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July 1994

EPA Superfund Record of Decision:

Cedartown Municipal Landfill Site, Cedartown, GA

RECORD OF DECISION

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION

CEDARTOWN MUNICIPAL LANDFILL SITE

CEDARTOWN, POLK COUNTY, GEORGIA

PREPARED BY

U. S. ENVIRONMENTAL PROTECTION AGENCY

REGION IV

ATLANTA, GEORGIA

DECLARATION
of the
RECORD OF DECISION

SITE NAME AND LOCATION

Cedartown Municipal Landfill Site
Cedartown, Polk County, Georgia

STATEMENT OF BASIS AND PURPOSE

This decision document (Record of Decision), presents the selected remedy for the Cedartown Municipal Landfill Site, Cedartown, Georgia, developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), 42 U.S.C. § 9601 et seq., and to the extent practicable, the National Contingency Plan (NCP), 40 CFR Part 300.

This decision is based on the administrative record for the Cedartown Municipal Landfill Site.

The State of Georgia concurs with the selected remedy.

ASSESSMENT OF THE SITE

Actual or threatened releases of hazardous substances from the Cedartown Municipal Landfill Site, if not addressed by implementing the response action selected in this Record of Decision (ROD), may present an imminent and substantial endangerment to public health, welfare, or the environment.

DESCRIPTION OF THE SELECTED REMEDY

This action is the first and final action planned for the Site. This alternative calls for the design and implementation of response measures which will protect human health and the environment. The action addresses the principal threat at the Site, the contaminant sources in the wastes, as well as the ground water contamination at the Site.

The major components of the selected remedy include:

- cover maintenance and seep controls;
- institutional controls, such as record notices and deed, zoning and land-use restrictions;
- ground/surface water monitoring program to insure natural attenuation processes would be effective and that contaminants would not migrate;

- a two year review during which EPA would determine whether ground water performance standards continue to be appropriate and if natural attenuation processes are effective. EPA shall consider and at EPA's sole discretion implement an active ground water remediation if ground water performance standards continue to be appropriate and natural attenuation processes are not effective,

- a contingency remedial action which includes ground water extraction, on-site treatment, and discharge under National Pollutant Discharge Elimination System (NPDES) to a nearby surface water or POTW; and,

- continued ground water monitoring upon attainment of the performance standards at sampling intervals to be approved by EPA. The ground water monitoring program would continue until EPA approves a five-year review concluding that the alternative has achieved continued attainment of the performance standards and remains protective of human health and the environment.

STATUTORY DETERMINATIONS

The selected remedy with an active ground water treatment contingency is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate, and is cost-effective. This remedy with contingency satisfies the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element. Finally, it is determined that this remedy utilizes a permanent solution and treatment technology to the maximum extent practicable.

Because this remedy may result in hazardous substances remaining on-site, a review will be conducted within five years after commencement of the remedy to ensure that the remedy continue to provide adequate protection of human health and the environment.

Patrick M Tobin
PATRICK M. TOBIN, ACTING REGIONAL ADMINISTRATOR

11-2-93
DATE

TABLE OF CONTENTS

LIST OF TABLES

LIST OF FIGURES

Decision Summary
Record of Decision
Cedartown Municipal Landfill Site
Cedartown, Georgia

1.0 SITE LOCATION AND DESCRIPTION

The Site is located in Polk County on the outskirts of the City of Cedartown, Georgia, approximately 62 miles northwest of Atlanta, Georgia. The Site encompasses a former iron ore mine which subsequently was used as a municipal landfill. The Site is situated on the western edge of Cedartown and is bordered on the east by Tenth Street, the south by Route 100 (Prior Station Road), and the north and west by undeveloped and/or agricultural land. A portion of the Site lies within the limits of the City of Cedartown. (Note: The City is currently in the process of annexing all portions of the Site not currently within the City limits.) The general location of the Site is illustrated in Figure 1-1, Area Map and Figure 1-2, Local Map.

Property immediately east of the Site consists of an industrial complex, while land to the north, south, and west is a mixture of residential, agricultural, and undeveloped land.

The Site, which consists of land formerly used as part of the landfill operations, occupies approximately 94 acres. The Site itself is well vegetated with wooded areas along the north, south, and west. A seasonal stream and pond, which appear during periods of high precipitation, exist approximately 700 feet west of the western Site perimeter. The eastern half of the Site is covered by thick grasses. Approximately 10 acres of land, situated between the eastern and western halves of the Site, were not used for landfill operations. This area includes the pond situated directly behind the former Rome Coca-Cola Bottling Company building (referred to herein as the "Coke Pond") and the lands in and around the former Leary residence (formerly situated immediately north of the Coke Pond). See Figure 1-3, Site Map.

The surface of the Site is grassed with limited areas of mainly exposed soil occurring northeast of the location of the former Leary home. The crown of the Site is 872 feet above mean sea level (AMSL) and gently slopes on all sides with the exception of portions of the western perimeter which are relatively steep (9 percent slope). Minor areas of surficial erosion were observed in the central, northwest and eastern portions of the Site. No exposed refuse was observed in any of the erosion areas noted. A leachate seep was observed on-site west of the Coke Pond.

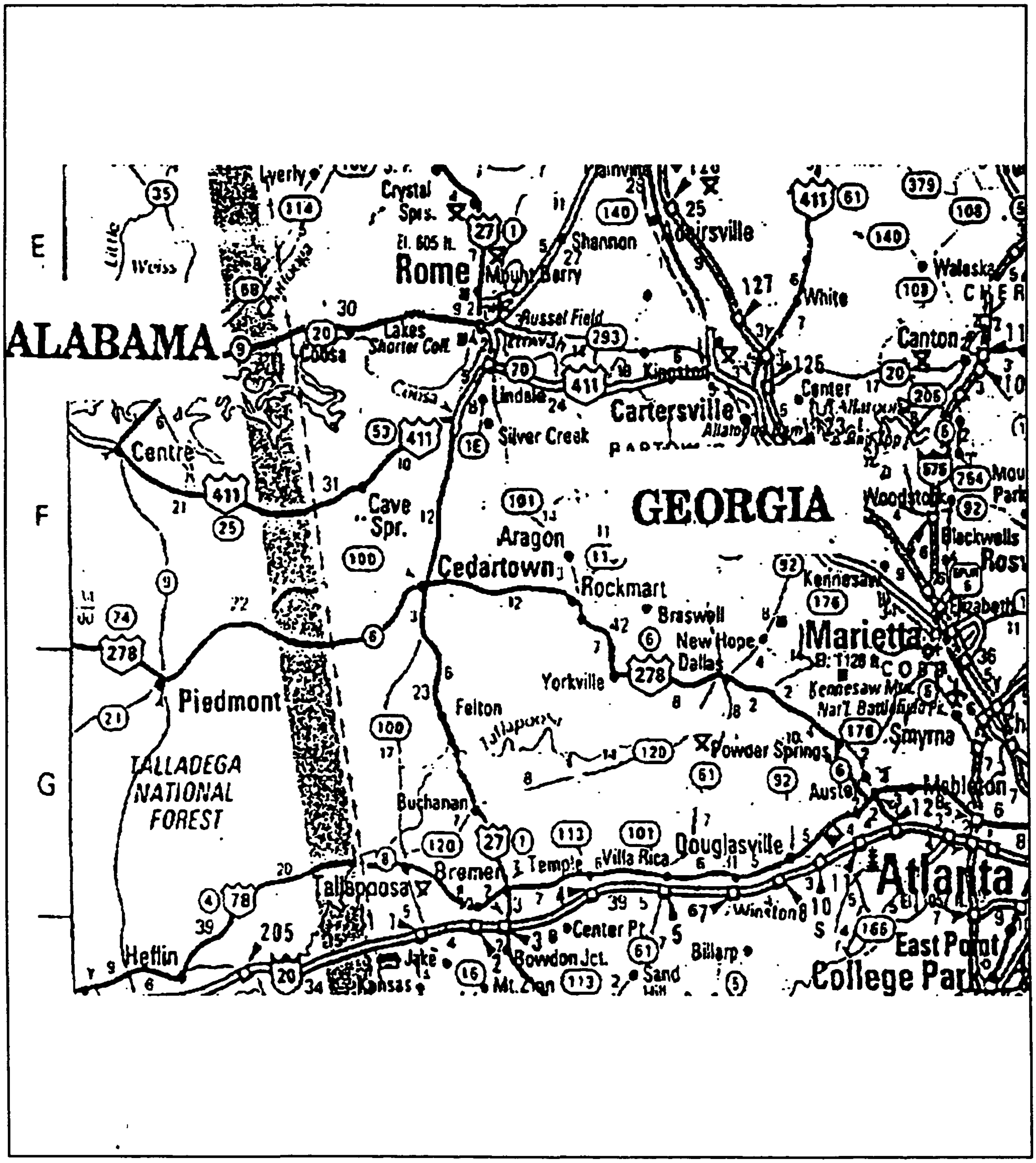


Figure 1-1 Area Map

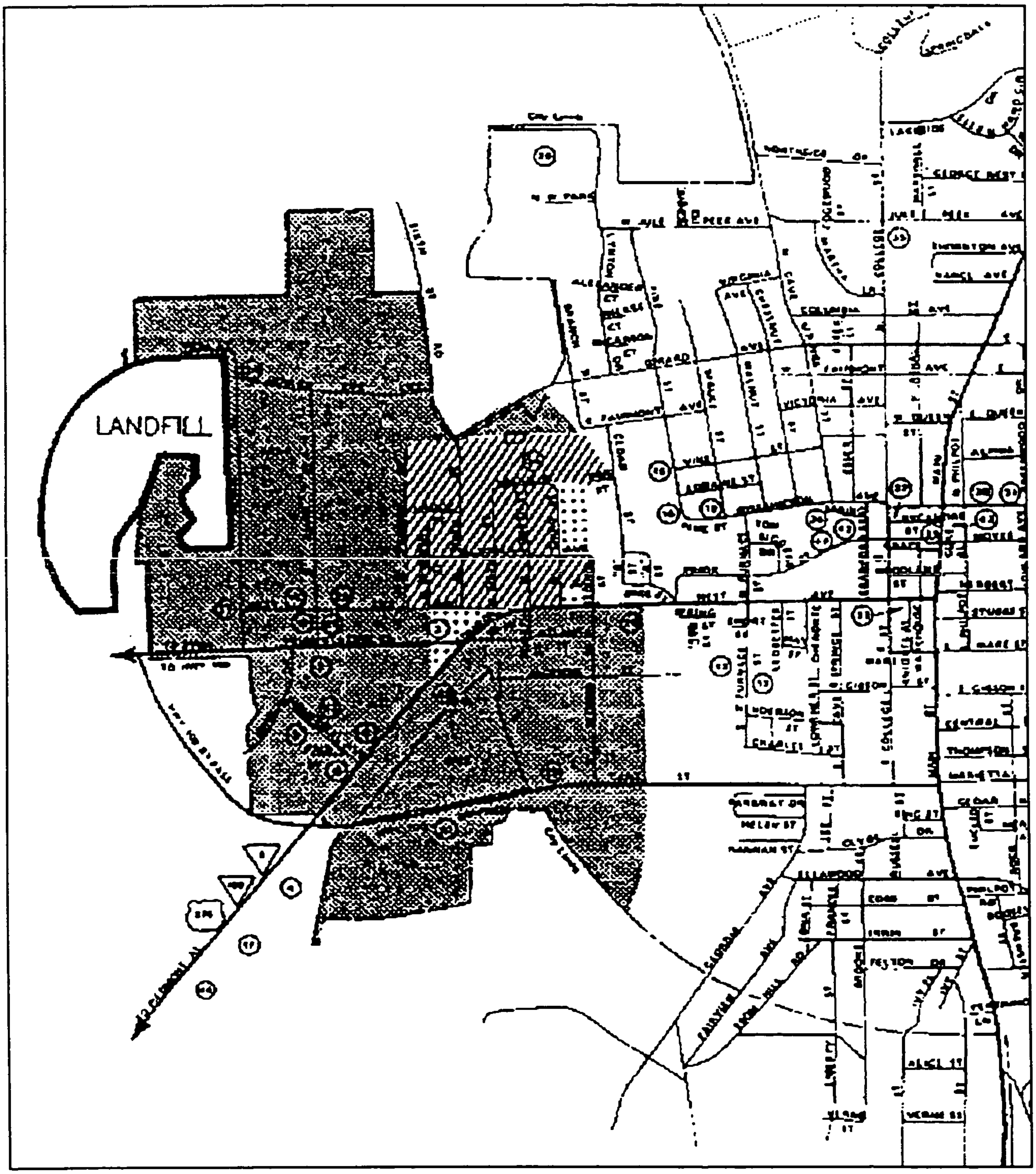
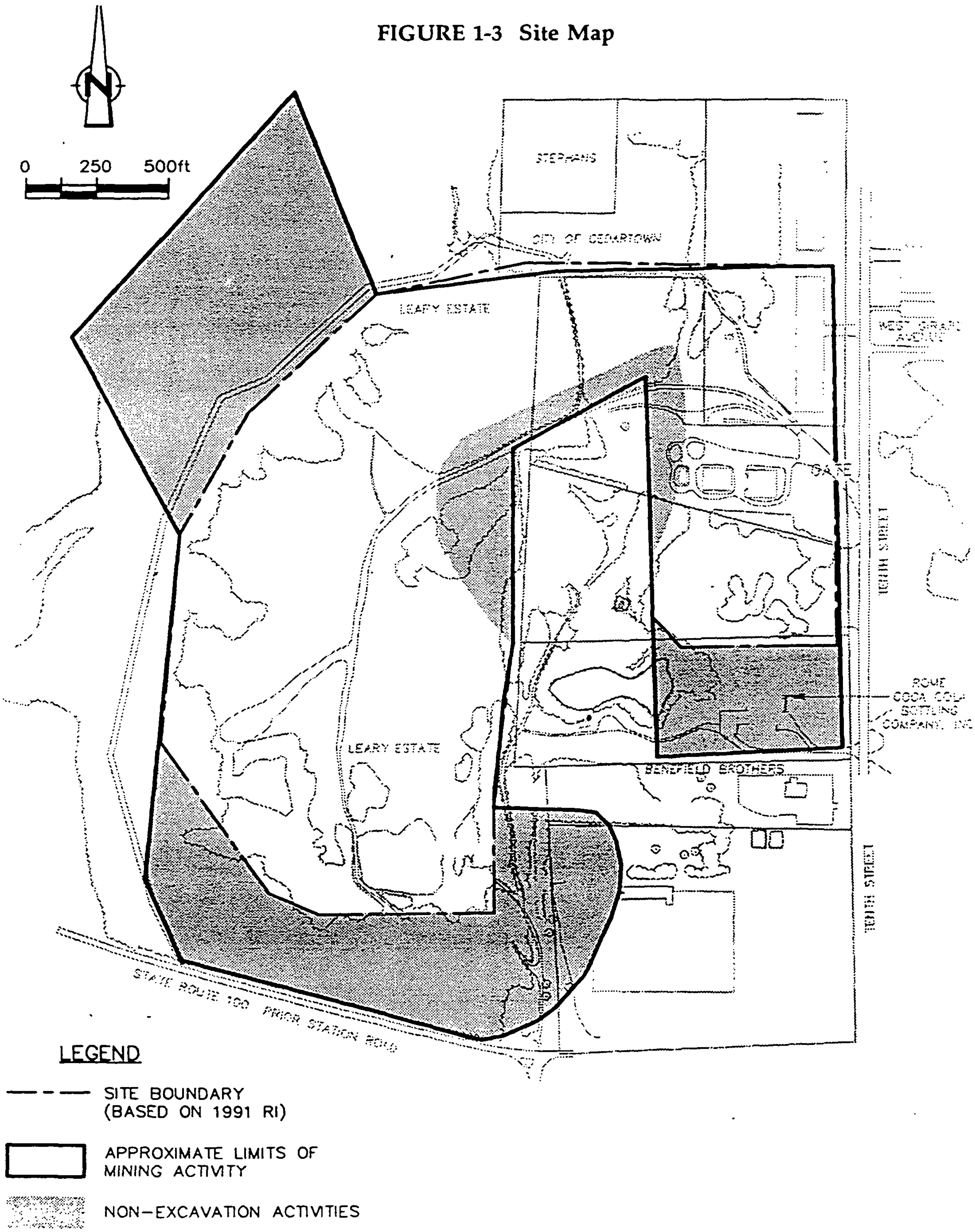


Figure 1-2 Local Map

FIGURE 1-3 Site Map



Although the Site is not fenced, access is limited due to the dense vegetation which occurs around the northern, western and southern boundaries. The primary access route from the east directs traffic past the City garage and is restricted by a fence gate which limits vehicle access to the Site.

2.0 SITE HISTORY AND ENFORCEMENT ACTIVITIES

The Site was originally developed in the 1880s as an iron ore strip mine. Mining operations continued at the Site, with some interruptions, until the mid 1900s. At that time, portions of the Site were leased and/or subsequently acquired by the City of Cedartown for development as a municipal landfill.

Pits resulting from the strip mining operations were utilized by the City of Cedartown and Polk County as disposal areas for municipal and, to a lesser extent, industrial wastes. These pits contained native clay or may have been partially backfilled with clay previously stockpiled from the mining operations prior to placement of waste materials. Once waste was in place, the pits were covered and graded.

This type of operation is significantly different from common landfill operations of the period where wastes were placed in large common fill disposal cells with occasional daily and/or interim cover material. The lack of on-going, irregular settlement of the existing cap may be attributable to the shallow intermittent disposal practices which occurred.

The outer limits of the area used for waste placement within on-site pits, as determined during the Remedial Investigation (RI), are illustrated on Figure 1-3.

While the landfill received primarily municipal solid sanitary waste during its operation, limited quantities of industrial waste were also reportedly disposed at the Site. The industrial wastes disposed of at the Site include but is not limited to the following:

i) sludge from an industrial waste water treatment system;

ii) animal fat and vegetable oil skimmings from a separation unit;

iii) liquid dye wastes;

iv) latex paint and paint sludges; and

v) plant trash.

In 1979, in accordance with then applicable State regulations pertaining to the closure of landfills, the Site was covered with a layer of clay soil varying in thickness from one to 12 feet. A vegetative cover was then established over the soil layer to prevent erosion.

On June 6, 1985, a representative of USEPA completed an initial Site inspection to evaluate conditions at the Site and identify areas of potential investigation. In October 1986, an initial reconnaissance of the Site was completed by representatives of USEPA. Subsequently, during 1987 and 1988, an investigation of the Site was conducted.

USEPA evaluated the Site using the Hazardous Ranking System (HRS). The aggregate HRS score derived for the Site evaluated by USEPA was 33.62. The Site was subsequently proposed for inclusion on the National Priorities List (NPL) in June 1988 and finalized in March 1989.

Cedartown Municipal Landfill Potentially Responsible Parties' (PRPs) committee completed the Remedial Investigation (RI) and Feasibility Study (FS) in July 1993 under EPA oversight pursuant to EPA's 1990 Administrative Order of Consent (AOC). Field work for the RI began in 1991 and was completed in 1993. The RI was designed to determine the nature and extent of contamination in order for a remedy selection to be made. Field work for the RI included installing monitoring wells and sampling soils, sediments, leachate, landfill waste, surface water and ground water.

