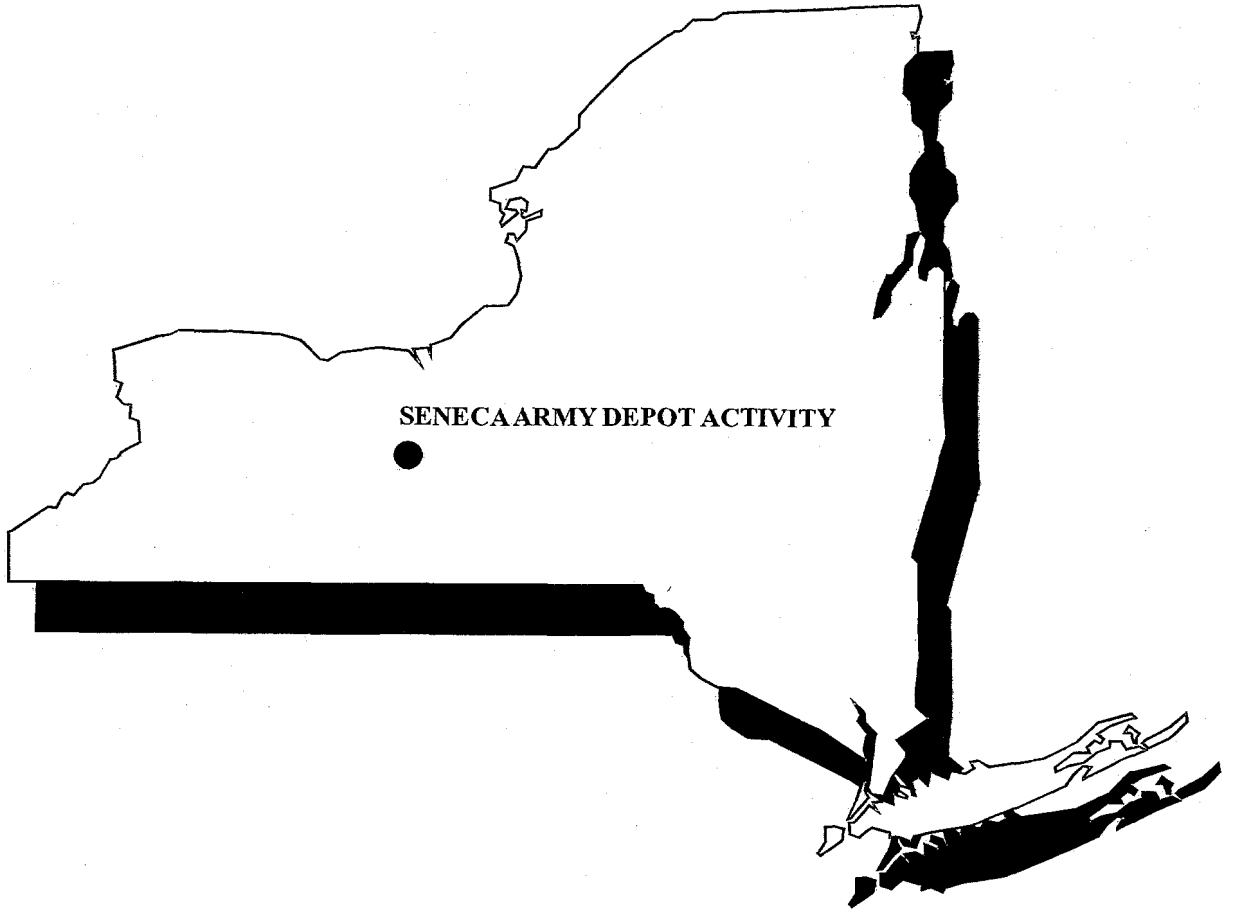
U.S. ARMY ENGINEER DIVISION
HUNTSVILLE, ALABAMA



REVISED FINAL
PROPOSED PLAN FOR
The ABANDONED DEACTIVATION FURNACE (SEAD-16) and the ACTIVE DEACTIVATION FURNACE (SEAD-17)

SENECA ARMY DEPOT ACTIVITY
ROMULUS, NEW YORK

CONTRACT NO. DACA87-95-D-0031
DELIVERY ORDER 003

DECEMBER 2003

PROPOSED PLAN
The Abandoned Deactivation Furnace (SEAD-16)
and the Active Deactivation Furnace (SEAD-17)
Seneca Army Depot Activity (SEDA)
Romulus, New York

Table of Contents

LIST OF TABLES

LIST OF FIGURES

PROPOSED PLAN
The Abandoned Deactivation Furnace (SEAD-16)
and the Active Deactivation Furnace (SEAD-17)
Seneca Army Depot Activity (SEDA)
Romulus, New York
APPENDIX

LIST OF APPENDICES

Appendix	Description
A	Analysis of Alternative 4P: Off-Site Disposal (Pre-Disposal Scenario)
B	Response to Comments

Proposed Plan – Final, Revision 1

The ABANDONED DEACTIVATION FURNACE (SEAD-16) and the ACTIVE DEACTIVATION FURNACE (SEAD-17) at the SENECA ARMY DEPOT ACTIVITY (SEDA) Romulus, New York

December 2003

1.0 PURPOSE OF PROPOSED PLAN

This Proposed Plan describes the alternatives considered for remediation at the Abandoned Deactivation Furnace (SEAD-16) and the Active Deactivation Furnace (SEAD-17) located within the Seneca Army Depot Activity (SEDA or the Depot). The plan identifies the preferred remedial option with the rationale for its preference. The Proposed Plan was developed by representatives of the U. S. Army in cooperation with the U.S. Environmental Protection Agency (EPA) and the New York State Department of Environmental Conservation (NYSDEC). The U.S. Army is issuing this Proposed Plan as part of its public participation responsibilities under Section 117(a) of the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) of 1980, as amended, and Section 300.430(f) of the National Contingency Plan (NCP). The remedial options summarized here are described in the remedial investigation and feasibility study (RI/FS) report, which should be consulted for a more detailed description of all the options. The RI/FS is contained in the Administrative Record, which is available for public review at the Seneca Army Depot Activity, Building 123. Please contact the office of Mr. Steve Absolom at the address below in order to view these documents.

This Proposed Plan is being provided to inform the public of the U.S. Army's preferred remedial alternative. This document is intended to solicit public comments pertaining to all the remedial options evaluated, as well as to specify the Army's preferred remedial option.

The remedy described in this Proposed Plan is the preferred remedy for the site. Changes to the preferred remedy or from the preferred remedy to another remedy may be made if public comments or additional data indicate that such a change would result in a more appropriate remedial action. Public comments are solicited on all of the options considered in the detailed analysis of the RI/FS because EPA, NYSDEC, and the U.S. Army may select a remedy other than the preferred remedy. The final decision regarding the selected remedy will be made after the U.S. Army has taken into consideration all public comments.

A brief description of the Army's preferred remedy for SEAD-16 and SEAD-17 is as follows:

- Conducting additional sampling as part of the pre-design sampling program to further delineate the areas of excavation;
- Removing, testing, and disposing off-site of the SEAD-16 building debris;
- Excavating approximately 275 cubic yards (cy) of ditch soil with lead concentrations greater than 1250 mg/kg until cleanup goals are achieved;
- Excavating approximately 1760 cy of surface soils at SEAD-16 with lead concentrations greater than 1250 mg/kg, and PAH and metal concentrations greater than risk-based cleanup goals (**Table 1**);
- Excavating approximately 67 cy of subsurface soils at SEAD-16 (areas around SB16-2, SB16-4, and SB16–5) with lead concentrations greater than 1250 mg/kg, and PAH and metal concentrations greater than risk-based derived cleanup goals (**Table 1**);
- Excavating approximately 2590 cy of surface soils at SEAD-17 with lead concentrations greater than 1250 mg/kg and metal concentrations greater than risk-based cleanup goals (**Table 1**);
- Stabilizing soils from SEAD-16 and 17 and building debris from SEAD-16 exceeding the TCLP criteria;

- Disposing of the excavated material from both sites in an off-site landfill;
- Backfilling the excavated areas at both sites with clean backfill;
- Conducting semi-annual groundwater monitoring at both sites until concentrations are below the GA criteria;
- Conducting annual sediment sampling in Kendaia Creek;
- Submitting a Completion Report following the remedial action; and
- Implementing land use controls and completing five-year reviews to evaluate whether the response action remains protective of public health and the environment.

2.0 COMMUNITY ROLE IN SELECTION PROCESS

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 CERCLA site. To this end, the RI/FS reports, the Proposed Plan, and the 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].

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, will be documented in the Responsiveness Summary Section of the Record of Decision (ROD)--the document that formalizes the selection of the remedy.

Copies of the RI/FS report, Proposed Plan, and supporting documentation are available at the following repositories:

Seneca Army Depot Activity
Building 123, P.O. Box 9
Romulus, NY 14541
(607) 869-1309
Hours are Mon-Fri 8:30 am to 4:30 pm

All written comments should be addressed to:

Mr. Stephen Absolom
BRAC Environmental Coordinator
Building 123, P.O. Box 9
Seneca Army Depot Activity
Romulus, NY 14541-5001

Dates to remember:
MARK YOUR CALENDAR

[enter start and completion dates of public comment period]
Public comment period on RI/FS report, Proposed Plan, and remedies considered

[enter public meeting date]
Public meeting at the [enter meeting location and time]

3.0 SITE BACKGROUND

SEDA is a 10,587-acre military facility located in Seneca County, Romulus, New York, which has been owned by the United States Government and operated by the Department of the Defense since 1941. The facility is located in an upland area, which forms a divide separating two of the New York Finger Lakes, Cayuga Lake on the east and Seneca Lake on the west. The elevation of the facility is approximately 600 feet Mean Sea Level (MSL).

The Abandoned Deactivation Furnace (SEAD-16) is located in the east-central portion of SEDA (**Figure 1**). 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 on-site 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.**

The Active Deactivation Furnace (SEAD-17) is located in the east-central portion of SEDA (**Figure 1**). 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 operated under interim status and still requires clean closure under RCRA. A RCRA closure plan for the deactivation furnace, which will demonstrate that the building and equipment were previously clean closed in accordance with RCRA guidelines, will be submitted along with the Record of Decision. The site includes Building 367, which consists of the deactivation furnace, surrounded by a cinder block barrier, 10 to 12 feet tall, with openings in the barrier to allow for entrance and egress. There is no cover over the furnace. This structure 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 3**.

Both sites were involved in 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.

SEDA was proposed for the National Priorities List (NPL) in July 1989. In August 1990, SEDA was finalized and listed in Group 14 of the Federal Section of the National Priorities List (NPL). The EPA, 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 and that the Resource Conservation and Recovery Act (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.

4.0 REMEDIAL INVESTIGATION SUMMARY

SEAD-16 and 17 are described in four reports previous to the Remedial Investigation (RI) and the Feasibility Study (FS), which are available to the public at the repository cited above. The first report is the Work Plan for CERCLA Expanded Site Inspection (ESI) of Ten Solid Waste Management Units (SWMUs) (Parsons Main, Inc., January 1993). This report detailed the site work and sampling to be performed under the ESI. The second report is the SWMU Classification Report (Parsons ES, 1994), which describes and evaluates the SWMU at SEDA. The third is the Final Closure Report for the Underground Storage Tank Removal (Science Applications International Corporation, May 1994). This report describes the removal of two underground storage tanks (USTs) at SEAD-16 and presents the confirmatory sampling records and chemical analyses associated with the closure. The fourth report is an Expanded Site Inspection Report (Parsons ES, 1995), which describes a more detailed investigation of SEAD-16 and SEAD-17. The fieldwork for the ESI was conducted according to the Work Plan for CERCLA ESI of Ten Solid Waste Management Units (Parsons ES, 1994). The ESI consisted of geophysics, soil sampling, monitoring well installation and groundwater sampling. Additional investigations at SEAD-16 included standing water sampling and interior building material sampling.

Based on the results of the ESI, an RI Workplan 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 investigation in the overburden aquifer (sampling, well installation, and aquifer testing), surface water and sediment investigations, an ecological investigation, and a building investigation. The RI at SEAD-17 was similar to that at SEAD-16, with the exception of the soil boring samples and building investigation, which were not part of the field program at SEAD-17. The remedial investigations were designed to meet site-specific data quality objectives (DQOs).

4.1 SEAD-16

The primary contaminants of concern (COCs) at the Abandoned Deactivation Furnace (SEAD-16) are the metals arsenic, copper, lead, and zinc in surface soils and copper, lead, and zinc in surface water. Polycyclic 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 COCs 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.

4.1.1 Soil

NYSDEC provides Technical Administrative Guidance Memorandums (TAGMs) (January 1994), which are technical guidance publications that describe various processes and

procedures recommended by NYSDEC for the investigation and remediation of hazardous waste sites. One TAGM, No. 4046 *Determination of Soil Cleanup Objectives and Cleanup Levels*, provides guideline values for soil cleanup limits at waste sites. Arsenic, copper, lead, and zinc were detected in almost all of the surface soil samples at concentrations above their respective TAGMs. The soil analysis results for SEAD-16 are presented in **Tables 2A** and **2B**. 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 µg/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.

Additionally, the Army recognizes that the ROD may require additional sampling for further delineation as outlined in a Pre-Design Sampling Analysis Program. This work could further define excavation areas in support of the remedial design.

4.1.2 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 2C**. 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.

4.1.3 Sediment

Semivolatile organic compounds (SVOCs) and pesticides were found at elevated concentrations in all of the drainage ditches that were investigated at SEAD-16. The sediment results for SEAD-16 are presented in **Table 2D**. The highest concentrations of SVOCs and pesticides 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.

4.1.4 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 Maximum Contaminant Level (MCL) standards. The groundwater analysis results for SEAD-16 are presented in **Table 2E**. The site mean concentrations for aluminum, iron, manganese, and sodium are not statistically different than their background mean concentrations, presented in Table 6-2E of the RI. 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 using furnace and atomic absorption techniques was performed to confirm the presence of thallium in the groundwater. The analytical results indicated that thallium was not detected in any of the on-site monitoring wells. The detection limit for these analyses was 1.5 µg/L which is less than the MCL criteria of 2 µg/L. The prior results were likely due to laboratory errors from aluminum interference (the presence of aluminum in a sample can falsely elevate the reported concentration of thallium). Elevated thallium concentrations may also have been the result of high turbidity in the samples. Based on these results, thallium is not considered a parameter that is present in the groundwater.

4.2 SEAD-17

The primary COCs at the Active Deactivation Furnace, (SEAD-17) are the metals antimony, arsenic, copper, lead, mercury, and zinc in soils. PAHs and pesticides found in sediments are also of significance. All of these contaminants 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.

4.2.1 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 3A** and **3B**. Lead was detected in all of the subsurface soil samples at concentrations that exceeded its TAGM No. 4046 cleanup objective. Available subsurface data at SEAD-17 indicated no subsurface contamination based on risk-based derived cleanup goals. 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. The Army recognizes that the ROD may require additional sampling for further delineation as outlined in a Pre-Design Sampling Analysis Program. This work could further define excavation areas in support of the remedial design.

4.2.2 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 3C**. 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.

4.2.3 Sediment

Elevated concentrations of PAHs, pesticides, and metals were found in all of the drainage ditches that were investigated at SEAD-17. Sediment analytical results are presented in **Table 3D**. 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.

4.2.4 Groundwater

Generally, the groundwater at SEAD-17 has not been significantly impacted by any chemical contaminants. While there were a few exceedences of groundwater standards, these concentrations were only slightly greater than their respective action levels. Groundwater analytical results are presented in **Table 3E**. Low concentrations of SVOCs were detected, and two metals, thallium and manganese, exceeded their respective MCL criteria values by a factor of 3.5 and 1.5, respectively, during the first sampling round. Iron and sodium exceeded their respective NYSDEC AWQS Class GA standard by less than a factor of two. No volatile organic compounds (VOCs), pesticides, polychlorinated biphenyls (PCBs), or nitroaromatics were detected in the samples.

As mentioned in **Section 4.1.4**, an additional round of groundwater sampling and analysis was performed at SEAD-16 to confirm the presence of thallium in the groundwater. The analytical results indicated that thallium was not detected in any of the on-site monitoring wells at SEAD-16, and it was concluded that thallium is not a COC in groundwater at SEAD-16. By comparing the data and the turbidity readings of the two rounds of sampling, a correlation was observed between elevated concentrations of thallium and high turbidity. Although no additional groundwater data were collected at SEAD-17, similar results to those at SEAD-16 would be expected. The elevated thallium detections in the groundwater were likely caused by high turbidity in the samples. Based on these results, thallium is not considered a parameter that is present in the groundwater.

5.0 SUMMARY OF SITE RISK

A baseline risk assessment (BRA) 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.

5.1 Human Health Risk Assessment

The reasonable maximum human exposure was evaluated. 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 (e.g. a one-in-a-million excess cancer risk).

The primary COCs 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 COCs 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.

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); and
10. Dermal Contact to indoor dust/dirt (future industrial worker at SEAD-16 only).

(Note: The SEAD-16 future industrial worker is assumed to only work indoors in a new building. The SEAD-17 future industrial worker is assumed to work only outdoors.)

Under current EPA 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, EPA has established an acceptable cancer risk range of 10^{-4} to 10^{-6} (one-in-ten thousand to one-in-one million).

5.1.1 SEAD-16

The results of the baseline risk assessment at SEAD-16 indicate that the HI is above the EPA 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 **Section 5.1.3,** *Additional Information on SEAD-16 and SEAD-17 Human Health Risk Assessment.*

5.1.2 SEAD-17

The results of the baseline risk assessment at SEAD-17 indicate that the cancer risks for all receptors evaluated were within the EPA 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 EPA level of 1. The HI for the future day care center child is primarily due to the ingestion of soils with metals (antimony, arsenic, cadmium).

5.1.3 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 EPA and NYSDEC as protective, based on "Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil" (EPA, December 1996) and "Guidance Manual for the Integrated Exposure Uptake Biokinetic Model for Lead in Children" (EPA, February 1994), which reference levels that are protective of adults and children, respectively.

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 at SEAD-16 (October 1999) to confirm the presence of thallium at these sites. The confirmatory sampling used an analytical procedure with a detection limit below the EPA

allowable concentration for thallium. The October 1999 results indicate that thallium is not present at SEAD-16 and that the earlier inconsistent detections of thallium were due to either laboratory analytical error or matrix interference effects (the presence of aluminum in a sample can falsely elevate the reported concentration of thallium). Elevated thallium concentrations may also have been the result of high turbidity in the samples. Therefore, thallium is not considered to contribute to non-carcinogenic risk in groundwater at SEAD-16. For the reasons mentioned above in **Section 4.2.4**, it was determined that thallium is not considered a COC at SEAD-17 and does not contribute to non-carcinogenic risk in groundwater.

5.2 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 contaminants of potential concern (COPCs) 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 would 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 to indicate 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.

At SEAD-16, potential risk was calculated for both the deer mouse (terrestrial receptor) and the creek chub (aquatic receptor). Of the COPCs at SEAD-16 having an HQ equal to or greater than 1, seven were identified in soil, six in surface water, and 15 in ditch sediment/soils. The following contaminants are considered COCs at SEAD-16 due to elevated HQs. 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. It should be noted that risk from exposure to sediment/ditch soils assumes that the ditches are supporting aquatic life and that the receptor is continuously exposed. Site conditions at SEAD-16/17 suggest that there is usually no water in the ditches and that they do not support aquatic life. Due to this fact, these COPCs are not believed to pose a threat to the environment and are not of concern. In addition, the assumptions and many toxicity values used in the ecological risk assessment were overly conservative and over represent site risk.

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 would support a significant portion of the community of species that occupy the area surrounding and including these sites.

6.0 SCOPE AND ROLE OF ACTION

The scope of this action is to provide adequate protection for current and future human and ecological receptors at the Abandoned Deactivation Furnace and the Active Deactivation Furnace at SEDA.

7.0 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, land uses requiring more conservative cleanup goals were considered in order to satisfy the New York State requirement to evaluate the pre-release condition. More conservative cleanup goals were also considered in order 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 COCs, 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. 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 contaminants from soil to groundwater.
- Prevent ingestion of groundwater containing contaminants in excess of federal and state drinking water standards or criteria, or which pose a threat to public health.
- Prevent future exposure by the establishment of land use controls and ongoing groundwater monitoring until MCLs are achieved.

Long-term monitoring for groundwater is proposed for SEAD-16 and SEAD-17. Remediation goals for an industrial use scenario 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 1**. Initially, 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, most other compounds that contribute to risk would also be remediated. The cleanup goal for lead is 1250 mg/Kg based on the future industrial use scenario. Available soils data were reviewed and there were exceedances of other metals of concern (antimony, arsenic, cadmium, copper, mercury, thallium, and zinc), which were located outside of the area delineated by lead greater than 1250 mg/kg. In addition, there were elevated PAHs detected in the soils at SEAD-16. As a result, risk-based cleanup goals were developed for metals and carcinogenic PAHs.

As discussed above, land uses requiring more conservative cleanup goals were considered to satisfy state and Army protocols. These land uses and corresponding cleanup goals are as follows: (i) A future industrial use scenario was evaluated using a more conservative cleanup goal for lead of 1000 mg/kg; (ii) a residential land use scenario using a lead cleanup goal of 400 mg/kg; (iii) a pre-disposal scenario (or unrestricted use scenario) using a lead cleanup goal of 400 mg/kg and TAGM values for other metals. The four sets of cleanup goals considered are described in more detail below.

7.1 Soil with lead concentration exceeding 1250 mg/Kg and metal and PAH concentrations exceeding cleanup goals

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 EPA, 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 EPA 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" (EPA, 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 EPA, 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.

In order to address all COCs on-site, risk-based cleanup goals were derived for metals and carcinogenic PAHs using the method presented in NYSDEC TAGM 4046: *Determination of Soil Cleanup Objectives and Cleanup Levels*. The risk-based goals were based on a future construction worker receptor, since it is the most conservative receptor under the intended future use scenario, industrial (daycare facility use would be restricted). The cleanup goals for metals were derived by back calculating concentrations of metals that, combined, would yield a non-carcinogenic risk less than 1. In order to account for the fact that each metal COC is only a partial contributor to total risk, the post-remediation HI for each COC was normalized to reflect the magnitude of risk of one metal in comparison to the total risk from all the metals of concern. It should be noted that *post-remediation* assumes that all surface soil samples located within the boundary of the area delineated by concentrations of lead greater than 1250 mg/kg have been removed. The extent of the remedial area for SEAD-16 and SEAD-17 are shown on **Figure 2** and **Figure 3**, respectively. Once the remedial action is completed, confirmatory samples would be collected to ensure that the extent of contamination had been properly delineated.

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 HQs are very close to the soil HQs calculated during the SEAD-12 RI using site background concentrations (refer to Table M.111 in the SEAD-12 RI Report in August 2002); therefore, soil is not expected to pose significant adverse effects to the environment after remediating soils with lead concentration exceeding 1250 mg/kg and metal and PAH concentrations exceeding derived cleanup goals. 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 for lead and the derived cleanup goals for COCs presented in **Table 1** would 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.

Each alternative developed in the FS was fully evaluated for the industrial use scenario, meeting the cleanup goals established above since these cleanup goals would be protective of the intended re-users of the site.

7.2 Soil with lead concentration exceeding 1000 mg/kg

In addition to the proposed soil cleanup goal of 1250 mg/kg for lead and the risk-based derived cleanup goals for metals and PAHs, the remediation of lead to a concentration of 1,000 mg/kg (for industrial use) was also considered. This cleanup goal scenario was evaluated for each alternative with respect to cost only. This concentration level was derived from past communications and agreement between the New York State Department of Health (NYSDOH) and the Army.

7.3 Soil with lead concentration exceeding 400 mg/kg

In addition to the previous two soil cleanup levels, remediation of lead to a concentration of 400 mg/kg (for residential use) 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. This cleanup goal scenario was evaluated for each alternative with respect to cost only.

7.4 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, alternatives that remediate the site to pre-disposal conditions were also evaluated. 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 EPA's Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities, 1994 and is the EPA's

default value for the residential use scenario. The remediation of all other metals would comply with NYSDEC TAGM values. This cleanup goal scenario was evaluated for each alternative with respect to cost. In addition, this cleanup goal scenario was also fully evaluated for one alternative (Alternative 4P) with respect to the nine EPA evaluation criteria. This full evaluation was not presented in the FS and is included in **Appendix A** of this document. A summary of the detailed evaluation of this alternative is presented in **Section 8.0** of this Proposed Plan, along with the other industrial use alternatives evaluated . In addition, the pre-disposal alternative is compared to other industrial use alternatives in **Section 9.0.**

The cleanup levels selected for soil at SEAD-16 and SEAD-17 under an industrial use scenario are presented in **Table 1.**

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 a lower cleanup level was cost effective, in the opinion of the Department of Defense (DoD).

7.5 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. It should be noted that other metal and PAH concentrations in ditch soils did not exceed the risk-based derived cleanup goals for other metals and PAHs.

7.6 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.

8.0 *SUMMARY OF REMEDIAL 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.

8.1 SEAD-16 and SEAD-17 Remedial Alternatives

Seven 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 (Pre-Disposal Scenario);
- Alternative 5: On-Site Disposal (Excavate/On-site stabilization/On-site Subtitle D Landfill); and
- 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 7.0** above), the pre-disposal (or unrestricted use) condition was also evaluated for Alternative 4 to weigh the advantages of restoring the site to pre-disposal conditions without permanent land use controls, versus the cost that such land use controls would incur. Full evaluation of this alternative (Alternative 4P) was not presented in the FS with the other alternatives, and is, therefore, presented in **Appendix A** to the Proposed Plan. A summary of the detailed evaluation of this alternative is presented in **Section 8.0** of this Proposed Plan, along with the other industrial use alternatives evaluated . In addition, the pre-disposal alternative is compared to other industrial use alternatives in **Section 9.0.**

Alternative 4P is included in the Proposed Plan to consider an alternative similar to Alternative 4 that meets pre-disposal conditions and would allow for unrestricted use at the site. Alternative 4 was selected for this evaluation based on its relatively low cost, technical feasibility, and overall effectiveness.

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. To that end, land use controls would aim to prevent future use of the site as a daycare facility or residential use and to prevent ingestion of groundwater. Types of land use controls may include deed restrictions, physical controls such as signs and fences, 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 temporary institutional controls to prevent the use of groundwater until the NYSDEC GA standards are met; however, there would be no long-term land use controls. Details regarding implementation and enforcement of land use controls will be provided in the Remedial Design Plan. In addition, 5-year reviews are an element of each remedy to evaluate whether the response action remains protective of public health and the environment. Estimated costs for land use controls, such as signage, development of a deed restriction, and attorney's fees, are incorporated in the annual operations and maintenance (O&M) costs.

8.1.1 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.

8.1.2 Alternative 2 – On-site Containment

Alternative 2 consists of installing institutional controls (such as signage), excavating soils found in the drainage swales with lead concentration greater than 1250 mg/kg, and metal and PAH concentrations greater than the risk-based derived cleanup goals, disposing of it 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, and metal and PAH concentrations greater than cleanup goals.

Excavated ditch soil would be stockpiled and tested by the Toxicity Characteristic Leaching Procedure (TCLP) prior to being disposed. Ditch soil passing the TCLP criteria would be transported and disposed of in a Subtitle D landfill. Ditch soil exceeding the TCLP criteria would 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 would 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 would also be removed, stockpiled, and tested for TCLP prior to being disposed. Material passing the TCLP criteria would be transported and disposed off-site in a Subtitle D landfill. Material exceeding the TCLP criteria would be stabilized either on-site or off-site. Debris and dust would also be removed from the surface of the furnace and boiler stacks and disposed and stabilized as appropriate.

A soil cover would be placed over the surface and subsurface soil areas with lead concentrations greater than 1250 mg/kg and metal and PAH concentrations greater than risk-based derived cleanup goals. The soil cover would consist of the following, from top to bottom:

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

Regrading of the site and installation of institutional controls (such as signage and a groundwater use restriction) would be required prior to placement of the soil cover. Drainage swales and ditches would be backfilled to existing grade with topsoil and vegetative growth would 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 EPA MCL or NYS GA standards for groundwater in the future. This alternative may also limit the future land use due to the inclusion of land use restrictions as an element of the remedy. Land use restrictions could include prohibiting disturbance of the cover, excavation, etc. Long-term groundwater monitoring and O&M would be required.

8.1.3 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 and with PAH and metal concentrations greater than the risk-based derived cleanup goals. Ditch soil with lead concentrations greater than 1250 mg/kg would be excavated from the drainage swales and ditches, consolidated with the soils, and stabilized. The stabilized material would be graded and left on-site. The soil cover used in Alternative 2 would be placed over the stabilized material and a vegetative cover would be established. Drainage swales and ditches would be backfilled with topsoil, and vegetative growth would be established.

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

Material and debris from Buildings S-311 and 366 would be removed, stockpiled, and tested for TCLP prior to being disposed. Material passing the TCLP criteria would be transported and disposed of in a Subtitle D landfill. Material exceeding the TCLP criteria would 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 would 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 would be required.

8.1.4 Alternative 4 – Off-Site Disposal

Alternative 4 involves excavating surface, subsurface and ditch soils with lead concentrations greater than 1250 mg/kg and with PAH and metal concentrations greater than risk-based derived cleanup goals, and disposing the excavated material in an off-site landfill **(Figures 2 and 3)**. Excavated soil and ditch soil would be stockpiled and tested prior to being transported off-site for disposal. Excavated material passing the TCLP criteria would be transported and disposed of in a Subtitle D landfill. Excavated soil and ditch soil that exceeds the TCLP criteria would 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 would also be removed, stockpiled, and tested for TCLP prior to disposal. Material passing the TCLP criteria would be transported and disposed of in a Subtitle D landfill. Material exceeding the TCLP criteria would be considered hazardous and would be stabilized either on-site or off-site. Debris and dust would also be removed from the surface of the furnace and boiler stacks and disposed and stabilized as appropriate.

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

8.1.5 Alternative 4P – Off-Site Disposal (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. 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 would be stabilized prior to disposal.

Full evaluation of this alternative (Alternative 4P) was not presented in the FS with the other alternatives, and is, therefore, presented in **Appendix A** to the Proposed Plan. A summary of the detailed evaluation of this alternative is presented in **Section 8.0** of this Proposed Plan, along with the other industrial use alternatives evaluated . In addition, the pre-disposal alternative is compared to other industrial use alternatives in **Section 9.0**.

Temporary institutional controls are an element of this alternative until groundwater ARARs are achieved. Long-term groundwater monitoring would be necessary; however, long-term operations and maintenance would not be required.

8.1.6 Alternative 5 – On-Site Disposal

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

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

Excavated areas would be backfilled with clean fill and topsoil, and vegetative growth would 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 would be necessary; however, long-term operations and maintenance would not be required for the excavated areas.

The on-site landfill would be located at SEDA and constructed to meet the requirements of a Subtitle D landfill according to the EPA and NYSDEC, identified in 6 NYCRR 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 1×10^{-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.

8.1.7 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 and with PAH and metal concentrations greater than risk-based derived cleanup goals, stockpiling the material, and washing it to separate the coarse fraction of soil from the fine fraction. The coarse fraction would be backfilled as clean fill, provided it meets remedial action objectives. The fine fraction is expected to contain the majority of the target contaminants 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 would also be removed, stockpiled and tested for TCLP prior to being disposed. Debris and dust would 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, could be performed on-site or off-site. On-site treatment could 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 would 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 contaminants 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 contaminants 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; and
- filter presses.

Chemical Extraction Unit Operations
- washwater treatment/recycle;
- residual treatment and disposal; and
- treated water discharge.

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

8.2 Alternatives Evaluation

Each of the seven remedial alternatives was initially evaluated using a two-step screening process to reduce the number of alternatives that would undergo detailed analysis. 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 are 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 seven 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.

8.2.1 Alternatives Screening

Alternative 1, No Action, is the only alternative that would 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 4**. 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. Note that the screening evaluation shown on **Table 4** was used to screen out alternatives prior to the detailed evaluation presented in **Section 8.3** below. Alternative 4P, the unrestricted use alternative, was retained, based on the screening results for Alternative 4, for detailed evaluation.

8.3 Detailed Analysis of Alternatives

A more detailed description of five retained remedial action alternatives is presented in **Table 5**. In addition, a discussion of

these four alternatives with respect to 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 is presented below.

