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Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R04-88/041
September 1988

EPA

Superfund Record of Decision:

Flowood, MS

50272-101

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Flowood, MS
First Remedial Action - Final

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Washington, D.C. 20460

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14.

15. Supplementary Notes

16. Abstract (Limit: 200 words)

The Flowood site consists of 225 acres of mostly wetlands and lowlands, is located in the Town of Flowood, Rankin County, Mississippi, on the east side of the Pearl River. The site includes wastewater discharge areas and downstream areas adjacent to two industrial manufacturing facilities. The immediate area of the site includes a borrow-pit, a slough or canal used as a discharge area, a flood levee, and a cow pasture with an area of ponded water. The site is bordered to the north and east by various industrial and commerical operations, while forested areas are located west of the site. The nearest residence is more than 0.5 mile south of the site. Two manufacturing facilities have been owned and operated by a series of companies at the Flowood site since the 1950s. The northernmost facility manufactured corrugated boxes, and the southernmost facility produced ceramic tiles through the 1970s and stoneware cooking pots from the mid-1970s to the present. A routine industrial wastewater inspection conducted by the Mississippi Department of Natural Resources (MDNR) in the fall of 1982 revealed the unpermitted discharge of hazardous substances to the onsite canal. Subsequent sampling detected lead contamination in water and sediments from the canal. The MDNR began an emergency treatment and removal process to address the contaminated wastewater, but discontinued the process when higher levels of lead were found in the
(See Attached Sheet)

17. Document Analysis a. Descriptors
Record of Decision
Flowood, MS
First Remedial Action - Final
Contaminated Media: soil, sediments
Key Contaminants: lead

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 45
	20. Security Class (This Page) None	22. Price

EPA/ROD/R04-88/041
Flowood, MS
First Remedial Action - Final

16. ABSTRACT (continued)

canal adjacent to one of the manufacturing sites. In 1983, EPA investigations revealed high lead levels in onsite sludges, sediments, and surface soil. The primary contaminant affecting the soil and sediments is lead.

The selected remedial action for this site includes: excavation and stabilization/solidification through chemical fixation of approximately 6,000 yd^3 of soil and sediments from all contaminated areas, followed by placement of the treated material in the excavated slough/lagoon area, capping with clean top soil and seeding to provide a vegetative cover; and ground water monitoring. The estimated present worth cost of this remedial action is $2,000,000 with a first year O&M cost of $25,000.

DECLARATION FOR THE RECORD OF DECISION

SITE NAME AND LOCATION

Flowood
Flowood, Rankin County, Mississippi

STATEMENT OF PURPOSE

This decision document represents the selected remedial action for the Flowood site in Flowood, Mississippi, developed in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act Of 1986 (SARA) 42 U.S.C. Section 9601 et seq., and to the extent practicable, the National Contingency Plan (NCP) 40 CFR Part 300.

STATEMENT OF BASIS

This decision is based upon documents which make up the site administrative record. The attached index identifies items which comprise the administrative record.

The State of Mississippi has concurred on the selected remedy.

DESCRIPTION OF SELECTED REMEDY

The selected remedy involves groundwater monitoring and the excavation and stabilization/solidification of contaminated soils from the following contiguous areas:

- hot spot in Lake Marie
- sediments from wash area and drainage ditches
- cow pasture ponded area
- slough/lagoon area

The treated soil will be backfilled into the slough/lagoon area and capped as necessary with clean fill. The selected remedy is the final remedial action for the site.

DECLARATION

The selected remedy is protective of human health and the environment, attains federal and state requirements that are applicable or relevant and appropriate, and is cost-effective. This remedy satisfies the preference for treatment that reduces toxicity, mobility, or volume as a principal element. Finally, it is determined that this remedy utilizes a permanent solution and alternative treatment technology to the maximum extent practicable.

Patrick M Tobin for
GREER C. TIDWELL, REGIONAL ADMINISTRATOR

9-30-88
DATE

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Patrick M Tobin
for GREER C. TIDWELL, REGIONAL ADMINISTRATOR

9-30-88
DATE

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION

FLOWOOD SITE

FLOWOOD, RANKIN COUNTY, MISSISSIPPI

PREPARED BY:

U. S. ENVIRONMENTAL PROTECTION AGENCY

REGION IV

ATLANTA, GEORGIA

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SUMMARY OF REMEDIAL ALTERNATIVE SELECTION
FLOWOOD SITE
FLOWOOD, RANKIN COUNTY, MISSISSIPPI

1.0 Introduction

The Flowood site was proposed for inclusion on the National Priorities List (NPL) in June, 1983 and formally added to the NPL in September 1984. The site is listed as No. 97 on the NPL in group two and is the highest priority site for the state of Mississippi. The Flowood site has been the subject of a Remedial Investigation (RI) and Feasibility Study (FS) performed by one of the Potentially Responsible Parties (PRP), Marmon Group, Inc., under an administrative order by consent dated January 3, 1986. The RI report which examines sediments, soil, surface water and groundwater contamination at the site was delivered in draft in November 1986. Following review of the results, a determination was made by the Agency of the need for additional field investigation in order to more fully characterize the site. The RI was completed (including a addendum report) in August 1987. The FS which develops and examines alternatives for remediation of the site was issued in draft form to the public on May 16, 1988.

This Record of Decision has been prepared to summarize the remedial alternative selection process and to present the selected remedial alternative.

1.1 Site Location and Description

The Flowood site is located in the town of Flowood, Rankin County, Mississippi along Highway 468 on the east side of the Pearl River, east of Jackson, Mississippi (figure 1.1). The site encompasses approximately 225 acres and consists of mostly wetlands and lowlands of the alluvial plain of the Pearl River. It is separated from the river by one or both of two levees, the inner levee immediately adjacent to the manufacturing facility area and the ring levee to the west.

The site consist of wastewater discharge areas and downstream areas adjacent to two industrial manufacturing facilities. The immediate area of the site includes a borrow-pit (Lake Marie), a slough or canal used as a discharge area and other land areas contiguous to the plant sites, and the cow pasture ponded area (figure 1.2).

Flowood is an incorporated town with a population of 943 in the 1980 census and an area of approximately nineteen square miles within the city limits. The nearest single residence is more than a half mile south of

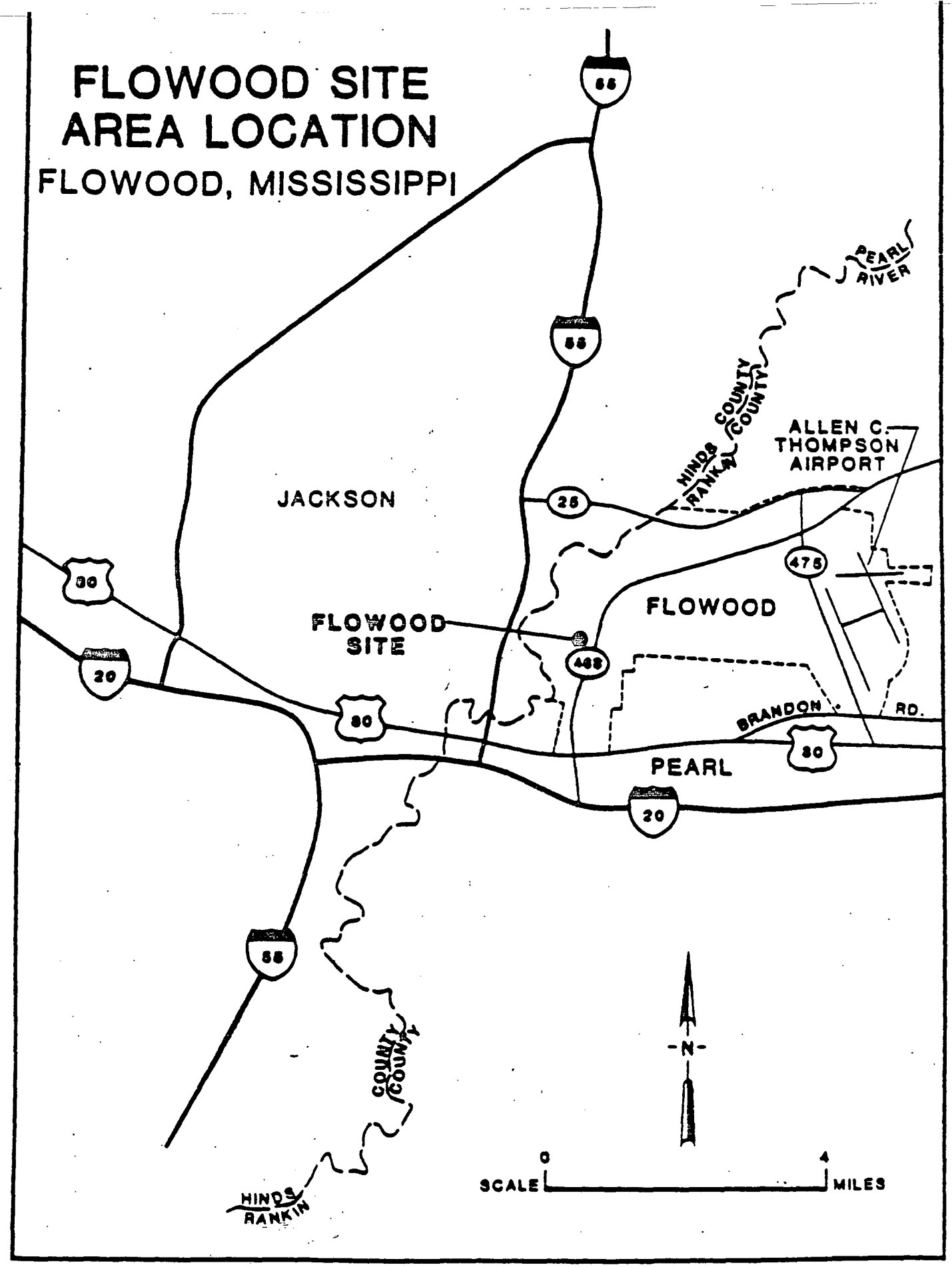
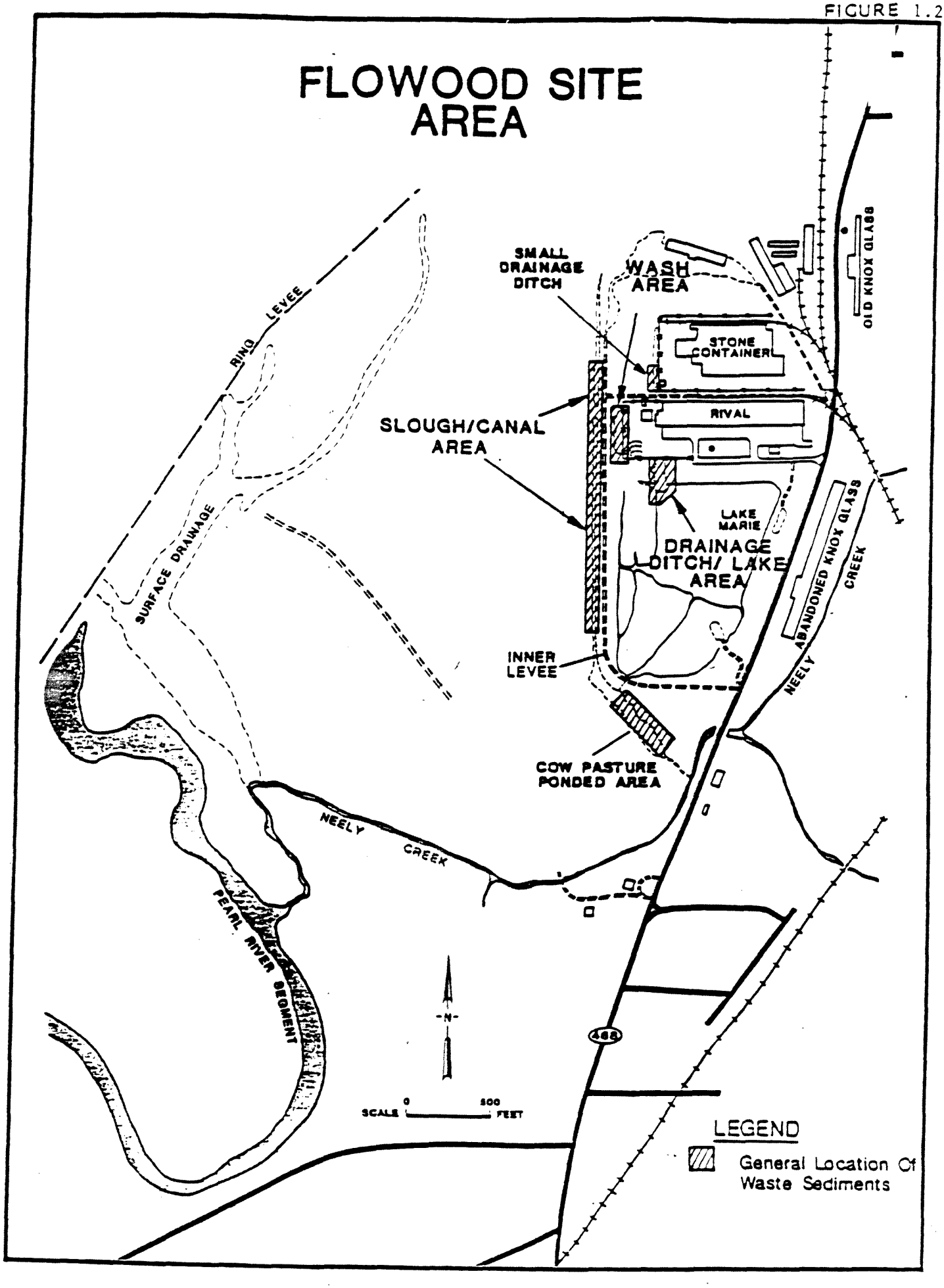

