U.S. ARMY ENGINEER DIVISION
HUNTSVILLE, ALABAMA

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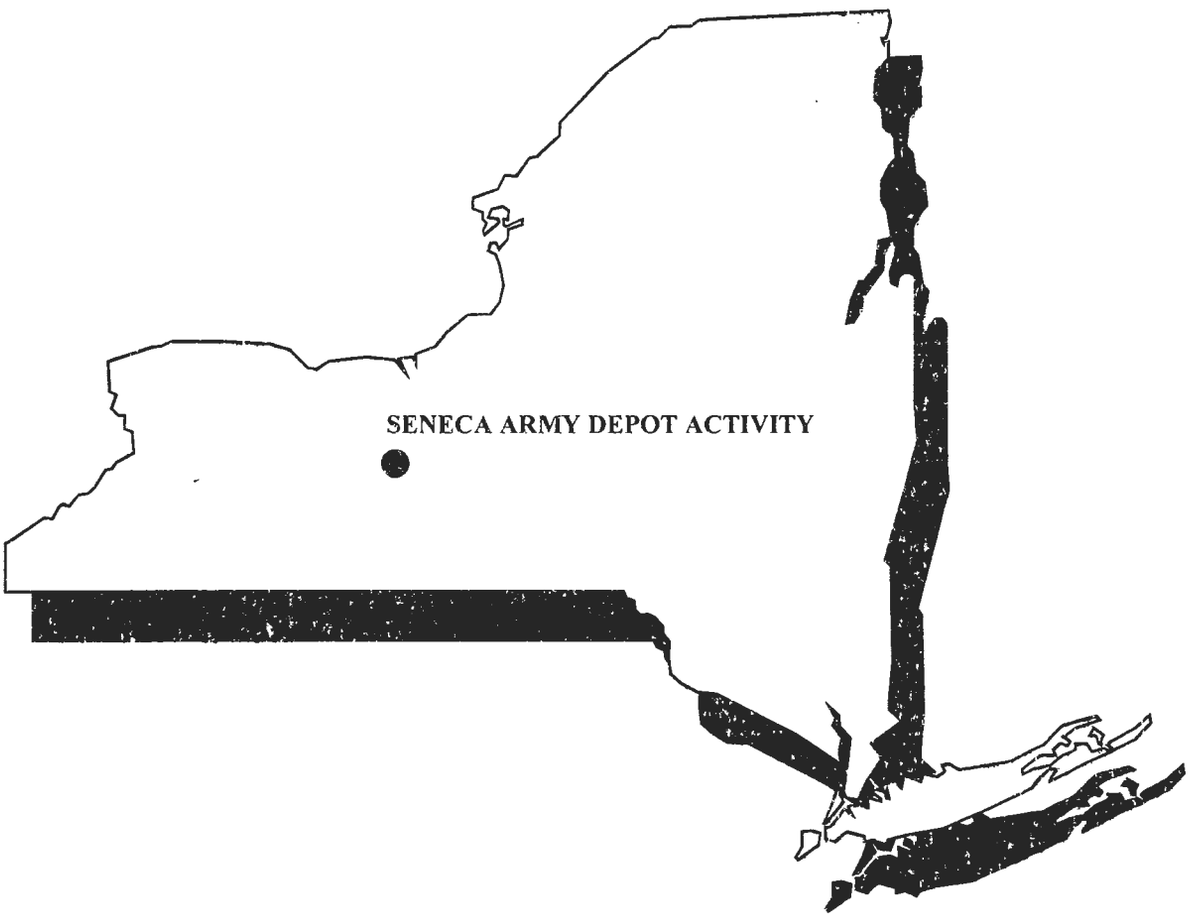

DRAFT

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

CONTRACT NO. DACA87-95-D-0031
TASK ORDER O OF DELIVERY ORDER 15

MARCH 2001

PARSONS ENGINEERING SCIENCE, INC.

30 Dan Road • Canton, Massachusetts 02021-2809 • (781) 401-3200 • Fax: (781) 401-2575

March 30, 2001

Commander
U.S. Army Corps of Engineers
Engineering and Support Center, Hunstville
Attn: Ms. Allen CEHNC-PM
4820 University Square
Huntsville, AL 35816-1822

SUBJECT: **Seneca Army Depot Activity, Draft Decision Document and Draft Technical Specifications for Removal Actions at SWMUs SEAD-24, SEAD-50, SEAD-54, and SEAD-67**

Dear Major Sheets:

Parsons Engineering Science (Parsons ES) is pleased to submit three copies of the draft Decision Document and three copies of the draft Technical Specifications for Removal Actions at the Areas of Concern (AOC) listed above. These documents were originally submitted to the Army in 1995 and again in 1999. Revisions, including the provision of a health and safety plan, have been made in order to update these documents. This work was performed in accordance with the Scope of Work (SOW) for Delivery Order 15, Annex O to the Parsons ES Contract DACA87-95-0031.

Parsons ES appreciates the opportunity to provide you with these documents. Should you have any questions, please do not hesitate to call me at (781) 401-2492 to discuss them.

Sincerely,

PARSONS ENGINEERING SCIENCE, INC.

Michael Duchesneau, P.E.
Project Manager

cc: S. Absolom, SEDA
R. Battaglia, CENAN
K. Hoddinott, USACHPPM
C. Kim, USAEC
B. Wright, USAIOC

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DRAFT

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.
Canton, Massachusetts

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

MARCH 2001

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1.0 SEAD-24 ABANDONED POWDER BURNING PIT

1.1 EXECUTIVE SUMMARY

An Expanded Site Inspection (ESI) performed at SEAD-24, the Abandoned Powder Burning Pit, at Seneca Army Depot Activity (SEDA) demonstrated that a release of hazardous constituents to the environment has occurred. This decision document presents the proposed plan for conducting a time-critical removal action at SEAD-24 to eliminate contaminants that have been identified in the soil that represent a potential threat to the environment and neighboring populations. This removal action is considered time-critical because the historic military mission of the base has been terminated and the base has officially been closed by the Department of the Defense (DoD) and the US Army. In accordance with provisions of the DoD's Base Realignment and Closure (BRAC) process, the land and the facilities of the former depot have been surveyed and evaluated, and prospective beneficial uses of the facility have been identified. Portions of the depot are now being released to the public and private sectors for reuse under the BRAC process. As portions of the former depot are released for other beneficial uses, increased access is afforded to all portions of the former depot, resulting in an increased potential for exposure of populations to any residual chemicals that are present at former solid waste management units (SWMUs) remaining at the depot pending clean-up. Therefore, the goal of the proposed time-critical removal action at SEAD-24 is to eliminate and contain an identified source of residual chemical materials in the soil to remove or at least lessen the magnitude of the potential threat that it represents to surrounding populations and the environment.

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.

1.2 SITE BACKGROUND

1.2.1 Site Description

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

1.2.2 Site History

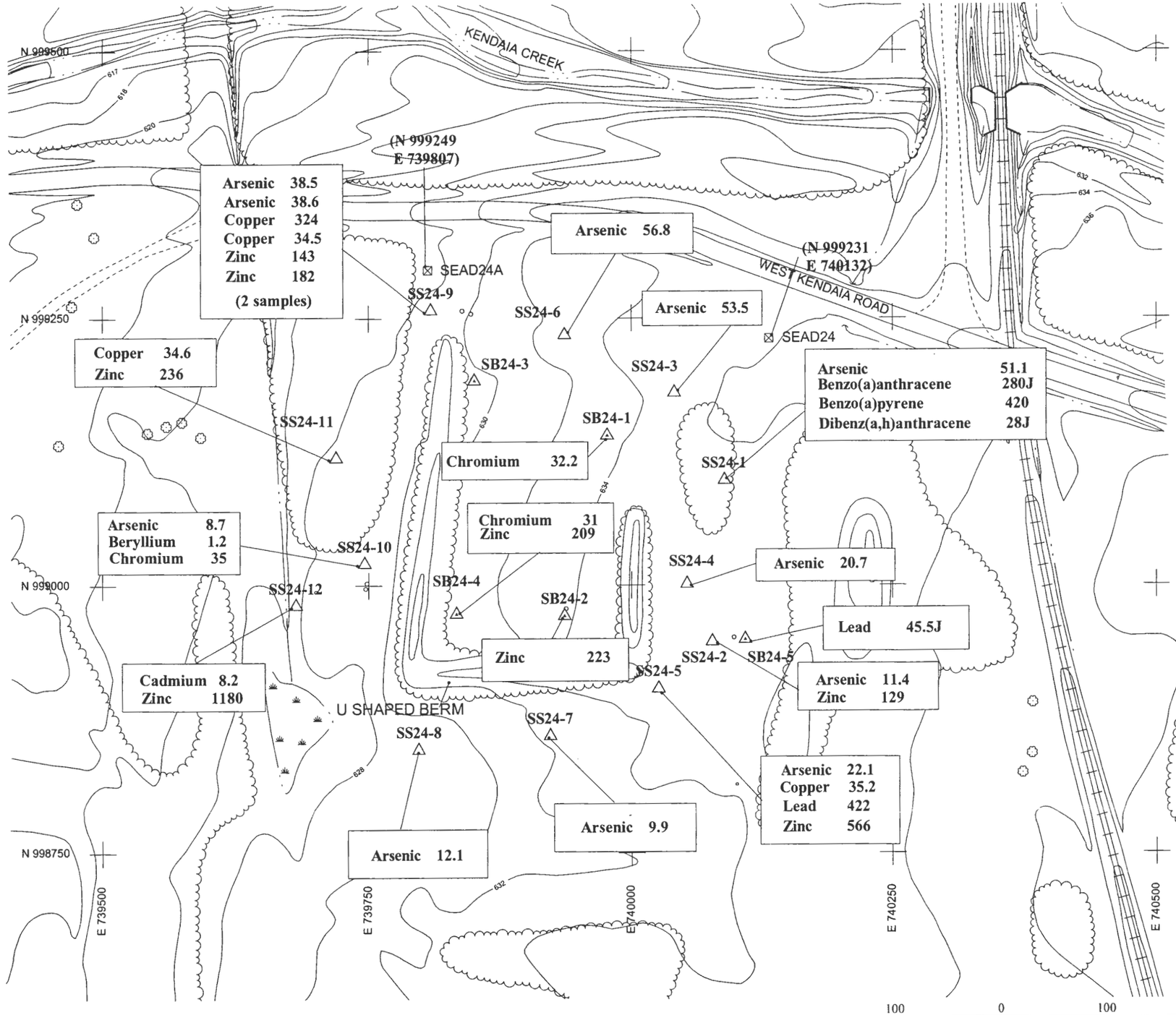
The Abandoned Powder Burning Pit was active during the 1940s and 1950s. Although operating practices at this site are undocumented, it is presumed that black powder, M10 and M16 solid propellants, and explosive trash were disposed here by burning. It is further presumed that petroleum hydrocarbon fuel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

1.3 PREVIOUS INVESTIGATIONS

1.3.1 Description of Sampling Program

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

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



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LEGEND

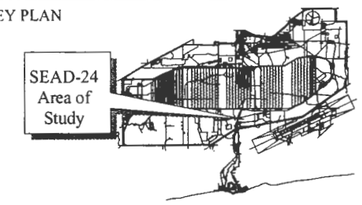
- PAVED ROAD
- GROUND CONTOUR AND ELEVATION
- WETLAND
- BRUSH
- CHAIN LINK FENCE
- UTILITY POLE
- APPROXIMATE LOCATION OF FIRE HYDRANT
- RAILROAD

- △ Surface Soil Samples
- △ Berm Soil Samples
- ⊕ GroundWater Samples
- ⊠ Survey Monument

TAGM LEVELS

Arsenic	8.2 mg/kg
Beryllium	1.1 mg/kg
Cadmium	8.2 mg/kg
Chromium	29.6 mg/kg
Copper	33 mg/kg
Lead	400 mg/kg
Zinc	114 mg/kg

KEY PLAN



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SENECA ARMY DEPOT ACTIVITY
ABANDONED POWDER BURNING PIT
SEAD-24

FIGURE 1

ANALYTES EXCEEDING THEIR RESPECTIVE CRITERIA LEVELS IN SURFACE SOILS

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

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

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

All samples were analyzed for the following constituents: the Target Compound List (TCL), including volatile organic compounds (VOCs), semivolatile organic compounds (SVOCs) and pesticides/ polychlorinated biphenyls (PCBs). The Target Analyte List (TAL) including metals and cyanide. Each analysis was performed in accordance with the New York State Department of Environmental Conservation (NYSDEC) Analytical Services Program (ASP) Statement of Work (SOW). Explosive compounds were analyzed by the Environmental Protection Agency (EPA) SW-846 Method 8330; herbicides were analyzed by EPA SW-846 Method 8150, nitrates were analyzed by EPA Method 352.2, and total recoverable petroleum hydrocarbons (TRPH) were analyzed by EPA Method 418.1.

1.3.2 Results of Sampling Program

The results of the soil sampling program are presented in **Table 1**. Fifty-seven different TCL/TAL analytes, including 36 organic compounds and 21 metals, plus total petroleum hydrocarbons were detected in soil samples collected from SEAD-24. Of this total, only three SVOCs and 14 metals were present at concentrations that exceeded criteria values defined in NYSDEC's Technical and Administrative Guidance Memorandum (TAGM) #4046 or by the US EPA.

Each of the SVOCs that exceeded its criteria level was a PAH (i.e., benzo(a)anthracene, benzo(a)pyrene, and dibenz(a,h)anthracene) and were found collocated in one surface soil sample location, SS24-1, which is located outside and to the east of the bermed pit. Of further note is the finding that a majority of all observed SVOCs occurred in the shallow soil samples that are located to the north and due east of the open end of the bermed pit. The compound, 2,4-dinitrotoluene, a component of explosive materials was also detected in all of the surface soil samples where the other SVOCs were found. However, this compound was also found in three surface soil samples that were collected east and southeast of the shorter eastern berm wall. These three samples are all very close to sample location SB24-2, which is the only location within the bermed area where 2,4-dinitrotoluene was found. No criteria value currently exists for 2,4-dinitrotoluene.

Fourteen metals were detected at concentrations above their respective criteria values. Two of these metals (i.e., arsenic and zinc) were found at concentrations above their respective criteria values in more than one-third of the soil samples collected and a majority of the high concentrations were found in surface soil samples. The 12 remaining metals were only found at concentrations above their respective criteria values in 1 to 4 samples. Seventeen of the metals found were detected in all of the soil samples collected from the area of SEAD-24.

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

TABLE 1
SEAD-24 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

PARAMETER	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID UNITS	MAXIMUM DETECT	FREQUENCY OF DETECTION	CRITERIA VALUE (a)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF SAMPLES	SOIL SEAD-24 0-0.2 10/22/93 SS24-1 202078 Value (Q)	SOIL SEAD-24 0-0.2 10/22/93 SS24-2 202079 Value (Q)	SOIL SEAD-24 0-0.2 10/22/93 SS24-3 202080 Value (Q)	SOIL SEAD-24 0-0.2 10/22/93 SS24-4 202081 Value (Q)	SOIL SEAD-24 0-0.2 10/22/93 SS24-5 202082 Value (Q)
Volatile Organics												
Acetone	ug/kg	27	10.3%	200	0	3	29	14 UJ	13 U	11 U	12 U	12 U
Benzene	ug/kg	1	3.4%	60	0	1	29	14 UJ	13 U	11 U	12 U	12 U
Chlorobenzene	ug/kg	7	6.9%	1700	0	2	29	14 UJ	13 U	11 U	12 U	12 U
Chloroform	ug/kg	13	37.9%	300	0	11	29	5 J	13 U	11 U	12 U	13
Methylene Chloride	ug/kg	12	10.3%	100	0	3	29	14 UJ	13 U	11 U	12 U	12 U
Toluene	ug/kg	2	3.4%	1500	0	1	29	14 UJ	13 U	11 U	12 U	12 U
Trichloroethene	ug/kg	1	3.4%	700	0	1	29	14 UJ	13 U	11 U	12 U	12 U
Herbicides												
2,4,5-T	ug/kg	8	3.4%	1900	0	1	29	6.1 U	6.7 U	5.5 U	6.2 U	6.1 U
Dicamba	ug/kg	9.7	3.4%		0	1	29	6.1 U	6.7 U	5.5 U	6.2 U	6.1 U
MCPP	ug/kg	6600	3.4%		0	1	29	6600	6700 U	5500 U	6200 U	6100 U
Nitroaromatics												
1,3-Dinitrobenzene	ug/kg	76	3.4%		0	1	29	130 U	130 U	130 U	130 U	130 U
2,4-Dinitrotoluene	ug/kg	4400	20.7%		0	6	29	130 U	310	640	130 U	4400
Tetryl	ug/kg	120	6.9%		0	2	29	130 U	130 U	130 U	130 U	130 U
Semivolatile Organics												
2,4-Dinitrotoluene	ug/kg	12000	27.6%		0	8	29	74 J	440 U	250 J	420	12000
Acenaphthylene	ug/kg	54	3.4%	41000	0	1	29	54 J	440 U	360 U	400 U	1600 U
Anthracene	ug/kg	19	3.4%	50000*	0	1	29	19 J	440 U	360 U	400 U	1600 U
Benzo(a)anthracene	ug/kg	280	13.8%	220	1	4	29	**280** J	440 U	360 U	400 U	1600 U
Benzo(a)pyrene	ug/kg	420	13.8%	61	1	4	29	**420**	440 U	360 U	400 U	1600 U
Benzo(b)fluoranthene	ug/kg	350	17.2%	1100	0	5	29	350 J	440 U	360 U	400 U	1600 U
Benzo(g,h,i)perylene	ug/kg	170	6.9%	50000*	0	2	29	170 J	440 U	360 U	400 U	1600 U
Benzo(k)fluoranthene	ug/kg	340	17.2%	1100	0	5	29	340 J	440 U	360 U	400 U	1600 U
bis(2-Ethylhexyl)phthalate	ug/kg	1300	51.7%	50000*	0	15	29	400 U	440 U	360 U	400 U	1600 U
Chrysene	ug/kg	320	24.1%	400	0	7	29	320 J	440 U	18 J	400 U	1600 U
Dibenz(a,h)anthracene	ug/kg	28	3.4%	14	1	1	29	**28** J	440 U	360 U	400 U	1600 U
Di-n-butylphthalate	ug/kg	1100	24.1%	8100	0	7	29	400 U	440 U	31 J	400 U	370 J
Fluoranthene	ug/kg	210	24.1%	50000*	0	7	29	210 J	440 U	20 J	400 U	1600 U
Indeno(1,2,3-cd)pyrene	ug/kg	220	6.9%	3200	0	2	29	220 J	440 U	360 U	400 U	1600 U
N-Nitrosodiphenylamine	ug/kg	810	24.1%	50000*	0	7	29	30 J	440 U	74 J	70 J	650 J
Phenanthrene	ug/kg	44	13.8%	50000*	0	4	29	37 J	440 U	360 U	400 U	1600 U
Pyrene	ug/kg	260	24.1%	50000*	0	7	29	260 J	440 U	18 J	400 U	1600 U
Pesticides/PCB												
4,4'-DDE	ug/kg	12	17.2%	2100	0	5	29	4 U	4.4 U	3.6 U	4.1 U	3.6 J
4,4'-DDT	ug/kg	35	6.9%	2100	0	2	29	4 U	4.4 U	3.6 U	4.1 U	4 UJ
alpha-Chlordane	ug/kg	4.7	3.4%	540	0	1	29	2 U	2.3 U	1.9 U	2.1 U	2 UJ
Endosulfan I	ug/kg	2.3	10.3%	900	0	3	29	2 U	2.3 U	1.9 U	2.1 U	2 UJ
Endrin aldehyde	ug/kg	4.2	3.4%		0	1	29	4 U	4.4 U	3.6 U	4.1 U	4 UJ
gamma-Chlordane	ug/kg	6	3.4%	540	0	1	29	2 U	2.3 U	1.9 U	2.1 U	2 UJ
Metals												
Aluminum	mg/kg	25500	100.0%	19300	3	29	29	9540	16800	12000	18900	13200
Arsenic	mg/kg	56.8	100.0%	8.2	11	29	29	**51.1**	**11.4**	**53.5**	**20.7**	**22.1**
Barium	mg/kg	149	100.0%	300	0	29	29	71.6	149	57.8	105	121
Beryllium	mg/kg	1.2	100.0%	1.1	1	29	29	0.43 J	0.89 J	0.51 J	0.91 J	0.59 J
Cadmium	mg/kg	8.2	6.9%	2.3	1	2	29	0.64 U	0.72 U	0.71 U	0.69 U	0.75 U
Calcium	mg/kg	106000	100.0%	121000	0	29	29	79300	3290	23600	2140	23000
Chromium	mg/kg	35.1	100.0%	29.6	3	29	29	12.2	24.5	22.2	23.9	21.9
Cobalt	mg/kg	20.5	100.0%	30	0	29	29	4.7 J	13.9	10.9	11.5	10.4 J
Copper	mg/kg	324	100.0%	33	4	29	29	13.5 J	20 J	28.2 J	26.1 J	**35.2** J
Iron	mg/kg	37700	100.0%	36500	2	29	29	14000	30900	25500	29200	25000

TABLE 1
SEAD-24 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

	MATRIX							SOIL	SOIL	SOIL	SOIL	SOIL
	LOCATION							SEAD-24	SEAD-24	SEAD-24	SEAD-24	SEAD-24
	DEPTH (FEET)							0-0.2	0-0.2	0-0.2	0-0.2	0-0.2
	SAMPLE DATE							10/22/93	10/22/93	10/22/93	10/22/93	10/22/93
	ES ID		FREQUENCY		NUMBER	NUMBER	NUMBER	SS24-1	SS24-2	SS24-3	SS24-4	SS24-5
	LAB ID	MAXIMUM	OF	CRITERIA	ABOVE	OF	OF	202078	202079	202080	202081	202082
PARAMETER	**UNITS**	**DETECT**	**DETECTION**	**VALUE (a)**	**CRITERIA**	**DETECTS**	**SAMPLES**	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)
Lead	mg/kg	422	100.0%	400 (2)	1	29	29	15.1	46.6	59.4	51.3	**422**
Magnesium	mg/kg	43700	100.0%	21500	2	29	29	**43700**	4320	5960	4600	5470
Manganese	mg/kg	1770	100.0%	1060	2	29	29	393	**1770**	353	244	550
Mercury	mg/kg	0.15	51.7%	0.1	1	15	29	0.04 J	0.05 J	0.04 J	**0.15**	0.04 U
Nickel	mg/kg	535	100.0%	49	2	29	29	13.8	30	39.5	26.4	31.6
Potassium	mg/kg	2510	100.0%	2380	1	29	29	1140	1340	1190	1710	1560
Selenium	mg/kg	0.3	10.3%	2	0	3	29	0.2 UJ	0.23 UJ	0.2 UJ	0.26 UJ	0.23 UJ
Sodium	mg/kg	161	100.0%	172	0	29	29	146 J	51.9 J	95.5 J	56 J	88.4 J
Thallium	mg/kg	0.14	3.4%	0.7	0	1	29	2.2 U	0.25 U	0.22 U	0.29 U	0.25 U
Vanadium	mg/kg	39.3	100.0%	150	0	29	29	17.7	30.1	17.1	32.8	22.3
Zinc	mg/kg	1180	100.0%	110	10	29	29	58.7	**129**	100	85.1	**566**
Other Analyses												
Nitrate/Nitrite-Nitrogen	mg/kg	2.1	100.0%		0	29	29	2.1	0.56	0.22	0.18	0.6
Total Solids	%W/W	93.2	100.0%		0	29	29	81.6	75.4	91.4	80.7	81.9
Total Petroleum Hydrocarbons	mg/kg	158	100.0%		0	29	29	99	81	73	72	78

Notes
1) NYSDEC Technical and Administrative Guidance Memorandum #4046, except as noted.
2) US EPA, OSWER Directive # 9200.4-27 Soil Lead Guidance, August 1998
* = As per proposed TAGM, total VOCs < 10ppm; total Semi-VOCs <500ppm; individual semi-VOCs < 50 ppm.
NA = Not Available
U = Compound was not detected.
J = the reported value is an estimated concentration.
R = the data was rejected in the data validating process.
UJ = the compound was not detected; the associated reporting limit is approximate.

