U.S. ARMY ENGINEER DIVISION
HUNTSVILLE, ALABAMA

FINAL

DECISION DOCUMENT FOR REMOVAL ACTIONS AT SWMUs SEAD-24, SEAD-50, SEAD-54, AND SEAD-67, SENECA ARMY DEPOT ACTIVITY

NOVEMBER 1995

DECISION DOCUMENT
FOR REMOVAL ACTION
AT SEADS-24,50,54 and 67 SENECA ARMY DEPOT ACTIVITY

PURPOSE OF INTERIM REMEDIAL ACTION

This decision document presents the selected removal action for the abandoned Power Burning Pit (SEAD-24), the Tank Farm (SEAD-50), the Asbestos Storage Unit (SEAD-54), and the Dump Site East of Sewage Treatment Plant Number 4 (SEAD-67), at the Seneca Army Depot Activity (SEDA). This removal action was developed in accordance with 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 (NCP).

SEAD-24 is located in the west-central portion of SEDA. The burning pit is approximately 325 by 150 feet and surrounded on the east, south and west by a U-shaped, vegetated berm approximately 4 feet high. The burning pit was active during the 1940s and 1950s, and while exact operating practices are unknown, black powder, M10 and M16 solid propellants and explosive trash were probably disposed here by burning. Petroleum hydrocarbon fuel may have been used to initiate the burn.

SEAD-50 is located in the southeastern portion of SEDA. There are 4 tanks remaining on the site, three of which are empty. Two of the empty tanks were used to store an antimony ore, and the third was used to store a titanium ore. The fourth tank is currently used to store asbestos and comprises SEAD-54.

SEAD-67 is located in the east-central portion of SEDA and is the waste piles and berms located in a heavily vegetated area east of Sewage Treatment Plant No. 4. The piles are approximately 10 feet in diameter, and are all approximately 3 to 4 feet high except one pile which is 10 feet high. The berms are each 20 to 30 feet long and are also approximately 3 to 4 feet high. The contents of the waste piles and the time period during which the waste piles were formed are unknown.

An Expanded Site Inspection (ESI) was performed at SEAD-24 in 1993 and 1994 and at SEADs-50, 54, and 67 in 1994. The data collected show that the surface soil at each of the sites has been impacted by metals and PAHs and the surface soil at SEADs-50 and 54 has been impacted by asbestos.

This removal action is intended to be the final remedy for each of the four sites.

SUMMARY OF SITE RISK

Impacted soil at SEADS-24, 50, 54 and 67 presents the potential for human and environmental exposure to various heavy metals, PAHs and asbestos. The soil at all 4 sites may pose a threat to on-site workers, visitors and terrestrial biota through dermal contact; and to terrestrial and aquatic biota through ingestion. The soil at SEADs-50 and 54 may pose a threat to on-site workers, visitors and terrestrial biota through inhalation.

SUMMARY OF REMEDIAL ALTERNATIVES

Three general categories of removal actions for the contaminated soils were considered: on-site treatment, on-site containment, and off-site disposal.

The on-site treatment alternative considered was soil-washing. The advantages of soil washing are that it is well suited for the treatment of PAH and metals-impacted soil and it reduces the volume of soil that needs to be disposed of off-site. The primary disadvantage of using soil-washing as a remedial alternative is that it is not effective with the type of soil found at SEDA that has a high clay or silt content.

The on-site containment alternative considered was in-situ solidification. The advantages of this alternative are that it is applicable to PAH and metals-impacted soil and it eliminates the need to transport or dispose of impacted soil off-site. The disadvantages using in-situ solidification are that it is unsuitable for use in cold climates, cohesive soil, and soil with a high percentage of gravel and cobbles, all of which exist at SEDA.

The off-site disposal alternative considered was excavation, removal and off-site disposal. The advantages of this method is that there are no limitations on the types of waste or types of soil that can be excavated and removed, and that it can completely eliminate contamination at a site and eliminate the need for long term monitoring. The primary disadvantage to this method is the cost associated with off-site disposal if the material to be removed is classified as hazardous under 40 CFR 261 Subpart C.

Off-site disposal has been selected as the preferred remedial alternative for the removal of PAHs, metals and asbestos impacted soil at SEADs-24, 50, 54, and 67. The unsuitability of on-site treatment and on-site containment for the conditions at SEDA eliminate them as practical remedial alternatives at these sites. Of the three alternatives discussed, excavation, removal and off-site disposal will be the alternative most able to achieve the appropriate ARARS and eliminate risk of human and environmental exposure from PAH, metals and asbestos-impacted soil; and because none of the impacted soil to be removed will be classified as hazardous under 40 CFR 261 Subpart C, this removal method will be cost-effective as well.

DESCRIPTION OF THE SELECTED REMEDIAL ACTION

Soil at SEADs-24, 50, 54 and 67 will be excavated, contained and transported to a non-hazardous waste landfill to be disposed. Dust suppression methods will be employed to minimize the dispersion of impacted dust during the removal operations. Particulate monitoring will be performed to monitor the effectiveness of the dust-suppression, and at SEADs-50 and 54, asbestos monitoring will be performed at the perimeter of the removal operation. A Health and Safety Plan will describe the procedures to be followed to ensure that the removal is completed with all applicable consideration for worker safety.

Post-removal verification sampling will be performed to ensure that all impacted soil exceeding state and federal criteria is removed. A Chemical Data Acquisition Plan will describe the procedures to be followed to ensure that the data collected is valid, and will be accepted as evidence of a successful removal action. At a minimum, the QA/QC plan will address sampling procedures, analytical procedures, data validation and reduction procedures, and quality assurance samples (duplicates, blanks, etc.) The analytical methods specified will be acceptable to NYSDEC and EPA, and will have detection limits low enough to ensure that the treatment criteria have been met.

PUBLIC/COMMUNITY INVOLVEMENT

It is Department of Defence (DoD) and Army Policy to involve the local community as early as possible and throughout the installation restoration process at an installation. To accomplish this, a Community Relations Plan (CRP) was developed at SEDA with input from residents and officials from the adjacent towns in the area. The CRP is the guidance document that, under the Federal Facilities Agreement (FFA), will be followed to conduct community relations activities at this site. Furthermore, the Technical Review Committee (TRC), which meets quarterly, has been kept up to date on this project. The TRC is open to the public and attendees include interested environmental groups and newspaper reporters. The development in each TRC are reported in the local newspapers. A public announcement with a 30-day comment period and a public meeting will be scheduled.

DECLARATION

The selected remedy is protective of human health and the environment, attains Federal and State requirements that are applicable or relevant and appropriate to this removal action, and is cost effective. This remedy satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, and the volume as a principal element.

Because this remedy will not result in hazardous substances remaining on-site above levels that allow for unlimited use and unrestricted exposure, the five-year review will not apply to this action.

Roy E. Johnson
LTC, U.S. Army
Commanding

Date

COMMENTS AND RECOMMENDATIONS
PRE-DRAFT DECISION DOCUMENT FOR
REMOVAL ACTIONS AT SWMUS
SEADS 24, 50, 54 AND 67
SENECA ARMY DEPOT ACTIVITY
ROMULUS, NY
NOVEMBER 1995

Comment #1 General, Scott Bradley - Report Format

Documents should conform to the requirements of EPA/540/P-90/004 (Action Memorandum Guidance) in both content and structure unless a directive to use other requirements exists.

Recommendation: Identify and follow appropriate requirements.

Response #1 Agree. The soil and sediment analytical results for the three SWMUs showed the presence of various metals and semivolatile organics which exceeded their respective TAGMs. The presence of these hazardous constituents at concentrations exceeding their respective TAGMs causes the SWMUs to be considered a potential threat to human health, welfare, or the environment. In accordance with the decision process outlined in the Federal Facilities Agreement (FAA), if an Area of Concern (AOC) is determined to potentially pose a threat to human health, welfare, or the environment, the Army can either perform a removal action to eliminate that threat, or it can conduct a CERCLA Remedial Investigation (RI). A removal action is proposed for the three SWMUs as the most cost effective and permanent solution for the localized presence of the metals and SVOCs in surface soils and the absence of any other contaminants of concern which were analyzed for.

The format of the document is based upon the Statement of Work (SOW) under Delivery Order 0040 to Contract DACA87-92-D-0022 which specifies the requirements for preparation of the decision document. The outline and content of the Decision Document conform with the requirements specified in the SOW.

Comment #2 Section 3.1, p.1-3, Scott Bradley - Discussion of study results.

Recommendation: Provide site maps identifying locations which exceed their TAGMs. Provide documentation which sufficiently describes that contamination is only present in surface soils.

Response #2 Agree. Figures are provided in the Decision Document for all three SWMUs showing the location and concentration of metals which exceed their respective TAGMs. In addition to the surface soil samples which were collected at each SWMU at the 0-0.2 ft. depth, soil borings were advanced to determine the vertical extent of the hazardous constituents. Concentrations of the metals and SVOCs at depth below the surface soil samples were generally below their respective TAGMs, showing that the presence of the contaminants were generally limited to the 0-0.2 horizon. All surface soil samples were non-composited. The soil borings were collected at 2 foot intervals.

Comment #3 Section 4.0, p. 1-13, Scott Bradley - Justification for proposed removal actions.

Recommendation: Provide additional justification for proposed removal actions.

Response #3 Agree. The justification for recommending removal of surface soils to a depth of 6" is based upon the rationale that the hazardous constituents which exceeded their TAGMs were generally confined to the 0-0.2 foot horizon. Surface soils are generally defined as 0-6". Further, samples collected at greater depths in soil borings did not show exceedence of TAGMs in most cases. In order to implement the most cost effective solution, and to minimize the volume of soils excavated, it is recommended that excavation of soils be performed to a depth of 6 inches. This is also generally the minimum limits for excavation and grading equipment.

Comment #4 Section 8.0, p. 1-18, Scott Bradley - Inconsistency

Section 4.0 identifies soil removal to a depth of 6" and Section 8.0 identifies removal to a depth of 1.0'.

Recommendation: Resolve the inconsistency noted above.

Response #4 Agree. Section 8.0 has been changed to specify that removal of surface soils be performed to a depth of 6".

Comment #5 Section 10.0, p. 4-19, Scott Bradley - Justification of Post-Excavation Samples

Recommendation: Ensure objectives for post-excavation samples to include data quality objectives.

Response #5 Agree. The post-excavation samples are intended to ensure that the recommended removal actions will reduce the concentrations of metals and semivolatile organics in surface soils to the NYSDEC Technical and Administrative Guidance Memorandum (TAGM) HWR-92-4046 recommended levels in soils. Therefore, the DQOs for the removal actions will verify that the removal actions have accomplished this. The post-excavate samples are also intended to be used to assess whether the extent of soil removal shown in the Removal Plans are sufficient to meet these objectives. The location and numbers of past-excavation samples are in accordance with NYSDEC Sampling Guidelines and Protocols, March 1991. The analysis will be identical to those performed in the Expanded Site Inspection (EIS) for metals and semivolatile organics which conform with the NYSDEC CLP

SOW. The samples will also determine whether the exposure pathways identified in the ESI have been eliminated by the removal action.

Comment #6 General, Scott Bradley.

Recommendations: See comment 1-3 as they apply to SEADs 50, 54 and 67.

Response #6 The responses to comments 1-3 are intended to apply for SEADs 24, 50, 54 and 67.

Comment #7 Summary Section, Scott Bradley - Use of term "Interim Remedial Actions".

Recommendation: Replace references to "Interim Remedial Action" with "Removal Actions".

Response #7 Agree. The term "Interim Remedial Actions" has been replaced by "Removal Action".

Comment #8 SEADs 50, 54 and 67 Entire Section, A. Maly, Pesticide Removal.

Recommendations: Provide information on source of pesticide contamination at each SEAD. State if other clean-up work is being done for pesticides.

Response #8 Agree. The source of the pesticides in these areas is unknown since there was no previous data available for these sites and very little is know about past waste disposal practices. The use of pesticides at the Seneca Army Depot Activity in the past may have contributed to the detectable levels found in the sediment samples. The removal action is recommended for the presence of several polynuclear aromatic hydrocarbons as well as selective pesticides. The concentration of pesticides were compared to NYSDEC sediment criteria for human health and wildlife. Removal of sediments to concentration of these constituents to below their respective criteria will be protective of both human health and wildlife and will eliminate these potential exposure pathways from considerations. The Army does not currently use pesticides or herbicides to any significant degree and therefore, the removal action should be considered as a permanent solution for this media and the contaminants of concern. There are other SWMUs which are being evaluated for pesticides at SEDA.

Comment #9 Executive Summary, Section 1.0, A. Maly, Wording of "release of hazardous constituents and disposal in off-site, non-hazardous waste landfill."

Recommendation: Use of wording should be less contradictory.

Response #9 Agreed. The reference to disposal in "off-site non-hazardous waste landfill" will be changed to "off-site permitted waste landfill" to avoid the contradiction in terms. This term was used assuming that waste composite samples of stockpiled soils and sediments would indicate that the soils were suitable for non-hazardous disposal in accordance with state and federal requirements.

In addition, the estimated costs for excavation and disposal of soils is based upon disposal in a non-hazardous waste landfill.

D#13\Comments\DecDoc\Draft.Pre

PARSONS ENGINEERING SCIENCE, INC.

Prudential Center • Boston, Massachusetts 02199-7697 • (617) 859-2000 • Fax: (617) 859-2043

November 7, 1995

Ms. Dorothy Richards
CEHND-PM-EO
U.S. Army Corps of Engineers
Huntsville Division
4820 University Square
Huntsville, Alabama 35807-4301

SUBJECT: **Final Submittal of the Decision Document for Removal Actions at SWMUs SEAD-24, SEAD-50, SEAD-54, and SEAD-67, at Seneca Army Depot Activity**

Dear Ms. Richards:

Parsons Engineering Science, Inc. (Parsons ES) is pleased to submit the Final submittal of the Decision Document for Removal Actions at the above Areas of Concern (AOC). This work was performed in accordance with the Scope of Work (SOW) for Delivery Order 0040 to the Parsons ES Contract DACA87-92-D-0022. Included with this letter is a compilation of written responses to Army comments made on the Pre-draft submittal. Copies of the final document were not issued to either the EPA or NYSDEC.

Parsons ES appreciates the opportunity to work with the Army Corps of Engineers on this important project and looks forward to a continued relationship on this and other projects. Please feel free to call me at (617) 859-2492.

Sincerely,

PARSONS ENGINEERING SCIENCE, INC.

Michael Duchesneau, P.E.
Project Manager

cc: Mr. Keith Hoddinott, HSHB-ME-S
Mr. Harry Krierler, SFIM-ACE-IRP
Mr. Steve Absolom, SDSSE-HE

MD/sb/D#13

DECISION DOCUMENT FOR
REMOVAL ACTIONS AT SWMUs
SEAD-24, SEAD-50 and -54, and SEAD-67
SENECA ARMY DEPOT ACTIVITY

Prepared for:

Seneca Army Depot Activity
Romulus, New York

Prepared by:

Parsons Engineering Science, Inc.
Prudential Center
Boston, Massachusetts

727024 NOVEMBER 1995

TABLE OF CONTENTS

TABLE OF CONTENTS
(CONT)

TABLE OF CONTENTS
(CONT)

List of Tables

TABLE OF CONTENTS
(CONT)

List of Figures

SEAD-24 ABANDONED POWDER BURNING PIT

1.0 EXECUTIVE SUMMARY

An Expanded Site Inspection performed at SEAD-24, the Abandoned Powder Burning Pit, at Seneca Army Depot Activity (SEDA) demonstrated that a release of hazardous constituents to the environment has occurred. This decision document presents the selected removal action that was developed in accordance with the Federal Facility 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 surface soil to the north and to the east of the Burning Pit be removed to a depth of six inches, contained, and disposed of at an off-site permitted waste landfill. This removal action is intended to be the final remedy for this site.

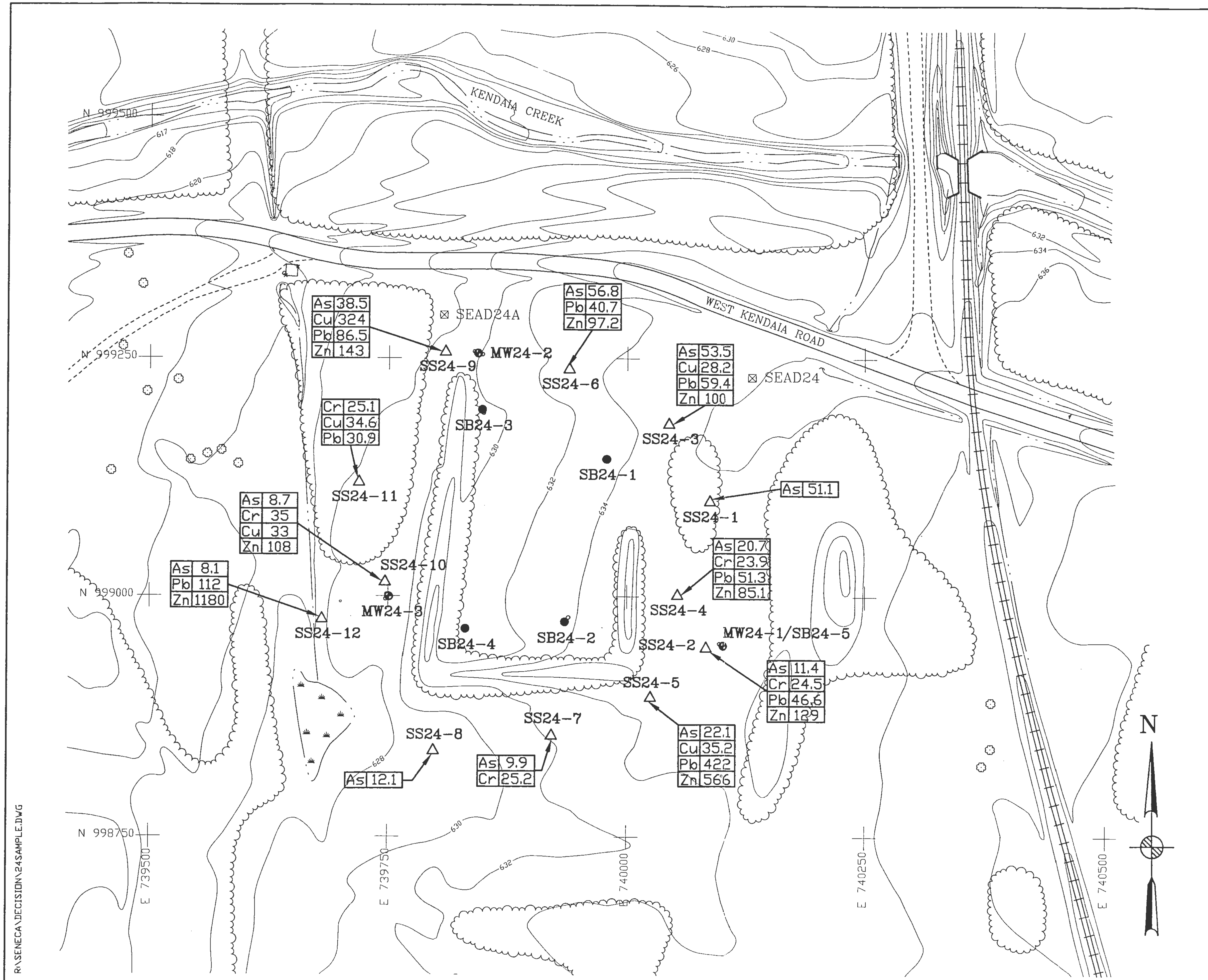
2.0 SITE BACKGROUND

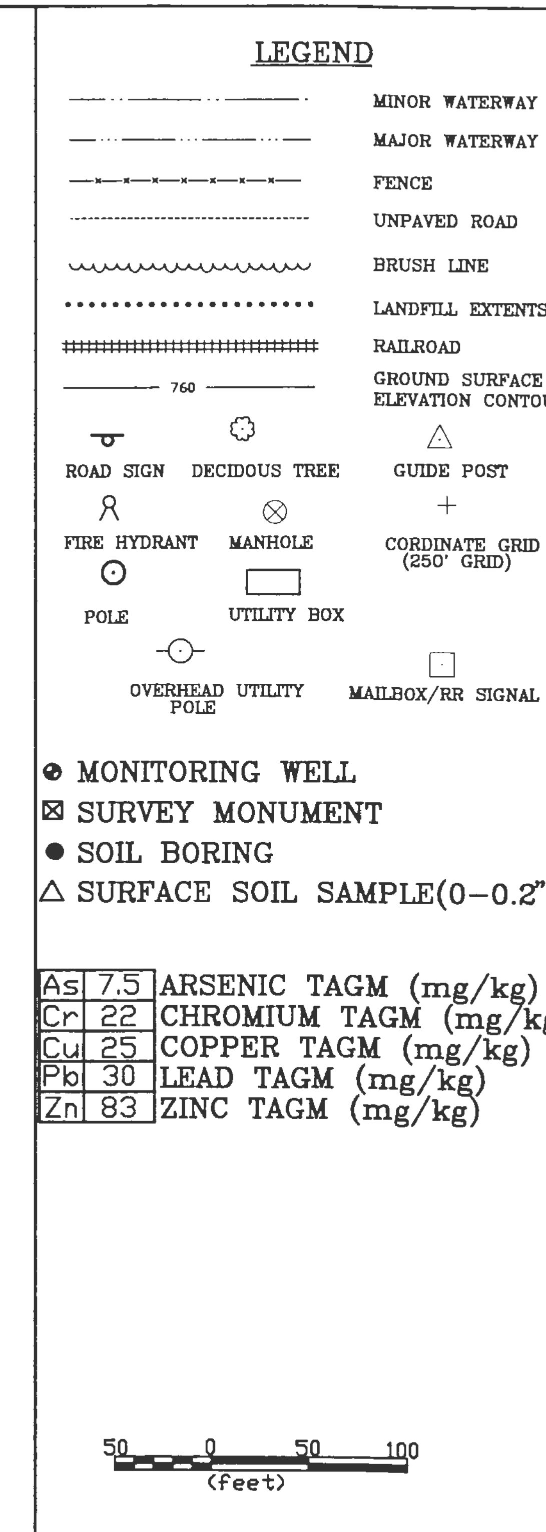
2.1 Site Description

SEAD-24, the Abandoned Powder Burning Pit, is located in the west-central portion of SEDA. The Burning Pit is approximately 325 by 150 feet and surrounded on the east, south and west by a U-shaped vegetated berm approximately 4 feet high (Figure 1). The site is bounded by West Kendaia Road to the north and by 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. The topography on-site slopes gently to the west; north of West Kendaia Road the land slopes more steeply to the north-northwest toward 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.

