REDACTED VERSION

PRELIMINARY ASSESSMENT

of

COLFAX CREOSOTING COMPANY

(LAD008184616)

Prepared By

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Region 6

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PREPARED BY	DRAWN BY	REVIEWED BY	APPROVED BY	CAD FILE	PROJECT NUMBER
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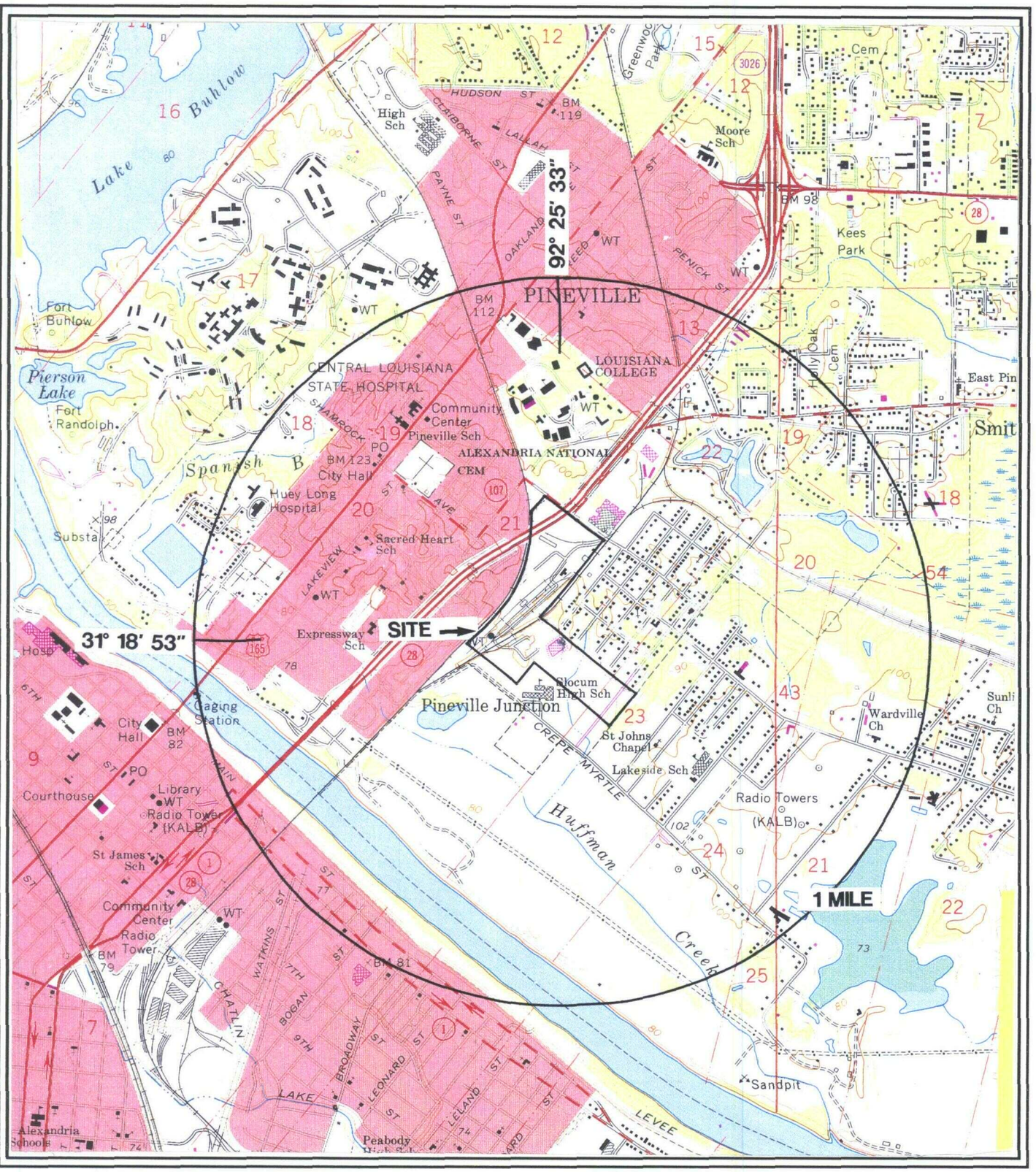

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FIGURE 1

SITE LOCATION MAP

COLFAX CRESOTING
PINEVILLE, RAPIDES PARISH, LOUISIANA

CERCLIS #LAD008184616

QUADRANGLE LOCATION
ALEXANDRIA, LA. 1972
PHOTOREVISED 1979

1.0 INTRODUCTION

The Region 6 Alternative Remedial Contracting Strategy (ARCS) contractor, Morrison Knudsen-Environmental Services/ICF Technology Inc. (MK/ICF), was tasked by the U.S. Environmental Protection Agency (EPA) under Work Contract No. 68-W9-0025 and Work Assignment No. 29-6JZZ to conduct the Preliminary Assessment (PA) of Colfax Creosoting Company in Pineville, Rapides Parish, Louisiana.

The purpose of a PA is to determine whether further investigations are warranted and provide a preliminary screening of sites to facilitate EPA's assignment of site priorities.

The PA investigation focuses on determining CERCLA eligibility, reviewing available file information, documenting the presence and type, or absence of uncontained or uncontrolled hazardous substances on-site and on the collection of area receptor and site characteristic information.

2.0 SITE DESCRIPTION AND OPERATIONAL HISTORY

This section addresses operational history, waste containment, hazardous substance identification, and regulatory status of the facility.

2.1 SITE LOCATION

Colfax Creosoting Company (Colfax) is located at 74 Wadley Road in Pineville, Louisiana approximately ¾ mile northeast of the Red River. The geographical coordinates of the site are 92° 25' 33" west longitude and 31° 18' 53" north latitude (Figure 1).

2.2 OPERATIONAL HISTORY

Colfax is a wood preserving facility that originally established operations in Colfax, Louisiana in 1923 (Ref. 2, p. 2). The operation moved to its current location in 1948. Colfax originally treated wood by using creosote as the main preservative and used this process until 1958. From 1958 to 1972, Colfax used a pentachlorophenol (PCP) treatment system. In 1972, Colfax began using copper, chromium, and arsenic (CCA) as a preservative. In 1990, Colfax discontinued using CCA preservatives but continues using creosote and PCP preservation systems (Ref. 2, p. 2).

Processes at the facility include the following: transporting the untreated wood by railcar into the treatment cylinder; removing water from the wood by using a vacuum process; treating the wood under high-pressure to force the preservative into the wood; and removing the treated wood by railcar from the cylinder after 2 hours and letting excess preservative drip from the wood (Ref. 2. p. 2).

CCA is a water-demanding process, while PCP and creosote are water-bearing processes. In the CCA method, process spill generated was collected with storm water runoff, and stored in above-ground steel tanks. The collected water was used to dilute the concentrated CCA solution for the next batch of preservative. Water not claimed in the CCA process was evaporated through a spray system (Ref. 3, p. 24).

The creosote and the PCP systems generate approximately 10,000 gallons of process water per day (Ref. 3, p. 24). Discharge of wastewater prior to 1975 was to the main drainage ditch along

with storm water runoff from the plant and was not controlled prior to the implementation of RCRA regulations (Ref. 4, p. 20). After RCRA regulations became effective, Colfax constructed a series of surface impoundments to collect wastewater. Discharge was first directed into a recovery lagoon so that preservatives carried by the wastewater could settle to the bottom for removal and recycling. Water was then transferred via a pump into smaller settling ponds before being discharged into the City of Pineville sewer system (Ref. 4, p. 21). Until late 1983, all process water was released to surface impoundments south of the facility. When ground water contamination was detected in a well downgradient of the surface impoundments, the Louisiana Department of Environmental Quality (LDEQ) ordered that no further discharge be made into the impoundments and that they be officially closed under RCRA (Ref. 3, pp. 3,4). Final closure of the surface impoundments was approved in 1988 (Ref. 3, p. 28; Ref. 4, p. 21). Colfax is in the post-closure phase.

Currently, Colfax operates an above-ground process water recovery system and a water treatment facility to handle the generated process water. Treated process water is discharged into the Pineville sewer system under a permit issued by the City of Pineville (Ref. 3, p. 28).

2.3 REGULATORY STATUS/ACTIVITIES

Colfax Creosoting had no intention of becoming a Transportation, Storage and Disposal (TSD) facility. Once ground water was found to be contaminated, clean closure could not be achieved (Ref. 4, p. 32). Colfax filed a facility closure plan with the LDEQ for three of the impoundments in October 1985 (Ref. 4, p. 34). Colfax solidified some of the material found at the bottom of the impoundments and closed some of them in place as reported in the Closure Certification Document dated August 26, 1986 (Ref. 4, p. 32). Colfax then fell under RCRA regulation as a closed TSD facility and initiated a Post Closure Permit. Colfax became permitted under RCRA on January 22, 1991 (Ref. 4, p. 32).

A RCRA Facility Assessment (RFA) was prepared for the facility September 2, 1988 (Ref. 3). Twenty-seven Solid Waste Management Units (SWMUs) and two Areas of Concern (AOC) were identified and inspected for releases or potential releases requiring further investigation (Ref. 3, p. 2). Twenty units were finally identified for further investigation in the HWSA section of the post closure permit (Ref. 4, p. 58).

Soil sampling was conducted by an EPA contractor as part of a RCRA Facility Investigation (RFI) on September 19, 1991 (Ref. 2, p. 11). Sampling was also conducted by Colfax's contractor, Ball Engineering, Inc. in June 1992 based on work plans approved by the EPA and LDEQ. Sixty-six borings and 14 trenches were completed for the RFI (Ref. 14, p. 1-1). An RFI Phase I Report was completed by Ball Engineering, Inc. on March 12, 1993 (Ref. 14). Contaminants detected during the RFI sampling are discussed in Section 2.4 below.

2.4 WASTE CONTAINMENT AND HAZARDOUS SUBSTANCE IDENTIFICATION

As stated previously, twenty SMWUs were identified for investigation in the HWSA section of the post closure permit (Ref. 4, p. 58). Table 1 identifies the SWMUs and AOC and gives the status of the units (Ref. 19).

The site was found to be contaminated with 47 volatile and semi-volatile compounds commonly associated with wood processing facilities. Over half of the contamination consisted of phenanthrexene, naphthalene and flouranthene (Ref. 14, p. 1-1).

TABLE 1

SWMUs/AOCs

COLFAX CREOSOTING

SWMU/ AOC#	NAME OF UNIT	RATIONALE/ CONCERN	STATUS
1	Northeast Treated Wood Storage Area	Stained Soil was observed in the treated wood storage areas during the Visual Site Inspection (VSI). These storage areas receive wood treated with any of the three preservatives used at this facility: creosote, PCP or CCA, which may have released hazardous constituents to the soil, ground water and surface water.	A
2	Southeast Treated Wood Storage Area	Stained Soil was observed in the treated wood storage areas during the VSI. These storage areas receive wood treated with any of the three preservatives used at this facility: creosote, PCP or CCA, which may have released hazardous constituents to the soil, ground water and surface water.	A
3	West Treated Wood Storage Area	Stained Soil was observed in the treated wood storage areas during the VSI. These storage areas receive wood treated with any of the three preservatives used at this facility: creosote, PCP or CCA, which may have released hazardous constituents to the soil, ground water and surface water.	A
4	Southwest Treated Wood Storage Area	Stained Soil was observed in the treated wood storage areas during the VSI. These storage areas receive wood treated with any of the three preservatives used at this facility: creosote, PCP or CCA, which may have released hazardous constituents to the soil, ground water and surface water.	A
8	Railcar Separator	This unit is an 8,000-gallon separator which is a converted railroad tank car. The separator is 7 feet in diameter and 32 feet in length. Creosote waste was pumped from the recovery pond into the separator, where further separation of creosote occurred. During the VSI, a creosote-like material was observed on a valve on the separator and the soil directly beneath it. Releases of hazardous constituents to soil, ground water and surface water are highly possible.	C

A = Active
C = Closed/Removed

TABLE 1

SWMUs/AOCs

COLFAX CREOSOTING
(continued)

SWMU/ AOC#	NAME OF UNIT	RATIONALE/ CONCERN	STATUS
9	Main Runoff Pathway	The main runoff pathway begins on-site and flows to the southwest near the process area. During this time, the main runoff pathway served as the discharge ditch for waste water generated by the PCP and creosote processes. This unit does not appear to have any type of liner. During the VSI, a tar-like material was observed in locations along the main runoff pathway. Release of hazardous constituents to soil, ground water and surface water is highly possible.	A
10	Truck Washing Area	This area is used to wash equipment and trucks which transport the treated wood products. The vehicles are washed on a 10-by-30-foot concrete pad. The area is not contained and waste water produced by the washing of potentially contaminated vehicles is discharged into the main runoff pathway. The release potential to soil, ground water and surface water is high.	C
11	Untreated Wood Landfill	The unlined landfill is approximately one acre in size. Untreated wood scraps and sawdust are used to fill the depressed area. During the VSI several pieces of treated wood were observed in the landfill. Release potential to soil, ground water and surface water is high.	A
12	Ground Water Recovery Tank	This unit is a 3,000-gallon tank which is used to contain contaminated ground water (creosote constituents) from piezometer well P-1. This tank is located on bare ground. The potential for release to soil, ground water and surface water is high.	C

A = Active
C = Closed/Removed

TABLE 1

SWMUs/AOCs

COLFAX CREOSOTING
(continued)

SWMU/ AOC#	NAME OF UNIT	RATIONALE/ CONCERN	STATUS
13	PCP-Creosote Sump Containment	This unit is comprised of a sloped concrete pad surrounded by a concrete dike and a berm system. Portions of the concrete pad have been in use since the company began operation in 1948. High potential for contamination of the soil and ground water existed prior to installation of the concrete dike and berm system.	A
14	CCA Containment System	This unit consists of a sloped concrete pad surrounded by a concrete berm and dike system, two rain water pumps, a concrete door pit and a waste water pump. The potential for release was high before the concrete dike and berm was installed.	A
15	Creosote Dehydrator	This unit is a 9,971-gallon tank which receives recovered sludge from Creosote Separator #3, then dries it to acceptable moisture levels and pumps it to the Reclaimed Creosote Storage Tank. This unit has a secondary containment of a concrete dike and berm system. Potential for contamination of soil existed prior to the installation of the concrete dike and berm system. This dehydrator has been in use at this facility since 1948. The waste handled is creosote waste water sludge.	A
16	Creosote Separator #1	This unit is an 8,000-gallon converted railroad tank car which is located near the middle of the process area on the west side of the cooling pond and adjacent to Creosote Separator #2. High potential for release to soil and ground water existed prior to the installation of the concrete dike and berm system.	C