TABLE 1
SEAD-24 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

PARAMETER	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID UNITS	MAXIMUM DETECT	FREQUENCY OF DETECTION	CRITERIA VALUE (a)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF SAMPLES	SOIL SEAD-24 0-0.2 10/22/93 SS24-6 202083 Value (Q)	SOIL SEAD-24 0-0.2 10/22/93 SS24-7 202084 Value (Q)	SOIL SEAD-24 0-0.2 10/22/93 SS24-8 202085 Value (Q)	SOIL SEAD-24 0-0.2 10/22/93 SS24-9 202086 Value (Q)	SOIL SEAD-24 0-0.2 10/22/93 SS24-13 202092 Value (Q)
Volatile Organics												
Acetone	ug/kg	27	10.3%	200	0	3	29	27	7 J	14 U	13 U	13 UJ
Benzene	ug/kg	1	3.4%	60	0	1	29	13 U	12 U	14 U	13 U	13 UJ
Chlorobenzene	ug/kg	7	6.9%	1700	0	2	29	13 U	12 U	14 U	13 U	13 UJ
Chloroform	ug/kg	13	37.9%	300	0	11	29	5 J	1 J	3 J	13 U	4 J
Methylene Chloride	ug/kg	12	10.3%	100	0	3	29	13 U	12 U	14 U	13 U	13 UJ
Toluene	ug/kg	2	3.4%	1500	0	1	29	13 U	12 U	14 U	13 U	13 UJ
Trichloroethene	ug/kg	1	3.4%	700	0	1	29	13 U	12 U	14 U	13 U	13 UJ
Herbicides												
2,4,5-T	ug/kg	8	3.4%	1900	0	1	29	6.4 U	6.1 U	6.9 U	8	6.1 U
Dicamba	ug/kg	9.7	3.4%		0	1	29	6.4 U	6.1 U	6.9 U	6.1 U	9.7
MCPP	ug/kg	6600	3.4%		0	1	29	6400 U	6100 U	6900 U	6100 U	6100 U
Nitroaromatics												
1,3-Dinitrobenzene	ug/kg	76	3.4%		0	1	29	130 U	130 U	130 U	130 U	130 U
2,4-Dinitrotoluene	ug/kg	4400	20.7%		0	6	29	240	130 U	130 U	900	560
Tetryl	ug/kg	120	6.9%		0	2	29	130 U	130 U	120 J	130 U	130 U
Semivolatile Organics												
2,4-Dinitrotoluene	ug/kg	12000	27.6%		0	8	29	93 J	400 U	450 U	5100	7600
Acenaphthylene	ug/kg	54	3.4%	41000	0	1	29	420 U	400 U	450 U	800 U	1600 U
Anthracene	ug/kg	19	3.4%	50000*	0	1	29	420 U	400 U	450 U	800 U	1600 U
Benzo(a)anthracene	ug/kg	280	13.8%	220	1	4	29	38 J	400 U	450 U	41 J	78 J
Benzo(a)pyrene	ug/kg	420	13.8%	61	1	4	29	34 J	400 U	450 U	45 J	1600 U
Benzo(b)fluoranthene	ug/kg	350	17.2%	1100	0	5	29	42 J	400 U	450 U	52 J	83 J
Benzo(g,h,i)perylene	ug/kg	170	6.9%	50000*	0	2	29	24 J	400 U	450 U	800 U	1600 U
Benzo(k)fluoranthene	ug/kg	340	17.2%	1100	0	5	29	40 J	400 U	450 U	44 J	74 J
bis(2-Ethylhexyl)phthalate	ug/kg	1300	51.7%	50000*	0	15	29	420 U	400 U	450 U	520	620
Chrysene	ug/kg	320	24.1%	400	0	7	29	51 J	400 U	450 U	59 J	100 J
Dibenz(a,h)anthracene	ug/kg	28	3.4%	14	1	1	29	420 U	400 U	450 U	800 U	1600 U
Di-n-butylphthalate	ug/kg	1100	24.1%	8100	0	7	29	25 J	400 U	450 U	110 J	1100 J
Fluoranthene	ug/kg	210	24.1%	50000*	0	7	29	82 J	400 U	450 U	95 J	160 J
Indeno(1,2,3-cd)pyrene	ug/kg	220	6.9%	3200	0	2	29	22 J	400 U	450 U	800 U	1600 U
N-Nitrosodiphenylamine	ug/kg	810	24.1%	50000*	0	7	29	420 U	400 U	450 U	440 J	810 J
Phenanthrene	ug/kg	44	13.8%	50000*	0	4	29	37 J	400 U	450 U	44 J	1600 U
Pyrene	ug/kg	260	24.1%	50000*	0	7	29	72 J	400 U	450 U	99 J	150 J
Pesticides/PCB												
4,4'-DDE	ug/kg	12	17.2%	2100	0	5	29	2 J	12	4.5 U	11 J	8.6 J
4,4'-DDT	ug/kg	35	6.9%	2100	0	2	29	4.1 U	35	4.5 U	4 UJ	2.7 J
alpha-Chlordane	ug/kg	4.7	3.4%	540	0	1	29	2.1 U	4.7 J	2.3 U	2 UJ	2.1 UJ
Endosulfan I	ug/kg	2.3	10.3%	900	0	3	29	1.1 J	2.1 U	2.3 U	1.9 J	2.3 J
Endrin aldehyde	ug/kg	4.2	3.4%		0	1	29	4.2 J	4 U	4.5 U	4 UJ	4 UJ
gamma-Chlordane	ug/kg	6	3.4%	540	0	1	29	2.1 U	6	2.3 U	2 UJ	2.1 UJ
Metals												
Aluminum	mg/kg	25500	100.0%	19300	3	29	29	13600	18700	14700	11500	14300
Arsenic	mg/kg	56.8	100.0%	8.2	11	29	29	**56.8**	**9.9**	**12.1**	**38.5**	**38.6**
Barium	mg/kg	149	100.0%	300	0	29	29	81.9	118	105	68.8	96.6
Beryllium	mg/kg	1.2	100.0%	1.1	1	29	29	0.66 J	0.86	0.81 J	0.53 J	0.67 J
Cadmium	mg/kg	8.2	6.9%	2.3	1	2	29	0.65 U	0.55 U	0.77 U	0.68 U	0.71 U
Calcium	mg/kg	106000	100.0%	121000	0	29	29	19900	2100	3940	11800	8670
Chromium	mg/kg	35.1	100.0%	29.6	3	29	29	20.4	25.2	23.3	20	23.8
Cobalt	mg/kg	20.5	100.0%	30	0	29	29	10.6	13	12.6	10.7	11
Copper	mg/kg	324	100.0%	33	4	29	29	22.2 J	23.9 J	22.5 J	**324** J	**34.5** J
Iron	mg/kg	37700	100.0%	36500	2	29	29	24300	29100	29700	23900	26300

TABLE 1
SEAD-24 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

	MATRIX							SOIL	SOIL	SOIL	SOIL	SOIL
	LOCATION							SEAD-24	SEAD-24	SEAD-24	SEAD-24	SEAD-24
	DEPTH (FEET)							0-0.2	0-0.2	0-0.2	0-0.2	0-0.2
	SAMPLE DATE							10/22/93	10/22/93	10/22/93	10/22/93	10/22/93
	ES ID		FREQUENCY		NUMBER	NUMBER	NUMBER	SS24-6	SS24-7	SS24-8	SS24-9	SS24-13
	LAB ID	MAXIMUM	OF	CRITERIA	ABOVE	OF	OF	202083	202084	202085	202086	202092
PARAMETER	**UNITS**	**DETECT**	**DETECTION**	**VALUE (a)**	**CRITERIA**	**DETECTS**	**SAMPLES**	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)
Lead	mg/kg	422	100.0%	400 (2)	1	29	29	40.7	15.4	24.4	86.5	112
Magnesium	mg/kg	43700	100.0%	21500	2	29	29	4400	5190	4730	5010	5390
Manganese	mg/kg	1770	100.0%	1060	2	29	29	724	677	448	546	519
Mercury	mg/kg	0.15	51.7%	0.1	1	15	29	0.03 U	0.05 J	0.04 J	0 04 J	0 04 J
Nickel	mg/kg	535	100.0%	49	2	29	29	26.8	30.1	34.8	32.3	35.4
Potassium	mg/kg	2510	100.0%	2380	1	29	29	1360	2090	1590	1020 J	1410
Selenium	mg/kg	0.3	10.3%	2	0	3	29	0.21 UJ	0.22 UJ	0.23 UJ	0.2 UJ	0.25 UJ
Sodium	mg/kg	161	100.0%	172	0	29	29	69.8 J	52.3 J	59.8 J	68 J	74.3 J
Thallium	mg/kg	0.14	3.4%	0 7	0	1	29	0.23 U	0.24 U	0.25 U	0.21 U	0.28 U
Vanadium	mg/kg	39.3	100.0%	150	0	29	29	24.4	32.8	27.2	18.3	24
Zinc	mg/kg	1180	100.0%	110	10	29	29	97.2	63.8	88.5	143	182
Other Analyses												
Nitrate/Nitrite-Nitrogen	mg/kg	2.1	100.0%		0	29	29	0.11	0.26	0.16	0.28	0 37
Total Solids	%W/W	93.2	100.0%		0	29	29	78.6	82.2	73.2	81.7	81.5
Total Petroleum Hydrocarbons	mg/kg	158	100.0%		0	29	29	93	59	46	61	158

Notes

1) NYSDEC Technical and Administrative Guidance Memorandum #4046, except as noted.
2) US EPA, OSWER Directive # 9200.4-27 Soil Lead Guidance, August 1998

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

TABLE 1
SEAD-24 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

PARAMETER	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID UNITS	MAXIMUM DETECT	FREQUENCY OF DETECTION	CRITERIA VALUE (a)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF SAMPLES	SOIL SEAD-24 0-0.2 10/22/93 SS24-10 202089 Value (Q)	SOIL SEAD-24 0-0.2 10/22/93 SS24-11 202090 Value (Q)	SOIL SEAD-24 0-0.2 10/22/93 SS24-12 202091 Value (Q)	SOIL SEAD-24 0-2 11/30/93 SB24-1.1 205918 Value (Q)	SOIL SEAD-24 4-6 11/30/93 SB24-1.3 205919 Value (Q)
Volatile Organics												
Acetone	ug/kg	27	10.3%	200	0	3	29	13 U	11 U	13 U	20 U	26 U
Benzene	ug/kg	1	3.4%	60	0	1	29	13 U	11 U	13 U	12 U	11 U
Chlorobenzene	ug/kg	7	6.9%	1700	0	2	29	13 U	11 U	7 J	12 U	11 U
Chloroform	ug/kg	13	37.9%	300	0	11	29	13 U	11 U	3 J	12 U	11 U
Methylene Chloride	ug/kg	12	10.3%	100	0	3	29	13 U	11 U	13 U	12 U	11 U
Toluene	ug/kg	2	3.4%	1500	0	1	29	13 U	11 U	13 U	12 U	11 U
Trichloroethene	ug/kg	1	3.4%	700	0	1	29	13 U	11 U	13 U	12 U	11 U
Herbicides												
2,4,5-T	ug/kg	8	3.4%	1900	0	1	29	6.3 U	5.6 U	6.5 U	6.2 U	5.6 UJ
Dicamba	ug/kg	9.7	3.4%		0	1	29	6.3 U	5.6 U	6.5 U	6.2 U	5.6 UJ
MCPP	ug/kg	6600	3.4%		0	1	29	6300 U	5600 U	6500 U	6200 U	5600 UJ
Nitroaromatics												
1,3-Dinitrobenzene	ug/kg	76	3.4%		0	1	29	130 U	130 U	130 U	130 UJ	130 U
2,4-Dinitrotoluene	ug/kg	4400	20.7%		0	6	29	130 U	130 U	130 U	130 UJ	130 U
Tetryl	ug/kg	120	6.9%		0	2	29	130 U	130 U	130 U	130 UJ	130 U
Semivolatile Organics												
2,4-Dinitrotoluene	ug/kg	12000	27.6%		0	8	29	420 U	370 U	430 U	400 U	370 U
Acenaphthylene	ug/kg	54	3.4%	41000	0	1	29	420 U	370 U	430 U	400 U	370 U
Anthracene	ug/kg	19	3.4%	50000*	0	1	29	420 U	370 U	430 U	400 U	370 U
Benzo(a)anthracene	ug/kg	280	13.8%	220	1	4	29	420 U	370 U	430 U	400 U	370 U
Benzo(a)pyrene	ug/kg	420	13.8%	61	1	4	29	420 U	370 U	430 U	400 U	370 U
Benzo(b)fluoranthene	ug/kg	350	17.2%	1100	0	5	29	420 U	370 U	430 U	400 U	370 U
Benzo(g,h,i)perylene	ug/kg	170	6.9%	50000*	0	2	29	420 U	370 U	430 U	400 U	370 U
Benzo(k)fluoranthene	ug/kg	340	17.2%	1100	0	5	29	420 U	370 U	430 U	400 U	370 U
bis(2-Ethylhexyl)phthalate	ug/kg	1300	51.7%	50000*	0	15	29	420 U	370 U	430 U	1200	860
Chrysene	ug/kg	320	24.1%	400	0	7	29	420 U	370 U	20 J	400 U	370 U
Dibenz(a,h)anthracene	ug/kg	28	3.4%	14	1	1	29	420 U	370 U	430 U	400 U	370 U
Di-n-butylphthalate	ug/kg	1100	24.1%	8100	0	7	29	420 U	370 U	430 U	400 U	370 U
Fluoranthene	ug/kg	210	24.1%	50000*	0	7	29	420 U	370 U	29 J	400 U	370 U
Indeno(1,2,3-cd)pyrene	ug/kg	220	6.9%	3200	0	2	29	420 U	370 U	430 U	400 U	370 U
N-Nitrosodiphenylamine	ug/kg	810	24.1%	50000*	0	7	29	420 U	370 U	430 U	400 U	370 U
Phenanthrene	ug/kg	44	13.8%	50000*	0	4	29	420 U	370 U	430 U	400 U	370 U
Pyrene	ug/kg	260	24.1%	50000*	0	7	29	420 U	370 U	29 J	400 U	370 U
Pesticides/PCB												
4,4'-DDE	ug/kg	12	17.2%	2100	0	5	29	4.1 U	3.6 U	4.3 U	4 U	3.7 U
4,4'-DDT	ug/kg	35	6.9%	2100	0	2	29	4.1 U	3.6 U	4.3 U	4 U	3.7 U
alpha-Chlordane	ug/kg	4.7	3.4%	540	0	1	29	2.1 U	1.9 U	2.2 U	2.1 U	1.9 U
Endosulfan I	ug/kg	2.3	10.3%	900	0	3	29	2.1 U	1.9 U	2.2 U	2.1 U	1.9 U
Endrin aldehyde	ug/kg	4.2	3.4%		0	1	29	4.1 U	3.6 U	4.3 U	4 U	3.7 U
gamma-Chlordane	ug/kg	6	3.4%	540	0	1	29	2.1 U	1.9 U	2.2 U	2.1 U	1.9 U
Metals												
Aluminum	mg/kg	25500	100.0%	19300	3	29	29	**25500**	12900	15900	**24000**	11400
Arsenic	mg/kg	56.8	100.0%	8.2	11	29	29	**8.7**	6.4	8.1	5.2	3.9
Barium	mg/kg	149	100.0%	300	0	29	29	119	28.2 J	88.8	97.3	58.9
Beryllium	mg/kg	1.2	100.0%	1.1	1	29	29	**1.2**	0.57 J	0.81 J	0.9 J	0.5 J
Cadmium	mg/kg	8.2	6.9%	2.3	1	2	29	0.7 U	0.75 J	**8.2**	0.59 U	0.51 U
Calcium	mg/kg	106000	100.0%	121000	0	29	29	2770	13400	4660	4950	58500
Chromium	mg/kg	35.1	100.0%	29.6	3	29	29	**35.1**	25.1	23.8	**32.2**	17.6
Cobalt	mg/kg	20.5	100.0%	30	0	29	29	17.8	14.8	11.5 J	12.2	9.5
Copper	mg/kg	324	100.0%	33	4	29	29	32.6 J	**34.6** J	24.4 J	28.9	26.4
Iron	mg/kg	37700	100.0%	36500	2	29	29	**37500**	30600	27500	33200	22700

TABLE 1
SEAD-24 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

	MATRIX							SOIL	SOIL	SOIL	SOIL	SOIL
	LOCATION							SEAD-24	SEAD-24	SEAD-24	SEAD-24	SEAD-24
	DEPTH (FEET)							0-0.2	0-0.2	0-0.2	0-2	4-6
	SAMPLE DATE							10/22/93	10/22/93	10/22/93	11/30/93	11/30/93
	ES ID		FREQUENCY		NUMBER	NUMBER	NUMBER	SS24-10	SS24-11	SS24-12	SB24-1.1	SB24-1.3
	LAB ID	MAXIMUM	OF	CRITERIA	ABOVE	OF	OF	202089	202090	202091	205918	205919
PARAMETER	**UNITS**	**DETECT**	**DETECTION**	**VALUE (a)**	**CRITERIA**	**DETECTS**	**SAMPLES**	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)
Lead	mg/kg	422	100.0%	400 (2)	1	29	29	24.6	30.9	121	13.5 J	13.1 J
Magnesium	mg/kg	43700	100.0%	21500	2	29	29	6660	6750	5000	6990	11300
Manganese	mg/kg	1770	100.0%	1060	2	29	29	612	293	512	438	397
Mercury	mg/kg	0.15	51.7%	0.1	1	15	29	0.05 J	0.04 U	0.06 J	0.04 J	0.02 UJ
Nickel	mg/kg	535	100.0%	49	2	29	29	46.6	**52.4**	**535**	43.4	30.8
Potassium	mg/kg	2510	100.0%	2380	1	29	29	**2510**	1200	1650	2120	1610
Selenium	mg/kg	0.3	10.3%	2	0	3	29	0.21 UJ	0.27 J	0.26 UJ	0.19 UJ	0.21 UJ
Sodium	mg/kg	161	100.0%	172	0	29	29	63 J	91.5 J	53.5 J	86.5 J	116 J
Thallium	mg/kg	0.14	3.4%	0.7	0	1	29	0.23 U	0.23 U	0.28 U	0.21 UJ	0.23 UJ
Vanadium	mg/kg	39.3	100.0%	150	0	29	29	39.3	18.2	26.1	33	17
Zinc	mg/kg	1180	100.0%	110	10	29	29	108	**236**	**1180**	99.9	**114**
Other Analyses												
Nitrate/Nitrite-Nitrogen	mg/kg	2.1	100.0%		0	29	29	0.3	0.05	0.14	0.01	0.02
Total Solids	%W/W	93.2	100.0%		0	29	29	78.1	90.5	76.7	81	89.5
Total Petroleum Hydrocarbons	mg/kg	158	100.0%		0	29	29	47	38	87	32	68

Notes

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

2) US EPA, OSWER Directive # 9200.4-27 Soil Lead Guidance, August 1998

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

NA = Not Available

U = Compound was not detected.

