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Environmental Protection
Agency

Office of
Emergency and
Remedial Response

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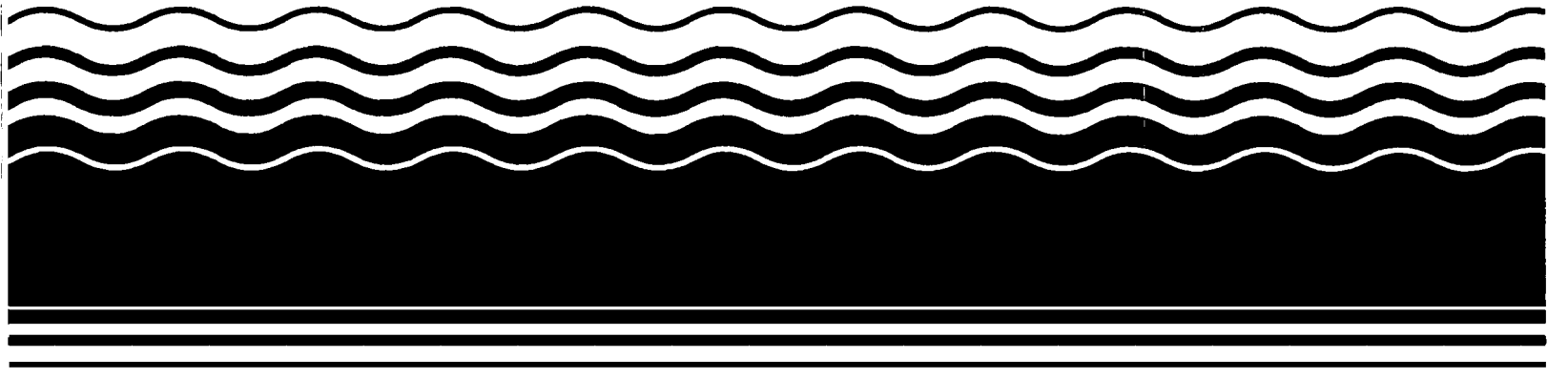
September 1993
PB94-964112

EPA

Superfund Record of Decision:

Lakeland Disposal Service, IN



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First Remedial Action - Final

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16. Abstract (Limit: 200 words)

The 39-acre Lakeland Disposal Service is an inactive landfill located near Claypool, Kosciusko County, Indiana. Land use in the area is predominantly agricultural, with some residences situated to the north and west of the site. In addition, several wetland and woodland areas are situated adjacent to Sloan Ditch, an agricultural drainage ditch which discharges to Palestine Lake, and subsequently, to the Tippecanoe River. The residents living in the vicinity of the site use private wells to obtain their drinking water supply. The site includes a "hot-spot" drummed waste disposal area, a general trash area, a drying bed area, and several industrial waste areas. Prior to 1974, the site was used for agricultural purposes. From 1974 to 1978, Lakeland Disposal Service (LDS) accepted general refuse, including plastic, metal, wood, leaves, paper, cardboard, and certain specific industrial wastes, including paint sludge; sludge and filter sand containing metals; cyanide, zinc, and chrome plating liquid; sugar contaminated with bromochloromethane; and oils and oily wastewater. State records indicate that at least 18,000 drums of waste, 8,900 tons of plating sludge, and more than 2,000,000 gallons of plating sludge containing metals were disposed of onsite. During site operations, the landfill operator violated

(See Attached Page)

17. Document Analysis a. Descriptors
Record of Decision - Lakeland Disposal Service, IN
First Remedial Action - Final
Contaminated Media: debris, gw, surface water
Key Contaminants: VOCs (benzene, PCE, TCE, toluene, xylenes), other organics (PAHs, phenols), metals (arsenic, chromium, lead), inorganics

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 68
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Abstract (Continued)

numerous permit regulations by improperly accepting and disposing of waste in the landfill. These violations included disposing of sludge in trenches with little or no cover; depositing uncovered barrels of waste in water; contaminating run-off water, the adjacent stream, and the low areas with paint sludge and refuse; dumping liquid waste into the general refuse area; burning in the open; and not providing proper surface drainage. In 1977, the State denied renewal of the operating permit due to failure of the landfill to maintain a minimum of 50% acceptable inspections over the prior two-year period. After the landfill operator appealed the decision, site operations continued until 1978. Because the operator failed to close the site in 1978, the State initiated enforcement actions and required two additional ground water monitoring wells to be installed with continued monitoring. From 1978 to 1983, the State conducted several inspections onsite that identified onsite leachate problems. In 1979, residential mobile homes were built onsite, and, in 1982, the State conducted amethane gas survey that detected high methane concentrations beneath one of the mobile homes. In 1981, the State required that the landfill owner continue onsite ground water monitoring until 1984, and seal any leachate seeps until 1983. In 1983, the County required that all residents vacate the site. This ROD addresses a first and final remedy for the onsite ground water contamination, the landfill waste material in the "hot-spot" area, and surface water. The primary contaminants of concern affecting the debris, ground water, and surface water are VOCs, including benzene, PCE, TCE, toluene, and xylenes; other organics, including PAHs and phenols; metals, including arsenic, chromium, and lead; and other inorganics.

The selected remedial action for this site includes excavating, temporarily storing onsite, and separating approximately 3,300 drums containing waste material from the hot-spot area of the landfill; handling, sampling, and disposing of an estimated 1,650 intact or partially intact drums offsite; sorting approximately 500 yd^3 of non-containerized waste material and any landfill waste and debris encountered during excavation of the slurry wall; disposing of RCRA hazardous waste material offsite based on TCLP testing; reconsolidating non-hazardous waste onsite in the landfill and installing a sanitary landfill cap with a 6-inch vegetative soil cover and a 12-inch gas collection layer, with either active or passive gas collection vents beneath the compacted layer; installing a soil-bentonite slurry wall around the perimeter of the landfill to contain onsite ground water in the upper aquifer; providing for a contingent remedy to store and treat extracted ground water onsite, using filtration, and air stripping if necessary, with onsite discharge of the treated water through Sloan Ditch; installing extraction wells along the downgradient of the slurry wall to maintain a water table elevation within the slurry wall below the water table outside the slurry wall; conducting a wetlands assessment to determine if any significant portions of the wetlands are affected by the installation of the cap and the slurry wall, with installation of an adjustable weir in Sloan Ditch to maintain proper water levels in the wetlands and conducting any additional mitigation, replacement, and/or restoration of the wetlands, if necessary; installing an onsite ground water storage and treatment system, based on further studies; fencing the site; monitoring ground water and surface water; and implementing institutional controls, including deed, ground water, and land use restrictions. The estimated present worth cost for this remedial action is $10,473,300, which includes an estimated annual O&M cost of $174,000 for 1.5 years.

PERFORMANCE STANDARDS OR GOALS:

Debris and ground water cleanup goals are based upon RCRA, the more stringent of SDWA MCLs or State water quality standards, and an EPA-action level for lead of 15 ug/kg or 15 ug/l. Chemical-specific cleanup goals were not provided.

RECORD OF DECISION

SELECTED REMEDIAL ALTERNATIVE

DECLARATION

SITE NAME AND LOCATION

Lakeland Disposal Service, Inc. Landfill Site
Claypool, Indiana

STATEMENT OF BASIS AND PURPOSE

This decision document presents the United States Environmental Protection Agency's (U.S. EPA) selected remedial action for the Lakeland Disposal Service, Inc. Landfill Superfund Site near Claypool, Indiana. This decision document was developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and, to the extent practicable, the National Contingency Plan (NCP). This decision is based on the administrative record file for this site.

The State of Indiana has concurred with most components of the selected remedy. The responsiveness summary section addresses the concerns expressed by the State of Indiana.

ASSESSMENT OF THE SITE

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

DESCRIPTION OF THE REMEDY

This remedy is intended to be the final action for the site. This remedy addresses all contaminated media at the site.

The major components of the selected remedy include:

- Construction of an Indiana Sanitary Landfill Cap, in accordance with Indiana Solid Waste Management Regulations contained in 329 IAC 2-14-19 and RCRA Subtitle D cover requirements for surface containment of the waste material;

- Construction of a soil-bentonite slurry wall and extraction wells for containment of the on-site groundwater in the upper aquifer;

- Storage, treatment, if necessary, to meet National Pollution Discharge Elimination System (NPDES) requirements, and discharge of recovered groundwater.

- Removal of drummed wastes in the hot-spot area of the landfill site, and off-site treatment and/or disposal of the drums and non-containerized waste;

- Fencing to prevent access, groundwater advisories, and possible well abandonment and deed restrictions to prevent future development from interfering with remedial components, as provided for by Indiana regulations;

- Construction of an adjustable weir in Sloan Ditch, if necessary, to maintain proper water levels in the adjacent wetlands;

- Excavation and removal off-site of any landfill wastes and debris encountered during excavation of the slurry wall, which exhibit RCRA hazardous waste characteristics per Toxicity Characteristic Leaching Procedure (TCLP) test.

- A wetlands assessment to determine the portions of the wetlands that are affected by the installation of the selected remedy. Based on this assessment, the Remedial Action will include a program to mitigate, replace and/or restore wetlands, if necessary.

STATUTORY DETERMINATIONS

The selected remedy is protective of human health and the environment, complies with Federal and State requirements that are legally applicable or relevant and appropriate to the remedial action, and is cost effective. This remedy utilizes permanent solutions and alternative treatment technologies to the maximum extent practicable. To the maximum extent practicable, this remedy addresses the principal threats posed by the drummed waste material in the hot-spot area of the landfill by reducing its toxicity, mobility, and volume, and satisfies the statutory preference for treatment as principal element.

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

Valdas V. Adamkus
Regional Administrator

9/25/93
Date

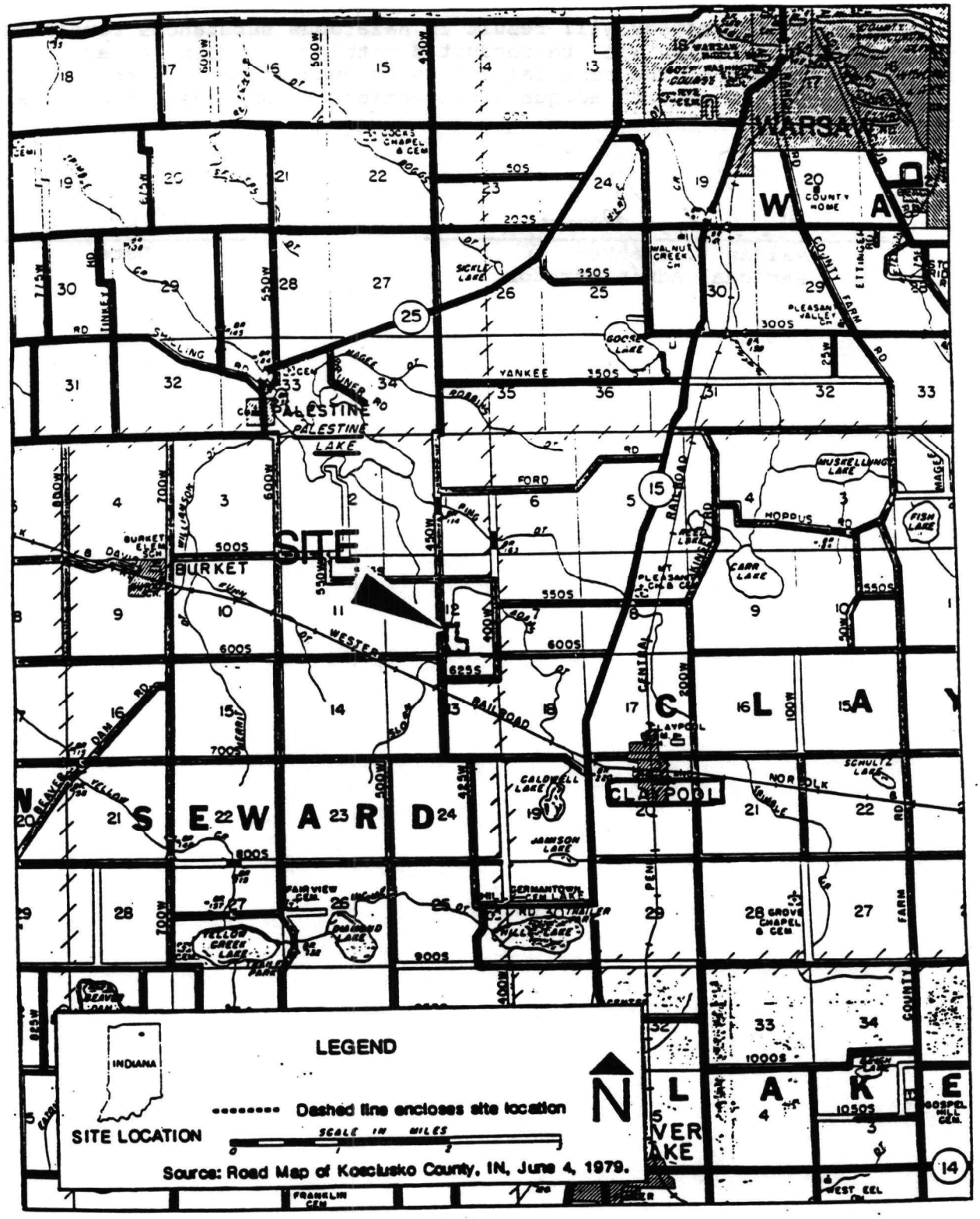

Figure 1.
ROD - Site Location Map.
Lakeland Disposal Landfill

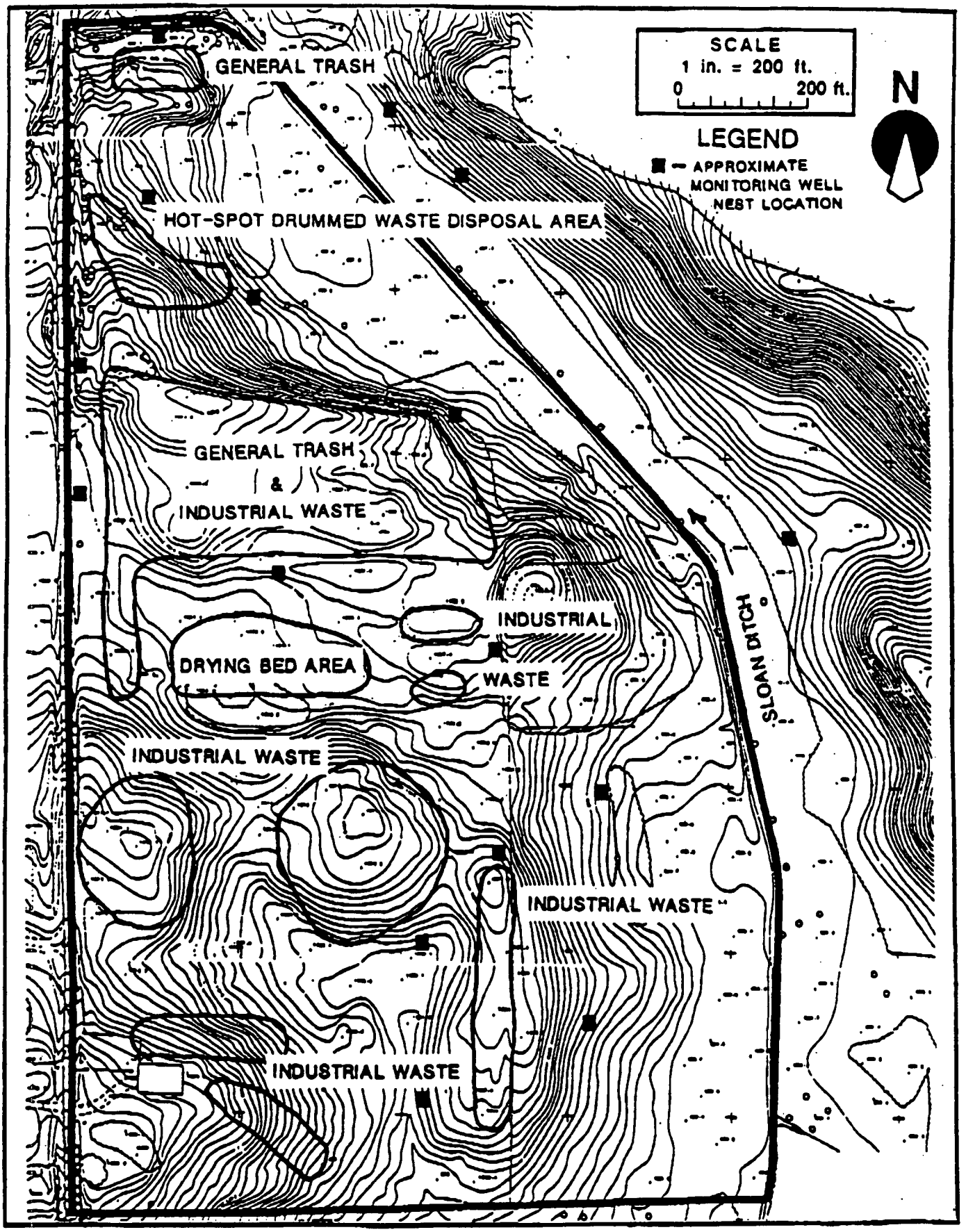

Figure 2.
ROD - Approximate Locations of Waste Disposal Areas
Lakeland Disposal Landfill