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 use scenario, which has a proposed cleanup level for lead of 1250 mg/kg and with PAH and metal concentrations greater than risk-based derived cleanup goals, presented in **Table 1.** Additionally, costs for each of the retained alternatives have been estimated for the three other cleanup levels combinations (i.e., lead concentrations exceeding 1000 mg/kg; lead concentrations exceeding 400 mg/kg; and lead concentrations exceeding 400 mg/kg plus other metal concentrations exceeding TAGM values) described earlier. The range of costs based on the range of cleanup goals are presented for each alternative. 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, were evaluated only for the proposed 1250 mg/kg lead and PAH and metal cleanup level. Costs anticipated for each of the remaining alternatives to satisfy each of the four identified cleanup goals were also assessed and summarized. The costs associated with each specific cleanup goal are presented in **Table 6.**

It should be note that Alternative 4P has been added as an alternative since the FS was submitted. A full evaluation of Alternative 4P, comparable to the evaluation of alternatives performed in Section 6 of the FS, is included in **Appendix A.**

It should be noted that costs have been revised since the FS. O&M costs for all alternatives that require permanent land use controls were updated to include costs for signage, attorney's fees, and development of a deed restriction ($81,510). The O&M costs for the unrestricted use alternative, Alternative 4P, remains unchanged, estimated as $40,400. In addition, assumptions regarding hazardous disposal were revised for cost estimating purposes. It is assumed that 15% of soils (surface soil, subsurface soil, and ditch soil) excavated under the 1250 mg/kg for lead, and risk based cleanup goals for metals and PAHs scenario, approximately 704 cubic yards, would require hazardous disposal. The remaining soil could be disposed in a non-hazardous Subtitle D facility. It is assumed that any additional soil excavated under a more conservative scenario would require non-hazardous disposal (i.e., under all cleanup goal scenarios, only 704 cubic yards of soils would require hazardous disposal). It should be noted that based on other sites at SEDA where total lead concentrations in soils were close to 1250 ppm and TCLP data were available, an assumption that 15% of the soils would be hazardous is a conservative estimate.

The unrestricted use alternative was developed and 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 retained for detailed evaluation. The details of this evaluation are summarized below.

8.3.1 Alternative 1: No-Action Alternative

The CERCLA 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 would be undertaken at the site. No monitoring or security measures would be undertaken. Any attenuation of the threats posed by the site to human health and the environment would be the result of natural processes. Current security measures would be eliminated or modified so that the property may be transferred or leased as appropriate.

8.3.2 Alternative 2: On-site Containment

Capital Cost Range: $847,640 - $1,591,350
O&M Cost: $81,510 – ditch soil sampling, semi-annual groundwater monitoring, and land use controls for restricted use scenarios + $5000-$7000 (cover maintenance)
Present Worth Cost: $2,343,574 - $2,428,976
Construction Time: 2 to 7 months depending on location of stabilization activities.

As part of the pre-design sampling program, additional sampling would be conducted to further delineate the extent of remediation. Alternative 2 consists of removing, testing, and disposing off-site the SEAD-16 building debris; installing

institutional controls (such as a permanent fence or signs); excavating soils found in the drainage swales with lead concentrations greater than 1250 mg/kg (it should be noted that there were no exceedences of the metal and PAH risk-based derived cleanup goals in ditch soil); 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 metal and PAH concentrations greater than risk-based derived cleanup goals.

Based on data from other sites a SEDA having similar lead concentrations, it is assumed that 15% of excavated ditch soils would exceed the TCLP criteria. Excavated ditch soil exceeding the TCLP criteria would be considered hazardous and would require stabilization. If the material is stabilized off-site, the ditch soil would 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 would 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 would 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 would be located adjacent to the unnamed road between SEAD-16 and -17. This would 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 would be loaded directly from the stockpiles, once TCLP test results are received. A small staging area and equipment decontamination area would be set up as necessary.

Both short- and long-term protectiveness of human health is provided with Alternative 2 because it would prevent ingestion of and direct contact with surface soils and ditch soils containing lead concentrations over 1250 mg/kg and metal and PAH concentrations greater than cleanup goals. This would 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 would be removed, which would meet the remedial action objectives for ditch soil and prevent contamination downgradient in Kendaia Creek. Although Alternative 2 would 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 would protect human health and the environment, however, it may restrict future use of the land.

Measures would be taken to ensure protection to the community and site workers during the remedial action. Environmental impacts to the site during the remedial action would 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; however, NYSDEC TAGM No. 4046 are To Be Considered (TBCs). According to modeling results, groundwater is not estimated to exceed ARARs in the future, even with no action. Off-site disposal would 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, placement of the soil cover, and installation of the fence. The long-term management of the excavated material would be the responsibility of the selected off-site landfill.

Alternative 2 would be effective in reducing the toxicity and mobility of the hazardous contaminants present in the ditch soil and the material from SEAD-16 buildings if the material was treated to eliminate hazardous characteristics. The soil cover would 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 would be treated in order to meet the TCLP criteria prior to disposal. The treated material would no longer be hazardous and would exhibit lower toxicity than the untreated waste. By disposing the stabilized ditch soil in a landfill, the mobility of the hazardous contaminants would decrease. The stabilized ditch soil would have a larger volume than the untreated ditch soil, but the stabilized ditch soil would 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 would require stabilization. Stabilization is a technology that has been frequently used to treat similar material, and it is not anticipated that problems would be encountered during construction. If on-site stabilization is used, a treatment study would be necessary to establish the optimal additive and dosage and a specialty contractor would perform the work, most likely using a pug mill. The additives would be properly monitored to assure proper dosage. The stabilized material would be tested to assure that it meets the TCLP criteria. If off-site treatment is conducted, most of the treatment, storage, and disposal (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. 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 clean fill, topsoil, and filter fabric is readily available in the Romulus area. If on-site stabilization is performed, a pug mill would 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 fencing and cover maintenance.

State acceptance addresses technical and administrative concerns of the State with regard to remediation. NYSDEC is providing input during the preparation of this Proposed Plan, and their concurrence with the selected remedy will be included in the ROD. Community acceptance of the selected remedy will be evaluated following the public comment period and will be discussed in the Responsiveness Summary of the ROD.

8.3.3 Alternative 4: Off-Site Disposal

Capital Cost Range: $1,631,060 - $3,604,160
O&M Cost: $81,510 – ditch soil sampling, semi-annual groundwater monitoring, and land use controls for restricted use scenarios
Present Worth Cost: $3,040,534 - $4,303,450
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 metal and PAH concentrations greater than cleanup goals; and disposing the excavated material in an off-site landfill (**Figures 2** and **3**). As part of the pre-design sampling program, additional sampling would be conducted to further delineate the extent of remediation. The excavation of soils would extend up to the railroad tracks and would not disrupt the railroad tracks. Excavated soils (ditch soil, surface soil, and subsurface soil) would be stockpiled and tested prior to being transported off-site for disposal. Excavated soils that exceed the TCLP limits would be considered hazardous and would be stabilized prior to disposal.

Soils exceeding the TCLP criteria require stabilization. If the material is stabilized off-site, the soil would be transported off-site, stabilized, and disposed in an appropriate landfill. Stabilization involves mixing an additive agent with the soil. It is assumed that 15% of excavated soils would exceed the TCLP criteria and require disposal in a hazardous off-site facility. If on-site stabilization is used, soils would 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 would be performed on the stabilized material at a rate required by the landfill accepting the waste.

Excavated areas would be backfilled to restore the area to original conditions and to provide proper stormwater control. Clean fill, which would be tested prior to use, and topsoil would be placed and vegetative growth would be established.

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 would be located adjacent to the unnamed road between SEAD-16 and -17. This would provide a central location for the dump trucks to transport the excavated soil to the stockpile area.

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

Both short- and long-term protectiveness of human health and environment are 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 metal and PAH concentrations greater than cleanup goals. The ditch soils with concentrations of lead above 1250 mg/kg would be removed, which would meet the remedial action objective for ditch soil and prevent contamination downgradient in Kendaia Creek. Measures would be taking to ensure protection to the community and site workers during the remedial action. Environmental impacts to the site during the remedial action would not be substantially different from the effects resulting from 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 would be the responsibility of the selected off-site landfill.

Alternative 4 would be effective in reducing the toxicity and mobility of the hazardous contaminants present in the soil and ditch soil at the site. The material and debris from SEAD-16 buildings would be removed, as would the soil and ditch soil exceeding the proposed cleanup levels. Since some of the excavated soil and ditch soil (assumed to be 15% of soils) must be treated prior to disposal in order to meet the TCLP criteria, the treated material would no longer be hazardous and would exhibit lower toxicity than the untreated waste. By transferring the excavated material to a landfill, the mobility of the hazardous contaminants would be eliminated. The stabilized soil would, 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 would require stabilization. Stabilization is a technology that has been frequently used to treat similar soils, and it is not anticipated that problems would be encountered during construction. If on-site stabilization is used, a treatment study would be necessary to establish the optimal additive and dosage and a specialty contractor would perform the work, most likely using a pug mill. The additives would be properly monitored to assure proper dosage. The stabilized material would 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. Once the remedial action is complete, the site would be vegetated and would 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 clean fill and topsoil, is also readily available in the Romulus area. If on-site stabilization is performed, a pug mill would 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.

State acceptance addresses technical and administrative concerns of the State with regard to remediation. NYSDEC is providing input during the preparation of this Proposed Plan, and their concurrence with the selected remedy will be included in the ROD. Community acceptance of the selected remedy will be evaluated following the public comment period and will be discussed in the Responsiveness Summary of the ROD.

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

Capital Cost: $3,604,160
O&M Cost: $40,400 – ditch soil sampling and semi-annual groundwater monitoring
Present Worth Cost: $4,303,450
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 (**Figures 2** and **3**). As part of the pre-design sampling program, additional sampling would be conducted to further delineate the extent of remediation. 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 would be considered hazardous and would 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 would be removed, which would meet the remedial action objective for ditch soil and prevent contamination downgradient in Kendaia Creek. Measures would be taken to ensure protection to the community and site workers during the remedial action. Environmental impacts to the site during the remedial action would 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 would be the responsibility of the selected off-site landfill.

Alternative 4P would be effective in reducing the toxicity and mobility of the hazardous contaminants present in the soil and ditch soil at the site. The material and debris from SEAD-16 buildings would be removed, as would 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 would no longer be hazardous and would exhibit lower toxicity than the untreated waste. By transferring the excavated material to a landfill, the mobility of the hazardous contaminants would be eliminated. The stabilized soil would, 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 would require stabilization. Stabilization is a technology that has been frequently used to treat similar soils, and it is not anticipated that problems would be encountered during construction. If on-site stabilization is used, a treatment study would be necessary to establish the optimal additive and dosage and a specialty contractor would perform the work, most likely using a pug mill. The additives would be properly monitored to assure proper dosage. The stabilized material would 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. Once the remedial action is complete, the site would be vegetated and would 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 would 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.

State acceptance addresses technical and administrative concerns of the State with regard to remediation. NYSDEC is providing input during the preparation of this Proposed Plan, and their concurrence with the selected remedy will be included in the ROD. Community acceptance of the selected remedy will be evaluated following the public comment period and will be discussed in the Responsiveness Summary of the ROD.

8.3.5 Alternative 6: Innovative Treatment – Soil Washing

Capital Cost Range: $3,557,930 - $10,868,710
O&M Cost: $81,510 – ditch soil sampling, semi-annual groundwater monitoring, and land use controls for restricted use scenarios
Present Worth Cost: $4,967,404 - $11,568,000
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 metal and PAH concentrations greater than cleanup goals; stockpiling the soil, soil washing, backfilling on-site the coarse grain material; and disposing the fine grain material in an off-site landfill. As part of the pre-design sampling program, additional sampling would be conducted to further delineate the extent of remediation. The extent of soil excavation would 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 would be treated prior to disposal in a landfill. As with Alternative 4, excavated areas would be backfilled to restore the area to original conditions. Topsoil would be placed and vegetative growth would 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 would be located adjacent to the unnamed road between SEAD-16 and -17. This would provide a central location for the dump trucks to transport the excavated soil to the stockpile area.

A soil washing operation would 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 would 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 contaminants have been removed to acceptable levels. The material would then be re-used as clean fill. After dewatering, the fine material would be treated off-site, if necessary, and disposed of in an off-site landfill. The cost estimate assumes that 30% of the material are fine grains, which require off-site disposal, and 15% of that fine material would require disposal in a hazardous facility. The water would 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 metal and PAH concentrations greater than cleanup goals. The ditch soils with lead concentrations above 1250 mg/kg would be removed, which would meet the remedial action objective for ditch soil and prevent contamination downgradient in Kendaia Creek. Measures would be taken to ensure protection to the community and site workers during the remedial action. Environmental impacts to the site during the remedial action would 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 would 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 would be the responsibility of the selected off-site landfill.

Alternative 6 would be effective in reducing the toxicity, mobility, and volume of the hazardous contaminants present in the soil and ditch soil at the site. It is estimated that soil washing would 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 would effectively reduce the toxicity and mobility of the hazardous contaminants.

Alternative 6 is technically feasible to complete. It involves routine earth moving work including excavation, stockpiling, transportation, and backfilling. It would 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 would be necessary to confirm that the technology would be effective at SEAD-16 and -17.

As with Alternative 4, the fine grain material that fails the TCLP criteria would 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 would be encountered during construction. It is anticipated that the stabilization process would be effective because the fine grain material would mix easier with the selected additive(s). If on-site stabilization is used, a treatment study would be necessary to establish the optimal additive and dosage and a specialty contractor would perform the work, most likely using a pug mill. The additives would be properly monitored to assure proper dosage. The stabilized material would 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. Once the remedial action is complete, the site would be vegetated and would 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 would 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.

State acceptance addresses technical and administrative concerns of the State with regard to remediation. NYSDEC is providing input during the preparation of this Proposed Plan, and their concurrence with the selected remedy will be included

in the ROD. Community acceptance of the selected remedy will be evaluated following the public comment period and will be discussed in the Responsiveness Summary of the ROD.

9.0 COMPARATIVE EVALUATION OF ALTERNATIVES

9.1 Overall Protectiveness of Human Health and the Environment

Each alternative is 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 would be removed and disposed off-site. Ditch soil with lead concentrations above 1250 mg/kg would be removed from the site. Soil with metal and PAH concentrations above the proposed cleanup goals would either be treated, removed from the site, or covered. Removing or covering these materials would prevent dermal contact and ingestion, which have been identified by the BRA as the major exposure pathways for dust, soil and ditch soil at SEAD-16 and -17. Alternatives 2, 4, 4P, or 6 would each reduce risk to acceptable levels.

Removal of soils found in the drainage ditches would 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) would decrease any potential for migration to groundwater, and placing a soil cover over these areas (Alternative 2) would decrease the potential for erosion and migration to nearby areas.

Land use controls would aid in the protection of human health and the environment by limiting access to the site and preventing the use of groundwater as a drinking water source.

9.2 Compliance With ARARs

Compliance with ARARs is 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 EPA 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 at the end of this document.

There are currently no chemical specific ARARs for soil in the State of New York; however NYSDEC TAGM No. 4046 are To Be Considered (TBCs). For groundwater, according to the fate and transport modeling results presented in Section 1.4 of the FS Report, even without any remedial action, exceedances of ARARs would not be expected in the future; however, semi-annual groundwater monitoring would be performed to ensure compliance with ARARs.

Off-site disposal would 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 Proposed Plan. 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.

9.3 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 contaminants in the soils and ditch soils. Alternative 4P is the most effective in eliminating the long-term threats since it would involve excavation and removal of

contaminants, which is required to allow unrestricted use. Alternative 6 is highly effective in eliminating the long-term threats because soil washing segregates the coarse and fine fractions of the soil. Most of the hazardous contaminants are contained in the fines fraction, which would be disposed of off-site. This coarse fraction would no longer contain concentrations of lead above the proposed cleanup level and would be backfilled to the site. Alternative 4 is the next effective because it involves 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 would 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 EPA MCL or NYS GA standards for groundwater in the future. This alternative may also limit the future land use. All 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 the risk-based derived cleanup goals for metals and specific carcinogenic PAHs (**Table 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, arsenic, cadmium, copper, lead, mercury, and thallium are expected to be below the cleanup value determined to be protective of human health (**Table 7**). After remediation at SEAD-17, the maximum concentrations of the metals, antimony, arsenic, cadmium, copper, lead, mercury, thallium, and zinc, are expected to be below their respective clean up values (**Table 8**).

Although no residual contamination is expected, after the remedial action, residual contamination would 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. All alternatives would require temporary groundwater use restrictions until ARARs are achieved. Alternatives 2, 4, and 6 would require permanent land use controls restricting the site to industrial use only and prohibiting future use as a daycare facility. Details regarding implementation and enforcement of land use controls will be provided in the Remedial Design Plan. The Army believes that land use controls are effective and can be permanent if monitored and enforced until such restrictions can be removed. Alternative 4P ranks higher for permanence since permanent land use controls would not be required for these sites because this alternative would allow for unrestricted use. Alternative 1, the no action alternative, is not permanent because no treatment or soil cover is used.

9.4 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 contaminants 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 contaminants 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 contaminants 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 contaminants are essentially immobile. Alternative 2 also decreases the mobility of the surface and subsurface soils through the placement of the soil cover, which would contain the soil and prevent migration to surface water via erosion.

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

stabilized soil would no longer be hazardous; hence, the toxicity would be reduced.

9.5 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 they do require off-site disposal. They 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.

9.6 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 4P is advantageous since no permanent land use controls would be required since the alternative would allow for unrestricted land use. 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 landfill capable of accepting and treating, if necessary, the site material would be needed.

9.7 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 limiting future land use to industrial use and restricting future use of the site as a daycare facility. 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 6.**

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 $2,343,574 to $2,428,976, depending on the cleanup level used. Alternative 4 varies in cost from $3,040,534 to $4,303,450, depending on the cleanup level used. The capital cost of Alternative 4P would total $3,604,160. Alternative 6 is the most expensive alternative and varies in cost from $4,967,404 to $11,568,000, depending on the cleanup level used.

9.8 State Acceptance

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

9.9 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 this Proposed Plan.

10.0 PREFERRED ALTERNATIVE

Remedial action alternatives were prepared together for the removal of contaminated materials at the Abandoned Deactivation Furnace (SEAD-16) and at the Active Deactivation Furnace (SEAD-17). The baseline human health risk assessment indicates that the current cancer and hazardous risk is above acceptable levels for SEAD-16 and SEAD-17. Alternatives 2, 4, 4P, and 6 address remediating the soil, ditch soil, and building material and debris and would all be effective in reducing the human health and ecological risk as well as meeting the remedial action objectives. In summary, the goal of the remedial action is to prevent ingestion of and dermal contact with soils and ditch soils with lead concentrations above 1250 mg/kg and with metals and PAH concentrations greater than the risk-based

derived cleanup goals (based on future industrial use scenario) shown in **Table 1**; and with dust caused by excess debris and materials that are currently inside the abandoned buildings at SEAD-16.

Based on the evaluation of various options, the preferred alternative of the U.S. Army for SEADs-16 and 17 is Alternative 4 (Excavation, Stabilization, and Off-site Disposal). The unrestricted use alternative was considered for Alternative 4 in order 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 over $1 million more than Alternative 4, was not selected as the preferred alternative due to the significant cost increase compared to its industrial use counterpart. Since human health risk for the intended future use, industrial, is acceptable under Alternative 4, the additional health risk reductions achieved by the unrestricted use alternative, Alternative 4P, does not warrant an additional $1 million.

The elements that compose this remedy include:

- Conducting additional sampling as part of the pre-design sampling program to further delineate the areas of excavation;
- Removing, testing, and disposing off-site of the SEAD-16 building debris;
- Excavating approximately 275 cubic yards (cy) of ditch soil with lead concentrations greater than 1250 mg/kg to until cleanup goals are achieved;
- Excavating approximately 1760 cy of surface soils at SEAD-16 with lead concentrations greater than 1250 mg/kg, and PAH and metal concentrations greater than risk-based cleanup goals (**Table 1**);
- Excavating approximately 67 cy of subsurface soils at SEAD-16 (areas around SB16-2, SB16-4, and SB16–5) with lead concentrations greater than 1250 mg/kg, and PAH and metal concentrations greater than risk-based cleanup goals (**Table 1**);
- Excavating approximately 2590 cy of surface soils at SEAD-17 with lead concentrations greater than 1250 mg/kg and metal concentrations greater than risk-based cleanup goals (**Table 1**);
- Stabilizing soils from SEAD-16 and 17 and building debris from SEAD-16 exceeding the TCLP criteria;
- Disposing of the excavated material from both sites in an off-site landfill;
- Backfilling the excavated areas at both sites with clean backfill;
- Conducting semi-annual groundwater monitoring at both sites until concentrations are below the GA criteria;
- Conducting annual sediment sampling in Kendaia Creek;
- Submitting a Completion Report after completion of the remedial action; and
- Implementing land use controls and completing five-year reviews to evaluate whether the response action remains protective of public health and the environment.

The proposed areas of excavation for SEAD-16 and SEAD-17 for Alternative 4 are shown in **Figures 2** and **3**. **Figure 4** shows the process flow schematic. 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, which each of these do. 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 would 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 long-term maintenance aside from semi-annual groundwater monitoring and maintenance of land use controls such as signage; and, the alternative can be implemented quickly to provide short-term effectiveness. Finally, it is a permanent solution that would 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) would be reviewed after five years. At this time, modification may be implemented to the remedial program, if appropriate.

Land use controls would be required in order to prevent future use of the site as a daycare facility or for residential use and to prevent ingestion of groundwater. There would be a temporary groundwater use restriction until the groundwater at the site meets MCL and NYSDEC AWQS Class GA standards. Additional controls, such as a deed restriction, may be a permanent part of the remedy to prevent residential use of the property or use as a daycare facility. The land use controls are intended to prevent the use of groundwater as drinking water and to maintain its industrial

use. 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. Details regarding implementation and enforcement of land use controls will be provided in the Remedial Design Plan.

GLOSSARY

Acid Leaching
The process by which contaminants are transferred from a stabilized matrix to acid, a liquid medium.

Additive
A substance added to another in relatively small amounts to effect a desired change in properties.

Adhesion
The molecular attraction exerted between the surfaces of bodies in contact.

Administrative Record
The body of documents that were considered or relied on which form the basis for the selection of a response action.

Adsorption
Adsorption is the adhesion of molecules of gas, liquid, or dissolved solids to a surface. The term also refers to a method of treating wastes in which activated carbon removes organic matter from wastewater.

Adverse effects
Effects of exposure to a chemical that are unfavorable or harmful.

Aluminum
Aluminum is a metal that accumulates in the environment.

Ambient Air
The encompassing air or atmosphere of the outdoor portions of a site.

Ambient Water Quality Standards (AWQS)
Standards and guidance values developed by New York State for specific classes of fresh and saline surface waters and fresh groundwaters for protection of the best uses assigned to each class.

Antimony
Antimony is a metal that accumulates in the environment.

Applicable or Relevant and Appropriate Requirements (ARARs)
As defined under CERCLA, ARARs are cleanup standards, standards of control, and other substantive environmental protection requirements, criteria, or limits set forth under federal or state law that specifically address problems or situations present at a CERCLA site. ARARs are major considerations in setting cleanup goals, selecting a remedy, and determining how to implement that remedy at a CERCLA site. ARARs must be attained at all CERCLA sites unless a waiver is attained. ARARs are not national cleanup standards for the Superfund program. *See also Comprehensive Environmental Response, Compensation, and Liability Act and Superfund.*

Aquifer
An aquifer is a saturated permeable geologic unit or rock formation that can store significant quantities of water and transmit the water under ordinary hydraulic gradients, possibly to wells.

Assessment endpoints
Assessment endpoints represent environmental values to be protected and generally refer to characteristics of populations and ecosystems.

Attenuation
The reduction of concentrations and amounts of pollutants in contaminated soil and groundwater.

Backfill
To refill (as an excavation) usually with excavated material or with clean material brought from off-site.

Balancing Criteria
Criteria against which a remedial alternative is evaluated. These criteria are used to compare various recommended alternatives. The five primary balancing criteria are long-term effectiveness and permanence; reduction of toxicity, mobility, or volume through treatment; short-term effectiveness; implementability; cost.

Base Realignment and Closure (BRAC)
A congressionally mandated process that involves closure of military bases. The goal of BRAC is to transition the former bases from military uses to civilian reuse, with the intent of minimizing the negative effects of base closure by spurring economic development and growth. The SEDA was listed as a base to be closed in October 1995.

Baseline Risk Assessment (BRA)
A baseline risk assessment is an assessment conducted before cleanup activities begin at a site to identify and evaluate the threat to human health and the environment. After remediation has been completed, the information obtained during a baseline risk assessment can be used to determine whether the cleanup levels were reached.

Baseline
A scenario or set of critical observations or data used for comparison or a control.

Bedrock
Bedrock is the rock that underlies the soil; it can be permeable or non-permeable. The underlying bedrock as the Seneca Army Depot Activity is shale.

Benchmark value
A point of reference from which measurements may be made or something that serves as a standard by which others may be measured or judged. In the ecological risk assessment toxicity benchmarks reflecting dietary NOAELs (the level of exposure at which no adverse effects have been demonstrated) were used for benchmarks in the soil screening.

Borehole
A borehole is a hole cut into the ground by means of a drilling rig.

Borrow pit
An excavated area where material has been dug for use as fill at another location.

BRAC Cleanup Team (BCT)
The BCT is designated for each closing installation where property will be made available for reuse. The BCT is comprised of a BRAC Environmental Coordinator (BEC) (a Department of Defense [DoD] employee) and representatives from the state environmental regulatory agency and the U.S. Environmental Protection Agency regional office. The Restoration Advisory Board and the Local Redevelopment Authority work closely with the BCT regarding environmental

restoration and provide the BCT with input on reuse priorities and decisions.

Cadmium
Cadmium is a heavy metal that accumulates in the environment. See also Heavy Metal.

Cancer Slope Factor
The slope factor is a plausible upper-bound estimate of the probability of a response per unit intake of a chemical over a lifetime. The slope factor is used in risk assessments to estimate an upper-bound lifetime probability of an individual developing cancer as a result of exposure to a particular level of a potential carcinogen. Slope factors for each chemical are expressed in units of inverse mg chemical per kg body weight per day of exposure.

Capital Cost
The initial cost associated with constructing a treatment remedy. The capital cost does not include the operation and maintenance of the remedy.

Carcinogen
A substance that produces cancer in an organism or increases the potential for an organism to develop cancer.

Characteristic Waste
Under RCRA, a solid waste can be hazardous if it has certain characteristics. These wastes are called "characteristic wastes." The characteristics are: ignitability (if the waste is a liquid and has a flashpoint less than 140 degrees); corrosivity (if the waste has a pH of 2 or less, or 12.5 or more, OR if it corrodes steel at a certain rate); reactivity (if the material reacts with water, forms explosive mixtures with water, generates toxic fumes or vapors when mixed with water, is a cyanide or sulfide bearing waste which generates hazardous fumes or vapors, or is explosive); toxic - if the wastes contain more than a certain level of some toxic materials.

Chronic
Chronic means always present or encountered. For example, the chronic daily intake is an estimate of the daily exposure of a receptor to a chemical.

Clean Water Act (CWA)
CWA is a 1977 amendment to the Federal Water Pollution Control Act of 1972, which set the basic structure for regulating discharges of pollutants to U.S. waters. This law gave EPA the authority to set wastewater discharge standards on an industry-by-industry basis and to set water quality standards for all contaminants in surface waters.

Cleanup
Cleanup is the term used for actions taken to deal with a release or threat of release of a hazardous substance that could affect humans and or the environment. The term sometimes is used interchangeably with the terms remedial action, removal action, response action, or corrective action.

Compaction
The process of pressing soil together to reduce volume and decrease the voids within the soil.

Composite Liner
Landfill liners, which are made of dissimilar materials, each employed to achieve one or more of the following goals: 1) minimize hydraulic conductivity, 2) minimize molecular diffusion rate 3) maximize retardation. *See also hydraulic conductivity, molecular diffusion, retardation.*

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA)
CERCLA is a federal law passed in 1980 that created a special tax those funds a trust fund, commonly known as Superfund, to be used to investigate and clean up abandoned or uncontrolled hazardous waste sites. CERCLA required for the first time that EPA step beyond its traditional regulatory role and provide response authority to clean up hazardous waste sites. EPA has primary responsibility for managing cleanup and enforcement activities authorized under CERCLA. Under the program, EPA can pay for cleanup when parties responsible for the contamination cannot be located or are unwilling or unable to perform the work, or take legal action to force parties responsible for contamination to clean up the site or reimburse the federal government for the cost of the cleanup. *See also Superfund.*

Containment
A passive contaminant control technology, which focuses on controlling hydrologic pathways for contaminant migration.

Contaminant
A contaminant is any physical, chemical, biological, or radiological substance or matter present in any media at concentrations that may result in adverse effects on air, water, or soil.

Copper
Copper is a heavy metal that accumulates in the environment. *See also Heavy Metal.*

Data Quality Objective (DQO)
DQOs are qualitative and quantitative statements specified to ensure that data of known and appropriate quality are obtained. The DQO process is a series of planning steps, typically conducted during site assessment and investigation, which is designed to ensure that the type, quantity, and quality of environmental data used in decision-making are appropriate. The DQO process involves a logical, step-by-step procedure for determining which of the complex issues affecting a site are the most relevant to planning a site investigation before any data are collected.

Deactivation Furnace
A technology used to destroy obsolete and unserviceable munitions by incineration.

Disposal
Disposal is the final placement or destruction of toxic, radioactive or other wastes; surplus or banned pesticides or other chemicals; polluted soils; and drums containing hazardous materials from removal actions or accidental release. Disposal may be accomplished through the use of approved secure landfills, surface impoundments, land farming, deep well injection, or ocean dumping.

Dosage
The addition of an ingredient or the application of an agent in a measured dose.

Downgradient
Areas that are within the bounds of potential contamination (e.g. downstream or downwind).

Emergency Planning and Community Right-to-Know Act (EPCRA)
This act (also referred to as SARA Title III) was passed by Congress as part of the Superfund Amendments and Reauthorization Act of 1986 (SARA). The act created a program with two basic goals: 1) To increase public knowledge of and access to information on the presence of toxic chemicals in communities, releases of toxic chemicals into the environment, and waste management activities involving toxic chemicals; and 2) to encourage and support planning for responding to environmental emergencies. It led to the creation of the Toxics Release Inventory or TRI and the hazardous chemical inventory. This information enables state and local governments and the community to identify what needs to be done at the local level to better deal with pollution and chemical emergencies.

Endangered/Threatened Species
A species threatened with extinction.

Endosulfan
An insecticide that is used in the control of numerous crop insects and some mites.

Environmental Protection Agency (EPA)
The federal regulatory agency responsible for enforcing the rules and regulations pertaining to the environment of the United States. Representatives from the EPA Region 2, which includes New York State, are involved in the review and oversight of the environmental work being conducted at the Seneca Army Depot Activity.

Environmental Risk
Environmental risk is the chance that human health or the environment will suffer harm as the result of the presence of environmental hazards.

Ex Situ
The term ex situ or "moved from its original place, means excavated or removed.

Exceedence
A measured level of a compound in a medium that is greater than a defined state or federal standard.

Excess Lifetime Cancer Risk
The incremental probability of an individual developing cancer over a lifetime as a result of exposure to a potential carcinogen.

Expanded Site Investigation (ESI)
An expanded site investigation typically includes media sampling and analyses. An ESI is performed following a Preliminary Site Investigation to obtain more information regarding the concentrations of pollutants at a site.

Exposure Pathway
An exposure pathway is the way a chemical comes into contact with a person (i.e. by ingestion, inhalation, dermal contact). Determining whether exposure pathways exist is an essential step in conducting a baseline risk assessment. *See also Baseline Risk Assessment.*

Exposure Point Concentration (EPC)
The value that represents a conservative estimate of the chemical concentration available from a particular medium or route of exposure.

Fallout
Material released as a solid, liquid, or gas from a stack that drops out of the atmosphere by gravitational forces, condensation, or adsorption.

Feasibility
A measure of whether an alternative is capable of being done or carried out successfully.

Federal Facilities Agreement (FFA) also known as the Interagency Agreement (IAG)
An agreement signed between EPA, NYSDEC and the Army that describes the process for identifying, investigating and remediating sites at the Seneca Army Depot Activity.

GA Groundwater Standard
A water quality standard promulgated by the NYSDEC that establishes a minimum quality of a groundwater supply that could be used as a source of drinking water.

Geomembrane
An engineered polymeric or plastic material that is fabricated to be virtually impermeable.

Grain Size Distribution
A sample of soil is made up of particles of various sizes. The various sizes of the soil particles can be expressed by a plot of percent finer by weight versus diameter in millimeters. This plot is known as the grain size distribution.