3.0 HIGHLIGHTS OF COMMUNITY PARTICIPATION

All basic requirements for public participation under CERCLA sections 113(k)(2)(B)(i-v) and 117, were met in the remedy selection process. Because the local community has been interested and involved in the Cedartown Municipal Landfill Site status during the remedial activities at this Site, community relations activities remained an important aspect throughout the remedial process. The community relations program at the Cedartown Municipal Landfill Site was designed to maintain communication between the residents in the affected community and the government agencies conducting remedial activities at the Cedartown Municipal Landfill Site. Frequent communication with nearby residents and local officials has been maintained as a priority. Special attention has been directed toward keeping the community informed of all study results. Numerous meetings have been held with Cedartown city officials. Prior to approval of the Remedial Investigation/Feasibility Study (RI/FS) Workplan, EPA officials attended a local Chamber of Commerce public forum and a Kiwanis Club meeting. In addition, a meeting was held with the community at an availability session in the Winter of 1991 to inform residents of EPA's intentions and to obtain input concerning sampling locations and health and safety procedures.

On September 9, 1993, after the finalization of the Remedial Investigation (RI) Report and the completion of the Feasibility Study (FS), EPA presented its preferred remedy for the Cedartown Municipal Landfill Site during a public meeting at the Cedartown Public Library, 245 East Avenue, Cedartown, Georgia. The 30-day public comment period was held September 1 through September 30, 1993. A copy of the Administrative Record, upon which the remedy was based, is located at the Cedartown Public Library, 245 East Avenue, Cedartown, Georgia 31701. EPA's responses to comments which were received during the comment period are contained in Appendix A.

4.0 SCOPE AND ROLE OF ACTION

This selected remedy with an active ground water treatment contingency is the first and final remedial action for the Site. The function of this remedy is to reduce the risks associated with exposure to contaminated ground water.

The selected remedial alternative will address conditions which pose a threat to human health and the environment:

- Contaminated ground water (may potentially impact drinking water supplies); and,
- contaminated landfill leachate (present a continuing source of contamination).

Pathways of exposure include:

- Ingestion of contaminated ground water; and,
- aquatic exposure to leachate migrating to surface waters

The major components of the remedy are:

- cover maintenance and seep controls;
- institutional controls, such as record notices and deed, zoning and land-use restrictions;

- ground water monitoring program to insure natural attenuation processes would be effective and that contaminants would not migrate;

- a two year review which EPA would determine whether ground water performance standards continue to be appropriate and if natural attenuation processes are effective. EPA shall consider and at EPA's sole discretion implement an active ground water contingency remedial action if ground water performance standards continue to be appropriate and natural attenuation processes are not effective,

- contingency remedial action to include ground water extraction, on-site treatment, and discharge under National Pollutant Discharge Elimination System (NPDES) to a nearby surface water or POTW; and,

- continued ground water monitoring upon attainment of the performance standards at sampling intervals to be approved by EPA. The ground water monitoring program would continue until EPA approves a five-year review concluding that the alternative has achieved continued attainment of the performance standards and remains protective of human health and the environment.

This remedy addresses the first and final cleanup action planned for the Site. The ground water present beneath the Site contains elevated levels of contaminants similar to that present in wastes and leachate at the Site. Although this water bearing zone is affected, the contamination is not affecting the public drinking water supply (Cedartown Springs). The purpose of this proposed action is to prevent current or future exposure to the landfill wastes and contaminated ground water, and to reduce the migration of contaminants.

5.0 SUMMARY OF SITE CHARACTERISTICS

5.1 GEOLOGY AND SOILS

The Site is bounded on the north by an undeveloped field, on the west by an agricultural field, on the south by undeveloped land and a residential area, and on the east by an industrial development. The Site is mound-shaped in nature with gentle slopes on the south and east and steeper slopes on the north and west. Densely wooded areas consisting of pine trees and thick viney underbrush border the Site on the north, west and southern perimeters. The eastern edge of the Site is generally wooded with pine trees and vegetated with thick grasses. The remainder of the Site, specifically the crown of the landfill, is bare to grassy.

Minor areas of surficial erosion were observed in the central, northwest and eastern portions of the Site. No exposed refuse was observed in any of the erosion areas inspected.

The Cedartown Municipal Landfill Site is located in the Valley and Ridge physiographic province of the Appalachian Region. The Valley and Ridge province is characterized by lowlands and hilly areas that range in altitude from approximately 600 to 1,000 feet. A few isolated ridges occur but most have altitudes of less than 1,300 feet (Cressler, 1970).

5.1.1 FILL MATERIALS

Placement of waste materials was not uniform across the landfill. Only 11 of the 30 boreholes advanced within the six landfill cells encountered waste materials. When encountered, waste materials typically consisted of municipal/industrial refuse including plastic, cardboard, glass, wood, and metal. Waste materials, where encountered, were found to range from one foot thick in borehole (leachate well) LW-2A to 30 feet thick in LW-1 (see figure 5-1, Sampling Map). On the landfill proper, the cover material and fill materials consisted of orange to red mottled clay. The Kaolinite-rich clay was likely obtained from on-Site stockpiles generated during historical mining of iron deposits. This clayey mixture visually appears to be consistent with the clays of the residuum/saprolite described below.

5.1.1.1 GEOTECHNICAL TESTS

Geotechnical data obtained from the Shelby tube samples collected from the base of the waste materials indicate vertical hydraulic conductivity values from 3.08×10^{-7} cm/sec to 1.06×10^{-7}.

5.1.2 RESIDUUM AND SAPROLITE

A residuum/saprolite unit was encountered on-site beneath the fill materials and at the surface in off-site areas. The residuum consists of weathered in place bedrock that displays no recognizable original bedrock structure. Saprolite is similar to residuum in its formation but has been weathered to a lesser degree so that some original bedrock structure is discernible. The residuum was described as stiff to very stiff, Kaolinite-rich clay to sandy clay. The unit also contained frequent iron nodules.

Near the base of the residuum more of the clay mottling occurred indicating some vestigial remains of the bedrock structure. The residuum/saprolite consists of 69 to 92 percent silt and clay sized particles.

The total thickness of this unit varied from 20 feet to 156 feet (OW-3). Beneath the landfill, the total thickness of residuum/saprolite was found to range from 20 to 80 feet.

5.1.3 NEWALA LIMESTONE

The Ordovician age Newala Limestone was encountered below the residuum/saprolite unit in each of the seven perimeter bedrock monitoring wells completed as part of the RI. The Newala Limestone was investigated to depths ranging from 9 to 60 feet from the top of the bedrock during the RI. This unit consisted of a light to dark gray interbedded dolostone to limestone with cherty zones. The bedrock exhibited slight to moderate weathering. Examination of the bedrock cores provided evidence of bedding plane and higher angle fractures. Post-depositional infilling of some fractures with calcite or quartz was also noted. The primary post-depositional feature of the Newala Limestone is the presence of karst features. These features range from small voids to large cavern-like openings. The presence of void spaces in the bedrock was noted at wells OW-1, OW-2, OW-3 and OW-6B. The vertical extent of the voids ranged from seven feet (OW-1) to greater than 60 feet (OW-6B).

The top of rock was encountered at elevations ranging from approximately 770 feet AMSL to 785 feet AMSL. The minor changes in the elevation of the top of rock indicate small undulations in the bedrock surface, but no significant trends across the Site. The variation of the thickness of overburden across the Site is influenced by previous mining operations and historical landfilling activities.

5.2 SURFACE WATER/HYDROLOGY

The hydrology on-site is controlled by the relief on the landfill site and the relatively low permeability of the cover material. Precipitation falling on the landfill proper will either infiltrate into the subsurface or run off following the topographic trends. A northeast trending high exists across the central portions of the landfill. This central elevated arch has an elevation of approximately 860 feet AMSL, which is as much as 50 to 60 feet higher than lower areas to the east and west. Overland flow along the west side of the landfill will move downslope towards relatively flat areas bordering the landfill. Some of this overland flow may continue westward towards an intermittent stream located west of the landfill.

This intermittent stream crosses Prior Station Road approximately one-half mile west of the site and flows northeasterly to a pond (Cotton Pond) which is located approximately 500 feet west of the central portion of the landfill perimeter. This pond may receive overland discharge from the Site during rainfall events. This intermittent stream continues along a northeasterly path away from the pond and continues to diverge away from the Site.

The landfill cap is mounded resulting in sheet flow runoff extending radially outward from the central portion of the landfill. No major drainage courses are present on the Site itself. Along the south side of the Site overland flow moves off the landfill toward a drainage ditch which runs east/west along Prior Station Road. This drainage ditch flows west where it appears to be intercepted by a low area on the west side of the Site immediately west of the perimeter access road. No surface water was observed in this low area or in the ditch along Prior Station Road throughout the field component of the RI. Overland flow along the southeast side of the Site moves overland towards Tenth Street. Much of the overland flow across the eastern central portion of the landfill moves toward a small pond located west of the Coca Cola bottling plant (Coke Pond). Across the north and northeastern section of the landfill Site, overland flow moves toward an area located north of the City Garage. This area is drained by an overflow drainage ditch that directs drainage northward away from the Site.

5.3 HYDROGEOLOGY

Seven (7) new bedrock monitoring wells (OW-1 to OW-5 inclusive plus OW-6A and OW-6B) were installed around the perimeter of the landfill to supplement existing perimeter bedrock wells previously installed by USEPA during the site investigation (see figure 5-1). The seven new wells plus three existing wells (CL-03-WP, CL-04-WP, CL-09-WP) were sampled on different occasions (October 1991, December 1991, and June 1993) to define the extent of ground water contamination.

5.4 SUMMARY OF SITE CONTAMINATION

5.4.1 GROUND WATER CHARACTERIZATION

Seven (7) new bedrock monitoring wells (OW-1 to OW-5 inclusive plus OW-6A and OW-6B) were installed around the perimeter of the landfill to supplement existing perimeter bedrock wells previously installed during the site investigation. The seven new wells plus three existing NUS wells (CL-03-WP, CL-04-WP, CL-09-WP) were sampled on three different occasions in October (event #1) and December 1991 (event #2) and June 1993 (event #3).

Seven bedrock monitoring wells (OW-1 to OW-5 inclusive plus CL-03-WP and CL-09-WP) were also sampled for analysis of chromium and manganese in June 1993. Perimeter monitoring well locations are illustrated on Figure 5-1 and analytical data are summarized in Table 5-1.

VOLATILE ORGANICS (VOCs)

Acetone was detected during the October and december sampling events at concentrations ranging from 16 to 570 micrograms per liter (µg/l) or parts per billion (ppb). 1,2-Dichloroethane was reported in monitoring well OW-2 at an estimated concentration of 4 ppb.

PESTICIDES, BASIC/NEUTRAL ACID EXTRACTABLES (BNAs), AND POLYCHLORINATED BIPHENYLS (PCBs)

Pesticides and PCBs were not detected in any wells during any sampling event.

Eight (8) BNAs were reported in OW-6B (including three estimated at less than 10 ppb) during the second sampling event. In addition, fluorene and pyrene were both reported at an estimated concentration of 2 ppb in well OW-3 during the second sampling event.

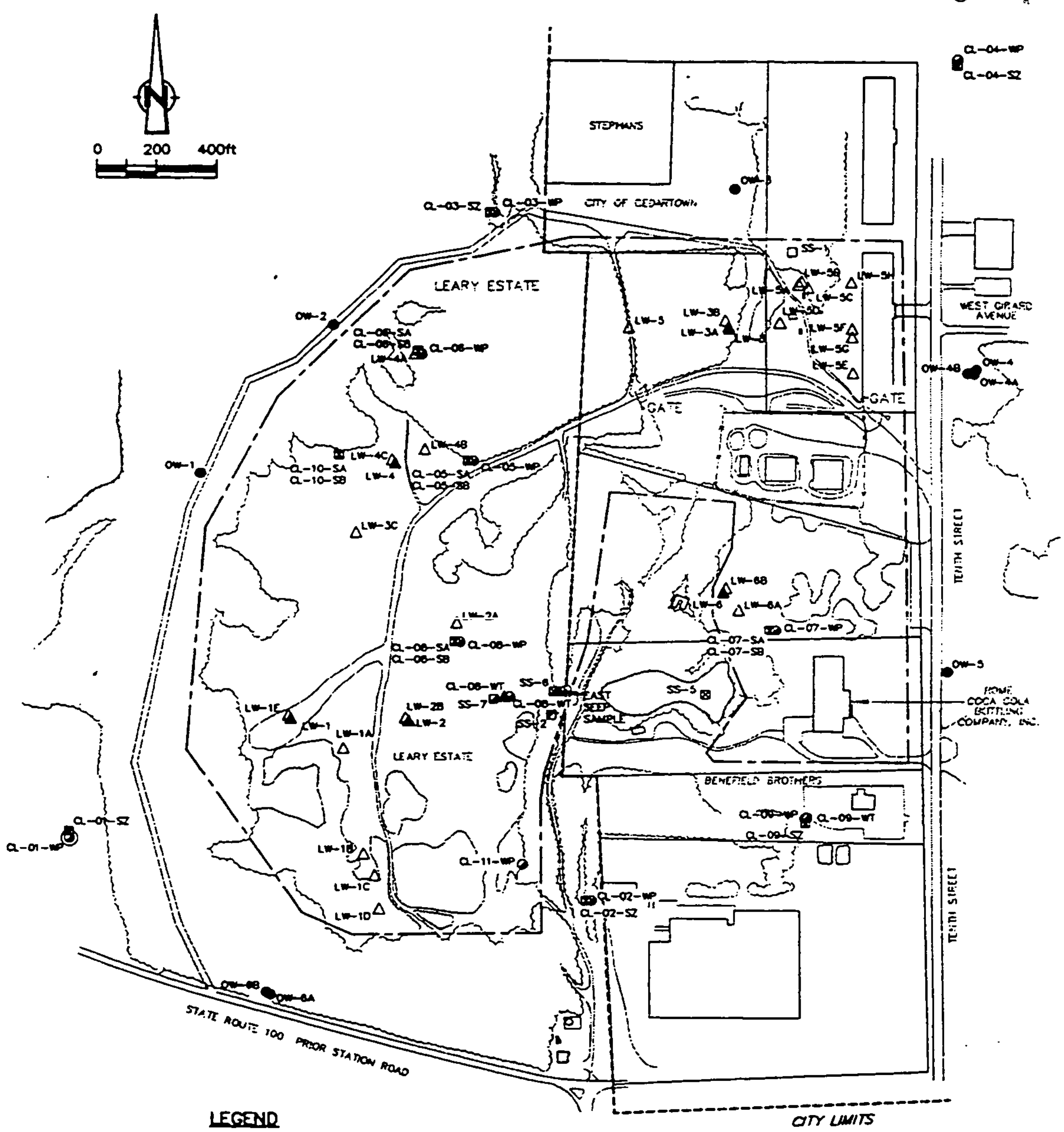
METALS

Metals were reported in all ground water samples collected during the first and second sampling events.

Chromium was also detected in all cross- and down-gradient monitoring wells except OW-3 and OW-4. Chromium ranged in concentration from 13 µg/L to 230 µg/L (CL-03-WP). The values in most wells varied between events may be due to varying sediment contents. While metal concentrations may have been impacted by sample turbidity, using low flow sampling techniques and proper well construction may produce a sample more representative of actual ground water quality.

In sampling events 1 and 2, Beryllium, Chromium, Cadmium, and Lead were detected above their respective Safe Drinking Water Act (SDWA) Maximum Contaminant Level (MCL). The results obtained from sampling event #3, using low

FIGURE 5-1
SITE SAMPLING PLAN



LEGEND

- SITE BOUNDARY (DEFINED BY NUS)
- OW-2 — RI OBSERVATION WELL
- LW-1 — LEACHATE WELL
- LW-1A — LEACHATE WELL PILOT BOREHOLE
- CL-09-WP — NUS OBSERVATION WELL
- CL-05-SA — NUS 1987 SOIL SAMPLING LOCATIONS
- CL-12-WP — OBSERVATION WELL (NOT FOUND)
- SS-6 — SEDIMENT/SURFACE WATER SAMPLE LOCATION
- SS-1 — SEDIMENT SAMPLE LOCATION
- SS-7 — UNAFFECTED SOIL SAMPLE
- SS-2 — STAINED SOIL SAMPLE
- EAST SEEP SAMPLE — LEACHATE SEEP SAMPLE

TABLE 5-1
SUMMARY OF SUBSTANCES DETECTED IN GROUND WATER

		Downgradient Wells (3)			*Background Wells (4)*		
		Range of Detections			*Range of Concentrations*		
Compound	*Frequency of Detection*	*Minimum*	*Maximum*	*Average Concentration*	*Minimum*	*Maximum*	*Average Concentration*
<u>*VOCs (µg/L)*</u>							
Acetone	3 / 14	ND(10)	240	25	ND(10)	570	149
1,2-Dichloroethane	1 / 14	ND(5)	4J	2.6 J	-		ND (5)
Xylenes (Total)	1 / 14	ND(5)	2J	2.5 J	-		ND (5)
<u>*Inorganics (µg/L)*</u>							
Aluminum	14 / 14	525	77,000	21,107	930	40,000	18,108
Arsenic	5 / 14	ND(5)	18	7.1	-		ND (5)
Barium	14 / 14	55	830	361	10	475	217
Beryllium	6 / 14	ND(5)	60	11.9	ND(5)	50	17
Cadmium	4 / 14	ND(5)	24	4.8 J	ND(5)	8.5	4 J
Calcium	14 / 14	51,000	865,000	272,429	11,000	61,000	40,250
Chromium	9 / 20	ND(10)	230	43	ND(10)	185	48
Cobalt	7 / 14	ND(50)	250	68	ND(50)	335	136
Copper	13 / 14	ND(10)	180	58	ND(10)	370	138
Iron	14 / 14	3,600	200,000	52,679	8,100	125,000	50,250
Lead	8 / 14	ND(3)	100	20	ND(5)	308	83
Magnesium	12 / 14	ND(5,000)	280,000	61,421	ND(5,000)	24,500	11,125
Manganese	19 / 20	ND(15)	8,800	1,714	96	5,000	1,487
Mercury	3 / 14	ND(0.2)	0.4	0.15 J	ND(0.2)	1.1	0.6
Nickel	12 / 14	ND(40)	1,000	204	ND(40)	1,170	405
Potassium	11 / 14	ND(5,000)	88,000	25,350	ND(5,000)	15,000	8,250
Sodium	11 / 14	ND(5,000)	290,000	48,079	ND(5,000)	10,000	5,783
Vanadium	5 / 14	ND(50)	170	57	ND(50)	120	56
Zinc	12 / 14	ND(20)	3,200	520	31	2,550	937
<u>*General Chemistry (µg/L)*</u>							
Alkalinity	14 / 14	86,000	1,200,000	430,071	72,000	155,000	114,250
Chloride	13 / 14	ND(2,000)	15,000	7,286	3,000	3,000	3,000
Hardness	14 / 14	140,000	2,200,200	917,857	20,000	156,000	109,000
Sulfate	9 / 14	ND(5,000)	940,000	109,464	ND(5,000)	15,000	10,188

<u>Notes:</u>

ND(5) - Not detected at detection limit presented in brakets.
J - Indicates value is estimated.
(3) Samples from Site-Specific Background locations were not includec
(4) Background well locations include CL-09-WP and OW-6B.

flow sampling techniques, indicates that chromium is not present above 10 µg/L. This concentration is well below the SDWA MCL of 100 µg/l.

The manganese results obtained from ground water sampling event #3 are consistent with sampling events 1 and 2. Therefore, sediment has had little or no impact on these results. The manganese levels are similar to those determined during the RI which are above the risk based performance standard of 175 µg/l. Monitoring wells OW-6B and CL-09-WP provided the background ground water quality data.