A = Active
C = Closed/Removed

TABLE 1

SWMUs/AOCs

COLFAX CREOSOTING
(continued)

SWMU/ AOC#	NAME OF UNIT	RATIONALE/ CONCERN	STATUS
17	Creosote Separator #2	This unit is an 8,000-gallon converted railroad tank car which is located near the middle of the process area on the west side of the cooling pond and adjacent to Creosote Separator #1. High potential for release to soil and ground water existed prior to the installation of the concrete dike and berm system.	C
18	Creosote Separator #3	This unit is an 8,000-gallon converted railroad tank car which is located near the middle of the process area on the west side of the cooling pond and adjacent to Creosote Separator #2. Waste water is pumped into this separator from the surface of Creosote Separator #2. High potential for release to soil and ground water existed prior to the installation of the concrete dike and berm system.	C
19	PCP Reclaiming Hopper	This unit is a 20,000-gallon cone-bottom tank which is located in the far southeast portion of the process area north of the PCP mix tank. This tank serves as a large separation funnel for the reclaimed PCP pumped here from the PCP separator. This unit is surrounded by the concrete dike and berm system, but prior to installation of this system, release potential was high to soil and ground water.	A
20	PCP Separator	This unit is an 8,000-gallon converted railroad tank car which is located near the middle of the process area on the west side of the cooling pond and adjacent to Creosote Separator #3. High potential for release to soil and ground water existed prior to the installation of the concrete dike and berm system.	C

A = Active
C = Closed/Removed

TABLE 1

SWMUs/AOCs

COLFAX CREOSOTING
(continued)

SWMU/ AOC#	NAME OF UNIT	RATIONALE/ CONCERN	STATUS
25	Cooling Pond	This unit is a 40-foot by 30-foot concrete pond, which is located in the middle of the process area on the west side of the treating room. Processed waste water circulates through the pond providing coolant needed to operate the vacuum system utilized within the treatment cylinders. This cooling pond was originally built in 1948 and is assumed to be unlined. It was reconstructed in 1986. A high potential for release to soil, ground water and surface water existed before reconstruction.	C
B	Creosote Unloading Area	This unit is the area that has been used as a creosote unloading area since the company began operation in 1948. The concrete pad was originally constructed in 1958 and reconstructed in 1982. Considering the long period of operation at this unit, and the two periods of reconstruction, a high potential exists for past releases to soil, surface water and ground water.	A
A	West Runoff Pathway	This unit is a runoff pathway that drains approximately the western 15 percent of the site that used to air-dry the treated wood (SWMU #1). During the VSI, an indication of the presence of two substances (an orange sediment and a white sheen) which do not appear to be native to the west ditch was noted.	A

A = Active
C = Closed/Removed

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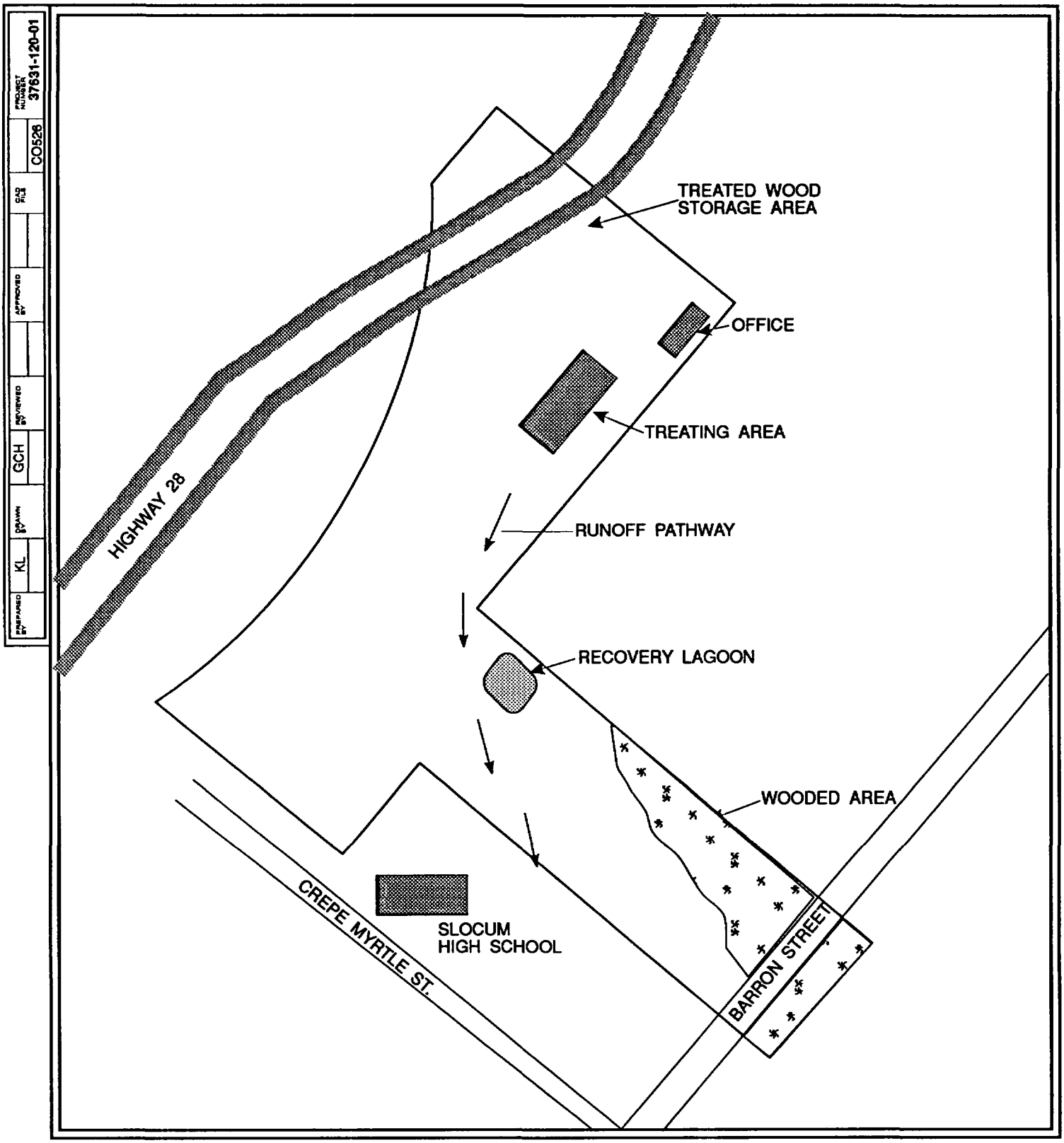

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NOT TO SCALE

FIGURE 2

SITE SKETCH

COLFAX CRESOTING
PINEVILLE, RAPIDES PARISH, LOUISIANA

REPRODUCED FROM:
EPA REGION 6
RFA

CERCLIS #LAD008184616

Currently, Colfax does not operate any active treatment, storage or disposal areas for hazardous waste. Hazardous waste is generated occasionally during routine cleaning of plant equipment. The waste is in small quantities and is shipped off-site to a TSD facility and no waste is stored at the plant for longer than 90 days (Ref. 4, p. 8).

Prior to closure, the recovery lagoon (surface impoundment) was 1 acre in area and 10 feet deep (Ref. 4, p. 34). The two smaller impoundments (#1 and #2) were 990 square feet and 8 feet deep, and 1,270 square feet and 6 feet deep, respectively (Ref. 4, p. 34). These impoundments were not lined. An estimated total of 6,800 cubic yards of material was removed from the impoundments (4,700 cubic yards of K001 sludge plus 2,100 cubic yards contaminated soil). The material was shipped to a recycle reuse facility in Morgan City, Louisiana in 1986 (Ref. 4, pp. 34-35).

2.5 SUMMARY OF RECONNAISSANCE INSPECTION

The ARCS team conducted an on-site reconnaissance inspection of the facility on June 8, 1993. The team was escorted by Mr. Carl Johnson, Plant Manager. Mr. Johnson stated that the facility covers approximately 70-80 acres and has 100 employees. Most of the facility is fenced and/or heavily wooded (Figure 2). Colfax employs a security guard during off hours (Ref. 10, p. 3). Mr. Johnson took the ARCS team to the closed impoundments and the adjacent ground water recovery system. The ARCS team observed that the impoundments were vegetated with seeded grass and the area was in need of mowing. No odors or stains were evident. Mr. Johnson said that the RFI had just been completed. All the monitoring wells are inspected weekly to ensure that the wells are locked and have not been tampered with (Ref. 10).

3.0 PATHWAY ASSESSMENT

This section characterizes the environmental pathways and associated targets of contaminant migration from the facility.

3.1 GROUND WATER PATHWAY

3.1.1 Ground Water Characteristics

The site lies within the West Gulf Coastal Plain province and is underlain by alluvial deposits of the Red River. The Red River Valley is dissected by a number of small streams flowing southwest into Bayou Bouef and southeast towards Chatlin Lake Canal (Ref. 5, p. 2). The sediments of the alluvium consist of unconsolidated sand, gravel, and clay deposited by the Red River and is a fresh-water bearing unit. These deposits range in thickness up to 60 feet (Ref. 5, p. 4). The static water levels are generally within 100 feet of the land surface for the alluvial aquifers in the parish, and within 50 feet of the surface in most places (Ref. 6, p. 9). Ground water was encountered at depths of 5 to 15 feet below ground surface during the RFI at Colfax (Ref. 14, p. 6-5).

The alluvial deposits are underlain by sedimentary rocks of the Miocene age. The Miocene sandstones are divided into two formations: the Fleming Formation and the underlying Catahoula Formation (Ref. 6, p. 10). The Fleming Formation consists of the following members in descending sequence: the Blounts Creek, Caster Creek, Williamson Creek, Dough Hills, Carnahan Bayou, and the Lena. The Blounts Creek, Williamson Creek and Carnahan Bayou are

water-bearing sands; Caster Creek, Dough Hills, and the Lena are clay (Ref. 6, p. 10). The most important water-bearing members of the Fleming Formation in the Alexandria/Pineville area are the Williamson Creek and Carnahan Bayou (Ref. 7, p. 15).

The Williamson Creek Member is the first important water-bearing sand and is also referred to as the "400-foot sand," indicating the depth that the sands generally occur. The average thickness of this sand is 53 feet (Ref. 6, p. 7). The Dough Hills Member is an extensive clay layer (Ref. 6, p. 7).

The Carnahan Bayou Member is also referred to as the "700-foot sand," indicating the depth at which it generally occurs (Ref. 7, p. 8). It is one of the most extensively used aquifers in the area and is composed of fresh-water bearing sands averaging 38 feet in thickness (Ref. 6, p. 7) and is the aquifer of concern.

Colfax currently has 12 monitoring wells and recovery wells on-site (Ref. 4, p. 10). They range in depth from 49.9 feet to 66 feet from top of casing to bottom of the well (Ref. 4, p. 11). They are used to monitor ground water contamination from the surface impoundments. Ground water was contaminated in the area south of the old surface impoundments (Ref. 4, p. 14). Contaminants detected in the ground water were arsenic, chromium, lead and organic constituents (PCP, phenols, napthalene, acenapthene, pyrene, phenanthrene and anthracene) (Ref. 4, Sec. 6.2).

The net precipitation for the area is 24.26 inches (Ref. 15).

3.1.2 Ground Water Receptors

The Cities of Alexandria and Pineville use ground water as their drinking water source. The City of Alexandria operates 64 wells that screen the Carnahan Bayou and Williamson Creek Members. The water is treated and distributed equally to approximately 60,000 people (Ref. 8). Each well serves approximately 938 persons (60,000 ÷ 64 = 938 persons). The City of Pineville operates 9 wells that screen the Carnahan Bayou Member (Ref. 9). The city has a blended system and serves about 20,000 persons (Ref. 9). Each Pineville well serves 2,222 persons (20,000 ÷ 9 = 2,222).

The nearest well is located approximately 0.53 miles to the west. The well is a public supply well for Pineville and is screened within the Carnahan Bayou Member (Ref. 1; Ref. 11). There are no wells within the 0 to ¼-mile or the ¼ to ½-mile radius. There are four Pineville wells within the ½ to 1-mile radius; two Pineville wells and eight Alexandria wells within the 1 to 2-mile radius; one Pineville well and eight Alexandria wells within the 2 to 3-mile radius; and six Alexandria wells within the 3 to 4-mile radius (Ref. 1; Ref. 11). Table 2 provides populations served within each radius.

The LDEQ has designated that a Wellhead Protection Area exists within a 2-mile radius of the site for unconfined aquifers and a 1-mile radius for confined aquifers (Ref. 17). The municipal wells are in a Wellhead Protection Area.

TABLE 2

POPULATION SERVED BY WELLS

COLFAX CREOSOTING LAD008184646

Radius	No. of Wells	Populations Served/Well	Total Population
0 - ¼ mile	0	0	0
¼ - ½ mile	0	0	0
½ - 1 mile	4	2,222 (Pineville)	8,888
1 - 2 miles	2	2,222 (Pineville)	4,444
	8	938 (Alexandria)	7,504
2 - 3 miles	1	2,222 (Pineville)	2,222
	8	938 (Alexandria)	7,504
3 - 4 miles	6	938 (Alexandria)	5,628

3.2 SURFACE WATER PATHWAY

3.2.1 Surface Water Characteristics

Drainage patterns are dictated by the railroad spurs throughout the property (Ref. 14, p. 7-3). Generally, surface runoff from the facility flows south for approximately 0.5 miles in an intermittent ditch before discharging into Huffman Creek, an intermittent creek (Ref. 1). Huffman Creek flows southeast and enters the Red River 1.7 miles downstream, which is the Probable-Point-of-Entry (PPE). The overland migration route is greater than 2 miles. The end of the 15-mile downstream segment lies within the Red River (Ref. 1). The average streamflow of the Red River is 32,000 cubic feet per second (Ref. 6, p. 5).

