestion of Ground Water	TABLE L-7E	2E-002	5E-007
	Dermal Contact to Surface Water	TABLE L-4F	1E-001	2E-006
	Dermal Contact to Sediment	TABLE L-4D	2E-004	2E-009
	TOTAL RECEPTOR RISK (Nc & Car)		*1E-001*	*2E-006*
FUTURE RECREATIONAL VISITOR (CHILD)	Inhalation of Dust Ambient Air	TABLE L-2B	0E+000	0E+000
	Ingestion of Soil	TABLE L-7B	2E-003	7E-010
	Dermal Contact to Soil	TABLE L-4B	3E-007	2E-010
	Inhalation of Ground Water	TABLE L-9	2E-008	7E-013
	Ingestion of Ground Water	TABLE L-7E	3E-003	1E-008
	Dermal Contact to Ground Water	TABLE L-4E	5E-003	2E-007
	Dermal Contact to Surface Water	TABLE L-4F	1E-001	2E-006
	Dermal Contact to Sediment	TABLE L-4D	5E-004	5E-009
	TOTAL RECEPTOR RISK (Nc & Car)		*1E-001*	*2E-006*
FUTURE CONSTRUCTION WORKER	Inhalation of Dust in Ambient Air	TABLE L-2B	3E-007	8E-012
	Ingestion of Soil	TABLE L-7B	1E-002	2E-008
	Dermal Contact to Soil	TABLE L-4B	8E-004	8E-009
	TOTAL RECEPTOR RISK (Nc & Car)		*1E-002*	*3E-008*

TABLE 6-9B (Disposal Pit C) (cont.)
CALCULATION OF TOTAL NONCARCINOGENIC AND CARCINOGENIC RISKS
CENTRAL TENDENCY (CT) - SEAD-12
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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 L-2B	0E+000	0E+000	0E+000
	Ingestion of Soil	TABLE L-7B	8E-003	8E-002	6E-008
	Dermal Contact to Soil	TABLE L-4B	8E-007	1E-005	1E-008
	Inhalation of Ground Water	TABLE L-9	2E-007	6E-007	9E-011
	Ingestion of Ground Water	TABLE L-7E	4E-002	1E-001	2E-006
	Dermal Contact to Ground Water	TABLE L-4E	9E-002	2E-001	5E-005
	Dermal Contact to Surface Water	TABLE L-4F	9E-002	4E-001	2E-005
	Ingestion of Sediment	TABLE L-7D	1E-003	9E-003	1E-007
	Dermal Contact to Sediment	TABLE L-4D	4E-005	2E-003	4E-008
	TOTAL RECEPTOR RISK (Nc & Car)		*2E-001*	*8E-001*	*7E-005*

TABLE 6-9C (Former Dry Waste Disposal Pit)
CALCULATION OF TOTAL NONCARCINOGENIC AND CARCINOGENIC RISKS
CENTRAL TENDENCY (CT) - SEAD-12
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RECEPTOR	EXPOSURE ROUTE	EXPOSURE/RISK CALCULATIONS Table Number	HAZARD INDEX	CANCER RISK
CURRENT SITE WORKER	Inhalation of Dust in Ambient Air	TABLE L-2C	4E-009	1E-013
	Ingestion of Soil	TABLE L-7C	4E-004	6E-010
	Dermal Contact to Soil	TABLE L-4C	1E-005	1E-010
	TOTAL RECEPTOR RISK (Nc & Car)		*4E-004*	*7E-010*
FUTURE OUTDOOR PARK WORKER	Inhalation of Dust in Ambient Air	TABLE L-2C	5E-008	1E-012
	Ingestion of Soil	TABLE L-7C	5E-003	9E-009
	Dermal Contact to Soil	TABLE L-4C	2E-004	2E-009
	Ingestion of Ground Water	TABLE L-7E	2E-002	5E-007
	Dermal Contact to Surface Water	TABLE L-4F	1E-001	2E-006
	Dermal Contact to Sediment	TABLE L-4D	2E-004	2E-009
	TOTAL RECEPTOR RISK (Nc & Car)		*1E-001*	*2E-006*
FUTURE RECREATIONAL VISITOR (CHILD)	Inhalation of Dust Ambient Air	TABLE L-2C	1E-008	5E-014
	Ingestion of Soil	TABLE L-7C	2E-003	6E-010
	Dermal Contact to Soil	TABLE L-4C	9E-005	1E-010
	Inhalation of Ground Water	TABLE L-9	2E-008	7E-013
	Ingestion of Ground Water	TABLE L-7E	3E-003	1E-008
	Dermal Contact to Ground Water	TABLE L-4E	5E-003	2E-007
	Dermal Contact to Surface Water	TABLE L-4F	1E-001	2E-006
	Dermal Contact to Sediment	TABLE L-4D	5E-004	5E-009
	TOTAL RECEPTOR RISK (Nc & Car)		*1E-001*	*2E-006*
FUTURE CONSTRUCTION WORKER	Inhalation of Dust in Ambient Air	TABLE L-2C	1E-006	3E-012
	Ingestion of Soil	TABLE L-7C	1E-002	6E-009
	Dermal Contact to Soil	TABLE L-4C	1E-003	2E-009
	TOTAL RECEPTOR RISK (Nc & Car)		*1E-002*	*8E-009*

TABLE 6-9C (Former Dry Waste Disposal Pit) (cont.)
CALCULATION OF TOTAL NONCARCINOGENIC AND CARCINOGENIC RISKS
CENTRAL TENDENCY (CT) - SEAD-12
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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 L-2C	2E-007	4E-007	9E-012
	Ingestion of Soil	TABLE L-7C	8E-003	8E-002	5E-008
	Dermal Contact to Soil	TABLE L-4C	2E-004	3E-003	1E-008
	Inhalation of Ground Water	TABLE L-9	2E-007	6E-007	9E-011
	Ingestion of Ground Water	TABLE L-7E	4E-002	1E-001	2E-006
	Dermal Contact to Ground Water	TABLE L-4E	9E-002	2E-001	5E-005
	Dermal Contact to Surface Water	TABLE L-4F	9E-002	4E-001	2E-005
	Ingestion of Sediment	TABLE L-7D	1E-003	9E-003	1E-007
	Dermal Contact to Sediment	TABLE L-4D	4E-005	2E-003	4E-008
	TOTAL RECEPTOR RISK (Nc & Car)		*2E-001*	*8E-001*	*7E-005*

TABLE 6-9D (Downgradient)
CALCULATION OF TOTAL NONCARCINOGENIC AND CARCINOGENIC RISKS
CENTRAL TENDENCY (CT) - SEAD-12
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RECEPTOR	EXPOSURE ROUTE	EXPOSURE/RISK CALCULATIONS Table Number	HAZARD INDEX	CANCER RISK
OFF-SITE WADER (CHILD)	Dermal Contact to Surface Water	TABLE L-4H	1E-003	5E-009
	Dermal Contact to Sediment	TABLE L-4G	1E-005	1E-008
	TOTAL RECEPTOR RISK (Nc & Car)		*1E-003*	*2E-008*

Table 6-10
Incremental Lifetime Cancer Risk from Individual Radionuclides and Media
Total Future Residential Risk[a] - Onsite
SEAD-12 Remedial Investigation
Seneca Army Depot Activity

Radionuclide	Surface Water	Groundwater	Sediment	Surface Soil		
				Disposal Pits A/B	Disposal Pit C	Dry Waste Disposal Pit
Ac-227				9.69E-08	2.08E-07	
Cs-137			7.95E-07			
H-3				4.92E-12	1.72E-08	8.01E-18
Pb-210					4.54E-06	
Ra-228					7.50E-08	
Rn-222	7.30E-15					
Th-227	6.79E-10					
Th-228		5.77E-07				
Th-230	2.22E-09					
Th-232	4.10E-10					
Th-234			2.09E-08			
Tl-208			2.90E-05			
U-234	1.93E-09					
U-238			3.54E-08			
Totals	5.24E-09	5.76953E-07	2.98518E-05	9.69E-08	4.83E-06	8.005E-18

Total Resident Risk at Disposal Pits A/B	**3.053E-05**
Total Resident Risk at Disposal Pit C	**3.527E-05**
Total Resident Risk at Dry Waste Disposal Pit	**3.043E-05**

a : Total residential risk includes risk for both child and adult resident

Table 6-11
Incremental Lifetime Cancer Risk from Individual Radionuclides and Media
Total Current Site Worker Risk - Onsite
SEAD-12 Remedial Investigation
Seneca Army Depot Activity
Calculated using RESRAD and Surface Soil ROPCs

Disposal Pits A/B				
Radionuclide	**Inhalation**	**Soil Ingestion**	**Ground Radiation**	**Radionuclide Risk**
Ac-227	2.13E-10	1.41E-10	5.21E-09	5.56E-09
H-3	8.27E-25	2.55E-28	0.00E+00	8.27E-25
			Site Total	**5.56E-09**
Disposal Pit C				
Radionuclide	**Inhalation**	**Soil Ingestion**	**Ground Radiation**	**Radionuclide Risk**
Ac-227	5.25E-10	2.88E-10	1.11E-08	1.19E-08
H-3	3.84E-17	4.86E-21	0.00E+00	3.84E-17
Pb-210	3.62E-10	6.39E-09	2.58E-11	6.78E-09
Ra-228	5.51E-11	1.54E-11	8.44E-09	8.51E-09
			Site Total	**2.72E-08**
Former Dry Waste Disposal Pit				
Radionuclide	**Inhalation**	**Soil Ingestion**	**Ground Radiation**	**Radionuclide Risk**
H-3	<1E-15	<1E-15	<1E-15	<1E-15
			Site Total	**<1E-15**

Table 6-12
Incremental Lifetime Cancer Risk from Individual Radionuclides and Media
Total Future Park Worker Risk - Onsite
SEAD-12 Remedial Investigation
Seneca Army Depot Activity

Radionuclide	Surface Water	Groundwater	Sediment	Surface Soil Disposal Pits A/B	Surface Soil Disposal Pits C	Surface Soil Dry Waste Disposal Pit
Ac-227				4.83E-08	1.03E-07	
Cs-137			2.65E-07			
H-3				6.92E-25	3.21E-17	0.00E+00
Pb-210					5.87E-08	
Ra-228					7.43E-08	
Rn-222	1.28E-15					
Th-227	9.10E-16					
Th-228		5.954E-08				
Th-230	1.48E-17					
Th-232	1.89E-18					
Th-234			6.90E-09			
Tl-208			1.52E-05			
U-234	7.34E-18					
U-238			1.18E-08			
Totals	2.21508E-15	5.954E-08	1.54791E-05	4.83E-08	2.36E-07	0.0000

Total Recreational User Risk at Disposal Pits A/B	**1.559E-05**
Total Recreational User Risk at Disposal Pit C	**1.577E-05**
Total Recreational User Risk at Former Dry Waste Disposal Pit	**1.554E-05**

Table 6-13
Incremental Lifetime Cancer Risk from Individual Radionuclides and Media
Total Future Construction Worker Risk - Onsite
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Seneca Army Depot Activity

Radionuclide	Surface Water	Groundwater	Sediment	Total Soil		
				Disposal Pits A/B	Disposal Pits C	Dry Waste Disposal Pit
Ac-227				1.96E-08	2.06E-08	2.29E-08
Cs-137			4.96E-08			
H-3				7.32E-10	7.18E-09	2.07E-10
Pb-210				5.24E-08	2.39E-07	
Ra-228					3.23E-08	
Rn-222	1.41E-16					
Th-227	1.05E-16					
Th-228				8.21E-07	9.81E-07	3.87E-07
Th-230	1.96363E-18					
Th-232	2.73108E-19					
Th-234			2.53E-09			
Tl-208			2.83E-06			
U-234	1.14104E-18					
U-238			2.56E-09			
Totals	2.49072E-16	0	2.89E-06	8.93E-07	1.28E-06	4.10E-07

Total Worker Risk at Disposal Pits A/B	**3.783E-06**
Total Worker Risk at Disposal Pit C	**4.170E-06**
Total Worker Risk at Dry Waste Disposal Pit	**3.300E-06**

Table 6-14

Incremental Lifetime Cancer Risk from Individual Radionuclides and Media

Total Future Recreational User (Child) Risk - Onsite

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Radionuclide	Surface Water	Groundwater	Sediment	Surface Soil		
				Disposal Pits A/B	Disposal Pits C	Dry Waste Disposal Pit
Ac-227				6.48E-09	1.40E-08	
Cs-137			2.06E-08			
H-3				8.65E-13	1.57E-09	8.14E-16
Pb-210					1.44E-08	
Ra-228					8.22E-08	
Rn-222	1.47E-16					
Th-227	9.78E-12					
Th-228		2.70E-09				
Th-230	3.19E-11					
Th-232	5.91E-12					
Th-234			5.46E-10			
Tl-208			1.18E-06			
U-234	2.78E-11					
U-238			9.20E-10			
Totals	7.54438E-11	2.7031E-09	1.20394E-06	6.48E-09	1.12E-07	8.139E-16

Total Recreational User Risk at Disposal Pits A/B	**1.213E-06**
Total Recreational User Risk at Disposal Pit C	**1.319E-06**
Total Recreational User Risk at Former Dry Waste Disposal Pit	**1.207E-06**

Table 6-15
Incremental Lifetime Cancer Risk from Individual Radionuclides and Media
Total Recreational User (Child) Risk - Downgradient
SEAD-12 Remedial Investigation
Seneca Army Depot Activity

Radionuclide	Surface Water	Groundwater	Sediment	Surface Soil		
				Disposal Pits A/B	Disposal Pits C	Dry Waste Disposal Pit
Ra-226	4.49E-10					
U-234	3.70E-10		2.40E-12			
U-238	1.02E-10		5.73E-09			
	9.21E-10	0	5.73E-09			
			Total Downgradient Risk	6.65E-09		

TABLE 6-16
Total Cancer Risk for Chemical and Radiological Pathways
SEAD-12 Remedial Investigation Report
Seneca Army Depot Activity

Potential Area of Concern	Risk Scenerio	Chemical Total Cancer Risk (1)	Radiological Total Cancer Risk	Chemical and Radiological Total Cancer Risk
Disposal Pits A/B	Current Site Worker	5.00E-08	5.56E-09	5.56E-08
	Future Outdoor Park Worker	2.00E-05	1.56E-05	3.56E-05
	Future Recreational Child	2.00E-05	1.21E-06	2.12E-05
	Future Construction Worker	1.00E-07	3.78E-06	3.88E-06
	Future Resident	7.00E-04	3.05E-05	7.31E-04
Disposal Pits C	Current Site Worker	2.00E-08	2.72E-08	4.72E-08
	Future Outdoor Park Worker	2.00E-05	1.58E-05	3.58E-05
	Future Recreational Child	2.00E-05	1.32E-06	2.13E-05
	Future Construction Worker	1.00E-07	4.17E-06	4.27E-06
	Future Resident	7.00E-04	3.61E-05	7.36E-04
Former Dry Waste Disposal Pit	Current Site Worker	2.00E-08	<1.00E-15	2.00E-08
	Future Outdoor Park Worker	2.00E-05	1.55E-05	3.55E-05
	Future Recreational Child	2.00E-05	1.21E-06	2.12E-05
	Future Construction Worker	4.00E-08	3.30E-06	3.34E-06
	Future Resident	7.00E-04	3.04E-05	7.30E-04
Downgradient	Off-Site Wader (Child)	6.00E-08	5.73E-09	6.57E-08

(1) Chemical RME. risk values were used because they are more conservative then the CT values.

Future Outdoor Park Worker

Six chemical exposure routes and seven radiological exposure routes were evaluated for the outdoor park worker. The total cancer risk from all chemical and radiological exposure routes is within the USEPA 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.

Future Construction Worker

Three chemical exposure routes and five radiological exposure routes were evaluated for the construction worker. The total cancer risk from all chemical and radiological exposure routes is below the USEPA 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.

Future Recreational Visitor (Child)

Eight chemical exposure routes and eight radiological exposure routes were evaluated for the child recreational visitor. The total cancer risk from all chemical and radiological exposure routes is within the USEPA 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.

Future Resident

Nine chemical exposure routes and nine radiological exposure routes were evaluated for the future resident. For the RME, the total cancer risk from all chemical exposure routes, 7×10^{-4}, exceeds the USEPA target range. From radiological exposure routes, the total cancer risk is 3.05×10^{-5}. For both the RME and CT, the total non-cancer hazard index from all chemical exposure routes is less than one for both the adult and child resident.

Dermal Contact with Groundwater and Surface Water are the exposure routes responsible for the calculated RME cancer risk. The chemical that drives this risk level is benzo(a)pyrene, cancer risk for dermal contact to groundwater $= 4 \times 10^{-4}$; cancer risk for dermal contact to surface water 2×10^{-4}.

The reader is cautioned that the cancer risk values attributed to benzo(a)pyrene due to dermal contact with water are highly uncertain and may grossly overestimate actual risks. In groundwater this compound was detected in two wells during the same sampling event and was not confirmed during the second round of groundwater sampling (i.e. results were non detect for this compound). In both cases, the reported concentration was a very low estimated value, lower than the quantitation limit for the samples. In surface water this compound was detected in one sample during the ESI study phase; the compound was not detected during the RI study phase. Therefore, it is highly unlikely that the compound is pervasive in either groundwater or surface water across SEAD-12, 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", EPA warns that its exposure assessment method for dermal contact with water during showering 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 was the case for benzo(a)pyrene in groundwater at SEAD-12. It should also be noted that the single detected benzo(a)pyrene concentrations were below the applicable New York drinking water standard. These and other related issues are discussed further in the Uncertainty Section (**Section 6.5.3**).

6.5.2.2 Disposal Pit C

Current Site Worker

Three chemical exposure routes three radiological exposure routes were evaluated for the site worker. The total cancer risk from all chemical and radiological exposure routes is below the USEPA 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.

Future Outdoor Park Worker

Six chemical exposure routes and seven radiological exposure routes were evaluated for the outdoor park worker. The total cancer risk from all chemical and radiological exposure routes is within the USEPA 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.

Future Construction Worker

Three chemical exposure routes five radiological exposure routes were evaluated for the construction worker. The total cancer risk from all chemical and radiological exposure routes is below the USEPA 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.

Future Recreational Visitor (Child)

Eight chemical exposure routes and eight radiological exposure routes were evaluated for the child recreational visitor. The total cancer risk from all chemical and radiological exposure routes is within the USEPA 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.

Future Resident

Nine chemical exposure routes nine radiological exposure routes were evaluated for the future resident. For the RME, the total cancer risk from all chemical exposure routes, 7×10^{-4}, exceeds the USEPA target range. From radiological exposure routes, the total cancer risk is 3.53×10^{-5}. For both the RME and CT, the total non-cancer hazard index from all chemical exposure routes is less than one for both the adult and child resident.

Cancer risk from chemical exposure is due to the presence of benzo(a)pyrene in two wells detected below the detection limit. The pathway causing the elevated risk is from dermal contact with groundwater. The uncertainty associated with this risk is discussed above under Future Resident in **Section 6.5.2.1** above and further in **Section 6.5.3**.

6.5.2.3 Former Dry Waste Disposal Pit

Current Site Worker

Three chemical exposure routes and three radiological exposure routes were evaluated for the site worker. The total cancer risk from all chemical and radiological exposure routes is below the USEPA 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.

Future Outdoor Park Worker

Six chemical exposure routes and seven radiological exposure routes were evaluated for the outdoor park worker. The total cancer risk from all chemical and radiological exposure routes is within the USEPA 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.

Future Construction Worker

Three chemical exposure routes and five radiological exposure routes were evaluated for the construction worker. The total cancer risk from all chemical and radiological exposure routes is below the USEPA 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.

Future Recreational Visitor (Child)

Eight chemical exposure routes eight radiological exposure routes were evaluated for the child recreational visitor. The total cancer risk from all chemical and radiological exposure routes is within the USEPA 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.

Future Resident

Nine chemical exposure routes and nine radiological exposure routes were evaluated for the future resident. For the RME, the total cancer risk from all chemical exposure routes, 7 x 10-3, exceeds the USEPA target range. From radiological exposure routes, the total cancer risk is 3.04 x 10^{-5}. For both the RME and CT, the total non-cancer hazard index from all chemical exposure routes is less than one for both the adult and child resident.

Cancer risk from chemical exposure is due to the presence of benzo(a)pyrene in two wells detected below the detection limit. The pathway causing the elevated risk is from dermal contact with groundwater. The uncertainty associated with this risk is discussed above under Future Resident in **Section 6.5.2.1** above and further in **Section 6.5.3**.

