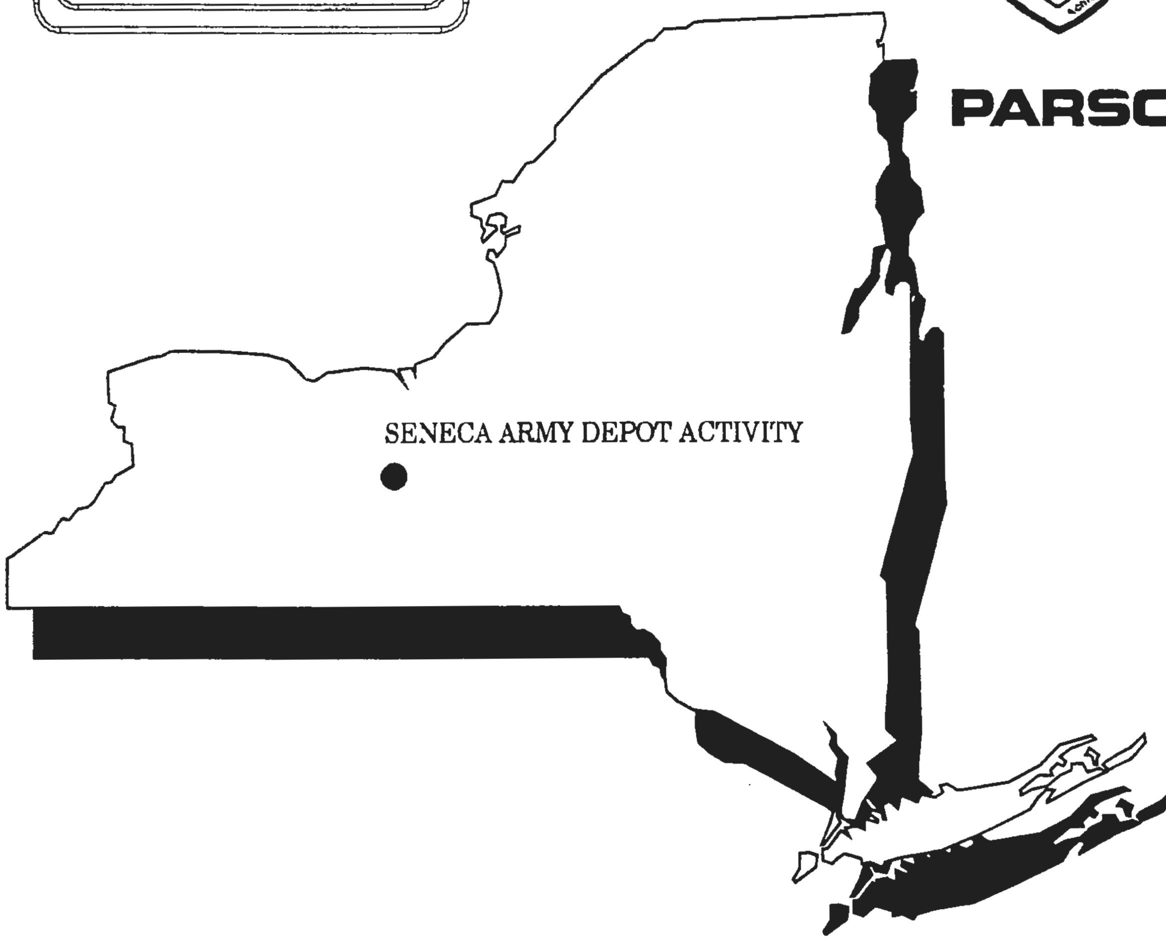
U.S. ARMY ENGINEER DIVISION
HUNTSVILLE, ALABAMA



PARSONS




# PRE-DRAFT
## RECORD OF DECISION (ROD)
## The ABANDONED DEACTIVATION FURNACE (SEAD-16)
## The ACTIVE DEACTIVATION FURNACE (SEAD-17)

SENECA ARMY DEPOT ACTIVITY (SEDA)

JULY 2002

# PRE-DRAFT
# RECORD OF DECISION
# FOR
# The ABANDONED DEACTIVATION FURNACE (SEAD-16) and the ACTIVE DEACTIVATION FURNACE (SEAD-17)

**SENECA ARMY DEPOT ACTIVITY**
**ROMULUS, NEW YORK**

**Prepared for:**

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**ROMULUS, NEW YORK**

**and**

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**Contract Number: DACA87-95-D-0031**
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## ACRONYMS AND ABBREVIATIONS

| | |
|---|---|
| ARAR | Applicable or Relevant and Appropriate Requirement |
| AWQS | Ambient Water Quality Criteria |
| BRA | Baseline Risk Assessment |
| BRAC | Base Realignment and Closure |
| CERCLA | Comprehensive Environmental Responsibility, Compensation and Liability Act |
| COPC | Chemical of Potential Concern |
| DoD | Department of Defense |
| DQO | Data Quality Objective |
| EPC | Exposure Point Concentration |
| EQ | Ecological quotient |
| ES | Engineering Science, Inc. |
| ESI | Expanded Site Investigation |
| FFA | Federal Facilities Agreement |
| FS | Feasibility Study |
| GA | NYSDEC ground water classification for a source that is suitable for drinking water |
| HEAST | USEPA Health Effects Summary Table |
| HI | Hazard Index |
| IAG | Interagency Agreement |
| IRM | Interim Remedial Measure |
| LRA | Seneca Army Depot Local Redevelopment Authority |
| LUC | Land Use Controls |
| MCL | Maximum Contaminant Level |
| mg | milligrams |
| mg/L | milligrams per liter |
| mg/kg | milligrams per kilogram |
| mL | milliliters |
| NA | Not Available |
| NCP | National Contingency Plan |
| NPL | National Priority List |
| NYSDEC | New York State Department of Environmental Conservation |
| NYSDOH | New York State Department of Health |
| O&M | Operations and Maintenance |
| PAH | Polynuclear Aromatic Hydrocarbon |
| PCB | Polychlorinated Biphenyls |
| PID | Planned Industrial Development |
| ppb | parts per billion |
| ppm | parts per million |

## ACRONYMS AND ABBREVIATIONS
## (Continued)

| | |
|---|---|
| PRAP | Proposed Plan |
| RAB | Restoration Advisory Board |
| RCRA | Resource Conservation and Recovery Act |
| RfD | Reference Dose |
| RI | Remedial Investigation |
| RI/FS | Remedial Investigation/Feasibility Study |
| ROD | Record of Decision |
| SEAD | Former acronym for the Seneca Army depot used to designate SWMU numbers |
| SEDA | Seneca Army Depot Activity |
| SF | Slope Factor |
| SVOC | Semi-Volatile Organic Compound |
| SWMU | Solid Waste Management Unit |
| TAGM | Technical and Administrative Guidance Memorandum |
| TBC | To be Considered |
| TCLP | Toxicity Characteristic Leaching Procedure |
| UCL | Upper Confidence Limit |
| ug/l | micrograms per liter |
| USACE | U.S. Army Corps of Engineers |
| USEPA | U.S. Environmental Protection Agency |
| VOCs | Volatile Organic Compounds |

# 1.0 DECLARATION OF THE RECORD OF DECISION

## Site Name and Location

The Abandoned Deactivation Furnace (SEAD-16) and the Active Deactivation Furnace (SEAD-17)
Seneca Army Depot Activity
CERCLIS ID# NY0213820830
Romulus, Seneca County, New York

## Statement of Basis and Purpose

This decision document presents the U.S. Army's (Army's) selected remedy for SEAD-16 and SEAD-17, located at the Seneca Army Depot Activity (SEDA) near Romulus, New York. The decision was developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) as amended, 42 U.S.C. §9601 et seq. and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Part 300. The Base Realignment and Closure (BRAC) Environmental Coordinator; the Chief of Staff at Army Materiel Command; the Director of the Office of Site Remediation and Restoration, and the U.S. Environmental Protection Agency (USEPA) Region II have been delegated the authority to approve this Record of Decision (ROD). The New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH) have been consulted on the planned remedial action in accordance with CERCLA 121(f), 42 U.S.C. 9621(f), and concur with the selected remedy.

This ROD is based on the Administrative Record that has been developed in accordance with Section 113(k) of CERCLA. The Administrative Record is available for public review at the Seneca Army Depot Activity, 5786 State Route 96, Building 123, Romulus, NY 14541. The Administrative Record Index identifies each of the items considered during the selection of the remedial action. This index is included in **Appendix A**.

The State of New York, through the NYSDEC and NYSDOH, has concurred with the selected remedy. The NYSDEC Declaration of Concurrence is provided in **Appendix B** of this ROD.

## Site Assessment

The response action selected in this Record of Decision is necessary to protect the public welfare or the environment from actual or threatened releases of hazardous substances into the environment or from actual or threatened releases of pollutants or contaminants from this site which may present an imminent and substantial endangerment to public health or welfare.

**Description of the Selected Remedy**

The selected remedy for SEAD-16 and SEAD-17 addresses contaminated soil, building debris, and groundwater. The selected remedy will result in the removal of soil and groundwater. Groundwater will be monitored to ensure that soil contamination left on-site does not further degrade groundwater.

The elements that compose this remedy include:

- Conduct additional sampling as part of the pre-design sampling program to further delineate the areas of excavation;
- Remove, test, and dispose of the SEAD-16 building debris off-site;
- Excavate the ditch soil with lead concentrations greater than 1250 mg/kg to a depth of one foot;
- Excavate surface and subsurface soils with lead concentrations greater than 1250 mg/kg at SEAD-16;
- Excavate surface soils with lead concentrations greater than 1250 mg/kg at SEAD-17;
- Excavate hotspots at additional soil sampling locations at both SEAD-16 and SEAD-17;
- Stabilize soils and building debris exceeding the TCLP criteria;
- Dispose of the excavated material in an off-site landfill;
- Backfill the excavated areas with clean backfill;
- Conduct semi-annual groundwater monitoring;
- Conduct annual soil sampling in Kendaia Creek at four locations;
- Establish and maintain land use controls to restrict the use of site groundwater and prevent residential use; and
- Conduct five-year reviews to evaluate whether the response actions remain protective of public health and the environment.

Land use controls will be a part of the remedy until the groundwater at the site meets Federal MCL and NYSDEC Class GA groundwater standards. Additional controls will be required to prevent residential use of the property. The goals of the land use controls are to ensure adequate protection of human health and the environment, and to preserve and promote the long-term effective operation of remedial alternatives proposed for the sites. The institutional controls that will be implemented will include posting signs at the sites and implementing deed restrictions. A public water supply is available, thus a groundwater restriction should have minimal impact on land reuse of the sites. Upon land transfer, there will be language in the deed that requires the continued use of institutional controls. At a minimum, the deed will prohibit the following:

- The installation of any groundwater extraction wells, except for regulator-approved remediation purposes.

- Human or ecological exposure to groundwater from the site(s), or use of this groundwater for any industrial, commercial, sanitary, human consumptive, or agricultural purposes.
- Unauthorized interference (to be defined in the Deed) with existing monitoring systems or any additional treatment or monitoring systems that may be subsequently constructed at the site(s) (these systems to be described and locations specified in the Deed to the extent practicable).
- Residential use of the site.

**State Concurrence**

NYSDEC has concurred with the selected remedy. **Appendix B** of this Record of Decision contains a copy of the Declaration of Concurrence.

**Declaration**

CERCLA requires each preferred remedy to be protective of human health and the environment, cost effective, comply with other statutory laws; and use permanent solutions, alternative treatment technologies, and resource recovery options to the maximum extent possible. CERCLA also includes a statute indicating a preference for treatment as a principal element for the reduction of toxicity, mobility, or volume of the hazardous substances.

The selected remedy is consistent with CERCLA and is protective of human health and the environment, complies with Federal and State requirements that are applicable or relevant to the remedial action, is cost-effective, and utilizes permanent solutions. This remedy also satisfies the statutory preference for treatment as a principal element of the remedy (i.e., reduces the toxicity, mobility, or volume of hazardous substances, pollutants, or contaminants as a principal element through treatment).

Because this remedy may result in hazardous substances, pollutants, or contaminants remaining on-site above levels that allow for unlimited use and unrestricted exposure for an intermediate period, a statutory review will be conducted within five years after initiations of remedial action to ensure that the remedy is, or will be, protective of human health and the environment.

A discussion of the Army's position on documenting land use controls in the ROD is presented in **Appendix C**.

The foregoing represents the selection of a remedial action by the U.S. Department of the Army and the U.S. Environmental Protection Agency, with the concurrence of the New York State Department of Environmental Conservation.

Concur and recommend for immediate implementation:

________________________________________ ______________

STEPHEN M. ABSOLOM Date

BRAC Environmental Coordinator

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The New York State Department of Environmental Conservation (NYSDEC) and the New York State Department of Health (NYSDOH) will forward to the U.S. Environmental Protection Agency a letter of concurrence regarding the selection of a remedial action in the future. This letter of concurrence will be placed in **Appendix B**.

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The foregoing represents the selection of a remedial action by the U.S. Department of the Army and the U.S. Environmental Protection Agency, with the concurrence of the New York State Department of Environmental Conservation.

Concur and recommend for immediate implementation:

______________________________ ______________

NAME HERE Date
Major General, USA
Chief of Staff
U.S. Army Materiel Command

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The foregoing represents the selection of a remedial action by the U.S. Department of the Army and the U.S. Environmental Protection Agency, with the concurrence of the New York State Department of Environmental Conservation.

Concur and recommend for immediate implementation:

________________________________________ ______________

NAME HERE Date
Director Office of Site Remediation and Restoration
U.S. Environmental Protection Agency, Region II

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## 2.0 SITE NAME, LOCATION AND DESCRIPTION

SEDA is a 10,587-acre military facility located in Seneca County near Romulus, New York, which has been owned by the United States Government and operated by the Department of the Army since 1941. A location map for SEDA is provided below as **Figure 2-1**. As shown in **Figure 2-1**, SEDA is located between Seneca Lake and Cayuga Lake. **Figure 2-1** also shows that SEDA is bordered by New York State Highway 96 on the east, New York State Highway 96A on the west, and sparsely populated farmland on the north and south.

The Abandoned Deactivation Furnace (SEAD-16) is located in the east-central portion of SEDA (**Figure 2-2**). The site consists of 2.6 acres of fenced land with grasslands in the north, east, and west, a storage area for empty boxes and wooden debris, and an unpaved roadway in the south. Also onsite is the building which housed the deactivation furnace, a smaller abandoned building known as the Process Support Building, two sets of SEDA railroad tracks, and some utilities. Two underground storage tanks previously existed at the site but have been removed. A site map of the area is included as **Figure 2-3.**

The Active Deactivation Furnace (SEAD-17) is located in the east-central portion of SEDA (**Figure 2-2**). The site consists of a deactivation furnace building that is surrounded by a crushed shale road. Beyond the perimeter of the crushed shale road is grassland. Two small sheds are located in the eastern portion of the site and there is vehicular access to the site from an unpaved road to the north. Access to the site is restricted because the site is located in the former ammunition storage area. A site map of SEAD-17 is included as **Figure 2-4.**

# 3.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

## 3.1 LAND USE AND RESPONSE HISTORY

Prior to construction of SEDA in 1941, much of the land was used for farming. Since construction, SEDA has been owned by the United States Government and operated by the Department of the Army. SEDA's primary mission was the receipt, storage, maintenance, and supply of military items.

Both sites were used for the demilitarization of various small arms munitions. The process of deactivation of munitions involved heating the munitions within a rotating steel kiln, which caused the munitions to detonate. The byproducts produced during this detonation were then swept out of the kiln through the stack.

SEAD-16 has been inactive and abandoned since the 1960s.

SEAD-17 was constructed to replace the operation of SEAD-16. However, SEAD-17 has been inactive since 1989 due to RCRA permitting issues. The existing deactivation furnace at SEAD-17 had been in the process of being permitted as a hazardous waste incinerator, under the provision of RCRA, but the RCRA permit was withdrawn by the Army when the Depot was listed for base closure in 1995.

To address employment and economic impacts associated with the SEDA's closure, 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 prepare a plan for redevelopment of the SEDA property. Following a comprehensive planning process, a *Reuse Plan and Implementation Strategy for Seneca Army Depot* was completed and adopted by the LRA on October 8, 1996. The Seneca County Board of Supervisors subsequently approved this *Reuse Plan* on October 22, 1996. **Figure 3-1** depicts the intended future land uses for SEDA, as proposed by the LRA. As indicated on **Figure 3-1**, the proposed future land use for SEAD 16 and 17 is for Planned Industrial Development (PID).

## 3.2 ENFORCEMENT HISTORY

SEDA was proposed for the National Priorities List (NPL) in July 1989. In August 1990, SEDA was finalized and listed in Group 14 on the Federal Section of the NPL. The USEPA, NYSDEC, and the Army entered into an agreement, called the Federal Facility Agreement (FFA), also known as the Interagency Agreement (IAG). This agreement determined that future investigations were to be based on CERCLA guidelines, RCRA was considered to be an Applicable or Relevant and Appropriate Requirement (ARAR) pursuant to Section 121 of CERCLA. In October 1995, SEDA was designated as a facility to be closed under the provisions of the Base Realignment and Closure (BRAC) process. As required for sites on the NPL, an RI/FS was completed for SEAD-16 and 17. The Final RI was completed and submitted in March 1999, and the FS was completed and submitted in July 2001.

## 4.0 COMMUNITY PARTICIPATION

The U.S. Army relies on public input to ensure that the concerns of the community are considered in selecting an effective remedy for each Superfund site. To this end, the RI/FS report, the Proposed Plan and supporting documentation have been made available to the public for a public comment period, which begins on [enter public comment period start date] and concludes on [enter public comment period end date]. Copies of the RI/FS report, the Proposed Plan, the Record of Decision, and supporting documentation are available at the following repository:

Seneca Army Depot Activity
Building 123
Romulus, NY 14541
(607) 869-1309
Hours are Mon-Fri 8:30 am to 4:30 pm

A public meeting will be held during the public comment period at the [meeting location] on [meeting date] at [meeting time] to present the conclusions of the RI/FS, to elaborate further on the reasons for recommending the preferred remedial option, and to receive public comments. Comments received at the public meeting, as well as written comments, are documented in the Responsiveness Summary Section of the Record of Decision (ROD), **Appendix D**.

The primary responsibility assigned to the LRA was the preparation of a plan for the redevelopment of the Depot. During the BRAC process, monthly presentations have been given to the Local Redevelopment Authority. In addition, the SEDA Restoration Advisory Board (RAB) was established to facilitate the exchange of information between SEDA and the community. RAB members include the representatives from the Army, USEPA, NYSDEC, New York State Department of Health (NYSDOH), and the community. After a comprehensive planning process, a Reuse Plan and Implementation Strategy for Seneca Army Depot was completed and adopted by the LRA on October 8, 1996. The Reuse Plan was subsequently approved by the Seneca County Board of Supervisors on October 22, 1996.

During the BRAC process there have been, and continue to be, monthly presentations to the RAB regarding the progress of SEAD 16 and SEAD 17 and other investigations related to the closure of SEDA.

## 5.0 SCOPE AND ROLE

At SEAD 16/17, the contaminated soil, ditch soil, building debris and the groundwater will be addressed by the selected remedy. The selected remedy includes:

- Conduct additional sampling as part of the pre-design sampling program to further delineate the areas of excavation;
- Remove, test, and dispose of the SEAD-16 building debris off-site;
- Excavate the ditch soil with lead concentrations greater than 1250 mg/kg to a depth of one foot;
- Excavate surface and subsurface soils with lead concentrations greater than 1250 mg/kg at SEAD-16;
- Excavate surface soils with lead concentrations greater than 1250 mg/kg at SEAD-17;
- Excavate hotspots at additional soil sampling locations at both SEAD-16 and SEAD-17;
- Stabilize soils and building debris exceeding the TCLP criteria;
- Dispose of the excavated material in an off-site landfill;
- Backfill the excavated areas with clean backfill;
- Conduct semi-annual groundwater monitoring;
- Conduct annual soil sampling in Kendaia Creek at four locations;
- Establish and maintain land use controls to restrict the use of site groundwater and prevent residential use; and
- Conduct five-year reviews to evaluate whether the response actions remain protective of public health and the environment.

This alternative was selected as the preferred alternative since it eliminates source soils from further impacting the site by preventing contact with receptors and migration of contaminants to surface water and groundwater. It is a cost-effective, readily available alternative that does not require any long-term maintenance aside from semi-annual groundwater monitoring and can be implemented quickly to provide short-term effectiveness. Finally, it is a permanent solution that will significantly reduce the mobility of the contaminants and potential for exposure at the site.

The selected remedies are discussed in greater detail in **Section 11.0**.

## 6.0 SITE CHARACTERISTICS

This section provides an overview of the site impacts and also identifies the actual and potential routes of exposure posed by the conditions at the site. A complete description of the site characteristics is included in Section 4.0 of the RI report.

Based on the results of the ESI, a RI Work Plan was prepared and the RI field program was conducted. At SEAD-16, the RI field program consisted of site surveys, soil sampling (surface and in boreholes), groundwater investigations in the overburden aquifer, surface water/sediment investigations, a building investigation, and an ecological investigation. The RI at SEAD-17 was similar to that at SEAD-16, with the exception that soil boring samples and building investigation were not part of the field program at SEAD-17. The remedial investigations were designed to meet site-specific data quality objectives (DQOs).

### 6.1 SEAD-16

The primary constituents of concern at the Abandoned Deactivation Furnace (SEAD-16) are arsenic, copper, lead, and zinc in surface soils and copper, lead, and zinc in surface water. Polynuclear aromatic hydrocarbon (PAH) compounds were detected in surface soils and sediments, and metals, PAHs, and nitroaromatics were detected in the building samples. The most impacted soils are those adjacent to the Abandoned Deactivation Furnace. Many of these compounds were present in concentrations that exceeded their respective NYSDEC guidelines. All the constituents of concern are believed to have been released to the environment during the Former Deactivation Furnace's period of operation (approximately 1945 to the mid 1960s).

Seismic profiles performed on the flanks of SEAD-16 were successful in determining that the bedrock surface slopes to the southwest or west, generally following the slope of the ground surface, and that groundwater flow is also likely to be in this direction.

#### 6.1.1 Impacts to Soil

Arsenic, copper, lead, and zinc were detected in almost all of the surface soil samples at concentrations above their respective New York State Technical and Administrative Guidance Memorandum (TAGM) No. 4046 cleanup objectives. The soil analysis results for SEAD-16 are presented in **Tables 6-1A and 6-1B.** Copper and lead were also found to be pervasive in the subsurface soil samples. In all instances, the detected concentrations of metals were found to be highest in samples collected adjacent to the northeastern side of the Abandoned Deactivation Furnace Building. The elevated concentrations of PAHs and nitroaromatic compounds had a similar distribution pattern. The highest concentrations of PAHs were detected in the surface soil samples collected adjacent to the northwestern corner of the Abandoned Deactivation Furnace Building, and the majority of elevated nitroaromatics concentrations were detected in the surface soil samples collected around and in between the Abandoned Deactivation Furnace Building and the Process Support Building. There was one exception to this pattern: the highest concentration of 2,4-dinitrotoluene (7,700 ug/Kg) was found along the site access road in close proximity to the site's eastern perimeter fence.

The highest soil concentrations resulted from the operations that were performed within and in close proximity to the Abandoned Activation Furnace Building and the Process Support Building.

### 6.1.2 Impacts to Groundwater

Seven metals (i.e., aluminum, antimony, iron, lead, manganese, sodium, and thallium) were detected in groundwater samples at concentrations that exceeded the NYSDEC AWQS Class GA or Federal MCL standards. The groundwater analysis results for SEAD-16 are presented in **Table 6-1c**. The site mean concentrations for aluminum, iron, manganese, and sodium are not statistically different than their background mean concentrations. Antimony and lead concentrations exceed their respective standards in only one well, which is located adjacent to the southern portion of the Abandoned Deactivation Furnace Building. Thallium was detected at elevated concentrations in three groundwater monitoring wells, which are also located close to the Abandoned Deactivation Furnace Building. These data indicate that the source of the antimony, lead, and thallium in groundwater is likely in or near the building, though no obvious distribution pattern in groundwater for any of these elements is apparent. Sodium exceeded the groundwater standard in a single well. The source of this single exceedance is unknown.

An additional round of groundwater sampling and analysis was performed to confirm the presence of thallium in the groundwater at both sites. The analytical results indicated that thallium was not detected in any of the on-site monitoring wells. The detection limit for analyses conducted using furnace, atomic absorption techniques for thallium analyses was 1.5 ug/L, which is less than its MCL criteria of 2 ug/L. Based on these results, thallium is not considered a parameter that is present in the groundwater.

### 6.1.3 Impacts to Surface Water

Cadmium, copper, iron, lead, selenium, and zinc were detected at concentrations exceeding the NYSDEC Ambient Water Quality Standards (AWQS) Class C surface water standards in several of the surface water samples collected at SEAD-16. The surface water results for SEAD-16 are presented in **Table 6-1d.** In general, the highest metal concentrations in the surface water samples were collected from the two drainage ditches that are closest to, and south of, the Abandoned

Deactivation Furnace Building. The distribution of metals in SEAD-16 surface waters, as well as the wide distribution of metals in surface soil samples, indicates that the on-site surface soils are the likely source area for the metals found in the surface water samples.

### 6.1.4 Impacts to Sediment

SVOCs and pesticides were found at elevated concentrations in all of the drainage ditches that were investigated at SEAD-16. The sediment (ditch soil) results for SEAD-16 are presented in **Table 6 1e**. The highest concentrations of SVOCs and pesticide compounds were detected in the sediment sample collected from the northeast corner of the Abandoned Deactivation Furnace Building. No apparent spatial distribution trend was observed for SVOC or pesticide concentrations throughout the site. These data indicate that past operating processes in the Abandoned Deactivation Furnace Building did not contribute directly to the distribution of these compounds throughout the site. Rather, the SVOC impacts may have resulted from the use of vehicles for site operations (including locomotives, transport trucks, and automobiles) and the pesticide impacts are likely to have occurred from on-site pesticide applications.

## 6.2 SEAD-17

The primary constituents of concern at the Active Deactivation Furnace, (SEAD-17) are the metals antimony, arsenic, copper, lead, mercury, and zinc in soils. PAH and pesticide compounds found in sediments are also of significance. All of these compounds are likely to have been released to the environment during the Active Deactivation Furnace's period of operation (approximately 1962 to 1989).

Seismic profiles performed on the flanks of SEAD-17 were successful in determining that the bedrock surface slopes to the southwest or west, generally following the slope of the ground surface, and that groundwater is also likely to flow in this direction. At SEAD-17 water table elevations indicate that groundwater flow is essentially to the west.

### 6.2.1 Impacts to Soil

Antimony, arsenic, copper, lead, mercury, and zinc were detected in almost all of the surface soil samples at concentrations above their respective TAGM No. 4046 cleanup objectives. The soil analytical results for SEAD-17 are presented in **Tables 6-2a and 6-2b**. Lead was detected in all of the subsurface soil samples at concentrations that exceeded its TAGM No. 4046 cleanup objective. In all instances, the detected concentrations of metals were found to be highest in those samples collected closest to the Active Deactivation Furnace Building, and some of the highest concentrations were located to the southwest of the building. A drainage pipe, which drains the retort inside the Active Deactivation Furnace Building, discharges to the southwest of the building, and may explain the presence of the high metal concentrations found in the nearby surface soils. Because the Active Deactivation Furnace Building has very few points where materials can enter and exit the building (such as drainage pipes), and since the most significant impacts from metals are generally equally distributed around the building, it is likely that fallout of emissions from the kiln's stack is a source for the metals.

### 6.2.2 Impacts to Groundwater

Generally, the groundwater at SEAD-17 has not been significantly impacted by any chemical constituents. Groundwater analytical results are presented in **Table 6-2c**. Low concentrations of SVOCs were detected, and two metals, thallium and manganese, exceeded their respective MCL criteria values by a factor of 3.5 or less during the first sampling round. Iron and sodium exceeded their respective NYSDEC AWQS Class GA standard. No VOCs, pesticides, PCBs, or nitroaromatics were detected in the samples. As discussed in groundwater results for SEAD-16, the results of the additional groundwater sampling and analysis program indicated that thallium was not detected in any of the on-site wells and thus, it is not considered a parameter that is present in the groundwater.

### 6.2.3 Impacts to Surface Water

Copper, iron, lead and selenium were detected at concentrations above the NYSDEC AWQS Class C surface water standards in some of the surface water samples collected at SEAD-17. Surface water analytical results are presented in **Table 6-2d**. In general, most of the elevated concentrations of metals in the surface water samples were found in the drainage ditch located south of the Active Deactivation Furnace Building. This drainage ditch also collects the overland runoff from the deactivation furnace's retort drainage pipe. The finding of high metals in the surface waters to the south of SEAD-17, as well as the wide distribution of metals in the SEAD-17 surface soil samples, indicates that the on-site surface soils are the likely source for the inorganic elements found in the surface water samples.

### 6.2.4 Impacts to Sediment

Elevated concentrations of PAHs, pesticides, and metals were found in the drainage ditches that were investigated at SEAD-17. Sediment (ditch soil) analytical results are presented in **Table 6-2e**. Noted impacts from PAHs were most significant in one sample collected from the drainage ditch in the northeastern corner of the site. All elevated pesticide compound concentrations were detected in the sediment samples collected from the northern and western most drainage ditches. None of the pesticides were detected at elevated concentrations at locations in close proximity to the Active Deactivation Furnace Building. This spatial distribution pattern indicates that the pesticide compound most likely occur from on-site pesticide applications and not from past operating processes in the Abandoned Deactivation Furnace Building.

Cadmium, copper, iron, lead, and nickel were detected at concentrations that exceeded their respective criteria values in most of the SEAD-17 sediment samples. The earlier discussion of soil results indicates that copper and lead were found to be pervasive in the on-site surface soil samples and thus the site's surface soils are the likely source of the noted sediment impacts from these two metals. Cadmium, nickel, and iron were less predominant in the site soils, but were nonetheless frequently present at concentrations that exceeded their respective TAGM values. Therefore, the source of cadmium, nickel, and lead in the SEAD-17 sediments is also most likely attributable to on-site surface soil runoff.

