PARSONS ENGINEERING SCIENCE, INC.

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

April 15, 1997

Ms. Dorothy Richards
CEHNC-PM-EO
U.S. Army Corps of Engineers
4820 University Square
Huntsville, AL 35816

SUBJECT: Submittal of the Pre-Draft Record of Decision (ROD) for the Ash Landfill Site

Dear Ms. Richards:

Parsons Engineering Science (Parsons ES) is pleased to submit the Pre-Draft Record of Decision (ROD) for the Ash Landfill Site at the Seneca Army Depot Activity located in Romulus, New York. This work was performed in accordance with the Scope of Work (SOW) for Delivery Order 0010 to the Parsons ES Contract DACA87-92-D0022. We would greatly appreciate comments on the document prior to May 5 so that they may be reflected in the Draft ROD for the Ash Landfill Site, which is due to the regulators May 21, 1997.

Parsons ES appreciates the opportunity to provide you with document. Should you have any questions, please do not hesitate to call me at (617) 859-2492.

Sincerely,

PARSONS ENGINEERING SCIENCE, INC.

Elya Schacht for
Michael Duchesneau, P.E.
Project Manager

cc: Mr. Randall Battaglia, CENAN
Mr. Keith Hoddinott, USACHPPM (Prov.)
Mr. Jeff Waugh, USAEC
Mr. Don Williams, CEMRD
Mr. Stephen Absolom, SEDA
Mr. Randall Nida, HQUSAIOC

PRE-DRAFT RECORD OF DECISION
ASH LANDFILL SITE
SENECA ARMY DEPOT ACTIVITY
ROMULUS, NY
SENECA COUNTY

Contract No. DACA87-95-D-0031

April 1997

Prepared by:

Parsons Engineering Science. Inc.
Prudential Center
Boston, Massachusetts

Delivery Order 0010

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ACRONYMS AND ABBREVIATIONS

ARAR	Applicable, or Relevant and Appropriate Requirement
AWQS	Ambient Water Quality Criteria
BRA	Baseline Risk Assessment
CERCLA	Comprehensive Environmental Responsibility, Compensation and Liability Act
CFR	Code of Federal Regulations
cfs	cubic feet per second
CLP	Contract Laboratory Program
cm^2	square centimeter
CWA	Clean Water Act
cy	cubic yards
DCE	Dichloroethene
DOT	Department of Transportation
DQO	Data Quality Objective
DWQS	Drinking Water Quality Standard
EE/CA	Engineering Evaluation/Cost Analysis
EPA	Environmental Protection Agency
EPC	Exposure Point Concentration
ES	Engineering Science, Inc.
F-Listed	RCRA F-Listed Hazardous Waste
FS	Feasibility Study
GA	NYSDEC groundwater classification suitable as a source for drinking water
HEAST	USEPA Health Effects Summary Table
HI	Hazard Index
hr	hour
IRM	Interim Remedial Measure
L	Liter
LDR	Land Disposal Restriction
LOT	Limit of Tolerance
LTTD	Low Temperature Thermal Desorption
MAIN	Charles T. Main, Inc. (now known as Engineering Science, Inc.)
MC	Migration Control
MCL	Maximum Contaminant Level
MDL	Minimum Detection Limit
mg	milligrams
mg/L	milligrams per liter

ACRONYMS AND ABBREVIATIONS
(Cont.)

mg/kg	milligrams per kilogram
mL	milliliters
MSL	Mean Sea Level
NA	Not Available
NCFL	Non-Combustible Fill Landfill
NCP	National Contingency Plan
ND	Not Detected
NYSDEC	New York State Department of Environmental Conservation
NYSDOH	New York State Department of Health
NYCRR	New York Codes, Rules, Regulations
O&M	Operations and Maintenance
OSHA	Occupational Safety and Health Administration
PAH	Polynuclear Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyls
pH	pH Standard Units
PM10	Particulate Matter with a diameter $\leq$ 10um
POTW	Publicly-Owned Treatment Works
ppb	parts per billion
ppm	parts per million
QA/QC	Quality Assurance/Quality Control
RCRA	Resource Conservation and Recovery Act
RfD	Reference Dose
RI	Remedial Investigation
RI/FS	Remedial Investigation/Feasibility Study
ROD	Record of Decision
SARA	Superfund Amendments Reauthorization Act
SC	Source Control
SCG	Standards, Criteria, or Guidelines
SEAD	Former acronym for the Seneca Army depot used to designate SWMU numbers
SEDA	Seneca Army Depot Activity
SPDES	State Pollution Discharge Elimination System
SVE	Soil Vapor Extraction
SVOC	Semi-Volatile Organic Compound

ACRONYMS AND ABBREVIATIONS
(Cont.)

SWMU	Solid Waste Management Unit
TAGM	Technical and Administrative Guidance Memorandum
TBC	To be Considered
TCE	Trichloroethene
TCLP	Toxicity Characteristic Leaching Procedure
TOGS	Technical and Operational Guidance Series
tph	tons per hour
TSDF	Treatment, Storage and Disposal Facility
UCL	Upper Confidence Limit
ug/l	micrograms per liter
UV	Ultraviolet
USACE	U.S. Army Corps of Engineers
USAEHA	U.S. Army Environmental Hygiene Agency
USATHAMA	U.S. Army Toxic and Hazardous Materials Agency
USFWS	U.S. Fish and Wildlife Service
VC	Vinyl Chloride
VOCs	Volatile Organic Compounds
1,2-DCE	1,2-Dichloroethene, same as DCE

DECLARATION FOR THE RECORD OF DECISION

1.0 DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Ash Landfill Site
Seneca Army Depot Activity, Seneca County, Romulus, New York

STATEMENT OF PURPOSE AND BASIS

This decision document presents the U.S. Army's selected remedial action for soils and groundwater at the Seneca Army Depot Activity (SEDA) Ash Landfill Superfund site. It was developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) as amended, 42 U.S.C. §9601 *et seq.* and the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), 40 CFR Part 300, to the extent practicable. The Base Realignment Closure (BRAC) Environmental Coordinator; the Chief of Staff at Army Material Command; the Director of the Office of Site Remediation and Restoration, and the U.S. Environmental Protection Agency (EPA) Region II have been delegated the authority to approve this Record of Decision (ROD.

This decision is based on the Administrative Record that has been developed in accordance with Section 113(k) of CERCLA. The Administrative Record is available for public review at the Town of Willard Public Library. The Administrative Record Index identifies each of the items considered during the selection of the remedial action. This index is included in Appendix A.

ASSESSMENT OF THE SITE

The selected remedy for the Ash Landfill site, which is summarized in this Record of Decision, will ensure that potential human health and ecological risks from hazardous substances in soils and groundwater are within acceptable criteria established by the EPA and New York State Department of Environmental Conservation (NYSDEC) for current and proposed future site uses.

DESCRIPTION OF THE SELECTED REMEDY

The selected remedy consists of a combination of one source control alternative and one migration control alternative and it addresses impacts to both soil and groundwater.

For soils, the selected remedy outlined in this ROD addresses potential exposures to elevated levels of lead and PAHs in the "Debris Piles." For this remedy, the Debris Piles will be excavated and disposed of off-site. The remedy for soils (source controls) lowers the already acceptable risk levels determined by the baseline risk assessment for both current and future exposure scenarios.

For groundwater, the selected remedy will address potential exposure to off-site receptors from VOCs dissolved in groundwater. The remedy for groundwater (migration control) prevents potential exposures of off-site receptors to VOCs in groundwater by using a funnel-and-gate treatment system to decrease the on-site concentrations of VOCs to site clean-up levels.

STATE CONCURRENCE

New York State Department of Environmental Conservation has concurred with the selected remedy. Appendix B of this Record of Decision contains a copy of the Declaration of Concurrence.

DECLARATION

The selected remedy is consistent with CERCLA and to the extent practicable the NCP, and it is 1) protective of human health and the environment, 2) complies with federal and state requirements that are legally applicable or relevant and appropriate to the remedial action, and 3) is cost effective. The remedy is a permanent solution for soil and groundwater impacts at the Ash Landfill.

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

Concur and recommend for immediate implementation:

______________________________ ____________

ROBERT E. CHASE Date
BRAC Environmental Coordinator

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

Concur and recommend for immediate implementation:

Billy K. SOLOMON
Major General, USA
Chief of Staff
U.S. Army Materiel Command

Date

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

Concur and recommend for immediate implementation:

XXXXXXXXXXXX Date

Director Office of Site Remediation and Restoration

U.S. Environmental Protection Agency, Region II

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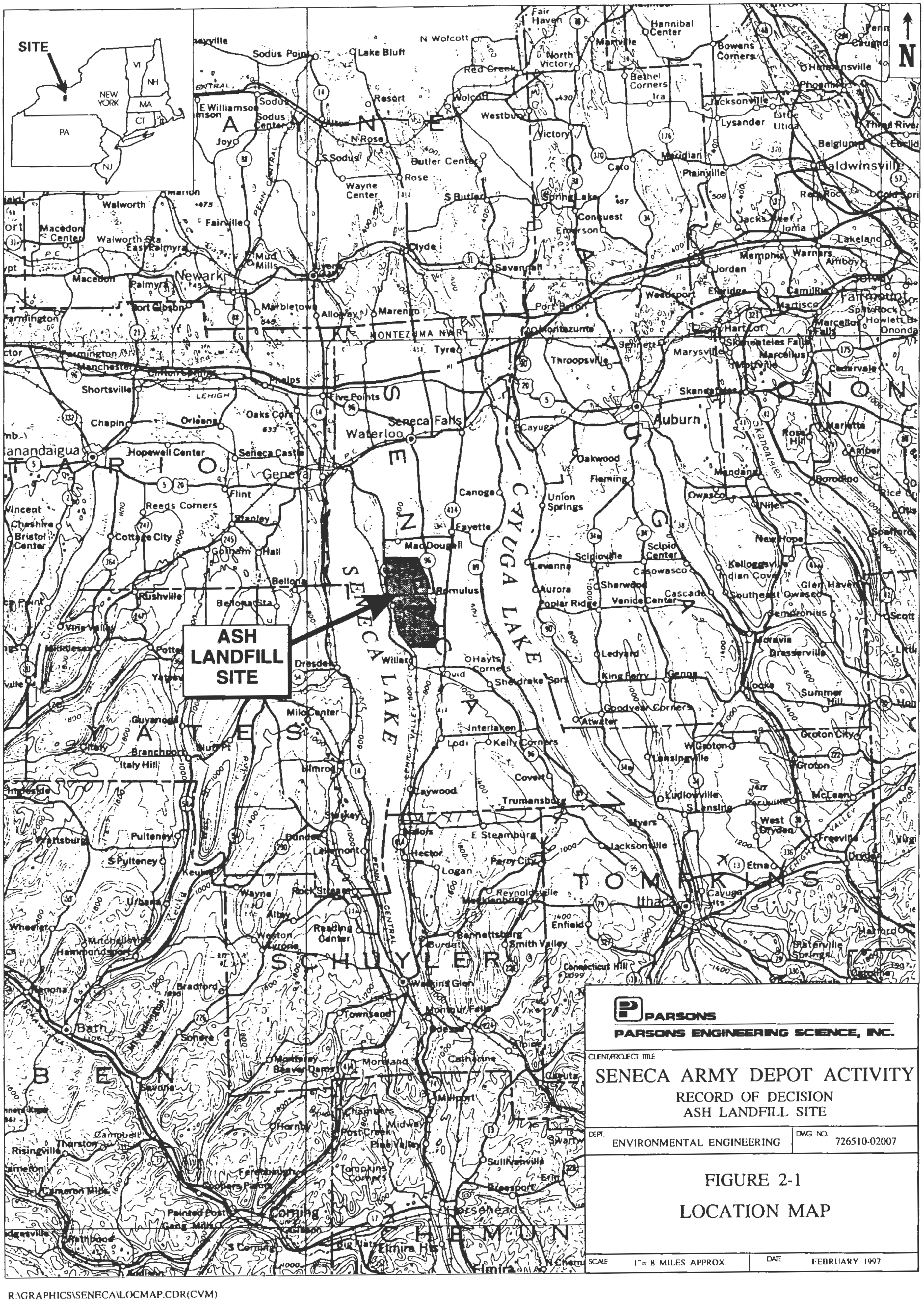
2.0 SITE NAME, LOCATION, AND DESCRIPTION

Ash Landfill Site
Seneca Army Depot Activity, Seneca County, Romulus, New York

The Ash Landfill site occupies approximately 130 acres on 10,000 acres of land that comprise the Seneca Army Depot Activity (SEDA) in Romulus, New York, which is located between Seneca and Cayuga Finger Lakes (Figure 2-1). The Depot is on an upland area, at elevations of between 600 and 750 feet above mean sea level, that forms an elongate divide separating these two Finger Lakes. New York State Highways 96 and 96A bound SEDA on the east and west, respectively (Figure 2-2). Sparsely populated farmland covers most of the surrounding area. The Ash Landfill site is located on the western flank of the upland area and it is comprised of an abandoned incinerator building (Building 2207), a cooling pond, an ash landfill, a non-combustible fill landfill (NCFL), and a number of debris areas (Figure 2-3). It is bounded on the north by Cemetery Road, on the east by a SEDA railroad line, on the south by undeveloped SEDA land, and on the west by the Depot's boundary. Beyond the Depot's western boundary are farmland and residences on Smith Farm Road and along Route 96A. Sampson State Park, which is on the shore of Seneca Lake, is located immediately to the west of Route 96A.

The stratigraphy on the Ash Landfill site generally consists of between 6 and 10 feet of till, below which is a thin zone (1 to 3 feet) of weathered shale, which grades into competent shale at depth (Figure 2-4). Generally, the depth to groundwater in the till/weathered shale aquifer varies seasonally between approximately 2 and 6 feet below the ground surface; the depth to groundwater is similar in the competent shale aquifer. Infiltration of precipitation is the sole source of groundwater for the overburden aquifer and run-off on the site is controlled by a network of engineered drainage ditches. The direction of groundwater flow in the till/weathered shale aquifer is generally to the west toward Seneca Lake (Figure 2-5); the flow direction in the competent shale aquifer is also to the west. No significant vertical gradients exists between the overburden and bedrock aquifers, and also no substantial vertical connection exists between these two aquifers. The site groundwater is classified as GA by the NYSDEC, which mean that it is protected as a source of drinking water, as is almost all groundwater in the State of New York. Seneca Lake, which is west of the site, is a source of drinking water for SEDA and many surrounding communities. A more comprehensive description of the site is presented in the Remedial Investigation (RI) Report.



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CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY

RECORD OF DECISION

ASH LANDFILL SITE

DEPT.	DWG NO.
ENVIRONMENTAL ENGINEERING	726510-02007

FIGURE 2-1

LOCATION MAP

SCALE	DATE
1" = 8 MILES APPROX.	FEBRUARY 1997

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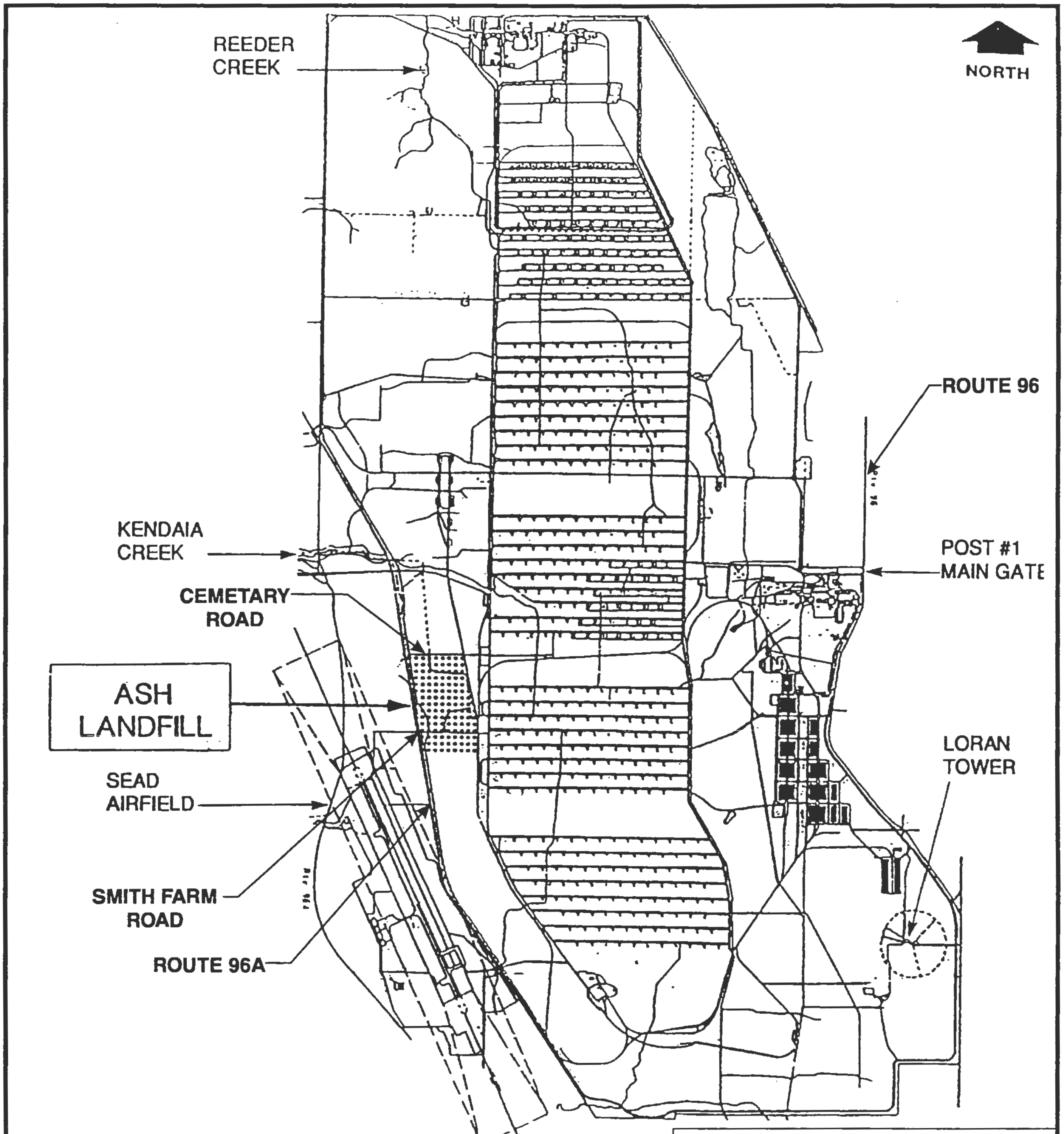

PARSONS
PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE SENECA ARMY DEPOT ACTIVITY RECORD OF DECISION ASH LANDFILL SITE	
DEPT. ENVIRONMENTAL ENGINEERING	DWG NO. 726510-02007
FIGURE 2-2 LOCATION OF ASH LANDFILL AT SEDA	
SCALE NA	DATE FEBRUARY 1997

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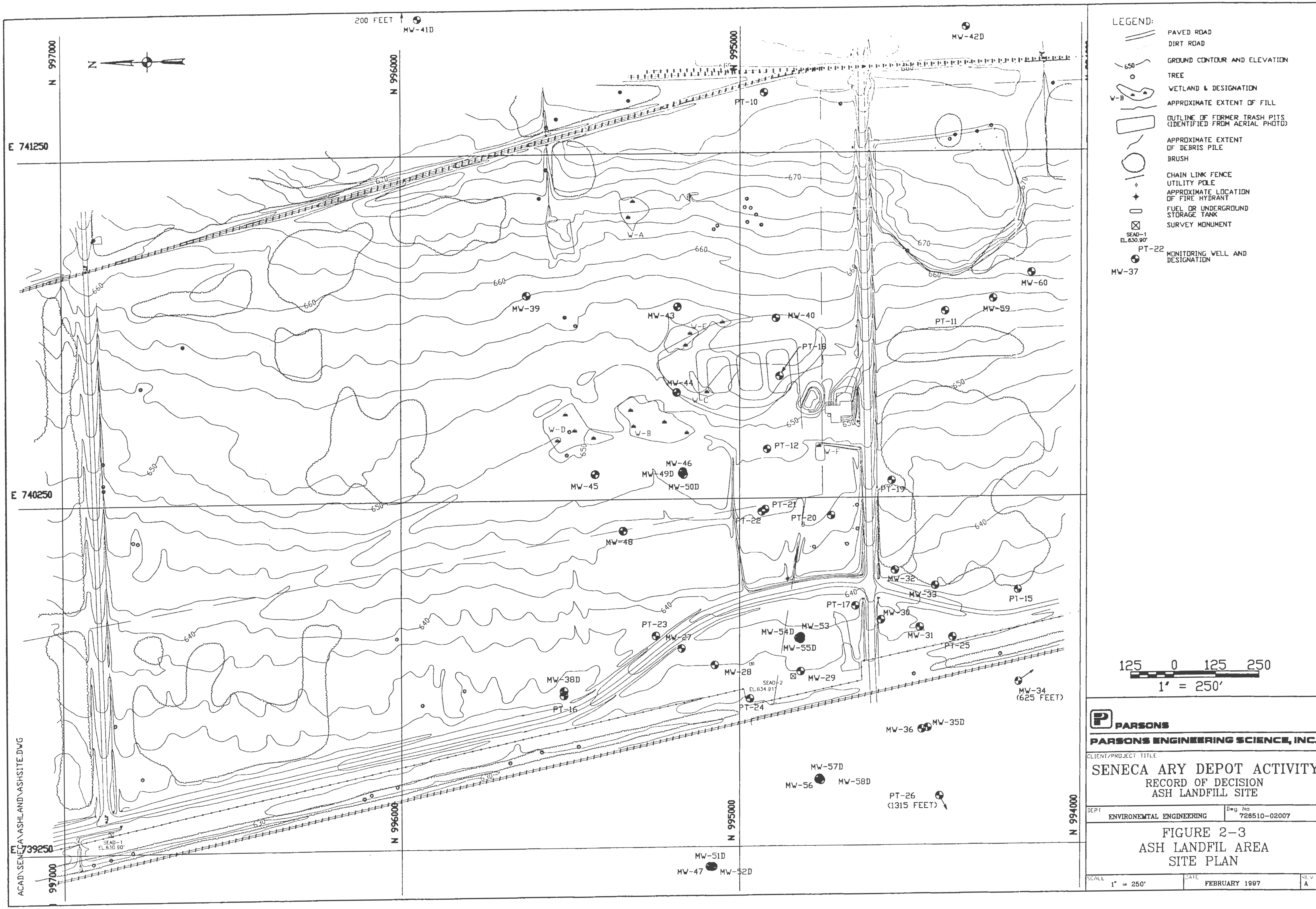