6.5.2.4 Off-Site Wader

Two chemical exposure routes and three radiological exposure routes were evaluated for the off-site wader. The total cancer risk from all chemical and radiological exposure routes is within the USEPA 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.

6.5.3 Uncertainty Assessment

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

6.5.3.1 Uncertainty in Data Collection and Evaluation

Uncertainties in the data collection/evaluation step of the risk assessment focus on determining whether enough samples were collected to adequately characterize the risk, and if sample analyses were conducted in a qualified manner to maximize the confidence in the results. Results of the sample analyses were used to develop a database that includes a complete list of the chemicals by media and their representative concentrations used in the risk assessment. The sampling and analysis 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 that 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.

6.5.3.2 Uncertainty in Exposure Assessment

There are inherent uncertainties in predicting future land uses and future chemical concentrations. Future land use scenarios were based on 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 **Tables 6-5A and B**, there are many factors that determine the level of exposure for each exposure pathway. These factors include inhalation rates, ingestion rates, exposure frequencies, exposure durations, body weight, etc. The values for these exposure factors must be selected by the risk assessor to represent each receptor. For the 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 that 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 that 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). EPA has cautioned that its recommended approach for calculating dermal exposures to organic chemicals in water may be overly conservative. USEPA 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. USEPA 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.

6.5.3.3 Uncertainty in Toxicity Assessment

Of the chemicals of potential concern, a number had no reference dose or slope factors. They are:

- Aroclor-1242
- Delta-BHC
- Endrine aldehyde
- Endrine ketone
- Calcium
- Magnesium
- Sodium
- 4-chlorophenyl phenyl ether

- Acenaphthylene
- Benzo(ghi)perylene
- Phenanthrene
- Lead
- Dibenzofuran
- Methyl butyl ketone

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 that extrapolates low dose effects from high dose animal studies. Because toxicity constants are generally based on the upper limit of the 95th-percentile confidence interval or incorporate safety factors to compensate for uncertainty, chemical-specific risks may be overestimated.

Toxicity information was not available for dermal exposure; hence, several assumptions had to be made which may tend to over- or underestimate risk. Oral toxicity values were used without adjustment to calculate risks from dermal exposure because the EPA 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. A default dermal absorption factor of 0.1 was used for semivolatile organic compounds, and therefore led to the uncertainty of risks associated with dermal exposure. Oral toxicity values were used to evaluate risks associated with dermal exposure by adjusting gastrointestinal absorption efficiency recommended by USEPA (1999e). EPA recommends a 100% gastrointestinal absorption efficiency value for chemicals not listed in Table 4.1 of the Dermal Risk Assessment Interim Guidance (USEPA, 1999e). This assumption may contribute to an underestimate of risks for compounds that are actually poorly absorbed. In addition, dermal contact with a chemical may also result in direct dermal toxicity, such as allergic contact dermatitis, urticarial reactions, chemical irritations, and skin cancer, which was not evaluated using the USEPA's recommended approach. Therefore, dermal risks evaluated in the report does not address potential dermal toxicity associated with direct contact.

6.5.3.4 Uncertainty in Risk Characterization

Uncertainties in the toxicity assessment are compounded under the assumption of dose additivity for multiple substance exposure. That assumption ignores possible 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.

6.5.3.5 Uncertainty Pertaining to Dermal Risks from PAHs in Water

As highlighted in the Risk Characterization section (**Section 6.5.2.1**), there is considerable uncertainty associated specifically with dermal exposures PAHs in groundwater and surface water at SEAD-12. Areas of uncertainty are discussed below:

1. Low frequency of detection. Benzo(a)pyrene was detected in just two of 89 groundwater samples and one of 52 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. Compound detected in one of two sampling rounds. Benzo(a)pyrene in groundwater was detected in just one of two sampling rounds from the same two set of wells. Therefore, its presence is unconfirmed in the second set of tests. Benzo(a)pyrene in surface water was detected in the first study phase, the ESI, but not in the second study, the RI.
3. Concentrations reported below the Sample Quantitation Limit (SQL). The detected results for benzo(a)pyrene in both groundwater and 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. EPA believes that its recommended model for estimating absorbed doses of organic compounds from dermal contact with water may overestimate true potential doses, with factors used here being even more conservative than recent guidance. This would tend to further discount the risk associated with dermal exposure to benzo(a)pyrene. (future risk assessment calculations will utilize the lower adherence factor values). 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.

6.5.3.6 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 **Tables 6-9A, B, C and D** for chemical exposure only. As described by USEPA, 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 USEPA 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 **Tables 6-8A, B, C, and D to 6-9A, B, C, and D** 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.

6.6 SUMMARY OF CHEMICAL AND RADIOLOGICAL HUMAN HEALTH RISK ASSESSMENT

The human health risk assessment was performed in accordance with the EPA's Risk Assessment Guidance for Superfund (USEPA, 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, a future resident (child and adult), and an off-site wader. Each of these scenarios, except the off-site wader, was considered for three potential release areas: Disposal Pits A/B, Disposal Pit C, and the Former Waste Disposal Pit. Overall, these three areas within were impacted to the greatest extent by former activities in the Former Weapons Storage Area (SEAD-12). Therefore, each of these areas was evaluated separately. Three sets of soil exposure point concentrations were derived for each of these areas in evaluating soil exposure pathways. For surface water, sediment, and groundwater, exposure point concentrations were derived from all site data and added to the risk generated from the area-specific soil risk. For the off-site wader, downgradient sediment and surface water data were used to generate exposure point concentrations for this scenario.

The results of the human health risk assessment show that only a future resident has the potential to be exposed to chemicals of concern at levels that are above those defined by the EPA.

Human health risks were calculated for following exposure scenarios:

1) current on-site worker;
2) future outdoor park worker
3) future on-site construction worker;
4) future recreational visitor;
5) future resident;
6) off-site wader.

Of these receptors, only the future resident for all three potential risk areas exhibits risks of cancer above the EPA target risk range. None of the receptors exhibits non-cancer health risk.

As shown in **Tables 6-8A, B, and C,** the RME excess cancer risk for the resident of 1 x 10-3 is due primarily to dermal contact with groundwater and surface water. Since the exposure point concentrations from groundwater and surface water were derived from all site data, then added to risks from other matrices for each of the three potential release areas, the resident considered for each of these areas is subjected to this excess cancer risk. The excess cancer risk is primarily due to the detection of benzo(a)pyrene in groundwater and surface water. 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 (chemical and radiological combined) and non-cancer health risks for all other receptors were within or below the EPA target levels: the current site worker, future outdoor park worker, future construction worker, future recreational visitor, and off-site wader.

The potential risks from exposure to lead in soil were not assessed since this metal was not elevated above background levels.

7.0 ECOLOGICAL RISK ASSESSMENT

An ecological risk assessment (ERA) was undertaken at SEAD-12 to evaluate whether hazardous substance release 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 M**.

7.1 INTRODUCTION

In addition to the evaluation of human health, potential risks posed by site contaminants to 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" (NYSDEC, 1994), and "The Role of Screening-Level Risk Assessments and Refining Contaminants of Concern in Baseline Ecological Risk Assessments" (USEPA, 2001).

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) (Step 3.2). Step 3.2, COC refinement, was performed in accordance with EPA's ERAGS (1997) and supplemental guidance of ERAGS (2001).

Upon completion of screening-level 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 the SLERA indicate which contaminants found at the site can be eliminated from further consideration and which should be evaluated further. 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, contaminants of potential concern (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-12 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 the September 1999 site surveys performed by Parsons ES ecologists. During the field survey, observations and assessments were concentrated on undeveloped upland areas, waterways, and wetlands within the study area. A qualitative biological survey 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. 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**.

The physical site description is provided in **Section 1** and **Section 3** with vegetative communities and habitat, and terrestrial cultural communities are described in detail is **Section 3.4**.

7.2.2 Identification of 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 locations are shown as **Figure 2-8** and **Figure 2-9,** with exceedences of NYSDEC screening criteria summarized in **Section 4.3.** Sediment sample locations exceeding screening values are provided as **Figure 4-4, Figure 4-5,** and **Figure 4-6** (**Section 4.5**). Surface water sample locations exceeding NYSDEC screening criteria are provided in **Figure 4-7** and **Figure 4-8** (**Section 4.4** and **Section 4.7**). 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., environmentally protective) generic values derived by various regulatory bodies.

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), surface water and sediment. Statistical summaries for all detected analytes are provided in Tables M.1 to M.16. Input parameters used in radiological screening are given in Table M.17. Comparisons of maximum detections to screening values are shown in Tables M.18 to M.35. COPCs are summarized in Tables M.36 to M.39, and are discussed below.

7.2.2.1 Identification of Radionuclide COPCs

Radionuclides may produce toxic effects as a result of their chemical properties as well as their radioactive properties. Radioactive emissions are considered to be responsible for most of the biologically deleterious effects that may be produced in exposed organisms as a result of radionuclide intake (ATSDR 1989). Ecological receptors also may be affected by radionuclides through direct exposure to external radiation. Therefore, both routes of exposure are considered in evaluating potentially toxic effects from radioactive constituents.

The toxic effects induced in an organism by the chemical properties of a constituent are characteristic of that specific substance. The adverse effects induced in an organism by radiation, on the other hand, are independent of the chemical toxicity of the radionuclide and are related to the amount of radiation absorbed by tissues and organs. While chemical properties affect the distribution and biological half-life of a radionuclide and influence the retention of the radionuclide within a target organ, the damage from a given type of radiation is independent of the source of that radiation (ATSDR 1992a).

Radiation occurs as a result of the spontaneous disintegration of the nucleus of certain isotopes of certain elements, which results in the emission of one or more characteristic types of radiation. The types of radiation most commonly produced are alpha particles, beta particles, and gamma rays.

The presence of radionuclides in environmental media can result in the two forms of potential radiation exposure discussed above: internal and external. The term, "exposure," when used with regard to radiation, refers to the physical interaction of radiation emitted by radionuclides with the cells and tissues of organisms. Internal exposures occur when radionuclides that have entered the body (e.g., such as through ingestion of contaminated soil) undergo radioactive decay, resulting in the deposition of energy to internal organs. External exposures occur when radiation enters the body directly from sources located outside the body (e.g., such as from radionuclides present in soil or water).

In general, external exposures result from radionuclides that emit gamma radiation, which readily penetrates skin and other body coverings. Alpha and beta radiation from external sources are far less penetrating and deposit their energy primarily on the skin's outer layer. Consequently, their contribution to the total dose of external radiation absorbed by an organism is negligible compared to that deposited by gamma rays (ATSDR 1992a). Therefore, in evaluating the receptors' exposure to external radiation from radionuclides in media of concern, only the gamma-emitting radionuclides in each medium are included.

As noted in **Section 6.1**, the three potential release areas evaluated for ecological risk are:

- Disposal Pit A/B,
- Disposal Pit C, and
- Former Dry Waste Disposal Pit.

Each of these areas were evaluated separately. As a conservative measure, the maximum detected concentration from mixed soils (0-4') was used for soil screening.

Because media-specific screening benchmarks have not been developed for radionuclides, the process used to identify COPCs is more complicated for these contaminants. External and internal dose estimates are calculated for representative receptors in each medium present. These dose estimates are then compared to chronic no observed effect chronic dose rates developed by The International Atomic Energy Agency (IAEA; 1992). The IAEA reports that irradiation at chronic dose rates of 0.1 rad per day and 1.0 rad per day or less do not appear likely to cause observable changes in terrestrial and aquatic animal populations, respectively. Therefore, for terrestrial receptor populations exposed to soil, the screening benchmark was set at 0.01 rad/d for individual radionuclides and 0.1 rad/d from all radionuclides. The benchmarks are set at one tenth of the recommended levels as a conservative measure to account for exposure to multiple radionuclides. For aquatic receptor populations exposed to surface water or sediment, the screening benchmark was 0.1 rad/d for individual radionuclides and 1 rad/d from all radionuclides.

7.2.2.1.1 Radionuclide Screening for Soil

The results of the soil screening are presented in **Tables M.20, M.21, M.24, M.25, M.28** and **M.29**. For all three areas, the total radionuclide dose is less than 0.1. Therefore, no soil radionuclide COPCs were identified in surface or mixed soils in any of the three areas.

Potential risk from external exposure to radionuclides in soil is evaluated by calculating external gamma dose rates for a small mid-level predator (i.e., a carnivore with small home ranges preying predominantly on biota with small home ranges e.g., earthworms). Small mammals are sensitive to radionuclides, have a high dietary intake relative to body weight, and feed on soil invertebrates exposed maximally to any soil contamination.

Radionuclide dose rates were compared to an external radiation toxicity benchmark of 0.01 rad/d. The soil external dose was calculated by multiplying the maximum concentration of each gamma-emitting radionuclide by the appropriate external dose conversion factor (DCF) using the following equation (NRC 1992).

$$D = Cs \times DCF \times CFa \times CFd \times 4$$

where:

D	=	dose (rem/d)
Cs	=	maximum radionuclide concentration in soil (pCi/g)
DCF	=	dose conversion factor (Sievert/d per Bq/m^3) (includes daughters)
Cfa	=	conversion factor for activity (5.92E+04 Bq/m^3 = 1 pCi/g)
Cfd	=	conversion factor for dose (100 rem/Sv)
4	=	adjustment factor for height above ground to account for burrowing behavior

The external DCF values obtained from NRC (1992) are based on exposures at a height of 1 m (3.28 ft). However, the dose rate from a large plane source of radiation declines as a function of height above the source. Consequently, for small animals, the calculated dose rates are multiplied by a factor of 4 to account for their greater proximity to the radiation source (soil) due to burrowing. If a large animal (e.g., deer) or non-burrowing animal is used, the dose estimate must be revised accordingly.

The quantity obtained from the above equation is the dose equivalent (H) of the radiation to which an organism may be exposed. The dose equivalent is equal to absorbed dose (D), measured in rads, multiplied by a quality factor to account for the relative biological effectiveness of a radiation type. Because the value of the quality factor for gamma rays is considered to be 1, H is essentially equal to D, and the calculated dose equivalent in rems is equal to the absorbed dose in rads. Consequently, the calculated value can be directly compared to the benchmark value of 0.01 rad/d.

Internal dose of radionuclides is calculated using the concentration of each radionuclide ingested by a small mammal receptor. The concentration in a small mammal relative to the concentration in soil and food materials is modeled using a simple food uptake model. The absorbed doses from alpha-, beta-, and gamma-emitting sources are considered. Intakes from plant, animal, and incidental soil ingestion are used to evaluate the absorbed dose in animals exposed to ingested radionuclides.

The ingested concentration, C, is used in the following subsections to evaluate the absorbed dose for α, β, and γ-emitters.

The internal α-radiation dose rate due to emission of α-particles at a constant rate can be evaluated as:

$$D = (CF) \times C \times (E_\alpha n_\alpha) \times (\Phi_\alpha)$$

where:

D	=	dose (rad/d) (includes daughters)
CF	=	conversion factor (1E-12 Ci/pCi * 3.7E+10 dis/sec per Ci * 1/62.4E+06 rad per MeV/g * 3600 sec/hr * 24 hr/d)
C	=	daily ingested concentration per gram body weight (pCi/g)
E_α	=	alpha energy of the radionuclide (MeV)
n_α	=	proportion of disintegrations producing an α-particle
Φ	=	absorbed fraction of energy E_α (dimensionless, assumed to be 1)

The absorbed fraction is equal to one, since essentially all the energy from α-particles is absorbed locally.

The internal β-radiation dose rate due to emission of β-particles at a constant rate can be evaluated as:

$$D = (CF) \times C \times (E_\beta n_\beta) \times (\Phi_\beta)$$

where:

D	=	dose (rad/d) (includes daughters)
CF	=	conversion factor (1E-12 Ci/pCi * 3.7E+10 dis/sec per Ci * 1/62.4E+06 rad per MeV/g * 3600 sec/hr * 24 hr/d)
C	=	daily ingested concentration per gram body weight (pCi/g)
E_β	=	beta energy of the radionuclide (MeV)
n_β	=	proportion of disintegrations producing a β-particle
Φ_β	=	absorbed fraction of energy E_β (dimensionless)

Gamma-dose equations are more complex than α- and β-dose equations because the emitted γ energy is absorbed at some distance from the source. However, if the source point of interest is within the source volume, it is possible to adapt the method and equation for β-dose to evaluate γ-dose by using the absorbed fraction, Φ, as a correction factor. The internal γ-radiation dose rate due to emission of γ-particles at a constant rate can be evaluated as:

$$D = (CF) \times C \times (E_\gamma n_\gamma) \times (\Phi_\gamma)$$

where:

D	=	dose (rad/d) (includes daughters)
CF	=	conversion factor (1E-12 Ci/pCi * 3.7E+10 dis/sec per Ci * 1/62.4E+06 rad per MeV/g * 3600 sec/hr * 24 hr/d)
C	=	daily ingested concentration per gram body weight (pCi/g)
E_γ	=	photon energy emitted during transition from a higher to a lower energy state (MeV)
n_γ	=	proportion of disintegrations producing a γ-particle
Φ_γ	=	absorbed fraction of energy E_γ (dimensionless)

The combined dose is the sum of external and internal doses:

$$D = (Cs \times DCF \times Cfa \times CFd \times 4) + [CF \times C \times (E_\alpha n_\alpha \times \Phi_\alpha) + (E_\beta n_\beta \times \Phi_\beta) + (E_\gamma n_\gamma \times \Phi_\gamma)]$$

As noted previously, the results of the soil screening are presented in **Tables M.20, M.21, M.24, M.25, M.28** and **M.29**. For all three areas, the total radionuclide dose is less than 0.1. Therefore, no soil radionuclide COPCs are identified in surface or mixed soils in any of the three areas.

7.2.2.1.2 Radionuclide Screening for Sediment

For sediment, the screening method for external dose from radionuclides is conducted using the method presented in Blaylock et al. (1993). The receptor is assumed to be a crayfish or other macroinvertebrate that spends all of its time at the sediment-water interface. Because the fraction of radiation absorbed is larger for crayfish than for smaller sediment dwelling animals, the resulting screen for radionuclides in sediments is conservative. The gamma-radiation dose for an animal the approximate size of a crayfish at the sediment-surface water interface is as follows:

$$D = ((2.88E\text{-}04) \times (E_\gamma\, n_\gamma) \times (1 - \Phi_\gamma) \times (Csed \times CF_1 \times CF_2) \times R) \times (CF_3)$$

where:

D	=	dose (rad/d) (includes daughters)
2.88E-04	=	constant from Blaylock et al. (1993)
E_γ	=	photon energy emitted during transition from a higher to a lower energy state (MeV)
n_γ	=	proportion of disintegrations producing a γ-ray
$1 - \Phi_\gamma$	=	absorbed fraction of energy E_γ (dimensionless)
Csed	=	maximum radionuclide concentration in sediment (pCi/g)
CF_1	=	conversion factor (1 pCi/g = 37 Bq/kg)
CF_2	=	conversion factor to convert sediment concentration from dry weight to wet weight (assume 0.75)
R	=	fraction of time organism spends at the sediment-water interface (assume 1.0)
CF_3	=	conversion factor (1 μGy/h = 2.4E-03 rad/d)

Values for $E_\gamma n_\gamma$ are obtained from Eckerman and Ryman (1993). Values of Φ_γ are obtained from Blaylock et al. (1993) or DOE (1998). No internal dose calculation is performed for this receptor.

The results of the sediment screening are presented in **Tables M.31** and **M.32**. The total radionuclide dose is less than 1. Therefore, no radionuclide COPCs were identified in sediments.

7.2.2.1.3 Radionuclide Screening for Surface Water

For surface water, external radionuclide screening is done using the method in Blaylock et al. (1993). Because the fraction of radiation energy absorbed (Φ) increases with the size of the receptor, small fish should be used to maximize the exposure parameter ($1-\Phi$), for external radiation without being overly conservative for external radiation and underestimating internal radiation. The external gamma-radiation dose for an animal the approximate size of a small fish that is surrounded by water is as follows:

$$D = ((5.76E\text{-}04) \times (E_\gamma n_\gamma) \times (1\text{-} \Phi_\gamma) \times (Cw \times CF_1)) \times (CF_2)$$

where:

D	=	dose (rad/d) (includes daughters)
5.76E-04	=	constant from Blaylock et al. (1993)
E_γ	=	photon energy emitted during transition from a higher to a lower energy state (MeV)
n_γ	=	proportion of disintegrations producing a γ-ray
1- Φ	=	absorbed fraction of energy E_γ (dimensionless)
Cw	=	maximum concentration in surface water (pCi/l)
CF_1	=	conversion factor (1 pCi/l = 3.7E-02 Bq/l)
CF_2	=	conversion factor (1 µGy/h = 2.4E-03 rad/d)

Values for $E_\gamma n_\gamma$ are obtained from Eckerman and Ryman (1993). Values of Φ_γ are obtained from Blaylock et al. (1993) or DOE (1998).