## 7.0 SUMMARY OF SITE RISKS

A baseline risk assessment was conducted using data collected during the RI to estimate the risks associated with current and future site conditions. The baseline risk assessment estimated the human health and ecological risk that could result from the site if no remedial action were taken.

### 7.1 HUMAN HEALTH RISK ASSESSMENT

The reasonable maximum human exposure to chemicals was evaluated. The methodology is shown in **Figure 7-1**. A four-step process was used for assessing site-related human health risks for a reasonable maximum exposure scenario:

- *Hazard Identification*--identified the contaminants of concern based on several factors such as toxicity, frequency of occurrence, and concentration.
- *Exposure Assessment*--estimated the magnitude of actual and/or potential human exposures, the frequency and duration of these exposures, and the pathways by which humans are potentially exposed.
- *Toxicity Assessment*--determined the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure (dose) and severity of adverse effects (response).
- *Risk Characterization*--summarized and combined the outputs of the exposure and toxicity assessments to provide a quantitative assessment of site-related risks (for example, one-in-a-million excess cancer risk).

The primary constituents of concern at the Abandoned Deactivation Furnace (SEAD-16) are four metals (i.e., arsenic, copper, lead, and zinc), PAH compounds, and nitroaromatics. At the Active Deactivation Furnace (SEAD-17) the primary constituents of concern are six metals (i.e., antimony, arsenic, copper, lead, mercury, and zinc), PAH compounds, and pesticide compounds. Several of these compounds, including some PAH and pesticide compounds, are known to cause cancer in laboratory animals and are suspected to be human carcinogens.

The baseline risk assessment evaluated the health effects that may result from exposure for the following six receptor groups:

1. Current site worker,
2. Future on-site industrial worker,
3. Future on-site construction worker,
4. Future child trespasser,

5. Future child at an on-site day care center, and
6. Future worker at an on-site day care center.

**Figures 7-2 and 7-3** shows the exposure pathways considered for the media of concern.

The following exposure pathways were considered:

1. Inhalation of dust in ambient air (current site worker, future on-site construction worker, future child trespasser, future day care center child, future day care center worker, future industrial worker at SEAD-17 only);
2. Ingestion of on-site soils (current site worker, future on-site construction worker, future child trespasser, future day care center child, future day care center worker, future industrial worker at SEAD-17 only);
3. Dermal contact to on-site soils (current site worker, future on-site construction worker, future child trespasser, future day care center child, future day care center worker, future industrial worker at SEAD-17 only);
4. Ingestion of groundwater (daily) (future industrial worker, future day care center child, future day care center worker);
5. Dermal contact to surface water (future child trespasser);
6. Ingestion of on-site sediment (future child trespasser);
7. Dermal contact to sediment (future child trespasser);
8. Inhalation of dust in indoor air (future industrial worker at SEAD-16 only);
9. Ingestion of indoor dust/dirt (future industrial worker at SEAD-16 only);
10. Dermal Contact to indoor dust/dirt (future industrial worker at SEAD-16 only).

(Note: The SEAD-16 industrial worker is assumed to work only indoors. The SEAD-17 industrial worker is assumed to work only outdoors.)

Under current USEPA guidelines, the likelihood of carcinogenic and non-carcinogenic effects due to exposure to site-related chemicals are considered separately. Non-carcinogenic risks were assessed by calculation of a Hazard Index (HI), which is an expression of the chronic daily intake of a chemical divided by its safe or Reference Dose (RfD). An HI that exceeds 1.0 indicates the potential for non-carcinogenic effects to occur. Carcinogenic risks were evaluated using a cancer slope factor (SF), which is a measure of the cancer-causing potential of a chemical. Slope factors are multiplied by daily intake estimates to generate an upper-bound estimate of excess lifetime cancer risk. For known or suspected carcinogens, USEPA has established an acceptable cancer risk range of $10^{-4}$ to $10^{-6}$ (one-in-ten thousand to one-in-one million).

**SEAD-16**

A summary of the chemicals of concern for potential human health receptors based on the risk assessment are presented in **Table 7-1**. **Table 7-2** summarizes the results for the total carcinogenic and non-carcinogenic risks, and **Table 7-3** provides a summary of the primary contributors to unacceptable risk levels. The results of the baseline risk assessment at SEAD-16 indicate that the HI is above the USEPA target of 1.0 for the future industrial worker (HI=20), future on-site construction worker (HI=1), future day care center child (HI=6), and future day care center worker (HI=2). The total hazard index for the future industrial worker is due (in decreasing order) to ingestion of indoor dust, dermal contact with indoor dust, and ingestion of groundwater. The total hazard index for the future on-site construction worker is primarily due to ingestion of soils. The total hazard index for the future day care child is due (in decreasing order) to ingestion of groundwater and ingestion of soil. The total hazard index for the future day care center worker is primarily due to ingestion of groundwater.

The cancer risk is within the target risk range of $10^{-4}$ to $10^{-6}$ for all receptors except the future industrial worker ($5x10^{-3}$). The total cancer risk for the future industrial worker is due primarily to the ingestion of indoor dust.

The elevated hazard indices for the ingestion of indoor dust exposure pathway are primarily due to SVOCs, 2,4-dinitrotoluene, and metals (antimony and copper). The elevated hazard index for the dermal contact with indoor dust exposure pathway is primarily due to cadmium. The elevated hazard index for the ingestion of groundwater exposure pathway results primarily from thallium. An additional discussion of thallium in groundwater is presented below in the section entitled, *Additional Information on SEAD-16 and SEAD-17 Human Health Risk Assessment*.

**SEAD-17**

A summary of the chemicals of concern for potential human health receptors based on the risk assessment are presented in **Table 7-4**. **Table 7-5** summarizes the results for the total carcinogenic and non-carcinogenic risks, and **Table 7-3** provides a summary of the primary contributors to unacceptable risk levels. The results of the baseline risk assessment at SEAD-17 indicate that the cancer risks for all receptors evaluated were within the USEPA target risk range and that the HI for all but one receptor was below the target value. The exception was the future day care center child, which had a HI equal to the acceptable USEPA level of 1. The HI for the future day care center child is primarily due to the ingestion of soil and to metals (antimony, arsenic, cadmium) in those soils.

**Additional Information on SEAD-16 and SEAD-17 Human Health Risk Assessment**

It should be noted that lead, which was found at elevated levels in soil at both SEAD-16 and SEAD-17, was not considered in the quantitative risk assessment because an allowable RfD is not available. Lead was considered by comparing site data to levels established by USEPA and NYSDEC as protective.

Due to the risks produced by the presence of thallium in groundwater and because there is no historical use of thallium at these sites, an additional sampling round for thallium alone was performed (October 1999) to confirm the presence of thallium at these sites. The confirmatory sampling used an analytical procedure with a detection limit below the USEPA allowable concentration for thallium. The October 1999 results indicate that thallium is not present and that the earlier inconsistent detections of thallium were due to either laboratory analytical error or matrix interference effects. Therefore, thallium is not considered to contribute to non-carcinogenic risk in groundwater at SEAD-16 or SEAD-17.

## 7.2 ECOLOGICAL RISK ASSESSMENT

The reasonable maximum environmental exposure was also evaluated. A four-step process was used for assessing site-related ecological risks for a reasonable maximum exposure scenario:

- *Characterization of the Site and the Ecological Communities*—Includes ecological conditions observed at the unit, site habitat characterization, wildlife resources that are present in the area, and the importance of ecological resources to wildlife and to humans.
- *Exposure Assessment*—Discusses chemicals of potential concern (COPC) and exposure point concentrations and it presents exposure assessments. Chemical distribution of COPCs, and their uptake through various pathways are also discussed in this section. Daily intakes of COPCs through environmental media are quantified as well.
- *Effects Assessment*—Assesses ecological effects that potentially may result from receptor exposure to COPCs. Evaluates potential toxicity of each COPC in each medium and defines toxicity benchmark values that will be used to calculate the ecological hazard quotient.
- *Risk Characterization*—Integrates the results of the preceding elements of the assessment. It estimates risk with respect to the assessment endpoints, based on the predicted exposure to and toxicity of each COPC.

Ecological risk is then presented in terms of a hazard quotient (HQ), which is defined as the ratio of the expected exposure point concentration to an appropriate toxicity reference value (TRV). In general, ratios of exposure point concentrations to TRV greater than 1 are considered indicative of a potential risk. However, due to the uncertainties associated with using this approach, safety factors are considered in interpreting the findings. HQs between 1 and 10 are interpreted as having some potential for adverse effects, whereas, HQs between 10 and 100 indicate a significant potential for adverse effects. HQs greater than 100 indicate that adverse impacts can be expected.

Potential risk was calculated for both the deer mouse (terrestrial receptor) and the creek chub (aquatic receptor) at SEAD-16. Seven COPCs in soil, six COPCs in surface water, and 15 COPCs in ditch sediment/soils were identified as having HQs equal to or greater than 1. The following compounds are considered ecological compounds of concern (COCs) due to HQs that are greater than 10. In surface and subsurface soils, lead and mercury both have HQs greater than 10. In surface water, iron and lead have HQs greater than 10. In ditch sediment/soils, endosulfan-I, antimony, lead, and mercury have HQs greater than 10. Copper in ditch sediment/soils has an HQ greater than 100.

At SEAD-17, potential risk was also calculated for the deer mouse and the creek chub. Of the COPCs at SEAD-17 having an HQ equal to or greater than 1, six were identified in soil, three in surface water, and 11 in ditch sediment/soils. There is a low likelihood of risk to the deer mouse from the concentrations of COPCs found in soils therefore, none of these compounds are considered to be COCs. The COPCs in surface water and ditch sediment/soils are also not likely to adversely impact populations of creek chub in the surface water bodies at the Depot. With HQs of most of the surface water and ditch sediment/soil COPCs less than 10 and based on very conservative assumptions, none were considered a COC.

The results of the ecological risk assessment presented in the RI report (Parsons ES, March 1999) concluded that there is negligible risk to the ecosystems of the SEAD-16 and SEAD-17 study areas. During the field evaluation, no overt acute toxic impacts were noted. In addition, there are no threatened, endangered, or sensitive species that would be expected to inhabit or frequent either site. The quantitative ecological risk evaluation initially suggested that a possibility exists for the COPCs to present a small potential for environmental effects due to soil, surface water, and ditch sediment/soils at both SEAD-16 and SEAD-17. However, given the conservative nature of the assessment, the poor quality of the SEAD-16 and 17 habitat, and the future land use designation of the sites as industrial, it is not likely that the sites support or will support a significant portion of the community of species that occupy the area surrounding and including these sites.

## 8.0 REMEDIAL ACTION OBJECTIVES

Remedial action objectives have been developed that consist of media-specific objectives for the protection of human health and the environment. These objectives are based on available information and standards such as ARARs and risk-based levels established in the risk assessment. These objectives are also based upon the current and intended future land use, which is industrial use for both sites.

For both sites, residential land use was only considered to compare the cost of remediating the sites for this land use versus the cost to implement restricted use on the sites. Future residential use was also considered to comply with Army guidance, which states that alternatives consistent with property use without restriction should be considered to compare life-cycle institutional control costs with more conservative clean-up alternatives (DAIM-BO, "Army Guidance for Using Institutional Controls in the CERCLA Process").

Remedial action objectives are specific goals to protect human health and the environment; they specify the contaminant(s) of concern, the exposure route(s), receptor(s), and acceptable contaminant level(s) for each exposure route. These objectives are based on risk levels established in the risk assessment and comply with ARARs to the greatest extent possible. A list of ARARs is provided in **Appendix E**. The remedial action objectives for the SEAD-16 and SEAD-17 operable unit are as follows:

- Prevent public or other persons from direct contact with adversely impacted soils, sediments, solid waste and surface water that may present a health risk.
- Eliminate or minimize the migration of hazardous constituents from soil to groundwater.
- Prevent ingestion of groundwater containing constituents in excess of federal and state drinking water standards or criteria, or which pose a threat to public health.
- Prevent off-site migration of constituents above levels protective of public health and the environment.
- Restore groundwater, soil, surface water, and sediments to levels that are protective of public health and the environment.

Remediation goals were developed for soil and building materials at SEAD-16 and SEAD-17. The cleanup goals for surface, subsurface, and ditch soils for SEAD-16 and SEAD-17 are presented in **Table 8-1**. Lead was selected as the indicator metal for soil since the presence of lead is the most geographically dispersed over the site and by remediating lead-contaminated soil, other compounds that contribute risk will also be remediated. The cleanup goal for lead is 1250 mg/Kg based on the future industrial use scenario. Cleanup goals were also derived for antimony, copper, mercury, thallium, and zinc for the industrial future use scenario.

Three other lead cleanup goals were also evaluated and include 1000 mg/Kg for the future industrial use scenario, 400 mg/Kg (plus TAGM levels for other metals) for the pre-disposal scenario, and 400 mg/Kg for the residential scenario. Cleanup goals were also derived for antimony, copper, mercury, thallium, and zinc for the residential future use scenario. Most exceedances of these five metals are co-located with the lead exceedances.

Although lead was found in the site soils and ditch soils at both sites, it was not included in the risk assessment since no allowable reference dose (RfD) value is available for lead. However, based on discussions between the USEPA, NYSDEC, and the Army, a cleanup level of 1250 mg/Kg for lead at these sites was proposed (September 14, 1998 letter from the Army to USEPA and NYSDEC). This value was derived in accordance with the publication "Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil" (USEPA, December 1996). This publication suggests a range of lead cleanup levels (750 ppm to 1750 ppm) that may result in an acceptable residual risk under an industrial use scenario. Based on discussions held at a BRAC Cleanup Team (BCT) meeting as well as several correspondences between the Army, NYSDEC, and USEPA, the Army has proposed adopting the midpoint of this range (1250 mg/Kg) as the industrial soil cleanup goal at SEAD-16 and SEAD-17.

There are some soil concentrations of antimony, copper, mercury, thallium, and zinc that exceed NYSDEC's TAGM cleanup objectives outside the proposed 1250 mg/Kg lead cleanup areas at SEAD-16 and SEAD-17. To address this, maximum metal concentrations were calculated for the five above-mentioned metals for the future industrial use scenario. The receptor used for the industrial scenario was a day-care child. The day-care child receptor was included in the future industrial use scenario as requested by the USEPA based on the fact that other day care centers had been present at SEDA. Maximum metal concentrations were calculated by assigning the total hazard index (HI) of the five metals as 1. The HI was distributed among the five metals according to the post-remediation HI for ingestion of surface soil by a day-care-child at SEAD-16. Results indicate that metal concentrations of 18 mg/Kg, 359 mg/Kg, 539 mg/Kg, 2.69 mg/Kg, and 3.59 mg/Kg for antimony, copper, zinc, mercury, and thallium, respectively, will not pose unacceptable risks for the future industrial use scenario. Although soil concentrations of other metals, such as arsenic and cadmium, exceeded the exposure point concentrations (EPCs) outside the proposed lead cleanup areas, the exceedances were not significant and were not as pervasive as the above five metals. Therefore, the delineated area for lead cleanup concentrations of 1250 mg/Kg has been expanded to include areas where concentrations of the other five metals exceed the above-mentioned levels for the future industrial use scenario.

Hotspot removal will be conducted at SEAD-16 and SEAD-17. The locations include the area between the northwest corner of Building S-311 at SEAD-16 and the railroad tracks (soil sampling locations SS16-1 and SB16-4); soil sampling locations SS16-35 and SS16-31, which are located adjacent to the railroad tracks; and the area around soil sampling location SS17-10. Hotspot removal will only be incorporated to the extent that the railroad tracks are not disrupted. The areas will be excavated to a depth of 12 inches and backfilled with clean soil. No confirmatory sampling will be conducted.

Five metals (antimony, barium, lead, mercury, and thallium) in soil and sediment/soil found in the ditches pose potential risks to the deer mouse after remediation to the above cleanup levels. The hazard quotients (HQ) are very close to the soil HQs calculated using site background concentrations, therefore, soil is not expected to pose significant adverse effects to the environment after remediating soils with lead concentration exceeding 1250 mg/Kg. In addition, there are no endangered or threatened species in the vicinity that are likely to be dependent on or affected by the habitat at the site. The area of the site is small, the habitat it provides appears to be relatively low in diversity and productivity, and the future land use of the site is intended to be industrial, therefore, in general, the proposed soil cleanup goal of 1250 mg/Kg will be protective of the environment. A Completion Report, which will demonstrate that the remedial actions are protective of human health and the environment in an industrial future use scenario, will be submitted after the remedial actions have been conducted.

**Soil with lead concentration exceeding 1000 mg/Kg**

In addition to the proposed soil cleanup goal of 1250 mg/Kg, cost associated with the remediation of lead to a concentration of 1,000 mg/Kg was also estimated. This concentration level is associated with the NYSDOH guidelines for industrial use. As discussed above, the remediation area was expanded to include soil with metal concentrations of antimony, copper, zinc, mercury, and thallium exceeding 18 mg/Kg, 359 mg/Kg, 539 mg/Kg, 2.69 mg/Kg, and 3.59 mg/Kg, respectively.

**Soil with lead concentration exceeding 400 mg/Kg**

In addition to the previous two soil cleanup levels, the cost associated with the remediation of lead to a concentration of 400 mg/Kg was also evaluated. Risk-based concentrations for the 5 additional metals (i.e., antimony, copper, zinc, mercury, and thallium) that are protective of a residential child under a residential use scenario were also calculated from a risk HI of 1 and considered in the delineation of the area to be remediated. The remediation area was delineated to include soil with metal concentrations of antimony, copper, zinc, mercury, and thallium exceeding 12.8 mg/Kg, 256 mg/Kg, 385 mg/Kg, 1.92 mg/Kg, and 2.56 mg/Kg, respectively, to ensure that there will be no unacceptable risk to future residential receptors by ingestion of site soil.

**Soil with lead concentration exceeding 400 mg/Kg (plus TAGM for other metals)**

New York State regulations establish a goal for site remediation to "restore the site to pre-disposal conditions, to the extent feasible and authorized by law." In accordance with this regulation, costs associated with the remediation of lead to pre-disposal conditions were also estimated. To comply with the pre-disposal conditions, the lead in soil would be remediated to a concentration of 400 mg/Kg. This concentration is based on the USEPA's Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities, 1994 and is the USEPA's default value for the residential use scenario. The remediation of all other metals would comply with NYSDEC TAGM values.

The decision to accept the residential use or pre-disposal scenario clean-up goal would be considered if the cost comparison showed that the additional cost to achieve lower cleanup level was affordable, in the opinion of the Department of Defense. The pre-disposal scenario for one remediation alternative was also evaluated against the nine evaluation criteria in **Appendix A** of the PRAP.

**Soil in Ditches**

The soil found in the ditches does not support an aquatic ecosystem, nor does it provide quality habitat for benthic organisms. There is no unacceptable human health risk by ingestion of or dermal contact with the on-site ditch soil. Therefore, the cleanup goal for the ditch soils will be the same as that for the surface and subsurface soils, which is 1250 mg/Kg for lead.

**Building Material and Debris**

The material and debris in Buildings S-311 and 366, which are both located at SEAD-16, is a media of concern. This is based on the human health risk associated with the ingestion of and dermal contact with indoor dust by a future industrial worker. In addition, metals, SVOCs, and nitroaromatics were detected above the respective TAGM values in the building samples collected from both buildings. Asbestos was detected at 13 locations in the two buildings in materials including pipe insulation, roofing material, and floor tiles. The remedial action objective is to remediate the buildings to reduce the risk for a future industrial worker.

## 9.0 DESCRIPTION OF ALTERNATIVES

CERCLA requires that each selected site remedy be protective of human health and the environment, be cost effective, comply with other statutory laws, and use permanent solutions, alternative treatment technologies, and resource recovery options to the maximum extent possible. In addition, the statute includes a preference for the treatment as a principal element for the reduction of toxicity, mobility, or volume of the hazardous substances.

Six remedial alternatives were identified for SEAD-16 and SEAD-17. These remedial alternatives consider SEAD-16 and SEAD-17 as one unit and have been evaluated as such. The alternatives, along with the technologies and processes that make up each alternative, are:

- Alternative 1: No-Action.
- Alternative 2: On-Site Containment (Institutional controls/Soil Cover).
- Alternative 3: In-Situ Treatment (Consolidate/In-situ stabilization/Soil Cover).
- Alternative 4: Off-Site Disposal (Excavate/Stabilize/ Off-site Disposal).
- Alternative 4P: Off-Site Disposal under Pre-Disposal Condition.
- Alternative 5: On-Site Disposal (Excavate/On-site stabilization/On-site Subtitle D Landfill).
- Alternative 6: Ex-Situ (Innovative) Treatment (Excavate/Wash/Backfill coarse fraction/Treat and dispose fine fraction/Treat and dispose fine fraction in off-site Subtitle D Landfill).

As requested by NYSDEC and to comply with the Army guidance (see Section 8 above), the unrestricted use condition was also evaluated for Alternative 4 to weigh the advantages of restoring the site to pre-disposal conditions versus the cost that this would incur. The full details of the evaluation of this alternative (Alternative 4P) were presented in Appendix A of the PRAP. This additional evaluation was conducted only for Alternative 4 to avoid the redundancy of evaluating each alternative multiple times.

All alternatives for SEAD-16 and SEAD-17 include land use controls as part of the remedy. The goals of the land use controls are to ensure adequate protection of human health and the environment, and to preserve and promote the long-term effective operation of remedial alternatives proposed for the sites. Types of land use controls may include deed restrictions, physical controls such as signs, and prevention of the use of groundwater as drinking water. A public water supply is available at the Depot, thus a groundwater restriction should have minimal impact on land reuse of the site. Alternative 4P includes institutional controls to prevent the use of groundwater until the NYSDEC GA standards are met.

**Alternative 1 – No Action**

Alternative 1 is the No Action alternative. This alternative allows the site to remain as it currently is, with no further consideration given to any remedial action.

**Alternative 2 – On-Site Containment**

Alternative 2 consists of installing institutional controls, excavating soils found in the drainage swales with lead concentration greater than 1250 mg/kg, disposing of the soil in an off-site landfill, backfilling the excavated drainage ditches with clean fill, and placing a clean soil cover over surface and subsurface soils with lead concentrations greater than 1250 mg/kg.

Excavated ditch soil will be stockpiled and tested by the Toxicity Characteristic Leaching Procedure (TCLP) prior to being disposed. Ditch soil passing the TCLP criteria will be transported and disposed of in a Subtitle D landfill. Ditch soil exceeding the TCLP criteria will be stabilized either on-site or off-site. Stabilization involves mixing an additive such as cement, quick lime, flyash, pozzolans, or a proprietary agent with the soil. Because of the relatively small volume of ditch soil to be treated at SEAD-16 and SEAD-17, it is expected that off-site treatment will be more cost effective than on-site treatment. On-site treatment of excavated ditch soils would require a treatability study, site permitting, and a specialty contractor, which would increase the cost. Therefore, for screening purposes, this alternative assumes that all excavated ditch soil is transported off-site for both treatment and disposal. It should be noted that TCLP is not a cleanup level, rather it determines whether the soils are a characteristic waste and the type of disposal the waste requires.

Material and debris from Buildings S-311 and 366 will also be removed, stockpiled, and tested for TCLP prior to being disposed. Material passing the TCLP criteria will be transported and disposed off-site in a Subtitle D landfill. Material exceeding the TCLP criteria will be stabilized either on-site or off-site. Debris and dust will also be removed from the surface of the furnace and boiler stacks and disposed and stabilized as appropriate.

A soil cover will be placed over the surface and subsurface soil areas with lead concentrations greater than 1250 mg/Kg. The soil cover will consist of the following, from top to bottom:

- 6 inches topsoil
- 6 inches common fill
- Filter fabric (i.e. separation layer)

Regrading of the site and installation of institutional controls (such as signage and possibly a groundwater use restriction) will be required prior to placement of the soil cover. Drainage swales and ditches will be backfilled to existing grade with topsoil and vegetative growth will be established.

The intent of this alternative is to isolate the waste from receptors and to prevent migration of surface soil to surface water via soil erosion. This alternative has little effect in preventing groundwater deterioration from potential contaminant leaching from soil. However, groundwater quality is not expected to exceed USEPA MCL or NYS GA standards for groundwater in the future. This alternative may also limit the future land use. Long-term groundwater monitoring and O & M will be required.

**Alternative 3 – In-Situ Treatment**

Alternative 3 consists of in-situ stabilization of the surface and subsurface soils with lead concentrations greater than 1250 mg/Kg. Ditch soil with lead concentrations greater than 1250 mg/Kg will be excavated from the drainage swales and ditches, consolidated with the soils, and stabilized. The stabilized material will be graded and left on site. The soil cover used in Alternative 2 will be placed over the stabilized material and a vegetative cover will be established. Drainage swales and ditches will be backfilled with topsoil and vegetative growth will be established.

Stabilization is a process that reduces the amount of leachate from the source material into the groundwater. A treatability-testing program is necessary to identify the most effective additive and dosage.

Material and debris from Buildings S-311 and 366 will be removed, stockpiled and tested for TCLP prior to being disposed. Material passing the TCLP criteria will be transported and disposed of in a Subtitle D landfill. Material exceeding the TCLP criteria will be stabilized either on-site or off-site. Stabilization involves mixing an additive such as cement, quick lime, flyash, pozzolans, or a proprietary agent with the soil. Debris and dust will also be removed from the surface of the furnace and boiler stacks and disposed and stabilized as appropriate.

The intent of this alternative is to stabilize the source material to reduce migration into the groundwater; to isolate the waste from receptors; and to prevent migration of surface soil to surface water via soil erosion. Institutional controls are an element of this alternative. Long-term groundwater monitoring and O & M will be required.

### Alternative 4 – Off-Site Disposal

Alternative 4 involves excavating surface, subsurface and ditch soils with lead concentrations greater than 1250 mg/Kg, and disposing the excavated material in an off-site landfill (**Figures 2 and 3**). Excavated soil and ditch soil will be stockpiled and tested prior to being transported off-site for disposal. Excavated material passing the TCLP criteria will be transported and disposed of in a Subtitle D landfill. Excavated soil and ditch soil that exceeds the TCLP criteria will be stabilized either on-site or off-site. Stabilization processes are described above. Based on conversations with stabilization contractors, it is expected that off-site treatment may be more cost effective than on-site treatment. Therefore, for screening purposes and for conservative cost comparison purposes, this alternative assumes all excavated soil is transported off-site for both treatment and disposal.

Material and debris from Buildings S-311 and 366 will also be removed, stockpiled and tested for TCLP prior to disposal. Material passing the TCLP criteria will be transported and disposed of in a Subtitle D landfill. Material exceeding the TCLP criteria will be stabilized either on-site or off-site. Debris and dust will also be removed from the surface of the furnace and boiler stacks and disposed and stabilized as appropriate.

Excavated areas will be backfilled to restore the area to original conditions and to provide proper storm water control. Common fill and topsoil will be placed and vegetative growth will be established. The intent of this alternative is to remove the waste from the site to prevent contact with receptors and migration to surface water and groundwater. Institutional controls are an element of this alternative. Long-term groundwater monitoring will be necessary; however, long-term operations and maintenance will not be required.

### Alternative 4P – Off-Site Disposal under Pre-Disposal Scenario

Alternative 4P addresses future unrestricted use of SEAD-16 and SEAD-17, which would restore the sites to the pre-disposal condition, even though the intended future use of the sites is industrial. Restoring the sites to the pre-disposal condition is in accordance with 6 NYCRR 375-1.10, which establishes a goal for site remediation to "restore the site to pre-disposal conditions, to the extent feasible and authorized by law." As a result, in order to be protective of human health under a residential scenario, the cleanup goals for soil have been revised to 400 mg/Kg for lead and TAGM values for the five metals, antimony, copper, mercury, thallium, and zinc. This alternative would be implemented in exactly the same manner as Alternative 4, except that the excavation volume would increase. This alternative would include excavating surface, subsurface, and ditch soils with lead concentrations greater than 400 mg/Kg and concentrations of the other five metals at levels exceeding their respective TAGM value, and disposing the excavated material in an off-site landfill.

Excavated soils would be stockpiled and tested prior to being transported off-site for disposal. Excavated soils and ditch soils that exceed the TCLP limits will be stabilized prior to disposal.

Institutional controls are an element of this alternative. Long-term groundwater monitoring will be necessary; however, long-term operations and maintenance will not be required.

**Alternative 5 – On-Site Disposal**

Alternative 5 involves excavating surface, subsurface, and ditch soils with lead concentration greater than 1250 mg/Kg, and disposing the excavated material in a newly constructed on-site Subtitle D landfill. Excavated soil and ditch soil will be stockpiled and tested prior to being transported for on-site disposal. Excavated soils and ditch soils that exceed the TCLP limits will be stabilized on-site prior to disposal in the on-site landfill.

Material and debris from Buildings S-311 and 366 will also be removed, stockpiled and tested for TCLP prior to being disposed of in the on-site landfill. Material passing the TCLP criteria will be transported and disposed of in the on-site Subtitle D landfill. Material exceeding the TCLP criteria will be stabilized on-site. Debris and dust will be removed from the surface of the furnace and boiler stacks.

Excavated areas will be backfilled with common fill and topsoil, and vegetative growth will be established. The intent of this alternative is to remove the waste from the site to prevent contact with receptors and migration to surface water and groundwater. Long-term groundwater monitoring will be necessary; however, long-term operations and maintenance will not be required for the excavated areas.