2.2 Site History

The Abandoned Powder Burning Pit was active during the 1940s and 1950s. Although operating practices at this site are unknown, black powder, M10 and M16 solid propellants, and explosive trash were probably disposed here by burning. Petroleum hydrocarbon fuel may have been used to initiate the burn. There is an shale-covered area adjacent to the bermed area which may also have been used.





PARSONS

PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
ABANDONED POWDER BURNING PIT
SEAD-24

DEPT. ENVIRONMENTAL ENGINEERING	Dwg. No. 727024-02001

FIGURE 1

PREVIOUS SAMPLE LOCATIONS WITH METALS EXCEEDING THEIR RESPECTIVE TAGMS IN SURFACE SOILS

SCALE	DATE	REV
1" = 100'	NOVEMBER 1995	A

3.0 PREVIOUS INVESTIGATIONS

3.1 Description of Sampling Program

In 1993 and 1994, an Expanded Site Inspection was performed to determine whether a release of hazardous constituents had occurred. A seismic refraction survey was performed to determine the direction of groundwater flow, and EM-31 and ground penetrating radar surveys were performed to locate potential pits and buried ordnance at the site and characterize the extent of disturbed soil at SEAD-24.

A total of five borings were advanced at SEAD-24 with four of the borings located within the berm area, and a fifth located outside of the Burning Pit to obtain background soil quality data. Three samples from each boring (a total of 15 samples) were submitted for chemical analysis. Surface soil samples (0-2") were collected from 12 locations surrounding the pit and submitted for chemical analysis.

Three monitoring wells were installed in the till/weathered shale aquifer at SEAD-24 with one monitoring well installed upgradient of SEAD-24 to obtain background water quality data and two wells installed adjacent to and downgradient to evaluate whether hazardous constituents have migrated from SEAD-24. One sample from each well (a total of three samples) was submitted for chemical analysis.

A total of 15 subsurface soil samples, 12 surface soil samples and three groundwater samples were collected from SEAD-24 for chemical analysis. All sample locations are shown in Figure 1. All the samples were analyzed for the following: the Target Compound List volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides/ polychlorinated biphenyls (PCBs), Target Analyte List metals and cyanide according to the New York State Department of Environmental Conservation (NYSDEC) Contract Laboratory Program Statement of Work. Explosive compounds were analyzed by Environmental Protection Agency (EPA) Method 8330, herbicides were analyzed by EPA Method 8150, nitrates were analyzed by EPA Method 352.2, and total recoverable petroleum hydrocarbons (TRPH) were analyzed by EPA Method 418.1.

3.2 Results of Sampling Program

The results of the soil sampling program are presented in Table 1. Several constituents including VOCs, SVOCs, pesticides and PCBs, herbicides, metals, nitroaromatics and TRPH were detected in the soil at this site. Three SVOCs and 15 metals were present in concentrations exceeding their respective Technical and Administrative Guidance Memorandum (TAGM) values. All three SVOC compounds that were reported to exceed their respective TAGM values were found in sample SS24-1. The only other organic compound of note was 2,4-dinitrotoluene, a nitroaromatic, which was present in several surface soil samples and was detected at a maximum concentration of 4,400 μg/kg. No TAGM value currently exists for this compound.

Of the 15 metals found, arsenic, cadmium, copper, lead, nickel, and zinc were found at the highest concentrations and in the largest number of samples above the TAGM values. In general, the distribution of the metals is limited to the surface soils at the site. Arsenic was detected at concentrations above the TAGM, which at this site is 7.5 mg/kg, in 11 of the surface soil samples collected. The highest concentration, 56.8 mg/kg, was detected in the surface soil sample SS24-6. All arsenic concentrations reported for the subsurface soils were below the TAGM concentration. Cadmium was detected in concentrations exceeding the TAGM value in only one sample, SS24-12. The concentration of 8.2 mg/kg exceeded the TAGM value of 1 mg/kg. Copper was detected in concentrations exceeding the TAGM value, which is 25 mg/kg, in 12 of the soil samples analyzed. Most of these were in the surface soil samples, and most were only slightly above the TAGM value (i.e., in the 25 to 30 mg/kg range). The exception was sample SS24-9, which had a copper concentration of 324 mg/kg, however, the copper concentration in the duplicate sample of SS24-9, SS24-13, was 34.5 mg/kg, suggesting that the high concentration is not widespread. Lead concentrations exceeded the TAGM value which is 30 mg/kg, in 14 of the soil samples analyzed. As with the other metals, the TAGM exceedances were limited primarily to the surface soil samples, which were collected at the 0-2 inch interval. The maximum concentration of lead, 422 mg/kg, was found in the surface soil sample SS24-5. All other lead concentrations were below 100 mg/kg. Nickel concentrations exceeded the TAGM value, of 37 mg/kg in eight of the soil samples collected. The only anomalously high concentration of nickel was 535 mg/kg, found in the surface soil sample SS24-12. Zinc concentrations exceeded the TAGM value (90 mg/kg) in 14 samples. As with all the other noted metals, there were primarily in surface soil samples. The highest concentrations were 566 mg/kg in SS24-5 and 1180 mg/kg in sample SS24-12.

TABLE 1

SOIL ANALYSIS RESULTS
SENECA ARMY DEPOT
SEAD-24 EXPANDED SITE INVESTIGATION

COMPOUND	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID UNITS	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NO. ABOVE TAGM	SOIL SEAD-24 0-0.2 10/22/93 SS24-1 202078	SOIL SEAD-24 0-0.2 10/22/93 SS24-2 202079	SOIL SEAD-24 0-0.2 10/22/93 SS24-3 202080	SOIL SEAD-24 0-0.2 10/22/93 SS24-4 202081	SOIL SEAD-24 0-0.2 10/22/93 SS24-5 202082	SOIL SEAD-24 0-0.2 10/22/93 SS24-6 202083	SOIL SEAD-24 0-0.2 10/22/93 SS24-7 202084	SOIL SEAD-24 0-0.2 10/22/93 SS24-8 202085	SOIL SEAD-24 0-0.2 10/22/93 SS24-9 202086
VOLATILE ORGANICS														
Methylene Chloride	ug/kg	12	10.3%	100	0	14 UJ	13 U	11 U	12 U	12 U	13 U	12 U	14 U	13 U
Acetone	ug/kg	27	10.3%	200	0	14 UJ	13 U	11 U	12 U	12 U	27	7 J	14 U	13 U
Chloroform	ug/kg	13	34.5%	300	0	5 J	13 U	11 U	12 U	13	5 J	1 J	3 J	13 U
Trichloroethene	ug/kg	1	3.4%	700	0	14 UJ	13 U	11 U	12 U	12 U	13 U	12 U	14 U	13 U
Benzene	ug/kg	1	3.4%	60	0	14 UJ	13 U	11 U	12 U	12 U	13 U	12 U	14 U	13 U
Toluene	ug/kg	2	3.4%	1500	0	14 UJ	13 U	11 U	12 U	12 U	13 U	12 U	14 U	13 U
Chlorobenzene	ug/kg	7	6.9%	1700	0	14 UJ	13 U	11 U	12 U	12 U	13 U	12 U	14 U	13 U
HERBICIDES														
2,4,5-T	ug/kg	8	3.4%	1900	0	6.1 U	6.7 U	5.5 U	6.2 U	6.1 U	6.4 U	6.1 U	6.9 U	8
Dicamba	ug/kg	9.7	3.4%	NA	NA	6.1 U	6.7 U	5.5 U	6.2 U	6.1 U	6.4 U	6.1 U	6.9 U	6.1 U
MCPP	ug/kg	6600	3.4%	NA	NA	6600	6700 U	5500 U	6200 U	6100 U	6400 U	6100 U	6900 U	6100 U
NITROAROMATICS														
1,3-Dinitrobenzene	ug/kg	76	3.4%	NA	NA	130 U	130 U	130 U	130 U	130 U	130 U	130 U	130 U	130 U
Tetryl	ug/kg	110	3.4%	NA	NA	130 U	130 U	130 U	130 U	130 U	130 U	130 U	120 J	130 U
2,4-Dinitrotoluene	ug/kg	4400	17.2%	NA	NA	130 U	310	640	130 U	4400	240	130 U	130 U	900
SEMIVOLATILE ORGANICS														
Acenaphthylene	ug/kg	54	3.4%	41000	0	54 J	440 U	360 U	400 U	1600 U	420 U	400 U	450 U	800 U
2,4-Dinitrotoluene	ug/kg	12000	24.1%	NA	NA	74 J	440 U	250 J	420	12000	93 J	400 U	450 U	5100
N-Nitrosodiphenylamine	ug/kg	810	17.2%	50000 *	0	30 J	440 U	74 J	70 J	650 J	420 U	400 U	450 U	440 J
Phenanthrene	ug/kg	44	13.8%	50000 *	0	37 J	440 U	360 U	400 U	1600 U	37 J	400 U	450 U	44 J
Anthracene	ug/kg	19	3.4%	50000 *	0	19 J	440 U	360 U	400 U	1600 U	420 U	400 U	450 U	800 U
Di-n-butylphthalate	ug/kg	1100	20.7%	8100	0	400 U	440 U	31 J	400 U	370 J	25 J	400 U	450 U	110 J
Fluoranthene	ug/kg	210	20.7%	50000 *	0	210 J	440 U	20 J	400 U	1600 U	82 J	400 U	450 U	95 J
Pyrene	ug/kg	260	20.7%	50000 *	0	260 J	440 U	18 J	400 U	1600 U	72 J	400 U	450 U	99 J
Benzo(a)anthracene	ug/kg	280	10.3%	220	1	280 J	440 U	360 U	400 U	1600 U	38 J	400 U	450 U	41 J
Chrysene	ug/kg	320	20.7%	400	0	320 J	440 U	18 J	400 U	1600 U	51 J	400 U	450 U	59 J
bis(2-Ethylhexyl)phthalate	ug/kg	1300	41.4%	50000 *	0	400 U	440 U	360 U	400 U	1600 U	420 U	400 U	450 U	520
Benzo(b)fluoranthene	ug/kg	350	13.8%	1100	0	350 J	440 U	360 U	400 U	1600 U	42 J	400 U	450 U	52 J
Benzo(k)fluoranthene	ug/kg	340	13.8%	1100	0	340 J	440 U	360 U	400 U	1600 U	40 J	400 U	450 U	44 J
Benzo(a)pyrene	ug/kg	420	13.8%	61	1	420	440 U	360 U	400 U	1600 U	34 J	400 U	450 U	45 J
Indeno(1,2,3-cd)pyrene	ug/kg	220	6.9%	3200	0	220 J	440 U	360 U	400 U	1600 U	22 J	400 U	450 U	800 U
Dibenz(a,h)anthracene	ug/kg	28	3.4%	14	1	28 J	440 U	360 U	400 U	1600 U	420 U	400 U	450 U	800 U
Benzo(g,h,i)perylene	ug/kg	170	6.9%	50000 *	0	170 J	440 U	360 U	400 U	1600 U	24 J	400 U	450 U	800 U

TABLE 1

SOIL ANALYSIS RESULTS
SENECA ARMY DEPOT
SEAD-24 EXPANDED SITE INVESTIGATION

COMPOUND	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID UNITS	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NO. ABOVE TAGM	SOIL SEAD-24 0-0.2 10/22/93 SS24-1 202078	SOIL SEAD-24 0-0.2 10/22/93 SS24-2 202079	SOIL SEAD-24 0-0.2 10/22/93 SS24-3 202080	SOIL SEAD-24 0-0.2 10/22/93 SS24-4 202081	SOIL SEAD-24 0-0.2 10/22/93 SS24-5 202082	SOIL SEAD-24 0-0.2 10/22/93 SS24-6 202083	SOIL SEAD-24 0-0.2 10/22/93 SS24-7 202084	SOIL SEAD-24 0-0.2 10/22/93 SS24-8 202085	SOIL SEAD-24 0-0.2 10/22/93 SS24-9 202086
PESTICIDES/PCB														
Endosulfan I	ug/kg	2.3	6.9%	900	0	2 U	2.3 U	1.9 U	2.1 U	2 UJ	1.1 J	2.1 U	2.3 U	1.9 J
4,4'-DDE	ug/kg	12	10.3%	2100	0	4 U	4.4 U	3.6 U	4.1 U	3.6 J	2 J	12	4.5 U	11 J
4,4'-DDT	ug/kg	35	3.4%	2100	0	4 U	4.4 U	3.6 U	4.1 U	4 UJ	4.1 U	35	4.5 U	4 UJ
Endrin aldehyde	ug/kg	4.2	3.4%	NA	NA	4 U	4.4 U	3.6 U	4.1 U	4 UJ	4.2 J	4 U	4.5 U	4 UJ
alpha-Chlordane	ug/kg	4.7	3.4%	540	0	2 U	2.3 U	1.9 U	2.1 U	2 UJ	2.1 U	4.7 J	2.3 U	2 UJ
gamma-Chlordane	ug/kg	6	3.4%	540	0	2 U	2.3 U	1.9 U	2.1 U	2 UJ	2.1 U	6	2.3 U	2 UJ
METALS														
Aluminum	mg/kg	25500	93.1%	15523	12	9540	16800	12000	18900	13200	13600	18700	14700	11500
Arsenic	mg/kg	56.8	93.1%	7.5	11	51.1	11.4	53.5	20.7	22.1	56.8	9.9	12.1	38.5
Barium	mg/kg	149	93.1%	300	0	71.6	149	57.8	105	121	81.9	118	105	68.8
Beryllium	mg/kg	1.2	93.1%	1	2	0.43 J	0.89 J	0.51 J	0.91 J	0.59 J	0.66 J	0.86	0.81 J	0.53 J
Cadmium	mg/kg	8.2	3.4%	1	1	0.64 U	0.72 U	0.71 U	0.69 U	0.75 U	0.65 U	0.55 U	0.77 U	0.68 U
Calcium	mg/kg	106000	93.1%	120725	0	79300	3290	23600	2140	23000	19900	2100	3940	11800
Chromium	mg/kg	35.1	93.1%	24	9	12.2	24.5	22.2	23.9	21.9	20.4	25.2	23.3	20
Cobalt	mg/kg	20.5	93.1%	30	0	4.7 J	13.9	10.9	11.5	10.4 J	10.6	13	12.6	10.7
Copper	mg/kg	324	93.1%	25	12	13.5 J	20 J	28.2 J	26.1 J	35.2 J	22.2 J	23.9 J	22.5 J	324 J
Iron	mg/kg	37700	93.1%	28986	10	14000	30900	25500	29200	25000	24300	29100	29700	23900
Lead	mg/kg	422	93.1%	30	14	15.1	46.6	59.4	51.3	422	40.7	15.4	24.4	86.5
Magnesium	mg/kg	43700	93.1%	12308	4	43700	4320	5960	4600	5470	4400	5190	4730	5010
Manganese	mg/kg	1770	93.1%	759	4	393	1770	353	244	550	724	677	448	546
Mercury	mg/kg	0.15	68.0%	0.1	1	0.04 J	0.05 J	0.04 J	0.15	0.04 U	0.03 U	0.05 J	0.04 J	0.04 J
Nickel	mg/kg	535	93.1%	37	8	13.8	30	39.5	26.4	31.6	26.8	30.1	34.8	32.3
Potassium	mg/kg	2510	93.1%	1548	11	1140	1340	1190	1710	1560	1360	2090	1590	1020 J
Selenium	mg/kg	0.3	10.3%	2	0	0.2 UJ	0.23 UJ	0.2 UJ	0.26 UJ	0.23 UJ	0.21 UJ	0.22 UJ	0.23 UJ	0.2 UJ
Sodium	mg/kg	161	93.1%	114	10	146 J	51.9 J	95.5 J	56 J	88.4 J	69.8 J	52.3 J	59.8 J	68 J
Thallium	mg/kg	0.28	6.9%	0.3	0	2.2 U	0.25 U	0.22 U	0.29 U	0.25 U	0.23 U	0.24 U	0.25 U	0.21 U
Vanadium	mg/kg	39.3	93.1%	150	0	17.7	30.1	17.1	32.8	22.3	24.4	32.8	27.2	18.3
Zinc	mg/kg	1180	93.1%	90	14	58.7	129	100	85.1	566	97.2	63.8	88.5	143
OTHER ANALYSES														
Nitrate/Nitrite-Nitrogen	mg/kg	2.1	93.1%	NA	NA	2.1	0.56	0.22	0.18	0.6	0.11	0.26	0.16	0.28
Total Solids	%W/W	807				81.6	75.4	91.4	80.7	81.9	78.6	82.2	73.2	81.7
Total Petroleum Hydrocarbons	mg/kg	158	93.1%	NA	NA	99	81	73	72	78	93	59	46	61

TABLE 1

SOIL ANALYSIS RESULTS
SENECA ARMY DEPOT
SEAD-24 EXPANDED SITE INVESTIGATION

COMPOUND	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID UNITS	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NO. ABOVE TAGM	SOIL SEAD-24 0-0.2 10/22/93 SS24-13 202092 SS24-9DUP	SOIL SEAD-24 0-0.2 10/22/93 SS24-10 202089	SOIL SEAD-24 0-0.2 10/22/93 SS24-11 202090	SOIL SEAD-24 0-0.2 10/22/93 SS24-12 202091	SOIL SEAD-24 0-2 11/30/93 SB24-1.1 205918	SOIL SEAD-24 4-6 11/30/93 SB24-1.3 205919	SOIL SEAD-24 10-12 11/30/93 SB24-1.5 205920
VOLATILE ORGANICS												
Methylene Chloride	ug/kg	12	10.3%	100	0	13 UJ	13 U	11 U	13 U	12 U	11 U	11 U
Acetone	ug/kg	27	10.3%	200	0	13 UJ	13 U	11 U	13 U	20 U	26 U	11 U
Chloroform	ug/kg	13	34.5%	300	0	4 J	13 U	11 U	3 J	12 U	11 U	11 U
Trichloroethene	ug/kg	1	3.4%	700	0	13 UJ	13 U	11 U	13 U	12 U	11 U	11 U
Benzene	ug/kg	1	3.4%	60	0	13 UJ	13 U	11 U	13 U	12 U	11 U	11 U
Toluene	ug/kg	2	3.4%	1500	0	13 UJ	13 U	11 U	13 U	12 U	11 U	11 U
Chlorobenzene	ug/kg	7	6.9%	1700	0	13 UJ	13 U	11 U	7 J	12 U	11 U	11 U
HERBICIDES												
2,4,5-T	ug/kg	8	3.4%	1900	0	6.1 U	6.3 U	5.6 U	6.5 U	6.2 U	5.6 UJ	5.4 U
Dicamba	ug/kg	9.7	3.4%	NA	NA	9.7	6.3 U	5.6 U	6.5 U	6.2 U	5.6 UJ	5.4 U
MCPP	ug/kg	6600	3.4%	NA	NA	6100 U	6300 U	5600 U	6500 U	6200 U	5600 UJ	5400 U
NITROAROMATICS												
1,3-Dinitrobenzene	ug/kg	76	3.4%	NA	NA	130 U	130 U	130 U	130 U	130 UJ	130 U	130 U
Tetryl	ug/kg	110	3.4%	NA	NA	130 U	130 U	130 U	130 U	130 UJ	130 U	130 U
2,4-Dinitrotoluene	ug/kg	4400	17.2%	NA	NA	560	130 U	130 U	130 U	130 UJ	130 U	130 U
SEMIVOLATILE ORGANICS												
Acenaphthylene	ug/kg	54	3.4%	41000	0	1600 U	420 U	370 U	430 U	400 U	370 U	350 U
2,4-Dinitrotoluene	ug/kg	12000	24.1%	NA	NA	7600	420 U	370 U	430 U	400 U	370 U	350 U
N-Nitrosodiphenylamine	ug/kg	810	17.2%	50000 *	0	810 J	420 U	370 U	430 U	400 U	370 U	350 U
Phenanthrene	ug/kg	44	13.8%	50000 *	0	1600 U	420 U	370 U	430 U	400 U	370 U	350 U
Anthracene	ug/kg	19	3.4%	50000 *	0	1600 U	420 U	370 U	430 U	400 U	370 U	350 U
Di-n-butylphthalate	ug/kg	1100	20.7%	8100	0	1100 J	420 U	370 U	430 U	400 U	370 U	350 U
Fluoranthene	ug/kg	210	20.7%	50000 *	0	160 J	420 U	370 U	29 J	400 U	370 U	350 U
Pyrene	ug/kg	260	20.7%	50000 *	0	150 J	420 U	370 U	29 J	400 U	370 U	350 U
Benzo(a)anthracene	ug/kg	280	10.3%	220	1	78 J	420 U	370 U	430 U	400 U	370 U	350 U
Chrysene	ug/kg	320	20.7%	400	0	100 J	420 U	370 U	20 J	400 U	370 U	350 U
bis(2-Ethylhexyl)phthalate	ug/kg	1300	41.4%	50000 *	0	620	420 U	370 U	430 U	1200	860	38 J
Benzo(b)fluoranthene	ug/kg	350	13.8%	1100	0	83 J	420 U	370 U	430 U	400 U	370 U	350 U
Benzo(k)fluoranthene	ug/kg	340	13.8%	1100	0	74 J	420 U	370 U	430 U	400 U	370 U	350 U
Benzo(a)pyrene	ug/kg	420	13.8%	61	1	1600 U	420 U	370 U	430 U	400 U	370 U	350 U
Indeno(1,2,3-cd)pyrene	ug/kg	220	6.9%	3200	0	1600 U	420 U	370 U	430 U	400 U	370 U	350 U
Dibenz(a,h)anthracene	ug/kg	28	3.4%	14	1	1600 U	420 U	370 U	430 U	400 U	370 U	350 U
Benzo(g,h,i)perylene	ug/kg	170	6.9%	50000 *	0	1600 U	420 U	370 U	430 U	400 U	370 U	350 U