The surface impoundments were not contained for any flooding. The site is located within the Red River 100-year flood plain (Ref. 3, p. 36). The drainage area for the facility is 70-80 acres (Ref. 10).

The two-year, 24-hour rainfall for the area is 5 inches (Ref. 12). Soils at the site consist of Acadia silt loams with 0 to 1 percent slopes (Ref. 13, p. 7, 32). It is a somewhat poorly drained soil. It has a loamy surface layer and a clayey subsoil. Runoff is slow after rains and water moves very slowly through the subsoil (Ref. 13, p. 7).

Surface runoff samples were collected by Ball Engineering, Inc. from most of the outfalls after 3 rainfall events and during one low flow period (Ref. 14, p. 7-7). Based on surface water sampling data collected during the Phase I of the RFI, it was concluded that volatile and semi-volatile constituents are released from the property during episodic storm events (Ref. 14, p. 7-25). Samples have not been collected from the Red River.

3.2.2 Surface Water Receptors

There are no known surface water intakes within Huffman Creek or the Red River. It is likely that the Red River is a fishery. There is no information regarding the pounds of fish consumed annually.

Wetlands are present within the 15-mile downstream target distance limit. It was calculated that there are 24 frontage miles of wetlands (Ref. 18).

It is not known if there are irrigation intakes for commercial food or forage crops. The Red River is used for recreational purposes (Ref. 9).

3.3 GROUND WATER RELEASE TO SURFACE WATER PATHWAY

Movement of water in the alluvium is mainly towards the Red River, whose present bed is 15 feet to 35 feet above sea level. The Red River is cut into the alluvium along most of its course; therefore, there is a potential for a ground water to surface water pathway (Ref. 6, p. 12). The Red River is approximately ¾ miles southeast of the site.

3.4 SOIL EXPOSURE PATHWAY

Soil samples were collected by Ball Engineering, Inc. as part of the RFI from around the drip pads. EPA and the LDEQ identified these areas as being unpermitted for accepting solid or

hazardous waste (Ref. 2, p. 1). During the sampling, the facility was in the process of constructing a concrete rail and drip pads to satisfy the Wood Preserving Rules and Regulations promulgated December 6, 1990 (Ref. 2, p. 14). As part of the activities, the facility excavated about 2 feet of the fill and soil material at the facility. The concrete pad areas were constructed at ground surface. However, to bring the ground surface even with the edges of the pads, the facility had to backfill areas along the edges of the pads (Ref. 2, pp. 14, 15). In some of the areas requiring backfill, Colfax used soil that was previously excavated. Soil samples were not collected from the soil, but it was noted that some of the material was stained from previous wood-treating operations (Ref. 2, p. 15).

3.4.1 Resident Threat Receptors

No residents are on-site. The facility employs 100 workers (Ref. 10, p. 3). There are no residents within 200 feet of areas suspected of contamination (Ref. 1). There are no schools or daycare centers on-site or within 200 feet. The J. S. Slocum High School is located approximately 600 feet from the closed impoundment (Ref. 10, p. 5). There was no evidence of commercial, agriculture, silviculture, livestock production or terrestrial sensitive environments on-site (Ref. 10. p. 5).

3.4.2 Nearby Threat Receptors

Most of the facility is fenced (Ref. 10, p. 3). Portions of the site that are not fenced are heavily wooded. There is a security guard on-site for after hours (Ref. 10., p. 3).

The nearest regularly occupied building is on-site. The population within a ¼-mile radius is 675, within a ½-mile radius is 1,692, and within a 1-mile radius is 2,858 (Ref. 16). The J. S. Slocum High School is located within ¼-mile radius. The enrollment for the school was not determined.

3.5 AIR PATHWAY

3.5.1 Air Pathway Characteristics

There is a potential for gaseous or particulate migration based on the contaminants detected in the facility. Creosote and creosote by-products may volatilize and the chromium, copper and arsenic may be released via particulate migration. No air samples have been collected at the site.

3.5.2 Air Receptors

The nearest occupied building is on-site. There are 5 schools and 1 University within a 2-mile radius (Ref. 1). The enrollment of the schools was not determined. The population within the ¼-mile radius is 675; within ½ mile is 1,698; within 1-mile is 2,858; within 2-miles is 13,680; within 3-miles is 22,373, and within 4 miles is 13,286 (Ref. 16).

There are no commercial agriculture, silviculture or designated recreational areas within the ½-mile target radius (Ref. 1). There are approximately 100 acres of wetlands within a 4-mile radius (Ref. 18).

4.0 SUMMARY

Colfax Creosoting Company is located in Pineville, Louisiana. It is approximately ¾ mile northeast of the Red River near Pineville Junction. It is a wood preserving plant that originally began operations in Colfax, Louisiana in 1923. The facility moved to its present location in 1948.

Colfax originally treated wood using creosote. Colfax then switched to PCP and then CCA. In 1990, Colfax discontinued using CCA and now only uses creosote and PCP preservatives.

Discharge of wastewater prior to 1975 was to the main drainage ditch along with storm water drainage. Water from this ditch flowed into Huffman Creek and eventually into the Red River. After RCRA regulations, Colfax constructed a series of surface impoundments to handle water generated during the preservation process at the plant. Water was first discharged into a recovery lagoon, so that preservatives carried by the waste water could settle to the bottom for removal and recycling. Water from this pond was then transferred via a pump into a series of smaller settling ponds before being discharged into the City of Pineville sewer system. The waste water units were used from 1975 until 1983 when ground water contamination was detected. The units were ordered closed under RCRA guidelines. Final closure was approved in 1988 and the impoundments are currently in the post-closure phase.

Twenty SWMUs were identified for further investigation in the HWSA section of the post-closure permit. A RFI Phase I Report was completed in March 1993. The facility was found to be contaminated with 47 volatile and semi-volatile compounds associated with wood preserving plants. Most of the contamination was found in the process area.

Ground water is used as a municipal drinking water supply for Pineville and Alexandria. The nearest drinking water well is located 0.53 miles to the west. There are no wells within the 0 to ¼ and ¼ to ½-mile radii; there are 29 public supply wells within the remaining target radii. The wells are screened either in the Williamson Creek Member or Carnahan Bayou Member, which are approximately 400 feet and 700 feet below ground surface, respectively.

Ground water (alluvial deposits) below the closed recovery lagoons (surface impoundments) was found to be contaminated with creosote by-products and inorganic compounds.

The overland migration route is 2.2 miles to the Red River. The site is within the 100 year flood plain of the Red River. There are no drinking water intakes within the Red River. It is likely that the Red River is a fishery. There are wetland frontage miles along the Red River.

Soil samples were collected as part of the RFI around the drip pads. No background samples were collected. There are 100 workers on-site. No residents, schools or daycare centers are located within 200 feet of suspected contamination. The J. S. Slocum High School is approximately 600 feet southwest of the closed surface impoundments.

No air samples have been collected at the facility. The population within a 4-mile radius is 54,670. There are wetlands within the 4-mile radius. It is not known if there are other sensitive environments within the target radii.

PA DOCUMENTATION LOG SHEET

SITE:	Colfax Creosoting Company
IDENTIFICATION NUMBER:	LAD008184616
CITY:	Pineville
STATE:	Louisiana

REFERENCE NUMBER	DESCRIPTION OF THE REFERENCE
1	U.S.G.S. 7.5 Minute Series Topographic Map of Louisiana: Alexandria, Louisiana; 1979. Rapides, 1972. Libuse, 1972.
2	PRC Environmental Management, Inc. RFI Soil Sampling Report for Colfax Creosoting, Pineville, Louisiana. Prepared for U.S.E.P.A. Office of Waste Programs Enforcement. November 25, 1991.
3	RCRA Facility Assessment Evaluation, Preliminary Review and Visual Site Inspection Colfax Creosoting, Pineville, Louisiana. Prepared by Ecology & Environment, September 2, 1988.
4	Ball Engineering, Inc. TASK 1: Preliminary Report: Description of Current Conditions for Colfax Creosoting Company, Pineville, Louisiana. April 22, 1991.
5	Geology and Ground-Water Resources of the Alexandria Area, Rapides Parish, Louisiana. Water Resources Pamphlet No. 3, Department of Conservation, Louisiana Geological Survey, November 1955.
6	Water Resources of Rapides Parish, Louisiana. Water Resources Bulletin No. 8. Department of Conservation, Louisiana Geological Survey. April 1966.
7	Ground-Water Resources of Rapides Parish, Louisiana. Geological Bulletin No. 17. Department of Conservation, Louisiana Geological Survey. January 1990.
8	Record of Communication. Water Supply in Alexandria, Louisiana. From: Michelle Scanlon, ICF Technology, Inc. To: Charles Miller, Superintendent, City of Alexandria Water Department. January 18, 1989.
9	Record of Communication. Water Use in Pineville Area. From: Michelle Scanlon, ICF Technology, Inc. To: Richard Brackney, Pineville Courthouse. January 20, 1989.

PA DOCUMENTATION LOG SHEET

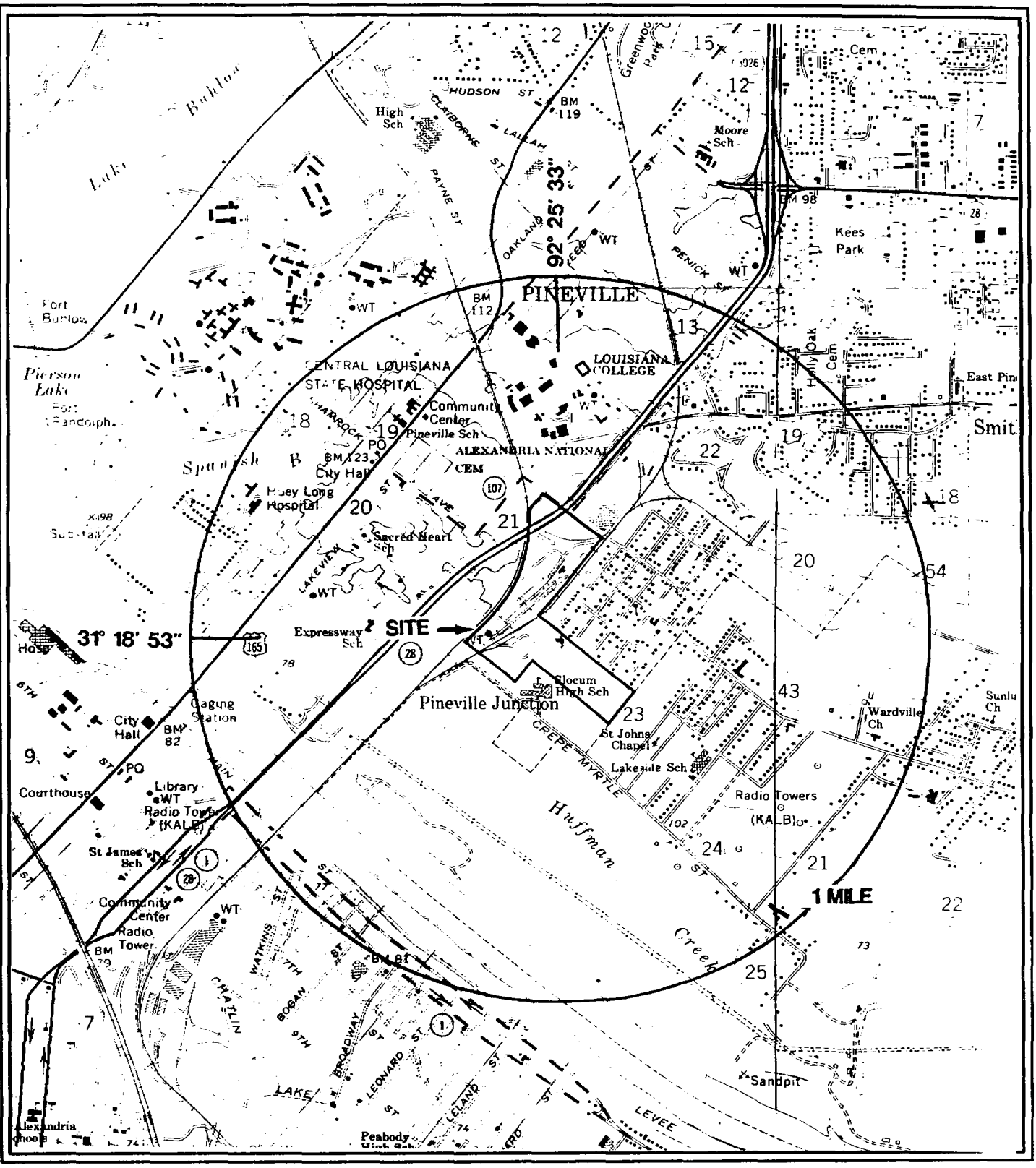
Continued

REFERENCE NUMBER	DESCRIPTION OF THE REFERENCE
10	Logbook Preliminary Assessment Inspection of Colfax Creosoting, Pineville. Kristine Lloyd, ICF Technology, Inc. May 24, 1993 - June 8, 1993.
11	Well Logs. Department of Transportation and Development. 4 Mile Radius of Colfax Creosoting.
12	Herschfield, David M. Technical Paper No. 40. Rainfall Frequency. Atlas of the United States Weather Bureau.
13	Soil Survey of Rapides Parish, Louisiana. U.S.D.A., Soil Conservation Service. 1988.
14	Ball Engineering, Inc. RCRA Facility Investigation Phase I Report for Colfax Creosoting Company. CERCLIS #LAD008184616. March 12, 1993.
15	Letter. HRS Precipitation Values. From: Andrew M. Platt, Group Leader, MITRE Corporation. To: Lucy Sibold, U.S. Environmental Protection Agency. May 24, 1988.
16	U.S. EPA Geographical Exposure Modeling System. 1990 Population. Accessed July 22, 1993 by Kevin Jaynes.
17	Louisiana Department of Environmental Quality Wellhead Protection Program. State of Louisiana. March 1990.
18	U.S. Department of the Interior, Fish and Wildlife Services, 15-minute National Wetlands Inventory Maps of Louisiana. Alexandria, LaCompte, Boyce. June 24, 1986.
19	Map. Location of Solid Waste Management Units. Ball Engineering, February 27, 1992.