Groundwater
Groundwater is the water that flows beneath the earth's surface, possibly in an aquifer, that fills pores between such materials as sand, soil, or gravel and that often supplies water to wells and springs. See also *Aquifer.*

Habitat
The place or environment where a plant or animal naturally or normally lives and grows.

Hazard Index (HI)
The unit used to assess the overall potential for non-carcinogenic effects posed by a chemical. It is expressed as the ratio of the exposure level or intake of a chemical to the chemical's reference dose.

Hazard Quotient (HQ)
The hazard quotient is used to present the ecological risk posed by a chemical. It is the ratio of the expected exposure point concentration to an appropriate toxicity reference value.

Hazardous Waste
A solid waste or combination of solid wastes which, because of its quantity, concentration or physical, chemical, or infectious characteristics, may a.) cause or significantly contribute to an increase in mortality or an increase in serious irreversible, or incapacitating reversible, illness; or b.) pose a substantial present or potential hazard

to human health or the environment when improperly treated, stored, transported, disposed of, or otherwise managed.

Heavy Metal
The term heavy metal refers to a group of toxic metals including arsenic, chromium, copper, lead, mercury, silver, and zinc. Heavy metals often are present at industrial sites at which operations have included battery recycling and metal plating.

Hydraulic Conductivity
The capability of a material to transmit water.

Immobile
Incapable of being moved and thereby spreading contamination.

In Situ
The term in situ, "in its original place," or "on-site", means unexcavated and unmoved. In situ soil flushing and natural attenuation are examples of in situ treatment methods by which contaminated sites are treated without digging up or removing the contaminants.

Information Repository
An information repository is a location in a public building that is convenient for local residents, such as a public school, city hall, or library that contains information about a Superfund site, including technical reports and reference documents.

Innovative Treatment
An innovative treatment is a process that has been tested and used as a treatment for hazardous waste or other contaminated materials, but lacks a long history of full-scale use. Information about its cost and how well it works is not sufficient to support prediction of its performance under a variety of operating conditions. An innovative technology usually must undergo pilot-scale treatability studies, in the field or the laboratory, to provide performance, cost, and design objectives for the technology. Innovative technologies are being used under many federal and state cleanup programs to treat hazardous wastes that have been improperly released. For example, the innovative technology, reactive barrier wall, is being evaluated to manage off-site migration of contamination.

Inorganic Compound
An inorganic compound is a compound that generally does not contain carbon atoms (although carbonate and bicarbonate compounds are notable exceptions) and tends to be more soluble in water. Examples of inorganic compounds include various acids, potassium hydroxide, and metals.

Institutional Controls
An institutional control, or a land use control, is a legal or institutional measure, which subjects a property owner to limit activities at or access to a particular property. They are used to ensure protection of human health and the environment, and to expedite property reuse. Fences, posting or warning signs, and zoning and deed restrictions are examples of institutional controls.

Intake
The amount of a chemical taken in by an organism.

Iron
Iron is a heavy metal that accumulates in the environment. *See also Heavy Metal.*

Landfill
A sanitary landfill is a land disposal site for non-hazardous solid wastes at which the waste is spread in layers compacted to the smallest practical volume.

Leachate
A leachate is a contaminated liquid that results when water collects contaminants as it trickles through wastes, agricultural pesticides, or fertilizers. Leaching may occur in farming areas and landfills and may be a means of the entry of hazardous substances into soil, surface water, or groundwater.

Leaching
The process by which contaminants are transferred from a stabilized matrix to a liquid medium such as water or acid.

Lead
Lead is a heavy metal that is hazardous to health if breathed or swallowed. Its use in gasoline, paints, and plumbing compounds has been sharply restricted or eliminated by federal laws and regulations. See also Heavy Metal.

Liner
The part of a landfill which serves as a barrier to minimize migration of contaminants.

Manganese
Manganese is metal that accumulates in the environment.

Maximum Contaminant Level (MCL)
Established under the Safe Drinking Water Act as concentrations of pollutants considered protective for drinking water.

Median
A value in an ordered set of values below and above which there is an equal number of values. If there is no middle number, the median is the arithmetic mean (or average) of the two middle values.

Medium
A medium is a specific environment (air, water, or soil) that is the subject of regulatory concern and activities.

Mercury
Mercury is a heavy metal that can accumulate in the environment and is highly toxic if breathed or swallowed. Mercury is found in thermometers, measuring devices, pharmaceutical and agricultural chemicals, chemical manufacturing, and electrical equipment. See also *Heavy Metal.*

Migration
Migration is the movement of contaminants from the source of contamination to contact with human populations or the environment. A migration pathway is a potential path or route that contaminants take. Migration pathways include air, surface water, groundwater, and land surface. The existence and identification of all potential migration pathways must be considered during assessment and characterization of a waste site.

Mobility
The ability of a contaminant to move throughout the affected media or to other media, thereby spreading the contamination.

Molecular diffusion
The movement of contaminants from an area of higher concentration to areas of lower concentration.

Monitoring Well
A monitoring well is a well drilled at a specific location on or off a hazardous waste site at which groundwater can be sampled at selected depths and studied to determine the direction of groundwater flow and the types and quantities of contaminants present in the groundwater.

National Contingency Plan (NCP)
The NCP, formally the National Oil and Hazardous Substances Contingency Plan, is the major regulatory framework that guides the Superfund response effort. The NCP is a comprehensive body of regulations that outlines a step-by-step process for implementing Superfund responses and defines the roles and responsibilities of EPA, other federal agencies, states, private parties, and the communities in response to situations in which hazardous substances are released into the environment. *See also Superfund.*

National Environmental Policy Act (NEPA)
Written in 1969, it is one of the first laws that established the broad national framework for protecting our environment. NEPA's basic policy is to assure that all branches of government give proper consideration to the environment prior to undertaking any major federal action that significantly affects the environment. The most visible NEPA requirements are Environmental Assessments (EA's) and Environmental Impact Statements (EIS's), which are required for all proposed federal activities.

National Priorities List (NPL)
The NPL is EPA's list of the most serious uncontrolled or abandoned hazardous waste sites identified for possible long-term remedial response under Superfund. Inclusion of a site on the list is based primarily on the score the site receives under the Hazard Ranking System. Money from Superfund can be used for cleanup only at sites that are on the NPL. EPA is required to update the NPL at least once a year. *See also Superfund.*

Natural Attenuation
Natural attenuation is an approach to cleanup that uses natural processes to contain the spread of contamination from chemical spills and reduce the concentrations and amounts of pollutants in contaminated soil and groundwater. Natural subsurface processes, such as dilution, volatilization, biodegradation, adsorption, and chemical reactions with subsurface materials, are allowed to reduce concentrations of contaminants to acceptable levels. An in situ treatment method that leaves the contaminants in place while those processes occur, natural attenuation is being used to clean up petroleum contamination from LUSTs across the country.

New York State Department of Environmental Conservation (NYSDEC)
The state regulatory agency responsible for enforcing the rules and regulations of New York. Representatives from the headquarters in Albany and Region 8 are involved in the review and oversight of the environmental work being conducted at the Seneca Army Depot Activity.

New York State Department of Health (NYSDOH)
A state regulatory agency whose mission is to protect and promote the health of New Yorkers through prevention, science, and the assurance of quality health care delivery.

Nitroaromatics
Nitroaromatics are organic compounds that contain 6-carbon ring structures, but in which nitrates are substituted for some of the carbon atoms. These compounds are used in explosives.

Non-Carcinogen
A substance, which produces systemic effects, or general effects, to the body of an organism. These effects are generally not cancer related.

Operable Unit (OU)
A grouping of sites into one larger entity. Sites can be grouped into an operable unit due to geographical proximity to each other, similar chemical hazards or for other reasons. The SEAD-16 and SEAD-17 sites are considered one operable unit for the purposes of remedial action.

Operation and Maintenance (O&M)
O&M refers to the activities conducted at a site, following remedial actions, to ensure that the cleanup methods are working properly. O&M activities are conducted to maintain the effectiveness of the remedy and to ensure that no new threat to human health or the environment arises. Under the Superfund program, the state or PRP assumes responsibility for O&M, which may include such activities as groundwater and air monitoring, inspection and maintenance of the treatment equipment remaining on-site, and maintenance of any security measures or institutional controls.

Organic Chemical or Compound
An organic chemical or compound is a substance produced by animals or plants that contains mainly carbon, hydrogen, and oxygen.

Overburden
The geologic material overlying bedrock.

Overt Acute Toxic Impacts
Effects of a chemical that are characterized by sudden and severe toxicity.

Permeability
Permeability is a characteristic that represents a qualitative description of the relative ease with which rock, soil, or sediment would transmit a fluid (liquid or gas).

Pervasive
A chemical which has a tendency to become diffused throughout every part of a medium.

Pesticide
A pesticide is a substance or mixture of substances intended to prevent or mitigate infestation by, or destroy or repel, any pest. Pesticides can accumulate in the food chain and or contaminate the environment if misused.

Physical Separation
Physical separation processes use different size sieves and screens to concentrate contaminants into smaller volumes. Most organic and

inorganic contaminants tend to bind, either chemically or physically, to the fine fraction of the soil. Fine clay and silt particles are separated from the coarse sand and gravel soil particles to concentrate the contaminants into a smaller volume of soil that could then be further treated or disposed.

Polychlorinated Biphenyl (PCB)
PCBs are a group of toxic, persistent chemicals, produced by chlorination of biphenyl, that once were used in high voltage electrical transformers because they conducted heat well while being fire resistant and good electrical insulators. These contaminants typically are generated from metal degreasing, printed circuit board cleaning, gasoline, and wood preserving processes. Further sale or use of PCBs was banned in 1979.

Polycyclic Aromatic Hydrocarbon (PAH)
A PAH is a chemical compound that contains more than one fused benzene ring. They are commonly found in petroleum fuels, coal products, and tar.

Potentially Responsible Party (PRP)
A PRP is an individual or company (such as owners, operators, transporters, or generators of hazardous waste) that is potentially responsible for, or contributing to, the contamination problems at a Superfund site. Whenever possible, EPA requires PRPs, through administrative and legal actions, to clean up hazardous waste sites they have contaminated. *See also Comprehensive Environmental Response, Compensation, and Liability Act and Superfund.*

Pre-disposal conditions
Conditions present at a site before activities that caused the current environmental contamination took place.

Preliminary Assessment and Site Inspection (PA/SI) A PA/SI is the process of collecting and reviewing available information about a known or suspected hazardous waste site or release. The PA/SI usually includes a visit to the site.

Present Worth Cost Analysis
The equivalent future worth of money at the present time. By discounting all costs to a common base year, the costs for different remedial action alternatives can to be compared on the basis of a single figure for each alternative. This is a calculated value that requires the length of time that an activity would be performed and the interest rate. For example, the cost of the long-term operation and maintenance of a remedy is provided in terms of the present worth. Typically, a 30-year cost is required and an interest rate of 10%.

Proposed Plan
The first step in the remedy selection process. The Proposed Plan provides information supporting the decisions of how the preferred alternative was selected. It summarizes the RI/FS process and how the alternatives comply with the requirements of the NCP and CERCLA. The Proposed Plan is provided to the public for comment. The responses to the Proposed Plan comments are provided in the ROD.

Publicly Owned Treatment Works (POTW)
A facility owned by the public that is used to treat wastewater generated from industrial, residential, or commercial activity.

Pug Mill
A machine in which materials (such as clay and water) are mixed, blended, or kneaded into a desired consistency.

Reasonable Maximum Exposure (RME)
The highest exposure that could reasonably be expected to occur for a given exposure pathway at a site. It is intended to account for both uncertainty in the contaminant concentration and variability in the exposure parameters.

Receptor
A human or animal, or group of humans or animals, that has the potential to be adversely affected by exposure to chemicals present in the environment.

Record of Decision (ROD)
A ROD is a legal, technical, and public document that explains which cleanup alternative will be used at a Superfund NPL site. The ROD is based on information and technical analysis generated during the remedial investigation and feasibility study (RI/FS) and consideration of public comments and community concerns. *See also Preliminary Assessment and Site Investigation and Remedial Investigation and Feasilbility Study.*

Reference Dose (RfD)
The reference dose is an estimate (with uncertainty spanning perhaps an order of magnitude) of a daily exposure to the human population (including sensitive subgroups) that is likely to be without appreciable risk of deleterious effects during a lifetime.

Release
A release is any spilling, leaking, pumping, pouring, emitting, emptying, discharging, injecting, leaching, dumping, or disposing into the environment of a hazardous or toxic chemical or extremely hazardous substance, as defined under RCRA. See also Resource Conservation and Recovery Act.

Remedial Action Objectives (RAO)
Media specific objectives designed to be protective of human health and the environment.

Remedial Design and Remedial Action (RD/RA)
The RD/RA is the step in the Superfund cleanup process that follows the RI/FS and selection of a remedy. An RD is the preparation of engineering plans and specifications to properly and effectively implements the remedy. The RA is the actual construction or implementation of the remedy. *See also Remedial Investigation and Feasibility Study.*

Remedial Investigation and Feasibility Study (RI/FS)
The RI/FS is the step in the Superfund cleanup process that is conducted to gather sufficient information to support the selection of a site remedy that will reduce or eliminate the risks associated with contamination at the site. The RI involves site characterization through collection of data and information necessary to characterize the nature and extent of contamination at the site. The RI also determines whether the contamination presents a significant risk to human health or the environment. The FS focuses on the development of specific response alternatives for addressing contamination at a site.

Resource Conservation and Recovery Act (RCRA)
RCRA is a federal law enacted in 1976 that established a regulatory system to track hazardous substances from their generation to their disposal. The law requires the use of safe and secure procedures in treating, transporting, storing, and disposing of hazardous substances. RCRA is designed to prevent the creation of new, uncontrolled hazardous waste sites.

Retardation
Processes that impede the transport of contaminants by removing or immobilizing them from a free state (i.e. an aqueous solution or vapor).

Retort
A vessel or chamber of the Deactivation Furnace in which substances are distilled or decomposed by heat.

Saturated Zone
The saturated zone is the area beneath the surface of the land in which all openings in the soil matrix and rock formations are filled with water.

Sediment Criteria
Technical guidance provided by NYSDEC, the Division of Fish and Wildlife, that describes allowable sediment quality for a variety of chemicals. The values provided in this document have been adopted as screening levels for comparison to site data. Exceedances of these values provide that basis for further evaluation and decision making.

Selenium
Selenium is a metal that accumulates in the environment.

Semivolatile Organic Compound (SVOC)
SVOCs, composed primarily of carbon and hydrogen atoms, have boiling points greater than 2000°C. Common SVOCs include PCBs and phenol. *See also Polychlorinated Biphenyl.*

Seneca Army Depot Activity (SEDA)
A 10,000-acre military facility, constructed in 1941, located in central New York, responsible for storage and management of military commodities, including munitions. The depot is undergoing closure and will cease military operations in 2000. Environmental clean-up activities will continue until all sites have been addressed.

Sensitive Species
A species that can be easily hurt or damaged.

Shale
A type of rock that is formed by the consolidation of clay, mud, or silt, has a finely stratified or laminated structure, and is composed of minerals essentially unaltered since deposition.

Sieve
A device with meshes or perforations through which finer particles of soil of various sizes may be passed to separate them from coarser ones. The #200 sieve separates soil particles greater than 75 m from smaller soil particles.

Significant Threat
The term refers to the level of contamination that a state would consider significant enough to warrant an action. The thresholds vary from state to state.

Sodium
Sodium is a metal that accumulates in the environment.

Soil Boring
Soil boring is a process by which a soil sample is extracted from the ground for chemical, biological, and analytical testing to determine the level of contamination present.

Soil Erosion
The process by which soil wears away by the action of water, wind, or glacial ice.

Soil Washing
Soil washing is an innovative treatment technology that uses liquids (usually water, sometimes combined with chemical additives) and a mechanical process to scrub soils, remove hazardous contaminants, and concentrate the contaminants into a smaller volume. The technology is used to treat a wide range of contaminants, such as metals, gasoline, fuel oils, and pesticides. Soil washing is a relatively low-cost alternative for separating waste and minimizing volume as necessary to facilitate subsequent treatment. It is often used in combination with other treatment technologies. The technology can be brought to the site, thereby eliminating the need to transport hazardous wastes.

Solid Waste Management Unit (SWMU)
A SWMU is a RCRA term used to describe a contiguous area of land on or in which a solid waste, including hazardous waste, was managed. This includes areas containing landfills, tanks, land treatment areas, and spills, or any areas where waste materials were handled. Identification of all SWMUs at SEDA was performed as part of the RCRA Part B Permit Application process.

Source Control
This term refers to a group of alternatives that were assembled to address control the source of contamination. Most typically these alternatives involve addressing soil or sludge contamination.

Spatial distribution
The frequency of occurrence of a contaminant across the horizontal area of a site.

Stabilization
Stabilization is the process of removing wastewater from a waste or changing it chemically to make the waste less permeable and susceptible to transport by water. Stabilization technologies can immobilize many heavy metals, certain radionuclides, and selected organic compounds, while decreasing the surface area and permeability of many types of sludge, contaminated soils, and solid wastes.

Stack
A number flues or vertical pipes embodied in one structure and rising above a roof to carry off smoke or emissions from the Deactivation Furnace.

Stockpile
To place or store in a pile.

Subsurface
Underground; beneath the surface.

Subtitle D Landfill
A non-hazardous municipal solid waste landfill. See also *Landfill.*

Superfund Amendment and Reauthorization Act (SARA)
SARA is the 1986 act amending CERCLA that increased the size of the Superfund trust fund and established a preference for the development and use of permanent remedies, and provided new enforcement and settlement tools. *See also Comprehensive Environmental Response, Compensation, and Liability Act.*

Superfund
Superfund is the trust fund that provides for the cleanup of hazardous substances released into the environment, regardless of fault. The Superfund was established under CERCLA and subsequent amendments to CERCLA. The term Superfund also is used to refer to cleanup programs designed and conducted under CERCLA and its subsequent amendments. See also *Comprehensive Environmental Response, Compensation, and Liability Act.*

Surface Water Standards - Class C
Standards and guidance values have been developed for specific classes of fresh and saline surface waters for protection of the best uses assigned to each class. Class C waters are defined as waters used for fishing. These waters should be suitable for fish propagation and survival and for primary and secondary contact recreation.

Surface Water
Surface water is all water naturally open to the atmosphere, such as rivers, lakes, reservoirs, streams, and seas.

Technical Administrative Guidance Memorandum (TAGM)
TAGMs are technical guidance publications provided by NYSDEC that describe various processes and procedures recommended by NYSDEC for the investigation and remediation of hazardous waste sites. One TAGM, No. 4046, provides guideline values for soil clean-up limits at waste sites.

Thallium
A sparsely but widely distributed poisonous metallic element that resembles lead in physical properties and is used chiefly in the form of compounds in photoelectric cells or as a pesticide.

Threshold Factors
Criteria against which a remedial alternative is evaluated to determine if it would be further considered as an option for a given site. Screening is performed by whether the alternative would pass or fail the threshold factor. The threshold factors are overall protection of human health and the environment and ARAR compliance.

Topsoil
Surface soil usually including the organic layer in which plants have most of their roots.

Toxicity Characteristic Leaching Procedure (TCLP)
The TCLP is a testing procedure used to identify the toxicity of wastes and is the most commonly used test for degree of mobilization offered by a solidification and stabilization process. Under this procedure, a waste is subjected to a process designed to model the leaching effects that would occur if the waste were disposed of in a RCRA Subtitle D municipal landfill. *See also Solidification and Stabilization.*

Toxicity Reference Value (TRV)
Estimates of constituent concentrations that if exceeded in an environmental medium, may produce toxic effects in ecological receptors exposed to that medium.

Toxicity
Toxicity is a quantification of the degree of danger posed by a substance to animal or plant life.

Treatability Study
A treatability study is a process of collecting engineering performance data that would be used for final design purposes. In many instances treatability studies are performed to demonstrate the effectiveness of an innovative technology. A treatability study has been performed at the Ash Landfill Operable Unit involving a zero-valence iron treatment wall.

Treatment, Storage, and Disposal Facility (TSD)
The contiguous land, structures, and other improvements or rights-of-way used for storing, recovering, recycling, treating, or disposing of hazardous waste.

Unsaturated Zone
The unsaturated zone is the area between the land surface and the uppermost aquifer (or saturated zone). The soils in an unsaturated zone may contain air and water.

Upgradient
Areas that are outside the area of assumed contamination (e.g. upstream or upwind). Upgradient samples are often used as background samples.

Volatile Organic Compound (VOC)
A VOC is one of a group of carbon-containing compounds that evaporate readily at room temperature. Examples of VOCs include trichloroethane, trichloroethylene, and BTEX. These contaminants typically are generated from metal degreasing, printed circuit board cleaning, gasoline, and wood preserving processes.

Volume
The quantity of a contaminated media.

Wastewater
Wastewater is spent or used water from an individual home, a community, a farm, or an industry that contains dissolved or suspended matter.

Water Table
A water table is the boundary between the saturated and unsaturated zones beneath the surface of the earth, i.e., the level of groundwater, and generally is the level to which water would rise in a well. *See also Aquifer and Groundwater*

Zinc
Zinc is a heavy metal that accumulates in the environment. *See also Heavy Metal*

ARAR LIST

Potential Chemical-Specific ARARs and TBCs

There are currently no chemical specific ARARs for soil in the State of New York. Cleanup levels for chemical hazardous contaminants in soil have been developed by the State of New York as TAGMs under 3HWR-92-4045. The NYSDEC TAGM manual for cleanup levels for soils is #HWR-94-4046 and has been used as guidance for this remedial action. The soil concentrations provided in the TAGM 4046 are not promulgated standards, and therefore are not ARARs, but rather are TBC guidelines for SEDA.

Groundwater at the sites is classified by NYSDEC as Class GA. As a result, the groundwater quality standards for a Class GA groundwater are potential ARARs for the sites. For groundwater, exceedance of ARARs would not be expected in the future, even without any action, according to fate and transport modeling results presented in Section 1.4 of the FS Report.

Surface water at SEAD-16 and SEAD-17 is found in drainage ditches that surround the site. The surface water in these ditches has not been classified by NYSDEC since these ditches are not recognized as an established stream or creek. However, because the drainage ditches near the sites form the headwaters for Kendaia Creek, the lower portion of which is designated as Class C surface water by NYSDEC, the Class C surface water ambient water quality criteria were used to provide a basis of comparison for the on-site chemical data. The Class C standards are not strictly applicable to the surface water in the drainage ditches found on the sites and thus are treated as TBCs.

Sediment results were compared to the most conservative New York State guidelines for sediment, including: New York State lowest effect level (NYS LEL), New York State human health bioaccumulation criteria (NYS HHB), New York State benthic aquatic life acute and chronic toxicity criteria (NYS BALAT and NYS BALCT, respectively), and New York State wildlife bioaccumulation criteria (NYS WB). These sediment criteria are not ARARs, but rather TBCs because they are not promulgated standards.

Potential Federal Location-Specific ARARs

- Executive Orders 11593, Floodplain Management (May 24, 1977), and 11990, Protection of Wetlands (May 24, 1977).
- 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)

TABLE 1
CLEANUP GOALS FOR SOILS FOR INDUSTRIAL USE
Proposed Plan for SEAD-16/17
Seneca Army Depot Activity

Compounds	Soil Cleanup Goal [1]
Polycyclic Aromatic Hydrocarbons (PAHs)	
Benzo(a)anthracene (ug/kg)	20,417
Benzo(a)pyrene (ug/kg)	2,042
Benzo(b)fluoranthene (ug/kg)	20,417
Benzo(k)fluoranthene [2] (ug/kg)	50,000
Chrysene [2] (ug/kg)	50,000
Dibenz(a,h)anthracene (ug/kg)	2,042
Indeno(1,2,3-cd)pyrene (ug/kg)	20,417
Metals	
Antimony (mg/kg)	29
Arsenic (mg/kg)	20
Cadmium (mg/kg)	14
Copper (mg/kg)	331
Lead [3] (mg/kg)	1250
Mercury (mg/kg)	0.54
Thallium (mg/kg)	2.6
Zinc (mg/kg)	773

Notes:

1. Soil cleanup goals (CUGs) are human health risk-based values. These values are protective of the most conservative receptor under an industrial use scenario, a future construction worker (a daycare facility is prohibited), unless otherwise noted. The CUG values for metals are normalized according to the post-remediation HQ distribution for a future construction worker. Soil cleanup goals are for surface, subsurface, and ditch soils.
2. The total value for SVOCs cannot exceed 50,000 ug/kg (TAGM 4046).
3. This value was selected as the cleanup 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 Proposed Plan for a more detailed discussion.

TABLE 2A
SEAD-16 SURFACE SOIL ANALYSIS RESULTS
Proposed Plan 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	2.8	9.3%	60	0	4	43
Carbon Disulfide	UG/KG	2	1.7	7.0%	2700	0	3	43
Chloroform	UG/KG	2	2.0	4.7%	300	0	2	43
Methylene Chloride	UG/KG	3	2.7	7.0%	100	0	3	43
Toluene	UG/KG	10	3.5	40%	1500	0	17	43
Xylene (total)	UG/KG	3.0	3.0	2.3%	1200	0	1	43
SEMIVOLATILE ORGANICS								
2,4-Dinitrotoluene	UG/KG	85000	8907	40%		0	17	43
2,6-Dinitrotoluene	UG/KG	8000	1162	26%	1000	3	11	43
2-Methylnaphthalene	UG/KG	19000	2250	21%	36400	0	9	43
3,3'-Dichlorobenzidine	UG/KG	850	850	2.3%		0	1	43
3-Nitroaniline	UG/KG	2100	2100	2.3%	500	1	1	43
Acenaphthene	UG/KG	72000	9055	19%	50000	1	8	43
Acenaphthylene	UG/KG	310	95.1	16%	41000	0	7	43
Anthracene	UG/KG	120000	10126	28%	50000	1	12	43
Benzo(a)anthracene	UG/KG	220000	11440	47%	224	10	20	43
Benzo(a)pyrene	UG/KG	200000	9682	51%	61	13	22	43
Benzo(b)fluoranthene	UG/KG	200000	9774	51%	1100	5	22	43
Benzo(g,h,i)perylene	UG/KG	100000	7391	35%	50000	1	15	43
Benzo(k)fluoranthene	UG/KG	170000	9382	44%	1100	4	19	43
Carbazole	UG/KG	89000	8184	26%		0	11	43
Chrysene	UG/KG	220000	8544	63%	400	9	27	43
Di-n-butylphthalate	UG/KG	16000	1541	40%	8100	1	17	43
Dibenz(a,h)anthracene	UG/KG	49000	5806	21%	14	9	9	43
Dibenzofuran	UG/KG	50000	5617	21%	6200	1	9	43
Diethylphthalate	UG/KG	19	17.5	4.7%	7100	0	2	43
Fluoranthene	UG/KG	530000	19487	65%	50000	1	28	43
Fluorene	UG/KG	78000	15657	12%	50000	1	5	43
Indeno(1,2,3-cd)pyrene	UG/KG	100000	9075	28%	3200	2	12	43
N-Nitrosodiphenylamine	UG/KG	25000	1905	42%		0	18	43
Naphthalene	UG/KG	66000	9547	16%	13000	1	7	43
Pentachlorophenol	UG/KG	1200	1200	2.3%	1000	1	1	43
Phenanthrene	UG/KG	490000	21642	53.5%	50000	1	23	43
Pyrene	UG/KG	360000	13421	65%	50000	1	28	43
bis(2-Ethylhexyl)phthalate	UG/KG	2100	589	26%	50000	0	11	43
PESTICIDES/PCB								
4,4'-DDD	UG/KG	23	8.2	19%	2900	0	8	43
4,4'-DDE	UG/KG	1400	90.9	77%	2100	0	33	43
4,4'-DDT	UG/KG	340	49.9	79%	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	150	21%	1000	0	9	43
Dieldrin	UG/KG	26	15.2	4.7%	44	0	2	43
Endosulfan I	UG/KG	33	8.6	42%	900	0	18	43
Endosulfan II	UG/KG	5	3.7	12%	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	6.0	14%		0	6	43
Endrin ketone	UG/KG	3.6	3.0	9.3%		0	4	43
Heptachlor	UG/KG	1.8	1.8	2.3%	100	0	1	43
Heptachlor epoxide	UG/KG	6.7	2.4	14%	20	0	6	43
Toxaphene	UG/KG	180	180	2.3%		0	1	43

TABLE 2A
SEAD-16 SURFACE SOIL ANALYSIS RESULTS
Proposed Plan 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	20.3	30%		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%	540	0	13	43
NITROAROMATICS								
2,4-Dinitrotoluene	UG/KG	74000	4498	63%		0	27	43
2,6-Dinitrotoluene	UG/KG	320	190	7.0%	1000	0	3	43
2-amino-4,6-Dinitrotoluene	UG/KG	430	430	2.3%		0	1	43
Tetryl	UG/KG	220	220	2.3%		0	1	43
METALS								
Aluminum	MG/KG	17200	10328	91%	19300	0	39	43
Antimony	MG/KG	1930	86.5	63%	5.9	16	27	43
Arsenic	MG/KG	32.2	7.5	100%	8.2	8	43	43
Barium	MG/KG	9340	537	98%	300	8	42	43
Beryllium	MG/KG	0.91	0.41	98%	1.1	0	42	43
Cadmium	MG/KG	16.6	1.7	60%	2.3	5	26	43
Calcium	MG/KG	260000	54983	100%	121000	4	43	43
Chromium	MG/KG	47.5	22.8	98%	29.6	8	42	43
Cobalt	MG/KG	17.8	10.4	100%	30	0	43	43
Copper	MG/KG	37900	1160	100%	33	35	43	43
Cyanide	MG/KG	1.5	1.5	2.3%	0.3	1	1	43
Iron	MG/KG	36500	22830	100%	36500	0	43	43
Lead	MG/KG	140000	4544	100%	24.8	39	43	43
Magnesium	MG/KG	56000	10591	100%	21500	5	43	43
Manganese	MG/KG	4140	505	100%	1060	1	43	43
Mercury	MG/KG	11.4	1.0	77%	0.1	25	33	43
Nickel	MG/KG	148	35	100%	49	5	43	43
Potassium	MG/KG	2300	1338	100%	2380	0	43	43
Selenium	MG/KG	1.5	0.67	44%	2	0	19	43
Silver	MG/KG	11.1	1.1	40%	0.75	2	17	43
Sodium	MG/KG	1830	163	88%	172	5	38	43
Thallium	MG/KG	16.6	2.2	33%	0.7	14	14	43
Vanadium	MG/KG	61.9	22.9	100%	150	0	43	43
Zinc	MG/KG	14600	605	100%	110	23	43	43
HERBICIDES								
2,4,5-T	UG/KG		7.8	13%	1900	0	2	16
MCPP	UG/KG		16000	6.0%		0	1	16