TABLE 1

SOIL ANALYSIS RESULTS
SENECA ARMY DEPOT
SEAD-24 EXPANDED SITE INVESTIGATION

COMPOUND	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID UNITS	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NO. ABOVE TAGM	SOIL SEAD-24 0-0.2 10/22/93 SS24-13 202092 SS24-9DUP	SOIL SEAD-24 0-0.2 10/22/93 SS24-10 202089	SOIL SEAD-24 0-0.2 10/22/93 SS24-11 202090	SOIL SEAD-24 0-0.2 10/22/93 SS24-12 202091	SOIL SEAD-24 0-2 11/30/93 SB24-1.1 205918	SOIL SEAD-24 4-6 11/30/93 SB24-1.3 205919	SOIL SEAD-24 10-12 11/30/93 SB24-1.5 205920
PESTICIDES/PCB												
Endosulfan I	ug/kg	2.3	6.9%	900	0	2.3 J	2.1 U	1.9 U	2.2 U	2.1 U	1.9 U	1.8 U
4,4'-DDE	ug/kg	12	10.3%	2100	0	8.6 J	4.1 U	3.6 U	4.3 U	4 U	3.7 U	3.5 U
4,4'-DDT	ug/kg	35	3.4%	2100	0	2.7 J	4.1 U	3.6 U	4.3 U	4 U	3.7 U	3.5 U
Endrin aldehyde	ug/kg	4.2	3.4%	NA	NA	4 UJ	4.1 U	3.6 U	4.3 U	4 U	3.7 U	3.5 U
alpha-Chlordane	ug/kg	4.7	3.4%	540	0	2.1 UJ	2.1 U	1.9 U	2.2 U	2.1 U	1.9 U	1.8 U
gamma-Chlordane	ug/kg	6	3.4%	540	0	2.1 UJ	2.1 U	1.9 U	2.2 U	2.1 U	1.9 U	1.8 U
METALS												
Aluminum	mg/kg	25500	93.1%	15523	12	14300	25500	12900	15900	24000	11400	9280
Arsenic	mg/kg	56.8	93.1%	7.5	11	38.6	8.7	6.4	8.1	5.2	3.9	3.8
Barium	mg/kg	149	93.1%	300	0	96.6	119	28.2 J	88.8	97.3	58.9	57.2
Beryllium	mg/kg	1.2	93.1%	1	2	0.67 J	1.2	0.57 J	0.81 J	0.9 J	0.5 J	0.44 J
Cadmium	mg/kg	8.2	3.4%	1	1	0.71 U	0.7 U	0.75 J	8.2	0.59 U	0.51 U	0.38 U
Calcium	mg/kg	106000	93.1%	120725	0	8670	2770	13400	4660	4950	58500	58400
Chromium	mg/kg	35.1	93.1%	24	9	23.8	35.1	25.1	23.8	32.2	17.6	15.5
Cobalt	mg/kg	20.5	93.1%	30	0	11	17.8	14.8	11.5 J	12.2	9.5	9.7
Copper	mg/kg	324	93.1%	25	12	34.5 J	32.6 J	34.6 J	24.4 J	28.9	26.4	14.9
Iron	mg/kg	37700	93.1%	28986	10	26300	37500	30600	27500	33200	22700	18800
Lead	mg/kg	422	93.1%	30	14	112	24.6	30.9	121	13.5 J	13.1 J	5.9 J
Magnesium	mg/kg	43700	93.1%	12308	4	5390	6660	6750	5000	6990	11300	12700
Manganese	mg/kg	1770	93.1%	759	4	519	612	293	512	438	397	384
Mercury	mg/kg	0.15	68.0%	0.1	1	0.04 J	0.05 J	0.04 U	0.06 J	0.04 J	0.02 UJ	0.03 UJ
Nickel	mg/kg	535	93.1%	37	8	35.4	46.6	52.4	535	43.4	30.8	23.7
Potassium	mg/kg	2510	93.1%	1548	11	1410	2510	1200	1650	2120	1610	1130
Selenium	mg/kg	0.3	10.3%	2	0	0.25 UJ	0.21 UJ	0.27 J	0.26 UJ	0.19 UJ	0.21 UJ	0.19 UJ
Sodium	mg/kg	161	93.1%	114	10	74.3 J	63 J	91.5 J	53.5 J	86.5 J	116 J	127 J
Thallium	mg/kg	0.28	6.9%	0.3	0	0.28 U	0.23 U	0.23 U	0.28 U	0.21 UJ	0.23 UJ	0.21 UJ
Vanadium	mg/kg	39.3	93.1%	150	0	24	39.3	18.2	26.1	33	17	13.5
Zinc	mg/kg	1180	93.1%	90	14	182	108	236	1180	99.9	114	44.3
OTHER ANALYSES												
Nitrate/Nitrite-Nitrogen	mg/kg	2.1	93.1%	NA	NA	0.37	0.3	0.05	0.14	0.01	0.02	0.17
Total Solids	%W/W	807				81.5	78.1	90.5	76.7	81	89.5	92.7
Total Petroleum Hydrocarbons	mg/kg	158	93.1%	NA	NA	158	47	38	87	32	68	43

TABLE 1

SOIL ANALYSIS RESULTS
SENECA ARMY DEPOT
SEAD-24 EXPANDED SITE INVESTIGATION

COMPOUND	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID UNITS	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NO. ABOVE TAGM	SOIL SEAD-24 0-2 11/30/93 SB24-1.7 205921 SB24-1.1DUP	SOIL SEAD-24 0-2 12/01/93 SB24-2.1 205922	SOIL SEAD-24 6-8 12/01/93 SB24-2.3 205923	SOIL SEAD-24 12-14 12/01/93 SB24-2.4 205952	SOIL SEAD-24 0-2 12/02/93 SB24-3.1 206044	SOIL SEAD-24 4-6 12/02/93 SB24-3.3 206045
VOLATILE ORGANICS											
Methylene Chloride	ug/kg	12	10.3%	100	0	11 U	12 U	11 U	12	12 U	11 U
Acetone	ug/kg	27	10.3%	200	0	11 U	12 U	14 U	11 U	12 U	11 U
Chloroform	ug/kg	13	34.5%	300	0	11 U	12 U	11 U	6 J	12 U	11 U
Trichloroethene	ug/kg	1	3.4%	700	0	11 U	12 U	11 U	11 U	12 U	11 U
Benzene	ug/kg	1	3.4%	60	0	11 U	12 U	11 U	11 U	12 U	11 U
Toluene	ug/kg	2	3.4%	1500	0	11 U	12 U	11 U	11 U	12 U	11 U
Chlorobenzene	ug/kg	7	6.9%	1700	0	11 U	12 U	11 U	11 U	12 U	11 U
HERBICIDES											
2,4,5-T	ug/kg	8	3.4%	1900	0	5.9 U	6.1 U	5.6 U	5.4 U	6.3 U	5.9 U
Dicamba	ug/kg	9.7	3.4%	NA	NA	5.9 U	6.1 U	5.6 U	5.4 U	6.3 U	5.9 U
MCPP	ug/kg	6600	3.4%	NA	NA	5900 U	6100 U	5600 U	5400 U	6300 U	5900 U
NITROAROMATICS											
1,3-Dinitrobenzene	ug/kg	76	3.4%	NA	NA	130 U	130 U	130 U	76 J	130 U	130 U
Tetryl	ug/kg	110	3.4%	NA	NA	130 U	130 U	130 U	130 U	1100 U	1700 U
2,4-Dinitrotoluene	ug/kg	4400	17.2%	NA	NA	130 U	130 U	130 U	130 U	130 U	130 U
SEMIVOLATILE ORGANICS											
Acenaphthylene	ug/kg	54	3.4%	41000	0	390 UJ	410 UJ	370 UJ	350 U	420 U	380 U
2,4-Dinitrotoluene	ug/kg	12000	24.1%	NA	NA	390 UJ	980 J	370 UJ	350 U	420 U	380 U
N-Nitrosodiphenylamine	ug/kg	810	17.2%	50000 *	0	390 UJ	280 J	370 UJ	350 U	420 U	380 U
Phenanthrene	ug/kg	44	13.8%	50000 *	0	390 UJ	410 UJ	370 UJ	350 U	33 J	380 U
Anthracene	ug/kg	19	3.4%	50000 *	0	390 UJ	410 UJ	370 UJ	350 U	420 U	380 U
Di-n-butylphthalate	ug/kg	1100	20.7%	8100	0	390 UJ	410 UJ	370 UJ	350 U	420 U	380 U
Fluoranthene	ug/kg	210	20.7%	50000 *	0	390 UJ	410 UJ	370 UJ	350 U	62 J	380 U
Pyrene	ug/kg	260	20.7%	50000 *	0	390 UJ	410 UJ	370 UJ	350 U	56 J	380 U
Benzo(a)anthracene	ug/kg	280	10.3%	220	1	390 UJ	410 UJ	370 UJ	350 U	420 U	380 U
Chrysene	ug/kg	320	20.7%	400	0	390 UJ	410 UJ	370 UJ	350 U	37 J	380 U
bis(2-Ethylhexyl)phthalate	ug/kg	1300	41.4%	50000 *	0	1300 J	30 J	27 J	41 J	420 U	89 J
Benzo(b)fluoranthene	ug/kg	350	13.8%	1100	0	390 UJ	410 UJ	370 UJ	350 U	27 J	380 U
Benzo(k)fluoranthene	ug/kg	340	13.8%	1100	0	390 UJ	410 UJ	370 UJ	350 U	27 J	380 U
Benzo(a)pyrene	ug/kg	420	13.8%	61	1	390 UJ	410 UJ	370 UJ	350 U	24 J	380 U
Indeno(1,2,3-cd)pyrene	ug/kg	220	6.9%	3200	0	390 UJ	410 UJ	370 UJ	350 U	420 U	380 U
Dibenz(a,h)anthracene	ug/kg	28	3.4%	14	1	390 UJ	410 UJ	370 UJ	350 U	420 U	380 U
Benzo(g,h,i)perylene	ug/kg	170	6.9%	50000 *	0	390 UJ	410 UJ	370 UJ	350 U	420 U	380 U

TABLE 1

SOIL ANALYSIS RESULTS
SENECA ARMY DEPOT
SEAD-24 EXPANDED SITE INVESTIGATION

COMPOUND	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID UNITS	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NO. ABOVE TAGM	SOIL SEAD-24 0-2 11/30/93 SB24-1.7 205921 SB24-1.1DUP	SOIL SEAD-24 0-2 12/01/93 SB24-2.1 205922	SOIL SEAD-24 6-8 12/01/93 SB24-2.3 205923	SOIL SEAD-24 12-14 12/01/93 SB24-2.4 205952	SOIL SEAD-24 0-2 12/02/93 SB24-3.1 206044	SOIL SEAD-24 4-6 12/02/93 SB24-3.3 206045
PESTICIDES/PCB											
Endosulfan I	ug/kg	2.3	6.9%	900	0	2 U	2.1 U	1.9 U	1.8 U	2.2 U	2 U
4,4'-DDE	ug/kg	12	10.3%	2100	0	3.8 U	4 U	3.7 U	3.5 U	4.2 U	3.8 U
4,4'-DDT	ug/kg	35	3.4%	2100	0	3.8 U	4 U	3.7 U	3.5 U	4.2 U	3.8 U
Endrin aldehyde	ug/kg	4.2	3.4%	NA	NA	3.8 U	4 U	3.7 U	3.5 U	4.2 U	3.8 U
alpha-Chlordane	ug/kg	4.7	3.4%	540	0	2 U	2.1 U	1.9 U	1.8 U	2.2 U	2 U
gamma-Chlordane	ug/kg	6	3.4%	540	0	2 U	2.1 U	1.9 U	1.8 U	2.2 U	2 U
METALS											
Aluminum	mg/kg	25500	93.1%	15523	12	17600	16500	9620	14200	19300	15800
Arsenic	mg/kg	56.8	93.1%	7.5	11	5	3.8	4.4	4.9	4.5	3.7
Barium	mg/kg	149	93.1%	300	0	67.3	111	79.3	54.3	132	76.2
Beryllium	mg/kg	1.2	93.1%	1	2	0.78	0.97	0.45 J	0.61	0.97 J	0.72 J
Cadmium	mg/kg	8.2	3.4%	1	1	0.47 U	0.53 U	0.43 U	0.38 U	0.72 U	0.56 U
Calcium	mg/kg	106000	93.1%	120725	0	13300	3070	63300	56900	3430	42100
Chromium	mg/kg	35.1	93.1%	24	9	27.5	22.5	15.5	23	24.9	23.3
Cobalt	mg/kg	20.5	93.1%	30	0	13.3	10.3	9.6	10.7	11.6	11.2
Copper	mg/kg	324	93.1%	25	12	26.1	24.5	24.7	17.1	19	21.2
Iron	mg/kg	37700	93.1%	28986	10	32100	27400	19800	26600	25700	25300
Lead	mg/kg	422	93.1%	30	14	14.9 J	80.3	11.9 J	4.7 J	81.7 J	13.3 J
Magnesium	mg/kg	43700	93.1%	12308	4	8050	4830	16400	11500	4280	11100
Manganese	mg/kg	1770	93.1%	759	4	509	413	388	434	837	581
Mercury	mg/kg	0.15	68.0%	0.1	1	0.03 J	0.03 J	0.03 UJ	0.03 J	0.09 J R	0.05 J R
Nickel	mg/kg	535	93.1%	37	8	42.2	28.9	26.4	34	29.6	31
Potassium	mg/kg	2510	93.1%	1548	11	1230	1170	1350	1760	1750	1830
Selenium	mg/kg	0.3	10.3%	2	0	0.23 UJ	0.22 UJ	2 UJ	0.28 J	0.3 J	0.24 UJ
Sodium	mg/kg	161	93.1%	114	10	74.9 J	51.3 J	135 J	161 J	64.6 J	113 J
Thallium	mg/kg	0.28	6.9%	0.3	0	0.25 UJ	0.24 UJ	0.22 UJ	0.25 U	0.22 U	0.26 U
Vanadium	mg/kg	39.3	93.1%	150	0	26	28	15.2	20.1	31.1	23.6
Zinc	mg/kg	1180	93.1%	90	14	86	223	62.6	48.9	112	76.1
OTHER ANALYSES											
Nitrate/Nitrite-Nitrogen	mg/kg	2.1	93.1%	NA	NA	0.01	0.01	0.12	0.14	0.47	0.02
Total Solids	%W/W	807				85.2	81.5	90.1	92.9	79.2	86.5
Total Petroleum Hydrocarbons	mg/kg	158	93.1%	NA	NA	74	33	45	106	119	58

TABLE 1

SOIL ANALYSIS RESULTS
SEAD-24 EXPANDED SITE INVESTIGATION
SENECA ARMY DEPOT

COMPOUND	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID UNITS	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NO. ABOVE TAGM	SOIL SEAD-24 8-10 12/02/93 SB24-3.5 206046	SOIL SEAD-24 0-2 12/01/93 SB24-4.1 205953	SOIL SEAD-24 6-8 12/01/93 SB24-4.4 205954	SOIL SEAD-24 12-14 12/02/93 SB24-4.7 205955	SOIL SEAD-24 0-2 12/02/93 SB24-5.1 206047	SOIL SEAD-24 4-6 12/02/93 SB24-5.3 206048	SOIL SEAD-24 8-10 12/02/93 SB24-5.5 206049
VOLATILE ORGANICS												
Methylene Chloride	ug/kg	12	10.3%	100	0	11 U	12 U	12 U	9 J	12 U	11 U	2 J
Acetone	ug/kg	27	10.3%	200	0	11 U	12 U	12 U	6 J	12 U	11 U	11 U
Chloroform	ug/kg	13	34.5%	300	0	11 U	5 J	12 U	3 J	12 U	2 J	11 U
Trichloroethene	ug/kg	1	3.4%	700	0	11 U	12 U	12 U	11 UJ	12 U	11 U	1 J
Benzene	ug/kg	1	3.4%	60	0	11 U	12 U	12 U	11 UJ	12 U	11 U	1 J
Toluene	ug/kg	2	3.4%	1500	0	11 U	12 U	12 U	11 UJ	12 U	11 U	2 J
Chlorobenzene	ug/kg	7	6.9%	1700	0	11 U	12 U	12 U	11 UJ	12 U	11 U	1 J
HERBICIDES												
2,4,5-T	ug/kg	8	3.4%	1900	0	5.4 U	5.9 U	5.6 U	5.4 U	6.3 U	5.4 U	5.7 U
Dicamba	ug/kg	9.7	3.4%	NA	NA	5.4 U	5.9 U	5.6 U	5.4 U	6.3 U	5.4 U	5.7 U
MCPP	ug/kg	6600	3.4%	NA	NA	5400 U	5900 U	5600 U	5400 U	6300 U	5400 U	5400 U
NITROAROMATICS												
1,3-Dinitrobenzene	ug/kg	76	3.4%	NA	NA	130 U	130 U	130 U	130 U	130 U	130 U	130 U
Tetryl	ug/kg	110	3.4%	NA	NA	1600 U	110 J	130 U	130 U	730 U	960 U	1700 U
2,4-Dinitrotoluene	ug/kg	4400	17.2%	NA	NA	130 U	130 U	130 U	130 U	130 U	130 U	130 U
SEMIVOLATILE ORGANICS												
Acenaphthylene	ug/kg	54	3.4%	41000	0	350 U	400 U	380 U	360 U	410 U	350 U	380 U
2,4-Dinitrotoluene	ug/kg	12000	24.1%	NA	NA	350 U	400 U	380 U	360 U	410 U	350 U	380 U
N-Nitrosodiphenylamine	ug/kg	810	17.2%	50000 *	0	350 U	400 U	380 U	360 U	410 U	350 U	380 U
Phenanthrene	ug/kg	44	13.8%	50000 *	0	350 U	400 U	380 U	360 U	410 U	350 U	380 U
Anthracene	ug/kg	19	3.4%	50000 *	0	350 U	400 U	380 U	360 U	410 U	350 U	380 U
Di-n-butylphthalate	ug/kg	1100	20.7%	8100	0	22 J	400 U	380 U	360 U	67 J	350 U	380 U
Fluoranthene	ug/kg	210	20.7%	50000 *	0	350 U	400 U	380 U	360 U	410 U	350 U	380 U
Pyrene	ug/kg	260	20.7%	50000 *	0	350 U	400 U	380 U	360 U	410 U	350 U	380 U
Benzo(a)anthracene	ug/kg	280	10.3%	220	1	350 U	400 U	380 U	360 U	410 U	350 U	380 U
Chrysene	ug/kg	320	20.7%	400	0	350 U	400 U	380 U	360 U	410 U	350 U	380 U
bis(2-Ethylhexyl)phthalate	ug/kg	1300	41.4%	50000 *	0	56 J	400 U	86 J	69 J	53 J	350 U	120 J
Benzo(b)fluoranthene	ug/kg	350	13.8%	1100	0	350 U	400 U	380 U	360 U	410 U	350 U	380 U
Benzo(k)fluoranthene	ug/kg	340	13.8%	1100	0	350 U	400 U	380 U	360 U	410 U	350 U	380 U
Benzo(a)pyrene	ug/kg	420	13.8%	61	1	350 U	400 U	380 U	360 U	410 U	350 U	380 U
Indeno(1,2,3-cd)pyrene	ug/kg	220	6.9%	3200	0	350 U	400 U	380 U	360 U	410 U	350 U	380 U
Dibenz(a,h)anthracene	ug/kg	28	3.4%	14	1	350 U	400 U	380 U	360 U	410 U	350 U	380 U
Benzo(g,h,i)perylene	ug/kg	170	6.9%	50000 *	0	350 U	400 U	380 U	360 U	410 U	350 U	380 U