The on-site landfill will be located at SEDA and constructed to meet the requirements of a Subtitle D landfill according to the USEPA and NYSDEC, identified in 6 NYCCR Part 360. Siting studies and permitting are required prior to construction of the landfill. Primary design components of the landfill include a double composite bottom liner system, leachate collection system, cover system, gas vent system, erosion control, and storm water system. As defined in 6 NYCRR 360-2.13, a composite liner consists of "two components, an upper geomembrane liner placed directly above a low permeability soil layer." The soil component of the upper liner must have a minimum compacted thickness of 18 inches. The soil component of the lower liner must have a minimum compacted thickness of 24 inches, and a maximum permeability of $1 \times 10^{-7}$ cm/s. There are also a number of compaction, construction, and slope requirements.

Institutional controls are an element of this alternative. Long-term groundwater monitoring and O & M would be required for the landfill.

**Alternative 6 – Innovative Treatment – Soil Washing**

Alternative 6 involves excavating soil in drainage swales and ditches with lead concentrations greater than 1250 mg/Kg, excavating surface and subsurface soils with lead concentrations greater than 1250 mg/Kg, stockpiling the material, and washing it to separate the coarse fraction of soil from the fine fraction. The coarse fraction will be backfilled as clean fill, provided it meets remedial action objectives. The fine fraction is expected to contain the majority of the target constituents of concern, e.g., lead, and can be further treated for off-site disposal, if necessary.

Material and debris from Buildings S-311 and 366 will also be removed, stockpiled and tested for TCLP prior to being disposed. Debris and dust will also be removed from the surface of the furnace and boiler stacks and disposed and stabilized as appropriate.

Treatment of the fine fraction to remove any toxicity characteristics, if necessary, can be performed on-site or off-site. On-site treatment can include stabilization, acid leaching, or other methods. However, because of the relatively small volume of fine grain material to be treated, it is expected that off-site treatment will be more cost-effective than on-site treatment. Therefore, for screening purposes presented later in this section, this alternative assumes all treatment of the fine grain material is performed off-site.

Soil washing has been identified as an effective technology because the site soils are made-up of a large quantity of coarse particles (crushed shale imported from a SEDA borrow pit) and a small quantity of fine particles (soil particles less than the #200 sieve). Based on several grain size distribution curves, the fine fraction in the site soil varies from 24 to 67 percent with median of approximately 36 percent. The fine fraction in ditch soil varies from 5 to 95 percent with median of approximately 56 percent. The inorganic constituents tend to bind chemically or physically to the fine-grained particles. The fine-grained particles, in turn, are attached to sand and gravel particles by physical processes, primarily compaction and adhesion. The washing process separates the smaller fine-grained fraction from the larger coarse-grained fraction and thus effectively separates chemical constituents into a smaller volume, which can then be further treated or disposed. The clean, coarse fraction can be used as clean backfill. The fine fraction can either be transported off-site for treatment and off-site disposal or treated further to remove the inorganic components and then off-site disposal. The water associated with the process is collected and treated.

The technology of soil washing varies from vendor to vendor and may consist of varying combinations of physical and chemical separation unit operations including the following:

Physical Separation Unit Operations

- dry screening (grizzly screen)
- dry screening (vibratory screen)
- dry trommel screen
- wet sieves
- attrition scrubber (wet)
- dense media separator (wet)
- hydrocyclone separators
- flotation separator
- gravity separators
- dewatering equipment
- clarifiers
- filter presses

Chemical Extraction Unit Operations

- wash water treatment/recycle
- residual treatment and disposal
- treated water discharge

Institutional controls are an element of this alternative and are discussed in the beginning of this section. Long-term groundwater monitoring will be necessary; however, long-term operations and maintenance will not be required.

## 10.0 SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

In selecting a remedy, several factors set out in CERCLA § 121, 42 U.S.C. §9621 were considered. Based on these specific statutory mandates, the NCP, Title 40 CFR §300.430(e)(9) and OSWER Directive 9355.3-01, present nine evaluation criteria to be used in assessing the individual alternatives.

CERCLA §121(b)(1), 42 U.S.C. §9621(b)(1), mandates that a remedial action must be protective of human health and the environment, cost effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Section 121(b)(1) also establishes a preference for remedial actions that employ, as a principal element, treatment to permanently and significantly reduce the volume, toxicity, or mobility of the hazardous substances, pollutants and contaminants at a site. CERCLA §121(d), 42 U.S.C. §9621(d), further specifies that a remedial action must attain a level or standard of control of the hazardous substances, pollutants, and contaminants, which at least attains ARARs under federal and state laws, unless a waiver can be justified pursuant to CERCLA §121(d)(4), 42 U.S.C. §9621(d)(4).

A detailed alternative analysis using the nine evaluation criteria was performed to select a site remedy. This section presents a summary of the comparison of each alternative's strengths and weaknesses with respect the nine evaluation criteria. Because this ROD addresses alternatives for both SEAD-16 and SEAD-17 as a combined unit, the evaluation discussion is presented jointly.

### 10.1 SUMMARY OF EVALUATION CRITERIA

The nine criteria are summarized as follows:

Threshold Criteria - The following two threshold criteria must be met for the alternatives to be eligible for selection in accordance with the NCP:

1. **Overall protection of human health and the environment** addresses whether or not remedy provides adequate protection and describes how risks posed through each exposure pathway are eliminated, reduced, or controlled through treatment, engineering controls, or institutional controls.
2. **Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)** addresses whether a remedy will meet all of the ARARs of other federal and state environmental laws and/or will provide grounds for invoking a waiver.

Primary Balancing Criteria - Once an alternative satisfies the threshold criteria, the following five criteria are used to compare and evaluate the elements of the alternative.

1. **Long-term effectiveness and permanence** addresses the criteria that are used to assess alternatives for the long-term effectiveness and permanence they afford, along with the degree of certainty that they will prove successful.
2. **Reduction of toxicity, mobility, or volume through treatment** addresses the degree to which alternatives use recycling or treatment that reduces toxicity, mobility, or volume, including how treatment is used to address the principle threats posed by the site.
3. **Short-term effectiveness** addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed during the construction and implementation period, until the cleanup goals are achieved.
4. **Implementability** addresses the technical and administrative feasibility of a remedy, including the availability of materials and services to implement a particular option.
5. **Cost** includes estimated capital, operation and maintenance (O&M), and present-worth costs.

Modifying Criteria - The modifying criteria are used in the final evaluation of remedial alternatives generally after the lead agency has received public comment on the RI/FS and Proposed Plan.

1. **State acceptance** addresses the state's position and key concerns related to the Selected Remedy and other alternatives, and the state's comments on ARARs or the proposed use of waivers. State acceptance of the preferred alternative will be addressed in the Record of Decision following review of the State comments received on the RI/FS Report and the PRAP.
2. **Community acceptance** addresses the public's general response to the alternatives described in the Proposed Plan and RI/FS. Community acceptance of the preferred alternative will be assessed in the Record of Decision following review of the public comments received on the RI/FS and the PRAP.

The assembled alternatives were screened as described in the USEPA guidance.

## 10.2 ALTERNATIVES EVALUATION PROCESS

Each of the six proposed remedial alternatives was initially evaluated using a two-step screening process to reduce the number of alternatives that would undergo detailed assessment versus the identified criteria. The first step was to evaluate the alternatives against the two remedy selection threshold factors (overall protection of human health and the environment; ARAR compliance) for a pass/fail/waiver decision. In the second step, the retained alternatives were evaluated against the five primary balancing criteria (long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; cost). This initial evaluation is a general and qualitative screening.

During the performance of the second step, each of the six alternatives was evaluated on the basis that the future land use of SEAD-16 and SEAD-17 was planned industrial development. This future use of the sites was identified by the community representative group, the Local Redevelopment Authority, during the BRAC process. The results of preliminary screening and alternative evaluations are presented below.

**Results of Preliminary Alternatives Screening**

Alternative 1, No Action, is the only alternative that will not comply with the two threshold factors (overall protection of human health and the environment; ARAR compliance) evaluated in Step 1. It was, however, retained to provide a baseline comparison with other alternatives throughout the screening process. The Step 2 analysis assigned a score to each alternative for each balancing criteria discussed above. These scores, as well as the total scores are shown in **Table 10-1**. As a result of this portion of the two-step process, Alternatives 3 and 5 received the lowest total scores and were screened out. The remaining four alternatives (Alternatives 1, 2, 4, and 6) were retained for a more detailed analysis and assessment.

## 10.3 DETAILED ANALYSIS OF ALTERNATIVES

Individual discussions of the four alternatives with respect to the seven of the nine evaluation criteria (i.e., overall protection of human health and the environment; ARAR compliance; long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; and cost) are presented below. Discussions of the State and community acceptance of the proposed alternatives are being developed under the community involvement process that is underway under the PRAP.

The proposed future use for SEAD-16 and SEAD-17 was identified as industrial by the community representative group, the Local Redevelopment Authority, during the BRAC process. The four retained alternatives have been screened based on the intended industrial/commercial use scenario, which has a proposed cleanup level for lead of 1250 mg/Kg. This scenario also has identified cleanup levels for five other metals (i.e., antimony, copper, zinc, mercury, and thallium). Additionally, costs for each of the retained alternatives have been estimated for the three other cleanup levels combinations describe earlier as follows.

- lead concentrations exceeding 1000 mg/Kg plus concentrations for the five other metals exceeding risk-based levels for the future industrial use scenario;
- lead concentrations exceeding 400 mg/Kg plus concentrations for the other five metals at risk-based levels derived for a residential child; and

- lead concentrations exceeding 400 mg/Kg plus concentrations of other metal exceeding TAGM values.

These additional cleanup levels are based on the NYSDOH guidelines for industrial use (1000 mg/Kg lead) and the State of New York requirements and Army guidance that future unrestricted use be considered. To avoid redundancy in evaluating each alternative four separate times, typically only the costs associated with achieving the varying cleanup goals were evaluated for each of the four remaining alternatives (except Alternative 4P). Thus, the alternative evaluation of criteria, exclusive of cost, was evaluated only for the proposed 1250 mg/Kg lead cleanup level. Costs anticipated for each of the remaining alternatives to satisfy each of the four identified cleanup goals were also assessed and are summarized. The cost associated with each specific cleanup goal is presented in **Table 10-2.**

The unrestricted use alternative was evaluated as Alternative 4P in order to weigh the advantages of restoring the sites to pre-disposal conditions versus the cost that this would incur. The evaluation of the unrestricted use alternative was conducted for only one of the four remedial alternatives. The details of this evaluation are summarized below.

**Alternative 1: No-Action Alternative**

The Superfund program requires that the "No-Action" option be considered as a baseline for comparison of other options. There are no costs associated with the no-action option. The no-action option means that no remedial activities will be undertaken at the site. No monitoring or security measures will be undertaken. Any attenuation of the threats posed by the site to human health and the environment will be the result of natural processes. Current security measures will be eliminated or modified so that the property may be transferred or leased as appropriate.

**Alternative 2: On-Site Containment**

Capital Cost Range: \$913,900 - \$1,898,360
O & M Cost: \$40,400 – ditch soil sampling and semi-annual groundwater monitoring + \$5000-\$7000 (cover maintenance)
Present Worth Cost: \$1,699,648 - \$2,735,984
Construction Time: 2 to 7 months depending on location of stabilization activities.

Alternative 2 consists of removing, testing, and disposing off-site the SEAD-16 building debris; installing institutional controls; excavating soils found in the drainage swales with lead concentrations greater than 1250 mg/Kg; disposing excavated ditch soils in an off-site landfill; and placing a clean soil cover over surface and subsurface soils that contain lead concentrations greater than 1250 mg/Kg and concentrations of five other metals (antimony, copper, zinc, mercury, and thallium) at levels above industrial scenario thresholds.

Excavated ditch soil exceeding the TCLP criteria will require stabilization. If the material is stabilized off-site, the ditch soil will be transported off-site, stabilized, and disposed in an appropriate landfill. Stabilization involves mixing an additive with the soil to fix the metals. If on-site stabilization is used, ditch soil will be transported to a temporary facility, such as a pug mill, and mixed with the selected additive(s). The stabilized ditch soil can be either discharged directly into trucks for transport to a landfill or to a stockpile area for TCLP testing. TCLP testing will be performed on the stabilized material at a rate required by the landfill accepting the waste.

This alternative requires an area sufficient for the pug mill (if on-site stabilization is used) and stockpiles for the excavated material as well as the soil cover material. It is estimated that the pug mill and stockpile area will be located adjacent to the unnamed road between SEAD-16 and -17. This will provide a central location for the dump trucks to transport the excavated ditch soil to the stockpile area.

If treatment is conducted off-site, trucks will be loaded directly from the stockpiles, once TCLP test results are received. A small staging area and equipment decontamination area will be set up as necessary.

Both short- and long-term protectiveness of human health is provided with Alternative 2 because it will prevent ingestion of and direct contact with surface soils and ditch soils containing lead concentrations over 1250 mg/Kg (as well as five other metals above calculated risk-based levels). This will reduce risk from soil and ditch soil, as well as building material and debris, to acceptable levels. The ditch soils with lead concentrations above 1250 mg/Kg will be removed, which will meet the remedial action objectives for ditch soil and prevent contamination downgradient in Kendaia Creek. Although Alternative 2 will leave contaminated soil in place, which does not protect groundwater from deterioration, groundwater is not expected to exceed relevant standards in the future for the metals of concern. Therefore, Alternative 2 will protect human health and the environment, however, it may restrict future use of the land.

Measures will be taken to ensure protection to the community and site workers during the remedial action. Environmental impacts to the site during the remedial action will not be substantially different from the current activities. In addition, since the hazardous material is primarily in the soil, there is little or no risk of a spill or release during the remedial action.

There are currently no chemical specific ARARs for soil and ditch soil. According to modeling results, groundwater is not estimated to exceed ARARs in the future, even with no action. Off-site disposal will fall under RCRA requirements, which must be complied with in the final remedial action plan. Alternative 2 does not preclude compliance with ARARs.

The remedial action would be considered permanent upon completion of the ditch soil excavation and placement of the soil cover. The long-term management of the excavated material will be the responsibility of the selected off-site landfill.

Alternative 2 would be effective in reducing the toxicity and mobility of the hazardous constituents present in the ditch soil and the material from SEAD-16 buildings if the material was treated to eliminate hazardous characteristics. The soil cover will contain the surface and subsurface soil and prevent migration of soil to surface water via erosion, thus reducing the mobility of contaminated soil. The toxicity and volume of the contaminated surface and subsurface soil, however, are not affected or reduced.

The excavated ditch soil will be treated in order to meet the TCLP criteria prior to disposal. The treated material will no longer be hazardous and will exhibit lower toxicity than the untreated waste. By disposing the stabilized ditch soil in a landfill, the mobility of the hazardous constituents will also be decreased. The stabilized ditch soil will have a larger volume than the untreated ditch soil, but the stabilized ditch soil will no longer be a hazardous waste.

Alternative 2 is technically feasible to complete. It involves routine earth moving work including excavation, stockpiling, transportation, and backfilling. The remediation areas have already been initially delineated.

The ditch soil that fails the TCLP criteria will require stabilization. Stabilization is a technology that has been frequently used to treat similar material, and it is not anticipated that problems will be encountered during construction. If on-site stabilization is used, a treatment study will be necessary to establish the optimal additive and dosage and a specialty contractor will perform the work, most likely using a pug mill. The additives will be properly monitored to assure proper dosage. The stabilized material will be tested to assure that it meets the TCLP criteria. If off-site treatment is conducted, most of the TSD facilities in the region have accepted similar wastes for a number of years. These facilities are capable of treating and disposing of the site soils.

Another aspect of technical feasibility is the ease with which additional work may be conducted. At this time, it is anticipated that this remedial action will preclude the necessity of any additional remedial efforts at these sites. However, if additional work were required, the soil cover integrity and the underlying soil would need to be considered as part of the remedial action.

The administrative feasibility of this alternative is also very good. Landfills that may be used are fully permitted for disposal and stabilization. Any necessary construction, excavation, or hauling permits or manifests are readily attainable by experienced contractors.

Alternative 2 relies primarily on standard construction equipment that is readily available in the Romulus area. The equipment includes backhoes, bulldozers, front-end loaders, and standard size dump trucks. Backfill material, such as common fill, topsoil, and filter fabric is readily available in the Romulus area. If on-site stabilization is performed, a pug mill will most likely be used. Several landfills have been identified that are capable of accepting the ditch soil for disposal.

The three major costs for this alternative are excavation and disposal, construction of soil cover, and groundwater monitoring. Costs are also included for cover maintenance.

**Alternative 4: Off-Site Disposal**

Capital Cost Range: $2,257,850 - $7,305,090
O & M Cost: $40,400 – ditch soil sampling and semi-annual groundwater monitoring
Present Worth Cost: $2,957,138 - $8,004,378
Construction Time: 2 to 8 months depending on location of stabilization activities

Alternative 4 includes removing, testing, and disposing off-site the SEAD-16 building debris; excavating surface and subsurface soils with lead concentrations greater than 1250 mg/Kg (and five other metals above risk-based levels); and disposing the excavated material in an off-site landfill. The excavation of soils would extend up to the railroad tracks and would not disrupt the railroad tracks. Excavated ditch soil and soil would be stockpiled and tested prior to being transported off-site for disposal. Excavated soils and ditch soils that exceed the TCLP limits will be stabilized prior to disposal.

Soils exceeding the TCLP criteria require stabilization. If the material is stabilized off-site, the soil will be transported off-site, stabilized, and disposed in an appropriate landfill. Stabilization involves mixing an additive agent with the soil. If on-site stabilization is used, soils will be transported to a temporary facility, such as a pug mill, and mixed with the selected additive(s). The stabilized soil can be either discharged directly into trucks for transport to a landfill or to a stockpile area for TCLP testing. TCLP testing will be performed on the stabilized material at a rate required by the landfill accepting the waste.

This alternative requires an area sufficient for the pug mill (if on-site stabilization is used) and stockpiles. It is estimated that the pug mill and stockpile area will be located adjacent to the unnamed road between SEAD-16 and -17. This will provide a central location for the dump trucks to transport the excavated soil to the stockpile area.

If treatment is conducted off-site, trucks will be loaded directly from the stockpiles, after receiving the TCLP test results. A small staging area and equipment decontamination area will be set up as necessary.

Both short- and long-term protectiveness of human health and environment is provided with Alternative 4 because it protects against ingestion of and direct contact with surface soils and ditch soils having concentrations of lead above 1250 mg/Kg (and five other metals above risk-based values). The ditch soils with concentrations of lead above 1250 mg/Kg will be removed, which will meet the remedial action objective for ditch soil and prevent contamination downgradient in Kendaia Creek. Measures will be taking to ensure protection to the community and site workers during the remedial action. Environmental impacts to the site during the remedial action will not be substantially different from the current activities. In addition, since the hazardous material is primarily in the soil, there is little or no risk of a spill or release during the remedial action.

Similar to Alternative 2, Alternative 4 does not preclude compliance with ARARs.

Once the excavated soil and ditch soil are removed from the site, the remedial action would be considered permanent. The long-term management of the excavated material will be the responsibility of the selected off-site landfill.

Alternative 4 would be effective in reducing the toxicity and mobility of the hazardous constituents present in the soil and ditch soil at the site. The material and debris from SEAD-16 buildings will be removed, as will the soil and ditch soil exceeding the proposed cleanup levels. Since some of the excavated soil and ditch soil must be treated prior to disposal in order to meet the TCLP criteria, the treated material will no longer be hazardous and will exhibit lower toxicity than the untreated waste. By transferring the excavated material to a landfill, the mobility of the hazardous constituents will be eliminated. The stabilized soil will, however, have a larger volume than the untreated soil.

Alternative 4 is technically feasible to complete. It involves routine earth moving work, including excavation, stockpiling, transportation, and backfilling. The remediation areas have already been initially delineated.

The excavated material that fails the TCLP criteria will require stabilization. Stabilization is a technology that has been frequently used to treat similar soils, and it is not anticipated that problems will be encountered during construction. If on-site stabilization is used, a treatment study will be necessary to establish the optimal additive and dosage and a specialty contractor will perform the work, most likely using a pug mill. The additives will be properly monitored to assure proper dosage. The stabilized material will be tested to assure that it meets the TCLP criteria. If off-site treatment is conducted, most of the TSD facilities in the region have accepted similar wastes for a number of years. These facilities are capable of treating and disposing of the site soils.

Another aspect of technical feasibility is the ease with which additional work may be conducted. At this time, it is anticipated that this remedial action will preclude the necessity of any additional remedial efforts at SEAD-16 and SEAD-17. However, if additional work is required in the future, this remedial action should not interfere in any way. Once the remedial action is complete, the site will be vegetated and will essentially remain as it is now.

The administrative feasibility of this alternative is also very good. Landfills that may be used are fully permitted for disposal and stabilization. Any necessary construction, excavation, or hauling permits or manifests are easily attainable by experienced contractors.

Alternative 4 relies primarily on standard construction equipment that is readily available in the Romulus area. The equipment includes backhoes, bulldozers, front-end loaders, scrapers, and standard size dump trucks. Backfill material, such as common fill and topsoil, is also readily available in the Romulus area. If on-site stabilization is performed, a pug mill will most likely be used. Several landfills have been identified that are capable of accepting the soil and ditch soil for disposal.

The major costs for this alternative are excavation, disposal, and groundwater monitoring.

**Alternative 4P: Off-Site Disposal (Pre-Disposal Scenario)**

Capital Cost: $7,305,090
O & M Cost: $40,400 – ditch soil sampling and semi-annual groundwater monitoring
Present Worth Cost: $8,004,378
Construction Time: 2 to 8 months depending on location of stabilization activities

This alternative would be implemented in exactly the same manner as Alternative 4, except that the excavation volume would increase. Alternative 4P includes removing, testing, and disposing off-site the SEAD-16 building debris; excavating surface and subsurface soils with lead concentrations greater than 400 mg/Kg and antimony, copper, mercury, thallium, and zinc concentrations greater than TAGM; and disposing the excavated material in an off-site landfill. The excavation of soils would extend up to the railroad tracks and would not disrupt the railroad tracks. Excavated ditch soil and soil would be stockpiled and tested prior to being transported off-site for disposal. Excavated soils and ditch soils that exceed the TCLP limits will be stabilized prior to disposal.

Both short- and long-term protectiveness of human health and environment is provided with Alternative 4P because it protects against ingestion of and direct contact with surface soils and ditch soils having concentrations of lead above 400 mg/Kg and concentrations of other metals above TAGM values. The ditch soils with concentrations of lead above 400 mg/Kg and metals above TAGM will be removed, which will meet the remedial action objective for ditch soil and prevent contamination downgradient in Kendaia Creek. Measures will be taken to ensure protection to the community and site workers during the remedial action. Environmental impacts to the site during the remedial action will not be substantially different from the current activities. In addition, since the hazardous material is primarily in the soil, there is little or no risk of a spill or release during the remedial action.

Similar to Alternative 2, Alternative 4P does not preclude compliance with ARARs.

Once the excavated soil and ditch soil are removed from the site, the remedial action would be considered permanent. The long-term management of the excavated material will be the responsibility of the selected off-site landfill.

Alternative 4P would be effective in reducing the toxicity and mobility of the hazardous constituents present in the soil and ditch soil at the site. The material and debris from SEAD-16 buildings will be removed, as will the soil and ditch soil exceeding the proposed cleanup levels. Since some of the excavated soil and ditch soil must be treated prior to disposal in order to meet the TCLP criteria, the treated material will no longer be hazardous and will exhibit lower toxicity than the untreated waste. By transferring the excavated material to a landfill, the mobility of the hazardous constituents will be eliminated. The stabilized soil will, however, have a larger volume than the untreated soil.

Alternative 4P is technically feasible to complete. It involves routine earth moving work, including excavation, stockpiling, transportation, and backfilling. The remediation areas have already been initially delineated.

The excavated material that fails the TCLP criteria will require stabilization. Stabilization is a technology that has been frequently used to treat similar soils, and it is not anticipated that problems will be encountered during construction. If on-site stabilization is used, a treatment study will be necessary to establish the optimal additive and dosage and a specialty contractor will perform the work, most likely using a pug mill. The additives will be properly monitored to assure proper dosage. The stabilized material will be tested to assure that it meets the TCLP criteria. If off-site treatment is conducted, most of the TSD facilities in the region have accepted similar wastes for a number of years. These facilities are capable of treating and disposing of the site soils.

Another aspect of technical feasibility is the ease with which additional work may be conducted. At this time, it is anticipated that this remedial action will preclude the necessity of any additional remedial efforts at SEAD-16 and SEAD-17. However, if additional work is required in the future, this remedial action should not interfere in any way. Once the remedial action is complete, the site will be vegetated and will essentially remain as it is now.

The administrative feasibility of this alternative is also very good. Landfills that may be used are fully permitted for disposal and stabilization. Any necessary construction, excavation, or hauling permits or manifests are easily attainable by experienced contractors.

Alternative 4P relies primarily on standard construction equipment that is readily available in the Romulus area. The equipment includes backhoes, bulldozers, front-end loaders, scrapers, and standard size dump trucks. Backfill material, such as common fill and topsoil, is also readily available in the Romulus area. If on-site stabilization is performed, a pug mill will most likely be used. Several landfills have been identified that are capable of accepting the soil and ditch soil for disposal.

The major costs for this alternative are excavation, disposal, and groundwater monitoring.

**Alternative 6: Innovative Treatment – Soil Washing**

Capital Cost Range: $3,286,010 - $12,111,090
O & M Cost: $40,400 – ditch soil sampling and semi-annual groundwater monitoring
Present Worth Cost: $3,985,298 - 12,810,378
Construction Time: 6 to 11 months (depending on amount of time necessary for treatability studies and soil washing activities)

Alternative 6 involves removing, testing, and disposing off-site the SEAD-16 building debris; excavating surface and subsurface soils with lead concentrations greater than 1250 mg/Kg (and five other metals above risk-based values); stockpiling the soil, soil washing, backfilling on-site the coarse grain material; and disposing the fine grain material in an off-site landfill. The extent of soil excavation will not disrupt the railroad tracks. Fine grain material would be stockpiled and tested prior to disposal. The fine grain material that exceeds the TCLP limits will be treated prior to disposal in a landfill. As with Alternative 4, excavated areas will be backfilled to restore the area to original conditions. Topsoil will be placed and vegetative growth will be established.

Soil is excavated and stockpiled as described in previous sections. This alternative requires an area sufficient for stockpile areas, soil washing equipment and a pugmill (only if on-site treatment is performed.) It is estimated that the stockpile area and the soil washing equipment will be located adjacent to the unnamed road between SEAD-16 and -17. This will provide a central location for the dump trucks to transport the excavated soil to the stockpile area.

A soil washing operation will consist of several or all of the following processes:

- Vibratory screen - This unit separates the feed, and removes oversized (greater than 2-inch diameter) particles.
- Feeder module and conveyor - This unit carries and weighs material fed to the soil washer.
- Trommel screen - This unit breaks up clumped feed materials.
- Attrition scrubber - This unit adds the wash water to the broken up soil. The wash water mobilizes the fine fraction of the soil.

- Hydrocyclone separators - This unit is a solids/liquid separation device which separates the coarse (sand and gravel) soil from the fine (silt and clay) soil.
- Dense media separation column - This unit separates materials based on density, and would be used to separate pieces of munitions, elemental metals and other debris from the soil to be treated.
- Dewatering screen - This unit removes the fine material from the process train. The coarse fraction is rinsed, and removed from the soil washer.
- Wash water treatment system - The spent wash water is treated for reuse or disposal. The type of treatment used is site-specific.
- Belt filter press - This unit dewaters the fine fraction prior to further treatment.

The stockpiled material will be loaded into the soil washing unit with a front-end loader. For SEAD-16 and -17, a 25-ton per hour (tph) unit could be used. The unit requires a 600-kW, 440-Volt AC power supply, and a 25-gallon per minute (gpm) water source.

The coarse fraction is removed from the unit, allowed to dry, and stockpiled in a clean soil area. The material can be tested to ensure that the hazardous constituents have been removed to acceptable levels. The material will then be re-used as clean fill. After dewatering, the fine material will be treated off-site, if necessary, and disposed of in an offsite landfill. The water will be treated on-site or sent to the Sewage Treatment Plant (STP) No. 4 (a wastewater treatment plant located at the Depot) for treatment. The cost estimate assumes that the water can be treated at STP No. 4 at minimal cost.

Both short- and long-term protectiveness of human health and environment is provided with Alternative 6 because it prevents ingestion of and direct contact with the material and debris from SEAD-16 buildings and with surface soils and ditch soils with lead concentrations over 1250 mg/Kg (and five other metals above risk-based levels). The ditch soils with lead concentrations above 1250 mg/Kg will be removed, which will meet the remedial action objective for ditch soil and prevent contamination downgradient in Kendaia Creek. Measures will be taken to ensure protection to the community and site workers during the remedial action. Environmental impacts to the site during the remedial action will not be substantially different from the current activities. In addition, since the hazardous material is primarily in the soil, there is little or no risk of a spill or release during the remedial action.

Similar to Alternatives 2 and 4, Alternative 6 does not preclude compliance with ARARs.

Once the fine soil material is removed from the site, the remedial action would be considered permanent. There will no longer be soil or ditch soil on site that poses an unacceptable threat to human health. The long-term management of the fine grain material will be the responsibility of the selected off-site landfill.

Alternative 6 would be effective in reducing the toxicity, mobility, and volume of the hazardous constituents present in the soil and ditch soil at the site. It is estimated that soil washing will reduce the volume of the contaminated soil and ditch soil to approximately one-third of the original volume. Treatment (if necessary) of the fine grain material and disposal into a landfill will effectively reduce the toxicity and mobility of the hazardous constituents.

Alternative 6 is technically feasible to complete. It involves routine earth moving work including excavation, stockpiling, transportation, and backfilling. It will also involve a specialty contractor to perform the soil washing. Soil washing has been used for a number of years and has been demonstrated to be effective at sites with similar contamination. The remediation areas have been initially delineated and a soil washing treatability study will be necessary to confirm that the technology will be effective at SEAD-16 and -17.