FLOWOOD SITE
AREA LOCATION
FLOWOOD, MISSISSIPPI
55
PEARL RIVER
HINDS COUNTY
RANKIN COUNTY
ALLEN C. THOMPSON AIRPORT
JACKSON
25
475
FLOWOOD
FLOWOOD SITE
468
BRANDON RD.
PEARL
20
80
55
N
0
4
SCALE
MILES
HINDS COUNTY
RANKIN COUNTY

FIGURE 1.2


FLOWOOD SITE AREA
SMALL DRAINAGE DITCH
WASH AREA
OLD KNOX GLASS
STONE CONTAINER
RIVAL
RING LEVEE
SLOUGH/CANAL AREA
LAKE MARIE
DRAINAGE DITCH/ LAKE AREA
SURFACE DRAINAGE
ABANDONED KNOX GLASS
NEELY CREEK
INNER LEVEE
COW PASTURE PONDED AREA
NEELY CREEK
PEARL RIVER SEGMENT
N
468
SCALE 0 500 FEET
LEGEND
General Location Of Waste Sediments

the site, and the closest group of residence is on the opposite side of Highway 468, almost a mile south of the site. The site is surrounded on its northern and eastern boundaries by various industrial and commercial uses while forested areas are located west of the site. Cattle grazing areas and automobile scrap yards are also located within one mile of the southern site boundary.

1.2 Site History

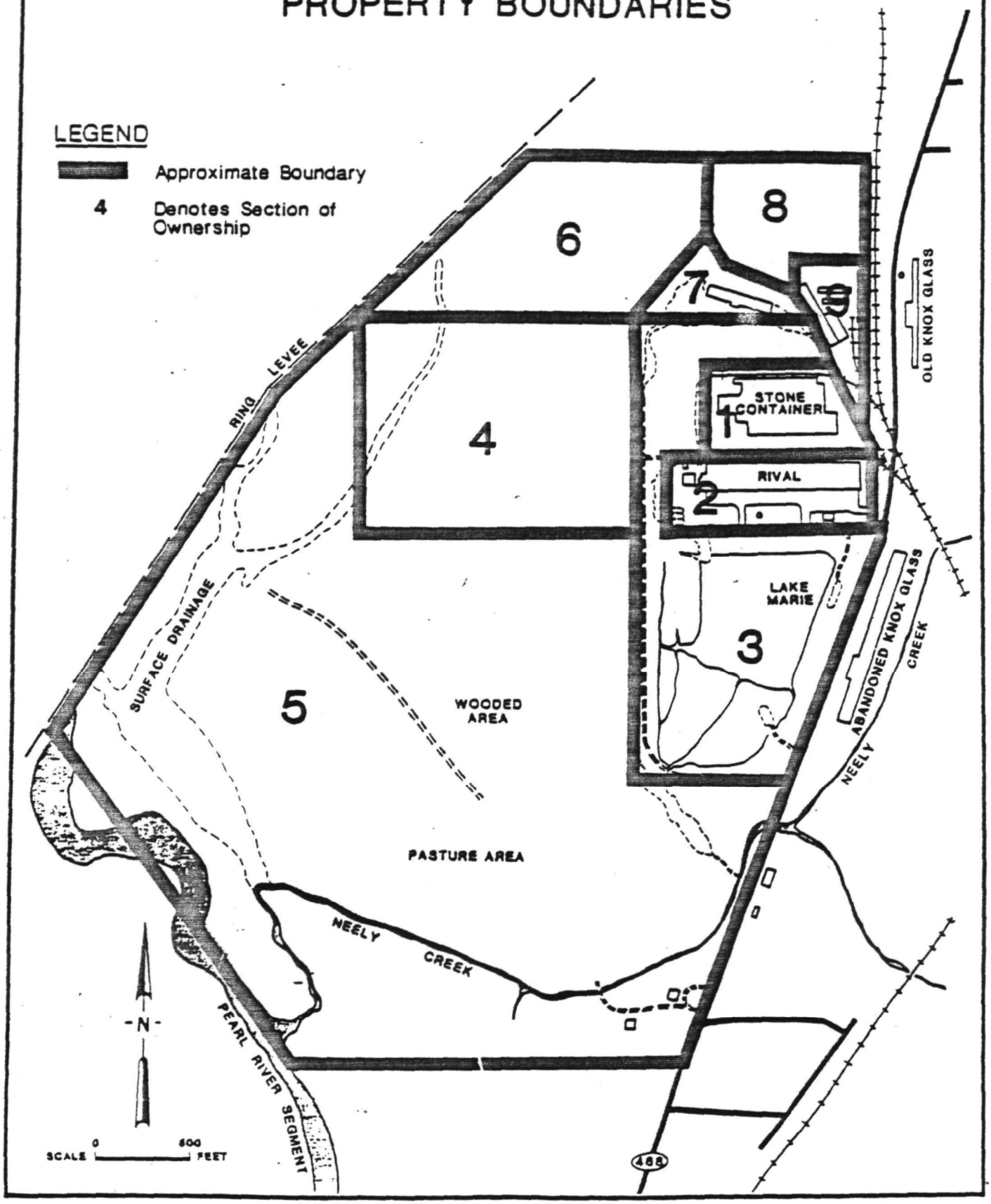
Two manufacturing facilities have existed at the Flowood site since at least the 1940's. The northernmost facility has been operated as a corrugated box company from the 1950's to present (figure 1.3 area 1). The Continental Forest Company owned the property from 1956 to 1983 when the facility was purchased by the present owner, the Stone Container Corporation. The facility to the south, currently the Rival Manufacturing Company, (figure 1.3, area 2) was operated for the manufacturing of ceramic tiles from the 1950's through the early 1970's. The past owner was The Marmon Group (figure 1.3, area 2) followed by the manufacture of stoneware cooking pots from the mid 1970's to the present.

In late 1955, an easement was granted by United Gas Pipe Line Company to discharge wastewater through the inner levee to the canal on the west side. The United Gas Pipe Line Company are property owners of Area 3 (figure 1.3)

State officials first became aware of the presence of hazardous substances in the canal during a routine industrial wastewater inspection in the fall of 1982. At that time, Mississippi Department of Natural Resources (MDNR) Industrial Wastewater Section discovered an unpermitted discharge leading from a pumping station operated by Continental Forest Products to the canal. Subsequent sampling of water and sediment from the canal revealed high levels of Lead contamination, prompting (MDNR) to issue an emergency permit for treatment and eventual removal of the contaminated wastewater from the canal in November 1982. This treatment and removal process was discontinued by MDNR when higher levels of Lead were found in the canal near the Rival facility.

In January 1983, the site was reported to the U. S. Environmental Protection Agency (US EPA) by the State of Mississippi as being a hazardous waste site that might require federal assistance. A preliminary site visit was conducted by a US EPA contractor (NUS) early in 1983 followed by a geophysical survey and borehole sampling study in mid to late 1983. Lead was found in sludges located in the lagoon or canal to the west of the inner levee, in the slough south of the lagoon and at locations within the inner levee west of the Rival facility. Lead was subsequently found in Lake Marie's water, and in sediments and surface soils outside and south of the inner levee. The total Lead content of the samples taken varied from 94,231 mg/kg in the canal adjacent to the industry's point of discharge to 14 and 23 mg/kg in the downstream Neely Creek.

FLOWOOD STUDY AREA
PROPERTY BOUNDARIES



The site was evaluated using the CERCLA Hazard Ranking System (Mitre Model), and received a score of 8.27. This site was added as a "Superfund" project pursuant to the Comprehensive Environmental Response, Compensation and Liability Act (CERCLA) of 1980 at the request of the State of Mississippi. EPA and the Marmon Group signed a RI/FS Consent Agreement on January 1986. The final RI report was issued August 1987 and the draft FS was released to the public May 1988.

The objective of the site investigation was to further characterize the site features and contaminants present in order to evaluate potential impacts to the environment or public health and provide a basis for determination of remedial alternatives under the feasibility study.

The purpose of the feasibility study was to develop and examine remedial alternatives for the site and to screen these alternatives on the basis of protection of human health and the environment, cost effectiveness and technical implementability. In accordance with CERCLA, as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), alternatives in which treatment would permanently and significantly reduce the volume, toxicity, or mobility of the hazardous substances of the site were preferred over those alternatives not involving such treatment.

2.0 Enforcement Analysis

The Flowood site was added to the NPL in September 1984 at the request of the State of Mississippi, and EPA assumed lead responsibility for the site at that time. Previous investigations conducted by the State had identified the PRPs: Continental Group, Rival Manufacturing and The Marmon Group, therefore a PRP search was not conducted. Notice Letters were issued to the PRP's in October 1984 to conduct the RI/FS. United Gas Pipeline Company was added as a PRP and notified in June 1985 after receipt of information requested by a Section 104 CERCLA Information Request letter. It was determined that the United Gas Pipeline Company owned a large portion of the surrounding contaminated property. Negotiations for the RI/FS Consent Agreement were concluded with the signing of the document by EPA and The Marmon Group (one of the PRPs) on January 3, 1986.

3.0 Current Site Status

3.1 Hydrogeologic Setting

The Pearl River alluvial sand, silts and clays are directly beneath the Flowood site and have a thickness of about 35 feet, followed by the Cockfield Formation (Eocene). The Cockfield Formation has a total thickness of about 200 feet and is generally a dark gray, sandy to silty, lignite and micaceous clay.

The shallowest water-bearing zone present at the Flowood site is composed of alluvial sands, found at depths from 5 to 10 feet below ground surface. The gradient is estimated to be 3.4 X 10^{-3} ft/ft with a groundwater flow direction to the southwest.

Lake Marie is believed to be a mostly perched water body. It is situated partially in clayey or silty soils that may serve to confine much of the lake boundaries. Portions of the lake bottom, however, appear to be in direct communication with the course grained, sandy soils of the alluvial aquifer.

Neely Creek to the south of the site is in direct communication with the alluvial aquifer. Stream flow measurements taken at locations along the creek and its tributaries averages 1.2 cubic feet per second.

3.2 Site Contamination

The immediate area of the site includes a borrow pit, called Lake Marie, various surface drainages, a flood levee (inner levee) and cow pasture (figure 3.1). Soil, groundwater, surface-water and sediment samples have been collected in and around each area and analyzed. All samples were analyzed for inorganic compounds with a selected number of samples analyzed for organic compounds.

The results of the investigation show that waste sediments containing Lead are deposited at four areas around the site. While some of these sediments exhibit Lead extractability under the EP Toxicity test, analytical results from soil samples obtained below the deposited materials indicated little Lead migration in the soil.