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SUMMARY OF REMEDIAL ALTERNATIVE SELECTION

LAKELAND DISPOSAL SERVICE, INC., LANDFILL SITE
CLAYPOOL, INDIANA

1.0 Site Name, Location, and Description

The Lakeland Disposal Service, Inc., site (LDL) is an inactive landfill located approximately 3-1/2 miles northwest of Claypool, Indiana. The site is located in Section 12, Township 31, Range 5 East, Kosciusko County, Indiana, and is bounded on the west by County Road 450 West. The site consists of approximately 39 acres (Figure 1).

A chain link fence runs along the western property of the site. The southern half of the landfill is surrounded by a farmer's fence. An agricultural drainage ditch, called Sloan Ditch, runs parallel to the eastern and northern edges of the site. Several wetland areas exist along Sloan Ditch. Wooded areas are located east of the landfill along Sloan Ditch and the adjacent wetlands.

Land use in Kosciusko County, and specifically for the area surrounding the site, is predominantly agricultural. Although the current zoning regulations are for agricultural purposes, several residences are located west of the site along County Road 450 West. The nearest residence north of the site is also located along County Road 450 West approximately 200 feet from the site's northern boundary. All of the homes in the vicinity of the landfill rely on their own private wells to provide drinking water and water for general use.

Surface drainage from the site is conducted by stream or overland flow. The primary stream in the immediate vicinity of LDL is Sloan Ditch, which eventually discharges to Palestine Lake, approximately 1.6 miles northwest of the landfill. Discharge from Palestine Lake continues via Trimble Creek which flows to the northwest and eventually discharges to the Tippecanoe River.

2.0 Site History and Enforcement Activities

The LDL Site (Figure 2) is a former landfill that was operated from June 1974 to December 1978 by Lakeland Disposal Service, Inc. Prior to 1974, this site was used for agricultural purposes. In January 1975, the Indiana Stream Pollution Control Board issued a Solid Waste Management Permit (Permit No. 43-2) for the operation of a sanitary landfill at the site. During its period of operation, the landfill accepted general refuse (e.g., plastic, metal, wood, leaves, paper and cardboard) and certain specific industrial wastes. According to Indiana State Board of Health (ISBH) records, the following known industrial wastes were disposed of at the LDL Site:

- Various sludges containing mainly the hydroxides of aluminum, cadmium, chromium, copper, lead, nickel, tin, selenium, and zinc;
- cyanide, zinc, and chrome plating liquid;
- paint sludge;
- sugar contaminated with bromochloromethane;
- oil and oily waste water; and
- filter sand contaminated with hydroxides of lead, zinc, copper, and chrome.

According to ISBH Records and other information, at least 18,000 drums of waste materials were disposed of at the LDL Site. In addition, approximately 8,900 tons of plating sludge and more than 2 million gallons of plating sludge containing various hydroxide sludges of aluminum, cadmium, chromium, copper, lead, nickel, tin, selenium, and zinc were disposed of at the site.

During the four years of the landfill's operation, the operator of the landfill violated numerous permit regulations by improperly accepting and disposing of waste material at the landfill. These violations included disposal of sludges in trenches with very little or no cover; hazardous wastes not placed in trenches; barrels of waste deposited in water and not covered; run-off water contaminated with paint sludge; sludge running out of trenches to adjacent low areas and to the adjacent stream; refuse dumped in water; liquid waste dumped into general refuse area; unauthorized oil dumping causing pollution of the adjacent stream; open burning on site; and poor surface drainage.

On April 4, 1977, the Indiana Stream Pollution Control Board denied renewal of the operating permit due to failure of the landfill to maintain a minimum of 50 percent acceptable inspections over the prior two year period. The operator of the landfill appealed the denial and negotiated an Agreed Order allowing the landfill to operate until May 1, 1978. After the landfill failed to close on May 1, 1978, the State initiated enforcement actions. A second Agreed Order was negotiated and the landfill was closed in December 1978. The State required two additional ground-water monitoring wells to be installed at this time with monitoring to continue until 1983. During the period from 1978 to 1983, the State made several inspections and noted a number of leachate problems at the inactive site. The state negotiated an amended Agreed Order in August 1981. The Order provided that the prior landfill owner was to continue groundwater monitoring at the site until September 1984, and seal any leachate seeps until September 1983.

In January 1979, residential mobile homes were placed on the landfill facility. The State then notified the County Area Planning Commission that this was not a suitable use for the former landfill site. In November 1982, the State conducted a methane gas survey at the closed landfill site and detected high methane concentrations beneath one of the mobile homes. The State filed an injunction with Kosciusko County requesting residents to move from the landfill property. In March 1983, the Kosciusko County Board of Zoning Appeals ordered residents to move from the landfill site. No one currently resides on the landfill property.

The site was proposed for inclusion on the National Priorities List (NPL) in June 1988. U.S. EPA placed the site on the NPL on March 31, 1989, 54 Fed.Reg. 13302.

3.0 Highlights of Community Participation

Compliance with the public participation requirements of Section 113(k)(2)(i-v) of CERCLA/SARA, has been achieved for the LDL Site by the following activities:

- U.S. Environmental Protection Agency (U.S. EPA) issued a press release announcing a public "Remedial Investigation/Feasibility Study (RI/FS) kick-off" meeting to inform the community as to U.S. EPA's plans;
- U.S. EPA held a public "RI/FS kick-off" meeting in March 1990, announcing the initiation of the RI/FS;
- U.S. EPA developed and distributed a fact sheet in conjunction with the March meeting;
- U.S. EPA established site information repositories at the Claypool Post Office, Claypool, Indiana, and at the Kosciusko County Health Department, in Warsaw, Indiana, to provide public access to site-related documents;
- U.S. EPA conducted public availability sessions in April 1991, to discuss the results of the Phase I Remedial Investigation (RI) field activities; a fact sheet also was developed and distributed to the community relations mailing list;
- U.S. EPA conducted a public meeting in May 1992, to discuss the results of the RI of the LDL Site; the Agency also developed a fact sheet and distributed it through the community relations mailing list;
- U.S. EPA has compiled an Administrative Record, which includes the RI, Baseline Risk Assessment, Feasibility

Study (FS), and other documents. The record is located at the site information repositories;

- U.S. EPA placed a formal advertisement in the Warsaw Times-Union, a local newspaper of general circulation, on June 21, 1993, announcing the commencement of the public comment period, the availability of the Proposed Plan, and the time and place of the July 15, 1993, public meeting;

- U.S. EPA released the Proposed Plan for remedial action for public comment and placed the Plan into the Administrative Record on June 21, 1993;

- U.S. EPA provided a 30-day public comment period, which ended on July 30, 1993; copies of the Proposed Plan were distributed to the community relations mailing list;

- U.S. EPA held a public meeting on July 15, 1993, at the Claypool Lions Club at which U.S. EPA and the Indiana Department of Environment Management (IDEM) presented the Proposed Plan to the community and received verbal comments. U.S. EPA made a transcript of the public meeting, which was made available to the public and placed in the Administrative Record and site repositories;

- U.S. EPA has received oral and written comments on the Proposed Plan. Significant comments have been addressed in the attached Responsiveness Summary.

4.0 Scope of Response Action

The principal threats identified at the site are considered to be groundwater contamination and landfill waste material in the hot-spot area (see Figure 2) of the landfill. To mitigate the threat to human health and the environment, the selected remedy provides for the reduction of toxicity, mobility, and volume of contaminants through the removal of drummed waste in the hot-spot area. The remedy requires an investigation of the hot-spot area to more precisely define its geographical extent prior to the removal of any drums. The contaminated material remaining in the landfill will be addressed as a continuing source of groundwater contamination. The remedy also includes a wetland assessment to determine if any significant portions of the wetlands are affected by the installation of the cap and the slurry wall. Based on such an assessment, a program to mitigate, replace and/or restore wetlands will be implemented if necessary.

For the purposes of source control, the selected remedy includes the construction of an Indiana Sanitary Landfill Cap for surface

containment of waste material; construction of a slurry wall and extraction wells for containment of the on-site groundwater in the upper aquifer; and provision for storage, treatment and discharge of recovered groundwater. A soil-bentonite slurry wall will be constructed around the perimeter of the landfill to form a subsurface barrier to contain groundwater and waste under and within the landfill. The slurry wall shall be properly keyed into the confining layer below and the surface cap above the landfill.

The remedy includes contingency measures to address changed conditions or unanticipated problems. Examples of such contingency measures include the construction of an adjustable weir in Sloan Ditch to maintain proper water levels in the adjacent wetlands; provisions for any additional treatment equipment should it be required in the future to meet NPDES permits; and, if necessary, investigations to determine the presence of any underground drainage tile system across the landfill. Additionally, if any drummed wastes or any non-drummed wastes exhibiting RCRA hazardous waste characteristics are encountered during any excavation for implementation of the remedy, then such waste material would be disposed of off-site with the targeted drum removal activities.

In addition, the selected remedy includes institutional controls such as fencing to prevent access to the site, possible deed restrictions to limit future land and groundwater use, and a comprehensive long-term monitoring plan to ensure effectiveness of the remedy.

5.0 Summary of Site Characteristics

A RI/FS at the site was conducted to determine the nature and extent of contamination, define pathways of contaminant migration, define physical features that could affect the migration, containment, or remediation of the hazardous substances, and to gather information necessary to prepare a Baseline Risk Assessment (RA) and a FS for the Site. The goals of the FS are to develop and evaluate remedial alternatives to address the problems at the site. RI field activities included soil, sediment, surface water, groundwater, and waste material sampling. The discussion below summarizes the results of the RI activities.

5.1 Geology

The near surface geology underlying the LDL Site can be subdivided into two unconsolidated units. In the vicinity of Sloan Ditch, a brown silty sand loam with discontinuous lenses of silty and fine to coarse sand with occasional gravel occurs to a depth of approximately 15 below land surface. This deposit is associated with the wetland that occupies the valley crossed by

Sloan Ditch. Upland of the valley, a second near surface unit consists of silt and clay loam with some sand and gravel. It extends 5 to 25 feet below the land surface. This unit appears to have originated as a coarse till. The alluvial deposits and upland coarse till constitute the shallow geologic system and, together, are equivalent to the shallow unit (unconsolidated upper aquifer).

Underlying the shallow units, is an unstratified mixture of gray inorganic silt, clay and sand with pebbles and occasional discontinuous lenses of silt and fine to coarse silty sand with variable amounts of gravel. This glacial till unit is continuous across the Site. The top of the continuous till unit is found at depths of 4 to 30 feet below land surface, and is the predominant unit to a depth of at least 100 feet below land surface (the maximum depth of drilling activities during the remedial investigation).

5.2 Hydrogeology and Hydrology

Groundwater occurrence at the site is divided into two distinct hydrogeologic units: the shallow upper aquifer and the lower gravel aquifer. The lower aquifer is separated from the upper aquifer by a till unit which acts as an aquitard. The lower gravel aquifer is considered confined based on the artesian conditions found in some of the nearby regional wells. The till unit and the bedrock zone act as the upper and lower confining units to this aquifer.

The groundwater flow direction at the landfill site is generally toward the east to northeast with an average estimated horizontal hydraulic gradient of 0.036 ft/ft in the shallow upper aquifer.

Within the regional discharge area, the hydraulic gradients are generally upward toward the wetlands, lakes and streams. The vertical gradients calculated from well nest data indicate that downward gradients exist in the upland portion of the site and that upward gradients exist within the low-lying Sloan Ditch discharge area. Owing to the low hydraulic conductivity of the till aquitard, it is assumed that the rate of upward discharge is relatively low.

5.3 Soil Contamination

Soil samples were collected at various locations on the LDL Site. Volatile organic compounds (VOCs), semi-volatile organic compounds (Semi-VOCs), and inorganic analytes were detected above background concentrations in the surface and subsurface soils. A list of these contaminants and their maximum concentrations are shown on Table 1.

5.4 Groundwater Contamination

The shallow groundwater zone beneath and downgradient from the landfill has been impacted by waste disposal practices from the landfill. VOCs, Semi-VOCs, inorganic analytes and general water quality parameters were detected above background concentrations in the shallow groundwater. A list of these contaminants and their maximum concentrations in groundwater samples are presented in Table 2. In the downgradient groundwater samples, concentrations of vinyl chloride, trichloroethene, 1,2-dichloroethene, antimony, and lead exceed their established primary drinking water standards known as Maximum Contaminant Levels (MCLs) or action levels. Methylene Chloride was detected in the RI Phase I groundwater sample in one of the monitoring wells at a concentration of 60 parts per billion (ppb) and it exceeded its MCL of 5 ppb. Concentration of cadmium in one of the downgradient groundwater samples was equal to the MCL of 5 ppb. Several inorganic analytes such as aluminum, iron, manganese, and chlorides exceeded the established secondary drinking water standards. These contaminants were detected in some of the downgradient shallow monitoring and/or piezometer wells installed at depths ranging from 15 to 40 feet below land surface. No PCBs or pesticides were detected in any of the monitoring wells on site.

No contaminants were detected above established primary drinking water standards in monitoring wells installed in the lower aquifer within the LDL Site. Several inorganic analytes such as aluminum, iron and manganese, however, exceeded the established secondary drinking water standards.

The results of the drinking water samples obtained from the nearby residences did not indicate the presence of any of the contaminants above the established primary drinking water standards. Iron and manganese concentrations, however, exceeded the established secondary drinking water standards. A list of these contaminants and their maximum concentrations are presented in Table 3.