BACKGROUND UNCERTAINTIES

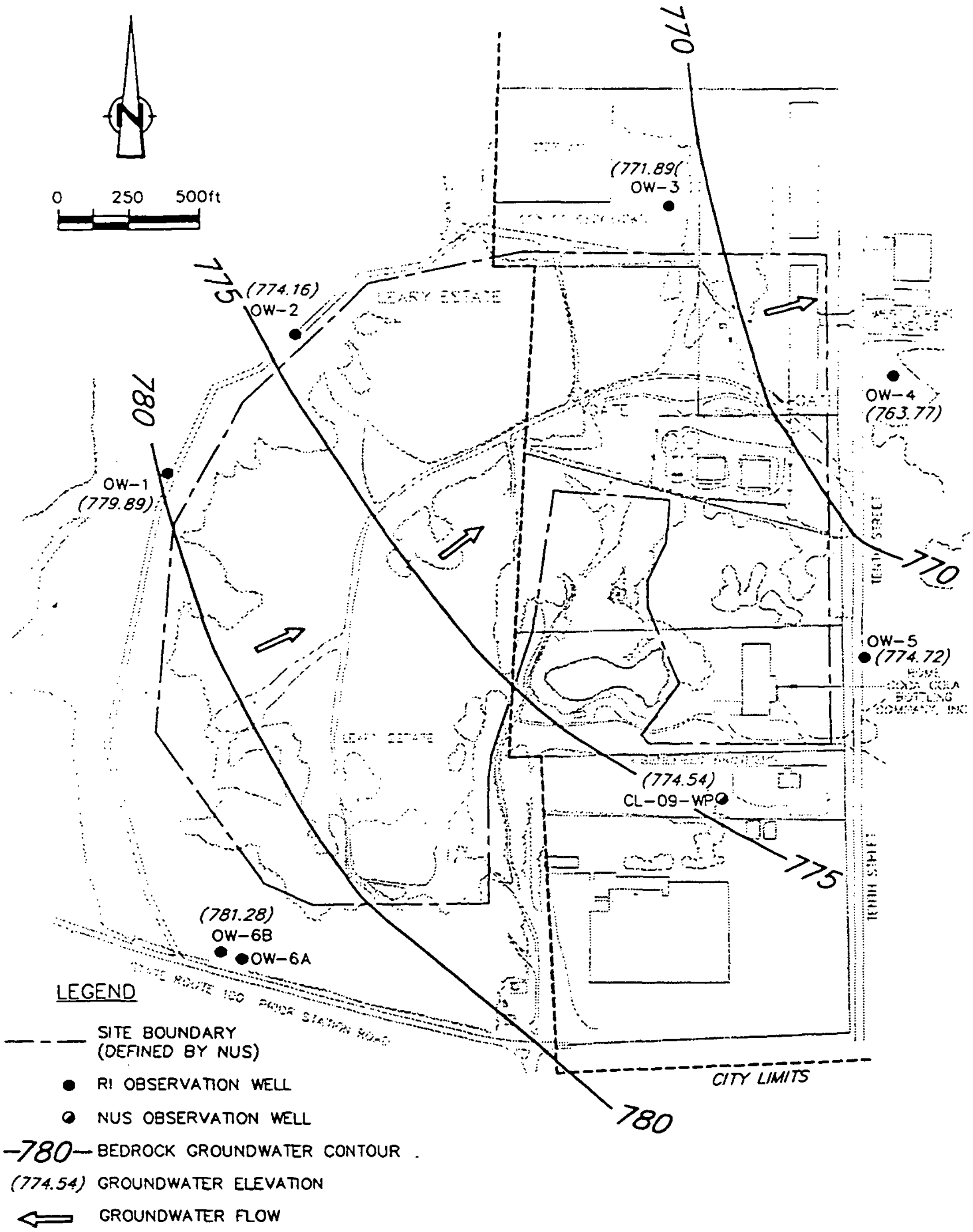
Perimeter bedrock monitoring wells OW-6 and CL-09WP are upgradient of the Site and provided the background ground water quality data. However, due to the substantial analytical differences between background results from the two wells, background concentration values will be confirmed during the first two years of ground water sampling. Two background wells were established, OW-06 (installed at EPA's direction), and CL-09WP (utilized by PRPs' contractor during the RI). OW-06 is upgradient. CL-09 appears to be upgradient, however the North/Northeast ground water flow from the landfill may have impacted this well as shown in Figure 5-2 and in the summarized data provided.

Beryllium, cadmium, chromium, and lead will remain Site Contaminants of Concern and performance standards will be their respective SDWA MCL, due to significant background analytical differences and the possible landfill contaminant impact on background well CL-09-WP. Further background sampling and analysis will be required to support modifying the SDWA MCL based performance standard due to technical infeasibility or inability to attain the ARAR as justified by actual background ground water quality.

The proposed remedy will require further sampling and analysis to further define background ground water concentrations of inorganic contaminants. If this analysis indicates that background ground water concentration for an inorganic constituent exceeds the applicable performance standard, consideration to amending the performance standards through an Explanation of Significant Differences (ESD) or Record of Decision (ROD) Amendment including any applicable or relevant and appropriate requirement (ARAR) waiver may be accomplished.

Proper well construction and development techniques along with a low flow sampling method would be used during monitoring. While certain inorganic and metals concentrations may have been impacted by sample turbidity, this impact may be reduced or eliminated utilizing low flow sampling techniques and proper well construction. Therefore, metal concentrations in ground water will be confirmed using low flow sampling techniques during post-ROD ground water monitoring.

Figure 5-2 Ground Water Contour Map



	CONTAMINANT CONCENTRATIONS (µg/l)					
Sampling Event 1	Lead	Cadmium	Chromium	Beryllium	Manganese	Arsenic
OW–6B	ND(5)	ND(5)	ND(11)	ND(5)	130	ND(5)J
Cl–09WP *	ND(50)J	12J	230J	61J	6200J	ND(5)
Sampling event 2						
OW–6B	7	ND(5)	ND(10)	ND(5)	96	ND(5)
CL–09WP	40	ND(5)	170	13	2200	ND(5)
Sampling Event 3 **						
CL–09WP	N/A	N/A	ND(10)	N/A	<15	N/A

NOTES
- * CL–09WP results based on two samples (one is a duplicate). The higher of the two results was utilized.
- ** Sampling Event #3 was only analyzed for Chromium and Manganese.
- j Estimated values

5.4.2 SOIL CHARACTERIZATION

Soil samples were collected off Site at all perimeter bedrock monitoring well locations. In addition, soil samples were collected from the soil cover at select locations within the limits of the landfill. Soil sample data are presented in Table 5-2.

VOCs

Several discrete detections of trace concentrations of several VOCs and phthalates were reported in soil samples from the locations of monitoring wells OW-1, OW-3 and OW-6. No VOCs were reported in the on-site soil sample collected adjacent to the seep on the east slope of the landfill.

PESTICIDES, BNAs, and PCBs

No PCBs, BNAs, or pesticides were reported in any of the off-site soil samples

TABLE 5-2
SUMMARY OF SUBSTANCES DETECTED IN SOIl.S

Compound	*Frequency of Detection*	*Range of Detections (3)*		*Average (3) Concentration*	*Background (4) Soil Concentration*
		Minimum	*Maximum*		
VOCs µg/kg)					
Acetone	3 / 10	ND(12) -	210J	42	111
Benzene	1 / 10	ND(6) -	8J	4.4 J	3.3 J
2-Butanone	1 / 10	ND(11) -	36J	10.9 J	ND (12)
Carbon Disulfide	1 / 10	ND(6) -	8J	4.5 J	ND (6)
Chlorobenzene	1 / 10	ND(6) -	4J	4.0 J	ND (6)
Ethylbenzene	1 / 10	ND(6) -	190J	23	ND (6)
Methylene Chloride	1 / 10	ND(6) -	21J	5.9 J	ND (6)
Toluene	1 / 10	ND(6) -	5J	4.2 J	ND (6)
Xylenes (Total)	1 / 10	ND(6) -	900J	94	ND (6)
BNAs (µg/kg)					
bis(2-Ethylhexyl)phthalate	1 / 9	ND(410) -	230J	275 J	218 J
2-Methylnaphthalene	1 / 9	ND(410) -	88J	254 J	208 J
Naphthalene	1 / 9	ND(410) -	210J	267 J	218 J
Inorganics (mg/kg)					
Aluminum	9 / 9	4,700 -	18,000	12,767	14,000
Arsenic	9 / 9	4.6 -	27	12.9	17.7
Barium	9 / 9	49 -	1,100	283	113
Beryllium	9 / 9	0.7 -	6.7	3.7	2.6
Cadmium	5 / 9	ND(0.6) -	2.4	1.2	0.6
Calcium	6 / 9	ND(290) -	6,700	1,371	2,484
Chromium	9 / 9	19 -	46	32	31.6
Cobalt	8 / 9	ND(2.9) -	470	111	40
Copper	9 / 9	13 -	86	54	42
Iron	9 / 9	21,000 -	160,000	101,556	69,720
Lead	9 / 9	6.4 -	100	31	49
Magnesium	6 / 9	ND(290) -	1,200	469	593
Manganese	9 / 9	33 -	33,000	5,575	1,502
Mercury	3 / 9	ND(0.12) -	0.4J	0.16	0.17
Nickel	9 / 9	11 -	340	158	81
Potassium	9 / 9	370 -	4,000	1,188	630
Selenium	1 / 9	ND(0.6) -	3.1	0.7 J	ND (0.6)
Sodium	1 / 9	ND(290) -	16,000	1,928	ND (320)
Vanadium	9 / 9	16 -	59	42	444
Zinc	9 / 9	38 -	650	381	237

Notes:

(1) ND(5) - Not detected at detection limit presented in brakets.
(2) J - Indicates value is estimated.
(3) Samples from Site-Specific Background locations were not included.
(4) Background soil locations include OW-4, OW-5 and OW-6.

collected. No VOCs, BNAs, PCBs, or pesticides were reported in the on-site soil sample collected adjacent to the seep on the east slope of the landfill.

METALS

Metal concentrations varied significantly between samples and ranged as follows: arsenic (4.6 to 31 mg/kg); barium (43 to 1,100 mg/kg); beryllium (0.7 to 6.7 mg/kg); cadmium (ND to 2.4 mg/kg); chromium (18 to 49 mg/kg); cobalt (ND to 470 mg/kg); lead (6.4 to 100 mg/kg); and zinc (38 to 650 mg/kg). Cyanide was reported in one surficial soil sample at a concentration of 0.82 mg/kg.

Contamination of surficial soils appears to be limited to those soils/sediments impacted by the seep.

5.4.3 SURFACE WATER CHARACTERIZATION

Surface water samples were collected from locations illustrated in Figure 5-1. Surface water data are presented in Table 5-3.

Two (2) surface water samples were collected from an intermittent drainage course situated 300 to 700 feet west of the Site. One (1) of these two samples was situated upgradient of the Site (SS-8) and a second sample was collected due west or cross-gradient from the Site (SS-4). No water was present in this drainage course downgradient of the Site.

VOCS, PESTICIDES, BNAs, and PCBs

VOCs were not reported in either of these samples. Trace concentrations of 10 BNAs were reported in the surface water sample taken from the Cotton Pond. No pesticides or PCBs were reported.

METALS

Metals were detected in all surface water samples collected, with the greatest number of parameters and highest concentrations detected in sample SS-6 from the shallow ponded area. The metals reported include: arsenic (9 µg/L); barium (1,200 µg/L); chromium (62 µg/L); cobalt (50 µg/L); lead (20 µg/L); manganese (4,900 µg/L); and zinc (540 µg/L). Most of the metals detected in this sample were not detected in the other three surface water samples. Metals detected in the surface water sample from the cotton pond were generally consistent with the sample collected upgradient of this location (SS-8) with the exception of higher levels of aluminum, iron and

TABLE 5-3
SUMMARY OF SUBSTANCES DETECTED IN SURFACE WATERS

Compound	*Frequency of Detection*	*Range of Detections (3)*		*Average (3) Concentration*	*Background (4) Surface Water Concentration*
		Minimum	*Maximum*		
VOCs					
Acetone	2 / 3	ND(10) -	100	54	ND (10)
2-Butanone	1 / 3	ND(10) -	6J	5.3 J	ND (10)
BNAs					
Acenaphthene	1 / 3	ND(10) -	11	7.0 J	ND (10)
Anthracene	1 / 3	ND(10) -	4J	4.7 J	ND (10)
Benzo(a)anthracene	1 / 3	ND(10) -	3J	4.3 J	ND (10)
Dibenzofuran	1 / 3	ND(10) -	9J	6.3 J	ND (10)
Di-n-butyl phthalate	1 / 3	ND(10) -	6J	5.3 J	ND (10)
Fluorene	1 / 3	ND(10) -	15	8.3 J	ND (10)
2-Methylnapthalene	1 / 3	ND(10) -	190	67	ND (10)
Naphthalene	1 / 3	ND(10) -	47	19	ND (10)
Phenanthrene	1 / 3	ND(10) -	42	17.3	ND (10)
Pyrene	1 / 3	ND(10) -	6J	5.3 J	ND (10)
Inorganics					
Aluminum	2 / 3	ND(200) -	19,000	6,467	ND (200)
Arsenic	1 / 3	ND(5) -	9	4.7 J	ND (5)
Barium	2 / 3	ND(200) -	1,200	438	ND (200)
Calcium	3 / 3	5,400 -	140,000	55,800	26,000
Chromium	1 / 3	ND(10) -	62	26	ND (10)
Cobalt	1 / 3	ND(50) -	50	33	ND (50)
Copper	1 / 3	ND(10) -	49	22	ND (25)
Iron	3 / 3	510 -	190,000	63,743	160
Lead	1 / 3	ND(5) -	20	8.3	ND (5)
Magnesium	2 / 3	ND(5,000) -	55,000	22,833	13,000
Manganese	3 / 3	82 -	4,900	1,701	19
Nickel	1 / 3	ND(40) -	55	32	ND (40)
Sodium	1 / 3	ND(5,000) -	290,000	98,333	ND (5000)
Vanadium	1 / 3	ND(50) -	110	53	ND (50)
Zinc	2 / 3	ND(50) -	540	199	33

Notes:

(1) ND(5) - Not detected at detection limit presented in brakets.
(2) J - Indicates value is estimated.
(3) Samples from Site-Specific Background locations were not included.
(4) Background concentrations are from sample location SS-8.

manganese.

5.4.3.1 EAST SEEP

Surface water samples were also collected from two locations on the east side of the Site. One surface water sample (sample SS-6) was collected from a shallow ponded area apparently fed by the seep noted on the east slope of the landfill. An additional surface water sample (sample SS-5) was collected from the Coke Pond which appears to be further downgradient of the seep and the ponded seep area (sample SS-6). Acetone was detected in the ponded area and Coke Pond at concentrations of 100 ppb and 58 ppb, respectively. 2-Butanone was reported at an estimated concentration of 6 ppb. No BNAs, pesticides or PCBs were reported in either sample. VOCS, BNAS, and metals reported in the leachate seep (east seep) were generally consistent with those reported in the nearby leachate well (CL-08-WT).

These concentrations suggest the Site has minimally impacted off-site surface water.

5.4.4 SEDIMENTS CHARACTERIZATION

Sediment samples were collected at all surface water sampling locations in addition to selected dry locations in intermittent stream beds. Results are shown in Table 5-4.

VOCS, PESTICIDES, and BNAs

Sediment samples collected from the "Dry Pond" (SS-3) and upgradient stream location (SS-4 in the Cotton Pond) contained no reported VOCs, one BNA (960 µg/kg of diethylphthalate at SS-3), no reported pesticides or PCBs, and metals consistent with background.

Sediment samples collected from the shallow ponded area and Coke Pond also had reported detections of acetone (380 µg/kg and 1500J µg/kg, respectively), and 2-butanone (76 µg/kg and 650J µg/kg, respectively), in addition to several other trace detections of other VOCs. One BNA was detected in Coke Pond sediment (bis(2-ethylhexyl)) phthalate at 220J µg/kg), no other BNAs or pesticides or PCBs were reported.

METALS

Metals were reported in all sediment samples collected at varying concentrations. Concentrations of the inorganic constituents reported in the sediment samples

TABLE 5-4
SUMMARY OF SUBSTANCES DETECTED IN SEDIMENTS

Compound	*Frequency of Detection*	*Range of Detections (3)* *Minimum*		*Maximum*	*Average (3) Concentration*	*Background (4) Sediment Concentration*
VOCs (µg/kg)						
Acetone	2 / 4	ND(13)	-	1,500J	467	70
Benzene	1 / 4	ND(7)	-	6J	7.5 J	3.4 J
2-Butanone	2 / 4	ND(13)	-	650J	184	ND(12)
Ethylbenzene	1 / 4	ND(7)	-	4.2J	7.1 J	ND(6)
Methylene Chloride	1 / 4	ND(7)	-	23	11.8	6.3 J
Toluene	1 / 4	ND(7)	-	8.5	8.1	ND(6)
BNAs (µg/kg)						
bis(2-Ethylhexyl)phthalate	1 / 4	ND(440)	-	220J	244 J	373 J
Diethylphthalate	1 / 4	ND(520)	-	960	512 J	ND(500)
Inorganics (mg/kg)						
Aluminum	4 / 4	7,700	-	17,000	12,300	10,933
·senic	4 / 4	5	-	13	8.2	11.5
ʙarium	4 / 4	67	-	170	116	85
Beryllium	4 / 4	0.62	-	2.8	1.3	1.3
Cadmium	1 / 4	ND(0.8)	-	0.7	0.6 J	0.4 J
Calcium	4 / 4	880	-	12,550	5,808	1,397
Chromium	4 / 4	16	-	28	21	22
Cobalt	4 / 4	6.2	-	28	14.4	21
Copper	4 / 4	7	-	29	19.6	20
Iron	4 / 4	16,000	-	48,000	30,250	37,573
Lead	4 / 4	13.9	-	47	35	47
Magnesium	3 / 4	ND(830)	-	1,040	711	493
Manganese	4 / 4	330	-	1,300	721	804
Mercury	1 / 4	ND(0.17)	-	0.2	0.14 J	0.10 J
Nickel	4 / 4	8.4	-	89	36	35
Potassium	2 / 4	ND(390)	-	2,050	910	323
Sodium	1 / 4	ND(330)	-	715	373	ND(320)
Vanadium	4 / 4	25	-	39	30	31
Zinc	4 / 4	55	-	400	.197	117

Notes:

(1) ND(5) - Not detected at detection limit presented in brakets.
'?) J - Indicates value is estimated.
) Samples from Site-Specific Background locations were not included.
(4) Background sediment locations includ·· OW-4, OW-5, OW-6 and SS-8.

collected from the intermittent drainage course situated west of the Site were, in general, consistent between upgradient and cross/downgradient sample locations. Levels of metals reported in the sediment sample collected from the dry pond (SS-3), downgradient of the Cotton Pond include: arsenic (13 mg/kg); barium (170 mg/kg); beryllium (2.8 mg/kg); mercury (0.2 mg/kg); nickel (89 mg/kg); and zinc (240 mg/kg). Samples collected from the seep and downstream location exhibited different characteristics, consistent with the impact of a municipal landfill (e.g. high calcium and sodium concentrations).

These concentrations further suggest the Site has minimally impacted off-site sediment quality.