LEGEND:
PAVED ROAD
DIRT ROAD
GROUND CONTOUR AND ELEVATION
TREE
WETLAND & DESIGNATION
APPROXIMATE EXTENT OF FILL
OUTLINE OF FORMER TRASH PITS (IDENTIFIED FROM AERIAL PHOTO)
APPROXIMATE EXTENT OF DEBRIS PILE
BRUSH
CHAIN LINK FENCE
UTILITY POLE
APPROXIMATE LOCATION OF FIRE HYDRANT
FUEL OR UNDERGROUND STORAGE TANK
SURVEY MONUMENT
SEAD-1 EL.630.90'
PT-22
MONITORING WELL AND DESIGNATION
MW-37
125 0 125 250
1" = 250'
N 997000
N 996000
N 995000
N 994000
E 741250
E 740250
E 739250
200 FEET
MW-41D
MW-42D
PT-10
W-A
W-B
W-C
W-D
W-E
W-F
MW-39
MW-43
MW-40
PT-18
PT-11
MW-59
MW-60
MW-44
PT-12
MW-46
MW-49D
MW-50D
MW-45
PT-19
PT-21
PT-22
PT-20
MW-48
MW-32
MW-33
PT-15
PT-17
MW-30
MW-31
PT-25
PT-23
MW-27
MW-54D
MW-53
MW-55D
MW-28
MW-29
SEAD-2 EL.634.91'
MW-38D
PT-16
PT-24
MW-34 (625 FEET)
MW-36
MW-35D
MW-57D
MW-56
MW-58D
PT-26 (1315 FEET)
MW-51D
MW-47
MW-52D
630
640
650
660
670
ACAD\SENECA\ASHLAND\ASHSITE.DWG
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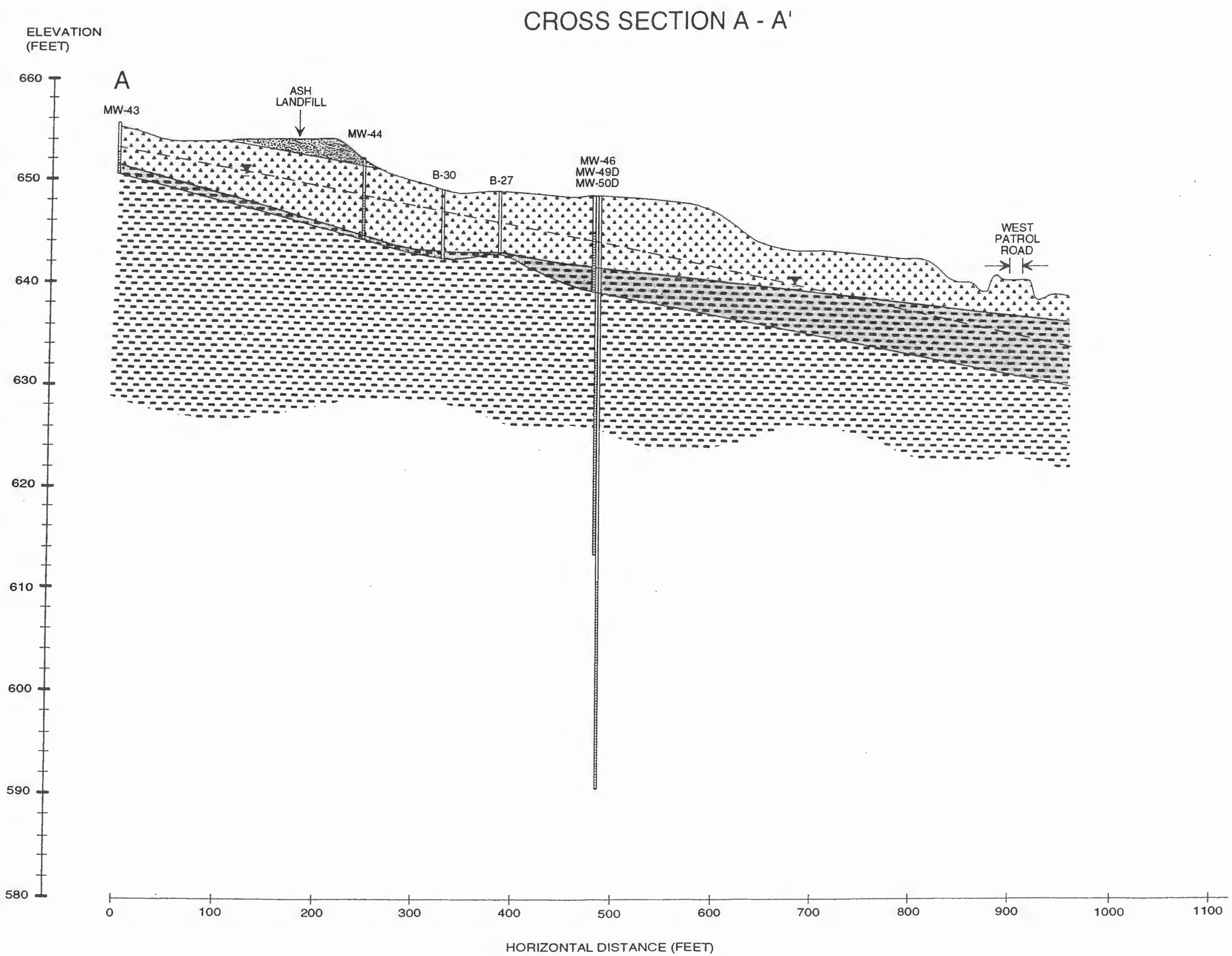
PARSONS ENGINEERING SCIENCE, INC.
CLIENT/PROJECT TITLE
SENECA ARY DEPOT ACTIVITY
RECORD OF DECISION
ASH LANDFILL SITE
DEPT
ENVIRONEMTAL ENGINEERING
Dwg. No.
728510-02007
FIGURE 2-3
ASH LANDFIL AREA
SITE PLAN
SCALE
1" = 250'
DATE
FEBRUARY 1997
REV.
A



NOTES:

1. Lithologic units are based on descriptions supplied by Engineering-Science, Inc. Interpretations are based on extrapolations between widely spaced boreholes, actual conditions may vary.
2. Groundwater table based on depth to water measurements made in June 1993.

MW-44

Monitoring Well Designation with Screened Interval

LEGEND:

FILL

TILL

WEATHERED SHALE

COMPETENT SHALE

GROUNDWATER TABLE

PARSONS

ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
RECORD OF DECISION
ASH LANDFILL SITE

DEPT. ENVIRONMENTAL ENGINEERING	DWG NO. 726510-02007

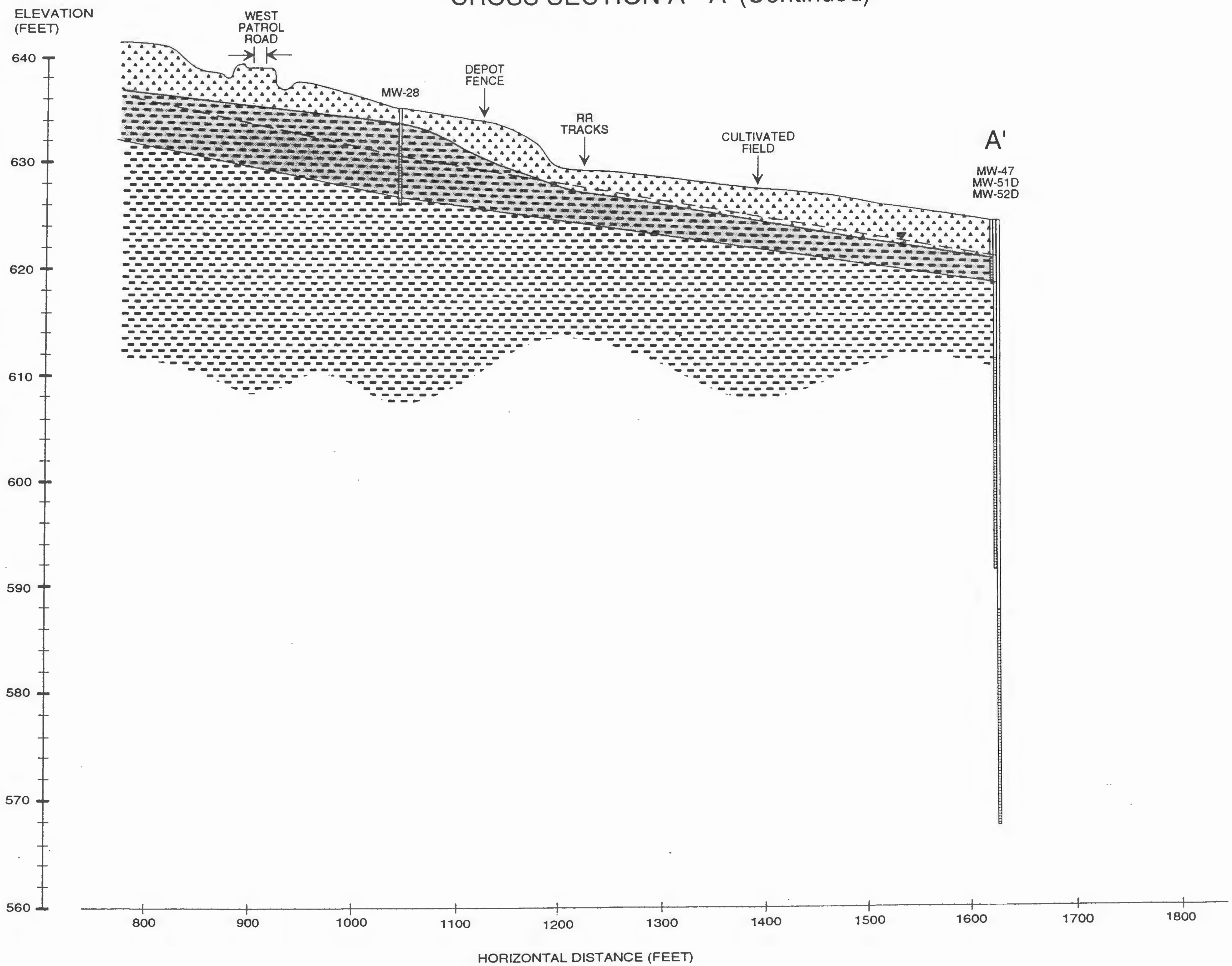
FIGURE 2-4

GEOLOGIC CROSS-SECTION A-A'

SCALE HOR 1"=100' VER 1" = 10'	DATE FEBRUARY 1997

GRAPHICS\SENECA\11X17TB.CDR

CROSS SECTION A - A' (Continued)



NOTES:

1. Lithologic units are based on descriptions supplied by Engineering-Science, Inc. Interpretations are based on extrapolations between widely spaced boreholes, actual conditions may vary.
2. Groundwater table based on depth to water measurements made in June 1993.

MW-44

Monitoring Well Designation with Screened Interval

LEGEND:

FILL

TILL

WEATHERED SHALE

COMPETENT SHALE

GROUNDWATER TABLE

PARSONS ENGINEERING SCIENCE, INC.

CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
RECORD OF DECISION
ASH LANDFILL SITE

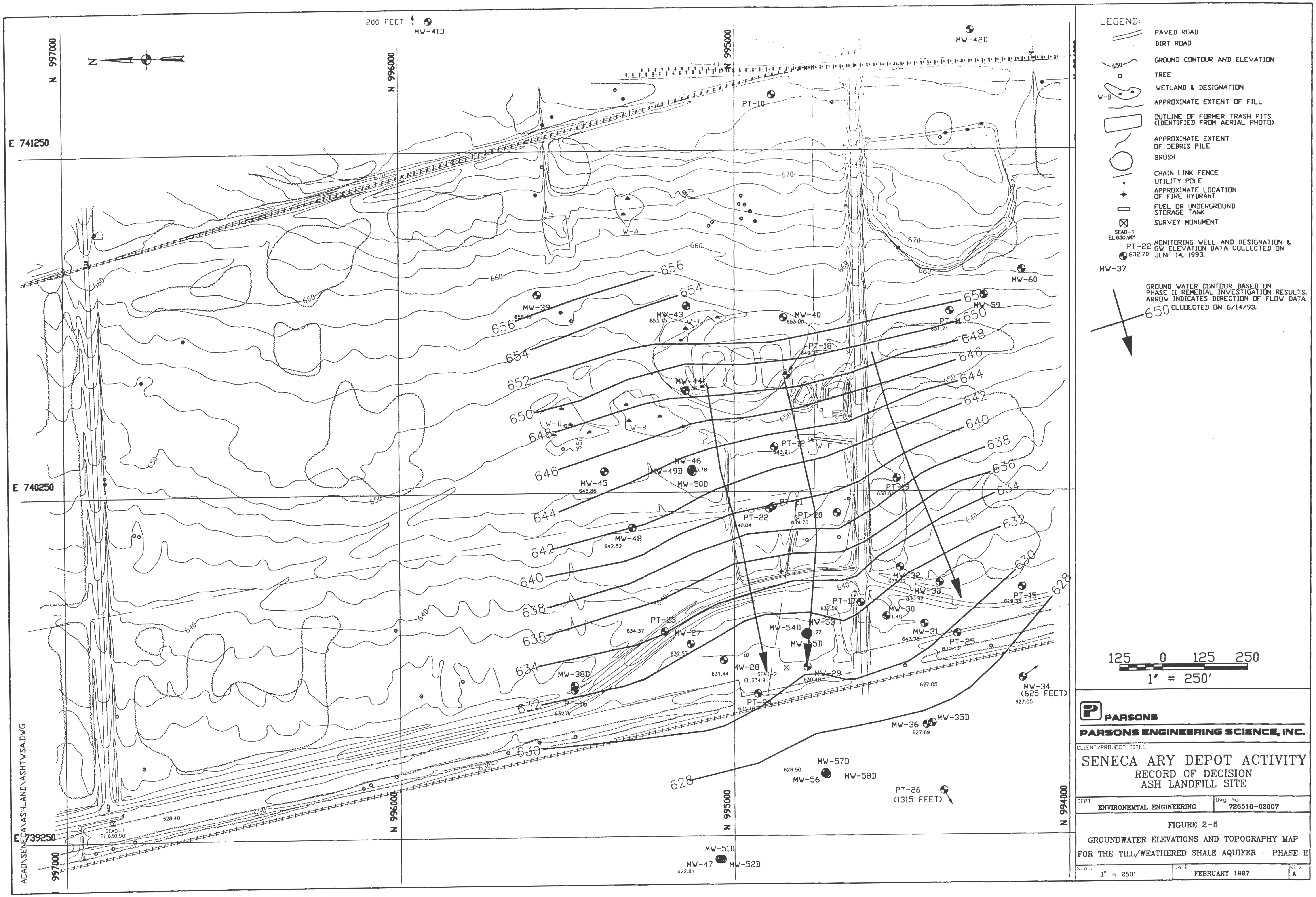
DEPT. ENVIRONMENTAL ENGINEERING	DWG NO. 726510-02007

FIGURE 2-4

GEOLOGIC CROSS-SECTION A-A' (CONTINUED)

SCALE HOR 1"=100' VER 1" = 10'	DATE FEBRUARY 1997

GRAPHICS\SENECA\11X17TB.CDR



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CLIENT/PROJECT TITLE

SENECA ARY DEPOT ACTIVITY
RECORD OF DECISION
ASH LANDFILL SITE

DEPT.	Dwg. No.
ENVIRONEMTAL ENGINEERING	726510-02007

FIGURE 2-5
GROUNDWATER ELEVATIONS AND TOPOGRAPHY MAP
FOR THE TILL/WEATHERED SHALE AQUIFER – PHASE II

SCALE	DATE	REV
1" = 250'	FEBRUARY 1997	A

3.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

3.1 Land Use and Response History

Land Use

SEDA was constructed in 1941 and has been owned by the United States Government and operated by the Department of the Army since this time. Prior to construction of the Depot, much of the land, including that occupied by the Ash Landfill site, was used for farming. From 1941 to 1974, uncontaminated trash was burned in a series of burn pits near the abandoned incinerator building (Building 2207). According to a U.S. Army Environmental Hygiene Agency (USAEHA) Interim Final Report, Groundwater Contamination Survey No. 38-26-0868-88 (July 1987), during approximately this same period of time (1941 until the late 1950's or early 1960's) the ash from the refuse burning pits was buried in the landfill.

The incinerator building was built in 1974. Between 1974 and 1979, materials intended for disposal were transported to the incinerator. The incinerator was a multiple chamber, batch-fed 2,000-pound per hour capacity unit which burned rubbish and garbage. The incinerator unit contained an automatic ram-type feeder, a refractory lined furnace with secondary combustion and settling chamber, a reciprocating stoker, a residue conveyor for ash removal, combustion air fans, a wet gas scrubber, an induced draft fan, and a refractory-lined stack (USAEHA, 1975). Nearly all of the approximately 18 tons of refuse generated per week on the Depot were incinerated. The source for the refuse was domestic waste from Depot activities and family housing. Large items which could not be burned were disposed of at the NCFL. The incinerator was destroyed by a fire on May 8, 1979, and the landfill was subsequently closed.

When the incinerator was active, ashes and other residues from the incinerator were temporarily disposed of in an unlined cooling pond immediately north of the incinerator building. The cooling pond consisted of an unlined depression approximately 50 feet in diameter and approximately 6 to 8 feet deep. When the pond filled (approximately every 18 months), the fly ash and residues were removed, transported, and buried in the adjacent landfill east of the cooling pond. The refuse was dumped in piles and occasionally spread and compacted. No daily or final cover was applied to the landfill. The active area of the Ash Landfill extended at least 500 feet north of the incinerator building, near a bend in a dirt road ("Bend in the Road"), based on an undated aerial photograph of the incinerator during operation. Parallel grooves at the northernmost extent of the filled area are visible in the aerial view of the incinerator and adjacent fill area during active operation and indicate that the fill was spread using a bulldozer or similar equipment. The landfill was apparently covered with native soils of various thickness but has not been closed with an engineered cover or cap.

A grease pit disposal area near the eastern boundary of the site was used for disposal of cooking grease. Evidence of burning of debris during the operation of the incinerator is included areas of blackened soil, charred debris and areas of stressed or dead vegetation.

The approximately 2-acre NCFL southeast of the incinerator building (immediately south of the SEDA railroad line) was used as a disposal site for non-combustible materials including construction debris from 1969 until 1977.

Response History

Below is a summary of the more significant response actions that were preformed at the Ash Landfill, or had a significant impact on its response hisotry.

Previous investigations that pertain to the environmental history of the Ash Landfill site were completed between 1979 and 1989 by various Army agencies. These investigations were performed primarily to investigate the release of chlorinated organics to soil and groundwater at the Ash Landfill site.

A CERCLA RI/Fs was performed at the Ash Landfill in 1993 and 1994 because the site was listed on the National Priority List (NPL).

Although unrelated to the Superfund process, in 1994, a 1,000-gallon fuel oil tank was removed from the east side of the abandoned incinerator building as part of a SEDA-wide program to investigate and evaluate USTs.

In 1995, SEDA was included on the list of U.S. Department of Defense installation recommended for closure and this list was subsequently approved by Congress.

Also, a removal action was performed between August 1994 and June 1995 to address the source of VOCs in soils near the "Bend in the Road" at the Ash Landfill site.

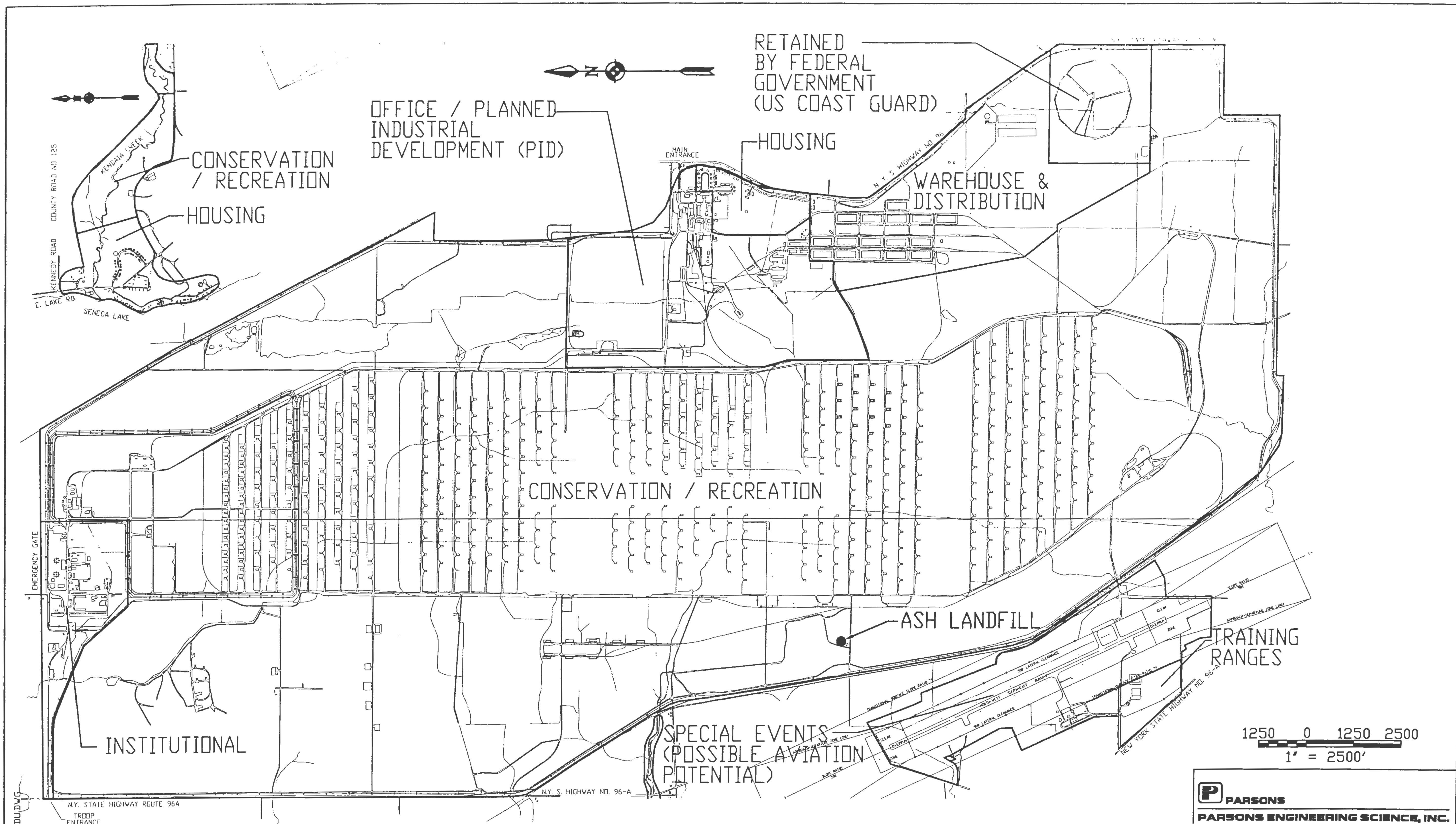
In early 1995, under the Base Realignment and Closure (BRAC) process, the Department of Defense recommended closure of SEDA. This recommendation was approved by Congress and the Depot is scheduled to be closed by July 2001.

To address employment and economic impacts associated with the closure of the Depot, the Seneca County Board of Supervisors established, in October 1995, the Seneca Army Depot Local Redevelopment Authority (LRA). The primary responsibility assigned to the LRA was to prepare a plan for the redevelopment of the Depot. After a comprehensive planning process, a Reuse Plan and Implementation Strategy for Seneca Army Depot was completed and adopted by the LRA on October 8, 1996. The Reuse Plan was subsequently approved by the Seneca County Board of Supervisors on October 22, 1996. Under this plan, the future intended use of the Ash Landfill site is designated as Conservation/Recreation land (Figure 3-1).

3.2 Enforcement History

The following list summarizes the significant dates relative to environmental studies and remediation at the Ash Landfill site, and closure of SEDA under BRAC:

- Under Army Pollution Abatement Program Study No. D-1031-W, a Landfill Leachate Study, No. 81-26-8020-81, was conducted by USAEHA in 1979.
- An Installation Assessment of Seneca Army Depot, Report No. 157, was conducted by the U.S. Army Toxic and Hazardous Materials Agency (USATHAMA) in 1980.
- An Interim Final Report Groundwater Contamination Survey, No. 35-26-0568-88, Evaluation of Solid Waste Units was conducted by USAEHA in 1987.
- Geohydrologic Study No. 38-26-0313-88 was conducted by USAEHA in 1987.
- A Remedial Investigation/Feasibility Study was conducted by USATHAMA/ICF, Inc. and a Site Investigation was conducted by Hunter/ESE in 1989.
- A Quarterly Groundwater Monitoring Program has been conducted at the Ash Landfill site from 1987 to the present.
- In 1989, SEDA was proposed for inclusion on the National Priorities List (NPL) under Superfund; the site was added to the NPL in August, 1990.
- A Federal Facilities Agreement (FFA) under CERCLA Section 120 between the U.S. Environmental Protection Agency Region II, the U.S. Department of the Army, and the NYS Department of Environmental Conservation became effective in January 1993.
- A Remedial Investigation Report, Ash Landfill, Seneca Army Depot, Romulus, New York, was prepared by Parsons ES, Inc. in July 1994.
    - A Non-time critical removal action was performed at the Ash Landfill site to remove the source of VOCs in soils between August 1994 and June 1995.