TABLE 2B
SEAD-16 SUBSURFACE SOIL ANALYSIS RESULTS
Proposed Plan 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	17%	300	0	1	6
Acetone	UG/KG	46	29	33%	200	0	2	6
Benzene	UG/KG	2	2	33%	60	0	2	6
Toluene	UG/KG	6	3.3	67%	1500	0	4	6
SEMIVOLATILE ORGANICS								
2,4-Dinitrotoluene	UG/KG	1700	884	33%		0	2	6
2,6-Dinitrotoluene	UG/KG	160	160	17%	1000	0	1	6
2-Methylnaphthalene	UG/KG	190	190	17%	36400	0	1	6
Acenaphthene	UG/KG	1100	1100	17%	50000	0	1	6
Acenaphthylene	UG/KG	300	300	17%	41000	0	1	6
Anthracene	UG/KG	2000	783	50%	50000	0	3	6
Benzo(a)anthracene	UG/KG	6600	1796	67%	224	2	4	6
Benzo(a)pyrene	UG/KG	6200	1571	83%	61	4	5	6
Benzo(b)fluoranthene	UG/KG	6000	1374	83%	1100	1	5	6
Benzo(g,h,i)perylene	UG/KG	11000	3254	83%	50000	0	5	6
Benzo(k)fluoranthene	UG/KG	5600	1296	83%	1100	1	5	6
Butylbenzylphthalate	UG/KG	18	18	17%	50000	0	1	6
Carbazole	UG/KG	730	730	17%		0	1	6
Chrysene	UG/KG	7000	1542	83%	400	2	5	6
Di-n-butylphthalate	UG/KG	240	138	33%	8100	0	2	6
Dibenz(a,h)anthracene	UG/KG	2500	1113	67%	14	4	4	6
Dibenzofuran	UG/KG	270	158	33%	6200	0	2	6
Fluoranthene	UG/KG	13000	2762	83%	50000	0	5	6
Fluorene	UG/KG	800	800	17%	50000	0	1	6
Indeno(1,2,3-cd)pyrene	UG/KG	7100	2320	83%	3200	2	5	6
N-Nitrosodiphenylamine	UG/KG	530	530	17%		0	1	6
Naphthalene	UG/KG	120	120	17%	13000	0	1	6
Pentachlorophenol	UG/KG	120	120	17%	1000	0	1	6
Phenanthrene	UG/KG	7600	1609	83%	50000	0	5	6
Pyrene	UG/KG	11000	2363	83%	50000	0	5	6
bis(2-Ethylhexyl)phthalate	UG/KG	110	110	17%	50000	0	1	6
PESTICIDES/PCB								
4,4'-DDE	UG/KG	8.3	8.3	17%	2100	0	1	6
4,4'-DDT	UG/KG	3.4	2.6	33%	2100	0	2	6
Dieldrin	UG/KG	12	12	17%	44	0	1	6
Endosulfan I	UG/KG	7.3	4.9	33%	900	0	2	6
Endrin	UG/KG	2.9	2.9	17%	100	0	1	6
NITROAROMATICS								
2,4-Dinitrotoluene	UG/KG	500	310	50%		0	3	6
METALS								
Aluminum	MG/KG	12800	12800	17%	19300	0	1	6
Antimony	MG/KG	135	48.9	50%	5.9	2	3	6
Arsenic	MG/KG	6.9	5.6	100%	8.2	0	6	6
Barium	MG/KG	302	143	100%	300	1	6	6
Beryllium	MG/KG	0.51	0.38	100%	1.1	0	6	6
Cadmium	MG/KG	0.45	0.18	83%	2.3	0	5	6
Calcium	MG/KG	97900	45766.7	100%	121000	0	6	6
Chromium	MG/KG	21.1	18.4	100%	29.6	0	6	6
Cobalt	MG/KG	12.2	10.7	100%	30	0	6	6
Copper	MG/KG	736	179	100%	33	3	6	6
Cyanide	MG/KG	0.52	0.52	17%	0.3	1	1	6

TABLE 2B
SEAD-16 SUBSURFACE SOIL ANALYSIS RESULTS
Proposed Plan 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%	36500	0	6	6
Lead	MG/KG	35400	6099	100%	24.8	4	6	6
Magnesium	MG/KG	13300	9715	100%	21500	0	6	6
Manganese	MG/KG	650	471	100%	1060	0	6	6
Mercury	MG/KG	1.9	0.74	67%	0.1	3	4	6
Nickel	MG/KG	37	29.9	100%	49	0	6	6
Potassium	MG/KG	1990	1400	100%	2380	0	6	6
Selenium	MG/KG	1.2	0.89	50%	2	0	3	6
Silver	MG/KG	1.2	0.73	33%	0.75	1	2	6
Sodium	MG/KG	160	101	50%	172	0	3	6
Thallium	MG/KG	0.91	0.91	17%	0.7	1	1	6
Vanadium	MG/KG	22.6	18.6	100%	150	0	6	6
Zinc	MG/KG	183	114	100%	110	3	6	6

TABLE 2C
SEAD-16 SURFACE WATER ANALYSIS RESULTS
Proposed Plan 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%	0.4	3	3	13
bis(2-Ethylhexyl)phthalate	UG/L	3	2.3	23%	0.6	3	3	13
METALS								
Aluminum	UG/L	261	207	15%	100	2	2	13
Antimony	UG/L	124	30.4	85%		0	11	13
Arsenic	UG/L	5.7	4.0	62%	190	0	8	13
Barium	UG/L	348	118	100%		0	13	13
Cadmium	UG/L	2	0.79	54%	1.86	1	7	13
Calcium	UG/L	89900	72223	100%		0	13	13
Chromium	UG/L	3	2.4	23%	347	0	3	13
Cobalt	UG/L	4.1	3.4	15%	5	0	2	13
Copper	UG/L	424	58.8	100%	20	8	13	13
Iron	UG/L	3650	964	85%	300	4	11	13
Lead	UG/L	813	112	100%	7.2	11	13	13
Magnesium	UG/L	11400	9125	100%		0	13	13
Manganese	UG/L	252	52.4	100%		0	13	13
Mercury	UG/L	0.9	0.4	23%		0	3	13
Nickel	UG/L	5.5	4.2	62%	154	0	8	13
Potassium	UG/L	4590	2981	100%		0	13	13
Selenium	UG/L	4.3	2.7	31%	1	4	4	13
Silver	UG/L	5.2	5.2	7.7%	0.1	1	1	13
Sodium	UG/L	9220	5642	100%		0	13	13
Vanadium	UG/L	4.9	3.0	54%	14	0	7	13
Zinc	UG/L	380	126	100%	141	4	13	13

Note:
1) Source: NYS AWQS CLASS C

TABLE 2D
SEAD-16 SEDIMENT ANALYSIS RESULTS
Proposed Plan 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
VOLATILE ORGANICS								
2-Butanone	UG/KG	12	12	9.1%		0	1	11
Acetone	UG/KG	36	25	55%		0	6	11
SEMIVOLATILE ORGANICS								
2,4-Dinitrotoluene	UG/KG	5400	2088	27%		0	3	11
2-Methylnaphthalene	UG/KG	55	48	18%		0	2	11
Acenaphthene	UG/KG	32	32	9.1%	5110 a	0	1	11
Acenaphthylene	UG/KG	54	44	27%		0	3	11
Anthracene	UG/KG	100	75	36%		0	4	11
Benzo(a)anthracene	UG/KG	570	238	64%	47.5 b	6	7	11
Benzo(a)pyrene	UG/KG	600	317	55%	47.5 b	6	6	11
Benzo(b)fluoranthene	UG/KG	1200	523	55%	47.5 b	6	6	11
Benzo(g,h,i)perylene	UG/KG	530	244	64%		0	7	11
Benzo(k)fluoranthene	UG/KG	780	373	55%	47.5 b	6	6	11
Carbazole	UG/KG	110	72	27%		0	3	11
Chrysene	UG/KG	1200	442	64%	47.5 b	6	7	11
Di-n-butylphthalate	UG/KG	250	195	36%		0	4	11
Dibenz(a,h)anthracene	UG/KG	170	101	45%		0	5	11
Fluoranthene	UG/KG	1600	463	73%	37230 a	0	8	11
Indeno(1,2,3-cd)pyrene	UG/KG	500	228	64%	47.5 b	6	7	11
N-Nitrosodiphenylamine	UG/KG	600	600	9.1%		0	1	11
Phenanthrene	UG/KG	420	188	73%	4380 a	0	8	11
Pyrene	UG/KG	1400	461	73%		0	8	11
bis(2-Ethylhexyl)phthalate	UG/KG	270	129	73%	7300 a	0	8	11
PESTICIDES/PCBs								
4,4'-DDD	UG/KG	730	116	73%	0.37 a	8	8	11
4,4'-DDE	UG/KG	570	103	100%	0.37 a	11	11	11
4,4'-DDT	UG/KG	420	83.8	73%	0.37 a	8	8	11
Aroclor-1254	UG/KG	670	160	64%	0.03 a	7	7	11
Aroclor-1260	UG/KG	130	71	45%	0.03 a	5	5	11
Endosulfan I	UG/KG	26	10	64%	1.10 a	7	7	11
Endosulfan II	UG/KG	6.8	5.2	27%	1.10 a	3	3	11
Endosulfan sulfate	UG/KG	18	11.3	18%		0	2	11
Endrin aldehyde	UG/KG	3.2	3.2	9.1%		0	1	11
Heptachlor epoxide	UG/KG	2.8	2.8	9.1%	0.03 b	1	1	11
alpha-Chlordane	UG/KG	12.1	8.8	27%		0	3	11
gamma-Chlordane	UG/KG	3.8	3.4	18%		0	2	11
NITROAROMATICS								
2,4-Dinitrotoluene	UG/KG	910	550	18%		0	2	11
METALS								
Aluminum	MG/KG	22900	13470	100%		0	11	11
Antimony	MG/KG	50.3	13.7	91%	2 c	9	10	11
Arsenic	MG/KG	9.6	5.9	100%	6 c	6	11	11
Barium	MG/KG	3980	556	100%		0	11	11
Beryllium	MG/KG	0.93	0.56	100%		0	11	11

TABLE 2D
SEAD-16 SEDIMENT ANALYSIS RESULTS
Proposed Plan 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
Cadmium	MG/KG	7.6	1.4	100%	0.6 c	7	11	11
Calcium	MG/KG	75700	37316	100%		0	11	11
Chromium	MG/KG	43.5	27.0	100%	26 c	5	11	11
Cobalt	MG/KG	15.6	10.1	100%		0	11	11
Copper	MG/KG	17500	1778	100%	16 c	11	11	11
Iron	MG/KG	46400	27545	100%	20000 c	8	11	11
Lead	MG/KG	4480	1364	100%	31 c	11	11	11
Magnesium	MG/KG	15100	7874	100%		0	11	11
Manganese	MG/KG	447	277	100%	460 c	0	11	11
Mercury	MG/KG	2.5	0.56	100%	0.15 c	7	11	11
Nickel	MG/KG	50.9	33.7	100%	16 c	11	11	11
Potassium	MG/KG	3870	2048	100%		0	11	11
Selenium	MG/KG	4.9	3.2	18%		0	2	11
Silver	MG/KG	0.35	0.35	9.1%	1 c	0	1	11
Sodium	MG/KG	782	241	100%		0	11	11
Thallium	MG/KG	1.6	1.3	18%		0	2	11
Vanadium	MG/KG	39.8	25.0	100%		0	11	11
Zinc	MG/KG	952	336	100%	120 c	9	11	11

1. Sediment criteria based on site specific total organic carbon (TOC) average value of 36,500 mg/kg.
   (a) NYS Benthic Aquatic Life Chronic Toxicity Criteria
   (b) NYS Human Health Bioaccumulation Criteria
   (c) NYS Lowest Effect Level

TABLE 2E
SEAD-16 GROUNDWATER ANALYSIS RESULTS
Proposed Plan 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	25	6.7%			0	1	15
4-Chloroaniline	UG/L	10	10	6.7%	5	a	1	1	15
Benzo[ghi]perylene	UG/L	1	1	6.7%			0	1	15
Dibenz[a,h]anthracene	UG/L	0.7	0.7	6.7%			0	1	15
Indeno[1,2,3-cd]pyrene	UG/L	0.6	0.6	6.7%			0	1	15
NITROAROMATICS									
1,3-Dinitrobenzene	UG/L	1.8	1.0	13%	5	a	0	2	15
2,4-Dinitrotoluene	UG/L	0.68	0.68	6.7%	5	a	0	1	15
METALS									
Aluminum	UG/L	1850	675	53%	50	b	6	8	15
Antimony	UG/L	12.3	9.9	13%	6	d	2	2	15
Arsenic	UG/L	3.2	3.2	6.7%	10	c	0	1	15
Barium	UG/L	97.4	76.2	47%	1000	a	0	7	15
Beryllium	UG/L	0.23	0.21	40%	4	d	0	6	15
Cadmium	UG/L	0.32	0.32	6.7%	5	d	0	1	15
Calcium	UG/L	193000	116960	100%			0	15	15
Chromium	UG/L	3.4	2.2	33%	50	a	0	5	15
Cobalt	UG/L	2.1	1.5	33%			0	5	15
Copper	UG/L	56.8	15	47%	200	a	0	7	15
Iron	UG/L	2400	640	93%	300	a	5	14	15
Lead	UG/L	24.1	10	47%	15	d	1	7	15
Magnesium	UG/L	23700	16791.33	100%			0	15	15
Manganese	UG/L	1380	215	93%	50	b	12	14	15
Nickel	UG/L	11	4.8	47%	100	d	0	7	15
Potassium	UG/L	18800	5216	53%			0	8	15
Selenium	UG/L	2.8	2.8	6.7%	10	a	0	1	15
Sodium	UG/L	409000	70347.86	93%	20000	a	3	14	15
Thallium	UG/L	11	7.7	27%	2	d	4	4	15
Vanadium	UG/L	3.8	2.8	33%			0	5	15
Zinc	UG/L	42	42	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 3A
SEAD-17 SURFACE SOIL ANALYSIS RESULTS
Proposed Plan 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	4.3	7.9%	1500	0	3	38
SEMIVOLATILE ORGANICS								
2,4-Dinitrotoluene	UG/KG	1400	393	11%		0	4	38
2,6-Dinitrotoluene	UG/KG	70	70.0	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	23.0	2.6%	50000	0	1	38
Benzo(a)anthracene	UG/KG	72	29.8	29%	224	0	11	38
Benzo(a)pyrene	UG/KG	58	28.3	29%	61	0	11	38
Benzo(b)fluoranthene	UG/KG	70	37.4	34%	1100	0	13	38
Benzo(g,h,i)perylene	UG/KG	82	42.4	21%	50000	0	8	38
Benzo(k)fluoranthene	UG/KG	49	28.0	26%	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	33.9	53%	400	0	20	38
Di-n-butylphthalate	UG/KG	1200	275	50%	8100	0	19	38
Dibenz(a,h)anthracene	UG/KG	59	51.3	7.9%	14	3	3	38
Fluoranthene	UG/KG	190	47.5	66%	50000	0	25	38
Indeno(1,2,3-cd)pyrene	UG/KG	62	38.0	13%	3200	0	5	38
N-Nitrosodiphenylamine	UG/KG	71	49.0	5.3%		0	2	38
Naphthalene	UG/KG	37	37.0	2.6%	13000	0	1	38
Pentachlorophenol	UG/KG	990	517	5.3%	1000	0	2	38
Phenanthrene	UG/KG	120	39.5	39%	50000	0	15	38
Pyrene	UG/KG	170	48.3	63%	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	32%	50000	0	12	38
PESTICIDES/PCB								
4,4'-DDD	UG/KG	15	6.0	11%	2900	0	4	38
4,4'-DDE	UG/KG	37	11.9	45%	2100	0	17	38
4,4'-DDT	UG/KG	16	7.4	24%	2100	0	9	38
Aldrin	UG/KG	1.9	1.9	2.6%	41	0	1	38
Aroclor-1260	UG/KG	28	25.7	7.9%	1000	0	3	38
Dieldrin	UG/KG	80	33.5	16%	44	2	6	38
Endosulfan I	UG/KG	2.4	1.6	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	176	11%		0	4	38
METALS								
Aluminum	MG/KG	18400	13370	100%	1930	38	38	38
Antimony	MG/KG	52	11.4	47%	5.9	6	18	38
Arsenic	MG/KG	16.1	6.4	100%	8.2	6	38	38
Barium	MG/KG	524	201	58%	300	5	22	38
Beryllium	MG/KG	0.87	0.59	100%	1.1	0	38	38

TABLE 3A
SEAD-17 SURFACE SOIL ANALYSIS RESULTS
Proposed Plan 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/KG	25.5	5.3	87%	2.3	20	33	38
Calcium	MG/KG	209000	44054	100%	121000	3	38	38
Chromium	MG/KG	27.2	20.2	100%	29.6	0	38	38
Cobalt	MG/KG	21.9	10.1	100%	30	0	38	38
Copper	MG/KG	837	191	100%	33	34	38	38
Cyanide	MG/KG	1.5	1.1	5%	0.3	2	2	38
Iron	MG/KG	28800	22384.7	100%	36500	0	38	38
Lead	MG/KG	6270	1075	97%	24.8	37	37	38
Magnesium	MG/KG	17300	5719	100%	21500	0	38	38
Manganese	MG/KG	996	530	100%	1060	0	38	38
Mercury	MG/KG	1	0.13	97%	0.1	5	37	38
Nickel	MG/KG	47.8	27.7	100%	49	0	38	38
Potassium	MG/KG	2260	1419	100%	2380	0	38	38
Selenium	MG/KG	1.7	0.73	68%	2	0	26	38
Silver	MG/KG	9	3.0	45%	0.75	12	17	38
Sodium	MG/KG	249	119	74%	172	6	28	38
Thallium	MG/KG	1.5	1.0	18%	0.7	6	7	38
Vanadium	MG/KG	30.1	22.9	100%	150	0	38	38
Zinc	MG/KG	1530	365	100%	110	30	38	38
HERBICIDES								
MCPA	UG/KG	34000	23500	17%		0	4	24

TABLE 3B
SEAD-17 SUBSURFACE SOIL ANALYSIS RESULTS
Proposed Plan 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	161	80%	50000	0	8	10
PESTICIDES/PCB								
Aroclor-1254	UG/KG	61	61	10%	10000	0	1	10
METALS								
Aluminum	MG/KG	19300	14530	100%	19300	0	10	10
Arsenic	MG/KG	6.9	5.1	100%	8.2	0	10	10
Barium	MG/KG	158	89.7	100%	300	0	10	10
Beryllium	MG/KG	0.99	0.67	100%	1.1	0	10	10
Cadmium	MG/KG	2.8	2.8	10%	2.3	1	1	10
Calcium	MG/KG	115000	33325	100%	121000	0	10	10
Chromium	MG/KG	27.9	21.5	100%	29.6	0	10	10
Cobalt	MG/KG	21.7	11.3	100%	30	0	10	10
Copper	MG/KG	85.1	31.8	100%	33	2	10	10
Iron	MG/KG	38700	27930	100%	36500	1	10	10
Lead	MG/KG	686	106	100%	24.8	2	10	10
Magnesium	MG/KG	18100	7678	100%	21500	0	10	10
Manganese	MG/KG	1160	576	100%	1060	2	10	10
Mercury	MG/KG	0.06	0.046	70%	0.1	0	7	10
Nickel	MG/KG	42	30.7	100%	49	0	10	10
Potassium	MG/KG	1750	1345	100%	2380	0	10	10
Sodium	MG/KG	239	111	100%	172	2	10	10
Vanadium	MG/KG	30.7	23.4	100%	150	0	10	10
Zinc	MG/KG	172	83.0	100%	110	1	10	10

TABLE 3C
SEAD-17 SURFACE WATER ANALYSIS RESULTS
Proposed Plan 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%	0.6	2	2	10
METALS								
Antimony	UG/L	23.6	11.4	40%		0	4	10
Arsenic	UG/L	4.6	3.7	60%	190	0	6	10
Barium	UG/L	100	47.0	100%		0	10	10
Cadmium	UG/L	1.3	0.63	50%	1.86	0.00	5.00	10
Calcium	UG/L	73500	53640	100%		0	10	10
Chromium	UG/L	1	1.0	10%	347	0.00	1.00	10
Copper	UG/L	32.7	13.0	100%	20	1.00	10.00	10
Iron	UG/L	322	146	100%	300	1	10	10
Lead	UG/L	37.1	11.5	60%	7.16	3.00	6.00	10
Magnesium	UG/L	9280	5904	100%		0	10	10
Manganese	UG/L	19.6	8.4	100%		0	10	10
Nickel	UG/L	1.7	1.7	10%	154	0.00	1.00	10
Potassium	UG/L	4380	3007	100%		0	10	10
Selenium	UG/L	3.5	3.1	50%	1	5	5	10
Sodium	UG/L	9460	5209	100%		0	10	10
Vanadium	UG/L	1.8	1.8	10%	14	0	1	10
Zinc	UG/L	61.7	24.1	100%	141	0.00	10.00	10

Note:
1) Source: NYS AWQS CLASS C

TABLE 3D
SEAD-17 SEDIMENT ANALYSIS RESULTS
Proposed Plan for SEAD-16/17
Seneca Army Depot Activity

Parameter	Units	Maximum Concentration	Average	Frequency	Action Level[1]	No. Above Action Level	No. of Detects	No. of Analyses
VOLATILE ORGANICS								
Acetone	UG/KG	26	17	30%		0	3	10
Toluene	UG/KG	8	8	10%		0	1	10
SEMIVOLATILE ORGANICS								
2,4-Dimethylphenol	UG/KG	32	32	10%		0	1	10
2,4-Dinitrotoluene	UG/KG	450	450	10%		0	1	10
Benzo(a)anthracene	UG/KG	25	25	10%	16.0 b	1	1	10
Benzo(a)pyrene	UG/KG	30	30	10%	16.0 b	1	1	10
Benzo(b)fluoranthene	UG/KG	43	43	10%	16.0 b	1	1	10
Benzo(g,h,i)perylene	UG/KG	31	31	10%		0	1	10
Benzo(k)fluoranthene	UG/KG	33	33	10%	16.0 b	1	1	10
Chrysene	UG/KG	48	48	10%	16.0 b	1	1	10
Fluoranthene	UG/KG	70	53	20%	12546.0 a	0	2	10
Indeno(1,2,3-cd)pyrene	UG/KG	24	24	10%	16.0 b	1	1	10
Phenanthrene	UG/KG	35	35	10%	1476 a	0	1	10
Pyrene	UG/KG	47	36.5	20%		0	2	10
bis(2-Ethylhexyl)phthalate	UG/KG	77	55.7	30%	2460 a	0	3	10
PESTICIDES/PCB								
4,4'-DDD	UG/KG	13	8	30%	0.12 b	3	3	10
4,4'-DDE	UG/KG	62	19.2	60%	0.12 b	6	6	10
4,4'-DDT	UG/KG	12	7.5	20%	0.12 b	2	2	10
Dieldrin	UG/KG	5	5.0	10%	1.23 b	1	1	10
Endosulfan I	UG/KG	1.6	1.6	10%	0.37 a	1	1	10
Endosulfan II	UG/KG	3.8	3.75	20%	0.37 a	2	2	10
METALS								
Aluminum	MG/KG	22100	16370	100%		0	10	10
Antimony	MG/KG	5.5	3.5	40%	2 c	2	4	10
Arsenic	MG/KG	7.5	5.3	100%	6 c	3	10	10
Barium	MG/KG	162	112	100%		0	10	10
Beryllium	MG/KG	0.99	0.64	100%		0	10	10
Cadmium	MG/KG	4.8	1.6	100%	0.6 c	7	10	10
Calcium	MG/KG	25000	6031	100%		0	10	10
Chromium	MG/KG	27.7	22.2	100%	26 c	1	10	10
Cobalt	MG/KG	17.8	10.8	100%		0	10	10
Copper	MG/KG	309	73.3	100%	16 c	10	10	10
Iron	MG/KG	35000	26540	100%	20000 c	9	10	10
Lead	MG/KG	1050	270	100%	31 c	10	10	10
Magnesium	MG/KG	6490	4890	100%		0	10	10
Manganese	MG/KG	768	445	100%	460 c	4	10	10
Mercury	MG/KG	0.16	0.078	40%	0.15 c	1	4	10
Nickel	MG/KG	31.6	27.2	100%	16 c	9	10	10
Potassium	MG/KG	2630	1899	100%		0	10	10
Selenium	MG/KG	1.9	1.5	30%		0	3	10
Sodium	MG/KG	452	214	80%		0	8	10
Thallium	MG/KG	1.3	1.2	20%		0	2	10
Vanadium	MG/KG	33.8	26.8	100%		0	10	10
Zinc	MG/KG	278	130	100%	120 c	3	10	10

1. Sediment criteria based on site specific total organic carbon (TOC) average value of 12,300 mg/kg.
   (a) NYS Benthic Aquatic Life Chronic Toxicity Criteria
   (b) NYS Human Health Bioaccumulation Criteria
   (c) NYS Lowest Effect Level

TABLE 3E
SEAD-17 GROUNDWATER ANALYSIS RESULTS
Proposed Plan 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	13%			0	1	8
Benzo[ghi]perylene	UG/L	2	1.5	25%			0	2	8
Dibenz[a,h]anthracene	UG/L	1	0.95	25%			0	2	8
Indeno[1,2,3-cd]pyrene	UG/L	2	1.5	25%			0	2	8
METALS									
Aluminum	UG/L	386	143	50%	50	b	3	4	8
Barium	UG/L	92.5	88.2	38%	1000	a	0	3	8
Beryllium	UG/L	0.26	0.2330	38%	4	c	0	3	8
Cadmium	UG/L	0.31	0.31	13%	5	c	0	1	8
Calcium	UG/L	118000	103638	100%			0	8	8
Chromium	UG/L	1.5	1.5	13%	50	a	0	1	8
Cobalt	UG/L	1.4	1.4	13%			0	1	8
Copper	UG/L	4.3	3.6	38%	200	a	0	3	8
Iron	UG/L	572	198	75%	300	a	1	6	8
Magnesium	UG/L	23000	17975	100%			0	8	8
Manganese	UG/L	73.8	45.5	75%	50	b	3	6	8
Nickel	UG/L	2.4	2.1	38%	100	c	0	3	8
Potassium	UG/L	5320	1805	50%			0	4	8
Silver	UG/L	2.3	2.3	13%	50	a	0	1	8
Sodium	UG/L	30100	14859	100%	20000	a	2	8	8
Thallium	UG/L	7.1	5.4	38%	2	c	3	3	8
Vanadium	UG/L	1.4	1.4	13%			0	1	8
Zinc	UG/L	63.9	63.9	13%	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 4

SCREENING OF SOIL REMEDIATION ALTERNATIVES

Proposed Plan 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	IMPLEMENTABILITY					COST				TOTAL SCORE	OVERALL ALTERNA-TIVE RANKING
		LONG-TERM HUMAN HEALTH & ENVIRONMENTAL 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	1	6	1	6	13	5	6	6	12	5	19	3
2	Containment Alternative Institutional controls/ Soil cover	2	2	4	2	2	2	5	9	2	4	4	4	5	13	5	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	3	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	3	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	3	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 favoreble 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. Land use controls are common to each alternative.

Alternative 4P, the unrestricted use alternative, was developed based on the screening results for Alternative 4 and was retained for further consideration in the detailed analysis.

TABLE 5
REMEDIAL ALTERNATIVES RETAINED FOR DETAILED ANALYSIS
Proposed Plan for SEAD-16/17
Seneca Army Depot Activity

ALTERNATIVE	TECHNOLOGIES AND PROCESSES
1	**No Action**
2	**On-site Containment: Institutional Controls/Soil Cover** - Conduct additional sampling as part of the pre-design sampling program to further delineate the areas of excavation - Mobilize, site prep, clear/grub, erosion control, access roads, and survey - Unexploded ordnance clearance - Remove material/debris from abandoned buildings at SEAD-16 - Excavate ditch soil with lead concentration > 1250 mg/kg or > risk-based derived cleanup goals - Stockpile ditch soil and building debris and perform TCLP testing - Perform cleanup verification testing - Transport ditch soil failing TCLP criteria to stabilization area (on-site or off-site) - Stabilize ditch soil exceeding TCLP criteria (on-site or off-site) - Transport and dispose soil and material in an off-site landfill - Backfill drainage swales with 1-foot topsoil and hydroseed - Place soil cover (6 inch topsoil, 6 inch clean fill & filter fabric) over soil > 1250 mg/kg and hydroseed - Demobilize - Long-term O & M and monitoring and 5-year reviews - Land use controls restricting future residential land use and use as a daycare facility
4 / 4P [1]	**Off-Site Disposal: Excavate/Stabilize/Off-site Disposal** - Conduct additional sampling as part of the pre-design sampling program to further delineate the areas of excavation - Mobilize, site prep, clear/grub, erosion control, access roads, and survey - Unexploded ordnance clearance - Remove material/debris from abandoned buildings at SEAD-16 - Excavate ditch soil with lead concentration > 1250 mg/kg [1] - Excavate surface and subsurface soils with lead concentration > 1250 mg/kg or > risk-based derived cleanup goals [1] - Stockpile and perform TCLP testing - Perform cleanup verification testing - Stabilize soil exceeding TCLP criteria (on-site or off-site) and transport material to off-site landfill - Backfill drainage swales with 1-foot topsoil and hydroseed - Backfill remainder of excavated area with clean fill & topsoil and hydroseed - Demobilize - Long-term monitoring and 5-year reviews - Land use controls restricting future residential land use, use as a daycare facility, and groundwater usage [1]
6	**Innovative Treatment: Excavate/Wash/Backfill coarse fraction/Treat and dispose fine fraction in an off-site landfill** - Conduct additional sampling as part of the pre-design sampling program to further delineate the areas of excavation - Mobilize, site prep, clear/grub, erosion control, access roads, and survey - Unexploded ordnance clearance - Remove material/debris from abandoned buildings at SEAD-16 - Excavate ditch soil with lead concentration > 1250 mg/kg - Excavate soils with lead concentration > 1250 mg/kg or > risk-based derived cleanup goals - Perform hot spot removal - Transport soil to on-site treatment staging area - Perform cleanup verification testing - Soil wash; Physical separation of fine grain from coarse grain - Backfill clean coarse grain material - Stockpile and perform TCLP testing on fine grain material - Transport fine grain material failing TCLP criteria to treatment area (on-site or off-site) - Treat fine grain material exceeding TCLP criteria (on-site or off-site) - Transport and dispose fine grain material in an off-site landfill - Backfill drainage swales with 1-foot topsoil and hydroseed - Backfill remainder of excavated area with topsoil and hydroseed - Demobilize - Long-term monitoring and 5-year reviews - Land use controls restricting future residential land use and use as a daycare facility

Notes:
1. The technologies and processes for Alternative 4P are similar to those presented for Alternative 4, with the exception that for Alternative 4P, the cleanup goals are 400 mg/kg for lead and NYSDEC TAGM 4046 for other metals. In addition, under Alternative 4P once groundwater ARARs are achieved, the site would be released for unrestricted use.

TABLE 6
DETAILED COST ESTIMATES
Proposed Plan for SEAD-16/17
Seneca Army Depot Activity

	ALTERNATIVE 2 On-site Containment				ALTERNATIVE 4 Off-site Disposal				ALTERNATIVE 6 Soil Washing			
Soil with Cleanup Goals [9]	**>1250 mg/kg lead, PAHs, + metals [7]**	**>1000 mg/kg [7]**	**>400 mg/kg [7]**	**>400 mg/kg +TAGM [7]**	**>1250 mg/kg lead, PAHs, + metals [7]**	**>1000 mg/kg [7]**	**>400 mg/kg [7]**	**>400 mg/kg +TAGM [7] (Alt. 4P) [8]**	**>1250 mg/kg lead, PAHs, + metals [7]**	**>1000 mg/kg [7]**	**>400 mg/kg [7]**	**>400 mg/kg +TAGM [7]**
Cost to Prime [1]	$392,509	$406,090	$554,726	$732,593	$782,244	$750,751	$1,175,792	$1,653,011	$1,702,119	$1,631,914	$2,923,498	$4,974,951
Cost to Owner [2]	$535,440	$554,200	$759,520	$1,005,220	$1,073,810	$1,030,300	$1,617,447	$276,670	$2,344,510	$2,247,530	$4,031,690	$6,865,530
Project Cost [3]	$847,640	$876,880	$1,202,380	$1,591,350	$1,699,930	$1,631,060	$2,560,555	$3,604,160	$3,711,550	$3,557,930	$6,382,510	$10,868,710
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	$81,510	$81,510	$81,510	$40,440	$81,510	$81,510	$81,510	$40,440	$81,510	$81,510	$81,510	$40,440
Present Worth O&M and Monitoring Cost (30 year) [5]	$1,495,934	$1,513,226	$1,530,518	$837,626	$1,409,474	$1,409,474	$1,409,474	$699,290	$1,409,474	$1,409,474	$1,409,474	$699,290
Total Evaluated Price [6]	**$2,343,574**	**$2,390,106**	**$2,732,898**	**$2,428,976**	**$3,109,404**	**$3,040,534**	**$3,970,029**	**$4,303,450**	**$5,121,024**	**$4,967,404**	**$7,791,984**	**$11,568,000**

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, monitoring, and, for restricted use scenarios, land use controls.
5. Present Worth Cost is based on a 4% interest rate over the number of years specified above. (Refer to Appendix B, Table B-1 in the FS)
6. Total Evaluated Price is the sum of the Project Cost and Present Worth Cost.
7. Soil remediated to concentrations as noted.
8. Alternative 4P, the unrestricted use scenario, is Alternative 4 with cleanup goals of 400 ppm for lead and TAGMs for other metals.
9. It should be noted that costs have been revised since the FS. Major changes are based on (1) revised hazardous disposal assumptions, (2) revised volume of soils to be excavated based on new cleanup goals, and (3) O&M costs which include costs of land use controls, such as signage and development of a deed restriction.or restricted use scenarios.