5.5.5 LEACHATE AND WASTE CONTAMINANTS

A total of 30 boreholes were specifically targeted in an effort to locate subsurface waste materials for the purpose of installing leachate wells during this phase of the work. No waste materials were encountered in 19 of the boreholes while waste materials were identified in the 11 remaining boreholes. Five leachate wells (LW-1, LW-2, LW-3, LW-4 and LW-6) were installed within the identified waste deposits immediately adjacent to five boreholes exhibiting waste. Leachate well LW-6 was installed approximately 75 feet from borehole LW-6A (see figure 5-1).

Soil/waste samples were collected during advancement of the boreholes. Samples were collected near the base of the waste in boreholes where waste was encountered. In addition, samples were collected from any unique zones/conditions encountered.

One round of leachate samples were collected from the five newly installed leachate wells and one existing leachate well (CL-08-WT).

5.5.5.1 WASTE/SOIL ANALYSES

Soil/waste samples include all subsurface solid samples collected on Site from identified waste disposal areas. Data obtained from the analyses of waste/soil samples are presented in Table 5-5.

VOCs

Detections of volatile organic compounds in the waste materials were variable. In general, trace concentrations (i.e. less than 100 ppb) of several common VOCs were detected in the waste/soil samples including: acetone, ethylbenzene, methylene

TABLE 5-5
SUMMARY OF SUBSTANCES DETECTED IN WASTE/SOILS

Compound	*Frequency of Detection*	*Range of Detections (3)*		*Average (3) Concentration*	*Background (4) Soil Concentration*
		Minimum	*Maximum*		
VOCs (µg/kg)					
Acetone	9 / 10	ND(19)	120J	56	111
Benzene	1 / 10	ND(6)	4J	3.5 J	3.3 J
Carbon Disulfide	1 / 10	ND(6)	4J	3.5 J	ND (6)
Chlorobenzene	1 / 10	ND(6)	12J	4.3 J	ND (6)
1,2-Dichloroethane	2 / 10	ND(6)	180,000	18,010	ND (6)
Ethylbenzene	2 / 10	ND(6)	15J	4.7 J	ND (6)
Methylene Chloride	2 / 10	ND(6)	17	5.5 J	ND (6)
Toluene	2 / 10	ND(6)	11	4.1 J	ND (6)
Xylenes (Total)	4 / 10	ND(6)	50J	11.9	ND (6)
BNAs (µg/kg)					
bis(2-Ethylhexyl)phthalate	3 / 9	ND(410)	27,000	3,315	218 J
Di-n-butyl phthalate	2 / 9	ND(410)	1,300	483	300 J
2-Methylnaphthalene	1 / 9	ND(410)	120,000	13,554	268 J
Naphthalene	3 / 9	ND(410)	95,000	10,740	218 J
Phenol	1 / 9	ND(410)	75,000	8,554	ND (500)
Inorganics (mg/kg)					
Aluminum	9 / 9	1,700	14,000	6,867	14,000
Arsenic	9 / 9	6.6	23	10.1	17.7
Barium	9 / 9	18	680	207	113
Beryllium	7 / 9	ND(0.31)	9.4	3.1	2.6
Cadmium	5 / 9	ND(0.6)	21	3.9	0.6
Calcium	7 / 9	ND(310)	120,000	14,244	2,484
Chromium	9 / 9	8.5	300	48	31.6
Cobalt	7 / 9	ND(3.1)	140	49	40
Copper	9 / 9	12	120	54	42
Iron	9 / 9	12,000	180,000	59,778	69,720
Lead	9 / 9	8	2,100	258	49
Magnesium	6 / 9	ND(310)	970	500	593
Manganese	9 / 9	4.2	2,900	1,202	1,502
Mercury	5 / 9	ND(0.1)	0.2	0.15 J	0.17
Nickel	7 / 9	ND(25)	350	122	81
Potassium	9 / 9	370	1,900	1,054	630
Selenium	4 / 9	ND(0.7)	8.4	1.8	ND (0.6)
Sodium	3 / 9	ND(310)	3,000	560	ND (320)
Vanadium	8 / 9	ND(3.5)	37	18.3	444
Zinc	9 / 9	3.3	1,300	345	237
Cyanide	1 / 9	ND(0.3)	0.56	0.20 J	0.29 J

Notes:

(1) ND(5) - Not detected at detection limit presented in brakets.
(2) J - Indicates value is estimated.
(3) Samples from Site-Specific Background locations were not included.
(4) Background soil sample locations include OW-4, OW-5 and OW-6.

chloride, toluene, and xylene.

1,2-Dichloroethane (1,2-DCA) was detected in one subsurface soil sample from a depth of 4 to 6 feet at a concentration of 180 ppm in borehole LW-3. The only other reported detection of 1,2-DCA in soil occurred at borehole LW-1 from a depth of 38 to 40 feet at a concentration of 0.079 ppm. No waste material was noted at this location. This sample was taken from a discrete discolored soil seam and was not representative of typical conditions noted in this or any other borehole.

PESTICIDES, BNAs, and PCBs

The same sample contained reported concentrations of various BNAs including bis(2-ethylhexyl)phthalate (27 ppm); 2-methylnaphthalene (120 ppm); napthalene (95 ppm); and phenol (75 ppm). Trace concentrations of other BNAs reported include Di-n-butyl phthalate in sample S-3482-10 (1.3 ppm) and bis(2-ethylhexyl)phthalate in sample S-3482-38 (0.77 ppm).

No other significant concentrations of BNAs were reported in the waste/soil samples.

No pesticides or PCBs were detected in any waste/soil samples submitted for analyses. Cyanide was detected in one waste/soil sample collected for analyses from borehole LW-6 at a concentration of 0.56 ppm.

METALS

Several metals were detected above non-waste soil levels in samples collected from borehole LW-6. The sample collected at a depth of 18 to 20 feet contained reported concentrations of various metals including: barium (390 ppm); beryllium (9.4 ppm); cadmium (21 ppm); copper (120 ppm); manganese (2,100 ppm); nickel (350 ppm); and zinc (1,300 ppm). Lead was reported at a concentration of 2,100 ppm in the sample collected from 6 to 10 feet in the same borehole.

The highest level of manganese was reported in the sample collected at a depth of 18 to 20 feet in borehole LW-4 at a concentration of 2,900 ppm. The highest level of chromium was found in borehole LW-3 at a depth of 4 to 6 feet. This sample contained chromium at a concentration of 300 ppm. No other significant concentrations of metals were reported in the waste/soil samples.

5.5.5.2 LEACHATE SAMPLE ANALYSES

Leachate analytical data are summarized in Table 5-6.

VOCs, PESTICIDES, BNAs, and PCBs

In general, only trace concentrations of a limited number of VOCs and BNAs were reported in the leachate samples collected. The most common compounds reported include: acetone (ND to 55 µg/L); benzene (ND to 37J µg/L); chlorobenzene (ND to 14 µg/L); ethylbenzene (ND to 290 µg/L); toluene (ND to 47 µg/L); and total xylenes (ND to 1600 µg/L). The highest reported BNA compound in leachate was naphthalene at a concentration of 125 µg/L. Remaining BNA compounds were less than 10 µg/L with the exception of several isolated and sporadic detections. No PCBs or pesticides were reported in any of the leachate samples.

METALS

Metals were reported at varying concentrations in all leachate samples collected, with the highest concentrations of metals generally reported in samples collected from leachate wells LW-4 and LW-6. Select metals were also detected in leachate well LW-2. Of these three wells, detected metals concentrations reported included: arsenic (ND to 19 µg/L); barium (3.5 to 12 mg/L); cadmium (5 to 55 µg/L); chromium (190 to 700 µg/L); lead (110 to 1,700 µg/L); manganese (3.9 to 180 mg/L); and zinc (12 to 17,000 µg/L). Arsenic, barium, and lead were also reported in the sample from well CL-08-WT at respective levels of 8, 1600 and 92 µg/L. Levels of barium (1,300 µg/L) and lead (31 µg/L) were found in the sample collected from leachate well LW-1. Select metals reported in the sample collected from the east seep included: arsenic (7 µg/L); barium (1,100 µg/L); manganese (3,200 µg/L); and lead (26 µg/L).

6.0 SUMMARY OF SITE RISK

CERCLA directs EPA to conduct a Baseline Risk Assessment (BRA) to determine whether a Superfund Site poses a current or potential threat to human health and the environment in the absence of any remedial action. The baseline risk assessment provides the basis for determining whether or not remedial action is necessary and the justification for performing remedial action.

TABLE 5-6
SUMMARY OF SUBSTANCES DETECTED IN LEACHATE

Compound	Frequency of Detection	Range of Detections Minimum		Range of Detections Maximum	Average Concentration
VOCs (µg/L)					
Acetone	5 / 7	ND(10)	-	55	25
Benzene	5 / 7	ND(5)	-	37J	17.6
Chlorobenzene	3 / 7	ND(5)	-	14	9.6
Ethylbenzene	3 / 7	ND(6)	-	290	67
Toluene	2 / 7	ND(6)	-	47	10.3
Xylenes (Total)	5 / 7	ND(5)	-	1,600	372
BNAs (µg/L)					
Acenaphthene	1 / 7	ND(10)	-	6J	8.1 J
Benzoic Acid	1 / 7	ND(10)	-	31J	26 J
bis(2-Ethylhexyl)phthalate	3 / 7	ND(10)	-	15	8.6 J
Dibenzofuran	1 / 7	ND(10)	-	3J	7.7 J
2,4-Dimethylphenol	3 / 7	ND(10)	-	16	10.1 J
Di-n-butyl phthalate	1 / 7	ND(10)	-	3J	7.7 J
1,4-Dichlorobenzene	1 / 7	ND(10)	-	4J	7.9 J
Fluorene	2 / 7	ND(10)	-	4J	7.6 J
2-Methylnapthalene	2 / 7	ND(10)	-	36	13.3
4-Methylphenol	1 / 7	ND(10)	-	27	11.1
Naphthalene	4 / 7	ND(10)	-	125	36
N-nitrosodimethylamine	1 / 7	ND(10)	-	5J	8.0 J
Phenanthrene	1 / 7	ND(10)	-	5J	8.0 J
Phenol	2 / 7	ND(10)	-	3J	7.4 J
Inorganics (µg/L)					
Aluminum	7 / 7	1,300	-	390,000	112,386
Arsenic	4 / 7	ND(5)	-	19	8.7
Barium	7 / 7	82	-	12,000	3,312
Beryllium	3 / 7	ND(5)	-	220	37
Cadmium	3 / 7	ND(5)	-	55	16.1
Calcium	7 / 7	8,200	-	170,000	108,886
Chromium	7 / 7	15	-	700	212
Cobalt	4 / 7	ND(50)	-	5,100	846
Copper	7 / 7	12	-	1,800	545
Iron	7 / 7	4,900	-	2,400,000	554,700
Lead	6 / 7	ND(5)	-	1,700	509
Magnesium	6 / 7	ND(5,000)	-	60,000	38,929
Manganese	7 / 7	1,200	-	180,000	29,000
Mercury	4 / 7	ND(0.2)	-	6.7	1.5 J
Nickel	6 / 7	ND(40)	-	8,300	1,451
Potassium	6 / 7	ND(5,000)	-	100,000	59,500
Sodium	7 / 7	3,200	-	280,000	168,743
Vanadium	5 / 7	ND(50)	-	670	240
Zinc	7 / 7	12	-	17,000	3,026
Cyanide	5 / 7	ND(5)	-	80	17.9
General Chemistry (µg/L)					
Alkalinity	7 / 7	40,000	-	1,100,000	734,285
Chloride	7 / 7	19,000	-	330,000	179,714
Hardness	7 / 7	26,000	-	820,000	438,000
Sulfate	7 / 7	8,000	-	46,000	16,429

6.1 HUMAN HEALTH RISKS

The human health risk assessment evaluated the nature and extent of the threat to public health caused by the release or threatened release of hazardous substances from the Site.

6.1.1 CONTAMINANTS OF CONCERN (COCs)

Chemicals were included in the Summary of Site Risk Section if the results of the risk assessment indicate that a contaminant might pose a significant current or future risk. The criteria for determining the contaminants of concern are those contaminants that contributed to a pathway which exceeds a 1E-4 risk or HI of 1; chemicals contributing risk to these pathways need not be included if their individual carcinogenic risk is less than 1E-6 or their noncarcinogenic risk is less than 1.0, the only pathway meeting this criteria is the *Future Residential Ingestion of Ground Water Route* and Table 6-1 summarizes the COCs for this pathway.

TABLE 6-1 CONTAMINANTS OF CONCERN

Media and Chemical	Exposure Point Concentrations		
	Frequency of Detection	RME [1]	Background
GROUND WATER	mg/l	mg/l	mg/l
Dichloroethane, 1,2–	1/14	0.0029	ND
Arsenic	5/14	0.01	ND
Barium	14/14	0.52	0.217
Beryllium	6/14	0.023	0.017
Cadmium	4/14	0.008	0.004
Manganese	19/20	2.747	1.487
Nickel	12/14	0.368	0.405
Vanadium	5/14	0.086	0.056
Zinc	12/14	1.017	0.937

1 Reasonable Maximum Exposure defined as the 95% upper confidence limit chemical concentration (UCL) on the arithmetic mean (or maximum concentration when the UCL exceeds the maximum).

6.1.1.1 COCs IN GROUND WATER

Monitoring wells OW-6 and CL-09WP are upgradient of the Site and provided background ground water quality data. However, due to the substantial analytical differences between background results from the two wells, the utilization of CL-09WP will be confirmed during future ground water monitoring.

While certain inorganic and metals concentrations may have been impacted by turbidity, this impact may be reduced or eliminated utilizing low flow sampling techniques and proper well construction. Therefore, metal concentrations in background ground water will be confirmed using low flow sampling techniques during future ground water sampling.

Nine chemicals reported in the downgradient and cross-gradient monitoring wells meet the COC criteria: 1,2-dichloroethane, arsenic, barium, beryllium, cadmium, manganese, nickel, vanadium and zinc.

6.1.2 EXPOSURE ASSESSMENT

Whether a chemical is actually a concern to human health depends upon the likelihood of exposure, i.e. whether the exposure pathway is currently complete or could be complete in the future. A complete exposure pathway (a sequence of events leading to contact with a chemical) is defined by the following four elements:

- Source and mechanism of release;
- a transport medium (e.g., surface water, air) and mechanisms of migration through the medium;
- the presence or potential presence of a receptor at the exposure point; and
- a route of exposure (ingestion, inhalation, dermal absorption).

If all four elements are present, the pathway is considered complete.

The two major constituent release and transport mechanisms potentially associated with the Site are as follows:

- Infiltration of precipitation through the affected waste/soils and the percolation of the resulting leachate into the ground water; and,

- release of affected waste/soil by seeps/leachate run-off to surface waters, sediments, and soils.

Because of the present landfill cover, wide and dispersed waste disposal practices, and the minimal presence of VOCs, exposure to constituents in air transport is not considered significant at the Site.

An evaluation was undertaken of all potential exposure pathways which could connect chemical sources at the Site with potential receptors. All possible pathways were first hypothesized and evaluated for completeness using the above criteria. The current pathways represent exposure pathways which could exist under current Site conditions while the future pathways represent exposure pathways which could exist, in the future, if the current exposure conditions change.

6.1.2.1 CURRENT EXPOSURE

Under present conditions, the eastern perimeter of the Site is bordered by light industrial operations. These operations involve limited outdoor activity; therefore, outdoor exposures to ambient air, surface soil, and surface water could involve work populations.

The remainder of the Site and surrounding area is primarily undeveloped and is covered by a dense growth of trees, brush and mixed vegetation. This area, therefore, has limited accessibility to the public from the nearby roads and other properties. Vehicle trails enter the Site across private land in several locations. This situation allows potential on-site exposure to site-related chemicals in surface soil, sediment, and surface water.

The receptor populations would be trespassers such as fishermen, hunters, older children, or hikers. New fencing and gates provide additional security for the Site and decrease the potential for trespassers and worker exposure.

GROUND WATER

Under current conditions there are no on-site ground water wells so there is no on-site exposure to ground water or leachate. Nearby residences are on the municipal water supply and generally, do not have private wells. Two private wells are known to exist within a 1 mile radius of the Site. One is located downgradient of the Site and one is cross gradient. Neither well is used for potable purposes. The down gradient well is over 200 feet in-depth in the Knox group and used for irrigation use only. The cross gradient well is of unknown depth and is used for irrigation use. Neither of these wells would likely be impacted by the Site. Potential exposures under present land use conditions are summarized as follows:

Potential Exposure Scenarios - Current Conditions

Media	*Exposure Pathway*	*Receptor Populations*
On-Site		
Surface Water Surface Soil Surface Sediment	Direct Contact Incidental Ingestion	On-Site Workers and Trespassers
Off-Site		
Surface Water (Coke Pond) Ground water	Recreational use (fish, swim) Direct contact; ingestion Household Water	Area residents using ponds and downgrade creek areas Area residents on private wells

6.1.2.2 FUTURE EXPOSURE

Under potential alternate future land use, the type of potential receptor populations would not change although the populations could increase in size due to expansion of the industrial park (more workers) and additional residential development (more convenient for older children to play on Site) in undeveloped areas close to the Site. One population, namely hunters, would probably decrease if the area around the Site becomes more developed.

From the information available (multiple ownership, limited zoning, and general accessibility of the area), future development of the Site, although possible, will be limited. The City of Cedartown has initiated action to acquire direct control of the property. Once acquired, the City may implement restrictions not allowing any future use of this Site. Without strict zoning, the development in the areas around the Site could be either commercial or residential. The area to the north and east of the Site is expected to be developed commercial to light industrial.

In the absence of strict regulations in the State or the county that require use of municipal water, new development within the County could involve either the use of County water or the development of private wells to utilize ground water for residential or industrial purposes. In the event a private well is developed, exposure from drinking and bathing in potentially contaminated water could occur.

If the City implements a formal maintenance program to ensure the integrity of the Site cover and prevent minor illegal waste disposal, workers involved in maintenance activities could be exposed to contaminated surface soils, sediment and surface water. Exposure pathways and receptor populations under future alternate land use conditions are similar to present land use conditions. Future complete exposure points can be summarized as follows:

Potential Exposure Scenarios - Future Conditions

Media		*Exposure Pathway*	*Receptor Populations*
On-Site			
	Surface Water	Direct Contact Incidental Ingestion	Residents near the Site - Trespassers
	Surface Soils & Sediments	Direct Contact & Ingestion	On-site Maintenance Workers & Trespassers
Off-Site			
	Surface Water	Recreational Use Direct Contact	Area Residents using ponds
	Ground water	Drinking & Bathing	Nearby Residents with Private wells [1]

(1) Only two private wells were noted to currently exist within a one mile radius of the Site. The City of Cedartown prohibits development of new wells within the City limits.

The exposure point concentrations for each of the chemicals of concern and the exposure assumptions for each pathway were used to estimate the chronic daily intakes for the potentially complete pathways. The chronic daily intakes were then used in conjunction with cancer potency factors and non-carcinogenic reference doses to evaluate risk.

The 95th percentile for reported concentrations of chemicals of concern in each-media evaluated were calculated as the exposure point concentrations for the reasonable maximum exposure (RME) in each of the exposure scenarios. Exposures point concentrations are summarized in Section 6.1.1, Table 6-1.

Potential future exposure scenarios included all the exposures examined under current conditions. Exposure assumptions were considered the same in evaluating future conditions as were used in evaluating current conditions.

