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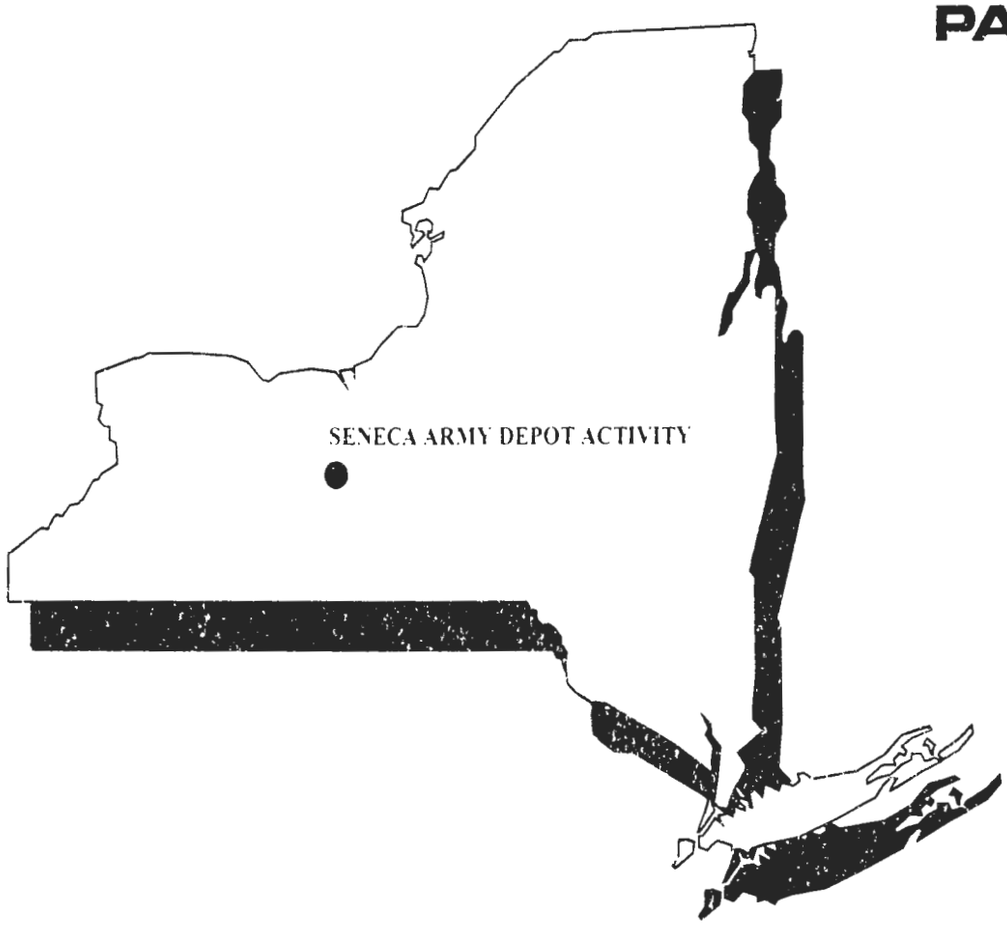

FINAL

ACTION MEMORANDUM and DECISION DOCUMENT TIME -CRITICAL REMOVAL ACTIONS FOUR METAL SITES (SEADs 24, 50/54, & 67)

CONTRACT NO. DACA87-95-D-0031
DELIVERY ORDER NO. 15

AUGUST 2002

FINAL
ACTION MEMORANDUM
TIME-CRITICAL REMOVAL ACTIONS, FOUR METAL SITES

SWMUs SEAD-24, SEAD-50/54, and SEAD-67
SENECA ARMY DEPOT ACTIVITY

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1 PURPOSE

The purpose of this Action Memorandum is to justify and describe the proposed time-critical removal actions at four Solid Waste Management Units (SWMUs) that are located at the Seneca Army Depot Activity (SEDA). The Depot is located in the Town of Romulus, Seneca County, New York. The four SWMUs, designated as SEADs 24, 50, 54, and 67, are historic operational sites where either shallow soils or soil contained within piles has been identified that is contaminated by metals and, in some cases, semivolatile organic compounds. Some of the contaminants released to the soil may have also migrated into the surficial soil that resides in drainage ditches or in sediment underlying streams located near the identified SWMUs.

The SEDA has been closed under the Department of Defense's (DoD's) Base Realignment and Closure (BRAC) process, and the land encompassing and surrounding these SWMUs is in the process of being returned to the public and private sectors for beneficial reuse purposes. Since the termination of the military presence in July 2000, security at the Depot has decreased while the presence of reusers has increased. Although an informational program has disclosed the presence of contaminated sites within the reuse areas, the potential threat of contaminants to human health and the environment in these areas remains a concern to the Army. Since 1992, the SEDA has been listed as a CERCLA federal facility. A Federal Facilities Agreement (FFA) describes the process that has been used to perform investigations and remediation of sites located at the Depot. Section 11 of the FFA describes removal actions as a viable option for eliminating possible threats. The Army intends to implement focused time-critical removal actions at these four sites to expedite the closure process and lessen, and perhaps eliminate, any possible threats, current or future, that these sites may pose to human health and the environment. These sites are comparatively small, with localized impacts that can be effectively addressed via the removal process. Completion of the removal actions will facilitate transfer of these properties in the future for beneficial reuse.

2 SITE CONDITIONS AND BACKGROUND

2.1 SEAD-24, THE ABANDONED POWDER BURNING PIT

2.1.1 Site Descriptions and History

SEAD-24, the Abandoned Powder Burning Pit, is located in the west-central portion of SEDA (see **Figure 1**) in a portion of the Depot where the future land use is designated as conservation/recreational. The burning pit comprises an area measuring approximately 325 feet by 150 feet that is surrounded on

the east, south and west by a berm that is approximately 4 feet high. The site is bounded by West Kendaia Road (north) and by areas of open grassland and low brush (east, west, south). Railroad tracks are located approximately 400 feet east of the bermed area. Kendaia Creek is located approximately 150 feet north of West Kendaia Road, and between 300 and 600 feet north of the northern-most and southern-most edges of the abandoned pit. The local topography slopes gently to the west; north of West Kendaia Road, the land slopes more steeply to the north-northwest towards the creek. **Figure 2** presents details of the configuration and orientation of SEAD-24.

The Abandoned Powder Burning Pit was active during the 1940s and 1950s. Although operating practices at this site are undocumented, it is presumed that black powder, M10 and M16 solid propellants, and explosive trash were disposed here by burning. It is further presumed that petroleum hydrocarbon fuel was used to initiate the burn.

2.1.2 Previous Investigations at SEAD-24

An Expanded Site Inspection (ESI) was performed at SEAD-24 between 1993 and 1994. The ESI combined geophysical surveys and intrusive operations to characterize the nature and extent of contaminants present in the area.

During intrusive operations environmental samples of soil and groundwater were collected. All samples collected as part of the ESI were analyzed for the following constituents: Target Compound List (TCL) volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides/polychlorinated biphenyls (PCBs), explosives, herbicides, Target Analyte List (TAL) metals and cyanide, nitrates, and total recoverable petroleum hydrocarbons.

Five borings were advanced and sampled at SEAD-24. A total of sixteen soil samples were collected and analyzed from the soil borings. Another thirteen surface soil samples (i.e., 0 to 2 or 3 inches below grade surface - bgs) were also collected and analyzed from twelve locations surrounding the pit. Three monitoring wells (i.e., one background, two downgradient) were installed and sampled at SEAD-24.

2.1.3 Results of ESI Program at SEAD-24

Soil

Fifty-seven different analytes, including 36 organic compounds and 21 metals, plus total petroleum hydrocarbons were detected in surface and subsurface soil samples collected from SEAD-24. Of this

total, three SVOCs and 14 metals were present at concentrations that exceeded cleanup objective guidance values defined in NYSDEC's Technical and Administrative Guidance Memorandum (TAGM) #4046. Summary results of the ESI are shown on Figure 1-2 of the accompanying Decision Document.

Each of the three SVOCs that exceeded its cleanup objective level was a polynuclear aromatic hydrocarbon (i.e., PAH – benzo(a)anthracene, benzo(a)pyrene, and dibenz(a,h)anthracene) and all three of these compounds were found collocated in a single surface soil sample (SS24-1). Three of the metals (i.e., arsenic, lead, and zinc) were found at concentrations above their respective cleanup objective values in more than one-third of the soil samples collected. The 11 remaining metals were only found at concentrations above their respective cleanup objective values in between one and four samples.

Arsenic was detected above its cleanup objective value in 11 of the surface soil samples collected. The highest arsenic concentration measured was 56.8 mg/Kg, found in the surface soil sample, SS24-6. All arsenic concentrations reported for subsurface soils were below the cleanup objective level concentration.

Lead concentrations exceeded its cleanup objective value in 14 of the soil samples analyzed; however, only one lead concentration (i.e., 422 ug/Kg at SS24-5) exceeded the US EPA guidance[1] for lead in residential soil. The high lead concentrations were again limited primarily to the surface soil samples.

Zinc concentrations exceeded its cleanup objective level value in 10 samples. As with all the other noted metals, the high concentrations reported for zinc were primarily found in surface soil samples.

Groundwater

The results of the groundwater sampling suggest that the groundwater near the Abandoned Powder Burning Pit has not been adversely impacted by the constituents found in the soil or by those presumed to have been burned in the area. No organic compounds were detected in the samples of groundwater collected and analyzed. Three metals (aluminum, iron and manganese) were detected in the groundwater at levels exceeding their respective comparison groundwater criteria values (e.g., NYSDEC GA standards or EPA Secondary Maximum Contaminant Levels - MCLs). None of the observed metals are considered to represent a potential threat to the environment because all elevated metals occurred in

[1] US EPA, Office of Solid Waste and Emergency Response, Directive # 9200.4-27, "Clarification to the 1994 Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities," August 1998, EPA/540/F-98/030, PB98-963244.

samples that had elevated levels of turbidity, and none of the groundwater in the vicinity of the Abandoned Powder Burn Pit is used as a source of potable water.

2.2 SEADs 50 AND 54, MINERAL/ORE STORAGE TANK FARM

2.2.1 Site Descriptions and History

SEADs 50 and 54 (SEAD-50/54) are located at the Depot's historic Tank Farm in the southeastern portion of SEDA. **Figure 1** shows the approximate location of SEADs 50/54 within SEDA. This site is located in a portion of the Depot where the intended future land use is designated as Warehousing.

The Tank Farm was sited in a triangular-shaped tract of land immediately west of East Patrol Road between Building 350 and Buildings 356 and 357. Four tanks remain at the tank farm site, three of which are empty. The empty tanks comprise what is left of SEAD-50; two of these tanks were previously used for the storage of antimony ore, the remaining empty tank was used to store rutile (i.e., titanium dioxide) ore. SEAD-54 encompasses the remaining full tank, Tank #88; this tank was previously used for storage of asbestos, but it is currently empty. **Figure 3** presents a detailed map of the area of SEADs 50/54.

The topography surrounding the tanks is relatively flat, with a total relief of 2 to 3 feet. There is an east-west running access road that bisects the Tank Farm site and connects Avenue H with the East Patrol Road. A drainage ditch is located on both sides of the access road, and water captured in these ditches flow east towards intersecting ditches bordering the East Patrol Road. North of the access road, SEAD-50/54 is generally overgrown with vegetation, exclusive of spots where the circular footprints of former tanks are located. The area south of the access road is flat and grassy. There are no mapped wetlands located within the bounds of the former Tank Farm.

The history of the Tank Farm area is not well documented. At one time, there were approximately 160 aboveground storage tanks in this area. According to interviews with SEDA personnel, the tanks were always used to store dry materials such as ores and minerals, including asbestos. Through the years, all but the remaining four tanks were removed.

2.2.2 Previous Investigations at SEAD-50/54

An ESI was performed at SEAD-50/54 between 1993 and 1994. The ESI combined geophysical surveys

and intrusive operations to characterize the nature and extent of contaminants present in the area.

During intrusive operations environmental samples of soil and groundwater, surface water and sediment were collected. All samples collected as part of the ESI were analyzed for the following constituents: TCL VOCs, SVOCs, pesticides/polychlorinated biphenyls (PCBs), and TAL metals and cyanide. In addition, soil samples collected from SEAD-50/54 were analyzed for asbestos.

Fifteen surface soil samples, three groundwater samples (i.e., one background, two downgradient), three surface water, and three soil samples were collected from the drainage ditches in and adjacent to SEADs 50 and 54.

2.2.3 Results of ESI Program at SEAD-50/54

Soil

Fifty-six analytes plus asbestos were detected in one or more of the shallow soils collected from SEAD-50/54. Of the 56 analytes detected, one was a VOC, 20 were SVOCs, 13 were pesticides or PCBs, and the remaining 22 were metals.

Concentrations measured for seven SVOCs (including six polynuclear aromatic hydrocarbons and phenol) exceeded their respective soil cleanup objective level values. A majority of the concentrations found above cleanup levels were identified in three samples collected from locations SS50-11, SS50-14, and SS50-15. Each of these locations is in the northern part of the historic tank farm. **Figure 2-2** of the accompanying Decision Document summarizes the location where soil cleanup objective criteria values have been exceeded.

Eight metals (i.e., antimony, arsenic, chromium, copper, lead, magnesium, mercury, and zinc) were found in soil samples at concentrations that exceeded their respective NYSDEC soil cleanup objective levels. Although lead was found at concentrations that exceeded its soil cleanup objective level in 13 of the 15 surface soil samples characterized, it was not found at a concentration that exceeded US EPA's recommended soil clean-up level for residential properties[1].

Asbestos (chrysotile), at a level of 10 to 15 percent, was found in a single sample collected from SEAD-50/54.

Groundwater

The available data indicate that groundwater has not been significantly impacted by the historic mineral/ore storage activities performed at SEADs 50/54. One semivolatile organic compound and 18 metals were detected in one or more of the groundwater samples collected. Concentrations measured for five of the metals (i.e., aluminum, iron, manganese, sodium and thallium) exceeded their respective groundwater criteria levels. Generally, all of the observed elevated metal concentrations occurred in groundwater samples that exhibited turbidity levels in excess of 20 NTUs that may have resulted due to the use of bailers during sampling. Therefore, it is presumed that many of the observed elevated metal results occurred due to the presence of soil or silt in the sample. Furthermore, aluminum, iron, manganese and sodium are naturally occurring metals that exhibit low toxicity at the concentrations found in turbidity-free groundwater.

The presence of thallium is questionable. First, thallium was not present in any samples of the other environmental matrices (i.e., soil, surface water, or sediment) collected from SEAD-50/54. Secondly, the thallium analyses were completed using inductively couple plasma that is susceptible to interference, especially if aluminum is also present in the sample. Given the two preceding conditions and the referenced turbidity issue, the results reported for thallium (i.e., 3 ug/L and 1.9 J ug/L), which are both at or slightly above the detection limit are presumed to be artifacts of sample collection and analysis process.

Surface Water

Available data indicate that surface water at the site has not been significantly impacted by the historic storage activities that were conducted in SEADs 50/54. Fifteen metals were detected in the surface water samples collected, and only two of these metals (i.e., aluminum and iron) were found at a concentration that exceeded their NYS class C surface water criteria.

Sediment

The drainage ditches that surround SEAD-50/54 are ephemeral, typically holding water only as a result of a storm or snowmelt event. Generally, these ditches capture waters from storm runoff events, and hold it while it percolates into the ground. Only under severe storm or runoff event conditions does water overflow from the ditches into downstream creeks and streams. As such, the "sediment" lining the base of the drainage ditches has been evaluated as soil.

In a severe storm or runoff event, overflow from the drainage ditches at SEAd-50/54 could flow into an unnamed stream or creek that flows eastwardly, then turns northerly and enters a regulated and mapped wetlands, OV-5, that is located north or Yerkes Road and east of State Route 96 near the former Depot housing area that is south of the main Depot entrance gate. At the point where this creek or stream exists the Depot and passes beneath State Route 96, it is classified as Class D surface water. At a location downstream of the Depot, near Yerkes Road, this stream or creek is reclassified as a Class C surface water body. This stream or creek continues to flow northerly and easterly, where it eventually becomes part of the flow that passes through Hicks Gully and enters Cayuga Lake at Dean Cove. Once the water enters Cayuga Lake at Dean Cove, it is classified as AA(T).

Available data suggests that the shallow soil underlying the drainage ditches at SEAD-50/54 may have been impacted by historic activities conducted in the area. Forty-four analytes, including one VOC, 17 SVOCs, six pesticides and PCBs and 20 metals were detected in samples collected. Of the compounds detected, 11 were detected at concentrations that exceeded their NYSDEC soil cleanup objective levels.

Six SVOCs [i.e., benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, chrysene and dibenz(a,h)anthracene] exceeded NYSDEC soil cleanup objectives in samples collected from the area of SEAD-50/54. Additionally, five metals (i.e., arsenic, lead, manganese, potassium, and zinc) were detected in sediment samples at concentrations that exceeded NYSDEC soil cleanup criteria values. All of the identified metal and benzo-PAH compound exceedances were found in samples collected from either SW/SD50-1 or SW/SD50-2, which are located upgradient of the point of where surface water contained in the drainage ditch could flow into the unnamed stream or creek that subsequently flows easterly and then northerly towards Yerkes Road. No exceedances of soil cleanup objective values were observed in the sample collected from SW/SD50-3, which is located at the confluence of the drainage ditches with the unnamed stream or creek that eventually flows into Hicks Gully.

2.3 SEAD-67, DUMP SITE EAST OF SEWAGE TREATMENT PLANT #4

2.3.1 Site Descriptions and History

SEAD-67 is comprised of five waste piles and two berm structures that are located east of sewage treatment plant No. 4 and south of West Romulus Road in the east-central portion of SEDA. This site is located in a portion of the Depot where the intended future land use is designated as Planned Industrial Development. The approximate location of SEAD-67 is shown on **Figure 1**. **Figure 4** presents a map of the area.

The site is entirely undeveloped and is heavily vegetated with low brush and deciduous trees. One, 10-foot

diameter waste pile and a second, 5-foot diameter waste pile are located approximately 50 feet and 70 feet, respectively, south of West Romulus Road. Both of these piles are grass covered. A brush-covered berm (60'L x 10-15'W), and a second, 10-foot diameter waste pile are located approximately 175 feet south of the road. Further south, a second, larger and irregularly-shaped berm is found. The second berm structure is located approximately 50 feet south of the first, smaller berm structure. The second berm measures approximately 110 feet in length, and is shaped roughly like a "Y" that is lying on its side. All of the piles and berms are approximately 3 to 4 feet high, with the exception of the 10-foot diameter pile that is approximately 5 feet high.

The topography in SEAD-67 slopes gently to the west towards a small, unnamed stream which is located approximately 250 away from any of the piles. The unnamed stream flows north beneath West Romulus Road into a large regulated wetland area that is located to the north of the road. The unnamed stream is a Class C surface water body, and downstream of the wetland it enters Kendig Creek. The unnamed stream also receives discharge water from Sewage Treatment Plant No. 4 (i.e., SEAD-20), which is in active service, at a location that is roughly due west of the SEAD-67 piles and berms.

Little is known about the history of SEAD-67 or the origin of the berms and the waste piles. The contents of the piles and the berms are largely unknown, as are the dates when they were first placed in this area. As the site is overgrown with thick vegetation, it is suspected that the piles were placed in this area many years ago and have remained undisturbed since that time.

2.3.2 Previous Investigations at SEAD-67

An Expanded Site Inspection (ESI) was performed at SEAD-67 between 1993 and 1994. The ESI combined geophysical surveys and intrusive operations to characterize the nature and extent of contaminants present in the area.

During intrusive operations environmental samples of soil and groundwater, surface water and sediment were collected. All samples collected as part of the ESI were analyzed for the following constituents: VOCs, SVOCs, pesticides/polychlorinated biphenyls (PCBs), metals, and cyanide.

The ESI included sampling of test pits, soil borings, monitoring wells, surface water and sediment. Eight soil samples were collected from SEAD-67. Three groundwater samples, two surface water and two sediment samples were also collected as part of the SEAD-67 site investigation.

2.3.3 Results of ESI Program at SEAD-67

Soil

Available results indicate that soil in the piles and berm structures at SEAD-67 has been impacted by SVOCs, predominantly polynuclear aromatic hydrocarbons (PAHs), and by the metal, mercury. A total of 50 TCL/TAL compounds were detected in soil samples, and of this total, 10 were detected at concentrations that exceeded NYSDEC's recommended soil cleanup objective levels. None of the values found to exceed NYSDEC cleanup objective levels were pesticides or PCBs.

Five SVOCs, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(a)pyrene, and dibenz(a,h)anthracene, were found at concentrations above their respective criteria limit values. Four metals (i.e., calcium, manganese, mercury, and potassium) were also detected at concentrations exceeding their respective NYSDEC recommended cleanup objective values. Only one value (i.e., calcium, 3160 J mg/Kg in sample MW67-2.02) observed to exceed NYSDEC's recommended soil cleanup objective levels was associated with soil that was recovered from the ground; all of the other noted exceedances were found in soil samples collected from the piles or berms.

Groundwater

Available data indicate that the groundwater has not been significantly impacted by historic operations at SEAD-67. Nineteen metals were the only analytes detected in the groundwater samples, and of these, only aluminum, iron, and manganese were detected at concentrations exceeding their criteria values. Elevated levels of turbidity were recorded in groundwater samples collected from SEAD-67, and it is presumed that the noted exceedances of aluminum, iron and manganese are associated, at least in part, with the elevated levels of turbidity.

Surface Water

Results indicate that the unnamed stream near SEAD-67 has not been significantly impacted by contaminants. Metals are the only analytes detected in the surface water samples, and of the detected metals, only aluminum and iron were detected at concentrations above their NYS surface water criteria value.

Sediments

Sediment near SEAD-67 has been impacted by SVOCs (mostly PAHs), pesticides, and a few metals. Six PAH compounds (i.e., benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, and indeno(1,2,3-cd)pyrene) were detected above their respective criteria values in both sediment samples collected. Three pesticides were also found at levels above their sediment criteria values. Four metals (i.e., copper, manganese, nickel, and silver) exceeded their respective sediment criteria values in sediment samples.

3 THREATS TO PUBLIC HEALTH OR WELFARE OR THE ENVIRONMENT, AND STATUTORY AND REGULATORY AUTHORITIES

As described above, data exist to indicate that metal and to a lesser extent, SVOC and pesticide/PCB constituents are present in the soils at each of the SWMUs discussed.

Metal, and to a lesser extent, semivolatile organic compound and pesticide/PCB constituents identified in the shallow soils, drainage ditch soils and sediments at the four SWMUs discussed above may be mobilized and move away from the identified sites either by being dissolved or suspended in storm water run-off or in infiltration water. Once mobilized, contaminants currently found predominantly in surficial soils and sediment may enter deeper soil, the groundwater, surface water or sediment. Specific inorganic contaminants of most immediate concern include arsenic (SEADs 24, and 50/54), asbestos (SEAD 50/54), lead (SEAD-24), mercury (SEADs 50/54 and 67) and zinc (SEADs 24 and 50/54). Specific semivolatile organic compounds of interest include PAHs at each of the areas.

Although a water supply system provides drinking water within the Depot, private drinking water wells are located within 1 mile of each of the SWMUs where the shallow soil and sediment contamination has been identified. Thus, if any of the identified contaminants enter the groundwater, they may impact water supplies for neighboring human and livestock populations. Further, use of affected groundwater for irrigation may result in impacts to crops that are grown on farms and used as food stocks for human and livestock populations. All groundwater is considered a potable source of water under NYSDEC statutes and regulations.

Available data indicate that some of the identified compounds have migrated into neighboring drainage ditches and streambeds. These drainage ditches and streambeds are located upgradient of receiving streams and surface waters at, and near the Depot. Repeated mobilization of contaminated soil and sediment in the drainage ditches and streams, through erosion and flushing, may eventually result in the

spread of these materials to downgradient receiving waters. Once in the receiving waters, the compounds may adversely impact the water quality and the resident ecosystem resident in the surface water body.

The increased access to these four sites can result in incidental contact with residual contaminated soils at each of these sites to future visitors or construction and site workers. Although severe and chronic health impacts are not anticipated, the potential for impacts are present.

4 ENDANGERMENT DETERMINATION

Actual or threatened releases of pollutants and contaminants from the identified SWMUs, if not addressed by implementing the response actions selected in this Action Memorandum, may present an endangerment to public health, or welfare, or the environment.

5 PROPOSED ACTIONS AND ESTIMATED COSTS

The proposed action for soil found at each of the four SEADs that is contaminated with metals, and to a lesser degree other constituents, is to excavate the contaminated soil, and to transport and dispose of it at an off-site, state-approved landfill. The estimated amount of soil requiring remediation from each of the SEADs is as follows: a) SEAD-24 – 1,990 cubic yards; b) SEAD-50/54 – 3,960 cubic yards; and c) SEAD-67 – 150 cubic yards. Therefore, the estimated total volume of soil expected to be removed under the proposed time-critical removal action is approximately 6,100 cubic yards (i.e., approximately 9,150 tons). An additional 95 cubic yards (i.e., approximately 142 tons) of contaminated shallow soil from drainage ditches surrounding SEAD-50/54 must also be removed and disposed. The estimated cost for excavation, transportation, disposal, backfill and compaction is estimated to be in the range of $100 per ton. Additional costs include mobilization, project oversight and management, monitoring, sampling and analysis and reporting. The total project cost, inclusive of all expected costs plus a 20 percent contingency is estimated not to exceed more than $1,680,000. A more complete description of the proposed time-critical removal actions for each of the SEADs is provided in the accompanying Decision Documents for Removal Actions at SWMUs SEAD-24, SEAD-50 and SEAD-54, and SEAD-67.

The completion of the removal actions will be assessed by collecting and analyzing verification sample within and surrounding each excavation site. The general plan for the collection of confirmational samples calls for the collection of:

- a minimum of five discrete, grab samples, or

- the collection of discrete grab samples at a rate of not less than one per each 900 square feet (e.g., 30 feet by 30 feet area) or less of surface on one plane, or,
- in the instance where the depth of the excavation is 12 inches of less, the collection of one, discrete grab sample at a rate of no less than one sample for every 30 linear feet or less of perimeter edge.

Additional details of the proposed confirmational sampling and analysis plan for the Metal Sites are provided in Appendix B of the accompanying Decision Document.

Each of the collected confirmational samples will be analyzed for chemical class constituents of concern including:

- For SEAD-24, Abandoned Powder Burning Pit – 208 samples plus associated quality assurance/quality control (QA/QC) samples:
  - three targeted TAL metals (i.e., arsenic, lead, and zinc) in 80 percent of the collected samples;
  - the full suite of TAL metals in 20 percent of the collected samples; and
  - TCL PAH compounds in 20 percent of the collected samples.
- For SEAD-50/54, Tank Farm – 468 samples plus associated QA/QC samples:
  - three targeted metals (i.e., arsenic and mercury) in 80 percent of the collected samples;
  - the full suite of TAL metals in 20 percent of the collected samples;
  - TCL PAH compounds in 20 percent of the collected samples;
  - pre-excavation samples in the vicinity of former sample location SS50-1 (on a 30 ft. by 30 ft. grid) for the analysis of asbestos; and
  - post-excavation samples surrounding former sample location SS50-1 (on a 30 ft. by 30 ft grid and at a perimeter spacing of 30 linear ft) for the analysis of asbestos.
- For SEAD-67, Dump Site East of Sewage Treatment Plant No. 4 – 47 samples plus associated QA/QC samples:
  - mercury; and
  - TCL PAH compounds.

All of the collected samples will be analyzed in accordance with NYSDEC CLP procedures at a state-certified laboratory. Data resulting from the confirmational sampling and analysis sequences will be compared to applicable criteria values (e.g., NYSDEC cleanup objectives for soil; NYSDEC sediment criteria for sediments) to evaluate and assess the adequacy of the completed removal action.

Once necessary soil is removed and the extent of the excavation is verified and confirmed, the excavation will be backfilled with clean fill, regraded, contoured and re-seeded to re-establish pre-

excavation conditions. A certification of the quality of the fill proposed for use at the removal action sites will be provided to the NYSDEC before the area is backfilled.

The proposed excavation, transport, and disposal of the metal and PAH contaminated soils from the sites and neighboring drainage ditches at state-approved landfills where they can be beneficially used as daily cover will place the contaminated materials into a more controlled environment. Placement of the contaminated media into controlled environments will lessen the likelihood that they can inadvertently enter the underlying groundwater supply via infiltration or migrate via stormwater run-off.

Two other treatment and disposal alternatives/technologies were also considered for the remediation of the metal contaminated soils and sediments. These include: 1) solidification/stabilization; and 2) soil washing. Treatment via soil washing and solidification were considered to be more expensive per ton and involve additional analytical costs. Additionally, the presence of organic materials in the soil and sediments to be treated may affect the ease and completeness of treatment via either of these processes. Excavation and off-site disposal is cost-effective and easily implementable and is the preferred alternative.

6 EXPECTED CHANGE IN THE SITUATION SHOULD ACTION BE DELAYED OR NOT TAKEN

The Army intends to implement focused time-critical removal actions at these four sites to expedite the closure process and lessen, and perhaps eliminate, any possible threats, current or future, that these sites may pose to human health and the environment. These sites are comparatively small, with localized impacts that can be effectively addressed via the removal process. Completion of the removal actions will facilitate transfer of these properties in the future for beneficial reuse.

As additional land is released by the Army and subsequently leased for beneficial public and private uses, there is an increased likelihood that incidental contact with contaminants identified in historic Depot use areas will occur if the contaminants are not removed or remediated. Delayed action will increase the likelihood that contaminants identified will migrate away from their present locations and impact larger volumes and different types of environmental matrices. The spread of these contaminants into other media will greatly increase the likelihood that surrounding populations of human and animal populations will come into contact with elevated levels of the identified contaminants.

7 OUTSTANDING POLICY ISSUES

No policy issues have been identified to prevent implementation of these actions.

8 ENFORCEMENT

The US Army is the Principle Responsible Party for the four identified metal sites discussed above, and is prepared to take responsibility for the proposed time-critical removal actions at these sites.

9 COORDINATION

This Action has been coordinated with the USEPA Region II, NYSDEC, USACHPPM, and USAEC. The public was briefed during the 16 May 2001 Restoration Advisory Board Meeting.

10 RECOMMENDATION

This Action Memorandum describes the selected time-critical removal action for four SWMUs (i.e., SEAD-24, -50/54 and -67) located at the SEDA. The proposed actions have been developed in accordance with CERCLA as amended, and are consistent with the National Contingency Plan (NCP). These decisions are based on the administrative record for the site. Conditions at the sites meet the NCP section 300.415(b)(2) criteria for a removal and the Army recommends your approval of the proposed removal actions. The total project ceiling if approved will be $ 1,680,000, inclusive of all expected project costs and a 20 % contingency.

11 REFERENCES

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US EPA, Office of Solid Waste and Emergency Response, Directive # 9200.4-27, "Clarification to the 1994 Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities," August 1998, EPA/540/F-98/030, PB98-963244.

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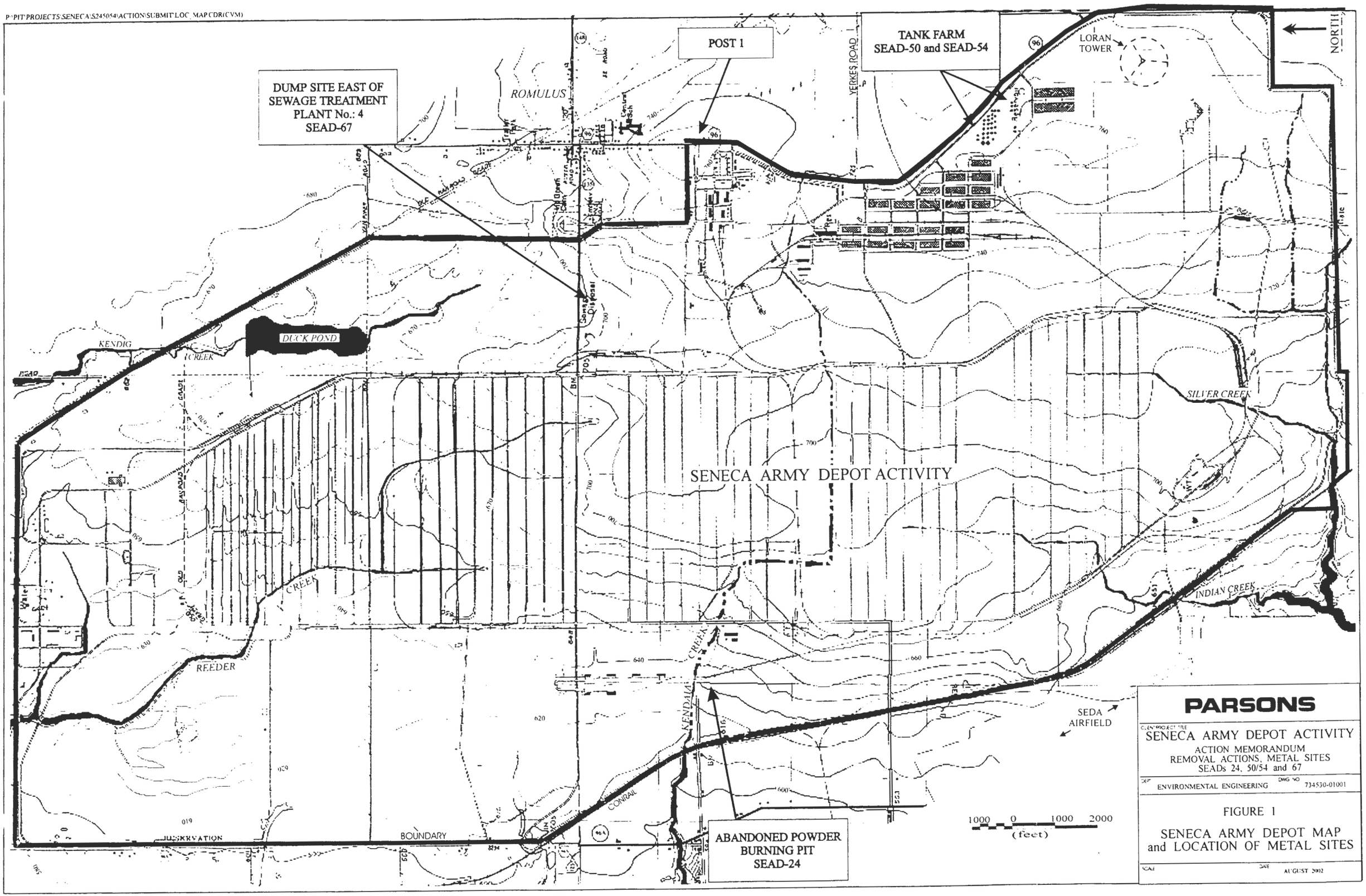


PARSONS

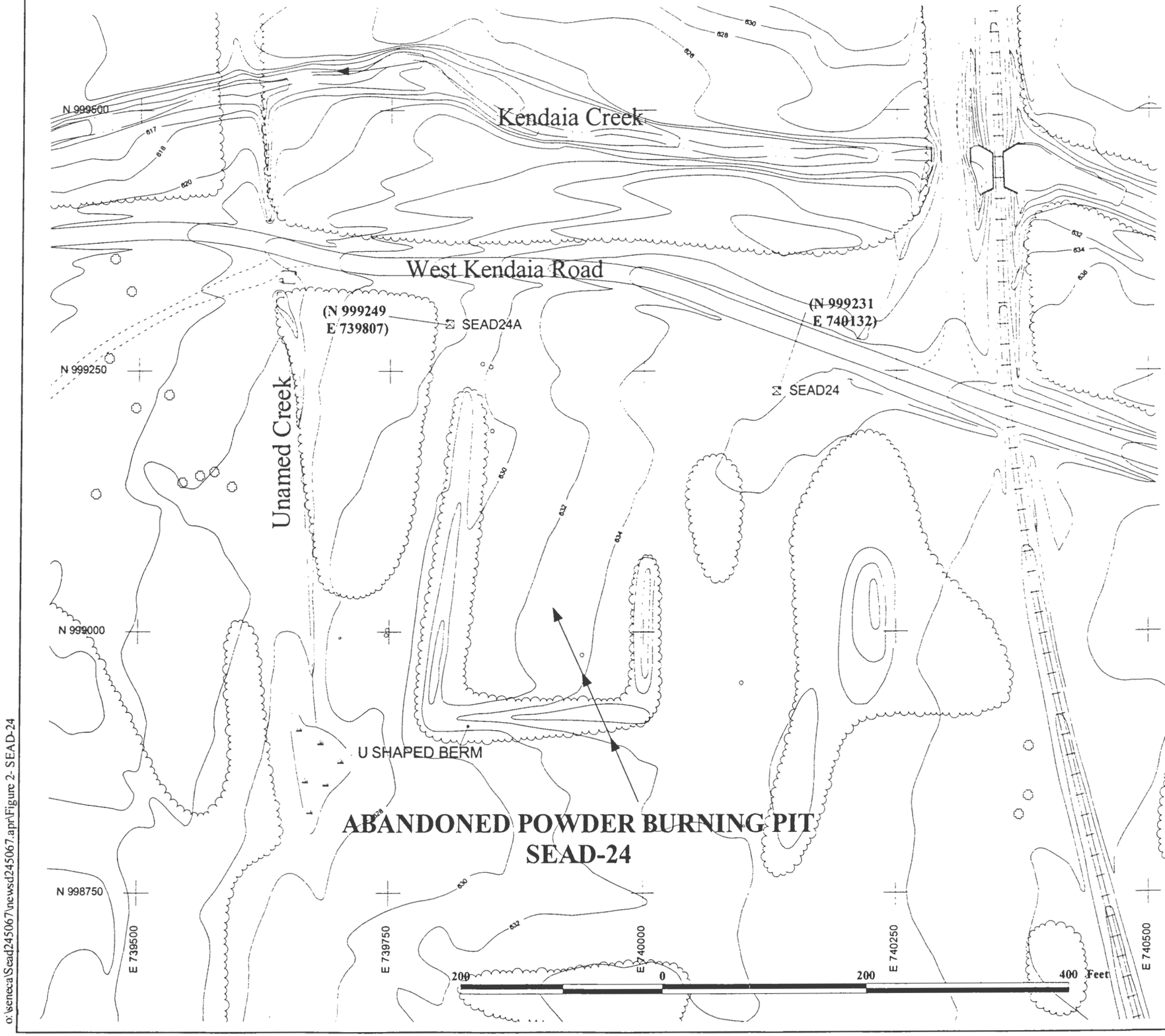
CLIENT PROJECT TITLE
SENECA ARMY DEPOT ACTIVITY
ACTION MEMORANDUM
REMOVAL ACTIONS, METAL SITES
SEADs 24, 50/54 and 67

DEP ENVIRONMENTAL ENGINEERING DWG NO 734530-01001

FIGURE 1

SENECA ARMY DEPOT MAP
and LOCATION OF METAL SITES

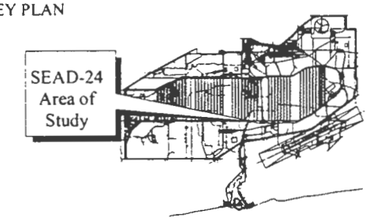
CAE DATE AUGUST 2002



LEGEND

- PAVED ROAD
- GROUND CONTOUR AND ELEVATION (680)
- WETLAND
- BRUSH
- CHAIN LINK FENCE
- UTILITY POLE
- APPROXIMATE LOCATION OF FIRE HYDRANT
- RAILROAD

KEY PLAN



PARSONS

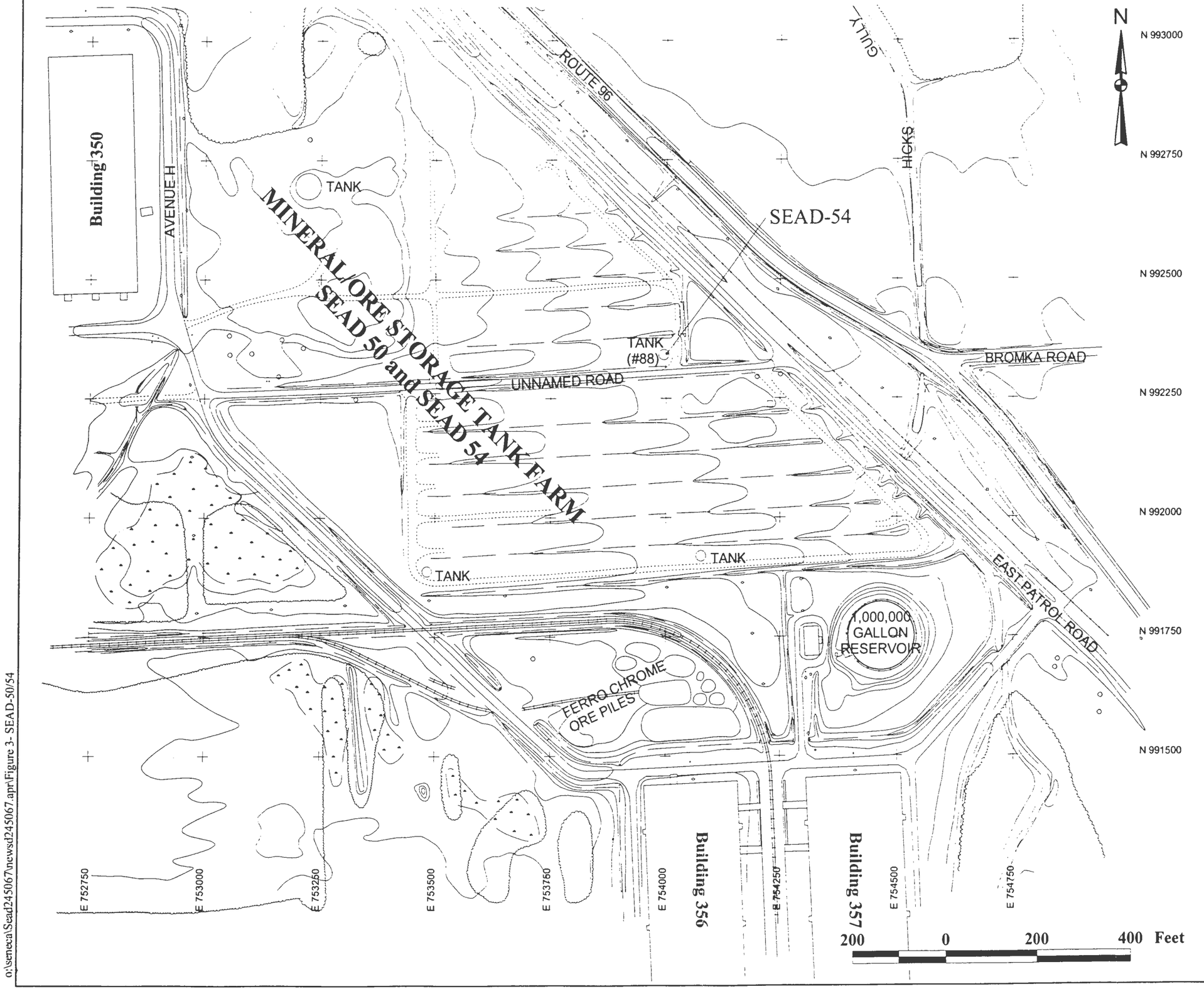
SENECA ARMY DEPOT ACTIVITY
ABANDONED POWDER BURNING PIT
SEAD-24

FIGURE 2

SITE MAP - SEAD-24

JOB NUMBER: 734530-01001 | DATE: AUGUST 2002

o:\seneca\Sead245067\newsd245067.apr\Figure 2- SEAD-24

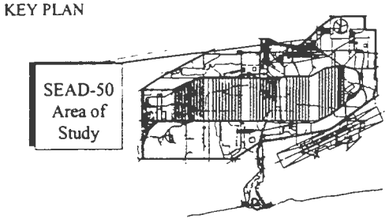


o:\seneca\Sead245067\newsd245067.apr\Figure 3- SEAD-50/54

LEGEND

- PAVED ROAD
- 680 GROUND CONTOUR AND ELEVATION
- WETLAND
- BRUSH
- CHAIN LINK FENCE
- UTILITY POLE
- APPROXIMATE LOCATION OF FIRE HYDRANT
- RAILROAD

KEY PLAN



PARSONS

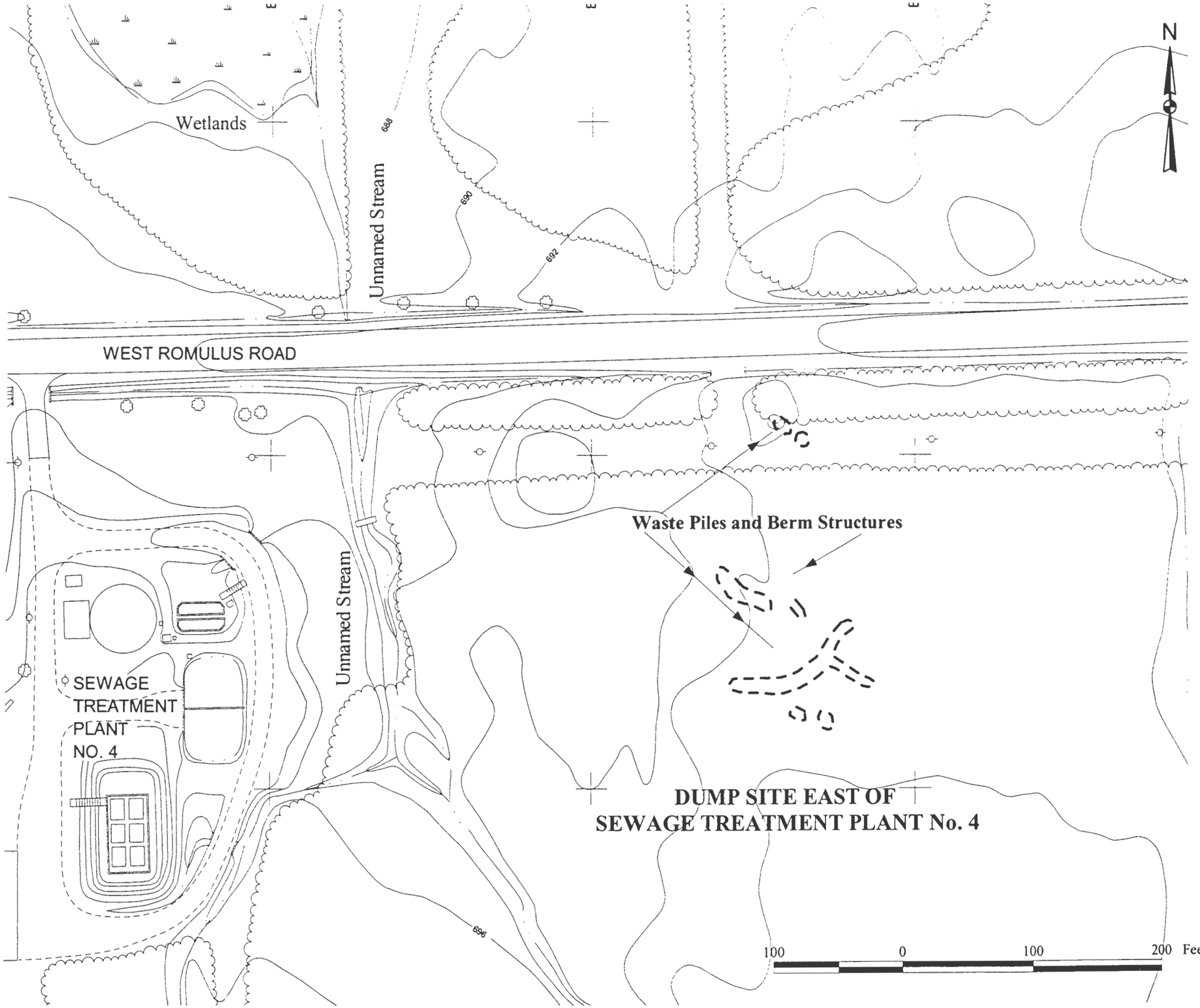
SENECA ARMY DEPOT ACTIVITY
MINERAL/ORE STORAGE TANK FARM
SEAD-50 and SEAD-54

FIGURE 3

SITE MAP - SEAD-50 and SEAD-54

JOB NUMBER: 734530-01001

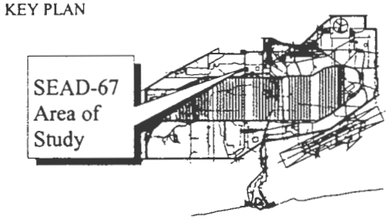
DATE: AUGUST 2002



LEGEND

- PAVED ROAD
- GROUND CONTOUR AND ELEVATION (680)
- WETLAND
- BRUSH
- CHAIN LINK FENCE
- UTILITY POLE
- APPROXIMATE LOCATION OF FIRE HYDRANT
- RAILROAD
- ⊕ Monitoring Well
- ⊠ Survey Monument
- Approximate Extent of Pile or Berm

KEY PLAN



PARSONS

SENECA ARMY DEPOT ACTIVITY

DUMP SITE EAST OF SEWAGE TREATMENT PLANT NO. 4
SEAD-67

FIGURE 4

SITE MAP - SEAD 67

JOB NUMBER: 734530-01001 | DATE: AUGUST 2002

Q:\seneca\sead2\45067\news067.apr\am Figure 4

FINAL

DECISION DOCUMENT FOR
TIME-CRITICAL REMOVAL ACTIONS, FOUR METAL SITES
SWMUs SEAD-24, SEAD-50, SEAD-54, and SEAD-67
SENECA ARMY DEPOT ACTIVITY

Prepared for:

Seneca Army Depot Activity
Romulus, New York

and

US Army Corps of Engineers
Huntsville Center

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Contract No. DACA87-95-D-0031
Delivery Order 15
734530

AUGUST 2002

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1 DECISION DOCUMENT FOR REMOVAL ACTION AT SEAD-24, ABANDONED POWDER BURNING PIT

1.1 EXECUTIVE SUMMARY

An Expanded Site Inspection (ESI) performed at SEAD-24, the Abandoned Powder Burning Pit, at Seneca Army Depot Activity (SEDA) suggests that a release to the environment of hazardous constituents, consisting primarily of metal contaminants, may have occurred. This Decision Document presents the rationale identifying the need for, and the proposed plan for conducting, a time-critical removal action at SEAD-24 to remove elevated levels of selected contaminants that have been identified at the site that potentially pose a threat to the environment and neighboring populations. Additionally, this document provides general details of a proposed sampling and analysis program that will be conducted to confirm that sufficient soil has been removed so as to reduce the level of the potential threat identified. This removal action is considered time-critical because the historic military mission of the Depot has been terminated and the Depot was closed by the Department of the Defense (DoD) and the US Army. In accordance with provisions of the DoD's Base Realignment and Closure (BRAC) process, the land and the facilities of the former Depot have been surveyed and evaluated, and prospective beneficial uses of the facility have been identified. Portions of the Depot are now being released to the public and private sectors for reuse under the BRAC process. As portions of the Depot are released for other beneficial uses, increased access is afforded to all areas of the former Depot, resulting in an increased potential for the exposure of populations to residual chemicals that are present at historic solid waste management units (SWMUs) remaining at the Depot pending clean-up. Therefore, the goal of the proposed time-critical removal action at SEAD-24 is to reduce, and possibly to eliminate, an identified source of residual chemical materials that exists in the soil. If this action is successful, this action will lessen and may possibly eliminate, a potential threat of exposure to surrounding populations and the environment.