3.2.1 Soil Data

Soil sample composites were obtained at various depths at each of the boring locations around the Flowood site. The primary analyses run on each of the soil composites were total Lead, EP toxicity Lead and pH. Selected samples were analyzed for additional inorganic as well as organic pollutant parameters, including volatile and semivolatile organics, extractable organics, and pesticides. Samples were collected at three different intervals, two feet below ground surface (sediment surface), two to six feet below ground surface and six to ten feet below ground surface. Figures 3.2, 3.3, and 3.4, depict the total Lead concentrations in the soil.

3.2.2 Sediment Data

Wastes are known to have been discharged to the slough or canal on the west side of the inner levee to Lake Marie, and to the wash area behind the Rival Manufacturing Company facility (figure 3.5).

In the slough, the waste material itself is underlain by clay or silty clay. In the southern end of the discharge lagoon, which is north of the

FIGURE 3.1

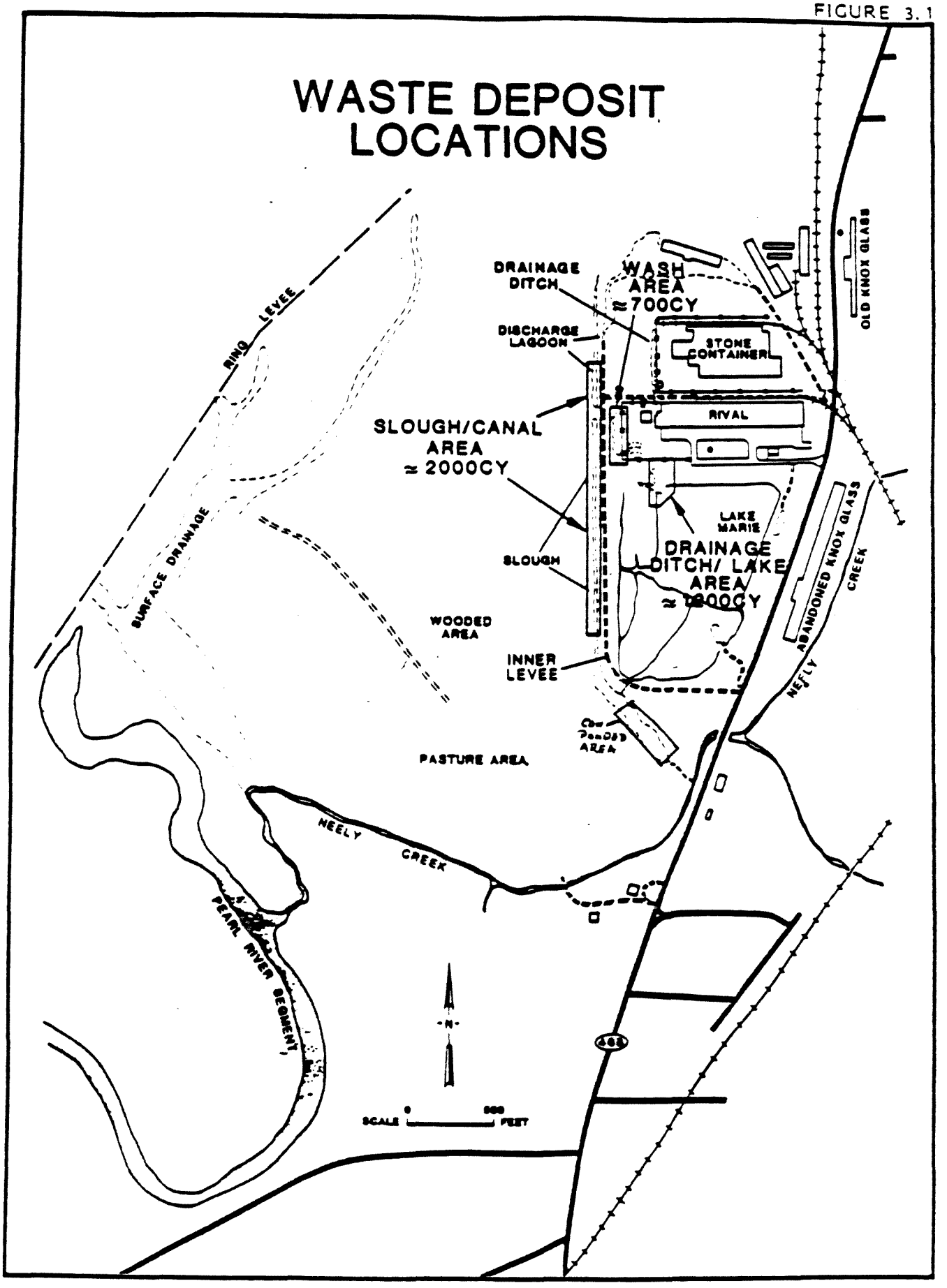

WASTE DEPOSIT LOCATIONS
DRAINAGE DITCH
WASH AREA ≈700CY
DISCHARGE LAGOON
STONE CONTAINER
RIVAL
SLOUGH/CANAL AREA ≈ 2000CY
SLOUGH
LAKE MARIE
DRAINAGE DITCH/ LAKE AREA ≈ 2800CY
WOODED AREA
INNER LEVEE
RING LEVEE
SURFACE DRAINAGE
OLD KNOX GLASS
ABANDONED KNOX GLASS
NEELY CREEK
PASTURE AREA
NEELY CREEK
PEARL RIVER SEGMENT
-N-
SCALE 0 500 FEET

FIGURE 3.2

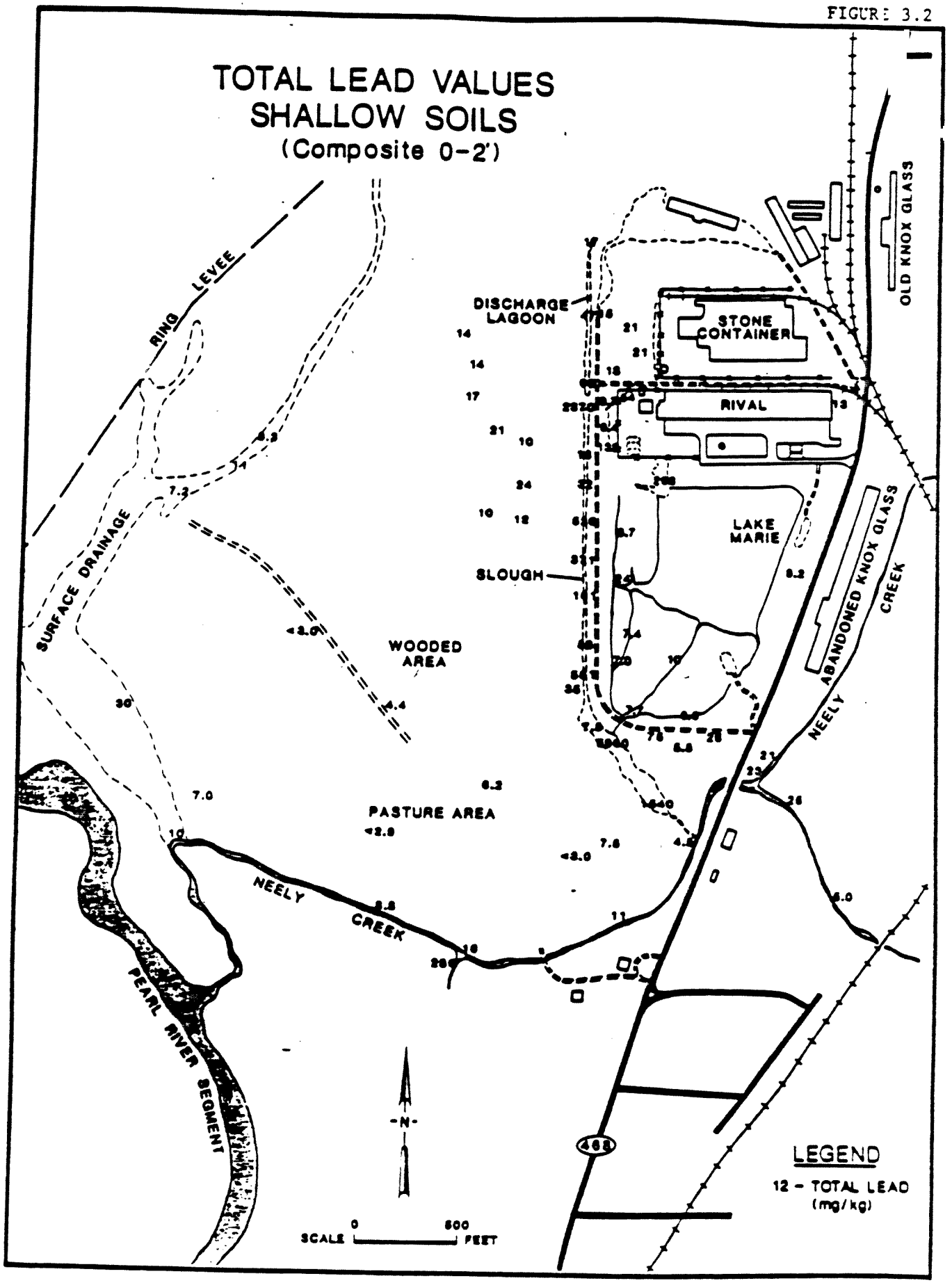

TOTAL LEAD VALUES
SHALLOW SOILS
(Composite 0-2')
RING LEVEE
SURFACE DRAINAGE
DISCHARGE LAGOON
STONE CONTAINER
RIVAL
OLD KNOX GLASS
LAKE MARIE
SLOUGH
ABANDONED KNOX GLASS
CREEK
NEELY
WOODED AREA
PASTURE AREA
NEELY CREEK
PEARL RIVER SEGMENT
-N-
SCALE 0 500 FEET
LEGEND
12 - TOTAL LEAD (mg/kg)