TABLE 7
SEAD-16 RESIDUAL CONTAMINATION
Proposed Remedial Action Plan for SEAD-16/17
Seneca Army Depot Activity

Compound	Risk-Based Derived Cleanup Goal[1] (mg/kg)	Max Hit (mg/kg)
	Industrial Use Construction Worker	Post Remediation
Antimony	29	17
Arsenic	20	9.9
Cadmium	14	0.61
Copper	331	192
Mercury	0.54	0.4
Thallium	2.6	1.8
Zinc	773	219

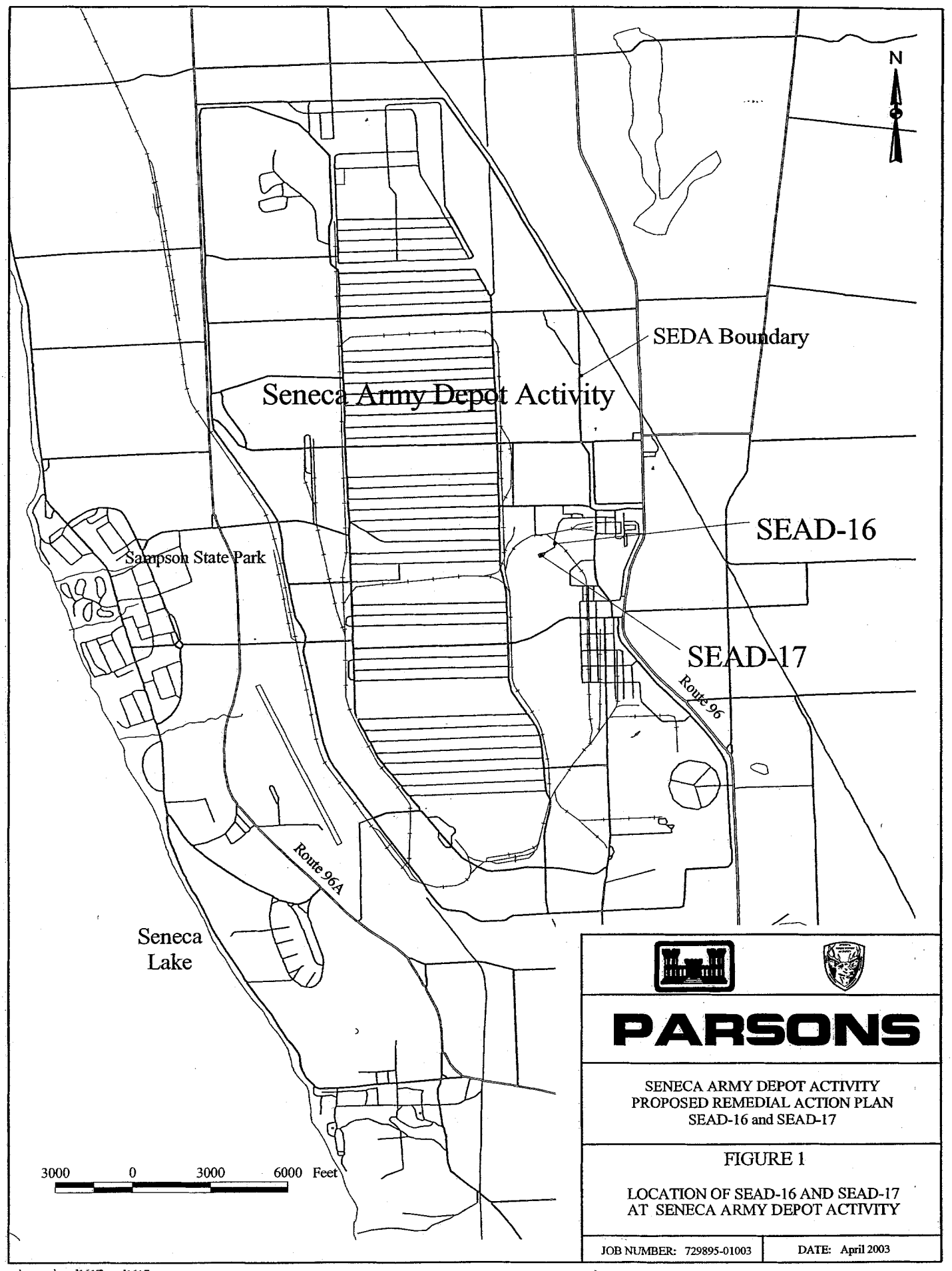
Notes:

1. The maximum concentrations to be protective of human health under an industrial use scenario for a construction worker (most conservative receptor when there is a restriction against a daycare facility).

TABLE 8
SEAD-17 RESIDUAL CONTAMINATION
Proposed Remedial Action Plan for SEAD-16/17
Seneca Army Depot

Compound	Risk-Based Derived Cleanup Goal[1] (mg/kg)	Max Hit (mg/kg)
	Industrial Use Construction Worker	Post Remediation
Antimony	29	5.0
Arsenic	20	8.9
Cadmium	14	5.6
Copper	331	182
Mercury	0.54	0.36
Thallium	2.6	1.50
Zinc	773	488

Notes:
1. The maximum concentrations to be protective of human health under an industrial use scenario for a construction worker (most conservative receptor when there is a restriction against a daycare facility).



PARSONS

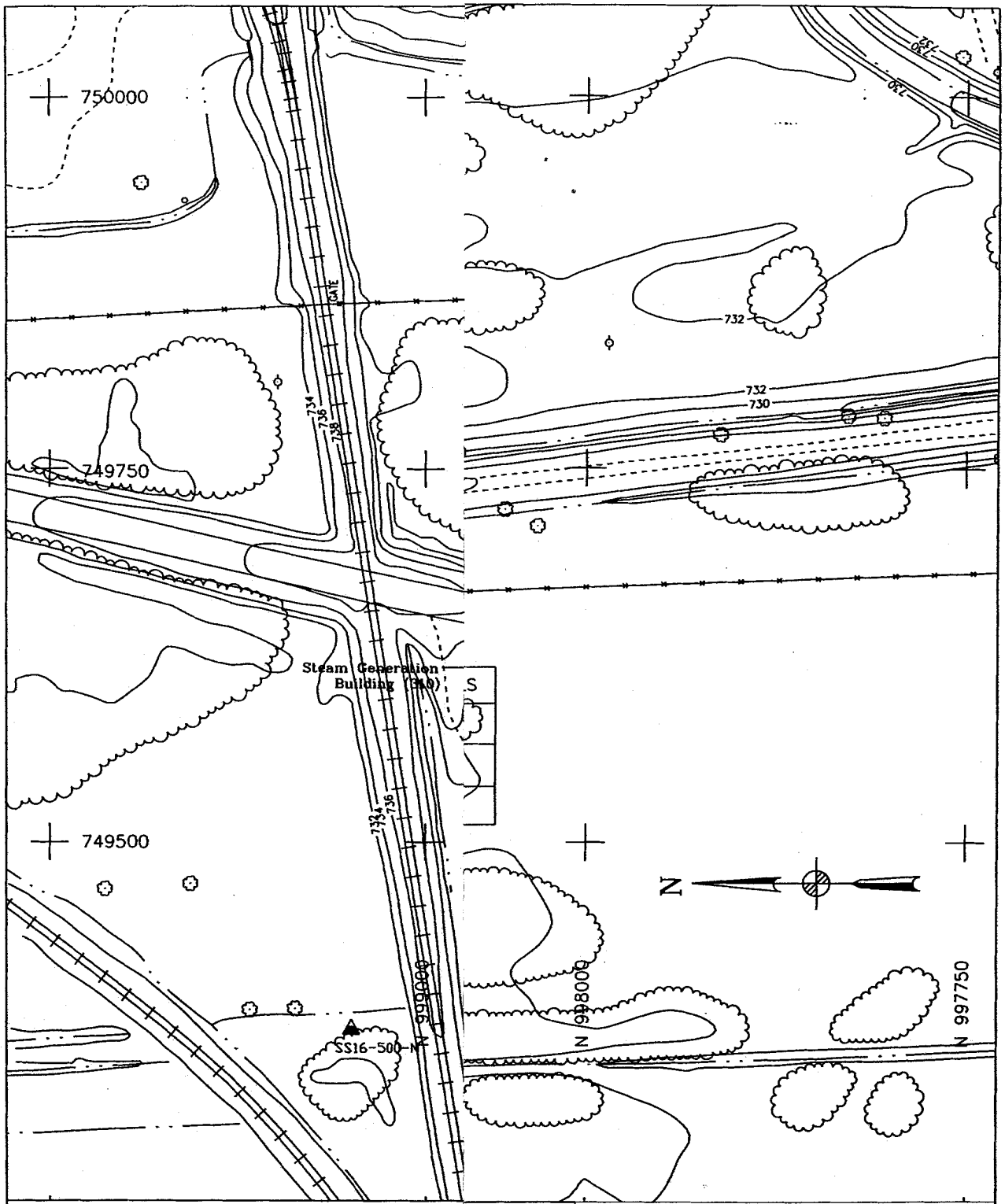
SENECA ARMY DEPOT ACTIVITY
PROPOSED REMEDIAL ACTION PLAN
SEAD-16 and SEAD-17

FIGURE 1

LOCATION OF SEAD-16 AND SEAD-17
AT SENECA ARMY DEPOT ACTIVITY

JOB NUMBER: 729895-01003	DATE: April 2003

o:\seneca\sead1617\sead1617.apr



LEG

- 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

THE MEDIAL.

MONY, LEAD, ND PAH

16-4 AND ED TO A URROUNDING D TO A DEPTH

R:\SENECA\729895\fig2-1.dwg

PARSONS

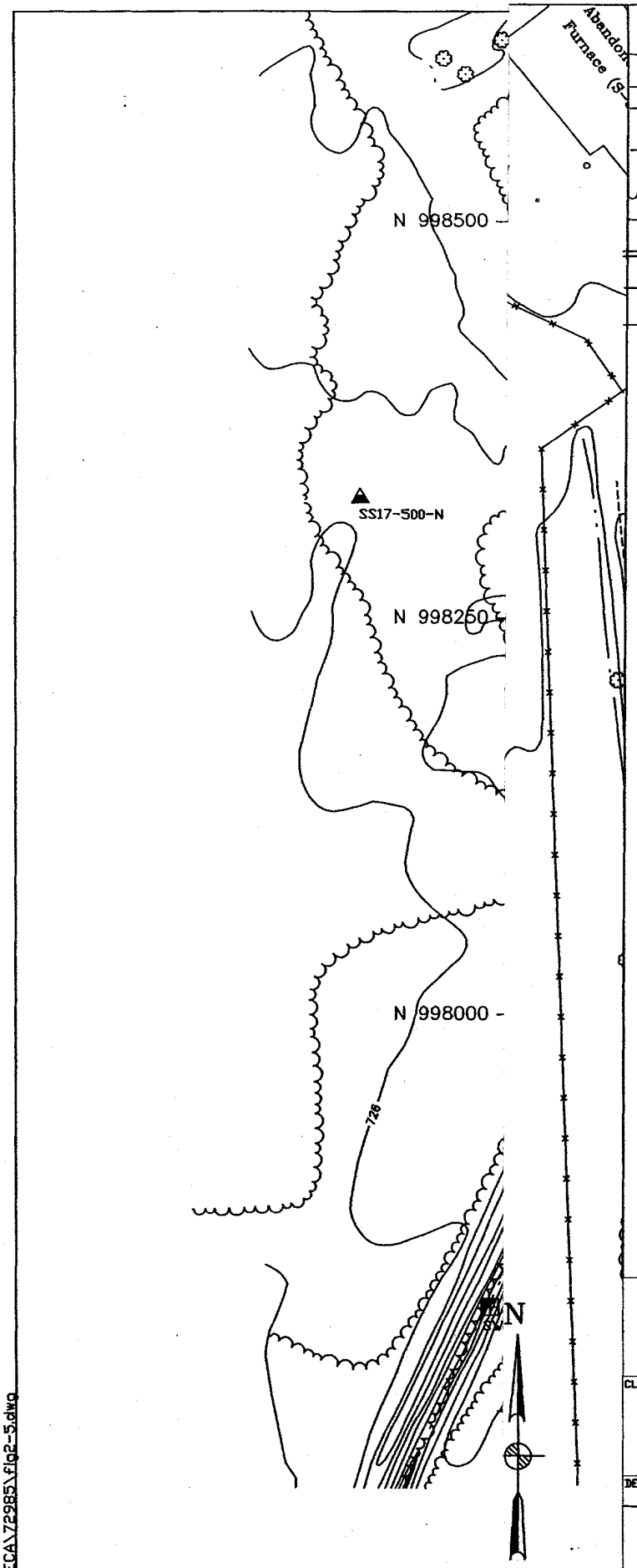
CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
PROPOSED PLAN
SEAD-16 AND SEAD-17

DEPT.	Dwg. No.
ENVIRONMENTAL ENGINEERING	729895-01002

FIGURE 2
SEAD-16 REMEDIATION AREA
(SOIL EXCEEDING CLEANUP GOALS)

SCALE	DATE	REV
1" = 100'-0"	MARCH 2003	A



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
- SOIL BORING LOCATION — SB16-4
- MONITORING WELL LOCATION — MW16-7
- SURFACE SOIL SAMPLE LOCATION — SS16-5
- SEDIMENT SAMPLE LOCATION — SW/SD16-6
- CASE 1 SURFACE SOILS WITH LEAD CONCENTRATION > 1250 mg/kg OR EXCEEDING OTHER CLEANUP GOALS (SEE NOTE 2)
- CASE 1 DITCH SOILS WITH LEAD CONCENTRATION > 1250 mg/kgOR EXCEEDING OTHER CLEANUP GOALS (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 EXCEEDING METAL (ANTIMONY, ARSENIC, CADMIUM, COPPER, LEAD, MERCURY, THALLIUM, ZINC) AND PAH CLEANUP GOALS FOR THE INDUSTRIAL USE SCENERIO.

PARSONS

CLIENT/PROJECT TITLE

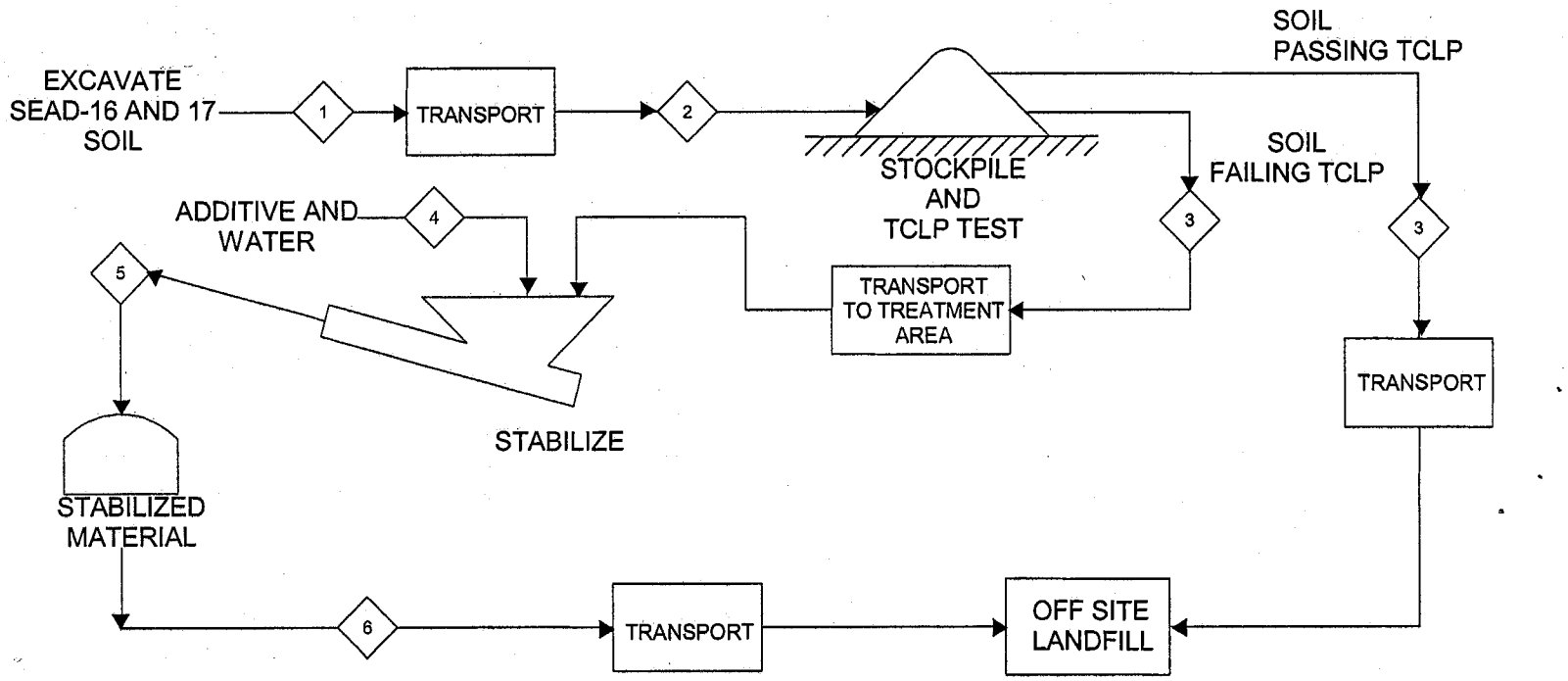
SENECA army DEPOT ACTIVITY
PROPOSED PLAN
SEAD-16 AND SEAD-17

DEPT.	Dwg. No.
ENVIRONMENTAL ENGINEERING	729895-01002

FIGURE 3
SEAD-17 REMEDIATION AREA
(SOIL EXCEEDING CLEANUP GOALS)

SCALE	DATE	REV
1" = 100'-0"	MARCH 2003	A

R:\SENECA\72985\fig2-5.dwg



TYPICAL FLOW RATES						
MATERIAL	STEAM NO.					
	1	2	3	4	5	6
SOIL/SEDIMENT (CY/HR)	50	50	50			50
STABILIZED PRODUCT (CY/HR)					30	
ADDITIVES/WATER (CY/HR)				30		

PARSONS

SENECA ARMY DEPOT ACTIVITY

PROPOSED REMEDIAL ACTION PLAN
SEAD-16 AND SEAD-17

FIGURE 4

ALTERNATIVE 4
GENERALIZED PROCESS FLOW SCHEMATIC

JOB NUMBER: 729895-01003 | DATE: APRIL 2003

o:\seneca\sead1617\sead1617.apr

APPENDIX A: ANALYSIS OF ALTERNATIVE 4P: OFF-SITE DISPOSAL (PRE-DISPOSAL SCENARIO)

According to the Seneca Army Depot Local Redevelopment Authority, and as documented in the Reuse Plan and Implementation Strategy (October, 1997), the intended future use of SEAD-16/17 is industrial. However, the future unrestricted use scenario has been considered in order to comply with New York State regulations to establish a goal for site remediation to "restore the site to pre-disposal conditions, to the extent feasible and authorized by law" and in accordance 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"). Following the detailed analysis, the top ranking alternative, Alternative 4, was modified to formulate a pre-disposal alternative, which is described and evaluated against all nine criteria below. The evaluation below is similar to that presented for other alternatives presented in Section 6 of the Feasibility Study for SEAD-16 and SEAD-17. Alternative 4P is summarized in Section 8 of the Proposed Plan and compared to the other alternatives in Section 9 of the Proposed Plan.

Definition of Alternative 4P

Description

Alternative 4P addresses future unrestricted use of SEAD-16 and SEAD-17, which would restore the sites to pre-disposal condition, even though the intended future use of the sites is industrial. Restoring the site to 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 other metals (antimony, copper, mercury, thallium, and zinc) detected must meet TAGMs. 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 with metal concentrations that exceed 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.

Excavated areas would be backfilled to restore the area to original conditions. Common fill and topsoil would be placed and vegetative growth would 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. Each step involved in this alternative will be described briefly in

this section. A detailed analysis of how this option meets the selected criteria and a budgetary cost estimate are provided below.

Surface and subsurface soils with lead concentrations greater than 400 mg/Kg and metal concentrations that exceed their respective TAGM value will be excavated. Railroad tracks and ties at SEAD-16 in the delineated area will not be disrupted. At both SEAD-16 and SEAD-17, all surface soil samples, except the downwind samples, would be excavated, as shown on **Figures 2-4** and **2-8**, respectively, of the FS Report. The soil would be removed to a depth of 12 inches below ground surface, resulting in an in situ volume as presented in Section 2 for Case 4. In addition, most subsurface soil samples at SEAD-16 and SEAD-17 would be excavated. It is estimated that the vertical limit would extend approximately 3 feet, and the combined volume of subsurface soils to be excavated at both sites would be approximately 839 CY. In addition, lead and other metals were detected above their cleanup goals (under this alternative) in the drainage ditches. Consequently, drainage ditch soils around Building S-311 and S-367 at SEAD-16 and SEAD-17, respectively, would be removed to an approximate depth of 12 inches. In total, the volume to be excavated at SEAD-16 and SEAD-17 would be approximately 7,298 CY and 6,687 CY, respectively.

The excavation can be accomplished with standard construction equipment, such as a front end loaders, bulldozers, and backhoes. The excavated soil and ditch soil (refer to Section 6.3 of the FS) would be loaded into trucks and transported to an on-site stockpile area. The soil would be placed in separate piles and samples would be obtained for TCLP testing. Based on the results, soil that passes the TCLP test would be transported and disposed of as a solid waste in an off-site Subtitle D Landfill. The soil that fails the TCLP would be transported, stabilized, and then disposed of in an off-site landfill. Based on conversations with stabilization contractors (refer to detail cost estimate, Appendix E in the FS) it is expected that off-site treatment may be more cost effective than on-site treatment. Therefore, for screening purposes presented later in this section and for conservative cost comparison purposes, this alternative assumes all excavated soil is transported off-site for both treatment and disposal.

Stabilized soil is not considered a characteristic RCRA hazardous waste but considered a solid waste, subject to RCRA Subtitle D and New York State solid waste regulations. In New York, all sanitary landfills are authorized to accept industrial wastes, and therefore would be able to accept the stabilized soil. The landfills cannot accept hazardous waste, and require extensive testing to assure that the waste is not a hazardous waste. The actual testing requirements vary between landfills, and the exact requirements for this remedial action will be specified once a landfill is selected. Several landfills have been identified for disposal, as discussed in Section 6.4.1.1 of the FS.

Upon completion of excavation, cleanup verification would be performed on the excavated areas. A cleanup verification work plan will be developed as part of the final design. Excavation would

continue further in those areas where lead concentrations or other metals concentrations in soil and ditch soil are greater than the cleanup goals. Sample location and frequency would be determined as part of the cleanup verification work plan.

Excavated areas would be backfilled to restore the area to original conditions and to provide proper storm water control. Common fill and topsoil would be placed and vegetative growth would be established. Semi-annual groundwater monitoring and annual ditch soil sampling would be necessary.

Process Flow and Site Layout

Figure 6-1 in the FS presents a process flow diagram that is applicable to Alternative 4P. Soil is excavated, stockpiled, and tested for TCLP as described above. Soils meeting the TCLP criteria would be transported and disposed of at an off-site landfill. Soils exceeding the TCLP criteria require stabilization. If the material is stabilized off-site, the soil would be transported off-site, stabilized, and disposed of in an appropriate landfill. If on-site stabilization is used, soils would 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 would 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 would be located adjacent to Unnamed Road between SEAD-16 and -17, as shown on **Figure 6-2** in the FS. This would provide a central location for the dump trucks to transport the excavated soil to the stockpile area.

If treatment is conducted off-site, trucks would 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.

Overall Protection of Human Health and the Environment

An evaluation of the overall protectiveness of human health and the environment includes the assessment of short- and long-term protectiveness of human health and the environment. The following discussion will show how this alternative meets these criteria.

Short-Term Protectiveness

This alternative will be evaluated with respect to the effect on human health and the environment during the implementation of the remedial action. Three items are included in an assessment of the short-term protectiveness of Alternative 4P. The first issue is protection of the community

during the remedial action. If off-site treatment is performed, hazardous material would be transported off-site. Precautionary measures must be taken to assure that the trucks are not overloaded and properly covered with a tarp to ensure that no material is released. If on-site treatment is performed, hazardous material would not be transported off-site. All waste, which is disposed in the off-site landfill, will no longer be considered hazardous waste.

There is also a minor threat from dust released during the excavation. The site is located away from the SEDA boundary, so the likelihood of any hazardous dust migrating off-site is negligible. As discussed in Sections 6 and 7 of the RI report as well as in Section 2 of the FS, fugitive dust migration (in soil) is not a major migration pathway. Fugitive dust is further minimized by the makeup of the soil to be excavated, which is primarily shale fill, a material that has a fairly large particle size, and is less subject to dust formation.

The short-term protectiveness to site workers is also considered. The major routes of exposure during remediation are direct contact with the excavated soil and inhalation of particulate. Exposure can be minimized through the use of site access controls and proper protective equipment for site workers, such as dust masks and Tyvek protective clothing. Air monitoring may be used to determine if there is a significant threat from the inhalation of particulate. Dust generation at the excavation can be minimized by using water or other dust control chemicals. If on-site treatment is used, precautionary measures should be taken to minimize dust generation. It should also be noted that all the site workers are required to meet all the OSHA training and medical monitoring requirements.

Another part of the short-term protectiveness criterion is assessing the environmental impacts during the remedial action. Impacts to the site will result from excavation, stockpiling, and truck traffic. Because SEAD-16 and -17 is located in an active portion of SEDA, these activities would 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.

Long-Term Protectiveness

The remedial action is designed such that the remaining soils and ditch soils have a lead concentration below the proposed cleanup goal of 400 mg/Kg, and metals concentrations that comply with TAGMs. The excavated soil and ditch soil would be excavated and transported off-site for disposal and no treatment residuals would be left on the site. There would no longer be soil and ditch soil on-site that poses an unacceptable threat to human health.

Overall Protection of Human Health and the Environment Conclusion

Alternative 4P would protect human health and the environment. The alternative protects against ingestion of and direct contact with surface soils and ditch soils having concentrations of lead

above 400 mg/Kg or other metals (antimony, copper, mercury, thallium, and zinc) at concentrations greater than TAGMs. The ditch soils with concentrations of lead above 400 mg/Kg or concentrations of other metals greater than their TAGM values would be removed, which would meet the RAO for ditch soil and prevent contamination downgradient in Kendaia Creek. In addition, after the removal action, the site would be suitable for unrestricted use and would be restored to pre-disposal conditions.

The results of the baseline risk assessment show that conditions at SEAD-16 and -17 require a remedial action (see Section 2 of the FS). The remedial action will reduce risk from soil and ditch soil as well as building material and debris to acceptable levels. Therefore, this alternative meets the RAOs by reducing risk, thus protecting human health.

ARAR Compliance

Similar to Alternative 2 (Section 6.4.3 of the FS), Alternative 4P does not preclude compliance with ARARs.

Long-Term Effectiveness and Permanence

The assessment of the long-term effectiveness can be divided into two categories, an assessment of the magnitude of the residual risk, and an evaluation of the adequacy and reliability of the controls used for the waste residuals and untreated soil.

As discussed in Section 6.5.2 of the FS for Alternative 4, Alternative 4P would protect human health and the environment in the long-term. Upon completion of the remedial action, no residual soil or ditch soil would remain on-site. The long-term management of the excavated material would be the responsibility of the selected off-site landfill. For this reason, it is important to select a reputable landfill to assure that the landfill is operated in accordance with State and Federal requirements. Although the excavated areas at the site would be backfilled and graded to promote storm water run-off and minimize erosion, maintenance activities would not be required upon the establishment of vegetative growth.

Once the excavated soil and ditch soil are removed from the site, the remedial action would be considered permanent. There would no longer be soil and ditch soil on-site that poses an unacceptable threat to human health for any receptors. Stabilized material would be designed to be resistant to leaching, weathering, and wet-dry cycles, which would indicate that the treatment would be permanent.

Permanent long-term land use controls would not be required for these sites, since Alternative 4P would allow for unrestricted land use at both SEAD-16 and SEAD-17. However, a temporary

groundwater use restriction would be imposed until ARARs are achieved. At that time, the alternative would be permanent.

Reduction in Toxicity, Mobility, and Volume

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 would be removed as well as the soil and ditch soil exceeding the proposed cleanup levels. In addition, the decrease in toxicity and mobility can be assessed two ways. First, the TCLP test provides an assessment of the toxicity and mobility of the hazardous constituents in the soil. The larger the leaching fraction, the greater the mobility and the greater the toxicity. Since some of the excavated soil and ditch soil must be treated in order to meet the TCLP criteria prior to disposal, the treated material would no longer be hazardous and would exhibit lower toxicity and mobility than the untreated waste.

In addition, by treating the soil that contains the highest concentrations of hazardous constituents, the overall site risk would be reduced to acceptable levels. By stabilizing the soil and ditch soil and then transferring to a landfill, the mobility of the hazardous constituents would be effectively eliminated. A properly managed landfill does not allow for uncontrolled releases from the landfill.

The stabilized soil would have a larger volume than the untreated soil, but the stabilized soil would no longer be a hazardous waste.

Short-Term Effectiveness

As discussed in Section 6.5.2.1 of the FS for Alternative 4, exposure to the community, the site workers and the environment can be minimized through the appropriate use of site access controls, dust controls, proper protective equipment for site workers, and monitoring system.

It is estimated that Alternative 4P can be completed in a short time period. If stabilization is conducted off-site, then it is estimated that the alternative may take approximately two to three months to complete, depending on the weather and turnaround time on the TCLP test results. This duration includes one week of mobilization, one week of building remediation, two to four weeks of excavation, three weeks to backfill and hydroseed, three weeks to test and dispose the material off-site, and one week to demobilization. The alternative would be an earthmoving operation, with little mobilization and specialty equipment.

If on-site stabilization is conducted, developing and implementing the treatability study, selecting the vendor, and obtaining the appropriate samples may take three to five months. Once the treatability testing is completed and a vendor is selected, it is estimated that the alternative may

take approximately three months to complete. In addition to the items mentioned above, some permitting may be required for stabilization and a specialty contractor would be required. Also, the alternative is dependant on the time needed for the stabilized material to cure.

Implementability

A discussion of implementability can be divided into three sections, technical feasibility, administrative feasibility, and availability of services and materials. Technical feasibility describes items such as construction and operation, technology reliability, and monitoring considerations. Administrative feasibility addresses issues such as permitting and community relations. Availability of services and materials describes the ease of obtaining vendors and equipment, and the availability of off-site disposal capacity.

Technical Feasibility

Alternative 4P is technically feasible to complete. It involves routine earth moving work, including excavation, stockpiling, transportation, and backfilling, and the remediation areas have been initially delineated. It is possible that some minor weather delays may be encountered, but most of the soil to be removed is located within 12 inches of the ground surface and would not be adversely affected by wet weather.

The excavated material that fails the TCLP criteria would require stabilization. Stabilization is a technology that has been frequently used to treat similar soils, and it is not anticipated that problems would be encountered during construction. If on-site stabilization is used, a treatment study would be necessary to establish the optimal additive and dosage and a specialty contractor would perform the work, most likely using a pug mill. The additives would be properly monitored to assure proper dosage. The stabilized material would 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.

Administrative Feasibility

Alternative 4P is administratively feasibility to complete. If off-site treatment is performed, the landfills that may be used are fully permitted for disposal and stabilization, if necessary. There

would be some transport of hazardous waste, and proper manifests would be required. All of the contractors used for excavation and hauling would be experienced in preparing manifests.

If on-site treatment is performed, a temporary treatment facility (pug mill) would be used and no hazardous waste transportation would be required, which simplifies the manifest requirements. Construction permits would be necessary for the construction activities. Since the wastes would be sent to a permitted disposal facility, no disposal permits would be necessary.

Coordination with the various regulatory agencies is also important. As previously described, the Army has coordinated the entire remedial program with both EPA and NYSDEC, and would consider input from both these agencies in the final remedy selection. It is anticipated that any issues arising with the regulatory agencies would be addressed prior to remedy selection.

Availability of Services and Materials

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 readily available in the Romulus area. If on-site stabilization is performed, a pug mill would most likely be used.

Several landfills have been identified that are capable of accepting the soil and ditch soil for disposal, as discussed in Section 6.4.1.1 of the FS for Alternative 4.

Cost

Capital Costs

Capital costs were estimated to remediate the soil with lead concentration exceeding 400 mg/Kg or the other tested metal concentrations exceeding the TAGM values. The detailed cost estimate and a description of the assumptions used are presented in Appendix E of the FS. The total capital costs (project cost) for the specified concentration level is estimated to be $3,604,000, as presented in **Table 6**.

O & M Costs

Annual monitoring costs associated with Alternative 4P include costs for semi-annual groundwater sampling and annual ditch soil monitoring. The annual monitoring cost is estimated to be $40,440. There is no annual operation and maintenance (O&M) costs associated with this alternative. In accordance with the Federal Facility Agreement CERCLA SECTION 120, Docket Number: II-CERCLA-FFA-00202, the remedial action (including monitoring program) will be reviewed after

five years. At this time, modification may be implemented to the remediation program (including monitoring program), if appropriate.