This Decision Document presents the selected removal action that was developed in accordance with the Federal Facility Agreement (FFA) and the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and the National Contingency Plan. Based upon the results of the ESI, it is recommended that a limited action be conducted focused on the removal of surficial (0

to 6 inches) and near-surface soil (i.e., to a depth of 12 inches) from three zones where elevated concentrations of up to three specific metal constituents have been identified. The excavated soil will be staged, contained, sampled and analyzed, and disposed of at an off-site permitted waste landfill.

1.2 SITE BACKGROUND

1.2.1 Site Description

SEAD-24, the Abandoned Powder Burning Pit, is located in the west-central portion of SEDA in a portion of the Depot where the designated future land use is conservation/recreational. The Abandoned Powder Burning Pit encompasses an area measuring approximately 325 feet by 150 feet that is bounded on the east, south and west by a U-shaped, vegetated berm that is approximately 4 feet high (see **Figure 1-1**). The site is bounded by West Kendaia Road to the north and by areas of open grassland and low brush to the east, south and west. SEDA railroad tracks are located approximately 400 feet east of the U-shaped berm. Kendaia Creek is located approximately 150 feet north of West Kendaia Road. Generally, the local topography slopes gently to the west; however, north of West Kendaia Road, the land slopes more steeply to the north-northwest towards the creek. The site can be accessed via West Kendaia Road. Within SEDA, vehicular and pedestrian access to the site is restricted, since it is located within the ammunition area.

1.2.2 Site History

The Abandoned Powder Burning Pit was active during the 1940s and 1950s. Although operating practices at this site are undocumented, it is presumed that black powder, M10 and M16 solid propellants, and explosive trash were disposed here by burning. It is further presumed that petroleum hydrocarbon fuel was used to initiate the burn. There is a shale-covered area adjacent to the bermed area; however, the use of this area is not known.

1.3 PREVIOUS INVESTIGATIONS

1.3.1 Description of Sampling Program

In 1993 and 1994, an Expanded Site Inspection (ESI) was performed to determine whether a release of hazardous constituents had occurred in the Abandoned Powder Burning Pit. The ESI combined geophysical surveys and intrusive operations to characterize the nature and extent of possible contaminants that may have been present in the area.

A seismic refraction survey was performed and the results were used to define the depth of the till and weathered shale horizon and to determine the direction of the local groundwater flow.

An electromagnetic EM-31 survey and a ground penetrating radar (GPR) survey were also performed and the results of these surveys were used to locate potential burial pits and buried ordnance that may have been present. The results of these surveys were also used to determine the extent of previously disturbed soil at SEAD-24.

After the geophysical surveys were completed, five borings were advanced at SEAD-24. Four of the borings were located within the bermed area of the former pit, while the fifth boring was located outside and east of the pit. The fifth boring was used to characterize the background soil quality. Three soil samples were submitted for chemical analysis from each of the five borings (i.e., 15 samples total). Another twelve surface soil samples (i.e., 0-2 inches below grade surface) were also collected at locations surrounding the pit and each of these additional samples was also submitted for chemical analysis. All of the soil sampling locations are shown on **Figure 1-1**.

Three monitoring wells were installed in the till/weathered shale aquifer at SEAD-24. One of these monitoring wells was installed upgradient of SEAD-24 to obtain background water quality data. The two remaining wells were installed adjacent to and downgradient of the burning pit to evaluate whether hazardous constituents had migrated from SEAD-24. One sample from each well (a total of three samples) was collected and each was submitted for chemical analysis. Each of the groundwater sampling locations is shown on **Figure 1-1**.

All samples were analyzed for the following constituents: Target Compound List (TCL) volatile

organic compounds (VOCs), semivolatile organic compounds (SVOCs) and pesticides/ polychlorinated biphenyls (PCBs); Target Analyte List (TAL) metals and cyanide; explosives; herbicides; selected anions; and petroleum hydrocarbons. Each analysis was performed in accordance with the New York State Department of Environmental Conservation (NYSDEC) Analytical Services Program (ASP) Statement of Work (SOW). The Environmental Protection Agency (EPA) SW-846 Method 8330 analyzed explosive compounds[1]; herbicides were analyzed by EPA SW-846 Method 8150[1], nitrates were analyzed by EPA Method 352.2[2], and total recoverable petroleum hydrocarbons (TRPH) were analyzed by EPA Method 418.1[2].

1.3.2 Results of Sampling Program

The results of the soil sampling program are presented in **Table 1-1**. Fifty-seven different TCL/TAL analytes, including 36 organic compounds and 21 metals, plus total petroleum hydrocarbons were detected in soil samples collected from SEAD-24. Of this total, only three SVOCs and 14 metals were present at concentrations that exceeded recommended cleanup level objectives defined pursuant to NYSDEC's Technical and Administrative Guidance Memorandum (TAGM) #4046. For a majority of the metals, the recommended cleanup level objective is defined as the 95th percentile value resulting from a set of Depot-specific background soil samples. NYSDEC published values were used as cleanup level objectives for all other compounds.

Each of the SVOCs that exceeded its recommended cleanup level objective was a polynuclear aromatic hydrocarbon (PAH – i.e., benzo(a)anthracene, benzo(a)pyrene, and dibenz(a,h)anthracene) and these three compounds were each found collocated at the surface soil sample location, SS24-1, which is located outside and to the east of the bermed pit. In addition, a majority of all SVOCs detected in soil samples were found in the shallow soil samples collected from the north and due east of the open end of the bermed pit. The compound, 2,4-dinitrotoluene, a component of explosive materials was also detected in all of the surface soil samples where the other SVOCs were found. However, this compound was also found in three surface soil samples that were collected east and

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[1] US EPA Publication SW-846, "*Test Methods for Evaluating Solid Waste, Physical/Chemical Methods.*"

[2] US EPA 600/4-79-020, "*Methods for Chemical Analysis of Water and Wastes*, revised March 1983"

southeast of the shorter eastern berm wall. These three samples are all very close to sample location SB24-2, which is the only location within the bermed area where 2,4-dinitrotoluene was found. No New York State guidance value currently exists for 2,4-dinitrotoluene in soil.

Fourteen metals were detected at concentrations exceeding defined cleanup level objective values. Three of the metals (i.e., arsenic, As; lead, Pb; and zinc, Zn) were found at concentrations above their respective objective values in more than one-third of the soil samples collected and 33 of 35 of the concentrations found to exceed the objective levels reported for arsenic, lead, and zinc were found in surface soil samples (i.e., collected from 0 to 2 feet below grade surface - bgs). A single concentration measured for zinc (i.e., 114 mg/Kg in sample SB24-1.3, 4 – 6 feet bgs) and a single concentration measured for lead (i.e., 33.8 mg/Kg in sample SB24-3.5, 8 – 10 feet bgs) represent the two exceptions that deviated from the noted depositional trend. It is further noted that both of the elevated concentrations found at depth are only moderately above the defined cleanup objective, and both were found at locations underlying shallower samples which did not show the presence of elevated concentrations for the same metal. This suggests that the two samples found to contain elevated concentrations of metals might result from natural variability in soil or other factors that are unrelated to historic site activities and releases.

Arsenic was detected above its defined cleanup objective level in 11 of the surface soil samples collected. The highest arsenic concentration measured for arsenic was 56.8 mg/Kg, found in the surface soil sample, SS24-6. All arsenic concentrations reported for subsurface soils were below the defined cleanup objective level.

Lead concentrations exceeded its defined cleanup level objective value (i.e., 24.8 mg/Kg) in 14 of the soil samples analyzed; however, only one lead concentration exceeded the US EPA guidance value[3] for acceptable lead content in residential soil. Generally, elevated lead concentrations are again limited primarily to the surface soil samples. The maximum concentration found for lead in soil was 422 mg/Kg and this was found in the surface sample SS24-5. This sample was the only sample found to contain a concentration of lead that exceeded EPA's recommended soil clean-up level (400 mg/Kg) for residential property. All other concentrations detected for lead in soil were

[3] US EPA, Office of Solid Waste and Emergency Response, Directive #9200.4-27, "Clarification to the 1994 Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities," August 1998, EPA/540/F-98/030, PB98-963244.

less than 100 mg/Kg.

Zinc concentrations exceeded the defined cleanup objective level (i.e., 110 mg/Kg) in 10 samples. As was the case for the other two predominant metals, and generally for all cases where elevated metals were detected, the reported high concentrations were primarily found in surface soil samples. The two highest concentrations measured for zinc were 1180 mg/Kg found in sample SS24-12 and 566 mg/Kg, found in sample SS24-5.

The other 11 metals (i.e., aluminum, Al; beryllium, Be; cadmium, Cd; chromium, Cr; copper, Cu; iron, Fe; magnesium, Mg; manganese, Mn; mercury, Hg; nickel, Ni; and potassium, K) found at concentrations exceeding defined cleanup objective levels were only detected at elevated concentrations in 1 to 4 samples, each. Again, a majority of samples found to contain concentrations of one or more of the other 11 metals at levels in excess of stated cleanup objective levels were found in shallow soil samples (i.e., collected from 0 to 2 feet bgs); the sole exception to this general trend was a level measured for magnesium in sample SB24-3.5 (8 – 10 feet bgs). **Figure 1-2** provides a summary presentation of shallow soil data exceeding soil cleanup objective levels.

The results of the groundwater sampling program are presented in **Table 1-2**. These results suggest that the groundwater near the Abandoned Powder Burning Pit has not been adversely impacted by any of the constituents found in the soil or by those materials presumed to have been burned in the area. No organic compounds were detected in the samples of groundwater collected. Three metals (aluminum, iron and manganese) were detected in the groundwater at levels exceeding their respective comparative groundwater criteria values. Although each of these three metals was routinely measured in the soil samples collected from the area of SEAD-24, most levels measured were generally lower than cleanup objective guidance values defined for soil. It is also presumed that the noted groundwater exceedances for aluminum, iron and manganese may be attributable, at least in part, with the elevated turbidity levels found in the samples analyzed.

1.4 DISCUSSION OF REMOVAL ALTERNATIVES

This Decision Document identifies and presents alternatives that have been considered to lessen and possibly eliminate the magnitude of potential human health and environmental risks that may be present at the Abandoned Powder Burning Pit site. Although human health and ecological risk

assessments considering future land uses for the site (i.e., recreational/conservation) have not been completed, the Army believes that the presence of metals and SVOCs at levels above defined cleanup objectives provides sufficient preliminary information to suggest that a potential risk may exist at the site. Due to the Depot's change in status, and the release of portions of the former Depot for beneficial reuse by the public and private sectors, the proposed action is considered time-critical and the selected option will be implemented quickly to mitigate and possibly eliminate the potential threat.

The focus of the Army's proposed time-critical removal action for SEAD-24 is the removal of soil that has been impacted by arsenic, lead and zinc, which are the three metal contaminants that are found most frequently at concentrations exceeding their respective cleanup objectives, as defined in accordance with NYSDEC's procedures identified in TAGM #4046. Although 11 other metals (i.e., Al, Be, Cd, Cr, Cu, Fe, Mg, Mn, Hg, Ni, and K) were also identified at concentrations exceeding cleanup objectives, the frequency of their detection and the general distribution of these metals is less pervasive throughout SEAD-24. Thus, while it is possible that these species may also represent a potential threat to the environment and human health, it is currently presumed that a majority of the potential risk present at SEAD-24 results from the surficial deposition of arsenic, lead, and zinc in shallow and near-surface soil. Subsequent to the completion of the removal of soil contaminated with arsenic, lead and zinc, additional sampling and analyses will be conducted to more fully characterize the nature of the metal deposition at, and in the vicinity of, SEAD-24.

As is described above, analytical results suggest that two zones of shallow soil (i.e., sample depth 0 to 0.2 feet bgs) located exterior to the Abandoned Powder Burning Pit are impacted by the deposition of elevated concentrations of metals, and to a lesser extent, by the deposition of a few polynuclear aromatic hydrocarbon (PAH) compounds. Additionally, available data indicates that near-surface soil (i.e., sample depth 0 to 2 feet below grade) within the footprint of the bermed area has also been impacted by the three metals. Therefore, the Army is proposing to perform a time-critical removal action to eliminate or lessen the severity of the potential threat posed by the three metals and the identified PAHs contained in the shallow and near-surface soil at SEAD-24.

Figure 1-2 summarizes analytical results for shallow and near-surface soils that are contaminated by metals and PAHs at concentrations above NYSDEC's recommended cleanup objectives. Available data for two of the locations (i.e., sample designation SB24-1.3 – zinc, and sample designations

SB24-3.5 – lead and magnesium) also indicate that metal concentrations exceeding TAGM levels exist in isolated deeper regimes at the site, but these are not believed to be associated with activities conducted at the site as shallower soil samples from the same borings do not show elevated concentrations of the identified metals. Therefore, the identified three results are considered spurious and of no immediate relevance to the proposed time-critical removal action discussed in this document.

Based on the preceding discussion and results, the Army proposes that limited amounts of soil in three areas of the Abandoned Powder Burn Pit should be removed to eliminate the identified elevated concentrations of the three primary metals (i.e., arsenic, lead, and zinc) of concern. The three area include:

1) (Area 1) a reversed "C" shaped area, roughly defined by the location of sampling locations SS24-9, SB24-3, SS24-6, SS24-3, SS24-1, SS24-4, SS24-2, SB24-5, SS24-5, SS24-7, and SS24-8 [i.e. encompassing approximately 76,500 square feet (ft^2) or approximately 1,415 cubic yards (yd^3) of soil];
2) (Area 2), an isolated area to the west of the abandoned pit that is roughly defined by sample locations SS24-10, SS24-11, and SS24-12 [i.e. encompassing approximately 12,500 ft^2 or approximately 230 yd^3 of soil]; and
3) an area inside and at the southern end of the bermed structure roughly defined by sample locations SB24-2 and SB24-4 [i.e. encompassing approximately 9,300 ft^2 or approximately 345 yd^3 of soil].

The areas of proposed excavation are shown in **Figure 1-3**. In two of the proposed removal areas (Area 1 and 2), the initial excavations will be extended to a depth of 6 inches below grade, which is deeper than the depth from which the original samples were collected. In the last area, the proposed depth of excavation will be 12 inches, which is the mid-point of the original near-surface sample's collection depth. The total quantity of soil to be removed is estimated as 1,990 yd^3 or approximately 2,985 tons of soil. The actual amount of soil that will be removed under the proposed action will be determined based on the results of confirmational samples that will be collected from the base and perimeter of the excavation once the initial removal action is completed.

Confirmational sampling and analysis will be conducted after the removal of the identified soil to

confirm that the three identified excavations remove sufficient soil to lessen, and hopefully eliminate, potential risks that result from the presence of the three identified primary metals of concern (i.e., arsenic, lead, and zinc).

Once necessary soil is removed and the extent of the excavation is verified and confirmed, the excavation will be backfilled with clean soil, regraded, contoured and re-seeded to re-establish pre-excavation conditions.

The following section briefly describes treatment or disposal alternatives that may be applicable for use at SEAD-24. Based on the results of the previous investigation, groundwater impacts in the vicinity of SEAD-24 appear minimal. At this time, the emphasis is on potential soil removal action alternatives. These alternatives fall into three categories: 1) on-site treatment, 2) on-site containment, and 3) off-site disposal. The on-site treatment alternative considered was soil washing, the on-site containment alternative considered was in situ solidification/stabilization, and the off-site disposal method considered was excavation and landfilling. These alternatives will be evaluated for technical implementability, ability to achieve ARARs and economic impacts.

1.5 REMEDIAL ALTERNATIVES

Soil Washing

Soil washing is a treatment option applicable to soil contaminated with metals and SVOCs. In the process, soil is slurried with water and subjected to intense scrubbings. To improve the efficiency of soil washing, the process may include the use of surfactants, detergents, chelating agents or pH adjustment. After contaminants are removed from the soil, the washing solutions can be treated in a wastewater treatment system. The washing fluid can then be recycled, continuing the soil washing process.

Certain site factors can limit the success of soil washing:

1. Highly variable soil conditions,
2. High silt or clay content which will reduce percolation and leaching, and inhibit the solid-liquid separations following the soil washing,

3. Chemical reactions with soil cation exchange and pH effects may decrease contaminant mobility, and
4. If performed in situ, the groundwater flow must be well defined in order to recapture washing solutions.

In Situ Solidification/Stabilization

In situ solidification involves the formation of an in-place monolithic mass through the mixing of a pozzolantic or a siliceous material with the existing soil. Multi-axis overlapping hollow stem augers are used to inject solidification/stabilization (S/S) agents and blend them with contaminated soil in situ. The augers are mounted on a crawler-type base machine. A batch mixing plant and raw materials storage tanks are also involved. The machine can treat 90 to 140 cubic yards of soil per 8-hour shift at depths up to 100 feet. This technology is applicable to soil contaminated with metals and SVOCs. The technique has been used in mixing soil cement, or chemical grout for more than 18 years on various construction applications, including cutoff walls and soil stabilization and is widely applied.

Drawbacks related to in situ solidification include the unsuitability for use in cold climates where the ground freezes and thaws, thus breaking up the monolithic mass and providing a greater surface area for corrosion and weathering. Another condition limiting its implementation is the cohesion and particle size of the soil matrix to be treated. Cohesive soil and soil with a large portion of coarse gravel and cobbles are unsuitable for this type of treatment.

Excavation and Landfilling

Excavation of hazardous materials is performed extensively for site remediation. Excavation is usually accompanied by off-site treatment or disposal in an off-site secured landfill. Excavation employs the use of earth moving equipment to physically remove soil and buried materials. There are no absolute limitations on the types of waste that can be excavated and removed. Factors that will be considered include the mobility of the wastes, the feasibility of on-site containment, and the cost of disposing the waste or rendering it non-hazardous once it has been excavated. A frequent practice at hazardous waste sites is to excavate and remove contaminant "hot spots" and to use other remedial measures for less contaminated soil. Excavation and removal can almost totally eliminate the

contamination at a site and the need for long-term monitoring. Another advantage is that the time to achieve beneficial results can be short relative to other alternatives.

The biggest drawbacks with excavation, removal, and off-site disposal are associated with cost and institutional aspects. Costs associated with off-site disposal can be high if the material to be excavated is classified as hazardous according to 40 CFR 261 Subpart C and this frequently results in the elimination of this alternative as a cost-effective alternative. Institutional aspects can add significant delays to program implementation.

1.6 REMOVAL COSTS

Soil Washing

A large number of vendors provide soil washing services. The treatment processes used vary according to the scale of the operation, particle size being treated, and extraction agent used. Because the operation is unique for each site, it is difficult to arrive at a cost estimate. However, in an evaluation of fourteen companies offering soil washing treatment services, a general price range of $50 to $205 per ton was noted in EPA Engineering Bulletin EPA/540/2-90/017, September 1990. This would result in an estimated cost of $149,250 to $612,000 with a most probable cost in the range of $372,500 to $492,500 (exclusive of monitoring, sampling and analysis, and oversight and management).

In Situ Solidification/Stabilization

Solidification treatment is grouped into different categories according to the types of additives and processes used, and the cost of this treatment is dependent upon which process is utilized. Any of the different processes available will range between $100 and $200 per ton of soil treated. This would result in an estimated cost of $298,500 to $597,000 with a most probable cost range of $372,500 to $560,000 (exclusive of monitoring, sampling and analysis, and oversight and management).

Excavation and Landfilling

The cost of excavation and landfilling soil depends upon whether the soil is classified as hazardous or non-hazardous according to 40 CFR 261 Subpart C. The excavation, containment, and transportation will cost the same regardless of whether the soil is considered hazardous, and most of that can be performed by SEDA personnel. If the soil is classified as hazardous, the cost to excavate and dispose of it in a hazardous waste landfill will range between $400 and $500 per ton. If it is not classified as hazardous, the cost to excavate and dispose of it in a landfill will range between $100 and $150 per ton. If it can be classified as clean enough for beneficial use as daily cover, the cost to excavate and dispose of it will range between $50 and $100 per ton. Assuming that it will be disposed of in a non-hazardous waste landfill, this will result in an estimated cost of $149,250 to $298,500 with a most probable cost in the range of $185,000 to $252,500 (exclusive of monitoring, sampling and analysis, and oversight and management).

1.7 COMPARISON OF REMEDIAL ALTERNATIVES

Of the three remedial alternatives presented above, excavation and off-site landfilling is the best alternative for the removal of the PAH and metals-impacted soil at SEAD-24. For the most part, this decision is due to the unsuitability of in situ solidification and soil washing for the conditions present at SEDA. The shallowness of the contaminants, the cold climate of central New York, the cohesive nature of the soil, and the high percentage of gravel and cobbles in the soil eliminate in situ solidification as a practical alternative for use at SEDA. The high percentage of clay and silt in the soil eliminates soil washing as a practical remedial alternative as well. In addition, excavation and off-site landfilling can be performed at substantial cost savings compared to the other two. Furthermore, if the excavated soil can be used for daily cover at an off-site landfill, further cost savings can be achieved.

1.8 RECOMMENDATION

The Army intends to implement a focused time-critical removal action at SEAD-24 to expedite the closure process and lessen, and perhaps eliminate, any possible threats, current or future, that this site may pose to human health and the environment. SEAD-24 is comparatively small, with localized impacts that can be effectively addressed via the removal process. Completion of the removal

actions will facilitate transfer of these properties in the future for beneficial reuse.

Surface soil in a limited area to the west of the Abandoned Powder Burn Pit, approximately defined by sample locations SS24-10 through 12, should be excavated to a depth of 6 inches and transported off-site for disposal at a state-approved landfill. In addition, shallow soil (i.e., to a depth of six inches) located within a reversed "C" shaped area extending from the south around the east and to the north of the abandoned bermed area (roughly defined by former sampling locations SS24-8, SS24-7, SS24-5, SS24-2, SB24-5, SS24-4, SS24-1, SS24-3, SS24-6, SB24-3 and SS24-9) should also be excavated and transported off-site for disposal at a state-approved landfill. Finally, near surface soils to a depth of roughly 12 inches contained in an area that is located at the southern end of the abandoned pit, and surrounding former sampling locations SB24-2 and SB24-4 should be excavated and transported off-site for disposal at a state-approved landfill. The total quantity of soil to be excavated and disposed off-site is initially estimated as 1,990 yd^3 or approximately 2,985 tons. The actual quantity of soil ultimately excavated and disposed under the proposed time-critical removal action will be determined based on the results of confirmational samples that will be collected from the proposed excavations and characterized for arsenic, lead and zinc content. The estimated cost is approximately $185,000 to $252,500 (exclusive of monitoring, sampling and analysis, and oversight and management) to excavate, contain, and dispose of this volume of soil.

1.9 JUSTIFICATION

Fourteen metal contaminants predominated by three species, arsenic lead, and zinc, were detected in one or more soil samples collected from the vicinity of SEAD-24 at concentrations exceeding cleanup objectives defined by NYSDEC. The three key metal species were each detected at elevated concentrations in roughly one-third of the samples collected and analyzed. Two isolated soil samples collected from depths of greater than two feet below grade surface were also found to contain a total of three metal concentrations (zinc in SB24-1.3, and lead and magnesium in SB24-3.5) that exceeded NYSDEC recommended cleanup levels, but each of these samples was located beneath soils that did not show elevated concentrations of the same metals.

In addition to finding metals at levels exceeding cleanup objectives, a single surface soil sample collected from location SS24-1, which is to the east of the Abandoned Powder Burning Pit, was also found to contain concentrations of three polynuclear aromatic hydrocarbons exceeding NYSDEC's

recommended cleanup objectives.

Groundwater monitoring data collected from wells surrounding SEAD-24 indicates that the groundwater has not been adversely impacted by any of the three focus metals of concern. There is data that indicates that the analyzed groundwater contained elevated levels of aluminum, iron, and manganese, but these were found in wells that were both up- and down-gradient of the Abandoned Powder Burning Pit. Further review of the data indicates that many of the highest concentrations reported for the other three metals (i.e., Al, Fe, Mn) in the vicinity of SEAD-24 were found in the upgradient well, which suggests that the identified groundwater contamination does not result from historic actions or releases occurring from the historic operations. Additionally, the samples collected and analyzed exhibited elevated levels of turbidity at the time of collection. Given this information, the Army is not proposing any additional action for the groundwater at SEAD-24 as part of this removal action.

The Army is proposing to conduct a removal action that focuses on the removal of soil that is contaminated with one or more of three key metals (i.e., arsenic, lead, and zinc) at concentrations above NYSDEC recommended cleanup objective levels. The removal and replacement of the identified soil should lessen, and may possibly eliminate, identified potential sources of elevated risk to human health and the environment. A side benefit of the proposed time-critical removal action for elevated concentrations of arsenic, lead and zinc is that the identified soil contaminated with these three metals also contains other metal constituents at concentrations exceeding their respective NYSDEC recommended cleanup objective values. Thus, the proposed removal action will remove these other contaminants as well. Furthermore, the proposed excavations will also encompass an isolated area where elevated levels of PAH compounds were found, and thus any potential threat resulting from this hot spot of contamination will also be removed.

1.10 VERIFICATION SAMPLING AND ANALYSIS

Confirmatory Sampling and Analysis

Post-removal verification sampling and analysis (i.e., confirmational sampling and analysis) will be conducted to document the extent to which the three target metals (i.e., arsenic, lead, and zinc) have been eliminated from the site. Additionally, samples will be analyzed to document the level of the

other TAL metals or TCL PAH compounds that are present in the soil.

Due to the shallow nature of the proposed excavations, confirmational samples will be collected from the base of the excavations and at exterior locations along the perimeter of the excavation bounds. Samples will not be collected from the sidewalls of the excavation. One confirmational sample will be collected from the base of the excavation for each area of 900 square feet (e.g., 30 ft. by 30 ft. area) or less of excavation extent. Additional confirmational samples will also be collected for each 30 linear feet of excavation perimeter. Specific details of the proposed confirmational sampling are provided in Appendix B of this Decision Document. At the proposed spacing of the confirmational soil samples, the Army anticipates that approximately 208 confirmational samples, plus associated quality assurance/quality control (QA/QC) samples, will be collected from the area of SEAD-24. Of the samples collected, 80 percent will be analyzed to document the levels of arsenic, lead, and zinc that are present in the soils underlying and surrounding the excavations. The remaining 20 percent of the proposed samples will be analyzed for the full suite of TAL metals that are present in the soil. The location of targeted versus full suite TAL metal analyses will be randomly distributed throughout the site. Furthermore, approximately 20 percent of the confirmational samples will be analyzed to document the residual levels of PAH compounds that are present at SEAD-24. Roughly one-third to one-half of these samples will be sited at locations near to historic sampling location SS24-1, which is where PAH compounds were identified during the ESI. The remainder of the samples collected for PAH analyses will be randomly distributed across the site. A detailed listing of the proposed confirmational samples and analyses for SEAD-24 is provided in Appendix B of this Decision Document.

Disposal or Characterization Sampling and Analysis

Additional samples of the excavated, stockpiled, and staged soil will be collected and analyzed for the purpose of evaluating and selecting reuse or disposal alternatives for the excavated soils. The number of samples collected from these determinations will be set at a rate of one sample per 150 cubic yards of soil contained in each pile. Disposal determinations will be based on the comparison of the resulting mass and TCLP data to recommended soil cleanup objective values and the toxicity characteristic criteria.

TABLE 1-1
SEAD-24 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

PARAMETER	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID UNITS	MAXIMUM DETECT	FREQUENCY OF DETECTION	CRITERIA VALUE (a)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF SAMPLES	SOIL SEAD-24 0-0 2 10/22/93 SS24-1 202078 Value (Q)	SOIL SEAD-24 0-0 2 10/22/93 SS24-2 202079 Value (Q)	SOIL SEAD-24 0-0 2 10/22/93 SS24-3 202080 Value (Q)	SOIL SEAD-24 0-0 2 10/22/93 SS24-4 202081 Value (Q)	SOIL SEAD-24 0-0 2 10/22/93 SS24-5 202082 Value (Q)
Volatile Organics												
Acetone	ug/kg	27	10 3%	200	0	3	29	14 UJ	13 U	11 U	12 U	12 U
Benzene	ug/kg	1	3 4%	60	0	1	29	14 UJ	13 U	11 U	12 U	12 U
Chlorobenzene	ug/kg	7	6 9%	1700	0	2	29	14 UJ	13 U	11 U	12 U	12 U
Chloroform	ug/kg	13	37 9%	300	0	11	29	5 J	13 U	11 U	12 U	13
Methylene Chloride	ug/kg	12	10 3%	100	0	3	29	14 UJ	13 U	11 U	12 U	12 U
Toluene	ug/kg	2	3 4%	1500	0	1	29	14 UJ	13 U	11 U	12 U	12 U
Trichloroethene	ug/kg	1	3.4%	700	0	1	29	14 UJ	13 U	11 U	12 U	12 U
Herbicides												
2,4 5-T	ug/kg	8	3 4%	1900	0	1	29	6 1 U	6 7 U	5 5 U	6.2 U	6 1 U
Dicamba	ug/kg	9 7	3 4%		0	1	29	6 1 U	6.7 U	5 5 U	6.2 U	6 1 U
MCPP	ug/kg	6600	3 4%		0	1	29	6600	6700 U	5500 U	6200 U	6100 U
Nitroaromatics												
1,3-Dinitrobenzene	ug/kg	76	3 4%		0	1	29	130 U	130 U	130 U	130 U	130 U
2 4-Dinitrotoluene	ug/kg	4400	20 7%		0	6	29	130 U	310	640	130 U	4400
Tetryl	ug/kg	120	6 9%		0	2	29	130 U	130 U	130 U	130 U	130 U
Semivolatile Organics												
2,4-Dinitrotoluene	ug/kg	12000	27 6%		0	8	29	74 J	440 U	250 J	420	12000
Acenaphthylene	ug/kg	54	3 4%	41000	0	1	29	54 J	440 U	360 U	400 U	1600 U
Anthracene	ug/kg	19	3 4%	50000*	0	1	29	19 J	440 U	360 U	400 U	1600 U
Benzo(a)anthracene	ug/kg	280	13 8%	220	1	4	29	280 J	440 U	360 U	400 U	1600 U
Benzo(a)pyrene	ug/kg	420	13 8%	61	1	4	29	420	440 U	360 U	400 U	1600 U
Benzo(b)fluoranthene	ug/kg	350	17.2%	1100	0	5	29	350 J	440 U	360 U	400 U	1600 U
Benzo(g,h,i)perylene	ug/kg	170	6.9%	50000*	0	2	29	170 J	440 U	360 U	400 U	1600 U
Benzo(k)fluoranthene	ug/kg	340	17 2%	1100	0	5	29	340 J	440 U	360 U	400 U	1600 U
bis(2-Ethylhexyl)phthalate	ug/kg	1300	51 7%	50000*	0	15	29	400 U	440 U	360 U	400 U	1600 U
Chrysene	ug/kg	320	24 1%	400	0	7	29	320 J	440 U	18 J	400 U	1600 U
Dibenz(a,h)anthracene	ug/kg	28	3.4%	14	1	1	29	28 J	440 U	360 U	400 U	1600 U
Di-n-butylphthalate	ug/kg	1100	24 1%	8100	0	7	29	400 U	440 U	31 J	400 U	370 J
Fluoranthene	ug/kg	210	24 1%	50000*	0	7	29	210 J	440 U	20 J	400 U	1600 U
Indeno(1,2,3-cd)pyrene	ug/kg	220	6.9%	3200	0	2	29	220 J	440 U	360 U	400 U	1600 U
N-Nitrosodiphenylamine	ug/kg	810	24.1%	50000*	0	7	29	30 J	440 U	74 J	70 J	650 J
Phenanthrene	ug/kg	44	13.8%	50000*	0	4	29	37 J	440 U	360 U	400 U	1600 U
Pyrene	ug/kg	260	24 1%	50000*	0	7	29	260 J	440 U	18 J	400 U	1600 U
Pesticides/PCB												
4,4'-DDE	ug/kg	12	17 2%	2100	0	5	29	4 U	4.4 U	3 6 U	4 1 U	3 6 J
4,4'-DDT	ug/kg	35	6.9%	2100	0	2	29	4 U	4 4 U	3 6 U	4 1 U	4 UJ
alpha-Chlordane	ug/kg	4 7	3 4%	540	0	1	29	2 U	2 3 U	1 9 U	2 1 U	2 UJ
Endosulfan I	ug/kg	2 3	10 3%	900	0	3	29	2 U	2 3 U	1 9 U	2 1 U	2 UJ
Endrin aldehyde	ug/kg	4 2	3 4%		0	1	29	4 U	4 4 U	3 6 U	4 1 U	4 UJ
gamma-Chlordane	ug/kg	6	3 4%	540	0	1	29	2 U	2 3 U	1 9 U	2 1 U	2 UJ
Metals												
Aluminum	mg/kg	25500	100 0%	19300	3	29	29	9540	16800	12000	18900	13200
Arsenic	mg/kg	56 8	100 0%	8 2	11	29	29	51.1	11.4	53.5	20.7	22.1
Barium	mg/kg	149	100 0%	300	0	29	29	71 6	149	57 8	105	121
Beryllium	mg/kg	1 2	100 0%	1 1	1	29	29	0 43 J	0 89 J	0 51 J	0 91 J	0 59 J
Cadmium	mg/kg	8 2	6 9%	2 3	1	2	29	0 64 U	0 72 U	0.71 U	0.69 U	0 75 U
Calcium	mg/kg	106000	100 0%	121000	0	29	29	79300	3290	23600	2140	23000
Chromium	mg/kg	35 1	100 0%	29 6	3	29	29	12 2	24 5	22 2	23 9	21 9
Cobalt	mg/kg	20 5	100 0%	30	0	29	29	4 7 J	13 9	10 9	11 5	10 4 J
Copper	mg/kg	324	100 0%	33	4	29	29	13 5 J	20 J	28 2 J	26 1 J	35.2 J
Iron	mg/kg	37700	100 0%	36500	2	29	29	14000	30900	25500	29200	25000

TABLE 1-1
SEAD-24 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

	MATRIX							SOIL	SOIL	SOIL	SOIL	SOIL
	LOCATION							SEAD-24	SEAD-24	SEAD-24	SEAD-24	SEAD-24
	DEPTH (FEET)							0-0 2	0-0 2	0-0 2	0-0 2	0-0 2
	SAMPLE DATE							10/22/93	10/22/93	10/22/93	10/22/93	10/22/93
	ES ID		FREQUENCY		NUMBER	NUMBER	NUMBER	SS24-1	SS24-2	SS24-3	SS24-4	SS24-5
	LAB ID	MAXIMUM	OF	CRITERIA	ABOVE	OF	OF	202078	202079	202080	202081	202082
PARAMETER	**UNITS**	**DETECT**	**DETECTION**	**VALUE (a)**	**CRITERIA**	**DETECTS**	**SAMPLES**	Value (O)	Value (Q)	Value (Q)	Value (Q)	Value (Q)
Lead	mg/kg	422	100 0%	400 (b)	1	29	29	15 1	46 6	59.4	51.3	422
Magnesium	mg/kg	43700	100 0%	21500	2	29	29	43700	4320	5960	4600	5470
Manganese	mg/kg	1770	100 0%	1060	2	29	29	393	1770	353	244	550
Mercury	mg/kg	0 15	51 7%	0 1	1	15	29	0 04 J	0 05 J	0 04 J	0.15	0 04 U
Nickel	mg/kg	535	100 0%	49	2	29	29	13 8	30	39 5	26 4	31 6
Potassium	mg/kg	2510	100 0%	2380	1	29	29	1140	1340	1190	1710	1560
Selenium	mg/kg	0 3	10 3%	2	0	3	29	0 2 UJ	0 23 UJ	0.2 UJ	0 26 UJ	0 23 UJ
Sodium	mg/kg	161	100 0%	172	0	29	29	146 J	51 9 J	95 5 J	56 J	88 4 J
Thallium	mg/kg	0 14	3 4%	0 7	0	1	29	2 2 U	0 25 U	0 22 U	0 29 U	0 25 U
Vanadium	mg/kg	39 3	100.0%	150	0	29	29	17 7	30.1	17 1	32 8	22 3
Zinc	mg/kg	1180	100 0%	110	10	29	29	58 7	129	100	85 1	566
Other Analyses												
Nitrate/Nitrite-Nitrogen	mg/kg	2 1	100 0%		0	29	29	2 1	0.56	0 22	0 18	0 6
Total Solids	%W/W	93 2	100 0%		0	29	29	81 6	75 4	91 4	80 7	81 9
Total Petroleum Hydrocarbons	mg/kg	158	100 0%		0	29	29	99	81	73	72	78

Notes

a) NYSDEC Technical and Administrative Guidance Memorandum #4046, except as noted

b) US EPA, OSWER Directive # 9200 4-27 Soil Lead Guidance, August 1998

* = As per proposed TAGM, total VOCs < 10ppm, total Semi-VOCs <500ppm, individual semi-VOCs < 50 ppm

NA = Not Available

U = Compound was not detected

J = the reported value is an estimated concentration

R = the data was rejected in the data validating process

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

TABLE 1-1
SEAD-24 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

PARAMETER	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID UNITS	MAXIMUM DETECT	FREQUENCY OF DETECTION	CRITERIA VALUE (a)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF SAMPLES	SOIL SEAD-24 0-0 2 10/22/93 SS24-6 202083 Value (Q)	SOIL SEAD-24 0-0.2 10/22/93 SS24-7 202084 Value (Q)	SOIL SEAD-24 0-0 2 10/22/93 SS24-8 202085 Value (Q)	SOIL SEAD-24 0-0 2 10/22/93 SS24-9 202086 Value (Q)	SOIL SEAD-24 0-0 2 10/22/93 SS24-13 202092 Value (Q)
Volatile Organics												
Acetone	ug/kg	27	10 3%	200	0	3	29	27	7 J	14 U	13 U	13 UJ
Benzene	ug/kg	1	3 4%	60	0	1	29	13 U	12 U	14 U	13 U	13 UJ
Chlorobenzene	ug/kg	7	6 9%	1700	0	2	29	13 U	12 U	14 U	13 U	13 UJ
Chloroform	ug/kg	13	37 9%	300	0	11	29	5 J	1 J	3 J	13 U	4 J
Methylene Chloride	ug/kg	12	10 3%	100	0	3	29	13 U	12 U	14 U	13 U	13 UJ
Toluene	ug/kg	2	3 4%	1500	0	1	29	13 U	12 U	14 U	13 U	13 UJ
Trichloroethene	ug/kg	1	3 4%	700	0	1	29	13 U	12 U	14 U	13 U	13 UJ
Herbicides												
2,4,5-T	ug/kg	8	3 4%	1900	0	1	29	6 4 U	6 1 U	6 9 U	8	6 1 U
Dicamba	ug/kg	9 7	3 4%		0	1	29	6 4 U	6 1 U	6 9 U	6 1 U	9 7
MCPP	ug/kg	6600	3 4%		0	1	29	6400 U	6100 U	6900 U	6100 U	6100 U
Nitroaromatics												
1,3-Dinitrobenzene	ug/kg	76	3 4%		0	1	29	130 U	130 U	130 U	130 U	130 U
2,4-Dinitrotoluene	ug/kg	4400	20 7%		0	6	29	240	130 U	130 U	900	560
Tetryl	ug/kg	120	6 9%		0	2	29	130 U	130 U	120 J	130 U	130 U
Semivolatile Organics												
2,4-Dinitrotoluene	ug/kg	12000	27 6%		0	8	29	93 J	400 U	450 U	5100	7600
Acenaphthylene	ug/kg	54	3 4%	41000	0	1	29	420 U	400 U	450 U	800 U	1600 U
Anthracene	ug/kg	19	3 4%	50000*	0	1	29	420 U	400 U	450 U	800 U	1600 U
Benzo(a)anthracene	ug/kg	280	13 8%	220	1	4	29	38 J	400 U	450 U	41 J	78 J
Benzo(a)pyrene	ug/kg	420	13 8%	61	1	4	29	34 J	400 U	450 U	45 J	1600 U
Benzo(b)fluoranthene	ug/kg	350	17.2%	1100	0	5	29	42 J	400 U	450 U	52 J	83 J
Benzo(g,h,i)perylene	ug/kg	170	6 9%	50000*	0	2	29	24 J	400 U	450 U	800 U	1600 U
Benzo(k)fluoranthene	ug/kg	340	17.2%	1100	0	5	29	40 J	400 U	450 U	44 J	74 J
bis(2-Ethylhexyl)phthalate	ug/kg	1300	51 7%	50000*	0	15	29	420 U	400 U	450 U	520	620
Chrysene	ug/kg	320	24 1%	400	0	7	29	51 J	400 U	450 U	59 J	100 J
Dibenz(a,h)anthracene	ug/kg	28	3 4%	14	1	1	29	420 U	400 U	450 U	800 U	1600 U
Di-n-butylphthalate	ug/kg	1100	24 1%	8100	0	7	29	25 J	400 U	450 U	110 J	1100 J
Fluoranthene	ug/kg	210	24 1%	50000*	0	7	29	82 J	400 U	450 U	95 J	160 J
Indeno(1,2,3-cd)pyrene	ug/kg	220	6 9%	3200	0	2	29	22 J	400 U	450 U	800 U	1600 U
N-Nitrosodiphenylamine	ug/kg	810	24 1%	50000*	0	7	29	420 U	400 U	450 U	440 J	810 J
Phenanthrene	ug/kg	44	13 8%	50000*	0	4	29	37 J	400 U	450 U	44 J	1600 U
Pyrene	ug/kg	260	24 1%	50000*	0	7	29	72 J	400 U	450 U	99 J	150 J
Pesticides/PCB												
4,4'-DDE	ug/kg	12	17.2%	2100	0	5	29	2 J	12	4 5 U	11 J	8 6 J
4,4'-DDT	ug/kg	35	6 9%	2100	0	2	29	4 1 U	35	4 5 U	4 UJ	2 7 J
alpha-Chlordane	ug/kg	4 7	3 4%	540	0	1	29	2 1 U	4 7 J	2 3 U	2 UJ	2 1 UJ
Endosulfan I	ug/kg	2 3	10 3%	900	0	3	29	1 1 J	2 1 U	2 3 U	1 9 J	2 3 J
Endrin aldehyde	ug/kg	4 2	3 4%		0	1	29	4 2 J	4 U	4 5 U	4 UJ	4 UJ
gamma-Chlordane	ug/kg	6	3 4%	540	0	1	29	2 1 U	6	2 3 U	2 UJ	2 1 UJ
Metals												
Aluminum	mg/kg	25500	100 0%	19300	3	29	29	13600	18700	14700	11500	14300
Arsenic	mg/kg	56 8	100 0%	8 2	11	29	29	56.8	9.9	12.1	38.5	38.6
Barium	mg/kg	149	100 0%	300	0	29	29	81 9	118	105	68 8	96 6
Beryllium	mg/kg	1 2	100 0%	1 1	1	29	29	0 66 J	0 86	0 81 J	0 53 J	0 67 J
Cadmium	mg/kg	8 2	6 9%	2 3	1	2	29	0 65 U	0 55 U	0 77 U	0 68 U	0 71 U
Calcium	mg/kg	106000	100 0%	121000	0	29	29	19900	2100	3940	11800	8670
Chromium	mg/kg	35 1	100 0%	29 6	3	29	29	20 4	25 2	23 3	20	23 8
Cobalt	mg/kg	20 5	100 0%	30	0	29	29	10 6	13	12 6	10 7	11
Copper	mg/kg	324	100 0%	33	4	29	29	22 2 J	23 9 J	22 5 J	324 J	34.5 J
Iron	mg/kg	37700	100 0%	36500	2	29	29	24300	29100	29700	23900	26300

TABLE 1-1
SEAD-24 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

	MATRIX							SOIL	SOIL	SOIL	SOIL	SOIL
	LOCATION							SEAD-24	SEAD-24	SEAD-24	SEAD-24	SEAD-24
	DEPTH (FEET)							0-0 2	0-0 2	0-0 2	0-0.2	0-0 2
	SAMPLE DATE							10/22/93	10/22/93	10/22/93	10/22/93	10/22/93
	ES ID		FREQUENCY		NUMBER	NUMBER	NUMBER	SS24-6	SS24-7	SS24-8	SS24-9	SS24-13
	LAB ID	MAXIMUM	OF	CRITERIA	ABOVE	OF	OF	202083	202084	202085	202086	202092
PARAMETER	UNITS	DETECT	DETECTION	VALUE (a)	CRITERIA	DETECTS	SAMPLES	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)
Lead	mg/kg	422	100 0%	400 (b)	1	29	29	40 7	15 4	24 4	86 5	112
Magnesium	mg/kg	43700	100 0%	21500	2	29	29	4400	5190	4730	5010	5390
Manganese	mg/kg	1770	100 0%	1060	2	29	29	724	677	448	546	519
Mercury	mg/kg	0 15	51 7%	0 1	1	15	29	0 03 U	0 05 J	0 04 J	0 04 J	0 04 J
Nickel	mg/kg	535	100 0%	49	2	29	29	26 8	30 1	34 8	32 3	35 4
Potassium	mg/kg	2510	100 0%	2380	1	29	29	1360	2090	1590	1020 J	1410
Selenium	mg/kg	0 3	10 3%	2	0	3	29	0 21 UJ	0 22 UJ	0.23 UJ	0 2 UJ	0.25 UJ
Sodium	mg/kg	161	100 0%	172	0	29	29	69 8 J	52 3 J	59.8 J	68 J	74 3 J
Thallium	mg/kg	0 14	3 4%	0 7	0	1	29	0 23 U	0 24 U	0.25 U	0 21 U	0 28 U
Vanadium	mg/kg	39 3	100 0%	150	0	29	29	24 4	32 8	27 2	18 3	24
Zinc	mg/kg	1180	100 0%	110	10	29	29	97 2	63 8	88 5	143	182
Other Analyses												
Nitrate/Nitrite-Nitrogen	mg/kg	2 1	100 0%		0	29	29	0 11	0 26	0 16	0 28	0 37
Total Solids	%W/W	93 2	100 0%		0	29	29	78 6	82 2	73 2	81 7	81 5
Total Petroleum Hydrocarbons	mg/kg	158	100 0%		0	29	29	93	59	46	61	158

Notes

a) NYSDEC Technical and Administrative Guidance Memorandum #4046, except as noted

b) US EPA, OSWER Directive # 9200 4-27 Soil Lead Guidance, August 1998

* = As per proposed TAGM, total VOCs < 10ppm; total Semi-VOCs <500ppm; individual semi-VOCs < 50 ppm

NA = Not Available

U = Compound was not detected

J = the reported value is an estimated concentration

R = the data was rejected in the data validating process.