As with Alternative 4, the fine grain material that fails the TCLP criteria will require treatment prior to disposal. On-site treatment can include stabilization, acid leaching, or other methods. Stabilization is a technology that has been frequently used to treat similar soils, and it is not anticipated that problems will be encountered during construction. It is anticipated that the stabilization process will be effective because the fine grain material will mix easier with the selected additive(s). If on-site stabilization is used, a treatment study will be necessary to establish the optimal additive and dosage and a specialty contractor will perform the work, most likely using a pug mill. The additives will be properly monitored to assure proper dosage. The stabilized material will be tested to assure that it meets the TCLP criteria. If off-site treatment is conducted, most of the TSD facilities in the region have accepted similar wastes for a number of years. These facilities are capable of treating and disposing of the site soils.

Another aspect of technical feasibility is the ease with which additional work may be conducted. At this time, it is anticipated that this remedial action will preclude the necessity of any additional remedial efforts at SEAD-16 and -17. However, if additional work is required in the future, this remedial action should not interfere in any way. Once the remedial action is complete, the site will be vegetated and will essentially remain as it is now.

The administrative feasibility of this alternative is also very good. Landfills that may be used are fully permitted for disposal and stabilization. All construction, excavation, or hauling permits or manifests are easily attainable by experienced contractors.

Alternative 6 relies on a soil washing specialty contractor and standard construction equipment, both of which are readily available in the Romulus area. Several companies have extensive experience in implementing soil washing and can provide the necessary unit operations for SEAD-16 and -17. The standard construction equipment includes backhoes, bulldozers, front-end loaders, scrapers, and standard size dump trucks. Backfill material, such as common fill and topsoil, is available in the

Romulus area. If on-site stabilization is performed, a pug mill will most likely be used. Several landfills have been identified that are capable of accepting the soil and ditch soil for disposal.

The three major costs for this alternative are excavation and disposal, soil washing, and groundwater monitoring.

## 10.4 COMPARISON OF ALTERNATIVES

### Overall Protectiveness of Human Health and the Environment

Each alternative was assessed against the threshold criteria of overall protection of human health and the environment. The alternative must satisfy these criteria for it to be eligible for selection.

All of the alternatives, except Alternative 1, provide protection of human health and the environment. The building material and debris from SEAD-16 will be removed and disposed off-site. Ditch soil with lead concentrations above 1250 mg/Kg will be removed from the site. Soil with lead concentrations above the proposed lead cleanup criteria and five other metals above defined risk-based levels will either be treated, removed from the site, or covered. Removing or covering these materials will prevent dermal contact and ingestion, which have been identified by the baseline risk assessment as the major exposure pathways for dust, soil and ditch soil at SEAD-16 and -17. Alternatives 2, 4, 4P, or 6 will each reduce risk to acceptable levels.

Removal of soils found in the drainage ditches will protect environmental receptors by preventing migration of contaminated ditch soils to Kendaia Creek, which is downgradient of SEAD-16 and -17. Additionally, removing contaminated surface and subsurface soil (Alternatives 4, 4P, and 6) will decrease any potential for migration to groundwater and placing a soil cover over these areas (Alternative 2) will decrease the potential for erosion and migration to nearby areas.

### Compliance With ARARs

Compliance with ARARs was a threshold criterion because each alternative must meet this to be carried through the ranking process. The remediation of SEAD-16 and SEAD-17 is subject to the pertinent requirements of both federal environmental statues and regulations (generally administered by USEPA Region II for SEDA) and the State of New York environmental statues and regulations (generally administered by NYSDEC) as determined in accordance with the CERCLA ARAR process. ARARs are promulgated standards that may be applicable to the site cleanup process after a remedial action has been chosen for implementation.

Any standard, requirement, criterion, or limitation under any federal environmental or state environmental or facility siting law may be either applicable or relevant and appropriate to a specific action. The only state laws that may become ARARs are those promulgated such that they are legally enforceable and generally applicable and equivalent to or more stringent than federal laws.

There are three categories of potential ARARs and they include chemical-specific, location-specific, and action-specific. A revised list of ARARs is presented in **Appendix E**.

There are currently no chemical specific ARARs for soil in the state of New York. For groundwater, exceedance of ARARs will not be expected in the future, even without any action, according to the fate and transport modeling results presented in Section 1.4 of the FS Report.

Off-site disposal will fall under RCRA requirements, which must be complied with in the final remedial action plan. Other federal ARARs and promulgated state regulations, which must also be complied with, are listed in this PRAP. After an alternative is chosen, the final design must incorporate compliance with ARARs, however, the concepts of each alternative consider ARARs and do not preclude compliance. All alternatives have potential to fully comply with ARARs.

**Long-Term Effectiveness and Permanence**

The criterion of long-term effectiveness addresses the long-term protection of human health and the environment, permanence of the remedial alternative, magnitude of remaining risk and adequacy and reliability of controls.

Alternatives 2, 4, 4P, and 6 demonstrate long-term effectiveness because they rely on disposal, containment, and treatment to reduce the hazardous constituents in the soils and ditch soils. Alternative 6 is the most effective in eliminating the long-term threats because soil washing segregates the coarse and fine fractions of the soil. Most of the hazardous constituents are contained in the fines fraction, which will be disposed of off-site. This coarse fraction will no longer contain concentrations of lead above the proposed cleanup level and will be backfilled to the site. Alternatives 4 and 4P are the next effective because they involve possible treatment and disposal of soils and ditch soils in an off-site landfill. Alternative 2 is also considered effective because it involves possible treatment and disposal of the ditch soil in an off-site landfill, as well as a soil cover for the surface soils. The soil cover will prevent contact with the underlying soil and reduce risk to acceptable levels. This alternative has little effect in preventing groundwater deterioration by potential contaminant leaching from soil. However, groundwater quality is not expected to exceed USEPA MCL or NYS GA standards for groundwater in the future. This alternative may also limit the future land use. The alternatives are considered to be technically feasible and provide effective long-term protection. Alternative 1, the no action alternative, does not provide long-term protection of human health and the environment.

The goal of all the remedial alternatives (except Alternative 4P) is to have no residual contamination in soils above 1250 mg/Kg for lead and above 18 mg/Kg, 359 mg/Kg, 539 mg/Kg, 2.69 mg/Kg, and 3.59 mg/Kg for antimony, copper, zinc, mercury, and thallium, respectively **(Table 8-1)**. These concentrations are considered to be protective of human health in the future industrial use scenario. After the remedial action at SEAD-16, the maximum concentrations of antimony, copper, lead, mercury, and thallium are expected to be below the cleanup value determined to be protective of human health (**Table 10-3**). Although the maximum concentration of zinc exceeds the clean up value of 539 mg/Kg, the EPC for zinc is expected to be below the clean up value. After remediation at SEAD-17, the maximum concentrations of the metals, antimony, copper, lead, mercury, thallium, and zinc, are expected to be below the respective cleanup values (**Table 10-4**).

The post-remediation concentrations of arsenic and cadmium were evaluated at both sites. At SEAD-16, the only expected exceedance of TAGM for arsenic or cadmium is one hit of arsenic at a concentration of 9.9 mg/Kg, which only slightly exceeds the TAGM of 8.2 mg/Kg. At SEAD-17, only one detection of arsenic, 8.9 mg/Kg, slightly exceeds the TAGM value. There are eight exceedances of the TAGM value for cadmium. The maximum concentration of cadmium is expected to be 5.6 mg/Kg, which exceeds the TAGM value of 2.3 mg/Kg. However, the EPC for cadmium is expected to be 2.45 mg/Kg, which only slightly exceeds the TAGM value.

After the remedial action, residual contamination will be assessed, with the aim that the remaining concentrations are protective of human health and the environment in the future industrial use scenario.

The relative rankings of the alternatives based on permanence are the same as the rankings for long-term protectiveness. Since Alternatives 4, 4P, and 6 reduce the volume of the soil on site, they are more permanent than Alternative 2, which requires soil to remain on-site. Alternative 1, the no action alternative, is not permanent because no treatment or soil cover is used.

**Reduction in Toxicity, Mobility or Volume**

The alternatives were compared with respect to the relative decreases in the toxicity, mobility, and volume of the hazardous constituents present at the site. Alternative 6 yields the greatest reduction in the toxicity by separating the coarse material from the fine material, treating the latter if necessary, and disposing it in an off-site landfill. The hazardous constituents are normally concentrated in the fine fraction of the soil, which could be treated using stabilization or acid leaching. Once the fine grain material is landfilled, the hazardous constituents are essentially immobile. Alternative 6 also provides the greatest volume reduction of the contaminated soils. Soil washing reduces the volume of the contaminated soil to approximately one-third of the original volume.

Under Alternative 2, ditch soil toxicity would decrease if it were stabilized after failing TCLP test. Under Alternatives 4 and 4P, both soil and ditch soil toxicity would decrease if they fail TCLP and are stabilized. The stabilization process decreases the toxicity of the metals because the metals are converted to less soluble forms. Once the soil is treated and landfilled in Alternatives 2, 4, and 4P the hazardous constituents are essentially immobile. Alternative 2 also decreases the mobility of the surface and subsurface soils through the placement of the soil cover, which will contain the soil and prevent migration to surface water via erosion.

Alternatives 4 and 4P, which rely on stabilization and disposal, ranks the poorest on the volume reduction. The treated soils typically have a greater volume than the initial untreated soil. Furthermore, the remaining soils, which will be excavated and landfilled, will increase in volume by approximately 30 percent as a result of the excavation process.

**Short-Term Effectiveness**

Alternative 2 does not involve a large amount of excavation and can be implemented relatively quickly, because it does not require specialized equipment or vendors. Off-site transportation is limited and includes transportation of soil excavated from the drainage ditches, building material and debris, and materials for the cap (topsoil, common fill, and filter fabric). The latter factor can be decreased through the use of on-site borrow soils. Alternatives 4 and 4P do not require additional handling for treatment or specialized equipment, but it does require off-site disposal. It can, however, be performed efficiently and quickly. Alternative 6 requires the same amount of excavation but the off-site transportation of a lesser volume of material than Alternative 4. However, Alternative 6 requires the excavated material to be handled more than Alternatives 2, 4, and 4P. This extra handling is required to consolidate and treat the material and increases the on-site worker's exposure to the material through direct contact and dust. Alternative 6 also requires specialized equipment to treat the soils.

**Implementability**

All of the alternatives score well on implementability. Alternative 1 is readily available. Alternative 2 can be constructed most easily since it involves leaving soils in place and constructing a soil cover. The construction of the soil cover involves routine earthmoving tasks, such as hauling, spreading and compacting soils. Numerous contractors are available and qualified to perform these tasks. Alternatives 4 and 4P can also be constructed easily, though it involves more excavation, stockpiling, testing, and transportation. In addition, off-site stabilization may be necessary prior to disposal. Alternative 6 is also relatively easy to implement, however, it requires a specialized soil washing contractor, treatability program, and additional handling. In addition, for all the alternatives an off-site landfills capable of accepting and treating, if necessary, the site material will be needed.

**Cost**

Capital costs, operating costs, and administrative costs were estimated for the four remedial action alternatives. Capital costs include those costs for professional labor, treatability studies, construction and equipment, site work, monitoring and testing, and treatment and disposal. Operating costs include costs for administrative and professional labor, monitoring, and utilities. Administrative costs include the costs for restricting future land use to non-residential. All costs discussed are present worth estimates using a common discount rate of 5%. The capital and operating costs for Alternatives 2, 4, 4P, and 6 are summarized in **Table 10-2**.

Alternative 1 (No-action) is not considered to have any associated capital or operating costs. This alternative is used as a basis of comparison for all other alternatives. Alternative 2 is the least expensive alternative and varies in cost from $1,699,648 to $2,735,984, depending on the lead cleanup level used. Alternative 4 varies in cost from $2,957,138 to $8,004,378, depending on the lead cleanup level used. Alternative 4P would cost $7,305,090. Alternative 6 is the most expensive alternative and varies in cost from $3,985,298 to $12,810,378, depending on the lead cleanup level used.

**State Acceptance**

State acceptance of the preferred alternative will be addressed in the Record of Decision following review of the State comments received on the RI Report, the FS Report, and the PRAP.

**Community Acceptance**

Community acceptance of the preferred alternative will be assessed in the Record of Decision following review of the public comments received on the RI/FS and the Proposed Plan PRAP.

## 11.0 SELECTED REMEDY

Based on the evaluation of remedial alternatives, the U.S. Army recommends Alternative 4 (Excavation, Stabilization, and Off-site Disposal) for SEAD-16 and -17. The unrestricted use alternative was considered for Alternative 4 (i.e., Alternative 4P) to weigh the advantages of restoring the sites to pre-disposal conditions versus the cost this would incur. Alternative 4P, which has a present worth value of approximately $5 million more than Alternative 4, was not selected as the preferred remedial alternative due to the significant cost increase compared to its industrial use counterpart. Since human health risk for the intended future use of SEAD-16 and -17, industrial, is acceptable under Alternative 4, the additional health risk reductions achieved by the unrestricted use alternative, Alternative 4P, does not warrant an additional $5 million.

The elements that compose the Army's preferred remedy include:

- Conduct additional sampling as part of the pre-design sampling program to further delineate the areas of excavation;
- Remove, test, and dispose of the SEAD-16 building debris off-site;
- Excavate the ditch soil with lead concentrations greater than 1250 mg/kg to a depth of one foot;
- Excavate surface and subsurface soils with lead concentrations greater than 1250 mg/kg at SEAD-16;
- Excavate surface soils with lead concentrations greater than 1250 mg/kg at SEAD-17;
- Excavate hotspots at additional soil sampling locations at both SEAD-16 and SEAD-17;
- Stabilize soils and building debris exceeding the TCLP criteria;
- Dispose of the excavated material in an off-site landfill;
- Backfill the excavated areas with clean backfill;
- Conduct semi-annual groundwater monitoring;
- Conduct annual soil sampling in Kendaia Creek at four locations;
- Establish and maintain land use controls to restrict the use of site groundwater and prevent residential use; and
- Conduct five-year reviews to evaluate whether the response actions remain protective of public health and the environment.

The proposed areas of excavation for SEAD-16 and SEAD-17 under Alternative 4 are shown in **Figures 11-1 and 11-2**. In comparison to other remedies considered in the FS, Alternative 4 has the highest overall ranking. While it does not rank highest for any single evaluation criterion, as Alternatives 2 and 6 do, neither does it rank the lowest for any evaluation criteria considered, which each of the other intrusive alternatives did. Alternative 4 ranks second of all the alternatives for long-term effectiveness and permanence and reduction of mobility of contaminants. It also ranks highest of the three alternatives (2, 4, and 6) for technical feasibility and overall cost. The preferred alternative will eliminate source soils from further impacting the site by preventing contact with receptors and migration of contaminants to surface water and groundwater. It is a cost-effective, readily available alternative that does not require any long-term maintenance aside from semi-annual groundwater monitoring and it can be implemented quickly to provide short-term effectiveness. Finally, it is a permanent solution that will significantly reduce the mobility of the contaminants and potential for exposure at the site.

In accordance with the Federal Facility Agreement CERCLA Section 120, Docket Number: II-CERCLA-FFA-00202, the remedial action (including the monitoring program) will be reviewed after five years. At this time, modification may be implemented to the remedial program, if appropriate.

Land use controls will be a part of the remedy until the groundwater at the site meets Federal MCL and NYSDEC Class GA groundwater standards. Additional controls will be required to prevent residential use of the property. The goals of the land use controls are to ensure adequate protection of human health and the environment, and to preserve and promote the long-term effective operation of remedial alternatives proposed for the sites. The institutional controls that will be implemented will include posting signs at the sites and implementing deed restrictions. A public water supply is available, thus a groundwater restriction should have minimal impact on land reuse of the sites. Upon land transfer, there will be language in the deed that requires the continued use of institutional controls. At a minimum, the deed will prohibit the following:

- The installation of any groundwater extraction wells, except for regulator-approved remediation purposes.
- Human or ecological exposure to groundwater from the site(s), or use of this groundwater for any industrial, commercial, sanitary, human consumptive, or agricultural purposes.
- Unauthorized interference (to be defined in the Deed) with existing monitoring systems or any additional treatment or monitoring systems that may be subsequently constructed at the site(s) (these systems to be described and locations specified in the Deed to the extent practicable).
- Residential use of the site.

## 12.0 STATUTORY DETERMINATIONS

CERCLA §121(b)(1), 42 U.S.C. §9621(b)(1), mandates that a remedial action must be protective of human health and the environment, cost effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Section 121(b)(1) also establishes a preference for remedial actions that employ treatment to permanently and significantly reduce the volume, toxicity, or mobility of the hazardous substances, pollutants, or contaminants at a site. CERCLA §121(d), 42 U.S.C. §9621(d), further specifies that a remedial action must attain a degree of cleanup that satisfies ARARs under federal and state laws, unless a waiver can be justified pursuant to CERCLA §121(d)(4), 42 U.S.C. §9621(d)(4).

For reasons discussed below, the remedial action selected for implementation at SEAD-16 and SEAD-17 site is consistent with CERCLA §121, 42 U.S.C. §9621 and, to the extent practical, the NCP. The selected remedy is protective of human health and the environment, attains ARARs, and is cost effective.

### 12.1 THE SELECTED REMEDY IS PROTECTIVE OF HUMAN HEALTH AND THE ENVIRONMENT

The selected remedy is protective of human health and the environment through source removal, offsite disposal, and long-term monitoring of the groundwater. Alternative 4 reduces human health risks by excavating the soil and ditch soil that could cause a potential human health risk under a future industrial site usage. Alternative 4 also provides long-term monitoring of the groundwater until ARARs are achieved and land use controls would be in place to prevent the use of the groundwater.

### 12.2 THE SELECTED REMEDY ATTAINS ARARS

Alternative 4 will comply with ARARs. In the short-term, land use controls will be imposed at SEAD-16 and SEAD-17 until ARARs for groundwater are achieved. Once ARARs are achieved, no land use controls would be required.

### 12.3 THE SELECTED REMEDY IS COST EFFECTIVE

The capital costs include construction costs for the excavation of soils, ditch soils, and building debris, site work, design, professional labor, treatment of excavated groundwater, and transportation and off-site disposal of material. The capital costs for Alternative 4 were higher than those projected for Alternative 2, but lower than those estimated for Alternative 6. The operating costs for Alternative 4 were estimated using a planned life of 30 years for monitoring; during the first five years semi-annual monitoring would occur, while annual monitoring would be conduct over the next 25 years. While Alternative 4 is not the lowest cost-effective solution, it will provide an effective solution requiring the least amount of operation and maintenance. Time to implement and elimination of operating systems have gained increased importance due to the fact that the transfer of property at Seneca has become a higher priority. This alternative provides overall protectiveness to human health and the environment, and the simple implementability justifies the selection of Alternative 4 despite its higher cost than Alternative 2.

## 12.4 THE SELECTED REMEDY UTILIZED PERMANENT SOLUTIONS AND ALTERNATIVE TREATMENT OR RESOURCE RECOVER TECHNOLOGIES TO THE MAXIMUM EXTENT PRACTICABLE

The selected remedy will be considered permanent when the concentrations of contaminants in soils, ditch soil, and groundwater are reduced to the site-specific cleanup goals. Alternative 4 meets the statutory requirement for permanence by disposing of the excavated soils, ditch soils, and building debris off-site in a landfill. The selected remedy affords the best balance of criteria as compared to other alternatives, since Alternative 4 has a reasonable cost and the best implementability in light of the importance of future land transfer, while providing the required level of overall protectiveness of human health and the environment.

## 12.5 THE SELECTED REMEDY SATISFIES THE PREFERENCE FOR TREATMENT THAT PERMANENTLY AND SIGNIFICANTLY REDUCES THE TOXICITY, MOBILITY, OR VOLUME OF HAZARDOUS SUBSTANCES AS A PRINCIPAL ELEMENT

The statutory preference for treatment as a principal element is satisfied by the selected remedy, which relies on excavation and off-site disposal in a landfill of contaminated media. Although the selected remedy does not rely on treatment as the principal element for soils, ditch soils, and building debris, it does address the principal threats posed by these materials. The selected remedy provides the most easily implementable alternative that can achieve the maximum extent of overall protection of human health and the environment at a reasonable cost.

# 13.0 DOCUMENTATION OF SIGNIFICANT CHANGES

(Reserved).

# 14.0 STATE ROLE

(Reserved).

**TABLE 6-1a**
**SEAD-16 SURFACE SOIL ANALYSIS RESULTS**
**Record of Decision for SEAD-16/17**
**Seneca Army Depot Activity**

| Parameter | Unit | Maximum Concentration | Average | Frequency of Detection | TAGM | No. Above TAGM | No. of Detects | No. of Analyses |
|---|---|---|---|---|---|---|---|---|
| VOLATILE ORGANICS | | | | | | | | |
| 1,1.2,2-Tetrachloroethane | UG/KG | 10 | 10 | 2.3% | 600 | 0 | 1 | 43 |
| Acetone | UG/KG | 17 | 12 | 4.7% | 200 | 0 | 2 | 43 |
| Benzene | UG/KG | 5 | 2.75 | 9.3% | 60 | 0 | 4 | 43 |
| Carbon Disulfide | UG/KG | 2 | 1.667 | 7.0% | 2700 | 0 | 3 | 43 |
| Chloroform | UG/KG | 2 | 2 | 4.7% | 300 | 0 | 2 | 43 |
| Methylene Chloride | UG/KG | 3 | 2.667 | 7.0% | 100 | 0 | 3 | 43 |
| Toluene | UG/KG | 10 | 3.529 | 39.5% | 1500 | 0 | 17 | 43 |
| Xylene (total) | UG/KG | 3 | 3 | 2.3% | 1200 | 0 | 1 | 43 |
| SEMIVOLATILE ORGANICS | | | | | | | | |
| 2,4-Dinitrotoluene | UG/KG | 85000 | 8907.2 | 39.5% | | 0 | 17 | 43 |
| 2,6-Dinitrotoluene | UG/KG | 8000 | 1162.5 | 25.6% | 1000 | 3 | 11 | 43 |
| 2-Methylnaphthalene | UG/KG | 19000 | 2249.8 | 20.9% | 36400 | 0 | 9 | 43 |
| 3,3'-Dichlorobenzidine | UG/KG | 850 | 850.0 | 2.3% | | 0 | 1 | 43 |
| 3-Nitroaniline | UG/KG | 2100 | 2100.0 | 2.3% | 500 | 1 | 1 | 43 |
| Acenaphthene | UG/KG | 72000 | 9055.3 | 18.6% | 50000 | 1 | 8 | 43 |
| Acenaphthylene | UG/KG | 310 | 95.1 | 16.3% | 41000 | 0 | 7 | 43 |
| Anthracene | UG/KG | 120000 | 10125.8 | 27.9% | 50000 | 1 | 12 | 43 |
| Benzo(a)anthracene | UG/KG | 220000 | 11440.2 | 46.5% | 224 | 10 | 20 | 43 |
| Benzo(a)pyrene | UG/KG | 200000 | 9681.5 | 51.2% | 61 | 13 | 22 | 43 |
| Benzo(b)fluoranthene | UG/KG | 200000 | 9773.9 | 51.2% | 1100 | 5 | 22 | 43 |
| Benzo(g,h,i)perylene | UG/KG | 100000 | 7391.4 | 34.9% | 50000 | 1 | 15 | 43 |
| Benzo(k)fluoranthene | UG/KG | 170000 | 9381.6 | 44.2% | 1100 | 4 | 19 | 43 |
| Carbazole | UG/KG | 89000 | 8184.5 | 25.6% | | 0 | 11 | 43 |
| Chrysene | UG/KG | 220000 | 8544.0 | 62.8% | 400 | 9 | 27 | 43 |
| Di-n-butylphthalate | UG/KG | 16000 | 1541.0 | 39.5% | 8100 | 1 | 17 | 43 |
| Dibenz(a,h)anthracene | UG/KG | 49000 | 5806.0 | 20.9% | 14 | 9 | 9 | 43 |
| Dibenzofuran | UG/KG | 50000 | 5616.8 | 20.9% | 6200 | 1 | 9 | 43 |
| Diethylphthalate | UG/KG | 19 | 17.5 | 4.7% | 7100 | 0 | 2 | 43 |
| Fluoranthene | UG/KG | 530000 | 19487.3 | 65.1% | 50000 | 1 | 28 | 43 |
| Fluorene | UG/KG | 78000 | 15656.8 | 11.6% | 50000 | 1 | 5 | 43 |
| Indeno(1,2,3-cd)pyrene | UG/KG | 100000 | 9074.5 | 27.9% | 3200 | 2 | 12 | 43 |
| N-Nitrosodiphenylamine (1) | UG/KG | 25000 | 1904.6 | 41.9% | | 0 | 18 | 43 |
| Naphthalene | UG/KG | 66000 | 9546.7 | 16.3% | 13000 | 1 | 7 | 43 |
| Pentachlorophenol | UG/KG | 1200 | 1200.0 | 2.3% | 1000 | 1 | 1 | 43 |
| Phenanthrene | UG/KG | 490000 | 21641.5 | 53.5% | 50000 | 1 | 23 | 43 |
| Pyrene | UG/KG | 360000 | 13420.8 | 65.1% | 50000 | 1 | 28 | 43 |
| bis(2-Ethylhexyl)phthalate | UG/KG | 2100 | 589.2 | 25.6% | 50000 | 0 | 11 | 43 |
| PESTICIDES/PCB | | | | | | | | |
| 4,4'-DDD | UG/KG | 23 | 8.169 | 18.6% | 2900 | 0 | 8 | 43 |
| 4,4'-DDE | UG/KG | 1400 | 90.861 | 76.7% | 2100 | 0 | 33 | 43 |
| 4,4'-DDT | UG/KG | 340 | 49.941 | 79.1% | 2100 | 0 | 34 | 43 |
| Aldrin | UG/KG | 5 | 3.9 | 4.7% | 41 | 0 | 2 | 43 |
| Aroclor-1254 | UG/KG | 1100 | 690 | 4.7% | 1000 | 1 | 2 | 43 |
| Aroclor-1260 | UG/KG | 340 | 149.667 | 20.9% | 1000 | 0 | 9 | 43 |
| Dieldrin | UG/KG | 26 | 15.15 | 4.7% | 44 | 0 | 2 | 43 |
| Endosulfan I | UG/KG | 33 | 8.576 | 41.9% | 900 | 0 | 18 | 43 |
| Endosulfan II | UG/KG | 5 | 3.7 | 11.6% | 900 | 0 | 5 | 43 |
| Endosulfan sulfate | UG/KG | 2.1 | 2.1 | 2.3% | 1000 | 0 | 1 | 43 |
| Endrin | UG/KG | 9.9 | 6.9 | 9.3% | 100 | 0 | 4 | 43 |
| Endrin aldehyde | UG/KG | 14 | 6.008 | 14.0% | | 0 | 6 | 43 |
| Endrin ketone | UG/KG | 3.6 | 3 | 9.3% | | 0 | 4 | 43 |
| Heptachlor | UG/KG | 1.8 | 1.8 | 2.3% | 100 | 0 | 1 | 43 |
| Heptachlor epoxide | UG/KG | 6.7 | 2.433 | 14.0% | 20 | 0 | 6 | 43 |
| Toxaphene | UG/KG | 180 | 180 | 2.3% | | 0 | 1 | 43 |

**TABLE 6-1a**
**SEAD-16 SURFACE SOIL ANALYSIS RESULTS**
**Record of Decision for SEAD-16/17**
**Seneca Army Depot Activity**

| Parameter | Unit | Maximum Concentration | Average | Frequency of Detection | TAGM | No. Above TAGM | No. of Detects | No. of Analyses |
|---|---|---|---|---|---|---|---|---|
| alpha-Chlordane | UG/KG | 170 | 20.308 | 30.2% | | 0 | 13 | 43 |
| beta-BHC | UG/KG | 2.3 | 1.8 | 4.7% | 200 | 0 | 2 | 43 |
| gamma-BHC (Lindane) | UG/KG | 2.3 | 2.3 | 2.3% | 60 | 0 | 1 | 43 |
| gamma-Chlordane | UG/KG | 200 | 22.2 | 30.2% | 540 | 0 | 13 | 43 |
| <u>NITROAROMATICS</u> | | | | | | | | |
| 2,4-Dinitrotoluene | UG/KG | 74000 | 4498.148 | 62.79% | | 0 | 27 | 43 |
| 2,6-Dinitrotoluene | UG/KG | 320 | 190 | 6.98% | 1000 | 0 | 3 | 43 |
| 2-amino-4,6-Dinitrotoluene | UG/KG | 430 | 430 | 2.33% | | 0 | 1 | 43 |
| Tetryl | UG/KG | 220 | 220 | 2.33% | | 0 | 1 | 43 |
| <u>METALS</u> | | | | | | | | |
| Aluminum | MG/KG | 17200 | 10327.9 | 90.7% | 19300 | 0 | 39 | 43 |
| Antimony | MG/KG | 1930 | 86.5 | 62.8% | 5.9 | 16 | 27 | 43 |
| Arsenic | MG/KG | 32.2 | 7.5 | 100.0% | 8.2 | 8 | 43 | 43 |
| Barium | MG/KG | 9340 | 537.0 | 97.7% | 300 | 8 | 42 | 43 |
| Beryllium | MG/KG | 0.91 | 0.4 | 97.7% | 1.1 | 0 | 42 | 43 |
| Cadmium | MG/KG | 16.6 | 1.7 | 60.5% | 2.3 | 5 | 26 | 43 |
| Calcium | MG/KG | 260000 | 54983.0 | 100.0% | 121000 | 4 | 43 | 43 |
| Chromium | MG/KG | 47.5 | 22.8 | 97.7% | 29.6 | 8 | 42 | 43 |
| Cobalt | MG/KG | 17.8 | 10.4 | 100.0% | 30 | 0 | 43 | 43 |
| Copper | MG/KG | 37900 | 1159.8 | 100.0% | 33 | 35 | 43 | 43 |
| Cyanide | MG/KG | 1.5 | 1.5 | 2.3% | 0.3 | 1 | 1 | 43 |
| Iron | MG/KG | 36500 | 22829.5 | 100.0% | 36500 | 0 | 43 | 43 |
| Lead | MG/KG | 140000 | 4543.9 | 100.0% | 24.8 | 39 | 43 | 43 |
| Magnesium | MG/KG | 56000 | 10590.7 | 100.0% | 21500 | 5 | 43 | 43 |
| Manganese | MG/KG | 4140 | 504.9 | 100.0% | 1060 | 1 | 43 | 43 |
| Mercury | MG/KG | 11.4 | 1.0 | 76.7% | 0.1 | 25 | 33 | 43 |
| Nickel | MG/KG | 148 | 35.3 | 100.0% | 49 | 5 | 43 | 43 |
| Potassium | MG/KG | 2300 | 1338.4 | 100.0% | 2380 | 0 | 43 | 43 |
| Selenium | MG/KG | 1.5 | 0.7 | 44.2% | 2 | 0 | 19 | 43 |
| Silver | MG/KG | 11.1 | 1.1 | 39.5% | 0.75 | 2 | 17 | 43 |
| Sodium | MG/KG | 1830 | 162.6 | 88.4% | 172 | 5 | 38 | 43 |
| Thallium | MG/KG | 16.6 | 2.2 | 32.6% | 0.7 | 14 | 14 | 43 |
| Vanadium | MG/KG | 61.9 | 22.9 | 100.0% | 150 | 0 | 43 | 43 |
| Zinc | MG/KG | 14600 | 604.7 | 100.0% | 110 | 23 | 43 | 43 |
| <u>HERBICIDES</u> | | | | | | | | |
| 2.4.5-T | UG/KG | | 7.8 | 13.0% | 1900 | 0 | 2 | 16 |
| MCPP | UG/KG | | 16000.0 | 6.0% | | 0 | 1 | 16 |