Screening for internal dose of radionuclides in surface water is also done using the methodology of Blaylock et al. (1993). Internal doses are calculated for alpha, beta, and gamma radiation and the total of the three for the detected radionuclides and their daughters.
Internal dose of alpha radiation is calculated as follows:

$$D = ((5.76E\text{-}04) \times (E_a\ n_a) \times (Cw \times BCF \times CF_1)) \times (CF_2)$$

where:

D	=	dose (rad/d) (includes daughters)
5.76E-04	=	constant from Blaylock et al. (1993)
E_a	=	alpha energy of the radionuclide (MeV)
n_a	=	proportion of disintegrations producing an a-particle
Cw	=	maximum radionuclide concentration in surface water (pCi/l)
BCF	=	bioconcentration factor (pCi/kg in organism per pCi/l in water) (values obtained from NRC 1992)
CF_1	=	conversion factor (1 pCi/l = 3.7E-02 Bq/l)
CF_2	=	conversion factor (1 µGy/h = 2.4E-03 rad/d)

Internal dose of beta radiation is calculated as follows:

$$D = ((5.76E\text{-}04) \times (E_{\beta}\ n_{\beta}) \times (\Phi_{\beta}) \times (Cw \times BCF \times CF_1)) \times (CF_2)$$

where:

D	=	dose (rad/d) (includes daughters)
5.76E-04	=	constant from Blaylock et al. (1993)
E_{β}	=	beta energy of the radionuclide (MeV)
n_{β}	=	proportion of disintegrations producing a ß-particle
Φ_{β}	=	absorbed fraction of energy E_{β} (dimensionless)
Cw	=	maximum radionuclide concentration in surface water (pCi/l)
BCF	=	bioconcentration factor (pCi/kg in organism per pCi/l in water) (values obtained from NRC 1992)
CF_1	=	conversion factor (1 pCi/l = 3.7E-02 Bq/l)
CF_2	=	conversion factor (1 µGy/h = 2.4E-03 rad/d)

Internal dose of gamma radiation is calculated as follows:

$$D = ((5.76E\text{-}04) \times (E_{\gamma}\ n_{\gamma}) \times (\Phi_{\gamma}) \times (Cw \times BCF \times CF_1)) \times (CF_2)$$

where:

D	=	dose (rad/d) (includes daughters)
5.76E-04	=	constant from Blaylock et al. (1993)
E_{γ}	=	photon energy emitted during transition from a higher to a lower energy state (MeV)
n_{γ}	=	proportion of disintegrations producing a γ-ray
Φ_{γ}	=	absorbed fraction of energy E_{γ} (dimensionless)
Cw	=	maximum radionuclide concentration in surface water (pCi/l)
BCF	=	bioconcentration factor (pCi/kg in organism per pCi/l in water) (values obtained from NRC 1992)
CF_1	=	conversion factor (1 pCi/l = 3.7E-02 Bq/l)
CF_2	=	conversion factor (1 µGy/h = 2.4E-03 rad/d)

The combined internal radiation dose is the sum of alpha, beta, and gamma doses:

$$D = 5.76E\text{-}04 \times (E_{\alpha}n_{\alpha} + E_{\beta}n_{\beta} \times \Phi_{\beta} + E_{\gamma}n_{\gamma} \times \Phi_{\gamma}) \times Cw \times BCF \times CF_1 \times CF_2$$

Values for $E_{\gamma}n_{\gamma}$, $E_{\beta}n_{\beta}$, and $E_a n_a$ are obtained from Eckerman and Ryman (1993). Values of Φ_{β} and Φ_{γ} are obtained from Blaylock et al. (1993) or DOE (1998).

The results of the surface water screening are presented in **Tables M.34** and **M.35**. The total radionuclide dose is less than 1. Therefore, no radionuclide COPCs were identified in surface water.

7.2.2.2 Identification of Nonradiolonuclide COPCs

7.2.2.2.1 Soil

Soil ecological COPCs were identified by comparing maximum detected concentrations to the ecological risk-based screening values. Sources of screening values referenced include:

- Oak Ridge National Laboratory soil criteria (Efroymson 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)

For the area designated as Disposal Pit A/B, screening values and COPCs identified for surface and mixed soils are provided on **Tables M.18** and **M.19**, respectively. Disposal Pit A/B COPCs are summarized in **Table M.36**.

Ecological COPCs for surface soil (0-1'bls) based on exceedance of screening criteria include:

- One PCB
- Four pesticides.
- Eleven metals

Additional surface soil contaminants identified as COPCs due to a lack of screening criteria included: two volatiles, five semivolatiles and eight PAHs.

Ecological COPCs for mixed soil in the area designated Disposal Pit A/B (0-4' bls, **Table M.19**) based on exceedence of screening criteria included:

- Two VOCs.
- Five PAHs
- Two semivolatiles
- Five pesticides.
- One PCB.
- Fourteen metals.

Additional mixed soil contaminants identified as COPCs due to a lack of screening criteria included: two volatiles, five semivolatiles and ten PAHs.

For the area designated as Disposal Pit C, screening values and COPCs identified for surface and mixed soils are provided on **Tables M.22** and **M.23**, respectively. Disposal Pit C COPCs are summarized in **Table M.37**.

Ecological COPCs for surface soil (0-1'bls) based on exceedance of screening criteria include:

- Three PAHs.
- Three pesticides.
- Nine metals

Additional surface soil contaminants identified as COPCs due to a lack of screening criteria included: one volatile, four semivolatiles and ten PAHs.

Ecological COPCs for mixed soil in the area designated Disposal Pit C (0-4' bls, **Table M.23**) based on exceedence of screening criteria included:

- One VOC.
- Four PAHs
- Three pesticides.
- Thirteen metals.

Additional mixed soil contaminants identified as COPCs due to a lack of screening criteria included: one volatile, five semivolatiles and ten PAHs.

For the area designated as Former Dry Waste Disposal Pit, screening values and COPCs identified for surface and mixed soils are provided on **Tables M.26** and **M.27**, respectively. Former Dry Waste Disposal Pit COPCs are summarized in **Table M.38**.

Ecological COPCs for surface soil (0-1'bls) based on exceedance of screening criteria include:

- One VOC.
- Two PCBs.
- One pesticide.
- Eleven metals.

Additional surface soil contaminants identified as COPCs due to a lack of screening criteria included: one volatile, three semivolatiles and eight PAHs.

Ecological COPCs for mixed soil in the area designated Former Dry Waste Disposal Pit (0-4' bls, **Table M.27**) based on exceedence of screening criteria included:

- One VOC.
- Two PCBs
- One pesticides.
- Eleven metals.

Additional mixed soil contaminants identified as COPCs due to a lack of screening criteria included: One volatile, three semivolatiles and eight PAHs.

7.2.2.2.2 Sediment

Sediment ecological COPCs were identified by comparing maximum detected concentrations to ecological risk-based screening criteria. (**Table M.30**) The criteria used were from the NYSDEC Technical Guidance for Screening Contaminated Sediments (NYSDEC, 1999) or from USEPA (USEPA, 1999f). Ecological COPCs for sediment based on exceedance of threshold effects level (TEL) screening value included:

- Eight PAHs
- One semivolatile.
- Five pesticides.
- Eleven metals.

In addition, two volatiles, two semivolatiles and eight metals were identified as COPCs due to a lack of screening criteria. Sediment COPCs are summarized on **Table M.39**.

7.2.2.2.3 Surface Water

Surface water ecological COPCs were identified by comparing maximum detected concentrations to ecological risk-based screening criteria. 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).

Ecological receptors are not directly exposed to groundwater. Therefore, groundwater pathways were considered incomplete and no COPCs are identified for groundwater. Ecological COPCs for surface water based on exceedance of screening values include:

- One semivolatile.
- One pesticide.
- Seven metals.

In addition, two pesticides and two metals were identified as COPCs due to a lack of screening criteria. Surface water COPCs are summarized on **Table M.39**.

A summary of the classes of compounds identified as chemicals of potential concern in each of the three media is provided as **Table 7-1.**

7.2.3 Preliminary Ecological Conceptual Site Model (CSM)

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-12 site. For this screening assessment, potential impacts to invertebrates were qualitatively evaluated by comparing maximum detected concentrations to screening benchmarks.

Amphibians also have the potential to be directly exposed to contaminants at the SEAD-12 site. Potential impacts to amphibians were qualitatively evaluated by comparing maximum detected concentrations of chemicals in surface water to screening benchmarks. Additionally, amphibians have the potential to be exposed to contaminants via the food chain. However, toxicity information via this exposure pathway is lacking; therefore, this exposure pathway could not be evaluated quantitatively.

TABLE 7-1
Chemical Classes Identified as Chemicals of Potential Concern
SEAD-12 Remedial Investigation
Seneca Army Depot Activity

Chemical Class	Soil			Surface Water	Sediment
	Area E	Area F	Area G		
Volatiles	X	X	X		X
Semi-volatiles	X	X	X	X	X
PAHs	X	X	X		X
Pesticides/PCBs	X	X	X	X	X
Metals	X	X	X	X	X

Small mammal populations likely to be present at SEAD-12 include mice, shrews, 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. 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-12.

An additional evaluation of surface 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 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-12.

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 data from other avian species were used for soil contaminants found at SEAD-12.

A raptor, at the top of the food web 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 is considered maximally exposed and 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-12.

Although little aquatic/wetland habitat is present at SEAD-12, the pond and ditch areas do represent habitat for several fish species and foraging area for piscivorous wetland birds. Fish may be exposed to surface water contaminants in the pond and ditch. 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 which was found at the site. Aquatic toxicity data are available for most surface water contaminants detected at SEAD-12. Additionally, fish may be exposed to contaminants via the food chain; however, as with amphibians, toxicity information via this exposure pathway is lacking. There are limited data available for concentrations of contaminants in fish tissue; therefore, bioconcentration in fish tissues via ingestion of contaminated prey was also evaluated by using largemouth bass as the receptor species since it is a top level aquatic predator.

Sediment invertebrates may be directly exposed to contaminants at the SEAD-12 site. For this screening assessment, potential impacts to invertebrates were qualitatively evaluated by comparing maximum detected concentrations to screening benchmarks.

In addition, higher trophic level wetland species like wading birds may be exposed directly to contaminants 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.

The preliminary CSM for evaluation of potential ecological risk at SEAD-12 is summarized in **Figure 7-1**. As shown in this figure, potentially complete exposure pathways for contaminants at the SEAD-12 site include: direct exposures for soil and sediment invertebrates, direct and food chain exposures to soil for birds and terrestrial mammals, direct exposures to surface water for amphibians, and direct and food chain exposures to surface water and sediment for fish and fish-eating birds.

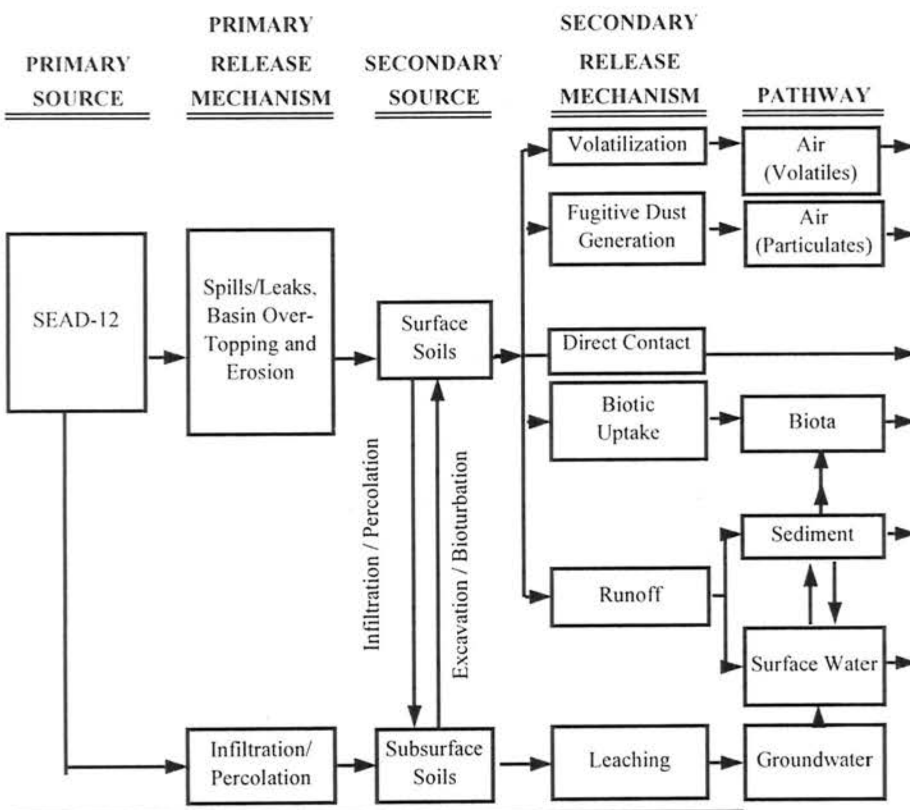
7.3 STEP 1B: SCREENING-LEVEL EFFECTS EVALUATION (TOXICITY)

Contaminants exceeding screening criteria were identified as COPCs. In addition, potential exposures to COPCs were also compared to adverse effect benchmarks. For invertebrates, these included soil and sediment screening benchmarks. For wildlife these included Toxicity Reference Values (TRVs) derived from studies reported in the literature. A comparison of maximum concentrations to invertebrate risk screening benchmarks and development of wildlife TRVs are discussed in the following subsections.

7.3.1 Invertebrate Risk Screening for Soil and Sediment COPCs

For soil COPCs, potential adverse impacts to soil invertebrates, and soil microorganisms and microbial processes were assessed by comparing maximum detected concentrations in soil samples to screening benchmarks (Will and Suter 1994). Screening benchmarks were available for metals, but not organic COPCs. Maximum detected contaminant concentrations in sediment were compared to sediment screening benchmarks (NYSDEC, 1999) to determine sediment COPCs.

FIGURE 7.1
CONCEPTUAL SITE MODEL FOR ECOLOGICAL RISK
SEAD-12
Seneca Army Depot, NY



EXPOSURE ROUTE[3]	Soil: Soil Inverts	Soil: Vole	Soil: Shrew	Soil: Dove	Soil: Hawk	Surface Water/Sediment: Sediment Inverts	Surface Water/Sediment: Bass	Surface Water/Sediment: Heron	Surface Water/Sediment: Amphibians
Inhalation	—	○	○	○	○	—	—	—	—
Inhalation	—	○	○	○	○	—	—	—	—
Ingestion	○	●	●	●	●	—	—	—	—
Contact	●	○	○	○	○	—	—	—	—
Ingestion	—	●	●	●	●	—	●	●	○
Ingestion	—	—	—	—	—	○	—	●	—
Contact	—	—	—	—	—	○	—	○	—
Ingestion	—	—	—	—	—	—	●	●	○
Contact	—	—	—	—	—	—	○	○	●

POTENTIAL ECOLOGICAL EXPOSURE PATHWAYS[1]

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.

7.3.2 Amphibian and Fish Risk Screening for Surface Water COPCs

For surface water COPCs, potential adverse impacts to amphibians were assessed by comparing maximum detected concentrations in surface water samples to known effect concentrations to develop HQs. Although amphibians may also be exposed to COPCs via the food chain, toxicity information is unavailable for amphibians via this pathway. Fish were evaluated for exposure via the food chain pathway by comparing estimated tissue concentrations of COPCs to COPC concentrations in fish tissue known to cause an adverse effect.

7.3.3 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 (1977), the lowest available, appropriate toxicity values were used with modifying factors to ensure a conservative (protective) screening-level evaluation.

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 LD50 (median lethal dose) in diet, or an LC50 (median lethal concentration).

The toxicity values selected from the literature were modified through the application of conversion factors to derive a TRV for each COPC. The TRVs represent NOAELs with conversion factors incorporated for toxicity information derived from studies other than chronic no-effects and lowest-effects studies. Two factors are used to convert other types of study results into TRV's comparable to NOAEL and LOAEL studies. The factors are 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.

Bird NOAEL and LOAEL TRVs and the data used to derive them including test organisms, effect dose, and study duration, are summarized in **Tables M.40** and **M.41**. Small mammal NOAEL and LOAEL TRVs and information used to derive them including test organisms, effect dose, and study duration, are summarized in **Tables M.42** and **M.43**. Fish TRVs and the information used to derive them including test organism, effect dose, and study duration, are summarized in **Table M.44**. Amphibian effect concentrations are summarized in **Table M.45**.

Numerous volatile organic contaminants were detected in soil and groundwater samples. For some of these, the maximum detects were above screening criteria, for others no screening criteria were available. Potential ecological risks associated with these volatile contaminants could not be evaluated due to a lack of toxicity values.

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 foodchain 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 quotients incorporate exposure factors (e.g., dietary soil intake and bioaccumulation factors). Soil to plant uptake factors, bioaccumulation factors and wildlife intake rates used to evaluate COPCs at SEAD-12 are provided in **Tables M.46** and **M.47**.

In order to quantify exposures of terrestrial wildlife receptors to each COPC in soil, a daily intake of each contaminant was calculated. Conversion of the environmental concentration of each COPC in 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 and from consumption of other organisms. The ERA did not attempt to measure potential risk from dermal and/or inhalation exposure pathways given the insignificance of these pathways relative to the major exposure pathways (e.g., ingestion) and due to the scarcity of data available for these pathways.

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 M.47**. Exposure calculations are provided on tables in **Appendix M**.

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 conservative 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. Since this is a screening level ecological risk assessment, conservative soil-to-plant uptake factors and bioaccumulation factors were used in order to estimate the maximum amount of a COPC within the food item. Soil-to-plant uptake factors and bioaccumulation factors are provided on **Table M.46**. All calculations and assumptions used to estimate daily intakes for soil and biota are provided on the exposure calculation tables.

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, ingestion of contaminated plant materials, 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 on **Table M.47**.

If surface water data were lacking for a chemical detected in sediment, partitioning coefficients (Koc) were used to estimate pore water concentrations for organic COPCs in sediment. For sediment metal COPCs, partitioning coefficients (Kd) were used to estimate pore water concentrations when surface water data were unavailable. The measured surface water concentrations or estimated pore water concentrations were used to estimate tissue concentrations in Trophic level 2. Bioaccumulation factors (BAFs) were estimated using BCFs and food chain multipliers (FCMs) to account for increasing concentrations at higher trophic levels (USEPA 1995a). In accordance with USEPA guidance and the DPD reference for screening level ERAs, conservative 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 on tables in **Tables M.99 and M.100**.

7.5 STEP 2B: SCREENING-LEVEL RISK CALCULATION

The risk calculation step uses the results of the wildlife exposure and toxicity effects assessments 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. Because conservative (protective) estimates of potential chronic exposures and toxicity are used, screening-level HQs tend to overestimate actual risks. Calculated HQs for mammal and bird receptors, for soil and sediment contamination, are reviewed below.

7.5.1 COPCs with NOAEL HQs Greater than One

For mammal and bird receptors, HQs were calculated for the no-effects endpoint (NOAEL) assuming a site utilization factor of 100%. A site utilization factor of 100% assumes the receptor is present at the site and does not forage or range beyond the boundaries of the site being evaluated. This is a very conservative assumption as most receptors will spend at least part of the time outside of the site boundaries, either by having a larger home range than the site area, seasonal migration patterns, and/or winter dormancy periods.

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 (**Table M.40**). 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 (**Table M.42**). TRVs based on reported NOAEL values for aquatic species were compared to estimated exposures for the largemouth bass (**Table M.44**) and amphibians (**Table M.45**). NOAEL HQs for soil, surface water, and sediment contaminants are discussed in the following subsections.

7.5.1.1 Soil COPCs

To evaluate potential ecological risks associated with soil contaminants at SEAD-12, assessment endpoints of no substantial adverse effects on survival, growth, and reproduction of resident mammal and bird populations were selected. TRVs based on reported NOAEL values for rodents were compared to estimated exposures for mammals (short-tailed shrew and meadow vole). TRVs based on reported NOAEL values for avian species were compared to estimated exposures for two avian species (red-tailed hawk and mourning dove). Additionally, maximum concentrations of chemicals in soil were compared to invertebrate benchmark values.

7.5.1.1.1 Soil COPCs - Disposal Pit A/B

Estimated exposures to surface and subsurface soil COPCs in the area designated Disposal Pit A/B for the vole, shrew, hawk, and dove are provided on **Tables M.48, M.49, M.52, M.53, M.56, M.57** and **M.60, M.61**, respectively. Calculated HQs for surface and subsurface soil COPCs vole, shrew, hawk, and dove are provided on **Tables M.50, M.51, M.54, M55, M.58, M.59** and **M.62, M.63**, respectively. The invertebrate risk screen for soils is provided in **Table M.64**.