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CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
RECORD OF DECISION
ASH LANDFILL SITE

DEPT.	Dwg No.
ENVIRONMENTAL ENGINEERING	726510-02007

FIGURE 3-1
FINAL LAND USE PLAN

SCALE	DATE	REV
1" = 2500'	FEBRUARY 1997	A

-
- SEDA was selected for closure under the 1995 Base Realignment and Closure (BRAC) process.
- A Draft Final Environmental Baseline Survey Report was prepared for the SEDA under BRAC in October 1996.
- A Reuse Plan and Implementation Strategy for Seneca Army Depot was prepared in December, 1996.

4.0 COMMUNITY PARTICIPATION

Throughout the RI/FS process, community concern and participation has been high. The SEDA Public Affairs Office has been active in responding to requests for information, concerns, and questions from the community. The status of CERCLA activities at SEDA were summarized in Technical Review Committee meetings open to the community that occurred every three months between 1990 and 1995.

Also, a community presentation was given at the Romulus High School on (***date***), 199x to present the non-time critical removal action to address VOCs in soil at the Ash Landfill.

The Ash Landfill RI report, FS report, and the Proposed plan for the site were released to the public for comment on (***date***). These documents were made available to the public in the administrative record file at the EPA Docket Room in Region II, New York and the information repositories at (***place***). The notice of availability for the above-referenced documents was published in the (***document/paper***) on (***date***). The public comment period on these documents was held from (***date***) to (***date***). On (***date***), EPA and NYSDEC conducted a public meeting at (***place***) to inform local officials and interested citizens about the Superfund process, to review current and planned remedial activities at the site, and to respond to any questions from area residents and other attendees. Responses to the comments received at the public meeting and in writing during the public comment period are included in the Responsiveness Summary (Appendix C).

To address employment and economic impacts associated with the closure of the Depot under BRAC, the Seneca County Board of Supervisors established, in October 1995, the Seneca Army Depot Local Redevelopment Authority (LRA). The primary responsibility assigned to the LRA was the preparation of a plan for the redevelopment of the Depot. During the BRAC process, monthly presentations have been given to the Land Reuse Authority. In addition, the SEDA Restoration Advisory Board (RAB) was established in (***month and year***) to facilitate the exchange of information between SEDA and the community. RAB members include the representatives from the Army, EPA, state regulatory agencies, and the community. After a comprehensive planning process, a Reuse Plan and Implementation Strategy for Seneca Army Depot was completed and adopted by the LRA on October 8, 1996. The Reuse Plan was subsequently approved by the Seneca County Board of Supervisors on October 22, 1996.

During the BRAC process there have been, and continue to be, monthly presentations to the Restoration Advisory Board regarding the progress of the Ash Landfill site and other nvestigations related to the closure of SEDA.

5.0 SCOPE AND ROLE OF RESPONSE ACTION

A selected remedy has been identified for the Ash Landfill site. The selected remedy includes:

- excavation of soil from the Debris Piles and off-site disposal (designated as source control option SC-5)
- treatment of groundwater using a funnel-and-gate/iron filings system to decrease the on-site concentrations of VOCs dissolved in groundwater to site clean-up levels (designated as migration control option MC-3a).

The selected remedies are discussed in greater detail in Section 9.0.

The selected remedial actions were chosen as the most cost-effective means to ensure that the already low human health risks from potential exposures to chemical constituents in soils and groundwater are maintained for both present and future site-use conditions. A removal action for soils was performed at the Ash Landfill between August 1994 and June 1995. This removal action was performed to remediate the soils that were the source of the VOCs in groundwater and contained elevated concentrations of other hazardous constituents. Approximately 35,000 tons of soils were excavated and treated by low temperature thermal desorption to meet the VOC clean-up criteria for the site. Also, during the removal action, (***how many***) gallons of groundwater were pumped from the aquifer in the source area and treated for VOCs.

6.0 SUMMARY OF SITE CHARACTERISTICS

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

Primary media investigated at the Ash Landfill included soil (from soil borings and test pits), groundwater (from monitoring wells), and surface water and sediment (from Kendaia Creek and on-site wetlands and drainage swales). On the basis of these investigations, soil and groundwater were found to be the media that were the most significantly impacted by a release of chemicals on-site.

6.1 Impacts to Soils

The most significant impacts to soils at the Ash Landfill site are as follows:

- The primary chlorinated VOCs in soils at the Ash Landfill site were trichloroethene (TCE), 1,2-dichloroethene (1,2-DCE), and vinyl chloride (VC). The highest concentrations of these compounds (540,000 μg/Kg, 79,000 μg/Kg, and 1,000 μg/Kg , respectively) were measured in a two acre area northwest of the Ash Landfill near the "Bend in the Road." The two source areas for the VOCs (i.e., Areas A and B near the "Bend in the Road") were identified using soil gas surveys and soil borings. Concentrations of chlorinated VOCs above the NYSDEC Technical and Administrative Guidance Memorandum (TAGM) clean-up guidelines were measured in this area at all depths from land surface to the top of the weathered shale. [As a note, TAGMs are used by NYSDEC for establishing cleanup guidelines. The TAGMs are not promulgated standards and therefore are not ARARs, but rather are To Be Considered (TBC) guidelines. As such, remedy selection was based upon other enforceable standards that are ARARs. However, if appropriate, TAGMs may be used to help determine treatment volumes.]

- The highest concentrations of aromatic VOCs were found northwest of the Ash Landfill in the same general area as the chlorinated VOC impacts. The primary aromatic constituents of concern were xylene and toluene, and they were measured at maximum concentrations of 17,000 μg/Kg, 5,700 μg/Kg, respectively, which were above the TAGM cleanup guidelines. The horizontal extent of the aromatics was smaller than that for the chlorinated volatile organics, approximately one-half acre, and the vertical impacts extended from the land surface to a depth of 4 feet.

- The soil source area for the chlorinated (and aromatic) VOCs at the "Bend in the Road" was remediated during a non-time critical removal action. Also, during the removal action approximately (***how many***) gallons of groundwater from the source area were treated for VOCs. The removal action was performed between August 1994 and June 1995.

- The other compounds of significance measured in the soils were semi-volatile organics and metals. PAHs were measured at concentrations above the TAGM clean-up guidelines in the Ash Landfill, in the NCFL and in the various debris piles present around the former Ash Landfill. In general, the highest PAH concentrations were detected in the NCFL and small debris pile surface soils (0 to 2 feet) that contained the residues of incomplete combustion.

- The metals that were detected at elevated concentrations (significantly above the TAGM) in soils were copper, lead, mercury and zinc. These elevated concentrations were found in the Ash Landfill, in the NCFL and in the debris piles. The highest concentrations of metals were detected at the surface of the debris piles. These piles are small, localized, surface features that are visibly discernible and do not extend significantly into the subsurface.

- Currently, the Ash Landfill site is located in a restricted area that is fenced, and it is used only by occasional SEAD employees. Under BRAC, the LRA has proposed that the Ash Landfill site be used as Conservation/Recreation land.

6.2 Impacts to Groundwater

The most significant impacts to groundwater at the Ash Landfill site are as follows:

- Groundwater was impacted by VOCs. The primary impact to the groundwater is from a plume of a chlorinated VOCs containing dissolved concentrations of TCE, 1,2-DCE and VC. The maximum detected volatile concentration was 204,000 µg/l, which is the sum of TCE, 1,2-DCE, and VC in monitoring well MW-44 located within the area considered to be the source area.

- The plume of chlorinated VOCs at the Ash Landfill site extends from the source area at the "Bend in the Road" to approximately 1,200 feet west, which is in the direction of groundwater flow in the till/weathered shale aquifer. The plume may extend approximately 100 feet beyond the Depot boundary and may contain a total chlorinated concentration of 10 µg/l at this location. Transport modeling using a conservative degradation rate (k), which is relatively slow, predicts that the plume of VOCs may continue to migrate west off of the Depot, however, a less conservative degradation rate may also be plausible for the site. Results using the less conservative k indicate that the plume does not migrate significantly farther off of the site. Also, chemical indicators measured in the aquifer suggest that natural biodegradation processes are occurring, and are believed to be active enough to help slow its movement. Vertically, the plume is believed to be restricted to the upper till/weathered shale aquifer because no VOCs were detected in the deeper competent shale aquifer. The vertical extent of the plume is small because there is a poor hydraulic connection between the till/weathered shale (overburden) and the competent shale (bedrock) aquifers, and there are no significant vertical gradients on-site.

- No significant concentrations of semivolatile organics were detected in groundwater; two semivolatile organics were detected slightly above their applicable standards in only one well (MW-44). No significant concentrations of metals were detected in groundwater.

- Currently, the aquifer at the Ash Landfill is not used for drinking water and, under BRAC, the LRA has proposed that the Ash Landfill site be used as Conservation/Recreation land. The nearest exposure points for groundwater are the three farmhouse wells, located approximately 1,250 feet from the leading edge of the plume. At least one of the farmhouse wells, a dug well, uses water from the till/weathered shale aquifer and the remaining two wells derive water from the bedrock aquifer. According to NYSDEC, the groundwater at the site is classified GA, which means that it is groundwater that is protected as a source of drinking water.

6.3 Impacts to Surface Water

No volatile or semi-volatile organic compounds were detected in any of the on-site surface waters or Kendaia Creek. Metals concentrations were also low in surface water with only iron exceeding NYSDEC water quality standards (6 NYCRR Subparts 701-705) in three of the six on-site wetlands.

6.4 Impacts to Sediment

The sediments in the wetland adjacent to the "Bend in the Road" (wetland W-B) contained elevated concentrations of 1,2-DCE. No other on-site sediments contained concentrations of volatile or semi-volatile organics. Metals concentrations in several sediments samples exceeded NYSDEC guidelines with the highest concentrations occurring in wetland W-B.

7.0 SUMMARY OF SITE RISKS

7.1 Introduction

A risk assessment was prepared as part of the RI at the Ash Landfill. Using the concentrations and distributions of chemicals at the Ash Landfill site, a baseline risk assessment was conducted to estimate the risks associated with current and future site conditions. The baseline risk assessment estimates the human health and ecological risk that could result from the constituents of concern at the site if no remedial actions were taken. The baseline risk assessment was performed before the propsed future use of the site was designated as conservation/recreation land under BRAC.

The baseline human health risk assessment followed the USEPA guidance and New York State guidance where appropriate to calculate carcinogenic and non-carcinogenic human health risks. The methodology involves a four-step process as shown in Figure 7-1. The ecological risk assessment included both a qualitative and quantitative assessment of the ecological status of the Ash Landfill

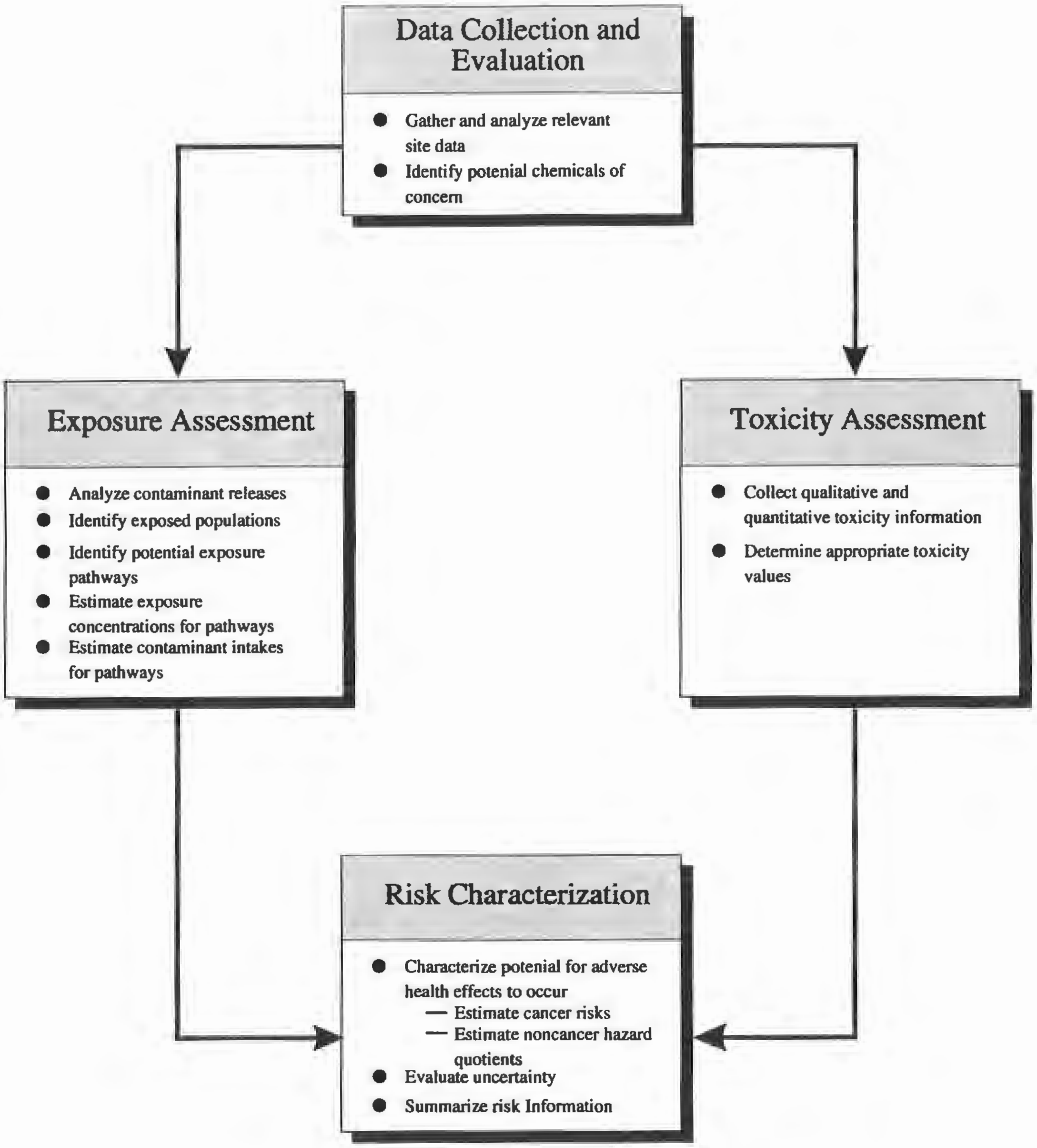
The baseline risk assessment addressed the potential risks to human health and biota by identifying several potential exposure pathways by which the public and terrestrial and aquatic organisms may be exposed to chemical releases at the site under current and future land use scenarios. Figure 7-2 shows the exposure pathways considered for the media of concern. For the human health risk assessment, the reasonable maximum exposure was evaluated.

The risk assessment considered chemicals in groundwater, soils, sediment and surface water at the Ash Landfill site that may pose a significant risk to human health and the environment. A summary of the contaminants of concern in sampled matrices is provided in Table 7-1 for potential human health receptors.

7.2 Human Health Risks

Introduction

A four step-process was utilized to assess site-related human health risks for a reasonable maximum exposure scenario:



Source: USEPA, 1989a

PARSONS
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CLIENT/PROJECT TITLE

SENECA ARMY DEPOT ACTIVITY
RECORD OF DECISION
ASH LANFILL SITE

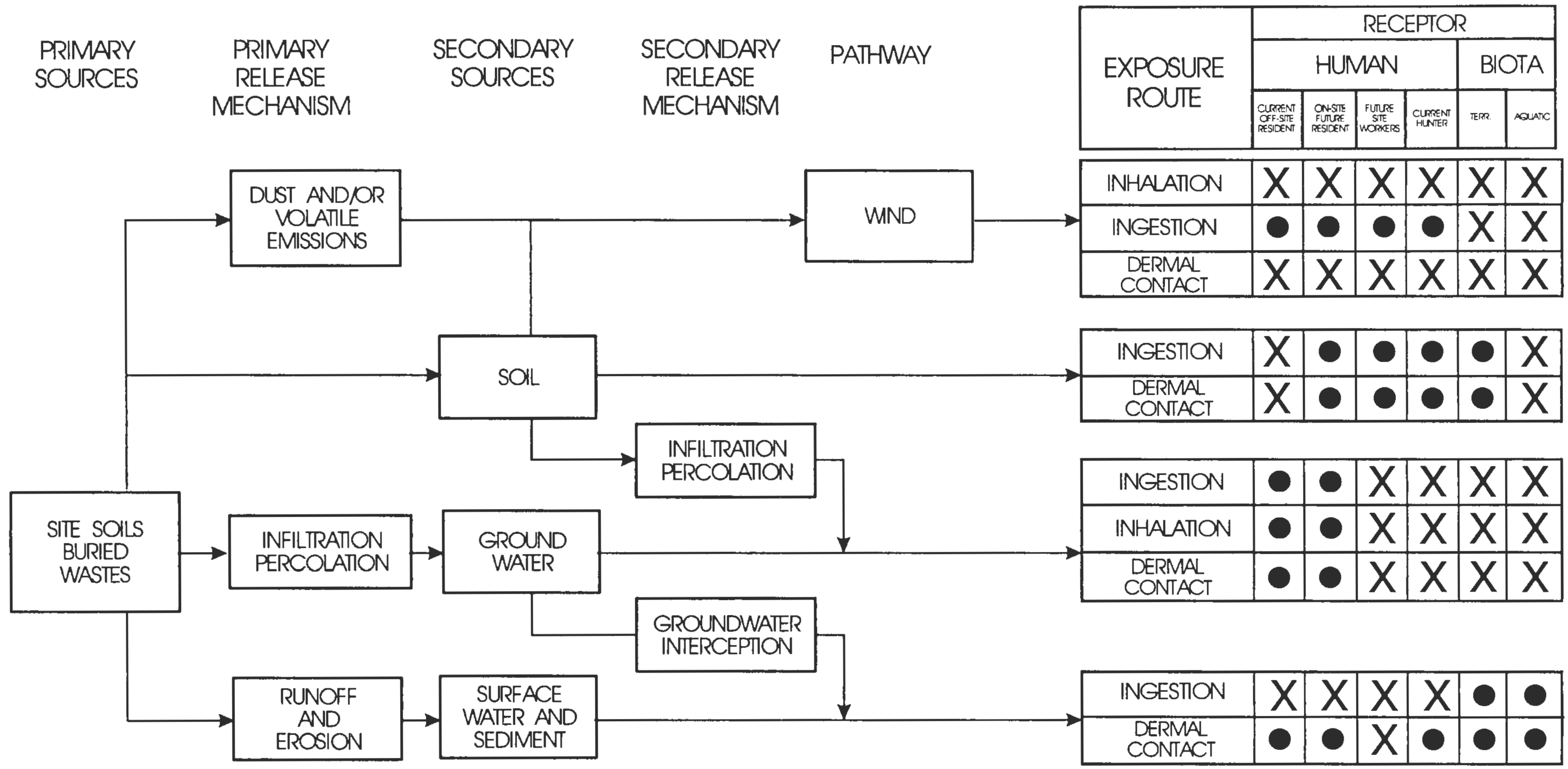
DEPT. ENVIRONMENTAL ENGINEERING	DWG NO. 726510-02007

FIGURE 7-1

BASELINE RISK ASSESSMENT PROCESS

SCALE Not Applicable	DATE FEBRUARY 1997

R:\GRAPHICS\SENECA\ASHBRAP.CDR



● PATHWAY CONSIDERED TO POSE POTENTIAL RISK

X PATHWAY DISCOUNTED AS SIGNIFICANT RISK

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RECORD OF DECISION
ASH LANDFILL SITE

DEPT. ENVIRONMENTAL ENGINEERING | DWG NO. 726510-02007

FIGURE 7-2
EXPOSURE PATHWAY SUMMARY

SCALE NA | DATE FEBRUARY 1997

R:\GRAPHICS\SENECA\ASHEXP.CDR

TABLE 7-1

EXPOSURE POINT CONCENTRATIONS-CHEMICALS OF CONCERN
SOIL ANALYSIS RESULTS (All Depths)
VALIDATED DATA (PHASES I & II)

SENECA ARMY DEPOT ACIVITY
ASH LANDFILL RECORD OF DECISION

COMPOUND	UNITS	NYSDEC TAGM*	MAXIMUM	95th UCL of the mean	MEAN	EXPOSURE POINT CONC.
Volatile Organics						
Vinyl Chloride	ug/kg	200	14,500	62.47	172.65	62.47
1,2-Dichloroethene (total)	ug/kg	300	79,000	1,712.18	1,989.32	1,712.18
Trichloroethene	ug/kg	700	540,000	2,267.98	9,373.25	2,267.98
Semivolatiles						
2-Methylnaphthalene	ug/kg	36,400	3,600	441.35	393.12	441.35
Acenaphthylene	ug/kg	41,000	510	265.48	248.15	265.48
Dibenzofuran	ug/kg	6,200	7,000	397.55	373.26	397.55
Phenanthrene	ug/kg	50,000	43,000	657.71	882.10	657.71
Benzo(a)anthracene	ug/kg	220 or MDL**	9,600	520.48	531.23	520.48
bis(2-Ethylhexyl)phthalate	ug/kg	50,000	230,000	714.92	2,050.95	714.92
Benzo(b)fluoranthene	ug/kg	1,100	9,500	498.22	513.04	498.22
benzo(k)fluoranthene	ug/kg	1,100	6,700	468.90	447.89	468.90
Benzo(a)pyrene	ug/kg	61 or MDL**	9,000	490.78	486.21	490.78
Indeno(1,2,3-cd)pyrene	ug/kg	3,200	4,800	430.56	396.93	430.56
Dibenz(a,h)anthracene	ug/kg	14 or MDL**	2,900	410.55	367.55	410.55
Benzo(g,h,i)perylene	ug/kg	50,000	5,000	431.19	392.32	431.19
Pesticides/PCBs						
Aroclor-1260	ug/kg	1,000	770	157.24	143.06	157.24
Metals						
Cadmium	mg/kg	1.74	43.1	3.84	2.47	3.84
Chromium	mg/kg	26.49	62	27.72	26.73	27.72
Copper	mg/kg	25	836	40.46	43.64	40.46
Lead	mg/kg	30	2,890	90.05	115.46	90.05
Zinc	mg/kg	88.89	55,700	409.06	860.14	409.06

* NYSDEC TAGM values based on Technical and Administrative Guidance Memorandum HWR-92-4046, November 16, 1992. The TAGMs are TBCs and are for comparison purposes only.