**TABLE 6-1b**
**SEAD-16 SUBSURFACE SOIL ANALYSIS RESULTS**
**Record of Decision for SEAD-16/17**
**Seneca Army Depot Activity**

| Parameter | Units | Maximum Concentration | Average | Frequency of Detection | TAGM | No. Above TAGM | No. of Detect | No. of Analyses |
|---|---|---|---|---|---|---|---|---|
| VOLATILE ORGANICS | | | | | | | | |
| 2-Butanone | UG/KG | 5 | 5 | 16.7% | 300 | 0 | 1 | 6 |
| Acetone | UG/KG | 46 | 28.5 | 33.3% | 200 | 0 | 2 | 6 |
| Benzene | UG/KG | 2 | 2 | 33.3% | 60 | 0 | 2 | 6 |
| Toluene | UG/KG | 6 | 3.25 | 66.7% | 1500 | 0 | 4 | 6 |
| SEMIVOLATILE ORGANICS | | | | | | | | |
| 2.4-Dinitrotoluene | UG/KG | 1700 | 883.5 | 33.3% | | 0 | 2 | 6 |
| 2.6-Dinitrotoluene | UG/KG | 160 | 160 | 16.7% | 1000 | 0 | 1 | 6 |
| 2-Methylnaphthalene | UG/KG | 190 | 190 | 16.7% | 36400 | 0 | 1 | 6 |
| Acenaphthene | UG/KG | 1100 | 1100 | 16.7% | 50000 | 0 | 1 | 6 |
| Acenaphthylene | UG/KG | 300 | 300 | 16.7% | 41000 | 0 | 1 | 6 |
| Anthracene | UG/KG | 2000 | 783.333 | 50.0% | 50000 | 0 | 3 | 6 |
| Benzo(a)anthracene | UG/KG | 6600 | 1796.25 | 66.7% | 224 | 2 | 4 | 6 |
| Benzo(a)pyrene | UG/KG | 6200 | 1570.6 | 83.3% | 61 | 4 | 5 | 6 |
| Benzo(b)fluoranthene | UG/KG | 6000 | 1374 | 83.3% | 1100 | 1 | 5 | 6 |
| Benzo(g.h.i)perylene | UG/KG | 11000 | 3254 | 83.3% | 50000 | 0 | 5 | 6 |
| Benzo(k)fluoranthene | UG/KG | 5600 | 1296 | 83.3% | 1100 | 1 | 5 | 6 |
| Butylbenzylphthalate | UG/KG | 18 | 18 | 16.7% | 50000 | 0 | 1 | 6 |
| Carbazole | UG/KG | 730 | 730 | 16.7% | | 0 | 1 | 6 |
| Chrysene | UG/KG | 7000 | 1542.4 | 83.3% | 400 | 2 | 5 | 6 |
| Di-n-butylphthalate | UG/KG | 240 | 137.5 | 33.3% | 8100 | 0 | 2 | 6 |
| Dibenz(a.h)anthracene | UG/KG | 2500 | 1113 | 66.7% | 14 | 4 | 4 | 6 |
| Dibenzofuran | UG/KG | 270 | 157.5 | 33.3% | 6200 | 0 | 2 | 6 |
| Fluoranthene | UG/KG | 13000 | 2762.4 | 83.3% | 50000 | 0 | 5 | 6 |
| Fluorene | UG/KG | 800 | 800 | 16.7% | 50000 | 0 | 1 | 6 |
| Indeno(1.2.3-cd)pyrene | UG/KG | 7100 | 2319.8 | 83.3% | 3200 | 2 | 5 | 6 |
| N-Nitrosodiphenylamine (1) | UG/KG | 530 | 530 | 16.7% | | 0 | 1 | 6 |
| Naphthalene | UG/KG | 120 | 120 | 16.7% | 13000 | 0 | 1 | 6 |
| Pentachlorophenol | UG/KG | 120 | 120 | 16.7% | 1000 | 0 | 1 | 6 |
| Phenanthrene | UG/KG | 7600 | 1608.6 | 83.3% | 50000 | 0 | 5 | 6 |
| Pyrene | UG/KG | 11000 | 2363 | 83.3% | 50000 | 0 | 5 | 6 |
| bis(2-Ethylhexyl)phthalate | UG/KG | 110 | 110 | 16.7% | 50000 | 0 | 1 | 6 |
| PESTICIDES/PCB | | | | | | | | |
| 4.4'-DDE | UG/KG | 8.3 | 8.3 | 16.7% | 2100 | 0 | 1 | 6 |
| 4.4'-DDT | UG/KG | 3.4 | 2.55 | 33.3% | 2100 | 0 | 2 | 6 |
| Dieldrin | UG/KG | 12 | 12 | 16.7% | 44 | 0 | 1 | 6 |
| Endosulfan I | UG/KG | 7.3 | 4.85 | 33.3% | 900 | 0 | 2 | 6 |
| Endrin | UG/KG | 2.9 | 2.9 | 16.7% | 100 | 0 | 1 | 6 |
| NITROAROMATICS | | | | | | | | |
| 2.4-Dinitrotoluene | UG/KG | 500 | 310 | 0.5 | | 0 | 3 | 6 |
| METALS | | | | | | | | |
| Aluminum | MG/KG | 12800 | 12800 | 16.7% | 19300 | 0 | 1 | 6 |
| Antimony | MG/KG | 135 | 48.867 | 50.0% | 5.9 | 2 | 3 | 6 |
| Arsenic | MG/KG | 6.9 | 5.6 | 100.0% | 8.2 | 0 | 6 | 6 |
| Barium | MG/KG | 302 | 143.083 | 100.0% | 300 | 1 | 6 | 6 |
| Beryllium | MG/KG | 0.51 | 0.38 | 100.0% | 1.1 | 0 | 6 | 6 |
| Cadmium | MG/KG | 0.45 | 0.176 | 83.3% | 2.3 | 0 | 5 | 6 |
| Calcium | MG/KG | 97900 | 45766.7 | 100.0% | 121000 | 0 | 6 | 6 |
| Chromium | MG/KG | 21.1 | 18.383 | 100.0% | 29.6 | 0 | 6 | 6 |
| Cobalt | MG/KG | 12.2 | 10.7 | 100.0% | 30 | 0 | 6 | 6 |
| Copper | MG/KG | 736 | 179.167 | 100.0% | 33 | 3 | 6 | 6 |
| Cyanide | MG/KG | 0.52 | 0.52 | 16.7% | 0.3 | 1 | 1 | 6 |

**TABLE 6-1b**
**SEAD-16 SUBSURFACE SOIL ANALYSIS RESULTS**
**Record of Decision for SEAD-16/17**
**Seneca Army Depot Activity**

| Parameter | Units | Maximum Concentration | Average | Frequency of Detection | TAGM | No. Above TAGM | No. of Detect | No. of Analyses |
|---|---|---|---|---|---|---|---|---|
| Iron | MG/KG | 31400 | 24433.3 | 100.0% | 36500 | 0 | 6 | 6 |
| Lead | MG/KG | 35400 | 6099.27 | 100.0% | 24.8 | 4 | 6 | 6 |
| Magnesium | MG/KG | 13300 | 9715 | 100.0% | 21500 | 0 | 6 | 6 |
| Manganese | MG/KG | 650 | 470.667 | 100.0% | 1060 | 0 | 6 | 6 |
| Mercury | MG/KG | 1.9 | 0.74 | 66.7% | 0.1 | 3 | 4 | 6 |
| Nickel | MG/KG | 37 | 29.85 | 100.0% | 49 | 0 | 6 | 6 |
| Potassium | MG/KG | 1990 | 1400 | 100.0% | 2380 | 0 | 6 | 6 |
| Selenium | MG/KG | 1.2 | 0.887 | 50.0% | 2 | 0 | 3 | 6 |
| Silver | MG/KG | 1.2 | 0.725 | 33.3% | 0.75 | 1 | 2 | 6 |
| Sodium | MG/KG | 160 | 100.7 | 50.0% | 172 | 0 | 3 | 6 |
| Thallium | MG/KG | 0.91 | 0.91 | 16.7% | 0.7 | 1 | 1 | 6 |
| Vanadium | MG/KG | 22.6 | 18.567 | 100.0% | 150 | 0 | 6 | 6 |
| Zinc | MG/KG | 183 | 113.65 | 100.0% | 110 | 3 | 6 | 6 |

**TABLE 6-1c**
**SEAD-16 GROUNDWATER ANALYSIS RESULTS**
**Record of Decision for SEAD-16/17**
**Seneca Army Depot Activity**

| Parameter | Units | Maximum Concentration | Average | Frequency of Detection | Action Level | Source | No. Above Action Level | No. of Detects | No. of Analyses |
|---|---|---|---|---|---|---|---|---|---|
| SEMIVOLATILE ORGANICS | | | | | | | | | |
| 3-Nitroaniline | UG/L | 25 | 6.7% | 6.7% | | | 0 | 1 | 15 |
| 4-Chloroaniline | UG/L | 10 | 6.7% | 6.7% | 5 | a | 1 | 1 | 15 |
| Benzo[ghi]perylene | UG/L | 1 | 6.7% | 6.7% | | | 0 | 1 | 15 |
| Dibenz[a,h]anthracene | UG/L | 0.7 | 6.7% | 6.7% | | | 0 | 1 | 15 |
| Indeno[1,2,3-cd]pyrene | UG/L | 0.6 | 6.7% | 6.7% | | | 0 | 1 | 15 |
| NITROAROMATICS | | | | | | | | | |
| 1,3-Dinitrobenzene | UG/L | 1.8 | 13.3% | 13.3% | 5 | a | 0 | 2 | 15 |
| 2.4-Dinitrotoluene | UG/L | 0.68 | 6.7% | 6.7% | 5 | a | 0 | 1 | 15 |
| METALS | | | | | | | | | |
| Aluminum | UG/L | 1850 | 53.3% | 53.3% | 50 | b | 6 | 8 | 15 |
| Antimony | UG/L | 12.3 | 13.3% | 13.3% | 6 | d | 2 | 2 | 15 |
| Arsenic | UG/L | 3.2 | 6.7% | 6.7% | 10 | c | 0 | 1 | 15 |
| Barium | UG/L | 97.4 | 46.7% | 46.7% | 1000 | a | 0 | 7 | 15 |
| Beryllium | UG/L | 0.23 | 40.0% | 40.0% | 4 | d | 0 | 6 | 15 |
| Cadmium | UG/L | 0.32 | 6.7% | 6.7% | 5 | d | 0 | 1 | 15 |
| Calcium | UG/L | 193000 | 100.0% | 100.0% | | | 0 | 15 | 15 |
| Chromium | UG/L | 3.4 | 33.3% | 33.3% | 50 | a | 0 | 5 | 15 |
| Cobalt | UG/L | 2.1 | 33.3% | 33.3% | | | 0 | 5 | 15 |
| Copper | UG/L | 56.8 | 46.7% | 46.7% | 200 | a | 0 | 7 | 15 |
| Iron | UG/L | 2400 | 93.3% | 93.3% | 300 | a | 5 | 14 | 15 |
| Lead | UG/L | 24.1 | 46.7% | 46.7% | 15 | d | 1 | 7 | 15 |
| Magnesium | UG/L | 23700 | 100.0% | 100.0% | | | 0 | 15 | 15 |
| Manganese | UG/L | 1380 | 93.3% | 93.3% | 50 | b | 12 | 14 | 15 |
| Nickel | UG/L | 11 | 46.7% | 46.7% | 100 | d | 0 | 7 | 15 |
| Potassium | UG/L | 18800 | 53.3% | 53.3% | | | 0 | 8 | 15 |
| Selenium | UG/L | 2.8 | 6.7% | 6.7% | 10 | a | 0 | 1 | 15 |
| Sodium | UG/L | 409000 | 93.3% | 93.3% | 20000 | a | 3 | 14 | 15 |
| Thallium | UG/L | 11 | 26.7% | 26.7% | 2 | d | 4 | 4 | 15 |
| Vanadium | UG/L | 3.8 | 33.3% | 33.3% | | | 0 | 5 | 15 |
| Zinc | UG/L | 42 | 6.7% | 6.7% | 5000 | b | 0 | 1 | 15 |

Notes:
a) NY State Class GA Groundwater Standard (TOGS 1.1.1, June 1998)
b) US EPA Secondary Drinking Water Regulation, non-enforceable (EPA 822-B-00-001, Summer 2000)
c) US EPA Maximum Contaminant Limit announced 10/31/01. Source http://www.epa.gov/safewater/arsenic.html
d) US EPA National Primary Drinking Water Standards, EPA 816-F-01-007 March 2001

**TABLE 6-1d**
**SEAD-16 SURFACE WATER ANALYSIS RESULTS**
**Record of Decision for SEAD-16/17**
**Seneca Army Depot Activity**

| Parameter | Units | Maximum Concentration | Average | Frequency of Detection | Action Level[1] | No. Above Action Level | No. of Detects | No. of Analyses |
|---|---|---|---|---|---|---|---|---|
| SEMIVOLATILE ORGANICS | | | | | | | | |
| Di-n-butylphthalate | UG/L | 0.5 | 0.5 | 7.7% | | 0 | 1 | 13 |
| Pentachlorophenol | UG/L | 4 | 1.9 | 23.1% | 0.4 | 3 | 3 | 13 |
| bis(2-Ethylhexyl)phthalate | UG/L | 3 | 2.3 | 23.1% | 0.6 | 3 | 3 | 13 |
| METALS | | | | | | | | |
| Aluminum | UG/L | 261 | 206.5 | 15.4% | 100 | 2 | 2 | 13 |
| Antimony | UG/L | 124 | 30.4 | 84.6% | | 0 | 11 | 13 |
| Arsenic | UG/L | 5.7 | 4.0 | 61.5% | 190 | 0 | 8 | 13 |
| Barium | UG/L | 348 | 118.0 | 100.0% | | 0 | 13 | 13 |
| Cadmium | UG/L | 2 | 0.8 | 53.8% | 1.86 | 1 | 7 | 13 |
| Calcium | UG/L | 89900 | 72223.1 | 100.0% | | 0 | 13 | 13 |
| Chromium | UG/L | 3 | 2.4 | 23.1% | 347.27 | 0 | 3 | 13 |
| Cobalt | UG/L | 4.1 | 3.4 | 15.4% | 5 | 0 | 2 | 13 |
| Copper | UG/L | 424 | 58.8 | 100.0% | 20.29 | 8 | 13 | 13 |
| Iron | UG/L | 3650 | 964.4 | 84.6% | 300 | 4 | 11 | 13 |
| Lead | UG/L | 813 | 112.0 | 100.0% | 7.16 | 11 | 13 | 13 |
| Magnesium | UG/L | 11400 | 9125.4 | 100.0% | | 0 | 13 | 13 |
| Manganese | UG/L | 252 | 52.4 | 100.0% | | 0 | 13 | 13 |
| Mercury | UG/L | 0.9 | 0.4 | 23.1% | | 0 | 3 | 13 |
| Nickel | UG/L | 5.5 | 4.2 | 61.5% | 154.49 | 0 | 8 | 13 |
| Potassium | UG/L | 4590 | 2980.8 | 100.0% | | 0 | 13 | 13 |
| Selenium | UG/L | 4.3 | 2.7 | 30.8% | 1 | 4 | 4 | 13 |
| Silver | UG/L | 5.2 | 5.2 | 7.7% | 0.1 | 1 | 1 | 13 |
| Sodium | UG/L | 9220 | 5642.3 | 100.0% | | 0 | 13 | 13 |
| Vanadium | UG/L | 4.9 | 3.0 | 53.8% | 14 | 0 | 7 | 13 |
| Zinc | UG/L | 380 | 126.4 | 100.0% | 141.38 | 4 | 13 | 13 |

Note:
1) Source: NYS AWQS CLASS C

**TABLE 6-1e**
**SEAD-16 SEDIMENT ANALYSIS RESULTS**
**Record of Decision for SEAD-16/17**
**Seneca Army Depot Activity**

| Parameter | Units | Maximum Concentration | Average | Frequency of Detection | Action Level | No. Above Action Level | No of Detects | No. of Analyses |
|---|---|---|---|---|---|---|---|---|
| VOLATILE ORGANICS | | | | | | | | |
| 2-Butanone | UG/KG | 12 | 12.00 | 9.1% | | 0 | 1 | 11 |
| Acetone | UG/KG | 36 | 24.83 | 54.5% | | 0 | 6 | 11 |
| SEMIVOLATILE ORGANICS | | | | | | | | |
| 2,4-Dinitrotoluene | UG/KG | 5400 | 2087.67 | 27.3% | | 0 | 3 | 11 |
| 2-Methylnaphthalene | UG/KG | 55 | 47.50 | 18.2% | | 0 | 2 | 11 |
| Acenaphthene | UG/KG | 32 | 32.00 | 9.1% | 5110 | 0 | 1 | 11 |
| Acenaphthylene | UG/KG | 54 | 44.00 | 27.3% | | 0 | 3 | 11 |
| Anthracene | UG/KG | 100 | 74.50 | 36.4% | | 0 | 4 | 11 |
| Benzo(a)anthracene | UG/KG | 570 | 237.71 | 63.6% | 47.45 | 6 | 7 | 11 |
| Benzo(a)pyrene | UG/KG | 600 | 316.67 | 54.5% | 47.45 | 6 | 6 | 11 |
| Benzo(b)fluoranthene | UG/KG | 1200 | 523.33 | 54.5% | 47.45 | 6 | 6 | 11 |
| Benzo(g,h,i)perylene | UG/KG | 530 | 244.43 | 63.6% | | 0 | 7 | 11 |
| Benzo(k)fluoranthene | UG/KG | 780 | 373.33 | 54.5% | 47.45 | 6 | 6 | 11 |
| Carbazole | UG/KG | 110 | 72.00 | 27.3% | | 0 | 3 | 11 |
| Chrysene | UG/KG | 1200 | 442.29 | 63.6% | 47.45 | 6 | 7 | 11 |
| Di-n-butylphthalate | UG/KG | 250 | 195.00 | 36.4% | | 0 | 4 | 11 |
| Dibenz(a,h)anthracene | UG/KG | 170 | 101.00 | 45.5% | | 0 | 5 | 11 |
| Fluoranthene | UG/KG | 1600 | 463.00 | 72.7% | 37230 | 0 | 8 | 11 |
| Indeno(1,2,3-cd)pyrene | UG/KG | 500 | 228.29 | 63.6% | 47.45 | 6 | 7 | 11 |
| N-Nitrosodiphenylamine (1) | UG/KG | 600 | 600.00 | 9.1% | | 0 | 1 | 11 |
| Phenanthrene | UG/KG | 420 | 188.13 | 72.7% | 4380 | 0 | 8 | 11 |
| Pyrene | UG/KG | 1400 | 461.38 | 72.7% | | 0 | 8 | 11 |
| bis(2-Ethylhexyl)phthalate | UG/KG | 270 | 128.88 | 72.7% | 7300 | 0 | 8 | 11 |
| PESTICIDES/PCBs | | | | | | | | |
| 4,4'-DDD | UG/KG | 730 | 116.30 | 72.7% | 0.37 | 8 | 8 | 11 |
| 4,4'-DDE | UG/KG | 570 | 103.30 | 100.0% | 0.37 | 11 | 11 | 11 |
| 4,4'-DDT | UG/KG | 420 | 83.78 | 72.7% | 0.37 | 8 | 8 | 11 |
| Aroclor-1254 | UG/KG | 670 | 160.29 | 63.6% | 0.03 | 7 | 7 | 11 |
| Aroclor-1260 | UG/KG | 130 | 71.00 | 45.5% | 0.03 | 5 | 5 | 11 |
| Endosulfan I | UG/KG | 26 | 10.00 | 63.6% | 1.10 | 7 | 7 | 11 |
| Endosulfan II | UG/KG | 6.8 | 5.23 | 27.3% | 1.10 | 3 | 3 | 11 |
| Endosulfan sulfate | UG/KG | 18 | 11.30 | 18.2% | | 0 | 2 | 11 |
| Endrin aldehyde | UG/KG | 3.2 | 3.20 | 9.1% | | 0 | 1 | 11 |
| Heptachlor epoxide | UG/KG | 2.8 | 2.80 | 9.1% | 0.03 | 1 | 1 | 11 |
| alpha-Chlordane | UG/KG | 12.1 | 8.77 | 27.3% | | 0 | 3 | 11 |
| gamma-Chlordane | UG/KG | 3.8 | 3.35 | 18.2% | | 0 | 2 | 11 |
| NITROAROMATICS | | | | | | | | |
| 2,4-Dinitrotoluene | UG/KG | 910 | 550.00 | 18.2% | | 0 | 2 | 11 |
| METALS | | | | | | | | |
| Aluminum | MG/KG | 22900 | 13470.00 | 100.0% | | 0 | 11 | 11 |
| Antimony | MG/KG | 50.3 | 13.73 | 90.9% | 2 | 9 | 10 | 11 |
| Arsenic | MG/KG | 9.6 | 5.94 | 100.0% | 6 | 6 | 11 | 11 |
| Barium | MG/KG | 3980 | 555.76 | 100.0% | | 0 | 11 | 11 |
| Beryllium | MG/KG | 0.93 | 0.56 | 100.0% | | 0 | 11 | 11 |

**TABLE 6-1e**
**SEAD-16 SEDIMENT ANALYSIS RESULTS**
**Record of Decision for SEAD-16/17**
**Seneca Army Depot Activity**

| Parameter | Units | Maximum Concentration | Average | Frequency of Detection | Action Level | No. Above Action Level | No of Detects | No. of Analyses |
|---|---|---|---|---|---|---|---|---|
| Cadmium | MG/KG | 7.6 | 1.44 | 100.0% | 0.6 | 7 | 11 | 11 |
| Calcium | MG/KG | 75700 | 37316.36 | 100.0% | | 0 | 11 | 11 |
| Chromium | MG/KG | 43.5 | 26.96 | 100.0% | 26 | 5 | 11 | 11 |
| Cobalt | MG/KG | 15.6 | 10.07 | 100.0% | | 0 | 11 | 11 |
| Copper | MG/KG | 17500 | 1777.58 | 100.0% | 16 | 11 | 11 | 11 |
| Iron | MG/KG | 46400 | 27545.46 | 100.0% | 20000 | 8 | 11 | 11 |
| Lead | MG/KG | 4480 | 1363.64 | 100.0% | 31 | 11 | 11 | 11 |
| Magnesium | MG/KG | 15100 | 7873.64 | 100.0% | | 0 | 11 | 11 |
| Manganese | MG/KG | 447 | 277.09 | 100.0% | 460 | 0 | 11 | 11 |
| Mercury | MG/KG | 2.5 | 0.56 | 100.0% | 0.15 | 7 | 11 | 11 |
| Nickel | MG/KG | 50.9 | 33.73 | 100.0% | 16 | 11 | 11 | 11 |
| Potassium | MG/KG | 3870 | 2047.91 | 100.0% | | 0 | 11 | 11 |
| Selenium | MG/KG | 4.9 | 3.15 | 18.2% | | 0 | 2 | 11 |
| Silver | MG/KG | 0.35 | 0.35 | 9.1% | 1 | 0 | 1 | 11 |
| Sodium | MG/KG | 782 | 240.70 | 100.0% | | 0 | 11 | 11 |
| Thallium | MG/KG | 1.6 | 1.30 | 18.2% | | 0 | 2 | 11 |
| Vanadium | MG/KG | 39.8 | 24.96 | 100.0% | | 0 | 11 | 11 |
| Zinc | MG/KG | 952 | 335.76 | 100.0% | 120 | 9 | 11 | 11 |

**TABLE 6-2a**
**SEAD-17 SURFACE SOIL ANALYSIS RESULTS**
**Record of Decision for SEAD-16/17**
**Seneca Army Depot Activity**

| Parameter | Units | Maximum | Average | Frequency of Detection | TAGM | No. Above TAGM | No. of Detects | No. of Analyses |
|---|---|---|---|---|---|---|---|---|
| VOLATILE ORGANICS | | | | | | | | |
| Acetone | UG/KG | 15 | 10 | 7.9% | 200 | 0 | 3 | 38 |
| Benzene | UG/KG | 2 | 3 | 2.6% | 60 | 0 | 1 | 38 |
| Methylene Chloride | UG/KG | 4 | 4 | 2.6% | 100 | 0 | 1 | 38 |
| Toluene | UG/KG | 8 | 4.333 | 7.9% | 1500 | 0 | 3 | 38 |
| SEMIVOLATILE ORGANICS | | | | | | | | |
| 2,4-Dinitrotoluene | UG/KG | 1400 | 392.5 | 10.5% | | 0 | 4 | 38 |
| 2,6-Dinitrotoluene | UG/KG | 70 | 70 | 2.6% | 1000 | 0 | 1 | 38 |
| 2-Methylnaphthalene | UG/KG | 130 | 130 | 2.6% | 36400 | 0 | 1 | 38 |
| 3,3'-Dichlorobenzidine | UG/KG | 410 | 410 | 2.6% | | 0 | 1 | 38 |
| 3-Nitroaniline | UG/KG | 990 | 990 | 2.6% | 500 | 1 | 1 | 38 |
| 4-Nitroaniline | UG/KG | 990 | 990 | 2.6% | | 0 | 1 | 38 |
| Anthracene | UG/KG | 23 | 23 | 2.6% | 50000 | 0 | 1 | 38 |
| Benzo(a)anthracene | UG/KG | 72 | 29.818 | 28.9% | 224 | 0 | 11 | 38 |
| Benzo(a)pyrene | UG/KG | 58 | 28.273 | 28.9% | 61 | 0 | 11 | 38 |
| Benzo(b)fluoranthene | UG/KG | 70 | 37.385 | 34.2% | 1100 | 0 | 13 | 38 |
| Benzo(g,h,i)perylene | UG/KG | 82 | 42.375 | 21.1% | 50000 | 0 | 8 | 38 |
| Benzo(k)fluoranthene | UG/KG | 49 | 28 | 26.3% | 1100 | 0 | 10 | 38 |
| Butylbenzylphthalate | UG/KG | 46 | 41.5 | 5.3% | 50000 | 0 | 2 | 38 |
| Carbazole | UG/KG | 410 | 410 | 2.6% | | 0 | 1 | 38 |
| Chrysene | UG/KG | 78 | 33.85 | 52.6% | 400 | 0 | 20 | 38 |
| Di-n-butylphthalate | UG/KG | 1200 | 275 | 50.0% | 8100 | 0 | 19 | 38 |
| Dibenz(a,h)anthracene | UG/KG | 59 | 51.333 | 7.9% | 14 | 3 | 3 | 38 |
| Fluoranthene | UG/KG | 190 | 47.481 | 65.8% | 50000 | 0 | 25 | 38 |
| Indeno(1,2,3-cd)pyrene | UG/KG | 62 | 38 | 13.2% | 3200 | 0 | 5 | 38 |
| N-Nitrosodiphenylamine (1) | UG/KG | 71 | 49 | 5.3% | | 0 | 2 | 38 |
| Naphthalene | UG/KG | 37 | 37 | 2.6% | 13000 | 0 | 1 | 38 |
| Pentachlorophenol | UG/KG | 990 | 516.5 | 5.3% | 1000 | 0 | 2 | 38 |
| Phenanthrene | UG/KG | 120 | 39.467 | 39.5% | 50000 | 0 | 15 | 38 |
| Pyrene | UG/KG | 170 | 48.25 | 63.2% | 50000 | 0 | 24 | 38 |
| bis(2-Chloroisopropyl) ether | UG/KG | 410 | 410 | 7.1% | | 0 | 1 | 14 |
| bis(2-Ethylhexyl)phthalate | UG/KG | 1300 | 608.333 | 31.6% | 50000 | 0 | 12 | 38 |
| PESTICIDES/PCB | | | | | | | | |
| 4,4'-DDD | UG/KG | 15 | 6 | 10.5% | 2900 | 0 | 4 | 38 |
| 4,4'-DDE | UG/KG | 37 | 11.876 | 44.7% | 2100 | 0 | 17 | 38 |
| 4,4'-DDT | UG/KG | 16 | 7.389 | 23.7% | 2100 | 0 | 9 | 38 |
| Aldrin | UG/KG | 1.9 | 1.9 | 2.6% | 41 | 0 | 1 | 38 |
| Aroclor-1260 | UG/KG | 28 | 25.667 | 7.9% | 1000 | 0 | 3 | 38 |
| Dieldrin | UG/KG | 80 | 33.5 | 15.8% | 44 | 2 | 6 | 38 |
| Endosulfan I | UG/KG | 2.4 | 1.58 | 5.3% | 900 | 0 | 2 | 38 |
| Endrin | UG/KG | 1.8 | 1.8 | 2.6% | 100 | 0 | 1 | 38 |
| Heptachlor epoxide | UG/KG | 1.1 | 1.1 | 2.6% | 20 | 0 | 1 | 38 |
| NITROAROMATICS | | | | | | | | |
| 2,4-Dinitrotoluene | UG/KG | 330 | 175.5 | 10.5% | | 0 | 4 | 38 |
| METALS | | | | | | | | |
| Aluminum | MG/K | 18400 | 13370 | 100.0% | 1930 | 38 | 38 | 38 |
| Antimony | MG/K | 52 | 11.383 | 47.4% | 5.9 | 6 | 18 | 38 |
| Arsenic | MG/K | 16.1 | 6.408 | 100.0% | 8.2 | 6 | 38 | 38 |
| Barium | MG/K | 524 | 200.927 | 57.9% | 300 | 5 | 22 | 38 |
| Beryllium | MG/K | 0.87 | 0.589 | 100.0% | 1.1 | 0 | 38 | 38 |