The future residential ingestion of ground water exposure scenario assumed a 30 year duration (5 years as a child). The assumed ingestion rates for an adult and a child were 2 liters and 1 liter, respectively. Body weights were 70 kg for adults and 15 kg for a child.

6.1.3 TOXICITY ASSESSMENT

A cancer slope factor (CSF) and a reference dose (RfD) are applied to estimate the potential risk of cancer from an exposure and the potential for non-carcinogenic effects to occur from the exposure.

CSFs have been developed by EPA's Carcinogenic Assessment Group for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic contaminants of concern. CSFs which are expressed in units of $(mg/kg/day)^{-1}$, are multiplied by the estimated intake of a potential carcinogen in mg/kg/day, to provide an upper-bound estimate of the excess lifetime cancer risk associated with exposure at that intake level. The term "upper-bound" reflects the conservative estimate of risks calculated from the CSF. Use of this approach makes underestimation of the actual cancer risk highly unlikely. CSF are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied.

This increased cancer risk is expressed by terms such as 1E-6. To state that a chemical exposure causes a 1E-6 added upper limit risk of cancer means that if 1,000,000 people are exposed, one additional incident of cancer is expected to occur. The calculations and assumptions yield an upper limit estimate which assures that no more than one case is expected and, in fact, there may be no additional cases of cancer. USEPA policy has established that an upper limit cancer risk falling below or within the range of 1E-6 to 1E-4 is acceptable.

RfDs have been developed by EPA for indicating the potential for adverse health effects from exposure to COCs exhibiting noncarcinogenic effects. RfDs which are expressed in units of mg/kg/day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals, that are likely to be without risk of an adverse affect. Estimated intakes of COCs from environmental media (e.g. amount of COCs ingested from contaminated ground water) can be compared to the RfD. RfDs are derived from the results of human epidemiological studies or chronic animal bioassays to which animal-to-human extrapolation and uncertainty factors have been applied (e.g. to account for the use of animal data to predict effects on humans). If the estimated exposure to a chemical expressed as mg/kg/day is less than the RfD, the exposure is not expected to cause any non-carcinogenic effects, even if the exposure is continued for a lifetime. In other words, if the estimated dose divided by the RfD is less than 1.0, there is no concern for adverse non-carcinogenic effects.

Exposure Point Concentrations, and Toxicity Potency Factors used to calculate Human Health Risks are summarized in Table 6-2.

TABLE 6-2 CONTAMINANTS OF CONCERN TOXICITY ASSESSMENT		
Media and Chemical	Toxicity	
	CSF [2] 1/(mg/kg/day)	RfD [1] mg/kg/day
GROUND WATER		
Dichloroethane, 1,2–	.091	N/A
Arsenic	1.75	.0003
Barium	N/A	.07
Beryllium	4.3	.005
Cadmium	N/A	.001
Manganese	N/A	.005
Nickel	N/A	.02
Vanadium	N/A	.3
Zinc	N/A	.02

1 Reference doses (RfDs) have been developed by EPA for indicating the potential for adverse health effects from exposure to chemicals exhibiting non–carcinogenic effects. Adapted from USEPA IRIS, July 92 and USEPA Health Effects Summary Table, OERR 9200.6–303 (1992).

2 Cancer potency factors (CPFs) have been developed for estimating excess lifetime cancer risks associated with exposure to potentially carcinogenic chemicals. Adapted from USEPA IRIS, July 92 and USEPA Health Effects Summary Table, OERR 9200.6–303 (1992). unless otherwise noted.

6.1.4 RISK CHARACTERIZATION

For carcinogens, risks are estimated as the incremental probability of an individual developing cancer over a life-time as a result of exposure to the carcinogen. Excess life-time cancer risk is calculated from the following equation:

RISK = CDI X CSF

where:

risk = a unit less probability (e.g., 2×10^{-5}) of an individual developing cancer;

CDI = chronic daily intake averaged over 70 years (mg/kg-day); and,

CSF = slope-factor, expressed as $(mg/kg\text{-}day)^{-1}$

These risks are probabilities that are generally expressed in scientific notation (e.g., $1X10^{-6}$ or $1E^{-6}$). An excess lifetime cancer risk of 1×10^{-6} indicates that, as a reasonable maximum estimate, an individual has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at the Site.

The potential for noncarcinogenic effects is evaluated by comparing an exposure level over a specified time period (e.g., lifetime) with a reference dose derived for a similar exposure period. The ratio of exposure to toxicity is called a hazard quotient (HQ). By adding the HQ's for all COCs that affects the same target organ within a medium or across all media to which a given population may reasonably be exposed, the Hazard Index (HI) can be generated.

The HQ is calculated as follows:

Non-cancer HQ = CDI/RfD

where:

CDI = Chronic Daily intake

RfD = Reference Dose; and,

CDI and RfD are expressed in the same units and represent the same exposure period (i.e., chronic, subchronic, or short-term).

To evaluate the estimated cancer risks, a risk level lower than $1x10^{-6}$ is considered a minimal or de minimis risk. The risk range of $1x10^{-6}$ to $1x10^{-4}$ is an acceptable risk range and would not be expected to require a response action. A risk level greater than $1x10^{-4}$ would be evaluated further, and a remedial action to decrease the estimated risk considered.

A hazard index (HI) of less than unity (1.0) indicates that the exposures are not expected to cause adverse health effects. An HI greater than one (1.0) requires further evaluation. For example, although the hazard quotients of the several chemicals present are added and exceed 1.0, further evaluation may show that their toxicities are not additive because each chemical affects different target organs. When total affects are evaluated on an effect and target organic basis, the hazard index of the separate chemicals may be at acceptable levels.

Carcinogenic risks and non-carcinogenic hazards were evaluated for potential exposures to media-specific chemicals of concern in surface soil, surface water, surface sediment and ground water. Receptor populations were potentially exposed workers, trespassers and area residents that could, theoretically, use ground water for a household water source.

Estimated potential exposure to chemicals of concern in surface water, surface soil and surface sediments did not result in unacceptable carcinogenic risk or non-carcinogenic hazard.

Estimated potential added cancer risks and non-carcinogenic hazards from the use of contaminated ground water for household use are in an unacceptable range. The estimated cancer risk exceedances are related to arsenic and beryllium concentrations reported. The arsenic concentration is well below the MCL. The maximum beryllium concentration in downgradient wells is below the maximum background concentrations reported, and elevated levels of certain metals may be related to the presence of sediment in the ground water samples. Background and COC's concentrations will be confirmed during future ground water monitoring.

Similarly, exceedances of a hazard index of 1.0 may be related to high concentrations of metals resulting from turbidity in ground water samples.

TABLE 6-3: SUMMARY OF UNACCEPTABLE RISK -- GROUND WATER INGESTION [a]		
Chemical	Lifetime Excess Cancer Risk	Hazard Quotient
Dichloroethane, 1,2-	4.0×10^{-06}	NV
Arsenic	2.6×10^{-04}	2.2
Barium	N/A	0.5
Beryllium	1.5×10^{-03}	0.3
Cadmium	N/A	0.5
Manganese	N/A	36.6
Nickel	N/A	1.2
Vanadium	N/A	0.8
Zinc	N/A	0.2
TOTAL	2.0×10^{-03}	42.3
a Calculations based on RME values for exposure assumptions and point concentrations		

6.1.5 IDENTIFICATION OF UNCERTAINTIES

The following areas of uncertainty were associated with the estimation of chemical uptake from exposure to ground water:

1. Exposure scenarios based on USEPA Guidance utilize conservative assumptions which means the actual risk will not be greater than the estimate and may be lower. For this reason, the estimated cancer risks based on USEPA Guidance such as are presented in this document may not represent actual risks to the population. The function of these risk estimates is to assist in evaluating: which chemicals may be responsible for the major risk, if any, associated with the Site; which media and exposures present the greatest potential problems; what remediation, if any, is needed; and how effective any selected remediation will be in decreasing the estimated risk.

2. Exposures related to drinking and bathing are theoretical because ground

water in the area is not presently used for drinking water or for other household water needs, and it is unlawful at this time for residents to bore a new well within the city limits.

3. Because of the limitations of a data set, the 95th percentile may exceed the maximum concentration reported in some evaluations. This may occur when there are a large number of non-detects and the detection limits are unusually high due to interferences in the analyses (e.g., BNAs in surface soil). In these cases, consistent with USEPA Region IV guidance, the maximum reported values were used as exposure point concentrations to estimate human exposures. Although the use of maximum values is generally recognized as an appropriate screening approach, it should be recognized that this procedure may over estimate the actual exposure.

4. This is also the case for the use of detection limits as the non-detect values when a chemical has been reported as not detected in the majority of the samples collected and analyzed. Since some of the non-detects may be zero, assuming that a concentration equal to half the detection limit is present instead of zero may over-estimate the actual chemical concentrations at the Site. This is particularly true if interfering chemicals affect the analyses and the non-detect value is elevated.

5. Environmental sampling and analysis can contain significant errors and artifacts. At this Site, the data are believed to adequately and accurately represent the existing conditions.

6. When the long-term health effects are evaluated, it is assumed that the chemical concentrations are constant for the exposure period being evaluated. This may not be accurate since the reported chemical concentrations are changing due to various degradation processes (i.e. dilution by uncontaminated water, sorption, dispersion of contaminated ground water, volatilization, biodegradation, chemical degradation and photo degradation). The use of steady state conditions will likely over-estimate the exposure.

7. The exposures to vapors and dust at the Site, dermal contact with ground water from household uses other than bathing (i.e. laundry, washing dishes), and other possible exposures to surface soil and surface water were not evaluated. Although these and other potential exposures could occur, the magnitudes of these exposures are expected to be much lower than the exposures evaluated, and would not quantitatively affect the total health impact from the Site.

8. Since ground water in the surrounding area is not presently used for drinking water or for other household water needs, the exposures related to drinking and bathing are theoretical and relate to potential future exposures should a new house or an existing house develop a well for a household potable water supply. This is unlikely since public water is available in the area and would be the preferred source for residential water. The City of Cedartown has in effect an ordinance (City Code Section 11-117) which makes it unlawful to bore any well in the City limits. This ordinance applies to both individuals and corporations.

The following are uncertainties associated with estimation of risks:

1. In the hazard and risk evaluations, the risks or hazards presented by several chemicals reported for the same exposure have been added to provide a sum of estimated total risk or hazard for that particular exposure. This is a conservative assumption and is scientifically accurate only in those instances where the health effects of individual chemicals are directed at the same effect and same target organ. The effects may be additive, synergistic or antagonistic. Since a large number of chemicals have no similarity as to their non-carcinogenic action or the target of their action, this approach may over-estimate risk.

2. Risks calculated from slope factors are derived using a linearized multistage procedure; therefore, are likely to be conservative upper bound estimates. The actual risks may be much lower.

3. There is a degree of uncertainty regarding the RfD for manganese in the ground water ingestion scenario. There is currently a debate whether it is appropriate to separate the exposures from food and water as currently done by IRIS for some chemicals, and whether it is appropriate to separate the exposure from food and water as presently done for manganese (and some other inorganics) by IRIS. Due to the high degree of uncertainty associated with the present RfD of 0.005 mg/kg/day for manganese, the RfD determination is scheduled for EPA review. The current EPA RfD for manganese in water of 0.005 mg/kg/day was used to evaluate risks concerning manganese drinking water intake.

6.2 ECOLOGICAL EVALUATION

An assessment of the nature of the Cedartown Municipal Landfill Site supports a conclusion that an in-depth ecological and environmental evaluation is not warranted.

6.2.1 TERRESTRIAL

The Site was closed in 1979 and has been covered with clean soil of 1 to 10 feet in depth and graded to match its original high mounded terrain. When grading was completed, each area was vegetated with grasses, various herbaceous growth, trees, and shrubs. The result is a sloping terrain which is covered by some open grassy areas, some areas of brushy volunteer tree and shrub growth and some areas of reforestation (pine trees). Some areas are minimally vegetated, possibly due to the clay nature of the cover. The ultimate result appears to be a reasonably well balanced wildlife habitat providing food and cover which is suitable for a wide variety of terrestrial wildlife.

The Georgia Fish and Wildlife Service provided the following list of federally endangered species which may inhabit the area:

Picoides borealis	Red-Cockaded Woodpecker
Haliaeetus leucocephalus	Bald Eagle
Felis concolor cougar	Eastern Cougar
Myotis grisescens	Gray Bat

The Georgia Department of Natural Resources indicated the red-cockaded woodpecker would not locate near the Site because pine trees are relatively young, and this bird inhabits old growth pines. The bald eagle and eastern cougar would not be found in this area due to urbanization/industrialization. The nearest cave which hosts the gray bat is over 30 miles from the Site. Since the typical range of the gray bat is a few miles, it is unlikely that the Site would impact this species.

The U.S. Fish and Wildlife indicated the following protected plants which may be present in the area:

Yellow Lady's Slipper
False Hellebore

While both species are native to Northwest Georgia, they are only found in undisturbed, old growth forests. This habitat does not exist on or near the Site.

Because the surface soil is non-contaminated, there is no risk of chemical exposure from contaminated soil for animal and bird populations which may inhabit the area.

6.2.2 AQUATIC

Surface Waters

There are several areas of surface water near the Site. A comparison of chemical concentrations reported in all the surface water bodies with criteria to protect aquatic organisms was accomplished. A comparison of the maximum surface water concentrations with the Federal Ambient Water Quality Criteria (AWQC) and the Georgia Surface Water Quality Standards indicates exceedances were found in the East Seep Pond, which likely reflects leachate seepage from the landfill.

Metals found in the East Seep Pond were above the maximum (acute) surface water concentrations criteria and standards for aluminum and chromium (based upon Cr VI). Copper and zinc exceed both the acute and chronic AWQC and iron and lead exceed the chronic AWQC. These values are referenced in the RI and FS (Table 1.7).

The East Seep Pond is a small depression which collects water during precipitation. Because of limited area, water depth and a susceptibility to dryness during the summer months, the East Seep Pond does not provide a suitable habitat for aquatic biota. Therefore, exposure of aquatic biota to contaminants in this pond would not be a concern.

Inorganic surface water concentrations in the downgradient Coke Pond do not exceed the AWQC, thus indicating that Site-related inorganic contaminants are not currently impacting the surface water in Coke Pond at levels that might cause adverse effects on aquatic biota living in the pond. However, given the levels of contaminants of ecological concern in the East Seep Pond, the future potential migration of surface water contaminants (runoff) from the East Seep Pond into the Coke Pond, down gradient of the East Seep Pond, is a concern.

Sediments

A comparison of chemical concentrations in sediments of the Cotton Pond, East Seep Pond and Coke Pond to USEPA Region IV Screening Values adopted from the National Oceanic and Atmospheric Administration (NOAA) was accomplished in the RI.

NOAA developed these screening values through evaluation of biological effect data for aquatic (marine and freshwater) organisms, obtained through equilibrium partitioning calculations, spiked-sediment bioassays, and concurrent biological and chemical field surveys. For each constituent having sufficient data available, the concentrations causing adverse biological effects were arrayed, and the lower 10 percentile (called an Effects Range-Low, or ER-L) and the median (called an Effects Range-Median, or ER-M) were determined.

If sediment contaminant concentrations are above the ER-M, adverse effects on the biota are considered probable. If contaminant concentrations are between the ER-L and the ER-M, adverse effects are considered possible. If contaminant concentrations are below the ER-L, adverse effects are considered unlikely.

There are no available sediment screening values for the VOCs and BNAS. For the inorganics with available sediment screening values, corresponding maximum reported values are below the ER-L values, with the exception of lead, nickel and zinc. The maximum lead concentration reported in the Cotton Pond exceeded the ER-L value, but it did not exceed the ER-M value. In addition, the background lead concentration exceeded the ER-L value. The maximum reported concentration of nickel exceeded the ER-M value only in the Dry Pond, while the maximum zinc concentration exceeded the ER-M value only in the Coke Pond. It should also be noted that even background sediment concentrations of lead and nickel exceed the ER-L values, while background zinc concentrations in sediments are similar to the ER-L value. Therefore, this indicates limited potential for effects on the bottom dwelling aquatic biota in these ponds.

An ecological and environmental evaluation of the Site leads to a conclusion that the Site currently provides a habitat for a variety of wildlife and that chemical exposures on the Site do not represent a threat to wildlife which may inhabit the area. The Coke Pond currently does not appear to contain surface water and sediment contaminants at levels that would adversely affect aquatic biota living in this habitat. However, it is possible that contaminants form the East Seep/Pond may potentially migrate into Coke Pond in the future.

6.3 CONTAMINANTS OF CONCERN & PERFORMANCE STANDARDS

Estimated potential exposure to site chemicals in surface water, surface soil, and surface sediments do not result in unacceptable cancer or non cancer risks at the Cedartown Landfill Site. However, the estimated potential cancer and non-cancer risks from future exposure to ground water exceed EPA's cleanup target risk range and an HQ of 1. Therefore, EPA established performance standards for chemicals in ground water at levels above EPA's target risk range or Safe Drinking Water Act MCL to ensure that any future ground water users would not be exposed to unsafe levels of site-related contaminants. Performance standards for the remediation of ground water are shown in Table 6-4.

In the area of the Site, background concentrations (in ground water not contaminated by the site) of some chemicals may actually be higher than MCLs. Since remediation below background levels is not technically feasible, additional sampling will be conducted to confirm if data is indicative of background conditions.

Actual and threatened releases of hazardous substances from this Site, if not addressed by implementing the response action selected in this ROD, may present an imminent and substantial endangerment to public health, welfare, or the environment.

TABLE 6-4
SUMMARY OF REMEDY PERFORMANCE STANDARDS (GROUND WATER)

Contaminant	Concentrations Detected (μg/l)		Background (μg/l)	Performance Standard (μg/l)
	Mean	Max		
Manganese	1,714	8,800	1,487	175 [a]
Beryllium	11.9	60	17	4 [b]
Cadmium [c]	4.8	24	4	5 [b]
Chromium [d]	43	230	48	100 [b]
Lead [c]	20	100	83	15 [e]

a - Calculated value based on an acceptable risk or a Hazard Quotient (HQ) of 1. Exposure assumptions are a 2 liter per day ingestion rate and a 70 kilogram body weight.

b - Safe Drinking Water Act Maximum Contaminant Level (MCL).

c - Included due to contaminant concentrations and frequency of detection.

d - While Chromium was below detection during third sampling round, it was detected above standards in previous rounds. Therefore, it was retained for determining performance standards.

e - EPA Action Level from Lead and Copper Rule, 56 FR, June 7, 1991.

7.0 DESCRIPTION OF ALTERNATIVES

The Feasibility Study Report evaluated possible alternatives for remediation of conditions at the Cedartown Municipal Landfill Site. A total of three (3) alternatives have been established for detailed analysis consideration. These alternatives were selected to provide a range of remedial actions for the Site. The table below summarizes the alternatives and estimated cost of each alternative.

1.	No Action	$ 0
2.	Institutional Controls, Cover Maintenance, Seep Control, and Ground water Monitoring	$ 625,000
3.	Ground Water Extraction and Treatment	$ 5,225,000 - 8,631,000

7.1 ALTERNATIVE 1: NO ACTION

EPA is required to consider the no action alternative by the National Oil and Hazardous Substances Pollution Contingency Plan (NCP), the regulation implementing the Superfund law. It is used as a baseline for comparing other alternatives. Under this alternative, EPA would take no action to minimize the impact ground water contamination has on the area. There is no cost associated with this alternative since no additional activities would be conducted.