5.5 Landfill Waste Contamination

The results of test pit samples at the Site indicate the presence of several VOCs, Semi-VOCs, and inorganic analytes. No PCBs or pesticides were detected in any of the Site waste samples. A list of these contaminants and their maximum concentrations are presented in Table 4. The results of drummed waste sample analysis in the hot-spot area indicated high concentrations of ethylbenzene (20,000 mg/kg), methylene chloride (10,000 mg/kg), toluene (55,000 mg/kg), 1,1,1-trichloroethane (65,000 mg/kg), trichloroethene (6,000 mg/kg), and xylene (74,000 mg/kg).

Table 1

Contaminants detected in Soil Samples
Lakeland Disposal Landfill Site, Claypool, Indiana

Contaminants	Surficial Soil Maximum Concentrations (mg/kg)	Subsurface Soil Maximum Concentrations (mg/kg)
Cobalt	6.8	11.0
Copper	750.0	57.0
Cyanide	11.0	--
Iron	27,000.0	33,000.0
Lead	100.0	26.0
Magnesium	220,000.0	35,000.0
Manganese	1,100.0	1,400.0
Mercury	0.32	0.17
Nickel	500.0	300.0
Potassium	3,100.0	3,200.0
Selenium	5.0	7.5
Silver	0.44	0.13
Thallium	--	0.75
Vanadium	66.0	72.0
Zinc	1,400.0	1,400.0

Table 1

Contaminants detected in Soil Samples
Lakeland Disposal Landfill Site, Claypool, Indiana

Contaminants	Surficial Soil Maximum Concentrations (mg/kg)	Subsurface Soil Maximum Concentrations (mg/kg)
VOCs		
Acetone	0.009	0.048
Benzene	0.001	0.002
2-Butanone	0.031	0.013
Carbon disulfide	--	0.001
Chloroform	0.009	0.007
1,1-Dichloroethane	--	0.19
1,2-Dichloroethene (total)	0.001	1.2
Ethylbenzene	0.001	--
Methylene chloride	0.031	0.064
Tetrachloroethene	0.003	0.007
Tetrahydrofuran	0.052	--
Toluene	0.009	0.004
1,1,1-Trichloroethane	--	0.084
Trichloroethene	0.036	0.10
Xylene (total)	0.006	0.006
Semi-VOCs		
Benzo(b)fluoranthene	0.057	--
Benzo(a)pyrene	--	0.086
Bis(2-ethylhexyl)phthalate	1.3	3.4
Butylbenzylphthalate	0.32	1.2
3,3-Dichlorobenzidine	0.8	--
Di-n-butylphthalate	0.9	1.8
Di-n-octylphthalate	0.67	3.0
Fluoranthene	0.049	--
Inorganics		
Aluminum	25,000.0	28,000.0
Antimony	1.2	2.3
Arsenic	20.0	20.0
Barium	300.0	290.0
Beryllium	1.6	1.9
Cadmium	98.0	1.2
Calcium	100,000.0	110,000.0
Chromium	690.0	36.0

Table 2

Contaminants detected in Ground Water Samples
Lakeland Disposal Landfill Site, Claypool, Indiana

Contaminants	Maximum concentration (mg/l)
VOCs	
Acetone	0.011
Benzene	0.003
2-Butonone	0.140
Carbon disulfide	0.005
Chlorobenzene	0.004
Chloroethane	0.120
1,1-Dichloroethane	0.058
1,1-Dichloroethene	0.001
1,2-Dichloroethene (total)	0.190
Ethylbenzene	0.002
Methylene Chloride	0.060
4-Methyl-2-pentanone	0.013
Tetrahydrofuran	0.110
Toluene	0.008
Trichloroethene	14.000
Vinyl acetate	0.018
Vinyl chloride	0.003
Semi-VOCs	
Bis(2-ethylhexyl)phthalate	0.011
Diethylphthalate	0.006
Di-n-butylphthalate	0.006
Phenol	0.340
Inorganics	
Aluminum	2.210
Antimony	0.020
Arsenic	0.015
Barium	1.230
Cadmium	0.005
Calcium	413.000
Chloride	547.000
Copper	0.045
Cyanide	0.011
Iron	25.900
Lead	0.027

Table 2

Contaminants detected in Ground Water Samples
Lakeland Disposal Landfill Site, Claypool, Indiana

Contaminants	Maximum concentration (mg/l)
Magnesium	158.000
Manganese	1.180
Mercury	0.0004
Potassium	92.600
Selenium	0.0075
Sodium	204.000
Sulfide	23.800
Vanadium	0.050
Zinc	0.046

Table 3

Contaminants detected in Residential Well Samples
Lakeland Disposal Landfill Site

Contaminants	Maximum Concentrations (mg/l)
VOCs	
Carbon disulfide	0.0005
Inorganics	
Arsenic	0.014
Barium	0.362
Calcium	94.500
Chloride	14.600
Iron	2.350
Lead	0.0084
Magnesium	30.900
Manganese	0.086
Mercury	0.0003
Zinc	0.094

Table 4

Contaminants detected in Waste Characterization Samples
Lakeland Disposal Landfill Site, Claypool, Indiana

Contaminants	Maximum Concentrations (excluding hot-spot area) (mg/kg)	Maximum Concentrations (hot-spot area) (mg/kg)
VOCs		
Acetone	26.0	66.0
Benzene	0.42	5.8
2-Butanone	250.0	770.0
Chlorobenzene	--	5.7
Chloroethane	0.45	--
Chloroform	0.32	--
1,1-Dichloroethane	20.0	1,100.0
1,2-Dichloroethane	--	11.0
1,2-Dichloroethene (total)	18.0	86.0
1,1-Dichloroethene	--	180.0
Ethylbenzene	48.0	20,000.0
Methylene chloride	5.1	10,000.0
4-Methyl-2-pentanone	20.0	20.0
Tetrachloroethene	270.0	9.7
Toluene	360.0	55,000.0
1,1,1-Trichloroethane	21.0	65,000.0
1,1,2-Trichloroethane	--	84.0
Trichloroethene	190.0	6,000.0
Vinyl chloride	2.8	--
Xylene (total)	200.0	74,000.0
Semi-VOCs		
Bis-(2-ethylhexyl)phthalate	27.0	130.0
Butylbenzylphthalate	0.25	400.0
Di-n-butylphthalate	1.4	--
2-Methylnaphthalene	0.97	--
Naphthalene	33.0	450.0
Inorganics		
Aluminum	7,940.0	110,000.0
Antimony	1.2	18.8
Arsenic	12.1	4.5
Barium	1,470.0	15.0
Beryllium	1.1	--

Table 4

Contaminants detected in Waste Characterization Samples
Lakeland Disposal Landfill Site, Claypool, Indiana

Contaminants	Maximum Concentrations (excluding hot-spot area) (mg/kg)	Maximum Concentrations (hot-spot area) (mg/kg)
Cadmium	40.7	27.6
calcium	216,000.0	3,110.0
Chromium	13,100.0	4.8
Cobalt	13.7	130.0
Copper	17,400.0	22.5
Cyanide	122.0	0.29
Iron	125,000.0	4,050.0
Lead	142.0	5.6
Magnesium	15,300.0	772.0
Manganese	732.0	67.2
Mercury	0.08	--
Nickel	2,670.0	9.6
Potassium	6.35	--
Silver	0.52	--
Sodium	1,030.0	--
vanadium	23.8	10.4
Zinc	22,800.0	40.9

5.6 Leachate Contaminants

The surface leachate seeps which discharge to Sloan Ditch contained high concentrations of several VOCs such as acetone, 2-butanone, ethylbenzene, 4-methyl-2-pentanone, tetrahydrofuran, toluene, vinyl chloride, and xylene. Significant among the semi-VOCs were benzoic acid, diethylphthalate, 4-methylphenol, and phenol. Also, several inorganic analytes such as aluminum, chromium, copper, and lead were detected in the leachate samples which eventually discharge to Sloan Ditch. A list of these contaminants and their maximum concentrations are presented in Table 5.

5.7 Surface Water and Sediments in Sloan Ditch

Acetone and Di-n-butylphthalate were detected at relatively low concentrations in the surface water samples downgradient of the site. Acetone, however, was also detected in one of the upgradient surface water samples. Several inorganic analytes were detected in the surface water samples. Inorganic contaminants, including copper, lead, and mercury, were detected in the surface water samples. Concentrations of mercury in surface waters adjacent to the landfill exceeded the IDEM Chronic Aquatic Criteria (CAC). Iron exceeded the established U.S. EPA (1986) water quality criteria of 1000 µg/l. These contaminants were also detected in the background surface water samples. Several inorganic constituents detected in the surface water samples, including cadmium, copper, and lead, were also detected in the surface leachate seeps which eventually discharge to Sloan Ditch. A list of these contaminants and their maximum concentrations are presented in Table 6.

Several VOCs, Semi-VOCs, and inorganic analytes were detected above background concentrations in the sediments of Sloan Ditch. Several of these constituents were also detected in the surface leachate seeps that eventually discharge to Sloan Ditch. Elevated levels of some of the inorganic contaminants detected adjacent to the landfill indicate that contaminants may have migrated from the landfill. A list of these contaminants and their maximum concentrations are presented in Table 6.

5.8 Wetland Sediment Samples

Several VOCs, Semi-VOCs and inorganic analytes were detected in the wetland sediment samples above background concentrations. A list of these contaminants and their maximum concentrations are presented in Table 5.

5.9 Air Contamination

The ISBH, during a site inspection in November 1982, conducted a methane gas survey at the closed landfill site and detected high

Table 5

Contaminants detected in Leachate and Wetland Sediment Samples
Lakeland Disposal Landfill Site, Claypool, Indiana

Contaminants	Leachate Maximum Concentrations (mg/l)	Wetland Sediments Maximum Concentrations (mg/kg)
VOCs		
Acetone	14.0	0.19
Benzene	0.011	0.003
2-Butanone	28.0	0.044
Carbon disulfide	0.004	--
Chlorobenzene	0.001	--
Chloroethane	0.019	--
1,1-Dichloroethane	0.069	0.004
1,2-Dichloroethene (total)	0.021	0.076
Ethylbenzene	0.078	0.005
2-Hexanone	0.13	--
Methylene chloride	0.002	0.16
4-Methyl-2-pentanone	46.0	--
Styrene	--	0.003
Tetrachloroethene	--	0.009
Tetrahydrofuran	0.16	--
Toluene	0.44	0.021
Trichloroethene	--	0.026
Vinyl chloride	0.13	--
Xylene (total)	0.26	0.010
Semi-VOCs		
Benzoic acid	4.8	--
Bis(2-ethylhexyl)phthalate	--	3.9
Butylbenzylphthalate	0.002	--
Di-n-butylphthalate	--	1.4
Diethylphthalate	0.048	--
Dimethylphthalate	--	0.09
4-Methylphenol	0.74	--
Phenol	0.51	--
Inorganics		
Aluminum	56.4	24,500.0
Antimony	--	34.1
Arsenic	0.028	12.8
Barium	1.68	180.0

Table 5

Contaminants detected in Leachate and Wetland Sediment Samples
Lakeland Disposal Landfill Site, Claypool, Indiana

Contaminants	Leachate Maximum Concentrations (mg/l)	Wetland Sediments Maximum Concentrations (mg/kg)
Cadmium	0.007	78.6
Calcium	507.0	76,500.0
Chloride	370.0	--
Chromium	0.111	39,700.0
Cobalt	--	20.2
Copper	0.071	10,600.0
Cyanide	--	0.17
Iron	410.0	39,500.0
Lead	0.051	495.0
Magnesium	143.0	18,400.0
Manganese	3.02	1,180.0
Mercury	--	0.14
Nickel	0.1	130.0
Potassium	91.8	2,340.0
Selenium	--	8.6
Silver	0.0012	6.9
Sodium	213.0	--
Thallium	0.0066	--
Vanadium	0.115	51.9
Zinc	1.03	27,300.0

Table 6

Contaminants detected in Surface Water and Sediment Samples
Lakeland Disposal Landfill Site, Claypool, Indiana

Contaminants	Surface Water Maximum Concentrations (mg/l)	Sediments in Sloan Ditch Maximum Concentrations (mg/kg)
VOCs		
Acetone	0.009	0.29
2-Butanone	--	0.053
Chloromethane	--	0.005
Ethylbenzene	--	0.002
Toluene	--	0.008
Xylene (total)	--	0.008
Semi-VOCs		
Bis(2-ethylhexyl)phthalate	--	0.029
Butylbenzylphthalate	--	0.53
Di-n-butylphthalate	0.004	6.4
Inorganics		
Aluminum	31.0	20,600.0
Arsenic	0.011	22.6
Barium	0.437	246.0
Cadmium	--	1.3
Calcium	159.0	45,300.0
Chloride	2.96	--
Chromium	0.033	25.9
Copper	0.036	31.8
Cyanide	--	0.92
Iron	40.3	30,600.0
Lead	0.022	35.1
Magnesium	34.9	9,100.0
Manganese	12.2	2,730.0
Mercury	0.0003	0.1
Nickel	--	30.6
Potassium	14.8	2,640.0
Selenium	--	4.7
Sodium	17.4	--
Sulfide	28.3	--
Silver	--	0.33
Vanadium	0.065	50.3
Zinc	0.174	145.0

methane concentrations beneath one of the mobile homes. Methane is a common gas generated by most landfills. During the RI field activities, no specific effort was made to monitor methane gas at the site.

6.0 Summary of Site Risks

The Baseline Risk Assessment in the RI Report (Chapter 5), followed the guidance provided in U.S. EPA's Risk Assessment Guidance for Superfund (RAGs): Volume I, Human Health Evaluation Manual. Risk assessment guidelines developed by the State of Indiana were also applied.

6.1 Contaminants of Concern

Chemicals considered in the Baseline Risk Assessment are those which are present as a result of chemical releases which have occurred at the Site and are termed "chemicals of potential concern." To identify these, chemicals present in soil and groundwater samples are distinguished from those which may naturally be present (Site background) and those which can be unintentionally introduced into samples through sample collection or laboratory analysis. Further, consideration is given to the frequency of occurrence of the chemical at the Site. Those infrequently identified may not be significant in view of overall Site contamination. Chemicals considered to be of potential concern are evaluated further in the risk assessment.

For the LDL Site risk assessment, 68 contaminants representing inorganic, volatile, and semi-volatile organic compounds were evaluated. Of these, 51 contaminants were used in assessing site risks. The contaminants of concern include monocyclic aromatic hydrocarbons, chlorinated aliphatic hydrocarbons, ketones, tetrahydrofuran, carbon disulfide, benzoic acid, phthalate esthers, naphthalene, phenols, and inorganic compounds. A list of these contaminants of concern is found at Table 46 of the RI Report.

6.2 Exposure Assessment

An exposure assessment is performed to identify actual and potential pathways by which human exposure to contaminated Site media may occur. The assessment considers factors such as the physical location of contaminated areas, the type of contamination and the population which may come into contact with these areas. Exposure pathways are identified for two Site land use scenarios: pathways based on land use practices as they currently exist, and potential pathways based on land use changes which may occur in the future and result in additional types of exposure. Both current and future pathways which represent possible exposures are then quantified to estimate the magnitude of daily contaminant exposure a population may incur. To

accomplish this, assumptions pertaining to the exposed population are made, such as the nature of the individuals (e.g., child vs. adult), the rate of contact with the contaminated medium (e.g., adult consumes 2 liters of water daily) and the length of time the exposure is likely to occur (e.g., years vs. lifetime). These population variables are then combined with chemical concentration data to calculate a level of exposure.