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

TABLE 1-1
SEAD-24 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

PARAMETER	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID UNITS	MAXIMUM DETECT	FREQUENCY OF DETECTION	CRITERIA VALUE (a)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF SAMPLES	SOIL SEAD-24 0-0 2 10/22/93 SS24-10 202089 Value (Q)	SOIL SEAD-24 0-0 2 10/22/93 SS24-11 202090 Value (Q)	SOIL SEAD-24 0-0 2 10/22/93 SS24-12 202091 Value (Q)	SOIL SEAD-24 0-2 11/30/93 SB24-1.1 205918 Value (Q)	SOIL SEAD-24 4-6 11/30/93 SB24-1.3 205919 Value (Q)
Volatile Organics												
Acetone	ug/kg	27	10 3%	200	0	3	29	13 U	11 U	13 U	20 U	26 U
Benzene	ug/kg	1	3 4%	60	0	1	29	13 U	11 U	13 U	12 U	11 U
Chlorobenzene	ug/kg	7	6 9%	1700	0	2	29	13 U	11 U	7 J	12 U	11 U
Chloroform	ug/kg	13	37 9%	300	0	11	29	13 U	11 U	3 J	12 U	11 U
Methylene Chloride	ug/kg	12	10 3%	100	0	3	29	13 U	11 U	13 U	12 U	11 U
Toluene	ug/kg	2	3 4%	1500	0	1	29	13 U	11 U	13 U	12 U	11 U
Trichloroethene	ug/kg	1	3 4%	700	0	1	29	13 U	11 U	13 U	12 U	11 U
Herbicides												
2,4,5-T	ug/kg	8	3 4%	1900	0	1	29	6 3 U	5 6 U	6 5 U	6.2 U	5 6 UJ
Dicamba	ug/kg	9 7	3 4%		0	1	29	6 3 U	5.6 U	6 5 U	6.2 U	5 6 UJ
MCPP	ug/kg	6600	3 4%		0	1	29	6300 U	5600 U	6500 U	6200 U	5600 UJ
Nitroaromatics												
1,3-Dinitrobenzene	ug/kg	76	3 4%		0	1	29	130 U	130 U	130 U	130 UJ	130 U
2,4-Dinitrotoluene	ug/kg	4400	20 7%		0	6	29	130 U	130 U	130 U	130 UJ	130 U
Tetryl	ug/kg	120	6 9%		0	2	29	130 U	130 U	130 U	130 UJ	130 U
Semivolatile Organics												
2,4-Dinitrotoluene	ug/kg	12000	27 6%		0	8	29	420 U	370 U	430 U	400 U	370 U
Acenaphthylene	ug/kg	54	3 4%	41000	0	1	29	420 U	370 U	430 U	400 U	370 U
Anthracene	ug/kg	19	3.4%	50000*	0	1	29	420 U	370 U	430 U	400 U	370 U
Benzo(a)anthracene	ug/kg	280	13.8%	220	1	4	29	420 U	370 U	430 U	400 U	370 U
Benzo(a)pyrene	ug/kg	420	13.8%	61	1	4	29	420 U	370 U	430 U	400 U	370 U
Benzo(b)fluoranthene	ug/kg	350	17.2%	1100	0	5	29	420 U	370 U	430 U	400 U	370 U
Benzo(g,h,i)perylene	ug/kg	170	6.9%	50000*	0	2	29	420 U	370 U	430 U	400 U	370 U
Benzo(k)fluoranthene	ug/kg	340	17.2%	1100	0	5	29	420 U	370 U	430 U	400 U	370 U
bis(2-Ethylhexyl)phthalate	ug/kg	1300	51 7%	50000*	0	15	29	420 U	370 U	430 U	1200	860
Chrysene	ug/kg	320	24 1%	400	0	7	29	420 U	370 U	20 J	400 U	370 U
Dibenz(a,h)anthracene	ug/kg	28	3 4%	14	1	1	29	420 U	370 U	430 U	400 U	370 U
Di-n-butylphthalate	ug/kg	1100	24.1%	8100	0	7	29	420 U	370 U	430 U	400 U	370 U
Fluoranthene	ug/kg	210	24 1%	50000*	0	7	29	420 U	370 U	29 J	400 U	370 U
Indeno(1,2,3-cd)pyrene	ug/kg	220	6 9%	3200	0	2	29	420 U	370 U	430 U	400 U	370 U
N-Nitrosodiphenylamine	ug/kg	810	24 1%	50000*	0	7	29	420 U	370 U	430 U	400 U	370 U
Phenanthrene	ug/kg	44	13.8%	50000*	0	4	29	420 U	370 U	430 U	400 U	370 U
Pyrene	ug/kg	260	24.1%	50000*	0	7	29	420 U	370 U	29 J	400 U	370 U
Pesticides/PCB												
4,4'-DDE	ug/kg	12	17.2%	2100	0	5	29	4 1 U	3 6 U	4 3 U	4 U	3 7 U
4,4'-DDT	ug/kg	35	6 9%	2100	0	2	29	4.1 U	3.6 U	4 3 U	4 U	3 7 U
alpha-Chlordane	ug/kg	4 7	3 4%	540	0	1	29	2 1 U	1 9 U	2 2 U	2 1 U	1 9 U
Endosulfan I	ug/kg	2 3	10.3%	900	0	3	29	2.1 U	1.9 U	2 2 U	2 1 U	1 9 U
Endrin aldehyde	ug/kg	4 2	3 4%		0	1	29	4 1 U	3 6 U	4.3 U	4 U	3 7 U
gamma-Chlordane	ug/kg	6	3 4%	540	0	1	29	2.1 U	1.9 U	2 2 U	2 1 U	1 9 U
Metals												
Aluminum	mg/kg	25500	100 0%	19300	3	29	29	**25500**	12900	15900	**24000**	11400
Arsenic	mg/kg	56 8	100 0%	8 2	11	29	29	**8.7**	6.4	8 1	5 2	3 9
Barium	mg/kg	149	100 0%	300	0	29	29	119	28 2 J	88 8	97 3	58 9
Beryllium	mg/kg	1 2	100 0%	1 1	1	29	29	**1.2**	0 57 J	0.81 J	0 9 J	0 5 J
Cadmium	mg/kg	8 2	6 9%	2 3	1	2	29	0 7 U	0 75 J	**8.2**	0 59 U	0 51 U
Calcium	mg/kg	106000	100 0%	121000	0	29	29	2770	13400	4660	4950	58500
Chromium	mg/kg	35 1	100 0%	29 6	3	29	29	**35.1**	25 1	23 8	**32.2**	17 6
Cobalt	mg/kg	20 5	100 0%	30	0	29	29	17 8	14.8	11 5 J	12 2	9 5
Copper	mg/kg	324	100 0%	33	4	29	29	32 6 J	**34.6** J	24 4 J	28 9	26 4
Iron	mg/kg	37700	100 0%	36500	2	29	29	**37500**	30600	27500	33200	22700

TABLE 1-1
SEAD-24 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

	MATRIX							SOIL	SOIL	SOIL	SOIL	SOIL
	LOCATION							SEAD-24	SEAD-24	SEAD-24	SEAD-24	SEAD-24
	DEPTH (FEET)							0-0 2	0-0.2	0-0.2	0-2	4-6
	SAMPLE DATE							10/22/93	10/22/93	10/22/93	11/30/93	11/30/93
	ES ID		FREQUENCY		NUMBER	NUMBER	NUMBER	SS24-10	SS24-11	SS24-12	SB24-1 1	SB24-1 3
	LAB ID	MAXIMUM	OF	CRITERIA	ABOVE	OF	OF	202089	202090	202091	205918	205919
PARAMETER	**UNITS**	**DETECT**	**DETECTION**	**VALUE (a)**	**CRITERIA**	**DETECTS**	**SAMPLES**	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)
Lead	mg/kg	422	100.0%	400 (b)	1	29	29	24 6	30 9	121	13 5 J	13 1 J
Magnesium	mg/kg	43700	100 0%	21500	2	29	29	6660	6750	5000	6990	11300
Manganese	mg/kg	1770	100.0%	1060	2	29	29	612	293	512	438	397
Mercury	mg/kg	0 15	51.7%	0 1	1	15	29	0 05 J	0.04 U	0.06 J	0 04 J	0 02 UJ
Nickel	mg/kg	535	100 0%	49	2	29	29	46 6	52.4	535	43 4	30 8
Potassium	mg/kg	2510	100 0%	2380	1	29	29	2510	1200	1650	2120	1610
Selenium	mg/kg	0 3	10 3%	2	0	3	29	0 21 UJ	0 27 J	0.26 UJ	0 19 UJ	0 21 UJ
Sodium	mg/kg	161	100.0%	172	0	29	29	63 J	91 5 J	53 5 J	86 5 J	116 J
Thallium	mg/kg	0 14	3 4%	0 7	0	1	29	0 23 U	0 23 U	0 28 U	0 21 UJ	0 23 UJ
Vanadium	mg/kg	39 3	100 0%	150	0	29	29	39 3	18 2	26 1	33	17
Zinc	mg/kg	1180	100.0%	110	10	29	29	108	236	1180	99 9	114
Other Analyses												
Nitrate/Nitrite-Nitrogen	mg/kg	2 1	100 0%		0	29	29	0 3	0.05	0.14	0 01	0 02
Total Solids	%W/W	93.2	100 0%		0	29	29	78 1	90 5	76 7	81	89 5
Total Petroleum Hydrocarbons	mg/kg	158	100 0%		0	29	29	47	38	87	32	68

Notes

a) NYSDEC Technical and Administrative Guidance Memorandum #4046, except as noted

b) US EPA, OSWER Directive # 9200 4-27 Soil Lead Guidance, August 1998

* = As per proposed TAGM, total VOCs < 10ppm, total Semi-VOCs <500ppm, individual semi-VOCs < 50 ppm

NA = Not Available

U = Compound was not detected

J = the reported value is an estimated concentration

R = the data was rejected in the data validating process

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

TABLE 1-1
SEAD-24 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

PARAMETER	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID UNITS	MAXIMUM DETECT	FREQUENCY OF DETECTION	CRITERIA VALUE (a)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF SAMPLES	SOIL SEAD-24 10-12 11/30/93 SB24-1 5 205920 Value (Q)	SOIL SEAD-24 0-2 11/30/93 SB24-1 7 205921 Value (Q)	SOIL SEAD-24 0-2 12/01/93 SB24-2.1 205922 Value (Q)	SOIL SEAD-24 6-8 12/01/93 SB24-2 3 205923 Value (Q)	SOIL SEAD-24 12-14 12/01/93 SB24-2 4 205952 Value (Q)
Volatile Organics												
Acetone	ug/kg	27	10 3%	200	0	3	29	11 U	11 U	12 U	14 U	11 U
Benzene	ug/kg	1	3 4%	60	0	1	29	11 U	11 U	12 U	11 U	11 U
Chlorobenzene	ug/kg	7	6 9%	1700	0	2	29	11 U	11 U	12 U	11 U	11 U
Chloroform	ug/kg	13	37 9%	300	0	11	29	11 U	11 U	12 U	11 U	6 J
Methylene Chloride	ug/kg	12	10 3%	100	0	3	29	11 U	11 U	12 U	11 U	12
Toluene	ug/kg	2	3 4%	1500	0	1	29	11 U	11 U	12 U	11 U	11 U
Trichloroethene	ug/kg	1	3 4%	700	0	1	29	11 U	11 U	12 U	11 U	11 U
Herbicides												
2,4,5-T	ug/kg	8	3 4%	1900	0	1	29	5 4 U	5 9 U	6 1 U	5 6 U	5 4 U
Dicamba	ug/kg	9 7	3 4%		0	1	29	5 4 U	5 9 U	6.1 U	5 6 U	5 4 U
MCPP	ug/kg	6600	3 4%		0	1	29	5400 U	5900 U	6100 U	5600 U	5400 U
Nitroaromatics												
1,3-Dinitrobenzene	ug/kg	76	3 4%		0	1	29	130 U	130 U	130 U	130 U	76 J
2,4-Dinitrotoluene	ug/kg	4400	20 7%		0	6	29	130 U	130 U	130 U	130 U	130 U
Tetryl	ug/kg	120	6 9%		0	2	29	130 U	130 U	130 U	130 U	130 U
Semivolatile Organics												
2,4-Dinitrotoluene	ug/kg	12000	27 6%		0	8	29	350 U	390 UJ	980 J	370 UJ	350 U
Acenaphthylene	ug/kg	54	3 4%	41000	0	1	29	350 U	390 UJ	410 UJ	370 UJ	350 U
Anthracene	ug/kg	19	3 4%	50000*	0	1	29	350 U	390 UJ	410 UJ	370 UJ	350 U
Benzo(a)anthracene	ug/kg	280	13.8%	220	1	4	29	350 U	390 UJ	410 UJ	370 UJ	350 U
Benzo(a)pyrene	ug/kg	420	13 8%	61	1	4	29	350 U	390 UJ	410 UJ	370 UJ	350 U
Benzo(b)fluoranthene	ug/kg	350	17 2%	1100	0	5	29	350 U	390 UJ	410 UJ	370 UJ	350 U
Benzo(g,h,i)perylene	ug/kg	170	6.9%	50000*	0	2	29	350 U	390 UJ	410 UJ	370 UJ	350 U
Benzo(k)fluoranthene	ug/kg	340	17 2%	1100	0	5	29	350 U	390 UJ	410 UJ	370 UJ	350 U
bis(2-Ethylhexyl)phthalate	ug/kg	1300	51 7%	50000*	0	15	29	38 J	1300 J	30 J	27 J	41 J
Chrysene	ug/kg	320	24 1%	400	0	7	29	350 U	390 UJ	410 UJ	370 UJ	350 U
Dibenz(a,h)anthracene	ug/kg	28	3 4%	14	1	1	29	350 U	390 UJ	410 UJ	370 UJ	350 U
Di-n-butylphthalate	ug/kg	1100	24.1%	8100	0	7	29	350 U	390 UJ	410 UJ	370 UJ	350 U
Fluoranthene	ug/kg	210	24 1%	50000*	0	7	29	350 U	390 UJ	410 UJ	370 UJ	350 U
Indeno(1,2,3-cd)pyrene	ug/kg	220	6.9%	3200	0	2	29	350 U	390 UJ	410 UJ	370 UJ	350 U
N-Nitrosodiphenylamine	ug/kg	810	24 1%	50000*	0	7	29	350 U	390 UJ	280 J	370 UJ	350 U
Phenanthrene	ug/kg	44	13 8%	50000*	0	4	29	350 U	390 UJ	410 UJ	370 UJ	350 U
Pyrene	ug/kg	260	24 1%	50000*	0	7	29	350 U	390 UJ	410 UJ	370 UJ	350 U
Pesticides/PCB												
4,4'-DDE	ug/kg	12	17.2%	2100	0	5	29	3.5 U	3.8 U	4 U	3 7 U	3.5 U
4,4'-DDT	ug/kg	35	6 9%	2100	0	2	29	3.5 U	3 8 U	4 U	3 7 U	3.5 U
alpha-Chlordane	ug/kg	4 7	3 4%	540	0	1	29	1 8 U	2 U	2.1 U	1.9 U	1 8 U
Endosulfan I	ug/kg	2 3	10 3%	900	0	3	29	1 8 U	2 U	2.1 U	1 9 U	1 8 U
Endrin aldehyde	ug/kg	4 2	3 4%		0	1	29	3 5 U	3.8 U	4 U	3 7 U	3 5 U
gamma-Chlordane	ug/kg	6	3 4%	540	0	1	29	1 8 U	2 U	2 1 U	1.9 U	1 8 U
Metals												
Aluminum	mg/kg	25500	100 0%	19300	3	29	29	9280	17600	16500	9620	14200
Arsenic	mg/kg	56 8	100 0%	8 2	11	29	29	3 8	5	3 8	4 4	4 9
Barium	mg/kg	149	100 0%	300	0	29	29	57 2	67 3	111	79 3	54 3
Beryllium	mg/kg	1 2	100 0%	1 1	1	29	29	0 44 J	0 78	0 97	0 45 J	0 61
Cadmium	mg/kg	8 2	6 9%	2 3	1	2	29	0 38 U	0 47 U	0 53 U	0 43 U	0 38 U
Calcium	mg/kg	106000	100 0%	121000	0	29	29	58400	13300	3070	63300	56900
Chromium	mg/kg	35 1	100 0%	29 6	3	29	29	15 5	27 5	22 5	15 5	23
Cobalt	mg/kg	20 5	100 0%	30	0	29	29	9 7	13 3	10 3	9 6	10 7
Copper	mg/kg	324	100 0%	33	4	29	29	14 9	26 1	24 5	24 7	17 1
Iron	mg/kg	37700	100 0%	36500	2	29	29	18800	32100	27400	19800	26600

TABLE 1-1
SEAD-24 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

	MATRIX							SOIL	SOIL	SOIL	SOIL	SOIL
	LOCATION							SEAD-24	SEAD-24	SEAD-24	SEAD-24	SEAD-24
	DEPTH (FEET)							10-12	0-2	0-2	6-8	12-14
	SAMPLE DATE							11/30/93	11/30/93	12/01/93	12/01/93	12/01/93
	ES ID		FREQUENCY		NUMBER	NUMBER	NUMBER	SB24-1 5	SB24-1 7	SB24-2 1	SB24-2 3	SB24-2 4
	LAB ID	MAXIMUM	OF	CRITERIA	ABOVE	OF	OF	205920	205921	205922	205923	205952
PARAMETER	**UNITS**	**DETECT**	**DETECTION**	**VALUE (a)**	**CRITERIA**	**DETECTS**	**SAMPLES**	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)
Lead	mg/kg	422	100 0%	400 (b)	1	29	29	5 9 J	14 9 J	80 3	11 9 J	4 7 J
Magnesium	mg/kg	43700	100 0%	21500	2	29	29	12700	8050	4830	16400	11500
Manganese	mg/kg	1770	100.0%	1060	2	29	29	384	509	413	388	434
Mercury	mg/kg	0 15	51 7%	0 1	1	15	29	0 03 UJ	0 03 J	0 03 J	0 03 UJ	0 03 J
Nickel	mg/kg	535	100 0%	49	2	29	29	23 7	42 2	28.9	26 4	34
Potassium	mg/kg	2510	100 0%	2380	1	29	29	1130	1230	1170	1350	1760
Selenium	mg/kg	0 3	10 3%	2	0	3	29	0 19 UJ	0 23 UJ	0.22 UJ	2 UJ	0 28 J
Sodium	mg/kg	161	100 0%	172	0	29	29	127 J	74 9 J	51 3 J	135 J	161 J
Thallium	mg/kg	0 14	3 4%	0 7	0	1	29	0 21 UJ	0 25 UJ	0 24 UJ	0 22 UJ	0 25 U
Vanadium	mg/kg	39 3	100 0%	150	0	29	29	13 5	26	28	15 2	20 1
Zinc	mg/kg	1180	100 0%	110	10	29	29	44 3	86	223	62 6	48 9
Other Analyses												
Nitrate/Nitrite-Nitrogen	mg/kg	2 1	100 0%		0	29	29	0 17	0 01	0 01	0.12	0 14
Total Solids	%W/W	93 2	100 0%		0	29	29	92 7	85 2	81.5	90 1	92 9
Total Petroleum Hydrocarbons	mg/kg	158	100 0%		0	29	29	43	74	33	45	106

Notes

a) NYSDEC Technical and Administrative Guidance Memorandum #4046, except as noted

b) US EPA, OSWER Directive # 9200 4-27 Soil Lead Guidance, August 1998

* = As per proposed TAGM, total VOCs < 10ppm, total Semi-VOCs <500ppm, individual semi-VOCs < 50 ppm

NA = Not Available

U = Compound was not detected

J = the reported value is an estimated concentration

R = the data was rejected in the data validating process

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

TABLE 1-1
SEAD-24 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

PARAMETER	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID UNITS	MAXIMUM DETECT	FREQUENCY OF DETECTION	CRITERIA VALUE (a)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF SAMPLES	SOIL SEAD-24 0-2 12/02/93 SB24-3 1 206044 Value (Q)	SOIL SEAD-24 4-6 12/02/93 SB24-3 3 206045 Value (Q)	SOIL SEAD-24 8-10 12/02/93 SB24-3 5 206046 Value (Q)	SOIL SEAD-24 0-2 12/01/93 SB24-4.1 205953 Value (Q)	SOIL SEAD-24 6-8 12/01/93 SB24-4 4 205954 Value (Q)
Volatile Organics												
Acetone	ug/kg	27	10 3%	200	0	3	29	12 U	11 U	11 U	12 U	12 U
Benzene	ug/kg	1	3 4%	60	0	1	29	12 U	11 U	11 U	12 U	12 U
Chlorobenzene	ug/kg	7	6 9%	1700	0	2	29	12 U	11 U	11 U	12 U	12 U
Chloroform	ug/kg	13	37 9%	300	0	11	29	12 U	11 U	11 U	5 J	12 U
Methylene Chloride	ug/kg	12	10 3%	100	0	3	29	12 U	11 U	11 U	12 U	12 U
Toluene	ug/kg	2	3 4%	1500	0	1	29	12 U	11 U	11 U	12 U	12 U
Trichloroethene	ug/kg	1	3 4%	700	0	1	29	12 U	11 U	11 U	12 U	12 U
Herbicides												
2,4,5-T	ug/kg	8	3 4%	1900	0	1	29	6 3 U	5 9 U	5 4 U	5 9 U	5 6 U
Dicamba	ug/kg	9 7	3 4%		0	1	29	6.3 U	5 9 U	5.4 U	5.9 U	5 6 U
MCPP	ug/kg	6600	3 4%		0	1	29	6300 U	5900 U	5400 U	5900 U	5600 U
Nitroaromatics												
1,3-Dinitrobenzene	ug/kg	76	3 4%		0	1	29	130 U	130 U	130 U	130 U	130 U
2,4-Dinitrotoluene	ug/kg	4400	20 7%		0	6	29	130 U	130 U	130 U	130 U	130 U
Tetryl	ug/kg	120	6 9%		0	2	29	1100 U	1700 U	1600 U	110 J	130 U
Semivolatile Organics												
2,4-Dinitrotoluene	ug/kg	12000	27 6%		0	8	29	420 U	380 U	350 U	400 U	380 U
Acenaphthylene	ug/kg	54	3 4%	41000	0	1	29	420 U	380 U	350 U	400 U	380 U
Anthracene	ug/kg	19	3 4%	50000*	0	1	29	420 U	380 U	350 U	400 U	380 U
Benzo(a)anthracene	ug/kg	280	13 8%	220	1	4	29	420 U	380 U	350 U	400 U	380 U
Benzo(a)pyrene	ug/kg	420	13 8%	61	1	4	29	24 J	380 U	350 U	400 U	380 U
Benzo(b)fluoranthene	ug/kg	350	17 2%	1100	0	5	29	27 J	380 U	350 U	400 U	380 U
Benzo(g,h,i)perylene	ug/kg	170	6 9%	50000*	0	2	29	420 U	380 U	350 U	400 U	380 U
Benzo(k)fluoranthene	ug/kg	340	17 2%	1100	0	5	29	27 J	380 U	350 U	400 U	380 U
bis(2-Ethylhexyl)phthalate	ug/kg	1300	51 7%	50000*	0	15	29	420 U	89 J	56 J	400 U	86 J
Chrysene	ug/kg	320	24 1%	400	0	7	29	37 J	380 U	350 U	400 U	380 U
Dibenz(a,h)anthracene	ug/kg	28	3 4%	14	1	1	29	420 U	380 U	350 U	400 U	380 U
Di-n-butylphthalate	ug/kg	1100	24 1%	8100	0	7	29	420 U	380 U	22 J	400 U	380 U
Fluoranthene	ug/kg	210	24 1%	50000*	0	7	29	62 J	380 U	350 U	400 U	380 U
Indeno(1,2,3-cd)pyrene	ug/kg	220	6 9%	3200	0	2	29	420 U	380 U	350 U	400 U	380 U
N-Nitrosodiphenylamine	ug/kg	810	24 1%	50000*	0	7	29	420 U	380 U	350 U	400 U	380 U
Phenanthrene	ug/kg	44	13 8%	50000*	0	4	29	33 J	380 U	350 U	400 U	380 U
Pyrene	ug/kg	260	24 1%	50000*	0	7	29	56 J	380 U	350 U	400 U	380 U
Pesticides/PCB												
4,4'-DDE	ug/kg	12	17 2%	2100	0	5	29	4 2 U	3 8 U	3.5 U	4 U	3.7 U
4,4'-DDT	ug/kg	35	6 9%	2100	0	2	29	4.2 U	3 8 U	3 5 U	4 U	3 7 U
alpha-Chlordane	ug/kg	4 7	3 4%	540	0	1	29	2.2 U	2 U	1 8 U	2 U	1 9 U
Endosulfan I	ug/kg	2 3	10 3%	900	0	3	29	2.2 U	2 U	1 8 U	2 U	1 9 U
Endrin aldehyde	ug/kg	4 2	3 4%		0	1	29	4 2 U	3 8 U	3.5 U	4 U	3.7 U
gamma-Chlordane	ug/kg	6	3 4%	540	0	1	29	2 2 U	2 U	1 8 U	2 U	1 9 U
Metals												
Aluminum	mg/kg	25500	100 0%	19300	3	29	29	19300	15800	5820	20700	7470
Arsenic	mg/kg	56 8	100 0%	8 2	11	29	29	4 5	3 7	2 5	4 2	2 5
Barium	mg/kg	149	100 0%	300	0	29	29	132	76 2	40 5	115	73 8
Beryllium	mg/kg	1 2	100 0%	1 1	1	29	29	0 97 J	0 72 J	0 34 J	1 1	0.37 J
Cadmium	mg/kg	8 2	6 9%	2 3	1	2	29	0 72 U	0.56 U	0 63 U	0 45 U	0 52 U
Calcium	mg/kg	106000	100 0%	121000	0	29	29	3430	42100	106000	3660	81400
Chromium	mg/kg	35 1	100 0%	29 6	3	29	29	24 9	23 3	10 8	31	15 6
Cobalt	mg/kg	20 5	100 0%	30	0	29	29	11 6	11 2	6 7 J	20 5	5 7 J
Copper	mg/kg	324	100 0%	33	4	29	29	19	21 2	14 6	25 3	18 1
Iron	mg/kg	37700	100 0%	36500	2	29	29	25700	25300	14100	37700	14800

TABLE 1-1
SEAD-24 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

	MATRIX							SOIL	SOIL	SOIL	SOIL	SOIL
	LOCATION							SEAD-24	SEAD-24	SEAD-24	SEAD-24	SEAD-24
	DEPTH (FEET)							0-2	4-6	8-10	0-2	6-8
	SAMPLE DATE							12/02/93	12/02/93	12/02/93	12/01/93	12/01/93
	ES ID		FREQUENCY		NUMBER	NUMBER	NUMBER	SB24-3 1	SB24-3.3	SB24-3 5	SB24-4 1	SB24-4 4
	LAB ID	MAXIMUM	OF	CRITERIA	ABOVE	OF	OF	206044	206045	206046	205953	205954
PARAMETER	UNITS	DETECT	DETECTION	VALUE (a)	CRITERIA	DETECTS	SAMPLES	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)
Lead	mg/kg	422	100 0%	400 (b)	1	29	29	81 7 J	13 3 J	33 8 J	31.4 J	7 6 J
Magnesium	mg/kg	43700	100 0%	21500	2	29	29	4280	11100	**36700**	6270	16800
Manganese	mg/kg	1770	100 0%	1060	2	29	29	837	581	349	802	409
Mercury	mg/kg	0 15	51 7%	0 1	1	15	29	0 09 JR	0 05 JR	0.03 J	0 07 JR	0.06 JR
Nickel	mg/kg	535	100 0%	49	2	29	29	29 6	31	23 9	43 6	19 3
Potassium	mg/kg	2510	100 0%	2380	1	29	29	1750	1830	1040	1520	1390
Selenium	mg/kg	0 3	10 3%	2	0	3	29	0 3 J	0 24 UJ	0 15 UJ	0 24 UJ	0 15 UJ
Sodium	mg/kg	161	100 0%	172	0	29	29	64 6 J	113 J	133 J	58 3 J	138 J
Thallium	mg/kg	0 14	3 4%	0 7	0	1	29	0 22 U	0.26 U	0 16 U	0 27 U	0 85 U
Vanadium	mg/kg	39 3	100 0%	150	0	29	29	31 1	23.6	10 7	32 6	13 4
Zinc	mg/kg	1180	100 0%	110	10	29	29	**112**	76 1	39 6	**209**	58 7
Other Analyses												
Nitrate/Nitrite-Nitrogen	mg/kg	2 1	100 0%		0	29	29	0 47	0 02	0 2	0.29	0.07
Total Solids	%W/W	93 2	100 0%		0	29	29	79 2	86 5	93 2	83 5	88 2
Total Petroleum Hydrocarbons	mg/kg	158	100 0%		0	29	29	119	58	81	89	116

Notes

a) NYSDEC Technical and Administrative Guidance Memorandum #4046, except as noted

b) US EPA. OSWER Directive # 9200 4-27 Soil Lead Guidance, August 1998

* = As per proposed TAGM. total VOCs < 10ppm, total Semi-VOCs <500ppm, individual semi-VOCs < 50 ppm

NA = Not Available

U = Compound was not detected

J = the reported value is an estimated concentration.

R = the data was rejected in the data validating process.

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

TABLE 1-1
SEAD-24 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

PARAMETER	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID UNITS	MAXIMUM DETECT	FREQUENCY OF DETECTION	CRITERIA VALUE (a)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF SAMPLES	SOIL SEAD-24 12-14 12/02/93 SB24-4 7 205955 Value (Q)	SOIL SEAD-24 0-2 12/02/93 SB24-5 1 206047 Value (Q)	SOIL SEAD-24 4-6 12/02/93 SB24-5 3 206048 Value (Q)	SOIL SEAD-24 8-10 12/02/93 SB24-5 5 206049 Value (Q)
Volatile Organics											
Acetone	ug/kg	27	10 3%	200	0	3	29	6 J	12 U	11 U	11 U
Benzene	ug/kg	1	3 4%	60	0	1	29	11 UJ	12 U	11 U	1 J
Chlorobenzene	ug/kg	7	6 9%	1700	0	2	29	11 UJ	12 U	11 U	1 J
Chloroform	ug/kg	13	37 9%	300	0	11	29	3 J	12 U	2 J	11 U
Methylene Chloride	ug/kg	12	10 3%	100	0	3	29	9 J	12 U	11 U	2 J
Toluene	ug/kg	2	3 4%	1500	0	1	29	11 UJ	12 U	11 U	2 J
Trichloroethene	ug/kg	1	3 4%	700	0	1	29	11 UJ	12 U	11 U	1 J
Herbicides											
2,4,5-T	ug/kg	8	3 4%	1900	0	1	29	5 4 U	6 3 U	5 4 U	5 7 U
Dicamba	ug/kg	9 7	3 4%		0	1	29	5 4 U	6 3 U	5 4 U	5.7 U
MCPP	ug/kg	6600	3 4%		0	1	29	5400 U	6300 U	5400 U	5400 U
Nitroaromatics											
1,3-Dinitrobenzene	ug/kg	76	3 4%		0	1	29	130 U	130 U	130 U	130 U
2,4-Dinitrotoluene	ug/kg	4400	20 7%		0	6	29	130 U	130 U	130 U	130 U
Tetryl	ug/kg	120	6 9%		0	2	29	130 U	730 U	960 U	1700 U
Semivolatile Organics											
2,4-Dinitrotoluene	ug/kg	12000	27 6%		0	8	29	360 U	410 U	350 U	380 U
Acenaphthylene	ug/kg	54	3 4%	41000	0	1	29	360 U	410 U	350 U	380 U
Anthracene	ug/kg	19	3 4%	50000*	0	1	29	360 U	410 U	350 U	380 U
Benzo(a)anthracene	ug/kg	280	13 8%	220	1	4	29	360 U	410 U	350 U	380 U
Benzo(a)pyrene	ug/kg	420	13 8%	61	1	4	29	360 U	410 U	350 U	380 U
Benzo(b)fluoranthene	ug/kg	350	17 2%	1100	0	5	29	360 U	410 U	350 U	380 U
Benzo(g,h,i)perylene	ug/kg	170	6 9%	50000*	0	2	29	360 U	410 U	350 U	380 U
Benzo(k)fluoranthene	ug/kg	340	17 2%	1100	0	5	29	360 U	410 U	350 U	380 U
bis(2-Ethylhexyl)phthalate	ug/kg	1300	51 7%	50000*	0	15	29	69 J	53 J	350 U	120 J
Chrysene	ug/kg	320	24 1%	400	0	7	29	360 U	410 U	350 U	380 U
Dibenz(a,h)anthracene	ug/kg	28	3 4%	14	1	1	29	360 U	410 U	350 U	380 U
Di-n-butylphthalate	ug/kg	1100	24 1%	8100	0	7	29	360 U	67 J	350 U	380 U
Fluoranthene	ug/kg	210	24 1%	50000*	0	7	29	360 U	410 U	350 U	380 U
Indeno(1,2,3-cd)pyrene	ug/kg	220	6 9%	3200	0	2	29	360 U	410 U	350 U	380 U
N-Nitrosodiphenylamine	ug/kg	810	24.1%	50000*	0	7	29	360 U	410 U	350 U	380 U
Phenanthrene	ug/kg	44	13 8%	50000*	0	4	29	360 U	410 U	350 U	380 U
Pyrene	ug/kg	260	24 1%	50000*	0	7	29	360 U	410 U	350 U	380 U
Pesticides/PCB											
4,4'-DDE	ug/kg	12	17 2%	2100	0	5	29	3 6 U	4 1 U	3.5 U	3 7 U
4,4'-DDT	ug/kg	35	6 9%	2100	0	2	29	3 6 U	4 1 U	3.5 U	3 7 U
alpha-Chlordane	ug/kg	4 7	3 4%	540	0	1	29	1 8 U	2 1 U	1.8 U	1 9 U
Endosulfan I	ug/kg	2 3	10 3%	900	0	3	29	1 8 U	2 1 U	1.8 U	1 9 U
Endrin aldehyde	ug/kg	4 2	3 4%		0	1	29	3 6 U	4 1 U	3 5 U	3 7 U
gamma-Chlordane	ug/kg	6	3 4%	540	0	1	29	1 8 U	2 1 U	1 8 U	1 9 U
Metals											
Aluminum	mg/kg	25500	100 0%	19300	3	29	29	11300	16200	10100	13700
Arsenic	mg/kg	56 8	100 0%	8 2	11	29	29	2 7	4 2	3 3	5
Barium	mg/kg	149	100 0%	300	0	29	29	47	117	58 3	67 2
Beryllium	mg/kg	1 2	100.0%	1 1	1	29	29	0 53 J	0.98 J	0 48 J	0 62 J
Cadmium	mg/kg	8 2	6 9%	2 3	1	2	29	0 41 U	0 78 U	0.36 U	0 7 U
Calcium	mg/kg	106000	100 0%	121000	0	29	29	30500	4540	74200	49000
Chromium	mg/kg	35 1	100 0%	29 6	3	29	29	18 8	24 5	16 9	23 1
Cobalt	mg/kg	20 5	100 0%	30	0	29	29	10 3	16	8 2	12
Copper	mg/kg	324	100 0%	33	4	29	29	12 5	28 4	20 9	22 2
Iron	mg/kg	37700	100 0%	36500	2	29	29	22600	33600	21300	26700

TABLE 1-1
SEAD-24 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

	MATRIX							SOIL	SOIL	SOIL	SOIL
	LOCATION							SEAD-24	SEAD-24	SEAD-24	SEAD-24
	DEPTH (FEET)							12-14	0-2	4-6	8-10
	SAMPLE DATE							12/02/93	12/02/93	12/02/93	12/02/93
	ES ID		FREQUENCY		NUMBER	NUMBER	NUMBER	SB24-4 7	SB24-5 1	SB24-5 3	SB24-5 5
	LAB ID	MAXIMUM	OF	CRITERIA	ABOVE	OF	OF	205955	206047	206048	206049
PARAMETER	UNITS	DETECT	DETECTION	VALUE (a)	CRITERIA	DETECTS	SAMPLES	Value (Q)	Value (Q)	Value (Q)	Value (Q)
Lead	mg/kg	422	100 0%	400 (b)	1	29	29	3 6 J	45 5 J	8 7 J	7 9 J
Magnesium	mg/kg	43700	100 0%	21500	2	29	29	7670	5150	12100	11400
Manganese	mg/kg	1770	100 0%	1060	2	29	29	400	1080	400	450
Mercury	mg/kg	0 15	51.7%	0 1	1	15	29	0 05 JR	0.07 JR	0 06 JR	0 04 JR
Nickel	mg/kg	535	100 0%	49	2	29	29	28 6	37 3	26 4	35 2
Potassium	mg/kg	2510	100 0%	2380	1	29	29	1140	1170 J	993	1660
Selenium	mg/kg	0.3	10 3%	2	0	3	29	0 12 UJ	0.15 UJ	0 23 UJ	0 22 UJ
Sodium	mg/kg	161	100 0%	172	0	29	29	131 J	50.9 J	153 J	139 J
Thallium	mg/kg	0 14	3 4%	0 7	0	1	29	0 14 J	0 16 U	0 25 U	0 24 U
Vanadium	mg/kg	39 3	100 0%	150	0	29	29	14 6	29 9	14 4	19 5
Zinc	mg/kg	1180	100 0%	110	10	29	29	30	85 7	62 8	63 2
Other Analyses											
Nitrate/Nitrite-Nitrogen	mg/kg	2 1	100 0%		0	29	29	0 13	0 27	0.15	0.33
Total Solids	%W/W	93 2	100 0%		0	29	29	92 1	80 5	92 7	87 7
Total Petroleum Hydrocarbons	mg/kg	158	100 0%		0	29	29	99	89	52	94

Notes

a) NYSDEC Technical and Administrative Guidance Memorandum #4046, except as noted

b) US EPA, OSWER Directive # 9200 4-27 Soil Lead Guidance, August 1998

* = As per proposed TAGM, total VOCs < 10ppm; total Semi-VOCs <500ppm; individual semi-VOCs < 50 ppm

NA = Not Available

U = Compound was not detected

J = the reported value is an estimated concentration

R = the data was rejected in the data validating process

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

TABLE 1-2
SEAD-24 GROUNDWATER ANALYSIS RESULTS

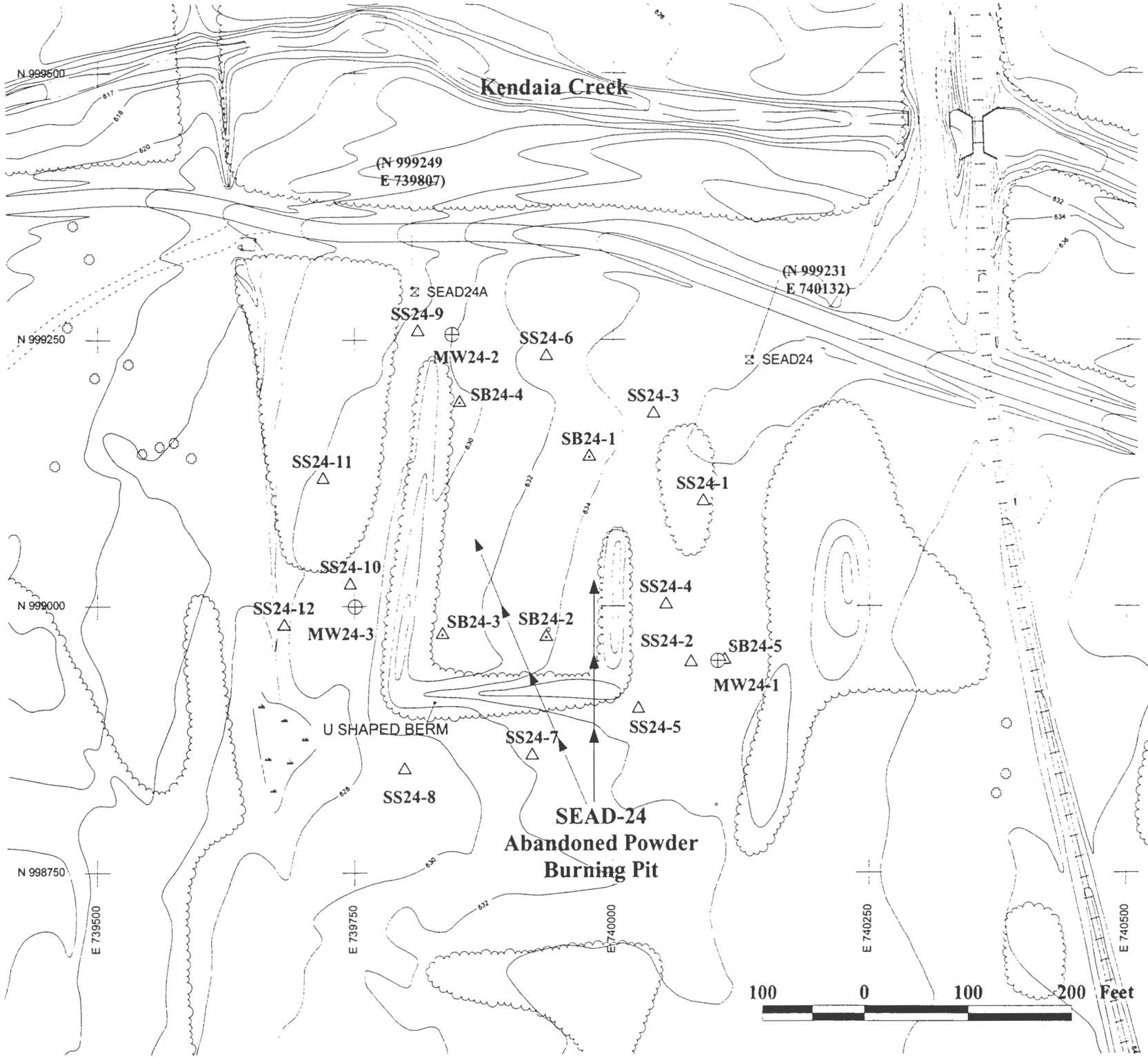
SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