TABLE 1

SOIL ANALYSIS RESULTS
SEAD-24 EXPANDED SITE INVESTIGATION
SENECA ARMY DEPOT

COMPOUND	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID UNITS	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NO. ABOVE TAGM	SOIL SEAD-24 8-10 12/02/93 SB24-3.5 206046	SOIL SEAD-24 0-2 12/01/93 SB24-4.1 205953	SOIL SEAD-24 6-8 12/01/93 SB24-4.4 205954	SOIL SEAD-24 12-14 12/02/93 SB24-4.7 205955	SOIL SEAD-24 0-2 12/02/93 SB24-5.1 206047	SOIL SEAD-24 4-6 12/02/93 SB24-5.3 206048	SOIL SEAD-24 8-10 12/02/93 SB24-5.5 206049
PESTICIDES/PCB												
Endosulfan I	ug/kg	2.3	6.9%	900	0	1.8 U	2 U	1.9 U	1.8 U	2.1 U	1.8 U	1.9 U
4,4'-DDE	ug/kg	12	10.3%	2100	0	3.5 U	4 U	3.7 U	3.6 U	4.1 U	3.5 U	3.7 U
4,4'-DDT	ug/kg	35	3.4%	2100	0	3.5 U	4 U	3.7 U	3.6 U	4.1 U	3.5 U	3.7 U
Endrin aldehyde	ug/kg	4.2	3.4%	NA	NA	3.5 U	4 U	3.7 U	3.6 U	4.1 U	3.5 U	3.7 U
alpha-Chlordane	ug/kg	4.7	3.4%	540	0	1.8 U	2 U	1.9 U	1.8 U	2.1 U	1.8 U	1.9 U
gamma-Chlordane	ug/kg	6	3.4%	540	0	1.8 U	2 U	1.9 U	1.8 U	2.1 U	1.8 U	1.9 U
METALS												
Aluminum	mg/kg	25500	93.1%	15523	12	5820	20700	7470	11300	16200	10100	13700
Arsenic	mg/kg	56.8	93.1%	7.5	11	2.5	4.2	2.5	2.7	4.2	3.3	5
Barium	mg/kg	149	93.1%	300	0	40.5	115	73.8	47	117	58.3	67.2
Beryllium	mg/kg	1.2	93.1%	1	2	0.34 J	1.1	0.37 J	0.53 J	0.98 J	0.48 J	0.62 J
Cadmium	mg/kg	8.2	3.4%	1	1	0.63 U	0.45 U	0.52 U	0.41 U	0.78 U	0.36 U	0.7 U
Calcium	mg/kg	106000	93.1%	120725	0	106000	3660	81400	30500	4540	74200	49000
Chromium	mg/kg	35.1	93.1%	24	9	10.8	31	15.6	18.8	24.5	16.9	23.1
Cobalt	mg/kg	20.5	93.1%	30	0	6.7 J	20.5	5.7 J	10.3	16	8.2	12
Copper	mg/kg	324	93.1%	25	12	14.6	25.3	18.1	12.5	28.4	20.9	22.2
Iron	mg/kg	37700	93.1%	28986	10	14100	37700	14800	22600	33600	21300	26700
Lead	mg/kg	422	93.1%	30	14	33.8 J	31.4 J	7.6 J	3.6 J	45.5 J	8.7 J	7.9 J
Magnesium	mg/kg	43700	93.1%	12308	4	36700	6270	16800	7670	5150	12100	11400
Manganese	mg/kg	1770	93.1%	759	4	349	802	409	400	1080	400	450
Mercury	mg/kg	0.15	68.0%	0.1	1	0.03 J	0.07 J R	0.06 J R	0.05 J R	0.07 J R	0.06 J R	0.04 J R
Nickel	mg/kg	535	93.1%	37	8	23.9	43.6	19.3	28.6	37.3	26.4	35.2
Potassium	mg/kg	2510	93.1%	1548	11	1040	1520	1390	1140	1170 J	993	1660
Selenium	mg/kg	0.3	10.3%	2	0	0.15 UJ	0.24 UJ	0.15 UJ	0.12 UJ	0.15 UJ	0.23 UJ	0.22 UJ
Sodium	mg/kg	161	93.1%	114	10	133 J	58.3 J	138 J	131 J	50.9 J	153 J	139 J
Thallium	mg/kg	0.28	6.9%	0.3	0	0.16 U	0.27 U	0.85 U	0.14 J	0.16 U	0.25 U	0.24 U
Vanadium	mg/kg	39.3	93.1%	150	0	10.7	32.6	13.4	14.6	29.9	14.4	19.5
Zinc	mg/kg	1180	93.1%	90	14	39.6	209	58.7	30	85.7	62.8	63.2
OTHER ANALYSES												
Nitrate/Nitrite-Nitrogen	mg/kg	2.1	93.1%	NA	NA	0.2	0.29	0.07	0.13	0.27	0.15	0.33
Total Solids	%W/W	807				93.2	83.5	88.2	92.1	80.5	92.7	87.7
Total Petroleum Hydrocarbons	mg/kg	158	93.1%	NA	NA	81	89	116	99	89	52	94

Notes:
a) * = As per proposed TAGM, total VOCs < 10ppm; total Semi-VOCs <500ppm; individual semi-VOCs < 50 ppm.
b) NA = Not Available
c) U = Compound was not detected.
d) J = the reported value is an estimated concentration.
e) R = the data was rejected in the data validating process.
f) UJ = the compound was not detected; the associated reporting limit is approximate.

The results of the groundwater sampling program are presented in Table 2. There is no evidence to indicate that groundwater has been adversely impacted by any of the constituents tested for under this investigation. No organic constituents were detected. Some elevated metals concentrations were found (iron, magnesium, and manganese) but these are attributed to high turbidities in the samples. Iron, magnesium and manganese are not considered to represent significant health threats.

4.0 DISCUSSION OF REMOVAL ALTERNATIVES

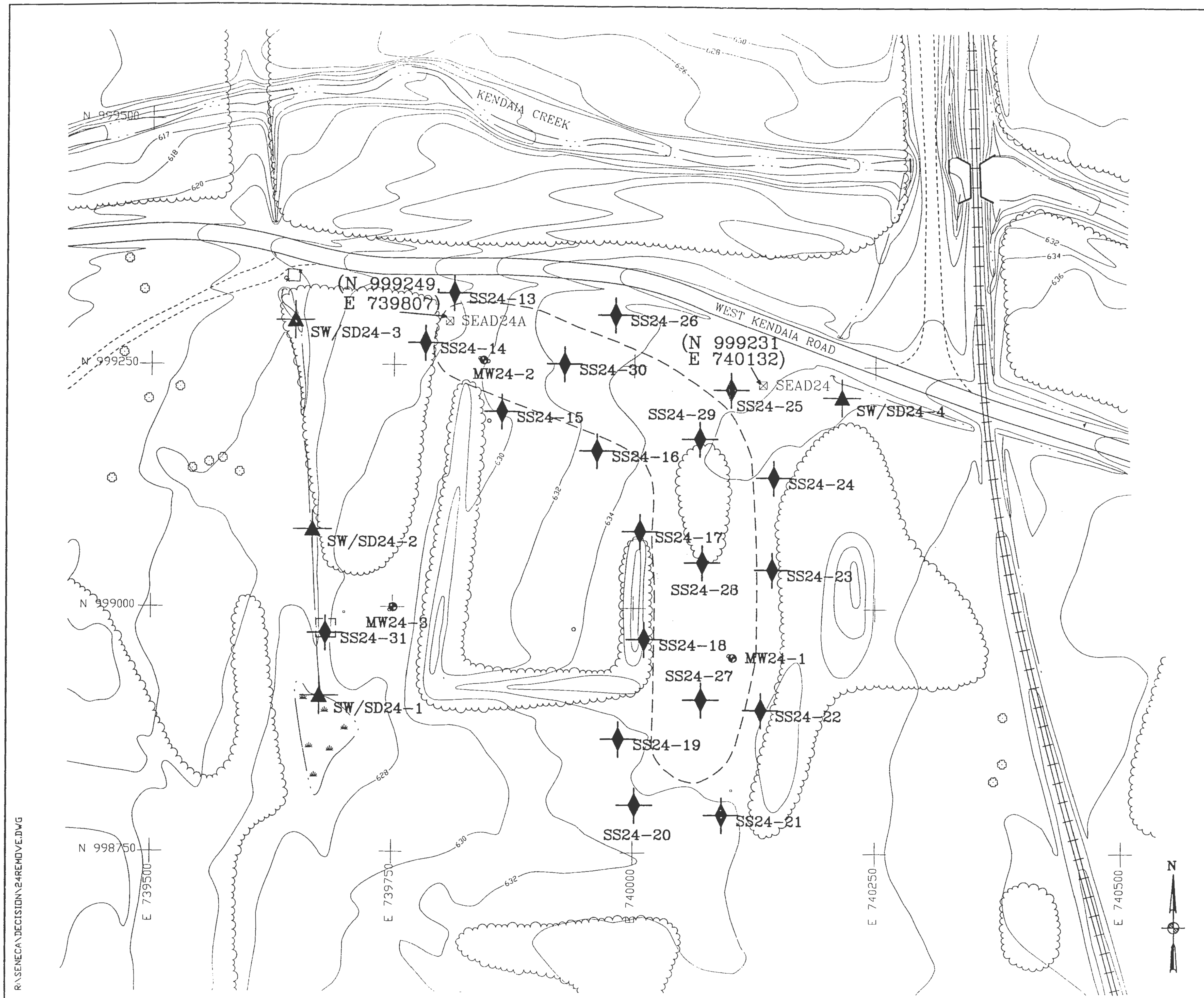
The objectives of a removal action are to comply with all ARAR's and reduce the overall threat to human health and the environment to an acceptable level at the site. To reduce this threat, the soil from 100 feet to 200 feet north of the burn pit and the soil from 10 feet to 110 feet east of burn pit should be remediated to a depth of 6 inches. In addition, a 10 foot square area surrounding surface soil sample S524-12 should also be remediated to a depth of 6 inches. These areas are shown as shaded areas on Figure 2. The total quantity of soil to be remediated is approximately 1,200 cy (1,800 tons).

This section briefly describes removal alternatives which may be applicable for use at SEAD-24. 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 ARAR's and economic impacts.

5.0 REMOVAL METHODS

Soil Washing

Soil washing is a treatment option applicable to soil contaminated with metals and SVOCs.



LEGEND

- MINOR WATERWAY
- MAJOR WATERWAY
- FENCE
- UNPAVED ROAD
- BRUSH LINE
- LANDFILL EXTENTS
- RAILROAD
- 760 GROUND SURFACE ELEVATION CONTOUR
- ROAD SIGN
- DECIDOUS TREE
- GUIDE POST
- FIRE HYDRANT
- MANHOLE
- CORDINATE GRID (250' GRID)
- POLE
- UTILITY BOX
- OVERHEAD UTILITY POLE
- MAILBOX/RR SIGNAL
- MONITORING WELL
- SURVEY MONUMENT
- SS24-13 POST-REMOVAL VERIFICATION SURFACE SOIL SAMPLE
- SWSD24-1 POST-REMOVAL VERIFICATION SURFACE WATER AND SEDIMENT SAMPLE
- (N 999231 E 740132) NY STATE PLANE COORDINATES
- AREA TO BE REMEDIATED

50 0 50 100
(feet)

PARSONS
PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE
SENECA ARMY DEPOT ACTIVITY
ABANDONED POWDER BURNING PIT
SEAD-24

DEPT	Dwg No
ENVIRONMENTAL ENGINEERING	727024-02001

FIGURE 2
REMOVAL PLANS

SCALE	DATE	REV
1"=100'	4/10/95	A

TABLE 2

GROUNDWATER ANALYSIS RESULTS
SENECA ARMY DEPOT
SEAD-24 EXPANDED SITE INSPECTION

COMPOUND	MATRIX LOCATION SAMPLE DATE ES ID LAB ID UNITS	MAXIMUM	FREQUENCY OF DETECTION	NY AWQS CLASS GA (a)	NO. ABOVE CRITERIA	WATER SEAD-24 01/23/94 MW24-1 209254	WATER SEAD-24 11/16/93 MW24-2 204657	WATER SEAD-24 11/15/93 MW24-3 204632
METALS								
Aluminum	ug/L	19100	100.0%	NA	NA	19100	9650	18700
Arsenic	ug/L	10	100.0%	625	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%	3	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%	25	0	7	3.1	3.9
Magnesium	ug/L	47700	100.0%	35000	3	39800	47700	43300
Manganese	ug/L	767	100.0%	300	3	712	767	528
Mercury	ug/L	0.06	33.3%	2	0	0.06 J	0.07 UJ	0.07 UJ
Nickel	ug/L	41.4	100.0%	NA	NA	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	NA	100.0%	300	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 Regulations
b) NA = Not Available
c) U = compound was not detected
d) J = the report value is an estimated concentration
e) UJ = the compound was not detected; the associated reporting limit is approximate
f) R = the data was rejected in the data validating process

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.

<u>In-Situ Solidification/Stabilization</u>

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 which can be excavated and removed. Factors which 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 alternative.

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 frequently result in the elimination of this alternative as a cost-effective alternative. Institutional aspects can add significant delays to program implementation.

6.0 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 $90,000 to $370,000 with a most probable cost in the range of $250,000 to $300,000.

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 $100,000 to $360,000 with a most probable cost range of $250,000 to $300,000.

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 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 $90,000 to $180,000 with a most probable cost in the range of $100,00 to $150,000.

7.0 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 at SEAD-24. For the most part, this decision is due to the unsuitability of insitu 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 insitu 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.

8.0 RECOMMENDATIONS

To reduce the threat from the PAH and metals-impacted soil at SEAD-24, the soil from 100 feet to 200 feet north of the Burning Pit and the soil from ten feet to 110 feet to the east of the Burning Pit (shown by shaded area on Figure 2) should be excavated to a depth of six inches, contained, and disposed of at a off-site permitted waste landfill. The soil in a 10-foot square area surrounding surface soil sample SS24-12 should also be excavated to a depth of six inches, contained, and disposed of in an off-site permitted waste landfill. The weight of soil to be removed is approximately 3,560 tons (2,830 cy) of material. The estimated cost is approximately $100,000 to $150,000 to excavate, contain, and dispose of this volume of soil.

9.0 JUSTIFICATIONS

Metals were detected exceeding TAGM values in all of the surface soil samples collected to the north and to the east of the Burning Pit. The surface soil sample SS24-12, to the west of the Burning Pit, contained several metals that exceeded TAGM values. The surface soil sample SS24-1, to the east of the Burning Pit, was the only sample to contain PAHs exceeding TAGM values. Samples collected within the Burning Pit itself, or to the west and south of the Burning Pit (except sample SS24-12) either did not contain any metals or PAHs exceeding TAGM values, or contained them at concentrations that only slightly exceeded TAGM values. Soil samples collected deeper than two feet did not contain any metals or PAHs that exceeded TAGM values. The groundwater samples collected indicate that none of the constituents have migrated from SEAD-24, so the removal of the soil containing the metals and PAHs that exceed the TAGM values would remove the impacted soil that poses any health risks and will serve as the final remedy for this site.

10.0 POST-REMOVAL VERIFICATION SAMPLING

To verify that the removal of the soil to the north and to the east of the Burning Pit and the soil in the area where SS24-12 was collected is sufficient to remove the impacted soil that poses any health risk, samples will be collected along the perimeter of the excavated areas. To verify that none of the constituents has migrated through surface water to Kendaia Creek, surface water and sediment samples will be collected in the drainage swales that drain from SEAD-24 in the direction of Kendaia Creek. All proposed sample locations are shown on Figure 2. Post-excavation samples will be used to satisfy the Data Quality Objectives for this removal action.

SEAD 50 and 54 TANK FARM

1.0 EXECUTIVE SUMMARY

An Expanded Site Inspection performed at SEAD-50 and 54, the Tank Farm, at Seneca Army Depot Activity (SEDA) demonstrated that a release of hazardous constituents to the environment has occurred. This decision document presents the selected 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 soil at SEAD-50 and 54 be excavated to a depth of six inches, contained and disposed of off-site at a permitted waste landfill. This removal action is intended to be the final remedy for this site.

2.0 SITE BACKGROUND

2.1 Site Description

SEAD-50 is the tank farm located in the southeastern portion of SEDA in a triangular shaped area immediately west of East Patrol Road between Building 350 and Buildings 356 and 357 (Figure 3). There are 4 tanks remaining on the site, three of which are empty. The two tanks used for the storage of antimony ore and one for the storage of rutile ore are empty. SEAD-54 is Tank #88 which currently contains asbestos (Figure 3).

The topography of the area is relatively flat with a total relief of 2 to 3 feet. There is an access road bisecting the site and connecting Avenue H with East Patrol Road. The asbestos storage tank is located immediately north of this road on the east side of SEAD-50. North of this access road, SEAD-50 is overgrown with vegetation except in the areas where tanks were previously located which are circular in shape and gravel covered. The area south of the road down to the ferro chromate ore site is flat and grassy. There are no wetlands in the area.

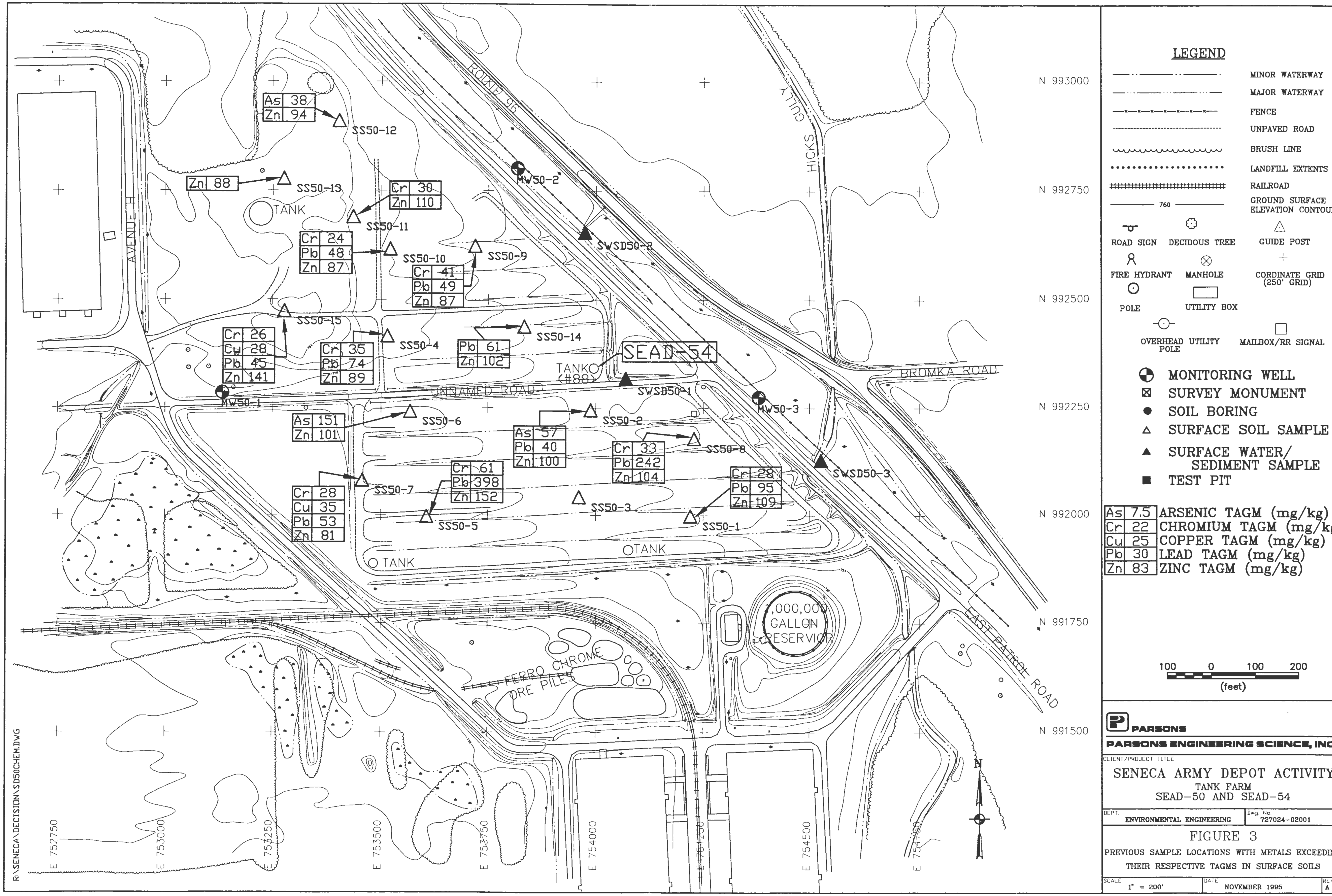


FIGURE 3
PREVIOUS SAMPLE LOCATIONS WITH METALS EXCEEDING THEIR RESPECTIVE TAGMS IN SURFACE SOILS

2.2 Site History

It is not known at what time the tank farm originated. At one time there were approximately 160 aboveground storage tanks in this area. According to SEDA personnel, the tanks were used to store dry materials such as ores and minerals including asbestos. Tanks have been removed from the farm over an extended period. In 1988, ten tanks were removed and sold to area farmers.