7.2 ALTERNATIVE 2: INSTITUTIONAL CONTROLS, COVER MAINTENANCE, SEEP CONTROL, AND GROUND WATER MONITORING

This alternative would include:

- Cover maintenance and seep controls;
- institutional controls, such as record notices and deed, zoning and land-use restrictions;
- ground/surface water monitoring program to insure natural attenuation processes would be effective and that contaminants would not migrate;
- a two year review during which EPA would determine whether ground water performance standards continue to be appropriate and if natural attenuation processes are effective. EPA would consider requiring the implementation of a contingency ground water remedial action as discussed in Alternative 3, if ground water performance standards continue to be appropriate and natural attenuation processes are not effective; and,

- continued ground water monitoring upon attainment of the performance standards at sampling intervals to be approved by EPA. The ground water monitoring program would continue until EPA approves a five-year review concluding that the alternative has achieved continued attainment of the performance standards and remains protective of human health and the environment.

The ground water monitoring program would require further sampling and analysis to further define background ground water concentrations of inorganic contaminants and would, at EPA's discretion, require the installation of additional wells. If, based on that information, the background concentration for an inorganic exceeds the MCL or acceptable risk based standards, EPA, at its sole discretion, would consider amending the performance standards through an ESD or ROD Amendment. Ground water samples would be collected on a quarterly basis for two years upon implementation of the ground water monitoring program. Proper well construction and development techniques along with a low flow sampling method would be used during the monitoring. EPA, at its sole discretion, may approve revising the sampling intervals of the ground water monitoring program.

Surface water sampling of the Coke Pond would be collected at sampling intervals to be approved by EPA and at the Five-Year review to ensure contaminants do not migrate from the East Seep. EPA would evaluate and at EPA's sole discretion discontinue sampling based on the results of the five year review.

The present worth cost of this alternative is estimated at $459,000 (semi-annual sampling) to $723,000 (quarterly sampling) consisting of 30 years of Operation and Maintenance (O&M) costs. An estimate of $625,000 was used for cost comparison purposes based on quarterly sampling for 5 years and semi-annual for the remaining 25 years.

7.3 ALTERNATIVE 3: GROUND WATER TREATMENT

This alternative would include:

- Cover maintenance and seep controls;

- institutional controls, such as record notices and deed, zoning and land-use restrictions;

- a ground/surface water monitoring program to insure the ground water treatment system would be effective and that contaminants would not migrate;

- active remediation of ground water. Ground water would be extracted, treated and discharged until all performance standards are met for two consecutive sampling events; and,

- continued ground water monitoring upon attainment of the performance standards at sampling intervals to be approved by EPA. The ground water monitoring program would continue until EPA approves a five-year review concluding that the alternative has achieved continued attainment of the performance standards and remains protective of human health and the environment.

Contaminated ground water would be extracted, treated and discharged through a National Pollutant Discharge Elimination System (NPDES). If NPDES is not viable, other discharge alternatives such as discharge to the local wastewater treatment plant would be considered. On-site treatment would likely be required. The treated water would meet permit requirements for discharge to a nearby surface water body. During pump and treat operations, the withdrawn ground water would be stored in an equalization tank from which it would be pumped to a treatment system. The equalization tank would provide storage during times when a downstream treatment system might be shut down.

During the remedial design for this project, bench scale treatability studies would be conducted to determine the effectiveness of chemical, ion exchange, and physical treatment or a combination there of. The treatment determined to be the most effective would be used. Other treatment technologies for ground water might be found to be effective and could be implemented if the time frame for cleanup would be retained. Final methods would be determined during design of the cleanup remedy. Any spent materials would be disposed of at a regulated facility. The number of extraction wells and pumping rates would be determined during the design.

Additionally, during the design, this remedy would require additional ground water sampling and analysis to verify background ground water concentrations of inorganic contaminants.

If EPA were to determine that ground water performance standards continue to be appropriate, the implementation of the ground water treatment remedy would be required.

The present worth cost of this alternative is estimated at a range from $5,225,000 with a capital cost of $1,394,500 and $3,830,500 for 30 years O&M for a 50 gallon per minute (gpm) to $8,631,000 with a capital cost of $1,539,000 and $7,092,000 for 30 years O&M for the 100 (gpm) treatment system.

7.4 APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

The remedial action for the Cedartown Municipal Landfill Site, under CERCLA Section 121(d), must comply with federal and state environmental laws that are either applicable or relevant and appropriate (ARARs). Applicable requirements are those standards, criteria or limitations promulgated under federal or state law that specifically address a hazardous substance, pollutant, contaminant, remedial action, location, or other circumstance at a CERCLA Site. Relevant and appropriate requirements are those that, while not applicable, still address problems or situations sufficiently similar to those encountered at the Site that their use is well suited to the particular Site. To-Be-Considered Criteria (TBCs) are non-promulgated advisories and guidance that are not legally binding, but should be considered in determining the necessary level of cleanup for protection of health or the environment.

The affected ground water in the aquifer beneath the Cedartown Municipal Landfill Site has been classified by EPA as Class IIA. Class IIA ground water is a source of drinking water. It is EPA's policy that ground water resources be protected and restored to their beneficial uses. A complete definition for ground water classification is provided in the Guidelines for Ground water Classification under the EPA Ground water Protection Strategy, Final Draft, December 1986.

While TBCs do not have the status of ARARS, EPA's approach to determining if a remedial action is protective of human health and the environment involves consideration of TBCs along with ARARs.

Location-specific ARARs are restrictions placed on the concentration of hazardous substances or the conduct of activities solely on the basis of location. Examples of location-specific ARARs include state and federal requirements to protect floodplains, critical habitats, and wetlands, and solid and hazardous waste facility siting criteria. Table 7-1 summarizes the potential location-specific ARARs for the Cedartown Municipal Landfill Site.

TABLE 7-1 POTENTIAL LOCATION SPECIFIC ARARs		
	Location	Citation
R&A	Critical habitat upon which endangered or threatened species depends	Endangered Species Act of 1973 50 CFR Parts 200 and 402 Fish and Wildlife Coordination Act 33 CFR Parts 320–330
R&A	Area affecting stream or river	Wild and Scenic River Act 40 CFR Part 6.302(e)
R&A	Within area affecting wild, scenic or recreational river	Wild and Scenic River Act 40 CFR Part 6.302(e)
STATE OF GEORGIA REGULATIONS		
R&A	Establishes facility location standards	Georgia Comprehensive Solid Waste Management Act, O.C.G.A. § 12–8–20 et seq. and Rules, Chapter 391–3–4.
R&A	Critical habitat upon which endangered or threatened species depends	Endangered Wildlife and Wildflower Preservation Act of 1973 O.C.G.A. § 12–6–172 et seq. and Rules, Chapter 391–4–10.

A ——— APPLICABLE REQUIREMENTS WHICH WERE PROMULGATED UNDER FEDERAL LAW TO SPECIFICALLY ADDRESS A HAZARDOUS SUBSTANCE, POLLUTANT, CONTAMINANT, REMEDIAL ACTION LOCATION OR OTHER CIRCUMSTANCE AT THE CEDARTOWN MUNICIPAL LANDFILL SITE.

R & A — RELEVANT AND APPROPRIATE REQUIREMENTS WHICH WHILE THEY ARE NOT "APPLICABLE" TO A HAZARDOUS SUBSTANCE, POLLUTANT, CONTAMINANT, REMEDIAL ACTION, LOCATION, OR OTHER CIRCUMSTANCE AT THE CEDARTOWN MUNICIPAL LANDFILL SITE, ADDRESS PROBLEMS OR SITUATIONS SUFFICIENTLY SIMILAR TO THOSE ENCOUNTERED AT THIS SITE THAT THEIR USE IS WELL SUITED.

Action-specific ARARs are technology- or activity-based requirements or limitations on actions taken with respect to hazardous wastes. These requirements are triggered by the particular remedial activities that are selected to accomplish a remedy. Since there are usually several alternative actions for any remedial Site, various requirements can be ARARs. Table 7-2 lists potential action-specific ARARs and TBCs for the selected and contingency ground water remedy for the Cedartown Municipal Landfill Site.

TABLE 7-2 POTENTIAL ACTION-SPECIFIC ARARs FOR THE SELECTED REMEDY AND CONTINGENT REMEDIAL ACTION		
CLEAN WATER ACT - 33 U. S. C. §§ 1251-1376		
R&A	40 CFR Part 131 – Ambient Water Quality Criteria	Ambient Water Quality Criteria: Ambient water standards for the protection of human health and aquatic life.
R&A	40 CFR Part 122, 125 – National Pollutant Discharge Elimination System, 40 CFR Part 125, 40 CFR Part 131, and 40 CFR Part 136.1	Requires permits for the discharge of pollutants for any point source into waters of the United States.
R&A	40 CFR Part 144 – Underground Injection Program	Requirements limiting injection of fluids containing chemical concentrations exceeding NPDES into underground sources of drinking water.
R&A	40 CFR Part 141 – National Primary Drinking Water Standards	Specifies sampling, analytical and monitoring requirements for public water systems.
R&A	40 CFR Part 403 – National Pretreatment Standards	Sets standards to control pollutants which pass through, interfere, or contaminate treatment processes in public treatment works.
RESOURCE CONSERVATION AND RECOVERY ACT - 42 U.S.C. §§ 6901-6987		
R&A	40 CFR 257 – 258 – Solid Waste Management Regulations	Establishes minimum levels of performance required of any solid waste land disposal Site operation and including operation and maintenance.
R&A	40 CFR Part 261 – Identification & Listing of Hazardous Wastes	Characterizations of Treatment Facility Generated Sludges.
R&A	40 CFR Part 262 – Standards Applicable to Generators of Hazardous Waste	General requirements for identifying and managing hazardous wastes and manifest requirements for hazardous wastes
R&A	40 CFR Part 263 – Standards Applicable to Transporters of Hazardous Waste	Establishes standards which apply to transporting hazardous waste within the U.S., if required under 40 CFR 262.

TABLE 7-2
POTENTIAL ACTION-SPECIFIC ARARs FOR THE SELECTED REMEDY AND CONTINGENT REMEDIAL ACTION

R&A	40 CFR Part 264 – Standards for Owners and Operators of Hazardous Waste Treatment, Storage and Disposal (TSD) Facilities	Establishes minimum national standards which define the acceptable management of hazardous wastes for owners and operators of facilities which treat, store or dispose of hazardous wastes.
CLEAN AIR ACT - 42 U.S.C. §§ 7401-7642		
R&A	40 CFR Part 61 – National Emission Standards for Hazardous Air Pollutants	Addresses hazardous air pollutants at their point of emission from specific sources
STATE OF GEORGIA REGULATIONS		
A	Georgia Hazardous Site Response Act § O.C.G.A. 12–8–90 et seq.	Requires corrective action for releases of hazardous waste, constituents, and substances.
R&A	Georgia Comprehensive Solid Waste Management Act § O.C.G.A. 12–8–20 et seq. and Rules, Chapter 391–3–4.	Establishes minimum levels of performance required of any solid waste land disposal Site operation and includes operation and maintenance.
R&A	Georgia Hazardous Waste Management Act O.C.G.A. § 12–8–60 et seq. and Rules, Chapter 391–3–11.	Establishes minimum state standards which define the acceptable management of hazardous wastes for owners and operators of facilities which treat, store or dispose of hazardous wastes in the State of Georgia.
R&A	Georgia Water Quality Control Act O.C.G.A. § 12–5–20 and Rules, Chapter 391–3–6.	Pre–treatment standards and permit requirements for Publicly Owned Treatment Works, criteria and standards for injection wells, and authorizes DNR to issue discharge permits.

A ——— APPLICABLE REQUIREMENTS WHICH WERE PROMULGATED UNDER FEDERAL LAW TO SPECIFICALLY ADDRESS A HAZARDOUS SUBSTANCE, POLLUTANT, CONTAMINANT, REMEDIAL ACTION LOCATION OR OTHER CIRCUMSTANCE AT THE CEDARTOWN MUNICIPAL LANDFILL SITE.

R & A – RELEVANT AND APPROPRIATE REQUIREMENTS WHICH WHILE THEY ARE NOT "APPLICABLE" TO A HAZARDOUS SUBSTANCE, POLLUTANT, CONTAMINANT, REMEDIAL ACTION, LOCATION, OR OTHER CIRCUMSTANCE AT THE CEDARTOWN MUNICIPAL LANDFILL SITE, ADDRESS PROBLEMS OR SITUATIONS SUFFICIENTLY SIMILAR TO THOSE ENCOUNTERED AT THE CEDARTOWN Municipal Landfill SITE THAT THEIR USE IS WELL SUITED TO THE SITE.

Chemical–specific ARARs are specific numerical quantity restrictions on individually–listed chemicals in specific media. Examples of chemical–specific ARARs include the MCLs specified under the Safe Drinking Water Act as well as the ambient water quality criteria that are enumerated under the Clean Water Act. Since there are usually numerous chemicals of concern for any remedial Site, various numerical quantity requirements can be ARARs. Table 7–3 lists potential chemical–specific ARARs for the Cedartown Municipal Landfill Site.

TABLE 7-3
POTENTIAL CHEMICAL-SPECIFIC ARARS

CLEAN WATER ACT - 33 U.S.C. §§ 1251-1376		
A	40 CFR Part 131 – Ambient Water Quality Criteria	Suggested ambient standards for the protection of human health and aquatic life.
R&A	40 CFR Part 403 – National Pretreatment Standards	Sets standards to control pollutants which pass through or interfere with treatment processes in publicly–owned treatment works or which may contaminate sewage sludge.
RESOURCE CONSERVATION AND RECOVERY ACT - 42 U.S.C. §§ 6901-6987		
R&A	40 CFR Part 261 – Identification and Listing of Hazardous Wastes	Defines those solid wastes which are subject to regulation as hazardous wastes under 40 CFR Parts 263–265 and Parts 124, 270, and 271.
R&A	40 CFR Part 262 – Standards Applicable to Generators of Hazardous Waste	Establishes standards for generators of hazardous waste.
CLEAN AIR ACT - 42 U.S.C. §§ 7401-7642		
R&A	40 CFR Part 50 – National Primary and Secondary Ambient Air Quality Standards	Establishes standards for ambient air quality to protect public health and welfare.
SAFE DRINKING WATER ACT - 40 U.S.C. §§ 300		

TABLE 7-3 POTENTIAL CHEMICAL-SPECIFIC ARARS		
R&A	40 CFR Part 141 – National Primary Drinking Water Standards	Establishes maximum contaminant levels (MCLs) which are health-based standards for public water systems.
A	PL No. 99–339 100 Stat. 462 (1986) – Maximum Contaminant Level Goals (MCLGs)	Establishes drinking water quality goals set at levels of no known or anticipated adverse health effects with an adequate margin of safety.
STATE OF GEORGIA REGULATIONS		
R&A	Air Quality Act of 1978 O.C.G.A. § 12–9–1 <u>et seq.</u> and Rules, Chapter 391–3–1.	Establishes standards for ambient air quality to protect public health and welfare.
R&A	Safe Drinking Water Act O.C.G.A. § 12–5–170 <u>et seq.</u> and Rules, Chapter 391–3–5.	Establishes maximum contaminant levels (MCLs) which are health-based standards for public water systems.
R&A	Georgia Water Quality Control Act O.C.G.A. § 12–5–20 <u>et seq.</u> and Rules, Chapter 391–3–6.	Establishes treatment standards for public water systems.

A ——— APPLICABLE REQUIREMENTS WHICH WERE PROMULGATED UNDER FEDERAL LAW TO SPECIFICALLY ADDRESS A HAZARDOUS SUBSTANCE, POLLUTANT, CONTAMINANT, REMEDIAL ACTION LOCATION OR OTHER CIRCUMSTANCE AT THE CEDARTOWN MUNICIPAL LANDFILL SITE.

R & A — RELEVANT AND APPROPRIATE REQUIREMENTS WHICH WHILE THEY ARE NOT "APPLICABLE" TO A HAZARDOUS SUBSTANCE, POLLUTANT, CONTAMINANT, REMEDIAL ACTION, LOCATION, OR OTHER CIRCUMSTANCE AT THE CEDARTOWN MUNICIPAL LANDFILL SITE, ADDRESS PROBLEMS OR SITUATIONS SUFFICIENTLY SIMILAR TO THOSE ENCOUNTERED AT THE CEDARTOWN Municipal Landfill SITE THAT THEIR USE IS WELL SUITED TO THE SITE.

8.0 SUMMARY OF THE COMPARATIVE ANALYSIS OF ALTERNATIVES

This section of the ROD provides the basis for determining which alternative provides the best balance with respect to the statutory balancing criteria in Section 121 of CERCLA, 42 U.S.C. Section 9621, and in the NCP, 40 CFR, Section 300.430. The major objective of the FS was to develop, screen, and evaluate alternatives for the remediation of the Cedartown Municipal Landfill Site. A wide variety of alternatives and technologies were identified as candidates to remediate the contamination at the Cedartown Municipal Landfill Site. These were screened based on their feasibility with respect to the contaminants present and Site characteristics. After the initial screening, the remaining alternatives/technologies were combined into potential remedial alternatives and evaluated in detail. The remedial alternative was selected from the screening process using the following nine evaluation criteria:

- Overall protection of human health and the environment;
- compliance with applicable and/or relevant Federal or State public health or environmental standards;
- long-term effectiveness and permanence;
- reduction of toxicity, mobility, or volume of hazardous substances or contaminants;
- short-term effectiveness or the impacts a remedy might have on the community, workers, or the environment during the course of implementation;
- implementability, that is, the administrative or technical capacity to carry out the alternative;
- cost-effectiveness considering costs for construction, operation, and maintenance of the alternative over the life of the project, including additional costs should it fail;
- acceptance by the State; and,
- acceptance by the Community.

The NCP categorizes the nine criteria into three groups:

(1) Threshold Criteria - overall protection of human health and the environment and compliance with ARARs (or invoking a waiver) are threshold criteria that must be satisfied in order for an alternative to be eligible for selection;

(2) Primary Balancing Criteria - long-term effectiveness and permanence; reduction of toxicity, mobility or volume; short-term effectiveness; implementability and cost are primary balancing factors used to weigh major trade-offs among alternative hazardous waste management strategies; and

(3) Modifying Criteria - state and community acceptance are modifying criteria that are formally taken into account after public comments are received on the proposed plan and incorporated in the ROD.

The selected alternative must meet the threshold criteria and comply with all ARARs or be granted a waiver for compliance with ARARs. Any alternative that does not satisfy both of these requirements is not eligible for selection. The Primary Balancing Criteria are the technical criteria upon which the detailed analysis of alternatives is primarily based. The final two criteria, known as Modifying Criteria, assess the public's and the state agency's acceptance of the alternative. Based on these final two criteria, EPA may modify aspects of a specific alternative.

The following analysis is a summary of the evaluation of alternatives for remediating the Cedartown Municipal Landfill Superfund Site under each of the criteria. A comparison is made between each of the alternatives for achievement of a specific criterion.

8.1 THRESHOLD CRITERIA

8.1.1 OVERALL PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

The No-Action Alternative will not mitigate the risks associated with contamination at or originating from the Cedartown Municipal Landfill Site. Therefore, this alternative is not protective of human health and the environment and will no longer be considered in this discussion.