J = the reported value is an estimated concentration.

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

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

TABLE 1
SEAD-24 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

PARAMETER	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID UNITS	MAXIMUM DETECT	FREQUENCY OF DETECTION	CRITERIA VALUE (a)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF SAMPLES	SOIL SEAD-24 10-12 11/30/93 SB24-1.5 205920 Value (Q)	SOIL SEAD-24 0-2 11/30/93 SB24-1.7 205921 Value (Q)	SOIL SEAD-24 0-2 12/01/93 SB24-2.1 205922 Value (Q)	SOIL SEAD-24 6-8 12/01/93 SB24-2.3 205923 Value (Q)	SOIL SEAD-24 12-14 12/01/93 SB24-2.4 205952 Value (Q)
Volatile Organics												
Acetone	ug/kg	27	10.3%	200	0	3	29	11 U	11 U	12 U	14 U	11 U
Benzene	ug/kg	1	3.4%	60	0	1	29	11 U	11 U	12 U	11 U	11 U
Chlorobenzene	ug/kg	7	6.9%	1700	0	2	29	11 U	11 U	12 U	11 U	11 U
Chloroform	ug/kg	13	37.9%	300	0	11	29	11 U	11 U	12 U	11 U	6 J
Methylene Chloride	ug/kg	12	10.3%	100	0	3	29	11 U	11 U	12 U	11 U	12
Toluene	ug/kg	2	3.4%	1500	0	1	29	11 U	11 U	12 U	11 U	11 U
Trichloroethene	ug/kg	1	3.4%	700	0	1	29	11 U	11 U	12 U	11 U	11 U
Herbicides												
2,4,5-T	ug/kg	8	3.4%	1900	0	1	29	5.4 U	5.9 U	6.1 U	5.6 U	5.4 U
Dicamba	ug/kg	9.7	3.4%		0	1	29	5.4 U	5.9 U	6.1 U	5.6 U	5.4 U
MCPP	ug/kg	6600	3.4%		0	1	29	5400 U	5900 U	6100 U	5600 U	5400 U
Nitroaromatics												
1,3-Dinitrobenzene	ug/kg	76	3.4%		0	1	29	130 U	130 U	130 U	130 U	76 J
2,4-Dinitrotoluene	ug/kg	4400	20.7%		0	6	29	130 U	130 U	130 U	130 U	130 U
Tetryl	ug/kg	120	6.9%		0	2	29	130 U	130 U	130 U	130 U	130 U
Semivolatile Organics												
2,4-Dinitrotoluene	ug/kg	12000	27.6%		0	8	29	350 U	390 UJ	980 J	370 UJ	350 U
Acenaphthylene	ug/kg	54	3.4%	41000	0	1	29	350 U	390 UJ	410 UJ	370 UJ	350 U
Anthracene	ug/kg	19	3.4%	50000*	0	1	29	350 U	390 UJ	410 UJ	370 UJ	350 U
Benzo(a)anthracene	ug/kg	280	13.8%	220	1	4	29	350 U	390 UJ	410 UJ	370 UJ	350 U
Benzo(a)pyrene	ug/kg	420	13.8%	61	1	4	29	350 U	390 UJ	410 UJ	370 UJ	350 U
Benzo(b)fluoranthene	ug/kg	350	17.2%	1100	0	5	29	350 U	390 UJ	410 UJ	370 UJ	350 U
Benzo(g,h,i)perylene	ug/kg	170	6.9%	50000*	0	2	29	350 U	390 UJ	410 UJ	370 UJ	350 U
Benzo(k)fluoranthene	ug/kg	340	17.2%	1100	0	5	29	350 U	390 UJ	410 UJ	370 UJ	350 U
bis(2-Ethylhexyl)phthalate	ug/kg	1300	51.7%	50000*	0	15	29	38 J	1300 J	30 J	27 J	41 J
Chrysene	ug/kg	320	24.1%	400	0	7	29	350 U	390 UJ	410 UJ	370 UJ	350 U
Dibenz(a,h)anthracene	ug/kg	28	3.4%	14	1	1	29	350 U	390 UJ	410 UJ	370 UJ	350 U
Di-n-butylphthalate	ug/kg	1100	24.1%	8100	0	7	29	350 U	390 UJ	410 UJ	370 UJ	350 U
Fluoranthene	ug/kg	210	24.1%	50000*	0	7	29	350 U	390 UJ	410 UJ	370 UJ	350 U
Indeno(1,2,3-cd)pyrene	ug/kg	220	6.9%	3200	0	2	29	350 U	390 UJ	410 UJ	370 UJ	350 U
N-Nitrosodiphenylamine	ug/kg	810	24.1%	50000*	0	7	29	350 U	390 UJ	280 J	370 UJ	350 U
Phenanthrene	ug/kg	44	13.8%	50000*	0	4	29	350 U	390 UJ	410 UJ	370 UJ	350 U
Pyrene	ug/kg	260	24.1%	50000*	0	7	29	350 U	390 UJ	410 UJ	370 UJ	350 U
Pesticides/PCB												
4,4'-DDE	ug/kg	12	17.2%	2100	0	5	29	3.5 U	3.8 U	4 U	3.7 U	3.5 U
4,4'-DDT	ug/kg	35	6.9%	2100	0	2	29	3.5 U	3.8 U	4 U	3.7 U	3.5 U
alpha-Chlordane	ug/kg	4.7	3.4%	540	0	1	29	1.8 U	2 U	2.1 U	1.9 U	1.8 U
Endosulfan I	ug/kg	2.3	10.3%	900	0	3	29	1.8 U	2 U	2.1 U	1.9 U	1.8 U
Endrin aldehyde	ug/kg	4.2	3.4%		0	1	29	3.5 U	3.8 U	4 U	3.7 U	3.5 U
gamma-Chlordane	ug/kg	6	3.4%	540	0	1	29	1.8 U	2 U	2.1 U	1.9 U	1.8 U
Metals												
Aluminum	mg/kg	25500	100.0%	19300	3	29	29	9280	17600	16500	9620	14200
Arsenic	mg/kg	56.8	100.0%	8.2	11	29	29	3.8	5	3.8	4.4	4.9
Barium	mg/kg	149	100.0%	300	0	29	29	57.2	67.3	111	79.3	54.3
Beryllium	mg/kg	1.2	100.0%	1.1	1	29	29	0.44 J	0.78	0.97	0.45 J	0.61
Cadmium	mg/kg	8.2	6.9%	2.3	1	2	29	0.38 U	0.47 U	0.53 U	0.43 U	0.38 U
Calcium	mg/kg	106000	100.0%	121000	0	29	29	58400	13300	3070	63300	56900
Chromium	mg/kg	35.1	100.0%	29.6	3	29	29	15.5	27.5	22.5	15.5	23
Cobalt	mg/kg	20.5	100.0%	30	0	29	29	9.7	13.3	10.3	9.6	10.7
Copper	mg/kg	324	100.0%	33	4	29	29	14.9	26.1	24.5	24.7	17.1
Iron	mg/kg	37700	100.0%	36500	2	29	29	18800	32100	27400	19800	26600

TABLE 1
SEAD-24 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

	MATRIX							SOIL	SOIL	SOIL	SOIL	SOIL
	LOCATION							SEAD-24	SEAD-24	SEAD-24	SEAD-24	SEAD-24
	DEPTH (FEET)							10-12	0-2	0-2	6-8	12-14
	SAMPLE DATE							11/30/93	11/30/93	12/01/93	12/01/93	12/01/93
	ES ID		FREQUENCY		NUMBER	NUMBER	NUMBER	SB24-1.5	SB24-1.7	SB24-2.1	SB24-2.3	SB24-2.4
	LAB ID	MAXIMUM	OF	CRITERIA	ABOVE	OF	OF	205920	205921	205922	205923	205952
PARAMETER	**UNITS**	**DETECT**	**DETECTION**	**VALUE (a)**	**CRITERIA**	**DETECTS**	**SAMPLES**	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)
Lead	mg/kg	422	100.0%	400 (2)	1	29	29	5.9 J	14.9 J	80.3	11.9 J	4 7 J
Magnesium	mg/kg	43700	100.0%	21500	2	29	29	12700	8050	4830	16400	11500
Manganese	mg/kg	1770	100.0%	1060	2	29	29	384	509	413	388	434
Mercury	mg/kg	0.15	51.7%	0.1	1	15	29	0.03 UJ	0.03 J	0.03 J	0.03 UJ	0.03 J
Nickel	mg/kg	535	100.0%	49	2	29	29	23.7	42.2	28.9	26.4	34
Potassium	mg/kg	2510	100.0%	2380	1	29	29	1130	1230	1170	1350	1760
Selenium	mg/kg	0.3	10.3%	2	0	3	29	0.19 UJ	0.23 UJ	0.22 UJ	2 UJ	0.28 J
Sodium	mg/kg	161	100.0%	172	0	29	29	127 J	74.9 J	51.3 J	135 J	161 J
Thallium	mg/kg	0.14	3.4%	0.7	0	1	29	0.21 UJ	0.25 UJ	0.24 UJ	0.22 UJ	0.25 U
Vanadium	mg/kg	39.3	100.0%	150	0	29	29	13.5	26	28	15.2	20.1
Zinc	mg/kg	1180	100.0%	110	10	29	29	44.3	86	223	62.6	48.9
Other Analyses												
Nitrate/Nitrite-Nitrogen	mg/kg	2.1	100.0%		0	29	29	0.17	0.01	0.01	0.12	0.14
Total Solids	%W/W	93.2	100.0%		0	29	29	92.7	85.2	81.5	90.1	92.9
Total Petroleum Hydrocarbons	mg/kg	158	100.0%		0	29	29	43	74	33	45	106

Notes
1) NYSDEC Technical and Administrative Guidance Memorandum #4046, except as noted.
2) US EPA, OSWER Directive # 9200.4-27 Soil Lead Guidance, August 1998
* = As per proposed TAGM, total VOCs < 10ppm; total Semi-VOCs <500ppm; individual semi-VOCs < 50 ppm.
NA = Not Available
U = Compound was not detected.
J = the reported value is an estimated concentration.
R = the data was rejected in the data validating process.
UJ = the compound was not detected; the associated reporting limit is approximate.

TABLE 1
SEAD-24 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

PARAMETER	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID UNITS	MAXIMUM DETECT	FREQUENCY OF DETECTION	CRITERIA VALUE (a)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF SAMPLES	SOIL SEAD-24 0-2 12/02/93 SB24-3.1 206044 Value (Q)	SOIL SEAD-24 4-6 12/02/93 SB24-3.3 206045 Value (Q)	SOIL SEAD-24 8-10 12/02/93 SB24-3.5 206046 Value (Q)	SOIL SEAD-24 0-2 12/01/93 SB24-4.1 205953 Value (Q)	SOIL SEAD-24 6-8 12/01/93 SB24-4.4 205954 Value (Q)
Volatile Organics												
Acetone	ug/kg	27	10.3%	200	0	3	29	12 U	11 U	11 U	12 U	12 U
Benzene	ug/kg	1	3.4%	60	0	1	29	12 U	11 U	11 U	12 U	12 U
Chlorobenzene	ug/kg	7	6.9%	1700	0	2	29	12 U	11 U	11 U	12 U	12 U
Chloroform	ug/kg	13	37.9%	300	0	11	29	12 U	11 U	11 U	5 J	12 U
Methylene Chloride	ug/kg	12	10.3%	100	0	3	29	12 U	11 U	11 U	12 U	12 U
Toluene	ug/kg	2	3.4%	1500	0	1	29	12 U	11 U	11 U	12 U	12 U
Trichloroethene	ug/kg	1	3.4%	700	0	1	29	12 U	11 U	11 U	12 U	12 U
Herbicides												
2,4,5-T	ug/kg	8	3.4%	1900	0	1	29	6.3 U	5.9 U	5.4 U	5.9 U	5.6 U
Dicamba	ug/kg	9.7	3.4%		0	1	29	6.3 U	5.9 U	5.4 U	5.9 U	5.6 U
MCPP	ug/kg	6600	3.4%		0	1	29	6300 U	5900 U	5400 U	5900 U	5600 U
Nitroaromatics												
1,3-Dinitrobenzene	ug/kg	76	3.4%		0	1	29	130 U	130 U	130 U	130 U	130 U
2,4-Dinitrotoluene	ug/kg	4400	20.7%		0	6	29	130 U	130 U	130 U	130 U	130 U
Tetryl	ug/kg	120	6.9%		0	2	29	1100 U	1700 U	1600 U	110 J	130 U
Semivolatile Organics												
2,4-Dinitrotoluene	ug/kg	12000	27.6%		0	8	29	420 U	380 U	350 U	400 U	380 U
Acenaphthylene	ug/kg	54	3.4%	41000	0	1	29	420 U	380 U	350 U	400 U	380 U
Anthracene	ug/kg	19	3.4%	50000*	0	1	29	420 U	380 U	350 U	400 U	380 U
Benzo(a)anthracene	ug/kg	280	13.8%	220	1	4	29	420 U	380 U	350 U	400 U	380 U
Benzo(a)pyrene	ug/kg	420	13.8%	61	1	4	29	24 J	380 U	350 U	400 U	380 U
Benzo(b)fluoranthene	ug/kg	350	17.2%	1100	0	5	29	27 J	380 U	350 U	400 U	380 U
Benzo(g,h,i)perylene	ug/kg	170	6.9%	50000*	0	2	29	420 U	380 U	350 U	400 U	380 U
Benzo(k)fluoranthene	ug/kg	340	17.2%	1100	0	5	29	27 J	380 U	350 U	400 U	380 U
bis(2-Ethylhexyl)phthalate	ug/kg	1300	51.7%	50000*	0	15	29	420 U	89 J	56 J	400 U	86 J
Chrysene	ug/kg	320	24.1%	400	0	7	29	37 J	380 U	350 U	400 U	380 U
Dibenz(a,h)anthracene	ug/kg	28	3.4%	14	1	1	29	420 U	380 U	350 U	400 U	380 U
Di-n-butylphthalate	ug/kg	1100	24.1%	8100	0	7	29	420 U	380 U	22 J	400 U	380 U
Fluoranthene	ug/kg	210	24.1%	50000*	0	7	29	62 J	380 U	350 U	400 U	380 U
Indeno(1,2,3-cd)pyrene	ug/kg	220	6.9%	3200	0	2	29	420 U	380 U	350 U	400 U	380 U
N-Nitrosodiphenylamine	ug/kg	810	24.1%	50000*	0	7	29	420 U	380 U	350 U	400 U	380 U
Phenanthrene	ug/kg	44	13.8%	50000*	0	4	29	33 J	380 U	350 U	400 U	380 U
Pyrene	ug/kg	260	24.1%	50000*	0	7	29	56 J	380 U	350 U	400 U	380 U
Pesticides/PCB												
4,4'-DDE	ug/kg	12	17.2%	2100	0	5	29	4.2 U	3.8 U	3.5 U	4 U	3.7 U
4,4'-DDT	ug/kg	35	6.9%	2100	0	2	29	4.2 U	3.8 U	3.5 U	4 U	3.7 U
alpha-Chlordane	ug/kg	4.7	3.4%	540	0	1	29	2.2 U	2 U	1.8 U	2 U	1.9 U
Endosulfan I	ug/kg	2.3	10.3%	900	0	3	29	2.2 U	2 U	1.8 U	2 U	1.9 U
Endrin aldehyde	ug/kg	4.2	3.4%		0	1	29	4.2 U	3.8 U	3.5 U	4 U	3.7 U
gamma-Chlordane	ug/kg	6	3.4%	540	0	1	29	2.2 U	2 U	1.8 U	2 U	1.9 U
Metals												
Aluminum	mg/kg	25500	100.0%	19300	3	29	29	19300	15800	5820	20700	7470
Arsenic	mg/kg	56.8	100.0%	8.2	11	29	29	4.5	3.7	2.5	4.2	2.5
Barium	mg/kg	149	100.0%	300	0	29	29	132	76.2	40.5	115	73.8
Beryllium	mg/kg	1.2	100.0%	1.1	1	29	29	0.97 J	0.72 J	0.34 J	1.1	0.37 J
Cadmium	mg/kg	8.2	6.9%	2.3	1	2	29	0.72 U	0.56 U	0.63 U	0.45 U	0.52 U
Calcium	mg/kg	106000	100.0%	121000	0	29	29	3430	42100	106000	3660	81400
Chromium	mg/kg	35.1	100.0%	29.6	3	29	29	24.9	23.3	10.8	31	15.6
Cobalt	mg/kg	20.5	100.0%	30	0	29	29	11.6	11.2	6.7 J	20.5	5.7 J
Copper	mg/kg	324	100.0%	33	4	29	29	19	21.2	14.6	25.3	18.1
Iron	mg/kg	37700	100.0%	36500	2	29	29	25700	25300	14100	37700	14800

TABLE 1
SEAD-24 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

	MATRIX							SOIL	SOIL	SOIL	SOIL	SOIL
	LOCATION							SEAD-24	SEAD-24	SEAD-24	SEAD-24	SEAD-24
	DEPTH (FEET)							0-2	4-6	8-10	0-2	6-8
	SAMPLE DATE							12/02/93	12/02/93	12/02/93	12/01/93	12/01/93
	ES ID		FREQUENCY		NUMBER	NUMBER	NUMBER	SB24-3.1	SB24-3.3	SB24-3.5	SB24-4.1	SB24-4.4
	LAB ID	MAXIMUM	OF	CRITERIA	ABOVE	OF	OF	206044	206045	206046	205953	205954
PARAMETER	**UNITS**	**DETECT**	**DETECTION**	**VALUE (a)**	**CRITERIA**	**DETECTS**	**SAMPLES**	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)
Lead	mg/kg	422	100.0%	400 (2)	1	29	29	81.7 J	13.3 J	33.8 J	31.4 J	7.6 J
Magnesium	mg/kg	43700	100.0%	21500	2	29	29	4280	11100	**36700**	6270	16800
Manganese	mg/kg	1770	100.0%	1060	2	29	29	837	581	349	802	409
Mercury	mg/kg	0.15	51.7%	0.1	1	15	29	0.09 JR	0.05 JR	0.03 J	0.07 JR	0.06 JR
Nickel	mg/kg	535	100.0%	49	2	29	29	29.6	31	23.9	43.6	19.3
Potassium	mg/kg	2510	100.0%	2380	1	29	29	1750	1830	1040	1520	1390
Selenium	mg/kg	0.3	10.3%	2	0	3	29	0.3 J	0.24 UJ	0.15 UJ	0.24 UJ	0.15 UJ
Sodium	mg/kg	161	100.0%	172	0	29	29	64.6 J	113 J	133 J	58.3 J	138 J
Thallium	mg/kg	0.14	3.4%	0.7	0	1	29	0.22 U	0.26 U	0.16 U	0.27 U	0.85 U
Vanadium	mg/kg	39.3	100.0%	150	0	29	29	31.1	23.6	10.7	32.6	13.4
Zinc	mg/kg	1180	100.0%	110	10	29	29	**112**	76.1	39.6	**209**	58.7
Other Analyses												
Nitrate/Nitrite-Nitrogen	mg/kg	2.1	100.0%		0	29	29	0.47	0.02	0.2	0.29	0.07
Total Solids	%W/W	93.2	100.0%		0	29	29	79.2	86.5	93.2	83.5	88.2
Total Petroleum Hydrocarbons	mg/kg	158	100.0%		0	29	29	119	58	81	89	116

Notes

1) NYSDEC Technical and Administrative Guidance Memorandum #4046, except as noted.
2) US EPA, OSWER Directive # 9200.4-27 Soil Lead Guidance, August 1998