** For semivolatile organic compounds the Minimum Detection Limit (MDL) is 330 ug/Kg.

TABLE 7-1

EXPOSURE POINT CONCENTRATIONS-CHEMICALS OF CONCERN
SURFACE SOIL ANALYSIS RESULTS (0-2 Foot Depths)
VALIDATED DATA (PHASES I & II)

SENECA ARMY DEPOT ACTIVITY
ASH LANDFILL RECORD OF DECISION

COMPOUND	UNITS	NYSDEC TAGM*	MAXIMUM	95th UCL of the mean	MEAN	Exposure Point Concentration
Volatile Organics						
Vinyl Chloride	ug/kg	200	750	16.02	33.24	16.02
1,2-Dichloroethene (total)	ug/kg	300	38000	584.27	1,545.47	584.27
Trichloroethene	ug/kg	700	150000	1,592.88	5,564.81	1,592.88
Semi-volatiles						
2-Methylnaphthalene	ug/kg	36,400	1250	360.05	318.57	360.05
Acenaphthylene	ug/kg	41,000	510	251.08	209.08	251.08
Dibenzofuran	ug/kg	6,200	1400	407.83	352.36	407.83
Phenanthrene	ug/kg	50,000	15000	1,047.87	998.34	1,047.87
Benzo(a)anthracene	ug/kg	220 or MDL**	9600	915.76	741.85	915.76
bis(2-Ethylhexyl)phthalate	ug/kg	50,000	230000	987.69	4,749.60	987.69
Benzo(b)fluoranthene	ug/kg	1,100	9500	833.22	744.38	833.22
Benzo(k)fluoranthene	ug/kg	1,100	6700	711.51	595.21	711.51
Benzo(a)pyrene	ug/kg	61 or MDL**	9000	876.03	702.87	876.03
Indeno(1,2,3-cd)pyrene	ug/kg	3,200	4800	635.36	493.98	635.36
Dibenz(a,h)anthracene	ug/kg	14 or MDL**	2000	466.15	385.94	466.15
Benzo(g,h,i)perylene	ug/kg	50,000	5000	680.92	506.77	680.92
Pesticides/PCB's						
Aroclor-1260	ug/kg	1,000	340	161.11	141.39	161.11
Metals						
Cadmium	mg/kg	1.74	43.1	5.53	3.22	5.53
Chromium	mg/kg	26.49	62	30.55	28.34	30.55
Copper	mg/kg	25	836	71.55	69.80	71.55
Lead	mg/kg	30	2890	264.93	208.08	264.93
Zinc	mg/kg	88.89	55700	1,579.68	2,111.63	1,579.68

* NYSDEC TAGM values based on Technical and Administrative Guidance Memorandum HWR-92-4046, November 16, 1992. The TAGMs are TBCs and are for comparison purposes only.

** For semivolatile organic compounds the Minimum Detection Limit (MDL) is 330 ug/Kg.

TABLE 7-1

EXPOSURE POINT CONCENTRATIONS - CHEMICALS OF CONCERN
SEDIMENT ANALYSIS RESULTS
VALIDATED DATA (PHASES I & II)

SENECA ARMY DEPOT ACTIVITY
ASH LANDFILL RECORD OF DECISION

COMPOUND	UNITS	NYSDEC CRITERIA*	MAXIMUM	95 th UCL of the mean	MEAN	Exposure Point Concentration
Semivolatiles						
2-Methylnaphthalene	ug/kg	NA	30.00	30.00	30.00	30.00
Acenaphthylene	ug/kg	NA	170.00	151.82	95.00	151.82
Phenanthrene	ug/kg	1,390	1,200.00	499.46	379.78	499.46
Benzo(a)anthracene	ug/kg	130	4,900.00	1,696.30	698.44	1,696.30
Benzo(b)fluoranthene	ug/kg	130	4,500.00	1,609.62	692.56	1,609.62
Benzo(k)fluoranthene	ug/kg	130	3,700.00	1,424.29	602.78	1,424.29
Benzo(a)pyrene	ug/kg	130	3,900.00	1,658.39	621.35	1,658.39
Indeno(1,2,3-cd)pyrene	ug/kg	130	2,400.00	1,263.37	513.83	1,263.37
Dibenz(a,h)anthracene	ug/kg	NA	1,300.00	537.25	423.61	537.25
Benzo(g,h,i)perylene	ug/kg	NA	2,300.00	971.19	508.72	971.19
Metals						
Aluminum	mg/kg	NA	20,900.00	15,013.53	13,763.33	15,013.53
Antimony	mg/kg	NA	10.80	6.51	5.54	6.51
Arsenic	mg/kg	5	12.10	7.40	6.23	7.40
Barium	mg/kg	NA	227.00	123.30	105.96	123.30
Beryllium	mg/kg	NA	1.20	0.89	0.79	0.89
Cadmium	mg/kg	0.8	4.10	2.49	1.92	2.49
Chromium VI	mg/kg	26	33.40	24.62	22.83	24.62
Cobalt	mg/kg	NA	17.00	11.19	10.09	11.19
Copper	mg/kg	19	58.60	39.69	34.59	39.69
Lead	mg/kg	27	219.00	95.63	70.48	95.63
Manganese	mg/kg	428	1,050.00	675.43	562.94	675.43
Nickel	mg/kg	22	45.90	32.05	29.41	32.05
Thallium	mg/kg	NA	0.52	0.50	0.33	0.50
Vanadium	mg/kg	NA	30.70	23.86	21.94	23.86
Zinc	mg/kg	85	834.00	455.05	365.39	455.05

* NYSDEC sediment criteria, December, 1989

TABLE 7-1

EXPOSURE POINT CONCENTRATIONS - CHEMICALS OF CONCERN
SURFACE WATER ANALYSIS RESULTS
VALIDATED DATA (PHASES I & II)

SENECA ARMY DEPOT ACTIVITY
ASH LANDFILL RECORD OF DECISION

COMPOUND	UNITS	NYSDEC AWQS*	MAXIMUM	95 th UCL of the mean	MEAN	Exposure Point Concentration
Volatiles Organics						
Chloroform	ug/L	NA	2.00	2.00	2.00	2.00
Metals						
Aluminum	ug/L	NA	2,410.00	96,163.98	818.34	2,410.00
Antimony	ug/L	NA	141.00	74.34	43.56	74.34
Arsenic	ug/L	360	2.90	2.23	1.86	2.23
Beryllium	ug/L	NA	1.20	0.81	0.56	0.81
Chromium	ug/L	NA	7.60	5.64	4.05	5.64
Cobalt	ug/L	110	6.90	8.87	4.70	6.90
Copper	ug/L	65.4	21.70	15.86	11.04	15.86
Lead	ug/L	477.8	42.30	3,485.81	8.08	42.30
Manganese	ug/L	NA	941.00	636.3	328.59	636.30
Nickel	ug/L	5,289.7	11.20	15.4	6.48	11.20
Zinc	ug/L	1,015.3	187.00	2,235.23	59.85	187.00

* NYSDEC AWQS for Class D surface waters. From 6 NYCRR Subparts 701-705.

TABLE 7-1

EXPOSURE POINT CONCENTRATIONS - CHEMICALS OF CONCERN
GROUNDWATER ANALYSIS RESULTS
VALIDATED ON-SITE DATA (PHASES I & II)

SENECA ARMY DEPOT ACTIVITY
ASH LANDFILL RECORD OF DECISION

COMPOUND	UNITS	NYSDEC AWQS*	MAXIMUM	95th UCL of the mean	MEAN	Exposure Point Concentration
Volatile Organics						
Vinyl Chloride	ug/L	2	23,000.00	59.81	648.56	59.81
1,2-Dichloroethene (total)	ug/L	5	130,000.00	845.01	2,656.02	845.01
1,1,1-Trichloroethane	ug/L	5	2,100.00	10.20	27.66	10.20
Trichloroethene	ug/L	5	51,000.00	605.60	1,431.20	605.60
Semi-volatiles						
2-Methylnaphthalene	ug/L	NA	13.00	5.58	5.38	5.58
Metals						
Aluminum	ug/L	NA	306,000.00	254,061.90	20,713.04	254,061.90
Cadmium	ug/L	10	64.60	3.09	3.03	3.09
Chromium	ug/L	50	418.00	62.23	31.04	62.23
Copper	ug/L	200	412.00	30.26	24.67	30.26
Lead	ug/L	25	147.00	21.10	10.76	21.10
Nickel	ug/L	NA	622.00	56.73	42.61	56.73
Zinc	ug/L	300	1,750.00	441.98	157.35	441.98

* NYSDEC AWQS for Class GA waters. From 6 NYCRR Parts 701-705.

	Federal MCLs (ug/L):	
Vinyl Chloride	2	
1,2-Dichloroethene	(cis) = 70; (trans) = 100	
1,1,1-Trichloroethane	200	
Trichloroethene	5	
2-Methylnaphthalene	NA	
Aluminum	NA	
Cadmium	5	
Chromium (total)	100	
Copper	1,300	(action level)
Lead	15	(action level)
Nickel	100	(being remanded))
Zinc	NA	

TABLE 7-1

EXPOSURE POINT CONCENTRATIONS - CHEMICALS OF CONCERN
FARMHOUSE WELLS QUARTERLY MONITORING RESULTS
VALIDATED ON-SITE DATA (PHASES I & II)

SENECA ARMY DEPOT ACTIVITY
ASH LANDFILL RECORD OF DECISION

COMPOUND	UNITS	NYSDEC AWQS*	MAXIMUM	95th UCL of the mean	MEAN	Exposure Point Concentration
Volatile Organics						
Vinyl chloride	ug/L	2	0.25	0.25	0.25	0.25
1,2-Dichloroethene (total)	ug/L	5	0.25	0.25	0.25	0.25
1,1,1-Trichloroethane	ug/L	5	0.25	0.25	0.25	0.25
Trichloroethene	ug/L	5	0.25	0.25	0.25	0.25
Semi-volatiles						
2-Methylnaphthalene	ug/L	NA	NA	NA	NA	NA
Metals						
Aluminum	ug/L	NA	324	36413.76	112.14	324.00
Cadmium	ug/L	10	1.55	1.48	1.34	1.48
Chromium	ug/L	50	1.65	1.65	1.39	1.65
Copper	ug/L	200	1.05	1.04	0.98	1.04
Lead	ug/L	25	4	2.61	1.54	2.61
Nickel	ug/L	NA	4.15	4.16	3.19	4.15
Zinc	ug/L	300	501	523.58	302.27	501.00

* NYSDEC AWQS for Class GA waters. From 6 NYCRR Subparts 701-705

	Federal MCLs (ug/L):	
Vinyl Chloride	2	
1,2-Dichloroethene	(cis) = 70; (trans) = 100	
1,1,1-Trichloroethane	200	
Trichloroethene	5	
2-Methylnaphthalene	NA	
Aluminum	NA	
Cadmium	5	
Chromium (total)	100	
Copper	1,300	(action level)
Lead	15	(action level)
Nickel	100	(being remanded))
Zinc	NA	

1. Hazard Identification - identifies the contaminants of concern at the site based on several factors such as toxicity, frequency of occurrence, and concentration.

2. Exposure Assessment - estimates the magnitude of actual and/or potential human exposures, the frequency and duration of these exposures, and the pathways (e.g., ingesting contaminated groundwater) by which humans are potentially exposed.
3. Toxicity Assessment - determines the types of adverse health effects associated with chemical exposures, and the relationship between magnitude of exposure (dose) and severity of adverse effects (response).
4. Risk Characterization - summarizes and combines outputs of the exposure and toxicity assessments to provide a quantitative assessment of site-related risks.

The BRA evaluated the potential risks to human health and the environment associated with the Ash Landfill site in its current state (i.e., conditions that existed after the removal action, which removed the source for VOCs in soil and treated groundwater in the source area). The risk assessment focused on contaminants in the soil and groundwater that were likely to pose a significant risk to human health and the environment. A summary of these contaminants of concern in the sampled matrices is provided in Table 7-1 for the human health receptors.

The BRA addressed the potential risks to human health by identifying several potential exposure pathways by which the public may be exposed to contaminant releases at the site under current and future use conditions.

Under current EPA guidelines, the likelihood of carcinogenic (cancer-causing) and non-carcinogenic effects due to exposure to site chemicals are considered separately. It was assumed that the toxic effects of the site-related chemicals would be additive. Thus, carcinogenic and non-carcinogenic risks associated with exposures to individual compounds of concern were summed to indicate the potential risks associated with mixtures of potential carcinogens and non-carcinogens, respectively.

Non-carcinogenic risks were assessed using a hazard index (HI) approach, based on a comparison of expected contaminant intakes and safe levels of intake (Reference Doses). Reference doses (RfDs) have been developed by EPA for indicating the potential for adverse health effects. RfDs, which are expressed in units of milligrams/kilogram-day (mg/kg-day), are estimates of daily exposure levels for humans which are thought to be safe over a lifetime (including sensitive individuals). Estimated intakes of chemicals from environmental media (e.g., the amount of a chemical ingested from contaminated drinking water) are compared to the RfD to derive the hazard quotient for the contaminant in the particular medium. The HI is obtained by adding the hazard quotients for all compounds across all media that impact a particular receptor population.

An HI greater than 1.0 indicates that the potential exists for non-carcinogenic health effects to occur as a result of site-related exposures. The HI provides a useful reference point for gauging the potential significance of multiple contaminant exposures within a single medium or across media.

Potential carcinogenic risks were evaluated using the cancer slope factors developed by EPA for the contaminants of concern. Cancer slope factors (Sfs) have been developed by EPA's Carcinogenic Risk Assessment Verification Endeavor for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. Sfs, which are expressed in units of $(mg/kg\text{-}day)^{-1}$, are multiplied by the estimated intake of a potential carcinogen, in mg/kg-day, to generate an upper-bound estimate of the excess lifetime cancer risk associated with exposure to the compound at that intake level. The term "upper bound" reflects the conservative estimate of the risks calculated from the Sf. Use of this approach makes the underestimation of the risk highly unlikely.

For known or suspected carcinogens, EPA considers excess upper-bound individual lifetime cancer risks of between 10^{-4} to 10^{-6} to be acceptable. This level indicates that an individual has no greater than a one-in-ten-thousand to one in a million chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year period under specific exposure conditions at the site.

Results

The primary constituents of concern at the Ash Landfill are VOC (primarily chlorinated and aromatic compounds), semivolatile organics (mainly PAHs), and to a lesser degree metals, such as copper lead, mercury, and zinc. Several compounds including the PAH compounds xylene and toluene are known to cause cancer in laboratory animals and are suspected to be human carcinogens.

The baseline human health risk assessments evaluated the health effects that may result from exposure for the following four receptor groups:

1. Current off-site residents;
2. Current and future on-site hunters,
3. Future on-site construction workers; and

4. Future on-site residents (not for use in determining remedial action alternatives).

The results for total carcinogenic and non-carcinogenic risk are summarized in Table 7-2. As a worst case condition, the potential-future land use of the Ash Landfill was considered to be residential. The excess cancer risk to future on-site residents under this exposure scenario is 1.7 x 10^{-3} with a HI of 4.2. Both parameters are above the USEPA target risk ranges of 10^{-6} to 10^{-4} and 1.0, respectively. These risks are due primarily to potential exposure of receptors to on-site groundwater as their sole drinking water source. Groundwater ingestion is responsible for over 80% of the total cancer risk and over 75% of the HI. Although the risk due to future residential land use was calculated in the baseline risk assessment, the decision to perform a remedial action will be based upon the proposed land use scenario (i.e., conservation/recreation land), which is identical to the land's current use, i.e., meadow and occasional deerhunting. The cancer risk was reduced to 1.5 x 10^{-3} after the non-time critical removal action. Because there are no plans to use the site for anything but as conservation/recreation land as specified in the Reuse Plan and Implementation Strategy for the Seneca Army Depot, risks to future on-site residents were not given further consideration for remedial action decisions. Any decisions pertaining to implementing a remedial action will be based upon the current and intended future land use. This includes the risk to receptor groups 1 through 3.

The calculated excess cancer risks to current off-site residents from these pathways is 4.3 x 10^{-5}. This means that 4 additional people in 10,000 are at risk of developing cancer. This risk number is within the USEPA defined target range of 10^{-6} to 10^{-4}. The calculated hazard index of 0.16 is less than the USEPA defined non-carcinogenic target risk value of one. The cancer risk and hazard index were reduced to 1.5 x 10^{-5} and 0.15, respectively, after the non-time critical removal action.

The calculated excess cancer risk for current on-site deerhunting is 1.1 x 10^{-5} with a HI of 0.0078. Both parameters are within or below USEPA defined target limits and were further reduced upon the completion of the non-time critical removal action, 9.4x10^{-6} and 0.0075, respectively.

Under the future on-site construction worker exposure scenario, the calculated excess cancer risk of 4.6 x 10^{-5} is within the USEPA target range and the HI of 0.077 is below the USEPA defined target of 1. The non-time critical removal action reduced the cancer risk and HI to 3.7x10^{-6} and 0.064, respectively.

To summarize, the results of the risk assessment indicate that none of the receptors are in danger of exceeding the EPA target risk range under the current and expected receptor scenarios. Groundwater sampling performed as part of this investigation, in addition to several years of

Table 7-2

CALCULATION OF TOTAL NONCARCINOGENIC AND CARCINOGENIC RISKS

SENECA ARMY DEPOT ACTIVITY
ASH LANDFILL RECORD OF DECISION

RECEPTOR	EXPOSURE ROUTE	HAZARD INDEX	CANCER RISK
CURRENT RESIDENTIAL			
CURRENT OFF-SITE RESIDENTS	Dermal Contact to Surface Water while Wading	3.1E-03	9.2E-06
	Dermal Contact to Sediment while Wading	2.0E-03	0.0E+00
	Ingestion of Groundwater	1.4E-01	5.6E-06
	Dermal Contact to Groundwater	3.2E-03	2.5E-07
	Inhalation of Groundwater while Showering	3.1E-07	1.1E-07
	Inhalation of Volatile Organics in Ambient Air	2.6E-04	3.2E-07
TOTAL RECEPTOR RISK (Nc & CAR)		1.5E-01	1.5E-05
CURRENT AND FUTURE ON SITE			
ON-SITE HUNTERS	Dermal Contact to Surface Water while Wading	3.1E-03	9.2E-06
	Dermal Contact to Sediment while Wading	2.0E-03	0.0E+00
	Ingestion of Onsite Soils	9.5E-04	2.2E-07
	Dermal Contact to Onsite Soils	1.4E-03	4.4E-08
	Inhalation of Volatile Organics in Ambient Air	1.3E-05	1.6E-08
TOTAL RECEPTOR RISK (Nc & CAR)		7.5E-03	9.5E-06
FUTURE ON-SITE CONSTRUCTION WORKERS	Ingestion of Onsite Soils	9.2E-03	1.9E-06
	Dermal Contact to Onsite Soils	5.4E-02	1.4E-06
	Inhalation of Volatile Organics in Ambient Air	4.7E-04	4.9E-07
TOTAL RECEPTOR RISK (Nc & CAR)		6.4E-02	3.8E-06
FUTURE RESIDENTIAL			
FUTURE ON-SITE RESIDENTS	Ingestion of Onsite Soils	3.4E-01	2.1E-05
	Dermal Contact to Onsite Soils	3.8E-01	4.6E-06
	Dermal Contact to Surface Water while Wading	3.1E-03	9.2E-06
	Dermal Contact to Sediment while Wading	2.0E-03	0.0E+00
	Ingestion of Groundwater	3.2E+00	1.4E-03
	Dermal Contact to Groundwater	2.0E-01	7.1E-05
	Inhalation of Groundwater while Showering	1.0E-03	2.9E-05
	Inhalation of Volatile Organics in Ambient Air	1.1E-03	1.4E-06
TOTAL RECEPTOR RISK (Nc & CAR)		4.2E+00	1.5E-03
TOTAL SOIL RISK		7.9E-01	3.1E-05
TOTAL GROUNDWATER RISK		3.6E+00	1.5E-03
TOTAL SEDIMENT RISK		5.9E-03	0.0E+00
TOTAL SURFACE WATER RISK		6.2E-03	1.8E-05
CURRENT SOIL RISK		6.6E-02	4.4E-06
FUTURE SOIL RISK		7.3E-01	2.7E-05

quarterly groundwater monitoring, has confirmed that the current off-site residents do not exhibit an increased risk of cancer in excess of the target risk range or adverse non-carcinogenic health threats. The carcinogenic risks for the off-site receptor were found to be within the EPA's target risk range. Additionally, the HI is less than the EPA defined non-carcinogenic HI target risk value of 1.0. The cancer risks for the on-site hunter and the on-site construction worker scenarios are also within the EPA target ranges.

Although risks are exhibited by potential future residents using groundwater for drinking, Land Redevelopment Authority (LRA) does not propose to use this land for residential purposes. As of July 1996, the LRA recommended to the Army specific reuse alternatives for several areas at SEDA. The Reuse Plan and Implementation Strategy for the Seneca Army Depot (1996), designates the potential future use of the Ash Landfill site is as Conservation/Recreation land (Figure 3-1). According to this reuse plan, the conservation area would protect the existing wildlife in this area and "could provide opportunities for a variety of public uses such as self-guided tours, nature trails, controlled hunting and fishing." Accordingly, it is unreasonable to establish remedial action objectives and remediate to conditions inconsistent with such land use. Any decisions pertaining to implementing a remedial action will be based upon the current and proposed future land use. This includes the risk to receptor groups 1 through 3. Should the intended future land use become residential, then in accordance with U.S. Army regulations and CERCLA the U.S. Army will notify all appropriate regulatory bodies and perform any remedial action necessary to meet the risk requirements for this land use scenario.

7.3 Ecological Risks

Introduction

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

1. Problem Formulation - a qualitative evaluation of contaminant release, migration, and fate. Identification of contaminants of concern, receptors, exposure pathways, and known ecological effects of the contaminants; and selection of endpoints for further study.
2. Exposure Assessment - a quantitative evaluation of contaminant release, migration, and fate; characterization of exposure pathways and receptors; and measurement or estimation of exposure point concentrations.
3. Ecological Effects Assessment - literature reviews, field studies, and toxicity tests linking contaminant concentrations to effects on ecological receptors.
4. Risk Characterization - measurement or estimation of current and future adverse effects.

Results

Phase I and Phase II field evaluations for the RI included fish trapping and counting, benthic macroinvertibrate sampling and counting, and small mammal species sampling and counting. In addition, a vegetation survey was performed, identifying major vegetation and understory types. The conclusions determined from these field efforts indicated a diverse and healthy aquatic and terrestrial environment. No overt acute toxic impacts were evidenced during the field evaluation.

The quantitative evaluation involved comparison of the 95th Upper Confidence Limit (UCL) of the mean of site data with the media specific criteria, suggested a slight potential for chronic risk from heavy metals. The acute effects from these metals have not been observed during fieldwork, that is, the ecological community appears diverse and normal; however, long term/chronic impacts are more subtle.

Calculated chronic toxicity concentrations for aquatic (mallard) wildlife were exceeded by lead in soil at the 95th UCL. For the protection of aquatic life in contact with sediments, the 95th UCL for nine metals, arsenic, cadmium, copper, iron, lead, manganese, mercury, nickel, and zinc did exceed the NYSDEC guidelines. For example, the NYSDEC guideline to protect wildlife that consumes aquatic life in contact with copper containing sediments is 19 mg/Kg. The 95th UCL of the mean for copper is 58.6 mg/Kg. For lead the NYSDEC sediment guideline is 27 mg/Kg, and the 95th UCL of the site mean is 95.63 mg/Kg. However, the Limits of Tolerance (LOT) criteria for the protection of benthic macro invertebrates were not exceeded for any metals in sediments.

To summarize, on-site soils, surface waters and sediment suggest the site conditions may pose a slightly elevated ecological risk due to the presence of heavy metals. However, these criteria are not considered ARARs since none of these criteria are promulgated standards. Only the NYSDEC water quality criteria, which is a promulgated standard for Kendaia Creek is considered to be an ARAR. No exceedences of this ARAR were observed. Although, some metal exceedences were observable for guidelines and reported literature values, the actual risk caused by these exceedences is uncertain and not readily observable. Furthermore, the use of the on-site wetlands and surface waters by aquatic species is unlikely since these wetlands are small and dry during a large portion of the year.