Soil COPCs with concentrations that generated NOAEL HQs greater than one for birds and/or small mammals included Aroclor 1254, aluminum, cadmium, copper, iron, lead, manganese, nickel, selenium, silver, thallium, vanadium and zinc (see **Tables 7-2** and **7-3**).

Aroclor 1254 was the only organic compound in soil that had a NOAEL HQ that was greater than one for the shrew exposed to mixed and surface soil (Tables **Tables 7-2** and **7-3**). None of the other receptors had HQ greater than 1 for Aroclor 1254 or any other organic compound.

The NOAEL HQs for the metals that are greater than 1 for the shrew are shown in **Tables 7-2** and **7-3**. These included aluminum, cadmium, copper, iron, lead, manganese, nickel, selenium, silver, thallium, and zinc. The NOAEL HQ slightly exceeded one for the dove exposed to aluminum in surface soil and, additionally, slightly exceeded one for the dove exposed to chromium and lead in mixed soils. The vole had a NOAEL HQ greater than one for aluminum and iron in both surface and mixed soils. Calculated NOAEL HQs for the hawk were all below 1. For the invertebrate screen, aluminum, cadmium, chromium, copper, iron, manganese, vanadium, and zinc exceeded the respective benchmark values (**Table M.64**).

7.5.1.1.2 Soil COPCs – Disposal Pit C

Estimated exposures to surface and subsurface soil COPCs in the area designated Disposal Pit C for the vole, shrew, hawk, and dove are provided on **Tables M.65, M.66, M.69, M.70, M.73,** M.74 **and** M.77, M.78, **respectively. Calculated HQs for surface and subsurface soil COPCs vole, shrew, hawk, and dove are provided on** Tables M.67, M.68, M.71, M.72, M.75, M.76, **and** M.79, M.80**, respectively.**

Soil COPCs with concentration that generated NOAEL HQs greater than one for birds and/or small mammals included aluminum, copper, iron, lead, manganese, nickel, selenium, thallium, vanadium and zinc (see **Tables 7-4 and 7-5**). No organic COPCs had calculated HQs greater than 1.

The NOAEL HQs for the metals evaluated with HQs greater than 1 for the shrew are shown in **Tables 7-4 and 7-5**. These included aluminum, copper, iron, lead, manganese, nickel, selenium, thallium, vanadium and zinc. NOAEL HQs for the vole exceeded 1 for aluminum and iron in both surface and mixed soils. The NOAEL HQ exceeded one for the dove exposed to zinc in surface and mixed soils and slightly exceeded one for the dove exposed to aluminum in mixed soils only. There was also a slight exceedance of one for the hawk exposed to zinc in mixed soils. For the invertebrate screen aluminum, chromium, iron, vanadium and zinc exceeded the respective benchmark values (**Table M.81**).

TABLE 7-2

Summary of Ecological Hazard Quotients > 1 - Surface Soil

Group E - Disposal Pit A/B - SEAD-12

Seneca Army Depot, NY

Constituent	Herbivorous Mammal (Vole)				Omnivorous Mammal (Shrew)				Grainivorous Bird (Dove)				Carnivorous Bird (Hawk)				Retained as COC? [1] (Yes/No)	Further Evaluation? [2] (Yes/No)
	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		
PCBs																		
Aroclor 1254	0.0	0.0	0.0	0.0	22	3.0	2.2	0.3	0.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	No
Metals																		
Aluminum	9.9	6.9	1.0	0.7	74	52	7.4	5.2	1.2	0.8	0.1	0.1	0.0	0.0	0.0	0.0	No	No
Iron	1.3	1.0	1.3	1.0	28	22	28	22	--	--	--	--	--	--	--	--	Yes	No
Manganese	0.0	0.0	0.0	0.0	8.3	3.7	2.6	1.2	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	No
Nickel	0.0	0.0	0.0	0.0	50	30	25	15	0.5	0.3	0.4	0.2	0.4	0.3	0.3	0.2	Yes	No
Selenium	0.1	0.0	0.0	0.0	30	7.4	18	4.5	0.5	0.1	0.3	0.1	0.0	0.0	0.0	0.0	No	No
Thallium	0.0	0.0	0.0	0.0	2.9	1.4	0.3	0.1	0.2	0.1	0.2	0.1	0.0	0.0	0.0	0.0	No	No
Vanadium	0.2	0.1	0.0	0.0	57	45	5.7	4.5	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Yes	No
Zinc	0.0	0.0	0.0	0.0	2.6	1.9	1.3	0.9	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	Yes	No

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 - COCs retained after evaluation in Step 3.2 of ERA as presented in Section 7.6.

2 - Constituents requiring further evaluation based on risk management factors described in Section 7.7.

TABLE 7-3
Summary of Ecological Hazard Quotients > 1 - Mixed Soil
Group E - Disposal Pit A/B - SEAD-12
Seneca Army Depot, NY

Constituent	Herbivorous Mammal (Vole)				Omnivorous Mammal (Shrew)				Grainivorous Bird (Dove)				Carnivorous Bird (Hawk)				Retained as COC? [1] (Yes/No)	Further Evaluation? [2] (Yes/No)
	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		
PCBs																		
Aroclor 1254	0.1	0.0	0.0	0.0	100	6.6	10	0.7	0.9	0.1	0.1	0.0	0.0	0.0	0.0	0.0	No	No
Metals																		
Aluminum	9.9	6.8	1.0	0.7	74	51	7.4	5.1	1.2	0.8	0.1	0.1	0.0	0.0	0.0	0.0	No	No
Cadmium	0.1	0.0	0.0	0.0	2.2	0.1	0.2	0.0	0.9	0.1	0.1	0.0	0.0	0.0	0.0	0.0	No	No
Copper	0.0	0.0	0.0	0.0	5.4	0.7	2.7	0.4	0.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	No
Iron	1.3	1.0	1.3	1.0	28	22	28	22	--	--	--	--	--	--	--	--	Yes	No
Lead	0.1	0.0	0.0	0.0	48	3.9	4.8	0.4	3.9	0.3	0.4	0.0	0.0	0.0	0.0	0.0	Yes	No
Manganese	0.0	0.0	0.0	0.0	8.3	3.4	2.6	1.1	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	No
Nickel	0.0	0.0	0.0	0.0	53	32	27	16	0.5	0.3	0.4	0.2	0.5	0.3	0.3	0.2	Yes	No
Selenium	0.1	0.0	0.0	0.0	30	7.4	18	4.5	0.5	0.1	0.3	0.1	0.0	0.0	0.0	0.0	No	No
Silver	0.0	0.0	0.0	0.0	8.6	0.5	0.9	0.0	--	--	--	--	--	--	--	--	No	No
Thallium	0.0	0.0	0.0	0.0	2.9	1.2	0.3	0.1	0.2	0.1	0.2	0.1	0.0	0.0	0.0	0.0	No	No
Vanadium	0.2	0.1	0.0	0.0	57	44	5.7	4.4	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Yes	No
Zinc	0.0	0.0	0.0	0.0	8.9	2.3	4.4	1.1	0.5	0.1	0.1	0.0	0.2	0.0	0.0	0.0	Yes	No

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 - COCs retained after evaluation in Step 3.2 of ERA as presented in Section 7.6.
2 - Constituents requiring further evaluation based on risk management factors described in Section 7.7.

TABLE 7-4
Summary of Ecological Hazard Quotients > 1 - Surface Soil
Group F - Disposal Pit C - SEAD-12
Seneca Army Depot, NY

Constituent	Herbivorous Mammal (Vole)				Omnivorous Mammal (Shrew)				Grainivorous Bird (Dove)				Carnivorous Bird (Hawk)				Retained as COC? [1] (Yes/No)	Further Evaluation? [2] (Yes/No)
	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		
Metals																		
Aluminum	**8.8**	**6.6**	0.9	0.7	**66**	**49**	**6.6**	**4.9**	1.0	0.8	0.1	0.1	0.0	0.0	0.0	0.0	No	No
Iron	**1.2**	1.0	1.2	1.0	**27**	**22**	**27**	**22**	--	--	--	--	--	--	--	--	Yes	No
Manganese	0.0	0.0	0.0	0.0	**4.1**	**3.0**	**1.3**	**0.9**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	No
Nickel	0.0	0.0	0.0	0.0	**44**	**28**	**22**	**14**	0.4	0.3	0.3	0.2	0.4	0.2	0.3	0.2	Yes	No
Selenium	0.0	0.0	0.0	0.0	**16**	**8**	**9.6**	**4.8**	0.3	0.1	0.1	0.1	0.0	0.0	0.0	0.0	No	No
Thallium	0.0	0.0	0.0	0.0	**2.7**	**1.4**	0.3	0.1	0.2	0.1	0.2	0.1	0.0	0.0	0.0	0.0	No	No
Vanadium	0.2	0.1	0.0	0.0	**59**	**44**	**5.9**	**4.4**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Yes	No
Zinc	0.0	0.0	0.0	0.0	**20**	**3.2**	**10**	**1.6**	**1.2**	0.2	0.1	0.0	0.4	0.1	0.0	0.0	Yes	Yes

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 - COC's retained after evaluation in Step 3.2 of ERA as presented in Section 7.6.

2 - Constituents requiring further evaluation based on risk management factors described in Section 7.7.

TABLE 7-5
Summary of Ecological Hazard Quotients > 1 - Mixed Soil
Group F - Disposal Pit C - SEAD-12
Seneca Army Depot, NY

Constituent	Herbivorous Mammal (Vole)				Omnivorous Mammal (Shrew)				Grainivorous Bird (Dove)				Carnivorous Bird (Hawk)				Retained as COC? 1 (Yes/No)	Further Evaluation? 2 (Yes/No)
	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		
Metals																		
Aluminum	**12**	**6.6**	**1.2**	0.7	**87**	**50**	**8.7**	**5.0**	**1.4**	0.8	0.1	0.1	0.0	0.0	0.0	0.0	No	No
Copper	0.0	0.0	0.0	0.0	**1.9**	0.6	0.9	0.3	0.0	0.0	0.2	0.1	0.0	0.0	0.0	0.0	No	No
Iron	**2.4**	1.0	**2.4**	1.0	**53**	**23**	**53**	**23**	--	--	--	--	--	--	--	--	Yes	No
Lead	0.0	0.0	0.0	0.0	**12**	**2.7**	**1.2**	0.3	1.0	0.2	0.1	0.0	0.0	0.0	0.0	0.0	Yes	No
Manganese	0.0	0.0	0.0	0.0	**5.0**	**2.9**	**1.6**	0.9	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	No
Nickel	0.0	0.0	0.0	0.0	**57**	**31**	**28**	**16**	0.6	0.3	0.4	0.2	0.5	0.3	0.4	0.2	Yes	No
Selenium	0.0	0.0	0.0	0.0	**25**	**9.4**	**15**	**5.7**	0.4	0.2	0.2	0.1	0.0	0.0	0.0	0.0	No	No
Thallium	0.0	0.0	0.0	0.0	**2.7**	**1.2**	0.3	0.1	0.2	0.1	0.2	0.1	0.0	0.0	0.0	0.0	No	No
Vanadium	0.2	0.1	0.0	0.0	**87**	**45**	**8.7**	**4.5**	0.6	0.3	0.6	0.3	0.0	0.0	0.0	0.0	Yes	No
Zinc	0.0	0.0	0.0	0.0	**190**	**9.2**	**95**	**4.6**	**11**	0.6	**1.3**	0.1	**3.4**	0.2	0.4	0.0	Yes	Yes

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 - COCs retained after evaluation in Step 3.2 of ERA as presented in Section 7.6.

2 - Constituents requiring further evaluation based on risk management factors described in Section 7.7.

7.5.1.1.3 Soil COPCs - Former Dry Waste Disposal Pit

Estimated exposures to surface and subsurface soil COPCs in the area designated Former Dry Waste Disposal Pit for the vole, shrew, hawk, and dove are provided on **Tables M.82, M.83, M.86, M.87, M.90, M.91** and **M.94, M.95** respectively. Calculated HQs for surface and subsurface soil COPCs vole, shrew, hawk, and dove are provided on **Tables M.84, M.85, M.88, M.89, M.92, M.93,** and **M.96** and **M.97**, respectively.

Soil COPCs generating NOAEL HQs greater than one for birds and/or small mammals included aluminum, iron, manganese, nickel, thallium, vanadium and zinc (see **Tables 7-6** and **7-7**). No organic compounds had calculated HQs exceeding 1.

The NOAEL HQs for the metals evaluated with HQs greater than 1 for the shrew are shown in **Tables 7-6** and **7-7**. These included aluminum, iron, manganese, nickel, selenium, thallium, vanadium and zinc in surface and mixed soils. The NOAEL HQs for the vole exposed to aluminum and iron in surface and mixed soils slightly exceeded one. The NOAEL HQ for the dove exposed to aluminum in mixed soils also exceeded 1. Calculated NOAEL HQs for the hawk were all below 1. For the invertebrate screen aluminum, chromium, iron, manganese, vanadium and zinc exceeded the respective benchmark value (**Table M.98**).

7.5.1.2 Sediment COPCs

To evaluate potential ecological risks associated with sediment/surface water contaminants at SEAD-12, 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 on **Tables M.99** and **M.100.** Calculated HQs for sediment COPCs for the heron are provided on **Table M.101**.

Sediment/surface water COPCs generating NOAEL HQs greater than one for the fish eating bird receptor (great blue heron) include bis(2-ethylhexyl)phthalate, DDD, DDE, DDT, Aroclor 1254, aluminum, chromium, mercury, selenium and zinc (**Table 7-8**).

7.5.1.3 Surface Water COPCs

To evaluate potential ecological risks associated with direct exposure to surface water contaminants at SEAD-12, assessment endpoints of no substantial adverse effects on survival, growth, and reproduction of fish and amphibian populations were selected. TRVs based on NOAEL values were compared to estimated exposures for the largemouth bass. Calculated HQs for direct exposure to surface water COPCs for the bass are provided on **Table M.102** and for exposure via the food chain in **Table M.103**. Surface water COPCs generating NOAEL HQs

TABLE 7-6

Summary of Ecological Hazard Quotients > 1 - Surface Soil

Group G - Former Dry Waste Disposal Pit - SEAD-12

Seneca Army Depot, NY

Constituent	Herbivorous Mammal (Vole)				Omnivorous Mammal (Shrew)				Grainivorous Bird (Dove)				Carnivorous Bird (Hawk)				Retained as COC? [1] (Yes/No)	Further Evaluation? [2] (Yes/No)
	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		
Metals																		
Aluminum	**8.5**	**5.9**	0.9	0.6	**64**	**44**	**6.4**	**4.4**	1.0	0.7	0.1	0.1	0.0	0.0	0.0	0.0	No	No
Iron	**2.0**	1.0	**2.0**	1.0	**43**	**21**	**4.3**	**2.1**	--	--	--	--	--	--	--	--	Yes	No
Manganese	0.0	0.0	0.0	0.0	**4**	**3**	**1.1**	**0.8**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	No
Nickel	0.0	0.0	0.0	0.0	**38**	**27**	**19**	**14**	0.4	0.3	0.3	0.2	0.3	0.2	0.2	0.2	Yes	No
Selenium	0.0	0.0	0.0	0.0	**17**	**7**	**10**	**4.0**	0.3	0.1	0.1	0.1	0.0	0.0	0.0	0.0	No	No
Thallium	0.0	0.0	0.0	0.0	**4**	**1**	0.4	0.1	0.2	0.1	0.2	0.1	0.0	0.0	0.0	0.0	No	No
Vanadium	0.2	0.1	0.0	0.0	**55**	**40**	**5.5**	**4.0**	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	Yes	No
Zinc	0.0	0.0	0.0	0.0	**2.5**	**1.7**	**1.2**	0.8	0.2	0.1	0.0	0.0	0.0	0.0	0.0	0.0	Yes	No

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 - COCs retained after evaluation in Step 3.2 of ERA as presented in Section 7.6.

2 - Constituents requiring further evaluation based on risk management factors described in Section 7.7.

TABLE 7-7

Summary of Ecological Hazard Quotients > 1 - Mixed Soil
Group G - Former Dry Waste Disposal Pit - SEAD-12
Seneca Army Depot, NY

Constituent	Herbivorous Mammal (Vole)				Omnivorous Mammal (Shrew)				Grainivorous Bird (Dove)				Carnivorous Bird (Hawk)				Retained as COC? [1] (Yes/No)	Further Evaluation? [2] (Yes/No)
	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		
Metals																		
Aluminum	**9.1**	**5.6**	0.9	0.6	**68**	**42**	**6.8**	**4.2**	**1.1**	0.7	0.1	0.1	0.0	0.0	0.0	0.0	No	No
Iron	**2.0**	0.9	**2.0**	0.9	**43**	**20**	**4.3**	**2.0**	--	--	--	--	--	--	--	--	Yes	No
Manganese	0.0	0.0	0.0	0.0	**3.5**	**2.4**	**1.1**	0.8	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	No	No
Nickel	0.0	0.0	0.0	0.0	**40**	**28**	**20**	**14**	0.4	0.3	0.3	0.2	0.3	0.2	0.3	0.2	Yes	No
Selenium	0.0	0.0	0.0	0.0	**17**	**6.1**	**10**	**3.7**	0.3	0.1	0.1	0.0	0.0	0.0	0.0	0.0	No	No
Thallium	0.0	0.0	0.0	0.0	**3.5**	**1.2**	0.4	0.1	0.2	0.1	0.2	0.1	0.0	0.0	0.0	0.0	No	No
Vanadium	0.2	0.1	0.0	0.0	**57**	**39**	**5.7**	**3.9**	0.4	0.3	0.4	0.3	0.0	0.0	0.0	0.0	Yes	No
Zinc	0.0	0.0	0.0	0.0	**2.5**	**1.6**	**1.2**	0.8	0.2	0.1	0.2	0.1	0.0	0.0	0.0	0.0	Yes	No

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 - COCs retained after evaluation in Step 3.2 of ERA as presented in Section 7.6.

2 - Constituents requiring further evaluation based on risk management factors described in Section 7.7.

TABLE 7-8
Summary of Ecological Hazard Quotients > 1 - Sediment and Surface Water
SEAD 12
Seneca Army Depot, NY

Constituent	Great Blue Heron				Largemouth Bass		Amphibians		Retained as COC? [1]	Further Evaluation? [2]
	NOAEL Max Hazard Quotient	NOAEL Mean Hazard Quotient	LOAEL Max Hazard Quotient	LOAEL Mean Hazard Quotient	Max Hazard Quotient	Mean Hazard Quotient	Max Hazard Quotient	Mean Hazard Quotient	(Yes/No)	(Yes/No)
Semi-Volatiles										
Bis(2-Ethylhexyl)phthalate	**1.8**	0.2	0	0.0	0.0	0.0	--	--	No	No
Pesticides										
4-4'-DDD	**93**	**7.4**	**9.3**	0.7	na	na	na	na	No	No
4,4'-DDE	**5.9**	**8.1**	0.6	0.8	na	na	na	na	No	No
4,4'-DDT	**180**	**27**	**18**	**2.7**	na	na	na	na	No	No
Arochlor-1254	**7.5**	0.2	0.8	0.0	na	na	na	na	No	No
Metals										
Aluminum	**5.8**	**1.6**	1	0.2	**3.1**	0.3	**69**	**5.6**	Yes	No
Chromium	**1.7**	0.3	0.3	0.1	na	na	na	na	No	No
Iron	--	--	--	--	**4.6**	0.3	--	--	No	No
Selenium	**4.9**	**1.3**	**2.5**	0.7	na	na	na	na	No	No
Zinc	**3.6**	0.5	0.4	0.1	na	na	na	na	No	No

"--" = Can not be calculated due to lack of toxicity data.

na = Not detected in this media.

1 - COCs retained after evaluation in Step 3.2 of ERA as presented in Section 7.6.

2 - Constituents requiring further evaluation based on risk management factors described in Section 7.7.

greater than one for direct exposure for the fish receptor include aluminum and iron. Surface water COPCs generating NOAEL HQs greater than 1 for the food chain exposure pathway for fish include heptachlor, aluminum and mercury.

To evaluate potential ecological risks associated with exposure to surface water by amphibians, HQs were calculated by comparing mean and maximum exposure concentrations with effects levels (**Table M.104**). The only surface water COPC with a concentration above background that generated an HQ greater than one was aluminum (**Table 7-8**). Although estimated exposures to amphibians through the food chain were calculated (**Table M.105**), comparative dose or tissue concentrations are unavailable for amphibians; therefore, HQs could not be generated.