Alternative 2 would use ground water monitoring and applies natural attenuation processes to meet ground water performance standards. If natural processes are not effective, EPA at its sole discretion may implement a contingency ground remedial action. Alternative 3 would provide for active restoration of the ground water. Alternative 3 would provide the best and most immediate protection of human health and the environment.

Alternatives 2 and 3 treat the metals contamination, thereby allowing the ground water to attain the COCs MCL through natural attenuation or by extraction and treatment. These alternatives protect human health and the environment through restoring the Class IIA aquifer and preventing any potential migration of the contaminated plume. Since there is not a current direct exposure route to ground water, natural attenuation of the ground water contamination is protective. A contingency ground water remedial action of extraction and treatment of ground water, if natural attenuation is determined ineffective, would be most protective.

8.1.2 COMPLIANCE WITH ARARS

Alternatives 2 and 3, will meet all of their respective ARARs.

Ground water ARARs include Maximum Contaminant Levels (MCLs) that establish chemical-specific limits on certain contaminants in community water systems. Long-term monitoring is included in Alternatives 2 and 3. Additional statistical analysis of data will further substantiate the presence/absence of a ground water plume. This long-term monitoring will provide the data necessary for a statistical determination of constituent concentrations in groundwater. If, in EPA's sole discretion, it becomes apparent that MCLs will not be met through attenuation, a contingency pump and treat remedial action as described in alternative 3 will be considered and at EPA's sole determination be implemented.

For Alternative 2, remedial action would include further sampling and analysis of ground water to assure that ground water beneath the Site will meet ARARs through attenuation in a reasonable time-frame. Surface water on-site currently meets ARARs.

Alternatives 2 and 3 would be able to meet all Federal and State standards for contaminants and proposed actions. Alternative 1, no action, would not be able to meet ARARs.

8.2 PRIMARY BALANCING CRITERIA

8.2.1 LONG-TERM EFFECTIVENESS AND PERMANENCE

Both Alternatives 2 and 3 would provide long-term effectiveness and permanence. Alternative 2 would use controls, which would be reevaluated two years after implementation of the monitoring program and again at the five-year review. Although this alternative would require additional time to meet the performance standards, it would likely be as effective from a long-term standpoint. Alternative 3 would use treatment technologies to reduce hazards posed by the contaminants in the ground water at the Landfill Site.

Alternatives 2 and 3 would require long-term cover maintenance and seep control and monitoring for at least 5 years after performance standards were met to ensure continued effectiveness. Five-year reviews would be needed to verify that the cleanup remained protective for both alternatives.

Alternative 3 would present long-term liabilities associated with disposal of treatment sludges in a secure landfill or treatment facility.

8.2.2 REDUCTION OF TOXICITY, MOBILITY, OR VOLUME THROUGH TREATMENT

Alternative 3 would provide for active ground water remediation and treatment. Alternative 2 would not provide for ground water treatment, but would likely reduce contaminants over time. Toxicity, volume, and mobility of ground water would be reduced through active restoration in Alternative 3.

Therefore, Alternative 3 (and Alternative 2 if the contingency ground water remedial action is implemented) would best satisfy CERCLA's statutory preference for treatment and use of treatment to reduce toxicity, mobility, and volume of contaminants.

8.2.3 SHORT-TERM EFFECTIVENESS

Alternative 2 is expected to have the least short-term risk because its implementation presents no risk to workers, community, and the environment. Its effectiveness would be achieved over a longer period of time, although it is expected to achieve a comparable reduction in toxicity. The contingent remedial action with Alternative 2 would ensure that if results were not achieved by attenuation, the effectiveness of Alternative 3 would be achieved.

Alternative 3 would also be effective in the short-term. Alternative 3 (ground water treatment) would need additional studies to determine ground water treatment design specifications. However, Alternative 3 would more quickly remediate ground water contamination through extraction and treatment. The installation of ground water wells may impose risks by disturbing the contamination in the soil or ground water; however, it is not expected to pose unacceptable short-term environmental or health hazards, which could not be controlled.

8.2.4 IMPLEMENTABILITY

Alternative 2 would be the simplest to implement and operate. Materials, services, capabilities, and specialists would be readily available for cover maintenance and seep control. Periodic maintenance of the cover would provide reliability in the future. The ground water monitoring program would determine the effectiveness of attenuation of the contaminated ground water.

Alternative 3 would be the most technically difficult to implement and would require complex treatability studies and testing to define the design parameters for these processes. Alternative 3 would also likely require off-site disposal of treatment sludges at regulated off-site facilities.

8.2.5 COST

Cost details are provided in the FS and are summarized below in Table 8-1. Alternative 2, institutional controls/monitoring, has the lowest present worth cost and Alternative 3, ground water treatment, is the highest. Alternatives 3 is significantly more expensive to construct and operate because of the ground water extraction and treatment component. The contingent remedial action in Alternative 2 would include the treatment costs associated with Alternative 3, however, it is expected that the attenuation processes will be effective. Alternative 2 provides for the best ratio of costs to benefit received through the permanent reduction of risks to human health and the environment.

8.3 MODIFYING CRITERIA

8.3.1 STATE ACCEPTANCE

The State of Georgia has concurred with the selection of Alternative 2 to remediate the Cedartown Municipal Landfill Site.

TABLE 8-1
COMPARISON OF COSTS

Alternative	30 Year Present-worth Cost	Capital Cost	Monitoring and Maintenance Cost (30-yr)
1. No-Action	$ 0	NONE	$ 0
2. Institutional Controls, Cover & Seep Maintenance, and Ground water Monitoring [1]	$ 625,000	$10,000	$ 615,000
3. Ground water Treatment	[2] $ 5,225,000 – [3] 8,631,000	$ 1,394,350 – 1,539,450	$ 5,225,000 – 7,091,500

[1] If the ground water contingency remedy is implemented, the estimated total cost of $4,923,700 as indicated in alternative 3 would apply.

[2] Based on a 50 gallon per minute (gpm) treatment system

[3] Based on a 100 gallon per minute (gpm) treatment system

8.3.2 COMMUNITY ACCEPTANCE

Based on comments expressed at the September 9, 1993, public meeting and receipt of written comments during the comment period, it appears that the Cedartown community generally agrees with the selected remedy; however, various comments received during the meeting and comment period did indicate a preference for Alternative 1, No-Action. Specific responses to issues raised by the community can be found in Appendix A, The Responsiveness Summary.

9.0 SUMMARY OF SELECTED REMEDY

Based upon consideration of the requirements of CERCLA, the NCP, the detailed analysis of alternatives and public and state comments, EPA has selected Alternative 2, institutional controls, ground water monitoring, and a ground water treatment contingent remedial action for this Site. At the completion of this remedy, the risk associated with this Site will be protective of human health and the environment.

The selected alternative for the Cedartown Municipal Landfill Site is consistent with the requirements of Section 121 of CERCLA and the National Contingency Plan. The selected alternative will reduce the mobility, toxicity, and volume of contaminated ground water at the Site. In addition, the selected alternative is protective of human health and the environment, will attain all Federal and State applicable or relevant and appropriate requirements, is cost-effective and utilizes permanent solutions to the maximum extent practicable.

Based on the information available at this time, the selected alternative represents the best balance among the criteria used to evaluate remedies. Alternative No. 2 is believed to be protective of human health and the environment, will attain ARARs, will be cost effective, and will utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable.

A. SOURCE CONTROL

Since the Baseline Risk Assessment indicates no unacceptable risk to exposure to soils, source control remediation will address restricting exposure to contaminated wastes and subsurface soils at the Site, prevent potential migration of landfill leachate to surface waters, and ensure cover integrity to minimize ground water contamination. Source control shall include landfill cover maintenance, seep controls, and land use restrictions.

A.1. The major components of source control to be implemented include:

- Cover maintenance and seep controls;
- Institutional controls implemented as follows to minimize land use:

  1) Deed or Record Notices would be placed on the landfill property and those properties affected by contaminated ground water;

  2) Municipal ordinances concerning permitting the installation of wells would be applied to prevent ground water well installation on the Site and/or affected properties, and;

  3) The Municipalities (City of Cedartown and/or Polk County) would annex all site properties and implement zoning restrictions that prevent development that would disturb or adversely change existing Site conditions of the Site and prevent ground water use of properties affected by the Site.

If these mechanisms (well permitting, annexation, and/or zoning mechanisms) fail to restrict usage, cannot be implemented, and/or ordinances and municipal regulations are changed and are no longer restrictive, deed restrictions or restrictive covenants would be implemented.

- Coke Pond surface water samples will be collected at sampling intervals to be approved by EPA to ensure leachate contaminants do not migrate from the East Seep. EPA will re-evaluate whether the potential migration from Landfill seep(s) to the Coke Pond still exists during the Five-Year Review. EPA may at its sole discretion discontinue sampling. Surface water sampling results shall be compared to the appropriate Federal Ambient Water Quality Criteria or more stringent Georgia Surface Water Quality Standard for aluminum, chromium, copper, lead, nickel, and zinc to ensure the contaminants do not migrate from the East Seep to the Coke Pond.

B. GROUND WATER MONITORING/RESTORATION

Ground water monitoring will be implemented at this Site to assess the movement of contamination through ground water. If ground water contaminants of concern do not meet monitoring performance standards, a contingency pump and treat system described in Alternative #3 shall be considered and at EPA's sole determination be implemented.

B.1. The major components of ground water monitoring/restoration to be implemented include:

- Long-term monitoring of ground water to consist of the following:

  1 Ground water monitoring program to insure that natural attenuation works and contaminants do not move.

  2 Two-year review during which EPA would determine whether ground water performance standards continue to be appropriate and would determine the effectiveness of natural attenuation.

  3 The ground water monitoring program would require further sampling and analysis to further define background ground water concentrations of inorganic contaminants and the effectiveness of natural attenuation. This remedy could require the installation of additional well(s). If, based on that information, the background concentration for an inorganic exceeded the MCL or acceptable

risk-based standards, EPA, at its sole discretion, would consider amending the performance standards through an Explanation of Significant Differences (ESD) or Record of Decision (ROD) Amendment. Ground water samples would be collected on a quarterly basis for two years upon implementation of the monitoring program. Proper well construction and development techniques along with a low-flow sampling method would be used during the monitoring to determine whether inorganic substances continue to be a problem. EPA, at its sole discretion, could revise sampling intervals of the ground water monitoring program.

4 EPA shall consider and at EPA's sole discretion require the implementation of a contingency ground water treatment remedial action, as discussed in Alternative 3, if ground water performance standards listed in Table 9-1 continue to be appropriate and natural attenuation processes are not effective as listed below:

- COCs concentration levels listed in the table below substantially increase during two consecutive sampling events; and/or,

- if natural attenuation has failed to demonstrate during the two-year review that the performance standards listed in Table 9-1 are likely attainable within 5 years of completion of the two year review.

5 Continued ground water monitoring upon attainment of the performance standards at sampling intervals approved by EPA. The ground water monitoring program would continue until EPA approves a five-year review concluding that the alternative has achieved continued attainment of the performance standards and remains protective of human health and the environment.

- Placement of institutional controls as described in section 9.0 A to preclude usage of ground water; and

- Implementation of a pump and treat system as a contingency action would be at EPA's sole determination that performance standards described in B.1 have not been met. The contaminated ground water will be pumped to the surface and treated in accordance with performance standards established in B.2.

TABLE 9-1
SUMMARY OF MONITORING PERFORMANCE STANDARDS
(GROUND WATER)

Contaminant	Performance Standard (µg/l)
Manganese	175 [a]
Beryllium	4 [b]
Cadmium [c]	5 [b]
Chromium [d]	100 [b]
Lead [c]	15 [e]

a - Calculated value based on an acceptable risk or a Hazard Quotient (HQ) of 1. Exposure assumptions are a 2 liter per day ingestion rate and a 70 kilogram body weight.

b - Safe Drinking Water Act Maximum Contaminant Level (MCL).

c - Included due to contaminant concentrations and frequency of detection.

d - While Chromium was below detection during third sampling round, it was detected above standards in previous rounds. Therefore, it was retained for determining performance standards.

e - EPA Action Level from Lead and Copper Rule, 56 FR, June 7, 1991.

B.2. Extraction, Treatment, and Discharge of Contaminated Ground Water, Contingency Remedial Action

If implemented, the ground water extraction system shall consist of a group of wells located within the estimated area of the plume. The pumping system shall be designed to provide a capture zone sufficient to intercept the delineated plume targeted for extraction.

The effectiveness of the ground water extraction system is dependent upon the aquifer characteristics, transmissivity and storativity. Typically, these design criteria are developed by aquifer testing based on constant discharge pumping and/or recovery tests. Pump tests and modeling shall be required prior to extraction. The number of wells and system extraction rate, estimated at 50 - 100 gpm will be determined during RD, if implemented.

Ground water will be treated and discharged to an off-site surface water body. NPDES standards shall be met for ground water discharge. Any required ground water treatment shall be accomplished by Ion, Chemical, and/or Physical or combination treatment train. Treatability studies shall be done at implementation of this contingency remedy to determine design parameters and procedures. The treated effluent would be discharged to the surface water and the system will be designed to meet Federal and State NPDES limitations for discharge to the surface water.

If NPDES requirements are not viable, other discharge mechanisms, such as discharge to the local wastewater treatment plant, would be considered. While extracted ground water concentrations may be lower than the limits set for discharges to the public sewer system (Cedartown Code 22-64), the discharge volume and flow may be a prohibitive factor in POTW acceptance of discharge due to limited treatment plant capacity.

B.3. Performance Standards for Ground Water

a. Treatment Standards

Ground water shall be treated until the following maximum concentration level is attained at the wells designated during the design and approved by the EPA as compliance points.

Beryllium	4 µg/l
Cadmium	5 µg/l
Chromium	100 µg/l
Lead	15 µg/l
Manganese	175 µg/l

b. Discharge Standards

Discharges from the ground water treatment system shall comply with all substantive requirements of the NPDES permitting program under the Clean Water Act, 33 U.S.C. 1251 et seq., and all effluent limits established by EPA and the State of Georgia.

c. Design Standards

The design, construction, and operation of any ground water treatment system shall be conducted in accordance with all Performance Standards, including the RCRA requirements set forth in 40 CFR Part 264 (Subpart F).

C. Compliance Testing

Ground water monitoring shall be conducted at this Site. After demonstration of compliance with all Performance Standards for 2 consecutive sampling events and continued attainment through the five-year review at the wells approved by the EPA as compliance points, sampling and monitoring may be discontinued at the discretion of EPA. If ground water sampling or monitoring indicates that the Performance Standards set forth in paragraphs B.1 and B.3 are being exceeded at any time after monitoring and/or pumping has been discontinued, extraction and treatment and/or sampling of the ground water may recommence until the performance standards are once again achieved.

10.0 STATUTORY DETERMINATION

Under CERCLA Section 121, 42 U.S.C. § 9621, EPA must select remedies that are protective of human health and the environment, comply with applicable or relevant and appropriate requirements (unless a statutory waiver is justified), are cost effective, and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. In addition, CERCLA includes a preference for remedies that employ treatment that permanently and significantly reduce the volume, toxicity, or mobility of hazardous wastes as their principal element. The following sections discuss how the selected remedy meets these statutory requirements.

10.1 PROTECTION OF HUMAN HEALTH AND THE ENVIRONMENT

The selected remedy provides protection of human health and the environment by eliminating, reducing, and controlling risk through engineering controls and/or institutional controls and ground water treatment, if required as delineated through performance standards described in Section 9.0 - SUMMARY OF SELECTED REMEDY, subsections A (Source Control) and B (Ground water Restoration). Ground water monitoring will be implemented in accordance with performance standards described in Section 9.0 - SUMMARY OF SELECTED REMEDY, subsection B.1

(Ground water Monitoring) to ensure that no exposure through ingestion of contaminated ground water occurs. Institutional controls and ground water monitoring will prevent exposure to contaminants while natural attenuation occurs over time. Active remediation will not be immediately implemented for ground water.

However, if contamination in the ground water does not attenuate to below performance standards described in Section 9.0 - SUMMARY OF SELECTED REMEDY, subsections B.1 (Ground Water Monitoring); the performance standards described in Section 9.0 - SUMMARY OF SELECTED REMEDY, B.2 (Extraction, Treatment, and Discharge of Contaminated Ground Water, Contingency Remedial Action) and B.3 (Performance Standards For Ground Water) shall apply and the aquifer shall be actively restored through treatment.

10.2 ATTAINMENT OF THE APPLICABLE OR RELEVANT AND APPROPRIATE REQUIREMENTS (ARARs)

Remedial actions performed under CERCLA, Section 121, 42 U.S.C. § 9621 must comply with all applicable or relevant and appropriate requirements (ARARs). All alternatives considered for the Site were evaluated on the basis of the degree to which they complied with these requirements. The selected remedy with contingent remedial action was found to meet or exceed ARARs identified in Tables 7-1, 2, 3 and 4. The following is a short narrative in support of attainment of the pertinent ARARs.

Chemical-Specific ARARs

Ground water restoration performance standards are consistent with RCRA ARARs identified in Table 7-4 concerning Identification and Listing of Hazardous Wastes and Standards Applicable to Generators of Hazardous Waste.

Ground water restoration performance standards identified as MCLs are the Ground water Protection Standards set out in this ROD as performance standards for remedial action. If it becomes apparent that MCLs will not be met by means of attenuation, a contingency pump and treat system will be implemented in accordance with performance standards identified in the selected remedy section to insure that MCLs are met.

Action-Specific ARARs

Performance and treatment standards are consistent with RCRA ARARs identified in Tables 7-2 and 7-3, and these regulations will be incorporated into the design and implementation of this remedy. If a pump and treat system becomes necessary, all groundwater treatment standards will be met prior to discharge of effluent to a U.S. water under an NPDES permit, or all National Pretreatment Standards will be met before off-site discharge of treated ground water to a POTW.

Location-Specific ARARs

Performance standards are consistent with ARARs identified in Tables 7-1.

The recommended remedial alternative is protective of species listed as endangered or threatened under the Endangered Species Act. Requirements of the Interagency Section 7 Consultation Process, 50 CFR Part 402, will be met. The Department of the Interior, Fish & Wildlife Service, will be consulted during remedial design to assure that endangered or threatened species are not adversely impacted by implementation of this remedy.

Waivers

Section 121 (d)(4)(C) of CERCLA, 42 U.S.C. § 9621(d)(4)(c), provides that an ARAR may be waived when compliance with an ARAR is technically impracticable from an engineering perspective. While waivers are not anticipated to be invoked at this Site, significant analytical differences between background wells will require further analysis for verification that background average values are valid. However, it is anticipated the contaminated ground water will meet all ARARs through the use of proper low flow sampling and well construction techniques.

The selected remedy will require further sampling and analysis to further define background ground water concentrations of inorganic contaminants. If background analysis indicates that concentration for an inorganic exceeds the MCL or acceptable risk based standards, EPA would consider amending the performance standards through an ESD or ROD Amendment. A technical infeasibility or inability to attain the ARAR as caused by existing background ground water conditions as supported by further background sampling and analysis support may be evaluated as part of an amended performance standard.

Other Guidance To Be Considered

Other Guidance To Be Considered (TBCs) include health-based advisories and guidance. TBCs have been utilized in estimating incremental cancer risk numbers for remedial activities at the Sites and in determining RCRA applications to contaminated media. TBCs for this Site include Guidelines for Groundwater Classification under the EPA Groundwater Protection Strategy, Final Draft, December 1986, Lead and Copper Rule, 56 FR, June 7, 1991, and EPA memorandum dated June 21, 1990 entitled "Cleanup Level for Lead in Ground Water".