FIGURE 3.3

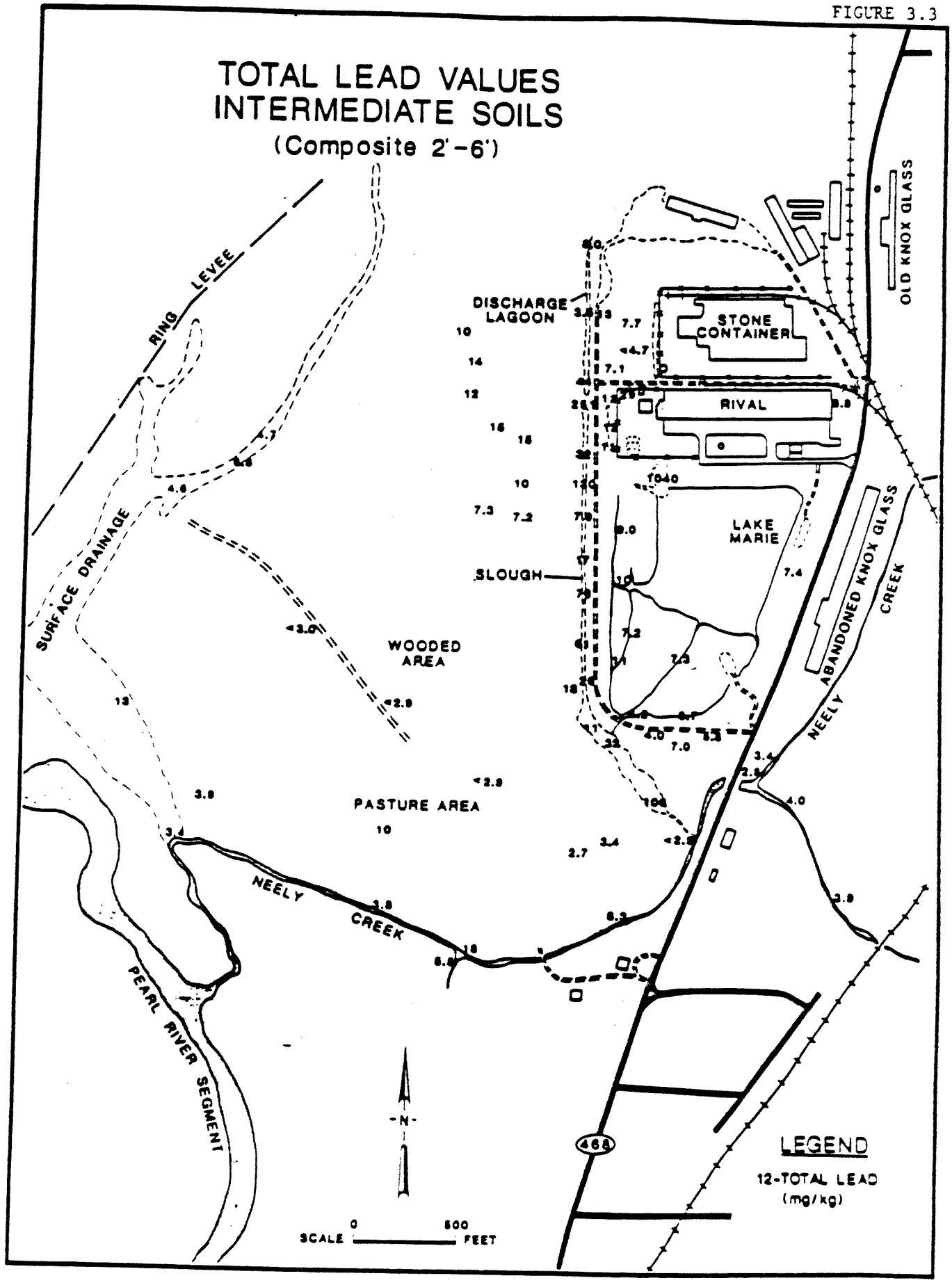

TOTAL LEAD VALUES
INTERMEDIATE SOILS
(Composite 2'-6')
RING LEVEE
SURFACE DRAINAGE
DISCHARGE LAGOON
STONE CONTAINER
RIVAL
OLD KNOX GLASS
LAKE MARIE
SLOUGH
ABANDONED KNOX GLASS
CREEK
NEELY
WOODED AREA
PASTURE AREA
NEELY CREEK
PEARL RIVER SEGMENT
-N-
SCALE 0 500 FEET
LEGEND
12-TOTAL LEAD (mg/kg)

FIGURE 3.4

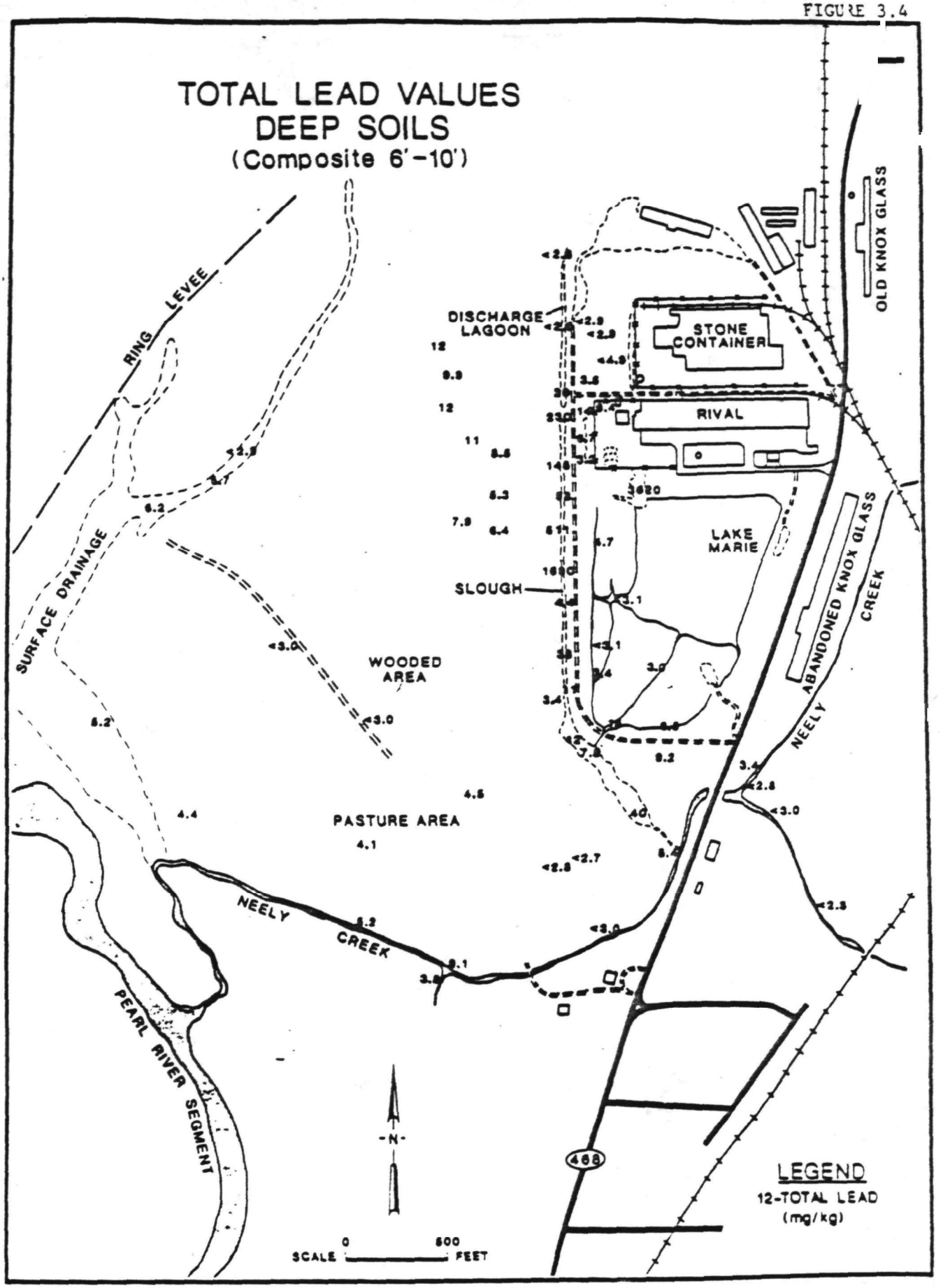
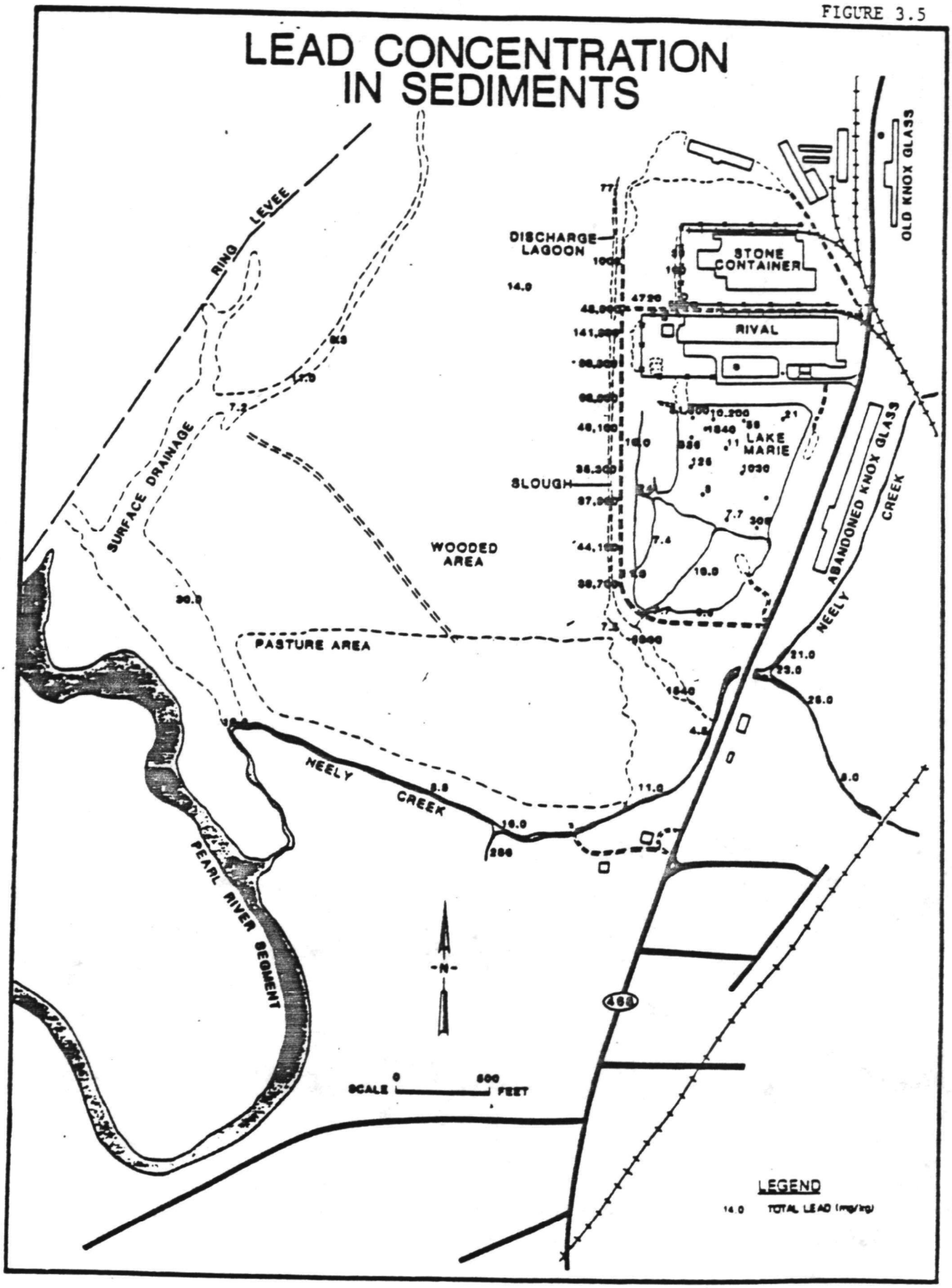

TOTAL LEAD VALUES
DEEP SOILS
(Composite 6'-10')
RING LEVEE
SURFACE DRAINAGE
DISCHARGE LAGOON
STONE CONTAINER
RIVAL
OLD KNOX GLASS
LAKE MARIE
SLOUGH
ABANDONED KNOX GLASS
NEELY CREEK
WOODED AREA
PASTURE AREA
PEARL RIVER SEGMENT
-N-
SCALE 0 500 FEET
LEGEND
12-TOTAL LEAD
(mg/kg)

FIGURE 3.5


LEAD CONCENTRATION IN SEDIMENTS
RING LEVEE
SURFACE DRAINAGE
DISCHARGE LAGOON
STONE CONTAINER
RIVAL
OLD KNOX GLASS
ABANDONED KNOX GLASS
LAKE MARIE
SLOUGH
WOODED AREA
PASTURE AREA
NEELY CREEK
PEARL RIVER SEGMENT
-N-
SCALE 0 500 FEET
LEGEND
14.0 TOTAL LEAD (mg/kg)

ceramic wastewater discharge point, the waste deposit thins out rapidly and is overlain by layers of black sludge. It is estimated that 2,000 cubic yards of waste sediments are deposited in the slough.

The slough drains into the cow pasture ponded area before reaching Neely Creek. Samples taken from the ponded area and Neely Creek show Lead contamination only in the ponded area.

Another area of waste disposal was by a drainage ditch to the northwest corner of Lake Marie. In the ditch, waste sediments are evident to a depth of about two feet. In the lake, the waste sediments are observed to fan out from the northwest corner of the lake, a distance of approximately 250 feet thinning rapidly from a thickness of about two feet to two tenths of a foot. It is estimated that 400 cubic yards of waste material is deposited in and around the ditch leading to the lake and 800 cubic yards of waste material is located in the northwest corner of Lake Marie.

The area located on the west side of the back property line of the Rival facility is less defined in area but is estimated to range in thickness from one to two feet in the north end down to one feet or less in the south end of this surface wash area. It is estimated that the volume of waste material in this area is 700 cubic yards.

3.2.3 Surface Water

The Flowood site includes three surface water bodies (figure 3.6) The first, Lake Marie, and the second, the discharge lagoon, are located within the immediate site area. The third, Neely Creek, is a receiving stream for drainage from the site.