**TABLE 6-2a**
**SEAD-17 SURFACE SOIL ANALYSIS RESULTS**
**Record of Decision for SEAD-16/17**
**Seneca Army Depot Activity**

| Parameter | Units | Maximum | Average | Frequency of Detection | TAGM | No. Above TAGM | No. of Detects | No. of Analyses |
|---|---|---|---|---|---|---|---|---|
| Cadmium | MG/K | 25.5 | 5.275 | 86.8% | 2.3 | 20 | 33 | 38 |
| Calcium | MG/K | 209000 | 44054 | 100.0% | 121000 | 3 | 38 | 38 |
| Chromium | MG/K | 27.2 | 20.224 | 100.0% | 29.6 | 0 | 38 | 38 |
| Cobalt | MG/K | 21.9 | 10.061 | 100.0% | 30 | 0 | 38 | 38 |
| Copper | MG/K | 837 | 190.913 | 100.0% | 33 | 34 | 38 | 38 |
| Cyanide | MG/K | 1.5 | 1.14 | 5.3% | 0.3 | 2 | 2 | 38 |
| Iron | MG/K | 28800 | 22384.7 | 100.0% | 36500 | 0 | 38 | 38 |
| Lead | MG/K | 6270 | 1074.87 | 97.4% | 24.8 | 37 | 37 | 38 |
| Magnesium | MG/K | 17300 | 5718.68 | 100.0% | 21500 | 0 | 38 | 38 |
| Manganese | MG/K | 996 | 530.263 | 100.0% | 1060 | 0 | 38 | 38 |
| Mercury | MG/K | 1 | 0.126 | 97.4% | 0.1 | 5 | 37 | 38 |
| Nickel | MG/K | 47.8 | 27.668 | 100.0% | 49 | 0 | 38 | 38 |
| Potassium | MG/K | 2260 | 1419.42 | 100.0% | 2380 | 0 | 38 | 38 |
| Selenium | MG/K | 1.7 | 0.731 | 68.4% | 2 | 0 | 26 | 38 |
| Silver | MG/K | 9 | 2.981 | 44.7% | 0.75 | 12 | 17 | 38 |
| Sodium | MG/K | 249 | 118.968 | 73.7% | 172 | 6 | 28 | 38 |
| Thallium | MG/K | 1.5 | 1 | 18.4% | 0.7 | 6 | 7 | 38 |
| Vanadium | MG/K | 30.1 | 22.876 | 100.0% | 150 | 0 | 38 | 38 |
| Zinc | MG/K | 1530 | 365.405 | 100.0% | 110 | 30 | 38 | 38 |
| <u>HERBICIDES</u> | | | | | | | | |
| MCPA | UG/KG | 34000 | 23500 | 16.7% | | 0 | 4 | 24 |

**TABLE 6-2b**
**SEAD-17 SUBSURFACE SOIL ANALYSIS RESULTS**
**Record of Decision for SEAD-16/17**
**Seneca Army Depot Activity**

| Parameter | Units | Maximum Concentration | Average | Frequency of Detection | TAGM | No. Above TAGM | No. of Detects | No. of Analyses |
|---|---|---|---|---|---|---|---|---|
| SEMIVOLATILE ORGANICS | | | | | | | | |
| bis(2-Ethylhexyl)phthalate | UG/KG | 490 | 160.5 | 80.0% | 50000 | 0 | 8 | 10 |
| PESTICIDES/PCB | | | | | | | | |
| Aroclor-1254 | UG/KG | 61 | 61 | 10.0% | 10000 | 0 | 1 | 10 |
| METALS | | | | | | | | |
| Aluminum | MG/KG | 19300 | 14530 | 100.0% | 19300 | 0 | 10 | 10 |
| Arsenic | MG/KG | 6.9 | 5.14 | 100.0% | 8.2 | 0 | 10 | 10 |
| Barium | MG/KG | 158 | 89.68 | 100.0% | 300 | 0 | 10 | 10 |
| Beryllium | MG/KG | 0.99 | 0.668 | 100.0% | 1.1 | 0 | 10 | 10 |
| Cadmium | MG/KG | 2.8 | 2.8 | 10.0% | 2.3 | 1 | 1 | 10 |
| Calcium | MG/KG | 115000 | 33325 | 100.0% | 121000 | 0 | 10 | 10 |
| Chromium | MG/KG | 27.9 | 21.53 | 100.0% | 29.6 | 0 | 10 | 10 |
| Cobalt | MG/KG | 21.7 | 11.3 | 100.0% | 30 | 0 | 10 | 10 |
| Copper | MG/KG | 85.1 | 31.79 | 100.0% | 33 | 2 | 10 | 10 |
| Iron | MG/KG | 38700 | 27930 | 100.0% | 36500 | 1 | 10 | 10 |
| Lead | MG/KG | 686 | 106.46 | 100.0% | 24.8 | 2 | 10 | 10 |
| Magnesium | MG/KG | 18100 | 7678 | 100.0% | 21500 | 0 | 10 | 10 |
| Manganese | MG/KG | 1160 | 576.2 | 100.0% | 1060 | 2 | 10 | 10 |
| Mercury | MG/KG | 0.06 | 0.046 | 70.0% | 0.1 | 0 | 7 | 10 |
| Nickel | MG/KG | 42 | 30.73 | 100.0% | 49 | 0 | 10 | 10 |
| Potassium | MG/KG | 1750 | 1344.8 | 100.0% | 2380 | 0 | 10 | 10 |
| Sodium | MG/KG | 239 | 111.13 | 100.0% | 172 | 2 | 10 | 10 |
| Vanadium | MG/KG | 30.7 | 23.35 | 100.0% | 150 | 0 | 10 | 10 |
| Zinc | MG/KG | 172 | 83.04 | 100.0% | 110 | 1 | 10 | 10 |

**TABLE 6-2c**
**SEAD-17 GROUNDWATER ANALYSIS RESULTS**
**Record of Decision for SEAD-16/17**
**Seneca Army Depot Activity**

| Parameter | Units | Maximum Concentration | Average | Frequency of Detection | Action Level | Source | No. Above Action Level | No. of Detects | No. of Analyses |
|---|---|---|---|---|---|---|---|---|---|
| SEMIVOLATILE ORGANICS | | | | | | | | | |
| Benzo[a]pyrene | UG/L | 0.7 | 0.7 | 12.5% | ND | a | 0 | 1 | 8 |
| Benzo[ghi]perylene | UG/L | 2 | 1.5 | 25.0% | | | 0 | 2 | 8 |
| Dibenz[a,h]anthracene | UG/L | 1 | 0.95 | 25.0% | | | 0 | 2 | 8 |
| Indeno[1,2,3-cd]pyrene | UG/L | 2 | 1.5 | 25.0% | | | 0 | 2 | 8 |
| METALS | | | | | | | | | |
| Aluminum | UG/L | 386 | 142.725 | 50.0% | 50 | b | 3 | 4 | 8 |
| Barium | UG/L | 92.5 | 88.167 | 37.5% | 1000 | a | 0 | 3 | 8 |
| Beryllium | UG/L | 0.26 | 0.233 | 37.5% | 4 | c | 0 | 3 | 8 |
| Cadmium | UG/L | 0.31 | 0.31 | 12.5% | 5 | c | 0 | 1 | 8 |
| Calcium | UG/L | 118000 | 103638 | 100.0% | | | 0 | 8 | 8 |
| Chromium | UG/L | 1.5 | 1.5 | 12.5% | 50 | a | 0 | 1 | 8 |
| Cobalt | UG/L | 1.4 | 1.4 | 12.5% | | | 0 | 1 | 8 |
| Copper | UG/L | 4.3 | 3.567 | 37.5% | 200 | a | 0 | 3 | 8 |
| Iron | UG/L | 572 | 197.733 | 75.0% | 300 | a | 1 | 6 | 8 |
| Magnesium | UG/L | 23000 | 17975 | 100.0% | | | 0 | 8 | 8 |
| Manganese | UG/L | 73.8 | 45.467 | 75.0% | 50 | b | 3 | 6 | 8 |
| Nickel | UG/L | 2.4 | 2.133 | 37.5% | 100 | c | 0 | 3 | 8 |
| Potassium | UG/L | 5320 | 1804.75 | 50.0% | | | 0 | 4 | 8 |
| Silver | UG/L | 2.3 | 2.3 | 12.5% | 50 | a | 0 | 1 | 8 |
| Sodium | UG/L | 30100 | 14858.8 | 100.0% | 20000 | a | 2 | 8 | 8 |
| Thallium | UG/L | 7.1 | 5.4 | 37.5% | 2 | c | 3 | 3 | 8 |
| Vanadium | UG/L | 1.4 | 1.4 | 12.5% | | | 0 | 1 | 8 |
| Zinc | UG/L | 63.9 | 63.9 | 12.5% | 5000 | b | 0 | 1 | 8 |

Notes:
a) NY State Class GA Groundwater Standard (TOGS 1.1.1, June 1998)
b) US EPA Secondary Drinking Water Regulation, non-enforceable (EPA 822-B-00-001, Summer 2000)
c) US EPA National Primary Drinking Water Standards, EPA 816-F-01-007 March 2001

**TABLE 6-2d**
**SEAD-17 SURFACE WATER ANALYSIS RESULTS**
**Record of Decision for SEAD-16/17**
**Seneca Army Depot Activity**

| Parameter | Units | Maximum Concentration | Average | Frequency of Detection | Action Level[1] | No. Above Action Level | No. of Detects | No. of Analyses |
|---|---|---|---|---|---|---|---|---|
| SEMIVOLATILE ORGANICS | | | | | | | | |
| bis(2-Ethylhexyl)phthalate | UG/L | 2 | 1.5 | 20.0% | 0.6 | 2 | 2 | 10 |
| METALS | | | | | | | | |
| Antimony | UG/L | 23.6 | 11.425 | 40.0% | | 0 | 4 | 10 |
| Arsenic | UG/L | 4.6 | 3.733 | 60.0% | 190 | 0 | 6 | 10 |
| Barium | UG/L | 100 | 47.01 | 100.0% | | 0 | 10 | 10 |
| Cadmium | UG/L | 1.3 | 0.632 | 50.0% | 1.86 | 0.00 | 5.00 | 10 |
| Calcium | UG/L | 73500 | 53640 | 100.0% | | 0 | 10 | 10 |
| Chromium | UG/L | 1 | 1 | 10.0% | 347.27 | 0.00 | 1.00 | 10 |
| Copper | UG/L | 32.7 | 13.04 | 100.0% | 20.29 | 1.00 | 10.00 | 10 |
| Iron | UG/L | 322 | 146.3 | 100.0% | 300 | 1 | 10 | 10 |
| Lead | UG/L | 37.1 | 11.45 | 60.0% | 7.16 | 3.00 | 6.00 | 10 |
| Magnesium | UG/L | 9280 | 5904 | 100.0% | | 0 | 10 | 10 |
| Manganese | UG/L | 19.6 | 8.43 | 100.0% | | 0 | 10 | 10 |
| Nickel | UG/L | 1.7 | 1.7 | 10.0% | 154.49 | 0.00 | 1.00 | 10 |
| Potassium | UG/L | 4380 | 3007 | 100.0% | | 0 | 10 | 10 |
| Selenium | UG/L | 3.5 | 3.14 | 50.0% | 1 | 5 | 5 | 10 |
| Sodium | UG/L | 9460 | 5209 | 100.0% | | 0 | 10 | 10 |
| Vanadium | UG/L | 1.8 | 1.8 | 10.0% | 14 | 0 | 1 | 10 |
| Zinc | UG/L | 61.7 | 24.13 | 100.0% | 141.38 | 0.00 | 10.00 | 10 |

Note:
1) Source: NYS AWQS CLASS C

**TABLE 6-2e**
**SEAD-17 SEDIMENT ANALYSIS RESULTS**
**Record of Decision for SEAD-16/17**
**Seneca Army Depot Activity**

| Parameter | Units | Maximum Concentration | Average | Frequency | Action Level | No. Above Action Level | No. of Detects | No. of Analyses |
|---|---|---|---|---|---|---|---|---|
| VOLATILE ORGANICS | | | | | | | | |
| Acetone | UG/KG | 26 | 17 | 30.0% | | 0 | 3 | 10 |
| Toluene | UG/KG | 8 | 8 | 10.0% | | 0 | 1 | 10 |
| SEMIVOLATILE ORGANICS | | | | | | | | |
| 2,4-Dimethylphenol | UG/KG | 32 | 32 | 10.0% | | 0 | 1 | 10 |
| 2,4-Dinitrotoluene | UG/KG | 450 | 450 | 10.0% | | 0 | 1 | 10 |
| Benzo(a)anthracene | UG/KG | 25 | 25 | 10.0% | 15.99 | 1 | 1 | 10 |
| Benzo(a)pyrene | UG/KG | 30 | 30 | 10.0% | 15.99 | 1 | 1 | 10 |
| Benzo(b)fluoranthene | UG/KG | 43 | 43 | 10.0% | 15.99 | 1 | 1 | 10 |
| Benzo(g,h,i)perylene | UG/KG | 31 | 31 | 10.0% | | 0 | 1 | 10 |
| Benzo(k)fluoranthene | UG/KG | 33 | 33 | 10.0% | 15.99 | 1 | 1 | 10 |
| Chrysene | UG/KG | 48 | 48 | 10.0% | 15.99 | 1 | 1 | 10 |
| Fluoranthene | UG/KG | 70 | 53 | 20.0% | 12546 | 0 | 2 | 10 |
| Indeno(1,2,3-cd)pyrene | UG/KG | 24 | 24 | 10.0% | 15.99 | 1 | 1 | 10 |
| Phenanthrene | UG/KG | 35 | 35 | 10.0% | 1476 | 0 | 1 | 10 |
| Pyrene | UG/KG | 47 | 36.5 | 20.0% | | 0 | 2 | 10 |
| bis(2-Ethylhexyl)phthalate | UG/KG | 77 | 55.667 | 30.0% | 2460 | 0 | 3 | 10 |
| PESTICIDES/PCB | | | | | | | | |
| 4,4'-DDD | UG/KG | 13 | 8 | 30.0% | 0.123 | 3 | 3 | 10 |
| 4,4'-DDE | UG/KG | 62 | 19.2 | 60.0% | 0.123 | 6 | 6 | 10 |
| 4,4'-DDT | UG/KG | 12 | 7.5 | 20.0% | 0.123 | 2 | 2 | 10 |
| Dieldrin | UG/KG | 5 | 5 | 10.0% | 1.23 | 1 | 1 | 10 |
| Endosulfan I | UG/KG | 1.6 | 1.6 | 10.0% | 0.369 | 1 | 1 | 10 |
| Endosulfan II | UG/KG | 3.8 | 3.75 | 20.0% | 0.369 | 2 | 2 | 10 |
| METALS | | | | | | | | |
| Aluminum | MG/KG | 22100 | 16370 | 100.0% | | 0 | 10 | 10 |
| Antimony | MG/KG | 5.5 | 3.45 | 40.0% | 2 | 2 | 4 | 10 |
| Arsenic | MG/KG | 7.5 | 5.29 | 100.0% | 6 | 3 | 10 | 10 |
| Barium | MG/KG | 162 | 111.77 | 100.0% | | 0 | 10 | 10 |
| Beryllium | MG/KG | 0.99 | 0.642 | 100.0% | | 0 | 10 | 10 |
| Cadmium | MG/KG | 4.8 | 1.573 | 100.0% | 0.6 | 7 | 10 | 10 |
| Calcium | MG/KG | 25000 | 6031 | 100.0% | | 0 | 10 | 10 |
| Chromium | MG/KG | 27.7 | 22.16 | 100.0% | 26 | 1 | 10 | 10 |
| Cobalt | MG/KG | 17.8 | 10.81 | 100.0% | | 0 | 10 | 10 |
| Copper | MG/KG | 309 | 73.32 | 100.0% | 16 | 10 | 10 | 10 |
| Iron | MG/KG | 35000 | 26540 | 100.0% | 20000 | 9 | 10 | 10 |
| Lead | MG/KG | 1050 | 270.32 | 100.0% | 31 | 10 | 10 | 10 |
| Magnesium | MG/KG | 6490 | 4890 | 100.0% | | 0 | 10 | 10 |
| Manganese | MG/KG | 768 | 445.1 | 100.0% | 460 | 4 | 10 | 10 |
| Mercury | MG/KG | 0.16 | 0.078 | 40.0% | 0.15 | 1 | 4 | 10 |
| Nickel | MG/KG | 31.6 | 27.2 | 100.0% | 16 | 9 | 10 | 10 |
| Potassium | MG/KG | 2630 | 1899 | 100.0% | | 0 | 10 | 10 |
| Selenium | MG/KG | 1.9 | 1.487 | 30.0% | | 0 | 3 | 10 |
| Sodium | MG/KG | 452 | 214 | 80.0% | | 0 | 8 | 10 |
| Thallium | MG/KG | 1.3 | 1.15 | 20.0% | | 0 | 2 | 10 |
| Vanadium | MG/KG | 33.8 | 26.77 | 100.0% | | 0 | 10 | 10 |
| Zinc | MG/KG | 278 | 130.03 | 100.0% | 120 | 3 | 10 | 10 |

## TABLE 7-1
## SEAD-16 EXPOSURE POINT CONCENTRATION SUMMARY FOR CHEMICALS OF CONCERN
### Record of Decision for SEADs-16/17
### Seneca Army Depot Activity

| Parameter | Units | No. of Valid Analyses | No. of Rejected SQLs | No. of Hits | Freq. (%) | Mean | Std. Dev. | Max. Hit | Normal? | 95% UCL of Mean | EPC |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Surface Soil** | | | | | | | | | | | |
| Antimony | MG/KG | 51 | 0 | 33 | 64.7% | 4.75E+01 | 2.70E+02 | 1.93E+03 | FALSE | 4.77E+01 | 4.77E+01 |
| Copper | MG/KG | 51 | 0 | 51 | 100.0% | 9.71E+02 | 5.30E+03 | 3.79E+04 | FALSE | 5.85E+02 | 5.85E+02 |
| **Total Soil** | | | | | | | | | | | |
| Antimony | MG/KG | 57 | 0 | 36 | 63.0% | 4.51E+01 | 2.55E+02 | 1.93E+02 | FALSE | 5.12E+01 | 5.12E+01 |
| **Groundwater** | | | | | | | | | | | |
| Thallium | MG/L | 11 | 0 | 4 | 36.0% | 4.07E-03 | 2.40E-03 | 9.20E-03 | FALSE | 6.14E-03 | 6.14E-03 |
| **Indoor Dust** | | | | | | | | | | | |
| 2,4-Dinitrotoluene | MG/KG | 11 | 0 | 8 | 73.0% | 2.07E+03 | 5.72E+03 | 1.90E+04 | FALSE | 2.62E+11 | 1.90E+04 |
| Antimony | MG/KG | 11 | 0 | 10 | 91.0% | 3.11E+02 | 5.53E+02 | 1.56E+03 | FALSE | 1.29E+04 | 1.56E+03 |
| Cadmium | MG/KG | 8 | 3 | 7 | 88.0% | 3.26E+01 | 4.77E+01 | 1.27E+02 | FALSE | 7.16E+04 | 1.27E+02 |
| Copper | MG/KG | 11 | 0 | 11 | 100.0% | 1.31E+04 | 2.56E+04 | 8.14E+04 | FALSE | 4.70E+06 | 8.14E+04 |

Notes
1. EPC = Exposure Point Concentration

# TABLE 7-2

## CALCULATION OF TOTAL NONCARCINOGENIC AND CARCINOGENIC RISKS
## REASONABLE MAXIMUM EXPOSURE (RME) - PRE-REMEDIATION
**Record of Decision SEAD-16**
**Seneca Army Depot Activity**

| RECEPTOR | EXPOSURE ROUTE | HAZARD INDEX | CANCER RISK |
|---|---|---|---|
| CURRENT SITE WORKER | Inhalation of Dust in Ambient Air | 3E-02 | 2E-11 |
| | Ingestion of Onsite Soils | 1E-02 | 1E-06 |
| | Dermal Contact to Onsite Soils | 2E-03 | 3E-08 |
| | *TOTAL RECEPTOR RISK (Nc & Car)* | *5E-02* | *1E-06* |
| FUTURE INDUSTRIAL WORKER | Inhalation of Dust in Indoor Air | 3E-01 | NQ |
| | Ingestion of Indoor Dust | 2E+01 | 5E-03 |
| | Dermal Contact to Indoor Dust | 2E+00 | 6E-06 |
| | Ingestion of Groundwater | 2E+00 | 4E-05 |
| | *TOTAL RECEPTOR RISK (Nc & Car)* | *2E+01* | *5E-03* |
| FUTURE ON-SITE CONSTRUCTION WORKERS | Inhalation of Dust in Ambient Air | 5E-01 | 9E-11 |
| | Ingestion of Onsite Soils | 9E-01 | 3E-06 |
| | Dermal Contact to Onsite Soils | 2E-02 | 1E-08 |
| | *TOTAL RECEPTOR RISK (Nc & Car)* | *1E+00* | *3E-06* |
| FUTURE TRESSPASSER | Inhalation of Dust in Ambient Air | 1E-02 | 2E-12 |
| | Ingestion of Onsite Soils | 9E-02 | 2E-06 |
| | Dermal Contact to Onsite Soils | 5E-03 | 2E-08 |
| | Dermal Contact to Surface Water while Wading | 7E-03 | 8E-07 |
| | Ingestion of Onsite Sediment | 2E-01 | 4E-07 |
| | Dermal Contact to Sediment while Wading | 1E-02 | 3E-08 |
| | *TOTAL RECEPTOR RISK (Nc & Car)* | *3E-01* | *3E-06* |
| FUTURE DAY CARE CENTER CHILD | Inhalation of Dust in Ambient Air | 8E-01 | 1E-10 |
| | Ingestion of Onsite Soils | 2E+00 | 4E-05 |
| | Dermal Contact to Onsite Soils | 4E-02 | 1E-07 |
| | Ingestion of Groundwater | 4E+00 | 2E-05 |
| | *TOTAL RECEPTOR RISK (Nc & Car)* | *6E+00* | *6E-05* |
| FUTURE DAY CARE CENTER WORKER | Inhalation of Dust in Ambient Air | 3E-01 | 2E-10 |
| | Ingestion of Onsite Soils | 2E-01 | 2E-05 |
| | Dermal Contact to Onsite Soils | 2E-02 | 3E-07 |
| | Ingestion of Groundwater | 2E+00 | 4E-05 |
| | *TOTAL RECEPTOR RISK (Nc & Car)* | *2E+00* | *6E-05* |

NQ = Not Quantified due to lack of toxicity data.

**Table 7-3**
**SENECA ARMY DEPOT ACTIVITY**
**RECORD OF DECISION**
**SEAD-16/17 Primary Contributors to Unacceptable Risk**

**SEAD-16**

| Receptor / Exposure Route | Primary Contributors to Unacceptable Risk | HI | Cancer Risk |
|---|---|---|---|
| FUTURE DAY CARE CENTER CHILD | | | |
| Ingestion of soil | antimony | 1E+00 | |
| | copper | 1E-01 | |
| | thallium | 1E-01 | |
| Ingestion of groundwater | thallium | 4E+00 | |
| FUTURE DAY CARE CENTER WORKER | | | |
| Ingestion of groundwater | thallium | 2E+00 | |
| FUTURE CONSTRUCTION WORKER | | | |
| Ingestion of soil | antimony | 6E-01 | |
| FUTURE INDUSTRIAL WORKER | | | |
| Ingestion of indoor dust | 2,4-dinitrotoluene | 9.E+00 | 5.E-03 |
| | antimony | 4.E+00 | |
| | copper | 2.E+00 | |
| Dermal contact to indoor dust | cadmium | 1.E+00 | |
| Ingestion of groundwater | thallium | 2.E+00 | |

**SEAD-17**

| Receptor / Exposure Route | Primary Contributors to Unacceptable Risk | HI | Cancer Risk |
|---|---|---|---|
| FUTURE DAY CARE CENTER CHILD | | | |
| Ingestion of soil | antimony | 3E-01 | |
| | arsenic | 2E-01 | 8E-06 |
| | cadmium | 2E-01 | |

NOTES:
1. These values are based on risk calculations presented in the FS Report (Parsons ES, Revised July 2001).
2. An additional discussion of thallium in groundwater is presented in Section 7. The results of the October 1999 sampling of groundwater indicated that thallium is not present and that the earlier detections of thallium were due to either laboratory analytical error or matrix interference effects. Therefore, thallium is not considered to contribute to non-carcinogenic risk in groundwater at SEAD-16.

# TABLE 7-4
# SEAD-17 EXPOSURE POINT CONCENTRATION SUMMARY FOR CHEMICALS OF CONCERN
## Record of Decision for SEADs-16/17
## Seneca Army Depot Activity

| Parameter | Units | No. of Valid Analyses | No. of Rejected SQLs | No. of Hits | Freq. (%) | Mean | Std. Dev. | Max. Hit | Normal? | 95% UCL of Mean | EPC [1] |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Surface Soil** | | | | | | | | | | | |
| Antimony | MG/KG | 47 | 0 | 26 | 55% | 6.65E+00 | 1.03E+01 | 5.20E+01 | FALSE | 1.15E+01 | 1.15E+01 |
| Arsenic | MG/KG | 47 | 0 | 47 | 100% | 6.00E+00 | 2.13E+00 | 1.61E+01 | FALSE | 6.44E+00 | 6.44E+00 |
| Cadmium | MG/KG | 47 | 0 | 42 | 89% | 3.71E+00 | 4.98E+00 | 2.55E+01 | FALSE | 8.82E+00 | 8.82E+00 |

Notes
1. EPC = Exposure Point Concentration

TABLE 7-5

CALCULATION OF TOTAL NONCARCINOGENIC AND CARCINOGENIC RISKS
REASONABLE MAXIMUM EXPOSURE (RME) - PRE-REMEDIATION
Record of Decision SEAD-17
Seneca Army Depot Activity

| RECEPTOR | EXPOSURE ROUTE | HAZARD INDEX | CANCER RISK |
|---|---|---|---|
| CURRENT SITE WORKER | Inhalation of Dust in Ambient Air | 1E-04 | 7E-09 |
| | Ingestion of Onsite Soils | 8E-03 | 4E-07 |
| | Dermal Contact to Onsite Soils | 8E-03 | 3E-08 |
| | *TOTAL RECEPTOR RISK (Nc & Car)* | *2E-02* | *5E-07* |
| FUTURE INDUSTRIAL WORKER | Inhalation of Dust in Ambient Air | 2E-03 | 9E-08 |
| | Ingestion of Onsite Soils | 1E-01 | 5E-06 |
| | Dermal Contact to Onsite Soils | 1E-01 | 3E-07 |
| | Ingestion of Groundwater | 2E-04 | 9E-05 |
| | *TOTAL RECEPTOR RISK (Nc & Car)* | *2E-01* | *1E-04* |
| FUTURE ON-SITE CONSTRUCTION WORKERS | Inhalation of Dust in Ambient Air | 2E-02 | 3E-08 |
| | Ingestion of Onsite Soils | 4E-01 | 1E-06 |
| | Dermal Contact to Onsite Soils | 9E-02 | 2E-08 |
| | *TOTAL RECEPTOR RISK (Nc & Car)* | *5E-01* | *1E-06* |
| FUTURE TRESSPASSER | Inhalation of Dust in Ambient Air | 7E-05 | 6E-10 |
| | Ingestion of Onsite Soils | 6E-02 | 6E-07 |
| | Dermal Contact to Onsite Soils | 2E-02 | 1E-08 |
| | Dermal Contact to Surface Water while Wading | 1E-03 | 1E-08 |
| | Ingestion of Onsite Sediment | 5E-02 | 3E-07 |
| | Dermal Contact to Sediment while Wading | 3E-03 | 5E-09 |
| | *TOTAL RECEPTOR RISK (Nc & Car)* | *1E-01* | *9E-07* |
| FUTURE DAY CARE CENTER CHILD | Inhalation of Dust in Ambient Air | 4E-03 | 4E-08 |
| | Ingestion of Onsite Soils | 1E+00 | 1E-05 |
| | Dermal Contact to Onsite Soils | 2E-01 | 1E-07 |
| | Ingestion of Groundwater | 4E-04 | 5E-05 |
| | *TOTAL RECEPTOR RISK (Nc & Car)* | *1E+00* | *6E-05* |
| FUTURE DAY CARE CENTER WORKER | Inhalation of Dust in Ambient Air | 2E-03 | 7E-08 |
| | Ingestion of Onsite Soils | 1E-01 | 5E-06 |
| | Dermal Contact to Onsite Soils | 1E-01 | 3E-07 |
| | Ingestion of Groundwater | 2E-04 | 9E-05 |
| | *TOTAL RECEPTOR RISK (Nc & Car)* | *2E-01* | *1E-04* |

**TABLE 8-1**
**SEAD-16/17 CLEANUP GOALS FOR SOIL**
**Record of Decision for SEAD-16/17**
**Seneca Army Depot Activity**

| Compounds | Soil Criteria [1] (mg/kg) |
|---|---|
| | |
| Antimony | 18.0 |
| Copper | 359 |
| Lead | 1250 [2] |
| Mercury | 2.69 |
| Thallium | 3.59 |
| Zinc | 539 |

Notes:

1. Soil criteria are based on maximum concentrations, derived in the Feasibility Study, that would be protective of human health under the industrial use scenario, unless otherwise noted.
2. This value was selected as the clean up goal for lead in accordance with the publication "Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil" (USEPA, December 1996). Refer to the *Remedial Action Objectives* section in the ROD for a more detailed discussion.
3. Soil criteria are for surface, subsurface, and ditch soils.