PARAMETER	MATRIX LOCATION SAMPLE DATE ES ID LAB ID UNITS	MAXIMUM DETECT	FREQUENCY OF DETECTION	CRITERIA VALUE (a)	NUMBER ABOVE CRITERIA	WATER SEAD-24 01/23/94 MW24-1 209254 Value (Q)	WATER SEAD-24 11/16/93 MW24-2 204657 Value (Q)	WATER SEAD-24 11/15/93 MW24-3 204632 Value (Q)
METALS								
Aluminum	ug/L	19100	100.0%	50 (b)	3	**19100**	**9650**	**18700**
Arsenic	ug/L	10	100.0%	10 (c)	0	10	5.5 J	6.7 J
Barium	ug/L	177	100.0%	1000	0	156 J	82.1 J	177 J
Beryllium	ug/L	0.89	100.0%	4 (d)	0	0.89 J	0.62 J	0.86 J
Calcium	ug/L	180000	100.0%	NA	NA	180000	176000	133000
Chromium	ug/L	32.6	100.0%	50	0	29.8	18.1	32.6
Cobalt	ug/L	18.7	100.0%	NA	NA	18.7 J	14.5 J	11.8 J
Copper	ug/L	32.5	100.0%	200	0	32.5	8.2 J	16.4 J
Iron	ug/L	32000	100.0%	300	3	**32000**	**19800**	**29800**
Lead	ug/L	7	100.0%	15 (d)	0	7	3.1	3.9
Magnesium	ug/L	47700	100.0%	NA	0	39800	47700	43300
Manganese	ug/L	767	100.0%	50 (b)	3	**712**	**767**	**528**
Mercury	ug/L	0.06	33.3%	0.7	0	0.06 J	0.07 UJ	0.07 UJ
Nickel	ug/L	41.4	100.0%	100	0	41.4	27.8 J	37.4 J
Potassium	ug/L	7550	100.0%	NA	NA	7220	6610	7550
Selenium	ug/L	2.5	66.7%	10	0	2.5 J	1 J	0.8 U
Sodium	ug/L	9510	100.0%	20000	0	5950	6950	9510
Vanadium	ug/L	30.9	100.0%	NA	NA	30.9 J	16.3 J	30.6 J
Zinc	ug/L	107	100.0%	5000 (b)	0	107	31.8	53
OTHER ANALYSES								
Nitrate/Nitrite-Nitrogen	mg/L	0.11	100.0%	10	0	0.11	0.07	0.01
pH	standard units	7.45	NA			7.26	7.45	6.95
Specific Conductivity	umhos/cm	700	NA			435	700	560
Turbidity	NTU	150	NA			150	NA(Cloudy)	NA(Cloudy)

NOTES:

a) NY State Class GA Groundwater Standard (TOGS 1.1.1, June 1998), except as noted below.
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

NA = Not Available
U = compound was not detected
J = the report value is an estimated concentration
UJ = the compound was not detected; the associated reporting limit is approximate
R = the data was rejected in the data validating process

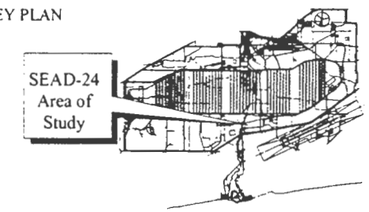


N

LEGEND

- PAVED ROAD
- GROUND CONTOUR AND ELEVATION
- WETLAND
- BRUSH
- CHAIN LINK FENCE
- UTILITY POLE
- APPROXIMATE LOCATION OF FIRE HYDRANT
- RAILROAD
- Monitoring Well Location
- Survey Monument
- Surface Soil Location
- Soil Boring Location

KEY PLAN



PARSONS

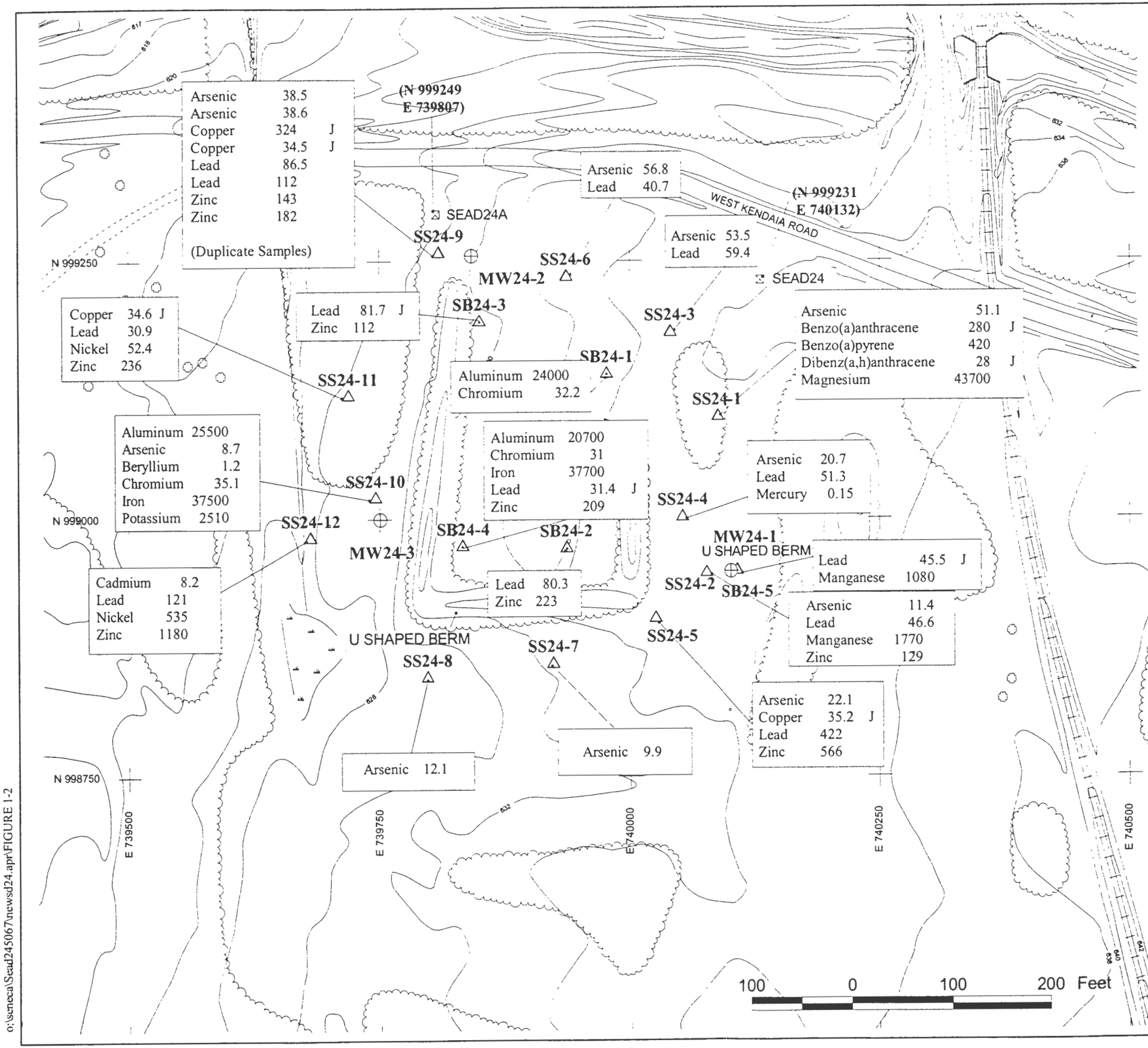
SENECA ARMY DEPOT ACTIVITY
ABANDONED POWDER BURNING PIT
SEAD-24

FIGURE 1-1
SITE MAP - SEAD-24

JOB NUMBER: 734530-01001

DATE: AUGUST 2002

o:\seneca\Sead245067\mcwsd24.apr\FIGURE 1-1



LEGEND

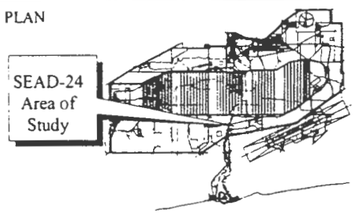
- PAVED ROAD
- GROUND CONTOUR AND ELEVATION
- WETLAND
- BRUSH
- CHAIN LINK FENCE
- UTILITY POLE
- APPROXIMATE LOCATION OF FIRE HYDRANT
- RAILROAD

- △ Surface Soil Samples
- ◬ Soil Boring Samples
- ⊕ GroundWater Samples
- ⊠ Survey Monument

TAGM LEVELS

Benzo(a)anthracene	220	ug/Kg
Benzo(a)pyrene	61	ug/Kg
Dibenz(a,h)anthracene	14	ug/Kg
Aluminum	19300	mg/Kg
Arsenic	8.2	mg/Kg
Beryllium	1.1	mg/Kg
Cadmium	2.3	mg/Kg
Chromium	29.6	mg/Kg
Copper	33	mg/Kg
Iron	36500	mg/Kg
Lead	24.8	mg/Kg
Magnesium	21500	mg/Kg
Manganese	1060	mg/Kg
Mercury	0.1	mg/Kg
Nickel	49	mg/Kg
Potassium	2380	mg/Kg
Zinc	110	mg/Kg

KEY PLAN



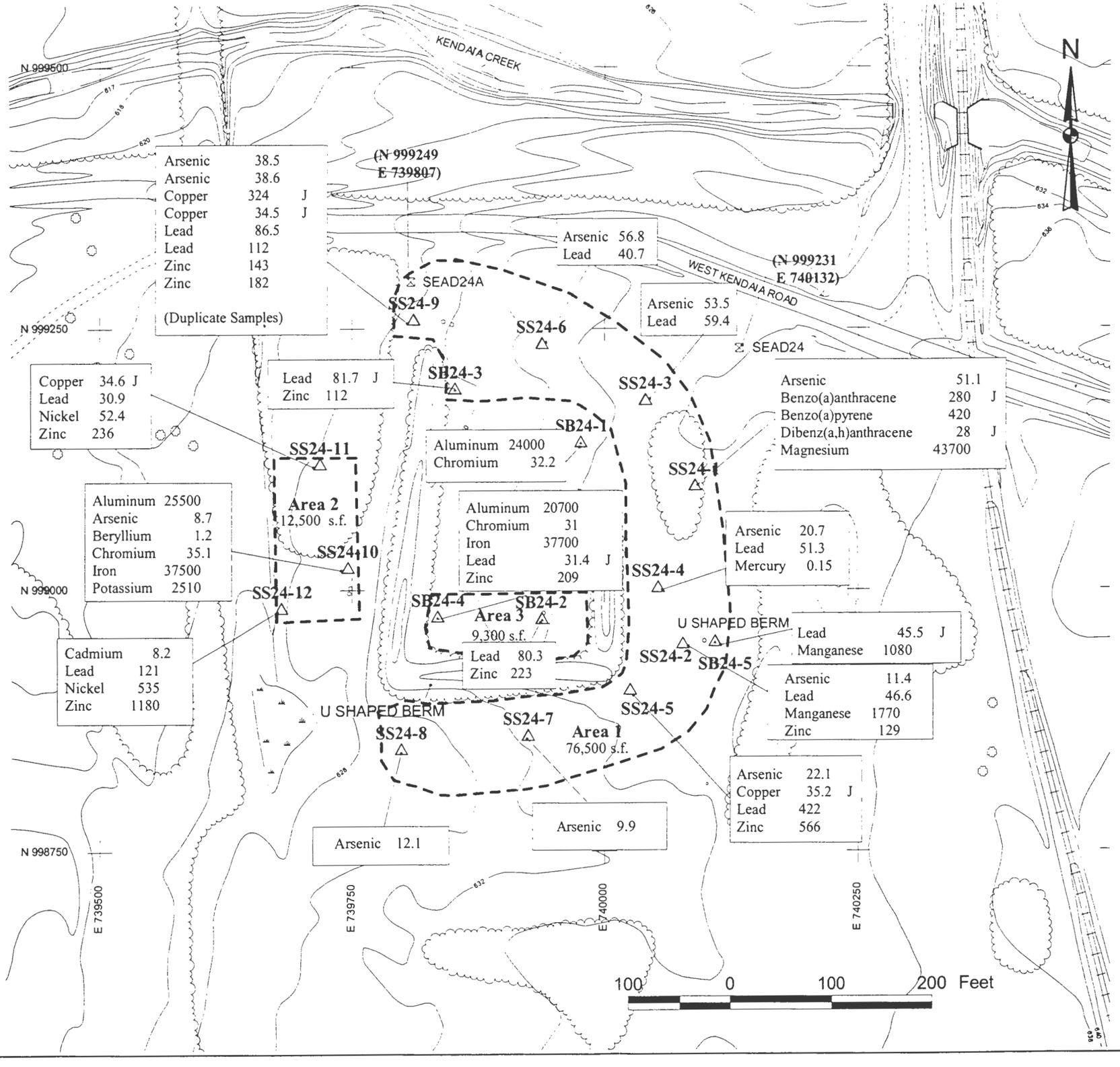
PARSONS

SENECA ARMY DEPOT ACTIVITY
ABANDONED POWDER BURNING PIT
SEAD-24

FIGURE 1-2
ANALYTES EXCEEDING SOIL
CLEANUP OBJECTIVE
LEVELS IN SURFACE SOILS

JOB NUMBER: 734530-01001 | DATE: APRIL 2002

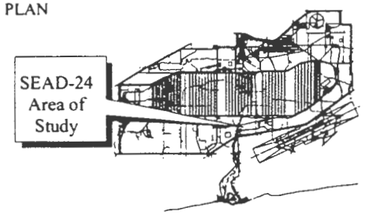
o:\seneca\Sead245067\newsd24.apr\FIGURE 1-2



LEGEND

- PAVED ROAD
- GROUND CONTOUR AND ELEVATION
- WETLAND
- BRUSH
- CHAIN LINK FENCE
- UTILITY POLE
- APPROXIMATE LOCATION OF FIRE HYDRANT
- RAILROAD
- Surface Soil Samples
- Soil Boring Samples
- GroundWater Samples
- Survey Monument
- Area to be Remediated

KEY PLAN



PARSONS

SENECA ARMY DEPOT ACTIVITY
ABANDONED POWDER BURNING PIT
SEAD-24

FIGURE 1-3
PROPOSED REMOVAL
ACTION AREAS

JOB NUMBER: 734530-01001 | DATE: AUGUST 2002

a:\seneca\Sead245067\newsd24.apr\FIGURE 1-3

2 DECISION DOCUMENT FOR REMOVAL ACTION AT SEAD 50 and 54, TANK FARM

2.1 EXECUTIVE SUMMARY

An Expanded Site Inspection (ESI) performed at SEAD-50, the Tank Farm, at Seneca Army Depot Activity (SEDA) suggests that a release of hazardous constituents, consisting primarily of metal and semivolatile contaminants, has occurred. The bounds of SEAD-50 encompass the location of SEAD-54, the Asbestos Storage Tank. This Decision Document presents the rationale identifying the need for, and the proposed plan for conducting, a time-critical removal action in the area of SEADs 50 and 54 (henceforth SEAD-50/54) to remove elevated levels of selected contaminants that have been identified at the site, which are presumed to pose a potential threat to the environment and neighboring populations. Additionally, this document identifies a proposed focused sampling and analysis program that will be conducted to confirm that sufficient soil is removed so as to reduce the level of the potential threat that is present in the area of SEAD-50/54. This removal action is considered time-critical because the historic military mission of the Depot has been terminated and the Depot was closed by the Department of the Defense (DoD) and the US Army. In accordance with provisions of the DoD's Base Realignment and Closure (BRAC) process, the land and the facilities of the former Depot have been surveyed and evaluated, and prospective beneficial uses of the facility have been identified. Portions of the Depot are now being released to the public and private sectors for reuse under the BRAC process. As portions of the Depot are released for other beneficial uses, increased access is afforded to all areas of the former Depot, resulting in an increased potential for the exposure of populations to residual chemicals that are present at historic solid waste management units (SWMUs) remaining at the Depot pending clean-up. Therefore, the goal of the proposed time-critical removal action at SEAD-50/54 is to reduce, and possibly to eliminate, an identified source of residual chemical materials that exists in the soil. If this action is successful, this action will lessen, and may eliminate, a potential threat of chemical exposure to surrounding populations and the environment.

This Decision Document presents the selected removal action that was developed in accordance with the Federal Facility Agreement (FFA) and the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and the National Contingency Plan. Based upon the results of the ESI, it is recommended that a limited action be conducted focused on the removal of surface soil (i.e., to a depth

of six inches) from seven zones where elevated metal and semivolatile organic compound concentrations have been identified. The excavated soil will be staged, contained, sampled and analyzed, and disposed of at an off-site permitted waste landfill.

2.2 SITE BACKGROUND

2.2.1 Site Description

SEAD-50/54 are located at the Depot's historic Tank Farm, which is located in the southeastern portion of SEDA in an area of the Depot where the designated future land use is Warehousing. The Tank Farm was sited in a triangular-shaped tract of land immediately west of East Patrol Road between Building 350 and Buildings 356 and 357 (see **Figure 2-1**). Four tanks remain at the Tank Farm site, three of which are currently empty. Two of the three empty tanks were previously used for the storage of antimony ore. The remaining empty tank was used to store rutile (i.e., titanium dioxide) ore. The remaining tank, identified as Tank # 88, encompasses all of SEAD-54; this tank once contained asbestos, but it is currently empty. SEAD-54 is listed as a separate SWMU under the Depot's prior submissions because it previously contained asbestos material and the tank will require special handling at the time of the its removal.

The topography of SEAD-50/54 is relatively flat, with a total relief of 2 to 3 feet. There is an east-west running access road that bisects the site and connects Avenue H with the East Patrol Road. A drainage ditch is located on both sides of the access road, and water captured in these ditches flow east towards intersecting ditches bordering the East Patrol Road. North of the access road, SEAD-50/54 is generally overgrown with vegetation, exclusive of spots where the circular footprints of former tanks are located. The area south of the access road is flat and grassy. The asbestos storage tank is located immediately north of the access road on the east side of the Tank Farm and the Depot's property line. North of the access road, the area of the Tank Farm is generally overgrown with vegetation, exclusive of spots where historic tanks were once located. The circular footprints of the former tanks are generally clear of vegetation and covered with gravel. The area south of the access road is flat and grassy. A ferro-chromate ore pile is located in the southern area of the historic Tank Farm at the border of the grassy area. There are no mapped wetlands located within the bounds of the former Tank Farm.

2.2.2 Site History

The history of the Tank Farm area is not well documented. At one time, there were approximately 160 aboveground storage tanks or silos in the area. According to interviews with SEDA personnel, the tanks were always used to store dry materials such as ores and minerals, including asbestos. Through the years, all but the remaining four tanks were removed.

2.3 PREVIOUS INVESTIGATIONS

2.3.1 Description of Sampling Program

An ESI was performed in the area of the Tank Farm in 1993 to determine whether a release of hazardous constituents had occurred. The ESI included a geophysical survey, the drilling and installation of three groundwater monitoring wells, and collection of soil, sediment, surface water and groundwater samples for subsequent chemical analyses. The geophysical survey conducted included a seismic refraction survey that was initially used to estimate the direction of groundwater flow.

Fifteen surface soil samples, three groundwater samples, three surface water samples, and three sediment samples were collected from the area of the Tank Farm. All of the samples were submitted to the laboratory for chemical analysis. The sample locations are shown in **Figure 2-2**. Collected samples were analyzed for Target Compound List (TCL) volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides/polychlorinated biphenyls (PCBs), Target Analyte List (TAL) metals and cyanide according to the NYSDEC Contract Laboratory Program Statement of Work. In addition, all of the surface soil samples were analyzed for bulk asbestos by polarized light microscopy.

The fifteen surface soil samples were collected at random locations within the Tank Farm to assess potential releases from the tanks. Six of these samples were collected from the 0-2 inch depth horizon, while the remaining nine samples were collected from the 0-12 inch depth horizon.

Three groundwater monitoring wells were installed in the till/weathered shale aquifer that exists in the area of the Tank Farm. One monitoring well was installed upgradient of SEAD-50/54 and was used to obtain background water quality data, while the remaining two wells were installed

downgradient, between East Patrol Road and the Depot's perimeter fence, to determine if hazardous constituents were entering and impacting the groundwater. Three samples, one sample from each well, were submitted to the laboratory for chemical analysis.

Three surface water and shallow soil samples were also collected from drainage culverts that run adjacent to roadway surfaces in the vicinity of the Tank Farm. One sample was collected from a drainage ditch that runs parallel to the unnamed road that bisects the Tank Farm, while the remaining two were collected from a downgradient drainage ditch that runs parallel to East Patrol Road.

2.3.2 Results of Sampling Program

Soil

The results of the soil sampling program are summarized and presented in **Tables 2-1** and **2-2**. Fifty-six TCL/TAL compounds plus asbestos were detected in one or more of the shallow soils collected during the ESI. Of the 56 TCL/TAL analytes detected, one was a volatile organic compound, 20 were semivolatile organics, 13 were pesticides or PCBs, and the remaining 22 were metals. These results indicate that shallow soil at the site has been impacted by semivolatile organic compounds, predominantly polynuclear aromatic hydrocarbons (PAHs), heavy metals, and asbestos.

Concentrations measured for seven semivolatile organic compounds (including six PAHs and phenol) exceeded their respective NYSDEC cleanup objective levels. A majority of the PAH concentrations found above cleanup levels were found in the three samples collected from locations SS50-11, SS50-14, and SS50-15. Each of these sampling locations is in the northern part of the historic Tank Farm, north of the unnamed road that bisects the area.

Eight metals (i.e., antimony, arsenic, chromium, copper, lead, magnesium, mercury, and zinc) were found in soil samples at concentrations that exceeded their respective NYSDEC cleanup objective levels. Although lead was found at concentrations that exceeded NYSDEC's recommended cleanup objective level (i.e., 24.8 mg/Kg based on site background) in 13 of the 15 surface soil samples characterized, it was not found at a concentration that exceeds the US EPA's recommended soil

clean-up level for residential properties[6] (i.e., 400 mg/Kg).

The sample collected at location SS50-5 contained the maximum concentrations measured within SEAD-50/54 for chromium, lead, mercury, and zinc. Arsenic concentrations exceeded NYSDEC's recommended cleanup level in three of the 15 surface soil samples collected. Other concentrations measured for metals that exceeded NYSDEC's recommended cleanup levels were generally evenly distributed amongst the soil sampling locations, and typically measured concentrations did not significantly exceed their respective cleanup levels.

Results for asbestos in soil are provided in **Table 2-2**. The surface soil sample collected at location SS50-1 contained 10 to 15 percent chrysotile asbestos. Asbestos was not found in any of the other surface soil samples collected from the area of SEAD-50/54.

Groundwater

The results of the groundwater sampling program are presented in **Table 2-3**. Generally, the data indicate that groundwater at SEAD-50/54 has not been significantly impacted by the historic storage activities that were performed in this area. One semivolatile organic compound and 18 metals were detected in one or more of the groundwater samples collected. Concentrations measured for five of the metals (i.e., aluminum, iron, manganese, sodium and thallium) exceeded their respective groundwater criteria levels. In three out of five cases (not including sodium and thallium), the highest concentration measured for these metals were found in the upgradient well (i.e., MW50-1). Additionally, none of these five metals were found at concentrations exceeding NYSDEC recommended cleanup level objectives for soil at the Tank Farm. Thus, it is presumed that the presence of these metals in the groundwater results from other sources or activities unrelated to the historic Tank Farm operations.

Surface Water

The results of the ESI surface water sampling program are presented in **Table 2-4**. The results indicate that surface water at the site has not been significantly impacted by the historic storage

6 US EPA, Office of Solid Waste and Emergency Response, Directive #9200.4-27, "Clarification to the 1994 Revised Interim Soil Lead Guidance for CERCLA Sites and RCRA Corrective Action Facilities," August 1998, EPA/540/F-98/030, PB98-963244.

activities that were conducted in SEAD-50/54. Only 15 metals were detected in the surface water samples collected, and only two of these metals (i.e., aluminum and iron) were found at a concentration that exceeded its NYS class C surface water criteria.

Sediment

Results from samples collected in drainage ditches that abut the Tank Farm are presented in **Table 2-5**. The drainage ditches that surround SEAD-50/54 are ephemeral, typically holding water only as a result of a storm or snowmelt event. Generally, these ditches capture waters from storm runoff events, and hold it while it percolates into the ground. Only under severe storm or runoff event conditions does water overflow from the ditches into downstream creeks and streams. As such, the "sediment" lining the base of the drainage ditches has been evaluated as soil.

In a severe storm or runoff event, overflow from the drainage ditches at SEAD-50/54 could flow into an unnamed stream or creek that flows eastwardly, then turns northerly and enters a regulated and mapped wetlands, OV-5, that is located north or Yerkes Road and east of State Route 96 near the former Depot housing area that is south of the main Depot entrance gate. At the point where this creek or stream exists the Depot and passes beneath State Route 96, it is classified as Class D surface water. At a location downstream of the Depot, near Yerkes Road, this stream or creek is reclassified as a Class C surface water body. This stream or creek continues to flow northerly and easterly, and eventually becomes part of the flow that enters Cayuga Lake at Dean Cove.

The available data suggests that chemical materials have impacted the surface soil contained in the drainage ditches at SEAD-50/54. Forty-four TCL/TAL analytes, including one volatile organic compound, 17 semivolatile organic compounds, six pesticides and PCBs and 20 metals were detected in samples collected and analyzed. Of the compounds detected, 11 were detected at concentrations that exceeded their respective NYSDEC soil cleanup objective levels. The 11 compounds found to exceed their respective NYSDEC cleanup objective levels included six SVOCs and five metals.

The PAH compound benzo(a)pyrene, and the metals arsenic, lead, and zinc, were each found at concentrations exceeding NYSDEC's soil cleanup criteria levels in two of the three samples collected from the Tank Farm area. In three of the four instances (i.e., exclusive of zinc), the highest concentration reported for each of these compounds was found at location SW/SD50-1, which is the sampling location that is closest to Tank #88 in the east-central portion of the Tank Farm. Eleven of

the 16 reported soil cleanup level exceedances found in ditch soil were found in the sample collected from location SW/SD50-1. This sample also contained the highest concentration found in ditch soil for 22 of 23 organic compounds (i.e., SVOCs and pesticides and PCBs) detected and 12 of the 20 metals detected from the area of the Tank Farm. Conversely, ditch soil samples collected from location SW/SD50-3, which is located at the point where surface water flow enters the natural drainage of Hicks Gully did not show any evidence of exceedances of soil cleanup criteria for organic or inorganic constituents identified in samples.

Six pesticides/PCB compounds were detected in one or more of the drainage ditches that border the Tank Farm; however, none of the identified pesticides/PCBs were found at concentrations that exceeded NYSDEC's recommended cleanup objectives for soil. All six of the identified pesticides/PCBs were detected in the sample collected from SW/SD50-1 which is closest to the location of Tank #88 in the east-central portion of the Tank Farm area. A single pesticide, endosulfan I was detected at location SW/SD50-2, which is located close to the northern end of the Tank Farm property, at what appears to be the most upstream end of the drainage ditch. None of the detected pesticides or PCBs were detected in the sample collected from SW/SD50-3, which is the furthest downstream location of sampling conducted in the drainage ditches, immediately upstream of the point where surface water flow would enter Hicks Gully.

Five metals (i.e., arsenic, lead, manganese, potassium and zinc) were detected in ditch soil samples at concentrations that exceeded NYSDEC soil cleanup criteria values. Four (i.e., excluding manganese) of the listed metals were found at concentrations that exceeded their soil cleanup criteria levels at sampling location SD50-1, while four (excluding potassium) of the metals were found at concentrations above soil cleanup objective levels at location SD50-2. Again, none of the metal concentrations measured at location SW/SD50-3 were found at concentrations exceeding NYSDEC's soil cleanup objective levels.

2.4 DISCUSSION OF REMOVAL ALTERNATIVES

Results of the ESI described above indicate that soil located within the bounds of the Tank Farm and in locations within the abutting storm water drainage channels has been impacted by chemical materials. The soil within the footprint of the Tank Farm shows evidence of contamination by metals and asbestos, and to a lesser extent, by a few PAH compounds, while soil found in the drainage culverts shows evidence of contamination by metals and PAHs. Initial indications suggest that the impacted soil

appears to be limited to the surface elevations in both cases. Therefore, the Army is proposing to perform a time-critical removal action to lessen, and possibly eliminate, the magnitude of any potential threat to human health and the environment that exists at SEAD-50 and SEAD-54. This Decision Document identifies and presents alternatives that have been considered to eliminate or lessen the magnitude of any potential threat that may exist. Due to the Depot's change in status, and the current release of portions of the former Depot for beneficial reuses by the public and private sectors, the proposed action is considered time-critical and the selected option will be implemented quickly to mitigate the potential threat.

The objectives of a removal action are to comply with ARARs and reduce the overall threat to human health and the environment to an acceptable level at the site. Therefore, to reduce the threat that appears to exist near the Tank Farm, the Army is proposing to conduct an action that focuses on the removal of soil that has been impacted by asbestos, arsenic, mercury, and polynuclear aromatic hydrocarbons at elevated concentrations. Specifically, the Army is proposing to address shallow soil contamination (i.e., soil in top 6 inches) that has been identified at five locations within the Tank Farm, as well as within two lengths of the drainage ditches that surround the Tank Farm. The largest area that will be subjected to the proposed time-critical removal action is roughly defined by sampling sites SS50-5, SS50-6 and SS50-2 in the southern portion of the Tank Farm and includes soil that contains elevated concentrations of arsenic and mercury and to a lesser degree, benzo(a)pyrene in the soil. This area encompasses approximately 110,000 square feet (sq. ft.) of land or roughly 2,000 – 2,100 cubic yards (yd^3) of soil.

The second area that requires attention surrounds the location of the historic surface soil sample SS50-14 in the east-central portion of the Tank Farm, where elevated levels of four PAHs [i.e., benzo(a)anthracene, benzo(a)pyrene, chrysene and dibenz(a,h)anthracene] were detected. The approximate size of this area is 10,000 – 12,000 sq. ft. of area (185 – 225 yd^3).

A third area containing similar levels of PAH contamination surrounds the former sampling location SS50-15, which is located in the west central portion of the Tank Farm. The approximate size of this area is roughly equivalent to that of the second area described above, or 10,000 – 12,000 sq. ft. of area (185 – 225 yd^3).

A fourth area is located in the northern portion of the Tank Farm and encompasses the locations of former sampling points SS50-12, where an elevated concentration of arsenic was found, and location

SS50-11 where the highest concentrations of six PAHs (i.e., benzo(a)anthracene, benzo(a)pyrene, benzo(b)fluoranthene, and benzo(k)fluoranthene, chrysene and dibenz(a,h)anthracene) were detected in soil. The estimated amount of area encompassed in this area is 50,000 – 55,000 sq. ft. (925 – 1,020 yd^3).

The last area within the Tank Farm surrounds the former sampling location SS50-1 in the southeastern corner of the Tank Farm, where asbestos was discovered in the soil. Based on the analytical data obtained for asbestos (i.e., 10 – 15 percent, chrysotile) during the ESI at this location, it is currently anticipated that any proposed time-critical removal action conducted in this area will need to comply with procedures outlined in New York State Department of Labor's Industrial Code Rule 56. The size of the area that will be remediated due to the presence of asbestos is estimated as approximately 22,500 – 25,000 sq. ft. (415 – 465 yd^3).

The proposed time-critical action will also include work in the drainage ditches that run parallel to the east-west road that bisects the Tank Farm, and along the eastern fence line that separates the Depot from the surrounding private property. Elevated concentrations of PAHs and arsenic were found in both of these areas. The volume of ditch soil to be removed from the vicinity of the SEAD-50 and 54 is approximately 5,000 sq. ft. or approximately 95 yd^3. All of the locations where remedial action is planned as part of the initial time-critical removal action are shown on **Figure 2-3**. The maximum area impacted by the proposed time-critical removal action is anticipated to be equivalent to 219,000 sq. ft. or approximately 4,055 yd^3 (approximately 6,085 tons).

Confirmational sampling and analysis will be conducted after the removal of the identified soil to confirm that the seven identified excavations remove sufficient soil to lessen, and hopefully eliminate, potential risks that result from the presence of the identified contaminants of concern (i.e., arsenic, asbestos, mercury and PAHs).

Once necessary soil is removed and the extent of the excavation is verified and confirmed, the excavation will be backfilled with clean soil, re-graded, contoured and re-seeded to re-establish pre-excavation conditions.

The following section briefly describes removal alternatives that may be applicable for use at SEAD-50/54. Based on the previous investigations, groundwater impacts appear minimal. At this time, the emphasis is on potential soil removal action alternatives. These alternatives fall into three

categories: 1) on-site treatment, 2) on-site containment, and 3) off-site disposal. The on-site treatment alternative considered was soil washing, the on-site containment alternative considered was in-situ solidification/stabilization, and the off-site disposal method considered was excavation and landfilling. These alternatives will be evaluated for technical implementability, ability to achieve ARARs and economic impacts.

2.5 REMOVAL METHODS

Soil Washing

Soil washing is a treatment option applicable to soil contaminated with metals and SVOCs. In the process, soil is slurried with water and subjected to intense scrubbings. To improve the efficiency of soil washing, the process may include the use of surfactants, detergents, chelating agents or pH adjustment. After contaminants are removed from the soil, the washing solutions can be treated in a wastewater treatment system. The washing fluid can then be recycled, continuing the soil washing process.

Certain site factors can limit the success of soil washing:

1. Highly variable soil conditions,
2. High silt or clay content which will reduce percolation and leaching, and inhibit the solid-liquid separations following the soil washing,
3. Chemical reactions with soil cation exchange and pH effects may decrease contaminant mobility, and
4. If performed in-situ, the groundwater flow must be well defined in order to recapture washing solutions.

In-Situ Solidification/Stabilization

In-situ solidification involves the formation of an in-place monolithic mass through the mixing of a pozzolantic or a siliceous material with the existing soil. Multi-axis overlapping hollow stem augers are used to inject solidification/stabilization (S/S) agents and blend them with contaminated soil in-situ. The augers are mounted on a crawler-type base machine. A batch mixing plant and raw materials storage tanks are also involved. The machine can treat 90 to 140 cubic yards of soil per 8-hour shift at

depths up to 100 feet. This technology is applicable to soil contaminated with metals and SVOCs. The technique has been used in mixing soil cement, or chemical grout for more than 18 years on various construction applications, including cutoff walls and soil stabilization and is widely applied.

Drawbacks related to in-situ solidification include the unsuitability for use in cold climates where the ground freezes and thaws, thus breaking up the monolithic mass and providing a greater surface area for corrosion and weathering. Another condition limiting its implementation is the cohesion and particle size of the soil matrix to be treated. Cohesive soil and soil with a large portion of coarse gravel and cobbles are unsuitable for this type of treatment.

Excavation and Landfilling

Excavation of hazardous materials is performed extensively for site remediation. Excavation is usually accompanied by off-site treatment or disposal in an off-site secured landfill. Excavation employs the use of earth moving equipment to physically remove soil and buried materials. There are no absolute limitations on the types of waste that can be excavated and removed. Factors that will be considered include the mobility of the wastes, the feasibility of on-site containment, and the cost of disposing the waste or rendering it non-hazardous once it has been excavated. A frequent practice at hazardous waste sites is to excavate and remove contaminant "hot spots" and to use other remedial measures for less contaminated soil. Excavation and removal can almost totally eliminate the contamination at a site and the need for long-term monitoring. Another advantage is that the time to achieve beneficial results can be short relative to such alternatives as in-situ bioremediation.

The biggest drawbacks with excavation, removal, and off-site disposal are associated with cost and institutional aspects. Costs associated with off-site disposal are can be high in the material to be excavated is classified as hazardous according to 40 CFR 261 Subpart C and this frequently results in the elimination of this alternative as a cost-effective alternative. Institutional aspects can add significant delays to program implementation.

2.6 REMOVAL COSTS

Soil Washing

A large number of vendors provide soil washing services. The treatment processes used vary according

to the scale of the operation, particle size being treated, and extraction agent used. Because the operation is unique for each site, it is difficult to arrive at a cost estimate. However, in an evaluation of fourteen companies offering soil washing treatment services, a general price range of $50 to $205 per ton was noted in EPA Engineering Bulletin EPA/540/2-90/017, September 1990. This would result in an estimated cost of $305,000 to $1,250,000 with a most probable cost range of $760,000 to $1,003,500 (exclusive of monitoring, sampling and analysis, and oversight and management).

In-Situ Solidification/Stabilization

Solidification treatment is grouped into different categories according to the types of additives and processes used, and the cost of this treatment is dependent upon which process is utilized. Any of the different processes available will range between $100 and $200 per ton of soil treated. This would result in an estimated cost of $605,000 to $1,215,000 with a most probable cost range of $760,000 to $1,140,000 (exclusive of monitoring, sampling and analysis, and oversight and management).

Excavation and Landfilling

The cost of excavation and landfilling soil depends upon whether the soil is classified as hazardous or non-hazardous according to 40 CFR 261 Subpart C. The excavation, containment, and transportation will cost the same regardless of whether the soil is considered hazardous, and most of that can be performed by SEDA personnel. If the soil is classified as hazardous, the cost to excavate and dispose of it in a hazardous waste landfill will range between $400 and $500 per ton. If it is not classified as hazardous, the cost to excavate and dispose of it in a landfill will range between $50 and $100 per ton. If it can be classified as clean enough for beneficial uses as a daily cover, the cost to excavate and dispose of it will range between $25 and $50 per ton. Assuming that it will be disposed in a non-hazardous landfill, this will result in an estimated cost of $300,000 to $610,000 with a most probable cost in the range of $375,000 to $515,000 (exclusive of monitoring, sampling and analysis, and oversight and management).

2.7 COMPARISON OF REMOVAL ALTERNATIVES

Of the three remedial alternative presented above, excavation and off-site landfilling is the best alternative for the removal of the PAH, pesticide, metal and asbestos-impacted soil at SEAD-50/54. This decision is due to the unsuitability of in-situ solidification and soil washing for the conditions

present at SEDA. The cold climate of central New York, the cohesive nature of the soil, and the high percentage of gravel and cobbles in the soil eliminate in-situ solidification as a practical alternative for use at SEDA. The high percentage of clay and silt in the soil eliminates soil washing as a practical remedial alternative as well. In addition, excavation and off-site landfilling, can be performed at substantial cost savings compared to the other two. Furthermore, if the excavated soil can be used for daily cover at the off-site landfill, further cost savings can be achieved.

2.8 RECOMMENDATION

Results of an ESI indicate that soil located within the Tank Farm and at locations within the abutting storm water drainage channels has been impacted by chemical materials. The soil within the footprint of the Tank Farm shows evidence of contamination by metals and asbestos, and by PAH compounds, while soil found in the drainage culverts shows evidence of contamination by metals and PAHs.

The Army is proposing to perform a time-critical removal action to lessen the magnitude of, and possibly eliminate, any potential threat to human health and the environment that exists at SEAD-50 and SEAD-54 due to the presence of the identified chemical materials. The objectives of the proposed removal action are to comply with ARARs and reduce the overall threat to human health and the environment to an acceptable level at the site.

As such, the Army is proposing to conduct an action that focuses on the removal of soil that has been impacted by asbestos, arsenic, mercury, and PAHs at elevated concentrations. Specifically, the Army is proposing to initially excavate shallow soil contamination that has been identified within five locations within the Tank Farm, as well as within two lengths of the drainage ditches that surround the Tank Farm. The preliminary extent of the proposed remedial action is identified on **Figure 2-3,** and involves the excavation, management, sampling and analysis, transport and off-site disposal of approximately 4,060 yd^3 of soil.

The cost of the proposed initial removal action is initially estimated to be between $375,000 to $515,000 (exclusive of monitoring, sampling and analysis, and oversight and management) to excavate, contain and dispose this volume in an off-site permitted non-hazardous waste landfill. Samples will be collected from the base and perimeter of the initial excavations, and the resulting data will be compared to NYSDEC's recommended soil clean-up levels to determine if sufficient soil has been removed to eliminate the source of the originally identified risk to human health and the

environment. Once the extent of the excavation and removal action is confirmed, the excavations will be backfilled and re-contoured to match surrounding grades and elevations.

2.9 JUSTIFICATION

Selected metals (i.e., arsenic and mercury) and PAHs (primarily benzo-PAHs) were detected in the soil samples collected from within, and from drainage culverts surrounding, SEAD-50 at concentrations that exceeded their NYSDEC recommended soil cleanup objective levels. Additionally, asbestos was detected in a single sample that was collected from surface soil sampling location SS50-1 at a concentration of 10 – 15 percent.

The continued presence of the identified metals, PAHs and asbestos at the identified levels poses a potential threat to human health and surrounding environment. Performance of a focused removal action at sites where the identified contaminants are at the greatest concentrations will lessen the magnitude of any potential threat that is present, and may reduce to acceptable levels, continuing risks found at the site.

2.10 VERIFICATION SAMPLING AND ANALYSIS

Confirmatory Sampling

Post-removal action verification sampling and analyses will be performed to verify that sufficient soil has been removed to eliminate the identified hot-spots of metal, asbestos, and PAH contamination. The proposed analysis for asbestos will initially be limited to the vicinity of former sampling location SS50-1, as this is the only location where asbestos was found during the expanded site inspection. If site observations indicate the presence of asbestos at other locations during the completion of the proposed removal actions, additional samples will be collected for asbestos determinations.

It is anticipated that at least one confirmational sample will be collected from the base of each excavated area at a rate of at least one sample per each 900 square feet (e.g., 30 ft. by 30 ft. area) of area excavated. Additional samples will be collected from the area immediately surrounding the perimeter of each excavation at a rate of one per every 30 feet of perimeter or at a rate that places one sample at each major point of the compass (i.e., north, east, south, west) surrounding the excavation area.

At the proposed spacing of the confirmational soil samples, the Army anticipates that approximately 468 confirmational samples, plus associated quality assurance/quality control (QA/QC) samples, will be collected from the area of SEAD-50/54. Of the samples collected, 80 percent will be analyzed to document the levels of arsenic and mercury that are present in the soils underlying and surrounding the excavations. The remaining 20 percent of the proposed samples will be analyzed for the full suite of TAL metals that are present in the soil. The location of targeted versus full suite TAL metal analyses will be randomly distributed throughout that portion of SEAD-50/54 that is affected by the proposed excavations. Furthermore, approximately 20 percent of the confirmational samples will be analyzed to document the residual levels of PAH compounds that are present in the soil at SEAD-50/54. Approximately half of these samples will be sited at locations that are near to historic sampling points where PAHs were detected during the ESI, while the remaining half of the samples will be randomly distributed throughout the area of excavation.

Pre-excavation samples of soil will also be collected from the area surrounding the location of the former sample SS50-1, which is where a level of 10 – 15 percent chrysotile asbestos was found in the soil. These samples will be collected in a grid-wise manner around the former sampling location and will advance outwardly until no evidence of asbestos is detected. It is currently anticipated that 28 samples may be collected from the 25,000 square foot area (See Figure 2-3, Area 5), which surrounds SS50-1, if a 900 square foot grid is used throughout this area to confirm the extent of asbestos that is present. Additional sampling and analysis for asbestos will be conducted if needed.

Post excavation sampling and analysis for asbestos will also be conducted in the area surrounding sample location SS50-1 to confirm the completeness of the proposed removal action in this area. Additionally, during sample collection, necessary sample volumes for targeted TAL metals or the full suite of TAL metals, and TCL PAHs will be collected for characterization at the levels identified above.

A detailed listing of the proposed confirmational samples and analyses for SEAD-50/54 is provided in Appendix B of this Decision Document.

Disposal or Characterization Sampling and Analysis

Additional samples of the excavated, stockpiled, and staged soil will be collected and analyzed for the purpose of evaluating and selecting reuse or disposal alternatives for the excavated soils. The number

of samples collected from these determinations will be set at a rate of one sample per 150 cubic yards of soil contained in each pile. Disposal determinations will be based on the comparison of the resulting mass and TCLP data to recommended soil cleanup objective values and the toxicity characteristic criteria.