Lake Marie is a borrow pit, approximately nine acres in surface area and about eight feet deep. This water body receives local runoff and has, in the past, received direct discharge of process waste water.

The discharge lagoon was formed from part of a canal that ran along the inner levee. It is approximately 1 - 2 feet deep and extends 700 feet northward from a point approximately even with the northern boundary of the Rival facility.

Neely Creek flows from east to west across the southern portion of the site and empties into a Pearl River basin segment. The cutoff river segments have been created from the construction of a large ring levee and straightening of the Pearl River channel in the 1960's. Surface water at thirty-six stream and drainage locations and thirteen locations on Lake Marie were sampled for analysis of total and soluble Lead, and measurements were made of pH and specific conductivity. The results of these analyses are presented in table 1. Figure 3.7 depicts the levels of total Lead determined at surface water sampling locations around the site area.

Lake Marie surface water samples show elevated levels of total Lead in the northwest corner. Surface water quality in the slough and lagoon followed

FIGURE 3.6

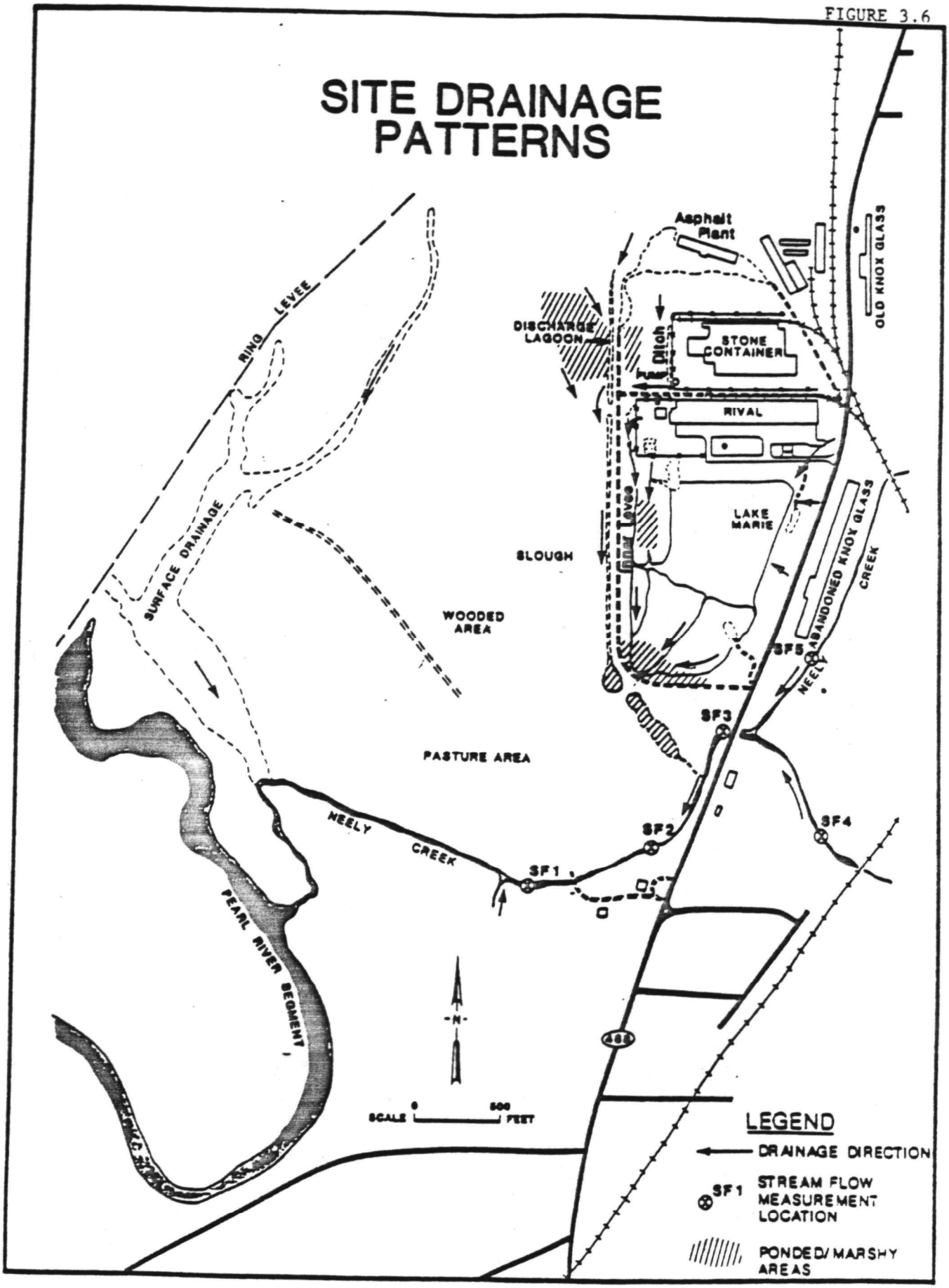

SITE DRAINAGE PATTERNS
Asphalt Plant
OLD KNOX GLASS
DISCHARGE LAGOON
Ditch
STONE CONTAINER
RIVAL
RING LEVEE
SURFACE DRAINAGE
LAKE MARIE
SLOUGH
Levee
ABANDONED KNOX GLASS CREEK
WOODED AREA
SF5
NEELY
SF3
PASTURE AREA
NEELY CREEK
SF2
SF4
SF1
PEARL RIVER SEGMENT
-N-
SCALE
500 FEET
LEGEND
DRAINAGE DIRECTION
SF1 STREAM FLOW MEASUREMENT LOCATION
PONDED/ MARSHY AREAS

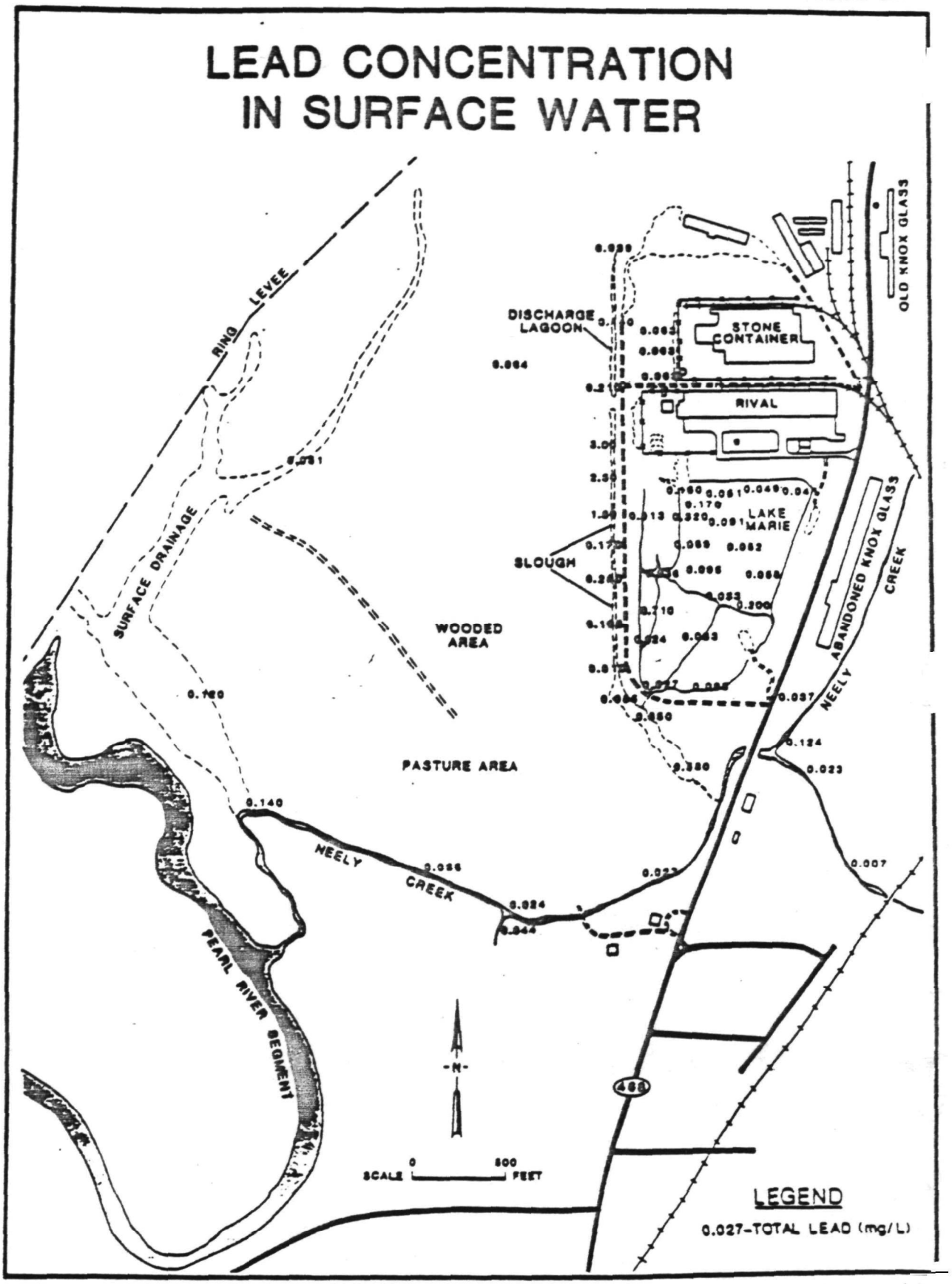
TABLE 1
SURFACE WATER ANALYTICAL RESULTS

Location	Date	Total Lead (mg/l)	Soluble Lead (mg/l)	Hardness (mg/l as $CaCo_3$)	pH	Specific Conductivity (umhos/cm)	Temp. °C
A2	7/19/86	0.051	0.026	--	6.7	122	22
A4	7/19/86	0.12	0.042	--	5.8	58	22
A5	7/13/86	0.14	0.020	26.5	7.4	450	26
A6	7/13/86	0.035	0.127	29.6	6.5	510	25
A7	7/13/86	0.044	0.038	--	6.9	250	25
A8	7/13/86	0.024	0.026	28.6	6.8	525	26
A9	7/13/86	0.027	0.020	--	6.6	400	--
A10	7/13/86	0.007	0.033	--	6.4	120	--
A11	7/13/86	0.023	0.012	24.5	6.6	110	
A12	7/13/86	0.037	0.024	--	7.5	540	--
A13	7/13/86	0.124	0.065	26.1	7.3	525	--
A14	7/13/86	0.021	0.052	25.9	7.4	400	30
A15	7/20/86	0.58	0.14	--	7.3	325	--
A16	7/10/86	0.35	0.019	--	6.8	380	31
A17	7/20/86	0.055	0.036	--	7.3	315	--
A18	7/13/86	0.61	0.19	--	7.5	290	28
A19	7/13/86	0.108	0.031	--	7.2	310	26
A20	7/13/86	0.28	0.027	--	7.3	330	26
A21	7/13/86	0.17	0.006	--	7.3	420	28
A22	7/13/86	1.80	0.37	--	7.8	470	30
A23	7/13/86	2.50	1.50	--	8.2	620	28
A24	7/13/86	3.00	1.10	--	9.4	730	27
A26	7/20/86	0.21	0.028	--	8.6	760	--
A27	7/20/86	0.14	0.051	--	8.2	650	--
A28	7/20/86	0.039	0.016	--	7.5	610	--
A29	7/24/86	0.064	0.065	--	6.2	550	32
A31	7/24/86	0.013	0.010	--	6.8	675	34
A32	7/24/86	0.036	0.039	--	7.8	475	35
A33	7/24/86	0.024	0.027	--	7.3	330	35
A34	7/20/86	0.71	0.12	--	7.1	350	--
A35	7/14/86	0.083	0.009	--	7.1	270	28
A36	7/20/86	0.027	0.158	--	7.1	300	--
A37	7/20/86	0.098	0.032	--	7.3	300	--
A38	8/7/86	0.063	0.016	--	6.4	450	22
A39	8/7/86	0.063	0.048	--	6.6	250	22
A40	8/7/86	0.063	0.028	--	6.8	300	20
L1	7/15/86	0.15	0. 9	28,6	8.5	310	
L2	7/18/86	0.17	0.014	--	8.0	300	
L3	7/17/86	0.32	0.065	--	8.3	300	
L4	7/18/86	0.051	0.023	--	8.1	290	
L5	7/18/86	0.049	0.011	--	8.2	300	
L6	7/16/86	0.091	0.011	--	8.4	300	
L7	7/17/86	0.069	0.006	--	8.1	310	
L8	7/18/86	0.041	0.027	--	8.3	280	

TABLE 1
SURFACE WATER ANALYTICAL RESULTS
(continued)

Location	Date	Total Lead (mg/l)	Soluble Lead (mg/l)	Hardness (mg/l as $CaCo_3$)	pH	Specific Conductivity (umhos/cm)	Temp. °C
L9	7/17/86	0.052	0.045	29.6	8.1	310	
L10	7/16/86	0.095	0.023	--	8.3	310	
L11	7/17/86	0.058	0.007	--	7.9	310	
L12	7/16/86	0.033	0.013	--	8.4	310	
L13	7/17/86	0.200	0.397	28.6	8.2	310	

FIGURE 3.7


LEAD CONCENTRATION
IN SURFACE WATER
RING LEVEE
SURFACE DRAINAGE
DISCHARGE LAGOON
STONE CONTAINER
RIVAL
OLD KNOX GLASS
LAKE MARIE
SLOUGH
ABANDONED KNOX GLASS
CREEK
NEELY
WOODED AREA
PASTURE AREA
NEELY CREEK
PEARL RIVER SEGMENT
-N-
SCALE 0 500 FEET
LEGEND
0.027-TOTAL LEAD (mg/L)

the general trends of sediment Lead levels in these areas. To the south of the slough the drainage passes through a low ponded area in the cow pasture. Surface water samples obtained also showed elevated levels of total Lead.