Present Worth Costs

The present worth cost (total evaluated price) to remediate the site to lead concentrations in soil with lead concentration exceeding 400 mg/Kg or the other tested metal concentrations exceeding the TAGM values is estimated to be $4,303,450.

Conclusion

An unrestricted use alternative was considered for the highest ranking alternative, Alternative 4, in order to weigh the advantages of restoring the sites to pre-disposal condition versus the cost this would incur. Alternative 4P, which has a present worth value approximately $5 million more than Alternative 4, would not be selected as the preferred alternative due to the significant cost increase compared to its industrial use counterpart. Since human health risk for the intended future use, industrial, is acceptable under Alternative 4, the additional health risk reductions achieved by the unrestricted use alternative, Alternative 4P, does not warrant an additional $1 million.

FINAL PROPOSED PLAN
FOR
THE ABANDONED DEACTIVATION FURNACE (SEAD 16)
AND THE ACTIVE DEACTIVATION FURNACE (SEAD 17)

SENECA ARMY DEPOT ACTIVITY
ROMULUS, NEW YORK

Appendix B

Prepared For:

Army Corps of Engineers
4820 University Square
Huntsville, Alabama

Prepared By:

Parsons
100 Summer Street, Suite 800
Boston, Massachusetts

April 2003

Army's Response to Comments from the US Environmental Protection Agency

Subject: Final Proposed Plan for the Abandoned Deactivation Furnace (SEAD-16)
and the Active Deactivation Furnace (SEAD-17)
Seneca Army Depot
Romulus, New York

Comments Dated: November 13, 2003 (received by email)

Date of Comment Response: December 4, 2003

Army's Response to Comments

Comment 1: Table 1: Cleanup goal for Arsenic should be 8.25 mg/kg, not 22.

Response 1: As discussed in the BCT Meeting on November 18, 2003, the cleanup goal for Arsenic will be modified. The value of 22 mg/kg is the maximum background value of Arsenic, which the Army agrees will not be used. However, the 95th percentile of the background data set (8.25 mg/kg) will not be used as the clean up goal either. A risk-based value of 20.3 mg/kg will be used for Arsenic. This value is based on protection of the most conservative receptor under an industrial use scenario, a future construction worker. Table 1 will be modified accordingly.

Comment 2: Response to Comment 9 to the NYSDEC letter states that delineation is not necessary. Please note that a residential perimeter needs to be delineated as per CERCLA (e.g., 400 mg/kg lead or other criteria).

Response 2: In response to NYSDEC's comment 9, the PRAP has been revised on pages 1 and 26 to state that as part of the remedy "additional sampling as part of the pre-design sampling program to further delineate the areas of excavation" will be conducted. The Army is not aware of a requirement per CERCLA that requires delineation of a residential perimeter. Furthermore, the area immediately surrounding SEAD-16/17 is in the PID Area that will have similar industrial ICs. Therefore, no additional sampling is planned to delineate the residential perimeter.

Army's Response to Comments from the New York State Department of Environmental Conservation, Division of Environmental Remediation

Subject: Final Proposed Plan for the Abandoned Deactivation Furnace (SEAD-16)
and the Active Deactivation Furnace (SEAD-17)
Seneca Army Depot
Romulus, New York

Comments Dated: May 23, 2003

Date of Comment Response: August 6, 2003

Army's Response to Comments

Comment 1: Army's Response #1: The Army states that "(I)t is impractical and it would seem unbalanced to move the 9-page discussion on Alternative 4P found in Appendix A into the body of the document." On the contrary, the NYSDEC feels that the most appropriate location for this alternative discussion would be in the body of the document. The Department finds it a quandary that the Army is so reluctant to place the discussion and description of an alternative in the Proposed Plan, that was developed/refined after the completion of the Feasibility Study (FS), when it has been performed at several other SEDA sites as Alternative #MC-3A for the Ash Landfill and Alternative #RA26-2 at SEADs 25 and 26. Therefore, the Department finds the Army's response unacceptable.

Response 1: The Army will maintain the same organization of the document. Like all other alternatives, a summary of Alternative 4P is included in the main text of the Proposed Plan. However, the Army contends it is most appropriate to place the expanded description of Alternative 4P, which ordinarily would have been presented in the FS, in an appendix. This ensures that the discussion of the remedial alternatives in the Proposed Plan gives equal treatment to all alternatives.

It is noted that the full descriptions of the revised Alternative #MC-3A for the Ash Landfill and the revised Alternative #RA26-2 at SEAD-26 were included in the main text of their respective documents. However, in the case of the Ash Landfill and SEAD-25/26, these revised alternatives were the selected alternatives; hence it seemed appropriate to dedicate a significant portion of the text to describe these alternatives. Since Alternative 4P is not the preferred alternative, it would be unbalanced to present this alternative in more detail than the other alternatives that were not selected.

Comment 2: Army's Response #4: The state does not agree that the proposed Cleanup Goals (CUGs) for PAHs include individual CUGs only for benzo(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, and dibenz(a,h)anthracene. Based on the RI data, in particular Figures 4-1 and 4-9, areas of elevated cPAH contamination includes all seven of the EPA's list of carcinogenic PAHs. The addition of CUGs for indeno(1,2,3 cd)pyrene, benzo(b)fluoranthene, and chrysene is required.

Response 2: New risk based CUGS for the three PAHs have been developed and added to a revised Table 1. The cleanup goals for benzo(b)fluoranthene, chrysene, and indeno(1,2,3-cd)pyrene are 20,417 µg/kg, 50,000 µg/kg, and 20,417 µg/kg, respectively. The addition of CUGs for these three PAHs does not impact the remediation area.

Comment 3: Army's Response #6: The Army's response is unacceptable. The statement that "the SEAD-16 and SEAD-17 area is of little value to the ecological community, and would not serve as a desirable habitat for this community," is inappropriate. The property is currently undeveloped, and may remain so for a significant period of time, maintaining a potential for unacceptable wildlife exposure for species occupying that undeveloped property. The Department cannot support the assumption that wildlife will only inhabit "unaffected areas adjacent to the impacted areas."

Response 3: As previously stated, the area encompassing SEAD-16/17 is designated for future industrial use, and, therefore, will be remediated to industrial standards. It is inappropriate to remediate a site designated for future industrial use to strict ecological standards. This would be more appropriate for the conservation/recreation areas. Since the area is not a likely habitat for ecological receptors, it is inappropriate to establish ecological standards. In addition, site conditions are not conducive for use as an animal habitat; thus, there is not a significant ecological risk.

Comment 4: Army's Responses to #19 and #20: The Army's statement that "any issues that remain relating to risk at SEAD-17 will be dealt with during the RCRA closure process" is inappropriate. As described in our November 14, 2002 letter, the CERCLA closure process is intended to incorporate the RCRA closure process, therefore this Record of Decision should incorporate the RCRA issues via a RCRA closure work plan. The Army acknowledges this in their response to our comment #7, but then defers the RCRA requirements in the responses to comment #19 and 20. The Army needs to submit a draft RCRA closure plan so that it may be referenced and recognized in the ROD. All RCRA issues will be addressed at the ROD stage, therefore the Army should acknowledge this their responses.

Response 4: A RCRA closure plan will be submitted with the ROD. The closure plan will demonstrate that the building and equipment were previously clean closed in accordance with RCRA guidelines. The plan will also state that the grounds surrounding SEAD-17 will be remediated through the ongoing CERCLA process. The text has been revised and a replacement page is being issued.

Comments on the Proposed Plan

Comment 5: Please explain how a groundwater use restriction would result in an unrestricted use scenario.

Response 5: The Army assumes that this comment refers to the temporary groundwater use restriction discussed in reference to Alternative 4P. The groundwater restriction is temporary, and once the groundwater restriction is removed, the site would be suitable for unrestricted use. All other remedial alternatives include long-term ICs as part of the remedy, which limits the site to restricted use of the site.

Comment 6: Table 6 values for Alternative 4, the Army's preferred alternative is $3,109,404, while the unrestricted use alternative, Alternative 4P is $4,303,450. Therefore, it appears that Alternative 4P, the reportedly unrestricted use alternative, appears to be a feasible option that should be pursued by the Army to avoid the effects of placing and enforcing institutional controls and deed restrictions on this site for an indeterminate amount of time.

Response 6: As stated in the Proposed Plan (Section 10), the present worth cost difference between Alternative 4 and 4P is approximately $1 million. "Since human health risk for the intended future use, industrial, is acceptable under Alternative 4, the additional health risk reductions achieved by the unrestricted use alternative, Alternative 4P, does not warrant an additional $1 million." The Army also believes that although the difference is presented as $1 million, there is a high likelihood that this cost difference could increase significantly since surrounding areas may have anthropogenic concentrations of metals and PAHs that would exceed unrestricted use standards. Placing and enforcing institutional controls (ICs) at SEAD-16/17 is not a burden, since all the areas immediately surrounding SEAD-16/17 in the PID Area will have similar industrial ICs, according to the ROD for Sites Requiring Institutional Controls in the Planned Industrial/Office Development or Warehousing Areas (Parsons, 2003).

Comment 7: Please include a clause compelling the property owner to annually certify to the New York State Department of Environmental Conservation that the deed restriction is in place, and that the use of the property is consistent with that restriction.

Response 7: Details on the implementation and enforcement of the ICs will be specified in the Remedial Design (RD) Plan. The SEAD-16/17 RD Plan will include: a Site Description; the IC Land Use Restrictions; the IC Mechanism to ensure that the land use restrictions are not violated in the future; and, Reporting/Notification requirements.

Comment 8: Regarding the Army's proposed cleanup goals for the industrial use scenario, the Army has not proven that the proposed cleanup goals are protective of site groundwater. Given that site groundwater is contaminated and monitoring is an element of the proposed remedy, the Army should address how their proposed cleanup goals provide for the protection of site groundwater/drinking water quality.

Response 8: Groundwater is not considered a media of concern. A recent round of groundwater sampling conducted in October 1999 showed that thallium, the major COC, was not present in the groundwater; previous detections had been a result of sampling methods and high turbidity. However, as a precaution, groundwater is being monitored, the site is subject to five-year reviews, and ICs will be in place preventing use of the groundwater. A public drinking water source is available, so a groundwater use restriction should not have a negative impact on use of the site. ICs (i.e., a groundwater use restriction) are considered a means of protecting receptors from contact with the groundwater.

Comment 9: Although the Army has addressed the DEC comment #40(a) in the Response to Comments section and incorporated a similar response in the text of the Proposed Plan, NYSDOH does not agree with the way it may be interpreted. On the first page of the Proposed Plan, the preferred remedy for SEAD-16 and SEAD-17 first bullet states: "Conducting additional sampling as part of the pre-design sampling program to further delineate the areas of excavation and to delineate the area that would be subject to land use controls." It is NYSDOH's understanding from the statements made on page 12 of the Proposed Plan that "All alternatives for SEAD-16 and SEAD-17 include land use controls as part of the remedy" and "To that end, land use controls would aim to prevent further use of the site as a daycare facility or residential use and to prevent ingestion of groundwater." It is not understood how the delineation of the area that is subject to land use controls is the same as the presumption that the overall site is subject to land use controls as stated on page 12. Will certain areas not be subject to land use controls? This is contrary to document statements. Further clarification is needed prior to our concurrence on the preferred selection since institutional controls are a major component of the remedy.

Response 9: The sampling will be completed in order to further delineate the areas of excavation and the boundary of the site. The entire extent of SEAD-16 and SEAD-17 will be subject to industrial institutional controls. Delineation of the area requiring institutional controls is no longer necessary. The ROD for Sites Requiring Institutional Controls in the Planned Industrial/Office Development or Warehousing Areas (Parsons, 2003) established an industrial land use control, preventing future residential use, land use for a daycare facility, and groundwater use, over the Planned Industrial/Office Development or Warehousing Areas (PID Area), which borders all sides of SEAD-16 and SEAD-17. The first bullet on page 1 and page 26 has

been revised to state that "conducting additional sampling as part of the pre-design sampling program to further delineate the areas of excavation."

Comment 10: Appendix P19 of 21: The Army states that it is its understanding that ". . .EPA and DoD have reached an understanding that requirements for implementation and enforcement of land use controls will be detailed in the Remedial Design. The discussion on land use controls in the Proposed Plan and ROD will be limited to the objectives and goals of the land use controls. The text has been revised to reflect this change." The following must be added to the objectives and goals of the land use controls in the Proposed Plan.

> "If SEAD-16 and SEAD-17 are not industrially developed within 3 years from the signing of the ROD the SEADs will be cleaned by the Army to levels protective of wildlife. At a minimum, for lead, soils will be cleaned to a level of 60 ppm similar to the remedy for the open burning grounds. Should the SEADs become terrestrial habitat after having been industrial, for any reason, to include but not limited to abandonment from industrial usage, it will be the Army's responsibility to clean the SEADs to levels protective of wildlife."

Response 10: Remedial actions will be based on the designated future land use, which currently is industrial. If the land use should change, the current property owner will re-evaluate the remedial action and determine if it is protective of the site under the revised land use scenario and be responsible for any additional remedial activities which are determined to be necessary. Future clean up goals for a scenario other than industrial will be determined at the time the future use is revised.

Comment 11: Table 1: Based on the above comment regarding the need of CUGs for the missing cPAHs, the information in Table 1 is inadequate for NYSDOH evaluation. Revisions to this table are requested.

Response 11: Table 1 has been revised to include cleanup goals for benzo(b)fluoranthene, chrysene, and indeno(1,2,3-cd)pyrene.

Comment 12: References to Tables 7 and 8 are made on page 24. The copy of the Proposed Plan that was provided does not include Tables 7 and 8. Please submit copies of each for the state's review.

Response 12: Agreed. Tables 7 and 8 will be provided for review.

Response to Comments from the New York State Departments of Environmental Conservation (NYSDEC) and Health (NYSDOH)

Subject: Draft Final Proposed Plan for the Abandoned Deactivation Furnace (SEAD-16) and the Active Deactivation Furnace (SEAD-17)
Seneca Army Depot
Romulus, New York

Comments Dated: November 14, 2002

Date of Comment Response: April 4, 2003

The New York State Departments of Environmental Conservation (NYSDEC) and Health (NYSDOH) have reviewed the above referenced document as well as the Army's responses to the NYSDEC's comments on the previous draft. Our comments follow:

Army's Response to NYSDEC Comments:

Comment 1: In the Army's response to General Comment #1, the Army states that "(R)esidential 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." As requested in our January 4, 2001, February 21, 2001, and November 13, 2001 letters regarding this site, the description and comparison of the residential scenario should be brought into the main body of the Proposed Plan so a comparative analysis of the pros and cons can be performed for this alternative versus the other remedial alternatives presented in this Proposed Plan.

Although it is stated in the response that Figure 2 has been added to show areas of proposed remediation including the previous "hotspot" areas, the area around SS16-31 still is not included in Figure 2. Revision of Figure 2 is needed.

Response 1: Alternative 4P, was considered and evaluated against all of the nine criteria, not just cost, in order to satisfy the New York State requirement to evaluate the site at pre-disposal conditions. Future residential use was also considered in order 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 cleanup alternatives (DAIM-BO, "Army Guidance for Using Institutional Controls in the CERCLA Process").

Alternative 4P is incorporated into the discussion of Section 8 (Summary of Remedial Alternatives) and Section 9 (Comparative Evaluation of Alternatives) of the Proposed Plan. The description of Alternative 4P and the discussion on the full evaluation of the nine criteria for that alternative, which is comparable to the comparison performed for all other alternatives in Section 6 of the FS, remains in Appendix A. It is impractical and it would seem unbalanced to move the 9-page discussion on

Alternative 4P found in Appendix A into the body of the document. However, analysis of Alternative 4P has been incorporated in the comparative analysis of all remedial alternatives.

The excavation area has been modified. The "hotspot" area around SS16–31 has been included in the revised excavation area based on the following rationale: Since the FS, risk-based cleanup goals (CUGs) for certain carcinogenic PAHs and metals (antimony, arsenic, cadmium, copper, mercury, thallium, and zinc) have been established. CUGs for PAHs were derived by following the same approach used at SEAD-59/71. PAH CUGs were derived using the NYSDEC Technical and Administrative Guidance Memorandum (TAGM) #4046: *Determination of Soil Cleanup Objectives and Cleanup Levels* method for establishing CUGs for carcinogens based on a future construction worker receptor (daycare facility use will be restricted), the most conservative receptor under the intended future use scenario (industrial). CUGs for metals were derived by back calculating concentrations of metals that, combined, would yield a non-carcinogenic risk less than 1. In order to account for the fact that each metal contaminant of concern (COC) is only a partial contributor to total risk, the post-remediation hazard index (HI) for each COC at SEAD-17 was normalized to reflect the magnitude of risk of one metal in comparison to the total risk from all the metals of concern. It should be noted that *post-remediation* assumes that all surface soil samples located within the boundary of the area delineated by concentrations of lead greater than 1250 mg/kg have been removed. The normalized HI was subsequently used as the acceptable risk value in the calculation to determine the CUGs for metals. The risk-based CUGs for PAHs and metals are presented in Table 1.

The CUG scenario of 1250 ppm for lead has been revised to include the derived CUGs for the other metals and PAHs. All locations that include concentrations that exceed these cleanup goals are included in the remedial area, and the remedial action is driven by compliance with the established cleanup goals. Consequently, the remedial area has expanded since the FS to include the corner area northwest of Building S-311, surrounding sample locations SB16-4 and SS16-31. The areas around SS16-35 and SS16-11 will also be remediated due to exceedances of PAH and metal CUGs. Based on available site data, the soil would be excavated to a depth of one foot, with the exception of the areas around SB16-2, SB16-4, and SB16-5, which would require excavation to a depth of 2-3 feet due to subsurface exceedances of cleanup goals. Available data at SEAD-17 indicates that there is no subsurface contamination. These excavations will be completed to the greatest extent possible without damaging or disturbing the railroad tracks. The Army requires that the future land user must have access to working railroad tracks in this area. The concept of "hotspots" no longer exists and has been removed from the text. Figures 2 and 3 have been revised to illustrate the extent of the remedial area.

Comment 2: Amendments to Excavation Areas: The Army's response to the state's request of remediating the surface soils contaminated with PAHs is unsatisfactory. The Army does not explain

why the requested areas of PAH contamination is only proposed to be "excavated to a depth of 12 inches and backfilled with clean soil." The proposal that "no confirmatory sampling will be conducted," at these hot spot removals is unsupported. As discussed in our January 4, 2001 and February 21, 2001 letters, PAH contamination needs to be thoroughly addressed as contaminants of concern with remedial clean-up levels determined and confirmed by sampling. We requested in our February 21, 2002 letter, that the spatial configuration be expanded to include "surface soil areas containing elevated levels of carcinogenic PAHs." As the PAH contamination is an expansion of the proposed areas of remediation, the extent of remediation should be expanded to include the areas represented by these soil samples, not merely the soil sample locations themselves.

Response 2: The Army has revised the areas of excavation at these sites based on risk based CUGs. The extent of contamination will be confirmed with post-remediation sampling. Based on available site data, the soil would be excavated to a depth of one foot, with the exception of the areas around SB16-2, SB16-4, and SB16-5, which would require excavation to a depth of 2-3 feet due to subsurface exceedances of cleanup goals. The excavation will be completed to the greatest extent possible without disturbing the railroad tracks. Available data at SEAD-17 indicates that there is no subsurface contamination. Tables A-1 and A-2 in Attachment A show the distribution of metal COCs in soil at depth at SEAD-16 and SEAD-17, respectively. As mentioned in the response to General Comment #1, risk-based CUGs for carcinogenic PAHs and metals (antimony, arsenic, cadmium, copper, mercury, thallium, and zinc) have been developed and are presented in Table 1. All locations that include concentrations that exceed the cleanup goals are included in the remedial area, and the remedial action is driven by compliance with the established cleanup goals. Consequently, the remedial area has expanded. Figures 2 and 3 have been revised to illustrate the extent of the remedial area. Confirmatory sampling will be conducted to ensure that the extent of contamination has been properly delineated.

Comment 3: Response to Specific Comment 1: Contrary to what is stated in the text, the title of this document has not been revised. Please remove "Superfund" from the title, as the term is not applicable to this site.

Response 3: Agreed. The title has been revised.

Comment 4: Response to Specific Comment 5: The Army's statement that "the goal of the remedial action is to have no residual contamination in soils above the clean up goals developed for the future industrial use scenario (lead concentration of 1250 mg/kg)," implies incorrectly that lead is the only contaminant of concern to be addressed by the proposed cleanup goal.

Response 4: The intent of the response was to express that the goal of the remedial action is to have no residual contamination in soils at a level that could pose a threat to human health or the environment under the future land use scenario. Risk-based cleanup goals have been developed for seven additional metals (antimony, arsenic, cadmium, copper, mercury, thallium, and zinc) and for carcinogenic PAHs whose NYSDEC TAGM 4046 values are human health based (benzo(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, and dibenz(a,h)anthracene), presented in Table 1. As a result of the new CUGs for several COCs, the remedial area has expanded. The goal of the remedial action is to meet the cleanup goals; hence, residual contamination above the established cleanup goals is not expected at the sites, as shown in Tables 7 and 8.

Comment 5: Response to Specific Comment #6: The Army's response to State's comments is disconcerting. The Army states that "(A)fter remediation is completed at SEAD-16, the maximum concentrations of antimony, copper, lead, mercury, and thallium, are expected to be below the calculated concentrations determined to be protective of human health under an industrial scenario. Although the maximum concentration of zinc exceeds the clean up goal, the EPC for zinc is less than the clean up goal." For SEAD-17, the Army, for the most part, repeats the same explanation for cadmium in that the "post remediation EPC for cadmium is expected to be 2.45 mg/kg, which slightly exceeds the TAGM value." It appears that the Army does not plan on remediating to their proposed cleanup goals but rather to achieve an average contaminant concentration that is less than the proposed cleanup goal. If the Army does not plan on achieving their proposed cleanup goals, then the Army should revise their cleanup goals so that no residual contamination in soils exceeds the cleanup goals, not the 95% upper confidence limit of the arithmetic mean of on-site soil samples.

As stated in the past, we are concerned with the Army's back-calculating PRGs of a site with multiple contaminants because those levels that are left behind could potentially lead to an unacceptable risk. Please include an additional column to Tables 7 and 8 indicating the maximum level of each contaminant of concern expected to be left onsite under each remedial alternative.

Response 5: As previously stated in response to Comment #1, cleanup goals have been developed for other metals (antimony, arsenic, cadmium, copper, mercury, thallium, and zinc), shown in Table 1. Each individual sampling location's concentration (not a site average) will be compared to the cleanup goal for that constituent. In order to account for the fact that each metal COC is only a partial contributor to total risk, the post-remediation hazard index (HI) for each COC at SEAD-17 was normalized to reflect the magnitude of risk of one metal in comparison to the total risk from all the metals of concern. It should be noted that *post-remediation* assumes that all surface soil samples located within the boundary of the area delineated by concentrations of lead greater than 1250 mg/kg have been removed. The normalized HI was subsequently used as the acceptable risk value in the calculation to determine the CUGs for metals. The Army's selected remedial action will comply with

the cleanup goals for all COCs. No residual contamination above cleanup goals will be left onsite, as shown in Tables 7 and 8.

Comment 6: Response to Specific Comment 7: The Army states that it's their intention "to clean up soil to be protective of the environment in an industrial scenario. After completion of the remedial action at both sites, a Completion Report that will demonstrate that the remedial action is protective of human health and the environment, will be submitted." Please clarify what is meant by protective of the environment by an industrial scenario. Although the property may be deed restricted, but undeveloped for a significant period of time, there remains a potential for unacceptable wildlife exposure for species occupying that undeveloped property. Please include measurable remedial objectives to be discussed in the Completion Report that would ensure protection of the environment under an industrial scenario. If necessary, the Army should provide for temporary remedial measures until the property is developed.

Response 6: The planned future use of SEAD-16 and SEAD-17 is for industrial use. Therefore, the SEAD-16 and SEAD-17 area is of little value to the ecological community, and would not serve as a desirable habitat for this community. Risk from exposure to sediment/ditch soil assumes that the ditches are supporting aquatic life and that the receptor is continuously exposed. Site conditions at SEAD-16/17 suggest that usually there is no water in the ditches and that they do not support aquatic life. Due to the fact that it is not believed that the sediment/ditch soils pose a threat to the environment, ecological risk is not of concern at these sites. Most likely, ecological receptors will inhabit unaffected areas adjacent to the impacted areas of SEAD-16/17, thereby avoiding areas where minimal ecological risk exists.

General Comments:

Comment 7: The FFA states that "any remedial action selected, implemented and completed under this agreement will be protective of human health and the environment such that remediation of releases covered by this Agreement shall obviate the need for further corrective action under RCRA." Therefore, under the FFA, RCRA shall be considered an ARAR under CERCLA. At the June 12, 2002 BCT meeting, we agreed that RCRA closure of the SEAD-17 facility will be assumed under CERCLA, and RCRA closure would be accomplished by including the RCRA closure requirements, as outlined in a RCRA closure plan, to be referenced in the Proposed Plan and consequently the Record of Decision. The RCRA closure plan should be submitted to the RCRA closure staff for review and approval prior to issuance of the Record of Decision.

Response 7: Agreed. A RCRA closure plan may be submitted as part of the Record of Decision submittal. The closure plan will defer the cleanup to the CERCLA process and demonstrate how each RCRA closure requirement will be met during the CERCLA closure process.

Comment 8: As discussed in our July 16, 2002 teleconference regarding the typographical errors found in the SEAD-25 and SEAD-26 Draft Final Proposed Plan, several of those comments apply to this document as well. Please incorporate those corrections as necessary.

Response 8: Agreed. The text has been revised to eliminate typographical errors.

Comment 9: This document is rather difficult to read/comment on without section numbering. For instance, under "Summary of Remedial Alternatives" there are several subsections that refer to the beginning of the section, however, it is difficult to discern the location of the beginning of the section. It would be helpful for the Army to include section numbering to help differentiate the subsections from the sections.

Response 9: Agreed. The sections have been numbered.

Comment 10: The term "PRAP" appears many times throughout the document, and in each instance, it should be replaced with "Proposed Plan."

Response 10: Agreed. The text has been revised.

Comment 11: The capital cost range for Alternative 4, which ranges from $2,257,850 to $7,305,090, needs to be revised. One of the Army's main assumptions in the preliminary detail cost estimates, which is Appendix E of the FS, is that "it has been assumed that all material will fail the TCLP test and will require stabilization prior to off-site disposal." The assumption is poor because it assumes that the Army would leave hazardous waste (by definition) on-site under the industrial re-use alternative. The Army would not leave hazardous waste on-site and consequently would not propose an alternative (cleanup goal of 1250 ppm lead) that would leave hazardous waste on-site. Therefore the volume estimates should be revised to reflect that only the soils above 1250 ppm would fail TCLP. Given the disposal costs for $117/ton for that which fails TCLP and $31.50/ton for that which passes, the difference for remediating only material above 1250 ppm lead versus remediating all material above 400 ppm lead and other metals above TAGM (an estimated 15,537 tons) reduces the remedial cost estimate by $1,328,414. Consequently, the difference between the Army's preferred alternative of $2,960,000 and the unrestricted use scenario of $5,980,000 would be $3,020,000. Please revise the capital cost ranges appropriately.

Response 11: Agreed. The cost estimates have been revised. It is assumed that 100% of building material would require hazardous disposal, and that 15% of soils (surface soil, subsurface soil, and ditch soil) excavated under the 1250 mg/kg for lead and cleanup goals for metals and PAHs scenario, approximately 704 cubic yards, would require hazardous disposal. The remaining soil could be disposed in a non-hazardous Subtitle D facility. It is assumed that any additional soil excavated under a more conservative scenario would require non-hazardous disposal (i.e., under all cleanup goal scenarios, only 704 cubic yards of soils would require hazardous disposal). It should be noted that based on other sites at SEDA where total lead concentrations in soils were close to 1250 ppm and TCLP data were available, an assumption that 15% of the soils would be hazardous is a conservative estimate.

Costs for the following cleanup goal scenarios have been revised and are presented in Table 6: 1250 ppm lead + metals and PAH CUGs; 1000 ppm lead; 400 mg/kg lead; and 400 ppm lead + TAGMS (unrestricted use scenario). The revised capital costs of the Army's preferred alternative and the unrestricted use scenario are approximately $1,699,930 and $3,604,160, respectively.

Specific Comments:

Comment 12: Page 1, Purpose of Proposed Plan: A brief description of the Army's preferred remedy for this site should be included in this section.

Response 12: Agreed. The elements of the remedy have been more clearly outlined in the "Purpose of the Proposed Plan" section.

Comment 13: Page 2, Site Background: The statement that the SEAD-17 deactivation furnace "has 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," is misleading. The document should clarify that the SEAD-17 RCRA facility was operated under interim status and still needs to be closed out under RCRA. See general comments above.

Response 13: Agreed. The text has been revised accordingly.

Comment 14: Page 2, Remedial Investigation Summary: The first sentence seems to indicate that SEAD-16 and SEAD-17 are described in only 4 of the previous reports, and not the RI or the FS. Also, it is indicated from the text that the RI and FS are not part of the document repository. Please correct.

Response 14: Agreed. SEAD-16 and 17 have been described in four reports previous to the Remedial Investigation (RI) and Feasibility Study (FS), which are available to the public at the repository at SEDA. The text has been revised accordingly.

Comment 15: Page 3, SEAD-16, Soil: The first sentence introduces New York State Technical and Administrative Guidance Memorandum (TAGM) values without presenting appropriate definitions or perspective. Please expand.

Response 15: Agreed. NYSDEC provides Technical Administrative Guidance Memorandums (TAGMs), which are technical guidance publications that describe various processes and procedures recommended by NYSDEC for the investigation and remediation of hazardous waste sites. One TAGM, No. 4046: *Determination of Soil Cleanup Objectives and Cleanup Levels (January 1994)*, provides guideline values for soil cleanup limits at waste sites. This information has been added to the text.

Comment 16: Page 3, SEAD-16, Sediment: The last two sentences in this sub-section are irrelevant and should be removed from the text.

Response 16: Agreed. The two sentences have been removed from the text.

Comment 17: Page 4, SEAD-17, Soil: The Statement that "(L)ead was detected in all of the subsurface soil samples at concentrations that exceed its TAGM value," indicates that the Army hasn't delineated the extent of subsurface soil contamination. Also, the last sentence is irrelevant and should be removed from the text.

Response 17: The subsurface contamination has been defined and delineated. Available subsurface data at SEAD-17 indicated no subsurface contamination, as shown in Table A-2 in Attachment A. The excavation area has been delineated by the risk-based derived cleanup goals. The final delineation will occur with confirmatory sampling following the completion of the remediation action. Additionally, the Army recognizes that additional sampling for further delineation may be required in the ROD in the form of a Pre-Design Sampling Analysis Program. This work could further define excavation areas in support of the remedial design.

The last sentence has been removed.

Comment 18: Page 5, SEAD-17, Groundwater: The first sentence in this section stating that "the groundwater at SEAD-17 has not been significantly impacted by any chemical constituents," is contradicted by latter sentences, which reveal that two inorganic elements exceeded MCLs while two

other inorganics exceeded the NYSDEC AWQS Class GA Standard. Please reconcile. Also, this section should recognize that the best use for site groundwater now and in the future is as drinking water and that those standards apply.

Response 18: Agreed. The section has been revised to reflect that while there were a few groundwater exceedences of standards, these concentrations were only slightly greater that the action level. A groundwater use restriction will be imposed as a land use control, so the site water would be prohibited as a source of drinking water.

Comment 19: Page 5, Human Health Risk Assessment: Further explanation is needed why inhalation of dust in ambient air and dermal contact to on-site soils was evaluated for future industrial workers at SEAD-17 only, and inhalation of indoor air and dust and dermal contact to indoor dust was evaluated at SEAD-16 only. The baseline risk assessment should also include a residential land use scenario, although the anticipated reuse of the SEADs as industrial only, to satisfy the requirement to evaluate the site at baseline conditions.

Response 19: The pathways of ambient air and dermal contact to on-site soil were not evaluated for SEAD-16 since the future industrial worker would essentially be an office worker with negligible exposure to these pathways. It should be noted that the ambient air and dermal contact to on-site soil pathways did not cause unacceptable risk to more sensitive receptors like the day care child (as presented in the table below); hence, the likelihood of these exposure pathways causing risk for an office worker is minute. Inhalation of indoor dust and dermal contact to indoor dust were not evaluated at SEAD-17 since the structure at SEAD-17, Building 367, is not considered a standard building. Building 367 consists of the deactivation furnace, surrounded by a cinder block barrier, 10 to 12 feet tall, with openings in the barrier to allow for entrance and egress. There is no cover over the furnace. The furnace had been operated under an interim RCRA permit. The Army does not believe that there is contamination in the structure at SEAD-17; however, any issues that remain relating to risk at SEAD-17 will be dealt with during the RCRA closure process.