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

TABLE 1
SEAD-24 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

PARAMETER	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID UNITS	MAXIMUM DETECT	FREQUENCY OF DETECTION	CRITERIA VALUE (a)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF SAMPLES	SOIL SEAD-24 12-14 12/02/93 SB24-4.7 205955 Value (Q)	SOIL SEAD-24 0-2 12/02/93 SB24-5.1 206047 Value (Q)	SOIL SEAD-24 4-6 12/02/93 SB24-5.3 206048 Value (Q)	SOIL SEAD-24 8-10 12/02/93 SB24-5.5 206049 Value (Q)
Volatile Organics											
Acetone	ug/kg	27	10.3%	200	0	3	29	6 J	12 U	11 U	11 U
Benzene	ug/kg	1	3.4%	60	0	1	29	11 UJ	12 U	11 U	1 J
Chlorobenzene	ug/kg	7	6.9%	1700	0	2	29	11 UJ	12 U	11 U	1 J
Chloroform	ug/kg	13	37.9%	300	0	11	29	3 J	12 U	2 J	11 U
Methylene Chloride	ug/kg	12	10.3%	100	0	3	29	9 J	12 U	11 U	2 J
Toluene	ug/kg	2	3.4%	1500	0	1	29	11 UJ	12 U	11 U	2 J
Trichloroethene	ug/kg	1	3.4%	700	0	1	29	11 UJ	12 U	11 U	1 J
Herbicides											
2,4,5-T	ug/kg	8	3.4%	1900	0	1	29	5.4 U	6.3 U	5.4 U	5.7 U
Dicamba	ug/kg	9.7	3.4%		0	1	29	5.4 U	6.3 U	5.4 U	5.7 U
MCPP	ug/kg	6600	3.4%		0	1	29	5400 U	6300 U	5400 U	5400 U
Nitroaromatics											
1,3-Dinitrobenzene	ug/kg	76	3.4%		0	1	29	130 U	130 U	130 U	130 U
2,4-Dinitrotoluene	ug/kg	4400	20.7%		0	6	29	130 U	130 U	130 U	130 U
Tetryl	ug/kg	120	6.9%		0	2	29	130 U	730 U	960 U	1700 U
Semivolatile Organics											
2,4-Dinitrotoluene	ug/kg	12000	27.6%		0	8	29	360 U	410 U	350 U	380 U
Acenaphthylene	ug/kg	54	3.4%	41000	0	1	29	360 U	410 U	350 U	380 U
Anthracene	ug/kg	19	3.4%	50000*	0	1	29	360 U	410 U	350 U	380 U
Benzo(a)anthracene	ug/kg	280	13.8%	220	1	4	29	360 U	410 U	350 U	380 U
Benzo(a)pyrene	ug/kg	420	13.8%	61	1	4	29	360 U	410 U	350 U	380 U
Benzo(b)fluoranthene	ug/kg	350	17.2%	1100	0	5	29	360 U	410 U	350 U	380 U
Benzo(g,h,i)perylene	ug/kg	170	6.9%	50000*	0	2	29	360 U	410 U	350 U	380 U
Benzo(k)fluoranthene	ug/kg	340	17.2%	1100	0	5	29	360 U	410 U	350 U	380 U
bis(2-Ethylhexyl)phthalate	ug/kg	1300	51.7%	50000*	0	15	29	69 J	53 J	350 U	120 J
Chrysene	ug/kg	320	24.1%	400	0	7	29	360 U	410 U	350 U	380 U
Dibenz(a,h)anthracene	ug/kg	28	3.4%	14	1	1	29	360 U	410 U	350 U	380 U
Di-n-butylphthalate	ug/kg	1100	24.1%	8100	0	7	29	360 U	67 J	350 U	380 U
Fluoranthene	ug/kg	210	24.1%	50000*	0	7	29	360 U	410 U	350 U	380 U
Indeno(1,2,3-cd)pyrene	ug/kg	220	6.9%	3200	0	2	29	360 U	410 U	350 U	380 U
N-Nitrosodiphenylamine	ug/kg	810	24.1%	50000*	0	7	29	360 U	410 U	350 U	380 U
Phenanthrene	ug/kg	44	13.8%	50000*	0	4	29	360 U	410 U	350 U	380 U
Pyrene	ug/kg	260	24.1%	50000*	0	7	29	360 U	410 U	350 U	380 U
Pesticides/PCB											
4,4'-DDE	ug/kg	12	17.2%	2100	0	5	29	3.6 U	4.1 U	3.5 U	3.7 U
4,4'-DDT	ug/kg	35	6.9%	2100	0	2	29	3.6 U	4.1 U	3.5 U	3.7 U
alpha-Chlordane	ug/kg	4.7	3.4%	540	0	1	29	1.8 U	2.1 U	1.8 U	1.9 U
Endosulfan I	ug/kg	2.3	10.3%	900	0	3	29	1.8 U	2.1 U	1.8 U	1.9 U
Endrin aldehyde	ug/kg	4.2	3.4%		0	1	29	3.6 U	4.1 U	3.5 U	3.7 U
gamma-Chlordane	ug/kg	6	3.4%	540	0	1	29	1.8 U	2.1 U	1.8 U	1.9 U
Metals											
Aluminum	mg/kg	25500	100.0%	19300	3	29	29	11300	16200	10100	13700
Arsenic	mg/kg	56.8	100.0%	8.2	11	29	29	2.7	4.2	3.3	5
Barium	mg/kg	149	100.0%	300	0	29	29	47	117	58.3	67.2
Beryllium	mg/kg	1.2	100.0%	1.1	1	29	29	0.53 J	0.98 J	0.48 J	0.62 J
Cadmium	mg/kg	8.2	6.9%	2.3	1	2	29	0.41 U	0.78 U	0.36 U	0.7 U
Calcium	mg/kg	106000	100.0%	121000	0	29	29	30500	4540	74200	49000
Chromium	mg/kg	35.1	100.0%	29.6	3	29	29	18.8	24.5	16.9	23.1
Cobalt	mg/kg	20.5	100.0%	30	0	29	29	10.3	16	8.2	12
Copper	mg/kg	324	100.0%	33	4	29	29	12.5	28.4	20.9	22.2
Iron	mg/kg	37700	100.0%	36500	2	29	29	22600	33600	21300	26700

TABLE 1
SEAD-24 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

	MATRIX							SOIL	SOIL	SOIL	SOIL
	LOCATION							SEAD-24	SEAD-24	SEAD-24	SEAD-24
	DEPTH (FEET)							12-14	0-2	4-6	8-10
	SAMPLE DATE							12/02/93	12/02/93	12/02/93	12/02/93
	ES ID		FREQUENCY		NUMBER	NUMBER	NUMBER	SB24-4.7	SB24-5.1	SB24-5.3	SB24-5.5
	LAB ID	MAXIMUM	OF	CRITERIA	ABOVE	OF	OF	205955	206047	206048	206049
PARAMETER	**UNITS**	**DETECT**	**DETECTION**	**VALUE (a)**	**CRITERIA**	**DETECTS**	**SAMPLES**	Value (Q)	Value (Q)	Value (Q)	Value (Q)
Lead	mg/kg	422	100.0%	400 (2)	1	29	29	3.6 J	45.5 J	8.7 J	7.9 J
Magnesium	mg/kg	43700	100.0%	21500	2	29	29	7670	5150	12100	11400
Manganese	mg/kg	1770	100.0%	1060	2	29	29	400	1080	400	450
Mercury	mg/kg	0.15	51.7%	0.1	1	15	29	0.05 JR	0.07 JR	0.06 JR	0.04 JR
Nickel	mg/kg	535	100.0%	49	2	29	29	28.6	37.3	26.4	35.2
Potassium	mg/kg	2510	100.0%	2380	1	29	29	1140	1170 J	993	1660
Selenium	mg/kg	0.3	10.3%	2	0	3	29	0.12 UJ	0.15 UJ	0.23 UJ	0.22 UJ
Sodium	mg/kg	161	100.0%	172	0	29	29	131 J	50.9 J	153 J	139 J
Thallium	mg/kg	0.14	3.4%	0.7	0	1	29	0.14 J	0.16 U	0.25 U	0.24 U
Vanadium	mg/kg	39.3	100.0%	150	0	29	29	14.6	29.9	14.4	19.5
Zinc	mg/kg	1180	100.0%	110	10	29	29	30	85.7	62.8	63.2
Other Analyses											
Nitrate/Nitrite-Nitrogen	mg/kg	2.1	100.0%		0	29	29	0.13	0.27	0.15	0.33
Total Solids	%W/W	93.2	100.0%		0	29	29	92.1	80.5	92.7	87.7
Total Petroleum Hydrocarbons	mg/kg	158	100.0%		0	29	29	99	89	52	94

Notes
1) NYSDEC Technical and Administrative Guidance Memorandum #4046, except as noted.
2) US EPA, OSWER Directive # 9200 4-27 Soil Lead Guidance, August 1998
* = As per proposed TAGM, total VOCs < 10ppm; total Semi-VOCs <500ppm; individual semi-VOCs < 50 ppm
NA = Not Available
U = Compound was not detected.
J = the reported value is an estimated concentration.
R = the data was rejected in the data validating process.
UJ = the compound was not detected; the associated reporting limit is approximate

Lead concentrations exceeded its 24.8 mg/Kg TAGM value in 14 of the soil samples analyzed; however, only one lead concentration exceeded the US EPA guidance[1] for lead in residential soil on measured. The high lead concentrations were again limited primarily to the surface soil samples. The maximum concentration of lead found in samples was 422 mg/Kg and this was found in the surface sample SS24-5. This was the only sample found at a concentration that exceeded EPA's recommended soil clean-up level (400 mg/Kg). All other concentrations detected for lead were below 100 mg/Kg.

Zinc concentrations exceeded the TAGM value (110 mg/Kg) in 10 samples. As with all the other noted metals, the high concentrations were primarily in surface soil samples. The highest concentrations were 566 mg/Kg in SS24-5 and 1180 mg/Kg in sample SS24-12.

The results of the groundwater sampling program are presented in **Table 2**. These results suggest that the groundwater near the abandoned powder burning pit has not been adversely impacted by any of the constituents found in the soil or by those presumed to have been burned in the area. No organic compounds were detected in the samples of groundwater collected. Four metals (aluminum, arsenic, iron and manganese) were detected in the groundwater at levels exceeding their respective groundwater criteria values. Of the metals detected, arsenic, which was found at a maximum concentration of 10 ug/L and surpassed US EPA's maximum contaminant level[2] (MCL) in each of the three samples collected, is the only one that may pose a threat if the groundwater is used as a source of drinking water. The highest concentration measured for arsenic in the samples was found in the upgradient well. All of the concentrations measured for arsenic in groundwater were less than NYSDEC's standards for GA groundwater[3] (25 ug/L)

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

[2] US EPA, Office of Water, Drinking Water Standards and Health Advisories, EPA 822-B-00-001, Summer 2000

[3] NYSDEC, Division of Water Technical and Operational Guidance Series (1.1.1), Ambient Water Quality Standards and Guidance Values and Groundwater Effluent Limits, June 1998.

TABLE 2
SEAD-24 GROUNDWATER ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

PARAMETER	MATRIX LOCATION SAMPLE DATE ES ID LAB ID UNITS	MAXIMUM DETECT	FREQUENCY OF DETECTION	CRITERIA VALUE (a)	NUMBER ABOVE CRITERIA	WATER SEAD-24 01/23/94 MW24-1 209254 Value (Q)	WATER SEAD-24 11/16/93 MW24-2 204657 Value (Q)	WATER SEAD-24 11/15/93 MW24-3 204632 Value (Q)
METALS								
Aluminum	ug/L	19100	100.0%	50 (b)	3	**19100**	**9650**	**18700**
Arsenic	ug/L	10	100.0%	5 (b)	3	**10**	**5.5** J	**6.7** J
Barium	ug/L	177	100.0%	1000	0	156 J	82.1 J	177 J
Beryllium	ug/L	0.89	100.0%	4 (b)	0	0.89 J	0.62 J	0.86 J
Calcium	ug/L	180000	100.0%	NA	NA	180000	176000	133000
Chromium	ug/L	32.6	100.0%	50	0	29.8	18.1	32.6
Cobalt	ug/L	18.7	100.0%	NA	NA	18.7 J	14.5 J	11.8 J
Copper	ug/L	32.5	100.0%	200	0	32.5	8.2 J	16.4 J
Iron	ug/L	32000	100.0%	300	3	**32000**	**19800**	**29800**
Lead	ug/L	7	100.0%	15 (b)	0	7	3.1	3.9
Magnesium	ug/L	47700	100.0%	NA	0	39800	47700	43300
Manganese	ug/L	767	100.0%	50 (c)	3	**712**	**767**	**528**
Mercury	ug/L	0.06	33.3%	0.7	0	0.06 J	0.07 UJ	0.07 UJ
Nickel	ug/L	41.4	100.0%	100	0	41.4	27.8 J	37.4 J
Potassium	ug/L	7550	100.0%	NA	NA	7220	6610	7550
Selenium	ug/L	2.5	66.7%	10	0	2.5 J	1 J	0.8 U
Sodium	ug/L	9510	100.0%	20000	0	5950	6950	9510
Vanadium	ug/L	30.9	100.0%	NA	NA	30.9 J	16.3 J	30.6 J
Zinc	ug/L	107	100.0%	5000 (c)	0	107	31.8	53
OTHER ANALYSES								
Nitrate/Nitrite-Nitrogen	mg/L	0.11	100.0%	10	0	0.11	0.07	0.01
pH	standard units	7.45	NA			7.26	7.45	6.95
Specific Conductivity	umhos/cm	700	NA			435	700	560
Turbidity	NTU	150	NA			150	NA(Cloudy)	NA(Cloudy)

NOTES:

a) NY State Class GA Groundwater Standard (TOGS 1.1.1, June 1998), except as noted below.
b) US EPA Maximum Contaminant Limit (EPA 822-B-00-001, Summer 2000)
c) US EPA Secondary Drinking Water Regulation, non-enforceable (EPA 822-B-00-001, Summer 2000)
NA = Not Available
U = compound was not detected
J = the report value is an estimated concentration
UJ = the compound was not detected; the associated reporting limit is approximate
R = the data was rejected in the data validating process

1.4 DISCUSSION OF REMOVAL ALTERNATIVES

Results of the ESI described above indicate that soil near the Abandoned Powder Burning Pit has been impacted by metals, and to a lessor extent, by a few polynuclear aromatic hydrocarbon (PAH) compounds. Therefore, the Army is proposing to perform a time-critical removal action to eliminate or lessen the magnitude of the potential threat that exists at SEAD-24. This decision document identifies and presents alternatives that have been considered to eliminate or lessen the magnitude of the potential threat. Due to the depot's change in status, and the current release of portions of the former depot for beneficial reuses by the public and private sectors, the proposed action is considered time-critical and the selected option will be implemented quickly to mitigate the potential threat.

Overall, the impacted soil appears to be limited to the surface as samples from deeper regions generally do not contain concentrations of the identified chemicals at levels exceeding or in fact, approaching their respective TAGM criteria values. Lead, arsenic and zinc ranked 1 through 3, respectively, in terms of being detected in the most shallow soil samples at concentrations exceeding their respective NYSDEC TAGM criteria levels. However, the levels of lead found at this site are not considered significant because they are generally below the EPA guidance level for lead in soil (400 mg/Kg^{1}) at residential properties.

The objectives of a removal action are to comply with ARARs and reduce the overall threat to human health and the environment to an acceptable level at the site. Therefore, to reduce the threat that appears to exist near the Abandoned Powder Burning Pit, the Army is proposing to conduct an action that will remove or reduce the threat that is represented by the identified shallow soil contamination.

As is indicated above, the shallow soil contamination identified is predominated by two chemical species: arsenic and zinc. Of these two analytes, arsenic is found in the greatest number of samples (i.e. 11) at concentrations that exceed its TAGM criteria value, followed by zinc (10 times). Further review of the data indicates that generally two, and sometimes all three, of these analytes are detected at concentrations exceeding their respective TAGM criteria value in each sample collected. Of further note is the finding that a majority of the other analytes found at concentrations exceeding their respective criteria values are also found in samples that contain one or more of the three metals at concentrations above their criteria levels.

Therefore, the Army proposes to use arsenic and zinc as indicator compounds that define the extent of contamination at SEAD-24. The extent of the soil contamination indicated by these analytes is shown on **Figure 2**.

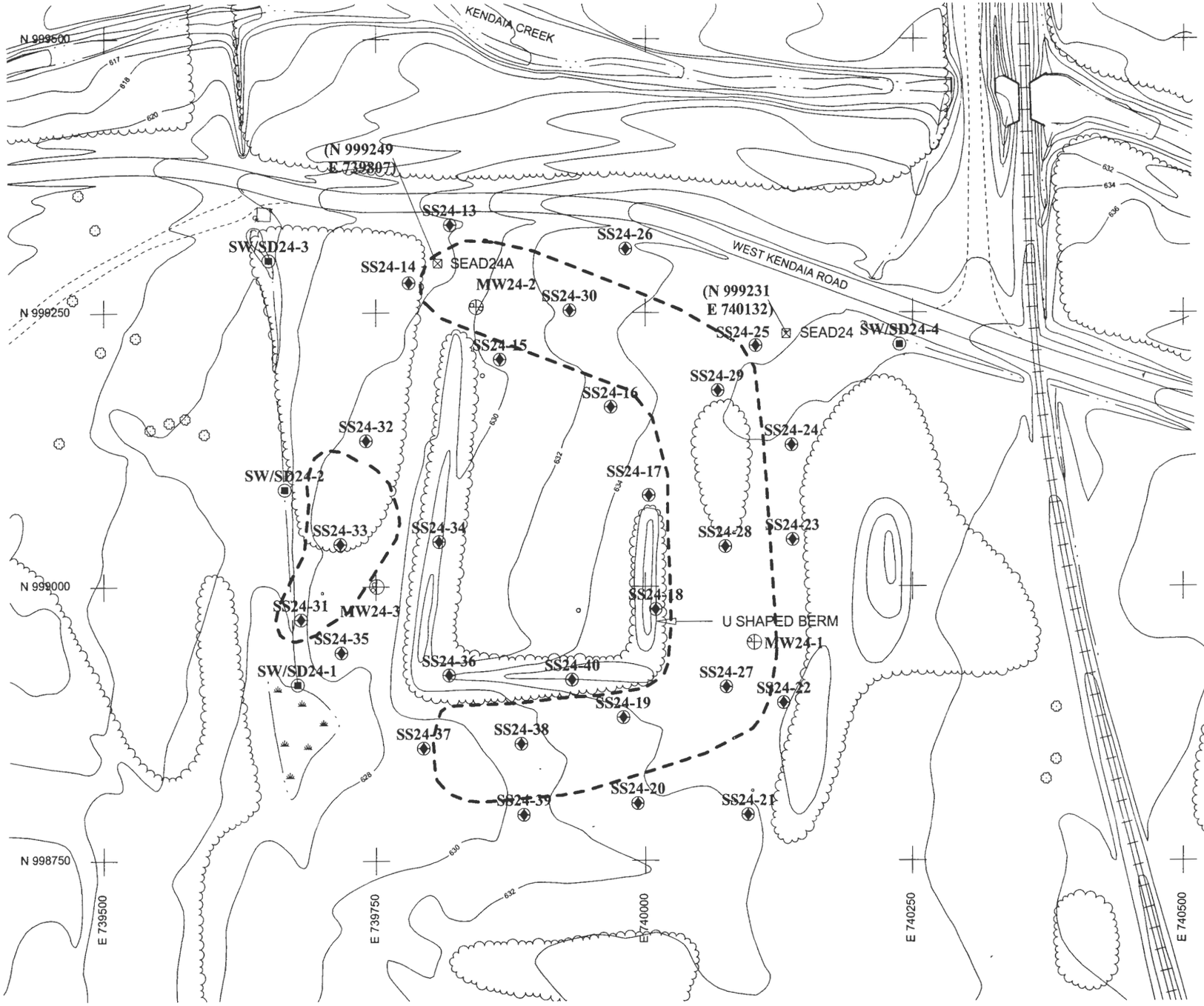
Surface soil in the limited area to the west of the Abandoned Powder Burn Pit, defined by sample locations SS24-10, SS24-11 and SS24-12, should be remediated to a depth of 6 inches. In addition, the shallow soil contained in the area to the north, east and south and exterior of the abandoned burn pit and measuring approximately 50 to 150 feet wide should be remediated to a depth of 6 inches. The total quantity of soil to be remediated is initially estimated as 2,500 cubic yards (CY or approximately 3,800 tons). The actual amount of soil that will be remediated under this action will be determined based on the results of confirmational samples that will be collected from the proposed excavations and characterized for arsenic and zinc content.

The following section briefly describes removal alternatives that 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 ARARs and economic impacts.

1.5 REMOVAL METHODS

Soil Washing

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



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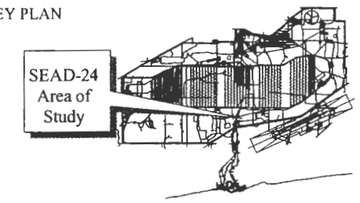
LEGEND

- PAVED ROAD
- GROUND CONTOUR AND ELEVATION (680)
- WETLAND
- BRUSH
- CHAIN LINK FENCE
- UTILITY POLE
- APPROXIMATE LOCATION OF FIRE HYDRANT
- RAILROAD
- ⊕ Monitoring Well
- ⊠ Survey Monument
- SS24-13 ◈ Post-Removal Verification Surface Soil Sample
- SW/SD24-1 ◉ Post-Removal Verification Surface Water and Sediment Sample
- Area To Be Remediated

KEY PLAN



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SENECA ARMY DEPOT ACTIVITY
ABANDONED POWDER BURNING PIT
SEAD-24

FIGURE 2

PROPOSED EXTENT OF
REMOVAL ACTION

JOB NUMBER: 734530-01001 | DATE: MARCH 2001

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Certain site factors can limit the success of soil washing:

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

In-Situ Solidification/Stabilization

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

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

Excavation and Landfilling

Excavation of hazardous materials is performed extensively for site remediation. Excavation is usually accompanied by off-site treatment or disposal in an off-site secured landfill. Excavation employs the use of earth moving equipment to physically remove soil and buried materials. There are no absolute limitations on the types of waste that can be excavated and removed.

Factors that will be considered include the mobility of the wastes, the feasibility of on-site containment, and the cost of disposing the waste or rendering it non-hazardous once it has been excavated. A frequent practice at hazardous waste sites is to excavate and remove contaminant "hot spots" and to use other remedial measures for less contaminated soil. Excavation and removal can almost totally eliminate the contamination at a site and the need for long-term monitoring. Another advantage is that the time to achieve beneficial results can be short relative to other 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.