3.2.4 Groundwater

An assessment of the water quality in the alluvial aquifer was made with the four monitoring wells installed. Results from the monitoring wells show limited impact from waste disposal operations on the site. Additional wells were added in the shallow aquifer and were analyzed for total Barium, Cadmium, Lead, Manganese, and Zinc. These parameters were chosen for analysis based on the levels of these metals found in some soil and sediment samples during the remedial investigation. Field measurements were also made of pH, specific conductivity and temperature.

Maximum contaminant levels for metals were generally not exceeded in the shallow ground water at this site (table 2). Only one well exhibited concentration of Lead slightly above the drinking water standard. This well is located in the immediate vicinity of Lake Marie and the water disposal areas. Impacts to the ground water are limited to the immediate vicinity of the disposal areas.

3.2.5 Biota Data

The Mississippi Bureau of Pollution Control collected fish samples from Crystal Lake. The drainage from the Flowood site enters into Neely Creek and continues to Crystal Lake. Bass and catfish were collected and sampled for Lead and PCB's.

A composite sample of five Largemouth bass was analyzed. The mean length was 433 mm and the mean weight was 1390 grams. The bass contained 0.07 mg/kg of Lead which is considered to be at background levels. PCB's were not detected.

The catfish were collected in trammel nets and a two fish composite of channel and blue catfish was analyzed. The mean length was 562 mm and the mean weight was 2324 grams. The Lead content was slightly elevated at .37 mg/kg, however, there are no known health risks associated with this level. PCB's were not detected.

4.0 Summary of Site Risks

Based on the analysis of samples from soil, surface water and ground water at the Flowood site, lead has been identified as the chemical of concern. The risk to human health and the environment has been assessed based on current and potential exposure to lead at this site.

TABLE 2

GROUND-WATER ANALYTICAL RESULTS FOR LEAD ANALYSIS

Well Description[1]		Type[2]	First Sampling				Second Sampling	
			Date	Total Lead (mg/l)	Soluble Lead (mg/l)	pH	Specific Conductivity (umhos/cm)	Date	Total Lead Results from HSL Scan (mg/l)
Alluvial Wells	W1	P	8/6/86	0.016	0.017	5.5	400	8/11/86	0.005
	W3	P	8/5/86	0.027	0.023	6.0	310	8/11/86	0.012
	W5	P	8/6/86	0.034	0.081	7.0	280	8/11/86	0.008
	W7	P	8/6/86	0.019	0.015	6.3	540	8/11/86	0.006
Shallow Borings	B15	T	8/4/86	0.250	0.015	5.9	320	NS	--
	B17	T	8/4/86	0.140	0.041	6.2	330	NS	--
	B18	T	8/4/86	0.700	--	4.8	350	NS	--
	B19	T	8/7/86	11.0	4.0	5.7	650	NS	--
	B20	T	8/4/86	2.2	0.021	6.1	980	NS	--
	B21	T	8/4/86	2.7	0.059	5.4	1,120	NS	--
Deep Well	W4	P	8/7/86	0.046	0.014	-	--	8/11/86	0.016

(1) Well W4 completed in the Cockfield Formation.

(2) P = Permanent stainless steel well.
T = Temporary PVC well.

NS = Not Sampled

4.1 Exposure Assessment

An assessment of current and potential routes of exposure at this site identified the following exposure pathways:

- Ingestion of contaminated soil by humans;
- Ingestion of contaminated fish by humans;
- Ingestion of contaminated groundwater by humans; and
- Ingestion of contaminated surface waters by cattle.

CERCLA directs the Agency to consider both current and potential risks from exposure to Superfund sites. The potential risks for this site have been developed using a maximum reasonable exposure scenario as discussed in the Superfund Public Health Evaluation Manual (October 1986). The scenario considered for this site is potential residential land use. Thus, cleanup levels set for this site must be protective of both adults and children. Potential risks from these exposure scenarios are assessed and discussed in section 4.3 below.

4.2 Toxicity Assessment

Lead has been classified as a B2 probable human carcinogen; however, the available data are inadequate to determine a cancer potency factor. For this reason, cancer risks for this site have not been estimated. Lead has also been shown to have non-carcinogenic effects, particularly via the ingestion route for children.

In addition to lead, the Agency has set protective Maximum Contaminant Level Goals (MCLGs) for barium and cadmium at 1.5 mg/l and 0.005 mg/l, respectively. Concentrations of these substances in groundwater and surface water were below these levels; therefore, these substances are not likely to present a risk to human health.

4.3 Summary of Risk Characterization

Based on the risks associated with exposure to soil in the pathways identified in section 4.1, a protective level of 500 mg/kg of Lead has been set for ingestion of soil. This level has been set based on the document "Preventing Lead Poisoning in Young Children" (CDC, Janurary 1985).

In addition, the Agency has set a protective Maximum Contaminant Level (MCL) for lead based on non-carcinogenic effects as 50 ug/L. However, the Agency has recently reviewed new data and is currently proposing a level of 5 ug/l of lead as the more appropriate protective MCL.

The average daily intake of lead for adults is estimated to be 178-274 ug/day. Using the standard daily fish consumption rate of 6.5 g/day, the average contribution from fish to the adult diet would be 2.4 ug/day. This value is well below concentration levels of fish found in nearby streams; therefore, consumption of contaminated fish does not present a human health risk.

Beef cattle grazing on site often drink from low ponded areas south of the slough and from Neely Creek. Lead concentrations in Neely Creek are as high as 150 ug/l. Lead absorption in the gut of animals has been demonstrated to range from 1 to 15 percent of the total ingested dose. The remaining portion of lead accumulates in the animal bones, not in fleshy portions. For this reason, the ingestion of meat from cattle that drink water contaminated at levels seen in Neely Creek are not of concern for human health.

4.4 Summary of Environmental Risks

Protective levels for freshwater biota are set by the Ambient Water Quality Criteria (AWQC) for lead. The chronic exposure level for freshwater biota set in the AWQC is 3.2 ug/l.

5.0 Cleanup Criteria

5.1 Soil/Sediment Remediation

The remedial action selected must, by statute, be protective of human health and the environment. Based on the risk assessment as described in section 4.0 above, the cleanup level for contaminated soil and contaminated sediments (including Lake Marie hot spots) has been set at 500 mg/kg.

5.2 Surface Water Remediation

Sampling of the surface water has shown that these waters are below the Ambient Water Quality Criterion for chronic freshwater biota exposure (3.2 ug/l). This is due to the fact that surface waters showed minimal impacts from site runoff. However, if the waste sediments are disturbed and resuspension of contaminated sediments is enhanced, the ambient water qualtiy in Neely Creek could be affected. The remediation of the contaminated soil and contaminated sediments (hot spots) to 500 mg/kg would alleviate any future impacts to the surface water.

5.3 Groundwater Remediation

Groundwater sampling did not show impacts to groundwater from the waste material; therefore, cleanup goals for the groundwater have not been set. Remediation of contaminated soils and contaminated sediment (hot spots) will eliminate future potential contamination of the groundwater.

6.0 Alternatives Evaluation

The purpose of the remedial action at the Flowood site is to mitigate and minimize contamination in the soils and sediments, and to reduce current and future potential risks to human health and the environment. The following cleanup objectives were determined based on regulatory requirements and the risk assessment at the site:

* To protect the public health and environment from exposure to contaminated soils through inhalation, direct contact, and surface run-off.

* To prevent the spread of contaminants to other soils.

* To prevent contamination of groundwater.

* Cleanup goals were developed for the contaminated soil at the Flowood site based on applicable or relevant and appropriate requirements (ARARs) of federal and state statutes (table 3), and after consideration of potential guidelines.

An initial screening of possible technologies was performed to identify those which best meet the criteria of Section 300.68 of the National Contingency Plan (NCP) (table 4). Following the initial screening of technologies, potential remedial action alternatives were identified and analyzed. These alternatives were screened and those which best satisfied the cleanup objectives, while also being cost effective and technically feasible were developed further.

Table 5 summarizes the results of the screening process. Each of the remaining alternatives for soils and sediment remediation were evaluated based upon cost, technical feasibility, permanence, a preference for treatment, and protection of human health and the environment.

6.1 Alternatives

Alternative 1: No Action

The risk assessment conducted as part of the remedial investigation showed that no action is not protective to human health from the site conditions presently existing. Contaminant toxicity is not reduced in the absence of treatment. No action does not provide permanent source control, and does not satisfy a preference for treatment.

Alternative 2: Excavation, solidification
(if necessary for landfilling)
Backfill/regrade with clean soil
Landfill (off-site permitted)

This alternative involves excavation and off-site disposal of contaminated materials from the following areas:

TABLE 3
LIST OF POTENTIAL APPLICABLE OF RELEVANT AND APPROPRIATE REQUIREMENTS (ARARS) FOR THE FLOWOOD SITE

ARAR Category	Criteria/ Comments
Chemical Specific	
Safe Drinking Water Act (SDWA) Maximum Contaminant Levels (MCL) (40 CFR 141)	Potentially relevant and appropriate for following criteria: -Barium 1,000 ug/L -Cadmium 10 ug/L -Lead 50 ug/L
Federal Water Quality Criteria (FWQC) (freshwater)	-Cadium 0.4 ug/L -Lead 0.6 ug/L
Action Specific	
Resource Conservation and Recovery Act (RCRA) and the Hazardous and Solid Waste Amendments of 1984 (HSWA) (40 CFR 264)	Potentially relevant and appropriate: -Cap design and on-site landfill design for RCRA hazardous wastes. -Ground-water monitoring and post closure care for all alternatives leaving wastes on-site. -Chemical fixation technologies (BDAT) with regard to de-characterization of wastes. -Disposal of the hazardous wastes at an off site RCRA landfill.
Mississippi Pollution Control Permit Board Regulation on Landfills	-Potentially relevant and appropriate for siting of landfill under Alternative Nos. 4 and 5.
Pretreatment of Discharges to Publicly Owned Treatment Works (Clean Water Act)	-Potentially applicable to wastewater discharges from dredging and decontamination activities.
Location Specific	
RCRA Flood plain Critera [44 CFR Parts 59-77 and 40 CFR 264.18 (b)]	-Potentially relevant and appropriate for consideration in on-site landfill and capping alternatives.

TABLE 5 cont.