3.0 PREVIOUS INVESTIGATIONS

3.1 Description of Sampling Program

In 1993, an Expanded Site Inspection was performed at SEAD-50 and 54 to determine whether a release of hazardous constituents had occurred. A seismic refraction survey was performed to determine the direction of groundwater flow.

Fifteen surface soil samples were collected at random from previous tank locations to serve as indicators for any spills or leaks from the tanks. Six surface soil samples were collected from 0-2" and 9 surface soil samples were collected from 0-12" and were submitted to the lab for chemical analysis.

Three groundwater monitoring wells were installed in the till/weathered shale aquifer at SEAD-50. One monitoring well was installed upgradient of SEAD-50 to obtain background water quality data, and two wells were installed downgradient, between East Patrol Road and the SEDA perimeter fence, to determine if hazardous constituents have migrated from SEAD-50. One sample from each well (a total of three samples) was submitted to the lab for chemical analysis.

Three surface water and sediment samples were collected and submitted for chemical analysis, one from a drainage ditch within SEAD-50, and two from a downgradient drainage ditch which runs parallel to East Patrol Road.

A total of fifteen surface soil samples, three groundwater samples, and three surface water and sediment samples were collected from SEAD-50 and 54 for chemical analysis. The sample locations are shown in Figure 3. All of the samples were analyzed for Target

Compound List volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs), pesticides/polychlorinated biphenyls (PCBs), Target Analyte List metals and cyanide according to the New York State Department of Environmental Conservation (NYSDEC) Contract Laboratory Program Statement of Work. In addition, all of the surface soil samples were analyzed for asbestos.

3.2 Results of Sampling Program

Soil

The results of the soil sampling program are presented in Table 3. Soil at the site has been impacted by semivolatile organic compounds, predominantly polynuclear aromatic hydrocarbons (PAHs), heavy metals, and asbestos. TAGM exceedances for 6 PAH compounds were found mostly in surface soil samples SS50-11 and SS50-14. These two sample locations are situated in the north-central portion of SEAD-50.

Chromium, lead, and zinc were all found at concentrations which exceeded their associated TAGM values in approximately two thirds of the soil samples collected at SEAD-50. Sample, SS50-5, had the maximum concentration of all three metals and was the only sample with concentrations significantly above the TAGM. SS50-8 also had a lead concentration significantly above the TAGM. Arsenic was also detected above TAGMS in 4 of the 15 surface soil samples. However, in only two samples SS50-6 and SS50-2 was the exceedance by a significant amount. TAGM exceedences for all other metals were generally evenly distributed throughout the surface soil samples and none were found at significant concentrations.

Chrysotile asbestos comprised between 10 to 15 percent of surface soil sample SS50-1 (Table 5). Asbestos was not found in any of the remaining 14 surface soil samples collected at SEAD-50. Other constituents that were detected, but were considered to pose little impact, include 1 volatile organic compound, pesticides and PCBs. All of the reported concentrations of these constituents were well below their respective TAGMs.

TABLE 3

SENECA ARMY DEPOT
SEAD-50 AND SEAD 54 EXPANDED SITE INSPECTION
SOIL ANALYSIS RESULTS

COMPOUND	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	SOIL SEAD-50 0-1 02/18/94 SS50-1 211971 42493	SOIL SEAD-50 0-0.2 02/18/94 SS50-2 211972 42493	SOIL SEAD-50 0-1 02/18/94 SS50-3 211973 42493	SOIL SEAD-50 0-1 02/17/94 SS50-4 211728 42460	SOIL SEAD-50 0-0.2 02/18/94 SS50-5 211974 42493
VOLATILE ORGANICS										
Acetone	ug/Kg	83	7%	200	0	14 U	83	13 U	72 U	16 U
SEMIVOLATILE ORGANICS										
Phenol	ug/Kg	31	7%	NA	NA	31 J	610 U	480 U	410 U	450 U
4-Methylphenol	ug/Kg	310	20%	NA	NA	490 U	100 J	480 U	410 U	95 J
Acenaphthene	ug/Kg	930	13%	50000*	0	490 U	610 U	480 U	410 U	450 U
Dibenzofuran	ug/Kg	260	7%	6200	0	490 U	610 U	480 U	410 U	450 U
Fluorene	ug/Kg	590	13%	50000*	0	490 U	610 U	480 U	410 U	450 U
Phenanthrene	ug/Kg	7800	67%	50000*	0	490 U	150 J	480 U	20 J	27 J
Anthracene	ug/Kg	1500	20%	50000*	0	490 U	610 U	480 U	410 U	450 U
Carbazole	ug/Kg	1100	20%	50000*	0	490 U	610 U	480 U	410 U	450 U
Di-n-butylphthalate	ug/Kg	56	80%	8100	0	35 J	56 J	33 J	410 U	34 J
Fluoranthene	ug/Kg	14000	80%	50000*	0	33 J	230 J	480 U	32 J	37 J
Pyrene	ug/Kg	12000	73%	50000*	0	25 J	160 J	480 U	27 J	30 J
Benzo(a)anthracene	ug/Kg	5200	40%	220	3	490 U	81 J	480 U	410 U	450 U
Chrysene	ug/Kg	5500	40%	400	3	490 U	100 J	480 U	410 U	450 U
bis(2-Ethylhexyl)phthalate	ug/Kg	1800	93%	50000*	0	950	720	760	690	820
Benzo(b)fluoranthene	ug/Kg	4400	40%	1100	1	490 U	180 J	480 U	410 U	450 U
Benzo(k)fluoranthene	ug/Kg	4000	40%	1100	1	490 U	610 UJ	480 U	410 U	450 U
Benzo(a)pyrene	ug/Kg	3700	40%	61	5	490 U	78 J	480 U	410 U	450 U
Indeno(1,2,3-cd)pyrene	ug/Kg	1800	33%	3200	0	490 U	69 J	480 U	410 U	450 U
Dibenz(a,h)anthracene	ug/Kg	840	20%	14	3	490 U	610 U	480 U	410 U	450 U
Benzo(g,h,i)perylene	ug/Kg	1800	27%	50000*	0	490 U	56 J	480 U	410 U	450 U
PESTICIDES/PCB										
Heptachlor	ug/Kg	1.3	7%	100	0	2.5 U	3.1 U	2.5 U	2.1 U	2.3 U
Aldrin	ug/Kg	1.3	7%	41	0	2.5 U	3.1 U	2.5 U	2.1 U	1.3 J
Heptachlor epoxide	ug/Kg	2.4	13%	20	0	2.5 U	3.1 U	2.5 U	2.1 U	2.4
Endosulfan I	ug/Kg	13	7%	900	0	2.5 U	3.1 U	2.5 U	2.1 U	2.3 U
Dieldrin	ug/Kg	59	13%	440	0	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	4.8 U	6.1 U	4.8 U	4.1 U	3.1 J
Endrin	ug/Kg	2.8	7%	100	0	4.8 U	6.1 U	4.8 U	4.1 U	4.4 U
4,4'-DDD	ug/Kg	2.2	7%	2900	0	4.8 U	6.1 U	4.8 U	4.1 U	4.4 U
4,4'-DDT	ug/Kg	4.1	27%	2100	0	4.8 U	6.1 U	4.8 U	4.1 U	2.2 J
alpha-Chlordane	ug/Kg	3.8	7%	540	0	2.5 U	3.1 U	2.5 U	2.1 U	2.3 U
Aroclor-1242	ug/Kg	75	20%	1000/10000(a)	0	48 U	61 U	48 U	41 U	75
Aroclor-1254	ug/Kg	75	13%	1000/10000(a)	0	48 U	61 U	48 U	41 U	44 U
Aroclor-1260	ug/Kg	25	7%	1000/10000(a)	0	48 U	61 U	48 U	41 U	25 J

TABLE 3

SENECA ARMY DEPOT
SEAD-50 AND SEAD 54 EXPANDED SITE INSPECTION
SOIL ANALYSIS RESULTS

COMPOUND	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	SOIL SEAD-50 0-1 02/18/94 SS50-1 211971 42493	SOIL SEAD-50 0-0.2 02/18/94 SS50-2 211972 42493	SOIL SEAD-50 0-1 02/18/94 SS50-3 211973 42493	SOIL SEAD-50 0-1 02/17/94 SS50-4 211728 42460	SOIL SEAD-50 0-0.2 02/18/94 SS50-5 211974 42493
METALS										
Aluminum	mg/Kg	15300	100%	14593	3	14500	13500	12500	15100 J	9050
Antimony	mg/Kg	7.1	93%	3.59	1	1.4 J	1.6 J	2.9 J	7.1 J	2.7 J
Arsenic	mg/Kg	151	100%	7.5	4	4.9	57.4	5	5.1 J	3.7
Barium	mg/Kg	115	100%	300	0	95.6	115	87.5	96.8 J	66.2
Beryllium	mg/Kg	0.71	100%	1	0	0.61 J	0.59 J	0.59 J	0.68 J	0.38 J
Cadmium	mg/Kg	0.8	87%	1	0	0.17 J	0.22 J	0.12 J	0.46 U	0.25 J
Calcium	mg/Kg	120000	100%	101904	1	12500 J	4740 J	6220 J	3650 J	46800 J
Chromium	mg/Kg	60.7	100%	22	10	28.3	21.7	20.4	34.6	60.7
Cobalt	mg/Kg	12.6	100%	30	0	11 J	9 J	8.8 J	9.9 J	7.4 J
Copper	mg/Kg	35.2	100%	25	2	24.8	24.4	18.7	16.9	22.2
Iron	mg/Kg	30000	100%	26627	5	25600	22800	22800	24400 J	18000
Lead	mg/Kg	398	100%	30	10	94.8	40.1	27	74	398
Magnesium	mg/Kg	48300	100%	12222	3	5300	3900	3930	3840 J	21100
Manganese	mg/Kg	722	87%	669	1	569	630	490	539 R	350
Mercury	mg/Kg	0.37	100%	0.1	2	0.06 J	0.05 J	0.04 J	0.04 J	0.37
Nickel	mg/Kg	42.6	100%	34	4	35 J	25.2 J	22.8 J	24.3	22.9 J
Potassium	mg/Kg	2170	100%	1762	5	1780 J	2160 J	1040 J	1190	1430 J
Selenium	mg/Kg	1.1	93%	2	0	0.95 J	1.1 J	0.52 J	0.23 UJ	0.25 J
Silver	mg/Kg	0.34	13%	0.4	0	0.16 U	0.25 U	0.16 U	0.91 U	0.11 U
Sodium	mg/Kg	136	80%	104	1	64.7 J	55.6 U	42.5 J	43 U	86.1 J
Vanadium	mg/Kg	26.2	100%	150	0	23.8	24.9	22.6	26.1	15.6
Zinc	mg/Kg	152	100%	83	13	109	100	71.9	88.9 J	152
OTHER ANALYSES										
Total Solids	%W/W					67.8	53.8	68.9	80.6	73.9

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SOIL ANALYSIS RESULTS

COMPOUND	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	SOIL SEAD-50 0-0.2 02/18/94 SS50-6 211975 42493	SOIL SEAD-50 0-1 02/18/94 SS50-7 211976 42493	SOIL SEAD-50 0-1 02/18/94 SS50-8 211977 42493	SOIL SEAD-50 0-0.2 02/18/94 SS50-9 211978 42493	SOIL SEAD-50 0-1 02/19/94 SS50-10 211979 42493
VOLATILE ORGANICS										
Acetone	ug/Kg	83	7%	200	0	41 U	12 U	12 U	22 U	14 U
SEMIVOLATILE ORGANICS										
Phenol	ug/Kg	31	7%	NA	NA	610 UJ	390 U	370 U	430 U	430 U
4-Methylphenol	ug/Kg	310	20%	NA	NA	310 J	390 U	370 U	430 U	430 U
Acenaphthene	ug/Kg	930	13%	50000*	0	610 UJ	390 U	370 U	430 U	430 U
Dibenzofuran	ug/Kg	260	7%	6200	0	610 UJ	390 U	370 U	430 U	430 U
Fluorene	ug/Kg	590	13%	50000*	0	610 UJ	390 U	370 U	430 U	430 U
Phenanthrene	ug/Kg	7800	67%	50000*	0	140 J	390 U	370 U	40 J	430 U
Anthracene	ug/Kg	1500	20%	50000*	0	610 UJ	390 U	370 U	430 U	430 U
Carbazole	ug/Kg	1100	20%	50000*	0	610 UJ	390 U	370 U	430 U	430 U
Di-n-butylphthalate	ug/Kg	56	80%	8100	0	610 UJ	34 J	22 J	46 J	28 J
Fluoranthene	ug/Kg	14000	80%	50000*	0	210 J	390 U	370 U	58 J	23 J
Pyrene	ug/Kg	12000	73%	50000*	0	140 J	390 U	370 U	47 J	430 U
Benzo(a)anthracene	ug/Kg	5200	40%	220	3	81 J	390 U	370 U	430 U	430 U
Chrysene	ug/Kg	5500	40%	400	3	97 J	390 U	370 U	430 U	430 U
bis(2-Ethylhexyl)phthalate	ug/Kg	1800	93%	50000*	0	980 J	500	1300	330 J	150 J
Benzo(b)fluoranthene	ug/Kg	4400	40%	1100	1	99 J	390 U	370 U	430 U	430 U
Benzo(k)fluoranthene	ug/Kg	4000	40%	1100	1	80 J	390 U	370 U	30 J	430 U
Benzo(a)pyrene	ug/Kg	3700	40%	61	5	84 J	390 U	370 U	430 U	430 U
Indeno(1,2,3-cd)pyrene	ug/Kg	1800	33%	3200	0	64 J	390 U	370 U	430 U	430 U
Dibenz(a,h)anthracene	ug/Kg	840	20%	14	3	610 UJ	390 U	370 U	430 U	430 U
Benzo(g,h,i)perylene	ug/Kg	1800	27%	50000*	0	610 UJ	390 U	370 U	430 U	430 U
PESTICIDES/PCB										
Heptachlor	ug/Kg	1.3	7%	100	0	3.2 U	2 U	1.9 U	1.3 J	2.2 U
Aldrin	ug/Kg	1.3	7%	41	0	3.2 U	2 U	1.9 U	2.2 U	2.2 U
Heptachlor epoxide	ug/Kg	2.4	13%	20	0	2.1 J	2 U	1.9 U	2.2 U	2.2 U
Endosulfan I	ug/Kg	13	7%	900	0	3.2 U	2 U	1.9 U	2.2 U	2.2 U
Dieldrin	ug/Kg	59	13%	440	0	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	6.2 U	3.9 U	3.7 U	2.9 J	4.3 U
Endrin	ug/Kg	2.8	7%	100	0	6.2 U	3.9 U	3.7 U	4.3 U	4.3 U
4,4'-DDD	ug/Kg	2.2	7%	2900	0	6.2 U	3.9 U	3.7 U	4.3 U	4.3 U
4,4'-DDT	ug/Kg	4.1	27%	2100	0	6.2 U	3.9 U	3.7 U	1.9 J	4.3 U
alpha-Chlordane	ug/Kg	3.8	7%	540	0	3.2 U	2 U	1.9 U	2.2 U	2.2 U
Aroclor-1242	ug/Kg	75	20%	1000/10000(a)	0	62 U	39 U	49	43 U	43 U
Aroclor-1254	ug/Kg	75	13%	1000/10000(a)	0	62 U	39 U	37 U	43 U	75
Aroclor-1260	ug/Kg	25	7%	1000/10000(a)	0	62 U	39 U	37 U	43 U	43 U

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SOIL ANALYSIS RESULTS

COMPOUND	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	SOIL SEAD-50 0-0.2 02/18/94 SS50-6 211975 42493	SOIL SEAD-50 0-1 02/18/94 SS50-7 211976 42493	SOIL SEAD-50 0-1 02/18/94 SS50-8 211977 42493	SOIL SEAD-50 0-0.2 02/18/94 SS50-9 211978 42493	SOIL SEAD-50 0-1 02/19/94 SS50-10 211979 42493
METALS										
Aluminum	mg/Kg	15300	100%	14593	3	12500	13800	9150	12300	11300
Antimony	mg/Kg	7.1	93%	3.59	1	1.5 J	1.7 J	0.71 J	2.3 J	0.95 J
Arsenic	mg/Kg	151	100%	7.5	4	151	7.6	4.7	7.5	4.9
Barium	mg/Kg	115	100%	300	0	103	55.5	58.1	39 J	63.2
Beryllium	mg/Kg	0.71	100%	1	0	0.56 J	0.57 J	0.36 J	0.45 J	0.45 J
Cadmium	mg/Kg	0.8	87%	1	0	0.19 J	0.09 J	0.28 J	0.09 J	0.17 J
Calcium	mg/Kg	120000	100%	101904	1	4650 J	27300 J	120000 J	3480 J	24000 J
Chromium	mg/Kg	60.7	100%	22	10	19.9	28.1	32.6	40.9	23.5
Cobalt	mg/Kg	12.6	100%	30	0	7.3 J	12.6	6.4 J	11.2	8 J
Copper	mg/Kg	35.2	100%	25	2	18.5	35.2	13.9	18.4	18.9
Iron	mg/Kg	30000	100%	26627	5	21700	29400	18200	28600	26100
Lead	mg/Kg	398	100%	30	10	25.2	52.7	242	181	48.4
Magnesium	mg/Kg	48300	100%	12222	3	3550	6600	15700	5690	11200
Manganese	mg/Kg	722	87%	669	1	487	374	604	413	430
Mercury	mg/Kg	0.37	100%	0.1	2	0.22	0.02 J	0.04 J	0.03 J	0.03 J
Nickel	mg/Kg	42.6	100%	34	4	20.8 J	42.6 J	15.4 J	30.2 J	22 J
Potassium	mg/Kg	2170	100%	1762	5	1550 J	1680 J	1540 J	1030 J	1490 J
Selenium	mg/Kg	1.1	93%	2	0	0.71 J	0.59 J	0.67 J	0.53 J	0.21 J
Silver	mg/Kg	0.34	13%	0.4	0	0.21 U	0.15 U	0.34 J	0.14 U	0.12 U
Sodium	mg/Kg	136	80%	104	1	66 J	81.6 J	89.3 J	53 J	60.7 J
Vanadium	mg/Kg	26.2	100%	150	0	23.2	21	17	16.4	19.2
Zinc	mg/Kg	152	100%	83	13	101	81.2	104	114	87.4
OTHER ANALYSES										
Total Solids	%W/W					53.3	84.9	88	76.8	77