7.4 Uncertainty in Risk Assessments

The procedures and inputs used to assess the risks in this evaluation, as in all such assessments, are subject to a wide variety of uncertainties. In general, the main sources of uncertainty for the Ash Landfill risk assessment include the following:

- environmental chemistry sampling and analysis,
- environmental parameter measurement,
- exposure parameter estimation,
- toxicological data,
- risk characterization, and
- central tendency risk.

Uncertainty in environmental sampling arises in part from the potentially uneven distribution of chemicals in the medial sampled. Consequently, there is significant uncertainty as to the actual levels present. Thus, the environmental chemistry analysis error can stem from several sources including the errors inherent in the analytical methods and characteristics of the matrix being sampled. Section 6.7.1 of the RI discusses uncertainty associated with: 1) non-random sample collection, 2) use of the 95th upper confidence level (UCL), 3) use of data from monitoring wells 4) selection of soil samples for Level IV analysis, 5) elimination of chemicals from the risk assessment, 6) comparison to background concentrations to eliminate chemicals in soil and groundwater, and 7) TICs.

Uncertainties in the exposure assessment are related to estimates of how often an individual would actually come in contact with chemicals of concern, the period of time over which such exposure would occur, and the models used to estimate the concentrations of the chemicals of concern at the point of exposure. Section 6.7.2 of the RI discusses uncertainty associated with: 1) future land use, and 2) exposure model assumptions.

Uncertainties in toxicological data occur in extrapolating both from animals to humans and from high doses to low doses of exposure, as well as from the difficulties in assessing the toxicity of a mixture of chemicals. These uncertainties are addressed by making conservative assumptions concerning risk and exposure parameters throughout the assessment. As a result, the risk assessment provides upper-bound estimates of the risks to populations near the site, and is highly unlikely to underestimate actual risks related to the site. Section 6.7.3 of the RI discusses uncertainty associated with: 1) reference doses and slope factors for certain chemicals, 2) weight of evidence classification, 3) valance states for selected metals, 4) toxicity values for the duration of the exposure assessed, 5) toxicity information for dermal exposure, and 6) conversion of RfCs and unit risk values into inhalation RfDs and slope factors.

Uncertainties in risk characterization exist because of the assumption of dose additivity for multiple substance exposure (Section 6.7.4 of the RI). That assumption ignores the possible synergyisms and antagonisms among chemicals, and assumes similarity of mechanisms of action and metabolism.

Uncertainties also exist in the calculation of central tendency risk compared to RME risks and these are discussed in Section 6.7.5 of the RI.

More specific information concerning public health risks, including quantitative evaluation of the degree of risk associated with various exposure pathways, is presented in Section 6.0, Baseline Risk Assessment, of the Ash Landfill RI report.

8.0 REMEDIAL ACTION OBJECTIVES

8.1 General Remedial Action Objectives

The Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) process is a risk-based process when considering remedial action objectives. It requires that the overall objective of any remedial response is to reduce the environmental and human health risks of the chemicals present in the various environmental media, to within established EPA target ranges. Additionally, the NCP requires that CERCLA remedial action objectives must comply with all ARARs. Finally, CERCLA, as amended by the Superfund Amendments and Reauthorization Act (SARA) of 1986, requires that a CERCLA remedial action must be cost-effective and must use permanent solutions to the maximum extent possible. Remedial action objectives have been developed that consist of media-specific objectives for the protection of human health and the environment. These objectives are risk-based, and comply with ARARs to the maximum extent possible.

The remedial action objectives for the Ash Landfill are based on exposure levels and associated risks posed by on-site chemicals, and chemicals that have, or might, migrate off-site. These objectives consider the site characteristics that define the fate and transport of chemicals, pathways of exposure, receptors, and short- and long-term health effects. The remedial action objectives for the Ash Landfill operable unit are as follows:

- Prevent public or other persons from direct contact with adversely impacted soils, sediments, solid waste and surface water that may present a health risk.

- Eliminate or minimize the migration of hazardous chemicals from soil to groundwater.

- Prevent ingestion of groundwater containing chemicals in excess of federal and state drinking water standards or criteria, or which pose a threat to public health.

- Prevent off-site migration of chemicals above levels protective of public health and the environment.

- Restore groundwater, soil, surface water, and sediments to levels that are protective of public health and the environment.

8.2 Risk-Based Remedial Action Objectives

The primary threat at the SEDA Ash Landfill under current and intended future site use is through exposure to contaminated soils. As shown in the baseline risk assessment conducted as part of the RI, volatile organics in groundwater do not pose a threat to human health because ingestion of on-site groundwater is not a completed exposure pathway under current or proposed future land use at the Ash Landfill, which is defined in the Reuse Plan and Implementation Strategy for the Seneca Army Depot. The risks posed by other contaminants (i.e., metals, SVOC) fall within or below the EPA target ranges. TCE and its breakdown products are present in the groundwater plume which has migrated off-site, although no concentrations above ARARs have been measured in off-site monitoring wells. The presence of TCE, DCE and vinyl chloride in the soil does not pose an unacceptable threat of airborne exposure through volatilization because the non-time critical removal action has remediated the soils that were the source of the VOCs. Finally, the impacted soil does not pose an unacceptable threat through occasional soil exposure to existing SEDA personnel.

The risk-based remedial objectives are to reduce any non-carcinogenic and carcinogenic risks to acceptable levels based upon EPA criteria established under CERCLA and SARA. Since current and intended future risk scenarios do not exceed the EPA target values, there is no need to conduct any risk-based remedial action or develop remedial action objectives.

However, additional considerations such as ARARs and removal actions under the NCP must be considered prior to developing an overall remedial action plan for the Ash Landfill. The following sections discuss these criteria in order to evaluate necessary remedial actions.

8.3 ARAR-Based Remedial Action Objectives

The investigation and clean-up of the Ash Landfill falls under the jurisdiction of both the State of New York regulations (administered by NYSDEC) and Federal regulations (administered by USEPA Region II). The categories of potentially applicable state and federal requirements are: chemical-specific, location-specific and action-specific.

In 40 CFR 300.5, EPA defines applicable requirements as those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal or state environmental, or facility siting laws that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance found at a CERCLA site.

Only those state standards that are identified by a state in a timely manner and that are more stringent than federal requirements may be applicable. Relevant and appropriate requirements are defined as those cleanup standards, standards of control, and other substantive requirements, criteria, or limitations promulgated under federal or state environmental or facility siting laws that, while not "applicable" to a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA site, address problems or situations sufficiently similar to those encountered at the CERCLA site that their use is well suited to the particular site.

Any standard, requirement, criterion, or limitation under any federal or state environmental or facility siting law may be either applicable or relevant and appropriate to a specific action. The only state laws that may become ARARs are those promulgated such that they are legally enforceable and generally applicable and equivalent to or more stringent than federal laws. A determination of applicability is made for the requirements as a whole, whereas a determination of relevance and appropriateness may be made for only specific portions of a requirement. An action must comply with relevant and appropriate requirements to the same extent as an applicable requirement with regard to substantive conditions, but need not comply with the administrative conditions of the requirement.

Chemical-specific ARARs address certain contaminants or a class of contaminants and relate to the level of contamination allowed for a specific pollutant in various environmental media (water, soil, air). Location-specific ARARs are based on the specific setting and nature of the site. Action-specific ARARs relate to specific actions proposed for implementation at a site. Both location-specific and action-specific ARARs are independent of the media. In addition to ARARs, advisories, criteria or guidance may be evaluated as "To Be Considered" (TBC) regulatory items. CERCLA indicates that the TBC category could include advisories, criteria or guidance that were developed by EPA, other federal agencies or states that may be useful in developing CERCLA remedies. These advisories, criteria or guidance are not promulgated and, therefore, are not legally enforceable standards.

8.4 Site Specific Cleanup Goals

Groundwater Clean-up Goals

The groundwater clean-up goals for the Ash Landfill are presented in Table 8-1. This table lists the constituents of concern that were retained after the site-specific data evaluation (Section 6.2.3 of the Ash Landfill RI) and were used in the baseline risk assessment. This table lists the clean-up goal and the ARAR basis for each clean-up goal. Ultimately, the groundwater clean-up goal will

TABLE 8-1

SITE-SPECIFIC CLEAN-UP GOALS FOR MEDIA OF CONCERN

SENECA ARMY DEPOT ACTIVITY
ASH LANDFILL RECORD OF DECISION

SOIL

Constituent of Concern	Clean-up Goal (ug/Kg)	TBC
Volatile Organics		
Vinyl Chloride	200	NYSDEC TAGM
1,2-Dichloroethene (total)	300	NYSDEC TAGM
Trichloroethene	700	NYSDEC TAGM
Semivolatiles		
2-Methylnaphthalene	36,400	NYSDEC TAGM
Acenaphthylene	41,000	NYSDEC TAGM
Dibenzofuran	6,200	NYSDEC TAGM
Phenanthrene	50,000	NYSDEC TAGM
Benzo(a)anthracene	220 or MDL	NYSDEC TAGM
bis(2-Ethylhexyl)phthalate	50,000	NYSDEC TAGM
Benzo(b)fluoranthene	1,100	NYSDEC TAGM
benzo(k)fluoranthene	1,100	NYSDEC TAGM
Benzo(a)pyrene	61 or MDL	NYSDEC TAGM
Indeno(1,2,3-cd)pyrene	3,200	NYSDEC TAGM
Dibenz(a,h)anthracene	14 or MDL	NYSDEC TAGM
Benzo(g,h,i)perylene	50,000	NYSDEC TAGM
Pesticides/PCBs		
Aroclor-1260	1,000	NYSDEC TAGM
Metals		
Cadmium	1,800	NYSDEC TAGM(SB)
Chromium	26,000	NYSDEC TAGM(SB)
Copper	25,000	NYSDEC TAGM
Lead	500,000	Site-Specific goal
Zinc	89,100	NYSDEC TAGM (SB)

GROUNDWATER

Constituent of Concern	Clean-up Goal (ug/L)	ARAR
Volatile Organics		
Vinyl Chloride	2	NYSDEC AWQS (GA)
1,2-Dichloroethene (total)	5	NYSDEC AWQS (GA)
1,1,1-Trichloroethane	5	NYSDEC AWQS (GA)
Trichloroethene	5	NYSDEC AWQS (GA)
Semi-volatiles		
2-Methylnaphthalene		NA
Metals		
Aluminum		NA
Cadmium	10	NYSDEC AWQS (GA)
Chromium	50	NYSDEC AWQS (GA)
Copper	200	NYSDEC AWQS (GA)
Lead	25	NYSDEC AWQS (GA)
Nickel		NA
Zinc	300	NYSDEC AWQS (GA)

SEDIMENT

Constituent of Concern	Clean-up Goal (ug/Kg)	TBC
Semivolatiles		
2-Methylnaphthalene		NA
Acenaphthylene		NA
Phenanthrene	1,390	NYSDEC Criteria
Benzo(a)anthracene	130	NYSDEC Criteria
Benzo(b)fluoranthene	130	NYSDEC Criteria
Benzo(k)fluoranthene	130	NYSDEC Criteria
Benzo(a)pyrene	130	NYSDEC Criteria
Indeno(1,2,3-cd)pyrene	130	NYSDEC Criteria
Dibenz(a,h)anthracene		NA
Benzo(g,h,i)perylene		NA
Metals		
Aluminum		NA
Antimony		NA
Arsenic	5,000	NYSDEC Criteria
Barium		NA
Beryllium		NA
Cadmium	800	NYSDEC Criteria
Chromium VI	26,000	NYSDEC Criteria
Cobalt		NA
Copper	19,000	NYSDEC Criteria
Lead	27,000	NYSDEC Criteria
Manganese	428,000	NYSDEC Criteria
Nickel	22,000	NYSDEC Criteria
Thallium		NA
Vanadium		NA
Zinc	85,000	NYSDEC Criteria

SURFACE WATER

Constituent of Concern	Clean-up Goal (ug/L)	ARAR
Volatile Organics		
Chloroform		NA
Metals		
Aluminum		NA
Antimony		NA
Arsenic	360	NYSDEC AWQS (D)
Beryllium		NA
Chromium		NA
Cobalt	110	NYSDEC AWQS (D)
Copper	65.4	NYSDEC AWQS (D)
Lead	477.8	NYSDEC AWQS (D)
Manganese		NA
Nickel	5,289.7	NYSDEC AWQS (D)
Zinc	1,015.3	NYSDEC AWQS (D)

Notes:
1) NYSDEC TAGM = values are based on Technical Administrative Guidance Memorandum HWR-92-4046, November 16, 1992. SB indicates that the site background for soil was used.
2) MDL = Minimum Detection Limit; for semivolatile organic compounds the MDL is 330 ug/Kg.
3) NYSDEC AWQS (GA) = values are based on Water Quality Standards for Class GA groundwaters From 6 NYCRR Subparts 701 - 705.
4) NYSDEC Criteria = values are based on Sediment Criteria, December, 1989.
5) NYSDEC AWQS (D) = values are based on Water Quality Standards for Class D surface waters From 6 NYCRR Subparts 701 - 705.
6) NA = Not Available.
7) TBC = To Be Considered
8) ARAR = Applicable or Relevant and Appropriate Requirement

be to further reduce site risks. The acceptable EPA hazard index is less than 1.0 and the total cancer risk range is 10^{-4} to 10^{-6}.

Currently, both the site total hazard index (0.24) and the total cancer risk (1.0×10^{-4}) are within the EPA's acceptable risk range for the current and proposed future land use scenarios. Volatile organics in groundwater do not pose a threat to human health because ingestion of on-site groundwater is not an exposure pathway under the current or proposed future land use under BRAC. The risks posed by other constituents (i.e., metals, SVOCs) fall within or below the EPA target ranges. Lastly, the plume of volatile organics extends off-site, although no constituent concentrations have been detected above the applicable ARARs.

Soil Clean-up Goals

The soil clean-up goals for the Ash Landfill are presented in Table 8-1. As noted above for the groundwater clean-up goals, the list of the constituents of concern was derived in the site specific data evaluation section of the Ash Landfill RI. The values for soil clean-up presented in NYSDEC TAGM #HWR-92-4046 are to be considered (TBCs) because they are not promulgated standards. These values are not used to determine the necessity of remediation but are used as guidelines in setting the remedial goals.

As noted above in the groundwater clean-up goals section, the site hazard index and total cancer risk are within the acceptable EPA risk range. However, the most significant risk comes from several exposure routes most notably soil ingestion, dermal contact with soil, and inhalation of compounds that volatilize from surface soils. These risks, however, were reduced by the non-time critical removal action that was performed on the source of the VOCs in soils near the "Bend in the Road."

Lead was not considered as part of the risk assessment because the EPA has withdrawn the allowable Reference Dose (RfD) value for lead. A site-specific clean-up goal for soil and on-site sediment was established at 500 mg/kg for lead as part of the Feasibility Study for the OB Grounds at SEDA. This clean-up goal has been adopted for the Ash Landfill.

8.5 General Response Actions

Remedial Action Objectives for the Ash Landfill are based upon two criteria. The first criteria is the need to achieve acceptable risk for the intended land use and the second is to achieve compliance with all ARARs. As previously discussed, the BRA has concluded that for the proposed use of this land as a meadow (i.e., conservation land), the risks to human health are acceptable. However, the groundwater quality does exceed the current New York State Classification standard of GA for TCE and the breakdown products 1,2-DCE and vinyl chloride. Because of this, remedial actions to improve the quality of the groundwater to meet GA groundwater standards need to be considered.

Also, the ecological risk analysis suggested that a slight threat may exist due to the presence of heavy metals based upon a comparison with all available state and federal guidelines and literature information. However, field observations and ecological monitoring data indicated that a diverse, healthy ecological community exists at the site. These observations and data are consistent with the aforementioned guideline comparison evaluation that suggested if any slight increased risks exist, these risks would be manifested in an increase in chronic (long-term) effects and, therefore, would not be readily apparent. Additionally, the uncertainty associated with the characterization of ecological risks further contributes to the contention that the evidence does not currently require a remedial action, especially since no ecological based ARAR has been exceeded by the site conditions.

Even though the risk analysis indicates that soil remediation is not a requirement, the ecological risk assessment does suggest that metals may be a source of increased chronic risk. Several chemicals exceed NYSDEC TAGM values recommended for site clean-up and, although these TAGM values are not ARARs, they still must be considered in the analysis. Since the areas at the site were not covered with an engineered cap, and areas such as the Ash Landfill and the debris piles have chemical impacts at the surface, there is a need to consider improving the condition of these areas.

Non-Time Critical Removal Action

One of the Remedial Action Objectives for this site is to improve the quality of the groundwater to the quality of GA groundwater standards. Actions have already been taken to achieve this objective through the implementation of the non-time critical removal action. Since there are no soil ARARs available, the remediation objectives and volumes of soil that have been established as requiring treatment for this action were determined by considering the NYSDEC TAGM values for soil clean-up. Based upon the risk analysis, the soil remediation for VOC constituents was not a requirement. Because a clearly defined source of groundwater impacts by VOCs was apparent, elimination of this source hastened the improvement of groundwater quality. Additionally, although the total site risks for the current and intended future land uses do not exceed the maximum EPA carcinogenic risk target value of 1×10^{-4}, the value is very close to this limit and it is likely to have been reduced by removal action. The most significant contributor to this total site risk value was the inhalation of volatiles emitted from the source soils.

The non-time critical removal action accomplished the following:

- It eliminated continued leaching of VOCs to groundwater from on-site soils.
- It mitigated exposure pathways for inhalation of VOCs, dermal contact and ingestion of VOCs soils for current and intended future site-use scenarios thereby decreasing the risk to human health.
- It complied with NYSDEC Soil Clean-up TAGM values for VOCs.
- It decreased the risk to ecological receptors.

Goals of the Remedial Action Alternatives

The goals (or intended accomplishments) of both the soil/sediment and groundwater remedial action alternative are presented below.

Soils/sediment remedial action alternatives were developed to accomplish the following:

- Mitigate exposure pathways for dermal contact and ingestion of metals and PAHs for current and intended future site use scenarios, thereby decreasing the already low risk to human health and the environment.
- Achieve NYSDEC soil clean-up TAGM values (TBCs) for inorganics (metals) and PAHs.

Groundwater remedial action alternatives were developed for the following:

- Comply with NYSDEC soil clean-up TAGM values (TBCs) for inorganics (metals) and PAHs.
- Comply with ARARs for Federal or New York State GA groundwater quality standards.
- Reduce and improve non-carcinogenic and cancer risk levels for current and intended future receptors.
- Prevent exposure to off-site receptors through possible off-site migration of the VOC plume.

For groundwater, the feasibility study considered options that improve the quality of the existing plume and manage the off-site migration of the plume.

RAO Summary and Response Action Alternatives

The Remedial Action Objectives for soil focus on mitigating exposure pathways for dermal contact and ingestion of metals and PAHs. To achieve these objectives for soil, three areas of the site, the Ash Landfill, debris piles, and NCFL, must be excavated, treated, or covered. For groundwater, the Removal Action conducted for source soils at the "Bend in the Road" was performed to mitigate the source of volatile organics which continue to leach into the groundwater. This Removal Action involved treatment of VOCs and PAHs in soils at the two areas designated as Areas A and B. Because the source of the groundwater plume has been removed, the Remedial Action Objectives for groundwater now involve management of the VOC plume, which includes improving the quality of the existing plume and managing the migration of the plume off-site. Therefore, assembling and screening of alternatives have been conducted separately in terms of Source Control (SC) for soil/sediment and Migration Control (MC) for the groundwater plume because the technologies, remedial actions, and constituents of concern for Source Control and Migration Control are clear and distinct for each media. Furthermore, separation of Source Control actions and Migration Control actions provides a more effective means of implementing a remedial action as evidenced by the non-time critical removal action performed by the Army for soils at the "Bend in the Road." That is, Remedial Action Objectives for each media may be achieved more effectively by developing and conducting the alternatives independently of one another.

Completion of the removal action for the source of the groundwater plume has minimized the interaction between the soil and the groundwater media. According to Section 4.2.6 of the CERCLA RI/FS Guidance Manual (USEPA, 1988), if interactions between the two media are not significant, an FS may describe options by media instead of on a site-wide basis. This approach permits greater flexibility in developing alternatives. The list of Source Control and Migration Control response actions for the Ash Landfill site are presented below.

Source Control

General response actions for source control (soil/sediment treatment) at the Ash Landfill are divided into the following groups:

- No-action
- Institutional controls
- Containment
- In situ treatment
- Removal

- Ex situ treatment
- Disposal

For source control, the following general response actions were retained:

- No-action
- On-site consolidation and containment,
- On-site treatment including innovative technologies, and
- Off-site disposal.

Technologies and processes associated with these actions are assembled into alternatives and presented in Table 8-2.

Migration Control

General response actions for migration control (groundwater treatment) at the Ash Landfill are divided into the following groups:

- No-action
- Institutional controls
- Containment
- Diversion
- Collection and removal
- In situ treatment
- On site (ex situ) treatment
- Off-site treatment

The general response actions retained for groundwater migration control are:

- No-action
- Institutional controls
- Collection and removal
- In situ treatment
- On-site treatment

Technologies and processes associated with these actions are assembled into alternatives and presented in Table 8-3.

Table 8-2

Assembled Remedial Alternatives for Source Control

Seneca Army Depot Activity
Ash Landfill Record of Decision

Alternative	Technologies and Process
SC-1	No Action.
SC-2	Excavation of both landfills/Disposal in an off-site non-hazardous Subtitle D landfill.
SC-3	Excavation of various areas of the Ash Landfill/Consolidation to the NCFL/Cap the NCFL
SC-4	Excavation/Wash/Backfill coarse fraction/Landfill and solidify fine fraction
SC-5	Excavation of Debris Piles/Off-site Subtitle D landfill/NCFL and Ash Landfill areas covered.

Table 8-3

Assembled Remedial Alternatives for Migration Control

Seneca Army Depot Activity
Ash Landfill Record of Decision

Alternative	Technologies and Process
MC-1	No Action.
MC-2	Natural attenuation and degradation of plume/Institutional controls
MC-3/MC-3a	Air sparging of plume/Funnel-and-gate system/Iron fillings
MC-4	Interceptor trenches/Tank storage/Filtration/Liquid-phase activated carbon/Discharge to surface water
MC-5	Interceptor trenches/Tank storage/Filtration/Air stripping/Discharge to surface water
MC-6	Interceptor trenches/Tank storage/Filtration/UV oxidation/Discharge to surface water
MC-7	Interceptor trenches/Tank storage/Filtration/Two-stage biological treatment/Discharge to surface water

9.0 DESCRIPTION OF ALTERNATIVES

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

This ROD evaluates in detail, 4 source control and 6 migration control remedial alternatives that address the contamination associated with the Ash Landfill site. The time to implement a remedial alternative reflects only the time required to construct or implement the remedy and does not include the time required to design the remedy, negotiate with the responsible parties, procure contracts for design and construction or conduct operation and maintenance at the site.

9.1 Description of Alternatives for Source Control

A detailed option screening included an extensive ranking process on the nine evaluation criteria [1) overall protection of human health and the environment, 2) compliance with applicable or relevant and appropriate requirements, 3) long-term effectiveness and permanence, 4) reduction of toxicity, mobility, or volume, 5) short-term effectiveness, 6) implementability, 7) cost, 8) state acceptance, and 9) community acceptance]. Overall protection of human health and Compliance with Applicable or Relevant and Appropriate Requirements (ARARs) were considered threshold criteria because any alternative that did not meet these criteria was not considered further. Alternatives, SC-1, and SC-3 through SC-5 were retained for a detailed screening analysis. Alternative SC-2 was eliminated from futher consideration because it did not to meet threshold criteria requirements as well as the other alternatives. These alternatives are discussed in detail in the FS and the pre-draft Proposed Remedial Action Plan (PRAP).