REMEDIAL ACTION ALTERNATIVES AND COST

Alternative No.	Description	Short-term Impacts to Environment, Public Health	Long-term Impact to Environment Public Health	Cost Range (thousand $)
6	Excavation (cow pasture, wash area & drainage ditches to Lake Marie & behind Stone Container). Relocate excavated sediments to slough. Capping (Lagoon & slough, Lake Marie corner) Backfill/regrade as necessary. Flow Diversion/ Run-on Control. Site Monitoring.	Some disruption for access as for Alternative 2. Minimal disruption to the area for placement of cap. Will require redirection of drainage patterns for run-on/run-off control No impacts to public health.	Isolates potential source of contaminated surface runoff and reduces potential for leachate generation from disposal areas. This alternative is protective.	500-1,000
7	Excavation (sediments/soils from all impacted areas). Chemical fixation. Backfill with fixed sediments (into slough/lagoon area). Cap as necessary with clean soils. Site Monitoring.	Same as for Alterntive 2.	Reduces toxicity and mobility of hazardous waste sediments and constituents. Protects groundwater from further contamination This alternative is protective.	2,000-4,000

-hot spot in Lake Marie
-wash area, drainage ditches
-cow pasture

The volume of material to excavate from each area was estimated using aerial photographs, ground observations and measurements and sampling results from the Remedial Investigation and from other investigations previously conducted at the site. The criteria used to estimate the soil and sediments to be removed was a total Lead concentration of 500 ppm or greater. The volume of material to be removed is approximately 6,000 cubic yards.

The excavated areas would be backfilled with clean soil. The filled areas will be graded to control drainage. The drainage west of the inner levee will be redirected around the slough and lagoon as part of the dewatering controls for excavation.

Offsite disposal will be conducted through transport to a secure landfill.

Alternative 3: Excavation (except hot spot in Lake Marie sediments) of areas in Alternative 2
Cap hot spot in Lake Marie
Backfill/regrade all areas excavated with clean soil
Landfill (off-site permitted)
Groundwater, Surface water Monitoring

This alternative incorporates the same excavation and disposal considerations discussed for alternative 2, except for contaminated sediments (hot spot) in Lake Marie. The contaminated sediments in Lake Marie will be left in place and capped. The surface water and groundwater will be monitored to assure that the surface water meets ambient water quality criteria (e.g. that there is no migration from capped sediments). Initially, monitoring will be conducted quarterly. After four or more quarterly samples show consistent results, subject to EPA's approval, monitoring will be reduced to semiannual sampling until the point of reevaluation in five years (SARA requires a five-year review of sites where there are residual contaminants above health-based levels).

Alternative 4: Excavation of areas as in Alternative 2
Solidification (if necessary for landfilling)
Backfill/regrade excavated areas with clean soil
Landfill (on-site)
Monitor groundwater
Landfill maintenance

This alternative will require all of the actions in alternative 2 with the exception of transport for disposal offsite. In this alternative, an on-site landfill will be constructed for disposal of the wastes.

The on-site landfill will be constructed mostly above ground because of the relatively shallow water table. Construction will include relatively impermeable layers of clay and synthetic liners. Leachate will be pumped to the nearest sewer line from a collection sump.

This alternative will require long term maintenance of the landfill and ground water monitoring.

Alternative 5: Excavation (except hot spot in Lake Marie sediments) of areas as in Alternative 2
Backfill/regrade with clean soil
Landfill (on-site)
Cap hot spot in Lake Marie sediments
Monitor Landfill and Groundwater, monitor Surface water around Lake Marie

This alternative will require the same actions as alternative 4 except the contaminated sediments in Lake Marie will be left in place and capped. Site monitoring for the capped sediments would be conducted as described in Alternative 3.

Alternative 6: Excavation (cow pasture, wash area and drainage ditches to Lake Marie and behind Stone Container)
Consolidate excavated sediments in slough
Capping (Lagoon and slough, hot spot in Lake Marie sediments)
Backfill/regrade excavated areas
Flow Diversion/Run on Control
Cap Maintenance
Groundwater, Surfacewater Monitoring

This alternative would provide source control through a combination of excavation, on-site consolidation of wastes, and capping.

The slough and lagoon waste materials are situated in a fairly stable environment. These materials do not show evidence of leaching contaminants to ground water. The slough and lagoon area containing consolidated soils would be covered by a cap composed of a synthetic membrane, clay layer, and sandy soil top soil layer.

The contaminated sediments remaining in the hot spot in Lake Marie will be covered by placement of two to three feet of clayey soils on top of the sediments. Control of run on into that corner of the lake will be effected by grading the backfill in the ditch and surrounding area.

Groundwater will be monitored in the vicinity of the capped slough and lake corner and surface water will be monitored in drainages from Lake Marie and Neely Creek.

Alternative 7: Excavation of areas as in Alternative 2
Chemical Fixation of contaminated materials
Backfill with fixed sediments (into slough/lagoon area)
Backfill/regrade excavated areas with clean soil
Cap disposal area with clean soil
Groundwater Monitoring

Materials from the various locations will be excavated as described in alternative 2 and subjected to a solidification and stabilization process. This process has the ability to stabilize materials containing high concentrations of heavy metals. Most processes use two inorganic chemical agents which react with polyvalent metal ions to form a chemically and mechanically stable solid. The process is based on reations between soluble silicates and silicate setting agents under controlled conditions to produce a solid matrix. Reagents commonly used include Sodium silicate, Fly ash, Kiln dust and Portland cement (as the setting agent).

The resulting solid will be redeposited in the slough/lagoon area, covered with a clean soil cap, and drainage will be redirected to prevent run on and erosion.

7.0 Recommended Alternative

7.1 Description of Recommended Remedy

The recommended alternative for remediation of soil and sediment contamination at the Flowood site includes solidification/stabilization and backfilling of stabilized material on the site (alternative 7.).

Contaminated soil will undergo a stabilization/solidification process. Following stabilization, the soil/sediment will be placed into the excavated slough area, be covered with clean top soil, and be seeded to provide vegetative cover. At selected intervals during excavation, soil samples will be collected and analyzed to determine the limits of excavation based on the clean-up level in section 5.1.

This recommended alternative meets the requirements of the National Oil and Hazardous Substances Contingency Plan (NCP), 40 CFR, 300.69(j) and the Superfund Amendments and Reauthorization Act 1986 (SARA). This alternative permanently and significantly reduces the mobility of hazardous contaminants in the soil and sediments.

The alternative is cost-effective when compared with other applicable alternatives. The technology has been proven and the alternative is implementable at the site. It is estimated this alternative could be implemented within twelve months.

TABLE 4 Continued

PRELIMINARY SCREENING OF TREATMENT AND DISPOSAL TECHNOLOGIES

Technology	Description	Remarks	Possibly Applicable	Not Applicable
Air Stripping	Removes volatile organic and some inorganic contaminants from an aqueous waste stream. Dissolved gases are transferred to air streams and are then typically treated by carbon adsorption or thermal oxidation.	Not applicable to non-volatile inorganic contaminants.		X
Steam Stripping	Similar to air stripping except steam is used as the stripping gas.	Not applicable to non-volatile inorganic contaminants.		X
Reverse Osmosis	Concentrates inorganic salts and some organics by forcing the solvent through a semi-permeable membrane which acts as a filter to remove TDS.	Primary uses have been a pretreatment step prior to ion-exchange or in recovery of reusable impurities. No advantages over sedimentation/filtration for large volume application.		X
Electrodialysis	An electrophoresis method of separating charged ions from an aqueous solution under action of an electric field.	Can effect removal of metals but is energy intensive and does not produce waste streams with very low concentrations.		X
Surface Impoundment	Waste liquids and sludges are disposed of in a lagoon type facility designed to receive hazardous waste.	Requires long-term management, monitoring, liability and high cost. Generally, a long-term solution.		X

TABLE 4 Continued

PRELIMINARY SCREENING OF TREATMENT AND DISPOSAL TECHNOLOGIES

Technology	Description	Remarks	Possibly Applicable	Not Applicable
Flow Diversion	Typically a channel, dike, berm etc. to intercept run-off, reduce slope length, and isolate wastes from surface water impacts.	Aims at eliminating run-on and maximizing runoff to avoid leachate generation and migration. Could be implemented for control of erosional induced contaminant transport.	X	

TABLE 5

REMEDIAL ACTION ALTERNATIVES AND COST

Alternative No.	Description	Short-term Impacts to Environment, Public Health	Long-term Impact to Environment Public Health	Cost Range* (Thousand $)
1	No action except long term monitoring.	Risk identified in the risk assessment for this baseline condition. Monitoring would be implemented to ensure future variaitons would be detected.	Based on remedial investigation risk assessment, potential may exist for impacts to ambient water quality.	20
2	Excavation (sediments/soils from all impacted areas). Solidification (if necessary for landfilling). Backfill/ regrade with clean soil.	Some disruption of biota in vicinity of excavation due to access clearing and transportation of materials. Clearing of about 2 acres of forested area for excavation of slough. Additional disruption for redirection of drainage (about 3,000 to 5,000 feet). Temporary resuspension of contaminated sediments from dredging in Lake Marie may occur but will be mitigated by silt curtains or sheet piling. No impacts to public health.	Removes potential for off-site impacts from contaminated surface runoff and leachate generation. This alternative is protective.	3,000-6,000
3	Excavation (except Lake Marie sediments). Cap Corner of Lake Marie. Backfill/regrade with clean soil. Landfill (off-site permitted). Site Monitoring.	Same as for Alternative 2 without potential impacts to Lake Marie.	This alternative is protective.	2,000-4,000
4	Excavation (sediments/soils from all impacted areas) Solidification (if necessary for landfilling). Backfill/ regrade with clean soil. Landfill (on-site, designed). Monitor landfill and Surface/ Ground Water around Lake Marie.	Same general impacts as for Alternative 2. Would have additional impacts from clearing of area for landfill construction. No impacts to public health.	Same protectiveness as Alternative 2.	2,000-4,000
5	Excavation (except Lake Marie sediments). Cap corner of Lake Marie. Backfill/regrade with clean soil. Landfill (on-site, designed). Monitor landfill and Surface/Ground Water around Lake Marie.	Same as for Alternative 4 without potential impacts to Lake Marie.	Same protectiveness as Alternative 2.	2,000-4,000

TABLE 4

PRELIMINARY SCREENING OF TREATMENT AND DISPOSAL TECHNOLOGIES

Technology	Description	Remarks	Possibly Applicable	Not Applicable
Excavation	Physical removal of contaminated materials for disposal or treatment.	May create temporary disturbance to the area. Proven technology for source control	X	
Capping	Barrier placed on top of exposed waste materials. Usually constructed of clay.	Requires limitation on land usage. Generally requires flow control. Provides for separation of contaminated material from contact with transport mechanisms. Requires long term monitoring and maintenance.	X	
Fixation				
- Resin Encapsulation	The waste is incorporated in solid form by resin coating to reduce leachate generation and to make it more suitable for landfilling or long-term storage.	Most practical for small quantities of highly toxic waste due to cost. The characteristics of the site waste sediments and environmental setting do not justify this approach.		X
- Chemical Encapsulation	Process to mix chemical wastes with inert materials (e.g., lime and fly ash or cement sodium silicate) to fix the waste solubility and leachability in a dry aggregate or solid material for landfilling.	Primarily applicable to acid-type wastes, scrubber sludges, and inorganic wastes.	X	

TABLE 4 Continued
PRELIMINARY SCREENING OF TREATMENT AND DISPOSAL TECHNOLOGIES

Technology	Description	Remarks	Possibly Applicable	Not Applicable
Waste Piles	Surface storage of waste materials.	Requires monitoring and maintenance. Generally not a long-term solution. No areas on-site compatible for storage of large volumes with adequate source control.		X
Incineration	Combustion/oxidation of contaminated materials at very high temperatures.	Not applicable to these inorganic wastes. Waste destruction applicable mostly to organic compounds.		X
Insitu Vitrification	Method of melting waste soils to form a glass material in situ by using inductive heating with high energy electrodes	Technology unproven in field applications. Vitrified material has significantly reduced toxicity. Costs would be high for widespread contamination and high moisture/ shallow groundwater level.		X
Solvent Flushing	Percolation of solvent through contaminated soils which can achieve two purposes: waste recovery for surface treatment or solubilization of adsorbed compounds to enhance in-situ treatment. Recovery of solvent is accomplished through a well point system.	May work for removal of organic contamination but consideration must be given to potential pollution from the solvent. Not applicable to inorganic wastes.		X