Both municipal and industrial wastes were accepted at the LDL Site from 1974 to 1978. Contaminants from the landfill have been identified in the groundwater within the shallow upper aquifer, surficial soil, subsurface soil, surface water, leachate, wastes, and sediments from Sloan Ditch and adjacent wetlands. The most highly contaminated media included a hot-spot area containing drummed wastes in the northern portion of the landfill and the groundwater in the shallow upper aquifer. Lower levels of contamination were found in other media such as surface water and sediments. Current well records indicate that residential and municipal wells within a 3-mile radius of the site likely obtain their water supplies from a gravel aquifer beneath the glacial till deposit. Analytical results from samples collected from nearby residential wells indicate that these wells have not been affected by the site contaminants.

Pathways considered to be most significant at the Site include exposure through groundwater use and direct contact with soils, summarized as follows:

Current Land Use Conditions:

1) Exposure of local residents to constituents in surficial soils and wetlands sediments by ingestion, dermal contact, and inhalation;

2) Exposure of local residents to constituents in groundwater by ingestion, dermal contact, and inhalation of volatile contaminants released into indoor air through household use;

3) Dermal contact with surface water and sediments of Sloan Ditch;

4) Ingestion of turkey meat from turkeys exposed to landfill soils and grasses;

5) Exposure to landfill wastes.

Potential Future Land Use Conditions:

1) Exposure of future residents to contaminated groundwater resulting from either installation of a well within the contaminant plume or by migration of

groundwater contaminants to existing wells. Exposure may occur through drinking and dermal absorption. Contaminant concentrations are assumed to exist in the future as under current conditions.

2) Exposure of individuals to contaminated soils at a future residence developed at the source areas. Exposures may occur through incidental ingestion of soil and dermal absorption. It is assumed contaminants in either surface or subsurface soils at current concentrations are made available for exposure as a result of Site development.

Using such scenarios, risk numbers are calculated for each contaminant. These calculations factor in the amount of exposure assumed, the dose of the chemical received (based on the concentrations found during the RI), and a toxicity estimator for each individual chemical which quantifies the toxicity of that chemical. Different constants and equations are used based on whether or not the chemical is carcinogenic. The constant for a carcinogenic chemical is called a slope factor, and the constant for a noncarcinogen is called a reference dose.

The results of these calculations are estimates of cancer risk for carcinogenic risks and estimates of Hazard Indices for noncarcinogenic risks. The cancer risk number is expressed in scientific notation and represents an estimate of an individual's increased risk of getting cancer over a lifetime. The carcinogenic risk estimate is generally a conservative estimate, i.e., the risk may be less than predicted. For example, 1.0×10^{-6} represents an increase in an individual's risk of cancer by 1 chance in a million, under the exposure conditions assumed. U.S. EPA considers this 1.0×10^{-6} number as a point of departure when determining risk at a site. Risks calculated to be less than this value are considered protective of human health and the environment, while risks between 1.0×10^{-4} and 1.0×10^{-6} are within a range acceptable to U.S. EPA but may not be considered protective due to site-specific conditions. Risks greater than 1.0×10^{-4} are generally unacceptable.

The Hazard Index (HI) represents the risk of adverse non-cancer effects occurring due to exposure to the site. The HI number generated is interpreted differently from the cancer risk number. To evaluate risk at a site due to noncarcinogenic contaminants, U.S. EPA has determined that an HI less than or equal to 1 estimates that no adverse effects are likely to occur due to the hypothetical exposure, while a Hazard Index greater than 1 estimates that adverse effects due to site exposure may occur and signals that potential risks to human health must be carefully evaluated.

The Baseline Risk Assessment and the Hazard Index showed that the site poses unacceptable risks to the public health. The excess lifetime cancer risk (ELCR) and HI for current exposure to the contaminated media from the LDL site are estimated to be:

Exposure Point	Receptor			
	Adult		Child	
	ELCR	HI	ELCR	HI
Soils	2×10^{-6}	0.07	3×10^{-6}	0.40
Wading	--	--	9×10^{-8}	0.03
Wetland sediment	2×10^{-6}	0.80	4×10^{-7}	1.00
Turkey Meat	4×10^{-7}	0.01	--	--
Drummed waste	5×10^{-4}	4.00	6×10^{-4}	20.00
Total Current Risks	5×10^{-4}	4.88	6×10^{-4}	21.43

The total ELCR and HI for future exposure to the contaminated media from the LDL site are estimated to be:

Exposure Point	Receptor			
	Resident		Worker	
	ELCR	HI	ELCR	HI
Soil	4×10^{-5}	1.00	7×10^{-8}	0.40
Groundwater	3×10^{-4}	5.00	--	--
Leachate	3×10^{-6}	0.20	--	--
Landfill Waste	2×10^{-2}	200.00	4×10^{-5}	60.00
Total Future Risks	2×10^{-2}	206.20	4×10^{-5}	60.40

Thus, the potential risks at the site exceed the acceptable risk range of 1×10^{-4} to 1×10^{-6}, and thus present unacceptable current and potential future risks to human health. Additionally, in many cases of exposure, it is likely a person

would be exposed to the site contamination through more than one exposure route. In these cases, the risk levels of the exposure routes would be added together resulting in higher risks due to exposure to site contaminants.

As with the carcinogenic risks, two or more routes of exposure may be complete for a person exposed to the site contamination. In these cases, the hazard index for each case would be added together resulting in a combined hazard index greater than 1.0. The total hazard index for the site is estimated to be 21.43 currently, and 206.2 for potential future use.

Actual or 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.

Based on the lead biokinetics model conducted as part of the RI, children between the ages of 0 to 6, exposed to groundwater and soils at the LDL Site are not expected to have blood levels that exceed the permissive limit of 10 ug/dl for lead.

6.3 Ecological Assessment

Ecological impacts from site-related contamination were also evaluated. These findings established a limited impact to the local wetlands. Based on a study of wetland sediment samples, landfill waste materials were detected 1.5 to 2 feet below wetland surface areas. Although these materials potentially could migrate from the deeper sediments to the upper sediments, the 0 to 0.5-foot wetland sediments currently did not contain levels of contaminants that could adversely affect wetland organisms. Elevated levels of zinc detected in wetland sediments, however, may adversely affect aquatic organisms. Surface leachate seeps also contained elevated levels of organic contaminants and may adversely affect immediately adjacent flora and fauna.

6.4 Uncertainties

The Risk Assessment could not quantify risks from those contaminants without known slope factors or reference factors. For a more detailed discussion of such contaminants at the LDL site, see the RI report (RI report, p. 208-09). Methods to quantify risks and possible synergistic effects due to exposure to mixtures of multiple contaminants or multiple pathways are very limited. The use of risk additivity helps prevent the underestimation of cancer risks or potential noncancer health effects.

7.0 Description of Alternatives

Based on the results of the RI, a FS was conducted to identify and evaluate remedial alternatives that would minimize or eliminate the health risks caused by site-related contaminants. The goals for remedy selection at the LDL Site include:

- Prevent or reduce the release of contaminants from the landfill into the various environmental media including air, groundwater, surface water and sediments of Sloan Ditch, and the adjacent wetlands;
- ensure that chemical-specific applicable or relevant and appropriate requirements (ARARs) are not exceeded outside the boundaries of the landfill;
- prevent or reduce off-site migration of contaminated groundwater;
- prevent or reduce the potential risk to human health associated with exposure to contaminated groundwater and/or landfill waste at the Site; and
- minimize all future adverse affects to the adjacent wetlands.

The following ten remedial alternatives were developed for the site, and are briefly described below. For more detailed information, see the FS Report. The major ARARs which were identified for these alternatives will be discussed in Section 8(2), Comparative Analysis of Alternatives, under Compliance with ARARs.

Alternative 1: NO ACTION

As required by the National Contingency Plan (NCP), the No Action Alternative is evaluated, and serves as a basis against which all other alternatives can be compared. Under this remedial alternative, no active remedial action or institutional action would be taken.

Estimated Capital Cost:	**$**	**0**
Estimated Annual O&M Cost:	**$**	**0**
Estimated Present Worth:	**$**	**0**
Estimated Time to Implement		**none**

Alternative 2: INSTITUTIONAL CONTROLS

Alternative 2, which is also incorporated in Alternatives 3, 3A, 4, 4A, 5, 5A, 6, and 6A, includes access and deed restrictions, landfill maintenance, and ground-water monitoring. Access

restriction would be achieved by installing a fence around the entire landfill site.

Institutional controls to restrict access, use, and development of the site also would be included in each of the alternatives. A fence would control access to the site and protect the cap (proposed under other alternatives) from unauthorized access. Restrictive covenants may be implemented on the property pursuant to Indiana Code (IC) 13-7-8.7-12 to prevent future development from interfering with remedial components. In addition, advisories will be issued to users and owners of water wells within the area of contamination. It is expected that water wells within the area of contamination will be abandoned pursuant to IC 13-7-26-7. Installation of new wells on the Site is expected to be prohibited by IC 13-7-26-7. A maintenance program would be implemented in order to maintain the existing landfill cover or a new cap. This program would include maintaining a full, competent vegetative layer and semi-annual inspection of the cover to ensure excessive erosion of leachate seep formation are not occurring. Any such erosion or leachate seeps would be repaired by the placement of compacted clay and top soil over the damaged area.

A ground-water monitoring program would be implemented to ensure that off-site releases of contaminants are not occurring. This program would follow the State of Indiana's sanitary landfill post-closure ground-water monitoring requirements identified under 329 IAC 3-45. The results of the monitoring data would be periodically assessed to determine whether additional remedial actions are warranted. Periodic surface water monitoring would also be conducted. In addition, periodic sediment monitoring would be conducted, if elevated levels of contamination are detected in either the groundwater or surface water samples. This Alternative is an integral part of the Alternatives 3, 3A, 4, 4A, 5, 5A, 6 and 6A.

Estimated Capital Cost:	$ 79,000
Estimated Annual O&M Cost:	$ 56,000
Estimated Present Worth:	$940,000
Estimated Time to Implement:	3 to 6 months

Alternative 3: SANITARY LANDFILL CAP/PERIMETER CUT-OFF WALL

Alternative 3 consists of a sanitary landfill cap for surface containment of the waste material and a soil-bentonite slurry wall for containment of the on-site groundwater in the upper aquifer. The landfill cap would consist of a compacted layer under a 6 inch layer of vegetated topsoil. The compacted layer would be 2 feet thick for slopes of less than 15 %, 3 feet thick for slopes of between 15 and 25 %, and 4 feet thick for slopes of greater than 25 % to conform with the substantive provisions of Indiana Solid Waste Management Regulations contained in 329 IAC

2-14-19 and RCRA Subtitle D. Provisions would be made to install a 12 inch gas collection layer with either active or passive gas collection vents beneath the compacted layer.

A soil boring program would be conducted along the perimeter of slurry wall to establish the depth to the inferred aquitard (low permeability confining layer) beneath the site. To ensure adequate groundwater containment, the bottom of the soil-bentonite slurry wall would be at least 20 feet below the existing land surface and would be keyed into a low permeability confining layer. It is expected that the depth of the slurry wall varies from 20 feet to approximately 45 feet below the land surface over the length of the perimeter slurry wall, and that the slurry wall would have an effective permeability of 10^{-7} cm/sec. Section 6.2.3.1 of the FS Report contains a detailed description of this alternative.

To maintain a water table elevation within the slurry wall below the water table elevation outside the slurry wall, at least 16 extraction wells recovering 0.5 to 2.0 gallons per minute each would be installed along the inside face of the eastern leg of the slurry wall. These wells would have to be periodically operated to maintain inward gradients along the entire eastern side of the slurry wall. It is expected that excessive drawdown would not occur in the adjacent wetlands. If, however, unacceptable drawdowns were to occur in the wetlands area, provisions would be made to install an adjustable weir within Sloan Ditch as a means of maintaining proper water levels in the wetlands. In addition, institutional controls would be implemented as described in Alternative 2.

It is unknown at this time whether the recovered groundwater would require treatment prior to discharge. To account for any treatment that may be required for the recovered groundwater from the extraction wells, an on-site groundwater storage and treatment system would be installed. The groundwater in the storage tank would be processed, either continuously or on a batch mode basis, through a filtration step followed by an air stripper, if necessary. The treatment equipment would be housed in a pre-engineered metal building that would be sized to facilitate additional treatment equipment should they be required some time in the future. Following on-site treatment as necessary, the recovered groundwater would be discharged off-site through Sloan Ditch under a National Pollution Discharge Elimination System (NPDES) permit.

Estimated Capital Cost:	$ 4,924,600
Estimated Annual O&M Cost:	$ 174,000
Estimated Present Worth:	$ 7,599,300
Estimated Time to Implement:	18 months

Alternative 3A: RCRA SUBTITLE C CAP/PERIMETER CUT-OFF WALL

Alternative 3A consists of a RCRA Subtitle C Cap for surface containment of the waste material and a soil-bentonite slurry wall for containment of the on-site groundwater in the upper aquifer. The description of this alternative is identical to that of Alternative 3 except that the surface cap would be a RCRA Subtitle C Cap instead of a Indiana Sanitary Landfill Cap.

RCRA Subtitle C Cap incorporates a 2-ft minimum upper vegetated layer, a minimum 12-inch drainage layer, and a low permeability layer of compacted clay (2-ft minimum) in combination with a synthetic membrane layer. The technical requirements for the RCRA Subtitle C Cap are contained in Title 40 of the Code of Federal Regulations, Part 264 (40 CFR 264). Provisions would be made to install a 12 inch gas collection layer with either an active or passive gas collection vents beneath the low permeability barrier layer.

As stated earlier, the descriptions for the construction of the slurry wall, extraction wells, treatment systems are identical to those of Alternative 3. The institutional controls described in Alternative 2 would also be incorporated as part of this alternative. Section 6.2.4.1 of the FS Report contains a detailed description of Alternative 3A.

Estimated Capital Cost:	$ 6,845,800
Estimated Annual O&M Cost:	$ 174,000
Estimated Present Worth:	$ 9,520,500
Estimated Time to Implement:	21 months

Alternative 4: SANITARY LANDFILL CAP/PERIMETER CUT-OFF WALL WITH TARGETED DRUM REMOVAL

Alternative 4 consists of a sanitary landfill cap for surface containment of the waste material and a soil-bentonite slurry wall for containment of the on-site groundwater in the upper aquifer. In addition, this alternative would also include the removal and disposal off-site of drummed and noncontainerized waste material which exhibits RCRA hazardous waste characteristics per TCLP test. The drums and the waste materials to be removed are located in the hot-spot area in the northern portion of the landfill. Figure 2 of the ROD identifies this hot-spot area.