7.5.2 Uncertainties for ERA Steps 1 and 2

Risk associated with intake of contaminants through the food chain was addressed by modeling food chain transfer of chemical residues through plants and prey items. Since conservative assumptions were used to select intake rates, bioaccumulation factors and site utilization factors, the estimated risk to the receptors is generally overestimated. Conservative assumptions were utilized in accordance with agency guidance and since no site-specific data are available.

Estimated pore water concentrations were used to represent surface water concentrations when these were not available. Considerable uncertainty is inherent in the factors used for the estimation of exposure to sediment COPCs, especially for metals. Since estimated pore water concentrations are generally larger than measured surface water concentrations for the metals, this method tends to overestimate risks from sediment.

There is uncertainty associated with the TRVs used for this ERA because the majority of the toxicity data are not specific to receptors at this site. To account for this uncertainty, the TRVs were modified using conservative conversion factors which also tend to overestimate risk. For many COPCs, especially metals, the form of the compound has a direct affect on its toxicity. For this screening ERA, the most toxic form of the COPC was utilized to derive the TRV. NOAELs or estimated NOAELs were always utilized as the TRV for the screening level ERA. However, LOAELs may be better for estimating risk since LOAELs are the lowest concentrations at which a receptor demonstrates adverse effects. Thus, HQs can be generated utilizing LOAELs in lieu of NOAELs to represent the concentration at which receptors start showing effects due to exposure to the COPCs.

Metals in environmental media, particularly solid matrices, are frequently bound to particles or complexed with other elements, making them less available to biological organisms. Metals such as lead can react with anions in water, such as hydroxides, carbonates, sulfates, and phosphates that have low water solubilities and will precipitate out of the water column, or occur as sorbed ions or surface coatings on sediment mineral particles (ATSDR, 1997a). Zinc is capable of forming complexes with a variety of organic and inorganic complexing groups. Sorption is the dominant reaction of zinc, resulting in the enrichment of zinc in suspended and bed sediments (ATSDR, 1997c). These complexes would limit the bioavailability of chemicals of potential ecological concern to receptors. Extraction and analysis of total metals in sediment samples does not differentiate between the bioavailable and non-bioavailable fraction (complexed with other compounds present in bulk sediment samples) of metals in sediment. This would result in an overestimation of hazard for the ecological receptors exposed to metals in sediment.

Exposure from dermal contact and inhalation of contaminants are 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 are likely to be minimal relative to intakes from ingestion.

HQs could not be calculated for all chemicals identified as COPCs due to a lack of availability of one or more variables needed to perform the calculations. The inability to perform these calculations could result in an underestimation of risks at this site; however, the number of these compounds is limited to only a few and for only a few of the receptors. The HQs calculated from conservative TRVs, maximum detection exposure concentrations and 100% site utilization factor 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.

Biota uptake is a major exposure pathway evaluated in the SLERA. The USEPA recommended food chain models have been used in the analysis. However, no biota sampling has been conducted to validate the model. If a further evaluation, i.e., a baseline ecological risk assessment, is warranted, a biota sampling would provide site-specific information and improve the understanding of the ecological impacts to the site habitat.

7.6 FURTHER REFINEMENT OF CONTAMINANTS OF CONCERN

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

Alternative toxicity values and mean exposures based on mean concentrations were considered for determining potential contaminants of concern (COCs). Utilizing the mean concentration instead of the maximum concentration presents a more realistic approach to how a receptor may come into contact with a COPC. The receptor is likely to range over the entire site and not be continuously exposed to the maximum concentration at all times. Thus, the mean is more representative of the actual exposure concentration for a receptor to contact on a continual basis. This additional risk characterization performed as part of the ERA Step 3 is discussed in Sections 7.6.2 through 7.6.3 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

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

Relative Bioavailability

Although the relative bioavailability of contaminants at the site was assumed to be 100 percent for the SLERA, contaminants in environmental media are generally less available to biological organisms compared with the same contaminants in the experimental medium (i.e., diet, water, etc.). For example, most of the soil COPCs identified in the initial screening level ERA is metals. The following factors should be considered in the refinement of metal COCs:

- Metals in soil are frequently bound to particles or complexed with other elements, making them less available to biological organisms. These tendencies would tend to limit the bioavailability of metal to ecological receptors.
- Metal toxicity is generally associated with the soluble fraction.
- Soluble metal and not total metal is associated with the uptake and bioaccumulation of metal from soil into plants.
- The oral toxicity of metal compounds in soil is dependant upon the chemical form. Insoluble compounds are considerably less toxic compared to the soluble forms. The soil pH observed at the site (7 to 8) favors formation of insoluble fractions.
- Although bioaccumulation has been observed for some metals (e.g., Cd, Pb, etc.), biomagnification is not reported for these metals.

Extensive scientific data now exist to support the concepts that the longer the chemicals remain in soil, (1) the less readily they are removed by solvents, including water, (2) the less available they become to microorganisms, (3) the less toxic they become to organisms such as earthworms, and (4) the less they are ingested by organisms such as earthworms. This reduction in availability of the chemicals reduces the risk associated with their presence in the soil (GRI, 1997, as cited in Nakles et al., 2002). For example, the toxicity of DDT declined by 25~80% for animals (including fruit flies, houseflies, and cockroaches) after 90 days of aging (Nakles, et al., 2002). Although the data in this example are specifically for DDT, an organic compound, the above concept (i.e., reduced relative bioavailability by aging) is applicable not only to organic compounds, but also to metals.

Although there are some interaction effects between certain metals (for example, lead may enhance cadmium absorption; ATSDR, 2001), the overall conservative assumptions (100% bioavailability) tend to overestimate the risks.

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

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 the impacted area of SEAD-12 is at most 4 acres (based on an estimation of the area corresponding to cleanup goals that would restore the site to the pre-disposal conditions), the foraging factor for the hawk would be less than 1%.

NOAEL/LOAEL Multiplier

A NOAEL is preferred to a LOAEL as a screening ecotoxicity value to ensure that risk is not underestimated (USEPA, 1997a). 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 ERAGS that is used to support the use of 0.1 as the NOAEL/LOAEL multiplier indicates that 96% of chemicals included in the review had a NOAEL/LOAEL multiplier no less than 0.2. Therefore, using a default NOAEL/LOAEL multiplier of 0.1 may result in an overestimation of the HQs.

7.6.2 Identification of Soil COCs

This section presents further evaluation of the soil COPCs identified in the initial screening level ERA. Upon the refinement described in this section, soil COCs identified for the ecological receptors at Disposal Pit A/B include: iron, lead, nickel, vanadium, and zinc. COCs identified for the ecological receptors in soils at the Former Dry Waste Disposal Pit include: iron, nickel, vanadium and zinc. For the designated Disposal Pit C area, the results suggested a potential for adverse ecological effects due to the presence of iron, lead, nickel, vanadium, and zinc.

7.6.2.1 Disposal Pit A/B

Based on the calculated risk estimates for the initial screening level ERA, several metals had HQs exceeding 1: aluminum, cadmium, copper, iron, lead, manganese, nickel, selenium, silver, thallium, vanadium, and zinc as well as one organic COPC, Aroclor-1254 (see **Tables 7-2 and 7-3**). Further evaluation presented in this section resulted in five COCs: iron, lead, nickel, vanadium, and zinc. The rationale for excluding aluminum, cadmium, copper, manganese, selenium, silver, and thallium, and Aroclor-1254 as COCs is discussed below.

Aluminum

EPA recommends that aluminum be considered as a COPC only at sites where the soil pH is less than 5.5 (USEPA, 2000a). The basis for this is as follows:

- Total aluminum in soil is not correlated with toxicity to the tested plants and soil invertebrates.
- Aluminum toxicity is associated with soluble aluminum.
- Soluble aluminum and not total aluminum is associated with the uptake and bioaccumulation of aluminum from soil into plants.
- The oral toxicity of aluminum compounds in soil is dependant upon the chemical form. Insoluble aluminum compounds such as aluminum oxides are considerably less toxic compared to the soluble forms.

The soil pH of the Seneca Army Depot Activity Site is generally between 7 and 8 (Soil pH for SEADs 38, 39, & 40 were presented in Parsons, 2001 report). Consequently, aluminum was not retained as a COC.

Cadmium

For cadmium, only the NOAEL HQ associated with the maximum cadmium concentration for the shrew in mixed soils was slightly above 1 (2.2). The alternative HQ based on the 2nd highest concentration of cadmium in mixed soils for the shrew was less than 1. The alternative HQ based on the mean concentration of cadmium in mixed soils for the shrew was 0.1. All HQs calculated for the other receptors were below 1. In addition, cadmium was detected only in 10 out of 28 samples. Although cadmium bioaccumulation has been reported for all levels of the food chain, biomagnification is not expected (ATSDR, 2001). Based upon the above discussion, cadmium is not expected to have any significant impacts on small mammals or higher trophic level species at this site and was not identified as a COC.

Copper

Copper is an essential element that is required by a wide variety of organisms. Nutrient requirements vary among species, but within the plant kingdom they typically range from 5 to 30 ppm in soil. Dietary requirements for birds and mammals are typically less than 10 ppm (USEPA, 2000a). The mean copper concentration at the site (in mixed soils) is 29 ppm, which is within the range of nutrient requirement for plants. Only the NOAEL HQ and LOAEL HQ associated with the maximum copper concentration for the shrew in mixed soils were above 1 (5.4 and 2.7, respectively for NOAEL HQ and LOAEL HQ). Out of a total of 28 samples, only 4 samples collected from 3 locations (two samples were collected from the same location at different depths) exhibited a NOAEL HQ greater than 1 for the shrew. The NOAEL HQ based on the mean concentration was below 1 at 0.7. There were no HQs for other receptors that exceeded one. Therefore, copper is not expected to have any significant impacts on small mammalian insectivores or other species at this site and was not identified as a COC.

Manganese

Another identified COPC with HQs exceeding 1 in both surface and mixed soils was manganese. In humans and animals, manganese is an essential nutrient that plays a role in bone mineralization, protein and energy metabolism, metabolic regulation, cellular protection from damaging free radical species, and the formation of glycosaminoglycans (ATSDR, 2001). Manganese requirements in the diet for livestock, poultry and other animals range from 3 ppm to 95 ppm (Salt Institute, 2001). The mean manganese concentration is approximately 6 times greater than the upper bound value for the diet requirement. The shrew was the only receptor that had an HQ exceeding 1 for manganese. The LOAEL HQs associated with the mean concentrations were slightly greater than 1 (1.2 and 1.1, respectively for surface soils and mixed soils). The NOAEL HQs associated with the mean concentrations were less than 5. Biomagnification of manganese is not reported. Based on the above discussion, manganese is not expected to present a significant risk to mammalian insectivores and was not considered a COC.

Selenium

Selenium had NOAEL HQs exceeding 1 for the shrew, but no other receptors. The majority of the risk associated with selenium is due to the ingestion of contaminated food. When evaluating the shrew's exposure via the food chain, a soil-to-plant uptake factor of 6.2 and a BAF of 5 were used as conservative parameters in the exposure uptake calculations. USEPA in their *"Screening Level ERA Protocol for Hazardous Waste Combustion Facilities"* (USEPA, 1999f) used a soil-to-plant uptake factor of 0.016 and a soil-to-soil invertebrate factor of 0.22 for selenium, which are based on a consideration of several experimental studies. If these factors are used as more realistic factors for food chain modeling, the risk to the shrew as a result of exposure to selenium is minimal (see the following table). Therefore, selenium was not considered to be a COC.

		NOAEL Max HQ	NOAEL Mean HQ	LOAEL Max HQ	LOAEL Mean HQ
SLERA HQs for Selenium	Surface/Mixed Soil	**30**	**7.4**	**18**	**4.5**
Alternate HQs for Selenium	Surface/Mixed Soil	**1.3**	0.32	0.78	0.19

Note: SLERA HQs are from Tables 7-2 and 7-3, alternate HQs are from Table M.107.

Silver

For silver, only one HQ had a calculated value above 1 (i.e. NOAEL Max HQ = 8.6 for the shrew). The mean LOAEL HQ for the shrew for silver was 0.5 and silver also had a relatively low frequency of detection (2/23) and was therefore not considered a COC.

Thallium

For thallium, HQs exceeded 1 only for the shrew. The NOAEL HQs associated with the mean thallium concentrations only slightly exceeded 1 (1.4 and 1.2, respectively for surface soils and mixed soils). The LOAEL HQs for the shrew were all below 1. In addition, as discussed in Section 7.6.1, the metal bioavailability is expected to be low according to the observed pH condition at the site. Therefore, thallium is not expected to have significant adverse effects on the ecological receptors at the site and was not identified as a COC.

Aroclor 1254

Aroclor 1254 was the only organic compound to have a calculated HQ above 1, and that was only for one receptor: the shrew. The NOAEL max HQ for Aroclor 1254 in mixed soils was 100 and the NOAEL mean for mixed soils for the shrew was 6.6. As with selenium, the majority of the predicted risk for Aroclor 1254 for the shrew is via ingestion of contaminated prey. Thus, additional sources for soil-to-plant uptake and soil-to-soil invertebrate bioaccumulation factors were consulted; however, there is limited information available for soil-to-plant uptake and no other factors applicable to the site could be found. For a soil-to-soil invertebrate bioaccumulation factor, 4.5 were used for the initial screening level risk assessment; however, USEPA (USEPA, 1999f) recommends a BAF of 1.3 for this pathway. A NOAEL mean HQ of 0.88 and a LOAEL mean of 0.09 were calculated using a BAF of 1.3 for exposure to surface soils (see the following table). For mixed soils, the alternative BAF resulted in a LOAEL mean HQ lower than 1 (0.19) and a NOAEL mean HQ slightly exceeding 1 (1.9). The TRV for Aroclor 1254 that was used to calculate these HQs is based on a LOAEL for an old field mouse where Aroclor 1254 was fed to the test animals for 12 months and reproductive effects were noted. The NOAEL was developed by applying an uncertainty factor of 10 to this LOAEL. As discussed above, all HQs associated with the mean concentrations were below 1 except that the NOAEL HQ slightly exceeded 1. Short-tailed shrews usually inhabit in the top 10 cm (0.3') of soil while sometimes as deep as 50 cm (1.6'; USEPA, 1993e). Therefore, the short-tailed shrew is expected to be exposed to surface soils (0-1') rather than mixed soils. Based on the above discussion and the fact that Aroclor 1254 did not show significant risk to any other receptors, Aroclor 1254 was not considered a COC for this site.

		NOAEL Max HQ	NOAEL Mean HQ	LOAEL Max HQ	LOAEL Mean HQ
SLERA HQs for Aroclor 1254	Surface Soils	**22**	**3.0**	**2.2**	0.3
	Mixed Soils	**100**	**6.6**	**10**	0.7
Alternate HQs for Aroclor 1254	Surface Soils	**6.4**	0.88	0.64	0.09
	Mixed Soils	**29**	**1.9**	**2.9**	0.19

Note: SLERA HQs are from Tables 7-2 and 7-3, alternate HQs are from Table M.109.

Based upon the above discussions and the factors (e.g., limited bioavailability) presented in Section 7.6.1, iron, lead, nickel, vanadium, and zinc were identified as COCs for Disposal Pit A/B surface soils and mixed soils due to their elevated HQs for the vole and/or the shrew.

7.6.2.2 Disposal Pit C

Based on the calculated risk estimates in Step 2, several metals had HQs exceeding 1 for the ecological receptors evaluated: aluminum, copper, iron, lead, manganese, nickel, selenium, thallium, vanadium and zinc (see **Tables 7-4 and 7-5**). After a potential toxicity evaluation, iron, lead, nickel, vanadium, and zinc were the only metals identified as COCs. The rationale for excluding the other metals (aluminum, copper, manganese, selenium, and thallium) as COCs is discussed below.

As with soils in Disposal Pit A/B, the majority of risk to the shrew is the result of exposure via contaminated food items. If soil-to-plant uptake and bioaccumulation factors are changed to those specified in USEPA, 1999, HQs to the shrew are below 1 with the exception that the NOAEL HQ associated with the maximum detected concentration slightly exceeds 1 (1.1). Therefore, selenium was not selected as a COC for this site.

		NOAEL Max HQ	NOAEL Mean HQ	LOAEL Max HQ	LOAEL Mean HQ
SLERA HQs for Selenium	Surface Soil	**16**	**8**	**9.6**	**4.8**
	Mixed Soil	**25**	**9.4**	**15**	**5.7**
Alternate HQs for Selenium	Surface Soil	0.67	0.34	0.41	0.21
	Mixed Soil	**1.1**	0.40	0.64	0.24

Note: SLERA HQs are from Tables 7-4 and 7-5, alternate HQs are from Table M.107.

Aluminum, copper, manganese, and thallium were eliminated as COCs at Disposal Pit C using the rationale presented in 7.6.2.1 for Disposal Pit A/B. Only iron, lead, nickel, vanadium, and zinc were identified as COCs for soil.

7.6.2.3 Former Dry Waste Disposal Pit

Based on the calculated risk estimates in Step 2, several metals were identified as potential soil COCs: aluminum, iron, manganese, nickel, selenium, thallium, vanadium and zinc (see **Tables 7-6 and 7-7**). After a potential toxicity evaluation, iron, nickel, vanadium and zinc were identified as COCs. The rationale for excluding each of the other metals (aluminum, manganese, selenium, and thallium) as a COC is discussed below.

As with soils in Disposal Pit A/B, the majority of risk posed by selenium to the shrew is the result of exposure via contaminated food items. If soil-to-plant uptake and bioaccumulation factors are changed to those specified in USEPA, 1999, all the HQs are below 1. Therefore, selenium was not selected as a COC for this site.

		NOAEL Max HQ	NOAEL Mean HQ	LOAEL Max HQ	LOAEL Mean HQ
SLERA HQs for Selenium	Surface Soil	**17**	7	**10**	**4.0**
	Mixed Soil	**17**	**6.1**	**10**	**3.7**
Alternate HQs for Selenium	Surface Soil	0.73	0.28	0.44	0.17
	Mixed Soil	0.73	0.26	0.44	0.16

Note: SLERA HQs are from Tables 7-6 and 7-7, Alternate HQs are from Table M.107.

Aluminum, manganese, and thallium were eliminated as COCs at Disposal Pit C using the rationale presented in 7.6.2.1 for Disposal Pit A/B. Iron, nickel, vanadium, and zinc were retained as COCs.

7.6.3 Identification of Sediment/Surface Water COCs

Based on the calculated risk estimates in the screening level ERA, several compounds in sediment/surface water had HQs exceeding 1 (see **Table 7-8**). The rationale for identifying or excluding each of these compounds as COCs is discussed below.

For bis(2-ethylhexyl)phthalate, the NOAEL HQ value for the blue heron is 1.8 when using the maximum concentration. If the mean concentration is used, the NOAEL HQ is 0.2 indicating that bis(2-ethylhexyl)phthalate does not pose a risk in sediments or surface water.

Four pesticides were identified as COPCs in sediments and surface water: DDE, DDD, DDT and heptachlor. DDD and heptachlor were identified as COPCs in surface water and were not detected in sediments, whereas DDE and DDT were detected in sediments and not surface water.

For the three DDX compounds (i.e., DDD, DDE, and DDT), all had means an order of magnitude below the screening criteria (**Table M.30**); therefore, none of these pesticides are considered to be COCs in sediment. For surface water, the estimated concentration in fish is based on the surface water concentration of the contaminant multiplied by a bioaccumulation factor for water to fish. DDD was not detected in surface water and an estimated pore water concentration was derived based on the sediment concentration. Since the mean concentrations of DDD and DDE in surface water are below their respective screening values, and because DDD was not detected in surface water and the maximum detected concentration of DDE in surface water is below its surface water screening value; DDD and DDE are not considered to be COCs in surface water. Although the maximum detected concentration of DDT exceeded its surface water screening value; DDT was only detected in 1 of 52 samples; therefore DDT is not a COC in surface water based on the low frequency of detection. For these various reasons, DDD, DDE and DDT were not considered to be COCs in either surface water or sediments.

Heptachlor was identified as a potential COPC in surface water because of potential adverse effects to upper trophic level fish via the food chain at the detected concentrations (**Table M.103**). However, the uncertainty associated with this conclusion is high since the toxicity information is based on tissue concentrations in the spot fish and is a NOED concentration. Since heptachlor was detected several orders of magnitude below its aquatic screening level, and because the uncertainty associated with the fish tissue evaluation is high, heptachlor was not considered a COC in surface water.