TABLE 3

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SOIL ANALYSIS RESULTS

COMPOUND	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	SOIL SEAD-50 0-0.2 02/19/94 SS50-11 211965 42460	SOIL SEAD-50 0-1 02/19/94 SS50-12 211980 42493	SOIL SEAD-50 0-0.2 02/19/94 SS50-13 211981 42493	SOIL SEAD-50 0-1 02/19/94 SS50-14 211982 42493	SOIL SEAD-50 0-0.2 02/19/94 SS50-15 211983 42493
VOLATILE ORGANICS										
Acetone	ug/Kg	83	7%	200	0	14 U	13 U	15 U	12 U	15 U
SEMIVOLATILE ORGANICS										
Phenol	ug/Kg	31	7%	NA	NA	2300 U	420 U	480 U	420 U	520 U
4-Methylphenol	ug/Kg	310	20%	NA	NA	2300 U	420 U	480 U	420 U	520 U
Acenaphthene	ug/Kg	930	13%	50000*	0	930 J	420 U	480 U	420 U	51 J
Dibenzofuran	ug/Kg	260	7%	6200	0	260 J	420 U	480 U	420 U	520 U
Fluorene	ug/Kg	590	13%	50000*	0	590 J	420 U	480 U	420 U	36 J
Phenanthrene	ug/Kg	7800	67%	50000*	0	7800	26 J	53 J	370 J	530
Anthracene	ug/Kg	1500	20%	50000*	0	1500 J	420 U	480 U	81 J	100 J
Carbazole	ug/Kg	1100	20%	50000*	0	1100 J	420 U	480 U	71 J	67 J
Di-n-butylphthalate	ug/Kg	56	80%	8100	0	2300 U	51 J	51 J	36 J	30 J
Fluoranthene	ug/Kg	14000	80%	50000*	0	14000	41 J	86 J	1300	1300
Pyrene	ug/Kg	12000	73%	50000*	0	12000	31 J	73 J	1200	1000
Benzo(a)anthracene	ug/Kg	5200	40%	220	3	5200	420 U	35 J	830	650
Chrysene	ug/Kg	5500	40%	400	3	5500	420 U	53 J	840	670
bis(2-Ethylhexyl)phthalate	ug/Kg	1800	93%	50000*	0	640 J	1800	960	610	1300
Benzo(b)fluoranthene	ug/Kg	4400	40%	1100	1	4400	420 U	45 J	860	690
Benzo(k)fluoranthene	ug/Kg	4000	40%	1100	1	4000	420 U	43 J	600	410 J
Benzo(a)pyrene	ug/Kg	3700	40%	61	5	3700	420 U	40 J	660	520
Indeno(1,2,3-cd)pyrene	ug/Kg	1800	33%	3200	0	1800 J	420 U	480 U	400 J	360 J
Dibenz(a,h)anthracene	ug/Kg	840	20%	14	3	840 J	420 U	480 U	200 J	190 J
Benzo(g,h,i)perylene	ug/Kg	1800	27%	50000*	0	1800 J	420 U	480 U	270 J	240 J
PESTICIDES/PCB										
Heptachlor	ug/Kg	1.3	7%	100	0	2.3 U	4.3 U	2.5 U	2.2 U	2.7 U
Aldrin	ug/Kg	1.3	7%	41	0	2.3 U	4.3 U	2.5 U	2.2 U	2.7 U
Heptachlor epoxide	ug/Kg	2.4	13%	20	0	2.3 U	4.3 U	2.5 U	2.2 U	2.7 U
Endosulfan I	ug/Kg	13	7%	900	0	2.3 U	4.3 U	2.5 U	13	2.7 U
Dieldrin	ug/Kg	59	13%	440	0	4.5 U	59 J	4.8 U	28 J	5.2 U
4,4'-DDE	ug/Kg	4.8	27%	2100	0	4.5 U	8.4 U	4.8 U	4.8 J	4 J
Endrin	ug/Kg	2.8	7%	100	0	2.8 J	8.4 U	4.8 U	4.2 U	5.2 U
4,4'-DDD	ug/Kg	2.2	7%	2900	0	4.5 U	8.4 U	4.8 U	2.2 J	5.2 U
4,4'-DDT	ug/Kg	4.1	27%	2100	0	4.5 U	8.4 U	4.8 U	4.1 J	4.1 J
alpha-Chlordane	ug/Kg	3.8	7%	540	0	3.8 J	4.3 U	2.5 U	2.2 U	2.7 U
Aroclor-1242	ug/Kg	75	20%	1000/10000(a)	0	45 U	84 U	48 U	37 J	52 U
Aroclor-1254	ug/Kg	75	13%	1000/10000(a)	0	45 U	84 U	48 U	24 J	52 U
Aroclor-1260	ug/Kg	25	7%	1000/10000(a)	0	45 U	84 U	48 U	42 U	52 U

TABLE 3

SENECA ARMY DEPOT
SEAD-50 AND SEAD 54 EXPANDED SITE INSPECTION
SOIL ANALYSIS RESULTS

COMPOUND	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	SOIL SEAD-50 0-0.2 02/19/94 SS50-11 211965 42460	SOIL SEAD-50 0-1 02/19/94 SS50-12 211980 42493	SOIL SEAD-50 0-0.2 02/19/94 SS50-13 211981 42493	SOIL SEAD-50 0-1 02/19/94 SS50-14 211982 42493	SOIL SEAD-50 0-0.2 02/19/94 SS50-15 211983 42493
METALS										
Aluminum	mg/Kg	15300	100%	14593	3	15300 J	15200	13800	10600	13300
Antimony	mg/Kg	7.1	93%	3.59	1	5.2 UJ	0.55 J	0.63 J	0.6 J	0.85 J
Arsenic	mg/Kg	151	100%	7.5	4	6 J	37.6	6.4	6.2	6.3
Barium	mg/Kg	115	100%	300	0	101 J	91.2	78	73.1	92.1
Beryllium	mg/Kg	0.71	100%	1	0	0.71 J	0.65 J	0.55 J	0.4 J	0.59 J
Cadmium	mg/Kg	0.8	87%	1	0	0.51 U	0.15 J	0.09 J	0.8 J	0.22 J
Calcium	mg/Kg	120000	100%	101904	1	15200 J	3870 J	10600 J	80100 J	18000 J
Chromium	mg/Kg	60.7	100%	22	10	29.9	22.7	21.1	21.8	25.7
Cobalt	mg/Kg	12.6	100%	30	0	10.3 J	11.6	10.4 J	9.2 J	12.6
Copper	mg/Kg	35.2	100%	25	2	23.6	19.6	22.2	20.9	28.1
Iron	mg/Kg	30000	100%	26627	5	27000 J	29400	26200	19700	30000
Lead	mg/Kg	398	100%	30	10	25.7	18.5	22.6	61.4	45.3
Magnesium	mg/Kg	48300	100%	12222	3	7510 J	4570	6330	48300	6780
Manganese	mg/Kg	722	87%	669	1	496 R	722	461	548	589
Mercury	mg/Kg	0.37	100%	0.1	2	0.05 J	0.05 J	0.05 J	0.03 J	0.03 J
Nickel	mg/Kg	42.6	100%	34	4	37.2	30.1 J	28.9 J	24.4 J	37 J
Potassium	mg/Kg	2170	100%	1762	5	2170	1600 J	1760 J	2140 J	1890 J
Selenium	mg/Kg	1.1	93%	2	0	0.41 J	0.41 J	0.33 J	0.55 J	0.44 J
Silver	mg/Kg	0.34	13%	0.4	0	1 U	0.16 J	0.18 U	0.16 U	0.14 U
Sodium	mg/Kg	136	80%	104	1	63.7 J	26.7 U	64.9 J	136 J	64.6 J
Vanadium	mg/Kg	26.2	100%	150	0	26.2	24.6	23.4	19.8	21.3
Zinc	mg/Kg	152	100%	83	13	110 J	93.7	87.9	102	141
OTHER ANALYSES										
Total Solids	%W/W					72.9	78.2	69.3	78.8	63.9

NOTES:

a) The TAGM value for PCBs is 1000ug/Kg for surface soils and 10,000 ug/Kg for subsurface soils.
b) * = As per proposed TAGM, total VOCs < 10 ppm, total SVOs < 500 ppm, and individual SVOs < 50 ppm.
c) NA = Not Available.
d) U = The compound was not detected below this concentration.
e) J = The reported value is an estimated concentration.
f) UJ = The compound may have been present above this concentration, but was not detected due to problems with the analysis.
g) R = The data was rejected during the data validation process.

Groundwater

The results of the groundwater sampling program are presented in Table 4. Groundwater at the site has not been significantly impacted by any of the constituents analyzed for during the investigation. The constituents which were detected in the groundwater samples collected at SEAD-50, but considered to pose an insignificant risk to receptors because of their low reported concentrations, include one semivolatile organic compound and metals. The reported concentrations of these constituents were generally below their associated criteria values. Specifically, iron, manganese, and sodium were the only elements found above their associated NY AWQS Class GA groundwater criteria.

Surface Water

The results of the surface water sampling program are presented in Table 5. Surface water at the site has not been significantly impacted by any of the constituents analyzed for during the investigation. Metals were the only constituents that were detected. The metals which were detected in the surface water samples collected at SEAD-50 were considered to pose an insignificant risk to receptors because they were detected at low concentrations and only one sample slightly exceeded the NYS class D surface water criterium for iron.

Sediment

The results of the sediment sampling program are presented in Table 6. Sediment at the site has been impacted by semivolatile organic compounds (mostly PAHs) and pesticides, and PCBs. The PAH compounds benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, and indeno(1,2,3-cd)pyrene were found at concentrations above their respective TAGM values in all 3 of the sediment samples collected at SEAD-50. The pesticides aldrin, endosulfan I, 4,4'-DDE, and alpha-Chlordane and the PCB Aroclor-1260 were found in sediment sample SD50-1 at concentrations which exceeded their respective NYSDEC sediment criteria for human and/or aquatic life. Other constituents which were detected in the sediment samples include one volatile organic compound and metals. These constituents were not considered to pose a significant risk because they were present at low concentrations and only a small number of samples exceeded their respective sediment criteria.

TABLE 4

SENECA ARMY DEPOT
SEAD-50 AND SEAD-54 EXPANDED SITE INSPECTION
GROUNDWATER ANALYSIS RESULTS

COMPOUND	MATRIX LOCATION SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM	FREQUENCY OF DETECTION	NY AWQS CLASS GA	NUMBER ABOVE CRITERIA	WATER SEAD-50 07/12/94 MW50-1 226794 45332	WATER SEAD-50 07/18/94 MW50-2 227267 45332	WATER SEAD-50 07/18/94 MW50-3 227268 45332
SEMIVOLATILE ORGANICS								
Di-n-octylphthalate	ug/L	5	33%	50	0	10 U	10 U	5 J
METALS								
Aluminum	ug/L	1790	100%	NA	NA	1790 J	137 J	19.6 J
Arsenic	ug/L	2.2	33%	25	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	33%	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	33%	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%	300	3	1040	791	317
Mercury	ug/L	0.05	33%	2	0	0.05 J	0.04 U	0.04 U
Nickel	ug/L	8	67%	NA	NA	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	67%	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	67%	NA	NA	1.9 J	3 J	1.9 U
Vanadium	ug/L	3	67%	NA	NA	3 J	0.5 U	0.54 J
Zinc	ug/L	20.2	67%	300	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 Regulations
b) NA = Not Available
d) U = The compound was not detected below this concentration.
e) J = The reported value is an estimated concentration.

TABLE 5

SENECA ARMY DEPOT
SEAD-50 AND SEAD-54 EXPANDED SITE INSPECTION
SURFACE WATER ANALYSIS RESULTS

COMPOUND	MATRIX LOCATION SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM	FREQUENCY OF DETECTION	NYS GUIDELINE CLASS D (a,b)	NUMBER ABOVE CRITERIA	WATER SEAD-50 04/19/94 SW50-1 218499 43626	WATER SEAD-50 04/19/94 SW50-2 218500 43626	WATER SEAD-50 04/19/94 SW50-3 218501 43626
METALS								
Aluminum	ug/L	376	100%	NA	NA	376	63.1 J	68.2 J
Arsenic	ug/L	22.1	67%	360	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%	3275	0	0.88 J	0.4 U	1.3 J
Copper	ug/L	2.1	100%	36.8	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%	220	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%	50562	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%	190	0	1.1 J	0.7 U	0.7 U
Zinc	ug/L	10.5	100%	611	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 guidelines for Class D surface water.
b) Hardness dependent values assume a hardness of 217 mg/L.
c) NA = Not Available
d) U = The compound was not detected below this concentration.
e) J = The reported value is an estimated concentration.

TABLE 6

SENECA ARMY DEPOT
SEAD-50 AND SEAD-54 EXPANDED SITE INSPECTION
SEDIMENT ANALYSIS RESULTS

COMPOUND	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC SEDIMENT CRITERIA FOR AQUATIC LIFE (a)	NYSDEC SEDIMENT CRITERIA FOR HUMAN HEALTH (a)	NYSDEC SEDIMENT CRITERIA FOR WILDLIFE (a)	LOT (b)	NUMBER ABOVE CRITERIA	SOIL SEAD-50 0-0.2 04/19/94 SD50-1 218502 43663	SOIL SEAD-50 0-0.2 04/19/94 SD50-2 218503 43663	SOIL SEAD-50 0-0.2 04/19/94 SD50-3 218504 43663
VOLATILE ORGANICS											
2-Butanone	ug/Kg	11	33%	NA	NA	NA	NA	NA	11 J	21 UJ	13 U
SEMIVOLATILE ORGANICS											
4-Methylphenol	ug/Kg	110	67%	NA	NA	NA	NA	NA	44 J	110 J	420 U
Acenaphthene	ug/Kg	160	33%	7300	NA	NA	NA	0	160 J	690 UJ	420 U
Dibenzofuran	ug/Kg	97	33%	NA	NA	NA	NA	NA	97 J	690 UJ	420 U
Fluorene	ug/Kg	310	33%	NA	NA	NA	NA	NA	310 J	690 UJ	420 U
Phenanthrene	ug/Kg	2700	100%	1390	NA	NA	NA	1	2700	140 J	35 J
Anthracene	ug/Kg	480	33%	NA	13	NA	NA	1	480 J	690 UJ	420 U
Carbazole	ug/Kg	250	33%	NA	NA	NA	NA	NA	250 J	690 UJ	420 U
Fluoranthene	ug/Kg	3500	100%	NA	NA	NA	NA	NA	3500	310 J	94 J
Pyrene	ug/Kg	4000	100%	NA	NA	NA	NA	NA	4000	300 J	83 J
Benzo(a)anthracene	ug/Kg	1400	100%	NA	13	NA	NA	3	1400	120 J	44 J
Chrysene	ug/Kg	1500	100%	NA	13	NA	NA	3	1500	170 J	60 J
Benzo(b)fluoranthene	ug/Kg	1300	100%	NA	13	NA	NA	3	1300	160 J	51 J
Benzo(k)fluoranthene	ug/Kg	1200	100%	NA	13	NA	NA	3	1200	160 J	69 J
Benzo(a)pyrene	ug/Kg	1200	100%	NA	13	NA	NA	3	1200	160 J	58 J
Indeno(1,2,3-cd)pyrene	ug/Kg	770	100%	NA	13	NA	NA	3	770	120 J	38 J
Dibenz(a,h)anthracene	ug/Kg	260	33%	NA	NA	NA	NA	NA	260 J	690 UJ	420 U
Benzo(g,h,i)perylene	ug/Kg	790	100%	NA	NA	NA	NA	NA	790	120 J	42 J
PESTICIDES/PCB											
Aldrin	ug/Kg	2.2	33%	84	1	7.7	NA	1	2.2 J	3.5 UJ	2.2 U
Endosulfan I	ug/Kg	15	67%	0.3	NA	NA	NA	2	15 J	3 J	2.2 U
4,4'-DDE	ug/Kg	4.3	33%	500	0.1	10	NA	1	4.3 J	6.9 UJ	4.2 U
alpha-Chlordane	ug/Kg	8	33%	0.06	0.01	0.06	NA	1	8 J	3.5 UJ	2.2 U
Aroclor-1242	ug/Kg	120	33%	NA	NA	NA	NA	NA	120	69 UJ	42 U
Aroclor-1260	ug/Kg	56	33%	NA	0.008	195	NA	1	56 J	69 UJ	42 U

TABLE 6

SENECA ARMY DEPOT
SEAD-50 AND SEAD-54 EXPANDED SITE INSPECTION
SEDIMENT ANALYSIS RESULTS

COMPOUND	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC SEDIMENT CRITERIA FOR AQUATIC LIFE (a)	NYSDEC SEDIMENT CRITERIA FOR HUMAN HEALTH (a)	NYSDEC SEDIMENT CRITERIA FOR WILDLIFE (a)	LOT (b)	NUMBER ABOVE CRITERIA	SOIL SEAD-50 0-0.2 04/19/94 SD50-1 218502 43663	SOIL SEAD-50 0-0.2 04/19/94 SD50-2 218503 43663	SOIL SEAD-50 0-0.2 04/19/94 SD50-3 218504 43663
METALS											
Aluminum	mg/Kg	16300	100%	NA	NA	NA	NA	NA	16300	11000 J	10300
Antimony	mg/Kg	3.3	100%	NA	NA	NA	NA	NA	3.3 J	0.55 J	0.24 J
Arsenic	mg/Kg	62.7	100%	5	NA	NA	33	2	62.7	27.5 J	4.1
Barium	mg/Kg	117	100%	NA	NA	NA	NA	NA	108	117 J	62.9
Beryllium	mg/Kg	0.75	100%	NA	NA	NA	NA	NA	0.75 J	0.53 J	0.48 J
Cadmium	mg/Kg	0.8	100%	0.8	NA	NA	10	0	0.57 J	0.8 J	0.23 J
Calcium	mg/Kg	31400	100%	NA	NA	NA	NA	NA	7570	14800 J	31400
Chromium	mg/Kg	25.1	100%	26	NA	NA	111	0	25.1	23.3 J	15.9
Cobalt	mg/Kg	9.3	100%	NA	NA	NA	NA	NA	9.3 J	8.7 J	8.1
Copper	mg/Kg	25.5	100%	19	NA	NA	114	2	25.5	18.9 J	19.9
Iron	mg/Kg	26800	100%	24000	NA	NA	40000	1	26800	20500 J	19700
Lead	mg/Kg	49.6	100%	27	NA	NA	250	1	49.6	25.5 J	10.8
Magnesium	mg/Kg	6400	100%	NA	NA	NA	NA	NA	4980	3780 J	6400
Manganese	mg/Kg	1380	100%	428	NA	NA	1100	1	284 J	1380 J	390 J
Mercury	mg/Kg	0.02	100%	0.11	NA	NA	2	0	0.05 J R	0.08 J R	0.02 J
Nickel	mg/Kg	29.4	100%	22	NA	NA	90	3	29.4	27.4 J	24.4
Potassium	mg/Kg	2530	100%	NA	NA	NA	NA	NA	2530	1680 J	1580
Sodium	mg/Kg	121	67%	NA	NA	NA	NA	NA	45.1 U	121 J	69.7 J
Vanadium	mg/Kg	28.8	100%	NA	NA	NA	NA	NA	28.8	20.3 J	17.3
Zinc	mg/Kg	243	100%	85	NA	NA	800	2	202	243 J	63.9
OTHER ANALYSES											
Total Solids	%W/W	78.7							54.5	48	78.7

NOTES:
a) NYSDEC Sediment Criteria - 1989
b) LOT = Limit of Tolerance: Represents point at which significant effects on benthic species occur.
c) NA = Not Available.
d) U = The compound was not detected below this concentration.
e) J = The reported value is an estimated concentration.
f) UJ = The compound may have been present above this concentration, but was not detected dut to problems with the analysis.
g) R = The data was rejected during the data validation process.

TABLE 7
SENECA ARMY DEPOT
SEAD-50 AND SEAD-54 EXPANDED SITE INSPECTION
BULK SAMPLE ASBESTOS ANALYSIS RESULTS

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

4.0 DISCUSSION OF REMOVAL ALTERNATIVES

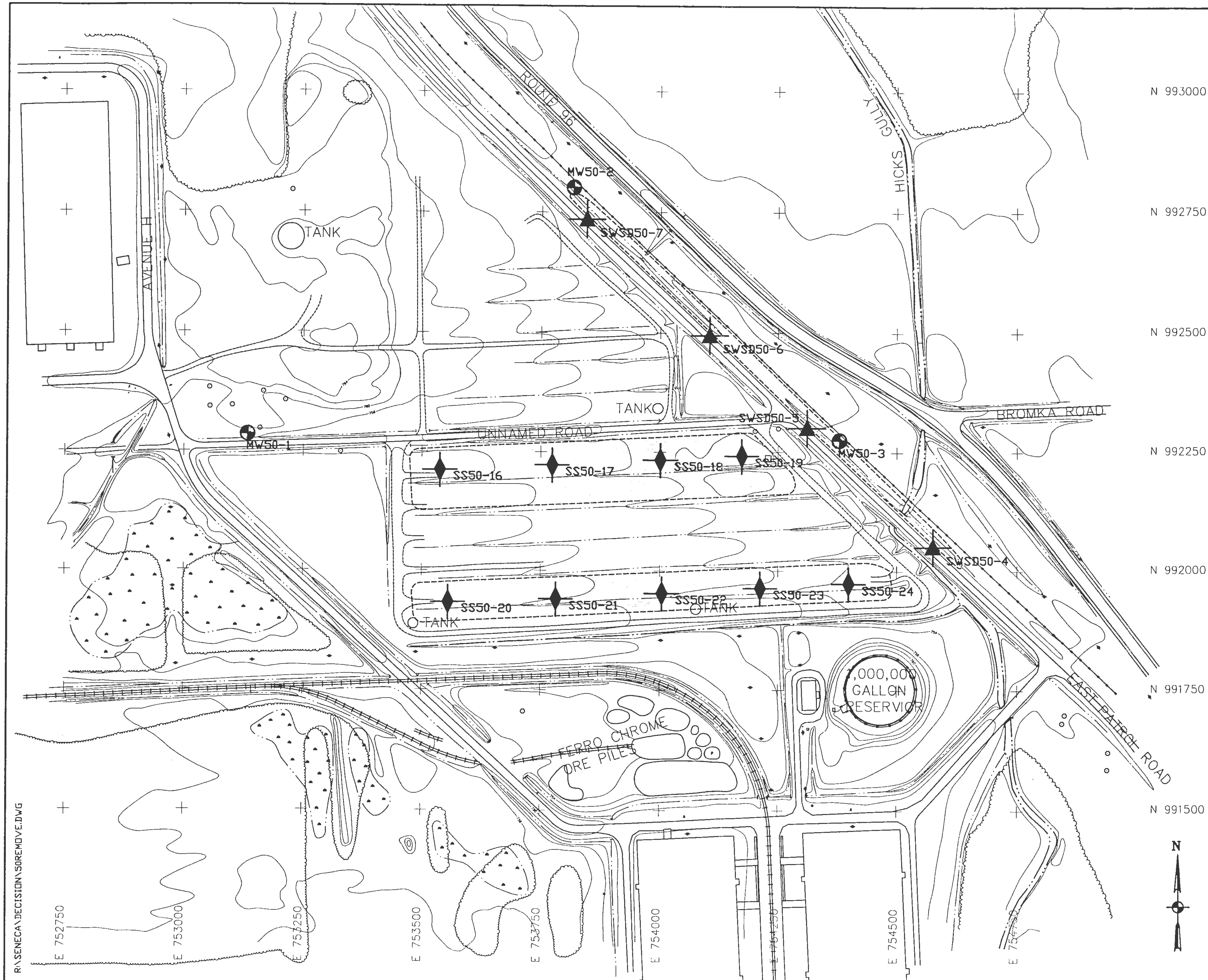
The objectives of a removal action are to comply with all ARARs and reduce the overall environmental and human health risk to an acceptable level at the site. To reduce the threat from metal and asbestos impacted soil, the surface soil between surface soil sample location SS50-5 and SS50-1 (150 feet by 1,000 feet) and between surface soil sample location SS50-1 and SS50-8 (150 feet by 800 feet) should be remediated to a depth of 6 inches. The volume of soil to be removed at SEAD-50 and 54 is approximately 5,000 cy (7,500 tons). To reduce the threat from PAH and pesticide-impacted sediments, the roadside drainage ditches that run alongside the road that runs east-west through the site (1,000 feet by 4 feet) should be remediated to a depth of six inches. The volume of sediment to be removed from SEAD-50 and 54 is approximately 150 cy (225 tons). These areas are shown as shaded areas on Figure 4.