The descriptions for the construction of the landfill cap, slurry wall, extraction wells, and the treatment systems are identical to those of Alternative 3, and thus will not be repeated here. Under this Alternative, the entire volume of buried waste material in the hot-spot area of the landfill would be excavated. Following site-specific health and safety procedures, waste materials in the hot-spot area would be excavated by the use of a

backhoe and placed in temporary storage area with appropriate containment features. Any intact or partially intact drums containing appreciable amounts of waste material, would be handled, sampled, and disposed off-site. Any waste material not contained in drums would be sampled to determine if it exhibits RCRA hazardous waste characteristics per TCLP test results. All waste materials exhibiting RCRA hazardous waste characteristics would be disposed off-site in compliance with Land Disposal Restrictions. All non-containerized waste material determined not to exhibit RCRA hazardous waste characteristics would be reconsolidated into the landfill prior to placement of the landfill cap. In addition, all of the institutional controls described in Alternative 2 would be incorporated as part of this alternative. Section 6.2.5.1 of the FS Report contains a detailed description of Alternative 4.

For the purposes of cost estimating, the FS Report assumes that there are approximately 3,300 drums containing waste materials and 500 cubic yards of non-containerized waste material exhibiting RCRA hazardous waste characteristics. Out of these 3,300 drums, approximately 1650 drums are assumed to be intact or partially intact and the materials in these drums require off-site treatment and disposal. Based on Indiana State Records and other information, at least 18,000 drums of waste were disposed of in the landfill. Although waste materials were disposed of throughout the landfill, drum disposal was predominant in the hot-spot area. This area was referred in the State records as a drummed waste area. U.S. EPA believes that there may be a significantly greater number of drums than the estimated 3,300 drums in this hot-spot area. The cost estimate provided below is based on the removal, off-site treatment and/or disposal of 1,650 intact or partially intact drums and may vary depending on the type of waste and the number of drums encountered at the site.

Estimated Capital Cost:	$ 7,798,600
Estimated Annual O&M Cost:	$ 174,000
Estimated Present Worth:	$ 10,473,300
Estimated Time to Implement:	18 months

Alternative 4A: RCRA SUBTITLE C CAP/PERIMETER CUT-OFF WALL WITH TARGETED DRUM REMOVAL

Alternative 4A consists of a RCRA Subtitle C Cap for surface containment of the waste material and a soil-bentonite slurry wall for containment of the on-site groundwater in the upper aquifer. In addition, this alternative would also include the removal of waste material contained in drums and removal of wastes not contained in drums but which exhibit RCRA hazardous waste characteristics. The description of this alternative is identical to that of Alternative 4 except that the surface cap would be a RCRA Subtitle C Cap instead of a Indiana Sanitary Landfill Cap. The description for the RCRA Subtitle C Cap is

described in Alternative 3A whereas the description for the drum removal procedure is described in Alternative 4, and thus will not be repeated here. The descriptions for the construction of the slurry wall, extraction wells, and the treatment systems are identical to those of Alternative 3. In addition, the institutional controls described in Alternative 2 would also be incorporated as part of this alternative. Section 6.2.6.1 of the FS Report contains a detailed description of Alternative 4A.

As stated earlier in Alternative 4, the cost estimate for Alternative 4A is also based on the removal of 1650 intact or partially intact drums containing waste material and 500 cubic yards of non-containerized waste material, and may vary depending on the type of waste and the actual number of drums encountered during remedial action.

Estimated Capital Cost:	$ 9,719,700
Estimated Annual O&M Cost:	$ 174,000
Estimated Present Worth:	$ 12,394,400
Estimated Time to Implement:	21 months

Alternative 5: SANITARY LANDFILL CAP/DOWNGRADIENT SUBSURFACE DRAIN

Alternative 5 consists of an Indiana Sanitary Landfill Cap for surface containment of the waste material and a downgradient subsurface drain for passive recovery of the on-site groundwater in the upper aquifer. Descriptions of the Indiana Sanitary Landfill Cap have been previously described in Alternative 3 and thus will not be repeated here. The downgradient subsurface drain would consist of a gravel-filled trench with a perforated drain pipe positioned approximately parallel to Sloan Ditch along the eastern edge of the site. The subsurface drain would function similar to a line of extraction wells by creating a continuous zone of depression in the water table along the entire drainage trench. Its intended function would be to recover the potentially affected on-site groundwater in the upper aquifer that would otherwise discharge to Sloan Ditch or the adjacent wetlands. The subsurface drain would be placed down to a depth approximately 20 to 25 feet below land surface along the proposed alignment of the drain. A geotextile fabric would be wrapped around the drain pipe to minimize the potential for silt accumulation. An impervious flexible membrane liner would be keyed into the glacial till below the drain pipe and would extend up the downgradient wall of the drain trench to a point just below the ground surface. The function of the impervious liner along the downgradient face of the subsurface drain is to minimize any long-term dewatering that may occur in the wetlands adjacent to the drain. The open drain pipe would be backfilled with sand and/or gravel to provide a highly permeable drainage envelope. The drain pipe would convey the recovered groundwater

to a series of concrete collection sumps installed along the alignment of the drain.

It is unknown at this time whether the recovered groundwater would require treatment prior to discharge. To account for any treatment that may be required, the water in the sumps would be pumped to an on-site groundwater storage and treatment system. The groundwater in the storage tank would be processed, either continuously or on a batch mode basis, through a filtration step followed by an air stripper, if necessary. The treatment equipment would be housed in a pre-engineered metal building that would be sized to facilitate additional treatment equipment should they be required some time in the future. Following on-site treatment as necessary, the recovered groundwater would be discharged to Sloan Ditch under an NPDES permit.

In addition, the institutional controls described in Alternative 2 would also be incorporated as part of this alternative. Section 6.2.7.1 of the FS Report contains a detailed description of Alternative 5.

Estimated Capital Cost:	$ 4,041,200
Estimated Annual O&M Cost:	$ 193,000
Estimated Present Worth:	$ 7,008,000
Estimated Time to Implement:	18 months

Alternative 5A: RCRA SUBTITLE C CAP/DOWNGRADIENT SUBSURFACE DRAIN

Alternative 5A consists of a RCRA Subtitle C Cap for surface containment of the waste material and a downgradient subsurface drain for passive recovery of the on-site groundwater in the upper aquifer. Alternative 5A is identical to Alternative 5 except that the surface cap would be a RCRA Subtitle C Cap instead of an Indiana Sanitary Landfill Cap. Descriptions of the RCRA Subtitle C Cap has been previously described in Alternative 3A and thus will not be repeated here. Descriptions of the subsurface drain is identical to that of Alternative 5 and thus will not be repeated here. Institutional controls described in Alternative 2 would also be incorporated as part of this alternative. Section 6.2.8.1 of the FS Report contains a detailed description of Alternative 5A.

Estimated Capital Cost:	$ 5,962,200
Estimated Annual O&M Cost:	$ 193,000
Estimated Present Worth:	$ 8,929,000
Estimated Time to Implement:	21 months

Alternative 6: SANITARY LANDFILL CAP/DOWNGRADIENT SUBSURFACE DRAIN WITH TARGETED DRUM REMOVAL

This alternative consists of a sanitary landfill cap for surface containment of the waste material and a downgradient subsurface

drain for passive recovery of the on-site groundwater in the upper aquifer. In addition, this alternative would also include the removal of waste material contained in drums and removal of wastes not contained in drums but which exhibit RCRA hazardous waste characteristics. Descriptions for the Sanitary Landfill Cap, drum removal and subsurface drain have been previously described in Alternatives 3, 4, and 5 respectively, and thus will not be repeated here. The Institutional controls described in Alternative 2 would also be incorporated as a part of this alternative. Section 6.2.9.1 of the FS Report contains a detailed description of Alternative 6.

As stated earlier in Alternative 4, the cost estimate for Alternative 6 is also based on the removal of 1650 intact or partially intact drums containing waste material and 500 cubic yards of non-containerized waste material, and may vary depending on the type of waste and the actual number of drums encountered during remedial action.

Estimated Capital Cost:	$ 6,915,000
Estimated Annual O&M Cost:	$ 193,000
Estimated Present Worth:	$ 9,881,800
Estimated Time to Implement:	18 months

Alternative 6A: RCRA SUBTITLE C CAP/DOWNGRADIENT SUBSURFACE DRAIN WITH TARGETED DRUM REMOVAL

Alternative 6A consists of a RCRA Subtitle C Cap for surface containment of the waste material and a downgradient subsurface drain for passive recovery of the on-site groundwater in the upper aquifer. In addition, this alternative would include the removal of waste material contained in drums and the removal of non-containerized waste material that exhibit RCRA hazardous waste characteristics. Alternative 6A is identical to Alternative 6 except that the surface cap would be a RCRA Subtitle C Cap instead of an Indiana Sanitary Landfill Cap. The descriptions for the RCRA Subtitle C Cap, drum removal, and subsurface drain have been previously described in Alternatives 3A, 4, and 5 respectively, and thus will not be repeated here. The institutional controls described in Alternative 2 would also be incorporated as part of this alternative. Section 6.2.10.1 of the FS Report contains a detailed description of Alternative 6A.

As stated earlier in Alternative 4, the cost estimate for Alternative 6A is also based on the removal of 1,650 intact or partially intact drums containing waste material and 500 cubic yards of non-containerized waste material, and may vary depending on the type of waste and the actual number of drums encountered during remedial action.

Estimated Capital Cost:	$ 8,836,100
Estimated Annual O&M Cost:	$ 193,000
Estimated Present Worth:	$ 11,802,900
Estimated Time to Implement:	21 months

The alternatives for the LDL site are summarized in the following table.

Table 7:
REMEDIAL ALTERNATIVES
LAKELAND DISPOSAL LANDFILL SITE
CLAYPOOL, INDIANA

	INDIANA SANITARY LANDFILL CAP	RCRA SUB-TITLE 'C' LANDFILL CAP	
SLURRY WALL + EXTRACTION WELLS	ALTERNATIVE 3 $ 7.6 MILLION	ALTERNATIVE 3A $ 9.52 MILLION	SLURRY WALL + EXTRACTION WELLS
SLURRY WALL EXTRACTION WELLS + DRUM REMOVAL	**ALTERNATIVE 4 $ 10.47 MILLION**	ALTERNATIVE 4A $ 12.39 MILLION	SLURRY WALL EXTRACTION WELLS + DRUM REMOVAL
SUBSURFACE DRAIN	ALTERNATIVE 5 $ 7.01 MILLION	ALTERNATIVE 5A $ 8.93 MILLION	SUBSURFACE DRAIN
SUBSURFACE DRAIN + DRUM REMOVAL	ALTERNATIVE 6 $ 9.88 MILLION	ALTERNATIVE 6A $ 11.80 MILLION	SUBSURFACE DRAIN + DRUM REMOVAL

8.0 Comparative Analysis of Alternatives: The Nine Criteria

The NCP requires that the alternatives be evaluated against nine evaluation criteria. This section summarizes the relative performance of the alternatives by highlighting the key differences among the alternatives in relation to these criteria. The nine evaluation criteria are grouped into three categories as: (1) Threshold Criteria; (2) Primary Balancing Criteria; and (3) Modifying Criteria. Each of these terms is described as follows:

A. Threshold Criteria

1) **Overall Protection of Human Health and the Environment** addresses whether a remedy provides adequate protection of human health and the environment and describes how risks posed through each exposure pathway are eliminated, reduced or controlled through treatment, engineering, or institutional controls. The selected remedy must meet this criteria.

Alternative 1 (No Action): Based upon the detailed analysis, it was concluded that Alternative 1 - No Action, would not satisfy the criterion of ensuring the overall protection of human health and the environment. The Baseline Risk Assessment has documented unacceptable risks present at the site and Alternative 1 does not meet this criterion because no remedial action would be taken to address the present and future uses of the site and contaminant migration from the site.

Alternative 2 (Institutional Controls): The perimeter fence and the deed restrictions to protect remedial components from future on-site development, in addition to restrictions on water wells in the area of contamination, that are proposed under this alternative would effectively minimize the potential for accidental human exposure to buried waste material and to the contaminated on-site groundwater in the shallow aquifer. Fencing, however, would not prevent wildlife such as birds and moles from inhabiting the site.

Groundwater monitoring would detect any trends in the quality of on-site groundwater and would be effective in establishing whether off-site releases of contaminants, via groundwater migration, were occurring, thus potentially contaminating off-site wells.

Although the landfill cover maintenance program would include provisions for remediating surface leachate seeps, it would not be fully effective in minimizing the releases due to leachate seeps. Future leachate seeps may cause contaminants to be released to the air via passive volatilization and to the adjacent wetlands and to Sloan Ditch via surface run-off. This alternative would not prevent the continued leaching of contaminants from the waste material into the groundwater. Also, this alternative would not prevent the release of methane gas and associated VOCs from the landfill. Therefore, Alternative 2 would provide a low degree of overall protection of human health and the environment.

Alternative 3 (Sanitary Landfill Cap/Perimeter Cut-off Wall): An Indiana Sanitary Landfill Cap proposed under this alternative would be effective in preventing surface exposure of the buried waste material, dissipating any landfill gases that may be

generated, and preventing the development of leachate seeps. The perimeter slurry wall would function to contain the contaminated groundwater in the upper aquifer. Horizontal containment provided by the slurry wall combined with the natural vertical containment provided by the underlying aquitard would ensure that off-site releases of contaminants would not occur via groundwater migration. The sanitary landfill cap in combination with the slurry wall would prevent any future adverse impacts from occurring to the adjacent wetlands, and to the surface water and sediments in Sloan Ditch. An on-site groundwater treatment system would be effective in achieving the necessary contaminant removal efficiencies required under an NPDES permit for discharge to Sloan Ditch. Alternative 3, in combination with the institutional controls, would provide a high degree of overall protection of human health and the environment.

Alternative 3A (RCRA Subtitle C Cap/Perimeter Cut-off Wall): Alternative 3A is identical to Alternative 3 except that the surface cap would be a RCRA Subtitle C Cap instead of a sanitary landfill cap. RCRA Subtitle C Cap provides significantly higher degree of protection against downward water infiltration than would a sanitary landfill cap. However, neither cap option would entirely eliminate the formation of leachate due to the fact that a portion of the waste material may still lie below the water table. Under the RCRA Subtitle C Cap scenario, a lesser amount of leaching of contaminants from the landfill to the groundwater would result, than would under the sanitary landfill cap scenario. The proposed slurry wall would contain the contaminated groundwater in the upper aquifer and prevent its migration off-site. Therefore, Alternative 3A, in combination with the institutional controls, would also provide a high degree (slightly better than Alternative 3) of overall protection of human health and the environment.

Alternative 4 (Sanitary Landfill Cap/Perimeter Cut-Off Wall with Targeted Drum Removal): Alternative 4, in addition to incorporating all the remedial measures included in Alternative 3, includes targeted drum removal as a means of providing potential reduction of toxic contaminants at the site. The removal of any intact or partially intact drums and non-containerized waste materials exhibiting RCRA hazardous waste characteristics would serve to potentially reduce the mass of toxic contaminants within the LDL Site. Based on the assumption in the FS Report that approximately 3,300 drums would be encountered at the hot-spot location, the expected reduction in the total number of drums is approximately 18%. This alternative has an increased potential for short-term worker exposure and contaminant releases that may result from the excavation and handling of waste materials at the site. However, with proper health and safety precautions, the potential for short-term worker exposure and contaminant releases could be effectively minimized. With the removal of drums containing toxic waste

materials, Alternative 4 provides a higher degree of long-term effectiveness and permanence than Alternatives 3 and 3A. In combination with the sanitary landfill cap, slurry walls and treatment system proposed in Alternative 3, and with the incorporation of the institutional controls, Alternative 4 would provide a higher degree of overall protection of human health and the environment than Alternatives 3 and 3A.