REFERENCE 1

ICF TECHNOLOGY INCORPORATED

PREPARED BY	DRAWN BY	REVIEWED BY	APPROVED BY	CAD FILE	PROJECT NUMBER
KL		VLR		CO525	37631-120-01



N

0 2000

SCALE 1 : 24000

FIGURE 1

SITE LOCATION MAP

COLFAX CRESOTING
PINEVILLE, RAPIDES PARISH, LOUISIANA

CERCLIS #LAD008184616

QUADRANGLE LOCATION
ALEXANDRIA, LA. 1972
PHOTOREVISED 1979

REFERENCE 2

PRC Environmental Management, Inc.
1 Dalla ntre
350 No t. Paul Street
Suite 2600
Dallas, TX 75201
214-754-8765
Fax 214-922-9715

PRC

November 25, 1991

Mr. Jon Fenske
Work Assignment Manager
U.S. EPA Region 6
1445 Ross Avenue
Dallas, Texas 75202

Re: U.S. EPA Contract No. 68-W9-0041
Work Assignment No. 041-R264001
Soil Sampling Report - Colfax Creosoting

Dear Mr. Fenske:

Enclosed for your review are four copies of PRC's soil sampling report conducted at Colfax Creosoting in Pineville, Louisiana. This report summarizes the soil sampling activities conducted and the analytical results obtained. Detailed accounts of the preparation for, and field operations at, the site are documented in PRC's site logbook and are available for EPA review.

If you have any questions or comments concerning this report, please call me or Stephen Phillips at (214) 754-8765.

Sincerely,

Ken M. Goodman
Contractor Project Manager

KMG/cci
enclosure

cc: File

contains recycled fiber and is recyclable

RFI SOIL SAMPLING REPORT
FOR
COLFAX CREOSOTING
PINEVILLE, LOUISIANA

Prepared for

U.S. ENVIRONMENTAL PROTECTION AGENCY
Office of Waste Programs Enforcement
Washington, DC 20460

Work Assignment No.	:	R264001
EPA Region	:	6
Site No.	:	LAD008184616
Date Prepared	:	November 25, 1991
Contract No.	:	68-W9-0041
PRC No.	:	041-R264001
Prepared by	:	PRC Environmental Management, Inc. Ken M. Goodman
Telephone No.	:	214/754-8765
EPA Work Assignment Manager	:	Jon Fenske
Telephone No.	:	214/655-6785

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A SAMPLE SUMMARY
B ANALYTICAL RESULTS
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1.0 INTRODUCTION

This report summarizes the activities and analytical results of the soil sampling conducted by PRC Environmental Management, Inc. (PRC), personnel at the Colfax Creosoting Company (Colfax) in Pineville, Louisiana. These sampling and analytical support activities were conducted under Work Assignment No. 041-R264001 of U.S. Environmental Protection Agency (EPA) contract No. 68-W9-0041. The field activities and analytical results described in this report represent a one-time Resource Conservation and Recovery Act (RCRA) facility investigation (RFI) sampling event. This report describes the (1) purpose and objectives, (2) facility description and operations, (3) sampling activities, (4) general observations, and (5) sample analysis results.

2.0 PURPOSE AND OBJECTIVE

PRC received Work Assignment No. 041-R264001 from EPA Region 6 in September 1991. Under this work assignment, PRC was required to provide EPA with soil sampling and laboratory analytical support. According to the EPA scope of work (SOW) and discussions with the EPA work assignment manager (WAM) - Mr. Jon Fenske - the purpose of the sampling visit was to obtain soil analytical data in areas at the facility where EPA Region 6 is considering conducting an RFI under the RCRA permitting process. EPA requested that this one-time RFI soil sampling event be conducted before the areas being considered for future RFI are covered with new drip pads that are currently being constructed by the facility. The sampling and analytical data to be obtained by PRC may also be used by regional or state compliance staff personnel for enforcement purposes.

The objective of the sampling event, as outlined in the EPA SOW, was to collect 10 soil samples. These soil samples were to be collected as grab samples from depths and locations to be determined by the EPA WAM. Four of the grab samples were to be collected from hand auger boreholes to be installed in an area adjacent to a drip pad that was being constructed by the facility. Two grab samples were to be collected from an area around the current drip track, and two other grab samples were to be collected from an on-site landfill area that EPA and the Louisiana Department of Environmental Quality (LDEQ) identified as being unpermitted for accepting solid or hazardous wastes. Collection of the final two of the 10 samples was required for laboratory quality assurance and quality control (QA/QC) purposes.

The boreholes from which six of the 10 samples were to be collected were required to be augered to a maximum depth of 5 feet below ground surface (BGS). The grab samples from these boreholes were to be collected at intervals identified by EPA.

3.0 FACILITY DESCRIPTION AND OPERATIONS

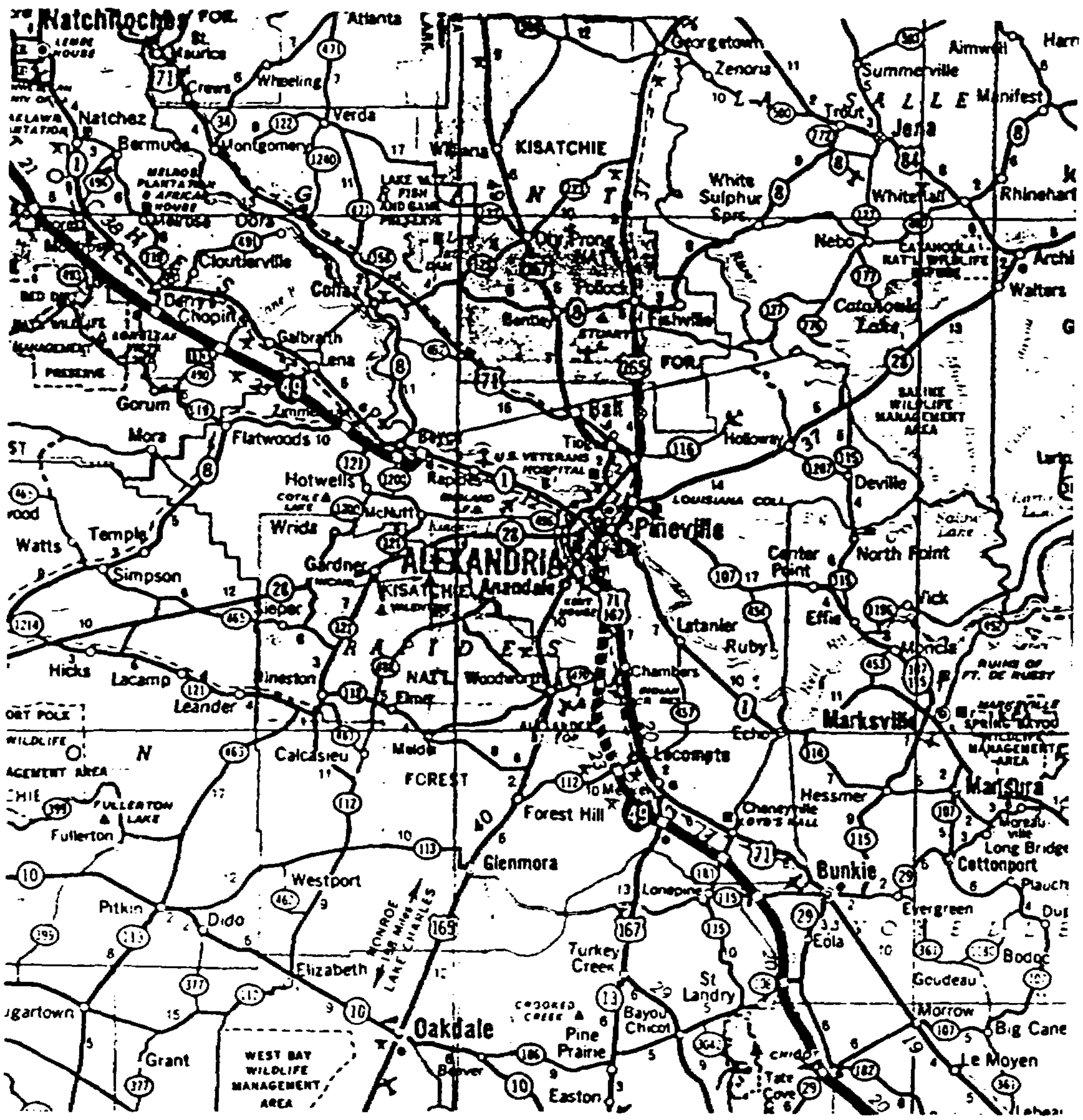
Since 1948, Colfax Creosoting Company (Colfax) has operated a wood-treating facility in Pineville, in the northern half of Rapides Parish, Louisiana (Photo 1) (Figure 1). The company property is about 3/4 mile northeast of the Red River near the city of Pineville Junction (Figure 2). Throughout the facility's history, it has received, prepared and stored untreated material, preserved the material, and shipped the final product (Photos 2 and 3). Since its establishment, Colfax has used the same types of wood-treating methods and has conducted the same types of operations, with modifications to the wood-treatment system. Also, since 1990, Colfax has been required to respond to two EPA enforcement actions.

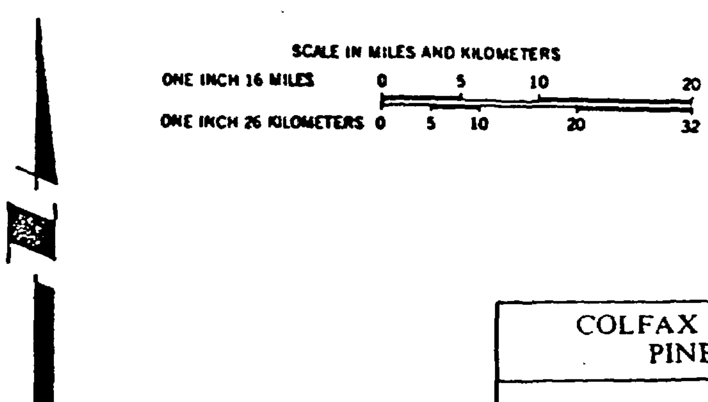
Colfax Creosoting Company originally established operations in 1923 in Colfax, Louisiana. The operation was moved to its current location in 1948. From 1948 to 1958, Colfax treated wood by using creosote as the main preservative. From 1958 to 1972, Colfax added a pentachlorophenol (PCP) treatment system to its operations. In 1972, Colfax began using copper, chromium, and arsenic (CCA) as a preservative in the creosoting process. In 1990, Colfax stopped using the CCA preservation system but continued its use of the creosote and PCP preservation systems.

Wood-preserving processes at the Colfax facility include (1) transporting the untreated wood by railcar into the treatment cylinder, (2) removing water from the wood by using a vacuum process, (3) treating the wood under high-pressure to force the preservative into the wood, and (4) removing the treated wood by railcar from the cylinder after 2 hours and letting the excess preservatives drip from the wood (Photo 4).

Since 1948, the drip pads at the facility have been in areas where the soil was unprotected, thereby allowing any of the remaining preservatives to drip onto the ground (Photo 4). On December 6, 1990, EPA promulgated the "Wood Preserving Rules and Regulations" in the Federal Register, requiring wood-preserving facilities to construct concrete drip pads in the dragout area from the treatment cylinders to minimize surface soil and subsequent subsurface soil contamination (Photo 5). According to the rules, the facilities are required to complete the pad construction by May 6, 1992.

On January 22, 1991, Colfax received a Hazardous and Solid Waste Amendment (HSWA) permit from EPA Region 6. Under its HSWA permit, the facility is required to conduct an RFI at 20 solid waste management units (SWMU).



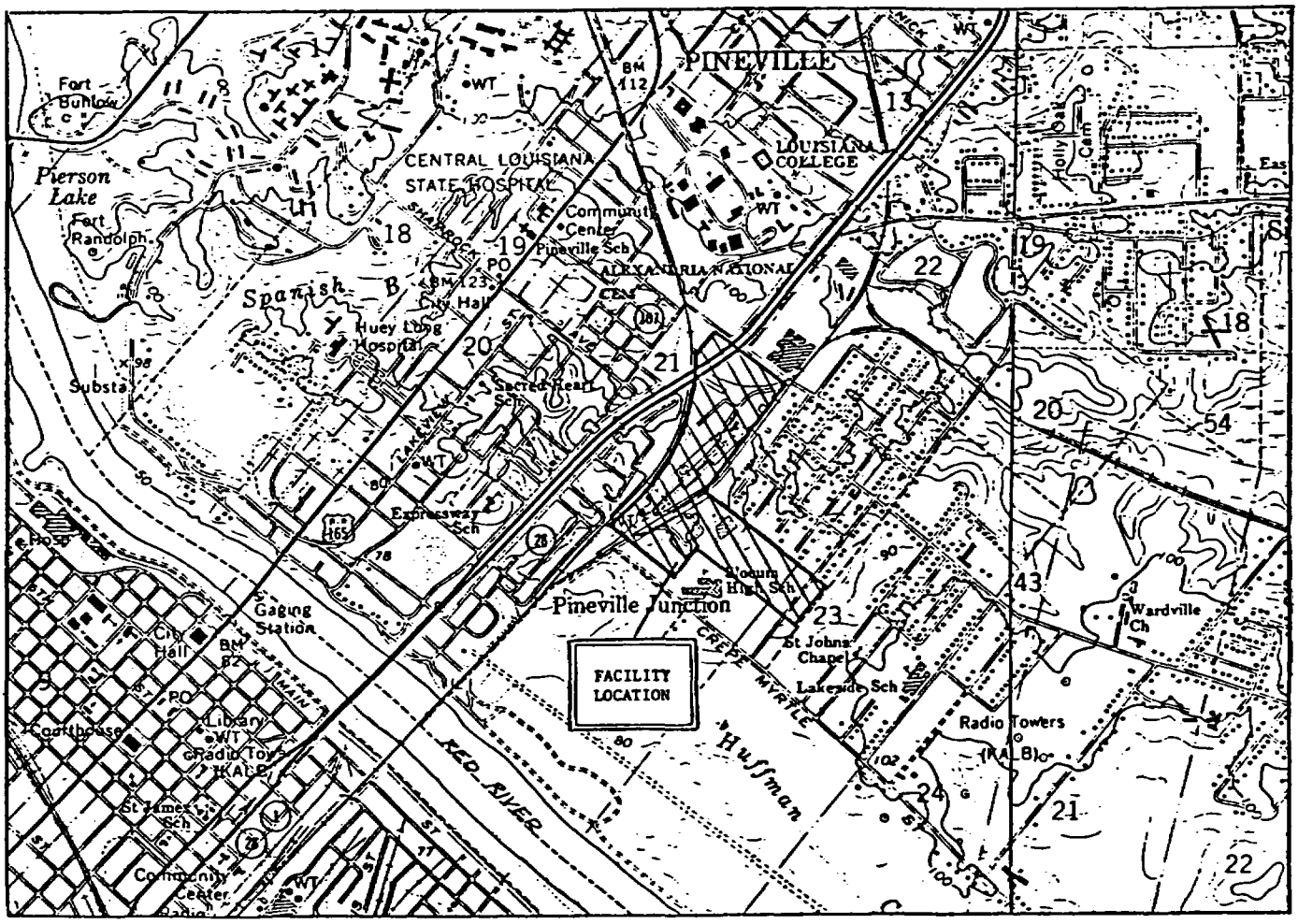


COLFAX CREOSOTING COMPANY
PINEVILLE, LOUISIANA

Figure 1
Regional Location

FRC ENVIRONMENTAL MANAGEMENT, INC.