1.6 REMOVAL COSTS

Soil Washing

A large number of vendors provide soil washing services. The treatment processes used vary according to the scale of the operation, particle size being treated, and extraction agent used. Because the operation is unique for each site, it is difficult to arrive at a cost estimate. However, in an evaluation of fourteen companies offering soil washing treatment services, a general price range of $50 to $205 per ton was noted in EPA Engineering Bulletin EPA/540/2-90/017, September 1990. This would result in an estimated cost of $190,000 to $780,000 with a most probable cost in the range of $525,000 to $630,000.

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 $380,000 to $760,000 with a most probable cost range of $570,000 to $650,000.

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 $100 and $150 per ton. If it can be classified as clean enough for beneficial use as daily cover, the cost to excavate and dispose of it will range between $50 and $100 per ton. Assuming that it will be disposed of in a non-hazardous waste landfill, this will result in an estimated cost of $190,000 to $380,000 with a most probable cost in the range of $300,000 to $380,000.

1.7 COMPARISON OF REMOVAL ALTERNATIVES

Of the three remedial alternative presented above, excavation and off-site landfilling is the best alternative for the removal of the PAH and metals-impacted soil 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.

1.8 RECOMMENDATIONS

Surface soil in the limited area to the west of the Abandoned Powder Burn Pit, defined by sample locations SS24-10, SS24-11 and SS24-12, should be remediated to a depth of 6 inches. In addition, shallow soil inside the U-shaped berm, roughly defined by the southwestern, southeastern, and northeastern quarters of the enclosed area, should be remediated to a depth of 6 inches. Finally, the shallow soil contained in the area to the north, east and south and exterior of

the abandoned pit and measuring approximately 50 to 150 feet wide should be remediated to a depth of 6 inches. The total quantity of soil to be remediated is initially estimated as 2,500 cubic yards (CY or approximately 3,800 tons). The actual amount of soil that will be remediated under this action will be determined based on the results of confirmational samples that will be collected from the proposed excavations and characterized for arsenic and zinc content. The estimated cost is approximately $300,000 to $380,000 to excavate, contain, and dispose of this volume of soil.

1.9 JUSTIFICATION

Metals, predominated by arsenic and zinc, were detected exceeding state and federal criteria values in all of the surface soil samples collected from locations surrounding the Abandoned Powder Burning Pit. The surface soil sample SS24-1, to the east of the abandoned pit, was the only sample to contain PAHs exceeding NYSDEC TAGM values. Soil samples collected at depths of more than two feet did not contain any metals or PAHs that exceeded NYSDEC TAGM values. The groundwater samples collected indicate that none of the constituents have migrated away 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.

1.10 POST-REMOVAL VERIFICATION SAMPLING

Confirmational samples will be collected and analyzed to verify that the proposed removal of soil at the Abandoned Powder Burning Pit is sufficient to remove the impacted soil that poses any health risk. Confirmation samples will include surface soil samples that are collected from the perimeter and bottom of the proposed excavation, and collection of surface water and sediment samples from the drainage swale that is located to the west of the site. All confirmational samples will be analyzed for metals. The analytical results from the samples will be compared to NYSDEC criteria values for each media and used to assess the adequacy of the removal action. 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.

2.0 SEAD 50 and 54 TANK FARM

2.1 EXECUTIVE SUMMARY

An Expanded Site Inspection (ESI) 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 proposed plan for conducting a time-critical removal action at SEAD-50 and SEAD-54 to eliminate contaminants that have been identified in the soil and sediment that represent a potential threat to the environment and neighboring populations. This removal action is considered time-critical because the historic military mission of the depot has been terminated and the depot has officially been closed by the Department of the Defense (DoD) and the US Army. In accordance with provisions of the DoD's Base Realignment and Closure (BRAC) process, the land and the facilities of the former depot have been surveyed and evaluated, and prospective beneficial uses of the facility have been identified. Portions of the depot are now being released to the public and private sectors for reuse under the BRAC process. As portions of the former depot are released for other beneficial uses, increased access is afforded to all portions of the former depot, resulting in an increased potential for exposure of populations to any residual chemicals that are present at former solid waste management units (SWMUs) remaining at the depot pending clean-up. Therefore, the goal of the proposed time-critical removal action at SEAD-50 and SEAD-54 is to eliminate and contain an identified source of residual chemical materials in the soil to remove or at least lessen the magnitude of the potential threat that it represents to surrounding populations and the environment.

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 the site.

2.2 SITE BACKGROUND

2.2.1 Site Description

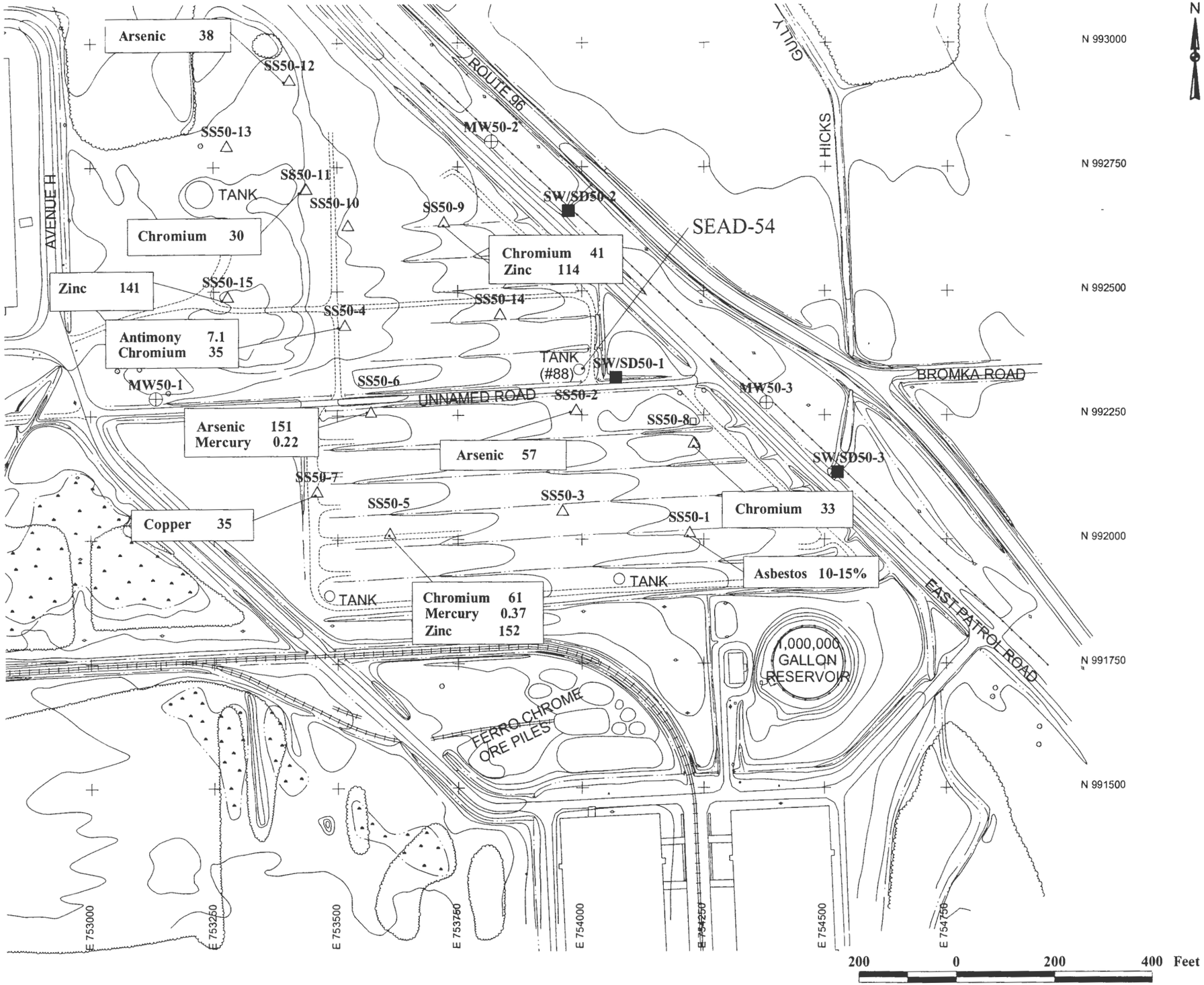
SEADs 50/54 is located at the depot's historic tank farm that was located in the southeastern portion of SEDA. The tank farm was sited in a triangular-shaped tract of land immediately west of East Patrol Road between Building 350 and Buildings 356 and 357 (see **Figure 3**). Four tanks remain at the tank farm site, three of which are currently empty. The three empty tanks comprise SEAD-50; two of these tanks were previously used for the storage of antimony ore. The remaining empty tank was used to store rutile (i.e., titanium dioxide) ore. SEAD-54 encompasses the remaining tank, Tank #88, which currently contains asbestos material. SEAD-54 was listed as a separate SWMU because it contained asbestos material and will require special handling.

The topography of the area is relatively flat, with a total relief of 2 to 3 feet. There is an east-west running access road that bisects the site and connects Avenue H with East Patrol Road. The asbestos storage tank is located immediately north of the access road on the east side of SEAD-50. North of the access road, SEAD-50 is generally overgrown with vegetation, exclusive of the spots where historic tanks were located. The circular footprints of the former tanks are generally clear of vegetation and covered with gravel. The area south of the access road is flat and grassy. A ferro-chromate ore pile is located in the southern area of the historic tank farm at the border of the grassy area. There are no mapped wetlands in the area.

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**).

2.2.2 Site History

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



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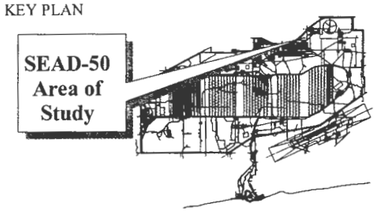
LEGEND

- PAVED ROAD
- GROUND CONTOUR AND ELEVATION (680)
- WETLAND
- BRUSH
- CHAIN LINK FENCE
- UTILITY POLE
- APPROXIMATE LOCATION OF FIRE HYDRANT
- RAILROAD
- △ Surface Soil Samples
- ■ Surface Water/Sediment Samples
- ⊕ Monitoring Well
- ⊠ Survey Monument

TAGM LEVELS

Antimony	5.9	mg/kg
Arsenic	8.2	mg/kg
Chromium	29.6	mg/kg
Copper	33	mg/kg
Mercury	0.1	mg/kg
Zinc	110	mg/kg

KEY PLAN



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

FIGURE 3

METALS EXCEEDING THEIR
RESPECTIVE CRITERIA
LEVELS IN SURFACE SOILS

JOB NUMBER: 734530-01001 | DATE: MARCH 2001

2.3 PREVIOUS INVESTIGATIONS

2.3.1 Description of Sampling Program

An Expanded Site Inspection of SEADs 50 and 54 was performed in 1993 to determine whether a release of hazardous constituents had occurred. The ESI included a geophysical survey and intrusive sampling operations.

A seismic refraction survey was performed, and the resulting data was used to determine the direction of groundwater flow.

Fifteen surface soil samples, three groundwater samples, three surface water, and three sediment samples were collected from SEADs 50 and 54. All of the samples were submitted to the laboratory for chemical analysis. The sample locations are shown in **Figure 3**. Collected 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 NYSDEC Contract Laboratory Program Statement of Work. In addition, all of the surface soil samples were analyzed for asbestos.

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

Three groundwater monitoring wells were installed in the till/weathered shale aquifer at SEADs 50/54. One monitoring well was installed upgradient of SEADs and used to obtain background water quality data, while the remaining two wells were installed downgradient, between East Patrol Road and the SEDA perimeter fence, to determine if hazardous constituents have impacted groundwater from SEAD-50. Three samples, one sample from each well, was submitted to the laboratory for chemical analysis.

Three surface water and sediment samples were collected from the area of SEADs 50 and 54 and submitted for chemical analysis. One sample was collected from a drainage ditch that runs parallel to the unnamed road that bisects the SEADs, while the remaining two were collected from a downgradient drainage ditch that runs parallel to East Patrol Road.

2.3.2 Results of Sampling Program

Soil

The results of the soil sampling program are summarized and presented in **Tables 3** and **4**. Fifty-six TCL/TAL compounds plus asbestos were detected in one or more of the shallow soils collected during the ESI. Of the 56 TCL/TAL analytes detected, one was a volatile organic compound, 20 were semivolatile organics, 13 were pesticides or PCBs, and the remaining 22 were metals. These results indicate that shallow soil at the site has been impacted by semivolatile organic compounds, predominantly polynuclear aromatic hydrocarbons (PAHs), heavy metals, and asbestos.

Concentrations measured for seven semivolatile organic compounds (including six polynuclear aromatic hydrocarbons and phenol) surpassed their respective TAGM criteria values. A majority of the concentrations found above the TAGM levels were identified in three samples collected from locations SS50-11, SS50-14, and SS50-15. Each of these locations is in the northern part of the historic tank farm, north of the unnamed road that bisects the area.

Eight metals (i.e., antimony, arsenic, chromium, copper, lead, magnesium, mercury, and zinc) were found in soil samples at concentrations that surpassed their respective NYSDEC TAGM criteria levels. Although lead was found at concentrations that exceeded its TAGM level (i.e., 24.8 mg/Kg based on site background) in 13 of the 15 surface soil samples characterized, it was not found at a concentration that exceeded US EPA's recommended soil clean-up level for residential properties[1] of 400 mg/Kg.

The sample collected at location SS50-5 contained the maximum concentrations measured within SEADs 50/54 for chromium, lead, mercury, and zinc. Arsenic concentrations surpassed its criteria level in three of the 15 surface soil samples collected. However, only those samples collected from locations SS50-2 (57.4 mg/Kg) and SS50-6 (151 mg/Kg) contained arsenic at concentrations significantly above the criteria value. Concentrations surpassing TAGM values for other metals were generally evenly distributed throughout the soil sampling locations and found at concentrations which did not significantly exceed their respective TAGMs.

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

TABLE 3
SEAD-50/SEAD-54 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

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

TABLE 3
SEAD-50/SEAD-54 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

PARAMETER	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM DETECT	FREQUENCY OF DETECTION	CRITERIA VALUE (a)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF SAMPLES	SOIL SEAD-50 0-1 02/18/94 SS50-1 211971 42493 Value (Q)	SOIL SEAD-50 0-0.2 02/18/94 SS50-2 211972 42493 Value (Q)	SOIL SEAD-50 0-1 02/18/94 SS50-3 211973 42493 Value (Q)	SOIL SEAD-50 0-1 02/17/94 SS50-4 211728 42460 Value (Q)	SOIL SEAD-50 0-0.2 02/18/94 SS50-5 211974 42493 Value (Q)
Volatile Organics												
Iron	mg/Kg	30000	100%	36500	0	15	15	25600	22800	22800	24400 J	18000
Lead	mg/Kg	398	100%	400 (b)	0	15	15	94.8	40.1	27	74	398
Magnesium	mg/Kg	48300	100%	21500	1	15	15	5300	3900	3930	3840 J	21100
Manganese	mg/Kg	722	87%	1060	0	13	15	569	630	490	539 R	350
Mercury	mg/Kg	0.37	100%	0.1	2	15	15	0.06 J	0.05 J	0.04 J	0.04 J	0.37
Nickel	mg/Kg	42.6	100%	498	0	15	15	35 J	25.2 J	22.8 J	24.3	22.9 J
Potassium	mg/Kg	2170	100%	2380	0	15	15	1780 J	2160 J	1040 J	1190	1430 J
Selenium	mg/Kg	1.1	93%	2	0	14	15	0.95 J	1.1 J	0.52 J	0.23 UJ	0.25 J
Silver	mg/Kg	0.34	13%	0.75	0	2	15	0.16 U	0.25 U	0.16 U	0.91 U	0.11 U
Sodium	mg/Kg	136	80%	172	0	12	15	64.7 J	55.6 U	42.5 J	43 U	86.1 J
Vanadium	mg/Kg	26.2	100%	150	0	15	15	23.8	24.9	22.6	26.1	15.6
Zinc	mg/Kg	152	100%	110	3	15	15	109	100	71.9	88.9 J	152
Other Analyses												
Total Solids	%W/W	88	100%		0	15	15	67.8	53.8	68.9	80.6	73.9

NOTES:

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

b) US EPA, OSWER Directive # 9200.4-27 Soil Lead Guidance, August 1998

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

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

NA = Not Available

U = Compound was not detected.

J = the reported value is an estimated concentration.

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

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

TABLE 3
SEAD-50/SEAD-54 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

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

TABLE 3
SEAD-50/SEAD-54 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

	MATRIX							SOIL	SOIL	SOIL	SOIL	SOIL
	LOCATION							SEAD-50	SEAD-50	SEAD-50	SEAD-50	SEAD-50
	DEPTH (FEET)							0-0.2	0-1	0-1	0-0.2	0-1
	SAMPLE DATE							02/18/94	02/18/94	02/18/94	02/18/94	02/19/94
	ES ID							SS50-6	SS50-7	SS50-8	SS50 9	SS50-10
	LAB ID		FREQUENCY		NUMBER	NUMBER	NUMBER	211975	211976	211977	211978	211979
	SDG NUMBER	MAXIMUM	OF	CRITERIA	ABOVE	OF	OF	42493	42493	42493	42493	42493
PARAMETER	**UNITS**	**DETECT**	**DETECTION**	**VALUE (a)**	**CRITERIA**	**DETECTS**	**SAMPLES**	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)
Volatile Organics												
Iron	mg/Kg	30000	100%	36500	0	15	15	21700	29400	18200	28600	26100
Lead	mg/Kg	398	100%	400 (b)	0	15	15	25.2	52.7	242	181	48.4
Magnesium	mg/Kg	48300	100%	21500	1	15	15	3550	6600	15700	5690	11200
Manganese	mg/Kg	722	87%	1060	0	13	15	487	374	604	413	430
Mercury	mg/Kg	0.37	100%	0.1	2	15	15	**0.22**	0.02 J	0.04 J	0.03 J	0.03 J
Nickel	mg/Kg	42.6	100%	498	0	15	15	20.8 J	42.6 J	15.4 J	30.2 J	22 J
Potassium	mg/Kg	2170	100%	2380	0	15	15	1550 J	1680 J	1540 J	1030 J	1490 J
Selenium	mg/Kg	1.1	93%	2	0	14	15	0.71 J	0.59 J	0.67 J	0.53 J	0.21 J
Silver	mg/Kg	0.34	13%	0.75	0	2	15	0.21 U	0.15 U	0.34 J	0.14 U	0.12 U
Sodium	mg/Kg	136	80%	172	0	12	15	66 J	81.6 J	89.3 J	53 J	60.7 J
Vanadium	mg/Kg	26.2	100%	150	0	15	15	23.2	21	17	16.4	19.2
Zinc	mg/Kg	152	100%	110	3	15	15	101	81.2	104	**114**	87.4
Other Analyses												
Total Solids	%W/W	88	100%		0	15	15	53.3	84.9	88	76.8	77

NOTES:

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

b) US EPA, OSWER Directive # 9200.4-27 Soil Lead Guidance, August 1998

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

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

NA = Not Available

U = Compound was not detected.

J = the reported value is an estimated concentration.