The maximum detected Aroclor 1254 concentration in sediments was just slightly above the screening criteria (1.2 vs. 1.04 mg/kg) and had a relatively low frequency of detection (4/54). Aroclor 1254 was not detected in surface water and the mean HQs and LOAEL Max HQ were all less than 1. Therefore, Aroclor 1254 was not identified as a COC in sediments or surface water.

There were five metals identified in surface water/sediments which had max HQs for at least one receptor greater than 1: aluminum, chromium, iron, selenium, and zinc. Only aluminum was identified as a COPC (i.e., with HQ exceeding 1) in both sediments and surface water and iron was identified as a COPC only in surface water.

For chromium, the NOAEL HQ for the heron was 1.7 when using the maximum detected concentration in sediments. However, if the mean concentration is used, the NOAEL HQ is below 1 at 0.3. The LOAEL HQs were less than 1 for the heron. Therefore, chromium was not identified as a COC in the sediments.

For selenium, the NOAEL HQs for the great blue heron were 4.9 and 1.3 for the maximum and mean concentrations, respectively. If the LOAEL is used instead of the NOAEL, the mean HQ for selenium for the great blue heron is less than 1 (HQ = 0.7). Therefore, selenium was not identified as a COC in the sediments.

For iron, the HQ for the largemouth bass was 4.6 for the maximum concentration. If the mean concentration is used instead of the maximum, the HQ is less than 1 (HQ = 0.3). Therefore, iron was not identified as a COC in the sediments.

For zinc, the NOAEL HQ for the heron was 3.6 when using the maximum detected concentration in sediments. However, if the mean concentration is used, the NOAEL HQ is below 1 at 0.5. Therefore, zinc was not identified as a COC in the sediments.

Based on the results of the screening-level ERA and further potential toxicity evaluation (part of Step 3 ERA), only aluminum was identified as a COC in surface water or sediments at the site.

7.7 RISK MANAGEMENT

This risk management section presents the Army's position on whether further evaluation of ecological risks is warranted based on the evaluation presented above as well as other factors, such as impact to habitat in the overall Seneca conservation/recreational area and site background. The impact to habitat in the overall Seneca conservation/recreation area is presented in Section 7.7.1. Since all of the identified COCs are inorganics, which are naturally occurring, comparison to the site background levels was considered. A comparison of the site concentrations to background was conducted for the COCs identified in the preceding section. Section 7.7.2 provides the site background information. Sections 7.7.3 through 7.7.6 present the comparison of the site concentrations to background as the rationale supporting the Army's proposal that no additional assessment is needed for the COCs having elevated HQs due to the concentrations similar to those found in background.

7.7.1 Impact to Habitat in the Overall Seneca Conservation/Recreation Area

A comparison of the affected area at SEAD-12 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-12 has been included in the conservation/recreation area. The entire conservation/recreation area is approximately 7,585 acres. The impacted area at SEAD-12, which corresponds to cleanup goals that would restore the site to pre-disposal conditions, is approximately 4 acres, or 0.05% of the total acreage of the conservation/recreation area.

7.7.2 Site Background

The soil background concentrations for metals are based upon a background dataset that has been compiled from 57 soil samples collected from 20 locations at different depths. The background samples were collected within the Seneca Army Depot Site but from areas unrelated to site releases during the various site investigations conducted at the Seneca Army Depot (SEAD 25 RI, 25 ESIs, the Ash Landfill, and the OB Grounds). These background samples were combined into the background database so that statistical evaluation of the data would be representative of the variations in the site soil. The background values calculated from this background dataset are representative of background of the Seneca Army Depot Site and have been assigned as background for all the sites at the Seneca Army Depot. The background data set and the locations from which the data were collected are provided in Appendix G. The overall background characterization completed at the Seneca Army Depot (e.g., sampling, comparison with the site data) is in compliance with the USEPA approach published in a document titled "Guidance for Characterizing Background Chemicals In Soil at Superfund Sites" (USEPA, 2001a).

In order to evaluate the contribution of background to the estimated elevated HQs for the COCs at SEAD-12 for the terrestrial receptors, HQs due to the exposure to background were calculated for the short-tailed shrew for all the COCs identified in the preceding section. The short-tail shrew was selected since it is the most sensitive receptor. Tables **M.110** and **M.111** present the calculation of the background exposure and the HQs related to the background exposure, respectively.

In general, the exposure to background resulted in all HQs exceeding 1 (including NOAEL and LOAEL HQs). The result on one hand may suggest the overly conservative assumptions used in the SLERA. On the other hand, background may pose potential risk to the terrestrial receptors at SEAD-12. The following sections compare the HQs associated with the site concentrations to

HQs associated with exposure to background for each COC for Disposal Pit A/B, Disposal Pit C, the Former Dry Waste Disposal Pit, and sediment/surface water, respectively.

7.7.3 Soil COCs in Disposal Pit A/B

Soil COCs identified (from Step 3) for the ecological receptors at Disposal Pit A/B included: iron, lead, nickel, vanadium, and zinc. **Table M.112** presents a comparison of the site concentrations (maximum and mean) with the background concentrations (maximum and mean).

For iron, nickel, and vanadium, the maximum and mean site concentrations were lower than the maximum and mean background concentrations, respectively.

The surface soil zinc concentrations were lower than site background. Although the maximum zinc concentration in mixed soils exceeded site background, the mean site concentration for mixed soils slightly exceeded background (7.3 mg/kg versus 7.2 mg/kg).

The lead concentrations in mixed soils at the site exceeded site background. However, site background contributed significantly to the elevated HQs for the shrew (**Table M.112**).

Based on the above discussion, the elevated HQs for iron, lead, nickel, vanadium, and zinc were due to the concentrations similar to those found in background. Therefore, the Army's risk management position is that no further evaluation is warranted at Disposal Pit A/B, as it would not be practical to address concentrations similar to those found in background.

7.7.4 Soil COCs in Disposal Pit C

Soil COCs identified (from Step 3) for the ecological receptors at Disposal Pit C included: iron, lead, nickel, vanadium, and zinc. **Table M. 113** presents the results of a comparison of the site concentrations to background. The rationale of excluding or retaining the COC for further evaluation is presented for each of the COCs as follows.

The iron concentrations at the site (including surface soils and mixed soils) were all less than site background with the exception of the maximum concentrations detected in mixed soils. The NOAEL HQ associated with the maximum background concentration (40) contributed significantly to the NOAEL HQ associated with the maximum concentration for mixed soils (HQ=53).

The maximum lead concentration detected in mixed soils was lower than background. Although the mean lead concentration in mixed soils exceeded background, the HQs associated with the mean site concentration and background were similar (2.7 versus 2.3).

The nickel concentrations at the site (including surface soils and mixed soils) were all less than site background.

The vanadium concentrations at the site (including surface soils and mixed soils) were all less than site background with the exception of the maximum concentration detected in mixed soils. The NOAEL maximum HQ associated with the site maximum concentration was 87 for the shrew; however, the background HQ was 78 for vanadium for the shrew, meaning that the elevated HQ is predominantly contributed by background. Therefore, vanadium does not warrant further evaluation.

The zinc concentrations in surface soils and mixed soils were greater than site background. The HQs associated with the site concentrations exceeded background HQs significantly, especially for mixed soils. Even if alternate BAFs and the LOAEL are used, the HQ for the maximum detected zinc concentration of 6080 mg/kg poses a potential risk to insectivorous mammals at this site. Therefore, zinc was retained as a soil COC for Disposal Pit C area.

As discussed above, the elevated HQs for iron, lead, nickel, and vanadium were due to the similar concentrations detected in background. Therefore, the Army's risk management position is that no further evaluation is warranted for these COCs. Further evaluation is proposed for zinc only. To further evaluate potential risks associated with zinc in soil at the Disposal Pit C area, assessment endpoints, and measurement endpoints relevant to the assessment endpoints, should be established. Based on conditions at this site and potential adverse impacts associated with zinc, appropriate assessment endpoints include no substantial adverse toxicological effects to invertebrates based on direct exposure. The assessment endpoint is intended to protect invertebrates from the effects of zinc toxicity.

7.7.5 Soil COCs in Former Dry Waste Disposal Pit

Table **M. 114** presents a comparison of the site concentrations (maximum and mean) with the background concentrations (maximum and mean). Soil COCs identified (from Step 3) for the ecological receptors at the Former Dry Waste Disposal Pit include: iron, nickel, vanadium and zinc. The site concentrations of nickel, vanadium, and zinc were lower than background. The mean concentrations of iron in mixed soils and surface soils were lower than background although the maximum concentrations slightly exceeded background. The NOAEL HQ associated with the detected maximum background concentration (HQ=40) contributed significantly to the NOAEL HQ associated with the site maximum concentration (HQ=43). As a result, the elevated HQs for the above COCs were due to the concentrations similar to those found in background. Therefore, the Army's risk management position is that no COCs warrant further evaluation for the Former Dry Waste Disposal Pit.

7.7.6 Sediment/Surface Water COCs

Aluminum is the only COC identified in sediment and surface water.

Although the NOAEL HQs are greater than 1 for the heron, the LOAEL HQs are both less than 1. For the surface water evaluation, the max NOAEL HQ was 3.1 for the largemouth bass and 69 for amphibians. The mean HQ for the largemouth bass was 0.3 and for amphibians was 5.6. Since these HQs are based on using no observed effect concentrations (NOECs), if the lowest observed effect concentration (LOEC) is used to calculated the HQs, all would be less than 1 assuming that the LOEC is an order of magnitude above the NOEC. In addition, the bioaccumulation model used to estimate uptake has likely overestimated body burdens at the site since a conservative BAF was used and aluminum is not very bioaccumulative.

Since sediment concentrations of aluminum are very similar to background concentrations (**Table M. 115**), the Army's risk management position is that aluminum does not warrant further evaluation for the sediment and surface water.

7.8 SUMMARY

In accordance with the USEPA guidance (USEPA, 1997a), a screening level ERA was performed to evaluate soil, surface water and sediment contaminants at the SEAD-12 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 (part of Step 3) was required to more fully characterize potential ecological risks and determine if further evaluation is warranted.

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). In addition, an invertebrate screen was completed for site soil contaminants.

Potential exposures and effects resulting from maximum concentrations of sediment/surface water contaminants were evaluated by estimating potential direct and indirect exposures for aquatic wildlife (great blue heron) and comparing exposures to NOAEL toxicity values.

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 comparing exposures to NOAEL toxicity values. Surface water contaminants were additionally evaluated by comparing surface water concentrations to effect level concentrations for amphibians.

Some of the additional information used to help characterize risks (part of Step 3) included a comparison of site concentrations to background concentrations and using alternative values for toxicity reference values, soil-to-plant uptake factors and bioconcentration and bioaccumulation factors.

Upon completion of ERA Steps 1and 2, 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.

Based on the results of the further refinement of COCs (part of Step 3), COCs were identified for soils and sediment/surface water. Soil COCs identified for the ecological receptors at Disposal Pit A/B included: iron, lead, nickel, vanadium, and zinc. COCs identified for the ecological receptors in the soils at the Former Dry Waste Disposal Pit included: iron, nickel, vanadium and zinc. For the area designated Disposal Pit C, the results suggested a potential for adverse ecological effects due to the presence of iron, lead, nickel, vanadium, and zinc.

Since all of the identified COCs are inorganics—which are naturally occurring—a comparison to site background levels was considered. The Army's risk management position is that COCs identified within the site background ranges would not be further evaluated. As a result, no further evaluation of COCs is recommended for ecological receptors in the soils of Disposal Pit A/B or in the Former Dry Waste Disposal Pit. Additionally, no further evaluation of COCs were identified in the surface water or sediments of the site. Therefore, these results indicate no further action is warranted at these areas based on the ecological risk assessment.

For the area designated Disposal Pit C, the results suggested a potential for adverse ecological effects due to the presence of zinc. A further evaluation of the data indicate the contamination is above background in three distinct areas represented by samples TP12-7BA, TP12-7BB, and TP12A-7 for one area, TP12-7AA for another area, and TP12A-4 for the final area. Other samples for zinc in Disposal Pit C are below background and indicate that contamination outside these areas do not have the potential for adverse ecological effects. The results indicate further investigation to evaluate zinc in soil or that the implementation of a limited removal action may be warranted.

The COCs warrant further evaluation as a result of this ERA are shown in **Table 7-9** along with calculated risk-based concentrations, ecological risk assessment screening values, and background concentrations. Risk-based concentrations were calculated using NOAEL and LOAEL as TRVs, respectively. It should be noted that the risk-based concentrations were back-calculated from a HQ of 1 using the same assumptions adopted in the SLERA. As discussed in Section 7.6, the assumptions used in the SLERA are generally very conservative; therefore, the calculated risk-based concentrations are for screening purposes only.

Table 7-9

Table 7-9
COCs Identified For Further Evaluation
Seneca / SEAD-12
Seneca Army Depot Activity

Constituent	Site Mean	Site Max	Risk-based Concentrations [1] NOAEL	Risk-based Concentrations [1] LOAEL	Ecological Risk Assessment Screening Criteria [2]	Background [3] Max Detect	Background [3] Mean
Area E Soils							
None							
Area F Soils							
Zinc	1.13E+02	6.56E+02	5.15E+02	1.03E+03	5.00E+01	1.26E+02	6.78E+01
Area G Soils							
None							
Surface Water							
None							
Sediments							
None							

Notes:

1. Risk-based concentrations for soil was developed by back calculating the shrew model assuming a goal HQ of 1.

   Risk-based Concentration = NOAEL (or LOAEL)*BW/[SFF*(SP*CF*IP+BAF*Ia+Is)]

   Where, NOAEL = no-observed-adverse-effects-level (160 mg/kg/day) (Table M.42)
   LOAEL = lowest-observed-adverse-effect-level (320 mg/kg/day) (Table M.43)
   CF = plant dry-to-wet-weight conversion factor (0.2)
   SP = soil-to-plant uptake factor (1.4) (Table M.46)
   Ip = plant-matter intake rate (0.00155 kg/day) (from Table M.47)
   Ia = animal-matter intake rate (0.00751 kg/day) (Table M.47)
   Is = incidental soil intake rate (0.000022 kg/day) (Table M.47)
   SFF = site foraging factor (1)
   BW = body weight (0.015 kg) (Table M.47)
   BAF = bioaccumulation factor (0.56) (Table M.46)

   As the assumptions used in the calculation are very conservative, the risk-based concentrations are for screening purposes only.
2. Screening criterion for zinc in soils is from Oak Ridge National Laboratory (Elfroymson et al. 1997).
3. Background values from Table G-1.

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8/28/02

8.0 SUMMARY

Located in the northern portion of the Seneca Army Depot (SEDA) facility, SEAD-12 encompasses approximately 360 acres within the former Weapons Storage Area (WSA). Constructed in 1941, SEDA has been owned and operated by the United States Government since that date for the receipt, storage, maintenance, and supply of military items, including munitions and equipment. SEAD-12 contains a number of buildings as well as large areas of open fields. For the period between 1962 and 1992, these buildings were used for classified maintenance functions. Discussions with SEDA personnel indicate these functions may have included the handling of military items containing radioactive materials or metal parts fabricated with alloys of U-238 or U-235. In addition to operations within the various buildings at SEAD-12, several disposal pits have been identified within the SEAD-12 area. Two additional areas, not within the former WSA, include in the Waste Water Treatment Building (Building 715) and the portion of Reeder Creek receiving surface water runoff from SEAD-12 and discharge from Building 715. Building 715 is suspected to have received wastewater from the buildings within the WSA.

This Remedial Investigation (RI) Report presents the results of the investigation performed to characterize the impacts of former site activities on the soil, surface water, sediment, and groundwater within the SEAD-12 area. Data collected from these media were then used to conduct both a baseline human health risk assessment as well as an ecological risk assessment. Investigation of the impacts of site activities performed within the buildings at SEAD-12 are being investigated and reported separately. The initial investigation activities at these buildings are reported in the Draft Radiological Survey Report, Class I and Class II Buildings (July 2000).

Soils Investigation

A phased investigation and evaluation approach was used in conducting the soils investigation at SEAD-12. This phased approach allowed for the identification of potential release areas within the SEAD-12 area. The nine potential release areas are:

- Building 819 & EM-27;
- Building 815, Building 816 & EM-28;
- Disposal Pit A/B;
- Disposal Pit C

- Former Dry Waste Disposal Pit;
- EM-5
- EM-6
- Class III Areas; and
- Wastewater Treatment Plant.

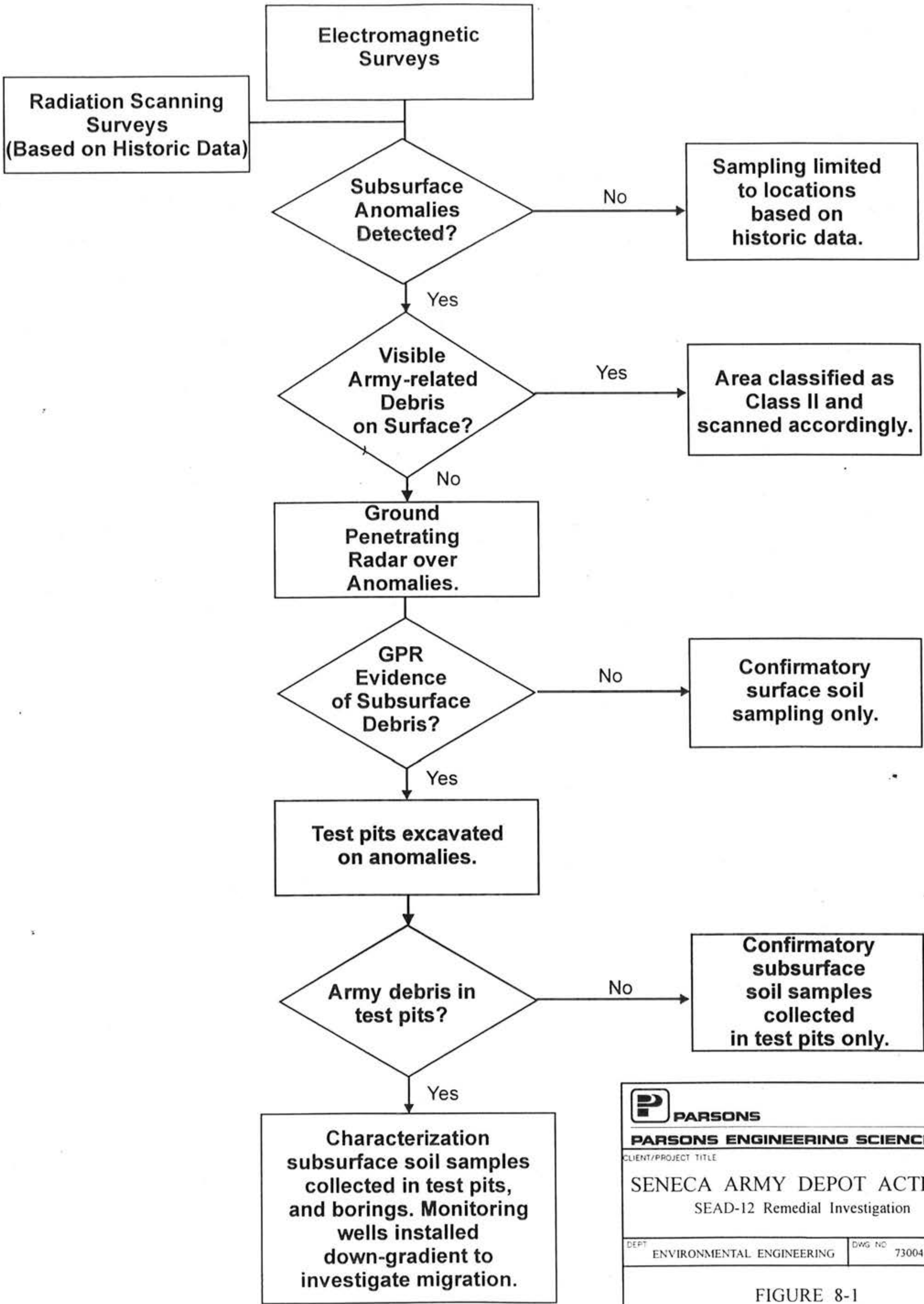
Because of the large size of the SEAD-12 investigation area and the various uses of different areas within the site, the identification of potential release areas aided in determining which areas of the former WSA warranted further attention and which areas did not.