Source: USGS, 1979



1 ½ 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

N

COLFAX CREOSOTING COMPANY
PINEVILLE, LOUISIANA

Figure 2
Facility Location

PRC ENVIRONMENTAL MANAGEMENT, INC.

Source: Gousha, 1990

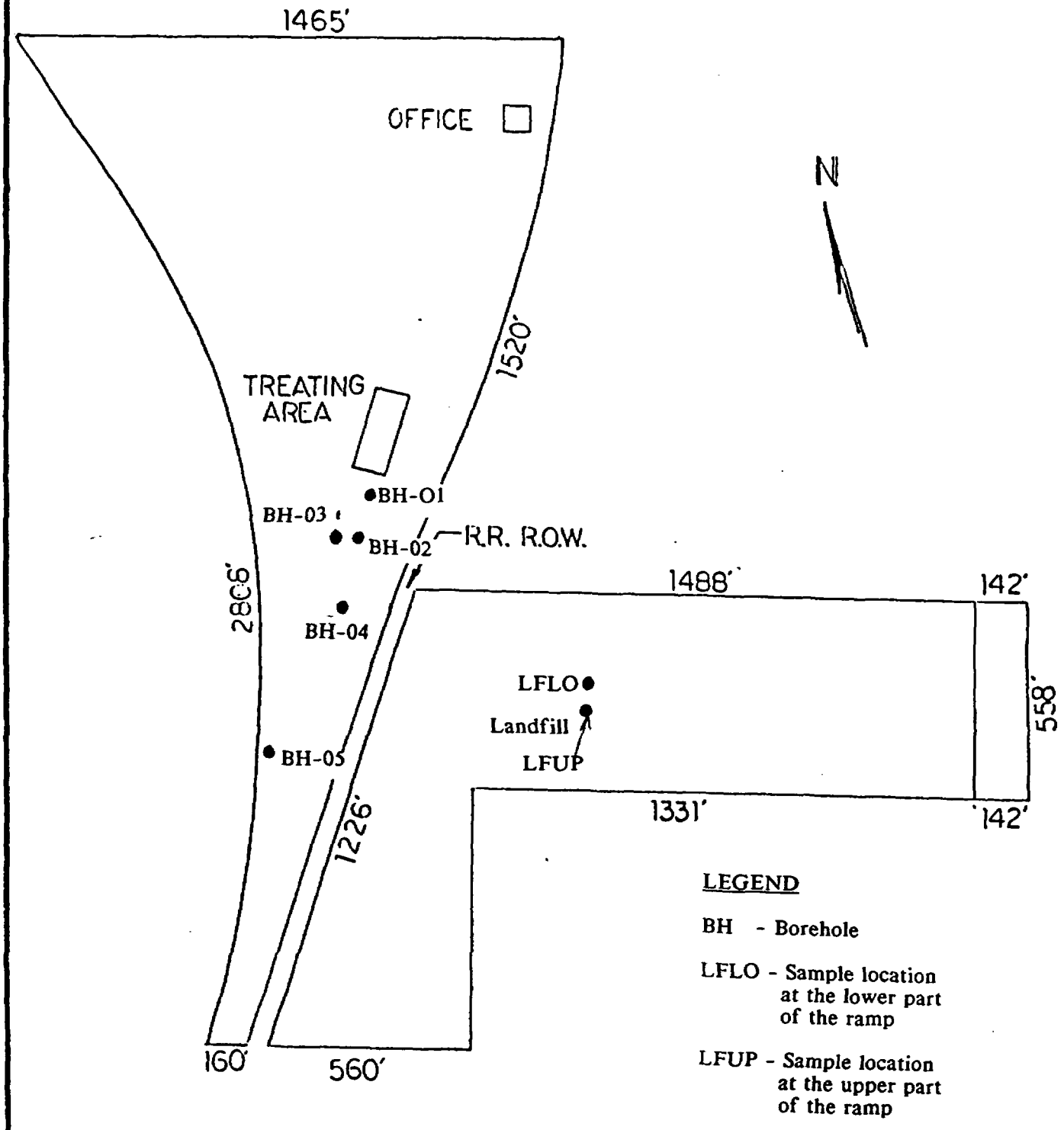
4.0 SAMPLING ACTIVITIES

On September 19, 1991, PRC personnel arrived at the Colfax facility to conduct soil sampling activities. Upon arrival, PRC met with EPA, LDEQ, and Colfax personnel and discussed EPA's purpose and objectives for the sampling activities at the facility. Personnel at the meeting included:

- Jon Fenske - EPA
- O.T. Bourgoyne - LDEQ
- Rick Kaiser - LDEQ
- Robert Durbin - LDEQ
- David McQueen - LDEQ
- Clyde Norton - Colfax
- Carl Johnson - Colfax
- Ken Goodman - PRC
- Mark Maki - PRC

After the meeting, EPA, LDEQ, and PRC walked through the facility to identify potential sampling locations. Following EPA's final identification and approval of sampling locations, PRC began preparing equipment for sampling. Figure 3 shows the sampling locations identified by the EPA WAM.

Following the identification of sampling locations, PRC began sampling activities. Activities conducted at each of the sampling locations consisted of (1) equipment preparation, (2) hand-augering of boreholes, (3) field screening of soil samples with a Microtip photoionization detector (PID), (4) sample collection, (5) equipment decontamination, (6) equipment rinsate sample collection, (7) auger hole abandonment, and (8) sample packaging, documentation, and shipment. For each of the sampling locations, the sampling procedures were the same. This section summarizes the procedures followed by PRC.



COLFAX CREOSOTING COMPANY
PINEVILLE, LOUISIANA

Figure 3
Sampling Locations

Source: Ball Engineering, 1991

ERC ENVIRONMENTAL MANAGEMENT, INC.

4.1 EQUIPMENT PREPARATION

For each type of equipment used by PRC at each location, the following summarizes (1) the method of preparing it for sampling, and (2) its functions in the samping process.

1. Microtip photoionization detector (PID)

   a. The Microtip was checked out and calibrated at the first sampling location only.

   b. Functions

      (1) Monitor background conditions.

      (2) Take readings at the mouth of the boreholes and headspace readings of soil samples placed in ziplock plastic bags.

2. Hand auger and extensions

   a. The hand auger and extensions were initially cleaned and decontaminated. Decontamination procedures included washing in Alconox solution and rinsing with water potable water.

   b. The hand auger was used to drill boreholes and retrieve samples to a predetermined depth of 5 feet below ground surface (BGS).

3. Stainless steel utensils, including spoons, knives, spatulas, and shovel

   a. These tools were prepared by decontamination

   b. Functions

      (1) Remove soil from the hand auger.

      (2) Place the selected soil samples in the appropriate containers.

4. Visqueen

   a. A sheet of visqueen was applied to the ground surface and under the decontamination tubs.

   b. Functions

      (1) Prevent soil samples from coming into contact with other potentially contaminated material.

      (2) Prevent decontamination water from contacting any other surface.

4.2 BOREHOLE AUGERING

At five locations identified by the EPA WAM, PRC used a stainless steel hand auger to bore holes for soil sample retrieval (Photo 7). Each borehole was advanced to about 5 feet BGS, or to a depth determined by the EPA WAM. In areas where the facility had excavated soil for the construction of the concrete pads, PRC used the preexisting ground surface level as the benchmark, at the direction of the EPA WAM (Photo 7).

At each location, PRC augered the borehole at about 10-inch intervals, or at intervals to which the auger bit would permit. After removing the auger, with the collected soil sample, from the hole, PRC removed the soil sample from the auger bit and placed it on a sheet of visqueen for visual observation, field screening methods, and lithologic description (Photo 8). Before reentering the borehole with the hand auger, PRC measured the depth of the hole to confirm the exact depth at which the sample was obtained. PRC also changed the lead auger bit or removed all soil from the auger bit to prevent cross contamination between the auger intervals (Photo 9).

4.3 FIELD SCREENING

For each auger sample that was removed from each borehole, PRC logged all observations for waste content (visual and odor) and collected a representative sample for headspace analysis by using a Microtip photoionization detector (Photo 9). Visual observations were logged in the field logbook and verified on-site by the EPA WAM. Results of the headspace analysis performed for each sample were also logged in the field logbook.

4.4 SAMPLE COLLECTION

PRC collected a total of 10 soil samples at Colfax and submitted them to the laboratory for chemical analysis, at the direction of the EPA WAM. Seven of the soil samples were collected from a total of five boreholes. These seven soil samples were split with the facility. Three of the soil samples were collected from two areas identified by the EPA WAM at the on-site landfill. The facility chose not to split the samples collected from the landfill.

The seven soil samples collected from the boreholes were selected by using the field screening techniques described in Section 4.3. After the sample interval was determined, PRC used stainless steel utensils to handle and place the soil samples in the laboratory-cleaned jars. To provide a proper split sample for the facility, PRC split the soil obtained from the auger bit

vertically, down the middle. PRC first filled its containers, then the facility's containers (Photo 10).

The three soil samples collected from the on-site landfill was based on field observations alone. The sites were confirmed and approved in the field by the EPA WAM. The soil samples were collected from the landfill area by removing about 6 inches of upper soil cover with a shovel. PRC used stainless steel utensils to fill the laboratory-cleaned containers. After collecting the samples at each location, PRC properly labeled the sample container before final packaging.

4.5 EQUIPMENT DECONTAMINATION

Equipment used at each location was decontaminated between locations to prevent cross contamination. Decontamination was conducted as follows:

- Remove all excess soil from equipment.
- Wash equipment in an Alconox and potable water bath.
- Rinse equipment in a potable water bath.
- Rinse equipment with deionized water.
- Rinse equipment with hexane.
- Rinse equipment with deionized water.
- Wrap equipment with foil to prevent the collection of dust or other foreign material on equipment while transporting it between locations.

The potable water used by PRC was collected from a water outlet at the Colfax facility. The deionized water used by PRC was purchased from a local vendor. PRC confirmed that the deionized water was produced by reverse osmosis.

All of the decontamination water and rinses were collected in a 55-gallon drum provided by the facility (Photo 6). After the final decontamination activities were completed, the facility allowed EPA to dispose of the drum contents at the facility's wastewater treatment unit.

4.6 EQUIPMENT RINSATE SAMPLE COLLECTION

Two equipment rinsate samples were collected during the sampling event conducted at Colfax. The first rinsate sample was collected at the first borehole location following collection of the samples from the borehole and decontamination of the equipment. The second rinsate sample was collected after the collection of the last soil sample at the on-site landfill.

The purpose of collecting an equipment rinsate sample is to provide a means of qualifying the decontamination procedures used. It also serves to identify any potential cross contamination between the sampling locations. PRC, under the direction of EPA, chose to collect two rinsate samples to provide better QA/QC procedures.

The rinsate samples were collected by (1) pouring high grade reagent water over the decontaminated equipment used for collecting the samples, and (2) collecting the rinse water in the appropriate container by using a stainless steel funnel. The high-grade reagent water used for the rinsate sample was supplied by the laboratory contracted to analyze the samples.

4.7 AUGER HOLE ABANDONMENT

After completing the augering and sample collection from each borehole, PRC backfilled the boreholes with the soil that was removed from the boreholes. This was done to avoid generating any excess soil or waste. Also, because the soil borings were only 5 feet BGS, providing a route for contaminants to migrate was not a critical concern.

4.8 SAMPLE DOCUMENTATION, PACKAGING, AND SHIPMENT

PRC used the U.S. EPA chain-of-custody forms for the sample documentation requirements. PRC also followed the Contract Laboratory Program (CLP) Guidance Document (1988) for sample packaging and shipment. The completed chain-of-custody forms used for case documentation are provided as Attachment C.

After collecting the samples and placing them in the appropriate sample containers, PRC used the following methods for packaging and shipment:

- Label the container.
  - Location
  - Time of collection
  - PRC sample identification number
- Place a piece of clear tape over the label.
- Place a chain-of-custody seal over the lid of the container, making it impossible to open the container without breaking the seal.
- Wrap electric tape around the lid of the container to prevent cross contamination during shipment.

- Place the container in a plastic bag to prevent cross contamination during shipment.
- Place the packaged sample in the cooler for shipment.
- Place packaging material and ice around the samples to prevent breakage of the containers and to ensure that the samples arrive at the laboratory at the required temperature.
- Place the sample chain-of-custody forms in a plastic bag, and tape the bag to the inside of the cooler lid.
- Tape the cooler lid shut with strapping tape, and submit the cooler to the carrier for transport. PRC used Federal Express for sample overnight shipment.

After PRC completed packaging the 10 soil and 2 water samples, PRC shipped them to the following laboratory that was contracted by PRC for doing the chemical analysis.