# TABLE 10-1
## SCREENING OF SOIL REMEDIATION ALTERNATIVES
### Record of Decision for SEAD-16/17
### Seneca Army Depot Activity

| ALT. | TECHNOL. AND PROCESS | LONG-TERM EFFECTIVENESS AND PERMANENCE | | | | REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT | | | | | SHORT-TERM EFFECTIVE-NESS | IMPLEMENTIBILITY | | | | | COST | | | | TOTAL SCORE | OVERALL ALTERNA-TIVE RANKING |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | | LONG-TERM HUMAN HEALTH & ENVIRONTAL PROTECT-IVENESS | PERM-ANENCE | SUB-TOTAL SCORE | CRITER-ION SCORE | Tox. | Mob. | Vol. | SUB-TOTAL SCORE | CRITER-ION SCORE | CRITER-ION SCORE | TECH-NICAL FEASI-BILITY. | ADMINIS-TRATIVE FEASI-BILITY. | AVAI-LABILITY | SUB-TOTAL SCORE | CRITER-ION SCORE | CAPIT. | O&M | SUB-TOTAL SCORE | CRITER-ION SCORE | | |
| 1 | No Action Alternative | 1 | 1 | 2 | 1 | 1 | 1 | 4 | 6 | 1 | 6 | 6 | 1 | 6 | 13 | 5 | 6 | 6 | 12 | 6 | 19 | 3 |
| 2 | Containment Alternative Institutional controls/ Soil cover | 2 | 2 | 4 | 2 | 2 | 2 | 5 | 9 | 2 | 5 | 4 | 4 | 5 | 13 | 6 | 5 | 2 | 7 | 4 | 19 | 3 |
| 3 | In-situ Treatment Alternative In situ stabilization/Soil cover | 3 | 3 | 6 | 3 | 5 | 3 | 1 | 9 | 3 | 2 | 2 | 5 | 2 | 9 | 2 | 3 | 3 | 6 | 2 | 12 | 5 |
| 4 | Off-site Disposal Alternative Excavate/Stabilize/ Off-site Disposal | 5 | 4 | 9 | 5 | 3 | 5 | 2 | 10 | 4 | 4 | 5 | 2 | 4 | 11 | 4 | 4 | 5 | 9 | 5 | 22 | 1 |
| 5 | On-site Disposal Alternative Excavate/on-site stabilization/ On-site Subtitle D landfill | 4 | 5 | 9 | 4 | 4 | 4 | 3 | 11 | 5 | 1 | 1 | 3 | 3 | 7 | 1 | 1 | 1 | 2 | 1 | 12 | 5 |
| 6 | Innovative Treatment Alternative Excavate/wash/backfill coarse fraction/treat and dispose fine fraction in off-site landfill | 6 | 6 | 12 | 6 | 6 | 6 | 6 | 18 | 6 | 3 | 3 | 6 | 1 | 10 | 3 | 2 | 4 | 6 | 3 | 21 | 2 |

Note: Alternatives were scored from 1 to 6 for each screening criterion. The score of 1 represents the least favorable score and 6 represents the most favorable score. The alternative with the highest total score represents the most favorable alternative. Within each screening criterion, alternatives were scored from one to six for each subcategory. The total score of all subcategories is the basis for the scoring for the screening criterion.

**TABLE 10-2**
**DETAILED COST ESTIMATES**
**Record of Decision for SEAD-16/17**
**Seneca Army Depot Activity**

| | ALTERNATIVE 2 On-site Containment | | | | ALTERNATIVE 4 Off-site Disposal | | | | ALTERNATIVE 6 Soil Washing | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Soil with Lead Concentration** | >1250 mg/kg (7) | >1000 mg/kg (7) | >400 mg/kg (7) | >400 mg/kg +TAGM (7) | >1250 mg/kg (7) | >1000 mg/kg (7) | >400 mg/kg (7) | >400 mg/kg +TAGM (7) | >1250 mg/kg (7) | >1000 mg/kg (7) | >400 mg/kg (7) | >400 mg/kg +TAGM (7) |
| Cost to Prime (1) | $422,806 | $454,397 | $652,709 | $872,984 | $1,037,371 | $1,214,107 | $2,162,151 | $3,345,376 | $1,507,529 | $1,788,721 | $3,288,477 | $5,543,067 |
| Cost to Owner (2) | $577,290 | $620,930 | $894,870 | $1,199,150 | $1,426,240 | $1,670,370 | $2,979,980 | $4,614,470 | $2,075,700 | $2,464,140 | $4,452,990 | $7,650,310 |
| Project Cost (3) | $913,900 | $982,520 | $1,416,660 | $1,898,360 | $2,257,850 | $2,644,340 | $4,717,570 | $7,305,090 | $3,286,010 | $3,900,850 | $7,049,450 | $12,111,090 |
| Annual O&M Costs (4) | $5,000 | $6,000 | $7,000 | $8,000 | NA | NA | NA | NA | NA | NA | NA | NA |
| Annual Post Remediation Monitoring Costs | $40,440 | $40,440 | $40,440 | $40,440 | $40,440 | $40,440 | $40,440 | $40,440 | $40,440 | $40,440 | $40,440 | $40,440 |
| Present Worth O&M and Monitoring Cost (30 year) (5) | $785,748 | $803,040 | $820,332 | $837,624 | $699,288 | $699,288 | $699,288 | $699,288 | $699,288 | $699,288 | $699,288 | $699,288 |
| **Total Evaluated Price (6)** | **$1,699,648** | **$1,785,560** | **$2,236,992** | **$2,735,984** | **$2,957,138** | **$3,343,628** | **$5,416,858** | **$8,004,378** | **$3,985,298** | **$4,600,138** | **$7,748,738** | **$12,810,378** |

NOTES
1 Cost to Prime (Contractor) is the sum of the direct costs plus any sales tax, subcontractor markups, and adjust pricing that have been applied in the project
2 Cost to Owner is the sum of the Cost to Prime plus prime contractor Indirect Cost. Also known as the bid amount or construction contract cost
3 Project Cost is the sum of the Direct, Indirect, and Owner costs for the project.
4 Annual Costs are costs that will occur yearly due to activities such as maintenance or monitoring.
5 Present Worth Cost is based on a 4% interest rate over the number of years specified above (Refer to Appendix E, Table E-1)
6 Total Evaluated Price is the sum of the Project Cost and Present Worth Cost.
7 Soil remediated to lead concentrations as noted.
8 Cost estimate details are provided in the Final Feasibility Study Report.

**TABLE 10-3**
**SEAD-16 RESIDUAL CONTAMINATION**
**Record of Decision for SEAD-16/17**
**Seneca Army Depot Activity**

| Compound | Max Concentration to be Protective of Human Health [1] (mg/kg) | EPCs [2] (mg/kg) | Max Hit (mg/kg) | TAGM 4046 (mg/kg) |
|---|---|---|---|---|
| | Industrial Use Day Care Child | Post Remediation | Post Remediation | |
| Antimony | 18.0 | 4.78 | 17.1 | 5.9 |
| Copper | 359 | 69.8 | 204 | 33 |
| Mercury | 2.69 | 0.350 | 1.2 | 0.1 |
| Thallium | 3.59 | 0.920 | 1.8 | 0.7 |
| Zinc | 539 | 133 | 1270 | 110 |

Notes:

1. The maximum concentrations to be protective of human health under an industrial use scenario were calculated in Table 2-3 in the Final FS, February 2001.
2. The EPC values were determined by selecting the lower value of either the max concentration or the calculated 95% UCL of the mean for the surface soil samples that were not located in the area included in the proposed remedial action.

**TABLE 10-4**
**SEAD-17 RESIDUAL CONTAMINATION**
**Record of Decision for SEAD-16/17**
**Seneca Army Depot**

| Compound | Max Concentration to be Protective of Human Health [1] (mg/kg) | EPCs [2] (mg/kg) | Max Hit (mg/kg) | TAGM 4046 (mg/kg) |
|---|---|---|---|---|
| | Industrial Use Day Care Child | Post Remediation | Post Remediation | |
| Antimony | 18.0 | 5.00 | 5.0 | 5.9 |
| Arsenic | NA | 5.90 | 8.9 | 8.2 |
| Cadmium | NA | 2.5 | 5.6 | 2.3 |
| Copper | 359 | 83.4 | 182 | 33 |
| Mercury | 2.69 | 0.150 | 1.00 | 0.1 |
| Thallium | 3.59 | 0.686 | 1.50 | 0.7 |
| Zinc | 539 | 230 | 488 | 110 |

Notes:
1. The maximum concentrations to be protective of human health under an industrial use scenario were calculated in Table 2-3 in the Final FS, February 2001.
2. The EPC values were determined by selecting the lower value of either the max concentration or the calculated 95% UCL of the mean for the surface soil samples that were not located in the area included in the proposed remedial action.

NA - Not Applicable: values were not determined for this constituent.


PARSONS

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY

RECORD OF DECISION
SEAD-16 AND 17

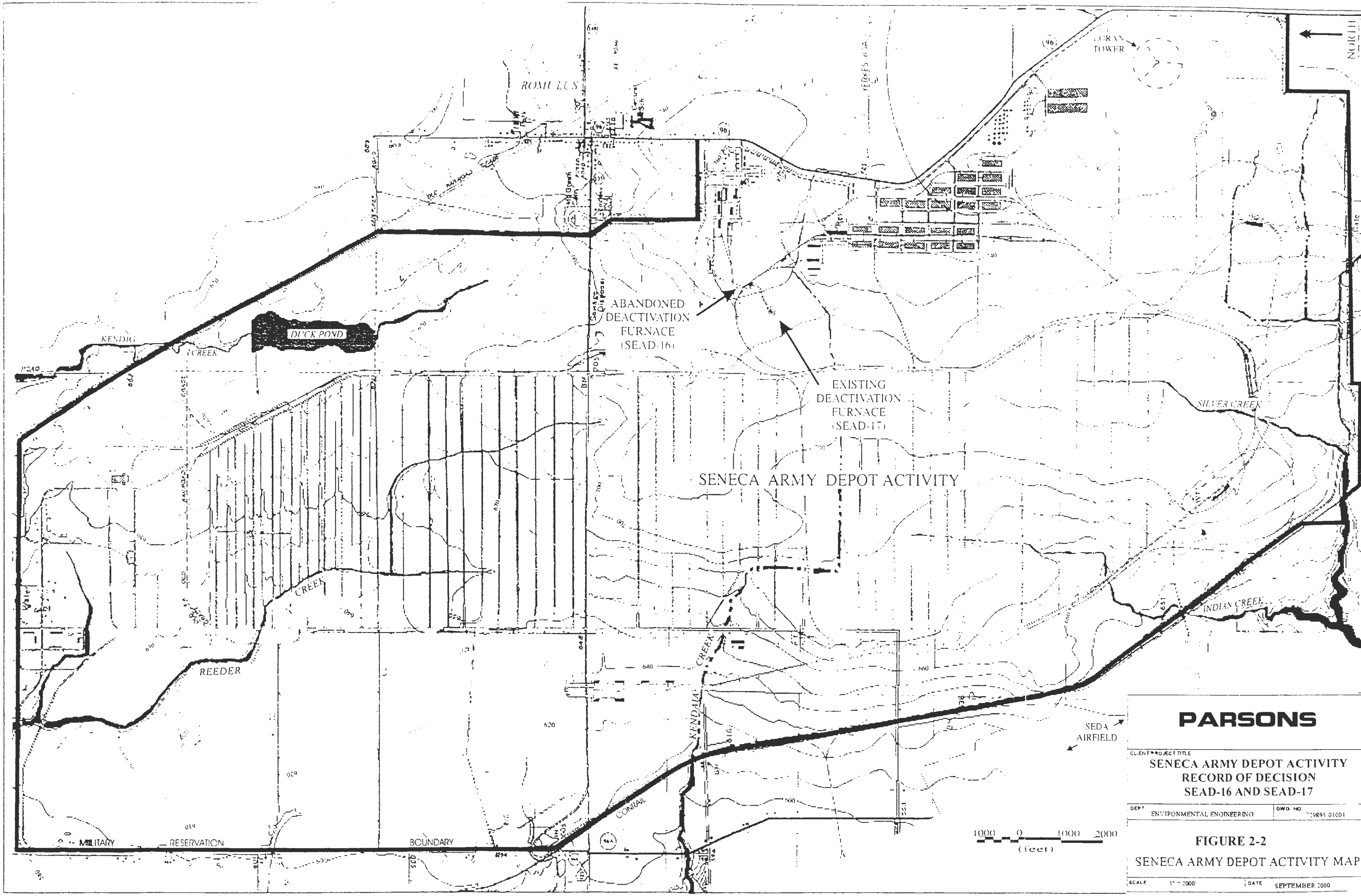
| DEPT | DWG NO |
|---|---|
| ENVIRONMENTAL ENGINEERING | 734516-01001 |

FIGURE 2-1

LOCATION MAP

| SCALE | DATE |
|---|---|
| 1"= 8 MILES APPROX. | JULY 2002 |

P:\pit\projects\seneca\s1617rod\predraft\figures\locmap.cdr




**PARSONS**

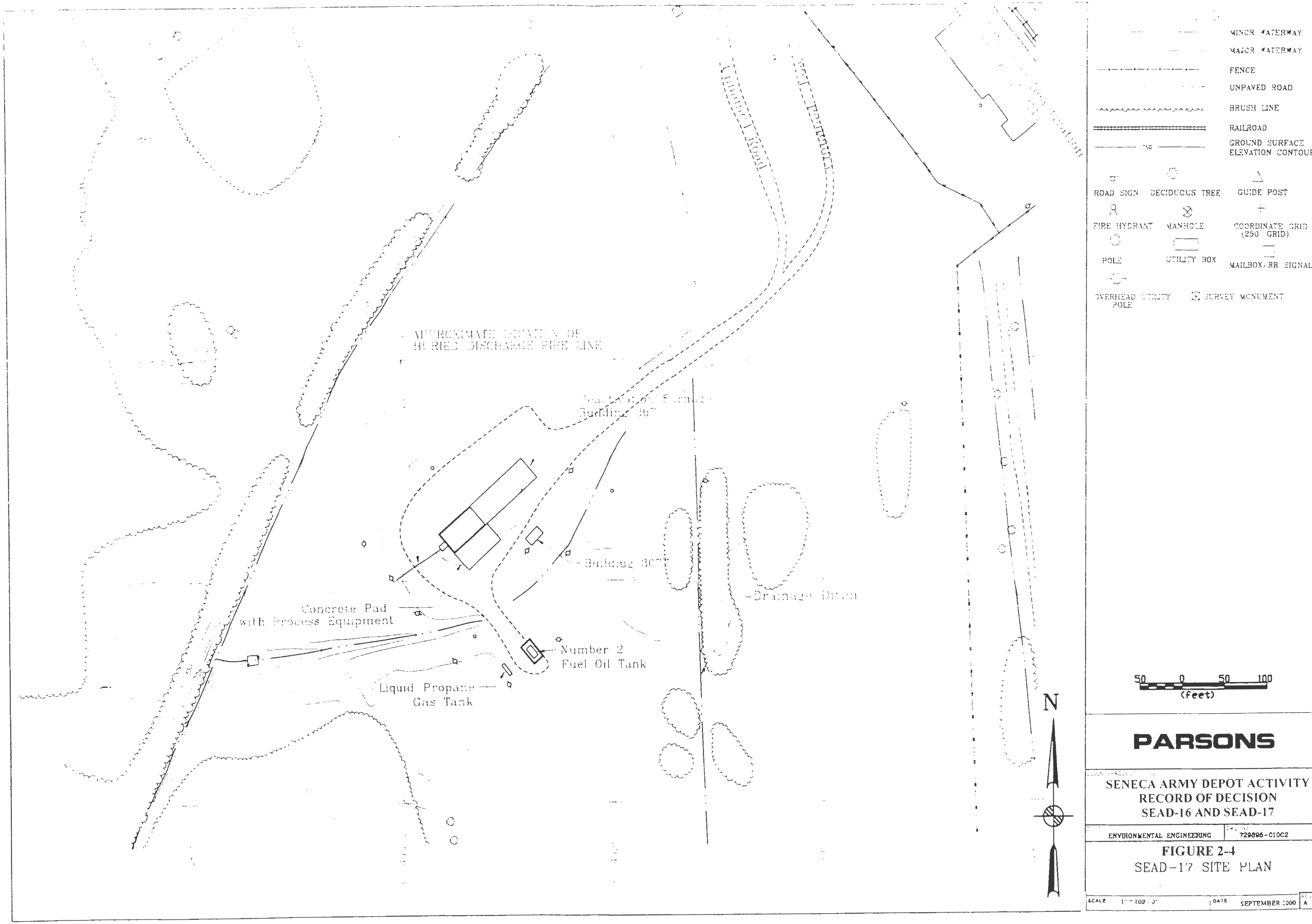
CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
RECORD OF DECISION
SEAD-16 AND SEAD-17

DEPT: ENVIRONMENTAL ENGINEERING | DWG NO: 729895 01001

**FIGURE 2-2**
SENECA ARMY DEPOT ACTIVITY MAP

SCALE: 1" = 2000' | DATE: SEPTEMBER 2000



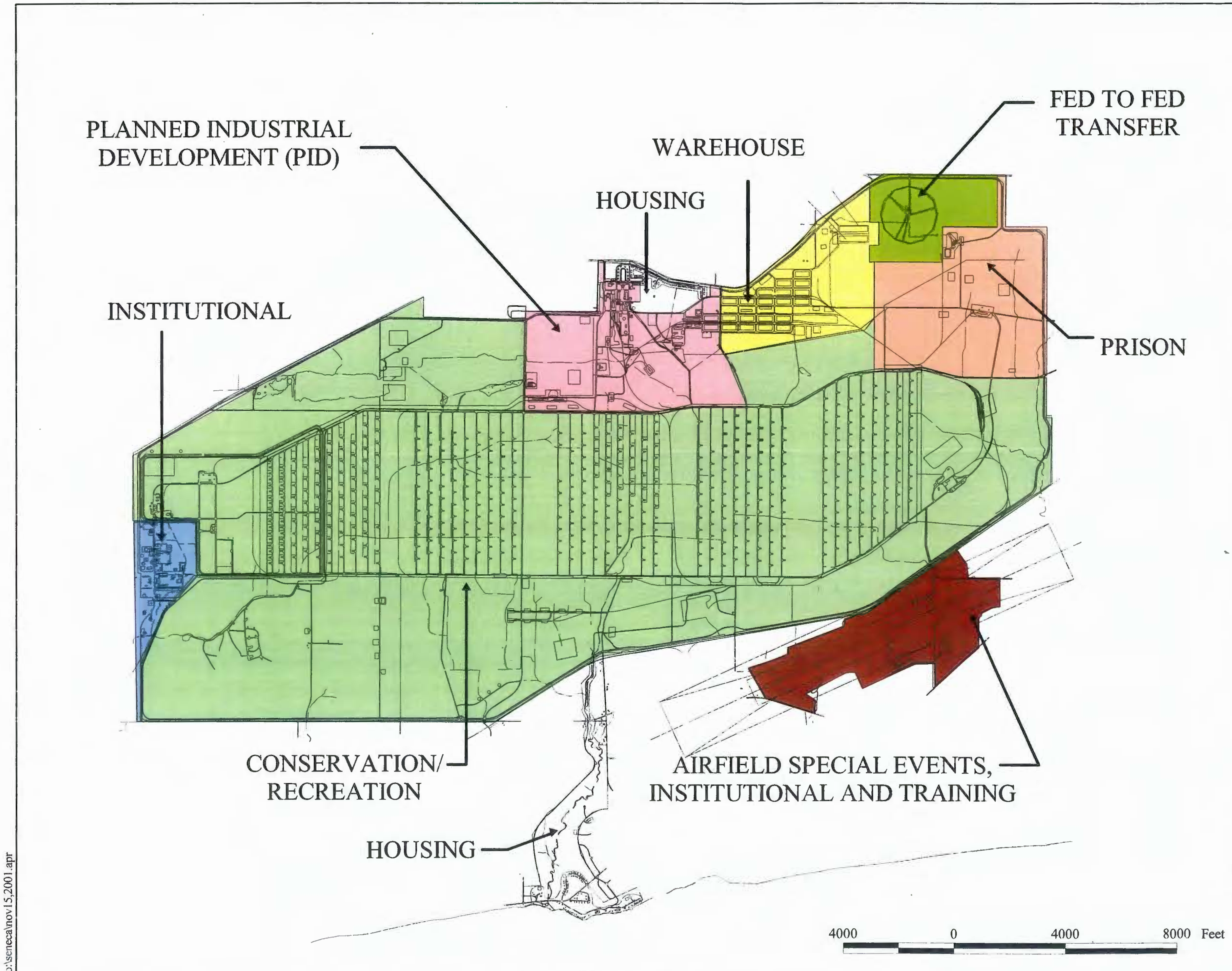

PARSONS

SENECA ARMY DEPOT ACTIVITY
RECORD OF DECISION
SEAD-16 AND SEAD-17

ENVIRONMENTAL ENGINEERING | 729896-C1002

FIGURE 2-4
SEAD-17 SITE PLAN

SCALE 1" = 100'-0" | DATE SEPTEMBER 2000 | A




LEGEND

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

N

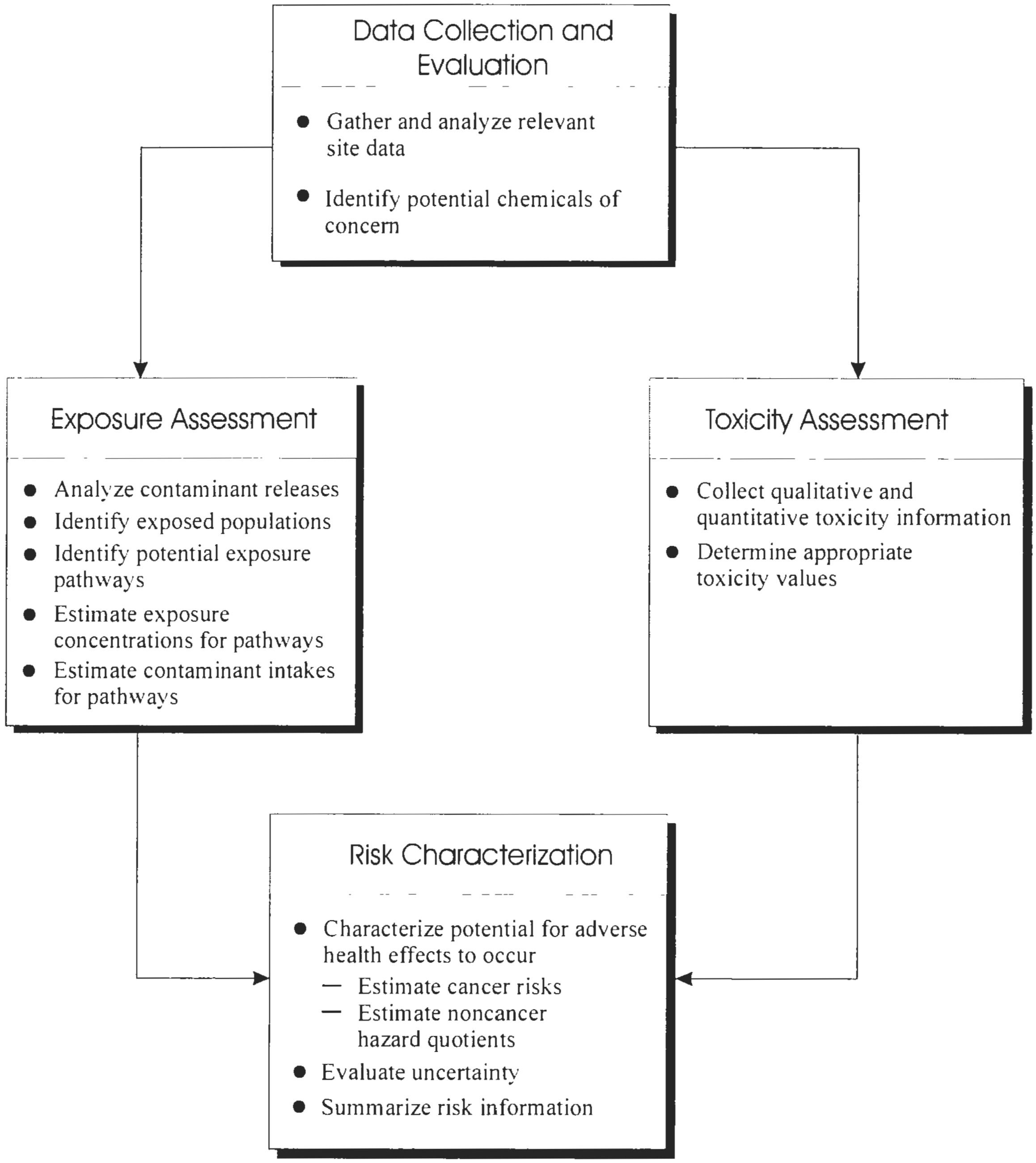
PARSONS

SENECA ARMY DEPOT ACTIVITY
Record of Decision

FIGURE 3-1
SENECA ARMY DEPOT ACTIVITY
LAND REUSE MAP

Scale as Shown | DATE: JULY 2002

o:\seneca\nov15,2001.apr




Source: USEPA, 1989a

**PARSONS**

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY

RECORD OF DECISION
SEAD-16 AND 17

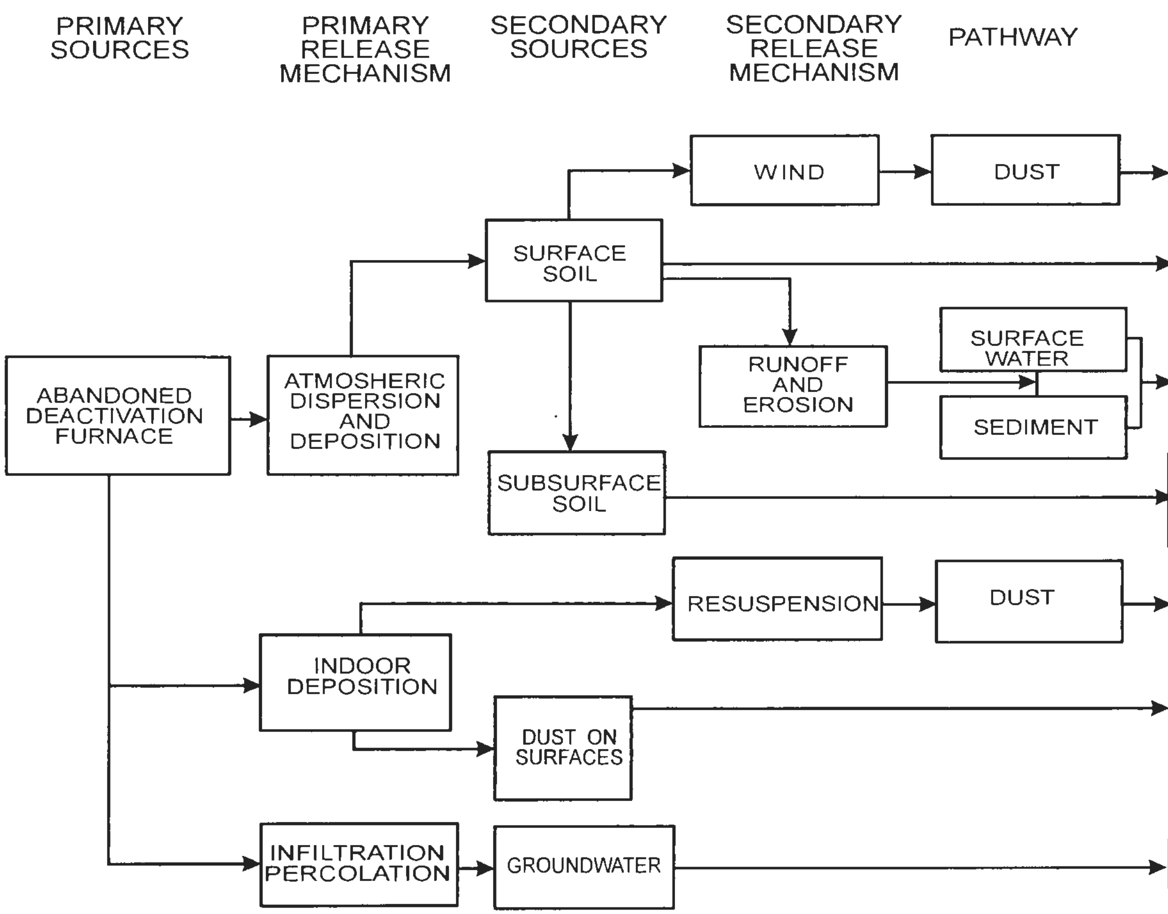
DEPT ENVIRONMENTAL ENGINEERING DWG NO 736677