Alternative 4A (RCRA Subtitle C Cap/Perimeter Cut-Off Wall with Targeted Drum Removal): Alternative 4A is identical to Alternative 4 except that the surface cap would be a RCRA Subtitle C Cap instead of a sanitary landfill cap. RCRA Subtitle C Cap provides significantly higher degree of protection against downward water infiltration than would a sanitary landfill cap. However, neither cap option would entirely eliminate the formation of leachate due to the fact that a portion of the waste material may still lie below the water table. Under the RCRA Subtitle C Cap scenario, a lesser amount of leaching of contaminants from the landfill to the groundwater would result, than would under the sanitary landfill cap scenario. The proposed slurry wall would contain the contaminated groundwater in the upper aquifer and prevent its migration off-site. The proposed drum removal would serve to provide a high degree of long-term effectiveness and permanence. Therefore, Alternative 4A, in combination with the institutional controls, would also provide a higher degree (slightly better than Alternative 4) of overall protection of human health and the environment than Alternatives 3 and 3A.

Alternative 5 (Sanitary Landfill Cap/Downgradient Subsurface Drain): An Indiana Sanitary Landfill Cap proposed under this alternative would be effective in preventing surface exposure of the buried waste material, dissipating any landfill gases that may be generated, and preventing the development of leachate seeps. The subsurface drain proposed under this alternative would serve to recover the potentially affected on-site groundwater in the upper aquifer that would otherwise discharge to Sloan Ditch or the adjacent wetlands. A potential drawback to the subsurface drain is that temporary dewatering of the upper aquifer along the alignment of the drain would be required for its installation. This temporary dewatering may create short-term adverse impact to the adjacent wetlands. The sanitary landfill cap in combination with the subsurface drain would prevent any future adverse impacts from occurring to the adjacent wetlands. An on-site groundwater treatment system would be effective in achieving the necessary contaminant removal efficiencies required under an NPDES permit for discharge to Sloan Ditch. Alternative 5, in combination with the institutional controls, would provide a high degree of overall protection of human health and the environment.

Alternative 5A (RCRA Subtitle C Cap/Downgradient Subsurface Drain): Alternative 5A is identical to Alternative 5 except that the surface cap would be a RCRA Subtitle C Cap instead of a sanitary landfill cap. RCRA Subtitle C Cap provides significantly higher degree of protection against downward water infiltration than would a sanitary landfill cap. However, neither cap option would entirely eliminate the formation of leachate due to the fact that a portion of the waste material may still lie below the water table. Under the RCRA Subtitle C Cap scenario, a lesser amount of leaching of contaminants from the landfill to the groundwater would result, than would under the sanitary landfill cap scenario. The proposed subsurface drain would serve to recover potentially affected on-site groundwater from otherwise discharging to Sloan Ditch and to the adjacent wetlands. Therefore, Alternative 5A, in combination with the institutional controls, would also provide a high degree (slightly better than Alternative 5) of overall protection of human health and the environment.

Alternative 6 (Sanitary Landfill Cap/Downgradient Subsurface Drain with Targeted Drum Removal): Alternative 6, in addition to incorporating all the remedial measures included in Alternative 5, includes targeted drum removal as a means of providing potential reduction of toxic contaminants at the site. The removal of any intact or partially intact drums and non-containerized waste materials exhibiting RCRA hazardous waste characteristics would serve to potentially reduce the mass of toxic contaminants within the LDL Site. Based on the assumption in the FS Report that approximately 3,300 drums would be encountered at the hot-spot location, the expected reduction in the total number of drums is approximately 18%. This alternative has an increased potential for short-term worker exposure and contaminant releases that may result from the excavation and handling of waste materials at the site. However, with proper health and safety precautions, the potential for short-term worker exposure and contaminant releases could be effectively minimized. With the removal of drums containing toxic waste materials, Alternative 6 provides a high degree of long-term effectiveness and permanence. In combination with the sanitary landfill cap, subsurface drain, and treatment system proposed in Alternative 5, and with the incorporation of the institutional controls, Alternative 6 would provide a higher degree of overall protection of human health and the environment than Alternatives 5 and 5A.

Alternative 6A (RCRA Subtitle C Cap/Downgradient Subsurface Drain with Targeted Drum Removal): Alternative 6A is identical to Alternative 6 except that the surface cap would be a RCRA Subtitle C Cap instead of a sanitary landfill cap. RCRA Subtitle C Cap provides significantly higher degree of protection against downward water infiltration than would a sanitary landfill cap. However, neither cap option would entirely eliminate the

formation of leachate due to the fact that a portion of the waste material may still lie below the water table. Under the RCRA Subtitle C Cap scenario, a lesser amount of leaching of contaminants from the landfill to the groundwater would result, than would under the sanitary landfill cap scenario. The proposed subsurface drain would serve to recover potentially affected on-site groundwater from otherwise discharging to Sloan Ditch and to the adjacent wetlands. The proposed drum removal would serve to provide a high degree of long-term effectiveness and permanence. Therefore, Alternative 6A, in combination with the institutional controls, would provide a higher degree (slightly better than Alternative 6) of overall protection of human health and the environment than Alternatives 5 and 5A.

2) **Compliance with Applicable or Relevant and Appropriate Requirements (ARARs)** addresses whether a remedy will meet applicable or relevant and appropriate federal and state environmental laws and/or justifies a waiver from such requirements. The selected remedy must meet this criteria or waiver of the ARAR must be obtained.

Alternative 1 (No Action): Compliance with ARARs does not apply for a "No Action" remedy. ARARs only apply when actions are taken at a site to address risks to human health or the environment.

Since Alternative 1 does not satisfy a Threshold Criterion, no further evaluation against the Primary Balancing or Modifying criteria is needed. Alternative 1 will not be chosen for the site.

Alternative 2 (Institutional Controls): Currently the groundwater in the upper aquifer outside the boundaries of the landfill is contaminated with contaminants at levels above their respective MCLs. In the absence of a remedial action, institutional controls such as groundwater monitoring would not ensure that chemical-specific ARARs are not exceeded outside the boundaries of the landfill, nor would such controls reduce off-site migration of the contaminated groundwater. Also, this alternative would not fully comply with all of its identified action and location specific ARARs, such as Indiana sanitary landfill closure requirements.

Since Alternative 2 does not satisfy a Threshold Criterion, no further evaluation against the Primary Balancing or Modifying criteria is needed. Alternative 2 will not be chosen for the site.

Alternatives 3, 3A, 4, 4A, 5, 5A, 6, and 6A: Alternatives 3, 3A, 4, 4A, 5, 5A, 6, and 6A would comply with all of their identified location and action-specific ARARs. If the point of compliance is determined to be at the downgradient edge of the waste

management area (i.e., at the downgradient edge of the landfill cap, perimeter slurry wall or subsurface drain), all of the alternatives 3, 3A, 4, 4A, 5, 5A, 6, and 6A would meet chemical-specific ARARs.

B. Primary Balancing Criteria

3) **Long-term Effectiveness and Permanence** refers to expected residual risk and the ability of a remedy to maintain reliable protection of human health and the environment over time, once cleanup levels have been met.

Alternatives 3, 3A, 4, 4A, 5, 5A, 6, and 6A: Alternatives 3, 4, 5, and 6 consist of an Indiana Sanitary Landfill Cap. Alternatives 3A, 4A, 5A, and 6A consist of RCRA Subtitle C Cap. Both of these caps would provide long-term effectiveness and permanence in preventing surface exposure of the buried waste material, dissipating any landfill gases that may be generated, and minimizing the potential for the development of leachate seeps. RCRA Subtitle C Cap under Alternatives 3A, 4A, 5A, and 6A would provide a significantly higher degree of protection against downward water infiltration than would an Indiana Sanitary Landfill Cap under Alternatives 3, 4, 5, and 6. Under the RCRA Subtitle C Cap scenario, a lesser amount of leaching of contaminants from the landfill to the groundwater would result, than would under the sanitary landfill cap scenario.

Alternatives 3, 3A, 4, and 4A utilize a perimeter slurry wall to contain the contaminated on-site groundwater in the upper aquifer. Alternatives 5, 5A, 6, and 6A utilize subsurface drains which serve to recover the potentially affected on-site groundwater in the upper aquifer that would otherwise discharge to Sloan Ditch or the adjacent wetlands. All of these alternatives have provisions to recover, store and treat the affected groundwater as necessary to facilitate discharge to Sloan Ditch per an NPDES permit. Both the slurry walls and the subsurface drains, in combination with the surface caps, would prevent any future adverse impact to the adjacent wetlands, and thus provide long-term effectiveness and permanence.

Alternatives 4, 4A, 6, and 6A have additional provisions to remove drums containing toxic wastes and non-containerized waste material exhibiting RCRA hazardous waste characteristics in the hot-spot area of the landfill. This removal activity would achieve a higher degree of long term effectiveness and permanence than the other alternatives.

Thus Alternatives 3A, 4A, 5A, and 6A, which include RCRA Subtitle C Caps, are slightly better than Alternatives 3, 4, 5, and 6, which include Indiana Sanitary Landfill Caps, in achieving long-term effectiveness and permanence. Alternatives 4, 4A, 6, and 6A which have provisions for removal of drums containing toxic

material would provide a higher degree of long-term effectiveness and permanence when compared to Alternatives 3, 3A, 5, and 5A, which do not have any provisions for drum removal.

> 4) **Reduction of Toxicity, Mobility, and Volume through Treatment** addresses the statutory preference for selecting remedial actions that employ treatment technologies that permanently and significantly reduce toxicity, mobility, or volume of the hazardous substances as their principal element. This preference is satisfied when treatment is used to reduce the principal threats at the site through destruction of toxic contaminants, reduction of the total mass of toxic contaminants, irreversible reduction in contaminant mobility, or reduction of total volume of contaminated media.

Alternatives 3, 3A, 4, 4A, 5, 5A, 6, and 6A: Alternatives 3, 3A, 5, and 5A do not employ any remedial measures for treatment of the buried waste material. Therefore, there would be no reduction in the toxicity, mobility, or volume of the principal threats in the landfill. Alternatives 4, 4A, 6, and 6A provide for the removal of intact or partially intact drums containing potentially toxic waste material, and the removal of non-containerized waste material exhibiting RCRA hazardous waste characteristics. The toxicity, mobility, and volume of both drummed and non-containerized waste material would be reduced through off-site treatment and/or disposal. In all of the alternatives, by recovering on-site groundwater, there may be a reduction over time in the volume of affected on-site groundwater. Thus Alternatives 4, 4A, 6, and 6A, which provide for the removal of drums, would provide a significantly higher degree of reduction of toxicity, mobility, and volume of potentially toxic material at the LDL Site, than would Alternatives 3, 3A, 5, and 5A, which do not employ any treatment.

> 5) **Short-term effectiveness** addresses the period of time needed to achieve protection and any adverse impacts on human health and the environment that may be posed, until cleanup levels are achieved.

Alternatives 3, 3A, 4, 4A, 5, 5A, 6, and 6A: For Alternatives 3 and 3A, there would be a slight potential for worker exposure and contaminant releases during installation of the slurry wall and extraction wells. For Alternatives 5 and 5A, there would also be a slight potential for worker exposure and contaminant releases during the installation of subsurface drains. In addition, installation of the subsurface drains may cause short-term adverse impacts to the adjacent wetlands because the upper aquifer along the alignment of the drain would have to be temporarily dewatered to facilitate its installation. However, it is expected that the long-term condition of the adjacent wetlands would not be adversely affected by the subsurface drain.

For Alternatives 4, 4A, 5, and 5A, there would be an increased potential for worker exposure and contamination releases resulting from the excavation and handling of waste material. However, with proper health and safety precautions, this can be effectively minimized. In all of the alternatives, the type of cap employed (i.e., RCRA Subtitle C Cap vs. Indiana Sanitary Landfill Cap) does not influence the comparative assessment of short-term effectiveness. Therefore, Alternatives 3, 3A, 5, and 5A pose less short-term effectiveness than alternatives 4, 4A, 6, and 6A, which include provisions for the removal of waste material at the LDL Site. Because Alternatives 5, 5A, 6, and 6A would cause short-term adverse impacts on the adjacent wetlands during implementation, Alternatives 3, 3A, 4, and 4A are better than Alternatives 5, 5A, 6, and 6A.

6) **Implementability** is the technical and administrative feasibility of a remedy, including the availability of materials and services needed to implement a particular option.

Alternatives 3, 3A, 4, 4A, 5, 5A, 6, and 6A: All of the Alternatives require strict health and safety precautions to be taken during implementation to minimize the potential for worker exposure and contaminant releases. The RCRA Subtitle C Cap is slightly more difficult to implement than the Indiana Sanitary Landfill Cap. The additional remedial measure of targeted drum removal provided under Alternatives 4, 4A, 6, and 6A is slightly more difficult to implement than Alternatives 3, 3A, 5, and 5A. The subsurface drain component of Alternatives 5, 5A, 6, and 6A, which requires temporary dewatering of the upper aquifer along the alignment of the drain, is more difficult to implement than the slurry walls and extraction wells under Alternatives 3, 3A, 4, and 4A. With proper health and safety precautions and/or proper hydraulic controls, all of the alternatives can be implemented without excessive difficulties. Alternatives 3, 4, 5, and 6 could all be implemented within a time frame of 12 to 18 months, whereas Alternatives 3A, 4A, 5A, and 6A would require an implementation time frame of 15 to 21 months.

7) **Cost** includes estimated capital and operation and maintenance (O&M) costs, also expressed as net present-worth cost.

Specific details regarding the costs of the remedies are available in the FS.

Alternatives 3A, 4A, 5A, and 6A cost approximately $1,921,200 more than Alternatives 3, 4, 5, and 6, respectively. The increase in cost is due to the higher cost associated with the RCRA Subtitle C Cap vs. the Indiana Sanitary Landfill Cap. Alternatives 4, 4A, 6, and 6A cost approximately $2,874,000 more

than Alternatives 3, 3A, 5, and 5A, respectively. This increase is due to the additional cost involved in the removal of drummed waste and non-containerized waste material, based on an assumption of a total of 3,300 drums and 500 cubic yards of waste material exhibiting RCRA hazardous waste characteristics. This cost for the removal of drums and non-containerized waste material varies depending on the actual number of drums encountered at the site and the amount of waste material found to exhibit RCRA hazardous waste characteristics. Because the subsurface drain is relatively inexpensive to install when compared to the installation of slurry walls and extraction wells, Alternatives 5, 5A, 6, and 6A cost less than Alternatives 3, 3A, 4, and 4A, respectively.

C. **Modifying Criteria**

8) Support Agency (IDEM) acceptance reflects aspects of the preferred alternative and other alternatives the IDEM favor or object to, and any specific comments regarding federal and state ARARs or the proposed use of waivers.

9) Community acceptance is assessed in the Responsiveness Summary. The Responsiveness Summary provides a thorough review of the public comments received on the Proposed Plan, and the Agency's responses to those comments.

9.0 The Selected Remedy

The U.S. EPA and IDEM have conducted an analysis of the potential remedies and U.S. EPA has chosen Alternative 4 as the remedy for the LDL Site. Alternative 4 consists of a perimeter cut-off wall in conjunction with an Indiana Sanitary Landfill Cap and targeted drum removal. The institutional controls described under Alternative 2 would also be incorporated as part of this remedy. Figures 3 and 4 of the ROD show the lateral extent and a typical cross section of the Indiana Sanitary Landfill Cap, respectively.