TABLE 2-1
SEAD-50/SEAD-54 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

PARAMETER	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM DETECT	FREQUENCY OF DETECTION	CRITERIA VALUE (a)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF SAMPLES	SOIL SEAD-50 0-1 02/18/94 SS50-1 211971 42493 Value (Q)	SOIL SEAD-50 0-0.2 02/18/94 SS50-2 211972 42493 Value (Q)	SOIL SEAD-50 0-1 02/18/94 SS50-3 211973 42493 Value (Q)	SOIL SEAD-50 0-1 02/17/94 SS50-4 211728 42460 Value (Q)	SOIL SEAD-50 0-0.2 02/18/94 SS50-5 211974 42493 Value (Q)
Volatile Organics												
Acetone	ug/Kg	83	7%	200	0	1	15	14 U	83	13 U	72 U	16 U
Semivolatile Organics												
4-Methylphenol	ug/Kg	310	20%	900	0	3	15	490 U	100 J	480 U	410 U	95 J
Acenaphthene	ug/Kg	930	13%	50000 (*)	0	2	15	490 U	610 U	480 U	410 U	450 U
Anthracene	ug/Kg	1500	20%	50000 (*)	0	3	15	490 U	610 U	480 U	410 U	450 U
Benzo(a)anthracene	ug/Kg	5200	40%	220	3	6	15	490 U	81 J	480 U	410 U	450 U
Benzo(a)pyrene	ug/Kg	3700	40%	61	5	6	15	490 U	78 J	480 U	410 U	450 U
Benzo(b)fluoranthene	ug/Kg	4400	40%	1100	1	6	15	490 U	180 J	480 U	410 U	450 U
Benzo(g,h,i)perylene	ug/Kg	1800	27%	50000 (*)	0	4	15	490 U	56 J	480 U	410 U	450 U
Benzo(k)fluoranthene	ug/Kg	4000	40%	1100	1	6	15	490 U	610 UJ	480 U	410 U	450 U
bis(2-Ethylhexyl)phthalate	ug/Kg	1800	100%	50000 (*)	0	15	15	950	720	760	690	820
Carbazole	ug/Kg	1100	20%	50000 (*)	0	3	15	490 U	610 U	480 U	410 U	450 U
Chrysene	ug/Kg	5500	40%	400	3	6	15	490 U	100 J	480 U	410 U	450 U
Dibenz(a,h)anthracene	ug/Kg	840	20%	14	3	3	15	490 U	610 U	480 U	410 U	450 U
Dibenzofuran	ug/Kg	260	7%	6200	0	1	15	490 U	610 U	480 U	410 U	450 U
Di-n-butylphthalate	ug/Kg	56	80%	8100	0	12	15	35 J	56 J	33 J	410 U	34 J
Fluoranthene	ug/Kg	14000	80%	50000 (*)	0	12	15	33 J	230 J	480 U	32 J	37 J
Fluorene	ug/Kg	590	13%	50000 (*)	0	2	15	490 U	610 U	480 U	410 U	450 U
Indeno(1,2,3-cd)pyrene	ug/Kg	1800	33%	3200	0	5	15	490 U	69 J	480 U	410 U	450 U
Phenanthrene	ug/Kg	7800	67%	50000 (*)	0	10	15	490 U	150 J	480 U	20 J	27 J
Phenol	ug/Kg	31	7%	30	1	1	15	31 J	610 U	480 U	410 U	450 U
Pyrene	ug/Kg	12000	73%	50000 (*)	0	11	15	25 J	160 J	480 U	27 J	30 J
Pesticides/PCB												
4,4'-DDD	ug/Kg	2.2	7%	2900	0	1	15	4.8 U	6.1 U	4.8 U	4.1 U	4.4 U
4,4'-DDE	ug/Kg	4.8	27%	2100	0	4	15	4.8 U	6.1 U	4.8 U	4.1 U	3.1 J
4,4'-DDT	ug/Kg	4.1	27%	2100	0	4	15	4.8 U	6.1 U	4.8 U	4.1 U	2.2 J
Aldrin	ug/Kg	1.3	7%	41	0	1	15	2.5 U	3.1 U	2.5 U	2.1 U	1.3 J
alpha-Chlordane	ug/Kg	3.8	7%	540	0	1	15	2.5 U	3.1 U	2.5 U	2.1 U	2.3 U
Aroclor-1242	ug/Kg	75	20%	1000(b)	0	3	15	48 U	61 U	48 U	41 U	75
Aroclor-1254	ug/Kg	75	13%	1000(b)	0	2	15	48 U	61 U	48 U	41 U	44 U
Aroclor-1260	ug/Kg	25	7%	1000(b)	0	1	15	48 U	61 U	48 U	41 U	25 J
Dieldrin	ug/Kg	59	13%	440	0	2	15	4.8 U	6.1 U	4.8 U	4.1 U	4.4 U
Endosulfan I	ug/Kg	13	7%	900	0	1	15	2.5 U	3.1 U	2.5 U	2.1 U	2.3 U
Endrin	ug/Kg	2.8	7%	100	0	1	15	4.8 U	6.1 U	4.8 U	4.1 U	4.4 U
Heptachlor	ug/Kg	1.3	7%	100	0	1	15	2.5 U	3.1 U	2.5 U	2.1 U	2.3 U
Heptachlor epoxide	ug/Kg	2.4	13%	20	0	2	15	2.5 U	3.1 U	2.5 U	2.1 U	2.4
Metals												
Aluminum	mg/Kg	15300	100%	19300	0	15	15	14500	13500	12500	15100 J	9050
Antimony	mg/Kg	7.1	93%	5.9	1	14	15	1.4 J	1.6 J	2.9 J	7.1 J	2.7 J
Arsenic	mg/Kg	151	100%	8.2	3	15	15	4.9	57.4	5	5.1 J	3.7
Barium	mg/Kg	115	100%	300	0	15	15	95.6	115	87.5	96.8 J	66.2
Beryllium	mg/Kg	0.71	100%	1.1	0	15	15	0.61 J	0.59 J	0.59 J	0.68 J	0.38 J
Cadmium	mg/Kg	0.8	87%	2.3	0	13	15	0.17 J	0.22 J	0.12 J	0.46 U	0.25 J
Calcium	mg/Kg	120000	100%	121000	0	15	15	12500 J	4740 J	6220 J	3650 J	46800 J
Chromium	mg/Kg	60.7	100%	29.6	5	15	15	28.3	21.7	20.4	34.6	60.7
Cobalt	mg/Kg	12.6	100%	30	0	15	15	11 J	9 J	8.8 J	9.9 J	7.4 J
Copper	mg/Kg	35.2	100%	33	1	15	15	24.8	24.4	18.7	16.9	22.2

TABLE 2-1
SEAD-50/SEAD-54 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

	MATRIX							SOIL	SOIL	SOIL	SOIL	SOIL
	LOCATION							SEAD-50	SEAD-50	SEAD-50	SEAD-50	SEAD-50
	DEPTH (FEET)							0-1	0-0.2	0-1	0-1	0-0.2
	SAMPLE DATE							02/18/94	02/18/94	02/18/94	02/17/94	02/18/94
	ES ID							SS50-1	SS50-2	SS50-3	SS50-4	SS50-5
	LAB ID		FREQUENCY		NUMBER	NUMBER	NUMBER	211971	211972	211973	211728	211974
	SDG NUMBER	MAXIMUM	OF	CRITERIA	ABOVE	OF	OF	42493	42493	42493	42460	42493
PARAMETER	UNITS	DETECT	DETECTION	VALUE (a)	CRITERIA	DETECTS	SAMPLES	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)
Volatile Organics												
Iron	mg/Kg	30000	100%	36500	0	15	15	25600	22800	22800	24400 J	18000
Lead	mg/Kg	398	100%	24.8	13	15	15	94.8	40.1	27	74	398
Magnesium	mg/Kg	48300	100%	21500	1	15	15	5300	3900	3930	3840 J	21100
Manganese	mg/Kg	722	87%	1060	0	13	15	569	630	490	539 R	350
Mercury	mg/Kg	0 37	100%	0.1	2	15	15	0.06 J	0.05 J	0.04 J	0.04 J	0.37
Nickel	mg/Kg	42.6	100%	498	0	15	15	35 J	25.2 J	22.8 J	24.3	22.9 J
Potassium	mg/Kg	2170	100%	2380	0	15	15	1780 J	2160 J	1040 J	1190	1430 J
Selenium	mg/Kg	1.1	93%	2	0	14	15	0.95 J	1.1 J	0.52 J	0.23 UJ	0 25 J
Silver	mg/Kg	0.34	13%	0 75	0	2	15	0.16 U	0.25 U	0.16 U	0.91 U	0 11 U
Sodium	mg/Kg	136	80%	172	0	12	15	64.7 J	55.6 U	42.5 J	43 U	86.1 J
Vanadium	mg/Kg	26.2	100%	150	0	15	15	23.8	24.9	22.6	26.1	15.6
Zinc	mg/Kg	152	100%	110	3	15	15	109	100	71.9	88.9 J	152
Other Analyses												
Total Solids	%W/W	88	100%		0	15	15	67.8	53.8	68.9	80.6	73.9

NOTES:

a) NYSDEC Technical and Administrative Guidance Memorandum (TAGM) #4046.

b) The TAGM value for PCBs is 1000 ug/Kg for surface soils and 10,000 ug/Kg for subsurface soils.

* = As per TAGM, total VOCs < 10 ppm; total Semi-VOCs < 500 ppm; individual semi-VOCs < 50 ppm.

NA = Not Available

U = Compound was not detected.

J = the reported value is an estimated concentration.

R = the data was rejected in the data validating process.

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

TABLE 2-1
SEAD-50/SEAD-54 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

PARAMETER	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM DETECT	FREQUENCY OF DETECTION	CRITERIA VALUE (a)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF SAMPLES	SOIL SEAD-50 0-0.2 02/18/94 SS50-6 211975 42493 Value (Q)	SOIL SEAD-50 0-1 02/18/94 SS50-7 211976 42493 Value (Q)	SOIL SEAD-50 0-1 02/18/94 SS50-8 211977 42493 Value (Q)	SOIL SEAD-50 0-0.2 02/18/94 SS50-9 211978 42493 Value (Q)	SOIL SEAD-50 0-1 02/19/94 SS50-10 211979 42493 Value (Q)
Volatile Organics												
Acetone	ug/Kg	83	7%	200	0	1	15	41 U	12 U	12 U	22 U	14 U
Semivolatile Organics												
4-Methylphenol	ug/Kg	310	20%	900	0	3	15	310 J	390 U	370 U	430 U	430 U
Acenaphthene	ug/Kg	930	13%	50000 (*)	0	2	15	610 UJ	390 U	370 U	430 U	430 U
Anthracene	ug/Kg	1500	20%	50000 (*)	0	3	15	610 UJ	390 U	370 U	430 U	430 U
Benzo(a)anthracene	ug/Kg	5200	40%	220	3	6	15	81 J	390 U	370 U	430 U	430 U
Benzo(a)pyrene	ug/Kg	3700	40%	61	5	6	15	84 J	390 U	370 U	430 U	430 U
Benzo(b)fluoranthene	ug/Kg	4400	40%	1100	1	6	15	99 J	390 U	370 U	430 U	430 U
Benzo(g,h,i)perylene	ug/Kg	1800	27%	50000 (*)	0	4	15	610 UJ	390 U	370 U	430 U	430 U
Benzo(k)fluoranthene	ug/Kg	4000	40%	1100	1	6	15	80 J	390 U	370 U	30 J	430 U
bis(2-Ethylhexyl)phthalate	ug/Kg	1800	100%	50000 (*)	0	15	15	980 J	500	1300	330 J	150 J
Carbazole	ug/Kg	1100	20%	50000 (*)	0	3	15	610 UJ	390 U	370 U	430 U	430 U
Chrysene	ug/Kg	5500	40%	400	3	6	15	97 J	390 U	370 U	430 U	430 U
Dibenz(a,h)anthracene	ug/Kg	840	20%	14	3	3	15	610 UJ	390 U	370 U	430 U	430 U
Dibenzofuran	ug/Kg	260	7%	6200	0	1	15	610 UJ	390 U	370 U	430 U	430 U
Di-n-butylphthalate	ug/Kg	56	80%	8100	0	12	15	610 UJ	34 J	22 J	46 J	28 J
Fluoranthene	ug/Kg	14000	80%	50000 (*)	0	12	15	210 J	390 U	370 U	58 J	23 J
Fluorene	ug/Kg	590	13%	50000 (*)	0	2	15	610 UJ	390 U	370 U	430 U	430 U
Indeno(1,2,3-cd)pyrene	ug/Kg	1800	33%	3200	0	5	15	64 J	390 U	370 U	430 U	430 U
Phenanthrene	ug/Kg	7800	67%	50000 (*)	0	10	15	140 J	390 U	370 U	40 J	430 U
Phenol	ug/Kg	31	7%	30	1	1	15	610 UJ	390 U	370 U	430 U	430 U
Pyrene	ug/Kg	12000	73%	50000 (*)	0	11	15	140 J	390 U	370 U	47 J	430 U
Pesticides/PCB												
4,4'-DDD	ug/Kg	2.2	7%	2900	0	1	15	6.2 U	3.9 U	3.7 U	4.3 U	4.3 U
4,4'-DDE	ug/Kg	4.8	27%	2100	0	4	15	6.2 U	3.9 U	3.7 U	2.9 J	4.3 U
4,4'-DDT	ug/Kg	4.1	27%	2100	0	4	15	6.2 U	3.9 U	3.7 U	1.9 J	4.3 U
Aldrin	ug/Kg	1.3	7%	41	0	1	15	3.2 U	2 U	1.9 U	2.2 U	2.2 U
alpha-Chlordane	ug/Kg	3.8	7%	540	0	1	15	3.2 U	2 U	1.9 U	2.2 U	2.2 U
Aroclor-1242	ug/Kg	75	20%	1000(b)	0	3	15	62 U	39 U	49	43 U	43 U
Aroclor-1254	ug/Kg	75	13%	1000(b)	0	2	15	62 U	39 U	37 U	43 U	75
Aroclor-1260	ug/Kg	25	7%	1000(b)	0	1	15	62 U	39 U	37 U	43 U	43 U
Dieldrin	ug/Kg	59	13%	440	0	2	15	6.2 U	3.9 U	3.7 U	4.3 U	4.3 U
Endosulfan I	ug/Kg	13	7%	900	0	1	15	3.2 U	2 U	1.9 U	2.2 U	2.2 U
Endrin	ug/Kg	2.8	7%	100	0	1	15	6.2 U	3.9 U	3.7 U	4.3 U	4.3 U
Heptachlor	ug/Kg	1.3	7%	100	0	1	15	3.2 U	2 U	1.9 U	1.3 J	2.2 U
Heptachlor epoxide	ug/Kg	2.4	13%	20	0	2	15	2.1 J	2 U	1.9 U	2.2 U	2.2 U
Metals												
Aluminum	mg/Kg	15300	100%	19300	0	15	15	12500	13800	9150	12300	11300
Antimony	mg/Kg	7.1	93%	5.9	1	14	15	1.5 J	1.7 J	0.71 J	2.3 J	0.95 J
Arsenic	mg/Kg	151	100%	8.2	3	15	15	151	7.6	4.7	7.5	4.9
Barium	mg/Kg	115	100%	300	0	15	15	103	55.5	58.1	39 J	63.2
Beryllium	mg/Kg	0.71	100%	1.1	0	15	15	0.56 J	0.57 J	0.36 J	0.45 J	0.45 J
Cadmium	mg/Kg	0.8	87%	2.3	0	13	15	0.19 J	0.09 J	0.28 J	0.09 J	0.17 J
Calcium	mg/Kg	120000	100%	121000	0	15	15	4650 J	27300 J	120000 J	3480 J	24000 J
Chromium	mg/Kg	60.7	100%	29.6	5	15	15	19.9	28.1	32.6	40.9	23.5
Cobalt	mg/Kg	12 6	100%	30	0	15	15	7.3 J	12.6	6.4 J	11.2	8 J
Copper	mg/Kg	35 2	100%	33	1	15	15	18.5	35.2	13.9	18.4	18.9

TABLE 2-1
SEAD-50/SEAD-54 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

PARAMETER	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM DETECT	FREQUENCY OF DETECTION	CRITERIA VALUE (a)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF SAMPLES	SOIL SEAD-50 0-0.2 02/18/94 SS50-6 211975 42493 Value (Q)	SOIL SEAD-50 0-1 02/18/94 SS50-7 211976 42493 Value (Q)	SOIL SEAD-50 0-1 02/18/94 SS50-8 211977 42493 Value (Q)	SOIL SEAD-50 0-0.2 02/18/94 SS50-9 211978 42493 Value (Q)	SOIL SEAD-50 0-1 02/19/94 SS50-10 211979 42493 Value (Q)
Volatile Organics												
Iron	mg/Kg	30000	100%	36500	0	15	15	21700	29400	18200	28600	26100
Lead	mg/Kg	398	100%	24 8	13	15	15	25.2	52.7	242	181	48.4
Magnesium	mg/Kg	48300	100%	21500	1	15	15	3550	6600	15700	5690	11200
Manganese	mg/Kg	722	87%	1060	0	13	15	487	374	604	413	430
Mercury	mg/Kg	0.37	100%	0.1	2	15	15	0.22	0.02 J	0.04 J	0.03 J	0.03 J
Nickel	mg/Kg	42.6	100%	498	0	15	15	20.8 J	42.6 J	15.4 J	30.2 J	22 J
Potassium	mg/Kg	2170	100%	2380	0	15	15	1550 J	1680 J	1540 J	1030 J	1490 J
Selenium	mg/Kg	1.1	93%	2	0	14	15	0.71 J	0.59 J	0.67 J	0.53 J	0.21 J
Silver	mg/Kg	0.34	13%	0 75	0	2	15	0.21 U	0.15 U	0.34 J	0.14 U	0.12 U
Sodium	mg/Kg	136	80%	172	0	12	15	66 J	81.6 J	89.3 J	53 J	60.7 J
Vanadium	mg/Kg	26.2	100%	150	0	15	15	23.2	21	17	16.4	19.2
Zinc	mg/Kg	152	100%	110	3	15	15	101	81.2	104	114	87.4
Other Analyses												
Total Solids	%W/W	88	100%		0	15	15	53.3	84.9	88	76.8	77

NOTES:

a) NYSDEC Technical and Administrative Guidance Memorandum (TAGM) #4046.

b) The TAGM value for PCBs is 1000 ug/Kg for surface soils and 10,000 ug/Kg for subsurface soils.

* = As per TAGM, total VOCs < 10 ppm; total Semi-VOCs < 500 ppm; individual semi-VOCs < 50 ppm.

NA = Not Available

U = Compound was not detected.

J = the reported value is an estimated concentration.

R = the data was rejected in the data validating process.

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

TABLE 2-1
SEAD-50/SEAD-54 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

PARAMETER	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM DETECT	FREQUENCY OF DETECTION	CRITERIA VALUE (a)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF SAMPLES	SOIL SEAD-50 0-0.2 02/19/94 SS50-11 211965 42460 Value (Q)	SOIL SEAD-50 0-1 02/19/94 SS50-12 211980 42493 Value (Q)	SOIL SEAD-50 0-0.2 02/19/94 SS50-13 211981 42493 Value (Q)	SOIL SEAD-50 0-1 02/19/94 SS50-14 211982 42493 Value (Q)	SOIL SEAD-50 0-0.2 02/19/94 SS50-15 211983 42493 Value (Q)
Volatile Organics												
Acetone	ug/Kg	83	7%	200	0	1	15	14 U	13 U	15 U	12 U	15 U
Semivolatile Organics												
4-Methylphenol	ug/Kg	310	20%	900	0	3	15	2300 U	420 U	480 U	420 U	520 U
Acenaphthene	ug/Kg	930	13%	50000 (*)	0	2	15	930 J	420 U	480 U	420 U	51 J
Anthracene	ug/Kg	1500	20%	50000 (*)	0	3	15	1500 J	420 U	480 U	81 J	100 J
Benzo(a)anthracene	ug/Kg	5200	40%	220	3	6	15	**5200**	420 U	35 J	**830**	**650**
Benzo(a)pyrene	ug/Kg	3700	40%	61	5	6	15	**3700**	420 U	40 J	**660**	**520**
Benzo(b)fluoranthene	ug/Kg	4400	40%	1100	1	6	15	**4400**	420 U	45 J	860	690
Benzo(g,h,i)perylene	ug/Kg	1800	27%	50000 (*)	0	4	15	1800 J	420 U	480 U	270 J	240 J
Benzo(k)fluoranthene	ug/Kg	4000	40%	1100	1	6	15	**4000**	420 U	43 J	600	410 J
bis(2-Ethylhexyl)phthalate	ug/Kg	1800	100%	50000 (*)	0	15	15	640 J	1800	960	610	1300
Carbazole	ug/Kg	1100	20%	50000 (*)	0	3	15	1100 J	420 U	480 U	71 J	67 J
Chrysene	ug/Kg	5500	40%	400	3	6	15	**5500**	420 U	53 J	**840**	**670**
Dibenz(a,h)anthracene	ug/Kg	840	20%	14	3	3	15	**840** J	420 U	480 U	**200** J	**190** J
Dibenzofuran	ug/Kg	260	7%	6200	0	1	15	260 J	420 U	480 U	420 U	520 U
Di-n-butylphthalate	ug/Kg	56	80%	8100	0	12	15	2300 U	51 J	51 J	36 J	30 J
Fluoranthene	ug/Kg	14000	80%	50000 (*)	0	12	15	14000	41 J	86 J	1300	1300
Fluorene	ug/Kg	590	13%	50000 (*)	0	2	15	590 J	420 U	480 U	420 U	36 J
Indeno(1,2,3-cd)pyrene	ug/Kg	1800	33%	3200	0	5	15	1800 J	420 U	480 U	400 J	360 J
Phenanthrene	ug/Kg	7800	67%	50000 (*)	0	10	15	7800	26 J	53 J	370 J	530
Phenol	ug/Kg	31	7%	30	1	1	15	2300 U	420 U	480 U	420 U	520 U
Pyrene	ug/Kg	12000	73%	50000 (*)	0	11	15	12000	31 J	73 J	1200	1000
Pesticides/PCB												
4,4'-DDD	ug/Kg	2.2	7%	2900	0	1	15	4.5 U	8.4 U	4.8 U	2.2 J	5.2 U
4,4'-DDE	ug/Kg	4.8	27%	2100	0	4	15	4.5 U	8.4 U	4.8 U	4.8 J	4 J
4,4'-DDT	ug/Kg	4.1	27%	2100	0	4	15	4.5 U	8.4 U	4.8 U	4.1 J	4.1 J
Aldrin	ug/Kg	1.3	7%	41	0	1	15	2.3 U	4.3 U	2.5 U	2.2 U	2.7 U
alpha-Chlordane	ug/Kg	3.8	7%	540	0	1	15	3.8 J	4.3 U	2.5 U	2.2 U	2.7 U
Aroclor-1242	ug/Kg	75	20%	1000(b)	0	3	15	45 U	84 U	48 U	37 J	52 U
Aroclor-1254	ug/Kg	75	13%	1000(b)	0	2	15	45 U	84 U	48 U	24 J	52 U
Aroclor-1260	ug/Kg	25	7%	1000(b)	0	1	15	45 U	84 U	48 U	42 U	52 U
Dieldrin	ug/Kg	59	13%	440	0	2	15	4.5 U	59 J	4.8 U	28 J	5.2 U
Endosulfan I	ug/Kg	13	7%	900	0	1	15	2.3 U	4.3 U	2.5 U	13	2.7 U
Endrin	ug/Kg	2.8	7%	100	0	1	15	2.8 J	8.4 U	4.8 U	4.2 U	5.2 U
Heptachlor	ug/Kg	1.3	7%	100	0	1	15	2.3 U	4.3 U	2.5 U	2.2 U	2.7 U
Heptachlor epoxide	ug/Kg	2.4	13%	20	0	2	15	2.3 U	4.3 U	2.5 U	2.2 U	2.7 U
Metals												
Aluminum	mg/Kg	15300	100%	19300	0	15	15	15300 J	15200	13800	10600	13300
Antimony	mg/Kg	7.1	93%	5.9	1	14	15	5.2 UJ	0.55 J	0.63 J	0.6 J	0.85 J
Arsenic	mg/Kg	151	100%	8.2	3	15	15	6 J	**37.6**	6.4	6.2	6.3
Barium	mg/Kg	115	100%	300	0	15	15	101 J	91.2	78	73.1	92.1
Beryllium	mg/Kg	0.71	100%	1.1	0	15	15	0.71 J	0.65 J	0.55 J	0.4 J	0.59 J
Cadmium	mg/Kg	0.8	87%	2.3	0	13	15	0.51 U	0.15 J	0.09 J	0.8 J	0.22 J
Calcium	mg/Kg	120000	100%	121000	0	15	15	15200 J	3870 J	10600 J	80100 J	18000 J
Chromium	mg/Kg	60.7	100%	29.6	5	15	15	**29.9**	22.7	21.1	21.8	25.7
Cobalt	mg/Kg	12.6	100%	30	0	15	15	10.3 J	11.6	10.4 J	9.2 J	12.6
Copper	mg/Kg	35.2	100%	33	1	15	15	23 6	19.6	22 2	20.9	28.1

TABLE 2-1
SEAD-50/SEAD-54 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

	MATRIX							SOIL	SOIL	SOIL	SOIL	SOIL
	LOCATION							SEAD-50	SEAD-50	SEAD-50	SEAD-50	SEAD-50
	DEPTH (FEET)							0-0.2	0-1	0-0.2	0-1	0-0.2
	SAMPLE DATE							02/19/94	02/19/94	02/19/94	02/19/94	02/19/94
	ES ID							SS50-11	SS50-12	SS50-13	SS50-14	SS50-15
	LAB ID		FREQUENCY		NUMBER	NUMBER	NUMBER	211965	211980	211981	211982	211983
	SDG NUMBER	MAXIMUM	OF	CRITERIA	ABOVE	OF	OF	42460	42493	42493	42493	42493
PARAMETER	UNITS	DETECT	DETECTION	VALUE (a)	CRITERIA	DETECTS	SAMPLES	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)
Volatile Organics												
Iron	mg/Kg	30000	100%	36500	0	15	15	27000 J	29400	26200	19700	30000
Lead	mg/Kg	398	100%	24.8	13	15	15	25.7	18.5	22.6	61.4	45.3
Magnesium	mg/Kg	48300	100%	21500	1	15	15	7510 J	4570	6330	48300	6780
Manganese	mg/Kg	722	87%	1060	0	13	15	496 R	722	461	548	589
Mercury	mg/Kg	0.37	100%	0.1	2	15	15	0.05 J	0.05 J	0.05 J	0.03 J	0.03 J
Nickel	mg/Kg	42.6	100%	498	0	15	15	37.2	30.1 J	28.9 J	24.4 J	37 J
Potassium	mg/Kg	2170	100%	2380	0	15	15	2170	1600 J	1760 J	2140 J	1890 J
Selenium	mg/Kg	1.1	93%	2	0	14	15	0.41 J	0.41 J	0.33 J	0.55 J	0.44 J
Silver	mg/Kg	0.34	13%	0.75	0	2	15	1 U	0.16 J	0.18 U	0.16 U	0.14 U
Sodium	mg/Kg	136	80%	172	0	12	15	63.7 J	26.7 U	64.9 J	136 J	64.6 J
Vanadium	mg/Kg	26.2	100%	150	0	15	15	26.2	24.6	23.4	19.8	21.3
Zinc	mg/Kg	152	100%	110	3	15	15	110 J	93.7	87.9	102	141
Other Analyses												
Total Solids	%W/W	88	100%		0	15	15	72.9	78.2	69.3	78.8	63.9

NOTES:

a) NYSDEC Technical and Administrative Guidance Memorandum (TAGM) #4046.

b) The TAGM value for PCBs is 1000 ug/Kg for surface soils and 10,000 ug/Kg for subsurface soils.

* = As per TAGM, total VOCs < 10 ppm; total Semi-VOCs < 500 ppm; individual semi-VOCs < 50 ppm.

NA = Not Available

U = Compound was not detected.

J = the reported value is an estimated concentration.

R = the data was rejected in the data validating process.

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

TABLE 2-2
SEAD-50 / SEAD-54 SOIL SAMPLE ASBESTOS ANALYSIS[1] RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

ES Sample ID	Asbestos (% Type)	Other Material
SS50-1	10-15 % Chrysotile	Binder, Quartz, 3-5 % Organic Fiber
SS50-2	Not Detected	Binder, Quartz, 15-25 % Organic Fiber
SS50-3	Not Detected	Binder, Quartz, 10-15 % Organic Fiber
SS50-4	Not Detected	Binder, Quartz, 1-3 % Organic Fiber
SS50-5	Not Detected	Binder, Quartz, 15-25 % Organic Fiber
SS50-6	Not Detected	Binder, Quartz, 15-25 % Organic Fiber
SS50-7	Not Detected	Binder, Quartz, 15-25 % Organic Fiber
SS50-8	Not Detected	Binder, Quartz, 5-10 % Organic Fiber
SS50-9	Not Detected	Binder, Quartz, 35-45 % Organic Fiber
SS50-10	Not Detected	Binder, Quartz, 10-15 % Organic Fiber
SS50-11	Not Detected	Binder, Quartz, 10-15 % Organic Fiber
SS50-12	Not Detected	Binder, Quartz, 5-10 % Organic Fiber
SS50-13	Not Detected	Binder, Quartz, 10-15 % Organic Fiber
SS50-14	Not Detected	Binder, Quartz, 1-3 % Organic Fiber
SS50-15	Not Detected	Binder, Quartz, 5-10 % Organic Fiber
SS50-16	Not Detected	Binder, Quartz, 3-5 % Organic Fiber

1) Bulk Asbestos Analysis by polarized ligh microscopy

SEAD-50/SEAD-54 GROUNDWATER ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

PARAMETER	MATRIX LOCATION SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM DETECT	FREQUENCY OF DETECTION	CRITERIA VALUE (a)	NUMBER ABOVE CRITERIA	WATER SEAD-50 07/12/94 MW50-1 226794 45332 Value (Q)	WATER SEAD-50 07/18/94 MW50-2 227267 45332 Value (Q)	WATER SEAD-50 07/18/94 MW50-3 227268 45332 Value (Q)
SEMIVOLATILE ORGANICS								
Di-n-octylphthalate	ug/L	5	100%	50	0	10 U	10 U	5 J
METALS								
Aluminum	ug/L	1790	100%	50 (b)	2	**1790** J	**137** J	19.6 J
Arsenic	ug/L	2.2	100%	5 (c)	0	2.2 J	2 U	2 U
Barium	ug/L	96.5	100%	1000	0	50.8 J	68.9 J	96.5 J
Calcium	ug/L	153000	100%	NA	NA	153000	113000	113000
Chromium	ug/L	3	100%	50	0	3 J	0.4 U	0.4 U
Cobalt	ug/L	4.9	100%	NA	NA	4.9 J	1.6 J	0.62 J
Copper	ug/L	1.4	100%	200	0	1.4 J	0.5 U	0.5 U
Iron	ug/L	5070	100%	300	2	**5070**	**1400**	206
Magnesium	ug/L	40200	100%	NA	NA	40200	20800	16900
Manganese	ug/L	1040	100%	50 (b)	3	**1040**	**791**	**317**
Mercury	ug/L	0.05	100%	0.7	0	0.05 J	0.04 U	0.04 U
Nickel	ug/L	8	100%	100	0	8 J	2 J	0.69 U
Potassium	ug/L	10400	100%	NA	NA	4460 J	5770 J	10400 J
Silver	ug/L	0.76	100%	50	0	0.5 U	0.75 J	0.76 J
Sodium	ug/L	91200	100%	20000	2	**22700**	**91200**	10000
Thallium	ug/L	3	100%	2 (d)	1	1.9 J	**3** J	1.9 U
Vanadium	ug/L	3	100%	NA	NA	3 J	0.5 U	0.54 J
Zinc	ug/L	20.2	100%	5000 (b)	0	20.2	2.4 J	2.2 U
OTHER ANALYSES								
pH	Standard Units					6.9	7	7.2
Conductivity	umhos/cm					820	900	580
Temperature	°C					17	17.9	18.7
Turbidity	NTU					160	27.7	1.5

NOTES:

a) NY State Class GA Groundwater Standard (TOGS 1.1.1, June 1998), except as noted below.
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
NA = Not Available
U = compound was not detected
J = the report value is an estimated concentration
UJ = the compound was not detected; the associated reporting limit is approximate
R = the data was rejected in the data validating process

TABLE 2-4
SEAD-50 / SEAD-54 SURFACE WATER ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

PARAMETER	MATRIX LOCATION SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM DETECT	FREQUENCY OF DETECTION	NYS CRITERIA VALUE (a,b)	NUMBER ABOVE CRITERIA	WATER SEAD-50 04/19/94 SW50-1 218499 43626 Value (Q)	WATER SEAD-50 04/19/94 SW50-2 218500 43626 Value (Q)	WATER SEAD-50 04/19/94 SW50-3 218501 43626 Value (Q)
METALS								
Aluminum	ug/L	376	100%	100	1	376	63.1 J	68.2 J
Arsenic	ug/L	22.1	67%	150	0	22.1	4.5 J	1.5 U
Barium	ug/L	34.3	100%	NA	NA	33.4 J	34.3 J	21.9 J
Calcium	ug/L	85200	100%	NA	NA	82700	85200	43400
Chromium	ug/L	1.3	67%	139.5	0	0.88 J	0.4 U	1.3 J
Copper	ug/L	2.1	100%	17.3	0	2.1 J	1.1 J	1.8 J
Iron	ug/L	575	100%	300	1	575	91.8 J	121
Lead	ug/L	0.89	33%	1.46	0	0.89 J	0.8 U	0.8 U
Magnesium	ug/L	13200	100%	NA	NA	12300	13200	8660
Manganese	ug/L	67.9	100%	NA	NA	67.9	6.6 J	7.1 J
Nickel	ug/L	1.7	67%	99 9	0	1.7 J	0.6 U	0.83 J
Potassium	ug/L	3140	100%	NA	NA	3140 J	1210 J	822 J
Sodium	ug/L	11200	100%	NA	NA	1890 J	11000	11200
Vanadium	ug/L	1.1	33%	14	0	1.1 J	0.7 U	0.7 U
Zinc	ug/L	10.5	100%	159.2	0	10.5 J	8.1 J	1.5 J
OTHER ANALYSES								
pH	Standard Units						7.7	8.4
Conductivity	umhos/cm						450	260
Temperature	°C						15.7	16
Turbidity	NTU						5.1	1.6

NOTES:

a) The New York State Ambient Water Quality Standards and Guidance Values for Class C surface water (June 1998).
b) Hardness dependent values assume a hardness of 216.4 mg/L (depot site-wide average).
NA = Not Available
U = The compound was not detected below this concentration.
J = The reported value is an estimated concentration.

E 2-5

SEAD-50 / SEAD-54 SEDIMENT ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

PARAMETER	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM DETECT	FREQUENCY OF DETECTION	CRITERIA VALUE (a)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	SOIL SEAD-50 0-0 2 04/19/94 SD50-1 218502 43663 Value (Q)	SOIL SEAD-50 0-0 2 04/19/94 SD50-2 218503 43663 Value (Q)	SOIL SEAD-50 0-0 2 04/19/94 SD50-3 218504 43663 Value (Q)
Volatile Organic Compounds										
2-Butanone	ug/Kg	11	33%	2700	0	1	3	11 J	21 UJ	13 U
Semivolatile Organic Compounds										
4-Methylphenol	ug/Kg	110	67%	900	0	2	3	44 J	110 J	420 U
Acenaphthene	ug/Kg	160	33%	50000	0	1	3	160 J	690 UJ	420 U
Anthracene	ug/Kg	480	33%	50000	0	1	3	480 J	690 UJ	420 U
Benzo(a)anthracene	ug/Kg	1400	100%	224	1	3	3	**1400**	120 J	44 J
Benzo(a)pyrene	ug/Kg	1200	100%	61	2	3	3	**1200**	**160** J	58 J
Benzo(b)fluoranthene	ug/Kg	1300	100%	1100	1	3	3	**1300**	160 J	51 J
Benzo(g,h,i)perylene	ug/Kg	790	100%	50000	0	3	3	790	120 J	42 J
Benzo(k)fluoranthene	ug/Kg	1200	100%	1100	1	3	3	**1200**	160 J	69 J
Carbazole	ug/Kg	250	33%		0	1	3	250 J	690 UJ	420 U
Chrysene	ug/Kg	1500	100%	400	1	3	3	**1500**	170 J	60 J
Dibenz(a,h)anthracene	ug/Kg	260	33%	14	1	1	3	**260** J	690 UJ	420 U
Dibenzofuran	ug/Kg	97	33%		0	1	3	97 J	690 UJ	420 U
Fluoranthene	ug/Kg	3500	100%	50000	0	3	3	3500	310 J	94 J
Fluorene	ug/Kg	310	33%	50000	0	1	3	310 J	690 UJ	420 U
Indeno(1,2,3-cd)pyrene	ug/Kg	770	100%	3200	0	3	3	770	120 J	38 J
Phenanthrene	ug/Kg	2700	100%	50000	0	3	3	2700	140 J	35 J
Pyrene	ug/Kg	4000	100%	50000	0	3	3	4000	300 J	83 J
Pesticides and PCBs										
4,4'-DDE	ug/Kg	4 3	33%	2100	0	1	3	4 3 J	6.9 UJ	4 2 U
Aldrin	ug/Kg	2 2	33%	41	0	1	3	2 2 J	3.5 UJ	2 2 U
alpha-Chlordane	ug/Kg	8	33%	540	0	1	3	8 J	3 5 UJ	2.2 U
Aroclor-1242	ug/Kg	120	33%	1000	0	1	3	120	69 UJ	42 U
Aroclor-1260	ug/Kg	56	33%	1000	0	1	3	56 J	69 UJ	42 U
Endosulfan I	ug/Kg	15	67%	900	0	2	3	15 J	3 J	2 2 U
Metals										
Aluminum	mg/Kg	16300	100%	19300	0	3	3	16300	11000 J	10300
Antimony	mg/Kg	3 3	100%	5 9	0	3	3	3.3 J	0.55 J	0 24 J
Arsenic	mg/Kg	62 7	100%	8 2	2	3	3	**62.7**	**27.5** J	4 1
Barium	mg/Kg	117	100%	300	0	3	3	108	117 J	62 9
Beryllium	mg/Kg	0 75	100%	1 1	0	3	3	0 75 J	0 53 J	0.48 J
Cadmium	mg/Kg	0 8	100%	2 3	0	3	3	0.57 J	0.8 J	0 23 J
Calcium	mg/Kg	31400	100%	121000	0	3	3	7570	14800 J	31400
Chromium	mg/Kg	25 1	100%	29 6	0	3	3	25 1	23.3 J	15 9
Cobalt	mg/Kg	9.3	100%	30	0	3	3	9 3 J	8.7 J	8.1
Copper	mg/Kg	25 5	100%	33	0	3	3	25.5	18.9 J	19 9
Iron	mg/Kg	26800	100%	36500	0	3	3	26800	20500 J	19700
Lead	mg/Kg	49 6	100%	24 8	2	3	3	**49.6**	**25.5** J	10 8
Magnesium	mg/Kg	6400	100%	21500	0	3	3	4980	3780 J	6400
Manganese	mg/Kg	1380	100%	1060	1	3	3	284 J	**1380** J	390 J
Mercury	mg/Kg	0 02	33%	0 1	0	1	3	0 05 JR	0 08 JR	0 02 J
Nickel	mg/Kg	29 4	100%	49	0	3	3	29.4	27.4 J	24 4
Potassium	mg/Kg	2530	100%	2380	1	3	3	**2530**	1680 J	1580
Sodium	mg/Kg	121	67%	172	0	2	3	45 1 U	121 J	69 7 J
Vanadium	mg/Kg	28 8	100%	150	0	3	3	28 8	20.3 J	17 3
Zinc	mg/Kg	243	100%	110	2	3	3	**202**	**243** J	63 9
Other Analytes										
Total Solids	%W/W	78 7	1		0	3	3	54 5	48	78 7

NOTES

a) NYSDEC Technical and Administrative Guidance Memeorandum # 4046, January 1994

U = The compound was not detected below this concentration

J = The reported value is an estimated concentration

UJ = The compound may have been present above this concentration, but was not detected dut to problems with the analysis

JR = The vlaue was initially estimated, but was subsequently rejected during the data validation process

3 DECISION DOCUMENT FOR REMOVAL ACTION AT DUMP SITE EAST OF SEWAGE TREATMENT PLANT NO. 4

3.1 EXECUTIVE SUMMARY

An Expanded Site Inspection (ESI) performed at SEAD-67, the Dump Site East of Sewage Treatment Plant No. 4, at the Seneca Army Depot Activity (SEDA) suggests that a release of hazardous constituents to the environment may have occurred. This Decision Document presents a proposed plan for conducting a time-critical removal action at SEAD-67 to eliminate contaminants that have been identified in abandoned piles of soil that may represent a potential threat to the environment and neighboring populations. This removal action is considered time-critical because the historic military mission of the Depot has been terminated and the Depot has officially been closed by the Department of the Defense (DoD) and the US Army. In accordance with provisions of the DoD's Base Realignment and Closure (BRAC) process, the land and the facilities of the former Depot have been surveyed and evaluated, and prospective beneficial uses of the facility have been identified. Portions of the Depot are now being released to the public and private sectors for reuse under the BRAC process. As portions of the former Depot are released for other beneficial uses, increased access is afforded to all portions of the former Depot, resulting in an increased potential for exposure of populations to any residual chemicals that are present at former solid waste management units (SWMUs) remaining at the Depot pending clean-up. Therefore, the goal of the proposed time-critical removal action at SEAD-67 is to eliminate identified potential sources of residual chemical materials in abandoned piles to lessen the magnitude of potential threats that may remain at the Depot.

This Decision Document describes and presents the rationale for the removal action that was developed in accordance with the Federal Facilities Agreement and the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA) as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and the National Contingency Plan. Based upon the results of the ESI, it is recommended that the abandoned piles and berms at the site be removed and disposed in an off-site permitted waste landfill.

3.2 SITE BACKGROUND

3.2.1 Site Description

SEAD-67 is comprised of five waste piles and two berm structures that are located east of Sewage Treatment Plant No. 4 and south of West Romulus Road in the east-central portion of SEDA (see **Figure 3-1**). This site is located in a portion of the Depot where the intended future land use is designated as Planned Industrial Development. The site is entirely undeveloped and is heavily vegetated with low brush and deciduous trees. One, 10-foot diameter waste pile and a second, 5-foot diameter waste pile are located approximately 50 feet and 70 feet, respectively, south of West Romulus Road. Both of these piles are covered with vegetation. A brush-covered berm, measuring approximately 60 feet long and 10 to 15 feet in width, and a second, 10-foot diameter waste pile are located approximately 175 feet south of the West Romulus Road. Continuing further south, a second, larger and irregularly-shaped berm is found. The second berm structure is located approximately 50 feet south of the first, smaller berm structure. The second berm measures approximately 110 feet in length, and is shaped roughly like a "y" that is lying on its side. The waste pile and berm locations are shown as dotted lines in **Figure 3-1**. All of the piles and berms are approximately 3 to 4 feet high, with the exception of the 10-foot diameter pile that is approximately 5 feet high.

The topography in SEAD-67 slopes gently to the west towards a small, unnamed stream which is located approximately 250 away from the piles and berm structures. The unnamed stream flows north beneath West Romulus Road into a large regulated wetland area that is located to the north of the road. The unnamed stream is a Class C surface water body, and downstream of the wetland it enters Kendig Creek. The unnamed stream also receives discharge water from Sewage Treatment Plant No. 4 (i.e., SEAD-20), which is in active service, at a location that is roughly due west of the SEAD-67 piles and berms.

3.2.2 Site History

Little is known about the history of SEAD-67 or the origin of the bermed structures and the waste piles. The contents of the piles and the berms are unknown, as are the dates when they were first placed in this area. As the site is overgrown with thick vegetation, it is suspected that this site appeared many years ago and has been inactive since that time.

3.3 PREVIOUS INVESTIGATIONS

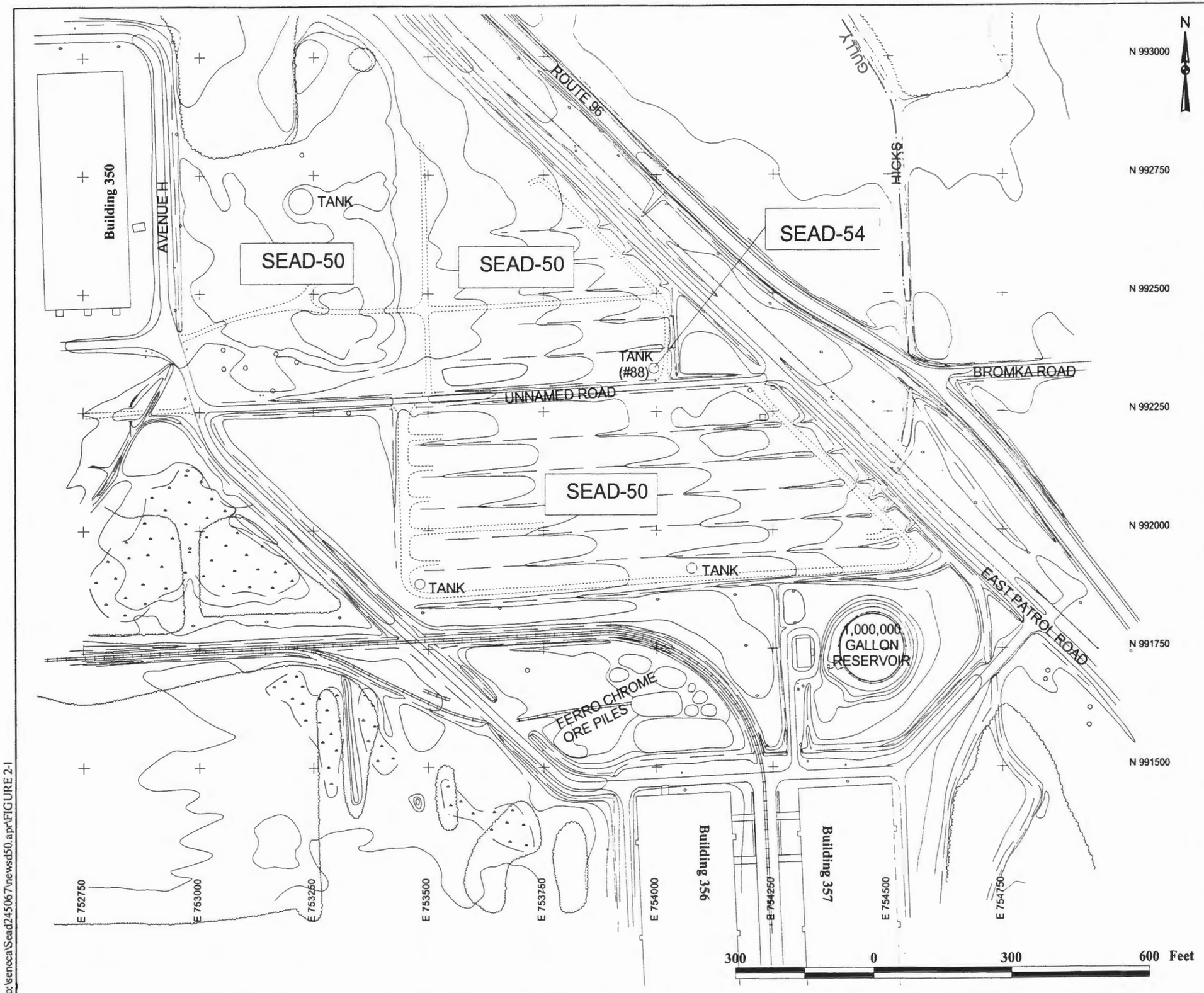
3.3.1 Description of Sampling Program

An Expanded Site Inspection of SEAD-67 was performed in 1993 to determine whether a release of hazardous constituents had occurred. The survey combined non-intrusive and intrusive sampling operations.