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

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

TABLE 3
SEAD-50/SEAD-54 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

PARAMETER	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM DETECT	FREQUENCY OF DETECTION	CRITERIA VALUE (a)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF SAMPLES	SOIL SEAD-50 0-0.2 02/19/94 SS50-11 211965 42460 Value (Q)	SOIL SEAD-50 0-1 02/19/94 SS50-12 211980 42493 Value (Q)	SOIL SEAD-50 0-0.2 02/19/94 SS50-13 211981 42493 Value (Q)	SOIL SEAD-50 0-1 02/19/94 SS50-14 211982 42493 Value (Q)	SOIL SEAD-50 0-0.2 02/19/94 SS50-15 211983 42493 Value (Q)
Volatile Organics												
Acetone	ug/Kg	83	7%	200	0	1	15	14 U	13 U	15 U	12 U	15 U
Semivolatile Organics												
4-Methylphenol	ug/Kg	310	20%	900	0	3	15	2300 U	420 U	480 U	420 U	520 U
Acenaphthene	ug/Kg	930	13%	50000 (*)	0	2	15	930 J	420 U	480 U	420 U	51 J
Anthracene	ug/Kg	1500	20%	50000 (*)	0	3	15	1500 J	420 U	480 U	81 J	100 J
Benzo(a)anthracene	ug/Kg	5200	40%	220	3	6	15	**5200**	420 U	35 J	**830**	**650**
Benzo(a)pyrene	ug/Kg	3700	40%	61	5	6	15	**3700**	420 U	40 J	**660**	**520**
Benzo(b)fluoranthene	ug/Kg	4400	40%	1100	1	6	15	**4400**	420 U	45 J	860	690
Benzo(g,h,i)perylene	ug/Kg	1800	27%	50000 (*)	0	4	15	1800 J	420 U	480 U	270 J	240 J
Benzo(k)fluoranthene	ug/Kg	4000	40%	1100	1	6	15	**4000**	420 U	43 J	600	410 J
bis(2-Ethylhexyl)phthalate	ug/Kg	1800	100%	50000 (*)	0	15	15	640 J	1800	960	610	1300
Carbazole	ug/Kg	1100	20%	50000 (*)	0	3	15	1100 J	420 U	480 U	71 J	67 J
Chrysene	ug/Kg	5500	40%	400	3	6	15	**5500**	420 U	53 J	**840**	**670**
Dibenz(a,h)anthracene	ug/Kg	840	20%	14	3	3	15	**840** J	420 U	480 U	**200** J	**190** J
Dibenzofuran	ug/Kg	260	7%	6200	0	1	15	260 J	420 U	480 U	420 U	520 U
Di-n-butylphthalate	ug/Kg	56	80%	8100	0	12	15	2300 U	51 J	51 J	36 J	30 J
Fluoranthene	ug/Kg	14000	80%	50000 (*)	0	12	15	14000	41 J	86 J	1300	1300
Fluorene	ug/Kg	590	13%	50000 (*)	0	2	15	590 J	420 U	480 U	420 U	36 J
Indeno(1,2,3-cd)pyrene	ug/Kg	1800	33%	3200	0	5	15	1800 J	420 U	480 U	400 J	360 J
Phenanthrene	ug/Kg	7800	67%	50000 (*)	0	10	15	7800	26 J	53 J	370 J	530
Phenol	ug/Kg	31	7%	30	1	1	15	2300 U	420 U	480 U	420 U	520 U
Pyrene	ug/Kg	12000	73%	50000 (*)	0	11	15	12000	31 J	73 J	1200	1000
Pesticides/PCB												
4,4'-DDD	ug/Kg	2.2	7%	2900	0	1	15	4.5 U	8.4 U	4.8 U	2.2 J	5.2 U
4,4'-DDE	ug/Kg	4.8	27%	2100	0	4	15	4.5 U	8.4 U	4.8 U	4.8 J	4 J
4,4'-DDT	ug/Kg	4.1	27%	2100	0	4	15	4.5 U	8.4 U	4.8 U	4.1 J	4.1 J
Aldrin	ug/Kg	1.3	7%	41	0	1	15	2.3 U	4.3 U	2.5 U	2.2 U	2.7 U
alpha-Chlordane	ug/Kg	3.8	7%	540	0	1	15	3.8 J	4.3 U	2.5 U	2.2 U	2.7 U
Aroclor-1242	ug/Kg	75	20%	1000(c)	0	3	15	45 U	84 U	48 U	37 J	52 U
Aroclor-1254	ug/Kg	75	13%	1000(c)	0	2	15	45 U	84 U	48 U	24 J	52 U
Aroclor-1260	ug/Kg	25	7%	1000(c)	0	1	15	45 U	84 U	48 U	42 U	52 U
Dieldrin	ug/Kg	59	13%	440	0	2	15	4.5 U	59 J	4.8 U	28 J	5.2 U
Endosulfan I	ug/Kg	13	7%	900	0	1	15	2.3 U	4.3 U	2.5 U	13	2.7 U
Endrin	ug/Kg	2.8	7%	100	0	1	15	2.8 J	8.4 U	4.8 U	4.2 U	5.2 U
Heptachlor	ug/Kg	1.3	7%	100	0	1	15	2.3 U	4.3 U	2.5 U	2.2 U	2.7 U
Heptachlor epoxide	ug/Kg	2.4	13%	20	0	2	15	2.3 U	4.3 U	2.5 U	2.2 U	2.7 U
Metals												
Aluminum	mg/Kg	15300	100%	19300	0	15	15	15300 J	15200	13800	10600	13300
Antimony	mg/Kg	7.1	93%	5.9	1	14	15	5.2 UJ	0.55 J	0.63 J	0.6 J	0.85 J
Arsenic	mg/Kg	151	100%	8.2	3	15	15	6 J	**37.6**	6.4	6.2	6.3
Barium	mg/Kg	115	100%	300	0	15	15	101 J	91.2	78	73.1	92.1
Beryllium	mg/Kg	0.71	100%	1.1	0	15	15	0.71 J	0.65 J	0.55 J	0.4 J	0.59 J
Cadmium	mg/Kg	0.8	87%	2.3	0	13	15	0.51 U	0.15 J	0.09 J	0.8 J	0.22 J
Calcium	mg/Kg	120000	100%	121000	0	15	15	15200 J	3870 J	10600 J	80100 J	18000 J
Chromium	mg/Kg	60.7	100%	29.6	5	15	15	**29.9**	22.7	21.1	21.8	25.7
Cobalt	mg/Kg	12.6	100%	30	0	15	15	10.3 J	11.6	10.4 J	9.2 J	12.6
Copper	mg/Kg	35.2	100%	33	1	15	15	23.6	19.6	22.2	20.9	28.1

TABLE 3
SEAD-50/SEAD-54 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

	MATRIX							SOIL	SOIL	SOIL	SOIL	SOIL
	LOCATION							SEAD-50	SEAD-50	SEAD-50	SEAD-50	SEAD-50
	DEPTH (FEET)							0-0.2	0-1	0-0.2	0-1	0-0.2
	SAMPLE DATE							02/19/94	02/19/94	02/19/94	02/19/94	02/19/94
	ES ID							SS50-11	SS50-12	SS50-13	SS50-14	SS50-15
	LAB ID		FREQUENCY		NUMBER	NUMBER	NUMBER	211965	211980	211981	211982	211983
	SDG NUMBER	MAXIMUM	OF	CRITERIA	ABOVE	OF	OF	42460	42493	42493	42493	42493
PARAMETER	**UNITS**	**DETECT**	**DETECTION**	**VALUE (a)**	**CRITERIA**	**DETECTS**	**SAMPLES**	Value (Q)	Value (Q)	Value (Q)	Value (Q)	Value (Q)
Volatile Organics												
Iron	mg/Kg	30000	100%	36500	0	15	15	27000 J	29400	26200	19700	30000
Lead	mg/Kg	398	100%	400 (b)	0	15	15	25.7	18.5	22.6	61.4	45.3
Magnesium	mg/Kg	48300	100%	21500	1	15	15	7510 J	4570	6330	**48300**	6780
Manganese	mg/Kg	722	87%	1060	0	13	15	496 R	722	461	548	589
Mercury	mg/Kg	0.37	100%	0.1	2	15	15	0.05 J	0.05 J	0.05 J	0.03 J	0.03 J
Nickel	mg/Kg	42.6	100%	498	0	15	15	37.2	30.1 J	28.9 J	24.4 J	37 J
Potassium	mg/Kg	2170	100%	2380	0	15	15	2170	1600 J	1760 J	2140 J	1890 J
Selenium	mg/Kg	1.1	93%	2	0	14	15	0.41 J	0.41 J	0.33 J	0.55 J	0.44 J
Silver	mg/Kg	0.34	13%	0.75	0	2	15	1 U	0.16 J	0.18 U	0.16 U	0.14 U
Sodium	mg/Kg	136	80%	172	0	12	15	63.7 J	26.7 U	64.9 J	136 J	64.6 J
Vanadium	mg/Kg	26.2	100%	150	0	15	15	26.2	24.6	23.4	19.8	21.3
Zinc	mg/Kg	152	100%	110	3	15	15	110 J	93.7	87.9	102	**141**
Other Analyses												
Total Solids	%W/W	88	100%		0	15	15	72.9	78.2	69.3	78.8	63.9

NOTES:

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

b) US EPA, OSWER Directive # 9200.4-27 Soil Lead Guidance, August 1998

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

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

NA = Not Available

U = Compound was not detected.

J = the reported value is an estimated concentration.

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

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

TABLE 4
SEAD-50 / SEAD-54 SOIL SAMPLE ASBESTOS ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

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

Results for Asbestos in soil are provided in **Table 4**. Surface soil sample SS50-1 contained 10 to 15 percent Chrysotile asbestos. Asbestos was not found in any of the other surface soil samples collected from SEADs 50/54.

Groundwater

The results of the groundwater sampling program are presented in **Table 5**. Generally, the data indicate that groundwater at SEADs 50/54 has not been significantly impacted by the historic storage activities that were performed in this area. One semivolatile organic compound and 18 metals were detected in one or more of the groundwater samples collected. Concentrations measured for five of the metals (i.e., aluminum, iron, manganese, sodium and thallium) surpassed their respective groundwater criteria levels. Of these metals, only thallium, which was detected in one of the groundwater samples at a concentration of 3 ug/L and surpassed the US EPA's[2] MCL of 2 ug/L is of potential concern. However, thallium was not detected in soil samples collected from SEADs 50/54, and the groundwater in this area is not used as a source of drinking water. Also of note for the groundwater, is the finding that many of the highest concentrations reported were found in the sample collected from MW50-1, which is the upgradient well that was placed in the area.

Surface Water

The results of the ESI surface water sampling program are presented in **Table 6**. The results indicate that surface water at the site has not been significantly impacted by the historic storage activities that were conducted in SEADs 50/54. Only 15 metals were detected in the surface water samples collected, and only two of these metals (i.e., aluminum and iron) were found at a concentration that exceeded its NYS class C surface water criteria.

Sediment

Results from the sediment sampling program are presented in **Table 7**. These data indicate that sediment at SEADs 50/54 has been impacted by the historic activities conducted in the area. Forty-four TCL/TAL, including one volatile organic compound, 17 semivolatile organic compounds, six pesticides and PCBs and 20 metals were detected in samples collected. Of the

[2] US EPA, Office of Water, Drinking Water Standards and Advisories, EPA 822-B-00-001, Summer 2000.

TABLE 5
SEAD-50/54 GROUNDWATER ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

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

NOTES:

a) NY State Class GA Groundwater Standard (TOGS 1.1.1, June 1998), except as noted below.
b) US EPA Maximum Contaminant Limit (EPA 822-B-00-001, Summer 2000)
c) US EPA Secondary Drinking Water Regulation, non-enforceable (EPA 822-B-00-001, Summer 2000)
NA = Not Available
U = compound was not detected
J = the report value is an estimated concentration
UJ = the compound was not detected; the associated reporting limit is approximate
R = the data was rejected in the data validating process

TABLE 6
SEAD-50 / SEAD-54 SURFACE WATER ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

PARAMETER	MATRIX LOCATION SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM DETECT	FREQUENCY OF DETECTION	NYS CRITERIA VALUE (a,b)	NUMBER ABOVE CRITERIA	WATER SEAD-50 04/19/94 SW50-1 218499 43626 Value (Q)	WATER SEAD-50 04/19/94 SW50-2 218500 43626 Value (Q)	WATER SEAD-50 04/19/94 SW50-3 218501 43626 Value (Q)
METALS								
Aluminum	ug/L	376	100%	100	1	**376**	63.1 J	68.2 J
Arsenic	ug/L	22.1	67%	150	0	22.1	4.5 J	1.5 U
Barium	ug/L	34.3	100%	NA	NA	33.4 J	34.3 J	21.9 J
Calcium	ug/L	85200	100%	NA	NA	82700	85200	43400
Chromium	ug/L	1.3	67%	139.5	0	0.88 J	0.4 U	1.3 J
Copper	ug/L	2.1	100%	17.3	0	2.1 J	1.1 J	1.8 J
Iron	ug/L	575	100%	300	1	**575**	91.8 J	121
Lead	ug/L	0.89	33%	1.46	0	0.89 J	0.8 U	0.8 U
Magnesium	ug/L	13200	100%	NA	NA	12300	13200	8660
Manganese	ug/L	67.9	100%	NA	NA	67.9	6.6 J	7.1 J
Nickel	ug/L	1.7	67%	99.9	0	1.7 J	0.6 U	0.83 J
Potassium	ug/L	3140	100%	NA	NA	3140 J	1210 J	822 J
Sodium	ug/L	11200	100%	NA	NA	1890 J	11000	11200
Vanadium	ug/L	1.1	33%	14	0	1.1 J	0.7 U	0.7 U
Zinc	ug/L	10.5	100%	159.2	0	10.5 J	8.1 J	1.5 J
OTHER ANALYSES								
pH	Standard Units						7.7	8.4
Conductivity	umhos/cm						450	260
Temperature	°C						15.7	16
Turbidity	NTU						5.1	1.6

NOTES:

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

TABLE 7
SEAD-50 / SEAD-54 SEDIMENT ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

PARAMETER	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM DETECT	FREQUENCY OF DETECTION	CRITERIA VALUE (a)	CRITERIA TYPE (b,c)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	SOIL SEAD-50 0-0.2 04/19/94 SD50-1 218502 43663 Value (Q)	SOIL SEAD-50 0-0.2 04/19/94 SD50-2 218503 43663 Value (Q)	SOIL SEAD-50 0-0.2 04/19/94 SD50-3 218504 43663 Value (Q)
VOLATILE ORGANICS											
2-Butanone	ug/Kg	11	33%				1	3	11 J	21 UJ	13 U
SEMIVOLATILE ORGANICS											
4-Methylphenol	ug/Kg	110	67%				2	3	44 J	110 J	420 U
Acenaphthene	ug/Kg	160	33%	5475	BALCT	0	1	3	160 J	690 UJ	420 U
Anthracene	ug/Kg	480	33%	4184	BALCT	0	1	3	480 J	690 UJ	420 U
Benzo(a)anthracene	ug/Kg	1400	100%	50.8	HHBC	2	3	3	**1400**	**120** J	**44** J
Benzo(a)pyrene	ug/Kg	1200	100%	50.8	HHBC	3	3	3	**1200**	**160** J	**58** J
Benzo(b)fluoranthene	ug/Kg	1300	100%	50.8	HHBC	3	3	3	**1300**	**160** J	**51** J
Benzo(g,h,i)perylene	ug/Kg	790	100%				3	3	790	120 J	42 J
Benzo(k)fluoranthene	ug/Kg	1200	100%	50.8	HHBC	3	3	3	**1200**	**160** J	**69** J
Carbazole	ug/Kg	250	33%				1	3	250 J	690 UJ	420 U
Chrysene	ug/Kg	1500	100%	50.8	HHBC	3	3	3	**1500**	**170** J	**60** J
Dibenz(a,h)anthracene	ug/Kg	260	33%				1	3	260 J	690 UJ	420 U
Dibenzofuran	ug/Kg	97	33%				1	3	97 J	690 UJ	420 U
Fluoranthene	ug/Kg	3500	100%	39887	BALCT	0	3	3	3500	310 J	94 J
Fluorene	ug/Kg	310	33%	312.8	BALCT	0	1	3	310 J	690 UJ	420 U
Indeno(1,2,3-cd)pyrene	ug/Kg	770	100%	50.83	HHBC	2	3	3	**770**	**120** J	38 J
Phenanthrene	ug/Kg	2700	100%	4693	BALCT	0	3	3	2700	140 J	35 J
Pyrene	ug/Kg	4000	100%	37580	BALCT	0	3	3	4000	300 J	83 J
PESTICIDES/PCB											
4,4'-DDE	ug/Kg	4.3	33%	0.39	HHBC	1	1	3	**4.3** J	6.9 UJ	4.2 U
Aldrin	ug/Kg	2.2	33%	3.9	HHBC	0	1	3	2.2 J	3.5 UJ	2.2 U
alpha-Chlordane	ug/Kg	8	33%	0.039	HHBC	1	1	3	**8** J	3.5 UJ	2.2 U
Aroclor-1242	ug/Kg	120	33%	0.031	HHBC	1	1	3	**120**	69 UJ	42 U
Aroclor-1260	ug/Kg	56	33%	0.031	HHBC	1	1	3	**56** J	69 UJ	42 U
Endosulfan I	ug/Kg	15	67%	1.17	HHBC	2	2	3	**15** J	**3** J	2.2 U
METALS											
Aluminum	mg/Kg	16300	100%				3	3	16300	11000 J	10300
Antimony	mg/Kg	3.3	100%	2	LEL	1	3	3	**3.3** J	0.55 J	0.24 J
Arsenic	mg/Kg	62.7	100%	6	LEL	2	3	3	**62.7**	**27.5** J	4.1
Barium	mg/Kg	117	100%				3	3	108	117 J	62.9
Beryllium	mg/Kg	0.75	100%				3	3	0.75 J	0.53 J	0.48 J
Cadmium	mg/Kg	0.8	100%	0.6	LEL	1	3	3	0.57 J	**0.8** J	0.23 J
Calcium	mg/Kg	31400	100%				3	3	7570	14800 J	31400
Chromium	mg/Kg	25.1	100%	26	LEL	0	3	3	25.1	23.3 J	15.9
Cobalt	mg/Kg	9.3	100%				3	3	9.3 J	8.7 J	8.1
Copper	mg/Kg	25.5	100%	16	LEL	3	3	3	**25.5**	**18.9** J	**19.9**
Iron	mg/Kg	26800	100%	20000	LEL	2	3	3	**26800**	**20500** J	19700
Lead	mg/Kg	49.6	100%	31	LEL	1	3	3	**49.6**	25.5 J	10.8
Magnesium	mg/Kg	6400	100%				3	3	4980	3780 J	6400
Manganese	mg/Kg	1380	100%	460	LEL	1	3	3	284 J	**1380** J	390 J
Mercury	mg/Kg	0.02	100%	0.15	LEL	0	1	1	0.05 JR	0.08 JR	0.02 J

TABLE 7
SEAD-50 / SEAD-54 SEDIMENT ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

	MATRIX								SOIL	SOIL	SOIL
	LOCATION								SEAD-50	SEAD-50	SEAD-50
	DEPTH (FEET)								0-0.2	0-0.2	0-0.2
	SAMPLE DATE								04/19/94	04/19/94	04/19/94
	ES ID								SD50-1	SD50-2	SD50-3
	LAB ID		FREQUENCY			NUMBER	NUMBER	NUMBER	218502	218503	218504
	SDG NUMBER	MAXIMUM	OF	CRITERIA	CRITERIA	ABOVE	OF	OF	43663	43663	43663
PARAMETER	**UNITS**	**DETECT**	**DETECTION**	**VALUE (a)**	**TYPE (b,c)**	**CRITERIA**	**DETECTS**	**ANALYSES**	Value (Q)	Value (Q)	Value (Q)
Nickel	mg/Kg	29.4	100%	16	LEL	3	3	3	**29.4**	**27.4** J	**24.4**
Potassium	mg/Kg	2530	100%				3	3	2530	1680 J	1580
Sodium	mg/Kg	121	67%				2	3	45.1 U	121 J	69.7 J
Vanadium	mg/Kg	28.8	100%				3	3	28.8	20.3 J	17.3
Zinc	mg/Kg	243	100%	120	LEL	2	2	3	**202**	**243** J	63.9
OTHER ANALYSES											
Total Solids	%W/W	78.7						3	54.5	48	78.7

NOTES:

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

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

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

U = The compound was not detected below this concentration.

J = The reported value is an estimated concentration.

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

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

compounds detected, 20 were detected at concentrations that exceeded their respective NYSDEC sediment criteria levels.

The PAH compounds benzo(a)pyrene, benzo(b)fluoranthene, benzo(k)fluoranthene, and chrysene were found at concentrations above their respective sediment criteria values in all three of the sediment samples collected from SEADs 50/54. Two additional PAH compounds, benzo(a)pyrene and indeno(1,2,3-cd)pyrene, were detected in two of the three samples at concentrations above their respective criteria levels.

All six pesticides/PCB compounds were detected in the sediment sample collected from location SD50-1, and of the six detect, five (i.e., endosulfan I, 4,4'-DDE, alpha-Chlordane, aroclor-1242 and aroclor-1260) were found at concentrations that exceeded their respective sediment criteria (i.e., human health bioaccumulation criteria) values. The concentration of endosulfan I measured as sampling location SD50-2 also was found to exceed the human health bioaccumulation criteria. None of the other pesticides/PCBs were detected in other sediment samples.

Nine metals (i.e., antimony, arsenic, cadmium, copper, iron, lead manganese, nickel and zinc) were detected in sediment samples at concentrations that exceeded NYSDEC sediment criteria values. Seven (i.e., excluding cadmium and manganese) of the listed metals were found at concentrations that exceeded their sediment criteria levels at sampling location SD50-1, while seven (excluding antimony and lead) were found at concentration above criteria levels at location SD50-2. Generally, a majority (i.e., 12 of the 20) of the metals detected were found at their highest concentration in the sediment sample collected from location SD50-1.