- Curtis & Tompkins
  2323 Fifth Street
  Berkley, California 94710

5.0 GENERAL OBSERVATIONS

General observations consisted of visual observations of soils being removed from boreholes and the landfill, and of facility construction operations.

5.1 BOREHOLES

On September 19, 1991, PRC hand-augered five boreholes - at the locations shown on Figure 3 - to depths ranging from 4 to 5 feet BGS. At each borehole, PRC lithologically described the samples, visually screened them, and collected headspace readings. The lithological descriptions consisted of identifying the type of sediment encountered, its physical characteristics, and its moisture content. Visual observations made in the field by PRC consisted of identifying the (1) occurrence and extent of visible contamination, and (2) contaminant odors in the soil. Headspace analysis conducted by PRC consisted of placing a soil sample into a plastic ziplock bag, letting it sit in the sun for about 5 minutes, and using a Microtip to detemine the potential presence of volatile organic compounds (VOC) in the headspace. The lithological, visual, and headspace readings were conducted on each soil sample removed from each borehole. The following is a discussion of the findings for each borehole and sampling location. The lithology is summarized in one paragraph, because the natural soils were consistent in lithological content across the site. Attachment D consists of borehole logs for each borehole.

5.1.1 Lithology

The lithology of the natural soils underlying the site ranged from gray to reddish-brown, silty to sandy clays, with limonite and organic debris. The moisture content of the recovered soil ranged from dry to slightly moist. In areas where excavation activities had not occurred, due to the construction at the facility, fill material was encountered from the surface to an average of about 20 inches BGS. All lithological descriptions of the recovered soils were prepared by a PRC geologist. No soil samples were submitted for geotechnical analysis.

5.1.2 Borehole 01

This sampling point was located about 65 feet south of the no. 1 treatment cylinder and about 5 feet west of the newly-constructed concrete rail pad leading into the no. 1 treatment cylinder (Photos 7 and 11). PRC initially removed about 12 inches of visibly contaminated fill material by using a shovel. PRC then used the hand-auger method and completed the boring at a depth of 48 inches BGS. Visible contamination and a strong contaminant odor were noted from the surface to 37 inches BGS. The headspace readings collected from the recovered soil samples ranged from about 41.3 parts per million (ppm) at the 12- to 15-inch interval to about 1.9 ppm at the 41- to 48-inch interval. After the borehole was completed the recovered soils were screened, EPA decided to collect one sample from 28 to 37 inches BGS. PRC also collected a duplicate soil sample from this interval as one of its QA/QC samples.

5.1.3 Borehole 02

BH-02 was located about 150 feet south of the no. 2 treatment cylinder, specifically at the northernmost end of the uncompleted concrete rail pad that was being constructed for the no. 2 treatment cylinder (Photo 12). At this location, Colfax had already excavated about 2 feet of surface soil and fill material from the area. However, at the direction of EPA, PRC used the previously existing grade as the point of reference when measuring the depth of the borehole. Before starting the boring at this location, PRC and LDEQ personnel noticed heavy staining on the soils exposed in the sides of the excavated area (Photo 13). Also, before starting the augering, PRC removed 1 inch of sand used as a base for the construction of the pad. Under this sandy cover, staining of the soil was visible (Photo 14).

After its initial observations, PRC hand-augered the boring to a depth of 53 inches BGS. Visible waste and an odor were noted from 24 to 33 inches BGS. Headspace analysis ranged from

3.7 ppm at the 30- to 37- inch interval to 1.9 ppm at the 20- to 29-inch interval. At the direction of EPA, one sample was collected from 37- to 44-inches BGS.

5.1.4 Borehole 03

BH-03 was located at the switch track control device about 250 feet south of the no. 3 treatment cylinder (Photo 15). At this location, the switch track mechanical arms were about 18 inches BGS (Photo 15); therefore, the augering of this borehole was started at that depth. The ground surface above the switch track arms was used as the reference point for measurements. The total depth (TD) of this borehole was about 57 inches BGS. Visible contamination and an odor were noted from 18 to 57 inches BGS, except in the 29- to 36-inch interval sample that was recovered. Photo 16 shows heavy contamination in the soil sample that was recovered from the 43- to 51.5-inch interval. Headspace readings ranged from 1.7 to 18.9 ppm. However, the readings from this borehole did not decrease from the surface to TD. As noted in the borehole log for BH-03, the readings increased from 1.7 ppm at the 29- to 36-inch interval to 18.9 ppm at the 51.5- to 57-inch interval.

PRC, at the direction of EPA, collected two soil samples from this borehole. The first sample was collected from the 43- to 51.5-inch interval, where the most heavily contaminated soil was identified (Photo 16). At the direction of EPA, the second sample was collected from the 51.5- to 57-inch interval. After collecting the second sample, EPA decided to advance the auger one more interval. When lowering the auger into the hole, PRC found that about 2 inches of ground water had accumulated in the hole. PRC retrieved the auger from the hole and found that the water had left a sheen on the auger bit (Photo 17). It was then decided not to recover another soil sample interval from the boring. After the discovery of the accumulation of ground water, Colfax personnel recovered a sample of the water from the hole. LDEQ also recovered a sample of the water from the hole; however, it is not known whether the sample was submitted for analysis.

5.1.5 Borehole 04

BH-04 was located 5 feet west of the no. 1 treatment cylinder drip pad, which was at the south end of the concrete rail track. This area was also excavated for the construction of the drip pad and concrete rail track area. About 28 inches of fill and soil had been excavated. Therefore, the top of the borehole started at 28 inches BGS, with the ground surface used as the measurment reference point. PRC augered this borehole to a TD of 68 inches BGS. No visible contamiantion or odors were present in the entire depth of this borehole. However, headspace readings were 5.5 ppm in the 32- to 40-inch interval and 2.9 ppm in the 60- to 68-inch interval. At the

direction of EPA, PRC collected one soil sample from this borehole. The sample was collected from 53 to 60 inches BGS.

5.1.6 Borehole 05

BH-05 was located at the southernmost end of the facility property, west of a newly-constructed drip pad area, at which a cover was also being constructed (Photos 18, 19, and 20). This area had also been excavated by about 2 feet for the installation of the drip pad. The original ground surface was used as the measuring point of reference while augering the borehole. The only visible contamination noted in this borehole was in the bottom 4 inches of the 24- to 36-inch interval and in the upper portion of the 36- to 42-inch interval. Headspace analysis ranged from 4.8 ppm at the 24 to 36 inch interval to 5.1 ppm at the 54.5- to 60-inch interval. Although the headspace readings increased with depth, it was not at elevated levels. As directed by EPA, PRC collected one soil sample from the 36- to 42-inch interval.

5.2 LANDFILL AREA

The landfill area is located in the south-southwest portion of the property. At the landfill, two areas were identified by EPA for sampling (Photos 21 and 22). One of the sampling locations was located on the top of a ramped area (Photo 21); the other was at the base of this ramped area (Photo 22). The types of material deposited in this landfill consisted of (1) excavated fill and soil material from the areas where the new drip and rail pads were being constructed, (2) concrete from the excavated areas, and (3) timber ties from various areas around the facility. The first samples were collected from the base of the ramped area. A portion of the first sample collected consisted of a piece of black waste material. The second sample was collected from the upper portion of the landfill. PRC also collected a duplicate sample from this area to fulfill its QA/QC requirements for the laboratory. Before collecting the samples from these areas, PRC removed about 6 inches of material from the surface and then collected the samples (Photo 23).

5.3 CONSTRUCTION OPERATIONS

While the sampling event was being conducted on September 19, 1991, the facility was in the process of constructing the concrete rail and drip pads to satisfy the Wood Preserving Rules and Regulations promulgated in the Federal Register on December 6, 1990. As part of the construction activities, the facility excavated about 2 feet of the fill and soil material at the facility. The concrete pad areas were thereby constructed at ground surface level. However, to bring the ground surface level even with the edges of the pads, the facility had to backfill areas

along the edges of the pads. In some of the areas requiring backfill material, Colfax was using the material that was excavated (Photos 24 and 25). Although soil samples of this backfill material were not collected and submitted for analysis, it was noted that some of the material exhibited staining from the previous wood-treating operations.

6.0 ANALYTICAL SUMMARY

As outlined in the EPA SOW, PRC was required to contract a laboratory to provide the analytical support for the soil and water samples collected at the Colfax facility. The following is a discussion of the (1) analytical parameters and methods required by the EPA SOW and those that were used, and (2) data review of the analytical results.

6.1 ANALYTICAL PARAMETERS AND METHODS

The analytical parameters identified by EPA were specific semivolatile organic compounds (SVOC) and metals that are specifically associated with the wood-preserving facilities - K001 listed wastes. The SVOC parameters identified consisted of pentachlorophenol (PCP), phenolics, and polycyclic aromatic hydrocarbon compounds (PAH). The metals identified consisted of arsenic, cadmium, chromium, copper, lead, zinc, and mercury.

The analytical methods selected for analyzing the SVOC and metals were the U.S. EPA SW-846 method 8240 and the toxicity characteristic leaching procedure (TCLP). According to the SOW, the U.S. EPA SW-846 method 8240 was to be used on the samples to be collected from the drip pad areas, and the TCLP method was to be used on the samples to be collected from the landfill.

The EPA WAM indicated that EPA intented to get the lowest detection limit available for the SVOC, specifically for PCP. In discussions with the contracted laboratory, it was presented to PRC that the lowest detection limit available for the SVOCs would be attained by using the contract laboratory program (CLP) procedures. The CLP procedures are those frequently used by EPA when EPA chooses to use the CLP program for data analysis. Not only does it provide a lower detection limit for the SVOCs, but it also requires a greater QA/QC protocol for laboratory procedures. For these reasons, the CLP methods were used for the analysis of the SVOC parameters. Also, by using the CLP procedures, the entire suite of SVOCs could be analyzed, instead of the limited list required by the SOW.

After collecting the 10 soil and 2 water samples from Colfax, EPA and PRC personnel discussed which samples should be analyzed with which of the two methods identified above.

After this discussion, EPA directed PRC to have the (1) two soil and one rinsate samples collected from BH-01, (2) the upper soil sample collected from BH-03, and (3) one soil sample collected from the lower end of the ramp in the landfill area, to be analyzed for the above listed SVOCs and metals by using the TCLP analytical method. The remaining six soil and one water samples were submitted to the laboratory to be analyzed by using the CLP SVOC methods discussed above. Attachment A is a summary of the samples collected and the analytical methods used for those samples. Attachment C contains the chain-of-custody forms that were sent to the laboratory with the sample shipment.

6.2 DATA REVIEW OF THE ANALYTICAL RESULTS

Review of the data package indicates that the data is provisional, based on the quality control criteria that were not met. Because of the nature of these criteria, the data are still usable. The organics portion of the data package met all of the quality control criteria, but parts of the inorganics portion failed to meet the quality control criteria.

Review of the inorganics portion of the data packages revealed several quality control criteria not being met. The cadmium estimate qualifier is the result of laboratory precision not being met. The mercury and selenium estimate qualifiers are because the matrix spike recovery was below the recovery criteria limits. The arsenic estimated qualifiers are the results of instrument and laboratory precision failures and matrix spike recovery failure.

Review of the organics raw data indicated that dilutions were required for samples BH-03, BH-05, landfill-upper (LFUP), and landfill-upper-duplicate LFUPD. The BH-05 fluoranthene results and the LFUP fluoranthene and pyrene results were recorded as nondetects on their first runs, and were identified and reported on their higher dilution runs. Review of the data reveals that the laboratory personnel missed reporting these compounds on the first run. There were Tentatively Identified Compounds (TIC) associated with all samples. Table 1 shows the number of TICs per sample and sample dilution.

TABLE 1

TENTATIVELY IDENTIFIED COMPOUNDS (TIC) AND SAMPLE DILUTION

Sample	No. of TICs	Dilution
BH-02	10	2:1
BH-03	10	100:1
BH-03	0	1000:1
BH-04	9	2:1
BH-05	21	2:1
BH-05	17	10:1
LFUP	16	100:1
LFUP	4	1000:1
LFUPD	15	100:1
LFUPD	6	1000:1

Notes:

Source -

BH = borehole
LFUP = landfill-upper
LFUPD = landfill-upper-duplicate

ATTACHMENT A

SAMPLE SUMMARY

ATTACHMENT A

SAMPLE SUMMARY

Date	Time[a]	PRC Sample No.	PRC Location No.[b]	Sample Type	Matrix	Depth[c]	PID Reading[d]	Sampling Method	Parameters[e]	QA/QC[f]
09/19/91	1140	CCI-RPN-03	BH-01	Grab	Soil	28-37	3.6	Auger	TC[j]LP, SVOC, & MET	
09/19/91	1140	CCI-RPN-03	BH-01	Grab	Soil	28-37	3.6	Auger	TCLP[j], SVOC, & MET	Duplicate
09/19/91	1215	CCI-RPN-01	BH-01	Composite	Water	NA[i]	NA[i]	NA[i]	TCLP[j], SVOC, & MET	
09/19/91	1310	CCI-DPN-04	BH-02	Grab	Soil	13-20	1.9	Auger	CLP[j], SVOC, & MET	
09/19/91	1405	CCI-DPST-05	BH-03	Grab	Soil	43-51.5	11.9	Auger	TCLP[j], SVOC, & MET	
09/19/91	1430	CCI-DPST-06	BH-03	Grab	Soil	51.5-57	18.9	Auger	CLP[j], SVOC, & MET	
09/19/91	1545	CCI-DPS-04	BH-04	Grab	Soil	53-60	6.5	Auger	CLP[j], SVOC, & MET	
09/19/91	1655	CCI-SDP-03	BH-05	Grab	Soil	36-42	6.3	Auger	CLP[j], SVOC, & MET	
09/19/91	1715	CCI-LFLO-01	LFLO[g]	Grab	Soil	NA[i]	NA[i]	Auger	TCLP[j], SVOC, & MET	
09/19/91	1720	CCI-LFUP-01	LFUP[h]	Grab	Soil	NA[i]	NA[i]	Auger	CLP[j], SVOC, & MET	
09/19/91	1720	CCI-LFUP-01	LFUPD[h]	Grab	Soil	NA[i]	NA[i]	Auger	CLP[j], SVOC, & MET	Duplicate
09/19/91	1800	CCI-LFUP-01	LFUP[h]	Composite	Water	NA[i]	NA[i]	Auger	CLP[j], SVOC, & MET	