The following source control remedial alternative were evaluated:

Alternative SC 1 - No-Action: This alternative was evaluated in detail in the FS to serve as a baseline to other source control remedial alternatives under consideration, which is required by the Superfund program. There are no costs associated with no-action option. The no-action option means that no remedial activities would be undertaken at the site. No monitoring or security measures would be undertaken. Any attenuation of the threats posed by the site to human health and the environment would be the result of natural processes. Current security measures would be eliminated or modified so that the property may be transferred or leased as appropriate. The only activity would be an EPA-required site review every 5 years. The Superfund program requires the "no-action" atlernative to be considered as a baseline for comparison to other alternatives.

Alternative SC-3 - Excavation of the Ash Landfill and Debris Piles/Consolidation at the NCFL/Cap the NCFL: This alternative consists of excavating contaminated soils from the Ash Landfill area, the "Bend-in-the-Road" area (considering that the non-time critical removal action treatment for volatile organics has been completed), and the debris piles, and consolidating them in the NCFL. This option is feasible for the non-volatile residuals at the site, and it would be feasible for management of areas not impacted with volatile organics or for the non-volatile residuals that exist in the two areas remediated under the non-time critical removal action. An excavation plan would be developed using previous RI data to delineate the extent of removal. The maximum volume to be excavated is approximately 32,400 cubic yards, which includes all the soils except those in the NCFL; the soils in the NCFL would remain in-place. The residual materials from the non-time critical removal action would be used as replacement fill material. The final cap at the NCFL would consist of an impermeable barrier such as clay or a geomembrane, covered with a vegetative layer. Because this option would result in contaminants remaining on-site, CERCLA requires that the site be reviewed every five years. If justified by the review, remedial actions may be implemented to remove or treat the wastes.

Estimated Capital Cost: $1.33 million
Estimated Operation and Maintenance Cost: $33,150
Estimated Present-Worth Cost (30 years): $1.65 million
Estimated Time for Construction: One week to set up staging and construct an equipment decontamination pad. Remediation would take one to two months depending on the weather.

Alternative SC-4 - Excavation/Soil Washing/Backfill Coarse Fraction/Solidify Fine Fraction/Cap: This alternative involves five unit operations: excavation, soil washing, backfilling of the coarse fraction, solidification of the fine fraction, and capping. The volume to be processed for this option is approximately 68,700 yd^3. For this alternative, the sediments and soils would be excavated and processed to segregate the coarse fraction of soil from the fine fraction. The coarse fraction would be backfilled as clean fill, providing the requirements of the Remedial Action Objective are met. Fine particles would be treated through solidification, which is a process in which the contaminants are converted to less toxic, less mobile, and/or in soluble forms. Solidification of inorganic contaminated fines would be achieved with cement or pozzolanic additives. Organic solidification/stabilization would be accomplished with thermo-plastic or organic polymerization additives (EPA, 1989). For soils containing both organic and inorganic contaminants, a combination of these processes would be used. Treatability testing would be conducted to determine the quantities and types of admixtures which best satisfy the treatment criteria for this site. Cement-based stabilization would be the likely choice for the Ash Landfill. Solidification/stabilization would be conducted in a batch mode. The coarse soils that exceed the Toxicity Characteristic Leaching Procedure (TCLP) requirements would also be solidified prior to landfilling in the NCFL. Coarse soils that do not exceed TCLP requirements will be backfilled on-site. In addition to decreasing the constituent mobility by binding constituents into a leach-resistant, concrete-like matrix, this process is also expected to increase the waste material volume by approximately 50%. Solidification is expected to be completed at 75 ton/hour (tph) or about 50 cy/hr.

Estimated Capital Cost: $31.36 million
Estimated Operation and Maintenance Cost: $33,150
Estimated Present-Worth Cost (30 years): $31.67 million
Estimated Time of Construction: Remediation would take three to six months.

Alternative SC-5 - Excavation of Debris Piles/Disposal in an off-site, non-hazardous Subtitle D landfill/Vegetative Soil Cap Ash Landfill and NCFL: This alternative consists of excavating contaminated soils from the debris piles and transporting the soil to an off-site landfill. The residual materials from the non-time critical removal action would be used as replacement fill material. Selective excavation of the debris piles would effectively remove the highest concentrations of metals and PAHs at the site and essentially lower the risk levels associated with on-site soils. The first step in this alternative is to excavate the contaminated soils from the debris piles. An excavation plan would be developed using previous RI data to delineate the extent of removal. The maximum volume to be excavated is approximately 770 cubic yards, which includes all the soils associated with the debris piles. The soils in the NCFL and Ash Landfill would remain in-place and be capped with a vegetative cover. The excavation would be accomplished with standard construction equipment, such as a front end loader or bulldozer. The excavated soil would be temporarily stockpiled in a secure area, tested for disposal requirements, and disposed of off-site in a secure, non-hazardous waste, Subtitle D landfill (assuming that the soils meet the criteria for disposal). If testing indicates that the soils are not suitable for disposal in a Subtitle D landfill, then other options such as on-site land filling and capping would be considered.

Estimated Capital Cost: $240,890
Estimated Operation and Maintenance Cost: $61,960
Estimated Present-Worth Cost (30 years): $825,020
Estimated Time of Construction: One week to set up staging and construct an equipment decontamination pad. Remediation would take one to two months depending on the weather.

9.2 Description of Alternatives for Migration Control

A detailed option screening included an extensive ranking process on the nine evaluation criteria [1) overall protection of human health and the environment, 2) compliance with applicable or relevant and appropriate requirements, 3) long-term effectiveness and permanence, 4) reduction of toxicity, mobility, or volume, 5) short-term effectiveness, 6) implementability, 7) cost, 8) state acceptance, and 9) community acceptance]. Overall protection of human health and Compliance with ARARs were considered threshold criteria because any option that did not meet these criteria was not considered further. Alternatives MC-1 through MC-3, MC-5, and MC-6 were retained for a detailed screening analysis. Alternatives MC-4 and MC-7 were eliminated from consideration because they did not meet threshold criteria requirements. All of these migration control alternative are discussed in detail in the FS and the pre-draft PRAP.

The following migration control alternative were evaluated:

Alternative MC-1 - No-Action: This alternative was evaluated in detail in the FS to serve as a baseline to other source control remedial alternatives under consideration, which is required by the Superfund program. There are no costs associated with no-action option. The no-action option means that no remedial activities would be undertaken at the site. No monitoring or security measures would be undertaken. Any attenuation of the threats posed by the site to human health and the environment would be the result of natural processes. Current security measures would be eliminated or modified so that the property may be transferred or leased as appropriate. The only activity would be an EPA-required site review every 5 years. The Superfund program requires the "no-action" atlernative to be considered as a baseline for comparison to other alternatives.

Option MC-2 - Natural Attenuation of Plume/Institutional Controls: In this alternative, reduction of the concentration of VOCs in the plume is achieved by natural biodegradation mechanisms in combination with institutional controls such as land use restrictions, groundwater monitoring, and an alternate water supply. This management of source control alternative is similar to the "no action" alternative, MC-1, with the added condition that institutional controls would be included to prevent exposure to groundwater. There are a number of institutional controls that are currently in place at the Ash Landfill, and would be part of any long-term solution, including fencing and limited security (once the Depot is closed). Other institutional controls for the Ash Landfill site would include a deed restriction to indicate that no drinking water wells should be constructed on-site, and an alternate water supply for any future on-site residences. To protect off-site receptors, additional monitoring wells would be installed along the SEDA boundary. And, the groundwater quarterly monitoring program started in 1987 would continue, with additional testing to be performed to address the possibility of metals and semivolatiles leaching into the groundwater and the possibility of the plume of chlorinated organics impacted groundwater plume migrating towards off-site receptors. If the groundwater data from these monitoring wells indicate a statistically significant rising trend in the concentrations of heavy metals or semivolatiles, a contingency plan would be initiated.

Estimated Capital Cost: $ 153,000
Estimated Operation and Maintenance Cost: $ 117,000
Estimated Present-Worth Cost (30 years): $1,253,000
Estimated Time of Construction: None.

Alternative MC-3 - Air Sparging of Plume: Alternative MC-3 uses an in situ treatment process (air sparging) to achieve reduction of VOC concentrations in groundwater. The treatment uses the concept of air stripping to remove volatile organic compounds from groundwater. Air sparging of groundwater would be conducted using interceptor trenches. Alternative MC-3 involves installation of two air sparging trenches and two vapor extraction trenches above the sparging trenches to collect the sparged volatiles. The system would consist of a sparging trench in the saturated soil and a vapor recovery trench above the sparging trench. A trench for air sparging would be constructed in cohesive soils by direct excavation, installation of gas lines, and either leaving the trench open or backfilling with coarse gravel. Two trenches, one located just down gradient of the former source areas and the other located at the "toe" of the existing VOC plume, would be installed perpendicular to the direction of groundwater flow and to the top of impermeable bedrock. Horizontal piping would be used in the trench to act as air injection and vapor extraction points. The volatilized organics would be captured by the vapor recovery wells, in much the same manner as a soil vapor extraction system. The air stream would be passed through vapor-phase carbon or some other vapor treatment technology to meet the requirements of air quality standards. Periodic groundwater monitoring would be used to assess the progress of the treatment. This option has a treatment time of up to 25 to 30 years.

Estimated Capital Cost: $ 716,000
Estimated Operation and Maintenance Cost: $ 270,000
Estimated Present-Worth Cost (20 years): $ 3,015,000
Estimated Time of Construction: Treatability testing would take two to three months. Construction and startup should take 2 to 3 months.

Alternative MC-3a - Funnel and Gate: This alternative would use low conductivity cut-off walls (funnel) to divert groundwater flow to an in situ reaction zone (gate). Three cut-off walls would be installed with two cut-off walls located in the same basic configuration as the sparging trenches. A third cut-off wall would be installed between the other two walls. The gates would be located at the point of convergence of the cut-off walls. The gates would be designed using sheet piling to construct a rectangular box. Native material would then be excavated and replaced with granular iron with a layer of peat gravel placed on either side of the granular iron. The iron would be placed to intercept the saturated thickness of the plume in the treatment zone (iron filings have been demonstrated to be effective in treating chlorinated solvents). The reaction chemistry involves the simultaneous oxidative corrosion of the reactive iron metal by both water and the chlorinated compounds. Bench-scale treatability tests would be required to determine the degradation rates of VOCs. Using initial VOC concentrations and degradation rates, the residence time that the groundwater must be in contact with the iron to meet treatment objectives would be determined. The thickness of the reactive zone would be determined using the groundwater velocity and the degradation rates from the bench-scale testing. Residence times can vary from 5-50 hours for chlorinated solvents such as TCE, vinyl chloride, and cis-1,2-dichloroethene. Air sparging may be substituted for iron filings to treat groundwater in this system.

Estimated Capital Cost: $ 1,049,200
Estimated Operation and Maintenance Cost: $ 64,120
Estimated Present-Worth Cost (10 years): $ 1,443,200
Estimated Time of Construction: Treatability testing would take two to three months. Construction and startup should take 2 to 3 months.

Alternative MC-5 - Interceptor trenches/Tank storage/Filtration/Air Stripping/Discharge to surface water: This alternative would involve diverting the impacted groundwater from interceptor trenches to a nearby air stripping treatment system; this is commonly referred to as a "pump-and-treat" method of decontaminating groundwater. Three trenches would be installed. One interceptor trench would be located as close as possible to the fence which runs along the western boundary of SEDA. This trench would prevent off-site migration of the plume. A second trench would be located in the middle of the plume, and would be constructed in a "V" shape, with a collection sump in the bottom of the "V." The location of the second trench would depend on the results of the trench test, and on the results of the non-time critical removal action that was performed on the soils near the "Bend in the road." A third trench would be located between the two trenches described above. Each trench would be approximately 1,000 feet long by 3 feet wide by 8 feet deep. The trenches would extend from the ground surface to the competent shale bedrock. The collection trenches would discharge to a collection sump and be pumped to an on-site treatment facility. Filtration would be provided to remove any collected sediment and precipitated metals. Air stripping would be used as the treatment process that would reduce the concentration of dissolved chlorinated organics to the remedial action objectives which are GA groundwater quality standards. Depending on the air emissions requirements, the air phase may be treated or directly discharged to the atmosphere. Air emission control technologies include: vapor-phase activated carbon, thermal oxidation or catalytic oxidation. Following treatment, the effluent would be discharged to the drainage ditches that exist along the edge of patrol roads, which eventually drain to Kendaia Creek. This surface water discharge would need to meet the NYSDEC stream classification quality standards for Kendaia Creek.

Estimated Capital Cost: $997,000
Estimated Operation and Maintenance Cost: $290,000
Estimated Present-Worth Cost (10 years): $2,781,000
Estimated Time of Construction: Treatability testing would take two to three months. Construction and startup should take 2 to 4 months.

Alternative MC-6 - Interceptor Trenches/Tank Storage/Filtration/Hardness Removal/UV Oxidation/Liquid-Phase Carbon/Drainage Ditch Surface Water Discharge: This alternative, which is similar to alternative MC-5, involves collecting groundwater using interceptor trenches and pumping the collected groundwater to an on-site treatment facility. The collected groundwater would receive pretreatment including flow equalization from temporary storage and filtration to remove suspended sediment and any precipitated metal oxides. Following the pretreatment of groundwater, liquid phase chemical oxidation from hydroxyl radicals would be produced from the interactions of ultraviolet (UV) radiation and hydrogen peroxide, H_2O_2. Ozone would be added if treatment effectiveness is lower than required. Using metering pumps, the contaminated groundwater would be mixed with peroxide, and then it would enter the UV reaction chamber. If required, ozone would be added to the reaction chamber, and hydroxyl radicals would be formed. The formation of the hydroxyl radicals is catalyzed by the UV light. The hydroxyl radicals react rapidly with the chlorinated organics, generating carbon dioxide, chloride and water. If ozone is added, any ozone not reacted would be decomposed in an ozone treatment unit prior to discharge.

The effluent from the UV treatment process would be discharged to the drainage ditches that exist along the edge of patrol roads, which eventually drain to Kendaia Creek. This surface water discharge would need to meet the NYSDEC stream classification quality standards for Kendaia Creek.

Estimated Capital Cost: $716,000
Estimated Operation and Maintenance Cost: $117,000
Estimated Present-Worth Cost (10 years): $1,437,000
Estimated Time of Construction: Treatability testing would take two to three months. Construction and startup should take 2 to 4 months.

10.0 SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

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

A detailed alternative analysis using the nine evaluation criteria was performed to select a site remedy. This section presents a summary of the comparison of each alternative's strengths and weaknesses with respect the nine evaluation criteria. Because this ROD addresses both source control alternatives and migration control alternatives, the evaluation for each is presented separately.

10.1 Summary of Evaluation Criteria

The nine criteria are summarized as follows:

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

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

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

3. **Long-term effectiveness and permanence** addresses the criteria that are used to assess alternatives for the long-term effectiveness and permanence they afford, along with the degree of certainty that they will prove successful.

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

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

8. **State acceptance** addresses the state's position and key concerns related to the selected remedy and other alternatives, and the state's comments on ARARs or the proposed use of waivers.
9. **Community acceptance** addresses the public's general response to the alternatives described in the Proposed Plan and RI/FS.

The alternatives assembled for both source and migration control were screened as described in EPA guidance. These alternatives, were evaluated against short-term and long-term aspects of three broad criteria: effectiveness, implementability and cost. Because the purpose of screening is to reduce the number of alternatives that will undergo detailed analysis, the screening conducted in this section is of a general nature. Although this is necessarily a qualitative screening, care has been taken to ensure that screening criteria are applied consistently to each alternative and that comparisons have been made on an equal basis, at approximately the same level of detail.

10.2 Discussion of Source Control Alternatives

The following discussion presents the nine criteria and brief narrative summaries of source control alternatives and identifies the relative advantages and disadvantages of each according to the detailed comparative analysis. A summary of the analysis of each alternative in terms of the criteria is presented in Table 10-1.

Overall Protection of Human Health and the Environment - Successful application of alternatives SC-4 and SC-5 would provide the highest level of overall protection because the contaminated soil would be removed, treated on-site, backfilled on-site and capped. Alternative SC-3 also provides protection, but at a slightly lower level that alternatives SC-4 and SC-5. Under

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Table 10-1
Individual Evaluation of Source Control Options

Criteria	Alternative SC-1 No Action	Alternative SC-3 Excavation/Consolidation to On-site Landfill/Cap	Alternative SC-4 Excavation/Soil Washing/ Solidify Fines/Cap	Alternative Sc-5 Excavation of Debris Piles/ Off-Site Subtitle D Landfill
OVERALL PROTECTIVENESS OF HUMAN HEALTH AND THE ENVIRONMENT				
Human Health Protection (EPA target range is 1 x 10E-4 to 1 x 10E-6 for carcinogenic risk and an HI < 1.0 for noncarcinogenic risk)	Sum of risks to current off-site resident, future on-site hunter and future on-site construction worker 2.9 E-05 HI = 0.22	Sum of risks to current off-site resident, future on-site hunter and future on-site construction worker 2.87E-05 HI = 0.1911	Sum of risks to current off-site resident, future on-site hunter and future on-site construction worker 2.83E-05 HI = 0.1934	Sum of risks to current off-site resident, future on-site hunter and future on-site construction worker 2.87E-05 HI = 0.1911
Exposure Pathways Include: Ingestion of Groundwater Dermal Contact Inhalation of Volatile Organics Ingestion of Soils (Future On-site hunter and construction worker only)	Not protective; Soils remain in-place.	Protective of human health; dependant on landfill maintenance	Protective of human health; Soils > NYSDEC Criteria excavated, washed, fines solidified	Protective of human health; dependent on landfill maintenance
Protection of Ecological Receptors	Does not protect receptors	Protects ecological receptors; Sediments > NYSDEC Criteria removed from Ash Landfill area.	Protects ecological receptors; Sediments > NYSDEC Criteria excavated, washed, fines solidified	Protects ecological receptors; Sediments > NYSDEC Criteria removed from Ash Landfill area.
COMPLIANCE WITH ARARs	Will comply with all ARARs	Will comply with all ARARs	Will comply with all ARARs	Will comply with all ARARs
LONG-TERM EFFECTIVENESS AND PERMANENCE				
Magnitude of Residual Risk	Sources have not been removed. Potential threat will remain.	No residual risk will exist , providing landfill does not leak.	Treatment residuals consisting of coarse fraction will remain on-site but will be tested to assure that no unacceptable levels contamination. Fines solidified to render unreactive	No residual risk will exist providing maintenance of cover integrity. Also, the Debris Piles will be disposed of off-site.
Permanence	Not a permanent solution.	Once soils are placed in the on-site landfill, the remedial action would be permanent, provided cap integrity is maintained.	Upon completion this action will be considered permanent.	Once soils are placed in the off-site landfill, the remedial action would be permanent, provided cap integrity is maintained.

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Table 10-1
Individual Evaluation of Source Control Options

Criteria	Alternative SC-1 No Action	Alternative SC-3 Excavation/Consolidation to On-site Landfill/Cap	Alternative SC-4 Excavation/Soil Washing/ Solidify Fines/Cap	Alternative Sc-5 Excavation of Debris Piles/ Off-Site Subtitle D Landfill
REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT				
Reduction of Toxicity, Mobility, or Volume	Little to none; Some attenuation is expected due to natural mechanisms.	Very effective in reducing mobility; no effect on toxicity or volume of contaminated soils.	Very effective in reducing volume, toxicity, and mobility. Solidification reduces toxicity and mobility. Soil washing reduces the volume.	Very effective in reducing mobility; no effect on toxicity or volume of contaminated soils.
SHORT-TERM EFFECTIVENESS				
Community Protection	Most protective under current conditions as current risk is within acceptable ranges.	Most protective of remedial actions as no transportation of waste materials off-site will occur. Some dust will be produced during filling and construction of landfill.	Least protective as large volume of contaminated soils is required. Hazardous materials (acids) may be transported on-site for extraction.	Moderately protective as transportation of waste materials off-site will occur.
Worker Protection	Not applicable.	Most protective of remedial actions as no transportation of waste materials off-site will occur. Some dust will be produced during filling and construction of landfill. Protection required from exposure.	Least protective ; Excavation and off-site transportation of waste materials increase potential for worker exposure and risk. Use of hazardous materials will also increase potential for worker exposure.	Moderately protective ; Excavation and off-site transportation of waste materials increase potential for worker exposure and risk.
Environmental Impacts	Not applicable.	Excavation will increase potential for dispersion of contaminated soil	Least protective due to increased potential for spills during washing.	Excavation will increase potential for dispersion of contaminated soil
Time Until Action is Complete	Not applicable	Remdial action: 1 to 2 months	Mob. & Prove-out: 1 to 2 months Soil Washing: 1 to 3 months Backfilling & Demob.: 1month. Moderate time required to attain goals, due to soil washing process rate.	Remediation action: 1 to 2 months.

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Table 10-1
Individual Evaluation of Source Control Options

Criteria	Alternative SC-1 No Action	Alternative SC-3 Excavation/Consolidation to On-site Landfill/Cap	Alternative SC-4 Excavation/Soil Washing/ Solidify Fines/Cap	Alternative Sc-5 Excavation of Debris Piles/ Off-Site Subtitle D Landfill
IMPLEMENTABILITY				
Technical Feasibility	Not applicable.	Very feasible; area with VOC has been remediated. Equipment required for excavation is standard.	Soil washing is feasible but least feasible of the four remedial actions as this technology is considered the most innovative and least proven for Ash landfill conditions.	Very feasible; area with VOC has been remediated. Equipment required for excavation is standard.
Ease of Doing More Action if Needed	Least interference, as nothing would be done to prevent required future action.	Most interference as on-site landfill will hamper any future actions.	Moderate level of interference as some equipment slabs and roadways may interfere with future actions. Solidified fines mass fairly permanent	Least level of interference as Debris Piles will be removed and NCFL and Landfill will be covered.
Ability to Obtain Approvals and Coordinates with Other Agencies	No approval necessary	Cap technology considered a temporary solution by the EPA.	Moderately likely to be approved as this alternative will involve the construction of a waste treatment facility.	Landfill space is abundant in the region. Permitting will not be req. providing the waste meets the requirements of the landfill. Standard bill of lading required to transport waste materials to facility. Most likely to be approved.
Availability of Services and Materials	No services or capacities required	Moderately available, requires specialized materials and installation contractors.	Least available, as technology is available from small, specialized group of soil washing contractors.	Very available; Subtitle D landfills located nearby.
COST				
Capital Cost	$0	$1.33 Million	$31.36 Million	$240,890
Annual O&M Cost	$0	$33,150	$33,150	$61,960
30 Year Present Worth O&M Cost	$0	$312,520	$312,520	$584,130
30 Year Present Worth Cost	$0	$1.65 Million	$31.67 Million	$825,020

alternative SC-3, protection is provided by excavation and a cap, which would prevent direct contact with contaminated soil; however, the contaminants would remain on-site, and protection would depend on continued maintenance of the cap. Alternative SC-1, "no action" provides no additional level of overall protection that is not provided by the existing condition of the site at SEDA. And, under these conditions, the results of the human health and environmental risk assessments indicate that overall protection of human health and the environment is still provided.

Compliance with ARARs - There are no chemical-specific ARARs for this site because there are no promulgated soil cleanup standards. All of the alternatives meet all of the other ARARs, which are discussed in the FS.