10.3 COST EFFECTIVENESS

EPA believes the selected remedy, Alternative 2 will eliminate the risks to human health at an estimated cost of $625,000. In the event that natural processes does not achieve the ground water performance standards, the ground water treatment costs will be comparable to Alternative 3. However, Alternative 2 may and is expected to achieve a comparable effectiveness at a substantially lower cost (although over a longer period of time). Alternative 2 provides an overall effectiveness proportionate to its costs, such that it represents a reasonable value achieved for the investment.

10.4 UTILIZATION OF PERMANENT SOLUTIONS TO THE MAXIMUM EXTENT PRACTICABLE

EPA and the State of Georgia have determined that the selected remedy represents the maximum extent to which permanent solutions and treatment technologies can be utilized in a cost-effective manner for the final remediation at the Cedartown Municipal Landfill Site. Of those alternatives that are protective of human health and the environment and comply with ARARs, EPA and the State have determined that this selected remedy provides the best balance of trade-offs in terms of long-term effectiveness and permanence, reduction in toxicity, mobility, or volume achieved through treatment, short-term effectiveness, implementability, and cost, while also considering the statutory preference for treatment as a principal element and consideration of state and community acceptance. The selected remedy will satisfy the statutory preference for treatment if the contingency remedial action is implemented. The selected remedy provides for long-term effectiveness and permanence, is easily implemented, reduces toxicity, mobility or volume, and is cost effective.

10.5 PREFERENCE FOR TREATMENT AS A PRINCIPAL ELEMENT

The selected remedy with contingency utilizes treatment technologies to the extent practicable. The statutory preference for remedies that employ treatment as a principal element is satisfied.

11.0 DOCUMENTATION OF SIGNIFICANT CHANGES

There have been no significant changes in the selected remedy, Alternative 2, from the preferred remedy described in the proposed plan.

APPENDIX A:

RESPONSIVENESS SUMMARY - CEDARTOWN MUNICIPAL LANDFILL

RECORD OF DECISION

SUMMARY OF MAJOR QUESTIONS AND COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA's RESPONSES

	ISSUE	EPA RESPONSE
3.	The effects of ore mining and published literature values for natural occurring ground water chemistry for metals were not discussed in the RI, but site history indicates that the landfill was an iron mine previous to development as a landfill.	The data does not support that the presence of metals are a logical result of iron mining. Chromium and Iron are different metals with different modes of occurrence. The iron ore in Polk county is composed of minerals that are not sources of chromium. Furthermore, the parent rocks containing iron ore are carbonate rocks, which are not chromium sources. Secondly, samples taken from the landfill leachate/wastes indicate that the contaminants in the groundwater have a relationship to wastes disposed of in the landfill. Lastly, site specific background samples were collected from areas that were believed not to be affected by landfill wastes. Since site specific data is more representative of actual conditions at the Site, this data was appropriately used to determine human health and environmental effects, to establish applicable clean–up standards, and to determine if contaminants were site related or were from non–site related sources.
	How valid is the data used for the Site Investigation?	The data collected by NUS, an EPA contractor, during the initial Site Investigation was valid for determining if a potential human health and environmental risk was present and supported calculations required for the hazardous ranking which led to proposing the Site to the National Priority Listing authorizing Superfund clean–up. The Remedial Investigation completed in August of 1993 was an extensive study with a high level of validity and data quality, to determine the levels and extent of contaminants along with the associated risk to people and the environment related to the Site.
5.	What is the cost of the remedy on a yearly basis?	A estimated cost for implementing the selected remedy is $625,000. This is based on a 30 year period for landfill maintenance and ground water monitoring (quarterly sampling years 1–5, and semi–annual years 6–30). On an annual basis, an estimated cost of $40,000 to $60,000 would be expected.
6.	Is the U.S. Geological Survey (USGS) to perform an intense analysis of the geology of this area.	USGS has considered performing an area wide geological survey. However, funding has not been available to conduct the survey and the study would likely take many years to conduct. The study may be accomplished at a future date.

SUMMARY OF MAJOR QUESTIONS AND COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA's RESPONSES

	ISSUE	EPA RESPONSE
7.	The oral reference dose (RfD) for manganese used to determine the amount of manganese that can be ingested without an adverse affect is flawed and not valid.	EPA recognizes that uncertainties exist regarding the amount of manganese that can be ingested in water without an adverse affect. Due to the uncertainties associated with the present RfD for manganese, the amount of manganese that can be ingested in water without an adverse effect is scheduled to be reviewed by EPA experts in the near future. EPA required that the current RfD for manganese be used to evaluate health risks concerning manganese in water and determine clean-up goals to ensure ingestion of ground water is protective of human health. However, as referenced in the proposed plan fact sheet, since there are uncertainties, EPA made a risk management decision to propose ground water monitoring versus active remediation as the appropriate response action. Lastly, as discussed in the proposed plan fact sheet, if the RfD for manganese is revised, EPA will evaluate an amendment to the Record of Decision revising the manganese clean-up standard in ground water.
8.	The correct clean-up standard for lead should be 50 µg/l (regulated drinking water standard) not the 15 µg/l stated in the proposed plan fact sheet.	50 parts per billion or micrograms per liter (µg/l) is not the regulated drinking water standard for lead. A regulated drinking water standard for lead in water has not been established. However, EPA has adopted the lead concentration of 15 µg/l as the appropriate ground water protection standard or action level for the protection of human health. The clean-up standard is based on an EPA memorandum dated June 21, 1990 entitled "Cleanup Level for Lead in Ground Water" and memorandum from EPA's Office of Drinking Water which set 15 µg/l as the drinking water action level. This action level is based preventing unsafe exposure of lead contaminated drinking water to young children. Since this level prevents exposure to unsafe concentrations of lead, it is appropriate to use this standard for Superfund cleanup and has been consistently used by EPA Region IV as a ground water clean-up standard to ensure drinking water is protective.

SUMMARY OF MAJOR QUESTIONS AND COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA's RESPONSES

	ISSUE	EPA RESPONSE
9.	Since the East Pond seep has not impacted the coke pond in the 12 years since the landfill was closed, the determination that the seep has a future potential to impact the coke pond is not correct and was included in the FS only to support the requirement for cover and seep maintenance.	1) Contaminant concentrations found in the Coke Pond indicates that Site-related contaminants are not currently adversely impacting the surface water in Coke Pond. However, given the levels of contaminants of ecological concern in the east seep pond, and the down stream location of the Coke Pond, a potential for future migration of contaminants into the Coke Pond does exist and was addressed as part of the proposed remedy to protect this environment. 2) The requirement for cover and seep maintenance would be a requirement of the selected remedy regardless of the potential impact on the coke pond. Due to the existing ground water contamination, cover maintenance is an important mechanism to reduce the leaching of contaminants to ground water and in ensuring that landfill contaminants do not have a pathway of exposure for the protection of human health.

SUMMARY OF MAJOR QUESTIONS AND COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA's RESPONSES

ISSUE	EPA RESPONSE
10. The pump and treat remedy described in alternative 3 is not technically feasible (will not obtain hydraulic containment in a karst topography) and will likely require pump rates of 500 gpm with a cost of $40,000,000.	1) Since the affected aquifer is a class IIA or current source of drinking water and must be restored to its full beneficial use, a contingency remedy is necessary. This contingency remedy will extract and treat contaminated ground water if attenuation is determined not to be effective. However, EPA does agree that uncertainties do exist in the hydrogeologic characteristics beneath the Site due to the karst setting or geology which will need to be resolved during the remedial design through treatability studies and performance tests to ensure contaminated ground water is extracted and treated if the contingency remedy is implemented. That characterization can be in the form of another dye–tracer analysis and/or a WADI survey. The WADI is a Very Low Frequency (VLF) or passive survey that uses an instrument that measures subsurface responses to military transmitters. The WADI has been used successfully by EPA to identify natural conduits at karst sites in TN and KY. Ground water extraction systems in karst settings are both being effectively operated at the Gulfcoast Lead RCRA site in Tampa, Florida and the Wolverine Tube RCRA site in Decatur, Alabama. 2) According to the RI, 18% of wells installed in the Newala Aquifer would be expected to pump over 20 gallons per minute (gpm) and 60% over 10 gpm. Cedartown spring itself pumps 2–4 millions gallons per day (mgd). A review of similar current pump and treat systems indicate an average pumping rate of 50 – 150 gpm. Therefore, a realistic pumping rate would likely be in the range of 50–100 gpm (5 wells). Additionally, if the implemented remedy costs exceeds + 50% above the Record of Decision's cost estimate, per the NCP, an Explanation of Significant Differences (ESD) or amendment to the Record of Decision would be evaluated to consider implementability of the remedy.

APPENDIX A: RESPONSIVENESS SUMMARY - CEDARTOWN MUNICIPAL LANDFILL RECORD OF DECISION

The U.S. Environmental Protection Agency (EPA) held a 30-day public comment period from September 1, 1993, through September 30, 1993 for interested parties to give input on EPA's Proposed Plan for Remedial Action at the Cedartown Municipal Landfill Superfund Site in Cedartown, Georgia. A public meeting was conducted on September 9, 1993, at the Cedartown Public Library, 245 East Avenue, Cedartown, Georgia. At the meeting, EPA staff presented the results of the Remedial Investigation and Feasibility Study (RI/FS) and explained EPA's preferred remedy for the Site.

A responsiveness summary is required to document how EPA addressed citizen comments and concerns, as raised during the public comment period. All comments summarized in this appendix have been factored into the final decision of the remedial action for the Cedartown Municipal Landfill Site.

SUMMARY OF MAJOR QUESTIONS AND COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA's RESPONSES

	ISSUE	EPA RESPONSE
1.	What are the exposure assumptions used to determine Human Health effects in the Risk Assessment for drinking ground water?	The assumed drinking or ingestion rates for an adult and a child were 2 liters and 1 liter, respectively. Body weights were 70 kg (154 lb) for adults and 15 kg (33 lb) for a child. The ingestion of ground water was assumed to occur over a 30 year duration (5 years as a child).
2.	Has ground water been analyzed for Coliform Bacteria since sewage sludges may have been disposed at the landfill?	Not by EPA. Under Superfund, the Remedial Investigation determines the presence and concentrations of hazardous substances for cleanup. These hazardous substances are typically chemicals or substances that have been determined to cause an adverse affect to human health. However, the municipal public water authority and/or public health organization monitors public drinking for adverse biological affects. A typical water treatment plant removes bacteria threats from drinking water prior to distribution to the public. A citizen using a private well can request the local public health or water authority test their well for bacterium.

SUMMARY OF MAJOR QUESTIONS AND COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA's RESPONSES

ISSUE	EPA RESPONSE
11. That EPA's directive for performing an RI/FS investigation states that ground water extraction is not feasible for extracting contaminants in fractured bedrock.	The section of EPA's RI/FS guidance document titled by the commenter as "EPA's Guidance on Pump and Treat Technology" was improperly referenced and used. EPA directive number OWSER 9355.3–01 titled "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA" is not EPA's guidance for Pump and Treat Technology. The commenter referenced figure 4–4, on page 4–17 titled "An Example of initial screening technologies and process options" as evidence that ground water extraction is not feasible. The use of figure 4–4 in this EPA Guidance was an illustration and example of how the process of selecting and screening technologies is approached, not whether a particular technology is effective on a particular or Site specific basis. As discussed in the previous response, EPA has effectively used ground water extraction systems in karst settings for ground water treatment and believes would be an effective treatment technology for this Site if the contingency remedy is required to be implemented.
12. The No Action alternative is protective of human health and the environment.	The results of the Remedial Investigation, Risk Assessment, and Feasibility Study indicates that beryllium, cadmium, lead, and manganese are present in concentrations in the ground water that are not protective of human health and the environment. The east seep does contain contaminants that may move and adversely impact the Coke Pond. The no–action remedy will not provide for cover maintenance and seep controls which will provide continued containment of landfill waste and assist in reducing leaching of the wastes to ground and surface waters. Secondly, the No–Action alternative does not provide a mechanism to determine if attenuation of the contaminated ground water is effective or not (no ground water monitoring). Thirdly, the No–Action alternative will not protect against exposure to ground water through ingestion. Since constituents are in the ground water are above health based and/or regulatory levels, the No–Action alternative is not protective of human health and the environment, therefore, response actions were considered and proposed.

SUMMARY OF MAJOR QUESTIONS AND COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA's RESPONSES

	ISSUE	EPA RESPONSE
13.	None of the alternatives meet ARARs due to naturally occurring background levels of manganese, lead, and beryllium.	Data indicates uncertainties in background results which were recognized in the proposed plan fact sheet and the Record of Decision and was a factor in selecting alternative #2. The indications are that monitor well MW–09–WP used as a background ground water well may have been impacted by the Cedartown Municipal Landfill. Therefore, requiring a waiver of a regulated drinking standard due to technical impractability (i.e. inability to clean–up to below background) would not be protective of human health until further background analysis as described in the Record of Decision is completed. If background ground water concentrations are determined by EPA to be greater than the clean–up or performance standard for a contaminant of concern, EPA shall consider an amendment to the record of decision, issuance of a drinking water standard waiver, if required, and modification of the clean–up standard.
14.	Why is background incremental risk discussion and evaluation not in the FS reports, and why hasn't the long–term effectiveness evaluation not considered risk due to background conditions?	Due to methods used in establishing risk–based performance standards and uncertainties in background analysis, the comparison of risk associated with ingestion of site–contaminated ground water with background ground water is not appropriate. In the risk assessment process, background concentrations are used as a screening mechanism to determine if further contaminant risk calculations are required. Manganese met this criteria which dictated that risk calculations be accomplished and appropriate clean–up standards be determined. Additionally, as stated in the previous comment, the final determination of manganese background concentrations is to be confirmed. If background analysis results are greater than the clean–up standard, EPA shall consider amending the clean–up standard.
15.	No–Action alternative is equally as effective as alternative 2 in the reduction of toxicity, mobility, and volume.	Since the No–Action alternative was determined not to be protective of human health and the environment and would not meet regulations, the comparison of long term effectiveness to other remedies is not an appropriate comparison. If a remedy does not meet the threshold criterium (i.e. protective and meets regulations), the alternative is deemed unacceptable for further comparison. However, the No–Action alternative is not as effective as the proposed remedy. The No–Action remedy will not provide for cover maintenance and seep controls. The No–Action alternative does not have a mechanism to determine if attenuation of the contaminated ground water is effective or not. Since constituents in the ground water are above health–based and/or regulatory levels, the No–Action alternative is not an effective remedy.

SUMMARY OF MAJOR QUESTIONS AND COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA's RESPONSES

	ISSUE	EPA RESPONSE
16.	Pre-specifying alternative #3, pump and treat, as a contingency remedy prevents the opportunity of evaluating future alternative technologies.	A record of decision is issued based on the most appropriate technology available which best satisfies the criteria for selecting a remedy and allows prompt clean-up of the Site. This Record of Decision represents best current technologies for this Site. However, EPA recognizes that best technologies used for remediation at Superfund sites are evolving and may change. EPA will consider issuing an amendment to the Record of Decision refining the remedial technologies and treatment processes, if a future technology becomes available which shows an improved benefit in implementability, effectiveness, and cost.
17.	Alternative 3 would involve exposure to workers to metal sludges and which was not considered in its evaluation.	The potential risk to workers was considered in the evaluation to alternative 3. EPA's decision to propose alternative 2 with alternative 3 as a contingency reflects this factor among others in determining the appropriate remedy. However, alternative 3, through engineered controls would be protective to workers and prevent exposure to metal sludges.
18.	Since the City of Cedartown is in the process of acquiring lands associated with the landfill, the City can enforce existing ordinances which prevents the drilling of private water supply wells. Therefore, institutional controls are not required in the Record of Decision.	The proposed remedy allows the City of Cedartown to implement land and/or ground water restrictions through zoning, annexing and well restrictions. Deed or other legal restrictions will be required if the City cannot implement restrictions which prevents access or exposure to contaminated ground water and landfill wastes. Since future changes to municipal laws and zoning is possible, and for the institutional controls to be effective, the possible implementation of deed restrictions is required to be protective in the long-term and shall remain an integral part of the remedy.
19.	Since there is no current or future risk attributable to the landfill and the level of contaminants found is what would normally be expected at a municipal landfill site of this type, the Site should be treated no differently than any other closed landfill site in Georgia, and should be delisted from the NPL.	Site was listed in part due to the close proximity to Cedartown's drinking water source. The Remedial Investigation and Risk Assessment using site-specific sampling data indicates this Site presents an unacceptable health risk from the ingestion of ground water. Comparison to other municipal landfills would be of benefit if site specific sampling data was not available. However, site specific data was collected and was available for determining the extent of contamination. Since the data analysis resulted in an unacceptable risk to human health and the environment, this Site cannot be deleted until all clean-up performance standards are achieved for the protection for human health and the environment.

SUMMARY OF MAJOR QUESTIONS AND COMMENTS RECEIVED DURING THE PUBLIC COMMENT PERIOD AND EPA's RESPONSES

ISSUE	EPA RESPONSE
20. Chromium in the ground water as determined by modeling and the June 1993, ground water sampling results, and in the Baseline risk assessment indicates it is not a contaminant of concern in ground water.	The first two rounds of ground water samples contained elevated levels of chromium (maximum 230 ug/l) that were over its drinking water standard. However, the June 1993 ground water sampling, using the low flow purging and sampling techniques, indicated chromium concentrations that were below detection limits. Since the old style high pump rate/high bailing rate purging and sampling techniques were used for the first two sampling events, a comparison of analytical results to this new procedure is not an appropriate evaluation. It is not appropriate to conclude that the ground water would have contained no detections of chromium in past sampling rounds if slow pump rate purging and sampling had been done. Therefore, neither the recent ground water sampling event (using low flow techniques) nor past contaminant distribution patterns disqualify the landfill from assuming responsibility for the elevated chromium soil and ground water concentrations at the site. Chromium, based on previous sampling results, will continue to be a contaminant of concern for ground water monitoring and the ground water concentrations established in sampling round #3 will be verified during future sampling. If the ground water monitoring program confirms that chromium levels are below the drinking water standard of 100 μg/l for two consecutive EPA verified sampling events, chromium will have attained the clean–up performance standard.

APPENDIX B:

STATE OF GEORGIA CONCURRENCE LETTER

Georgia Department of Natural Resources

205 Butler Street, S.E., Suite 1154 Atlanta, Georgia 30334
Joe D. Tanner, Commissioner
Environmental Protection Division
Harold F. Reheis, Director
404/656-2833 404/656-7802

September 21, 1993

Mr. Richard Green
Associate Division Director
Office of Superfund
U.S. EPA, Region IV
345 Courtland Street, N.E.
Atlanta, Georgia 30365

RE: Record of Decision
Cedartown Municipal Landfill

Dear Mr. Green:

The Georgia Environmental Protection Division (EPD) has reviewed the Record of Decision, Summary of Remedial Alternative Selection for the Cedartown Municipal Landfill NPL Site, Polk County, Georgia. The remedial alternative calls for cover maintenance and seep controls, institutional controls, a groundwater/surface water monitoring program to ensure natural attenuation, and a pump-and-treat contingency plan if groundwater standards are not attained. EPD concurs with the selected remedy.

If you have any questions or need further assistance, please contact Madeleine Kellam at (404) 657-8683.

Sincerely,

Harold F. Reheis
Director

HFR/mfk

c: Jay Bassett
file: Cedartown Municipal Landfill (B)