FIGURE 7-1

BASELINE RISK ASSESSMENT PROCESS

SCALE Not Applicable DATE JULY 2002

P:\PIT\PROJECTS\SENECA\S1617ROD\PREDRAFT\FIGURES\BASE_RISK.CDR




| EXPOSURE ROUTE | RECEPTOR — HUMAN: CURRENT SITE WORKERS | FUTURE INDUSTRIAL WORKER | FUTURE CONSTRUCTION WORKER | FUTURE TRESSPASSER | FUTURE DAY CARE CENTER CHILD | FUTURE DAY CARE CENTER WORKER |
|---|---|---|---|---|---|---|
| INHALATION | ● | NA | ● | ● | ● | ● |
| INGESTION | ● | NA | ● | ● | ● | ● |
| DERMAL CONTACT | ● | NA | ● | ● | ● | ● |
| INGESTION | NA | NA | NA | ● | NA | NA |
| DERMAL CONTACT | NA | NA | NA | ● | NA | NA |
| INGESTION | NA | NA | ● | NA | NA | NA |
| DERMAL CONTACT | NA | NA | ● | NA | NA | NA |
| INHALATION | NA | ● | NA | NA | NA | NA |
| INGESTION | NA | ● | NA | NA | NA | NA |
| DERMAL CONTACT | NA | ● | NA | NA | NA | NA |
| INGESTION | NA | ● | NA | NA | ● | ● |

● PATHWAY CONSIDERED TO POSE POTENTIAL RISK

NA NOT APPLICABLE RECEPTOR

**PARSONS**

CLIENT/PROJECT TITLE

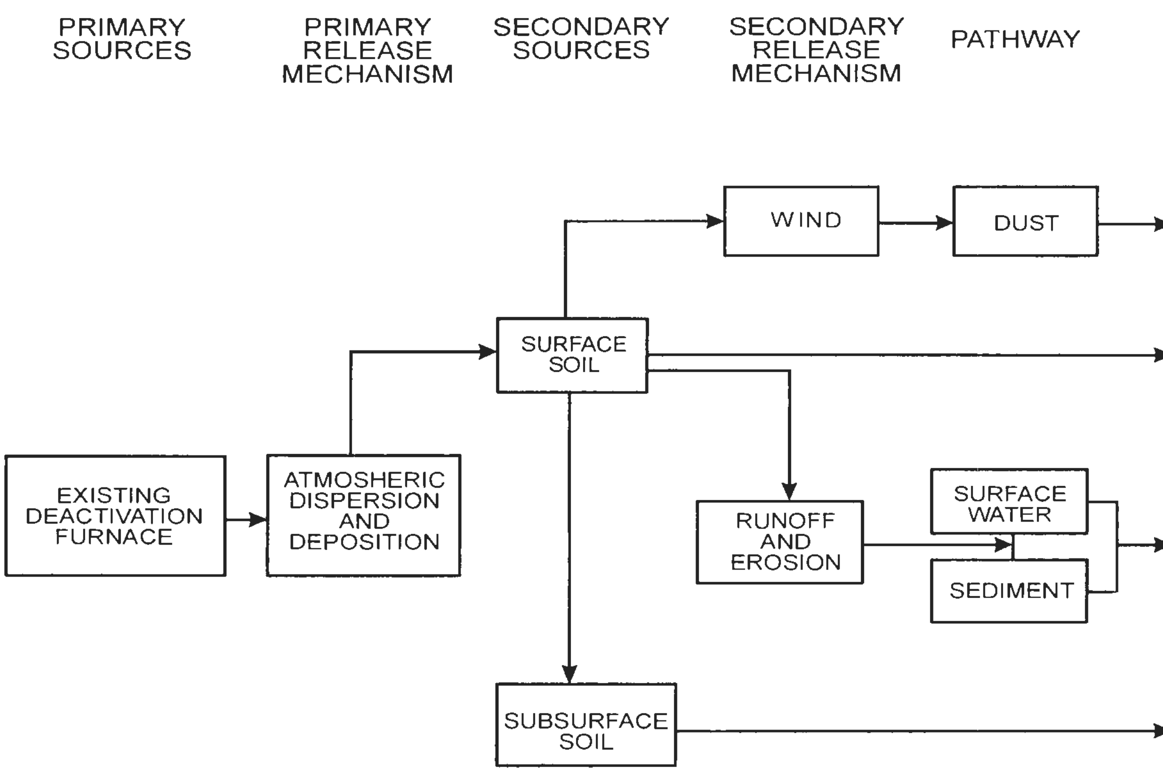
SENECA ARMY DEPOT ACTIVITY
RECORD OF DECISION
SEAD-16 FORMER DEACTIVATION FURNACE

DEPT: ENVIRONMENTAL ENGINEERING  DWG NO: 729895-01002

FIGURE 7-2
EXPOSURE PATHWAY SUMMARY

SCALE: NA  DATE: JULY 2002

p:\PIT\PROJECTS\SENECA\S1617ROD\PREDRAFT\SD16EXSM.CDR




| EXPOSURE ROUTE | RECEPTOR – HUMAN: CURRENT SITE WORKERS | FUTURE INDUSTRIAL WORKER | FUTURE CONSTRUCTION WORKER | FUTURE TRESSPASSER | FUTURE DAY CARE CENTER CHILD | FUTURE DAY CARE CENTER WORKER |
|---|---|---|---|---|---|---|
| INHALATION | ● | ● | ● | ● | ● | ● |
| INGESTION | ● | ● | ● | ● | ● | ● |
| DERMAL CONTACT | ● | ● | ● | ● | ● | ● |
| INGESTION | NA | NA | NA | ● | NA | NA |
| DERMAL CONTACT | NA | NA | NA | ● | NA | NA |
| INGESTION | NA | NA | ● | NA | NA | NA |
| DERMAL CONTACT | NA | NA | ● | NA | NA | NA |

● PATHWAY CONSIDERED TO POSE POTENTIAL RISK

NA NOT APPLICABLE RECEPTOR

**PARSONS**

CLIENT/PROJECT TITLE

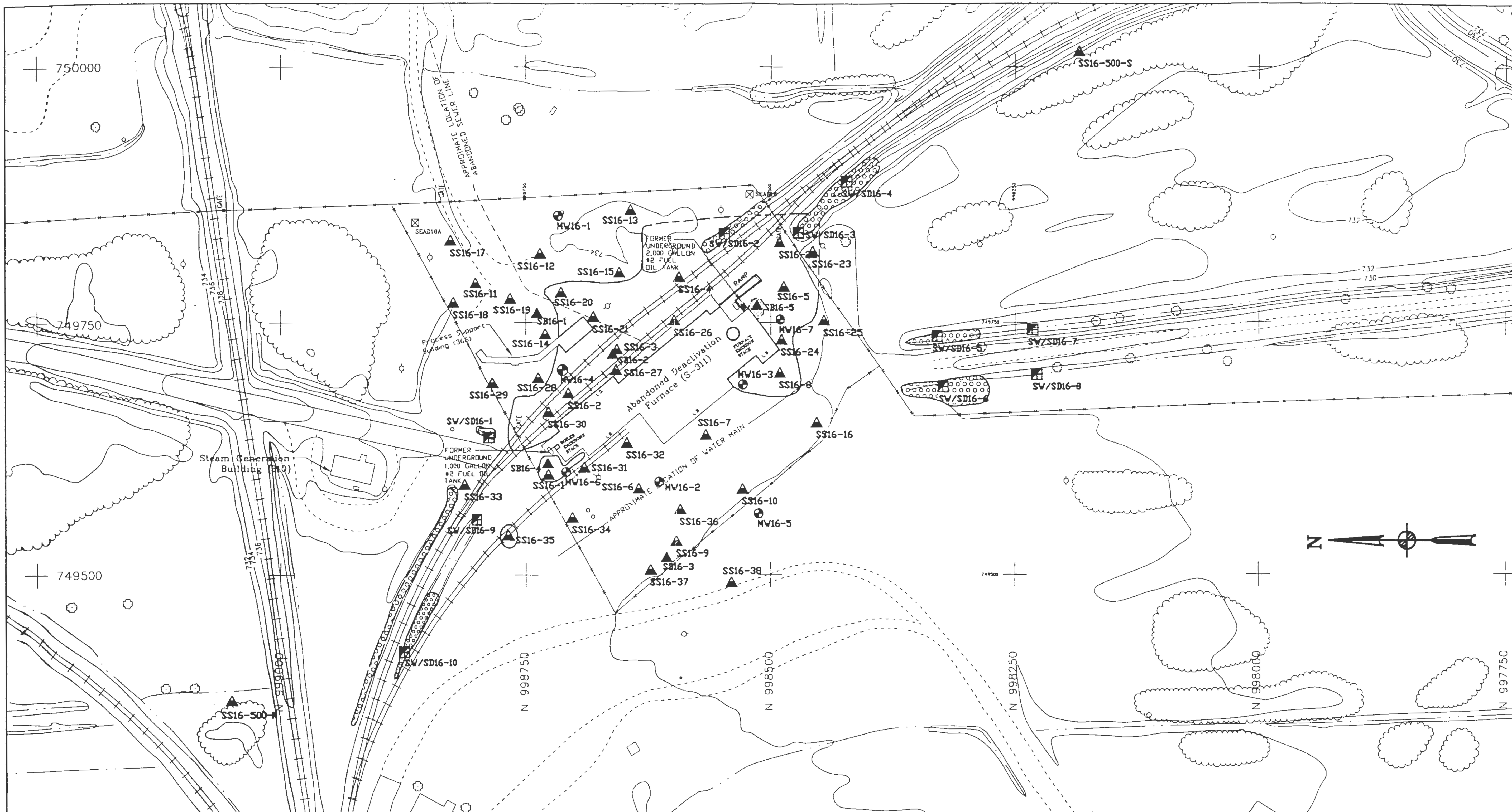
SENECA ARMY DEPOT ACTIVITY
RECORD OF DECISION
SEAD-17 EXISTING DEACTIVATION FURNACE

DEPT ENVIRONMENTAL ENGINEERING DWG NO 729895-01002

FIGURE 7-3
EXPOSURE PATHWAY SUMMARY

SCALE NA DATE JULY 2002

P:\PIT\PROJECTS\SENECA\S1617ROD\PREDRAFT\FIGURES\SD17EXPRSM.CDR




LEGEND

MINOR WATERWAY
MAJOR WATERWAY
FENCE
REMEDIATION LIMIT WHICH WILL BE DEFINED THROUGH PRE-DESIGN SAMPLING
BRUSH LINE
LANDFILL EXTENTS
RAILROAD
760 GROUND SURFACE ELEVATION CONTOUR
REMEDIATION LIMIT

SURVEY MONUMENT
L.D. LOADING DOCK
ROAD SIGN
DECIDOUS TREE
FIRE HYDRANT
MANHOLE
GUIDE POST
POLE
UTILITY BOX
CORDINATE GRID (250' GRID)
OVERHEAD UTILITY POLE
MAILBOX/RR SIGNAL

SB16-4 SOIL BORING LOCATION
MW16-7 MONITORING WELL LOCATION
SS16-5 SURFACE SOIL SAMPLE LOCATION
SW/SD16-6 SEDIMENT SAMPLE LOCATION

CASE 2 SURFACE SOILS WITH LEAD CONCENTRATION > 1250 mg/kg (SEE NOTE 2)
CASE 2 SUBSURFACE SOILS WITH LEAD CONCENTRATION > 1250 mg/kg (SEE NOTE 2)
CASE 2 DITCH SOILS WITH LEAD CONCENTRATION > 1250 mg/kg (SEE NOTE 2)

0 100 200
SCALE IN FEET

NOTE:
1. LIMIT OF THE PROPOSED REMEDIATION AREA BASED ON THE DATA PRESENTED IN THE REMEDIAL INVESTIGATION REPORT. (PARSONS ES, MARCH 1999)
2. LIMIT OF THE PROPOSED REMEDIATION AREA INCLUDES SOIL WITH METAL CONCENTRATIONS EXCEEDING MAXIMUM METAL CONCENTRATIONS FOR THE INDUSTRIAL USE SCENARIO.
3. TRACKS WITHIN LIMITS OF EXCAVATION WILL NOT DISTURBED DURING REMEDIAL ACTION.

PARSONS

CLIENT/PROJECT TITLE
SENECA ARMY DEPOT ACTIVITY
RECORD OF DECISION
SEAD-16 AND SEAD-17

DEPT ENVIRONMENTAL ENGINEERING
Dwg. No. 729695-01002

FIGURE 11-1
SEAD-16 REMEDIATION AREA
(SOIL W/LEAD > 1250 mg/kg)

SCALE 1" = 100'-0"
DATE JUNE 2002
REV A

R:\SENECA\729895\Fig2-1.dwg


LEGEND

- MINOR WATERWAY
- MAJOR WATERWAY
- FENCE
- REMEDIATION LIMIT WHICH WILL BE DEFINED THRU PRE-DESIGN SAMPLING
- BRUSH LINE
- LANDFILL EXTENTS
- RAILROAD
- 760 GROUND SURFACE ELEVATION CONTOUR
- REMEDIATION LIMIT
- SURVEY MONUMENT
- ROAD SIGN
- DECIDOUS TREE
- FIRE HYDRANT
- MANHOLE
- GUIDE POST
- POLE
- UTILITY BOX
- CORDINATE GRID (250' GRID)
- OVERHEAD UTILITY POLE
- MAILBOX/RR SIGNAL
- SB16-4 SOIL BORING LOCATION
- MW16-7 MONITORING WELL LOCATION
- SS16-5 SURFACE SOIL SAMPLE LOCATION
- SW/SD16-6 SEDIMENT SAMPLE LOCATION
- CASE 1 SURFACE SOILS WITH LEAD CONCENTRATION > 1250 mg/kg (SEE NOTE 2)
- CASE 1 DITCH SOILS WITH LEAD CONCENTRATION > 160 mg/kg (SEE NOTE 2)

NOTE:

1. LIMIT OF THE PROPOSED REMEDIATION AREA BASED ON THE DATA PRESENTED IN THE REMEDIAL INVESTIGATION REPORT. (PARSONS ES, MARCH 1999)
2. LIMIT OF THE PROPOSED REMEDIATION AREA INCLUDES SOIL WITH METAL CONCENTRATIONS EXCEEDING MAXIMUM METAL CONCENTRATIONS FOR THE INDUSTRIAL USE SCENERIO.

PARSONS

CLIENT/PROJECT TITLE
SENECA ARMY DEPOT ACTIVITY
RECORD OF DECISION
SEAD-16 AND SEAD-17

DEPT: ENVIRONMENTAL ENGINEERING
Dwg No. 729895-01008

FIGURE 11-2
SEAD-17 REMEDIATION AREA
(SOIL W/LEAD > 1250 mg/kg)

SCALE: 1" = 100'-0"
DATE: JUNE 2002
REV: A

# APPENDIX A

# ADMINISTRATIVE RECORD INDEX

# APPENDIX B

# NEW YORK DEPARTMENT OF ENVIRONMENTAL CONSERVATION DECLARATION OF CONCURRENCE

# APPENDIX C

# ARMY'S POSITION ON LAND USE CONTROL DOCUMENTATION IN THE ROD

# APPENDIX C

# ARMY'S POSITION ON LAND USE CONTROL DOCUMENTATION IN THE ROD

## ADDITIONAL LAND USE CONTROL DECLARATION

The Army acknowledges that USEPA maintains specific provisions respecting inspection, monitoring, reporting, maintaining and enforcing land use controls (LUCs) and provisions for developing a Five-Year Review Report, Land Use/Institutional Control Implementation Plan, Remedial Action Completion Report, Site Closeout Report, and others, as appropriate are required components of remedy selection and the ROD. The Army acknowledges that USEPA maintains that without such specific provisions the remedy is not fully protective. It is the position of the Army that such provisions are not part of the required remedy selection or the ROD; therefore, the Army has not identified these provisions as remedial components in this ROD. The Army has attached a letter discussing Army guidance on these disputed provisions; however, they are not thereby made a term, condition, provision or requirement of this ROD or the selected remedy, but are for purposes of illustration and information only. The Army acknowledges that, pursuant to 42 USC Sec. 9620(e)(4)(A) and 40 CFR Sec. 300.430(f)(4)(iii), the Administrator of the USEPA has sole remedial action selection authority at Federal facilities on the NPL if USEPA and the Army are unable to agree on remedy selection. It is USEPA's position that the disputed provisions described above fall within the meaning of "remedy" and USEPA's remedy selection authority. The Army expressly reserves its position that these disputed provisions do not fall within the meaning of "remedy" or USEPA's remedy selection authority. The Army commits to subsequently revising this ROD, in accordance with the procedural requirements of CERCLA and the NCP, if (a) DoD subsequently determines and agrees programmatically to include such provisions as components of the remedy selected and the ROD, or (b) DoD is directed to include such provisions at the conclusion of a dispute resolution process involving USEPA and the Army. The Army expressly reserves its right to invoke any applicable federal inter-agency dispute resolution process to resolve whether the specific provisions are within the scope of the USEPA Administrator's authority to select remedies. The Army expressly acknowledges that by USEPA signing and concurring with the remedy selected and identified by the Army in this ROD, USEPA is not waiving or prejudicing its position that such provisions respecting LUC/IC inspection, monitoring, reporting, maintenance and enforcement and provisions for developing a Five-Year Review Report, Use/Institutional Control Implementation Plan, Remedial Action Completion Report, Site Closeout Report, and others, as appropriate, are required components of the remedy selection process and the ROD and without such provisions the remedy is not fully protective.

OFFICE OF THE UNDER SECRETARY OF DEFENSE

3000 DEFENSE PENTAGON
WASHINGTON, DC 20301-3000

ACQUISITION, TECHNOLOGY AND LOGISTICS

JUN 4 2002

MEMORANDUM FOR DEPUTY ASSISTANT SECRETARY OF THE ARMY (ENVIRONMENT, SAFETY, AND OCCUPATIONAL HEALTH)
DEPUTY ASSISTANT SECRETARY OF THE NAVY (ENVIRONMENT)
DEPUTY ASSISTANT SECRETARY OF THE AIR FORCE (ENVIRONMENT, SAFETY, AND OCCUPATIONAL HEALTH)
STAFF DIRECTOR, ENVIRONMENT AND SAFETY, DEFENSE LOGISTICS AGENCY SUPPORT SERVICES (DSS-E)

SUBJECT: Interim Guidance on Environmental Restoration Records of Decision

The purpose of this memorandum is to clarify documentation requirements for remedial actions, to include specifically those containing land use restrictions, in Records of Decision (RODs) required by the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA). General guidance on documenting the remedy decision is contained in paragraph 23.1 of the September 28, 2001, Management Guidance for the Defense Environmental Restoration Program (DERP). More specific guidance that Components should consider on the appropriate content of RODs is contained in the U.S. Environmental Protection Agency (EPA) Office of Solid Waste and Emergency Response (OSWER) July 1999 guidance document 9200.1-23P, A Guide to Preparing Superfund Proposed Plans, Records of Decision, and Other Remedy Selection Decision Documents.

Using the CERCLA framework, DERP employs a risk management approach to take necessary and appropriate response action to protect human health and the environment from unacceptable risk(s) resulting from past contamination. When remedial action is taken, it must be documented in a ROD as required by CERCLA and its implementing regulation, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This requirement fully applies to remedies that have a use restriction component. The DoD as the lead agency has the obligation to move expeditiously through the cleanup process to address risks to human health and the environment. To facilitate this progress, Components are to follow this guidance to finalize and issue RODs.

All RODs need to focus on the risk and action(s) selected to address risk. Thus, the ROD needs to clearly:

- describe the risk(s) necessitating remediation;
- document risk exposure assumptions and reasonably anticipated land uses;
- state the remedial action objective(s);
- describe the remedy in general terms, specify the components of the remedy, and basis for the selection; and
- list the entity(ies) responsible for implementing and maintaining the selected remedial action.

These elements are consistent with the guidance contained in the DERP Management Guidance and OSWER 9200.1-23P.

In cases where use restrictions are selected as part of the remedy to address risk and exposure to any remaining residual contaminants, use controls are employed to manage the future use of the property. Where this type of use control is an integral component of the remedial action, the ROD (as stated in the OSWER guidance) needs to generally describe:

- the remedial action objective(s) of the use restrictions;
- the specific controls proposed to effectuate the restriction(s) "(e.g., deed restrictions such as easements and covenants, deed notices, land use restrictions such as zoning and local permitting, ground-water use restrictions, and public health advisories)";
- the area/property covered by use restriction and associated control(s);
- the duration of the control(s), if not permanent; and
- the "entities responsible for implementing and maintaining controls (e.g., property owner, town zoning authority, State health agency)."

These elements are consistent with the guidance contained in DoD's January 17, 2001, Policy on Land Use Controls (LUCs) Associated with Environmental Restoration Activities. Use controls must be identified and described in the ROD only when selected as remedial components necessary to protect human health and the environment from unacceptable risk. In addition, a Component may voluntarily choose to implement supplemental physical, legal, or administrative measures that reinforce the selected use controls, as addressed in DoD's March 2, 2001, Guidance on Land Use Control Agreements with Environmental Regulatory Agencies. These supplemental measures may be documented in voluntary agreements, non-enforceable arrangements, and internal documents, all of which normally would be included in the information repository for the site. However, such supplemental measures shall not be included in the ROD or any post-ROD enforceable documents. Examples of supplemental measures that are not to be included are:

- provisions for periodic monitoring or visual inspections of use restrictions and controls (other than CERCLA five-year reviews);

- certifications and reports to regulators associated with monitoring or inspections; and
- requirements for land use control implementation or assurance plans.

The April 23, 2001, DUSD(I&E) moratorium memorandum precluding Components from entering Federal Facility Agreements (FFAs), or modifying existing FFAs, that include Land Use Control Assurance or Implementation Plans, Operation and Maintenance Plans, Remedial Action Completion Reports, Site Closeout Reports, Five-Year Reviews, or any other similar post-ROD documents remains in effect pending resolution of current discussions between DoD and EPA. Similarly, the May 25, 2001, DUSD(I&E) clarification letter that states this moratorium also preclude including such documents, plans, reports, or reviews as an enforceable term, condition, provision, requirement, or deliverable in an FFA, ROD, or other similarly enforceable arrangement remains in place.

While finalizing a ROD, should a Component encounter regulator demands to include in RODs, or other post-ROD enforceable documents, provisions that conflict or deviate from DoD policy and guidance, the issue(s) shall be immediately elevated within the Component. We are working with EPA at a policy level to resolve differences in legal and policy interpretations. In general, if the only substantive disputes are the supplemental land use restriction and control issues or other post-remedy implementation, maintenance, completion or review provisions, then you should note in the ROD and Responsiveness Summary the nature of the dispute and that the ROD may be amended at a later time based upon resolution of the policy-level disagreement. As long as the Component can establish that EPA does concur with the underlying physical remedy, the Component may and shall unilaterally issue and then execute the ROD respecting those consensus elements of the physical remedy. Attached are model language and statements to be included in such ROD documentation. The elevation of and any dispute related to such specific use restriction and control, or other post-remedy issues, should not and must not be allowed to impede execution of those remedial selection and ROD elements for which there is agreement. My point of contact for this matter is Mr. Shah A. Choudhury, at (703) 697-7475.

John Paul Woodley, Jr.

John Paul Woodley, Jr.
Assistant Deputy Under Secretary of Defense
(Environment)

Attachment:
As stated

**Model ROD documentation language acknowledging policy-level disagreement:**

The [Component] acknowledges that the US EPA maintains specific provisions respecting [inspection, monitoring, reporting, maintaining and enforcing LUCs/ICs], and provisions for developing an [Operation and Maintenance Plan], [Five-Year Review Report], [Land Use/Institutional Control Implementation Plan], [Remedial Action Completion Report], [Site Closeout Report], [and others, as appropriate] are required components of remedy selection and the ROD. The [Component] acknowledges that US EPA maintains that without such specific provisions the remedy is not fully protective. It is the position of the [Component] that such provisions are not part of required remedy selection or the ROD; therefore, the [Component] has not identified these provisions as remedial components in this ROD. The [Component] has at attachment ___ included these disputed provisions; however, they are not thereby made a term, condition, provision or requirement of this ROD or the selected remedy, but are for purposes of illustration and information only. The [Component] acknowledges that, pursuant to 42 USC Sec. 9620(e)(4)(A) and 40 CFR Sec. 300.430(f)(4)(iii), the Administrator of the EPA has sole remedial action selection authority at Federal facilities on the NPL if EPA and the [Component] are unable to agree on remedy selection. It is EPA's position that the disputed provisions described above fall within the meaning of "remedy" and EPA's remedy selection authority. The [Component] expressly reserves its position that these disputed provisions do not fall with the meaning of "remedy" or EPA's remedy selection authority. The [Component] commits to subsequently revising this ROD, in accordance with the procedural requirements of CERCLA and the NCP, if (a) DoD subsequently determines and agrees programmatically to include such provisions as components of the remedy selected and the ROD, or (b) DoD is directed to include such provisions at the conclusion of a dispute resolution process involving EPA and [Langley Air Force Base or other installation, as appropriate]. The [Component] expressly reserves its right to invoke any applicable federal inter-agency dispute resolution process to resolve whether the specific provisions are within the scope of the EPA Administrator's authority to select remedies. The [Component] expressly acknowledges that by EPA signing and concurring with the remedy selected and identified by the [Component] in this ROD, EPA is not waiving or prejudicing its position that such provisions respecting [LUC/IC inspection, monitoring, reporting, maintenance and enforcement], and provisions for developing an [Operation and Maintenance Plan], [Five-Year Review Report], [Land Use/Institutional Control Implementation Plan], [Remedial Action Completion Report], [Site Closeout Report], [and others, as appropriate] are required components of the remedy selection process and the ROD and that without such provisions the remedy is not fully protective.

# APPENDIX D

# RESPONSIVENESS SUMMARY AND PUBLIC COMMENTS

# APPENDIX E

# SUMMARY OF ARARS FOR THE SELECTED REMEDY

- National Historic Preservation Act (16 USC 470) Section 106 and 110(f), and the associated regulations (*i.e.*, 36 CFR part 800) (requires Federal agencies to identify all affected properties on or eligible for the National Register of Historic Places and consult with the State Historic Preservation Office and Advisory Council on Historic Presentation).
- RCRA Location and 100-year Floodplains Requirements (40 CFR 264.18(b)).
- Clean Water Act, section 404, and Rivers and Harbor Act, section 10 (requirements for dredge and fill activities) and the associated regulations (*i.e*, (40 CFR part 230).
- Wetlands Construction and Management Procedures (40 CFR part 6, Appendix A).
- Endangered Species Act of 1973 (16 USC 1531 - 1544).
- Fish and Wildlife Coordination Act of 1934 (16 USC 661).
- Wilderness Act of 1964 (16 USC 1131 - 1136).

**Potential New York Location-Specific ARARs**

- New York State Freshwater Wetlands Law (New York Environmental Conservation Law (ECL) articles 24 and 71).
- New York State Freshwater Wetlands Permit and Classification Requirements (6 NYCRR 663 and 664).
- New York State Floodplain Management Act, ECL, article 36, and Floodplain Management regulations (6 NYCRR part 500).
- Endangered and Threatened Species of Fish and Wildlife, Species of Special Concern Requirements (6 NYCRR part 182).
- New York State Inactive Hazardous Waste Disposal Sites—Remedy Selection (6 NYCRR 375.10(b)("goal of the program for a specific site is to restore that site to pre-disposal conditions, to the extent feasible and authorized by law.").
- New York State Flood Hazard Area Construction Standards.

**Potential Federal Action-Specific ARARs**

- RCRA subtitle C, Hazardous Waste Treatment Facility Design and Operating Standards for Treatment and Disposal systems, (*i.e.*, landfill, incinerators, tanks, containers, etc.) (*i.e.*, 40 CFR part 264); RCRA section 3004(o), 42 USC 6924(o) (RCRA statutory minimum technology requirements.)
- RCRA, Closure and Post-Closure Standards (40 CFR 264, subpart G).
- RCRA Groundwater Monitoring and Protection Standards (40 CFR 264.92 and 264.97 – 264.99).
- RCRA Generator Requirements for Manifesting Waste for Off-site Disposal (40 CFR part 262, subpart B).
- RCRA Transporter Requirements for Off-Site Disposal (40 CFR part 263).
- RCRA, Subtitle D, Non-Hazardous Waste Management Standards (40 CFR part 257).

- RCRA Land Disposal Restrictions (40 CFR part 268) (on and off-site disposal of excavated soil).
- CWA--NPDES Permitting Requirements for Discharge of Treatment System Effluent (40 CFR parts 122-125).
- CWA--Effluent Guidelines for Organic Chemicals, Plastics and Synthetic Fibers (discharge limits) (40 CFR part 414).
- CWA--Discharge to POTW—general Pretreatment regulations (40 CFR part 403).
- DOT Rules for Hazardous Materials Transport (49 CFR part 107, and 171.1-171.500).
- OSHA Standards for Hazardous Waste Operations and Emergency Response, 29 CFR 1910.120, and procedures for General Construction Activities (29 CFR parts 1910 and 1926).
- RCRA Air Emission Standards for Process Vents, Equipment Leaks, and Tanks, Surface Impoundments, and Containers (40 CFR part 264, subparts AA, BB, and CC).

**Potential New York Action-Specific ARARs**

- New York State Pollution Discharge Elimination System (SPDES) Permit Requirements (Standards for Stormwater Runoff, Surface Water, and Groundwater Discharges (6 NYCRR 750-757)).
- New York State Hazardous Waste Regulations—identification, generators, transportation, treatment/storage/disposal, land disposal restrictions, and minimum technology requirements (6 NYCRR 370-376)
- New York State Solid Waste Management and Siting Restrictions (6 NYCRR 360-361).
- New York State Hazardous Waste Generator and Transporter Requirements for Manifesting Waste for Off-Site Disposal (6 NYCRR 364 and 372).
- New York State Inactive Hazardous Waste Disposal Sites—Remedy Selection (6 NYCRR 375.10(b)("At a minimum, the remedy selected shall eliminate or mitigate all significant threats to the public health and to the environment presented by hazardous waste disposed at the site through the proper application of scientific and engineering principles.").
- New York State Inactive Hazardous Waste Disposal Sites--Interim Remedial Measures (IRMs) (6 NYCRR 375-1.3(n) and 375.1.11)