Long Term Effectiveness and Permanence - The criterion of long-term effectiveness addresses the long-term protectiveness to human health and the environment. Most of the detailed alternatives are highly effective in eliminating the long-term threats. The results of the BRA indicate that for current and intended future use of this site, the risks are within the EPA target range for carcinogenic risks and below the acceptable target value for non-carcinogenic risks, especially since the VOCs were eliminated from the soils at the "Bend in the Road" during the non-time critical removal action. Consequently, there is no requirement to perform a risk-based remedial action since current site conditions are protective of human health. The environmental risk assessment did not identify unacceptable ecological risk and, therefore, current and intended future use of this site is also protective of the environment. However, the site-specific clean-up goal for lead in soil is not achieved by Alternative SC-1, the No Action Alternative. Alternative SC-4, in which the hazardous constituents are washed and solidified ranks high for long-term effectiveness because of the effectiveness of the solidification process. Alternatives SC-3 and SC-5 excavation/consolidation and capping, were not ranked high for long-term effectiveness because no treatment is performed. Alternative SC-1, the no action alternative, provides the least amount of long-term protection of human health and the environment because the dermal contact and ingestion of leaching of metals and PAHs will continue.

The rankings of the alternatives based on permanence are based upon the concept that those alternatives that reduce the overall site risk are ranked higher than those that do not. All of the alternatives that provide treatment are essentially permanent once the remedial action objectives have been obtained. Once the objectives have been met and the risk has been reduced to within acceptable criteria, there is no need to continue operation of the treatment program. Alternative SC-4 is considered to be the most permanent because this alternative involves treatment by soil washing and solidification. Alternative SC-3, the consolidation and capping alternative does not score as well since some soil containing hazardous constituents will remain on site. Alternative

SC-5 was ranked the same as SC-3. Alternative SC-1, the no action alternative is not permanent since no treatment is taking place.

Reduction of Toxicity, Mobility, or Volume Through Treatment - Source control alternatives have been compared relative to the decreases in the toxicity, mobility, and volume of the hazardous constituents present at the site.

Alternative SC-4 yields the greatest reduction in the toxicity by separating the fines and solidifying this smaller volume of material. Alternative SC-4 has advantages because hazardous constituents are normally concentrated in the fines fraction of the soil to be treated. The solidification process is more effective for fines than large aggregate materials and is most effective for metals and low concentrations of semi-volatile organic matrices. The solidification/stabilization process decreases the toxicity of the metals because the metals are converted to less soluble forms. Alternatives SC-3 and SC-5 do not score as well because both alternatives do not involve any treatment to reduce toxicity. However, these alternatives involve placing the soils in landfills, which consolidates the toxic materials and eliminates the exposure pathways. Alternative SC-1, the no action alternative does not reduce the toxicity of the hazardous constituents.

Alternative SC-4 provides the best reduction in mobility. Once the soils are washed, solidified and backfilled, the hazardous constituents are essentially immobile. In this option, the bulk of the contaminated soil is treated and backfilled, which immobilizes the hazardous constituents. In this alternative, some of the soil is left (or replaced) at the site, so there is a slight potential for mobility associated with this alternative. Alternative SC-3 will reduce the mobility by capping the landfill which will prevent leaching of contaminants from the landfill area. Alternative SC-1, the no action alternative, does nothing to reduce the mobility of the hazardous constituents and was ranked low. Alternative SC-5 received the same score as SC-3.

Alternative SC-4 provides the greatest volume reduction of the contaminated soils. For SC-4, the hazardous constituents are concentrated in the fines fraction, which reduces the volume of the contaminated soil to approximately 30 percent of the original volume. The soil is then solidified, which will cause some increase in volume but overall the volume of hazardous constituents in soil is reduced. Alternatives SC-3 and SC-5 rank lower because these alternatives do not provide volume reduction. Rather, the soils which are excavated and landfilled will increase in volume by approximately 20% as a result of the excavation process. In Alternative SC-1, the no action alternative, there is slight volume decrease due to natural processes.

Short-term Effectiveness - Alternative SC-1, the no action alternative provides good short-term protection of human health and the environment because of the administrative and land use controls currently in place. The remaining three alternatives involve excavating the soils, which would lower short-term protection to workers. Therefore, Alternatives SC-3, SC-4 and SC-5 are ranked lower than SC-1. Alternative SC-3 and SC-5 were ranked below SC-1 because these alternatives involve limited excavation. The soil washing alternative, SC-4 rated lowest for short-term effectiveness because it involves handling of a large volume the contaminated soil, and large quantities of treatment residuals will be generated, such as spent wash water which must also be treated.

Implementability - The alternatives carried to the detailed analysis score high on implementability. For technical feasibility, alternative SC-1, (the no action alternative) scored the highest. Alternative SC-3 and SC-5 involve standard earth moving equipment. Alternative SC-4 is the hardest to implement because of the need for specialized soil washing equipment, however, enough soil washing vendors are available to ensure that this option is still viable.

Alternative SC-1, scored well on long term monitoring, since there will be no long term monitoring required. Alternatives SC-3 and SC-5, which includes construction of a cap or cone, require long-term groundwater monitoring. Alternative SC-4 will likely require long-term monitoring, although the amount of monitoring will be less than SC-3 since there has been a large decrease in the volume of material under consideration. Also, alternatives SC-3 and SC-5 would require long term maintenance of the impermeable cap.

The availability of the equipment, materials, and vendors is very good for all the alternatives. Alternative SC-4 scores the lowest because there are fewer soil washing vendors than there are excavation and capping vendors; however, this will not preclude implementation of this alternative. Alternatives SC-3 and SC-5 rates the best on availability, because these materials are more readily available from local suppliers than the other alternatives.

The last item to consider is agency approval. Alternative SC-1, the no action alternative is ranked lowest because of the impacts to groundwater. Alternative SC-3 also ranks low because alternative SC-3 utilizes a cap technology, which is considered to be a temporary solution by the EPA. Alternative SC-4 is the best because of the greatest volume reduction and the permanent destruction of pollutants. Alternative SC-5 received a higher score because it complies with ARARs and is cost-effective.

Cost - The last criterion to compare is cost. This comparison will evaluate the present worth costs of the alternatives.

The least cost alternative is SC-1, the no action alternative, which has no costs associated with it. SC-5 is the next least costly alternative because it requires only limited off-site disposal and a simple soil cover. SC-3 is the next least costly alternative because it involves excavation and clay capping with no off-site disposal. This can all be performed by local contractors with local materials. The most expensive alternative is the soil washing alternative SC-4 because it requires mobilization of specialized equipment and will also involve performing treatability studies. Although SC-4 has the highest present worth costs, it also provides the greatest reduction in the toxicity.

10.3 Summary of Source Control

The Baseline human health risk assessment indicates that under the current and future use of the site, the risk-based carcinogenic and noncarcinogenic human health risk values are within the EPA target ranges. Therefore, if risk-based health criteria are applied to the Ash Landfill, remedial objectives have been met with no further action. However, soils at the site have lead concentrations above the established clean-up goal of 500 mg/kg.

Alternatives SC-3, -4 and -5 were determined to meet the site specific remedial objectives for soil. That is, they are protective against dermal contact with and ingestion of soils in the debris piles and the landfills.

Alternative SC-5 received the highest overall score due to its low costs, protectiveness of human health and the environment, implementability and availability.

Alternative SC-4 ranks highest for long-term protectiveness of human health and the environment, permanence, and reductions in toxicity, mobility, and volume of hazardous constituents. Alternative SC-3 ranks next highest for costs because the present worth cost of this alternative is $1,860,000, which is the lowest cost of the remaining alternatives involving remedial actions.

10.4 Discussion of Migration Control Alternatives

The following discussion presents the nine criteria and brief narrative summaries of migration control alternatives and identifies the relative advantages and disadvantages of each according to the detailed comparative analysis. A summary of the analysis of each alternative in terms of the criteria is presented in Table 10-2.

Overall Protection of Human Health and the Environment - Successful application of alternatives MC-3 (including MC-3a), MC-5, and MC-6 would provide the highest level of overall protection of the human health and the environment by reducing and improving non-carcinogenic and cancer risk levels for current and proposed future receptors. Under these alternatives, the contaminants in the groundwater would be removed using insitu treatment or treatment in a nearby facilities. Alternatives MC-3 (including MC-3a), MC-5, and MC-6 would require treatability testing and/or pilot testing. Alternative MC-2 would provide overall protectiveness of human health and the environment for the short term according to data in the RI, however, the overall protection is slightly less than those mentioned above. Alternative MC-2 will provide long-term protectiveness, however, there is some uncertainty associated with long-term protectiveness because the off-site land use cannot be controlled. As part of this alternative, the Army intends to maintain an ongoing groundwater monitoring program, and ensure that the human health and the environment are protected, using institutional controls if necessary.

Compliance with ARARs - All of the alternatives meet all of the ARARs, noting that alternative MC-2 will comply with ARARs over time.

Long Term Effectiveness And Permanence - The migration control alternatives will provide long-term effectiveness and permanence. All of the alternatives, including the natural attenuation alternative (MC-2), are capable of reducing VOCs in the groundwater to levels below the NYSDEC Class GA standards. Once the groundwater concentration reaches the desired concentration, the remedial action will be considered complete and permanent. The key differences between the alternatives are in the time necessary to achieve the criteria, and in the quantity and nature of the treatment residuals.

Alternatives MC-3a, MC-5, and MC-6 (the "pump-and-treat" alternatives) will likely required 10 years, since these are dependent on the removal or treatment of groundwater. However, the time necessary to achieve the remedial action objectives for groundwater is likely to be significantly reduced because the source of VOCs in soil was removed during the non-time critical removal action.

The differences between the treatment residuals are easier to quantify. The natural biodegradation alternative, MC-2, has no treatment residual, since there is no treatment. The primary residuals from alternative MC-3, air sparging is spent carbon if vapor emission control is required. The

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Table 10-2
Individual Evaluation of Migration Control Options

Criteria	Alternative MC-1 No Action	Alternative MC-2 Alternate Water Source with Natural Attenuation of Plume	Alternative MC-3/MC-3a ir Sparging of Plume/Funnel-and-Ga with Zero Valence Iron	Alternative MC-5 Collection/Filtration/Air Stripping/Discharge	Alternative MC-6 Collection/Filtration/ UV Oxidation/Discharge
PROTECTIVENESS OF HUMAN HEALTH AND THE ENVIRONMENT Human Health Protection (EPA target range is 1 x 10E-4 to 1 x 10E-6 for carcinogenic risk and an HI < 1.0 for noncarcinogenic risk)	Sum of risks to current off-site resident, future on-site hunter and future on-site construction worker 2.9E-05 HI = 0.22	Sum of risks remaining to off-site resident, hunter & construction worker following elimination of groundwater exposure 2.9E-05 - 5.6E-06 = 2.34E-05 HI = (0.22 - 0.14 = 0.08)	Sum of risks remaining to off-site resident, hunter & construction worker following elimination of groundwater exposure 2.9E-05 - 5.6E-06 = 2.34E-05 HI = (0.22 - 0.14 = 0.08)	Sum of risks remaining following elimination of groundwater as an exposure pathway 2.9E-05 - 5.6E-06 = 2.34E-05 HI = (0.22 - 0.14 = 0.08)	Sum of risks remaining following elimination of groundwater as an exposure pathway 2.9E-05 - 5.6E-06 = 2.34E-05 HI = (0.22 - 0.14 = 0.08)
Exposure Pathways Include : Ingestion of Groundwater Dermal Contact Inhalation of Volatile Organics Ingestion of Soils (Future On-site hunter and construction worker only)	Not Protective; Ingestion of groundwater at site boundary could result in exposure	Protective; Alternative water supply eliminates exposure to groundwater.	Protective; Groundwater exposure is eliminated.	Protective; Groundwater exposure is eliminated.	Protective; Groundwater exposure is eliminated.
Protection of Ecological Receptors	Protective; Depth to groundwater prevents ecological expsoure; Natural mechanisms reduces conc.	Protective; Depth to groundwater prevents ecological expsoure; Natural mechanisms reduces conc.	Protective; No Exposure from groundwater	Protective; Conc. of groundwater is reduced prior to discharge	Protective; Conc. of groundwater is reduced prior to discharge
COMPLIANCE WITH ARARs	Not Compliant with ARARs	Compliance with ARARs will be attained but will require a longer period of time	Will comply with all ARARs	Will comply with all ARARs	Will comply with all ARARs
LONG-TERM EFFECTIVENESS AND PERMANENCE					
Magnitude of Residual Risk	Source of VOCs have been removed.Residual risk is within EPA Target Range	Source of VOCs have been removed.Residual risk is within EPA Target Range	No residual risk will exist , groundwater will be treated until it meets treatment criteria.	No residual risk will exist , groundwater will be treated until it meets treatment criteria.	No residual risk will exist , groundwater will be treated until it meets treatment criteria.
Permanence	Will be permanent once natural mechanisms reduce conc.	Will be permanent once natural mechanisms reduce conc.	Once treatment criteria of <5 ug/L is attained the action is permanent.	Once treatment criteria of <5 ug/L is attained the action is permanent.	Once treatment criteria of <5 ug/L is attained the action is permanent.

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Table 10-2
Individual Evaluation of Migration Control Options

Criteria	Alternative MC-1 No Action	Alternative MC-2 Alternate Water Source with Natural Attenuation of Plume	Alternative MC-3/MC-3a ir Sparging of Plume/Funnel-and-Ga with Zero Valence Iron	Alternative MC-5 Collection/Filtration/Air Stripping/Discharge	Alternative MC-6 Collection/Filtration/ UV Oxidation/Discharge
REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT					
Reduction of Toxicity, Mobility, or Volume	Any reduction will not be documented	Reduction is documented from attenuation and degradation of pollutants via natural mechanisms.	Effective; Constituents are removed or destroyed	Effective; Constituents are removed, trenches will eliminate mobility.	Effective; Constituents are destroyed, trenches will eliminate mobility.
SHORT-TERM EFFECTIVENESS					
Community Protection	Protective under current conditions as current risk is within acceptable ranges.	Protective under current conditions as current risk is within acceptable ranges.	Protective of community; air emissions from sparging eliminated via carbon, will comply with air quality standards.	Protective of community; air emissions from stripping eliminated via carbon, will comply with air quality standards.	Protective of community; No air emissions produced, will comply with air quality standards.
Worker Protection	Protective under current conditions as current risk is within acceptable ranges.	Protective under current conditions as current risk is within acceptable ranges.	Dust produced during construction will be eliminated via personnel protective equipment.	Dust produced during construction will be eliminated via personnel protective equipment.	Dust produced during construction will be eliminated via personnel protective equipment.
Environmental Impacts	Current, short-term, conditions are protective of the environment.	Current, short-term, conditions are protective of the environment.	Protective; Any soil excavated will not contain hazardous constituents.	Protective; Any soil excavated will not contain hazardous constituents.	Protective; Any soil excavated will not contain hazardous constituents.
Time Until Action is Complete	Not Applicable; No action is performed	Estimated to be 30 years with a degradation rate of 0.0003/day	Estimated to be 20 years for sparging; estimated to be 10 years with funnel and gate system.	Estimated to be 10 years with three trenches	Estimated to be 10 years with three trenches

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Table 10-2
Individual Evaluation of Migration Control Options

Criteria	Alternative MC-1 No Action	Alternative MC-2 Alternate Water Source with Natural Attenuation of Plume	Alternative MC-3/MC-3a ir Sparging of Plume/Funnel-and-Ga with Zero Valence Iron	Alternative MC-5 Collection/Filtration/Air Stripping/Discharge	Alternative MC-6 Collection/Filtration/ UV Oxidation/Discharge
IMPLEMENTABILITY					
Technical Feasibility	Feasible, Nothing is implemented	Feasible, Reductions from natural mechanisms are occuring and will continue to occur	Feasible; Some uncertainty as zero valence iron is innovative; will require treatability/pilot testing	Feasible; Air stripping is a proven technology for VOC removal in groundwater.	Feasible; UV oxidation is a proven tech. for chlorinated VOCs in groundwater.
Ease of Doing More Action if Needed	Not Applicable; as nothing would be performed in the future	Least interference, as nothing would be done to prevent required future action.	This technology will not interfere with any other remedial activities.	Will not interfere with other remedial activities.	Will not interfere with other remedial activities.
Ability to Obtain Approvals and Coordinates with Other Agencies	No Action will be unacceptable to regulatory agencies due to potential for off-site migration	Will require approval for waterline construction from town and the Dept. of Health.	NYSDEC and EPA input required prior to final remedy selection. Regulatory issues will be addressed.	Construction permits are readibly attainable. EPA and NYSDEC will provide input.	Construction permits are readibly attainable. EPA and NYSDEC will provide input.
Availability of Services and Materials	No services required	All services required to install waterline and monitor the plume are readily available.	Material and Services are available. All equipment required is standard	Materials and Services are readily available. All equipment is standard.	Materials and Services are specialized; not as available UV equipment is specialized.
COST					
Capital Cost	$0	$153,000 includes installation of 10 MWs and 4800 l.f. of 6" water main	MC-3 $716,000 MC-3a $1,049,200	$997,000	$716,000
Annual O&M Cost	$0	$117,000	MC-3 $270,000 MC-3a $64,120	$290,000	$117,000
Total Present Worth Cost (Assumes 10% Interest)	$0	30 year Cost $1,253,000	20 year Cost MC-3 $3,015,000 10 year Cost MC-3a $1,443,200	10 year Cost $2,781,000	10 year Cost $1,437,000

treatment residuals from the other alternatives are similar. All of the alternatives have many of the same unit operations. All will generate sludge from the filter backwash, and if a softener is utilized there will be softener regeneration water, and lastly, spent carbon will be generated from the carbon polishing unit. The air stripper and UV oxidation units will also generate residuals, from the oxidation of iron and possibly from calcium buildup if a softener is not used. Air strippers can also generate a biological slime that must be periodically removed.

Reductions of Toxicity, Mobility, or Volume Through Treatment - The migration control alternatives have also been evaluated for reductions in toxicity, mobility, and volume. All of the alternatives, including the natural degradation alternative MC-2 reduce the mobility of pollutants. Alternative MC-3 (including MC-3a) uses interceptor trenches to prevent off-site migration of the contaminant plume, while alternatives MC-5 and MC-6 use an interceptor trenches to collect groundwater for treatment.

There are substantial differences in the toxicity reductions achieved by the alternatives. The natural degradation alternative, MC-2, achieves a reduction in toxicity through natural attenuation of the chemicals in the plume. All of the other alternatives use active measures to reduce the toxicity.

Alternative MC-6, UV oxidation achieve the greatest reduction in toxicity. The potentially hazardous organics are effectively destroyed in the treatment process, where they are converted completely to nonhazardous substances. Untreated organics are captured during the carbon polishing step, and are destroyed during the carbon regeneration process. In alternative MC-5, air stripping, the toxicity of the constituents in groundwater is reduced by transferring of the constituents from the groundwater to the air. Alternative MC-3, air sparging reduces the toxicity through a combination of the above methods. Alternative MC-2 relies on natural attenuation to destroy the organics due to interactions between biological material and the pollutants.

All of the alternatives are effective in reducing the volume of the hazardous constituents at the site. The volume of groundwater which exceeds the NYSDEC criteria will be reduced over time as organics are removed from the groundwater. This reduction is expected to be expedited now that the source of VOCs in groundwater has been eliminated.

Short-Term Effectiveness - All of the migration control alternatives rate fairly well for short-term effectiveness. The interceptor or air sparging trenches would be installed in areas of little or no soil impacts, so there would be minimal risk of exposure during installation of the system. Also, during any excavation operation, all air emissions will meet federal and state criteria, which will minimize the risk to the community. In addition, all operations will be conducted within the fenceline, so site access will be restricted. Alternative MC-6 (UV oxidation) rated the highest for short-term effectiveness because this option has little or no air emissions and is effective in eliminating pollutants.

Implementability - Alternative MC-2, natural degradation, rates the best with regard to technical implementability, but rates low for administrative implementability due to probable regulatory disagreement because groundwater concentrations currently exceed the NY State GA groundwater standard. However, they are expected to meet these standards overtime. Alternatives MC-5, air stripping, and MC-6, UV oxidation rate high on a technical basis because both of alternatives rely on standard equipment that is readily available from a number of vendors, and because the standard technologies are generally well documented and proven and have a high degree of acceptance.

Alternative MC-3 (including MC-3a) rates moderately due to the uncertainties of implementing an in-situ technology. Alternative MC-3, also scores lower because it is not a proven technology, and the available vendors and equipment are somewhat limited.

Cost - The natural attenuation alternative (MC-2) is the most cost effective, since the only costs are those associated with continued quarterly groundwater monitoring and possibly institutional controls. MC-3a, funnel-and-gate, and MC-6 had the next overall lowest total costs after MC-2. Alternative MC-3, air sparging, has the highest total costs and MC-5, air stripping, was the next highest in cost after MC-3.

10.5 Summary of Migration Control

As described above, all of the alternatives described in the detailed analysis would be effective for the Migration Control remedial action at the Ash Landfill for the future intended use of the site.

Alternatives MC-2, -3, -5, and -6 were determined to meet the site specific remedial objectives for groundwater. All four alternatives rank equally for long-term protectiveness of human health and the environment. That is, the alternatives are effective in reducing the concentration of constituents of concern to below the NYSDEC GA or federal standards and protecting off-site receptors. All alternatives rank equally in reducing toxicity, mobility, and volume of hazardous constituents. The difference between the alternatives is in the time-to-compliance.

Alternative MC-2 ranks highest in terms of technical implementability. Alternatives MC-5 and MC-6 rank lower in terms of technical implementability, and Alternative MC-3 ranks lower because it is an innovative technology.

Alternative MC-2 ranks highest for costs because the only costs associated with this alternative are for groundwater monitoring and possible institutional controls.

Alternative MC-3a ranked high for total costs but low on short-term protectiveness and long term monitoring.

11.0 THE SELECTED REMEDY

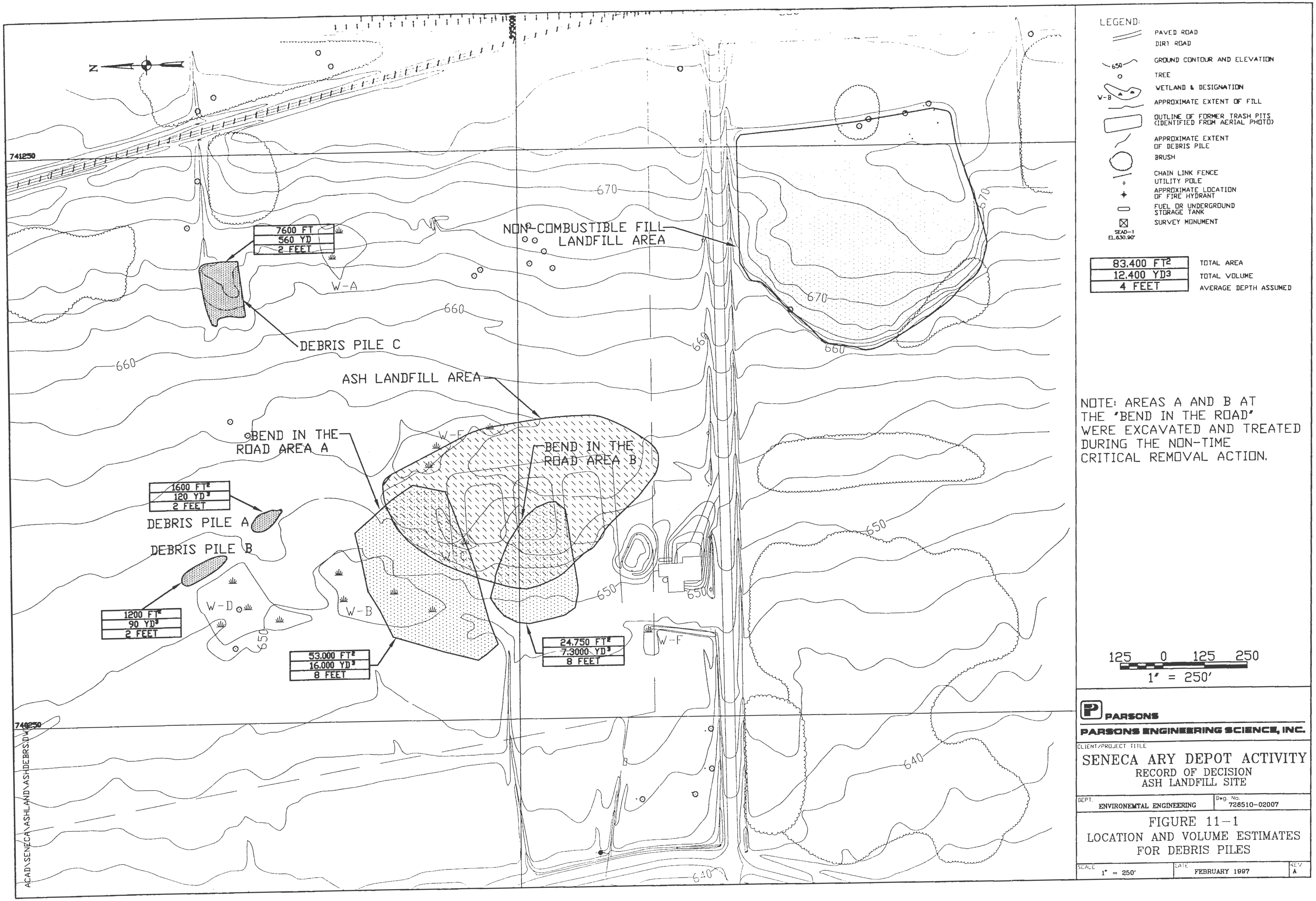
The selected remedy combines the source control and migration control alternatives. For source control the selected remedy is Alternative SC-5 and for migration control the selected remedy is MC-3a. Descriptions of the components of the alternatives that make up the selected remedy are provide below.