Notes:

a Time expressed in military hours
b Identifies the borehole and landfill locations from which samples were collected
c Depth indicates intervals, in inches, below ground surface, from which sample was collected
d Photoionization detector (PID) readings obtained from the sample collected for chemical analyses
e Parameters: SVOC - Semivolatile organic compound
MET - Metals
f Quality Assurance/Quality Control: MS/MSD - Laboratory QA/QC matrix spike, and matrix spike duplicate
Duplicate - Laboratory QA/QC duplicate sample
g LFLO - indicates landfill sample collected at the lower portion of the ramp area
h LFUP - indicates landfill sample collected at the upper portion of the ramp area
i NA - Not applicable to the sample or collection of the sample
j Analytical Methods TCLP - Toxicity characteristic leachate procedure
CLP - Contract Laboratory Program

ATTACHMENT B

ANALYTICAL RESULTS

ATTACHMENT B

ANALYTICAL RESULTS

Sheet 1 of 4

CLP Metals (mg/kg Dry Weight)

	BH-02 Soil	BH-03 (Soil)	BH-04 (Soil)	BH-05 (Soil)	LFUP (Soil)	LFUPD (Soil)
Arsenic[a]	5.2	3.0U	3.0U	4.0	8.3	10.7
Cadmium[a]	0.52	0.30U	0.30U	0.38	0.43	0.29U
Chromium	17.9	8.9	12.7	9.9	12.0	12.7
Copper	7.6	5.4	5.8	16.2	16.0	17.6
Iron	17,900	10,300	10,800	11,800	9,540	9,040
Mercury[a]	0.12U	0.11U	0.12U	0.11U	0.12U	0.12U
Zinc	41.6	19.6	17.9	78.4	51.9	47.4
Moisture Percent	19.4	16.5	16.6	16.5	13.9	14.3

CLP Metals (ug/L)

	LFUP (water)
Arsenic	5.0U
Cadmium	5.0U
Chromium	10.0U
Copper	10.0U
Iron	100.0U
Mercury	0.2U
Zinc	21.4

Notes:

U = Indicates analyte was analyzed for, but not detected.
[a] = These results are considered estimates due to quality control failure for these analytes.

ATTACHMENT B

ANALYTICAL RESULTS

Sheet 2 of 4

CLP Organics (Parts per Million)

	BH-02 (soil)	BH-03 (soil)	BH-04 (soil)	BH-05 (soil)	LFUP (soil)	LFUPD (soil)	LFUP (water)
Napthalene	ND	190	ND	ND	ND	ND	ND
2-methylnapthalene	ND	100	ND	0.640(J)	ND	ND	ND
Acenaphthene	ND	280	ND	7.4	410	250	ND
Dibenzolfuran	ND	210	ND	2.4	130	91	ND
Fluorene	ND	280	ND	6.7	330	240	ND
Phenanthrene	ND	1,000	0.460(J)	24	1,800	1,200	ND
Anthracene	ND	85	ND	12	400	230	ND
Fluoranthene	ND	460	ND	38*	2,200*	1,600	ND
Pyrene	ND	230	ND	31	1,500*	1,100	ND
Benzo(a)anthracene	ND	58	ND	8.1	300	220	ND
Chrysene	ND	53	ND	12	430	260	ND
Benzo(b)fluoranthene	ND	36	ND	13	330	220	ND
Acemaphthylene	ND	ND	ND	0.83	21	ND	ND
Pentachlorophenol	ND	ND	ND	2.7(J)	130(J)	78(J)	ND
Benzo(a)pyrene	ND	ND	ND	4.1	97	76	ND
Indeno (1, 2, 3-cd)pyrene	ND	ND	ND	2	41	32	ND
Dibenz(a, h)anthracene	ND	ND	ND	0.73	ND	ND	ND
Benzo(g, h, i)perylene	ND	ND	ND	1.9	37	29	ND

Notes:

ND = Not detected
J = Compound was positively identified; however, value is below the sample quantitation limit.
* = These compounds were not flagged or identified at the lower sample dilution.

ATTACHMENT B

ANALYTICAL RESULTS

Sheet 3 of 4

TCLP Metals (ug/L)

	BH-01 (soil)	BH-01D (soil)	BH-03 (soil)	LFLO (soil)	BH-01 (water)
Arsenic[a]	6.0	5.0U	5.0U	5.0U	5.0U
Barium	342	453	243	94.2	45.4
Cadmium	5.0U	5.0U	5.0U	5.0U	5.0U
Chromium	10.0U	10.0U	10.0U	46.1	10.0U
Lead	60U	60U	60U	60U	60U
Mercury	2.0U	2.0U	2.0U	2.0U	2.0U
Selenium[a]	5.0U	5.0U	5.0U	5.0U	5.0U
Silver	10.0U	10.0U	10.0U	10.0U	10.0U

Notes:

U = Analyte was analyzed for, but not detected.
a = These results are considered estimates due to quality control failure for these analytes.

ATTACHMENT B

ANALYTICAL RESULTS

Sheet 4 of 4

TCLP Semivolatiles (ug/L)

	BH-01 (soil)	BH-01D (soil)	BH-03 (soil)	LFLO (soil)	PQL (soil)	BH-01 (water)	PQL (water)
2-methylphenol	ND	ND	15	110	6.3	ND	5.0
3-,4-methylphenol	ND	ND	12	500[c]	6.3(63[c])	ND	5.0
2,4,5-trichloraphenol	ND	ND	ND	ND	31	ND	25
2,4,6-trichlorophenol	ND	ND	ND	ND	6.3	ND	5.0
Pentachlorophenol	18(J)	28(J)	130(J)[c]	130	31(310[c])	ND	25
1,4-Dichlorobenzene	ND	ND	ND	ND	6.3	ND	5.0
Hexachlorobenzene	ND	ND	ND	ND	6.3	ND	5.0
Hexachlorobutadiene	ND	ND	ND	ND	6.3	ND	5.0
Hexachloroethane	ND	ND	ND	ND	6.3	ND	5.0
Nitrobenzene	ND	ND	ND	ND	6.3	ND	5.0
2,4-dinitrotoluene	ND	ND	ND	ND	6.3	ND	5.0

Notes:

ND = Not detected
J = Compound was positively identified; however, value is below the PQL and is estimated.
[c] = 1:10 dilution run increases the PQL by the same factor.

ATTACHMENT C

CASE DOCUMENTATION

ENVIRONMENTAL PROTECTION AGENCY
Office of Enforcement

REG. 3
First International Bldg., 1201 Elm St.
Dallas, Texas 75270

CHAIN OF CUSTODY RECORD

PROJ. NO.

PROJECT NAME: RFI Colfax -041R264001

SAMPLERS: (Signature) [signature]

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	PHENOLICS	PCP	PAH	METALS	TCLP	REMARKS
BH01	091991	1140		X	CC1-RPN-03	1					X	
BH01D	091991	1140		X	CC1-RPN-03D	1					X	
BH02	091991	1310		X	CC1-DPN-04	1	X	X	X	X		
BH03	091991	1405		X	CC1-DPST-05	1					X	
BH03	091991	1430		X	CC1-DPST-06	1	X	X	X	X		
BH04	091991	1545		X	CC1-DPS-04	1	X	X	X	X		
BH05	091991	1655		X	CC1-SDP-03	1	X	X	X	X		
LFLO	091991	1715		X	CC1-LFLO-01	1					X	
LFUP	091991	1720		X	CC1-LFUP-01	1	X	X	X	X		
LFUP	09191	1720		X	CC1-LPUP-01D	1	X	X	X	X		

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
[signature]	09/20/91 0900				
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	
				FED. EX. No. 109457096	

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

6-19344

ENVIRONMENTAL PROTECTION AGENCY
Office of Enforcement

REGION 6
First International Bldg., 1201 Elm St.
Dallas, Texas 75270

CHAIN OF CUSTODY RECORD

PROJ. NO.: [illegible]R26 4001
PROJECT NAME: Colfax - RFI
SAMPLERS: (Signature) [signature]

STA. NO.	DATE	TIME	COMP.	GRAB	STATION LOCATION	NO. OF CONTAINERS	PHENOLICS	PCP	PAH	METALS	TCLP	REMARKS
3H01	091991	1215	X		CCI-RPN-01	2				X		
EUA	091991	1800	X		CCI-LFUP-01	2	X	X	X			
PUA	091991	1800	X		CCI-LFUP-01	1			X			

Note: Water sample being analyzed for metals is preserved with HNO_3 - Nitric Acid - to pH < 2

Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
[signature]	091991 0900				
Relinquished by: (Signature)	Date / Time	Received by: (Signature)	Relinquished by: (Signature)	Date / Time	Received by: (Signature)
Relinquished by: (Signature)	Date / Time	Received for Laboratory by: (Signature)	Date / Time	Remarks	
				FED EX No.: 109457100	

Distribution: Original Accompanies Shipment; Copy to Coordinator Field Files

ATTACHMENT D

BOREHOLE LOGS

LOG OF BORING NO. BH-01

TYPE BORING: HAND AUGER

PRC SAMPLE ID No.: CC1-RPN-03

DEPTH, IN.	SYMBOL	SAMPLES	SOIL DESCRIPTION	PID READING	VISUAL CONTAMINATION	ODOR
10			Fill material	NONE TAKEN	VC	O
			Fill material	41.3	VC	O
20			Fill material	28.5	VC	O
			Fill material	24.0	VC	O
			Brown silty clay, loose, no moisture	14.0	VC	O
30		X	Brown to reddish brown clay to clayey silt with some gravel; slightly moist	3.6	VC	O
40			Same as above except no moisture content	3.0		
			Reddish brown silt to clayey silt	1.9		
50						

COMPLETION DEPTH: 48 INCHES

DATE: 09/19/91

LOG OF BORING NO. BH-02

TYPE BORING: HAND-AUGER

PRC SAMPLE ID No.: CC1-DPN-04

DEPTH, IN.	SYMBOL	SAMPLES	SOIL DESCRIPTION	PID READING	VISUAL CONTAMINATION	ODOR		
10 20			Material from 0-24 in. was excavated due to construction of concrete pad					
30			Black to brown silty clay with organic debris, slightly moist		VC	O		
			Gray to light brown, slightly stiff silty clay with some organic debris, slightly moist	3.7	VC			
40		X	Reddish brown silty clay, slightly stiff, moist	1.9				
50			Reddish brown, slightly stiff, silty to sandy clay, moist	1.9				

COMPLETION DEPTH: 53 inches

DATE: 09/19/91

LOG OF BORING NO. BH-03

TYPE BORING: HAND-AUGER

PRC SAMPLE ID No.: CC1-DPST-05
CC1-DPST-06

DEPTH, IN.	SYMBOL	SAMPLES	SOIL DESCRIPTION	PID READING	VISUAL CONTAMINATION	ODOR
10			No material from 0-18 in.			
20			Black clayey soil with organic debris	0	VC	O
			Black blocky silty clay from 20-22 in.; reddish, dry, blocky silty clay from 22-29 in.	4.4	VC	
30			Reddish brown, slightly stiff, blocky, loose silty clay with trace of limonite, no moisture	1.7	none	none
40			Tan to reddish brown, slightly stiff silty clay with some limonite, and moist	10.6	VC	O
50		X	Gray silty clay with reddish stains	11.9	VC	O
		X	Tan to gray, thinly laminated silty clay; water encountered in this interval	18.9	VC	O

COMPLETION DEPTH: 57 inches

DATE: 09/19/91

LOG OF BORING NO. BH-04

TYPE BORING: HAND AUGER

PRC SAMPLE ID No.: CC1-DPS-04

DEPTH, IN.	SYMBOL	SAMPLES	SOIL DESCRIPTION	PID READING	VISUAL CONTAMINATION	ODOR		
30			Nothing from 0 to 32 in. due to excavation for constructing concrete pads.					
40			Brown to gray, blocky with some lamination silty clay, some limonite and no moisture	7.0	none	none		
			Gray, slightly stiff silty clay with some limonite and no moisture	6.7	none	none		
50			Reddish brown, slightly stiff to blocky, silty clay, with increasing limonite content; dry to slightly moist	5.8	none	none		
		X	Same as above	6.5	none	none		
60			Reddish brown to gray, blocky sandy clay with limonite stains and nodules; no moisture	4.4	none	none		
70								

COMPLETION DEPTH: 68 INCHES

DATE: 09/19/91

LOG OF BORING NO. BH-04

TYPE BORING: HAND AUGER

PRC SAMPLE ID No.: CC1-SDP-03

DEPTH, IN.	SYMBOL	SAMPLES	SOIL DESCRIPTION	PID READING	VISUAL CONTAMINATION	ODOR
20			Nothing from 0 to 24 inches due to excavation for constructing concrete pads			
30			Gray, stiff and blocky silty clay; dry to moist	3.4	VC	O
40		X	36 to 39 inches consists of gray, stiff and blocky silty clay; 39 to 42 inches consists of brown to tan slightly stiff silty clay with some limonite	4.9	VC	none
			Gray to tan, blocky, slightly stiff to stiff sandy clay with limonite staining	3.8	none	none
50			Tan to brown, blocky, sandy clay to clayey sand with limonite staining; no moisture	none	none	none
60			Same as above except grading from clayey sand to sandy clay	3.7	none	none