This section briefly describes removal alternatives which may be applicable for use at SEAD-50 and 54. Based on the previous investigations, groundwater impacts appear minimal. At this time, the emphasis is on potential soil and sediment 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.

5.0 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.



LEGEND

- MINOR WATERWAY
- MAJOR WATERWAY
- FENCE
- UNPAVED ROAD
- BRUSH LINE
- LANDFILL EXTENTS
- RAILROAD
- GROUND SURFACE ELEVATION CONTOUR (760)
- ROAD SIGN
- DECIDOUS TREE
- GUIDE POST
- FIRE HYDRANT
- MANHOLE
- CORDINATE GRID (250' GRID)
- POLE
- UTILITY BOX
- OVERHEAD UTILITY POLE
- MAILBOX/RR SIGNAL
- MONITORING WELL
- SURVEY MONUMENT
- SS50-17 POST-REMOVAL VERIFICATION SURFACE SOIL SAMPLE
- SWSD50-4 POST-REMOVAL VERIFICATION SURFACE WATER AND SEDIMENT SAMPLE
- AREA TO BE REMEDIATED

100 0 100 200
(feet)

PARSONS
PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE
SENECA ARMY DEPOT ACTIVITY
TANK FARM
SEAD-50 AND SEAD-54

DEPT.	Dwg. No.
ENVIRONMENTAL ENGINEERING	727024-02001

FIGURE 4
REMOVAL PLANS

SCALE	DATE	REV
1"=200'	NOVEMBER 1995	A

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 which can be excavated and removed. Factors which 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 frequently result in the elimination of this alternative as a cost-effective alternative. Institutional aspects can add significant delays to program implementation.

6.0 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 $390,000 to $1,600,000 with a most probable cost range of $1,000,000 to $1,200,000.

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 $770,000 to $1,500,000 with a most probable cost range of $1,000,000 to $1,200,000.

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 $50 and $100 per ton. Assuming that it will be disposed in a non-hazardous landfill, this will result in an estimated cost of $390,000 to $770,000 with a most probable cost in the range of $500,000 to $600,000.

7.0 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, metals and asbestos-impacted soil at SEAD-50 and 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.

8.0 RECOMMENDATIONS

To reduce the threat from the metals and asbestos-impacted soil at SEAD-50 and 54, the surface soils between sampling locations S550-6 and SS50-8 and between SS50-5 and SS50-1 should be excavated to a depth of 6 inches, and disposed of in a off-site landfill as non-hazardous waste. The quantity of soil to be removed at SEAD-50 and 54 is approximately 7,500 tons of material. To remove the PAH and pesticide-impacted sediments at SEAD-50, the roadside drainage ditches that run alongside the road that runs east-west through the site should be dredged to a depth of six inches. This material should also be disposed of in a off-site permitted waste landfill. The quantity of sediment to be removed from SEAD-50 and 54 is approximately 225 tons. The estimated cost is approximately $500,000 to $600,000 to excavate, contain and dispose this volume in an off-site permitted non-hazardous waste landfill.

9.0 JUSTIFICATIONS

Metals were detected in the surface soil samples across SEAD-50 at concentrations that exceeded their respective TAGM values. Asbestos was detected in one surface soil sample. The sediment collected from the drainage ditch in the central portion of the site contained PAHs and pesticides in concentrations that exceeded their respective TAGM values. The surface water, groundwater, and downstream sediment samples collected indicate that constituents have not migrated from the site. The removal of the top 6 inches of soil at SEAD-50 and 54 would remove the impacted soil that poses any health risks.

10.0 POST-REMOVAL VERIFICATION SAMPLING

To verify that the removal of the top 6 inches of soil is sufficient to remove the metals and asbestos-impacted soil at SEAD-50 and 54 that poses any health risks, soil samples should be collected below the excavation on a 200-foot intervals sampling grid. The samples should be analyzed for TAL metals and asbestos. To verify that the removal of the top 6 inches of the sediment in the drainage ditches that run west to east across the center of the site is sufficient to remove the sediment at SEAD-50 and 54 that poses any health risks, both surface water and sediment samples should be collected from the entire length of the drainage ditch at 100-foot intervals and analyzed for SVOCs and pesticides. Two surface water and sediment samples should also be collected in the drainage ditches downstream of SEAD-50 and 54. All proposed sample locations are shown on Figure 4. The post-excavation samples will be used to satisfy the Data Quality Objectives for this removal action.

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

1.0 EXECUTIVE SUMMARY

An Expanded Site Inspection performed at SEAD-67, the Dump Site East of Sewage Treatment Plant No. 4, at Seneca Army Depot Activity (SEDA) demonstrated that a release of hazardous constituents to the environment has occurred. This decision document presents the selected 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 waste piles and berms at the site be removed and disposed of in an off-site permitted waste landfill. This removal action is intended to be the final remedy for this site.

2.0 SITE BACKGROUND

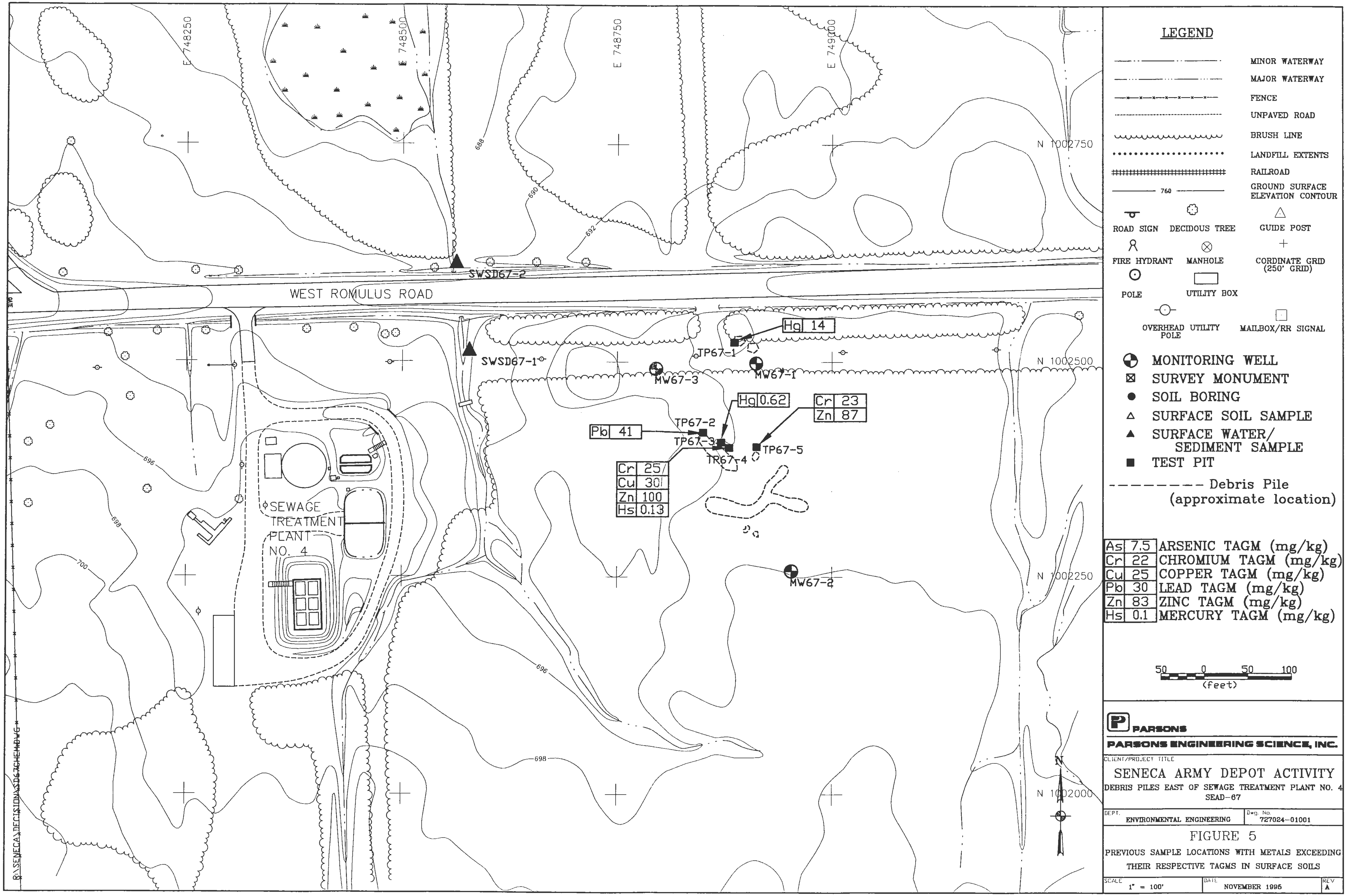
2.1 Site Description

SEAD-67 is comprised of several waste piles and berms located east of sewage treatment plant No. 4 and south of West Romulus Road in the east-central portion of SEDA (Figure 5). The site is entirely undeveloped and is heavily vegetated with low brush and deciduous trees. One grass-covered 10-foot diameter waste pile and 5-foot diameter waste pile are located approximately 50 feet and 70 feet, respectively, south of West Romulus Road. A brush-covered berm 60 feet long and a 10-foot diameter pile are located approximately 175 feet south of the road. An additional 110 foot long berm is located approximately 50 feet south of that. The pile and berm locations are represented by dashed lines as shown in Figure 5. All of the piles and berms are approximately 3 to 4 feet high except the 10-foot diameter pile 50 feet south of the West Romulus Road which is approximately 5 feet high.

The topography on the site slopes gently to the west towards a small stream. The stream flows north under West Romulus Road and into a large wetland area located to the north of SEAD-67.

2.2 Site History

Very little is known about the history of this site. The contents of the waste piles are unknown as well as the time period during which the waste piles were formed.



LEGEND
MINOR WATERWAY
MAJOR WATERWAY
FENCE
UNPAVED ROAD
BRUSH LINE
LANDFILL EXTENTS
RAILROAD
GROUND SURFACE ELEVATION CONTOUR
760
ROAD SIGN
DECIDOUS TREE
GUIDE POST
FIRE HYDRANT
MANHOLE
CORDINATE GRID (250' GRID)
POLE
UTILITY BOX
OVERHEAD UTILITY POLE
MAILBOX/RR SIGNAL
MONITORING WELL
SURVEY MONUMENT
SOIL BORING
SURFACE SOIL SAMPLE
SURFACE WATER/ SEDIMENT SAMPLE
TEST PIT
Debris Pile (approximate location)
As 7.5 ARSENIC TAGM (mg/kg)
Cr 22 CHROMIUM TAGM (mg/kg)
Cu 25 COPPER TAGM (mg/kg)
Pb 30 LEAD TAGM (mg/kg)
Zn 83 ZINC TAGM (mg/kg)
Hs 0.1 MERCURY TAGM (mg/kg)
50 0 50 100
(feet)
E 748250
E 748500
E 748750
E 749000
N 1002750
N 1002500
N 1002250
N 1002000
688
690
692
696
698
700
WEST ROMULUS ROAD
SWSD67-2
SWSD67-1
MW67-3
MW67-1
MW67-2
TP67-1
TP67-2
TP67-3
TP67-4
TP67-5
Hg 14
Hg 0.62
Pb 41
Cr 23
Zn 87
Cr 25
Cu 30
Zn 100
Hs 0.13
SEWAGE TREATMENT PLANT NO. 4
N
PARSONS
PARSONS ENGINEERING SCIENCE, INC.
CLIENT/PROJECT TITLE
SENECA ARMY DEPOT ACTIVITY
DEBRIS PILES EAST OF SEWAGE TREATMENT PLANT NO. 4
SEAD-67
DEPT.
ENVIRONMENTAL ENGINEERING
Dwg. No.
727024-01001
FIGURE 5
PREVIOUS SAMPLE LOCATIONS WITH METALS EXCEEDING THEIR RESPECTIVE TAGMS IN SURFACE SOILS
SCALE
1" = 100'
DATE
NOVEMBER 1996
REV
A

3.0 PREVIOUS INVESTIGATIONS

3.1 Description of Sampling Program

In 1993, an Expanded Site Inspection was performed at SEAD-67 to determine whether a release of hazardous constituents had occurred. A seismic refraction survey was performed to determine the direction of groundwater flow, and 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. One soil boring was completed as part of the upgradient monitoring well installation to obtain background soil quality data. Three soil samples were collected from the boring and submitted for chemical analysis. A total of five test pit excavations were performed at SEAD-67. One excavation was advanced through to 10-foot diameter pile 50 feet south of West Romulus Road, three were advanced in the 30-foot berm 175 feet south of West Romulus Road, and one was advanced in the 10-foot diameter pile 175 feet to the south of West Romulus Road. In each case, the test pit bisected the pile or berm allowing a complete visual inspection of the fill material. One soil sample was collected from each test pit (a total of five samples) and submitted for chemical analysis.

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 adjacent to and downgradient of SEAD-67 to determine if hazardous constituents have migrated from the site in groundwater. One sample from each well (a total of three 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 due north of the piles while the second sample was collected from the wetlands north of West Romulus Road.

A total of three subsurface soil samples, five surface soil samples, three groundwater samples, two surface water and two sediment samples were collected from SEAD-67 for chemical analysis. All sample locations are shown in Figure 5. All the samples were analyzed for Target Compound List volatile organic compounds (VOCs), semivolatile organic compounds

(SVOCs), pesticides/polychlorinated biphenyls (PCBs) and Target Analyte List (TAL) metals and cyanide according to the New York State Department of Environmental Conservation (NYSDEC) Contract Laboratory Program Statement of Work.

3.2 Results of Sampling Program

The results of the soil sampling program are presented in Table 8. Soil at SEAD-67 has been impacted by SVOCs, predominantly polynuclear aromatic hydrocarbons (PAHs), and the metal mercury. Concentrations exceeding Technical and Administrative Guidance Manual (TAGM) values for PAHs were detected in four of the five test pit samples and none were detected in the background samples. A number of metals were detected at concentrations exceeding their respective TAGM values, most of the exceedances were up to one to two times the TAGM value. However, the concentration of mercury in the sample TP67-1 (4 mg/kg) is noteworthy because it is 40 times the TAGM value of 0.1 mg/kg. The next highest mercury concentration was 0.62 mg/kg in sample TP67-3. Pesticides and PCBs were detected, but all reported concentrations were below their respective TAGMs.

The results of the groundwater sampling program are presented in Table 9. Groundwater at SEAD-67 has not been significantly impacted by any of the constituents of concern in the investigation. Metals were the only analytes detected in the groundwater samples, and iron and manganese were the only metals detected above their TAGM values. Iron and magnesium are not considered to be significant health risks.

The results of the surface water sampling program are presented in Table 10. Surface water at SEAD-67 has not been significantly impacted by any of the constituents of concern in the investigation. Metals were the only analytes detected in the surface water samples. The metals detected are not considered to pose any significant health risks because they were present at low concentrations and only iron was detected at a concentration exceeding the surface water criteria value.

The results of the sediment sampling program are presented in Table 11. Sediment at SEAD-67 has been impacted by SVOCs (mostly PAHs) and pesticides. PAHs were detected above the TAGM values in both sediment samples from the stream. The pesticide endosulfan I was detected in the most downstream sediment sample exceeding the TAGM value. The pesticide

TABLE 8

SENECA ARMY DEPOT
SEAD-67 EXPANDED SITE INSPECTION
SOIL ANALYSIS RESULTS

COMPOUND	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM	FREQUENCY OF DETECTION	TAGM	NUMBER ABOVE TAGM	SOIL SEAD-67 0-0.2 03/30/94 MW67-2.00 216109 43257	SOIL SEAD-67 2-4 03/30/94 MW67-2.02 216112 43257	SOIL SEAD-67 4-5 03/30/94 MW67-2.03 216113 43257	SOIL SEAD-67 2-3 06/06/94 TP67-1 223303 44410	SOIL SEAD-67 2-3 06/06/94 TP67-2 223305 44410	SOIL SEAD-67 2-3 06/06/94 TP67-3 223306 44410	SOIL SEAD-67 2-3 06/06/94 TP67-4 223307 44410	SOIL SEAD-67 2-3 06/06/94 TP67-5 223308 44410
SEMIVOLATILE ORGANICS													
Naphthalene	ug/Kg	34	25%	13000	0	480 U	380 U	370 U	34 J	380 U	34 J	400 U	450 U
2-Methylnaphthalene	ug/Kg	44	25%	36400	0	480 U	380 U	370 U	44 J	380 U	25 J	400 U	450 U
Acenaphthylene	ug/Kg	210	50%	41000	0	480 U	380 U	370 U	38 J	33 J	210 J	400 U	26 J
Acenaphthene	ug/Kg	50	13%	50000*	0	480 U	380 U	370 U	50 J	380 U	380 U	400 U	450 U
Dibenzofuran	ug/Kg	50	13%	6200	0	480 U	380 U	370 U	50 J	380 U	380 U	400 U	450 U
Fluorene	ug/Kg	110	38%	50000*	0	480 U	380 U	370 U	110 J	31 J	380 U	400 U	27 J
Phenanthrene	ug/Kg	740	63%	50000*	0	480 U	380 U	370 U	740	340 J	180 J	32 J	280 J
Anthracene	ug/Kg	140	50%	50000*	0	480 U	380 U	370 U	97 J	44 J	140 J	400 U	43 J
Carbazole	ug/Kg	80	38%	50000*	0	480 U	380 U	370 U	80 J	23 J	380 U	400 U	32 J
Di-n-butylphthalate	ug/Kg	47	13%	8100	0	480 U	47 J	370 U	390 U	380 U	380 U	400 U	450 U
Fluoranthene	ug/Kg	860	75%	50000*	0	36 J	380 U	370 U	760	610	860	55 J	510
Pyrene	ug/Kg	950	75%	50000*	0	31 J	380 U	370 U	520	500	950	43 J	450
Benzo(a)anthracene	ug/Kg	610	63%	220	4	480 U	380 U	370 U	280 J	250 J	610	24 J	240 J
Chrysene	ug/Kg	690	63%	400	1	480 U	380 U	370 U	300 J	290 J	690	29 J	230 J
bis(2-Ethylhexyl)phthalate	ug/Kg	250	38%	50000*	0	480 U	250 J	230 J	29 J	380 U	380 U	400 U	450 U
Benzo(b)fluoranthene	ug/Kg	1300	63%	1100	1	480 U	380 U	370 U	440 J	470 J	1300 J	26 J	430 J
Benzo(k)fluoranthene	ug/Kg	28	13%	1100	0	480 U	380 U	370 U	390 UJ	380 UJ	380 UJ	28 J	450 UJ
Benzo(a)pyrene	ug/Kg	830	63%	61	4	480 U	380 U	370 U	210 J	220 J	830	28 J	220 J
Indeno(1,2,3-cd)pyrene	ug/Kg	620	63%	3200	0	480 U	380 U	370 U	96 J	120 J	620	25 J	130 J
Dibenz(a,h)anthracene	ug/Kg	310	50%	14	4	480 U	380 U	370 U	70 J	53 J	310 J	400 U	65 J
Benzo(g,h,i)perylene	ug/Kg	620	63%	50000*	0	480 U	380 U	370 U	64 J	93 J	620	40 J	97 J
PESTICIDES/PCB													
Heptachlor epoxide	ug/Kg	5.5	25%	20	0	5.5	2 U	1.9 U	2 U	2 U	1.2 J	2.1 U	2.3 U
Endosulfan I	ug/Kg	25	75%	900	0	4	2 U	1.9 U	3.2 J	11 J	25 J	1.2 J	15 J
4,4'-DDE	ug/Kg	4.8	50%	2100	0	4.8 U	3.8 U	3.7 U	2.3 J	4.5 J	4.8 J	4 U	3 J
Endosulfan sulfate	ug/Kg	2.1	13%	1000	0	4.8 U	3.8 U	3.7 U	3.9 U	3.8 U	2.1 J	4 U	4.5 U
4,4'-DDT	ug/Kg	9.4	38%	2100	0	4.8 U	3.8 U	3.7 U	3.9 U	6.3 J	9.4	4 U	4.2 J
alpha-Chlordane	ug/Kg	2.1	38%	540	0	2.5 U	2 U	1.9 U	2 U	1.4 J	2.1 J	2.1 U	1.9 J
Aroclor-1254	ug/Kg	72	13%	1000/10000(a)	0	48 U	38 U	37 U	39 U	72 J	38 U	40 U	45 U
METALS													
Aluminum	mg/Kg	19100	100%	14593	5	16700	14900	9460	16100	12200	9870	19100	17200
Antimony	mg/Kg	0.44	63%	3.59	0	0.27 J	0.22 J	0.2 UJ	0.26 UJ	0.27 J	0.44 J	0.39 J	0.32 UJ
Arsenic	mg/Kg	6	100%	7.5	0	4.4	4.5	4.2	4.8	5.4	5	6	4.9
Barium	mg/Kg	182	100%	300	0	114	105	80.8	96.7	105	82.2	158	182
Beryllium	mg/Kg	0.87	100%	1	0	0.67 J	0.61 J	0.4 J	0.74 J	0.62 J	0.49 J	0.87 J	0.83 J
Cadmium	mg/Kg	0.73	100%	1	0	0.2 J	0.11 J	0.12 J	0.46 J	0.5 J	0.69 J	0.69 J	0.73 J
Calcium	mg/Kg	139000	100%	101904	1	3580	79000	77800	6810	5940	139000	12000	20100
Chromium	mg/Kg	24.8	100%	22	4	19.5	22.5	14.8	22.2	18.7	15.1	24.8	23.2
Cobalt	mg/Kg	12.8	100%	30	0	7.5 J	10.4 J	9.7 J	10.7	9.5	7.5	11	12.8
Copper	mg/Kg	29.7	100%	25	1	16.5	20.3	20.5	22	21.3	21.5	29.7	24.5
Iron	mg/Kg	27300	100%	26627	2	20500	24400	18700	26000	24000	16800	27300	27300
Lead	mg/Kg	40.9	100%	30	1	17.5	9.3	8.5	12.8	21.3	40.9	19.1	12
Magnesium	mg/Kg	20900	100%	12222	3	3590	15600	20900	4760	4730	12900	6660	5010
Manganese	mg/Kg	1380	100%	669	2	438	528	411	594	624	627	863	1380
Mercury	mg/Kg	4	100%	0.1	3	0.04	0.01 J	0.02 J	4 J	0.05 J	0.62 J	0.13 J	0.06 J
Nickel	mg/Kg	32.3	100%	34	0	18.7	32.3	25.9	27.8	27.2	22	30.1	30.2
Potassium	mg/Kg	3160	100%	1762	6	1780 J	3160 J	1970 J	1620 J	1390 J	2090 J	2520 J	2040 J
Selenium	mg/Kg	2	75%	2	0	0.81	0.36 U	0.34 U	1	1.1	0.41 J	1.2	2
Sodium	mg/Kg	112	75%	104	3	25.1 U	112 J	107 J	19.9 U	26.4 J	111 J	39.4 J	26.1 J
Thallium	mg/Kg	0.48	13%	0.28	1	0.48 J	0.34 U	0.32 U	0.38 U	0.34 U	0.28 U	0.41 U	0.47 U
Vanadium	mg/Kg	31.8	100%	150	0	28.2	24.8	16.5	26.5	22.7	20.9	31.8	27.8
Zinc	mg/Kg	100	100%	83	2	64.8	62	60.1	70.5	70.5	72.8	100	86.6
OTHER ANALYSES													
Total Solids	%W/W					68.9	85.5	90.2	83.8	86.4	86.3	82	73.5