Pre-Remediation Risk at SEAD-16:

	Inhalation of Ambient Air		Dermal Contact to On-Site Soil	
	HI	Cancer Risk	HI	Cancer Risk
Daycare Center Child	8E-1	1E-10	4E-2	1E-7

The Army believes that it has sufficiently evaluated baseline conditions by assessing a pre-disposal scenario for unrestricted use, Alternative 4P. Residential cleanup goals of 400 ppm for lead and TAGMs for other metals were established in the FS and were evaluated under the pre-disposal alternative, Alternative 4P. The purpose of performing a risk assessment for a future resident would be to determine levels that would be protective of that receptor. Since cleanup goals protective of a

future resident have previously been developed and evaluated, the addition of a future resident to the risk assessment is not deemed necessary. Therefore, a baseline risk assessment for a future resident will not be added to the risk assessment.

Comment 20: Page 6, Human Health Risk Assessment. There should be an explanation as to why the "SEAD-16 industrial worker is assumed to work only indoors" while the "SEAD-17 worker is assumed to work only outdoors." The statement that "(L)ead was considered by comparing site data to levels established by USEPA and NYSDEC as protective," needs further clarification as to what the protection is being applied to and under which conditions.

Response 20: At SEAD-16, the industrial worker will only work inside as an office worker; the future worker is not expected to be exposed to risk through most outdoors pathways. At SEAD-17, exposure to indoor pathways was not assessed since Building 367 is not a fully enclosed structure. The Army does not believe that there is contamination in the structure at SEAD-17; however, any issues that remain regarding risk at SEAD-17 will be dealt with during the RCRA closure process.

Risk caused by lead was considered by comparing site data to the levels established by EPA based on "Recommendations of the Technical Review Workgroup for Lead for an Interim Approach to Assessing Risks Associated with Adult Exposures to Lead in Soil" (EPA, December 1996) and "Guidance Manual for the Integrated Exposure Uptake Biokinetic Model for Lead in Children" (EPA, February 1994), which reference levels that are protective of adults and children, respectively. These statements have been added to the text.

Comment 21: Page 7, Ecological Risk Assessment: As stated in the Department's February 21, 2001 letter to the Army regarding the Final FS, the "proposition that an ecological hazard quotient of less than 10 should be considered acceptable (protective of ecological receptor), "is not adequately supported" and "screening is performed at a hazard quotient level of 1; raising the screening level to 10 appears arbitrary." Therefore, the NYSDEC continues to disagree with the Army's conclusion regarding their ecological risk assessment.

Response 21: Acknowledged. The text will be revised to remove references that a HQ of less than 10 represents an acceptable level of risk. However, the Army does believe that there is negligible ecological risk at SEAD-16 or SEAD-17. It should be noted that a hazard quotient of 1 is not considered a measure of risk but a measure of the level of concern. At both sites, most COCs with HQs greater than one were due to exposure to sediment/ditch soil. Risk from exposure to sediment/ditch soil assumes that the ditches are supporting aquatic life and that the receptor is continuously exposed. Site conditions at SEAD-16/17 suggest that usually there is no water in the ditches and that they do not support aquatic life. Due to the fact that it is not believed that the

sediment/ditch soils pose a threat to the environment, ecological risk is not of concern at the sites. In addition, the assumptions and many of the toxicity values used in the ecological risk assessment were overly conservative and over represent site risk.

Comment 22: Page 7, Remedial Action Objectives: Under this section the Army states that "(A)nother reason for the consideration of a residential use is 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." However, the Army never performs a comparison of life-cycle institutional control costs in the evaluation of alternatives. Because the document is so ambiguous as to which institutional controls would be required for each specific alternative, it inhibits any possible comparison of life-cycle institutional control costs. The Army should clearly spell out the institutional controls that would be required for each alternative, and then compare the life-cycle costs for institutional controls with more conservative cleanup alternatives (i.e., unrestricted scenario).

Response 22: Agreed. Possible land use controls that would be required as a part of each remedial alternative have been added to the text. For the purpose of cost estimation, costs for these controls, such as signage, development of a deed restriction, and attorney's fees, have been incorporated into the cost estimates and are presented in the text. The revised annual O&M cost for restricted use scenarios is $81,510 (formerly $40,440). The unrestricted use scenario would not require any long-term land use controls, hence, the annual O&M costs are unchanged, estimated at $40,440.

Comment 23: Page 8, Remedial Action Objectives: The statement that "(L)ead 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," is not adequately supported. Please provide a table/figure indicating the specific lead contamination levels comparative to the other contaminated levels proposed to be remediated by reaching the cleanup goal of 1250 ppm lead. The last sentence of this paragraph, stating that "(M)ost exceedances of these five metals are co-located with the lead exceedances," indicates that there would be metals contamination left on-site outside of the area that would be subject to the proposed cleanup goal of 1250 ppm lead. Please explain. Also, the Army does not present any remediation goals of the PAH or groundwater contamination as described on pages 3 through 5, respectively. Please reconcile.

Response 23: Acknowledged. The approach to defining the excavation area has been revised, as discussed in response to comment #1. To delineate the remedial area, initially the location of lead was mapped since it is the most geographically dispersed COC over the site. The extent of the remedial area was expanded by including any areas with samples that exceeded the metal and PAH

cleanup goals presented in Table 1. The Army will remediate to the cleanup goal scenario of soils containing lead greater than 1250 ppm or exceedances of PAH and metal cleanup goals that have been established.

Long-term monitoring for groundwater is proposed for SEAD-16 and SEAD-17. The text has been revised.

Comment 24: Page 8, Soil with Lead Concentration Exceeding 1250 mg/kg: The discussion on the proposed hot spot removal is not only lacking but also inappropriate. Not only does the Army not define what contaminants of concern would be addressed by the proposed hot spot removal, but they also do not state the cleanup goals to be achieved, or whether this hot spot removal is proposed for each alternative. The Army should define, in the description of alternatives, what contaminants are to be addressed and their respective cleanup goals. It is inappropriate for the Army to propose a hot spot removal in lieu of fully addressing the remediation of this area. The Army also needs to define the nature and extent of contamination that is being proposed for remediation of this area, instead of simply declaring a "hotspot removal." Also, is the Army proposing to perform a detailed risk assessment as part of the completion report? The definition of a completion report should be provided in the text.

Response 24: As stated in response to Comment #1, cleanup goals for PAHs and metals have been developed and, consequently, the remedial area has expanded. Therefore, the concept of "hotspots" no longer exists. All locations that include concentrations that exceed the cleanup goals are included in the remedial area, and the remedial action is driven by compliance with the established cleanup goals. It should be noted that all areas formerly referred to as "hot spots" are included in the revised remedial area based on exceedences of cleanup goals. Figures 2 and 3 have been revised to illustrate the extent of the remedial area.

A risk assessment will not be included as part of the completion report, since it is not a normal component of a completion report. Post remedial action sampling will confirm that there is no residual contamination remaining on-site.

Comment 25: Page 9, Soil with Lead Concentrations Exceeding 1000 mg/kg: The statement that "costs associated with the remediation of lead to a concentration of 1000 mg/kg was also estimated. This concentration level is associated with the New York State Department of Health (NYSDOH) guidelines for industrial use," should be revised to read that "(T)his concentration level was derived from past communications and agreement between the NYSDOH and the Army."

Response 25: Agreed. The text has been revised.

Comment 26: Page 9, Soil with Lead Concentration Exceeding 400 mg/kg + TAGM: The last sentence in this section is inappropriate and should be removed from the text.

Response 26: Agreed. The sentence has been removed from the text.

Comment 27: Page 10, SEAD-16 and SEAD-17 Remedial Alternatives: There are seven alternatives not six as stated. Alternative 4P is considered the seventh alternative.

Response 27: Agreed. The text has been revised.

Comment 28: Page 10, Alternative 2 – On-site Containment: Please expand on and explain how "(T)his alternative may also limit future land use."

Response 28: Agreed. This alternative may also limit future land use due to the inclusion of land use restrictions as an element of this remedy. Land use restrictions could include prohibiting disturbance of cover, excavation, etc. The text has been revised.

Comment 29: Page 11, Alternative 4P - Off-site Disposal: It is unclear whether the hot spot removal as outlined on page 8 would need to be performed for this alternative. Please clarify. Also, the last part of the first sentence, beginning with "even though" should be removed. Also, it is assumed that the institutional controls required for the residential scenario would be different from those that would be required under the industrial scenario, however this document does not clearly state the difference. The statement that ""(I)nstitutional controls, which are an element of this alternative, are discussed in the beginning of this section," should be removed and replaced with a discussion of the specific institutional controls proposed for this scenario.

Response 29: As stated in response to Comment #1, cleanup goals for PAHs and metals have been developed and, consequently, the remedial area has expanded. Therefore, the concept of "hotspots" no longer exists. All locations that include concentrations that exceed the cleanup goals are included in the remedial area, and the remedial action is driven by compliance with the established cleanup goals. Figures 2 and 3 have been revised to illustrate the extent of the remedial area.

The last part of the first sentence has been deleted, and the first sentence currently reads, "Alternative 4P addresses future unrestricted use of SEAD-16 and SEAD-17, which would restore the sites to the pre-disposal condition."

A discussion on common objectives of land use controls for all alternatives is presented upfront. Elements that are unique to each alternative are included as part of the detailed description of each alternative.

Comment 30: Page 11, Alternative 4, Off-site Disposal: The document should clarify if the "common fill" would be considered "clean" fill, and tested prior to backfilling. Also, the Proposed Plan should clarify that all soils failing TCLP will be handled as hazardous wastes for disposal purposes.

Response 30: Agreed. Clean backfill would be used and tested prior to backfilling. The text has been revised.

The Proposed Plan clarifies that soils failing TCLP will be handles as hazardous waste for disposal purposes.

Comment 31: Page 13, Detailed Analysis of Alternatives: The phrase "commercial use" is stated here and not anywhere else in the text. It is understood that the proposed future use of these sites is to be industrial use only, therefore please replace the phrase with more appropriate wording.

Response 31: The word "commercial" has been replaced with "industrial".

Comment 32: Page 14, Alternative 2: On-site Containment: It should be made clear in this section, and throughout the document, that additional sampling (i.e., pre-design sampling to define the extent of remediation) would be required, as stated in the Army's response to comments and in the list of elements of the preferred remedy.

Response 32: Agreed. Throughout the text, language is included to indicate that additional sampling (i.e., pre-design sampling to define the extent of remediation) would be required.

Comment 33: Page 15, Alternative 2: On-site Containment: The discussion on administrative feasibility of this alternatives, as with all of the alternatives presented in this Proposed Plan, does not discuss the implementability of institutional controls. It is the Department's understanding that the administrative feasibility of the implementation and enforcement of institutional controls at DOD facilities on the NPL is not favorable at this point. Please include a discussion. Also, community and state acceptance should be discussed under this alternative, and each of the other alternatives.

Response 33: It is the Army's understanding that EPA and the Department of Defense (DoD) have reached an understanding that requirements for implementation and enforcement of land use controls

will be detailed in the Remedial Design Plan. The discussion on land use controls in the Proposed Plan and ROD will be limited to the objectives and goals of the land use controls. The text has been revised to reflect this change.

State acceptance addresses technical and administrative concerns of the State with regard to remediation. NYSDEC is providing input during the preparation of this Proposed Plan, and their concurrence with the selected remedy will be included in the ROD. Community acceptance of the selected remedy will be evaluated following the public comment period and will be discussed in the Responsiveness Summary of the ROD. A discussion of community and state acceptance has been added under each alternative.

Comment 34: Page 16, Alternative 4, Off-site Disposal: The document states that "(A)t 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." If the Army is proposing Alternative 4 in that it will be protective of human health and the environment under an industrial scenario, these statements should be clarified. These statements are repeated on pages 17 and 18, and should be addressed in each instance as well.

Response 34: The Army find that this text leads to confusion and is not necessary. Therefore, the statements have been removed from the text.

Comment 35: Page 19, Overall Protection of Human Health and the Environment: This section does not address groundwater contamination with respect to protection of human health. Please address. This section should also discuss institutional controls and their relevance to protection of human health and the environment.

Response 35: Although the baseline risk assessment indicated that ingestion of groundwater did pose a risk to some receptors, which was caused by thallium, it is not believed that groundwater at the site poses a risk to human health. The Army questioned the thallium results used in the baseline risk assessment since thallium was not historically used in the vicinity of the site. The Army authorized an additional round of groundwater sampling in order to verify the presence of thallium. At SEAD-16, an additional sampling round for thallium was analyzed using furnace atomic absorption techniques, which has a lower detection limit for thallium (1.5 µg/L) and is not susceptible to aluminum interference. The original analytical method had a detection limit of 5 µg/L. The results demonstrated that thallium was not present in the groundwater, and prior results were likely due to laboratory errors from aluminum interference (the presence of aluminum in a sample can falsely elevate the reported concentration of thallium). In addition, the second round of sampling was

conducted using low flow techniques, which lowered reduced the turbidity of the samples. At other sites at SEDA, such as SEAD-13, low flow sampling has resulted in lower turbidity levels, which has corresponded to lower concentrations of metals. Turbidity data for the first round of sampling at SEAD-16/17 are not available. Since low flow sampling methods were not used during the first round, the turbidity levels of those samples were most likely high, which contributed to the reported elevated thallium concentrations. Accordingly, the Army believes that the thallium detections were attributed to the sample turbidity levels and analytical method. Therefore, groundwater does not pose a risk at SEAD-16. The only risk at SEAD-17 was for a day care center child (HI=1), which was also caused by ingestion of groundwater containing thallium. The additional round of groundwater sampling was not performed at SEAD-17. However, similar results to those at SEAD-16 would be expected. The elevated thallium may have been caused by high turbidity in the samples.

Land use controls aid in the protection of human health and the environment by limiting access to the site and preventing the use of groundwater as drinking water. The previous sentence has been added to the text.

Comment 36: Page 19, Compliance with ARARs: The document should point out that although there are no chemical specific ARARs for soil in New York State, NYSDEC TAGM 4046 are To Be Considered (TBCs). Also, although the Army does not expect there to be exceedances of ARARs for groundwater in the future, the Army should perform groundwater monitoring to confirm this notion.

Response 36: Agreed. NYSDEC TAGM 4046 are TBCs. The Army will perform groundwater monitoring to confirm compliance with ARARs. The text has been revised.

Comment 37: Page 20, Long-Term Effectiveness and Permanence: The NYSDEC disagrees with the Army's opinion that "(A)lternative 6 is the most effective in eliminating the long-term threats because soil washing segregates the coarse and fine factions of the soil." Alternative 4P should be the most effective in eliminating long-term threats because it involves excavating and removing the greatest amount of contamination form the site to a level that is protective for unrestricted use. Also, this section should include a discussion on institutional controls, and their role in relation to long-term effectiveness and permanence. Also, the term "EPC" is introduced without introduction and it is not located in the glossary.

Response 37: Agreed. Alternatives 2, 4, 4P, and 6 all demonstrate long-term effectiveness because they rely on disposal, containment, and treatment to reduce the hazardous constituents in the soils and ditch soils. Alternative 4P is the most effective in eliminating long-term threats since it would involve excavation and removal of contaminants, which is required in order to allow unrestricted use.

All alternatives would require temporary groundwater use restrictions until ARARs are achieved. Alternatives 2, 4, and 6 would require permanent land use controls restricting the site to industrial use only, with no daycare facility.

A discussion on the long-term effectiveness and permanence of land use controls has been added. The Army believes that land use controls are effective and permanent if monitored and enforced until such restrictions can be removed.

The term EPC, exposure point concentration, has been added to the glossary and defined in the text at its first reference on page 8.

Comment 38: Page 21, Implementability: This section should include a discussion of institutional controls and the ease, or lack thereof, of implementing all the alternatives that include this remedial element.

Response 38: It is the Army's understanding that EPA and DoD have reached an understanding that requirements for implementation and enforcement of land use controls will be detailed in the Remedial Design. The discussion on land use controls in the Proposed Plan and ROD will be limited to the objectives and goals of the land use controls. The text has been revised to reflect this change.

Comment 39: Page 21, Cost: This section states that "(A)dministrative costs include the costs for restricting future land use to non-residential." Does the Army intend on restricting this site for use as a daycare facility, or a conservation/recreation area? The term "non-residential" is too broad and should be clarified.

Response 39: The selected remedy will include language that only allows industrial use of the site. Additionally, use of the site as a daycare center will be restricted. The text has been revised to clarify this point.

Comment 40: Page 22, Preferred Alternative:

a) The first bullet of the remedial elements calls for "conducting additional sampling as part of the pre-design sampling program to further delineate the areas of excavation." This bullet should also call for the delineation of the area subject to institutional controls that is not suitable for unrestricted use due to residual contamination.
b) The third bullet should not specify a maximum excavation depth of ditch soil when there is a proposed cleanup goal of 1250 ppm lead.
c) The fifth bullet proposes excavating surface soils greater than 1250 ppm lead but does not address the subsurface soils. Please address.

d) As stated in Specific Comment 18, the text needs to indicate what contaminants the hotspot remediation is addressing.
e) The Army stated on Page 8 that a Completion Report would be submitted after the remedial actions have been completed, therefore the army should include this in the bulletized list.
f) The statement that Alternative 4 "is a cost effective, readily available alternative that does not require any long-term maintenance" should include a discussion of institutional controls, and the maintenance of such.
g) The statement that "(U)ntil the groundwater at the site meets MCL and GA standards, land use controls will be a part of the remedy," is false. Institutional controls, such as deed restrictions for industrial use only, etc. will be part of the remedy even after groundwater achieves ARARs. Please correct.
h) The last paragraph references a deed, but does not state that deed restrictions would be implemented as an institutional control. Please correct. Please note that for any deed restriction which may be instituted to ensure that this remedy is adequately protective of human health and the environment, a clause should be included compelling the property owner to annually certify to the New York State Department of Environmental Conservation that the deed restriction is in place, and that the use of the property is consistent with that restriction.
i) Also, under the bulleted items, please revise the statement "(C)onducting annual soil sampling in Kendaia Creek at four locations," to read (C)onducting annual sediment sampling in Kendaia Creek."

Response 40:

a) Agreed. The Army will also use the pre-design sampling and analysis information to delineate the area where land use restrictions will be required
b) Agreed. Excavation will continue until cleanup goals are achieved.
c) At SEAD-16, there are three locations (the area around SB16-2, SB16-4, and SB16-5) that would required subsurface excavation. This information has been added to the text. At SEAD-17 there is no identifiable soil exceeding the proposed cleanup goals in the subsurface. Table 3B indicates that 2 out of 10 samples exceeded the TAGM, however those samples were collected from the surface (0-2 feet).
d) As described in detail in previous responses, cleanup goals have been established for antimony, arsenic, cadmium, copper, mercury, thallium, zinc, and PAHs (benzo(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, and dibenz(a,h)anthracene). All excavation will continue until these CUGs have been achieved. The text has been revised.
e) Agreed. A bullet has been added that includes the submission of a Completion Report as an element of the remedy.

f) The text has been revised to reflect that Alternative 4 would also require maintenance of land use controls, such as fences and signs.

g) Agreed. There will be a temporary groundwater use restriction until groundwater concentration levels meet MCL and GA standards. Land use controls will be a permanent part of the remedy to restrict the site for industrial use only and to prevent site use for a daycare facility. The text has been revised.

h) It is the Army's understanding that EPA and DoD have reached an understanding that requirements for implementation and enforcement of land use controls will be detailed in the Remedial Design. The discussion on land use controls in the Proposed Plan and ROD will be limited to the objectives and goals of the land use controls. The text has been revised to reflect this change.

i) Agreed. The text has been revised.

Comment 41: Glossary: Under the BRAC definition it states that "(B)ase closure is in the process of being performed." It is the Department's understanding that the base has already been closed. If this is the case, then the definition should be corrected. NYSDEC is incorrectly defined as the "New York State Department of Environmental Protection." Under TAGM, the last sentence should be removed from the text.

Response 41: Agreed. The glossary has been revised.

Comment 42: Table 1A, 1B, 1D, and 2A: No footnote is provided for "n-nitrosodiphenylamine[1]".

Response 42: Agreed. The footnote has been deleted from all tables. It should be noted that the tables have been renumbered as Table 2A, 2B, 2D, and 3A.

Comment 43: Table 1D and 4D: These tables should define "action level."

Response 43: Agreed. The action level was NYSDEC sediment criteria, based on site specific total organic carbon (TOC) data. This information has been added to the tables. It should be noted that these tables have been renumbered Table 2D and 3D.

Comment 44: Table 1E: The values in the "average" and "frequency of detection" columns are the same. Please revise the "average" column to reflect a number not a percentage.

Response 44: Agreed. The table has been revised. It should be noted that the table has been renumbered Table 2E.

Comment 45: Table 3: This table should include PAH contamination (See Comment 2).

Response 45: Agreed. CUGs for carcinogenic PAHs whose NYSDEC TAGM 4046 values are human health based (benzo(a)anthracene, benzo(a)pyrene, benzo(k)fluoranthene, and dibenz(a,h)anthracene) have been developed and are presented in the table. It should be noted that this table has been renumbered as Table 1.

Comment 46: Tables 4 and 5: To be consistent with the text, all alternatives presented on these tables should indicate whether institutional controls would be required for each alternative.

Response 46: Agreed. The tables have been revised.

Comment 47: Table 6: This table should indicate the maintenance costs for institutional controls in the Annual O&M Costs column.

Response 47: Agreed. The maintenance costs for institutional controls will be included in the annual O&M costs (refer to comment #22). A note will be added to Table 6 to reflect this revision.

Comment 48: Tables 7 and 8: EPCs should be removed from these tables.

Response 48: Agreed. The remedial action will comply with the stated cleanup goals; therefore, no residual contamination exceeding cleanup goals is expected. Tables 7 and 8 have been revised and the EPCs have been removed from the tables.

Comment 49: As a suggestion, revising the tables by reducing the number of significant figures would make the tables more user-friendly.

Response 49: Agreed. The tables have been revised.

Comment 50: Appendix A: On page 2 it states that drainage ditch soils "would be removed to an approximate depth of 12 inches." In the Preferred alternatives section of the Proposed Plan it calls for removing ditch soils to a one foot depth. Please explain how the cleanup goals of 1250 ppm lead and 400 ppm lead and other metals to TAGM would result in the same depth of ditch soil to be remediated when clearly in the cost calculations it is estimated that the 400 ppm cleanup goal requires 3 times the amount of ditch soil to be remediated compared to the 1250 ppm cleanup goal. Please reconcile.

The last statement under Long-Term Effectiveness and Permanence should include a discussion of groundwater use restrictions.

Under Implementability, the statement "interaction with NYSDEC and EPA" should be removed from the text. Coordination with the regulatory agencies should not be included in the administrative feasibility discussion.

Response 50: a) Disagree. Although the depth of excavation of ditch soil is identical for both alternatives, the area of excavation is significantly larger for Alternative 4P. The area of ditch soil to be excavated under a cleanup goal of 1250 ppm lead was estimated at 7420 SF, which results in a volume of 275 CY. In Alternative 4P under a cleanup goal of 400 ppm lead and TAGM for other metals, the area of ditch soil to be excavated was approximated at 14,370 SF, which results in a volume of 532 CY. Therefore, Alternative 4P would require that approximately 2 times greater volume of ditch soil be excavated than under Alternative 4.

b) Agreed. All alternatives would require temporary groundwater use restrictions until ARARs are achieved. Alternatives 2, 4, and 6 would require permanent land use controls restricting residential use and land use as a daycare facility. Once groundwater ARARs are achieved, Alternative 4P would be permanent.

c) Agreed. The text has been revised.

TABLE A-1
Distribution of Metals in Soil at SEAD-16
SEAD-16/17
Seneca Army Depot Activity

		Proposed CUGs for Final Proposed Plan (mg/kg) [1]	DEPTHS									
			0-.2		0-.2 (DUP)		1'-2'		2'-4'		6'-12'	
SB16-1	Arsenic	22	5	J					3.3	J	6.3	J
	Cadmium	14	0.36						0.07	U	0.19	
	Copper	331	19	J					23.6	J	66.4	
	Lead	1250 [3]	21.9	j					12.6	J	309	
	Mercury	0.5	0.1	J					0.4	U	0.48	
	Thallium	2.6	1.8						0.94	U	0.85	
	Zinc	773	99.8						54.8		119	
SB16-2*	Arsenic	22	*SS16-3 is				6.9	J				
	Cadmium	14	nearby				0.45					
	Copper	331					206	J				
	Lead	1250 [3]					791	J				
	Mercury	0.5					**1.9**	**J**				
	Thallium	2.6					0.91					
	Zinc	773					183					
SB16-3	Arsenic	22	4	J	3.8	J						
	Cadmium	14	0.06	U	0.06	U						
	Copper	331	35.6	J	33	J						
	Lead	1250 [3]	65.9	J	51.7	J						
	Mercury	0.5	0.05	U	0.04	J						
	Thallium	2.6	0.82	U	0.79	U						
	Zinc	773	84.5		79.8							
SB16-4*	Arsenic	22	3	J					5.2	J		
	Cadmium	14	0.18						0.06			
	Copper	331	39.7	J					16.4	J		
	lead	1250 [3]	193	J					21.4	J		
	Mercury	0.54	0.51	J					0.04	J		
	Thallium	2.6	0.72						0.87	U		
	Zinc	773	90.4						89.2			
SB16-5*	Arsenic	22					6.9	J	5	J		
	Cadmium	14					0.09		0.09			
	Copper	331					**736**	**J**	26.6	J		
	lead	1250 [3]					**35400**	**J**	61.6	J		
	Mercury	0.5					0.54	J	0.03	U		
	Thallium	2.6					**88.2**		0.85	U		
	Zinc	773					165		70.9			

* Location included in area to be remediated to a depth of 1 ft (except SB16-4 and SB16-5 which are being excavated to 3 ft, and SB16-2 which is being excavated to 2 ft.).

bold Indicates that the concentration exceeds the risk-based CUGs

1. Soil criteria are human health based cleanup goals derived under the industrial scenario for the day-care child receptor. The CUG value is normalized according to the post-remediation HQ distribution for a day-care child receptor.
2. The cleanup goal value is based on the NYSDEC TAGM 4046, which is site background collected for SEDA, and was adopted since the risk-based value 0.7 was below background.
3. 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 PRAP for a more detailed discussion.

TABLE A-2
Distribution of Metals in Soil at SEAD-17
SEAD-16/17
Seneca Army Depot Activity

		Proposed CUGs for Final Proposed Plan (mg/kg) [1]	DEPTHS							
			0-.2		2'-4'		2'-4' (DUP)		4'-6'	
SB17-1	Arsenic	21.5	4.6		5.2				3.4	
	Cadmium	14.4	0.73	U	0.74	U			0.56	
	Copper	331	46.4		26.9				20	
	Lead	1250 [3]	266		11.4	J			7.5	J
	Mercury	0.54	0.05	J	0.06	J			0.03	UJ
	Zinc	773	93.4		80.2				57.1	
SB17-2*	Arsenic	21.5	5.2		6.9		6.3			
	Cadmium	14.4	2.8		0.74	U	0.6	U		
	Copper	331	85.1		18.5		21.5			
	Lead	1250 [3]	686		13		11.2			
	Mercury	0.54	0.04	U	0.04	J	0.04	J		
	Zinc	773	172		63		76.7			
SB17-3	Arsenic	21.5	4.1		5.4					
	Cadmium	14.4	0.43	U	0.74	U				
	Copper	331	25.9		26.9					
	Lead	1250 [3]	24.6	J	21.2	J				
	Mercury	0.54	0.06	J	0.04	J				
	Zinc	773	69.7		69					
SB17-4*	Arsenic	21.5	4.9		5.7					
	Cadmium	14.4	0.43		0.38	U				
	Copper	331	24		22.7					
	Lead	1250 [3]	12	J	11.7	J				
	Mercury	0.54	0.04	U	0.03	J				
	Zinc	773	64.2		85.1					

* Location included in area to be remediated to a depth of 1 ft.

bold Indicates that the concentration exceeds the risk-based CUGs

1. Soil criteria are human health based cleanup goals derived under the industrial scenario for the day-care child receptor. The CUG value is normalized according to the post-remediation HQ distribution for a day-care child receptor.
2. The cleanup goal value is based on the NYSDEC TAGM 4046, which is site background collected for SEDA, and was adopted since the risk-based value 0.7 was below background.
3. 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 PRAP for a more detailed discussion.

Response to Comments from the U.S. Environmental Protection Agency

Subject: Draft Final PRAP for SEAD-16 & 17
Seneca Army Depot
Romulus, New York

Comments Dated: October 29, 2002

Date of Comment Response: April 4, 2003

General Comments:

Comment 1: Page 1, 2nd Column, last ¶: Please update the address to receive comments and include your e-mail address.

Response 1: The mailing address has been updated. The Army requests that all comments be formally submitted to the Army in writing.

Comment 2: Page 4, 1st Column, 1st ¶, 2nd Sentence: Reference is made to groundwater background concentrations. Please provide a table with groundwater background concentration values.

Response 2: In the past the Army has not included this information in a Proposed Plan and does not see the relevance in including this information. Please refer to Table 6-2E in the RI for the groundwater background data.

Comment 3: Page 5, 1st Column, 2nd ¶, last Sentence: Confirm that thallium was also not detected at SEAD-17 by the additional groundwater sampling as discussed under SEAD-16 on page 4. Repeat last paragraph of the referenced groundwater discussion (regarding additional round of sampling) for SEAD-16 (page 4) as a new paragraph at the end of the Groundwater section under SEAD-17.

Response 3: The additional round of groundwater sampling was not performed at SEAD-17. However, similar results to those at SEAD-16 would be expected. For SEAD-16, the additional sampling round was analyzed using graphite furnace atomic absorption techniques, which has a lower detection limit for thallium (1.5 µg/L) and is not susceptible to aluminum interference. The original analytical method had a detection limit of 5 µg/L. The analytical results indicated that thallium was not detected in any of the on-site monitoring wells at SEAD-16, and it was concluded that thallium is not a COC in groundwater at SEAD-16. The additional groundwater sampling was conducted using low flow sampling techniques. At other sites, such as SEAD-13 (see attached), low flow sampling has resulted in lower turbidity levels, which has corresponded to lower concentrations of metals. Turbidity data for the first round of sampling at SEAD-16/17 are not available. Since low flow sampling methods were not used during the first round of sampling, the turbidity levels of those

samples were most likely high, which contributed to the reported elevated thallium concentrations. Accordingly, the Army believes that the thallium detections at SEAD-17 were attributed to the sample turbidity levels and analytical method. Thallium is not considered a parameter that is present in the groundwater. The text has been revised.

Comment 4: Page 8, 1st Column, 1st ¶, last 2 Bullets: Please delete the last two bullet items (RAOs) as, few if any, of the alternatives seem to address migration or restoration of media as bulleted. Add a new bullet describing the prevention of future exposure by institutional controls and groundwater monitoring until MCLs are met.

Response 4: Agreed. The text has been revised.

Comment 5: Page 8, 2nd Column, 3rd ¶, 2nd Sentence: Please provide the background HQ calculations or reference document with the calculations.

Response 5: Agreed. The text has been revised to include reference to the Remedial Investigation for SEAD-12, Table M.111 in Appendix M, which presents the background HQs for the short-tailed shrew, which is a similar receptor to a deer mouse.

Comment 6: Page 9, Summary of Remedial Alternatives: Please include language for institutional controls and Five-Year Reviews to each of the applicable remedies. Institutional controls should include restriction of land use to non-residential and groundwater use until MCLs are met.

Response 6: Agreed. Since all alternatives (except Alternative 4P) would result in contaminants remaining at the site that are above levels that allow unlimited use and unrestricted exposure, land use controls and five-year reviews would be required in order to attain remedial action objectives. All sites, including Alternative 4P, would require a groundwater use restriction until groundwater ARARs are achieved. Five-year reviews would be required to evaluate whether the response actions remain protective of public health and the environment. The text has been revised.

Comment 7: Page 15, Alternative 4 & 6, Cost Range: Please provide an explanation as to why there is a cost range under the Capital Cost and the Present Worth Cost for Alternatives 4 and 6.

Response 7: The range in costs is due to a range of cleanup goals evaluated for cost under each alternative (1250 mg/kg lead, 1000 mg/kg lead, 400 mg/kg lead, and 400 mg/kg lead + TAGMs).