2.4 DISCUSSION OF REMOVAL ALTERNATIVES

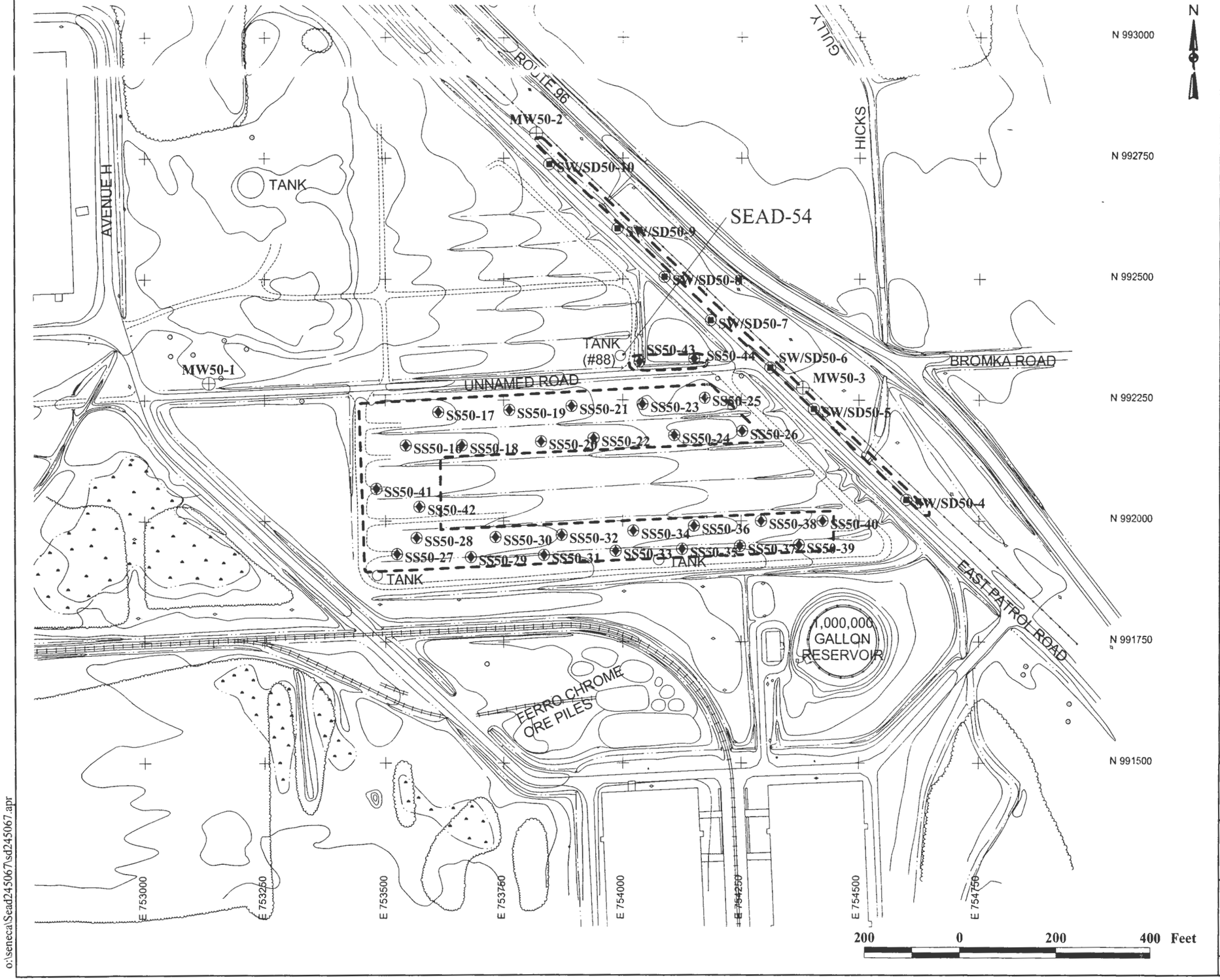
Results of the ESI described above indicate that soil and sediment in the area of the Tank Farm (SEADs 50/54) has been impacted by historic operations and activities. The soil shows evidence of contamination by metals and asbestos, and to a lessor extent, by a few polynuclear aromatic hydrocarbon (PAH) compounds. Similarly, the sediment shows evidence of contamination by metals, polynuclear aromatic hydrocarbons, and pesticides and PCBs. The impacted soil and sediment appears to be limited to the surface of both of these matrices. Therefore, the Army is proposing to perform a time-critical removal action to eliminate or lessen the magnitude of the potential threat that exists at SEAD-50 and SEAD-54. This decision document identifies and presents alternatives that have been considered to eliminate or lessen the magnitude of the

potential threat. Due to the depot's change in status, and the current release of portions of the former depot for beneficial reuses by the public and private sectors, the proposed action is considered time-critical and the selected option will be implemented quickly to mitigate the potential threat.

The objectives of a removal action are to comply with ARARs and reduce the overall threat to human health and the environment to an acceptable level at the site. Therefore, to reduce the threat that appears to exist near the Tank Farm, the Army is proposing to conduct an action that will remove or reduce the threat that is represented by the identified shallow soil and sediment contamination. Specifically, the Army is proposing to address shallow soil contamination by metals and asbestos that has been identified in the southern portion of the Tank Farm as is evidenced by the samples that have been found to contain elevated concentrations of arsenic, lead, mercury and several other metals. 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); between surface soil sample location SS50-6 and SS50-8 (150 feet by 800 feet), and between sample locations SS50-5, SS50-6, and SS50-7 (150 feet by 200 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 cubic yards (CY or 7,500 tons). These areas are shown as shaded areas on **Figure 4**.

Additionally, to reduce the threat from PAH and pesticide-impacted sediments, the roadside drainage ditches that run alongside the East Patrol Road and next to the unnamed east-west road that transects the site should be remediated to a depth of six inches. The volume of sediment to be removed from SEAD-50 and 54 is approximately 150 cubic yards (225 tons).

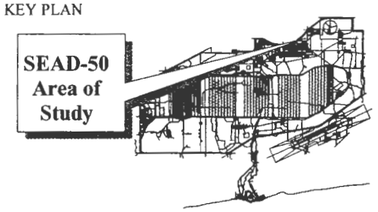
The following section briefly describes removal alternatives that may be applicable for use at SEADs 50/54. Based on the previous investigations, groundwater impacts appear minimal. At this time, the emphasis is on potential soil removal action alternatives. These alternatives fall into three categories: 1) on-site treatment, 2) on-site containment, and 3) off-site disposal. The on-site treatment alternative considered was soil washing, the on-site containment alternative considered was in-situ solidification/stabilization, and the off-site disposal method considered was excavation and landfilling. These alternatives will be evaluated for technical implementability, ability to achieve ARARs and economic impacts.



LEGEND

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

KEY PLAN



PARSONS

PARSONS ENGINEERING SCIENCE, INC.

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

FIGURE 4

REMOVAL PLANS

JOB NUMBER: 734530-01001

DATE: MARCH 2001

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2.5 REMOVAL METHODS

Soil Washing

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

Certain site factors can limit the success of soil washing:

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

In-Situ Solidification/Stabilization

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

Drawbacks related to in-situ solidification include the unsuitability for use in cold climates where the ground freezes and thaws, thus breaking up the monolithic mass and providing a greater surface area for corrosion and weathering. Another condition limiting its implementation is the cohesion

and particle size of the soil matrix to be treated. Cohesive soil and soil with a large portion of coarse gravel and cobbles are unsuitable for this type of treatment.

Excavation and Landfilling

Excavation of hazardous materials is performed extensively for site remediation. Excavation is usually accompanied by off-site treatment or disposal in an off-site secured landfill. Excavation employs the use of earth moving equipment to physically remove soil and buried materials. There are no absolute limitations on the types of waste 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.

2.6 REMOVAL COSTS

Soil Washing

A large number of vendors provide soil washing services. The treatment processes used vary according to the scale of the operation, particle size being treated, and extraction agent used. Because the operation is unique for each site, it is difficult to arrive at a cost estimate. However, in an evaluation of fourteen companies offering soil washing treatment services, a general price range of $50 to $205 per ton was noted in EPA Engineering Bulletin EPA/540/2-90/017, September 1990. This would result in an estimated cost of $400,000 to $1,650,000 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 $800,000 to $1,600,000 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 $25 and $50 per ton. Assuming that it will be disposed in a non-hazardous landfill, this will result in an estimated cost of $400,000 to $800,000 with a most probable cost in the range of $550,000 to $700,000.

2.7 COMPARISON OF REMOVAL ALTERNATIVES

Of the three remedial alternative presented above, excavation and off-site landfilling is the best alternative for the removal of the PAH, pesticide, metals and asbestos-impacted soil at SEADs 50/54. This decision is due to the unsuitability of in-situ solidification and soil washing for the conditions present at SEDA. The cold climate of central New York, the cohesive nature of the soil, and the high percentage of gravel and cobbles in the soil eliminate in-situ solidification as a practical alternative for use at SEDA. The high percentage of clay and silt in the soil eliminates soil washing as a practical remedial alternative as well. In addition, excavation and off-site landfilling, can be performed at substantial cost savings compared to the other two. Furthermore, if the excavated soil can be used for daily cover at the off-site landfill, further cost savings can be achieved.

2.8 RECOMMENDATION

To reduce the threat from the metals and asbestos-impacted soil at SEAD-50 and 54, surface soils located in the southern portion of the former Tank Farm (i.e., between SS50-1 and SS50-5; between SS50-8 and SS50-6, and between SS50-5, SS50-6, and SS50-7) 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 $550,000 to $700,000 to excavate, contain and dispose this volume in an off-site permitted non-hazardous waste landfill.

2.9 JUSTIFICATION

Metals were detected in the surface soil samples across SEADs 50/54 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 SEADs 50/54 would remove the impacted soil that poses any health risks.

2.10 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 SEADs 50/54 that poses any health risks, soil samples should be collected below the excavation on a 150-foot interval sampling grid (or one per 200 CY of excavated material). 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 SEADs 50/54 that poses any health risks, both surface water and sediment samples should be collected from the entire length of the drainage ditch at 200-foot intervals and analyzed for SVOCs and pesticides. Two surface water and sediment samples should also be collected in the drainage ditches downstream of SEADs 50/54.

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.

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

3.1 EXECUTIVE SUMMARY

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

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.

3.2 SITE BACKGROUND

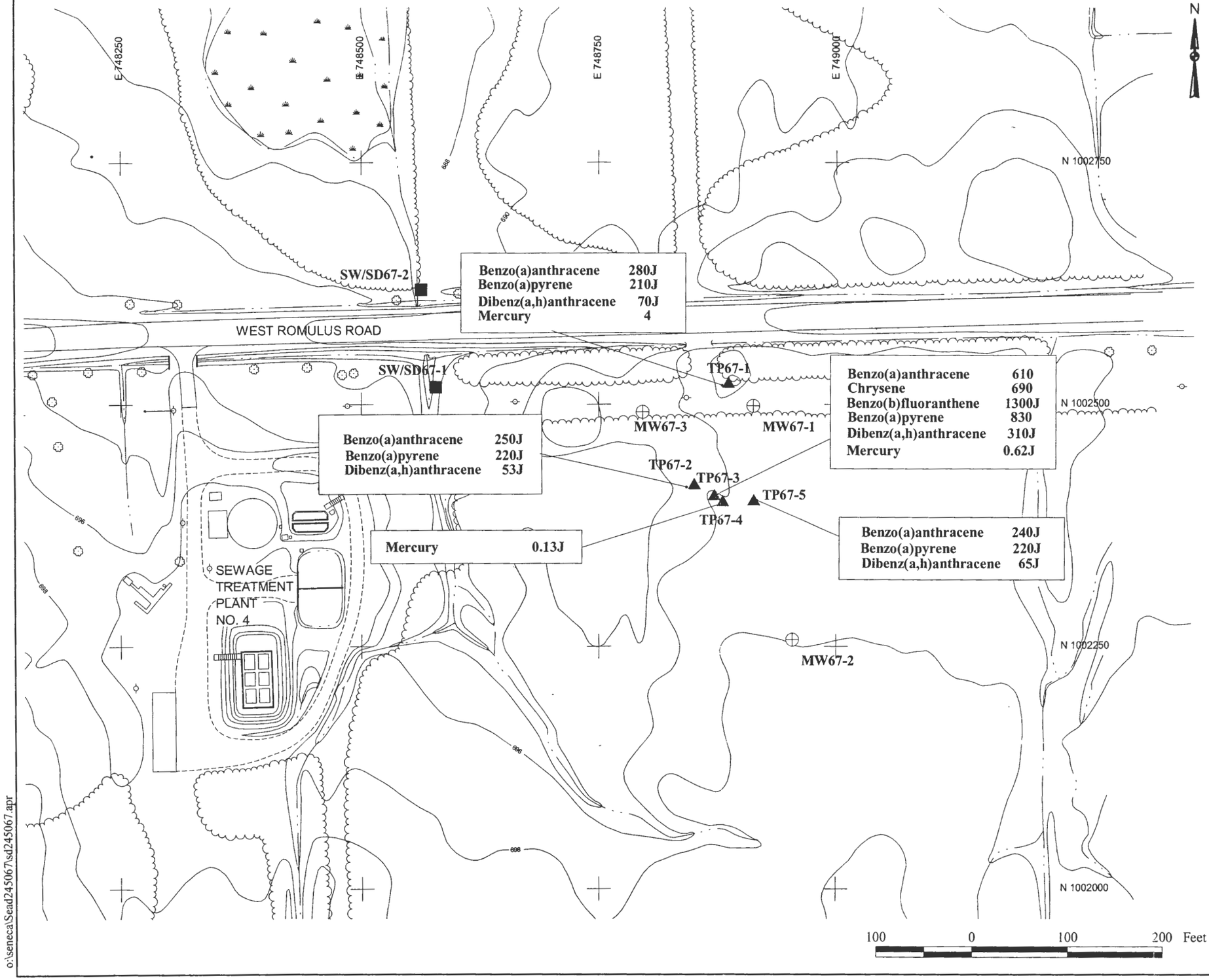
3.2.1 Site Description

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

The topography in SEAD-67 slopes gently to the west towards a small stream. The stream flows north where it passes beneath West Romulus Road and passes into a large wetland area that is located to the north of SEAD-67. This wetland provides tertiary treatment for wastewater discharges from the treatment plant.

3.2.2 Site History

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



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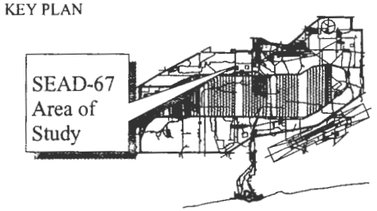
LEGEND

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

TAGM LEVELS

Benzo(a)anthracene	220	ug/Kg
Benzo(b)fluoranthene	1100	ug/Kg
Benzo(a)pyrene	61	ug/Kg
Chyrsene	400	ug/Kg
Dibenz(a,h)anthracene	14	ug/Kg
Mercury	0.1	mg/Kg

KEY PLAN



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SENECA ARMY DEPOT ACTIVITY

DEBRIS PILES EAST OF SEWAGE TREATMENT PLANT NO. 4
SEAD-67

FIGURE 5

ANALYTES EXCEEDING THEIR RESPECTIVE CRITERIA LEVELS IN SOIL SAMPLES

JOB NUMBER: 734530-01001

DATE: MARCH 2001

3.3 PREVIOUS INVESTIGATIONS

3.3.1 Description of Sampling Program

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

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

Intrusive investigations included test pitting, soil borings, installation of three monitoring wells and the collection of surface water and sediment samples. Eight soil samples were collected from SEAD-67. Three of these samples were collected from a soil boring that was advanced to install the upgradient groundwater monitoring well. The five remaining soil samples were collected from test pits that were excavated in the identified waste piles and berm structures. Three groundwater samples, two surface water and two sediment samples were also collected from SEAD-67. All sample locations are shown in **Figure 5**. All of the collected 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 NYSDEC Contract Laboratory Program Statement of Work.

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

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

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

3.3.2 Results of Sampling Program

Soils

The results of the soil sampling program are presented in **Table 8**. The results indicate that soil at SEAD-67 has been impacted by SVOCs, predominantly polynuclear aromatic hydrocarbons (PAHs), and the metal, mercury. A total of 50 TCL/TAL compounds were detected in soil samples that were submitted for analysis, and of this total, 10 were detected at concentrations that exceeded their respective TAGM criteria levels. None of the recorded TAGM exceedences were found for pesticides or PCBs.

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

Four metals (i.e., calcium, manganese, mercury, and potassium) were also detected at concentrations exceeding their respective criteria values. Most of the samples that contained metals concentrations that surpassed criteria levels were collected from the test pits that were advanced through the berm structure and the two waste piles. Of further note, is the finding that the majority of individual metal concentrations found above their respective criteria value were located in the excavation advanced through the central and southern end of the berm structure.

TABLE 8
SEAD-67 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

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

TABLE 8
SEAD-67 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

	MATRIX							SOIL	SOIL	SOIL	SOIL
	LOCATION							SEAD-67	SEAD-67	SEAD-67	SEAD-67
	DEPTH (FEET)							0-0.2	2-4	4-5	2-3
	SAMPLE DATE							03/30/94	03/30/94	03/30/94	06/06/94
	ES ID							MW67-2.00	MW67-2.02	MW67-2.03	TP67-1
	LAB ID		FREQUENCY		NUMBER	NUMBER	NUMBER	216109	216112	216113	223303
	SDG NUMBER	MAXIMUM	OF	CRITERIA	ABOVE	OF	OF	43257	43257	43257	44410
PARAMETER	UNITS	DETECT	DETECTION	VALUE (a)	CRITERIA	DETECTS	SAMPLES	Value (Q)	Value (Q)	Value (Q)	Value (Q)
Nickel	mg/Kg	32.3	100%	49	0	8	8	18.7	32.3	25.9	27.8
Potassium	mg/Kg	3160	100%	2380	2	8	8	1780 J	3160 J	1970 J	1620 J
Selenium	mg/Kg	2	75%	2	0	6	8	0.81	0.36 U	0.34 U	1
Sodium	mg/Kg	112	75%	172	0	6	8	25.1 U	112 J	107 J	19.9 U
Thallium	mg/Kg	0.48	13%	0.7	0	1	8	0.48 J	0.34 U	0.32 U	0.38 U
Vanadium	mg/Kg	31.8	100%	150	0	8	8	28.2	24.8	16.5	26.5
Zinc	mg/Kg	100	100%	110	0	8	8	64.8	62	60.1	70.5
Other Analyses											
Total Solids	%W/W	90.2	1		0	8	8	68.9	85.5	90.2	83.8

NOTES:

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

b) US EPA, OSWER Directive # 9200.4-27 Soil Lead Guidance, August 1998

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

NA = Not Available

U = Compound was not detected.

J = the reported value is an estimated concentration.

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

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

TABLE 8
SEAD-67 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

PARAMETER	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM DETECT	FREQUENCY OF DETECTION	CRITERIA VALUE (a)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF SAMPLES	SOIL SEAD-67 2-3 06/06/94 TP67-2 223305 44410 Value (Q)	SOIL SEAD-67 2-3 06/06/94 TP67-3 223306 44410 Value (Q)	SOIL SEAD-67 2-3 06/06/94 TP67-4 223307 44410 Value (Q)	SOIL SEAD-67 2-3 06/06/94 TP67-5 223308 44410 Value (Q)
Semivolatile Organics											
2-Methylnaphthalene	ug/Kg	44	25%	36400	0	2	8	380 U	25 J	400 U	450 U
Acenaphthene	ug/Kg	50	13%	50000*	0	1	8	380 U	380 U	400 U	450 U
Acenaphthylene	ug/Kg	210	50%	41000	0	4	8	33 J	210 J	400 U	26 J
Anthracene	ug/Kg	140	50%	50000*	0	4	8	44 J	140 J	400 U	43 J
Benzo(a)anthracene	ug/Kg	610	63%	220	4	5	8	**250** J	**610**	24 J	**240** J
Benzo(a)pyrene	ug/Kg	830	63%	61	4	5	8	**220 J**	**830**	28 J	**220 J**
Benzo(b)fluoranthene	ug/Kg	1300	63%	1100	1	5	8	470 J	**1300** J	26 J	430 J
Benzo(g,h,i)perylene	ug/Kg	620	63%	50000*	0	5	8	93 J	620	40 J	97 J
Benzo(k)fluoranthene	ug/Kg	28	13%	1100	0	1	8	380 UJ	380 UJ	28 J	450 UJ
bis(2-Ethylhexyl)phthalate	ug/Kg	250	38%	50000*	0	3	8	380 U	380 U	400 U	450 U
Carbazole	ug/Kg	80	38%	50000*	0	3	8	23 J	380 U	400 U	32 J
Chrysene	ug/Kg	690	63%	400	1	5	8	290 J	**690**	29 J	230 J
Dibenz(a,h)anthracene	ug/Kg	310	50%	14	4	4	8	**53 J**	**310** J	400 U	**65** J
Dibenzofuran	ug/Kg	50	13%	6200	0	1	8	380 U	380 U	400 U	450 U
Di-n-butylphthalate	ug/Kg	47	13%	8100	0	1	8	380 U	380 U	400 U	450 U
Fluoranthene	ug/Kg	860	75%	50000*	0	6	8	610	860	55 J	510
Fluorene	ug/Kg	110	38%	50000*	0	3	8	31 J	380 U	400 U	27 J
Indeno(1,2,3-cd)pyrene	ug/Kg	620	63%	3200	0	5	8	120 J	620	25 J	130 J
Naphthalene	ug/Kg	34	25%	13000	0	2	8	380 U	34 J	400 U	450 U
Phenanthrene	ug/Kg	740	63%	50000*	0	5	8	340 J	180 J	32 J	280 J
Pyrene	ug/Kg	950	75%	50000*	0	6	8	500	950	43 J	450
Pesticides/PCB											
4,4'-DDE	ug/Kg	4.8	50%	2100	0	4	8	4.5 J	4.8 J	4 U	3 J
4,4'-DDT	ug/Kg	9.4	38%	2100	0	3	8	6.3 J	9.4	4 U	4.2 J
alpha-Chlordane	ug/Kg	2.1	38%	540	0	3	8	1.4 J	2.1 J	2.1 U	1.9 J
Aroclor-1254	ug/Kg	72	13%	1000	0	1	8	72 J	38 U	40 U	45 U
Endosulfan I	ug/Kg	25	75%	900	0	6	8	11 J	25 J	1.2 J	15 J
Endosulfan sulfate	ug/Kg	2.1	13%	1000	0	1	8	3.8 U	2.1 J	4 U	4.5 U
Heptachlor epoxide	ug/Kg	5.5	25%	20	0	2	8	2 U	1.2 J	2.1 U	2.3 U
Metals											
Aluminum	mg/Kg	19100	100%	19300	0	8	8	12200	9870	19100	17200
Antimony	mg/Kg	0.44	63%	5.9	0	5	8	0.27 J	0.44 J	0.39 J	0.32 UJ
Arsenic	mg/Kg	6	100%	8.2	0	8	8	5.4	5	6	4.9
Barium	mg/Kg	182	100%	300	0	8	8	105	82.2	158	182
Beryllium	mg/Kg	0.87	100%	1.1	0	8	8	0.62 J	0.49 J	0.87 J	0.83 J
Cadmium	mg/Kg	0.73	100%	2.3	0	8	8	0.5 J	0 69 J	0.69 J	0.73 J
Calcium	mg/Kg	139000	100%	121000	1	8	8	5940	**139000**	12000	20100
Chromium	mg/Kg	24.8	100%	29.6	0	8	8	18.7	15.1	24.8	23.2
Cobalt	mg/Kg	12.8	100%	30	0	8	8	9.5	7.5	11	12.8
Copper	mg/Kg	29.7	100%	33	0	8	8	21.3	21.5	29.7	24.5
'ron	mg/Kg	27300	100%	36500	0	8	8	24000	16800	27300	27300
Lead	mg/Kg	40.9	100%	400 (b)	0	8	8	21.3	40.9	19.1	12
Magnesium	mg/Kg	20900	100%	21500	0	8	8	4730	12900	6660	5010
Manganese	mg/Kg	1380	100%	1060	1	8	8	624	627	863	**1380**
Mercury	mg/Kg	4	100%	0.1	3	8	8	0.05 J	**0.62** J	**0.13** J	0.06 J