Non-intrusive investigations included seismic refraction, electromagnetic, and ground penetrating radar surveys. The seismic refraction survey was performed to determine the direction of groundwater flow. EM-31 and ground penetrating radar surveys were performed to delineate the limits of the dump sites and to identify locations where metallic objects may have been buried.

Intrusive investigations included test pitting, soil borings, installation of three monitoring wells and the collection of surface water and sediment samples. Eight soil samples were collected from SEAD-67. Three of these samples were collected from a soil boring that was advanced to install the upgradient groundwater monitoring well. The five remaining soil samples were collected from test pits that were excavated in the identified waste piles and berm structures. Three groundwater samples, two surface water and two sediment samples were also collected from SEAD-67. All sample locations are shown in **Figure 3-2**. All of the collected samples were analyzed for Target Compound List (TCL) volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides/polychlorinated biphenyls (PCBs) and Target Analyte List (TAL) metals and cyanide according to the NYSDEC Contract Laboratory Program Statement of Work.

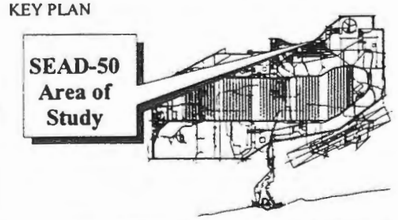
Five test pit excavations were performed in SEAD-67. One test pit was advanced through the 10-foot diameter waste pile that is located 50 feet south of West Romulus Road. Another three of the test pits were advanced through the 60-foot long berm structure that is located approximately 175 feet south of West Romulus Road. The last test pit was advanced through the 10-foot diameter pile that is located 175 feet to the south of West Romulus Road. In each case, the test pit bisected the pile or berm allowing for a complete visual inspection of the fill material.



LEGEND

- PAVED ROAD
- GROUND CONTOUR AND ELEVATION
- WETLAND
- BRUSH
- CHAIN LINK FENCE
- UTILITY POLE
- APPROXIMATE LOCATION OF FIRE HYDRANT
- RAILROAD

KEY PLAN



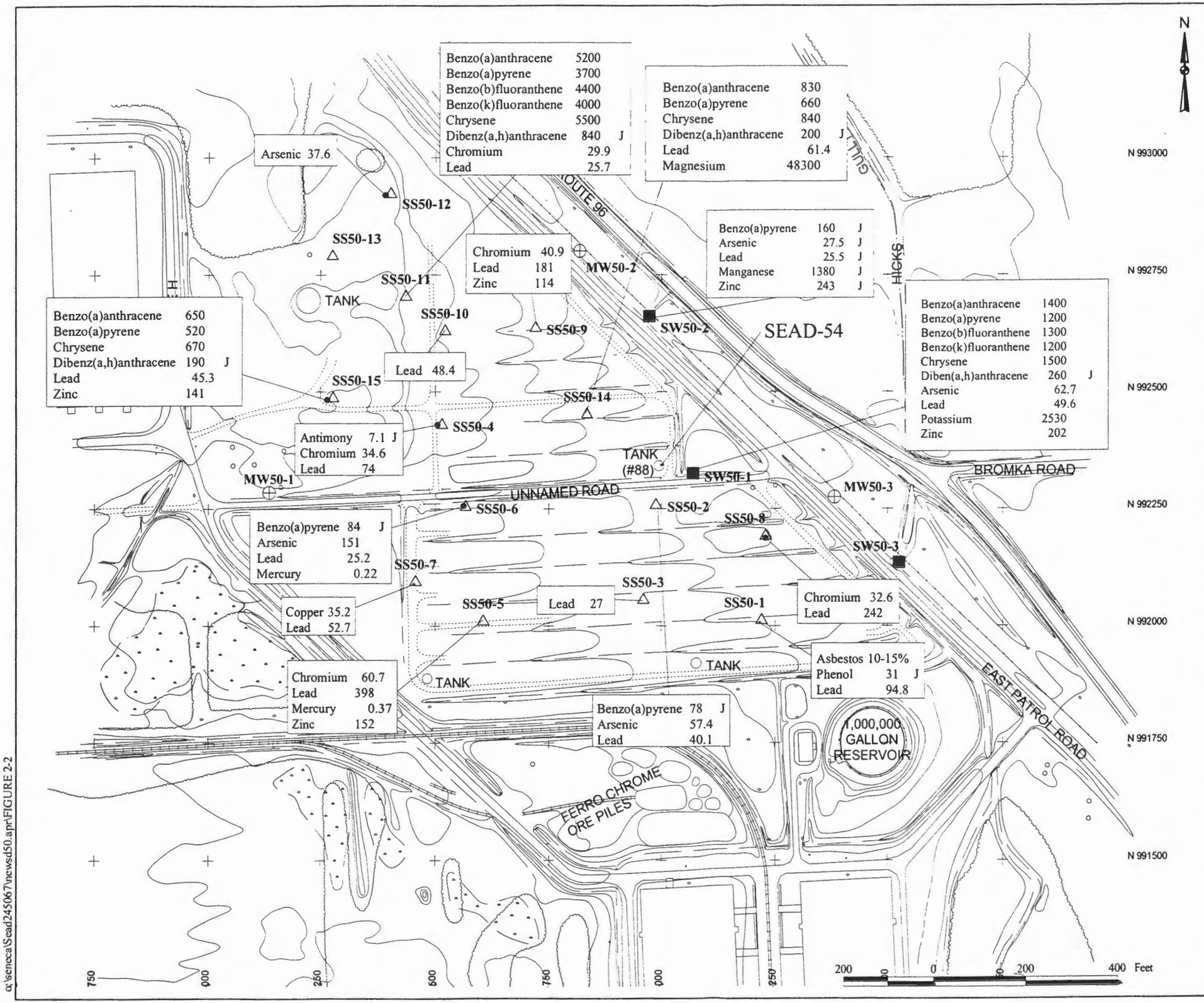
PARSONS

SENECA ARMY DEPOT ACTIVITY
TANK FARM
SEAD-50 AND SEAD-54

FIGURE 2-1
SITE MAP - SEAD 50 and SEAD 54

JOB NUMBER: 734530-01001 | DATE: AUGUST 2002

o:\seneca\Sead245067\newsd50.apr\FIGURE 2-1



LEGEND

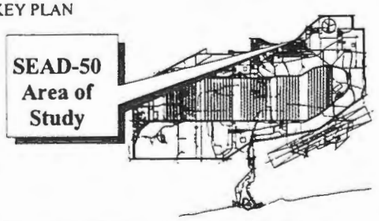
- PAVED ROAD
- GROUND CONTOUR AND ELEVATION
- WETLAND
- BRUSH
- CHAIN LINK FENCE
- UTILITY POLE
- APPROXIMATE LOCATION OF FIRE HYDRANT
- RAILROAD

- △ Surface Soil Samples
- ■ Surface Water/Sediment Samples
- ⊕ Monitoring Well
- ⊠ Survey Monument

TAGM LEVELS

Benzo(a)anthracene	220	ug/Kg
Benzo(a)pyrene	61	ug/Kg
Benzo(b)fluoranthene	1100	ug/Kg
Benzo(k)fluoranthene	1100	ug/Kg
Chrysene	400	ug/Kg
Dibenz(a,h)anthracene	14	ug/Kg
Phenol	30	ug/Kg
Antimony	5.9	mg/Kg
Arsenic	8.2	mg/Kg
Chromium	29.6	mg/Kg
Copper	33	mg/Kg
Lead	24.8	mg/Kg
Magnesium	21500	mg/Kg
Mercury	0.1	mg/Kg
Lead	110	mg/Kg

KEY PLAN



PARSONS

SENECA ARMY DEPOT ACTIVITY
TANK FARM
SEAD-50 AND SEAD-54

FIGURE 2-2
ANALYTES EXCEEDING SOIL CLEANUP OBJECTIVE LEVELS IN SURFACE SOILS

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o:\seneca\Sead245067\newsd50.apr\FIGURE 2-2

Three groundwater monitoring wells were installed in the till/weathered shale aquifer at SEAD-67. One monitoring well was installed upgradient of SEAD-67 to obtain background water quality data, while the remaining two monitoring wells were installed downgradient of SEAD-67 to determine if hazardous constituents have impacted groundwater from the site. One sample from each well (i.e., three total samples) was submitted for chemical analysis.

Two surface water and sediment samples were collected at SEAD-67 and submitted for chemical analysis. One sample was collected from the roadside drainage ditch to the south of West Romulus Road roughly 300 feet to the west of the waste piles and berm, while a second set of samples of surface water and sediment were collected from the wetlands north of West Romulus Road.

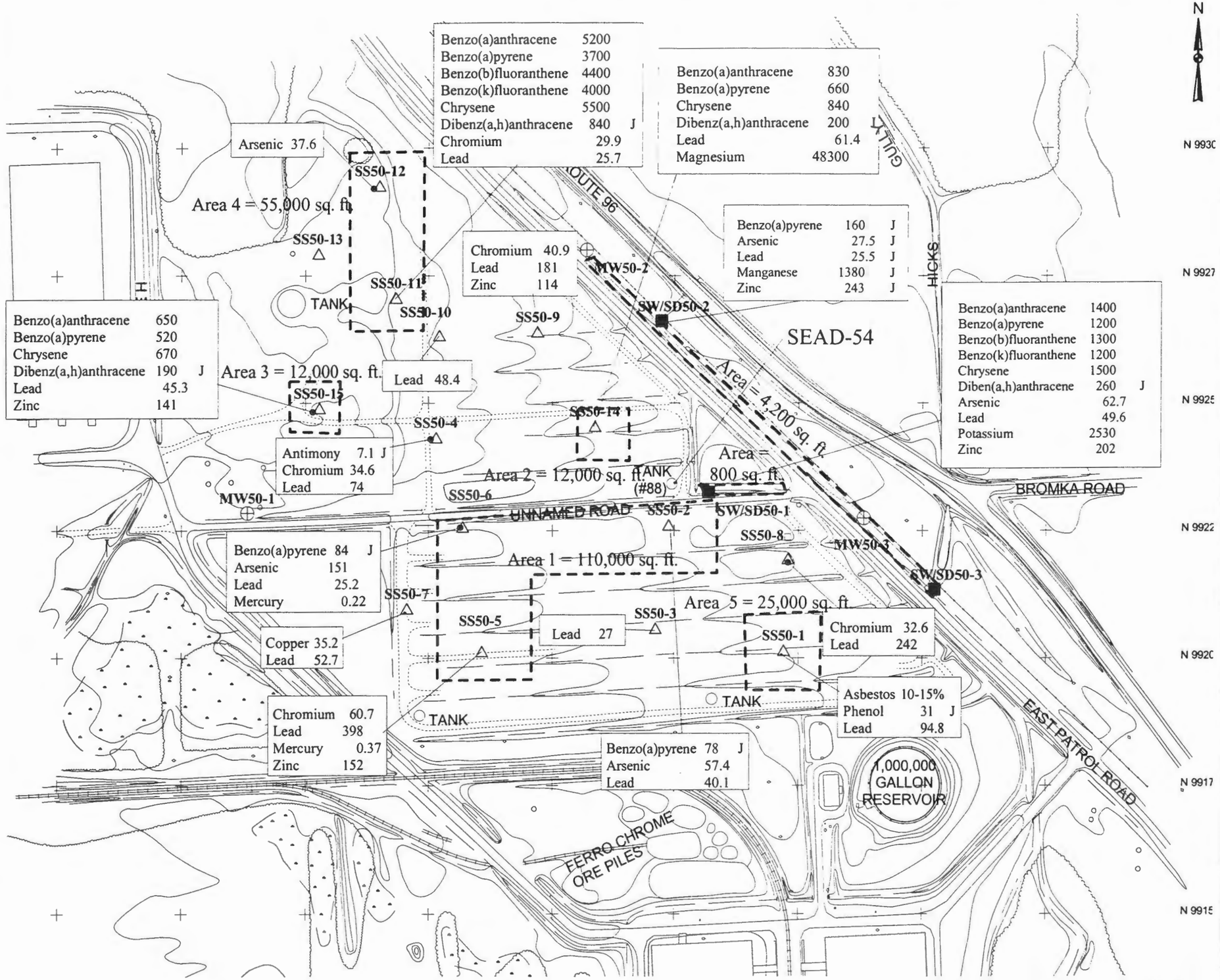
3.3.2 Results of Sampling Program

Soils

The results of the soil sampling program are presented in **Table 3-1**. The results indicate that soil located in waste piles and berms that are present at SEAD-67 has been impacted by SVOCs, predominantly polynuclear aromatic hydrocarbons (PAHs), and the metal, mercury. A total of 50 TCL/TAL compounds were detected in soil samples that were submitted for analysis, and of this total, 10 were detected at concentrations that exceeded NYSDEC's defined cleanup levels. None of the recorded TAGM exceedances were found for pesticides or PCBs. Furthermore, none of the noted exceedances were found in soil samples that were collected from the soil boring advanced for the installation of the background monitoring well.

Five semivolatile organic compounds, benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(a)pyrene, and dibenz(a,h)anthracene, were found at concentrations above their respective TAGM values. All of the noted PAH exceedances were found in samples collected from the test pits, and the majority of these occurred in samples recovered from the northern and central portions of the berm structure. However, soil samples collected from the two waste piles also showed results for PAHs that exceeded their respective TAGM cleanup objective levels.

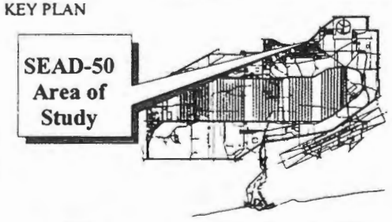
Five metals (i.e., calcium, lead, manganese, mercury, and potassium) were also detected at concentrations exceeding NYSDEC's recommended soil cleanup objectives. All but one of the samples containing metals concentrations that exceeded cleanup objective levels were collected from



LEGEND

- PAVED ROAD
- GROUND CONTOUR AND ELEVATION (680)
- WETLAND
- BRUSH
- CHAIN LINK FENCE
- UTILITY POLE
- APPROXIMATE LOCATION OF FIRE HYDRANT
- RAILROAD
- ⊕ Monitoring Well
- SS50-16 ◈ Post-Removal Verification Surface Soil Sample
- SW/SD50-4 ◉ Post-Removal Verification Surface Water and Sediment Sample
- Area to be Remediated

KEY PLAN



PARSONS

SENECA ARMY DEPOT ACTIVITY
TANK FARM
SEAD-50 AND SEAD-54

FIGURE 2-3
PROPOSED REMOVAL
ACTION AREAS

JOB NUMBER: 734530-01001 DATE: AUGUST 2002

G:\seneca\Sead245067\newsd50.apr\FIGURE 2-3

the test pits advanced through the berm structure and the two waste piles. The sole exception to this rule was one value measured for calcium, which was found in the boring advanced for monitoring well MW67-2, at a depth of 2 to 4 feet below grade. Of further note, is the finding that the majority of individual metal concentrations found above their respective criteria value were located in the excavation advanced through the central and southern end of the berm structure. One concentration measured for mercury is of particular note as a concentration of 4 mg/Kg was reported for this metal in a sample collected from TP67-1. This value is 40 times above the TAGM value for mercury (i.e., 0.1 mg/Kg). The next highest mercury concentration was 0.62 mg/Kg found in sample TP67-3. **Figure 3-2** presents a summary of the soil results found to exceed NYSDEC's recommended soil cleanup objective levels.

Groundwater

The results of the groundwater sampling program are presented in **Table 3-2**. These data indicate that groundwater has not been significantly impacted by historic operations at SEAD-67. Nineteen metals were the only analytes detected in the groundwater samples, and of these, only aluminum, iron, and manganese were detected at concentrations exceeding state or federal comparative criteria values. Additional review of the data presented in Table 3-2 indicates that turbidity levels were high in two of the three wells sampled, and not recorded for the third well, and it is presumed that the elevated concentrations reported for the three metals in groundwater may be associated with suspended solids contained in the groundwater.

Surface Water

The results of the surface water sampling program are presented in **Table 3-3**. These data indicate that surface water has not been significantly impacted by any of the constituents of concern in the investigation at SEAD-67. Again, metals are the only analytes detected in the surface water samples, and of the detected metals, only aluminum and iron were detected at a concentration above their NYS surface water criteria value. All of the other metals were detected at low concentrations.

Sediments

The results of the sediment sampling program are presented in **Table 3-4**. Sediment from the streambed located adjacent to West Romulus Road, roughly 300 feet west of SEAD-67, has been

impacted by SVOCs (mostly PAHs), pesticides, and a few metals. Six PAH compounds (i.e., benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, and indeno(1,2,3-cd)pyrene) were detected above their respective criteria values in both of the sediment samples collected.

Three pesticides were also found at levels above their sediment criteria values. Alpha-chlordane was found above its criteria value in both sediment samples, while endosulfan I and 4,4`-DDT were detected at a level exceeding their respective criteria values in the downgradient sediment sample.

Four metals (i.e., copper, manganese, nickel, and silver) exceeded their respective sediment criteria values in one or both samples. Copper, nickel, and silver exceeded their respective sediment criteria values in both sediment samples collected, while manganese was seen to exceed its criteria value in the downgradient sample only. It should be noted however, the concentrations measured for copper, manganese and nickel in the sediment closely approximate the levels measured in the soil surrounding the streambed. Additionally, silver was not detected in any of the soil samples collected from SEAD-67.

3.4 DISCUSSION OF REMOVAL ALTERNATIVES

The objectives of a removal action are to comply with ARARs and to reduce the overall environmental and human health risk to an acceptable level at the site. As is described above, results of the ESI indicate that soil found in waste piles and berm structures at SEAD-67 contains concentrations of certain chemicals, including metals and polynuclear aromatic hydrocarbons (PAHs), that exceed NYSDEC's recommended cleanup objectives for soil. Furthermore, limited results available from the sampling of streambed sediments in a nearby creek from locations near West Romulus Road contain elevated concentrations of several PAHs, three organochlorine pesticides and four metals. However, the available soil and sediment data are too limited to establish a firm cause and effect link between the two matrices. Other factors that may impact the deposition of chemicals in the streambed include discharges from the nearby active sewage treatment plant, deposition of materials from the road and activities in other neighboring area.

Based upon this limited data, the Army is proposing to perform a time-critical removal action to eliminate or lessen the magnitude of the potential threat that exists due to the presence of abandoned waste piles and berms that contain contaminated soil at SEAD-67. This Decision Document

identifies and presents alternatives that have been considered to eliminate or lessen the magnitude of the identified potential threats. Due to the Depot's change in status, and the current release of portions of the former Depot for beneficial reuses by the public and private sectors, the proposed action is considered time-critical and the selected option will be implemented quickly to mitigate the potential threat.

Specifically, the Army is proposing to excavate contaminated soil found in waste piles and berm structures east of Sewage Treatment Plant No. 4 and dispose of the material at state approved landfills. The extent of the initial excavation will be terminated at a level that is roughly equivalent with the surrounding ground surface level. **Figure 3-2** presents a summary of the analytical results found in soil that exceed NYSDEC's recommended cleanup objectives. The areas to be remediated are indicated as shaded areas on **Figure 3-3**. The estimated volume of soil to be excavated from the area of SEAD-67 is approximately 150 cubic yards (yd^3) or approximately 225 tons. Subsequent to the removal of the identified waste piles and berms, additional sampling will be conducted in the underlying and surrounding soils to determine whether materials underlying or surrounding the waste piles and berms have been impacted by the possible release of chemicals contained in the stockpiled soils. Additional sampling will also be conducted in the neighboring stream and wetlands to define the extent of potential contamination that is present in this area and to define potential sources contributing to the noted elevated concentrations found in sediment from the streambed.

Confirmational sampling and analysis will be conducted after the removal of the identified soil to confirm that the identified excavations of piles and berm structures removes sufficient soil to lessen, and hopefully eliminate, potential risks that result from the presence of the identified contaminants of concern (i.e., mercury and semivolatile organic compounds).

Once necessary soil is removed and the extent of the excavation is verified and confirmed, the excavation will be backfilled with clean soil, regraded, contoured and re-seeded to re-establish pre-excavation conditions. It is expected that backfill will be minimal since the primary focus of the proposed excavations is on the aboveground piles and berm structures.

This section briefly describes removal and treatment/disposal alternatives that may be applicable for use at SEAD-67. Based on the results of the previous investigation, groundwater impacts appear minimal. At this time, the emphasis is on potential soil removal action alternatives. These alternatives fall into three categories: 1) on-site treatment, 2) on-site containment, and 3) off-site disposal. The on-site

treatment alternative considered was soil washing, the on-site treatment alternative considered was in situ solidification/stabilization, and the off-site disposal method considered was excavation and landfilling. These alternatives will be evaluated for technical implementability, ability to achieve ARARs and economic impacts.

3.5 REMOVAL METHODS

Soil Washing

Soil washing is a treatment option applicable to soil contaminated with metals and SVOCs. In the process, soil is slurried with water and subjected to intense scrubbings. To improve the efficiency of soil washing, the process may include the use of surfactants, detergents, chelating agents or pH adjustment. After contaminants are removed from the soil, the washing solutions can be treated in a wastewater treatment system. The washing fluid can then be recycled, continuing the soil washing process.

Certain site factors can limit the success of soil washing:

1. Highly variable soil conditions,
2. High silt or clay content which will reduce percolation and leaching, and inhibit the solid-liquid separations following the soil washing,
3. Chemical reactions with soil cation exchange and pH effects may decrease contaminant mobility, and
4. If performed in situ, the groundwater flow must be well defined in order to recapture washing solutions.

In Situ Solidification/Stabilization

In situ solidification involves the formation of an in-place monolithic mass through the mixing of a pozzolantic or a siliceous material with the existing soil. Multi-axis overlapping hollow stem augers are used to inject solidification/stabilization (S/S) agents and blend them with contaminated soil in situ. The augers are mounted on a crawler-type base machine. A batch mixing plant and raw materials storage tanks are also involved. The machine can treat 90 to 140 cubic yards of soil per 8-hour shift at depths up to 100 feet. This technology is applicable to soil contaminated with metals and SVOCs. The

technique has been used in mixing soil cement, or chemical grout for more than 18 years on various construction applications, including cutoff walls and soil stabilization and is widely applied.

Drawbacks related to in situ solidification include the unsuitability for use in cold climates where the ground freezes and thaws, thus breaking up the monolithic mass and providing a greater surface area for corrosion and weathering. Another condition limiting its implementation is the cohesion and particle size of the soil matrix to be treated. Cohesive soil and soil with a large portion of coarse gravel and cobbles are unsuitable for this type of treatment.

Excavation and Landfilling

Excavation of hazardous materials is performed extensively for site remediation. Excavation is usually accompanied by off-site treatment or disposal in an off-site secured landfill. Excavation employs the use of earth moving equipment to physically remove soil and buried materials. There are no absolute limitations on the types of waste that can be excavated and removed. Factors that will be considered include the mobility of the wastes, the feasibility of on-site containment, and the cost of disposing the waste or rendering it non-hazardous once it has been excavated. A frequent practice at hazardous waste sites is to excavate and remove contaminant "hot spots" and to use other remedial measures for less contaminated soil. Excavation and removal can almost totally eliminate the contamination at a site and the need for long-term monitoring. Another advantage is that the time to achieve beneficial results can be short relative to such alternatives as in situ bioremediation.

The biggest drawbacks with excavation, removal, and off-site disposal are associated with cost and institutional aspects. Costs associated with off-site disposal are can be high in the material to be excavated is classified as hazardous according to 40 CFR 261 Subpart C and this frequently results in the elimination of this alternative as a cost-effective alternative. Institutional aspects can add significant delays to program implementation.

3.6 REMOVAL COSTS

Soil Washing

A large number of vendors provide soil washing services. The treatment processes used vary according to the scale of the operation, particle size being treated, and extraction agent used.

Because the operation is unique for each site, it is difficult to arrive at a cost estimate. However, in an evaluation of fourteen companies offering soil washing treatment services, a general price range of $50 to $205 per ton was noted in EPA Engineering Bulletin EPA/540/2-90/017, September 1990. This would result in an estimated cost of $11,250 to $46,150 with a most probable cost in the range of $28,000 to $37,500 (exclusive of monitoring, sampling and analysis, and oversight and management).

In Situ Solidification/Stabilization

Solidification treatment is grouped into different categories according to the types of additives and processes used, and the cost of this treatment is dependent upon which process is utilized. Any of the different processes available will range between $100 and $200 per ton of soil treated. This would result in an estimated cost of $22,500 to $45,000 with a most probable cost range of $28,000 to $42,200 (exclusive of monitoring, sampling and analysis, and oversight and management).

Excavation and Landfilling

The cost of excavation and off-site landfilling soil depends upon whether the soil is classified as hazardous or non-hazardous according to 40 CFR 261 Subpart C. The excavation, containment, and transportation will cost the same regardless of whether the soil is considered hazardous, and most of that can be performed by SEDA personnel. If the soil is classified as hazardous, the cost to excavate and dispose of it in an off-site hazardous waste landfill will range between $400 and $500 per ton. If it is not classified as hazardous, the cost to excavate and dispose of it in an off-site landfill will range between $50 and $100 per ton. If it can be classified as clean enough for beneficial use as daily cover the cost to excavate and dispose of it will range between $25 and $50 per ton. Assuming that it will be disposed of in a non-hazardous waste landfill, this will result in an estimated cost of $11,250 to $22,500 with a most probable cost in the range of $14,000 to $19,000 (exclusive of monitoring, sampling and analysis, and oversight and management).

3.7 COMPARISON OF REMOVAL ALTERNATIVES

Of the three remedial alternative presented above, excavation and off-site landfilling is the best alternative for the removal of the PAH- and metals-impacted soil identified at SEAD-67. For the most part, this decision is driven by the unsuitability of in situ solidification and soil washing for the

conditions present at SEDA. The cold climate of central New York, the cohesive nature of the soil, and the high percentage of gravel and cobbles in the soil eliminate in situ solidification as a practical alternative for use at SEDA. The high percentage of clay and silt in the soil eliminates soil washing as a practical remedial alternative as well. In addition, excavation and off-site landfilling can be performed at substantial cost savings compared to the other two. Furthermore, if the excavated can be used for daily cover at an off-site landfill further cost savings can be achieved.

3.8 RECOMMENDATION

The Army intends to implement a focused time-critical removal actions at SEAD-67 to expedite the closure process and lessen, and perhaps eliminate, any possible threats, current or future, that this site may pose to human health and the environment. SEAD-67 is comparatively small, with localized impacts identified in piles that can be effectively addressed via the removal process. Completion of the removal actions will facilitate transfer of these properties in the future for beneficial reuse.

The areas to be removed are indicated as shaded areas on **Figure 3-3**. The quantity of soil to be removed from SEAD-67 is estimated as approximately 225 tons or approximately 150 yd^3. The estimated cost is approximately $14,000 to $19,000 (exclusive of monitoring, sampling and analysis, and oversight and management) to excavate, contain and dispose of this material in a non-hazardous waste landfill.

3.9 JUSTIFICATION

Polynuclear aromatic hydrocarbons (PAHs) and metal contaminants at levels exceeded NYSDEC's recommended cleanup objectives were detected in soil samples collected from waste piles and berms structures identified east of Sewage Treatment Plant No. 4. Sediment samples collected from a nearby streambed indicate that PAHs, pesticides, and metals are present, but the full extent, and the potential source of these materials are not fully known. Available groundwater and surface water samples collected indicate that none of the identified constituents found in the soil are migrating away from the identified waste piles. Therefore, the Army is proposing to conduct a removal and off-site disposal action to eliminate the contaminated soil that is contained in the identified piles, and to conduct follow-up sampling and analysis to more fully characterize the extent of the potential soil and sediment contamination that may be present at the site.

3.10 VERIFICATION SAMPLING AND ANALYSIS

Confirmatory Sampling and Analysis

Post-removal action sampling and analysis will be conducted to provide additional data pertinent to the extent of soil contamination that may be present in the vicinity of the identified soil piles and berms. It is anticipated that at least one confirmational soil sample will be collected from the area immediately beneath each of the five piles at a rate of at least one per pile. Additionally, confirmational soil samples will also be collected around the perimeter of each of the piles at a rate of one per side (i.e., one per each major point on the compass, north, east, south, west). Confirmational samples will also be collected from beneath each of the berm structures, although more samples (e.g., 1 per each 50 linear foot length or less) are proposed at these sites to develop some understanding of the possible heterogeneous nature of the contents of the berms. Confirmational samples will also be collected from the area immediately beyond the perimeter of the berm structures at a rate of one per every 30 feet or less length of perimeter.

Based on the proposed sample spacing, it is currently anticipated that 47 samples will be collected from the area of the soil pile and berm removal action at SEAD-67. Each soil sample will be analyzed for mercury and the TCL PAH compounds, and the resulting data will be compared to recommended soil cleanup objective criteria. Additional details of the proposed confirmational sampling are provided in Appendix B of this Action Memorandum and Decision Document.

Additional samples will be collected from the area of the stream and the wetlands that are located to the north of West Romulus Road to provide additional information about the nature and extent of semivolatile organic compounds, metals and pesticide contamination that is present in the area of these water bodies.

Disposal or Characterization Sampling and Analysis

Additional samples of the excavated, stockpiled, and staged soil will be collected and analyzed for the purpose of evaluating and selecting reuse or disposal alternatives for the excavated soils. The number of samples collected from these determinations will be set at a rate of one sample per 150 cubic yards of soil contained in each pile. Disposal determinations will be based on the comparison

of the resulting mass and TCLP data to recommended soil cleanup objective values and the toxicity characteristic criteria.

TABLE 3-1
SEAD-67 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

PARAMETER	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM DETECT	FREQUENCY OF DETECTION	CRITERIA VALUE (a)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF SAMPLES	SOIL SEAD-67 0-0.2 03/30/94 MW67-2.00 216109 43257 Value (Q)	SOIL SEAD-67 2-4 03/30/94 MW67-2.02 216112 43257 Value (Q)	SOIL SEAD-67 4-5 03/30/94 MW67-2.03 216113 43257 Value (Q)	SOIL SEAD-67 2-3 06/06/94 TP67-1 223303 44410 Value (Q)
Semivolatile Organics											
2-Methylnaphthalene	ug/Kg	44	25%	36400	0	2	8	480 U	380 U	370 U	44 J
Acenaphthene	ug/Kg	50	13%	50000*	0	1	8	480 U	380 U	370 U	50 J
Acenaphthylene	ug/Kg	210	50%	41000	0	4	8	480 U	380 U	370 U	38 J
Anthracene	ug/Kg	140	50%	50000*	0	4	8	480 U	380 U	370 U	97 J
Benzo(a)anthracene	ug/Kg	610	63%	220	4	5	8	480 U	380 U	370 U	280 J
Benzo(a)pyrene	ug/Kg	830	63%	61	4	5	8	480 U	380 U	370 U	210 J
Benzo(b)fluoranthene	ug/Kg	1300	63%	1100	1	5	8	480 U	380 U	370 U	440 J
Benzo(g,h,i)perylene	ug/Kg	620	63%	50000*	0	5	8	480 U	380 U	370 U	64 J
Benzo(k)fluoranthene	ug/Kg	28	13%	1100	0	1	8	480 U	380 U	370 U	390 UJ
bis(2-Ethylhexyl)phthalate	ug/Kg	250	38%	50000*	0	3	8	480 U	250 J	230 J	29 J
Carbazole	ug/Kg	80	38%	50000*	0	3	8	480 U	380 U	370 U	80 J
Chrysene	ug/Kg	690	63%	400	1	5	8	480 U	380 U	370 U	300 J
Dibenz(a,h)anthracene	ug/Kg	310	50%	14	4	4	8	480 U	380 U	370 U	70 J
Dibenzofuran	ug/Kg	50	13%	6200	0	1	8	480 U	380 U	370 U	50 J
Di-n-butylphthalate	ug/Kg	47	13%	8100	0	1	8	480 U	47 J	370 U	390 U
Fluoranthene	ug/Kg	860	75%	50000*	0	6	8	36 J	380 U	370 U	760
Fluorene	ug/Kg	110	38%	50000*	0	3	8	480 U	380 U	370 U	110 J
Indeno(1,2,3-cd)pyrene	ug/Kg	620	63%	3200	0	5	8	480 U	380 U	370 U	96 J
Naphthalene	ug/Kg	34	25%	13000	0	2	8	480 U	380 U	370 U	34 J
Phenanthrene	ug/Kg	740	63%	50000*	0	5	8	480 U	380 U	370 U	740
Pyrene	ug/Kg	950	75%	50000*	0	6	8	31 J	380 U	370 U	520
Pesticides/PCB											
4,4'-DDE	ug/Kg	4.8	50%	2100	0	4	8	4.8 U	3.8 U	3.7 U	2.3 J
4,4'-DDT	ug/Kg	9.4	38%	2100	0	3	8	4.8 U	3.8 U	3.7 U	3.9 U
alpha-Chlordane	ug/Kg	2.1	38%	540	0	3	8	2.5 U	2 U	1.9 U	2 U
Aroclor-1254	ug/Kg	72	13%	1000	0	1	8	48 U	38 U	37 U	39 U
Endosulfan I	ug/Kg	25	75%	900	0	6	8	4	2 U	1.9 U	3.2 J
Endosulfan sulfate	ug/Kg	2.1	13%	1000	0	1	8	4.8 U	3.8 U	3.7 U	3.9 U
Heptachlor epoxide	ug/Kg	5.5	25%	20	0	2	8	5.5	2 U	1.9 U	2 U
Metals											
Aluminum	mg/Kg	19100	100%	19300	0	8	8	16700	14900	9460	16100
Antimony	mg/Kg	0.44	63%	5.9	0	5	8	0.27 J	0.22 J	0.2 UJ	0.26 UJ
Arsenic	mg/Kg	6	100%	8.2	0	8	8	4.4	4.5	4.2	4.8
Barium	mg/Kg	182	100%	300	0	8	8	114	105	80.8	96.7
Beryllium	mg/Kg	0.87	100%	1.1	0	8	8	0.67 J	0.61 J	0.4 J	0.74 J
Cadmium	mg/Kg	0.73	100%	2.3	0	8	8	0.2 J	0.11 J	0.12 J	0.46 J
Calcium	mg/Kg	139000	100%	121000	1	8	8	3580	79000	77800	6810
Chromium	mg/Kg	24.8	100%	29.6	0	8	8	19.5	22.5	14.8	22.2
Cobalt	mg/Kg	12.8	100%	30	0	8	8	7.5 J	10.4 J	9.7 J	10.7
Copper	mg/Kg	29.7	100%	33	0	8	8	16.5	20.3	20.5	22
Iron	mg/Kg	27300	100%	36500	0	8	8	20500	24400	18700	26000
Lead	mg/Kg	40.9	100%	24.8	1	8	8	17.5	9.3	8.5	12.8
Magnesium	mg/Kg	20900	100%	21500	0	8	8	3590	15600	20900	4760
Manganese	mg/Kg	1380	100%	1060	1	8	8	438	528	411	594
Mercury	mg/Kg	4	100%	0.1	3	8	8	0.04	0.01 J	0.02 J	4 J

TABLE 3-1
SEAD-67 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

	MATRIX							SOIL	SOIL	SOIL	SOIL
	LOCATION							SEAD-67	SEAD-67	SEAD-67	SEAD-67
	DEPTH (FEET)							0-0.2	2-4	4-5	2-3
	SAMPLE DATE							03/30/94	03/30/94	03/30/94	06/06/94
	ES ID							MW67-2.00	MW67-2 02	MW67-2 03	TP67-1
	LAB ID		FREQUENCY		NUMBER	NUMBER	NUMBER	216109	216112	216113	223303
	SDG NUMBER	MAXIMUM	OF	CRITERIA	ABOVE	OF	OF	43257	43257	43257	44410
PARAMETER	UNITS	DETECT	DETECTION	VALUE (a)	CRITERIA	DETECTS	SAMPLES	Value (Q)	Value (Q)	Value (Q)	Value (Q)
Nickel	mg/Kg	32.3	100%	49	0	8	8	18.7	32.3	25.9	27.8
Potassium	mg/Kg	3160	100%	2380	2	8	8	1780 J	3160 J	1970 J	1620 J
Selenium	mg/Kg	2	75%	2	0	6	8	0.81	0 36 U	0.34 U	1
Sodium	mg/Kg	112	75%	172	0	6	8	25.1 U	112 J	107 J	19.9 U
Thallium	mg/Kg	0.48	13%	0.7	0	1	8	0.48 J	0 34 U	0.32 U	0.38 U
Vanadium	mg/Kg	31.8	100%	150	0	8	8	28.2	24 8	16.5	26.5
Zinc	mg/Kg	100	100%	110	0	8	8	64.8	62	60.1	70.5
Other Analyses											
Total Solids	%W/W	90.2	1		0	8	8	68.9	85.5	90.2	83 8

NOTES:

a) NYSDEC Technical and Administrative Guidance Memorandum (TAGM) #4046.

* = As per TAGM #4046, total VOCs < 10 ppm; total Semi-VOCs < 500 ppm; individual semi-VOCs < 50 ppm

NA = Not Available

U = Compound was not detected.

J = the reported value is an estimated concentration.

R = the data was rejected in the data validating process.

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

TABLE 3-1
SEAD-67 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

PARAMETER	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM DETECT	FREQUENCY OF DETECTION	CRITERIA VALUE (a)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF SAMPLES	SOIL SEAD-67 2-3 06/06/94 TP67-2 223305 44410 Value (Q)	SOIL SEAD-67 2-3 06/06/94 TP67-3 223306 44410 Value (Q)	SOIL SEAD-67 2-3 06/06/94 TP67-4 223307 44410 Value (Q)	SOIL SEAD-67 2-3 06/06/94 TP67-5 223308 44410 Value (Q)
Semivolatile Organics											
2-Methylnaphthalene	ug/Kg	44	25%	36400	0	2	8	380 U	25 J	400 U	450 U
Acenaphthene	ug/Kg	50	13%	50000*	0	1	8	380 U	380 U	400 U	450 U
Acenaphthylene	ug/Kg	210	50%	41000	0	4	8	33 J	210 J	400 U	26 J
Anthracene	ug/Kg	140	50%	50000*	0	4	8	44 J	140 J	400 U	43 J
Benzo(a)anthracene	ug/Kg	610	63%	220	4	5	8	250 J	610	24 J	240 J
Benzo(a)pyrene	ug/Kg	830	63%	61	4	5	8	220 J	830	28 J	220 J
Benzo(b)fluoranthene	ug/Kg	1300	63%	1100	1	5	8	470 J	1300 J	26 J	430 J
Benzo(g,h,i)perylene	ug/Kg	620	63%	50000*	0	5	8	93 J	620	40 J	97 J
Benzo(k)fluoranthene	ug/Kg	28	13%	1100	0	1	8	380 UJ	380 UJ	28 J	450 UJ
bis(2-Ethylhexyl)phthalate	ug/Kg	250	38%	50000*	0	3	8	380 U	380 U	400 U	450 U
Carbazole	ug/Kg	80	38%	50000*	0	3	8	23 J	380 U	400 U	32 J
Chrysene	ug/Kg	690	63%	400	1	5	8	290 J	690	29 J	230 J
Dibenz(a,h)anthracene	ug/Kg	310	50%	14	4	4	8	53 J	310 J	400 U	65 J
Dibenzofuran	ug/Kg	50	13%	6200	0	1	8	380 U	380 U	400 U	450 U
Di-n-butylphthalate	ug/Kg	47	13%	8100	0	1	8	380 U	380 U	400 U	450 U
Fluoranthene	ug/Kg	860	75%	50000*	0	6	8	610	860	55 J	510
Fluorene	ug/Kg	110	38%	50000*	0	3	8	31 J	380 U	400 U	27 J
Indeno(1,2,3-cd)pyrene	ug/Kg	620	63%	3200	0	5	8	120 J	620	25 J	130 J
Naphthalene	ug/Kg	34	25%	13000	0	2	8	380 U	34 J	400 U	450 U
Phenanthrene	ug/Kg	740	63%	50000*	0	5	8	340 J	180 J	32 J	280 J
Pyrene	ug/Kg	950	75%	50000*	0	6	8	500	950	43 J	450
Pesticides/PCB											
4,4'-DDE	ug/Kg	4.8	50%	2100	0	4	8	4.5 J	4.8 J	4 U	3 J
4,4'-DDT	ug/Kg	9.4	38%	2100	0	3	8	6.3 J	9.4	4 U	4.2 J
alpha-Chlordane	ug/Kg	2.1	38%	540	0	3	8	1.4 J	2.1 J	2.1 U	1.9 J
Aroclor-1254	ug/Kg	72	13%	1000	0	1	8	72 J	38 U	40 U	45 U
Endosulfan I	ug/Kg	25	75%	900	0	6	8	11 J	25 J	1.2 J	15 J
Endosulfan sulfate	ug/Kg	2.1	13%	1000	0	1	8	3.8 U	2.1 J	4 U	4.5 U
Heptachlor epoxide	ug/Kg	5.5	25%	20	0	2	8	2 U	1.2 J	2.1 U	2.3 U
Metals											
Aluminum	mg/Kg	19100	100%	19300	0	8	8	12200	9870	19100	17200
Antimony	mg/Kg	0.44	63%	5.9	0	5	8	0.27 J	0.44 J	0.39 J	0.32 UJ
Arsenic	mg/Kg	6	100%	8.2	0	8	8	5.4	5	6	4.9
Barium	mg/Kg	182	100%	300	0	8	8	105	82.2	158	182
Beryllium	mg/Kg	0.87	100%	1.1	0	8	8	0.62 J	0.49 J	0.87 J	0.83 J
Cadmium	mg/Kg	0.73	100%	2.3	0	8	8	0.5 J	0.69 J	0.69 J	0.73 J
Calcium	mg/Kg	139000	100%	121000	1	8	8	5940	139000	12000	20100
Chromium	mg/Kg	24.8	100%	29.6	0	8	8	18.7	15.1	24.8	23.2
Cobalt	mg/Kg	12.8	100%	30	0	8	8	9.5	7.5	11	12.8
Copper	mg/Kg	29.7	100%	33	0	8	8	21.3	21.5	29.7	24.5
Iron	mg/Kg	27300	100%	36500	0	8	8	24000	16800	27300	27300
Lead	mg/Kg	40.9	100%	24.8	1	8	8	21.3	40.9	19.1	12
Magnesium	mg/Kg	20900	100%	21500	0	8	8	4730	12900	6660	5010
Manganese	mg/Kg	1380	100%	1060	1	8	8	624	627	863	1380
Mercury	mg/Kg	4	100%	0.1	3	8	8	0.05 J	0.62 J	0.13 J	0.06 J

TABLE 3-1
SEAD-67 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

	MATRIX							SOIL	SOIL	SOIL	SOIL
	LOCATION							SEAD-67	SEAD-67	SEAD-67	SEAD-67
	DEPTH (FEET)							2-3	2-3	2-3	2-3
	SAMPLE DATE							06/06/94	06/06/94	06/06/94	06/06/94
	ES ID							TP67-2	TP67-3	TP67-4	TP67-5
	LAB ID		FREQUENCY		NUMBER	NUMBER	NUMBER	223305	223306	223307	223308
	SDG NUMBER	MAXIMUM	OF	CRITERIA	ABOVE	OF	OF	44410	44410	44410	44410
PARAMETER	**UNITS**	**DETECT**	**DETECTION**	**VALUE (a)**	**CRITERIA**	**DETECTS**	**SAMPLES**	Value (Q)	Value (Q)	Value (Q)	Value (Q)
Nickel	mg/Kg	32.3	100%	49	0	8	8	27.2	22	30.1	30.2
Potassium	mg/Kg	3160	100%	2380	2	8	8	1390 J	2090 J	2520 J	2040 J
Selenium	mg/Kg	2	75%	2	0	6	8	1.1	0 41 J	1.2	2
Sodium	mg/Kg	112	75%	172	0	6	8	26.4 J	111 J	39.4 J	26.1 J
Thallium	mg/Kg	0.48	13%	0.7	0	1	8	0.34 U	0 28 U	0.41 U	0.47 U
Vanadium	mg/Kg	31.8	100%	150	0	8	8	22.7	20.9	31.8	27.8
Zinc	mg/Kg	100	100%	110	0	8	8	70.5	72 8	100	86.6
Other Analyses											
Total Solids	%W/W	90.2	1		0	8	8	86.4	86 3	82	73.5

NOTES:

a) NYSDEC Technical and Administrative Guidance Memorandum (TAGM) #4046

* = As per TAGM #4046, total VOCs < 10 ppm; total Semi-VOCs < 500 ppm; individual semi-VOCs < 50 ppm

NA = Not Available

U = Compound was not detected.