Comment 8: Page 20, 1st Column, last ¶: Please provide an explanation as to why there may be post-remediation exceedances of TAGM values (e.g., will still be protective with restriction to industrial use).

Response 8: It should be noted that since the FS, risk-based cleanup goals (CUGs) for certain carcinogenic PAHs and metals (antimony, arsenic, cadmium, copper, mercury, thallium, and zinc) have been established. CUGs for PAHs were derived by following the same approach used at SEAD-59/71. PAH CUGs were derived using the NYSDEC Technical and Administrative Guidance Memorandum (TAGM) #4046: *Determination of Soil Cleanup Objectives and Cleanup Levels* method for establishing CUGs for carcinogens based on a future construction worker receptor (daycare facility use will be restricted), the most conservative receptor under the intended future use scenario (industrial). CUGs for metals were derived by back calculating concentrations of metals that, combined, would yield a non-carcinogenic risk less than 1. In order to account for the fact that each metal constituent of concern (COC) is only a partial contributor to total risk, the post-remediation hazard index (HI) for each COC at SEAD-17 was normalized to reflect the magnitude of risk of one metal in comparison to the total risk from all the metals of concern. It should be noted that *post-remediation* assumes that all surface soil samples located within the boundary of the area delineated by concentrations of lead greater than 1250 mg/kg have been removed. The normalized HI was subsequently used as the acceptable risk value in the calculation to determine the CUGs for metals. The risk-based CUGs for PAHs and metals are presented in Table 1.

The remedial action will comply with the cleanup goals, shown in the revised Table 1. Tables 7 and 8 present the maximum level of each COC that is expected to remain on-site once the remedial action is complete. The text has been revised to reflect that there will be no post-remediation exceedances of the cleanup goals.

Response to Comments From New York State Department of Environmental Conservation

Subject: Draft Proposed Remedial Action Plan (PRAP) for SEAD-16 and 17
Seneca Army Depot
Romulus, New York

Comments Dated: November 13, 2001

Date of Comment Response: May 14, 2002

General Comments:

It is not clear if the proposed remedy will leave the site for unrestricted use or not. The Proposed Plan should be specific in defining all the components of a proposed remedy. This includes institutional controls. If the Army is intending on leaving residual contamination above acceptable levels for unrestricted use, institutional controls will be necessary to prevent unacceptable human exposures. This Proposed Plan must include the definition and description of the specific institutional controls envisioned. The geographic extent and the specific restrictions (i.e., residential, childcare facility, etc.) of the institutional controls must be included in the Proposed Plan and the subsequent Record of Decision. In addition, institutional controls should be compared to the evaluation criteria just as any other component of a remedial alternative. At least one unrestricted use alternative should be brought forth into the detailed analysis of alternatives to present a full comparison of the advantages and disadvantages of a range of alternatives, from unrestricted use to a restricted use scenario that requires institutional controls and long-term monitoring. The comparative analysis of institutional controls, including cost, implementability, and administrative feasibility needs to be addressed in this Proposed Plan.

Since groundwater contamination is not addressed by this remedy, some type of institutional control limiting groundwater usage must be included in addition to the proposed long-term groundwater monitoring.

The State requests the following spatial amendments be made to excavation areas for Alternative 4 (Off- Site disposal):

1. SEAD 16: The present spatial configuration of the excavation area does not include surface soil areas containing elevated levels of carcinogenic PAHs (up to 1,159 mg/kg). The inclusion of the following soil sampling areas in the final excavation are is requested: SS 16-1; SS 16-31; SS16-35; and SB16-4.

2. SEAD 17: As stated on page 8 of the draft Proposed Plan for concentrations of metals in soil, "...results indicate that metal concentrations of 18 mg/kg, 359 mg/kg, 539 mg/kg, 2.69 mg/kg

> for antimony, copper, zinc, mercury and thallium respectively, will not pose unacceptable risks for the future industrial use scenario...Therefore, the delineated area for lead cleanup...has been examined to include areas with concentrations exceeding the above-mentioned levels for the future industrial use scenario." These values were calculated based upon the maximum metal concentrations that would be protective of a day-care/residential child in an industrial and residential use scenario. However, when comparing the metals concentration pattern to the proposed delineated area to be excavated, the delineated area does not include all areas which metal concentrations exceed the above values. The soil sample from area SS17-10 contains 52 mg/kg antimony and 546 mg/kg copper and therefore must be included in the area of excavation.

This draft lacks data tables identifying contaminants of concern, corresponding concentrations, proposed cleanup standards and concentrations of contaminants proposed to be left on-site. This information need to be clearly presented in the revised Proposed Plan.

Response: Several changes have been made to the document in response to this comment. Data tables identifying the contaminants of concern and their concentrations and cleanup goals have been added to the report. In addition, the elements of the remedy have been more clearly outlined in the "Preferred Alternative" section. Figures 2 and 3 have been added to show the areas of remediation for the remedial action at both sites. Responses to additional points made above follow:

Future Use

The remedial action objectives for SEADs-16 and 17 were based upon the intended future land use, which is industrial use 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. The goal of the remedial action is to prevent ingestion of and dermal contact with soils and ditch soils with lead concentrations above 1,250 mg/kg, which is based on the future industrial use scenario. The text has been revised to clearly state that the proposed remedy is for future industrial land use. The elements of the remedy have been more clearly outlined in the *Preferred Alternative* section.

Institutional Controls

Text explaining the use of institutional controls has been added to the sections entitled *Summary of Remedial Alternatives* and *Preferred Alternative*. The use of institutional controls may include access control, land use restrictions, and the restriction of groundwater use. The land use controls are intended to prevent the use of groundwater as drinking water as long as the concentrations in the water are greater than GA or MCL standards. The report considers clean up for industrial use and makes reference to the future use of the property being industrial, which, by definition, will

necessitate the imposition of a land use restriction. Institutional controls will be part of the overall remedial strategy to restrict exposure to those activities involving industrial use. Upon land transfer, language will be included in the deed that would require the continued use and maintenance of the land use controls.

Institutional controls have been addressed in the cost estimates for all alternatives to cover semi-annual groundwater monitoring.

Detailed Analysis

The evaluation of an unrestricted land use alternative under the Alternative 4, Off-Site Disposal, has been conducted and will be added to the PRAP as Appendix A. For unrestricted land use, lead concentrations of 400 mg/kg + TAGM have been evaluated. The 400 mg/kg level of lead in soil is the EPA recommended level for residential use.

Groundwater

Groundwater use restrictions will be required until the groundwater monitoring shows that the concentrations of contaminants of concern have decreased to below the GA or MCL criteria. This statement has been added to the text in the institutional controls discussion.

Groundwater is not considered to be a media of concern because the results of the risk assessment showed no risk to future receptors. In addition, four of the metals that were detected at concentrations exceeding the groundwater criteria were also detected in background groundwater samples.

Amendments to Excavation Areas

Additional locations for removal will only be incorporated to the extent that the railroad tracks are not disrupted. The area between the northwest corner of Building S-311 and the railroad tracks has been added as an area of hotspot removal. This area includes the soil sampling locations SS16-1 and SB16-4. The soil sampling locations, SS16-35 and SS16-31, will be removed as hotspots at locations adjacent to the railroad tracks. The areas will be excavated to a depth of 12 inches and backfilled with clean soil. No confirmatory sampling will be conducted.

The area around soil sampling location SS17-10 has been added as a hot spot removal location. The area will be excavated to a depth of 12 inches and backfilled with clean soil. No confirmatory sampling will be conducted.

Specific Comments:

Comment 1: Please remove "Superfund" from the title. The Army is a responsible party as defined in Section 107 of CERCLA therefore the term "Superfund" is not applicable to this site.

Response: Agreed. The title has been revised.

Comment 2: Page 1, Purpose of Proposed Plan: In the third sentence, please remove the phrase "with support from" and replace it with more appropriate wording such as "in cooperation with." The USEPA and NYSDEC entered into the Federal Facilities Agreement as equal entities therefore the regulatory agencies are not "support" agencies as otherwise indicated.

Response: Agreed. The text has been revised.

Comment 3: Page 2, Site Background: The last sentence of the third paragraph states that "access to the site is restricted because the site is located in the ammunition storage area." It is the Department's understanding that there is no ammunition being stored on-site. If that is the case, then the Army should denote that the site is located in the "former" ammunition storage area.

Response 3: Agreed. The word "former" has been added to the text.

Comment 4: Page 5, Additional Information on SEAD-25 and SEAD-26 Human Health Risk Assessment: The statement "the decision to perform a remedial action will be based upon the intended land use scenario" should be removed from the text. The decision to perform a remedial action should be based upon a remedial investigation/feasibility study that includes a detailed analysis of remedial alternatives, not simply on the basis of the intended land use scenario.

Response: This comment does not apply to the SEAD-16 and 17 PRAP, but the SEAD-25 and 26 PRAP. The referenced statement is not found in the SEAD-16 and 17 PRAP.

Comment 5: Page 7, Remedial Action Objectives: The statement that "the selection of lead as a cleanup goal is a result of discussion between the Army, USEPA, and NYSDEC," is inappropriate, incorrect and should be removed from the text. Please refer to the general comments section of the NYSDEC's February 21, 2001 letter which states that "the FS does not clearly demonstrate if or how using a cleanup goal for lead will affect the other contaminants. The level of contaminants to be remediated or left untreated onsite should be evaluated and discussed for each alternative to provide a better perspective during the comparative analysis for each cleanup goal. Without such a discussion

it is difficult to support the Army's conclusion that the remedies evaluated are protective of human health."

Response 5: Acknowledged. The phrase has been removed from the text.

Lead was used as the indicator compound for determining the volume of soil to be remediated because lead was the most widespread metal of concern in soil. Four levels of protection for lead have been considered. These levels include 1250 mg/kg, 1000 mg/kg, 400 mg/kg, and 400 mg/kg + TAGM. In addition to lead, cleanup goals were calculated for antimony, copper, mercury thallium, and zinc for the industrial and residential scenarios. These cleanup goals were included in the four clean-up scenarios.

Results of the calculation 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. Therefore, the areas of soil to be remediated for lead cleanup concentrations of 1,250 and 1,000 mg/kg also include areas with concentrations exceeding the above-mentioned levels for the future industrial use scenario.

Results of the calculation indicate that metal concentrations of 12.8 mg/kg, 256 mg/kg, 385 mg/kg, 1.92 mg/kg, and 2.56 mg/kg for antimony, copper, zinc, mercury, and thallium, respectively, will not pose unacceptable risks for the future residential use scenario. Therefore, the areas of soil to be remediated for a lead cleanup concentration of 400 mg/kg also include areas with concentrations exceeding the above-mentioned levels for the future residential use scenario.

A discussion on residual contamination has been added to the text under the *Long-Term Effectiveness and Permanence* section under Evaluation of Alternatives. The goal of the remedial action is to have no residual contamination in soils above the clean up goals developed for the future industrial use scenario (lead concentration of 1250 mg/kg). The limits of excavation were established with the aim of achieving this objective. A table has been added to the PRAP presenting the clean up goals for soil for the future industrial use scenario.

After remediation is completed at SEAD-16, the maximum concentrations of antimony, copper, lead, mercury, and thallium, are expected to be below the calculated concentrations determined to be protective of human health under an industrial scenario. Although the maximum concentration of zinc exceeds the clean up goal, the EPC for zinc is below the clean up goal.

After remediation is completed at SEAD-17, the maximum concentrations of lead and the five metals, antimony, copper, mercury, thallium, and zinc, are expected to be below the calculated concentrations determined to be protective of human health under an industrial scenario.

Comment 6: Page 8, Soil with Lead Concentration Exceeding 1250 mg/kg: It states that the cleanup goal of 1250 mg/kg of lead "is likely to be result in residual levels of lead at the site that are protective of all receptors in a residential scenario." However, other metals "such as arsenic and cadmium, exceeded the EPCs outside the proposed lead cleanup areas." The draft needs to clarify that lead is not the only contaminant of concern at this site and discuss the post-remedial action levels remaining on-site of other contaminants under various alternatives.

Response 6: As stated in the response to Comment 5, lead was used as the indicator compound for determining the volume of soil to be remediated because lead was the most widespread metal of concern in the soil. However, cleanup goals were also calculated for antimony, copper, mercury, thallium, and zinc. The areas of remediation were established based on the values derived for the future industrial use scenario. This information was already provided in the section titled *Remedial Action Objectives*. A sentence has been added to that section stating that cleanup goals were also derived for the five metals.

The goal of each remedial action alternative is to have no residual contamination in soils above the clean up goals developed for the future industrial use scenario. As presented in the response to Comment 5, the cleanup goal is 1250 mg/kg for lead and the cleanup goal is 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. The text of the PRAP states that the alternatives were developed based on the proposed cleanup level of 1250 mg/kg for lead.

Tables A-1 and **A-2,** which present the post-remediation EPCs and maximum concentrations of antimony, copper, mercury, thallium, and zinc at each site, will be added to the PRAP as Tables 7 and 8. After the remediation is complete, the EPC values of these metals are expected to be below the calculated concentrations determined to be protective of human health under an industrial scenario. The post-remedial EPCs for arsenic and cadmium were also calculated for SEAD-17. The EPC for arsenic is less than the TAGM and the EPC for cadmium slightly exceeds the TAGM value.

After remediation is completed at SEAD-16, the maximum concentrations of antimony, copper, lead, mercury, and thallium, are expected to be below the calculated concentrations determined to be protective of human health under an industrial scenario. Although the maximum concentration of zinc exceeds the clean up goal, the EPC for zinc is less than the clean up goal.

After remediation is completed at SEAD-17, the maximum concentrations of lead and the five metals, antimony, copper, mercury, thallium, and zinc, are expected to be less than the calculated concentrations determined to be protective of human health under an industrial scenario.

After remediation at SEAD-16, the only expected exceedance of TAGMs for arsenic or cadmium is one hit of arsenic at a concentration of 9.9 mg/kg, which only slightly the TAGM value of 8.2 mg/kg.

The post-remedial concentrations of arsenic and cadmium were considered at SEAD-17. After remediation, only one detection of arsenic, 8.9 mg/kg, slightly exceeds the TAGM value of 8.2 mg/kg. For cadmium, there are expected to be eight exceedences of the TAGM, but seven of these detections are less than twice of the TAGM value. The maximum concentration of cadmium is expected to be 5.6 mg/kg. However, the post-remediation EPC for cadmium is expected to be 2.45 mg/kg, which only slightly exceeds the TAGM value.

The information discussed above has been added to the text in the *Long-Term Effectiveness and Permanence* section under *Evaluation of Alternatives*. It should be noted that only the intended future land use, industrial use, will be considered in the PRAP; consequently, discussion of analysis relating to a residential scenario has been removed from the document.

Comment 7: Page 8, with Lead Concentration Exceeding 1250 mg/kg: The statement "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," needs to be clarified. Is it the Army's contention that the soil cleanup objective is protective of the environment in an industrial setting only? Also, on page 2-12 of the FS it states that "a post remediation ecological risk assessment will be conducted to ensure the remediation plan is protective of the environment." However, the Proposed Plan does not address this.

Response 7: It is the Army's intent to clean up soil to be protective of the environment in an industrial setting. After completion of the remedial action at both sites, a Completion Report that will demonstrate that the remedial action is protective of human health and the environment, will be submitted. A post remediation ecological risk assessment will not be conducted. A statement that describes the submittal of a Completion Report has been added to the referenced paragraph.

Comment 8: Page 8, Soil with Lead Concentration Exceeding 400 mg/kg: The draft states that to comply with NYS regulations to "restore the site to pre-disposal conditions, to the extent feasible and authorized by law" the Army calculated the "costs associated with the remediation of lead to pre-disposal (or residential) conditions." As stated by the NYSDEC numerous times over the years, at least one unrestricted use alternative should be brought forth into the detailed analysis of alternatives. A simple cost comparison is not sufficient to present a full comparison of the advantages and disadvantages of a range of alternatives, from unrestricted use to a restricted use scenario that requires institutional controls and long-term monitoring.

The statement that "the decision to accept the residential use scenario clean-up goal would be considered if the cost comparison showed that the cost to achieve lower cleanup level was affordable, in the opinion of the Department of Defense" is not satisfactory.

Response 8: Acknowledged. The evaluation of unrestricted land use under Alternative 4, Off-Site Disposal, will be evaluated against the nine criteria and will be submitted as Appendix A to the PRAP. For unrestricted land use, lead concentrations of 400 mg/kg + TAGM will be the cleanup goals. The 400 mg/kg level of lead in soil is the EPA recommended level for residential use.

Comment 9: Page 9, Alternative 2- On-site Containment: It states that "regrading of the site and installation of institutional controls... will be required" for Alternative 2, however there is no mention of institutional controls in the detailed analysis of alternatives. See General Comments above. The draft also states "(T)his alternative may also limit the future land use." Does this imply that the land use will have to be restricted? The Proposed Plan should clarify this.

Response 9: As stated above, a discussion of institutional controls has been added to the description of the remedial alternatives. The PRAP considers clean up for the future industrial use scenario, which will necessitate the imposition of a land use restriction.

Comment 10: Page 12, Alternative 2: On-site Containment: The draft states that "Alternative 2 will leave contaminated soil in place" and "it may restrict future use of the land," however there is no discussion of institutional controls. The Proposed Plan needs to be clear on whether the site will need to be restricted or not. See General Comments and Specific Comment #10 above.

Response 10: As stated in the response to the General Comment, the use of institutional controls including access control, land use restrictions, and the restriction of groundwater use, has been added to the section titled *Summary of Remedial Alternatives*. The report considers clean up for industrial use and makes reference to the future use of the property being industrial, which, by definition, will necessitate the imposition of a land use restriction. Institutional controls will be part of the overall remedial strategy to restrict exposure to those activities involving industrial use. Upon land transfer, language will be included in the deed that would require the continued use and maintenance of the land use controls.

Comment 11: Page 13, Alternative 4: Off-site Disposal: The statement that "the remediation areas have already been initially delineated" needs to be clarified. As stated in the NYSDEC's February 21, 2001 letter to the Army concerning the FS, it is our opinion that "the estimate of quantities to be remediated cannot justifiably be made when the remediation limit is largely undefined." The Army's July 31, 2001 response to comments stated that "(A)dditional sampling has been planned as part of a

pre-design sampling program to further delineate the areas." The Army needs to add language to the Proposed Plan explaining the extent and purpose of this pre-design sampling.

Response 11: Agreed. An additional sampling program will be conducted as part of a pre-design sampling program to define the perimeter of the area of excavation. This sampling program has been added to the bulleted items in the *Preferred Alternative* section.

Comment 12: Page 16. Compliance With ARARs: The draft states that "exceedance of ARARs will not be expected in the future, even without any action, according to modeling results presented in FS.". However, there is no discussion or presentation in the FS regarding modeling results and future groundwater conditions.

Response 12: Agreed. The text has been revised to indicate that the Fate and Transport model, which was originally run for the RI Report, was rerun for the FS Report. A discussion of the model and the results are presented in Section 1.4 (Fate and Transport) of the FS Report. The fate and transport model consisted of a conceptual site model, water balance calculation, and the VLEACH model. A detailed discussion of the numerical models and their applications and assumptions is presented in the RI Report.

The fate and transport model was rerun for the FS Report using site specific information. The results suggested that the metals in the on-site soil tend to strongly bind to soil instead of partitioning into the water. For SEAD-16, the results of the model indicate that groundwater concentrations of copper, arsenic, mercury, and cadmium will not increase or exceed the respective groundwater standard in 100,000 years.

For SEAD-17, the results of the model indicate that groundwater concentrations of lead, copper, antimony, zinc, silver, and cadmium will not exceed the respective groundwater standard for 100,000 years.

Comment 13: Page 18. State Acceptance: After the phrase "State comments received on" please insert the following: "the RI report, FS report and."

Response: Agreed. The text has been revised.

TABLE A-1
SEAD-16 RESIDUAL CONTAMINATION
Proposed Remedial Action Plan for SEAD-16/17
Seneca Army Depot

	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 A-2
SEAD-17 RESIDUAL CONTAMINATION
Proposed Remedial Action Plan for SEAD-16/17
Seneca Army Depot

	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.

Response to Comments From United States Environmental Protection Agency

Subject: Draft Proposed Remedial Action Plan (PRAP) for SEAD-16 and 17
Seneca Army Depot
Romulus, New York

Comments Dated: March 7, 2002

Date of Comment Response: May 14, 2002

General Comments:

Comment 1: Page 1: Purpose of Proposed Plan, 1st Column, ¶1
Clarify the meaning of the word "Active" within the name of SEAD-17 in light of the closure status of Seneca, which is not an active facility anymore. Also, clarify the role of the Corps versus the Army (i.e., who is responsible to sign and implement the Record of Decision [ROD]).

Response 1: Agreed. A discussion has been added to the Site Background section on page 2 stating that the SEAD-17 furnace 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 provisions of RCRA, but the RCRA permit was withdrawn by the Army when the Depot was listed for base closure in 1995.

The Army is responsible for signing and implementing the Record of Decision. Reference to the U.S.Army Corps of Engineers (USACOE) has been removed from the document.

Comment 2: Page 1: Purpose of Proposed Plan, 2nd Column, Last ¶
Please provide an electronic mail address to receive comments via the internet.

Response 2: Disagree. The Army requests that all comments be formally submitted to the Army in writing.

Comment 3: Page 2: Site Background, 1st Column, ¶2 & 3
Provide a describe how each of these two sites were used (i.e., what kind of deactivation occurred, processes, etc.).

Response 3: Agreed. Text has been added describing the process of deactivation of small arms munitions at the sites.

Comment 4: Page 2: Site Background, 1st Column, ¶4
NPL means National Priorities List, not National Priority List as usually spelled out by the Army.

Response 4: Agreed. The text has been revised.

Comment 5: Remedial Investigation Summary, 2nd Column
Please provide the State's approval date for the Final Closure Report for the Underground Storage Tanks Removal of 1994. In addition, please indicate if the four referenced documents are available to the public as part of the Site's Administrative Record.

Response 5: The tanks were unregistered. During the removal of the tanks, there was no evidence of leaks. The report was not submitted to NYSDEC.

The four referenced documents are available to the public and are located at the Seneca Army Depot Activity. This information has been added to the first paragraph of the referenced section.

Comment 6: Page 3: Groundwater for SEAD-16
This section indicate that the source of inorganics exceedances is not likely to be SEAD-16. However, nothing is said of what is being done to determine any other possible sources or to determine if it is due to natural occurrence.

Response: Agreed. The text is misleading. The concentrations of aluminum, manganese, iron, and sodium in the site groundwater are similar to concentrations found in groundwater from background locations and are most likely naturally occurring. The sentence has been reworded to the following: "The site mean concentrations for aluminum, manganese, iron, and sodium are not statistically different from their background concentrations."

Comment 7: Page 3 & 4: SEAD-16 & 17
Please provide concentration values, ranges and maximums, for all the investigated media.

Response: Agreed. Tables have been added to the report.

Comment 8: Page 4: SEAD-17, Groundwater
This section only list MCLs as the criteria for contaminants evaluation in this media. Please include NYSDEC AWQS Class GA criteria and its respective evaluation.

Response: Agreed. The text has been revised.

Comment 9: Page 5 & 6: Summary of Site Risk, Human Health Risk Assessment

The reviewer found no discussion of the future land reuse expected for these sites. Is there any potential for future residential redevelopment? Furthermore, if future land use was only evaluated for industrial scenario, Institutional Controls (ICs) and 5-Year Reviews are required.

Response: Agreed. Text has been added to the section titled *Remedial Action Objectives* designating the future land use as industrial. A discussion of Institutional Controls has been added to the section titled *Summary of Remedial Alternatives*. A discussion of the 5-Year Review has been added to the *Preferred Alternative* section.

Comment 10: Page 7: Remedial Action Objectives, 2nd Column, ¶1
Remedial action objectives need further discussion, especially the groundwater component seems to have been omitted from the document.

Response: Agreed. A discussion of the remedial action objectives for groundwater, soil in the ditches, and building debris has been added to the PRAP.

Groundwater is not considered to be a media of concern because the results of the risk assessment showed no risk to future receptors. In addition, four of the metals that were detected at concentrations exceeding the groundwater criteria were also detected in background groundwater samples.

Comment 11: Page 7: Remedial Action Objectives, 2nd Column, last ¶
The word "residential" should be stricken out of this sentence.

Response : Agreed. The wording is incorrect. However, this sentence as well as related text discussing residual risk for the future residential use scenario have been removed from the document.

Comment 12: Page 8: 1st Column, ¶2, 2nd sentence
There seems to be confusion between exposure scenarios and receptor groups. Please clarify which scenario and receptor group were used to estimate the levels of inorganics proposed to be removed.

Response 12: Acknowledged. Two sets of maximum metals concentrations were calculated. One set was for the future industrial use scenario with the daycare child as the receptor. The second set was for the residential scenario using the child as the receptor. The discussion of the residential use scenario has been removed from the referenced paragraph, which describes the calculated clean up goals for the industrial scenario.

Comment 13: Page 8: 1st Column, ¶3, 2nd sentence

NYSDEC TAGM values are human health-based values, unsuitable to assess environmental conditions for ecological purposes. Please provide accepted ecological-based criteria as presented in the FS.

Response 13: Agreed. The paragraph has been revised to state that site background concentrations were also used to calculate ecological hazard quotients.

Comment 14: Page 9: Summary of Remedial Alternatives, 1st Column, after ¶1
Discussion of groundwater impact and remediation (i.e., treatment, monitoring. restrictions, etc.) are lacking throughout the entire document, specially under this section and the Evaluation of Alternatives section. In additional, institutional controls (ICs) and 5-year reviews are required for each of the alternatives presented within this document.

Clarify the type of treatment meant by "off-site treatment" throughout this section.

Response 14: Acknowledged. A discussion on the remedial action objective for groundwater has been added to the section titled *Remedial Action Objectives*. Groundwater is not considered to be a media of concern because the results of the risk assessment showed no risk to future receptors. In addition, four of the metals that were detected at concentrations exceeding the groundwater criteria were also detected in the background groundwater samples. The groundwater will be monitored on a semi-annual basis at both sites and institutional controls may be used to restrict usage of groundwater for drinking.

As stated in the Response to Comment 9, a discussion on institutional controls has been added to the PRAP. A discussion of the 5-year review requirement has been added to the *Preferred Alternative* section.

Off-site treatment may include soil stabilization, which involves mixing an additive such as cement, quick lime, flyash, pozzolans, or a proprietary agent with the soil. This information has been added to the text.

Comment 15: Figure 3
The copy submitted is not readable.

Response: The figure has been revised to be more readable.

Response to Comments From U.S. Army Corps of Engineers

Subject: Draft Proposed Remedial Action Plan (PRAP) for SEAD-16 and 17
Seneca Army Depot
Romulus, New York

Comments Dated: December 26, 2001

Date of Comment Response: April 7, 2002

Comments from Jim Peterson, Cost Engineering:

Comment 1: Please identify source of applicable cost information. Cost back up should be furnished in order to perform a review.

Response 1: The cost back up is provided in the Final Feasibility Study Report for SEAD-16 and 17 (Revised July 2001). A footnote has been added to Table 3, Detail Cost Estimates.

Comments from Sandy Frye, Compliance:

Comment 1: ARAR Issues ? The brief discussion on Compliance with ARARs on page 16 needs to be more specific. For example, stating the CWA is an ARAR is far too broad of a statement to make regarding ARARs for this project. The CWA covers a myriad of areas of compliance. In this document, the specific requirements of the CWA the contractor/Corps feels are germane need to listed. Are CWA requirements regulating storm water discharge at construction sites exceeding 1 acre in size the actual ARARs? Are substantive portions of the CWA pertaining to point source discharges applicable or relevant and appropriate? Or, is the contractor referring to AWQC standards? Past experience has shown that poorly identified ARARs in the ROD can come back to haunt a facility in the future. It is strongly recommended that the specific sections of the CWA the contractor feels are ARARs should be identified and any numeric standards listed. If this identification cannot be done, then perhaps the CWA is not an ARAR after all. ARARs should have been specifically identified in the FS. If not, it is unclear how the alternatives could have been adequately evaluated and a remedial action recommendation made. The ARAR evaluation required for the FS should be presented here in the Proposed Plan.

EPCRA is not an ARAR for this project. EPCRA contains no substantive requirements that would apply to any of the hazardous substances found on the site. It is an entirely administrative regulation and has no requirements that would be applicable or relevant and appropriate for this project. It should be deleted as an ARAR. [Note: EPCRA is not legally enforceable at any Federal facility. Compliance with EPCRA at Federal facilities is mandated by EO 13148 and not law. Because it is

not a legally enforceable standard, it does not meet the definition of an ARAR and should not be listed as such.]

NEPA is not an ARAR. CERCLA constitutes the functional equivalent of NEPA and therefore NEPA is not required at sites undergoing CERCLA response actions. DoD Instruction 4715.9, Enclosure 2, paragraph E.1.1.5 specifically states that the procedural requirements for preparation of documentation to meet the statutory requirements for remediation and/or restoration projects undertaken under CERCLA are substantially the same as prescribed under NEPA. It also states that components are not required to prepare separate NEPA documents for CERCLA actions. NEPA should be deleted as an ARAR.

Response 1: A revised list of ARARs has been added to the PRAP as Appendix A. The revised list refers to Section 404 of the Clean Water Act (CWA) as a Potential Federal Location-Specific ARAR. In addition, the NPDES Permitting Requirements for Discharge of Treatment System Effluent; Effluent Guidelines for Organic Chemicals, Plastics, and Synthetic Fibers; and Discharge to POTW are referenced as sections of the CWA that are Potential Federal Action-Specific ARARs. The EPCRA has been removed from the ARAR list.

Comment 2: Page 6 of the Proposed Plan indicates that there was no unacceptable risk posed at SEAD 17 except to a future child care center child. As this is NOT a reasonably foreseeable use for SEAD 17, it is totally unclear as to why valuable and increasingly rare DOD restoration dollars would be spent to remediate the site. In order to avoid giving the appearance of ?we don?t know what we are doing? it would be prudent to include the real driving force behind the decision to remediate the site. If political pressure is being applied or EPA and/or the State will not accept any other alternative, it should be stated clearly in the document. This will ensure that this information will be available for any future evaluations/assessments that might be done at the site regarding the logic used in the selection of the remedy.

Response 2: Evaluation of the day care child in the human health risk assessment was requested by the EPA based on the fact that other day care centers had been present at SEDA. The human health risk assessment indicates that indoor dust, soil, and groundwater at SEAD-16 present a risk to the future industrial worker, future day care child, and future day care center worker. In addition, the human health risk assessment indicates that ingestion of on-site soil presents a risk to the future day care child at SEAD-17.

Maximum soil concentrations of antimony, copper, mercury, thallium, and zinc were calculated for the two most conservative receptors, a day care child in an industrial scenario and a residential child.

For the future industrial use scenario, most locations with concentrations of metals exceeding the calculated clean up goals are co-located with the areas having lead exceedances of 1250 mg/kg.

The Army proposed a cleanup level for lead of 1250 mg/kg, which was derived from an EPA publication that suggested a range of lead cleanup levels (750 ppm to 1750 ppm) which may result in an acceptable residual risk under an industrial scenario. This concentration is protective of receptors in an industrial future use scenario, but not for a day care center child. Although a day care scenario was evaluated in the human health risk assessment, it is not the Army's intent to use the property for a day care center. Deed restrictions will be placed on both sites restricting day care centers.

Comments from Laura L. Tate, Chemical Engineer:

Comment 1: EPA 540-F-98-054 Presumptive Remedy for Metals-in-Soil Sites
"The presumptive remedy for principal threat metals-in-soil waste that is targeted for treatment is: Reclamation/Recovery (when feasible) –
....Immobilization - ....

The presumptive remedy for low-level threat metals-in-soil waste that is not targeted for treatment is: Containment - ..." Neither containment nor immobilization was adequately considered in this FS/PP.

Response 1: Alternative 2 is the on-site containment alternative. Alternative 4, Off-Site Disposal, includes stabilization of soils with metal concentrations exceeding the TCLP criteria. Both alternatives underwent detailed analysis with respect to 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. Refer to the Final Feasibility Study Report for details of the analysis and description of alternatives.

Comment 2: Evaluation of excavation and off-site disposal vs the presumptive remedies is contained in the appendices to the aforementioned document. Soil washing is ranked sufficiently above off-site disposal to justify a more detailed comparison.

Response 2: Soil washing was one of the alternatives that underwent detailed analysis, however, because soil washing was determined to be the most expensive option, it was not selected as the preferred option.