TABLE 8
SEAD-67 SOIL ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

	MATRIX							SOIL	SOIL	SOIL	SOIL
	LOCATION							SEAD-67	SEAD-67	SEAD-67	SEAD-67
	DEPTH (FEET)							2-3	2-3	2-3	2-3
	SAMPLE DATE							06/06/94	06/06/94	06/06/94	06/06/94
	ES ID							TP67-2	TP67-3	TP67-4	TP67-5
	LAB ID		FREQUENCY		NUMBER	NUMBER	NUMBER	223305	223306	223307	223308
	SDG NUMBER	MAXIMUM	OF	CRITERIA	ABOVE	OF	OF	44410	44410	44410	44410
PARAMETER	UNITS	DETECT	DETECTION	VALUE (a)	CRITERIA	DETECTS	SAMPLES	Value (Q)	Value (Q)	Value (Q)	Value (Q)
Nickel	mg/Kg	32.3	100%	49	0	8	8	27.2	22	30.1	30.2
Potassium	mg/Kg	3160	100%	2380	2	8	8	1390 J	2090 J	2520 J	2040 J
Selenium	mg/Kg	2	75%	2	0	6	8	1.1	0.41 J	1.2	2
Sodium	mg/Kg	112	75%	172	0	6	8	26.4 J	111 J	39.4 J	26.1 J
Thallium	mg/Kg	0.48	13%	0.7	0	1	8	0.34 U	0.28 U	0.41 U	0.47 U
Vanadium	mg/Kg	31.8	100%	150	0	8	8	22.7	20.9	31.8	27.8
Zinc	mg/Kg	100	100%	110	0	8	8	70.5	72.8	100	86.6
Other Analyses											
Total Solids	%W/W	90.2	1		0	8	8	86.4	86.3	82	73.5

NOTES:

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

b) US EPA, OSWER Directive # 9200.4-27 Soil Lead Guidance, August 1998

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

NA = Not Available

U = Compound was not detected.

J = the reported value is an estimated concentration.

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

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

The only concentration found for a metal that is of particular note is the level reported for mercury in the sample recovered from TP67-1 (4 mg/kg). This value is 40 times above the TAGM value for mercury which is 0.1 mg/kg. The next highest mercury concentration was 0.62 mg/kg found in sample TP67-3.

Groundwater

The results of the groundwater sampling program are presented in **Table 9**. These data indicate that groundwater has not been significantly impacted by historic operations at SEAD-67. Nineteen metals were the only analytes detected in the groundwater samples, and of these, only aluminum, iron, and manganese were detected at concentrations exceeding their criteria values. Aluminum, iron and magnesium are not considered to pose significant health risks.

Surface Water

The results of the surface water sampling program are presented in **Table 10**. These data indicate that surface water has not been significantly impacted by any of the constituents of concern in the investigation at SEAD-67. Again, metals were the only analytes detected in the surface water samples, and of the detected metals, only aluminum and iron were detected at a concentration above their NYS surface water criteria value. All of the other metals were detected at low concentrations.

Sediments

The results of the sediment sampling program are presented in **Table 11**. Sediment at SEAD-67 has been impacted by SVOCs (mostly PAHs), pesticides, and a few metals. Six PAH compounds (i.e., benzo(a)anthracene, chrysene, benzo(b)fluoranthene, benzo(k)fluoranthene, benzo(a)pyrene, and indeno(1,2,3-cd)pyrene) were detected above their respective criteria values in both sediment samples collected.

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

TABLE 9
SEAD-67 GROUNDWATER ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

PARAMETER	MATRIX LOCATION SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM DETECT	FREQUENCY OF DETECTION	CRITERIA VALUE (a)	NUMBER ABOVE CRITERIA	WATER SEAD-67 07/07/94 MW67-1 226307 45257 Value (Q)	WATER SEAD-67 07/10/94 MW67-2 226488 45282 Value (Q)	WATER SEAD-67 07/08/94 MW67-3 226308 45257 Value (Q)
METALS								
Aluminum	ug/L	5790	100%	50 (b)	3	**5790**	**1240**	**448**
Arsenic	ug/L	2.5	33%	5 (b)	0	2.5 J	2 U	2 U
Barium	ug/L	203	100%	1000	0	203	100 J	98.9 J
Beryllium	ug/L	0.72	33%	4 (b)	0	0.72 J	0.1 U	0.1 U
Calcium	ug/L	351000	100%	NA	NA	351000	119000	122000
Chromium	ug/L	10	100%	50	0	10	2 J	0.9 J
Cobalt	ug/L	12.3	100%	NA	NA	12.3 J	1.4 J	1.3 J
Copper	ug/L	13.1	100%	200	0	13.1 J	1.5 J	2 J
Iron	ug/L	10800	100%	300	3	**10800**	**2270**	**689**
Lead	ug/L	8.3	33%	15 (b)	0	8.3	0.9 U	0.9 U
Magnesium	ug/L	51800	100%	NA	NA	51800	24200	24000
Manganese	ug/L	1710	100%	50 (c)	3	**1710**	**153**	**194**
Mercury	ug/L	0.09	67%	0.7	0	0.09 J	0.04 U	0.06 J
Nickel	ug/L	15.9	100%	100	0	15.9 J	2.9 J	2.2 J
Potassium	ug/L	5740	100%	NA	NA	5740	1870 J	1670 J
Sodium	ug/L	13700	100%	20000	0	4240 J	13700	4970 J
Thallium	ug/L	2	33%	2 (b)	0	2 J	1.9 U	1.9 U
Vanadium	ug/L	9.2	100%	NA	NA	9.2 J	2.1 J	0.86 J
Zinc	ug/L	29.6	100%	5000 (c)	0	29.6	6.5 J	6.7 J
OTHER ANALYSES								
pH	Standard Units					7.2	7	7
Conductivity	umhos/cm					520	490	440
Temperature	°C					14.9	12	11.9
Turbidity	NTU					>1000	90	NR

NOTES:

a) NY State Class GA Groundwater Standard (TOGS 1.1.1, June 1998), except as noted below.
b) US EPA Maximum Contaminant Limit (EPA 822-B-00-001, Summer 2000)
c) US EPA Secondary Drinking Water Regulation, non-enforceable (EPA 822-B-00-001, Summer 2000)
NA = Not Available
U = compound was not detected
J = the report value is an estimated concentration
UJ = the compound was not detected; the associated reporting limit is approximate
R = the data was rejected in the data validating process

TABLE 10
SEAD-67 SURFACE WATER ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

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

NOTES:

a) The New York State Ambient Water Quality Standards and Guidance Values for Class C surface water (June 1998).

b) Hardness dependent values assume a hardness of 216.4 mg/L (depot site-wide average).

NA = Not Available

U = The compound was not detected below this concentration.

J = The reported value is an estimated concentration.

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

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

TABLE 11
SEAD-67 SEDIMENT ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

PARAMETER	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM DETECT	FREQUENCY OF DETECTION	CRITERIA VALUE (a)	CRITERIA TYPE (b,c)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	SOIL SEAD-67 0-0.2 04/26/94 SD67-1 219450 43663	SOIL SEAD-67 0-0.2 04/26/94 SD67-2 219451 43663
VOLATILE ORGANICS									Value (Q)	Value (Q)
2-Butanone	ug/Kg	21	50%			NA	1	2	21 J	20 UJ
Acetone	ug/Kg	53	50%			NA	1	2	53 J	28 UJ
SEMIVOLATILE ORGANICS										
Acenaphthene	ug/Kg	120	50%	5474	BALCT	0	1	2	820 UJ	120 J
Acenaphthylene	ug/Kg	54	50%				1	2	820 UJ	54 J
Anthracene	ug/Kg	600	50%	4184	BALCT	0	1	2	820 UJ	600 J
Benzo(a)anthracene	ug/Kg	1400	100%	50.83	HHBC	2	2	2	**180** J	**1400**
Benzo(a)pyrene	ug/Kg	970	100%	50.83	HHBC	2	2	2	**170** J	**970**
Benzo(b)fluoranthene	ug/Kg	880	100%	50.83	HHBC	2	2	2	**180** J	**880**
Benzo(g,h,i)perylene	ug/Kg	370	100%				2	2	87 J	370 J
Benzo(k)fluoranthene	ug/Kg	930	100%	50.83	HHBC	2	2	2	**160** J	**930**
Carbazole	ug/Kg	78	50%				1	2	820 UJ	78 J
Chrysene	ug/Kg	1300	100%	50.83	HHBC	2	2	2	**220** J	**1300**
Dibenz(a,h)anthracene	ug/Kg	230	50%				1	2	820 UJ	230 J
Dibenzofuran	ug/Kg	83	50%				1	2	820 UJ	83 J
Fluoranthene	ug/Kg	3400	100%	39887	BALCT	0	2	2	440 J	3400
Fluorene	ug/Kg	280	50%	312.8	BALCT	0	1	2	820 UJ	270 J
Indeno(1,2,3-cd)pyrene	ug/Kg	460	100%	50.83	HHBC	2	2	2	**98** J	**460** J
Phenanthrene	ug/Kg	2400	100%	4692	BALCT	0	2	2	260 J	2400
Pyrene	ug/Kg	3000	100%	37580	BALCT	0	2	2	370 J	3000
PESTICIDES/PCB										
4,4'-DDT	ug/Kg	4.1	50%	0.39	HHBC	1	1	2	8.2 UJ	**4.1** J
alpha-Chlordane	ug/Kg	4.8	100%	0.039	HHBC	2	2	2	**4.8** J	**3.6** J
Endosulfan I	ug/Kg	20	50%	1.17	BALCT	1	1	2	4.2 UJ	**20** J
METALS										
Aluminum	mg/Kg	12000	100%				2	2	12000 J	10700 J
Arsenic	mg/Kg	4.2	100%	6	LEL	0	2	2	3.7 J	4.2 J
Barium	mg/Kg	95.8	100%				2	2	95.8 J	92.7 J
Beryllium	mg/Kg	0.58	100%				2	2	0.58 J	0.56 J
Cadmium	mg/Kg	0.37	100%	0.6	LEL	0	2	2	0.37 J	0.34 J
Calcium	mg/Kg	13200	100%				2	2	6620 J	13200 J
Chromium	mg/Kg	18	100%	26	LEL	0	2	2	18 J	16.4 J
Cobalt	mg/Kg	8.3	100%				2	2	8 J	8.3 J
Copper	mg/Kg	37.7	100%	16	LEL	2	2	2	**37.7** J	**22.6** J
Iron	mg/Kg	19800	100%	20000	LEL	0	2	2	18900 J	19800 J
Lead	mg/Kg	17.8	100%	31	LEL	0	2	2	15.4 J	17.8 J

TABLE 11
SEAD-67 SEDIMENT ANALYSIS RESULTS

SENECA ARMY DEPOT ACTIVITY
REMOVAL ACTION

PARAMETER	MATRIX LOCATION DEPTH (FEET) SAMPLE DATE ES ID LAB ID SDG NUMBER UNITS	MAXIMUM DETECT	FREQUENCY OF DETECTION	CRITERIA VALUE (a)	CRITERIA TYPE (b,c)	NUMBER ABOVE CRITERIA	NUMBER OF DETECTS	NUMBER OF ANALYSES	SOIL SEAD-67 0-0.2 04/26/94 SD67-1 219450 43663	SOIL SEAD-67 0-0.2 04/26/94 SD67-2 219451 43663
Magnesium	mg/Kg	5030	100%				2	2	4160 J	5030 J
Manganese	mg/Kg	731	100%	460	LEL	1	2	2	413 J	**731** J
Nickel	mg/Kg	23.2	100%	16	LEL	2	2	2	**22.6** J	**23.2** J
Potassium	mg/Kg	1650	100%				2	2	1650 J	1330 J
Silver	mg/Kg	1.7	100%	1	LEL	2	2	2	**1.7** J	**1.1** J
Sodium	mg/Kg	107	100%				2	2	84.5 J	107 J
Vanadium	mg/Kg	20.4	100%				2	2	20.4 J	18.8 J
Zinc	mg/Kg	85.4	100%	120	LEL	0	2	2	85.4 J	76.5 J
OTHER ANALYSES										
Total Solids	%W/W						2	2	40.1	48.9

NOTES:

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

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

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

U = The compound was not detected below this concentration.

J = The reported value is an estimated concentration.

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

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

Four metals (i.e., copper, manganese, nickel, and silver) exceeded their respective sediment criteria values in one or both samples. Copper, nickel, and silver exceeded their respective sediment criteria values in both sediment samples collected, while manganese was seen to exceed its criteria value in only the downgradient sample. It should be noted however, the concentrations measured for copper, manganese and nickel in the sediment closely approximate the levels measured in the soil surrounding the stream bed.

3.4 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.

Results of the ESI described above indicate that sediment and soil found near SEAD-67 have been impacted by chemical materials. Therefore, the Army is proposing to perform a time-critical removal action to eliminate or lessen the magnitude of the potential threat that exists at SEAD-67. This decision document identifies and presents alternatives that have been considered to eliminate or lessen the magnitude of the potential threat. Due to the depot's change in status, and the current release of portions of the former depot for beneficial reuses by the public and private sectors, the proposed action is considered time-critical and the selected option will be implemented quickly to mitigate the potential threat.

Specifically, sediment located in a drainage ditch that runs along the east side of the sewage treatment plant has been impacted by pesticides, polynuclear aromatic hydrocarbons (PAHs), and a few metal species. Additionally, soil contained in waste piles and berm structures that are to the east of SEAD-67 has been impacted by PAHs and the metal mercury. The extent of the identified impacts to soil appear to be limited. The extent of the sediment contamination is less well known, but assumed to be surficial.

The objectives of a removal action are to comply with ARARs and reduce the overall threat to human health and the environment to an acceptable level at the site. Therefore, to reduce the threat that appears to exist at the Dump Site east of Sewage Treatment Plant No.: 4, the Army is proposing to conduct an action that will remove or reduce the threat that is represented by the identified shallow soil contamination. The potential threat associated with the PAH and mercury-impacted soil at SEAD-67 will be addressed by remediating all of the soil that is contained in the waste piles and berm structures. Comparably, the threat from PAH, pesticide and metal

impacted sediments will be addressed by removing the top six inches of the sediment in the small stream to the east of SEAD-67. The removal of sediment will also be performed for a short distance north of West Romulus Road but south of the wetlands. The areas to be remediated are indicated on the shaded areas of **Figure 6**. The volume of soil and sediment to be remediated from the area of SEAD-67 is approximately 160 cubic yards (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.

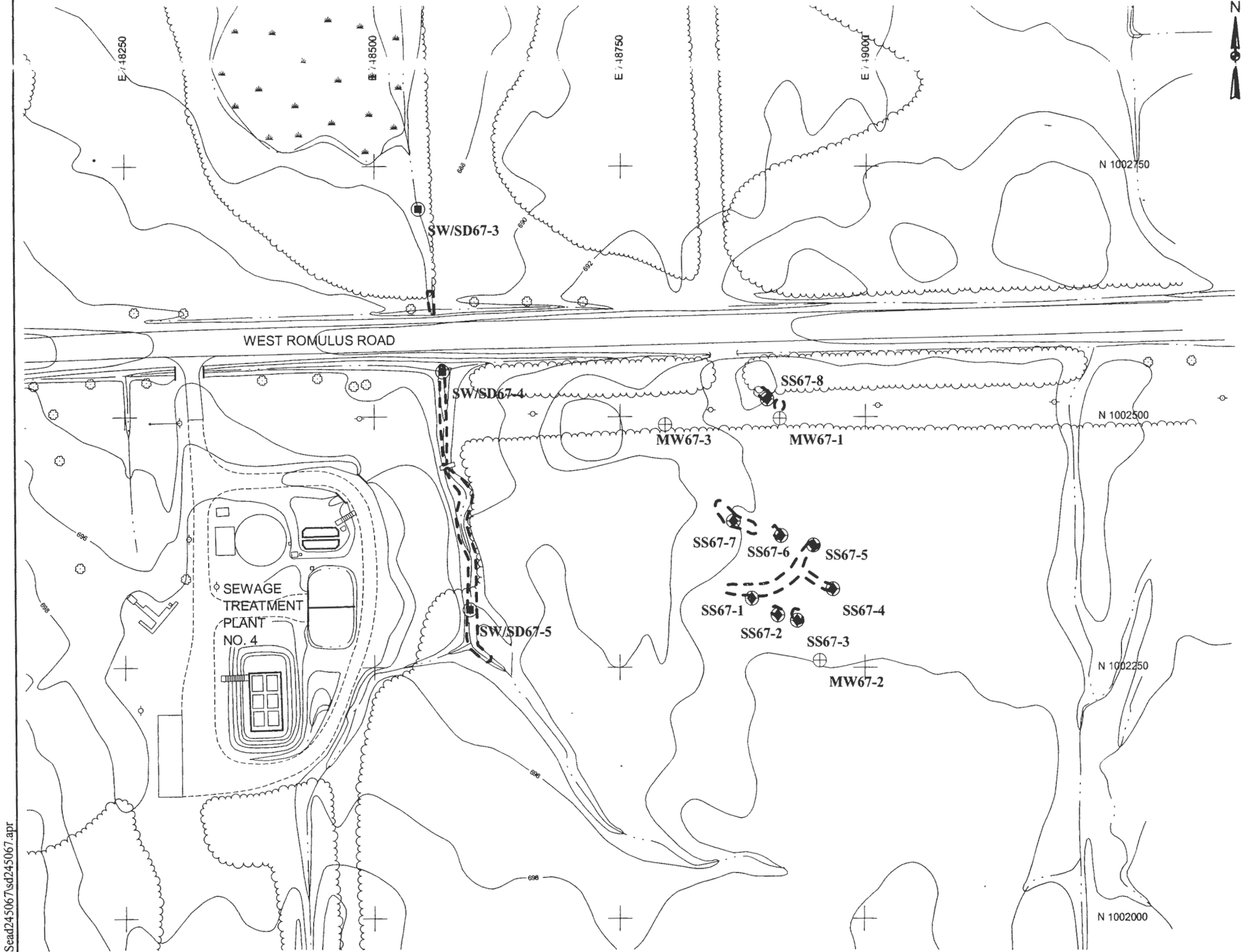
3.5 REMOVAL METHODS

Soil Washing

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

Certain site factors can limit the success of soil washing:

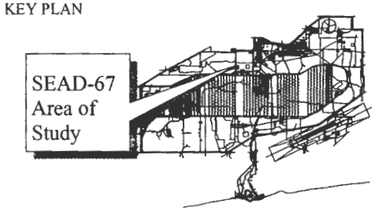
1. Highly variable soil conditions,
2. High silt or clay content which will reduce percolation and leaching, and inhibit the solid-liquid separations following the soil washing,
3. Chemical reactions with soil cation exchange and pH effects may decrease contaminant mobility and
4. If performed in-situ,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



LEGEND

- GROUND CONTOUR AND ELEVATION
- WETLAND
- BRUSH
- CHAIN LINK FENCE
- UTILITY POLE
- APPROXIMATE LOCATION OF FIRE HYDRANT
- RAILROAD
- Monitoring Well
- SS67-1 — Post-Removal Verification Surface Soil Sample
- SW/SD67-3 — Post-Removal Verification Surface Water and Sediment Sample
- Area to be Remediated

KEY PLAN



PARSONS

PARSONS ENGINEERING SCIENCE, INC.

SENECA ARMY DEPOT ACTIVITY

DEBRIS PILES EAST OF SEWAGE TREATMENT PLANT NO. 4
SEAD-67

FIGURE 6

REMOVAL PLANS

JOB NUMBER: 734530-01001

DATE: MARCH 2001

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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.

3.6 REMOVAL COSTS

Soil Washing

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

3.7 COMPARISON OF REMOVAL ALTERNATIVES

Of the three remedial alternative presented above, excavation and off-site landfilling is the best alternative for the removal of the PAH, 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.

3.8 RECOMMENDATION

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, pesticide, and metal-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 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.

3.9 JUSTIFICATION

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 PAHs, pesticides, and metals have impacted the drainage ditch. Available 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.

3.10 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.