Figure 8-1 shows the overall approach used in conducting the field work at SEAD-12. In general, both a radiation scanning survey and electromagnetic (EM) survey were conducted over the entire 360-acre site to initially identify areas requiring further investigation. The radiation survey was conducted in accordance with the Multi-Agency Radiological Survey and Site Investigation Manual (MARSSIM, EPA, 1997). This document provides guidelines for use in demonstrating compliance with radiological release criterion established for a site. The protocols in MARSSIM are dependent on radiological classifications of areas that are based on past known use or previous sampling results and their comparison to the Derived Concentration Guidance Level (DCGL) for a particular area. A DCGL is defined as the concentration of residual radioactivity distinguishable from background that, if uniformly distributed throughout a survey unit, would result in a defined total effective dose equivalent (TEDE) to an average member of a critical group. The TEDE selected for development of DCGLs at this site is the NYSDEC TAGM 4006 of 10 millirem per year (mrem/yr). Although EPA allows a TEDE of 15 mrem/yr and the Nuclear Regulatory Commission (NRC) allows a TEDE of 25mrem/yr, this total effective dose equivalent was selected since it is the most conservative.

Radiological classifications, as defined by MARSSIM, are:

Class I areas: Areas that have, or had prior to remediation, a potential for radioactive contamination (based on site operating history) or known contamination (based on previous radiological surveys). Note that areas containing contamination in excess of the DCGL prior to remediation were classified as Class I areas.

Class II areas: These areas have, or had prior to remediation, a potential for radioactive contamination or known contamination, but are not expected to exceed the DCGL.



PARSONS

PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY

SEAD-12 Remedial Investigation

DEPT	DWG NO
ENVIRONMENTAL ENGINEERING	730047

FIGURE 8-1

SEAD-12 INVESTIGATIONS FLOW CHART

SCALE	DATE
Not Applicable	January 2001

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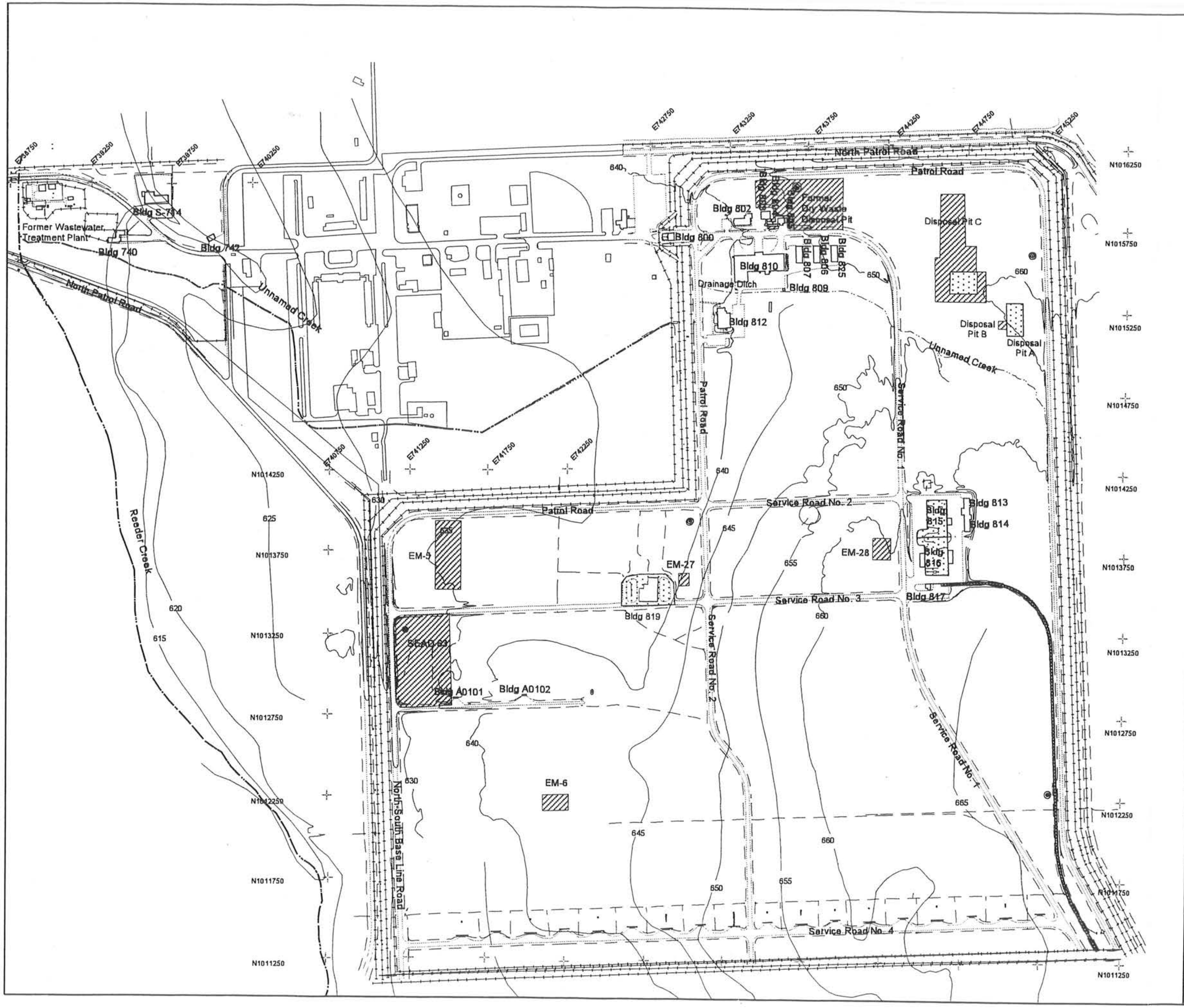

LEGEND

RADIATION CLASSIFICATION AREAS

- CLASS 1
- CLASS 2
- CLASS 3

600 0 600 (feet)

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SENECA ARMY DEPOT ACTIVITY

RI/FS

SEAD 12

FIGURE 8-2
LOCATION OF POTENTIAL RELEASE AREAS AND RADIATION CLASSIFICATION AREAS

SCALE	DATE	REV	
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Class III areas: Any potentially impacted areas that are not expected to contain any residual radioactivity, or are expected to contain levels of residual radioactivity at a small fraction of the DCGL, based on site operating history and previous radiological surveys.

For SEAD-12, each potential release area was assigned the classification listed in Table 8-1 and shown in **Figure 8-2**. These classifications were the basis for the extent of radiological scanning performed within each area, as well as the frequency of soil sampling conducted for radiological parameters. Class I areas were surveyed and sampled at a greater frequency, for example, than a Class III area. If during the initial surveys conducted (i.e. radiological or EM), an elevated reading or anomaly were detected, the initial classification of the area was re-evaluated based on the nature of the reading or anomaly.

The results of the EM survey were used to determine the extent of the subsurface investigation for both chemical and radiological parameters. Based on the nature of anomalies detected, as determined by visual inspection or ground penetrating radar (GPR), the need for test pitting, soil borings or groundwater monitoring wells was determined.

Table 8-1 summarizes the types of investigation and number of samples collected for each of the nine potential release areas identified. In addition to radiological scanning surveys, EM surveys, GPR surveys, surface soil sampling, test pits, and soil borings, two other investigations were conducted to further characterize site soils at SEAD-12. Borehole geophysical investigations were conducted at Disposal Pit A/B to determine the vertical extent of potential contamination within this area, and a soil gas survey was conducted outside of Buildings 813 and 814 to investigate a potential paint disposal area.

Data collected from the soils investigation at SEAD-12 were compared to the NYSDEC TAGM 4046 values for chemical constituents and DCGL values derived using RESRAD and the NYSDEC TAGM goal of 10 mrem/yr. The RESRAD computer code was developed by Argonne National Laboratories and is widely used by the Department of Energy (DOE) and other federal agencies to estimate dose from residual radioactive material and site specific cleanup levels for radioactive contaminants. Residential and occupational exposure scenarios were both considered during the development of the DCGLs.

Table 8-1
Investigation and Sample Collection Summary
SEAD-12 Remedial Investigation
Seneca Army Depot Activity

	Building 819 & EM-27		Building 815, 816, & EM-28								
	Building 819	**EM-27**	**Building 815& 816**	**EM-28**	**Disposal Pit A/B**	**Disposal Pit C**	**Former Dry Waste Disposal Pit**	**EM-5**	**EM-6**	**Class III Areas**	**WWTP**
Classification of Radiolgical Scanning	Class I	Class II	Class I	Class II	Class I & II	Class I & II	Class II	Class II	Class II	Class III	none performed
EM Anomalies Found? (a)	No	EM-27	No	EM-28	EM-25, EM-26	EM-21, 22, 23, 24	No	EM-5	EM-6	Several (b)	No
GPR Performed? (c)	No	No	No	EM-28	No	No	No	Yes	Yes	Several (d)	No
Borehole Geophysics Performed?	No	No	No	No	Yes (e)	No	No	No	No	No	No
Soil Gas Performed?	No	No	No	No	No	No	No	No	No	Yes (f)	No
Surface Soil Samples Collected? (g)	yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Associated Test Pits	None	TP12-17	None	TP12-18, TP12-19	TP12-1, TP12-2	TP12-8, TP12-7A, TP12-5, TP12-6, TP12-23, TP12-3, TP12-4	TP12-25, TP12-26	TP12-15, TP12-16	TP12-11, TP12-12	Several (h)	None
Subsurface Soil Samples Collected?	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	No
Associated Groundwater Monitoring Wells	None	MW12-21	None	MW12-29, MW12 30	MW12-13, MW12-8, MW12-10, MW12-12	MW12-34, MW12-33, MW12-15, MW12-7, MW12-14	MW12-9, MW12-16, MW12-17	MW12-22, MW12-23	24, MW12-25, MW12-	MW12-27, MW12-31, MW12-32	

(a) Refer to Table 2-1 (Gepophysical Anomaly Investigation Summary)
(b) Anomalies SO-1,2,3,4, EM-7 through EM-20, and EM-29 through EM-44
(c) Refer to Table 2-1 (Gepophysical Anomaly Investigation Summary)
(d) GPR Surveys Performed on anomalies EM-7 through EM-14, EM-17, EM-19, EM-20., and EM-29 through EM-42.
(e) Refer to Figure 2-6 (Borehole Geophysics Locations)
(f) A soil gas survey was performed around Buildings 813, 814 and 817 in the Eastern portion of the site shown in Figure 2-7.
(g) Refer to Table 2-7 (Surface Soil Sampling Summary)
(h) Class III Testpits: TP12-9, TP12-10, TP12-21, TP12-14, TP12-22A, TP12-22B, TP12-24, TP12-20, TP12-13.

Groundwater Investigation

The installation of groundwater monitoring wells at SEAD-12 was based on the results of the soils investigation as described in **Figure 8-1**. Results from the groundwater investigation were compared to those values established in the NYSDEC TOGS, 1.1.1, Class GA Standards (June 1998).

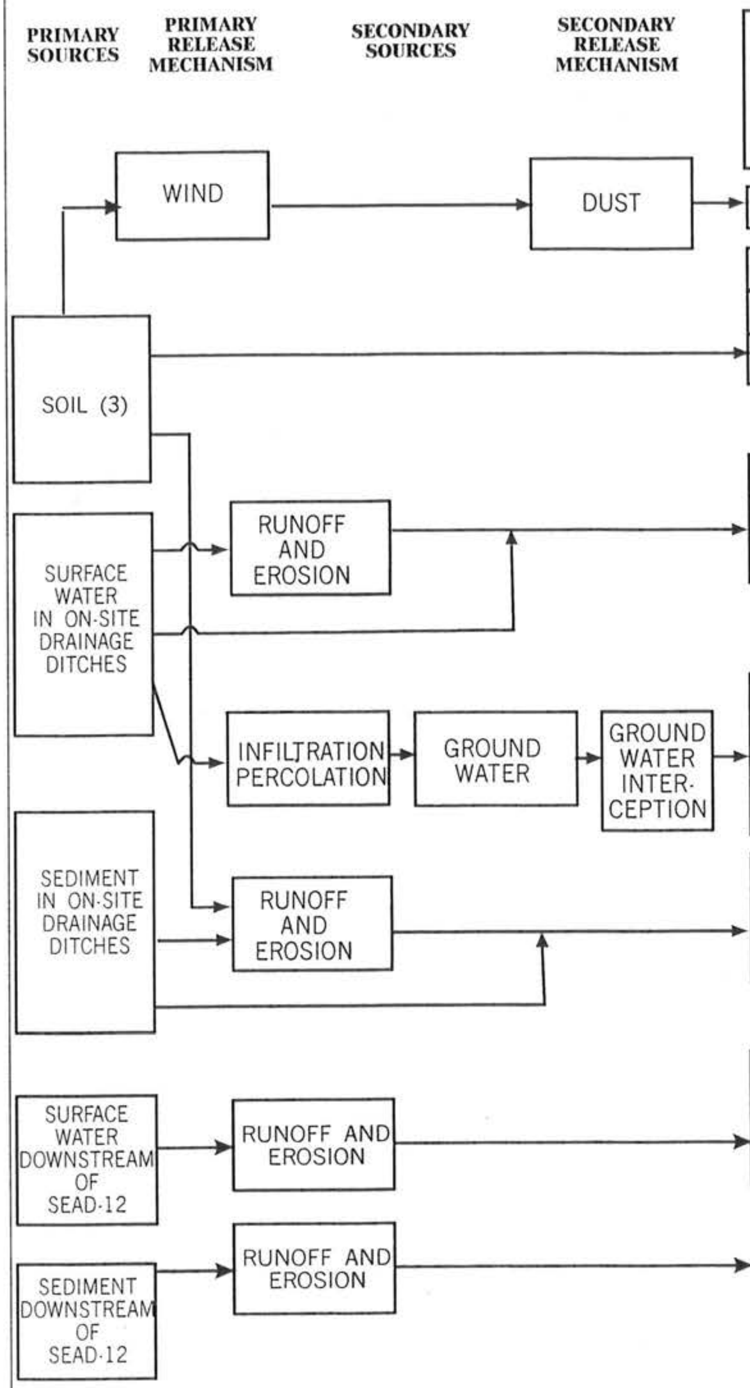
Surface Water and Sediment Investigation

Surface water and sediment samples were collected within the SEAD-12 ditches as well as upgradient of the site (within the ammo area) and downgradient of the site in Reeder Creek. Results from the surface water investigation were compared to NYSDEC TOGS, 1.1.1, Class C Standards (June 1998). Sediment results were compared to the NYSDEC Technical Guidance for Screening Contaminated Sediment (January 1999).

Risk Assessments

The human health baseline risk assessment (HH BRA) and ecological risk assessment (ERA) was conducted on three of the potential release areas, the Former Dry Waste Disposal Area, Disposal Pits A/B, and Disposal Pit C. It was decided that a single HHBRA and ERA for the entire former WSA would not be appropriate since SEAD-12 is actually made up of several potential release areas. Rather, the three areas that historically have been impacted most significantly were selected for HH BRAs and ERAs. In conducting these assessments, only the soil data from each of the three potential release areas were evaluated. Surface water, sediment and groundwater data collected from the entire site was used in the assessments.

Figures 8-3 and **8-4** show the exposure pathway summaries for the HH BRAs and ERAs conducted at each site. Both chemical and radiological pathways were considered. All receptors considered in the HH BRA were consistent with the planned future land use for SEAD-12 (Recreation/Conservation), with one exception. A future resident was also considered for comparison purposes.



EXPOSURE ROUTE	RECEPTOR: HUMAN — CURRENT SITE WORKER	FUTURE PARK WORKER OUTDOOR	OFF SITE WADER	FUTURE RECREATIONAL VISITOR	FUTURE CONSTRUCTION WORKER	RESIDENTIAL (2)
INHALATION	C/R	C/R	NA	C/R	C/R	C/R
INGESTION	C/R	C/R	NA	C/R	C/R	C/R
DERMAL CONTACT	C	C	NA	C	C	C
DIRECT EXPOSURE	R	R	NA	R	R	R
INGESTION	NA	NA	NA	NA	NA	NA
DERMAL CONTACT(1)	NA	C/R	NA	C/R	NA	C/R
DIRECT EXPOSURE	NA	R	NA	R	R	R
INGESTION	NA	C/R	NA	C/R	NA	C/R
INHALATION	NA	NA	NA	C	NA	C
DERMAL CONTACT(1)	NA	NA	NA	C/R	NA	C/R
INGESTION	NA	NA	NA	NA	NA	C/R
DERMAL CONTACT	NA	C	NA	C	NA	C
DIRECT EXPOSURE	NA	R	NA	R	R	R
INGESTION	NA	NA	NA	NA	NA	NA
DERMAL CONTACT(1)	NA	NA	C/R	NA	NA	NA
DIRECT EXPOSURE	NA	NA	R	NA	NA	NA
INGESTION	NA	NA	NA	NA	NA	NA
DERMAL CONTACT	NA	NA	C	NA	NA	NA
DIRECT EXPOSURE	NA	NA	R	NA	NA	NA

C — PATHWAY CONSIDERED TO POSE POTENTIAL CHEMICAL RISK

R — PATHWAY CONSIDERED TO POSE POTENTIAL RADIOLOGICAL RISK

NA — NOT APPLICABLE TO RECEPTOR

Notes:

(1) For radiological parameters, submersion rather than dermal contact is considered.

(2) Additional soil parameters considered for radiological parameters (using RESRAD) are plant, meat, and milk ingestion.

(3) The Future Construction Worker receptor considers both surface soil and subsurface soil. All other receptors consider only surface soil.

PARSONS
PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE
SENECA ARMY DEPOT
SEAD-12 RI/FS

ENVIRONMENTAL ENGINEERING — DWG NO 730047-01002

FIGURE 8-3
EXPOSURE PATHWAY SUMMARY

SCALE NA — DATE February 2001

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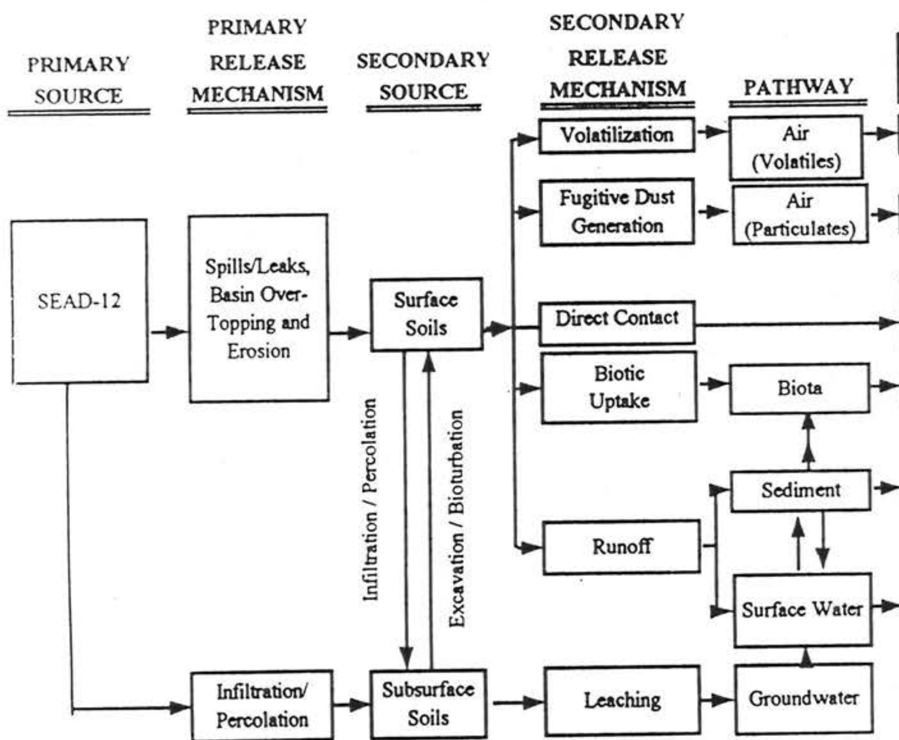
FIGURE 8-4
CONCEPTUAL SITE MODEL FOR ECOLOGICAL RISK
SEAD-12 REMEDIAL INVESTIGATION
SENECA ARMY DEPOT ACTIVITY



EXPOSURE ROUTE[3]	Soil: Soil Inverts	Soil: Vole	Soil: Shrew	Soil: Dove	Soil: Hawk	Surface Water/Sediment: Sediment Inverts	Surface Water/Sediment: Bass	Surface Water/Sediment: Heron	Surface Water/Sediment: Amphibians
Inhalation	—	○	○	○	○	—	—	—	—
Inhalation	—	○	○	○	○	—	—	—	—
Ingestion	○	●	●	●	●	—	—	—	—
Contact	●	○	○	○	○	—	—	—	—
Ingestion	—	●	●	●	●	—	○	●	○
Ingestion	—	—	—	—	—	○	—	●	—
Contact	—	—	—	—	—	○	—	○	—
Ingestion	—	—	—	—	—	—	●	●	○
Contact	—	—	—	—	—	—	○	○	●

POTENTIAL ECOLOGICAL EXPOSURE PATHWAYS[1]

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.