J = the reported value is an estimated concentration.

R = the data was rejected in the data validating process.

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

TABLE 3-2
SEAD-67 GROUNDWATER ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

PARAMETER	MATRIX LOCATION SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM DETECT	FREQUENCY OF DETECTION	CRITERIA VALUE (a)	NUMBER ABOVE CRITERIA	WATER SEAD-67 07/07/94 MW67-1 226307 45257 Value (Q)	WATER SEAD-67 07/10/94 MW67-2 226488 45282 Value (Q)	WATER SEAD-67 07/08/94 MW67-3 226308 45257 Value (Q)
METALS								
Aluminum	ug/L	5790	100%	50 (b)	3	**5790**	**1240**	**448**
Arsenic	ug/L	2.5	33%	10 (c)	0	2.5 J	2 U	2 U
Barium	ug/L	203	100%	1000	0	203	100 J	98.9 J
Beryllium	ug/L	0.72	33%	4 (d)	0	0.72 J	0.1 U	0.1 U
Calcium	ug/L	351000	100%	NA	NA	351000	119000	122000
Chromium	ug/L	10	100%	50	0	10	2 J	0.9 J
Cobalt	ug/L	12.3	100%	NA	NA	12.3 J	1.4 J	1.3 J
Copper	ug/L	13.1	100%	200	0	13.1 J	1.5 J	2 J
Iron	ug/L	10800	100%	300	3	**10800**	**2270**	**689**
Lead	ug/L	8.3	33%	15 (d)	0	8.3	0.9 U	0.9 U
Magnesium	ug/L	51800	100%	NA	NA	51800	24200	24000
Manganese	ug/L	1710	100%	50 (b)	3	**1710**	**153**	**194**
Mercury	ug/L	0.09	67%	0.7	0	0.09 J	0.04 U	0.06 J
Nickel	ug/L	15.9	100%	100	0	15.9 J	2.9 J	2.2 J
Potassium	ug/L	5740	100%	NA	NA	5740	1870 J	1670 J
Sodium	ug/L	13700	100%	20000	0	4240 J	13700	4970 J
Thallium	ug/L	2	33%	2 (d)	0	2 J	1.9 U	1.9 U
Vanadium	ug/L	9.2	100%	NA	NA	9.2 J	2.1 J	0.86 J
Zinc	ug/L	29.6	100%	5000 (b)	0	29.6	6.5 J	6.7 J
OTHER ANALYSES								
pH	Standard Units					7.2	7	7
Conductivity	umhos/cm					520	490	440
Temperature	°C					14.9	12	11.9
Turbidity	NTU					>1000	90	NR

NOTES:

a) NY State Class GA Groundwater Standard (TOGS 1.1.1, June 1998), except as noted below.
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

NA = Not Available
U = compound was not detected
J = the report value is an estimated concentration
UJ = the compound was not detected; the associated reporting limit is approximate
R = the data was rejected in the data validating process

TABLE 3-3
SEAD-67 SURFACE WATER ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

PARAMETER	MATRIX LOCATION SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM DETECT	FREQUENCY OF DETECTION	NYS CRITERIA VALUE (a,b)	NUMBER ABOVE CRITERIA	WATER SEAD-67 04/26/94 SW67-1 219464 43810 Value (Q)	WATER SEAD-67 04/26/94 SW67-2 219465 43810 Value (Q)
METALS							
Aluminum	ug/L	129	100%	100	1	129 J	38.1 J
Barium	ug/L	45.8	100%	NA	NA	45 8 J	45.6 J
Calcium	ug/L	77100	100%	NA	NA	77100	75900
Copper	ug/L	1.1	100%	17.3	0	1.1 J	0.86 J
Iron	ug/L	369	100%	300	1	369	84.6 J
Magnesium	ug/L	14700	100%	NA	NA	14100	14700
Manganese	ug/L	161	100%	NA	NA	161	37.7
Potassium	ug/L	1160	100%	NA	NA	1160 J	1120 J
Sodium	ug/L	7860	100%	NA	NA	5830	7860
Thallium	ug/L	2 1	50%	8	0	1.6 U	2.1 J
Zinc	ug/L	3.3	100%	159.2	0	2.4 J	3.3 J
OTHER ANALYSES							
pH	Standard Units			6.5 - 9	0	7.9	7.5
Conductivity	umhos/cm					445	440
Temperature	°C					21.4	22.7
Turbidity	NTU					1.4	1.6

NOTES:

a) The New York State Ambient Water Quality Standards and Guidance Values for Class C surface water (June 1998).
b) Hardness dependent values assume a hardness of 216.4 mg/L (depot site-wide average).

NA = Not Available
U = The compound was not detected below this concentration.
J = The reported value is an estimated concentration.
UJ = The compound may have been present above this concentration, but was not detected due to problems with the analysis.
R = The data was rejected during the data validation process.

TABLE 3-4
SEAD-67 SEDIMENT ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

PARAMETER	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM DETECT	FREQUENCY OF DETECTION	CRITERIA VALUE (a)	CRITERIA TYPE (b,c)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	SOIL SEAD-67 0-0.2 04/26/94 SD67-1 219450 43663 Value (Q)	SOIL SEAD-67 0-0.2 04/26/94 SD67-2 219451 43663 Value (Q)
VOLATILE ORGANICS										
2-Butanone	ug/Kg	21	50%			NA	1	2	21 J	20 UJ
Acetone	ug/Kg	53	50%			NA	1	2	53 J	28 UJ
SEMIVOLATILE ORGANICS										
Acenaphthene	ug/Kg	120	50%	5474	BALCT	0	1	2	820 UJ	120 J
Acenaphthylene	ug/Kg	54	50%				1	2	820 UJ	54 J
Anthracene	ug/Kg	600	50%	4184	BALCT	0	1	2	820 UJ	600 J
Benzo(a)anthracene	ug/Kg	1400	100%	50.83	HHBC	2	2	2	180 J	1400
Benzo(a)pyrene	ug/Kg	970	100%	50.83	HHBC	2	2	2	170 J	970
Benzo(b)fluoranthene	ug/Kg	880	100%	50.83	HHBC	2	2	2	180 J	880
Benzo(g,h,i)perylene	ug/Kg	370	100%				2	2	87 J	370 J
Benzo(k)fluoranthene	ug/Kg	930	100%	50.83	HHBC	2	2	2	160 J	930
Carbazole	ug/Kg	78	50%				1	2	820 UJ	78 J
Chrysene	ug/Kg	1300	100%	50.83	HHBC	2	2	2	220 J	1300
Dibenz(a,h)anthracene	ug/Kg	230	50%				1	2	820 UJ	230 J
Dibenzofuran	ug/Kg	83	50%				1	2	820 UJ	83 J
Fluoranthene	ug/Kg	3400	100%	39887	BALCT	0	2	2	440 J	3400
Fluorene	ug/Kg	280	50%	312 8	BALCT	0	1	2	820 UJ	270 J
Indeno(1,2,3-cd)pyrene	ug/Kg	460	100%	50.83	HHBC	2	2	2	98 J	460 J
Phenanthrene	ug/Kg	2400	100%	4692	BALCT	0	2	2	260 J	2400
Pyrene	ug/Kg	3000	100%	37580	BALCT	0	2	2	370 J	3000
PESTICIDES/PCB										
4,4'-DDT	ug/Kg	4.1	50%	0.39	HHBC	1	1	2	8.2 UJ	4.1 J
alpha-Chlordane	ug/Kg	4.8	100%	0.039	HHBC	2	2	2	4.8 J	3.6 J
Endosulfan I	ug/Kg	20	50%	1.17	BALCT	1	1	2	4.2 UJ	20 J
METALS										
Aluminum	mg/Kg	12000	100%				2	2	12000 J	10700 J
Arsenic	mg/Kg	4.2	100%	6	LEL	0	2	2	3.7 J	4.2 J
Barium	mg/Kg	95.8	100%				2	2	95.8 J	92.7 J
Beryllium	mg/Kg	0.58	100%				2	2	0.58 J	0.56 J
Cadmium	mg/Kg	0 37	100%	0.6	LEL	0	2	2	0.37 J	0.34 J
Calcium	mg/Kg	13200	100%				2	2	6620 J	13200 J
Chromium	mg/Kg	18	100%	26	LEL	0	2	2	18 J	16.4 J
Cobalt	mg/Kg	8.3	100%				2	2	8 J	8.3 J
Copper	mg/Kg	37 7	100%	16	LEL	2	2	2	37.7 J	22.6 J
Iron	mg/Kg	19800	100%	20000	LEL	0	2	2	18900 J	19800 J
Lead	mg/Kg	17.8	100%	31	LEL	0	2	2	15.4 J	17.8 J
Magnesium	mg/Kg	5030	100%				2	2	4160 J	5030 J
Manganese	mg/Kg	731	100%	460	LEL	1	2	2	413 J	731 J
Nickel	mg/Kg	23.2	100%	16	LEL	2	2	2	22.6 J	23.2 J
Potassium	mg/Kg	1650	100%				2	2	1650 J	1330 J
Silver	mg/Kg	1.7	100%	1	LEL	2	2	2	1.7 J	1.1 J
Sodium	mg/Kg	107	100%				2	2	84.5 J	107 J
Vanadium	mg/Kg	20 4	100%				2	2	20.4 J	18.8 J
Zinc	mg/Kg	85.4	100%	120	LEL	0	2	2	85.4 J	76.5 J

TABLE 3-4
SEAD-67 SEDIMENT ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

PARAMETER	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM DETECT	FREQUENCY OF DETECTION	CRITERIA VALUE (a)	CRITERIA TYPE (b,c)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	SOIL SEAD-67 0-0.2 04/26/94 SD67-1 219450 43663	SOIL SEAD-67 0-0.2 04/26/94 SD67-2 219451 43663
OTHER ANALYSES										
Total Solids	%W/W						2	2	40.1	48 9

NOTES

a) NYSDEC Technical Guidance for Screeing Contaminated Sediments - January 1999

b) BALCT = Benthic Aquatic Life Chronic Toxicity Criteria; HHBC = Human Health Bioaccumulation Criteria; LEL = Lowest Effect Level

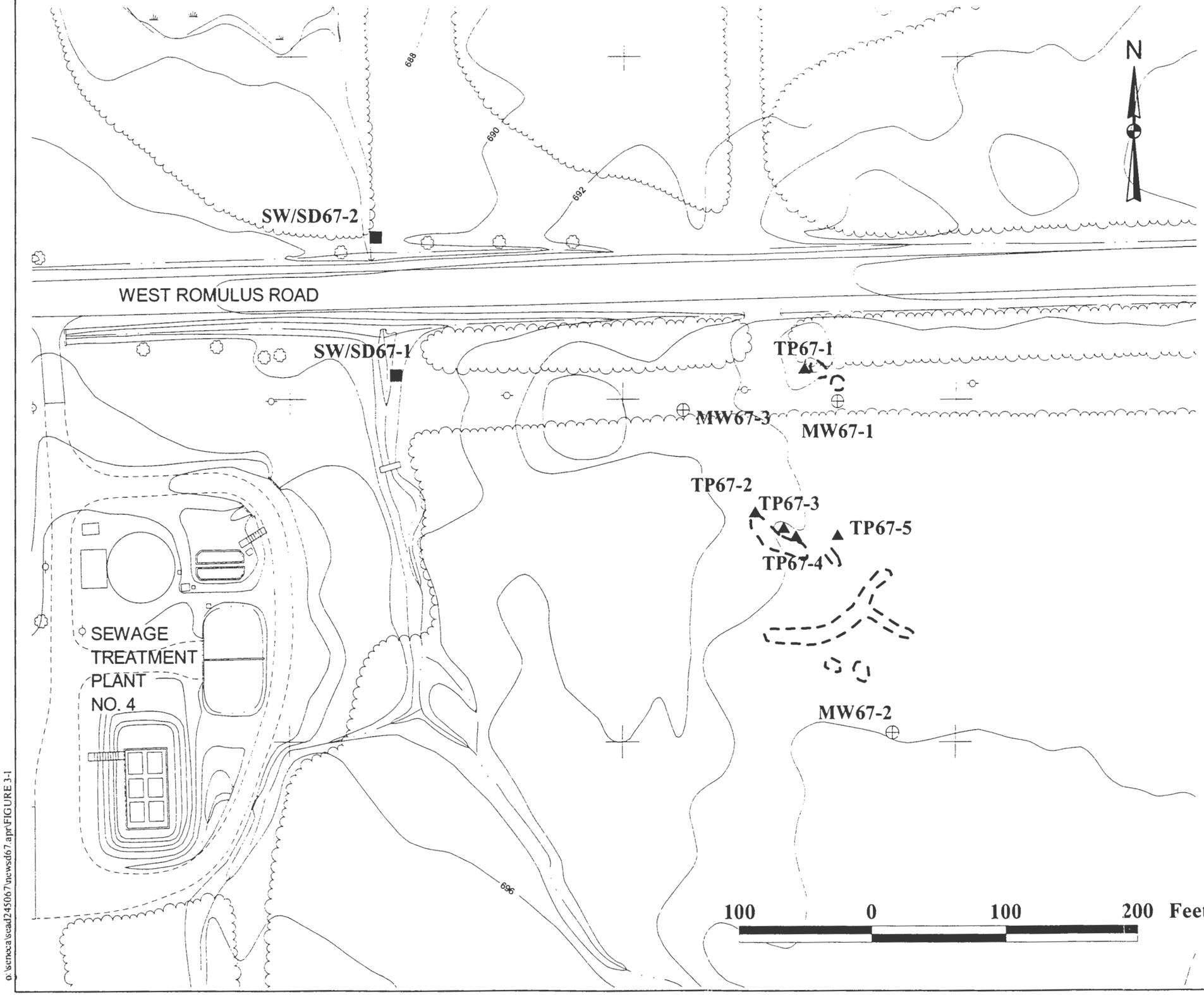
c) All organic criteria values derived based on assumed Total Organic Carbon content of 39,105 mg/Kg (depot average value)

U = The compound was not detected below this concentration.

J = The reported value is an estimated concentration.

UJ = The compound may have been present above this concentration, but was not detected due to problems with the analysis.

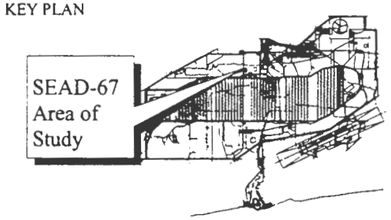
R = The data was rejected during the data validation process.



LEGEND

- PAVED ROAD
- GROUND CONTOUR AND ELEVATION (680)
- WETLAND
- BRUSH
- CHAIN LINK FENCE
- UTILITY POLE
- APPROXIMATE LOCATION OF FIRE HYDRANT
- RAILROAD
- Test Pit Samples
- Surface Water/Sediment Samples
- Monitoring Well
- Survey Monument
- Approximate Extent of Pile or Berm

KEY PLAN



PARSONS

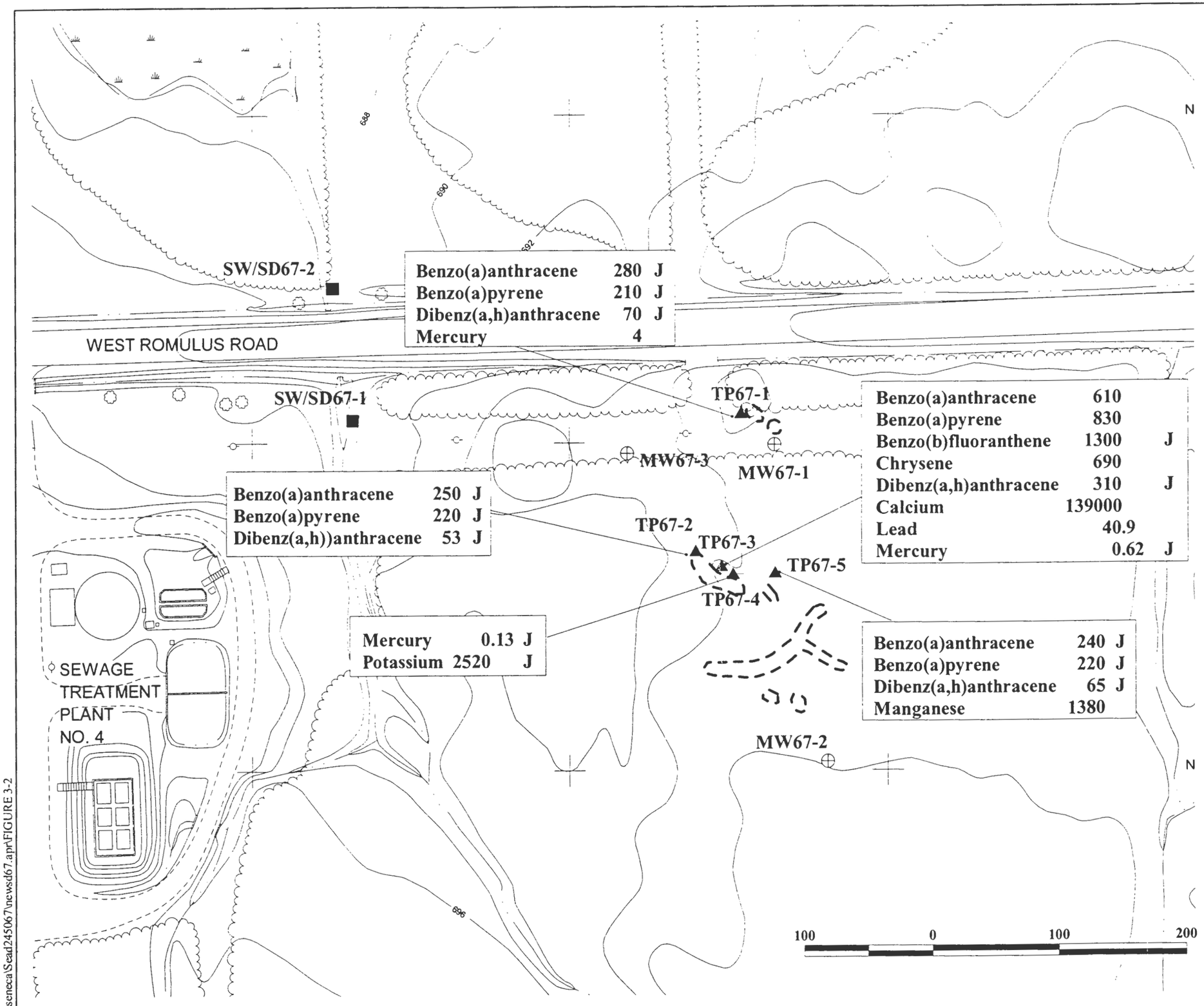
SENECA ARMY DEPOT ACTIVITY

DUMP SITE EAST OF SEWAGE TREATMENT PLANT NO. 4
SEAD-67

FIGURE 3-1
SITE MAP - SEAD-67

JOB NUMBER: 734530-01001 | DATE: AUGUST 2002

o:\seneca\sead\245067\newsd67.apr\FIGURE 3-1



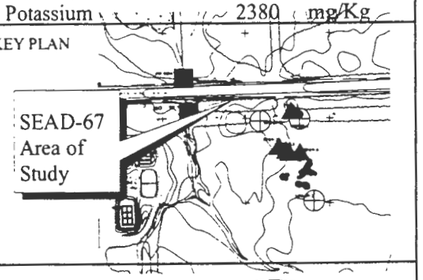
LEGEND

- PAVED ROAD
- GROUND CONTOUR AND ELEVATION (680)
- WETLAND
- BRUSH
- CHAIN LINK FENCE
- UTILITY POLE
- APPROXIMATE LOCATION OF FIRE HYDRANT
- RAILROAD
- Test Pit Samples
- Surface Water/Sediment Samples
- Monitoring Well
- Survey Monument
- Approximate Extent of Pile

TAGM LEVELS

Benzo(a)anthracene	220	ug/Kg
Benzo(a)pyrene	61	ug/Kg
Benzo(b)fluoranthene	1100	ug/Kg
Chrysene	400	ug/Kg
Dibenz(a,h)anthracene	14	ug/Kg
Calcium	121000	mg/Kg
Lead	24.8	mg/Kg
Manganese	1380	mg/Kg
Mercury	0.1	mg/Kg
Potassium	2380	mg/Kg

KEY PLAN



PARSONS

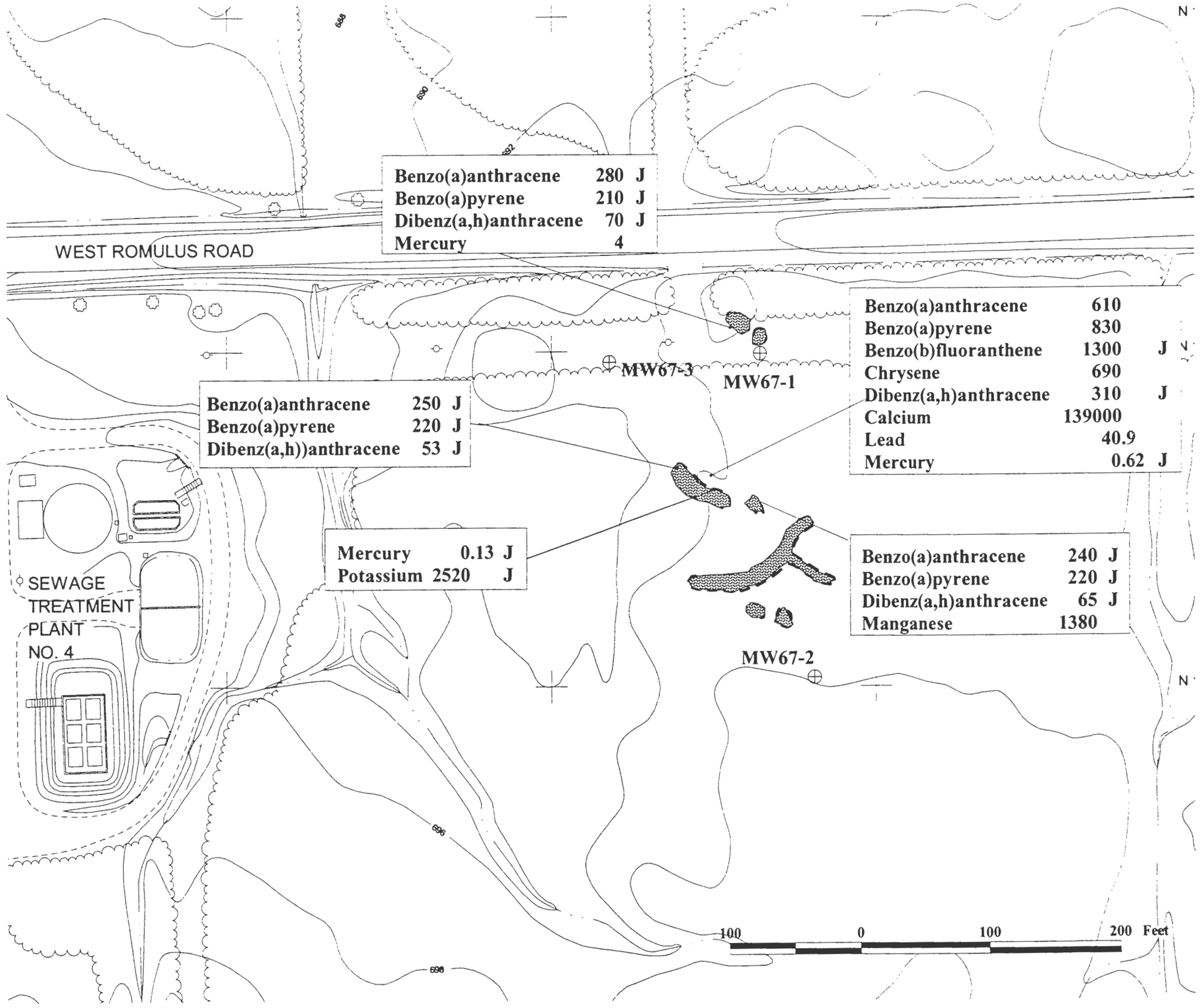
SENECA ARMY DEPOT ACTIVITY

DUMP SITE EAST OF SEWAGE TREATMENT PLANT NO. 4
SEAD-67

FIGURE 3-2
ANALYTES EXCEEDING SOIL CLEANUP OBJECTIVE LEVELS IN SOIL SAMPLES

JOB NUMBER: 734530-01001 DATE: AUGUST 2002

q:\seneca\Sead2450067\newsd67.apr\FIGURE 3-2



q:\seneca\Sead245067\newsd67.apr\FIGURE 3-3

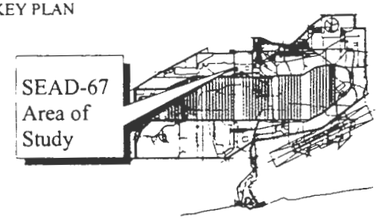
LEGEND

- PAVED ROAD
- GROUND CONTOUR AND ELEVATION (680)
- WETLAND
- BRUSH
- CHAIN LINK FENCE
- UTILITY POLE
- APPROXIMATE LOCATION OF FIRE HYDRANT
- RAILROAD
- ⊕ Monitoring Well
- ⊠ Survey Monument
- Approximate Area to be Excavated

TAGM LEVELS

Benzo(a)anthracene	220	ug/Kg
Benzo(a)pyrene	61	ug/Kg
Benzo(b)fluoranthene	1100	ug/Kg
Chrysene	400	ug/Kg
Dibenz(a,h)anthracene	14	ug/Kg
Calcium	121000	mg/Kg
Lead	24.8	mg/Kg
Manganese	1380	mg/Kg
Mercury	0.1	mg/Kg
Potassium	2380	mg/Kg

KEY PLAN



PARSONS

SENECA ARMY DEPOT ACTIVITY

DUMP SITE EAST OF SEWAGE TREATMENT PLANT NO. 4
SEAD-67

FIGURE 3-3
PROPOSED REMOVAL
ACTION AREAS

JOB NUMBER: 734530-01001 | DATE: AUGUST 2002

Confirmatory Sampling and Analysis
Time-Critical Removal Actions, Four Metal Sites
(SEADs 24, 50/54 and 67)

1. Introduction

Confirmatory soil sampling will be conducted at each site where excavations or pile/berm structure removal are performed. The goal of the confirmatory sampling is to verify that the identified contamination has been removed, and that concentrations of contaminants remaining at the subject site comply with the cleanup objectives. If the results of the confirmatory analysis verify that the cleanup objectives have been achieved, no further excavation will be conducted at the subject site. If the confirmatory results show that the Army's cleanup objectives have not been achieved, further excavation may be conducted until such verification is provided.

2. Equipment and Supplies

The following equipment and supplies will be required to complete the confirmatory sampling.

- Field Book and Project Plans
- Sample Labels
- Shipping Labels
- Sample Records
- Shipping Forms
- Chain-of-Custody Forms
- Camera
- Photo-ionization Detector
- Personal Protective Equipment in accordance with the Health and Safety Plan
- Marker stakes, flagging and paint
- Tape Measures
- Decontamination Supplies
- Inert (e.g., stainless steel or Teflon®) sampling equipment
- Hand Auger
- Mixing Bowls
- Pre-cleaned Sample Bottles
- Plastic Sheeting
- Shipping Tape
- Ice Chests and Ice (for sample transport)

3. Number, Frequency and Location of Confirmatory Sampling

In general, confirmational soil samples will be collected from the base and sidewalls of each excavation. Sidewall samples will not be collected where the depth of the excavation measures 12 inches or less. In situations where the sidewalls of an excavation are 12 inches or less in depth, confirmational samples will be collected outside the perimeter of the excavation. Confirmational samples will also be collected from locations beneath and around every aboveground soil pile or berm structure that is removed.

At least one discrete sample will be collected from each face of an open excavation that is 12 inches in depth or greater. Thus, a minimum of five confirmational samples (i.e., one base, and four sidewall samples) will be collected at each excavation. Additional confirmational samples will be collected from the base of each excavation at a rate of at least one per every 900 square feet (e.g., 30 ft by 30 ft area), or fraction thereof, of surface area. Furthermore, additional sidewall samples will be collected for each additional 30-foot length, or fraction thereof, of excavation opened on any sidewall face.

For excavations where the depth of the excavation is less than or equal to 12 inches in depth, confirmational samples will be collected from the perimeter of the excavation at a rate of no less than one sample per every 30 linear feet of length on each edge of the excavation. A minimum of one sample will be collected along each edge of the excavation. Additionally, at least one sample will be collected from the base of the excavation, and additional samples will be collected from the base of the excavation at a rate of at least one per every additional 900 square feet or less of surface area.

For aboveground soil piles or berm structures that are removed, at least one sample will be collected from a point that is directly beneath each pile or berm structure, and from at least four other locations (e.g., major compass point locations) that are located around the perimeter of the pile or berm. Additional samples from beneath the pile will be collected at a rate of not less than one per every 900 square feet or less of surface area underlying the pile or berm, and at a rate of at least one per every 30 linear feet of the piles or berms perimeter.

Locations of confirmational sampling will be biased towards areas that are most likely to be contaminated. Visual and olfactory sensing and use of portable field monitoring devices (e.g., photo-ionization detectors) should be used, within the bounds of the site-specific health and safety plan and good operating procedures, to assist in the selection of additional confirmational sampling locations.

4. Site-Specific Confirmational Sampling Details

SEAD-24

Confirmational sampling proposed for SEAD-24, the Abandoned Powder Burning Pit, is anticipated to conform to the general specifications provided above for shallow excavations (i.e., one sample per each 900 square feet or less of excavation base, and one sample for each 30 linear feet, or fraction thereof, of the perimeter of the proposed six-inch excavation), increased as necessary to address site-specific field observations and findings.

Based on this specification, it is currently anticipated that a minimum of 208 confirmational samples, plus an appropriate level of quality assurance/quality control (QA/QC) samples, will be collected from the proposed area of the excavation and its perimeter. Approximately 20 percent [i.e., 42 samples plus QA/QC samples] of the confirmational samples will be analyzed for the full suite of Target Analyte List (TAL) metals. The sample location of these samples will be randomly distributed throughout the proposed work area. The remaining 80 percent of the proposed confirmational samples (i.e., 168 plus QA/QC samples) will be analyzed for the metals arsenic, lead, and zinc, which are the primary metal contaminants identified in the area that are prompting the Army's proposed removal action. Additionally, approximately 20 percent of the confirmational samples collected will also be analyzed for Target Compound List (TCL) polynuclear aromatic hydrocarbon (PAH) compounds. Of these latter samples, approximately half (i.e., 21) will be located near the site of former sample SS24-1, where three PAHs were previously detected at levels above NYSDEC's recommended soil cleanup levels. These samples will be used to confirm that the limit of PAH concentrations exceeding cleanup goals is identified. The remainder of the proposed samples collected for PAHs will be selected from the area on a random basis.

SEAD-50/54

Confirmational sampling proposed for SEAD-50/54, the Tank Farm, is anticipated to conform to the general specifications provided above for shallow excavations (i.e., one sample per each 900 square feet or less of excavation base, and one sample for each 30 linear feet, or fraction thereof, of the perimeter of the proposed six-inch excavation), increased as necessary to address site-specific field observations and findings.

Based on this specification, it is currently anticipated that a minimum of 468 confirmational samples, plus associated QA/QC samples, will be collected from the seven proposed areas of excavation and their perimeter. Approximately 20 percent [i.e., 94 samples plus QA/QC samples] of the confirmational samples will be analyzed for the full suite of TAL metals. The remaining 80 percent of the proposed confirmational samples (i.e., 374 plus QA/QC samples) will be analyzed for the

metals arsenic and mercury, which are the two metals that are prompting the Army's planned removal action. Additionally, approximately 20 percent of the total number of samples (i.e., 94 plus QA/QC samples) will be analyzed for PAHs since these latter compounds were detected in some samples exceeding the TAGM cleanup goals. Half of the locations selected for the collection of samples for PAH analyses will be biased towards locations where PAHs were previously detected, while the remainder of the samples will be randomly distributed throughout the work area.

Additionally, pre-excavation confirmational samples will be collected around the location of former sample SS50-1 due to the previous discovery of asbestos at this single location during the initial investigation. Samples will be collected for asbestos analysis on a 30-foot by 30-foot grid in this area prior to the initiation of the proposed removal action, and the results of the asbestos analyses will be used to more fully describe the area where soil needs to be excavated due to the presence of asbestos. It is currently expected that 28 pre-excavation samples, plus associated QA/QC samples, will be collected and analyzed from the area of SS50-1 for asbestos. Subsequent to the completion of the proposed soil excavation for asbestos near SS50-1, post removal verification samples will be collected at a rate of one sample per every 900 square feet or less, and at a rate of one for every 30 feet of perimeter. It is currently expected that 48 post excavation samples, plus associated QA/QC samples, will be collected and analyzed for asbestos. Post excavation samples collected from the area of SS50-1 will also be characterized for target metals, the full suite of TAL metals and PAH compounds as described above.

SEAD-67

Confirmational sampling proposed for SEAD-67, the Dump Site East of Sewage Treatment Plant #4, is anticipated to conform to the general specifications provided above for piles and berm structures (i.e., one sample per each pile or berm, and one sample for each 30 linear feet, fraction thereof or major compass point around the perimeter of the targeted pile/berm), increased as necessary to address site-specific field observations and findings.

Based on this specification, it is currently anticipated that a minimum of 47 confirmational samples will be collected from the proposed areas of the piles and berm structures. Each of the proposed SEAD-67 confirmational samples will be analyzed for mercury and PAHs, which are the principal compounds previously detected prompting the Army's planned removal action.

5. Sampling Method

Once the excavation is complete, a drawing of the completed excavation will be prepared and necessary measurements shall be recorded in the field notes. Specific measurements will be collected including the length, width, and depth (if subsurface excavation) of the excavation. The depth of the

excavation will be reported at each corner, and at intermediate locations that are no further than 100 feet apart. These measurements will be used to document that sufficient samples have been collected from the excavation to reasonably assess whether residual contamination remains in the area of the excavation.

Once the drawing of the excavation is prepared, all proposed sampling locations will be marked and labeled and information describing the location of each proposed sampling location will be transcribed into the field notes and onto site maps. Each sampling location must be uniquely identified with a sample location.

Confirmational samples will be collected from a depth of not less than one-inch below the excavation's surface and not more than six inches below the excavation's surface. The one-inch minimum is recommended to ensure that soils exposed directly to the atmosphere, which could result in the off-gassing of volatile organic or inorganic (e.g., sulfide or cyanide) compounds and a decreased level of volatile content over time, are not collected and used for the volatile compound analyses. The depth from which confirmational samples are obtained will be recorded in the field notes at the time of collection.

At the time of their collection, confirmational soil samples will be visually described for:

1. soil type,
2. color,
3. moisture content,
4. texture,
5. grain size and shape,
6. consistency,
7. visible evidence of staining or discoloration, and
8. any other observations (e.g., odors).

All data collected at the time of sample collection will be transcribed into the field records. The identity of the sampler, the date and time of sample collection, the location of the sample collection (i.e., location id), the identity of the sample (i.e., sample number), a description of the sampling method (e.g., auger, trowel, spade, homogenized, etc.) used, the number of sample containers collected, and the intended analysis that will be completed will be recorded.

All sampling will be completed using decontaminated, inert (e.g., stainless steel, Teflon®, etc.) sampling equipment. Selected sampling equipment may be used for all collection activities conducted at one location (e.g., the sample and its duplicate for all required analyses) during one contiguous time period; however, once the equipment has been used at one location, it can not be used at another location until it has been thoroughly decontaminated per prescribed procedures.

Samples collected for volatile compound analyses (e.g., volatile organic compounds or cyanide) will be collected first and will be transferred directly from the ground to the appropriate sample container (e.g., EnCore™). Samples for volatile compound analyses will not be homogenized. Samples collected for non-volatile analyses (e.g., semivolatile organic compounds, pesticides, metals, nitrate, TOC, TPH) should be collected and transferred to an inert mixing bowl and homogenized prior to being placed into their final sample bottles.

6. Recommended Sampling Order

A recommended order for the proposed sample collection at Metal Removal Action sites is provided below:

Collected, homogenized, and split into required bottles
Semivolatile Organic Compounds
Metals and Asbestos

7. Laboratory Analyses

An analytical laboratory that is certified by the State of New York for the identified analysis will perform all confirmational sample analyses. The analytical procedures used for the performance of the proposed analyses will conform to requirements identified by the EPA in its document Test Methods for Evaluating Solid Wastes: Physical/Chemical Methods (EPA, SW-846 3rd edition) as modified by the NYSDEC's Contract Laboratory Program (CLP) Analytical Services Protocol (ASP).

The proposed analytical methods identified for the metal sites discussed above include:

- Targeted and full suite TAL Metals by SW-846 Method 6010B et al. as modified under NYSDEC's CLP ASP.
- TCL PAHs compounds by SW-846 Method 8270C as modified under NYSDEC's CLP ASP.
- Asbestos by Polarized Light Microscopy.

8. Quality Assurance/Quality Control Samples

Field quality assurance/quality control (QA/QC) samples will consist of the collection and analysis of one equipment blank, matrix spike, matrix spike duplicate, and duplicate sample for every batch of eighteen field samples or less per analytical matrix (e.g., soil or surface water) that is submitted to the laboratory for analysis. The identified QA/QC sample specification is applicable to TAL metal and

TCL SVOC analyses only. A preliminary estimate of the number of QA/QC samples that are expected to be collected during the proposed removal actions at the three sites is provided in Table 1. It is currently anticipated that each analytical sample delivery group will consist of a maximum of 18 field samples, one field duplicate, one field blank, one matrix spike and one matrix spike duplicate (a total of 22 samples in the SDG). Additional QA/QC samples will be collected in the event that particular sample delivery groups (SDGs) need to be closed due to delays in the field sampling program that impact sample extraction and analysis requirements defined by EPA and the NYSDEC.

Field QA/QC samples will be identified using standard sample identifiers, which will provide no indication of their QA/QC role. QA/QC sampling requirements are described in Section 5.4 of Appendix C of SEDA's Generic Installation RI/FS Work Plan (Parsons, 1995). Required sample containers, preservation techniques, and holding times are also specified in the Generic Installation RI/FS Work Plan, and in EPA's SW-846 document.

9. Data Validation

Validation of analytical data resulting from analytical determinations in soil will be performed in a manner that is generally consistent with procedures defined in the EPA's "National Functional Guidelines for Organic Data Review" and "National Functional Guidelines for Inorganic Data Review" and consistent with EPA Region 2's Standard Operating Procedures. Specific data validation procedures that will be followed include:

- HW-6, CLP Organics Data Review and Preliminary Review, Revision 12, March 2001;
- HW-22, Validating Semivolatile Organic Compounds by SW-846 Method 8270, Revision 2, June 2001; and
- HW-2, Evaluation of Metals Data for CLP Program, Revision 11, January 1992.

The data package submittal requested from the laboratory for the analytical determinations in soil will contain all data generated during the analysis, including mass spectral identification charts, mass spectral tuning data, spike recoveries, laboratory duplicate results, method blank results, instrument calibration, and holding time documentation. All sample data and laboratory quality control results will be requested for soil analyses completed for asbestos.

Commensurate levels of data validation will be performed on the results and the data packages reported for the proposed analyses. A *qualitative* review will be completed for the asbestos data. A qualitative review includes an analysis of the following items, as they are applicable to the polarized

light microscopy procedure; data completeness, custody documentation, holding times, laboratory and field QC blanks, instrument calibrations, laboratory control sample recoveries, matrix spike/matrix spike duplicate precision and accuracy, laboratory duplicate precision, instrument performance, surrogate recoveries, field duplicate precision, internal standard responses, instrument run logs, and all other QC samples.

Other analyses will be subjected to full data validation. Full data validation is a qualitative and quantitative review of those items evaluated during a qualitative assessment in addition to calculating sample and laboratory QC results with the instrument raw data. This level of data quality provides assurance that all sample results reported by the laboratory were transcribed, calculated, and reported correctly. Therefore, this level of data review requires laboratories to submit all environmental sample results, laboratory QC results, and instrument raw data (i.e., a full data package or "CLP-type" data deliverable).

TABLE 1
ANTICIPATED FIELD AND QA/QC SAMPLE COUNTS
TIME-CRITICAL REMOVAL ACTIONS, FOUR METAL SITES (SEADS 24, 50/54, AND 67)

SWMU IDENTIFICATION	SEAD-24		SEAD-50/54		SEAD-67	
SAMPLE ANALYSIS	Anticipated Field Samples	QA/QC Samples (dup, fb, ms/msd)[1]	Anticipated Field Samples	QA/QC Samples (dup, fb, ms/msd)[1]	Anticipated Field Samples	QA/QC Samples (dup, fb, ms/msd)[1]
Targeted TAL Metals (SW-846 6010B et al.)	166[2]	36	374[3]	84	37[4]	12
Full Suite of TAL Metals (SW-846 6010B et al.)	42	12	94	24	10	4
Total Number of Samples for Metal Analysis (SW-846 6010B et al.)	208	48	468	108	47	16
TCL Polynuclear Aromatic Hydrocarbons (SW-846 8270C)	42	12	94	24	47	12
Asbestos (PLM) pre excavation	NA	NA	28	4[5]	NA	NA
Asbestos (PLM) post excavation	NA	NA	48	6[5]	NA	NA

(1) dup = duplicate; fb = field blank; ms = matrix spike; msd = matrix spike duplicate.

(2) = arsenic, lead, and zinc only.

(3) = arsenic and mercury only.

(4) = mercury only.

(5) = field blank and duplicate only.

NA = Not Applicable

Response to the Comments from the New York State Department of Environmental Conservation and Department of Health

Subject: NYS Inactive Hazardous Waste Disposal Site No.8-50-006
Draft Final Action Memorandum and Decision Document Removal Actions
(SEADs 24, 50/54, 67)
Seneca Army Depot
Romulus, New York

Comments Dated: May 13, 2002
Date of Comment Response: July 26, 2002

The New York State Departments of Environmental Conservation and Health have reviewed the above referenced document dated April 2002. Comments are as follow:

General Comments:

Comment:

1. The title of this document should denote that it is proposing time-critical removal actions, not simply removal actions.

Response:

Agreed. The title of the document has been be modified to incorporate the phrase "time-critical." Additional uses of the phrase "time-critical" have also been added to the text of the Action Memorandum and the Decision Documents as are necessary for consistency.

Comment:

2. Public participation during the remedial process at inactive hazardous waste sites is valuable and necessary. Although it is understood that public participation in the form of public meetings is strictly not required prior to the initiation of field work for a Time-Critical Removal Action, it is questionable whether current circumstances at these sites warrant elimination of this important aspect of the remedial process prior to executing this planned effort. While a desire to remove environmental contamination on this property as rapidly as possible is laudable, it is not clear what information on the environmental condition of this property has been newly discovered which demands a course of action that does not allow for some degree of public participation at this point. Because of our understanding that the data

which is driving these actions is several years old, a delay of several additional weeks to allow for public participation in the process seems acceptable.

Response:

The public was briefed of the proposed time-critical removal actions during a Restoration Advisory Board Meeting that was held on May 16, 2001. There has been no significant new information identified pertinent to the environmental condition of the site since that public briefing was held. No new sampling or other actions have occurred at the sites.

The Army needs to move forward expeditiously with the proposed actions to lessen, and hopefully eliminate, potential threats to the environment and surrounding populations from sources of contamination that have been identified and disclosed to all parties. Successful completion of the removal actions will also provide valuable data that may be used to complete the required remedial investigations at the sites.

Comment:

3. Considering that this document is for a Time-Critical Removal Action, it seems rather redundant to submit work plans, which, with the exception of "specific details of the proposed confirmational sampling" will provide the same degree of information as this document, before the removal actions are to be performed. Perhaps it would more expedient to include the detailed confirmational sampling information in the next iteration of this document, to the satisfaction of the regulatory agencies, which can then be presented to the public (See General Comment #2) for comment.

Response:

The Army has prepared and included an attachment to the Action Memorandum and the Decision Document that provides details of the proposed confirmational sampling and analysis. This document was provided separately to the NYSDEC and EPA as a draft, and has been subsequently revised based on comments received from, and follow-up discussions with, both the NYSDEC and EPA. The plan defines the frequency of sampling that is proposed and the general location where the proposed samples will be collected. The actual confirmatory sampling and analysis will be biased towards locations that are suspected to be contaminated to provide a conservative assessment; thus selected locations of the proposed samples can not be shown on maps for the individual sites at this time.

Confirmational soil samples will be collected as discrete samples. Confirmational sampling will include no fewer than 5 samples from each area that is excavated. At a minimum, one confirmational sample will be collected from the base, and from each side-wall of the excavation, with the exception noted below for shallow excavations. The frequency of sampling will be set at a rate of 1 confirmational sample for all analyses required for each 900 square feet of area (e.g., 30 foot by 30 foot area) or less for excavation bases. Additional sidewall confirmational samples will be collected for each additional 30 linear feet of excavation sidewall.

Many of the proposed soil excavations for the metal sites initially focus on the removal of the top 6 to 12 inches of soil (SEAD-24 and 50/54), or on the elimination of soil that is piled above ground (i.e., SEAD-67 piles and berms). In both of these instances, the sidewall sampling will be replaced by confirmational sampling that focuses on the perimeter of the proposed excavation site instead of the sidewall sampling. In this instance, a minimum of one confirmational soil sample will be collected from the edge of each of the excavations, or in the case of a circular pile, from at least the four major points found on a compass. Additional perimeter samples will be collected at a rate of one for each 30 feet of perimeter.

If excavations are extended to a depth of greater than one foot below grade, confirmational samples will be collected from each sidewall at a rate of 1 sample for all needed analyses for each 30 linear feet.

Analyses completed on samples from each of the areas affected will be tailored to address specific concerns that have been identified at the areas where the proposed removal actions will occur. Additional details of the complete sampling and analysis program at each of the affected SWMUs are provided in the individual chapters of the Decision Document for the site, as well as in the Confirmatory Sampling and Analysis plan that is included in the Decision Document as an Appendix.