TABLE 4 Continued

PRELIMINARY SCREENING OF TREATMENT AND DISPOSAL TECHNOLOGIES

Technology	Description	Remarks	Possibly Applicable	Not Applicable
Soil Wash	Stripping of metals from soils by use of nitric acid or complexation solvents.	Possible reduction in waste sediment volume or reduction in toxicity. Requires treatment and disposal of washing fluid.	X	
Biodegradation	In-situ treatment using biological methods (e.g., microorganisms) for oily sludges and some organic wastes.	Not applicable to inorganic wastes.		X
Landfill	Waste materials are buried in an area designed to receive hazardous waste. Materials may be drummed or disposed of in bulk.	Primarily for disposal of solid materials such as contaminated soils. Requires long-term management, monitoring and liability. May be on-site or off-site.	X	
Chemical Treatment	Represents various oxidation, reduction or pH adjustment methods to effect the removal of soluble metals from water through precipitation.	Effective for removal of some soluble metals. Bench scale/ pilot testing required. May be used in conjunction with disposal of remediation generated waste water.	X	
Coagulation/ Flocculation	Used to bring small insoluble suspended particles together and allow agglomeration for enhanced settling. Usually requires the use of coagulant and/or flocculant aids.	Useful for removal of suspended solids, such as fine colloidal clay particles, from water. May be useful for removal of suspended components from generated wastewater.	X	

TABLE 4 Continued

PRELIMINARY SCREENING OF TREATMENT AND DISPOSAL TECHNOLOGIES

Technology	Description	Remarks	Possibly Applicable	Not Applicable
Sedimentation	Removal of suspended components from aqueous solution by gravity settling. Typically follows precipitation or coagulation and flocculation.	Applicable to waste streams with suspended solids.	X	
Filtration	Used to remove suspended solids from solution by forcing the liquid through a porous media (filter).	May be used following sedimentation, in conjunction with coagulation and flocculation or used alone.	X	
Activated Carbon Adsorption	Process where contaminants accumulate on an adsorbent surface due to physical or chemical forces.	Used primarily to remove organic compounds from aqueous waste. Not applicable to soluble metals.		X
Dissolved Air Flotation	Utilizes one of various methods to introduce minute bubbles which aid in flotation of insoluble contaminants. Floating waste is then removed from the surface and disposed.	Generally provides little advantage over pretreatment and sedimentation for suspended inorganic solids.		X
Ion Exchange	Process to replace unwanted ions (primarily inorganics) with innocuous resin ions.	Most commonly used for removal of metals from aqueous solutions. No significant advantage over filtration/sedimentation in large volume application considering cost.		X

7.2 Operation and Maintenance

No long-term operation and maintenance requirements are expected for this alternative.

Groundwater monitoring will occur quarterly for the first year. EPA will review the data and a decision will be made on the frequency of monitoring required.

Air monitoring during construction would be necessary to ensure that a safe working environment is maintained and that no threat to the public health or the environment is created by air emissions during construction.

7.3 Cost of Recommended Alternative

Solidification/stabilization is expected to have a total present worth cost of approximately 2,000,000. This estimate assumes a cost of $80 per cubic yard for solidification/stabilization bringing the total cost to approximately 1,975,000. Monitoring cost of 25,000 will be incurred for the first year.

7.4 Preliminary Schedule of Activities

The schedule of this alternative must provide for the immediate vegetation of the topsoil. Seeding is usually most successful in the late summer or early fall. Also it is preferable for excavation to be performed during a time of year when the groundwater table is low. Allowing six months for design and contractor selection, it is anticipated that this alternative could be completed in approximately thirteen months. Two months would be required to prepare the site (excavation of contaminated soil/sediment and to mobilize the solidification/stabilization equipment. One additional month would be necessary for the solidification/stabilization of the soil and three months to complete backfilling of the lagoon and vegetation of the topsoil. This schedule assumes that weather does not cause extreme delays.

7.5 Consistency with other Environmental Laws

Remedial actions performed under CERCLA must comply with all applicable Federal and State regulations. All alternatives considered for the Flowood site were evaluated on the basis of the degree to which they complied with these regulations. The recommended alternatives were found to meet or exceed all applicable environmental laws, as discussed below:

* Resource Conservation and Recovery Act (RCRA) (40 CFR 264)
  The proposed remedy of solidifying soils and sediments containing significant amounts of Lead would result in passing the EP toxicity test. The waste placed back onto or into the ground would therefore, not be a RCRA hazardous waste and would not be regulated by RCRA.

* Clean Water Act (51 FR 43665)
  One area exhibited a trace amount of contamination in the groundwater. The soil remediation will result in an end to the water contamination.

* Flood Plan Management Executive Order 11988
The CERCLA area lies within the Pearl River flood plain and the stabilization process will be designed to meet the requirements of E. O. 11988.

* Safe Drinking Water Act
Maximum Contaminant Levels (MCLs) established under the Safe Drinking Water Act were found to be relevant and appropriate. Although contamination was not found in the groundwater The site will be monitored to assure compliance during the remedial action.

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

8.0 Community Relations

The following community relations activities were performed at the Flowood site.

*Community Relations Plan finalized June 1985.

*An information repository was established in June at:
Pearl Public Library (601) 932-2562
3470 Highway 80 East
Pearl, Mississippi 39208

Contact: Ms. Janice Byrd, Librarian

*A press release providing an opportunity for a public meeting and information on the opening of the public comment period was issued May 11, 1988.

*Public notice providing the same information ran in the May 18, 1988 and the June 22, 1988 edition of the Rankin County News, a weekly newspaper.

*Information on the opening of the public comment period and opportunity for a public meeting was also sent to the interested parties on the mailing list.

8.1 Key Community Concerns

The primary concern expressed by the local environmental interest groups during the development of the Flowood site Community Relations Plan was the possibility of contamination of the area groundwater.

The public did not show an interest in a public meeting. Opposition from the public is not expected if the recommended remedial alternative is implemented.

A Responsiveness Summary has been prepared to summarize community concerns and EPA's community relations activities.

FLOWOOD SITE, FLOWOOD, MISSISSIPPI

RESPONSIVENESS SUMMARY

This community relations responsiveness summary is divided into the following sections:

Section I. Overview. This section discusses EPA's preferred alternative for remedial action and likely public reaction to this alternative.

Section II. Background on Community Involvement and Concerns. This section provides a brief history of community interest and concerns raised during remedial planning activities at the Flowood site.

Section III. Summary of Major Comments Received During the Public Comment Period and the EPA Responses to the Comments. Both the comment and EPA's response are provided.

I. Overview

At the beginning of the public comment period, EPA announced its preferred alternative to the public. This alternative addresses the soil/sediment contamination problem at the site. the preferred alternative specified in the Record of Decision (ROD) is the solidification/stabilization of the Lead contaminated areas.

The community favors remediation at the site.

II. Background on Community Involvement and Concerns

Key Issues and Potential Community Concerns

The nearest single residence to the Flowood site is more than a half mile south of the site, and the closest group of residences is on the opposite side of Highway 468, almost a mile south of the site. State officials have concluded that because the Flowood site is somewhat isolated from the public, greater citizen involvement is not likely without a major catalyst for increased community concern. Continued coverage of site activities in the Jackson press, however, could provide the impetus for citizen involvement, particularly if significant contamination is discovered beyond the immediate site area. Moreover, the proximity of the site to Jackson and the presence of a second Superfund site in Flowood raises the possibility that regional environmental groups and/or area residents may become more concerned about hazardous waste problems in the Rankin County area.

These issues and other specific concerns regarding the Flowood site are discussed in detail below.

a) **Soil and surface water contamination.** Even though there are no residential properties adjacent to the Flowood site, the discovery of significant additional soil contamination at the site could create significant community concern. This concern is particularly likely because the Flowood site is in an area that floods frequently, increasing the possibility that contaminants may have been carried a significant distance off-site. Similarly, any findings affecting area surface water, especially the Pearl River, are likely to be a major concern to area residents. MDNR officials contacted during development of this community relations plan stated that any contamination of the Pearl River because of activities at the Flowood site would create only limited concern because the site is downstream of Jackson. Nevertheless, environmental groups in the area would probably be greatly concerned because the Pearl River is heavily used for recreational purposes, even in marshy areas like those surrounding the Flowood site.

b) **Ground water contamination.** No ground water contamination has been discovered at the Flowood site at present. EPA and MDNR officials, however, are concerned that leaching of contaminants may affect area ground water, particularly given that the disposal activities at the site responsible for the soil contamination have occurred for such a long time Currently, EPA plans to sample private industrial and residential wells within a one mile radius of the site during the remedial investigation. Any sampling results revealing that ground water contamination has occurred would be a cause of concern to area residents and local officials, suggesting that the contamination problem at the Flowood site may be more extensive than originally was thought. Area environmental groups have already expressed particular concern about the human health threats of ground water contamination due to activities at the Flowood site.

c) **Hazardous waste problems in Flowood.** The Flowood site is one of two hazardous waste sites in the town of Flowood currently undergoing Superfund response activities. While no connection exists between activities at the two sites, it is possible that overall community concern regarding hazardous waste problems in the area will increase because of this situation. In particular, area environmental groups may choose to monitor activities more closely at the Flowood and Sonford sites, thus increasing EPA's visibility at both sites. These conditions increase the importance of EPA providing accurate and timely information to the local community throughout the remedial investigation and feasibility study at the Flowood site. In additions, efforts to maintain the credibility the Agency currently enjoys in the Flowood community will be important to the success of the community relations program.

III. Summary of Public Comments Received During Public Comment Period and Agency Responses.

1. Comments raised during the Flowood public comment period are summarized briefly below. The comment period was held from May 18 to June 29, 1988 to receive comments from the public on the

feasibility study. The only set of comments received, were from the Potential Responsible Party.

A. Alternative 7 in the Feasibility Study does not represent the recommended alternative presented by Region IV personnel or the language in the Public Notice.

EPA Response: EPA followed up this concern by telephone explaining the presentation was to give them a visual idea of what was involved and the exact mixture would be decided on a site by site basis. Alternative 7 in the Feasibility Study states a process similar to a Chemfix process will be used in which the materials are chemically bonded in a cement and silicate type matrix. It was never suggested that a mixture of cement alone was the only method accepted.

B. The alternative selected must be protective of public health and cost effective. In that regard, the Feasibility Study included Risk Assessment of each alternative studied, was approved and accepted by the USEPA. The results showed no public health risk for any alternative, including No Action.

EPA Response: The Feasibility Study and Risk Assessment showed a potential Environmental threat based on the high concentrations of Lead contaminated soil/sediment areas.

2. Remaining Public Concerns

No remaining concerns have been identified. The local public did not submit comments, oral or written, nor did they request a public meeting.

3. Community Relations activities to date are listed in the ROD.

MISSISSIPPI DEPARTMENT OF NATURAL RESOURCES
Bureau of Pollution Control
P. O. Box 10385
Jackson, Mississippi 39209
(601) 961-5171

August 26, 1988

Ms. Gena Townsend
Site Project Manager, Superfund Branch
U.S. Environmental Protection Agency
Region IV
Atlanta, Georgia 30365

Dear Ms. Townsend:

Re: Record of Decision (ROD)
Flowood, Mississippi NPL Site
MSD980710941

The Mississippi Bureau has reviewed the above referenced document. The Bureau approves of the remedy set forth in the ROD, which is Alternative 7. However, since solidification is a developing technology and since the resulting degree of permanent contaminant immobilization at this site is uncertain, the Bureau requests that:

1. Adequate bench-scale testing and evaluation be made on solidified sediments prior to field application at the Flowood site. The Bureau requests that be able to review any testing protocol prior to its implementation, and that the testing be prioritized for early in the remedial design process.

2. A long-term groundwater monitoring program should be carried out at the site to ensure that no upward trend in lead in the groundwater occurs. It is implied in Sections 7.2 and 7.3 of the ROD that this is not the present intent.

If you have any questions regarding this matter, please call me at (601) 961-5171.

Sincerely,

Trey Fleming
Hazardous Waste Division

TF:lr