8.1 Building 819/ EM-27

The areas surrounding Building 819 and EM-27 were combined into a single potential release area due to their proximal locations. Building 819 was used during the initial WSA operations as a quality assurance laboratory prior to 1962 (as presumably after 1962). The EM anomaly EM-27, located northeast of Building 819, was found be military-related debris. Building 819 was considered a Class I area based on its historical use. EM-27, located in an area originally considered a Class III area, was reclassified as a Class II area upon discovery of military debris at this anomaly.

Soil

Radiological scanning was completed with 100% coverage of paved, gravel and grassy areas that comprise the Building 819 area, and 50% coverage of EM-27 area. A "hot spot" was identified during the scanning survey outside of Building 819. Follow-up sampling, scanning, and a removal action were conducted. Confirmatory sampling and scanning indicated that the source of the elevated readings had been removed. The EM-27 area radiation scanning results were consistent with background radiation levels. One test pit was excavated to further investigate EM-27. Military-related debris consisting of metal wiring and plastic sheeting were found.

Surface soil samples collected for chemical analysis, found SVOCs (PAHs) and pesticide/PCBs exceeding NYSDEC TAGM criteria. These analytes were not detected in groundwater samples collected from the area. Radiological sampling found four isotopes to statistically exceed background, however no isotopes exceed the background plus worker DCGL.

Surface Water and Sediment

Levels of PAHs and pesticide/PCBs detected in sediments collected from ephemeral drainage ditches exceeded NYSDEC criteria. These constituents were detected in locations downgradient to asphalt paving; concentrations decreased in samples further downgradient from the site. Elevated levels of PAHs and pesticides/PCBs were not detected in corresponding surface water samples. The most significant exceedences in sediment and surface water are for chromium, lead and mercury in sediment, and lead in surface water.

Soil and sediment PAH exceedences are consistent with run-off from paved areas present at the site and are not considered significant. Metals values within the area are generally less than twice the regulatory criteria.

Groundwater

Groundwater exceedences are limited to iron, sodium, and bis(2-ethylhexyl)phthalate.

Human Health BRA and ERA

No human health BRA or ERA was conducted on the soils from Building 819 and EM-27.

Recommendations

No further action is proposed for the soils and groundwater in the Building 819/ EM-27 vicinity. The Feasibility Study (FS) should, however, consider the sediments peripheral to the area, as these sediments contain exceedences above the 95th percentile of background for Hg, Cu and Zn (metals identified as COCs in the ERA of site-wide sediments).

8.2 Building 815, Building 816/ EM-28

Activities within Buildings 815 and 816, until 1962, included inspection and testing of non-nuclear mechanical and electrical systems. Following 1962, and up to approximately 1992, these buildings were used for classified maintenance functions. Discussions with SEDA personnel indicate that maintenance or quality assurance operations may have been performed on military items that may have contained radioactive materials. Any operations would have been done with those radioactive materials still sealed within those military items, or in association with metal parts fabricated with alloys containing U-238 and/or U-235. Once any maintenance or quality assurance operations were completed on any given military item, the item was immediately returned to and sealed in its shipping container. All military items were transported and stored in their sealed shipping containers. After 1992, the buildings were used to de-militarize non-nuclear components as part of the nuclear stockpile reduction effort. These buildings have a soil covered roof. The EM-28 anomaly was determined to be associated with buried "military" debris, and is included in this potential release area due to its location immediately downgradient to Buildings 815 and 816. Historical activity in Buildings 815 and 816 resulted in the earthen roofs and surrounding areas being designated a Class I area. EM-28, located within an area originally established as a Class III area, was upgraded to a Class II area once this anomaly was identified. The upgrade of this area to Class II was made to ensure that any potential source for this anomaly was detected with more complete coverage.

Soil

Radiological scanning was completed with 100% coverage over the earthen roofs (with a 2 meter perimeter in areas of ingress and egress), and at 50% coverage for EM-28. These surveys found radiation levels to be consistent with background scanning levels. Test pits excavated as a result of the EM survey, found general site debris consistent with WSA operations. Chemical soil sampling was limited to monitoring wells downgradient to Buildings 815 and 816, within EM-28, and test pits in EM-28. Cadmium (MW12-29 surface soil) exceeds the soil criteria by more than a factor of two. Surface soil sampling at Buildings 815 and 816 was conducted for radiological compounds only. Radiological soil sampling detected ten isotopes at levels that statistically exceeded background, however no isotope levels exceeded the background plus worker DCGL.

Surface Water and Sediment

There were no surface water exceedences in the immediate area of Buildings 815 and 816. Exceedences of sediment criteria within the area were observed for PAHs, Pesticides/PCBs, and metals generally upgradient to side gradient of the site.

Groundwater

Elevated antimony values were detected in groundwater, upgradient and downgradient to Building 815 and 816, with lower levels downgradient suggesting an upgradient source. Iron and sodium levels were detected above the GA standard. Radiological soil sampling detected ten isotopes at levels that statistically exceeded background, however no isotopes exceed the background plus worker DCGL.

Human Health BRA and ERA

No human health BRA or ERA was conducted on the soils from Building 815/816 and EM-28. However, the human health BRA found dermal contact to benzo(a)pyrene in groundwater for the future resident to be the single exposure route exceeding the EPA hazard exposure target range. The only two wells containing detectable benzo(a)pyrene (MW12-39 and MW12-40) are in the Class III area upgradient and side-gradient to this area. The analytical results for benzo(a)pyrene are generally below the detection limit and could not be confirmed (Section 6.5.3.4), therefore this is considered an unlikely risk scenario. Site-wide ecological risk assessments for surface water and sediment indicate that further work may be warranted in the Class III area (see below) peripheral to Building 815.

Recommendations

No further action is proposed for the soils surrounding the Building 815 & 816/ EM-28 potential release area. The FS should consider the sediments peripheral to the area, based on the levels of mercury, copper and zinc detected. Mercury, copper and zinc were identified as constituents of concern in the ecological risk assessment of site-wide sediments.

8.3 Disposal Pits A/B

Disposal Pits A/B were initially identified during the 1994 ESI investigation in association with EM anomalies, in the southeastern portion of the area originally designated as SEAD-12A. Located adjacent to one another, Disposal Pit A (EM-26) is a Class I area, while Disposal Pit B (EM-25) is a Class II area. ESI test pit excavations found metal and fiberglass debris and miscellaneous electronic components. Radionuclides (e.g. Radium-226 in paint for luminescent dials) were believed to be associated with the miscellaneous electronic components.

Soils

Radiological scanning was completed with 100% coverage of the Disposal Pit A area and 50% coverage of the Disposal Pit B area. These surveys, and borehole scanning to define vertical distribution of radionuclides, found radiation levels to be consistent with background scanning levels. Test pits excavated based on historical information and to investigate EM anomalies, found debris consistent with the historical use of the disposal pits (disposal of classified electronic components), and included electronic components, wire, tools, metal and metal fragments, etc. Surface and subsurface soil samples were collected at soil boring, monitoring well and test pit locations, with surface soil samples collected for analysis of radiological parameters per MARSSIM guidance. Analytes exceeding soil standard by more than a factor of two, included: benzo(a)pyrene, dibenz(a,h)pyrene, silver, cyanide, cadmium, chromium, nickel, thallium, lead and zinc.

Radiological soil sampling detected six isotopes at levels that statistically exceeded background, however no isotopes exceed the background plus worker DCGL.

Surface Water and Sediment

There are no surface water or sediment sample locations near the Disposal Pits A/B area.

Groundwater

Groundwater exceedences of the GA standard are limited to iron.

Human Health BRA and ERA

A human health BRA and ERA were conducted on the soils at this site. The only human health risk calculated was due to dermal contact of benzo(a)pyrene in groundwater. This constituent was detected in MW12-39 and MW12-40 and are not within the Disposal Pit A/B area.

The ERA identified one PCB (Aroclor 1254) and eight metals as potential COCs within this area. Hazard quotients, calculated from soil concentrations, identified Aroclor 1254, lead and zinc as COCs with the potential for adverse ecological effects. Aroclor 1254 was detected in a localized area of Disposal Area B (samples SB12-3, SB12-17, and TP12A-2). Analytical results indicate that the presence of elevated levels of metals corresponds with the presence of disposal pit debris (e.g., in samples SB12-3, SB12-17, TP12-2, TP12-1, TP12A-1, and TP12A-2).

Recommendations

Based on the RI and ESI investigations, it is recommended that the soils and debris within the Disposal Pit A/B area be considered further, potentially through a removal action, in the FS.

8.4 Disposal Pit C

Initially investigated in 1994, Disposal Pit C was used as a disposal area for military-related debris. Based on the debris found, the extent of EM anomalies (EM-21, -22, -23, and -24), ESI investigations, and historical operations, a portion of Disposal Pit C is a Class I area with the remainder a Class II area.

Soil

Radiological scanning was completed with 100% coverage of the Class I area and 50% coverage of the Class II area. These surveys found radiation levels within Disposal Pit C to be consistent with background scanning levels. Test pits excavated within the area found debris consistent with the historical use of the disposal pits. Construction debris, asphalt, pipe, culvert material, "cone-shaped military items" (trainers), and a stainless steel cylinder were found within the test pits in this area. Surface and subsurface soil samples were collected at soil boring, monitoring well and test pit locations, with grid and random surface soil samples (per MARSSIM) collected for radionuclide characterization. Analytes exceeding soil TAGM by more than a factor of two, included: benzo(a)pyrene, dibenz(a,h)pyrene, silver, copper, sodium, nickel, lead, thallium and zinc.

Radiological soil sampling detected five isotopes at levels that statistically exceeded background, however no isotopes exceed the background plus worker DCGL.

Surface Water and Sediment

There are no surface water or sediment locations proximal to the Disposal Pits C area.

Groundwater

Groundwater exceedences in the area of Disposal Pit C are limited to iron.

Human Health BRA and ERA

A human health BRA and ERA were conducted on the soils at this site. The only human health risk calculated was due to dermal contact of benzo(a)pyrene in groundwater. This constituent was detected in MW12-39 and MW12-40 and are not within the Disposal Pit C area.

The ERA conducted using sediment data from the entire SEAD-12 area identified one PAH (dibenzofuran), and the metals selenium, thallium, vanadium, and zinc as potential COCs. Hazard quotients calculated from soil concentrations within Disposal Pit C identified zinc as the only COC with the potential for adverse ecological effects. Similarly, sampling indicates that elevated levels of metals correspond the presence of debris.

Recommendations

Based on the RI and ESI investigations, it is recommended that the soils and debris within the Disposal Pit C area be considered further, potentially through a removal action, in the FS.

8.5 Former Dry Waste Disposal Pit

Located northeast of Building 805, wastes associated with Buildings 803, 804, and 805 operations were stored in the former dry waste disposal pit. Materials temporarily stored in the Dry Waste Disposal Pit are reported to include; swipes containing solvents and uranium oxides, butcher paper, gloves, and lead-wire seals. This pit was lined and covered with plywood, with Sandia National Laboratory personnel reporting that the wastes stored in this pit were removed and shipped for disposal whenever the pit was full. The dry waste disposal pit was reported to have been excavated by the AEC in 1957, and again prior to their leaving the site in 1962. The dry waste disposal pit was later excavated by SEDA personnel in 1965 and 1986 with no buried wastes reported. Initially investigated as part of the ESI, historical use was the basis for the former Dry Waste Disposal pit being assigned a Class I designation for radiological investigations.

Soils

As a Class I area, radiological scanning was completed with 100% coverage of this potential release area. These surveys found radiation levels to be consistent with background scanning levels. Test pits excavated based on historical information found minor debris consistent with reports of past site excavations. Surface and subsurface soil samples were collected at soil boring, monitoring well and test pit locations, with additional grid surface soil samples (per MARSSIM) collected for radionuclide characterization. Analytes exceeding soil standards by more than a factor of two, included mercury, magnesium and thallium and are limited to subsurface soils.

Radiological soil sampling detected four isotopes at levels that statistically exceeded background, however no isotopes exceed the background plus worker DCGL.

Surface Water and Sediment

Surface water GA standards are exceeded for bis(2-ethylhexyl)phthalate, DDE and DDT. Constituents exceeding sediment standards included PAHs, Pesticides/PCBs (DDD, DDE, DDT, Aroclor 1254, heptachlor epoxide), and metals (arsenic, chromium, copper, mercury, manganese, lead, and zinc).

Groundwater

Groundwater exceedences in this area are limited to iron, sodium and manganese.

Human Health BRA and ERA

A human health BRA and ERA were conducted on the soils at this site. The only human health risk calculated was due to dermal contact of benzo(a)pyrene in groundwater. This constituent was detected in MW12-39 and MW12-40 and are not within the former Dry Waste Disposal Area.

The ERA identified copper, iron, thallium and zinc as potential COCs. Hazard quotients calculated from soil concentrations within this area were all below 1, indicating no adverse affects associated with these metals.

Recommendations

Based on the RI and ESI investigations, no further action is proposed for the former Dry Waste Disposal Pit potential release area. The FS should continue to consider the sediments peripheral to the area, as these sediments contain exceedences for mercury, copper, and zinc. These three metals were identified as COCs in the ecological risk assessment of site-wide sediments.

8.6 EM-5

Originally investigated as part of the SEAD-12 archeological assessment, the electromagnetic geophysical anomaly identified as potential release area EM-5 is apparently associated with debris remaining from an original farmstead that predates the SEDA. Geophysical investigations indicated subsurface debris, resulting in the Class II radiological classification.

Soils

As a Class II area, radiological scanning was completed with 50% coverage of this potential release area. These surveys found radiation levels to be consistent with background scanning levels. Test pits excavated found materials consistent with a former homestead (wood, nails, glass, pottery, clay pipe, etc.). Surface and subsurface soil samples were collected at monitoring well and test pit locations, with additional surface soil samples (per MARSSIM) collected for radionuclide characterization. Analytes exceeding soil standards by more than a factor of two, included copper, lead, mercury, and zinc.

Radiological soil sampling detected ten isotopes at levels that statistically exceeded background, with Ra-226 and Pb-210 exceeding the background plus worker DCGL. Further evaluation of radiological data using an ANOVA statistical analysis, indicates that Ra-226 is consistent with background levels. Elevated levels of Lead-210 may be associated with archeological site debris.

Surface Water and Sediment

Surface water locations in the EM-5 vicinity did not exceed NYSDEC GA standards. Sediment analytes exceeding standards included PAHs, Pesticides/PCB (Aroclor 1254), and metals (Cu, Fe, and Ni, with no metal greater than 95th percentile of the background data set).

Groundwater

Groundwater exceedences included bis(2-ethylhexyl)phthalate, iron, manganese, and sodium.

Human Health BRA and ERA

No human health BRA or ERA was conducted on the soils from Building EM-5.

Recommendations

Based on the RI investigations, the FS will include further evaluation of the elevated Pb-210 levels associated with the archeological debris at EM-5.

8.7 EM-6

Geophysical and test pit observations at EM-6 suggest that this area may have been a former disposal pit for construction-type debris. Originally classified as a Class III area, this area was upgraded to a Class II area upon discovery of debris at this EM anomaly.

Soils

As a Class II area, radiological scanning was completed with 50% coverage of this potential release area. These surveys found radiation levels to be consistent with background scanning levels. Test pits excavated found materials indicative of general debris disposal (stumps, brush, fencing and fence posts, concrete, general roads and grounds debris). Surface and subsurface soil samples were collected at monitoring well and test pit locations, with additional surface soil samples (per MARSSIM) collected for radionuclide characterization. Analytes exceeding soil standards by more than a factor of two, included manganese, thallium and zinc.

Radiological soil sampling detected seven isotopes at levels that statistically exceeded background, with Ra-226 exceeding the background plus worker DCGL. Further evaluation of radiological data using an ANOVA statistical analysis, indicated that Ra-226 is consistent with background.

Surface Water and Sediment

Surface water and sediment sampling locations in the EM-6 vicinity did not exceed their respective standards.

Groundwater

Groundwater samples exceeding NYSDEC GA standards included iron, manganese, and antimony.

Human Health BRA and ERA

No human health BRA or ERA was conducted on the soils from Building EM-6.

Recommendations

Based on the RI investigations, the media at EM-6 is not recommended for further consideration in the FS.

8.8 Class III Areas

The Class III potential release area encompasses the remainder of SEAD-12 that was not assigned to a specific potential release area, as described above. The Class III area includes numerous EM anomalies, ephemeral drainages, and outdoor areas around SEAD-12 buildings not included in the other potential release areas.

Soils

As a Class III area, radiological scanning was completed with 10% coverage of this potential release area. These surveys found radiation levels to be consistent with background scanning levels. Test pit excavations revealed materials associated with general debris disposal (lumber, fencing and fence posts, pipe wire, cable, empty ammo boxes, concrete, general roads and grounds debris). Surface and subsurface soil samples were collected at monitoring well and test pit locations, with surface soil samples also analyzed for radionuclide characterization. Surface soil analytes exceeding soil standards by more than a factor of two, included PAHs (up to 6 at some locations), and manganese and thallium. Subsurface soil analytes exceeding soil standards included four PAHs, cadmium, mercury, lead, sodium, manganese and zinc. Elevated levels within the soils correspond with locations adjacent to paved areas or associated debris descriptions.

Radiological soil sampling detected eleven isotopes at levels that statistically exceeded background, with no radionuclides exceeding the background plus worker DCGL.

Surface Water and Sediment

Surface water and sediment sampling locations where criteria were exceeded are distributed across the site. Exceedences were observed for pesticides/PCBs, SVOCs (PAHs), and metals.

Sediments near the transformer (SD12-32), north of Building 815, have the highest PAH values for the site with some the highest values detected for metals (notably antimony, arsenic, chromium, cadmium, copper, lead, mercury, nickel and zinc). Other sediment locations are consistent with site-wide values. Surface water samples and sediment values correlated to sediments downgradient from SD12-32 (particularly for mercury) or related to a possible upgradient source.

Groundwater

Groundwater samples exceeding NYSDEC GA standards include TCE, DCE, antimony, iron, sodium, and manganese.

Chemical impacts occur at several locations, most notably in the vicinity of Building 813 and Building 814 where TCE was detected in soil gas and groundwater.

Human Health BRA and ERA

A human health BRA and ERA were not conducted on the soils at this site. The only human health risk calculated was due to dermal contact of benzo(a)pyrene in groundwater. This constituent was detected in MW12-39 and MW12-40 and are not within the Class III area.

The ERA for this area is also limited to the site-wide evaluation of risk associated with surface water and sediment. Surface water and sediment identified 2-SVOCs, 4-pesticide/PCBs, and 12-metals, with copper, mercury and zinc as COCs.

Recommendations

Based on the RI in the Class III potential release area, it is proposed that the following items be included in the FS: 1) installation and monitoring of groundwater monitoring wells near Building 814 to define the source of TCE (include monitoring MW12-37 and existing downgradient wells to confirm limited extent of transport); and 2) define the source and evaluate removal of sediments near to and downgradient of SD12-32, related to the sediment and surface water samples showing elevated mercury and PAH values.

8.9 Waste Water Treatment Plant

Located downgradient of SEAD-12, this area was evaluated to determine if there were any impact on this area due to site operations at the former WSA. As noted above, the Waste Water Treatment Building (Building 715) is suspected to have received and processed waste water from the buildings within the WSA.

Soils

Radiological scanning was not conducted in this area. Surface soil analytes exceeding soil standards by more than a factor of two, included dibenz(a,h)anthracene, mercury, manganese, and zinc.

Surface Water and Sediment

There are no related surface water exceedences in this area. Downgradient sediments exceeded the criteria for PAHs, Pesticide/PCBs, and Mn.

Human Health BRA and ERA

The Human Health BRA was not completed for this area, based on RI and ESI investigation results. The ERA was not completed for this area. However, mercury was identified as a COC for the entire site.

Recommendations

It is recommended that elevated levels within the sediment in this area be addressed in the FS.

8.10 Summary

The following summarizes those areas within SEAD-12 that should be considered in the development of alternatives in the FS:

1) Disposal Pit A/B – removal of remaining "military" debris and contaminated soil associated with EM anomalies;
2) Disposal Pit C – removal of remaining "military" debris and contaminated soil associated with EM anomalies;
3) EM-5 – investigation and debris removal address Pb-210 contamination issues;
4) Class III area,
   a) Additional well to define TCE source east of Building 814,
   b) Additional groundwater monitoring to evaluate TCE movement near buildings 813/814
5) Site-Wide - Evaluate surface water and sediment exceedences (with limited sediment removal) in areas where they exceed criteria based on ecological Risk for Cu, Hg, and Zn. In particular, the area between Building 815 and Disposal Pit A/B should be considered.