The Indiana Sanitary Landfill Cap would effectively reduce surface water infiltration, control gas emissions and prevent direct contact with the waste materials. The soil-bentonite slurry wall around the perimeter of the landfill would effectively contain on-site groundwater in the upper aquifer. The aquitard, below elevation 979 feet, provides a natural vertical containment of the on-site groundwater. The extraction wells along the inside face of the downgradient slurry wall would serve to maintain an inward gradient and ensure that contaminated on-site groundwater would not migrate off-site. Recovered groundwater would be collected and stored.

The groundwater Performance Standards for the LDL Site are the Federal MCLs and the substantive provisions of Indiana State's Grounds Water Quality Standards, 327 IAC 2-1-7, whichever is more

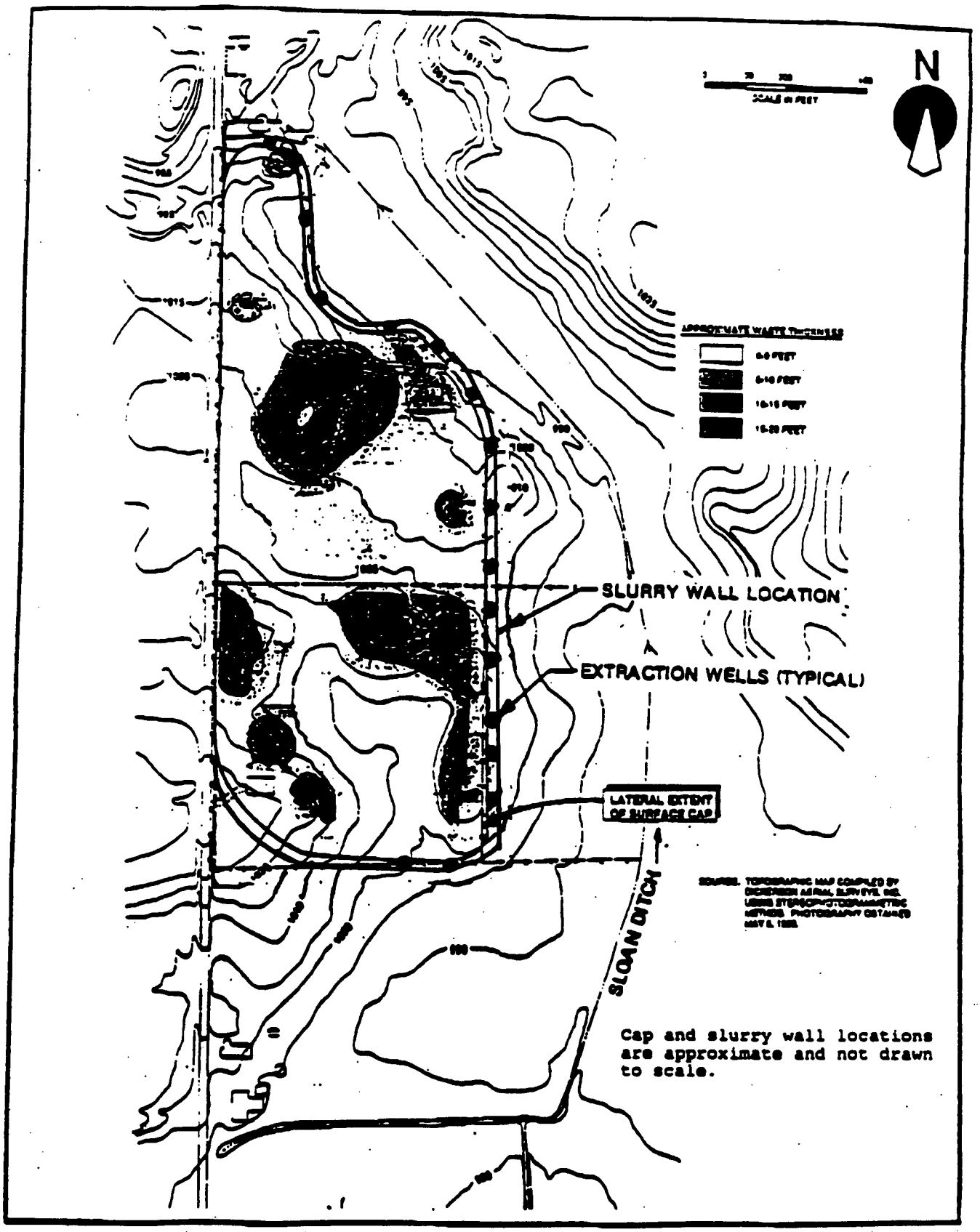
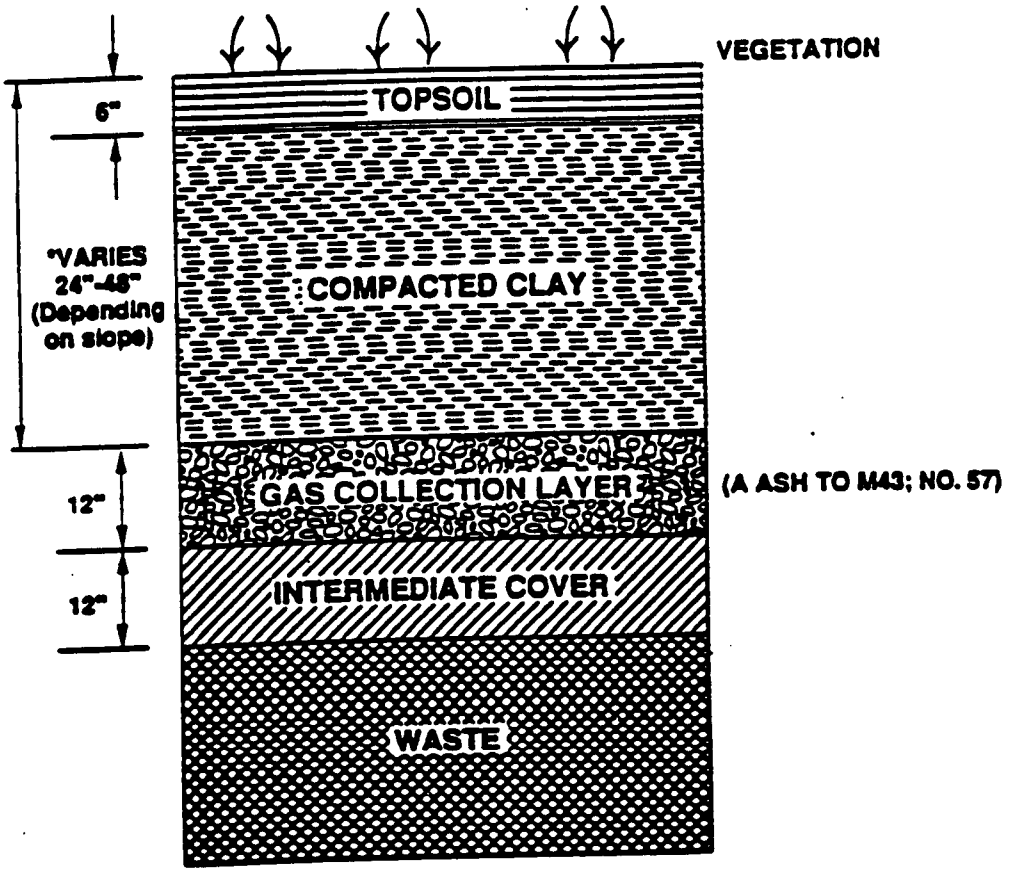


Figure 3.
ROD - Lateral Extent of Surface Cap and Slurry Wall
Lakeland Disposal Landfill.



GAS COLLECTION SYSTEM UTILIZED PASSIVE GAS VENTS (NOT SHOWN)

- 2' @ SLOPES < 15%
  3' @ SLOPES ≥ 15% TO ≤ 25%
  4' @ SLOPES ≥ 25%

Figure 4.
ROD - Indiana Sanitary Landfill Cap Cross-Section
Lakeland Disposal Landfill

stringent. Because there is no MCL for lead, the cleanup level for this contaminant in groundwater will be the federal action level of 15 ppb. The point of compliance for groundwater Performance Standards for the source containment system shall be adjacent to the perimeter of the slurry wall, as measured through a series of U.S. EPA designated monitoring wells. The purpose of the monitoring wells is to ensure that contaminated groundwater below the landfill is not migrating from the upper aquifer to either the lower aquifer or to Sloan Ditch. The selected remedy will meet MCLs and the lead action level at the boundary of the waste management unit and thus will comply with these standards outside the slurry wall.

To account for any treatment that may be required for recovered groundwater, the remedy provides for installation of an on-site treatment system. Following on-site treatment as necessary, the recovered groundwater would be discharged to Sloan Ditch. Discharged recovered groundwater will meet the substantive requirements of an NPDES permit. Sloan ditch is located partially on the site. If the discharge point is located on site, the substantive requirements of an NPDES permit will be met; if the discharge point is located off-site, then an NPDES permit will be required.

Based on the groundwater model simulations, it is expected that there would not be excessive drawdowns in the adjacent wetlands. If, however, unacceptable drawdowns were to occur in the wetlands due to the slurry wall and extraction wells, the remedy includes provisions for installation of an adjustable weir in Sloan Ditch to maintain proper water levels in the wetlands. To minimize or eliminate any short-term damage to the adjacent wetlands during installation, the remedy provides for installation of the slurry wall as close to the edge of the landfill cap as possible.

The remedy also includes a groundwater monitoring program and all of the institutional controls, as described under Alternative 2, including site fencing, groundwater advisories, and possible deed restrictions and well abandonment as provided for by Indiana regulations. A groundwater monitoring program, which includes periodic monitoring of groundwater, surface water and sediments, and residential wells, if necessary, will be established to monitor the effectiveness of the remedy and provide assurance that contaminated groundwater from the site is not impacting the local residents or the environment.

The Remedial Design will include a wetland assessment to determine if any significant portions of the wetlands are affected by the installation of the cap and the slurry wall. Based on this assessment, the remedial action will include a program to mitigate, replace and/or restore wetlands, if necessary. No estimate of the costs associated with the wetlands assessment is available at this time.

The U.S. EPA has determined that the selected remedy is the best balance of desirable characteristics among the alternatives with respect to the nine criteria. Based on information available at this time, the U.S.EPA believes that the selected remedy offers the best protection of human health and the environment, complies with ARARs, eliminates long-term risks, reduces toxicity, mobility or volume through treatment, is easily implemented and is cost effective. By cutting off surface leachate discharges to the adjacent wetlands and to Sloan Ditch, the sediment and the surface water quality will be improved, benefitting the local environment. The removal, off-site treatment and/or disposal of drummed waste materials in the hot-spot area would satisfy statutory preference for treatment as a principal element.

At the present time, IDEM has not fully concurred with U.S. EPA's selection of Alternative 4 as the chosen remedy for the LDL Site. IDEM concurs with the installation of the Indiana Sanitary Landfill Cap, targeted drum removal, extraction wells, treatment of the recovered groundwater, and institutional controls. IDEM has taken the position that the extraction wells without containment by a slurry wall are likely to be more effective in capturing all groundwater at the LDL Site. IDEM recommends that the decision to install a slurry wall be contingent on the results of monitoring groundwater downgradient from the extraction wells. Specific responses to IDEM's recommendations are given in the following Responsiveness Summary.

10.0 Statutory Determinations

Under its legal authorities, EPA's primary responsibility at Superfund sites is to undertake remedial actions that achieve adequate protection of human health and the environment. In addition, section 121 of CERCLA establishes several other statutory requirements and preferences. These specify that when complete, the selected remedial action for this site must comply with applicable or relevant and appropriate environmental standards established under Federal and State environmental laws, unless a statutory waiver is justified. The selected remedy also must be cost effective and utilize permanent solutions and alternative treatment technologies or resource recovery technologies to the maximum extent practicable. Finally, the statute includes a preference for treatment as principal element of the remedy. The following sections discuss how the selected remedy meets these statutory requirements.

10.1 Protection of Human Health and the Environment

The selected remedy protects human health and the environment through containment of buried waste material and extraction and treatment of selected wastes.

The Indiana Sanitary Landfill Cap will prevent surface exposure of the buried waste material, will dissipate any landfill gases that may be generated, and will prevent the development of leachate seeps. The perimeter slurry wall would function to contain the contaminated groundwater in the upper aquifer. Horizontal containment provided by the slurry wall combined with the natural vertical containment provided by the underlying aquitard would ensure that off-site releases of contaminants would not occur via groundwater migration. The sanitary landfill cap, in combination with the slurry wall, would prevent any future adverse impacts to the adjacent wetlands, surface water and sediments in Sloan Ditch, and private drinking water wells. The targeted drum removal in the hot spot will provide a reduction of toxic contaminants at the site. The removal of any intact or partially intact drums and non-containerized waste materials exhibiting RCRA hazardous waste characteristics will serve to potentially reduce the mass of toxic contaminants within the site. Based on the assumption in the FS Report that approximately 3,300 drums would be encountered at the hot-spot location, the expected reduction in the total number of drums at the site is approximately 18%. This percentage will increase with the increase in the total number of drums encountered at the site. Any potential for worker exposure and contaminant releases resulting from excavation and handling of waste material can be effectively addressed with proper health and safety precautions. There are no short-term threats associated with the selected remedy that cannot be readily controlled.

Regulations promulgated under section 404 of the Clean Water Act, 33 U.S.C. §1344, provide that discharges of dredged or fill material into navigable waters, including wetlands, will be permitted only if there is no practicable alternative to the proposed discharge which would result in a lesser impact to the aquatic ecosystem. 40 CFR §230.10(a). The sanitary landfill cap required as part of the selected remedy may result in filling two potential wetland areas on site. Additionally, the slurry wall and extraction well components of the selected remedy have the potential to cause short-term injury to wetland areas adjacent to the cap, on the western edge of Sloan Ditch. This injury is expected to result from potential vehicular movement through a portion of the wetlands, which is necessary for construction of these remedial components. Only two alternatives, Alternative 1 (no action) and Alternative 2 (institutional controls), discussed above, will not require filling on-site wetlands or vehicular movement on wetlands outside the proposed cap. These alternative remedies are not practicable alternatives under the criteria set out in 40 CFR 230.10 because neither would remediate the present flow of contaminants from the landfill into groundwater, surface water, soils, and wetlands on and off the site. Thus, these two alternatives would pose a significant adverse environmental consequence to the aquatic ecosystem, and therefore, are not

viable remedies for the site. As discussed in Section 8.0 above, the selected alternative provides the most effective protection of human health and the environment, taking into consideration cost, existing technology, and logistics in light of overall project purposes, as required by 40 CFR 230.10(a)(2).

Institutional Controls such as fencing, deed restrictions will supplement the selected remedy by preventing access to the site and limiting the land and groundwater usage at the site. The long-term monitoring will ensure effectiveness of the selected remedy.

10.2 Compliance with ARARs

The selected remedy of extraction and treatment of wastes in the hot-spot area, together with the Indiana Sanitary Landfill Cap and slurry wall will comply with all applicable or relevant and appropriate chemical, action, and location specific requirements (ARARs). The ARARs are presented below.