11.1 Description of the Components of the Source Control Portion of the Selected Remedy

The selected remedy for soil remediation (source control alternative SC-5) consists of excavation and off-site disposal of the soil piles designated as Debris Piles A, B, and C in Figure 11-1. The remedy for source control includes the following:

- Excavation of Debris Piles A, B, and C consisting of a total volume of approximately 770 yd^3 of material.
- Confirmatory soil sampling within excavations after contaminated soil removal.
- Off-site disposal of excavated soils.
- Backfilling and grading of excavation areas.
- Construction of a soil cap of at least 9 inches of compacted soils and seeding and maintenance of a vegetative cover for the Ash Landfill and NCFL areas shown in Figure 11-1.

For the source control remedy (SC-5) the soil piles that contain the highest concentrations of lead and PAHs at the Ash Landfill would be excavated, and stockpiled on-site, and tested to ensure that they are suitable for a non-hazardous, Subtitle D Landfill. If the soils are found to contain concentrations of contaminants that would classify them as a RCRA hazardous waste, then provisions would be made to dispose of the soils in a RCRA permitted facility. The excavation would be conducted using standard construction equipment and will not require any specialized equipment or procedures. The removal of the soil piles are being performed to comply with the site-specific cleanup goal of 500 ppm lead in soils. This remedial action will comply with all ARARs. All excavation areas would be sampled to ensure that cleanup goals are met. A vegetative soil cover would be constructed for both the Ash Landfill and NCFL areas using a 9-inch layer of compacted fill and vegetative cover.



LEGEND:
PAVED ROAD
DIRT ROAD
GROUND CONTOUR AND ELEVATION
TREE
WETLAND & DESIGNATION
APPROXIMATE EXTENT OF FILL
OUTLINE OF FORMER TRASH PITS (IDENTIFIED FROM AERIAL PHOTO)
APPROXIMATE EXTENT OF DEBRIS PILE
BRUSH
CHAIN LINK FENCE
UTILITY POLE
APPROXIMATE LOCATION OF FIRE HYDRANT
FUEL OR UNDERGROUND STORAGE TANK
SURVEY MONUMENT
SEAD-1
EL.630.90'
83,400 FT2 TOTAL AREA
12,400 YD3 TOTAL VOLUME
4 FEET AVERAGE DEPTH ASSUMED
NON-COMBUSTIBLE FILL LANDFILL AREA
DEBRIS PILE C
7600 FT
560 YD
2 FEET
ASH LANDFILL AREA
BEND IN THE ROAD AREA A
BEND IN THE ROAD AREA B
DEBRIS PILE A
1600 FT2
120 YD3
2 FEET
DEBRIS PILE B
1200 FT2
90 YD3
2 FEET
53,000 FT2
16,000 YD3
8 FEET
24,750 FT2
7,3000 YD3
8 FEET
W-A
W-B
W-D
W-F
670
660
650
640
741250
NOTE: AREAS A AND B AT THE 'BEND IN THE ROAD' WERE EXCAVATED AND TREATED DURING THE NON-TIME CRITICAL REMOVAL ACTION.
125 0 125 250
1" = 250'
PARSONS
PARSONS ENGINEERING SCIENCE, INC.
CLIENT/PROJECT TITLE
SENECA ARY DEPOT ACTIVITY
RECORD OF DECISION
ASH LANDFILL SITE
DEPT. ENVIRONEMTAL ENGINEERING
Dwg. No. 728510-02007
FIGURE 11-1
LOCATION AND VOLUME ESTIMATES FOR DEBRIS PILES
SCALE 1" = 250'
DATE FEBRUARY 1997
REV A
ACAD\SENECA\ASHLAND\ASHDEBRS.DWG

11.2 Description of the Components of the Migration Control Portion of the Selected Remedy

The remedy for groundwater remediation (migration control alternative MC-3a) consists of low conductivity cut-off walls (funnel) to divert groundwater flow to an in-situ reaction zone (gate). Alternative MC-3a will utilize a reactive iron treatment system to reduce the concentrations of VOCs in groundwater at the Ash Landfill. This process relies on the simultaneous oxidative corrosion of reactive iron metal by water and chlorinated compounds to reduce VOC chemical concentrations to below groundwater cleanup standards before a receptor pathway is completed. In this case, the potential receptor pathway for groundwater is off-site receptors using the groundwater as a drinking water source. The proposed future use for the Ash Landfill site is as conservation/recreation land according to the Reuse Plan and Implementation Strategy for Seneca Army Depot. Long-term groundwater monitoring has demonstrated that the nearest potential downgradient receptor for groundwater (the farmhouse wells located approximately 1,250 feet from the leading edge of the plume) has not been impacted by the VOCs in groundwater. Monitoring has also shown the presence of the breakdown products of TCE, namely 1,2-DCE and vinyl chloride in downgradient wells. Monitoring would be used to ensure that the potential off-site receptor pathway is not completed in the future.

If VOC concentrations show a statistical increase over time at the "toe" of the plume then additional remedial actions would be implemented. This preferred remedy for migration control may result in concentrations of VOCs remaining on-site for a period of time that exceed the site-specific cleanup goals. Therefore, the EPA and the Army will review the site at least once every 5 years after initiation of this preferred remedy to ensure that the potential risks to human health and the environment established through the baseline risk assessment do not increase. This preferred remedy complies with all ARARs, is cost-effective and meets EPA's criteria for overall protectiveness of the environment.

12.0 STATUTORY DETERMINATIONS

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

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

12.1 The Selected Remedy Is Protective of Human Health and the Environment.

The selected remedy is protective of human health and the environment through the use of a combination of treatment/engineering controls. The source control remedy uses engineering and treatment controls to further reduce acceptable human health and ecological risks by eliminating the highest levels of lead found in soils and by reducing the potential of exposure to low levels of selective metals and PAHs in soils using a vegetative soil cap. This action also reduces the potential for these constituents to migrate to groundwater, even though their migration potential is considered very low in both the short-term and long-term. The migration control remedy protects human health and the environment through the use of treatment controls to reduce the concentrations of both TCE and 1,2-DCE in the groundwater below 5 ug/L, the NYSDEC criteria for Class GA groundwater.

12.2 The Selected Remedy Attains ARARs.

The funnel-and-gate alternative complies with all ARARs. The concentrations of VOCs in groundwater will be reduced to concentrations below the NY State GA Standards. A list of the ARARs for this alternative are shown in Appendix D.

12.3 The Selected Remedy is Cost-Effective.

The selected remedy for source control (SC-5) is the most cost-effective alternative of the five alternatives retained for detailed evaluation after the no-action alternative. This alternative attains ARARs, is technically feasible, provides overall protectiveness to human health and the environment proportionate to its cost, and therefore, represents a reasonable value. The small incremental benefit that may be present in the evaluation criteria for the other source control alternatives is not proportionate to the costs and therefore does not justify using these alternatives.

The selected remedy for migration control (MC-3a) has the second lowest total costs of the four migration control alternatives retained for detailed evaluation. This alternative affords overall protectiveness of human health and the environment, attains ARARs over time, and provides good short-term and long-term effectiveness. This remedial alternative is considered to be moderately technically feasible and implementable. The other alternatives do not provide any significant incremental benefits for the various evaluation criteria and therefore their higher costs and greater difficulty in implementation do not justify using these alternatives.

12.4 The Selected Remedy Utilizes Permanent Solutions and Alternative Treatment or Resource Recovery Technologies to the Maximum Extent Practicable.

The selected remedy meets the statutory requirement for a permanent solution by ensuring that the VOC plume does not impact any potential on-site or off-site receptors and the funnel-and-gate system will gradually reduce the concentrations below the site-specific cleanup goals. Groundwater monitoring will be used to assess the progress of this system and, possibly, to detect any off-site migration of the plume front. The selected remedy provides the best balance of trade-offs among the alternatives with the respect to the evaluation criteria.

The alternative remedies evaluated do not provide incremental benefits that justify the dramatic increase in costs. The selected remedy will be considered permanent when the concentrations of VOCs in groundwater are reduced to the site-specific cleanup levels for groundwater. The selected remedy for source control (SC-5) meets the statutory requirement for permanence by disposing of the excavated soils off-site in a secure, non-hazardous, Subtitle D landfill and by the construction and maintenance of a vegetative soil cap for the Ash Landfill and the NCFL. The selected remedy also meets the statutory requirement for utilizing alternative treatment or resource recovery technologies to the maximum extent practicable by weighing costs as a primary factor. The selected remedy affords the most cost-effective, and most easily implementable remedy while providing the required level of overall protectiveness of human health and the environment.

Alternative treatment technologies such as alternative SC-4 (soil washing and solidification) do not provide enough additional significant benefits to justify the high costs ($31,500,000) associated with this remedy.

12.5 The Selected Remedy Satisfies the Preference for Treatment that Permanently and Significantly Reduces the Toxicity, Mobility or Volume of the Hazardous Substances as a Principal Element.

The statutory preference for treatment as a principal element is satisfied by the selected remedy for migration control (MC-3a) although the remedy for source control (SC-5) does not use treatment. The source control remedy relies on off-site disposal in a landfill and the migration control alternative relies on a funnel-and-gate treatment system to reduce the concentrations of VOCs in groundwater. Although the selected source control remedy does not rely on treatment as the principal element, it does address the principal threats posed by soils. The funnel-and-gate system uses reactive iron metal as a treatment system for the chlorinated compounds in the groundwater. These selected remedies provide the most cost-effective and easily implementable alternatives that can achieve the maximum extent of overall protection of human health and the environment.

13.0 DOCUMENTATION OF SIGNIFICANT CHANGES

(Reserved).

14.0 STATE ROLE

(Reserved).

APPENDIX A

ADMINISTRATIVE RECORD INDEX

APPENDIX B

NEW YORK DEPARTMENT OF ENVIRONMENTAL CONSERVATION DECLARATION OF CONCURENCE

APPENDIX C

RESPONSIVENESS SUMMARY AND PUBLIC COMMENTS

APPENDIX C.1

RESPONSIVENESS SUMMARY

ASH LANDFILL SITE
SENECA ARMY DEPOT SUPERFUND SITE

INTRODUCTION

A responsiveness summary is required by Superfund policy. It provides a summary of citizen's comments and concerns received during the public comment period, and the United States Environmental Protection Agency's (EPA's) and the New York State Department of Environmental Conservation's (NYSDEC's) responses to those comments and concerns. All comments summarized in this document have been considered in EPA's and NYSDEC's final decision for selection of a remedial alternative for the Ash Landfill site.

OVERVIEW

BACKGROUND ON COMMUNITY INVOLVEMENT

SUMMARY OF COMMUNITY RELATIONS ACTIVITIES

The RI report, FS report, and the Proposed Plan for the site were released to the public for comment on (*date*). These documents were made available to the public in the adminstrative record file at the EPA Docket Room, Region II, New York and the information repositories at (other repository locations). The notice of availability for the above-referenced documents was published in the *(local news paper)* on *(date of publication)*. The public comment period on these documents was held from (*start date*) to *(finish date*).

On (*date*), EPA and NYSDEC conducted a public meeting at (*meeting place*) to inform local officials and interested citizens about the Superfund process, to review current and planned remedial activities at the site, and to respond to any questions from area residents and other attendees.

SUMMARY OF COMMENTS AND RESPONSES

The following correspondence was recieved during the public comment period (C.2, Letters Submitted During the Public Comment Period):

- (*summarize each letter under bullet*)
-
-
-
-

A summary of the comments contained in the above letters and the comments provided by the public at the (***date***) public meeting, as well as EPA's and NYSDEC's responses to those comments, follows.

APPENDIX C.2

LETTERS SUBMITTED DURING THE PUBLIC COMMENT PERIOD

APPENDIX D

SUMMAR OF ARARS FOR SELECTED REMEDY

SOURCE CONTROL ARARS

ARARs Summary for Source Control Remedial Action Alternatives
Seneca Army Depot Activity - Ash Landfill

ARARs	Alternative SC-5
CHEMICAL-SPECIFIC ARARS	
Air Quality	
40 CFR Part 50.8: Ambient Air Quality Standard for Carbon Monoxide.	Will Comply
40 CFR Part 50.12: Ambient Air Quality Standard for Lead.	Will Comply
40 CFR Part 50.9: Ambient Air Quality Standard for Ozone.	Not Applicable
40 CFR Part 50.6: Ambient Air Quality Standard for PM-10.	Will Comply
40 CFR Part 61: NESHAPS	Will Comply
40 CFR Part 58: Ambient Air Quality Surveillance.	Will Comply
6 NYCRR subpart 257-1: Air Quality Standards General.	Will Comply
6 NYCRR subpart 257-3: Air Quality Standards-Particulates.	Will Comply
6 NYCRR subpart 257-4: Air Quality Standards for Carbon Monoxide.	Will Comply
6 NYCRR subpart 257-6: Air Quality Standards - Hydrocarbons (non methane).	Will Comply
NYSDEC Air Guide - 1: AGCs and SGCs for barium, copper, zinc, TCE, DCE, vinyl chloride	Will Comply
Water Quality	
40 CFR Part 131: Water Quality Standards.	Not Applicable
40 CFR Part 131.12: Antidegradation Policy.	Will Comply
40 CFR Part 141: National Primary Drinking Water Regulations.	Not Applicable

ARARs Summary for Source Control Remedial Action Alternatives
Seneca Army Depot Activity - Ash Landfill
(Con't)

ARARs	Alternative SC-5
40 CFR Part 141.11: Maximum Inorganic Chemical Contaminant Levels.	Not Applicable
40 CFR Part 230; Section 404(b)(I)L: Guidelines for Specification for Disposal Sites for Dredged or FIll material	Will Comply
40 CFR Part 264 Subpart F: Releases from Solid Waste Management Units.	Will Comply
40 CFR Part 403: Pretreatment Standards	Will Comply
6 NYCRR Chapter X: SPDES	Not Applicable
6 NYCRR subparts 701 and 702: Water quality standards	Will Comply
6 NYCRR subpart 703: Groundwater standards	Will Comply
6 NYCRR subpart 375: Inactive hazardous waste disposal sites.	Will Comply
6 NYCRR subpart 373-2.6 and 373-2.11: Groundwater monitoring for releases from SWMUs	Will Comply
6 NYCRR subpart 373-2: Postclosure care and groundwater monitoring	Will Comply
10 NYCRR Part 5: Drinking water supplies.	Not Applicable
NYSDEC TOGS 1.1.1: Water quality standards and guidance	Will Comply
Soil Quality	
40 CFR Part 268: Land Disposal Restrictions.	Will Comply
40 CFR subpart S parts 264.552 and 264.533: Corrective Action	Not Applicable
6 NYCRR subpart 375: Inactive hazardous waste disposal sites.	Will Comply

ARARs Summary for Source Control Remedial Action Alternatives
Seneca Army Depot Activity - Ash Landfill
(Con't)

ARARs	Alternative SC-5
LOCATION-SPECIFIC ARARS	
40 CFR Part 257.3-2: Endangered species	Will Comply
40 CFR Part 264.18: Location Standards for Hazardous Waste Facilities.	Not Applicable
40 CFR Part 241.202: Site selection	Not Applicable
16 USC Part 469a-1: The Archaeological and Historic Preservation Act	Will Comply
36 CFR Part 800: Historic properties	Will Comply
ACTION-SPECIFIC ARARS	
Solid Waste Management	
40 part CFR 241.100: Land Disposal of Solid Wastes.	Will Comply
40 CFR Part 241.204: Water Quality.	Not Applicable
40 CFR Part 241.205: Air quality	Will Comply
40 CFR Part 243.202: Transport	Will Comply
6 NYCRR Part 360: Subtitle D solid waste landfills	Will Comply
Hazardous Waste Management	
40 CFR 262.11: Generators	Not Applicable
40 CFR Part 263.30 and 263.31: Release during transport.	Not Applicable
40 CFR Part 264: Hazardous waste management facility standards	Will Comply

ARARs Summary for Source Control Remedial Action Alternatives
Seneca Army Depot Activity - Ash Landfill
(Con't)

ARARs	Alternative SC-5
40 CFR Part 270 subpart C: Permit conditions	Not Applicable
40 CFR Part 270 subpart B: Permit applications	Not Applicable
Occupational Health and Safety Administration	
29 CFR Part 1910.50: Occupational Noise	Will Comply
29 CFR Part 1910.1000: Occupational Air Contaminants	Will Comply
29 CFR Part 1910.1200: Hazard communication	Will Comply
29 CFR Part 120: Employee training and medical monitoring.	Will Comply
Transportation of Hazardous Waste	
49 CFR Part 171: Transport of hazardous material.	Not Applicable
40 CFR Part 172: Hazardous materials table, special provisions, Hazardous Materials Communications, Emergency Response Information, and Training requirements.	Will Comply
49 CFR Part 177: Carriage by Public Highway.	Not Applicable
6 NYCRR Chapter 364: New York Waste Transport Permit Regulation.	Not Applicable
EPA/DOT Guidance Manual on hazardous waste transportation	Not Applicable

Note: Final compliance with 16 USC Part 469a-1 and 36 CFR Part 800 depends on the results of the recent archeological survey, which has not yet been completed.

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MIGRATION CONTROL ARARS

ARARs Summary for Migration Control Remedial Action Alternatives
Seneca Army Depot Activity - Ash Landfill

ARARs	Alternative MC-3a
CHEMICAL-SPECIFIC ARARS	
Air Quality	
40 CFR Part 50.8: Ambient Air Quality Standard for Carbon Monoxide.	Not Applicable
40 CFR Part 50.12: Ambient Air Quality Standard for Lead.	Not applicable
40 CFR Part 50.9: Ambient Air Quality Standard for Ozone.	Not Applicable
40 CFR Part 50.6: Ambient Air Quality Standard for PM-10.	Not Applicable
40 CFR Part 61: NESHAPS	Not Applicable
40 CFR Part 58: Ambient Air Quality Surveillance.	Not Applicable
6 NYCRR subpart 257-1: Air Quality Standards General.	Not Applicable
6 NYCRR subpart 257-3: Air Quality Standards-Particulates.	Not Applicable
6 NYCRR subpart 257-4: Air Quality Standards for Carbon Monoxide.	Not Applicable
6 NYCRR subpart 257-6: Air Quality Standards - Hydrocarbons (non methane).	Not Applicable
NYSDEC Air Guide - 1: AGCs and SGCs for TCE, DCE, and vinyl chloride	Not Applicable
Water Quality	
40 CFR Part 131: Water Quality Standards.	Will Comply
40 CFR Part 131.12: Antidegradation Policy.	Will Comply
40 CFR Part 141: National Primary Drinking Water Regulations.	Not Applicable
40 CFR Part 141.11: Maximum Contaminant Levels.	Will Comply
40 CFR Part 264 Subpart F: Releases from Solid Waste Management Units.	Will Comply
40 CFR Part 403: Pretreatment Standards	Not Applicable
6 NYCRR Chapter X: SPDES	Will Comply
6 NYCRR subparts 701 and 702: Water quality standards	Will Comply

ARARs Summary for Migration Control Remedial Action Alternatives
Seneca Army Depot Activity - Ash Landfill
(Con't)

ARARs	Alternative MC-3a
6 NYCRR subpart 703: Groundwater standards	Will Comply
6 NYCRR subpart 375: Inactive hazardous waste disposal sites.	Will Comply
6 NYCRR subpart 373-2.6 and 373-2.11: Groundwater monitoring for releases from SWMUs	Will Comply
6 NYCRR subpart 373-2: Postclosure care and groundwater monitoring	Not Applicable
10 NYCRR Part 5: Drinking water supplies.	Not Applicable
NYSDEC TOGS 1.1.1: Water quality standards and guidance	Will Comply
LOCATION-SPECIFIC ARARS	
40 CFR Part 257.3-2: Endangered species	Will Comply
40 CFR Part 264.18: Location Standards for Hazardous Waste Facilities.	Not Applicable
40 CFR Part 241.202: Site selection	Not Applicable
16 USC Part 469a-1: The Archaeological and Historic Preservation Act	Will Comply
36 CFR Part 800: Historic properties	Will Comply
ACTION-SPECIFIC ARARS	
Solid Waste Management	
40 part CFR 241.100: Land Disposal of Solid Wastes.	Not Applicable
40 CFR Part 241.204: Water Quality.	Not Applicable
40 CFR Part 241.205: Air quality	Not Applicable
40 CFR Part 243.202: Transport	Not Applicable
6 NYCRR Part 360: Subtitle D solid waste landfills	Not Applicable
Hazardous Waste Management	
40 CFR 262.11: Generators	Not Applicable
40 CFR Part 263.30 and 263.31: Release during transport.	Not Applicable
40 CFR Part 264: Hazardous waste management facility standards	Not Applicable

ARARs Summary for Migration Control Remedial Action Alternatives
Seneca Army Depot Activity - Ash Landfill
(Con't)

ARARs	Alternative MC-3a
40 CFR Part 270 subpart C: Permit conditions	Not Applicable
40 CFR Part 270 subpart B: Permit applications	Not Applicable
Occupational Health and Safety Administration	
29 CFR Part 1910.50: Occupational Noise	Will Comply
29 CFR Part 1910.1000: Occupational Air Contaminants	Will Comply
29 CFR Part 1910.1200: Hazard communication	Will Comply
29 CFR Part 120: Employee training and medical monitoring.	Will Comply
Transportation of Hazardous Waste	
49 CFR Part 171: Transport of hazardous material.	Not Applicable
40 CFR Part 172: Hazardous materials table, special provisions, Hazardous Materials Communications, Emergency Response Information, and Training requirements.	Not Applicable
49 CFR Part 177: Carriage by Public Highway.	Not Applicable
6 NYCRR Chapter 364: New York Waste Transport Permit Regulation.	Not Applicable
EPA/DOT Guidance Manual on hazardous waste transportation	Not Applicable

Note: Final compliance with 16 USC Part 469a-1 and 36 CFR Part 800 depends on the results of the recent archeological surveys, which has not yet been completed.