Comment:

4. The Army maintains that the proposed action will eliminate or lessen the severity of the potential threat posed by the metals, semi-volatile organics, and asbestos at the four sites. Although this may be true, it does not nullify the need for post-excavation investigation at the sites to more fully characterize the extent of contamination at the sites. Information obtained from this investigation may indicate the need for additional remediation of the sites.

Response:

The Army has stated that the goal of the time-critical removal actions at each of the metal sites is to lessen, and perhaps eliminate, the potential threat that is posed by the presence of the identified contaminants. The Army believes that the collection of confirmatory samples will essentially serve as the post excavation investigation that the Department is requesting. This information will be evaluated after the action is completed to determine if additional sampling is required. Once data is available, it will be reported to the agencies in appropriate formats and forums.

Action Memorandum:

Comment:

1. Page 2, Section 2.1.1, Site Description and History: The document should clearly state the distance between Kendaia Creek and the SEAD-24 site. Also, because "it is presumed that black powder, M10 and M16 solid propellants, and explosive trash were disposed here by burning," explosives materials should be part of the chemical analysis for this site.

Response:

At its closest point, the Abandoned Powder Burning Pit is approximately 300 feet south of Kendaia Creek. The southern end of the abandoned pit is approximately 600 feet south of Kendaia Creek.

Disagree. Data for explosives were collected from this area during the ESI. These data were presented in the Final "Expanded Site Inspections, Seven High Priority SWMUs 4, 16, 17, 24, 25, 26, and 45," December 1996 (Parsons) and are summarized in the data provided in the Decision Document. These results indicate that explosives were infrequently (only three explosive compounds were found in any samples, and all compounds were found in fewer than seven of the 29 soil samples collected) found in the soil samples. None of the detected explosives (i.e., 1,3-Dinitrobenzene, 2,4-Dinitrotoluene and Tetyl) were detected at a concentration that exceeded NYSDEC's recommended soil cleanup objective levels. Therefore, the Army does not believe that explosives analyses need to be included in the confirmational analysis suite because these data already have been collected and analyzed.

Comment:

2. Page 4, Section 2.2.1, Site Description and History: In the description of SEAD-50/54, it states that "there are no mapped wetlands in the area." Are there regulated wetlands in the area, and/or should these wetlands be mapped? Please clarify.

Response:

The statement was meant to indicate that there are no wetlands within the bounds of the area used for Tank Storage (i.e., SEAD-50/54). There are mapped and regulated wetland areas outside of SEAD50/54 that have been mapped by the State and by the US Department of the Interior. Wetlands mapped by the US Department of the Interior are documented in the report "Seneca Army Depot Activity Wetlands, Fish and Wildlife Plan: A habitat based inventory and management plan including guidelines for fisheries, North American Waterfowl Plan goals and nongame birds," Administrative Report No. 96-01, US Department of the Interior, Fish and Wildlife Service, December 1995.

Comment:

3. Page 7, Section 2.2.3, Results of ESI Program at SEAD-50/54: This document mentions that all of the sediment samples that exceeded TAGM soil cleanup objectives were in an area "located upgradient of the point of where surface water contained in the drainage ditch flow into Hicks Gully." This statement infers that downgradient sediments/soils do not exceed TAGM. Please clarify. To confirm that the downgradient sediments/soils are not impacted, downstream data will be necessary. Also, "Hicks Gully" was never mentioned in the previous iteration of this document. Please clarify what type of water body Hicks Gully is, and whether it is a classified water body.

Response:

Data from three samples of "sediment" were provided in the Draft Final Decision Document for SEAD-50/54. Analytical results from each sample were provided in Table 2-5 and were highlighted in Figure 2-3 of the referenced report. All of the analytical data collected were compared to TAGMs and are reported in Table 2-5. Samples SW/SD50-1 and SW/SD50-2 are the upgradient locations, and location SW/SD50-3 is the downgradient location. Location SW/SD50-3 is immediately upgradient of where water would leave the Depot and enter the headwaters of what eventually becomes Hicks Gully. The sample collected from location SW/SD50-3 did not show evidence of any contaminant at concentrations above TAGMs. Thus, the Army stipulates that available data indicates that the identified contaminants have not reached this point at concentrations that are of concern.

Therefore, the Army submits that sampling and analyses is not currently warranted in the downstream reaches of the drainage ditches beyond the confines of Seneca Army Depot.

The validity of the existing data will be assessed as part of the proposed confirmational sampling and analysis that has been developed for the proposed removal action. Confirmatory samples will be collected and analyzed for those contaminants that have been identified as driving the planned removal action (e.g., metals and PAHs). Once analytical data from confirmatory sampling are available, additional determinations of potential downgradient migration can be made. If that data suggests that the identified contamination has spread downgradient of SW/SD50-3, the Army may consider performance of a limited downgradient investigation.

Based on information provided by personnel of NYDEC Region 8, the surface water body into which the drainage ditches at SEAD-50/54 may flow is classified as Class D as it exits the Depot and flows north towards the area of mapped wetland OV-5. At a point roughly 1,500 feet south of Yerkes Road, the water classification changes to Class C. This classification remains in effect until it flows through Hicks Gully to Dean Cove on Cayuga Lake. Once the flow enters Cayuga Lake, it becomes Class AA(T).

Comment:

4. Page 7, Section 2.3.1, Site Description and History: The document does not state whether the "small unnamed stream" that lies downgradient of the SEAD-67 is a classified stream. Also, the document does not state whether the large wetland area, that the stream flows into, is a regulated wetlands area. Please clarify.

Response:

Based on information provided by personnel of NYSDEC Region 8 offices, the small unnamed stream that is located 200 to 300 feet west of the SEAD-67 piles and berm features is categorized as a Class C water body. The unnamed creek then flows northerly into the large wetland area that is a NYSDEC regulated wetland area, and which forms part of the headwaters of Kendig Creek.

Comment:

5. Page 9, Section 10, Recommendation: The document states that "conditions at the sites meet the NCP section 300.415 (b)(2) criteria for a removal action" and that this Action Memorandum "is not inconsistent with the NCP." To remain consistent with the NCP and the Army's declaration of a TCRA, the Army should follow NCP 300.415 (m)(2), which calls

for the publishing of a notice of availability, which could note that this document will be discussed at the RAB meeting, a public comment period, and a written response to comments. A public presentation might be helpful as well (See General Comment #2). The Department requests a copy of the published notice of availability, when it is made available.

Response:

Disagree. See prior response to General Comment #2.

Comment:

6. Page 11, Section 5 Proposed Actions and Estimated Costs: Please note that a certification of the backfill material should be forwarded to the Department prior to backfilling.

Response:

Agreed. The Army will provide the necessary certification of backfill material to the NYSDEC in advance of the material being transported to the excavation sites for use at the Depot.

Decision Documents:

Comment:

1. The term "remedial action" should be removed from the text. This document proposes time-critical removal actions. A remedial action is generally the product of an RI/FS or equivalent and summarized in a ROD and is the final remedy for the site. These two should not be confused.

Response:

Agreed. The term remedial action will be changed to removal action.

Comment:

2. Page 1-15, Section 1.10, Post Removal Verification Sampling and Analysis: No composite samples should be taken as post-excavation verification sampling. Discrete post-excavation confirmational sampling should be performed to better determine the exact locations of the contamination, not composite samples. The state requests that the number of confirmational

samples should be increased. It is questionable whether the proposed number of confirmational samples will be sufficient to "... more fully characterize the extent of the potential soil and sediment contamination that may be present at the site"(see page 3-11).

The document should also state at what frequency these discrete post-excavation samples are to be taken. It should be noted in the document that if, based on the results of the post-excavation sampling, the excavation must continue deeper than 1 foot, then side-wall confirmational samples will be taken.

Lastly, please explain how the Spills Technology and Remediation Series (STARS) Guidance Memorandum is applicable to evaluating the disposal alternatives of the excavated soils that are contaminated with the "three target metals (i.e. arsenic, lead and zinc)." Samples of the stockpiled soil should be analyzed for these three metals in addition to VOCs and SVOCS.

Response:

Agreed. Per NYSDEC's direction, discrete soil samples will be collected from locations within and around each excavation and analyzed to provide confirmational data. The collected samples will be analyzed for selected metals and organic compounds that have identified as driving the proposed removal action at each of the identified sites (see discussions in section 1.10 of the Decision Document for SEAD-24; Section 2.10 for SEAD-50/54; and Section 3.10 for SEAD-67).

The Army proposes to collect confirmational samples at a frequency of not less than 5 samples per excavation and not less than one sample for each 900 square feet (e.g., 30 ft. by 30 ft. area) of exposed excavation base. Sidewall samples will be collected at a rate of one sample per 30 linear feet of sidewall. The sampling frequency specifications were discussed with the NYSDEC and agreed to by NYSDEC and the Army during discussions of July 2002. In the event that the sidewalls of a excavation measure less than one foot deep, confirmational samples will be collected from the perimeter of the excavation at a frequency of not less than one sample per side and not less than one per every 30 linear feet of perimeter contained on one side. Under either scenario, at least one confirmational sample would be collected from each face of the completed excavation. If the base of an excavation measures more than 900 square feet, additional confirmational samples at a rate of one per each subsequent 900 square foot or fraction thereof will be collected. The 30-foot grid spacing will be performed at a minimum.

As a point of clarification, the reference to the Spills Technology and Remediation Series (STARS) Guidance Memorandum in the following highlighted sentence was intended to provide the logic and

rationale for the specification of the number of samples that would be collected from stockpiled soil (i.e., excavated and staged for disposal) and analyzed prior to disposal.

> *"The number of composite samples collected from these determinations will be based on guidance provided in the Spills Technology and Remediation Series Guidance Memorandum #1..."*

The reference to volatile and semivolatile organic compounds was only provided as an example. It was anticipated that necessary analyses for each individual stockpile would be identified in the work plan that was prepared for the individual sites. Nevertheless, the reference to STARS has been eliminated from the text.

Comment:

3. Page 2-14, Section 2.10, Post-Removal Verification Sampling: This section does not indicate the type of post-excavation confirmational sampling (i.e. discrete or composite) that will be performed. Please indicate. Also, as stated in the above comment, it is not clear as to how the Spills Technology and Remediation Series (STARS) Guidance Memorandum is applicable to evaluating the disposal alternatives of the excavated soils that are contaminated with "asbestos, arsenic, mercury and PAHs. Samples of the stockpiled soil should be analyzed for all of the contaminants of concern in addition to VOCs and SVOCs. This applies to SEAD-67 as well.

Response:

Agreed. See response to Decision Document Comment #2 above.

Comment:

4. Page 3-2. Section 3.2.1. Site Description: Please clarify if the sewage treatment plant is currently active.

Response:

Yes, the Sewage Treatment Plant No. 4 is still active. It currently treats wastewaters originating from the administrative area of the former Depot, former Depot housing that is located along Route 96 in the area of the administrative area, the warehousing area of the Depot that has been leased to outside

parties, and the Five Points Correctional Facility. The wastewater treatment plant was recently upgraded during the construction of the Five Points Correctional Facility.

Comment:

5. The above Comments are generally applicable to each draft Decision Document.

Response:

No response required.

Response to the Comments from the US Environmental Protection Agency, Region 2

Subject: Draft Final Decision Document for the Four Metals Sites (SEADs 24, 50/54, 67)
Seneca Army Depot
Romulus, New York

Comments Dated: May 30, 2002
Date of Comment Response: July 26, 2002

This is in reference to the subject referenced documents received by this office on April 11, 2002.

I. GENERAL COMMENTS

Comment:

1. Text in Section 2.8 of the Decision Document indicates that the removal actions are being completed in order to "reduce the overall threat to human health and the environment to an acceptable level at the site". Section 6 on Page 11 of the Action Memorandum indicates that a delay in completing these removal actions will cause an "increased likelihood that incidental contact with contaminants found in historic Depot use areas will occur" and that the contaminated materials will migrate into other media and "greatly increase the likelihood that surrounding populations of human and animal populations will come into contact with elevated levels of the identified contaminants." Section 1 of the Action Memorandum indicates that environmental impacts of these sites "can be effectively addressed via the removal process." Revise text in appropriate sections to present a consistent justification for the removal actions.

Response:

Agreed. Changes in language used to justify the proposed time-critical removal actions at the four metals sites have been made in Section 6 of the Action Memorandum, as well as in Sections 1.8, 2.8, and 3.8 of the accompanying Decision Documents for the individual SEADs.

Comment:

2. The Army claims that contaminants found in the groundwater samples are attached to the solids and/or sediment particulate (turbidity) present within this media. Therefore, no impact to groundwater is assessed. Although we do not disagree with the Army's interpretation of the groundwater sampling results, we are still recommending the following actions:

Minimize migration of contaminants to the groundwater during the removal process and; Perform confirmatory samples of the groundwater by using EPA-Region 2 Low Stress (Low Flow) purging and sampling procedures.

Response:

Agreed. All removal action measures and operations will be conducted in a manner that minimizes, to the fullest extent possible, the migration of site contaminants into the groundwater.

Future groundwater sampling events for the metal sites will be performed using Region II's Low Stress (Low Flow) purging and sampling procedures.

II SPECIFIC COMMENTS

Comment:

1. Action Memorandum, Section 5, Second ¶, Page 11. The revised text addresses neither the frequency nor the scope of analyses, as indicated in the Response to Comments. While it is understood that the removal contractor will select locations for confirmation samples and complete this sampling, it should be possible to estimate the number of samples that will be required at each site based on the approximate volumes of soil estimated for removal. Similarly, as the contaminants of concern at each site have been identified, the scope of analytical work should presented.

Response:

Agreed. The Army has prepared and included an attachment to the Action Memorandum and the Decision Document that provides details of the proposed confirmational sampling and analysis. The plan defines the frequency of sampling that is proposed and the general location where the proposed samples will be collected. The actual sampling will be biased towards locations that are suspected to be contaminated to provide a conservative assessment; thus selected locations of the proposed samples can not be shown on maps for the individual sites at this time. A draft version of the proposed confirmational sampling plan for the Metal Removal Action Sites was provided to the EPA and NYSDEC in June 2002. Follow-up discussions on the draft plan were held in July 2002. The attached plan has been revised to reflect the results of the agencies review and comments.

Confirmational soil samples will be collected as discrete samples. Confirmational sampling will include no fewer than 5 samples from each area that is excavated. At a minimum, one confirmational sample will be collected from the base, and from each side-wall of the excavation,

with the exception noted below for shallow excavations. The frequency of sampling will be set at a rate of 1 confirmational sample for all analyses required for each 900 square feet of area (e.g., 30 foot by 30 foot area) or less for excavation bases. Additional sidewall confirmational samples will be collected for each additional 30 linear feet of excavation sidewall.

Many of the proposed soil excavations for the metal sites initially focus on the removal of the top 6 to 12 inches of soil (SEAD-24 and 50/54), or on the elimination of soil that is piled above ground (i.e., SEAD-67 piles and berms). In both of these instances, the sidewall sampling will be replaced by confirmational sampling that focuses on the perimeter of the proposed excavation site instead of the sidewall sampling. In this instance, a minimum of one confirmational soil sample will be collected from the edge of each of the excavations, or in the case of a circular pile, from at least the four major points found on a compass. Additional perimeter samples will be collected at a rate of one for each 30 feet of perimeter.

If excavations are extended to a depth of greater than one foot below grade, confirmational samples will be collected from each sidewall at a rate of 1 sample for all needed analyses for each 30 linear feet.

Analyses completed on samples from each of the areas affected will be tailored to address specific concerns that have been identified at the areas where the proposed removal actions will occur. Additional details of the complete sampling and analysis program at each of the affected SWMUs are provided in the individual chapters of the Decision Document for the site, as well as in the Confirmatory Sampling and Analysis plan that is included in the Decision Document as an Appendix.

Comment:

2. SEAD-50, SEAD-54 Decision Document, Section 2.4, Page 2- 7. The text in this section discusses the removal actions that will take place at SEAD-50 and SEAD-54. Text from the Draft document has been revised and is appropriate with the exception that if, when excavations at SEAD-50 are completed, the Amy should notify regulatory agencies if the conditions in the drainage ditch are not dry and the sampling procedures requires modification.

   In addition, the text on Page 2-8 of this section details five distinct areas of SEAD-50 that will undergo removal actions. However, Figure 2-3 shows six areas. A description of the drainage ditch excavation (shown on Figure 2-3 to be an estimated 4,200 sq ft) is missing from the text. While the Army has revised its original excavation plans to postpone the

sediment removal at SEAD-67, it has not done so for SEAD-50. Revise the text to include a description of this sixth area.

Response:

Agreed. The Army will notify the oversight agencies of any conditions that may necessitate modification of sampling procedures at SEAD-50/54. Again, the Army wishes to emphasize that the identified drainage ditches are man-made, and serve as infiltration galleries as much as they do as drainage ditches. Thus, the Army does not anticipate encountering conditions that will necessitate modification of the proposed sampling program.

In actuality, Figure 2-3 displays seven areas where excavations will be conducted. The seventh area is a second drainage ditch that is located northeast of Area 1, and encompasses roughly 800 square feet of land. A discussion of the proposed removal action for soils in the drainage ditch is provided in the paragraph following the one presenting details of the fifth area of the Tank Farm. This was provided on page 2-9 of the draft final Decision Document for SEAD-50/54.

Comment:

3. SEAD-50, SEAD-54 Decision Document, Section 2.9. The text indicates that asbestos was detected in one sample at a concentration of 10 – 15 percent by weight. Although Table 2-2 does not report the method of asbestos analysis used, almost certainly, bulk samples were analyzed by polarized light microscopy (OSHA Method ID-191 or equivalent). This method is not a gravimetric method and the reported asbestos content is not percent by weight. The text should be revised to be consistent with the description of the asbestos results presented in Section 2.3.2. A description of the bulk asbestos method of analysis should be provided in the text and in Table 2-2.

Response:

Agreed.

Response to the Comments from the US Environmental Protection Agency, Region II

Subject: NYS Site No.8-05-006
Draft Action Memorandum and Decision Document for the Four Metal Sites
Seneca Army Depot
Romulus, New York

Comments Dated: October 12, 2001
Date of Comment Response: April 8, 2002

The following represent our comments on the subject report dated received by this office on August 27, 2001.

I. GENERAL COMMENTS

Comment:

1. The Action Memorandum must include additional information about the locations of the planned confirmation samples, especially relative to the previous sampling efforts. Provide figures for each SEAD showing this information.

Response:

Additional information about the frequency and scope of analyses that will be included as part of the pending confirmational sampling and analysis has been added to the Action Memorandum. However, figures identifying proposed sampling location have not been included in the Action Memorandum as this work effort is within the scope of the removal action contractor. Specific details of the confirmational sampling activities will be provided in the removal action work plan developed by the removal action contractor.

Comment:

2. The Action Memorandum document should include reference figures for all three SEADs (24, 50, and 67). These figures should show the locations of storage tanks, berms, drainage ditches, and other pertinent features.

Response:

Figures of each of the SEADs have been added to the Action Memorandum as Figures 2 (SEAD-24), Figure 3 (SEAD-50/54) and Figure 4 (SEAD-67).

Comment:

3. Costing in the Decision Document is unclear with regard to the use of additional equipment during sediment excavation to prevent further migration of the metals from SEAD-50 and SEAD-67. For example, the removal at SEAD-67 will involve sediment excavation from a small flowing stream. Most likely, the excavation will require temporarily damming the stream. If costs of this additional activity were included, revised text is needed. If these costs were not included, then they should be provided in the Action Memorandum.

Response:

Additional equipment will not be needed to address sediment issues under the currently proposed scope of work. The "sediment" identified in the area of SEAD-50 is actually shallow soil that resides under man-made drainage ditches that have been designed to convey water away from the Tank Farm area. These ditches are traditionally dry, except for periods after significant storm events or extended wet periods or during snowmelt season. Furthermore, the Army has reconsidered it initial plan to excavate sediment in the area of SEAD-67 and has decided to postpone this effort until additional data is developed to document the nature and extent of any contamination that may exist, and identify potential sources contributing contamination that may be noted.

Comment:

4. The Action Memorandum document should include a references section.

Response:

A Reference Section has been added as Section 11 in the Action Memorandum.

Comment:

5. It is unclear that the removal action proposed in the Action Memorandum, involving excavation of only 6 inches of surficial soils, adequately addresses potential threats from these sites. At SEAD-67, for example, manganese at concentrations exceeding TAGM levels was found in subsurface samples, and also, in groundwater in excess of secondary MCLs, suggesting possible migration of contamination from this site. Similarly, SEAD-24 shows exceedance of the primary MCL for aluminum and the secondary MCL for manganese that may be attributed to subsurface contamination. Additional justification must be provided.

Response:

As a point of clarification, the noted exceedance of manganese in the SEAD-67 soil was found in a test pit sample that was dug in a soil pile or berm structure that sits atop the ground surface in the SEAD. Additionally, the noted exceedances of manganese in the groundwater collected at SEAD-67 were found in samples that contained elevated turbidity readings, and thus may be reflected of suspended solids in the water. With respect to the noted soil and groundwater chemical similarities in SEAD-24, again it is noted that the groundwater samples were turbid, and thus the noted readings for aluminum and manganese could result from the elevated levels of suspended solids present.

With respect to the comment about the removal of only six inches of soil, two points of clarification are offered. First, the removal of shallow soil is only suggested at SEADs 24 and 50/54, where the available information suggests that the identified contamination may be limited to the near surface. Once the initial quantity of soil is removed at these two sites, the results of confirmational sampling will be used to confirm that sufficient soil has been removed to eliminate the suspected threat. At SEAD-67, the proposal is to remove the piles of soil that sit atop the ground's surface. Again once the initial soil is removed, confirmational sampling and analyses will be used to determine whether additional excavations are needed.

The remedial actions proposed for each of the identified sites focuses on the removal of soil that has been found to contain concentrations of contaminants that may represent a potential threat to surrounding human populations or the environment. Human health and ecological risk assessments have not been conducted for any of these sites; thus, the preliminary determination made for each site is based solely on the selection of indicator parameters (e.g., arsenic, lead and zinc at SEAD-24), which have been found to impact large areas and exist at elevated concentrations. Thus, the Army's proposed removal actions focuses on the removal of that soil that appears to have the greatest likelihood of posing a potential substantive threat to human health and the environment as the site is accessed. Additional determinations, based in part on the results of planned confirmational sampling and possibly on the results of additional, future studies of the site, will need to be made before the site can be released to the public or private sector for reuse.

Comment:

6. Future land use for each SEAD should be stated within the document.

Response:

The defined land use applicable to each of the SEADs has been identified in Section 2.1.1 (SEAD-24, conservation/recreational); Section 2.2.1 (SEAD-50/54, warehousing); and Section 2.3.1 (SEAD-67, planned industrial development).

Comment:

7. Ground cover and re-grading after removal operations were excluded from the cost analysis and evaluation.

Response:

The preliminary estimated costs provided include the cost of backfill, re-grading and re-establishment of vegetative cover.

II. SPECIFIC COMMENTS

Comment:

1. **Section 2.1.2, Paragraph Three, page 2.** Specify the total number of samples that was collected from the twelve soil borings completed at this site during the Expanded Site Investigation performed in 1993 and 1994.

Response:

Five soil borings were advanced in the vicinity of SEAD-24, not 12 as is suggested by the comment. Sixteen soil samples were collected from the soil borings at depths ranging from 0 to 2 feet below ground to 12 to 14 feet below ground. Another 13 surface soil samples were collected from the 0 to 2 inch below ground level.

Comment:

2. **Section 2.3.1, Paragraph Three, Page 7.** Remove the comment indicating that the waste piles "appeared" at the site as this reference is not appropriate.

Response:

The wording of the sentence has been changed to "As the site is overgrown with thick vegetation, it is suspected that the piles were placed in this area many years ago and have remained undisturbed since that time."

Comment:

3. **Section 3.0, Paragraph One, Page 9.** Manganese should be included as a contaminant of concern at SEAD-67 and SEAD-24, and aluminum should be included as a contaminant of concern at SEAD-24.

Response:

The Army's intent is to conduct the proposed removal actions to address a limited number of contaminants that it has identified as potentially posing a substantive threat to surrounding populations based on the currently existing information. This determination is based on a combination of the concentration of the chemical identified, its frequency of detection, and a preliminary, subjective determination of the potential severity of the identified impact.

Comment:

4. **Section 5, Paragraph One, Page 10:** The sum of the volumes estimated for removal for the three sites is 7,660 cubic yards, not the 7,650 cubic yards stated in this paragraph. Please revise.

Response:

The identified text has been changed to reflect the Army's current, revised estimate for the volume of soil to be removed. The number is neither 7,650 or 7,660 cubic yards, but approximately 6,195 cubic yards. The noted decrease in volume results due to a modification in the Army's proposed approach for conducting the proposed action.

Comment:

5. **Decision Document, Section 1.3.2, Third Paragraph, Page 1-4:** While this paragraph discusses the metals analytical results of previous samples collected at SEAD-24, it does not mention that some metals, notably aluminum, chromium, iron, magnesium, manganese, and zinc, were detected at concentrations exceeding criteria in samples collected from the subsurface, as deep as 14 feet below ground surface (bgs). Text should be revised.

Response:

The text has been modified to identify the names of the other metals that were detected in soil samples at concentrations in excess of NYSDEC's TAGM guidance values. Forty-two of the 44 metal concentrations determined to be present in excess of NYSDEC's TAGM guidance

levels were found in samples that were collected from 0 to 2 feet below grade surface (bgs). The two metal concentrations (i.e., one for zinc in sample SB24-1.3, 4 to 6 feet bgs, and one for magnesium in sample SB24-3.5, 8 to 10 feet bgs) have been specifically identified in the revised text.

Comment:

6. **Decision Document, Section 2.1, Second Paragraph, Page 2-1:** The Executive Summary indicates that the recommended action at SEAD-50 will be a soil removal, when in fact, according to the Recommendations (Section 2.8) it will also include removal of the sediments from roadside drainage ditches at the site. Revise Section 2.1 for clarity.

Response:

The text has been revised in both sections to be consistent. Due to the fact that the drainage ditches surrounding SEAD-50/54 are ephemeral, the Army no longer considers the streambed to be comprised of sediment. Therefore, the Army has decided to change the designation of the material contained in the drainage ditch to soil. Thus, the proposed removal action focuses solely on shallow soil to a depth of six inches.

Comment:

7. **Decision Document, Section 2.3.2, Soil, Third Paragraph, Page 2-4:** While this paragraph discusses the metals analytical results of previous samples collected at SEAD-50, it does not mention that some metals, notably antimony, chromium, magnesium, mercury, and zinc, as well as arsenic, were detected at concentrations exceeding criteria in samples collected from the subsurface, extending to one foot bgs. Text should be revised.

Response:

The first sentence of the identified has been changed to read "Eight metals (i.e., antimony, arsenic, chromium, copper, lead, magnesium, mercury, and zinc) were found in soil samples at concentrations that exceeded their respective NYSDEC cleanup objective levels."

Comment:

8. **Decision Document, Section 2.8, Page 2-11:** Revise the text to indicate that the quantity of soil and sediments to be removed from SEAD-50 are 5000 and 150 cubic yards, respectively, to be consistent with presentation of these figures in other section.

Response:

The identified text has been modified to reflect the new volume and weight of soil that the Army expects to be excavated and disposed under the proposed remedial action (i.e., 6,195 cubic yards of soil and approximately 9,290 tons).

Comment:

9. **Decision Document, Section 3.1, Second Paragraph, Page 3-1:** The Executive Summary indicates that the recommended action at SEAD-67 will be removal of the waste piles and berms, when in fact, according to the Recommendations (Section 3.8), it will also include removal of the sediments from the small stream located to the west of the site. Revise Section 3.1 for clarity.

Response:

The Army has decided to initially focus the proposed removal action at SEAD-67 solely on the removal of soil contained in piles and in the berm structures. Previously, the Army had given thought to performing a limited excavation in the area of the stream, but further consideration suggests that it is prudent to conduct additional sampling and analysis in the stream especially at upgradient and downgradient locations to better define the nature and extent of the contamination present and other possible sources contributing to any identified contamination, if it is found to exist.

Comment:

10. **Decision Document, Section 3.3.2, Soils, Third Paragraph, Page 3-4:** While this paragraph discusses the metals analytical results of previous samples collected at SEAD-67, it does not mention that some metals, notably calcium, manganese, mercury, potassium, and zinc, were detected at concentrations exceeding criteria in samples collected from the subsurface, extending as deep as four feet bgs. Text should be revised.

Response:

Contrary to the implications of the comment, the original text does indicate that calcium, manganese, mercury, potassium, and zinc were found at concentrations that exceeded comparative criteria levels, which are NYSDEC TAGM levels. All but one of the observed exceedances was found in test pit samples collected from the ABOVEGROUND piles and berm structures that are present in SEAD-67. While these samples are subsurface with reference to the top of the pile or the berm structure, they are not subsurface with reference to the surrounding topography resident in SEAD-67. Calcium was the only metal found at a

concentration exceeding its NYSDEC recommended soil cleanup objective level in a SEAD-67 topographic subsurface sample found at a level of 3160 J mg/Kg in the sample collected from location MW67-2 at a depth of 2 to 4 feet below grade.

Comment:

11. **Decision Document, Section 3.8, Third Paragraph, Page 3-11:** The text indicates that "The quantity of soil and sediment to be removed from SEAD-67 is approximately 240." Revise this sentence to clarify that this figure refers to the tonnage, not volume, which is estimated as 160 cubic yards.

Response:

The identified sentence now reads "The quantity of soil to be removed from SEAD-67 is estimated as approximately 225 tons or approximately 150 yd^3." The change in quantity and volume arises due to the Army's decision to postpone any work in the stream until a clearer definition of the nature and extent and source of contamination, if present, is obtained.

Response to the Comments from the New York State Department of Environmental Conservation

Subject: NYS Inactive Hazardous Waste Disposal Site No.8-50-006
Draft Action Memorandum and Decision Document Removal Actions (SEADs 24, 50/54, 67)
Seneca Army Depot
Romulus, New York

Comments Dated: October 5, 2001
Date of Comment Response: April 8, 2002

The New York State Department of Environmental Conservation has reviewed the above referenced document. Comments are as follow:

General comments:

Comment:

In the Draft Action Memorandum in reference to verification sampling it states that "resulting data will be compared to regulatory limits for residual soil contamination established by the US EPA in the document "Soil Screening Guidance: Technical Background Document" (EPA/540/R-95/l28, July 1996). On the contrary, in the Draft Decision Document for the Removal Action at SEAD-24, it states that the "analytical results from the samples will be compared to NYSDEC criteria values for each media and used to assess the adequacy of the removal action." Please reconcile. Also, in the Draft Decision Documents for SEADs 50/54 and 67, it does not specify whether any verification sampling will be compared to soil cleanup standards nor specify which standards will be used. Clarification is sought.

Response:

Verification sampling and analysis results will be compared to NYSDEC's recommended soil cleanup objective levels. Changes reflecting this change have been made throughout the Action Memorandum and the Decision Documents for each SWMU.

Comment:

This document does not specify the proposed future land use for any of the SMWUs of concern. It should be presented in the text for each SEAD the proposed future land use and its relevance to the proposed cleanup goals. For instance, this draft compares detected lead levels with the USEPA guidance levels for residential use, however it appears that some of these SEADs are in the proposed conservation/recreation area.

Response:

Text provided in the "Site Descriptions and History" portions for the three SEADs (i.e., Sections 2.1.1, Section 2.2.1, and Section 2.3.1) of the Action Memorandum have all been modified to provide information regarding the intended future land use at each of the sites. Similar text changes have also been made in the "Site Description" portions (i.e., Section 1.2.1 for SEAD-24, Section 2.2.1 for SEAD-50/54, and Section 3.2.1 for SEAD-67) of each of the Decision Documents.

Comment:

For each of the removal actions that propose to excavate below the existing ground surface, site restoration should be considered or at least an explanation as to why it is not necessary should be provided in the text.

Response:

Text has been added to each section of the Action Memorandum and the individual Decision Documents that indicates that locations where excavations are performed will be backfilled with clean fill, regarded and returned to pre-excavation conditions, exclusive of any large trees or rocks that may be present.

Comment:

On page 7-8 of Section 7.7 of the December 1995 Expanded Site Inspection (ESI) of Eight Moderately Low Priority AOCs SEADs 5,9, 12 (a and b), (43, 56, 69) 44(A and B) 50, 58 and 59, it states that "it is recommended that a Decision Document be prepared which outlines a limited sampling program and a removal action for the affected media at SEAD-50." However this draft only proposes to remove the top six-inches of the impacted surface soils and sediments. Please reconcile. Also, it appears that SEAD-54 was not investigated under the ESI contrary to what is indicated in this draft.

Response:

The Action Memorandum and the Decision Documents discuss and describe a removal action and a confirmational sampling and analysis program that is proposed for SEAD-50. The current proposal to remove six inches of soil in the areas selected is intended to remove a major portion of the contamination that has been identified at the site to date. The proposed confirmational sampling and analysis, which includes a proposal for collecting samples from

the area surrounding the perimeter of the planned excavations, will provide additional data relative to the extent of contamination that may be present beyond that soil which is removed.

SEAD-54 is Tank #88 which is located in the Tank Farm. Within the fourth sentence of the second paragraph of Section 1.1.2.8.1 of the identified December 1995 Expanded Site Inspection (ESI) of Eight Moderately Low Priority AOCs SEADs 5,9, 12 (a and b), (43, 56, 69) 44(A and B) 50, 58 and 59 Report, Tank #88 is identified as being present. Tank #88, which was full of asbestos at the time of the ESI, was not independently investigated. Samples were collected from the general vicinity of SEAD-54 as part of the effort that was completed for SEAD-50.

Comment:

On page 7-3 under Section 7.5, of the ESI for Seven High Priority SMWUs SEAD 4, 16, 17, 24, 25, 26 and 45 it recommends for SEAD-24 Abandoned Powder Burning Pit that "a removal action be performed in conjunction with some limited investigative work to fully define the observed surficial soil impacts." However, this draft only proposes to excavate surface soils to a depth of six-inches without any further lateral investigation. Please reconcile.

Response:

The Action Memorandum and the Decision Documents discuss and describe a removal action and a confirmational sampling and analysis program that is proposed for SEAD-24. The current proposal to remove six inches of soil in the areas selected is intended to remove a major portion of the contamination that has been identified at the site to date. The proposed confirmational sampling and analysis program, which includes a proposal for collecting samples from the area surrounding the perimeter of the planned excavations, will provide additional data relative to the extent of contamination that may be present beyond that soil which is removed.

Comment:

On page 7-6 under Section 7.9, of the ESI Seven Low Priority AOCs SEADs 60, 62, 63, 64 (A, B, C and D) 67, 70, and 71 it recommends that "a decision document be prepared that outlines a removal action and a limited sampling program of the piles at SEAD-67 and a limited sampling plan of the sediments in and around SEAD-67." The removal action in conjunction with "a limited sampling program to demonstrate the attainment of cleanup standards is believed to be the most economical course of action for this site." The ESI continues to state that "the limited sediment sampling plan will provide a more complete understanding of the nature and extent of sediment and pesticide concentration that were

found in the SEAD-67 ESI sediment samples." However, this draft only proposes to excavate the waste piles and six-inches of the sediment without any further sampling. Please reconcile.

Response:

The Action Memorandum and the Decision Documents discuss and describe a removal action and a confirmational sampling and analysis program that is proposed for SEAD-67. The current proposal to remove the existing soil piles and berm structures is intended to remove a major portion of the contamination that has been identified at the site to date. The proposed confirmational sampling and analysis program, which includes a proposal for collecting samples from the area beneath and immediately surrounding the perimeter of the identified piles and berms, will provide additional data relative to the extent of contamination that may be present beyond that soil which is removed. Additionally, the Army is proposing to conduct additional sampling in the stream to further quantify the nature, extent, and potential sources to, any sediment contamination noted.

Specific comments on Draft Action Memorandum:

Comment:

1. Page 6, Section 2.2, Results of ESI Program at SEAD50/54: There are typographical errors in the first sentence of the second paragraph under the sub-section of Sediment.

Response:

The identified typographical mistakes have been corrected.

Comment:

2. Page 9, Section 4, Endangerment Determination: Please expand on how these SWMUs "if not addressed by implementing the response actions selected in this Action Memorandum, may present an imminent and substantial endangerment to public health, or welfare, or the environment."

Response:

The referenced sentence has been changed to read "Actual or threatened releases of pollutants and contaminants from the identified SWMUs, if not addressed by implementing the response actions selected in this Action Memorandum, may present an endangerment to public health, or welfare, or the environment." The phrase "imminent and substantial" has been eliminated,

as it overstates the perceived threat and risk associated with the identified releases. However, based on the comparison of the available data to soil cleanup objective levels, cleanup of the selected areas should lessen the potential risk associated with the identified contamination.

Specific comments on Draft Decision Documents:

Comment:

1. Page 1-5, Section 1.3.2, Results of Sampling Program: Arsenic concentrations in groundwater are apparently exceeding ARARs and the discussion of arsenic contamination in the groundwater needs to be supplemented. The text states that "the highest concentration measured for arsenic in the samples was found in the upgradient well," however there is no discussion as to why it is not being further addressed. For instance, is it the Army's contention that this arsenic is naturally occurring or that there is a potential upgradient source, and if so, will there be further investigation to identify the source of contamination?

Response:

During a review of the identified text, it was determined that the reference cited (see Drinking Water Standards and Health Advisories, Office of Water, EPA 822-B-00-001, Summer 2000) as the source of the federal Maximum Contaminant Levels (MCLs) for arsenic and other metals contained an error for the arsenic MCL entry. On page 8 of the table in the cited reference, the MCL for arsenic is listed as 0.005 mg/L or 5 ug/L. At the time of the submission of the draft Action Memorandum and Decision Document for SEAD-24, the actual federal MCL in effect for arsenic was 0.05 mg/L or 50 ug/L (see National Primary Drinking Water Standards, Office of Water, EPA 816-F-01-007, March 2001). None of the concentrations of arsenic measured in groundwater samples collected from the area of SEAD-24 exceeded the actual MCL value of 50 ug/L.

On October 31, 2001, the US EPA announced its decision to move forward implementing a new MCL standard of 10 ug/L. None of the groundwater concentrations measured in samples collected from SEAD-24 exceed this newly proposed MCL value. Therefore, at this time the Army has no plans to conduct any additional work pertaining to arsenic in the groundwater.

Comment:

2. Page 1-12, Section 1.10, Post-Removal Verification Sampling: The last sentence states that "post-excavation sampling will be used to satisfy the Data Quality Objectives for this removal action," however the Data Quality Objectives are not defined for this site.

Response:

This sentence has been changed to indicate that post-excavation confirmational samples will be compared to the NYSDEC's recommended soil cleanup levels.

Comment:

3. Page 1-12, Section 1.10, Post-Removal Verification Sampling: Please provide the number of confirmation samples that are proposed to be taken, including the number of post-excavation sidewall and bottom samples, the analytes and methods that will be used.

Response:

Base of excavation confirmational samples will be collected at a rate of 1 sample for each 2,500 square foot (sq. ft.) or less of excavation base. Thus, based on the current estimates that areas with proposed excavation bases measuring approximately 76,500 sq. ft., 9,300 sq. ft. and 12,500 sq. ft. will be worked as part of the proposed actions, the number of confirmational samples collected from the base of the excavation would be 31, 4, and 5, respectively from each area. Additional samples will be taken from the base if additional area is excavated during this removal action.

In addition, one sample will be collected for each 100 feet of perimeter opened for the excavation. Due to the shallow nature of the proposed excavations at SEAD-24, these samples will be collected from the surface of the ground surrounding the excavation instead of from the sidewall of the excavation. Based on the estimates that the perimeters of the three proposed excavation measure 1,950 feet, 475 feet, and 420 feet for Areas 1, 2, and 3 respectively, the number of confirmational samples that should be collected from the perimeter are 20, 5, and 5 respectively. Again, additional samples will be collected if additional excavation perimeter is opened.

Analyses that will be performed on the collected samples include Target Compound List metals and semivolatile organic compounds.

Comment:

4. Page 2-1, Section 2.1, Executive Summary: The statement "this removal action is intended to be the final remedy for the site," is inappropriate. A removal action is an action that is taken as an immediate response. Only further analysis will demonstrate whether or not additional remedial action is required. Therefore, the statement should be removed from the text.

Response:

The identified sentence has been removed.

Comment:

5. Page 3-11, Section 3.8, Recommendations: It states that "the quantity of soil and sediment to be removed from SEAD 67 is approximately 240." Please specify units.

Response:

The unit reference that should have accompanied the 240 was tons. However, based on a reassessment of the proposed removal action, the revised estimate of soil to be excavated is now 150 cubic yards or approximately 225 tons.

Comment:

6. Page 3-11, Section 3.9. Justifications: See Specific Comment # 4 above.

Response:

See response to Specific Comment # 4 above.

Comment:

7. There are three separate draft decision documents, one for each SEAD, that support the Draft Action Memorandum. Each decision document repeats much of what is stated, section for section, and the above comments are applicable to each draft decision document.

Response:

The Army has attempted to make necessary corrections to all documents included in this combined Action Memorandum and Decision Document.

Response to the Comments from the New York State Department of Health

Subject: NYS Site No.8-05-006
Draft Action Memorandum and Decision Document
Seneca Army Depot
Romulus, New York

Comments Dated: November 26, 2001
Date of Comment Response: April 8, 2002

I have reviewed the draft Action Memorandum and Decision Document for Removal Actions at Four Metals Sites – SEADs 24, 50/54 and 67 of the Seneca Army Depot located in Romulus, Seneca County and your October 5, 2001 comment letter on the referenced document. I concur with your assessment of the report and have the following additional comments:

SEAD-24 The Abandoned Powder Burning Pit

Comment:

1. Since elevated levels of carcinogenic PAH's are located at SS24-1, post-removal verification sampling of this area should include SVOC parameters in addition to metals parameters.

Response:

Agreed: Confirmational sampling and analysis will include provisions for the analysis of samples for semivolatile organic compound content.

Comment:

2. The Decision Document does not include any provisions for site restoration. If a clean soil cover is not included, the post-confirmatory sampling results of the exposed subsurface soils will be compared to surface soil TAGM levels by this department.

Response:

The Army's intention is to restore each of the proposed excavations to conditions that are equivalent to pre-excavation conditions. Once confirmational sampling and analyses are complete, and the results are reviewed and discussed with the state and the federal government, the area of excavation will be backfilled, regarded to pre-activity contours and re-seeded. Specific details of the proposed backfill and site restoration activities will be provided in the work plan developed by the remedial action contractor.

SEAD-50/54Tank Farm Area

Comment:

1. *Executive Summary* – It is premature to declare that this removal action is intended to be the final remedy for the site.

Response:

The identified sentence has been removed from the Executive Summary.

Comment:

2. As stated above, the Decision Document does not include any provisions for site restoration. If a clean soil cover on excavated soil areas is not included, the post-confirmatory sampling results of the exposed subsurface soils will be considered surface soil to compare to TAGM levels by the Department. Also, it is not stated if restoration is planned for sediment removal areas either. Since the drainage ditches are considered seasonal with variable flow rates, the department will compare the post-removal sediment sample results to surface soil instead of sediment TAGM levels.

Response:

The Army's intention is to restore each of the proposed excavations to conditions that are equivalent to pre-excavation conditions. Once confirmational sampling and analyses are complete, and the results are reviewed and discussed with the state and the federal government, the area of excavation will be backfilled, re-graded to pre-activity contours and re-seeded. Specific details of the proposed backfill and site restoration activities will be provided in the work plan developed by the remedial action contractor.

Comment:

3. During excavation of asbestos containing soil areas, appropriate measures must be taken to protect on- and off-site receptors to potential airborne asbestos fibers.

Response:

The proposed excavations and removal actions conducted in the vicinity of former sampling location SS50-1 will be completed in a manner that is consistent and compliant with New York's Department of Labor's Industrial Code Rule 56. Necessary monitoring and soil

wetting operations will be completed as part of the proposed actions in this area. Details of the intended scope of work will be provided in the remedial action work plan that is developed by the remedial contractor prior to the initiation of the work.

SEAD-67 Dump Site East of Sewage Treatment Plant

Comment:

1. *Executive Summary* – It is premature to declare that this removal action is intended to be the final remedy for the site.

Response:

The identified sentence has been removed from the Executive Summary.

Comment:

2. It is stated in the site description section that waste piles and berm locations are shown as dotted lines in Figure 3-1. Unfortunately, Figure 3-1 does not contain any dotted lines depicting waste piles and berm locations. Please revise this figure.

Response:

Outlines depicting the approximate extent of the piles have been added to Figure 3-1.

Comment:

3. *Action Memorandum – Groundwater* (page 8) – Please retract the following statement, "Aluminum, iron and manganese are not considered to pose significant health risks". This statement is misleading and not necessarily correct.

Response:

The identified sentence has been reworded. It now reads "Elevated levels of turbidity were recorded in groundwater samples collected from SEAD-67, and it is presumed that the noted exceedances of aluminum, iron and manganese are associated, at least in part, with the elevated levels of turbidity."

Comment:

4. I understand that the waste piles and berm areas are to be excavated and removed from the site, but I do not understand how much, if any, of the soil beneath the waste piles and berm areas is to be removed. Unfortunately no data was provided to indicate if soil beneath the piles and berms is contaminated and therefore it is unclear how much of the piles/berms will actually be excavated.

Response:

The goal of the proposed removal action is to excavate and remove the soil contained in the piles and the berm structures. Once the piles/berm structures are removed, samples of the soil underlying the piles/berm structures will be collected and analyzed to identify potential impacts to the ground surface.

Comment:

5. *Section 3.10* – "The post-excavation samples will be used to satisfy the Data Quality Objectives for the site". I found no reference to what the Data Quality Objectives are for the site. Clarification is needed.

Response:

The identified sentence has been revised and now reads "Each soil sample will be analyzed for metals and semivolatile organic compounds, and the resulting data will be compared to NYSDEC's recommended soil cleanup objective criteria."