Action-specific ARARs

Resource Conservation and Recovery Act (RCRA): The RCRA regulations applicable to facilities treating, storing or disposing of hazardous waste became effective November 19, 1980 (See 40 CFR sections 264.1 and 265.1). The LDL facility ceased operating and accepting wastes prior to that date. These regulations are therefore not legally "applicable" to the LDL facility.

These regulations are relevant, but not appropriate at the LDL site for the following reasons. Waste material at the site currently is in contact with groundwater, and is a source of potential contamination. Thus, choosing a hazardous waste cap rather than a sanitary landfill cap will not prevent further leaching of contaminants into the aquifer below the LDL Site. The slurry wall, however, in conjunction with either a hazardous waste cap or a sanitary landfill cap, will effectively mitigate further groundwater contamination. Because both caps would provide equivalent remedial results at the site, when used in conjunction with the slurry wall, the choice of the more expensive hazardous waste cap is not appropriate at the LDL Site.

Although new design requirements under 40 CFR 258.60 for covers on solid waste landfills are applicable only to landfills that received municipal waste after October 9, 1991, these design standards are relevant and appropriate at the LDL Site. 40 CFR 258.60 requires that the cover on a solid waste landfill must have (1) an infiltration layer of 18" of clay and (2) an erosion layer of 6" of soil capable of sustaining native plant growth. Additionally, 40 CFR 258.61 requires maintenance of the integrity and effectiveness of the final cover, collection leachate, and

monitoring of groundwater. These requirements are also relevant and appropriate at the LDL Site.

The Selected Alternative will comply with the substantive requirements of the following ARARs:

- 329 IAC 2-14-16 through 329 IAC 2-14-24, which specifies standards for Solid Waste Land Disposal Facilities. Contains standards for final cover, and requirement to monitor groundwater.
- 329 IAC 2-16, which specifies groundwater monitoring and corrective action for solid waste land disposal facilities.
- 329 IAC 2-14-20, which specifies requirements for landfill gas collection and extraction treatment systems.
- The substantive requirements of 326 IAC 2, which regulates any source which has the potential to emit air pollutants.
- 326 IAC 1-3, 6-4, 8-1, which specifies requirements for air emission monitoring with respect to primary and secondary ambient air quality standards, particulate emissions, and volatile organic compound emissions.
- 327 IAC 3, substantive requirements of construction standards for wastewater treatment facilities. There will be construction of some on-site treatment equipment if groundwater requires treatment;
- 327 IAC 15-5, substantive requirements of stormwater runoff control provisions for construction sites of five or more acres. This provision may be necessary if construction activities take place during any period of heavy rains.
- The Clean Water Act, §404, 33 U.S.C. §1344, and regulations promulgated thereunder, 40 CFR §230, regulate discharges or filling of navigable waters, including wetlands. These provisions are necessary to mitigate potential injury to wetlands as a result of implementing the selected remedy.

The Hazardous and Solid Waste Amendments (HSWA) to RCRA include provisions restricting land disposal of RCRA hazardous wastes. The purpose of the HSWA is to minimize the potential of future risk to human health and the environment by requiring treatment of hazardous waste prior to land disposal. At the LDL site there will be no land disposal on site, thus Land Disposal Restrictions do not apply. Containerized and non-containerized waste exhibiting RCRA hazardous waste characteristics per TCLP test will be shipped off-site for treatment and disposal in compliance with RCRA generator requirements under 40 CFR Part 262 and Land Disposal Restrictions.

Chemical-specific ARARs:

- Pursuant to the Safe Drinking Water Act, EPA has published maximum contaminant levels (MCLs) allowable in regulated public water supplies, 40 CFR Part 141. The MCLs are relevant and appropriate for use at the site since the lower aquifer once was used as a drinking water source, and remains a potential drinking water source. The selected remedy will meet MCLs at the boundary of the waste management unit and thus will comply with this ARAR outside the slurry wall;

- Pursuant to the Safe Drinking Water Act, U.S. EPA has published an action level for lead in drinking water, 40 CFR 141.2. The action level determines the treatment requirements that a water system is required to complete for specific contaminants. U.S. EPA has established a health-based action level for lead in drinking water sources at 15 ppb. This provision is relevant and appropriate for use at the site since the lower aquifer is a potential drinking water source, as explained above. The selected remedy will meet the action level at the boundary of the waste management unit and thus will comply with this ARAR outside the slurry wall;

- The Clean Water Act regulates point source discharge to navigable waters. This Act is administered by the state of Indiana under 327 IAC 5 and establishes surface water quality standards. The state oversees point discharge standards as promulgated by the Federal NPDES program under this Act. The selected remedy would comply with this ARAR by meeting the substantive requirements for an effluent discharge permit and the terms and conditions of the permit's effluent standards and limitations;

- 327 IAC 2-1, provides state minimum surface water quality standards which apply to all waters of the state.

Location-specific ARARs:

- Endangered Species Act (16 USC 1531); The Endangered Species Act requires that actions must be performed to conserve the endangered or threatened species located in and around the LDL site. Activities must not destroy or adversely modify the critical habitat upon which endangered species depend. The selected remedy will be implemented in compliance with this regulation. Prior to conducting remedial activities, a survey of the subject areas will be conducted to determine whether or not endangered or threatened species will be affected;

- IC 13-2-22, substantive provisions regarding construction in floodway. The slurry wall, extraction and monitoring wells, and water treatment discharge point may all be in the floodway of Sloan Ditch.

Federal "To be Considered" Requirements (TBCs)

In implementing the selected remedy, U.S. EPA and the State have agreed to consider the following federal provisions that are advisory, but not legally binding.

- Executive Order 11990 (40 C.F.R. Pt.6, App. A); provides that activities required in a wetland must minimize the destruction, loss, or degradation of the wetland. In addition, any affected wetlands may be restored, as appropriate.

- CERCLA Off-Site Policy, CERCLA §121(d)(3): The off-site policy describes procedures that should be observed when a response action under CERCLA involves off-site storage, treatment or disposal of CERCLA waste. The purpose of the policy is to prevent CERCLA wastes from contributing to further environmental problems by placing them in facilities where they will be appropriately managed.

10.3 Cost-Effectiveness

Cost effectiveness is determined by evaluating the following three of five balancing criteria to determine overall effectiveness: long-term effectiveness and permanence, reduction of toxicity, mobility, or volume through treatment, and short-term effectiveness. Overall effectiveness is then compared to cost to ensure that the remedy is cost effective.

The selected remedy is cost-effective because it provides a high degree of long-term effectiveness and permanence. Significant reduction in toxicity, mobility, and volume of drummed waste material is achieved through the removal of drummed waste material in the hot-spot area within the landfill. By adhering to proper health and safety plans, no unacceptable short-term risks will be caused by implementation of the remedy. Although other alternatives provide long-term effectiveness and permanence, only Alternatives 4, 4A, 6, and 6A provide for the reduction of toxicity, mobility, or volume of toxic contaminants through treatment. Of these four remedies, alternatives 6 and 6A were not preferred due to the additional short-term adverse impact these alternatives have on the adjacent wetlands during the implementation of the remedy. The cost difference of $1,921,100 between Alternatives 4 and 4A was not proportional to the increase in the overall effectiveness achieved by Alternative 4A. Therefore, the selected remedy (Alternative 4) is cost effective.

10.4 Utilization of Permanent Solutions and Alternative Treatment Technologies (or Resource Recovery Technologies) to the Maximum Extent Practicable

The U.S. EPA has 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 LDL Site. Of those alternatives that are protective of human health and the environment and that comply with ARARs, the U.S. EPA has determined that this selected remedy provides the best balance of tradeoffs in terms of long-term effectiveness and permanence, reduction in toxicity, mobility, or volume achieved through treatment, short-term effectiveness, implementability, cost, and considering the statutory preference for treatment as a principal element and considering state and community input.

The selected remedy consists of a perimeter cut-off wall in conjunction with an Indiana Sanitary Landfill Cap, targeted drum removal, and institutional controls. The sanitary landfill cap would effectively reduce surface water infiltration, control gas emissions and prevent direct contact with the waste materials. The soil bentonite slurry wall around the perimeter of the landfill would effectively contain on-site groundwater in the upper aquifer. By cutting off surface leachate discharges to the adjacent wetlands and to Sloan Ditch, the sediment and the surface water quality will be improved, benefitting the local environment. The removal of any intact or partially intact drums and non-containerized waste materials exhibiting RCRA hazardous waste characteristics would serve to potentially reduce the mass of toxic contaminants within the LDL site. With the removal of drums containing toxic waste materials, the preferred remedy provides a high degree of long-term effectiveness and permanence.

The preferred alternative is the best balance of desirable characteristics among the alternatives with respect to the nine balancing criteria. While all of the alternatives 3 through 6A discussed in the Proposed Plan provide overall protection of human health and the environment, the preferred alternative was selected based on the comparison of the following three items: Drum removal vs. non-drum removal; soil bentonite slurry wall vs. sub-surface drain; and an Indiana Sanitary Landfill Cap vs. RCRA Sub-title 'C' Cap.

The alternatives that included the reduction of toxicity, mobility, or volume through treatment were preferred to those that did not provide for such reduction. Alternatives that included the slurry walls were preferred to those that included sub-surface drain, due to the additional short-term risk to the adjacent wetlands during installation of the sub-surface drain. Alternatives that included RCRA Sub-title 'C' Cap were not preferred to those that included the Indiana Sanitary Landfill Cap due to their high cost.

The preferred alternative offers the best protection of human health and the environment, complies with ARARs, eliminates long-term risks, reduces toxicity, mobility and volume of contaminants through treatment, is easily implemented and is cost effective.

The State of Indiana is in partial concurrence with the selected remedy. Although public comments were received concerning the selected remedy, those comments are fully addressed in the responsiveness summary.

10.5 Preference for Treatment as a Principal Element

The FS Report estimated approximately 3,300 drums in the hot spot area. By removing an estimated 1,650 intact and partially intact drums, together with an estimated 500 cubic yards non-containerized waste materials from the hot-spot area, the Agency expects that the reduction in the total amount of drummed waste at the site will be approximately 18%. The removal, off-site treatment and/or disposal of drummed waste materials in the hot-spot area would satisfy the statutory preference for treatment as a principal element. Based on enforcement information, at least 18,000 drums were disposed of at the site. U.S. EPA believes that there could be a significantly higher number of drums than the estimated 3,300 in the hot spot area. Thus, the removal of drummed waste in this area could provide a higher percentage reduction of toxicity than the present estimate.

Additionally, by recovering on-site groundwater through extraction wells installed along the slurry wall, and, if necessary, treating recovered water by filtration and an air stripper, there will be a reduction over time in the volume of contaminated on-site groundwater.

11.0 Documentation of Significant Changes

U.S. EPA reviewed all written and verbal comments submitted during the public comment period. Upon review of these comments, it was determined that no significant changes to the remedy, as it was originally identified in the Proposed Plan, were necessary.

GLOSSARY

Applicable or Relevant and Appropriate requirements (ARARs) - Federal, State and local environmental and public health laws with which remedial actions must comply.

Aquifer - A body of rock that is sufficiently permeable to conduct groundwater and to yield economically significant quantities of water to wells and springs.

Aquitard - A confining bed that retards but does not prevent the flow of water to or from an adjacent aquifer

Baseline Risk Assessment - A study conducted to determine the associated short and long-term current and future risks posed to public health and the environment if no remedial actions are undertaken.

Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) - A Federal law passed in 1980 and revised in 1986 by the Superfund Amendments and Reauthorization Act. CERCLA created a special tax that goes into a trust fund, commonly known as "Superfund", to investigate and clean up abandoned or uncontrolled hazardous waste sites.

Groundwater - The water beneath the earth's surface that flows through soil pores and rock openings. Often utilized as a source of drinking water.

Inorganic Compounds - Chemical compounds that are composed of mineral materials, including salts and minerals such as iron, aluminum, mercury, and zinc.

Leachate - A liquid (usually water from rain or snow) that has percolated through wastes and contains components of those wastes.

MCLs - These are Maximum Contaminant Levels (see Primary Drinking Water Standards).

National Priority List (NPL) - U.S. EPA's list of top priority hazardous waste sites that are eligible for federal money under Superfund.

National Contingency Plan (NCP) - The Federal regulation that sets the framework for the Superfund program. The NCP identifies the governmental organizations involved in the remedial response, outlines their roles and responsibilities, and discusses the interrelationships of these organizations. In addition, the NCP provides guidelines for planning and conducting response activities.

Organic Compounds - Chemical compounds composed primarily of carbon, including materials such as solvents, oils, and pesticides.

Permeability - The ease with which groundwater moves through earth materials. Movement is controlled by the size and shape of spaces between these materials.

Polychlorinated Biphenyls (PCBs) - A group of organic compounds related by their basic chemical structure. They are highly resistant to degradation, but have a tendency to be retained in body tissue. They were widely used in electrical capacitors, transformers, and other products in the U.S. before 1980.

Present Value Cost - An economic term used to describe today's cost for a Superfund cleanup and reflect the discounted value of future costs. A present value cost estimate includes construction and future operation and maintenance costs. U.S. EPA uses present value costs when calculating the cost of alternatives for long-term projects.

Primary Drinking Water Standards (MCLs) - Primary Drinking Water Standards are the maximum contaminant levels (MCLs) set for substances that can pose a threat to health when present in drinking water at certain levels. Because these substances are of concern for health (not just aesthetic) reasons, primary MCLs are enforceable under the Safe Drinking Water Act.

Resource, Conservation and Recovery Act of 1976 (RCRA) - The federal law that establishes a regulatory system to require the safe and secure procedures to be used in treating and disposing of hazardous waste.

Record of Decision (ROD) - A document signed by EPA's Regional Administrator, outlining the selected remedy for a Superfund site. The ROD includes the Responsiveness Summary, which addresses concerns presented to EPA during the public comment period.

SMCLs - These are Secondary Maximum Contaminant Levels (see Secondary Drinking Water Standards).

Secondary Drinking Water Standards (SMCLs) - These are Secondary Maximum Contaminant Levels set under the Safe Drinking Water Act to serve as guide lines in setting levels based on aesthetic considerations such as taste or odor. Unlike primary MCLs, secondary MCLs are recommended levels only and are not federally enforceable.

Sediment - Material that settles to the bottom of a stream, creek, lake, or other body of water.

Surface Water - Streams, lakes, ponds, rivers or any other body of water above the ground.

Semi-Volatile Organic Compounds (Semi-VOCs) - Organic chemicals that vaporize less readily than VOCs. These compounds include many polynuclear aromatic hydrocarbons and pesticides.

Slurry Wall - A civil engineering technique commonly used at hazardous waste landfills to prevent movement of water soluble and mobile contaminants by restricting groundwater movement around or beneath the contaminant source. The most common slurry wall construction method is to excavate a trench and backfill with low permeability mixtures of soil or cement and bentonite clay.

Superfund Amendments and Reauthorization Act of 1986 (SARA) - Amendments to the Superfund Law, CERCLA.

Volatile Organic Compounds (VOCs) - Organic chemicals, such as methylene chloride and benzene, that vaporize easily. Some VOCs found at the site include carbon tetrachloride, vinyl chloride, benzene, and chloroform.

Wetlands - Areas that are inundated by surface or groundwater with sufficient frequency to support vegetative or aquatic life that depends upon saturated or seasonally saturated soil conditions for growth and reproduction. 40 CFR Pt.6, App.A, Section 4(j).