NOTES:
a) The TAGM value for PCBs is 1000ug/Kg for surface soils and 10,000 ug/Kg for subsurface
b) * = As per proposed TAGM, total VOCs < 10 ppm, total SVOs < 500 ppm, and individual S
c) NA = Not Available.
d) U = The compound was not detected below this concentration.
e) J = The reported value is an estimated concentration.
f) UJ = The compound may have been present above this concentration, but was not detecte
g) R = The data was rejected during the data validation process.

TABLE 9

SENECA ARMY DEPOT
SEAD-67 EXPANDED SITE INSPECTION
GROUNDWATER ANALYSIS RESULTS

COMPOUND	MATRIX LOCATION SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM	FREQUENCY OF DETECTION	NY AWQS CLASS GA (a)	NUMBER ABOVE CRITERIA	FEDERAL DRINKING WATER MCL (i)	NUMBER ABOVE CRITERIA	WATER SEAD-67 07/07/94 MW67-1 226307 45257	WATER SEAD-67 07/10/94 MW67-2 226488 45282	WATER SEAD-67 07/08/94 MW67-3 226308 45257
METALS										
Aluminum	ug/L	5790	100%	NA	NA	50-200 *	3	5790	1240	448
Arsenic	ug/L	2.5	33%	25	0	NA	NA	2.5 J	2 U	2 U
Barium	ug/L	203	100%	1000	0	2000	0	203	100 J	98.9 J
Beryllium	ug/L	0.72	33%	NA	NA	4	0	0.72 J	0.1 U	0.1 U
Calcium	ug/L	351000	100%	NA	NA	NA	NA	351000	119000	122000
Chromium	ug/L	10	100%	50	0	100	0	10	2 J	0.9 J
Cobalt	ug/L	12.3	100%	NA	NA	NA	NA	12.3 J	1.4 J	1.3 J
Copper	ug/L	13.1	100%	200	0	1000 *	0	13.1 J	1.5 J	2 J
Iron	ug/L	10800	100%	300	3	300 *	3	10800	2270	689
Lead	ug/L	8.3	33%	25	0	NA	NA	8.3	0.9 U	0.9 U
Magnesium	ug/L	51800	100%	NA	NA	NA	NA	51800	24200	24000
Manganese	ug/L	1710	100%	300	1	50 *	3	1710	153	194
Mercury	ug/L	0.09	67%	2	0	2	0	0.09 J	0.04 U	0.06 J
Nickel	ug/L	15.9	100%	NA	NA	100	0	15.9 J	2.9 J	2.2 J
Potassium	ug/L	5740	100%	NA	NA	NA	NA	5740	1870 J	1670 J
Sodium	ug/L	13700	100%	20000	0	NA	NA	4240 J	13700	4970 J
Thallium	ug/L	2	33%	NA	NA	2	1	2 J	1.9 U	1.9 U
Vanadium	ug/L	9.2	100%	NA	NA	NA	NA	9.2 J	2.1 J	0.86 J
Zinc	ug/L	29.6	100%	300	0	5000 *	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 Regulations
b) NA = Not Available
d) U = The compound was not detected below this concentration.
e) J = The reported value is an estimated concentration.
f) UJ = The compound may have been present above this concentration, but was not detected due to problems with the analysis.
g) R = The data was rejected during the data validation process.
h) NR = Not Recorded
i) Federal Primary and Secondary(*) Drinking Water Maximum Contaminant Levels (40 CFR 141.61-62 and 40 CFR 143.3)

TABLE 10

SENECA ARMY DEPOT
SEAD-67 EXPANDED SITE INSPECTION
SURFACE WATER ANALYSIS RESULTS

COMPOUND	MATRIX LOCATION SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM	FREQUENCY OF DETECTION	NYS GUIDELINES CLASS D (a)	NUMBER ABOVE CRITERIA	WATER SEAD-67 04/26/94 SW67-1 219464 43810	WATER SEAD-67 04/26/94 SW67-2 219465 43810
METALS							
Aluminum	ug/L	129	100%	NA	NA	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%	36.8	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%	20	0	1.6 U	2.1 J
Zinc	ug/L	3.3	100%	611	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 guidelines for Class D surface water.
b) Hardness dependent values assume a hardness of 217 mg/L.
c) NA = Not Available
d) U = The compound was not detected below this concentration.
e) J = The reported value is an estimated concentration.
f) UJ = The compound may have been present above this concentration, but was not detected due to problems with the analysis.
g) R = The data was rejected during the data validation process.

TABLE 11

SENECA ARMY DEPOT
SEAD-67 EXPANDED SITE INSPECTION
SEDIMENT ANALYSIS RESULTS

COMPOUND	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM	FREQUENCY OF DETECTION	NYSDEC SEDIMENT CRITERIA FOR AQUATIC LIFE (a)	NYSDEC SEDIMENT CRITERIA FOR HUMAN HEALTH (a)	NYSDEC SEDIMENT CRITERIA FOR WILDLIFE (a)	LOT (b)	NUMBER ABOVE CRITERIA	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
VOLATILE ORGANICS										
Acetone	ug/Kg	53	50%	NA	NA	NA	NA	NA	53 J	28 UJ
2-Butanone	ug/Kg	21	50%	NA	NA	NA	NA	NA	21 J	20 UJ
SEMIVOLATILE ORGANICS										
Acenaphthylene	ug/Kg	54	50%	NA	NA	NA	NA	NA	820 UJ	54 J
Acenaphthene	ug/Kg	120	50%	7300	NA	NA	NA	0	820 UJ	120 J
Dibenzofuran	ug/Kg	83	50%	NA	NA	NA	NA	NA	820 UJ	83 J
Fluorene	ug/Kg	280	50%	NA	NA	NA	NA	NA	820 UJ	270 J
Phenanthrene	ug/Kg	2400	100%	1390	NA	NA	NA	1	260 J	2400
Anthracene	ug/Kg	600	50%	NA	13	NA	NA	1	820 UJ	600 J
Carbazole	ug/Kg	78	50%	NA	NA	NA	NA	NA	820 UJ	78 J
Fluoranthene	ug/Kg	3400	100%	NA	NA	NA	NA	NA	440 J	3400
Pyrene	ug/Kg	3000	100%	NA	NA	NA	NA	NA	370 J	3000
Benzo(a)anthracene	ug/Kg	1400	100%	NA	13	NA	NA	2	180 J	1400
Chrysene	ug/Kg	1300	100%	NA	13	NA	NA	2	220 J	1300
Benzo(b)fluoranthene	ug/Kg	880	100%	NA	13	NA	NA	2	180 J	880
Benzo(k)fluoranthene	ug/Kg	930	100%	NA	13	NA	NA	2	160 J	930
Benzo(a)pyrene	ug/Kg	970	100%	NA	13	NA	NA	2	170 J	970
Indeno(1,2,3-cd)pyrene	ug/Kg	460	100%	NA	13	NA	NA	2	98 J	460 J
Dibenz(a,h)anthracene	ug/Kg	230	50%	NA	NA	NA	NA		820 UJ	230 J
Benzo(g,h,i)perylene	ug/Kg	370	100%	NA	NA	NA	NA	NA	87 J	370 J
PESTICIDES/PCB										
Endosulfan I	ug/Kg	20	50%	0.3	NA	NA	NA	1	4.2 UJ	20 J
4,4'-DDT	ug/Kg	4.1	50%	NA	NA	10	NA	0	8.2 UJ	4.1 J
alpha-Chlordane	ug/Kg	4.8	100%	0.06	0.01	0.06	NA	2	4.8 J	3.6 J
METALS										
Aluminum	mg/Kg	12000	100%	NA	NA	NA	NA	NA	12000 J	10700 J
Arsenic	mg/Kg	4.2	100%	5	NA	NA	33	0	3.7 J	4.2 J
Barium	mg/Kg	95.8	100%	NA	NA	NA	NA	NA	95.8 J	92.7 J
Beryllium	mg/Kg	0.58	100%	NA	NA	NA	NA	NA	0.58 J	0.56 J
Cadmium	mg/Kg	0.37	100%	0.8	NA	NA	10	0	0.37 J	0.34 J
Calcium	mg/Kg	13200	100%	NA	NA	NA	NA	NA	6620 J	13200 J
Chromium	mg/Kg	18	100%	26	NA	NA	111	0	18 J	16.4 J
Cobalt	mg/Kg	8.3	100%	NA	NA	NA	NA	NA	8 J	8.3 J
Copper	mg/Kg	37.7	100%	19	NA	NA	114	2	37.7 J	22.6 J
Iron	mg/Kg	19800	100%	24000	NA	NA	40000	0	18900 J	19800 J
Lead	mg/Kg	17.8	100%	27	NA	NA	250	0	15.4 J	17.8 J
Magnesium	mg/Kg	5030	100%	NA	NA	NA	NA	NA	4160 J	5030 J
Manganese	mg/Kg	731	100%	428	NA	NA	1100	1	413 J	731 J
Nickel	mg/Kg	23.2	100%	22	NA	NA	90	2	22.6 J	23.2 J
Potassium	mg/Kg	1650	100%	NA	NA	NA	NA	NA	1650 J	1330 J
Silver	mg/Kg	1.7	100%	NA	NA	NA	NA	NA	1.7 J	1.1 J
Sodium	mg/Kg	107	100%	NA	NA	NA	NA	NA	84.5 J	107 J
Vanadium	mg/Kg	20.4	100%	NA	NA	NA	NA	NA	20.4 J	18.8 J
Zinc	mg/Kg	85.4	100%	85	NA	NA	800	1	85.4 J	76.5 J
OTHER ANALYSES										
Total Solids	%W/W								40.1	48.9

NOTES:
a) NYSDEC Sediment Criteria - 1969
b) LOT = Limit of Tolerance: Represents point at which significant effects on benthic species occur.
c) NA = Not Available.
d) U = The compound was not detected below this concentration.
e) J = The reported value is an estimated concentration.
f) UJ = The compound may have been present above this concentration, but was not detected due to problems with the analysis.
g) R = The data was rejected during the data validation process.

alpha-chlordane was found in both sediment samples exceeding the TAGM value. Metals were the only other constituents that were detected, but only a small number of samples exceed their respective TAGM values and the only metals that exceed TAGM values are metals that are not considered to pose significant health risks.

4.0 DISCUSSION OF REMOVAL ALTERNATIVES

The objectives of a removal action are to comply with all ARARs and reduce the overall environmental and human health risk to an acceptable level at the site. To remove the threat from PAH and mercury-impacted soil at SEAD-67, all of the waste piles present should be remediated. To remove the threat from PAH and pesticide-impacted sediment, six inches of the sediment in the small stream to the west of SEAD-67 should be remediated adjacent to SEAD-67 and 20 feet to the north of West Romulus Road. The areas to be remediated are indicated on the shaded areas of Figure 6. The volume of soil and sediment to be remediated from SEAD-67 is approximately 160 cy (240 tons).

This section briefly describes removal alternatives which may be applicable for use at SEAD-67. 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 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.

5.0 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.

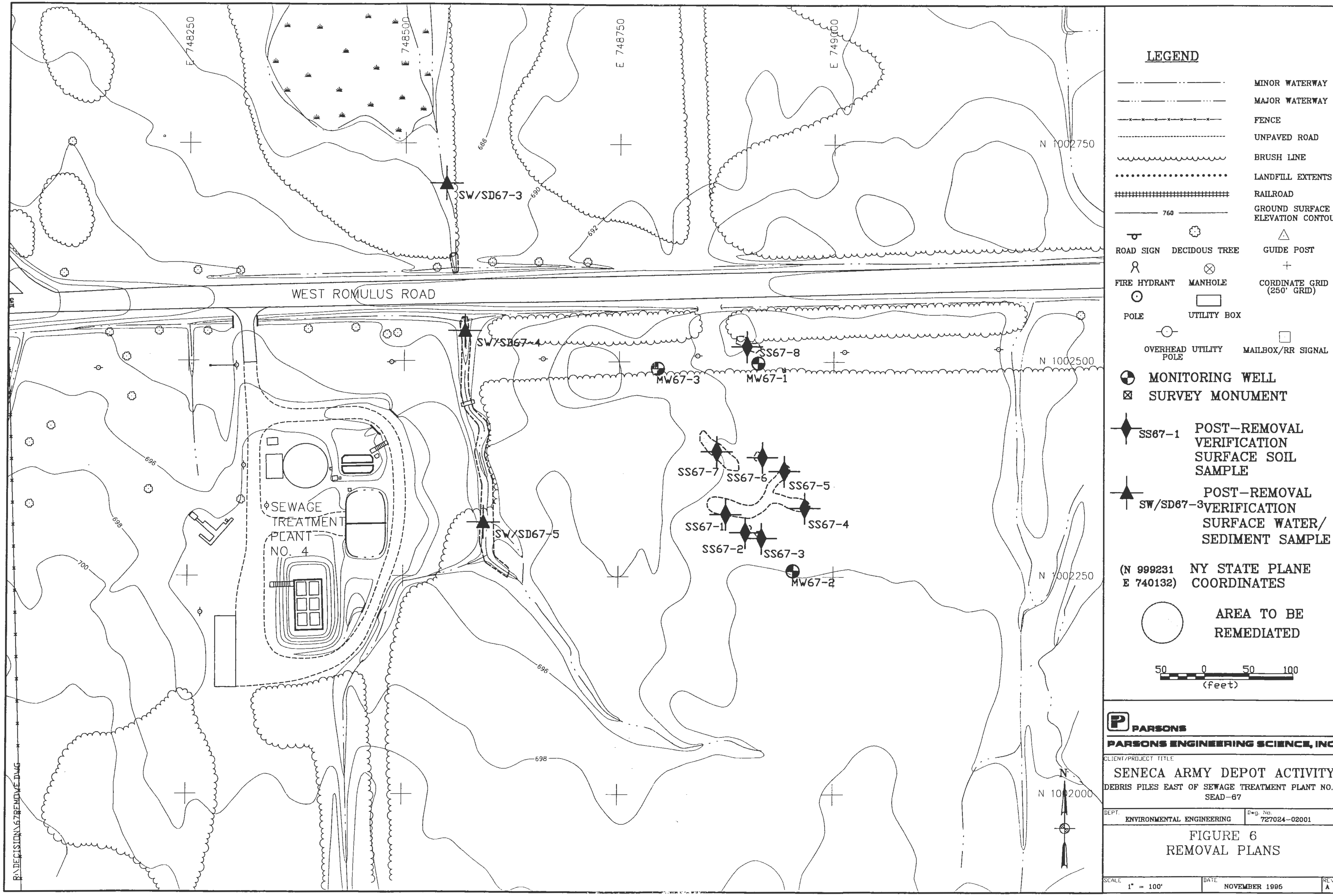


FIGURE 6
REMOVAL PLANS

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 which can be excavated and removed. Factors which 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 frequently result in the elimination of this alternative as a cost-effective alternative. Institutional aspects can add significant delays to program implementation.

6.0 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 $12,000 to $50,000 with a most probable cost in the range of $30,000 to $40,000.

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 $24,000 to $48,000 with a most probable cost range of $30,000 to $40,000.

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 $12,000 to $24,000 with a most probable cost in the range of $15,000 to $20,000.

7.0 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 and metals-impacted soil at SEAD-67. 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 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.

8.0 RECOMMENDATIONS

To reduce the threat from the PAH and mercury-impacted soil at SEAD-67, all of the waste piles present should be removed, contained and disposed of in an off-site permitted waste landfill. To remove the PAH and pesticide-impacted sediment, six inches of the sediment in the small stream to the west of SEAD-67 should be dredged adjacent to SEAD-67 and 20 feet to the north of West Romulus Road. This material should also be contained in drums and disposed of in an off-site non-hazardous waste landfill. The areas to be removed are indicated on the shaded areas of

Figure 6. The quantity of soil and sediment to be removed from SEAD-67 is approximately 240. The estimated cost is approximately $15,000 to $20,000 to excavate, contain and dispose of this material in a non-hazardous waste landfill.

9.0 JUSTIFICATIONS

PAHs were detected in all but one of the soil samples collected, and while most of the metals detected in the waste piles were at concentrations that are not considered to present significant health risks, two of the waste piles contained mercury in high concentrations. The sediment samples collected indicate that PAH's and pesticides have impacted the drainage ditch so the removal of the waste piles where high concentrations of mercury were detected and the removal of the sediments from the drainage ditch would remove the impacted soil that poses any health risks. The groundwater and surface water samples collected indicate that none of the constituents are migrating from SEAD-67, so the removal of the soil and sediments containing the metals, pesticides and PAHs that exceed the TAGM values will serve as the final remedy for this site.

10.0 POST-REMOVAL VERIFICATION SAMPLING

To verify that the removal of the waste piles is sufficient to remove the PAH and metals-impacted soil at SEAD-67 that poses any health risks, samples should be collected in the former locations of the waste piles and analyzed for SVOCs and TAL metals. To verify that the removal of six inches of the sediment in the small stream to the west of SEAD-67 is sufficient to remove the PAH and pesticide-impacted sediment, samples will be collected in the stream as well as downstream of the removal area and will be analyzed for SVOCs and pesticides. All proposed sample locations are shown on Figure 6. The post-excavation samples will be used to satisfy the Data Quality Objectives for the site.