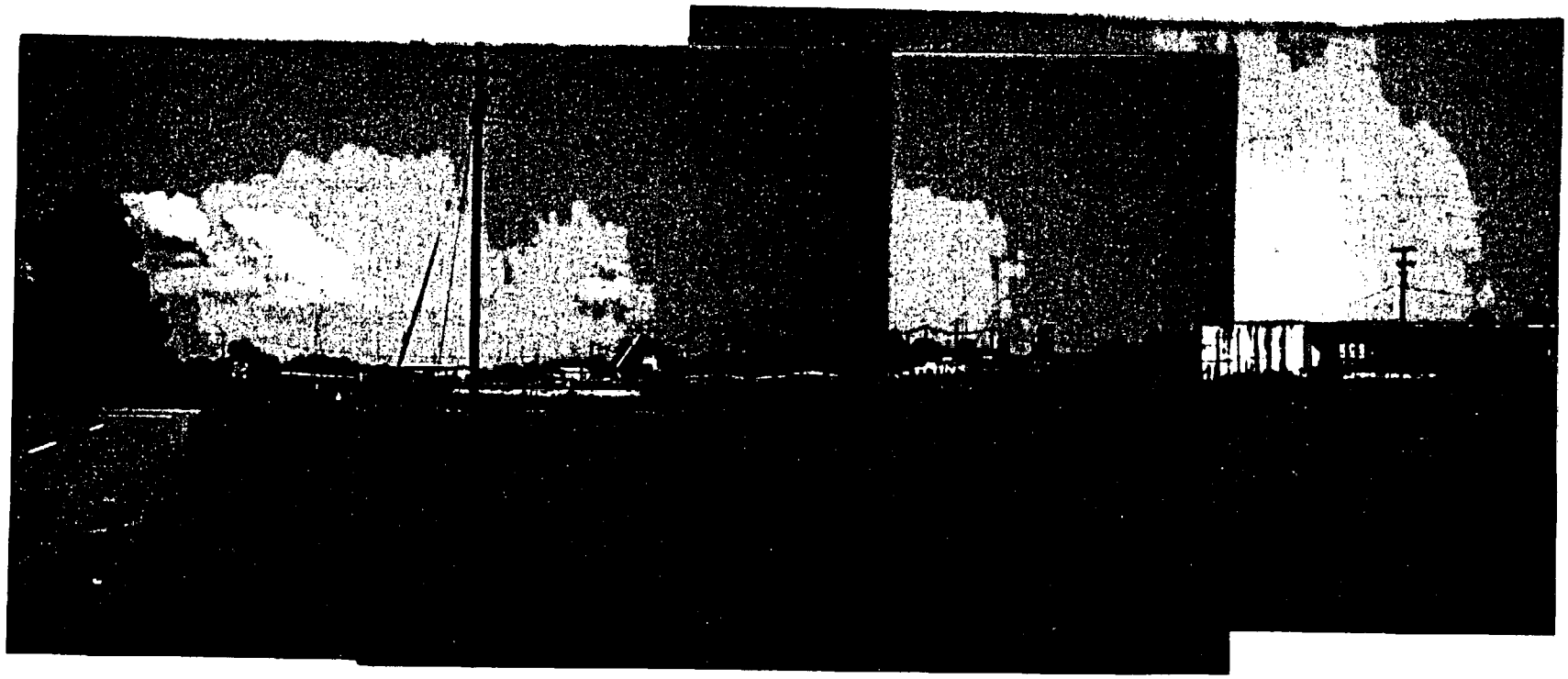
COMPLETION DEPTH: 60 INCHES

DATE: 09/19/91

ATTACHMENT E

PHOTOGRAPHS

PHOTO NO. 1



Date: 09-18-91 Picture Taken by: Mark Maki Direction Facing: East

Picture Description: Panoramic view of the west and southwest end of the facility

PHOTO NO. 2

Date: 09-18-91 Picture Taken by: Ken Goodman Direction Facing: South

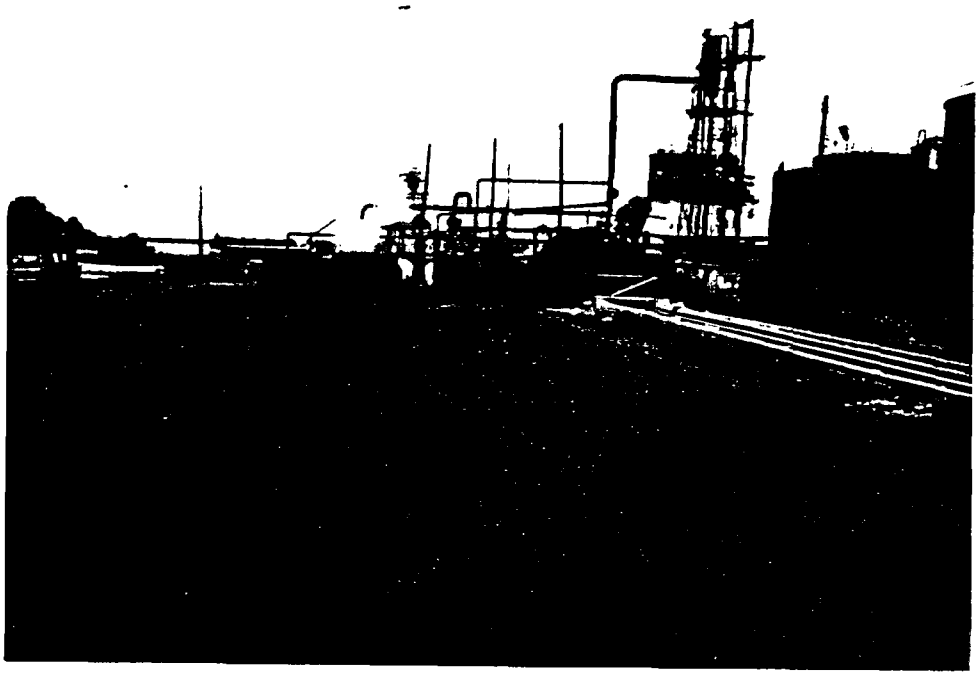
Picture Description: One of the many storage areas at Colfax; this area is used to store unprepared and untreated wood.

PHOTO NO. 3

Date: 09-19-91 Picture Taken by: Mark Maki Direction Facing: East

Picture Description: Storage areas at Colfax and, also, unit that debarks wood in preparation for treatment

PHOTO NO. 4



Date: 09-19-91 Picture Taken by: Mark Maki Direction Facing: North-Northeast
Picture Description: Treated wood being removed from treatment cylinders by rail, note the treatment cylinders in the background and the bare ground in the dragout areas.

PHOTO NO. 5

Date: 09-19-91 Picture Taken by: Mark Maki Direction Facing: North-Northeast

Picture Description: The right side of the photograph shows the concrete rail and drip pads currently under construction at the facility.

PHOTO NO. 6

Date: 09-19-91 Picture Taken by: Mark Maki Direction Facing: East

Picture Description: Visqueen is being placed on the ground and on tailgate of truck. Visqueen is used to prevent cross contamination by preventing recovered soil from contacting ground. Visqueen on tailgate is used to prevent decontamination wastewater from contacting other surfaces.

PHOTO NO. 7

Date: 09-19-91 Picture Taken by: Mark Maki Direction Facing: Southeast

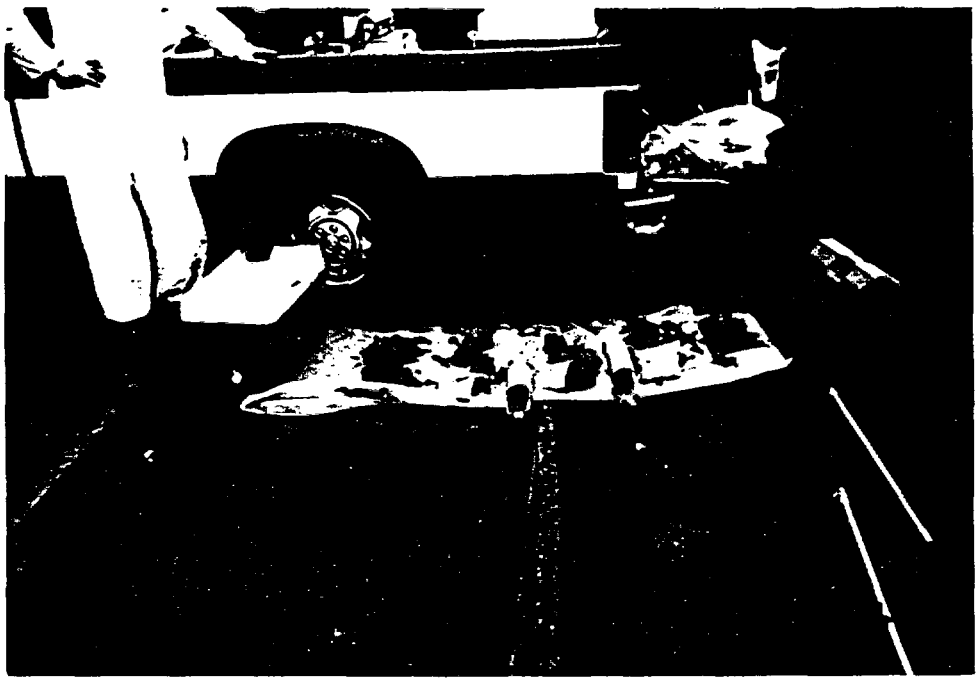
Picture Description: PRC personnel using stainless steel hand auger to bore holes and collect soil samples

PHOTO NO. 8

Date: 09-19-91 Picture Taken by: Mark Maki Direction Facing: ---

Picture Description: Note soil recovered from boreholes laid on visqueen to prevent crosss contamination. Also, note the plastic ziplock bags filled with representative soil samples, on which headspace analysis was performed.

PHOTO NO. 9



Date: 09-19-91 Picture Taken by: Ken Goodman Direction Facing: South

Picture Description: Soil samples placed on visqueen; also, note plastic bags containing representative soil samples for headspace analysis.

PHOTO NO. 10

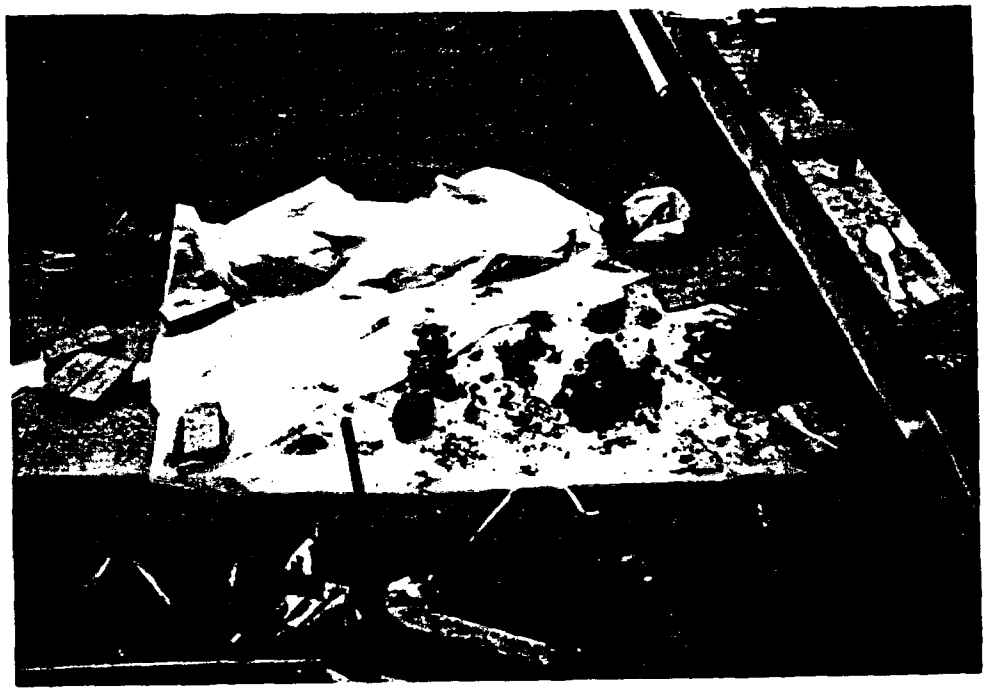
Date: 09-19-91 Picture Taken by: Ken Goodman Direction Facing: South-Southwest
Picture Description: PRC personnel splitting soil samples; note that EPA containers (sitting on edge of concrete) are filled first, followed by Colfax's container (in hand).

PHOTO NO. 11

Date: 09-19-91 Picture Taken by: Mark Maki Direction Facing: North

Picture Description: BH-01 location south of treatment cylinder no. 1, note borehole to right of soil sample intervals recovered from borehole, 55-gallon drum used to collect decontamination water, and decontamination station on tailgate of truck. Also, note the bare ground at dragout areas in front of the treatment cylinders.

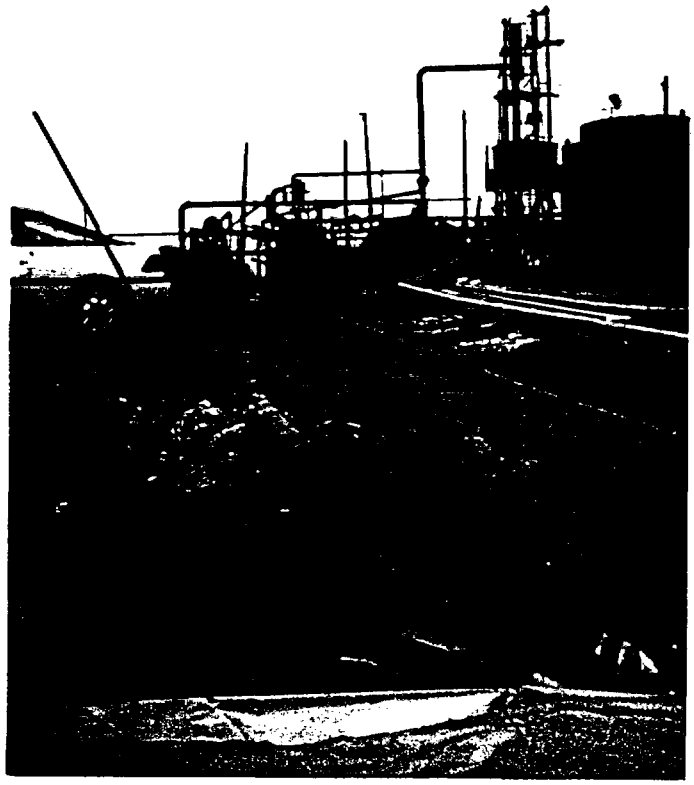
PHOTO NO. 12



Date: 09-19-91 Picture Taken by: Ken Goodman Direction Facing: South

Picture Description: BH-02 location at north end of concrete pad being constructed for treatment cylinder no. 2, note contaminated soil on visqueen at right.

PHOTO NO. 13



Date: 09-19-91 Picture Taken by: Ken Goodman Direction Facing: North

Picture Description: BH-02 location; note area of excavation and stained soils in the cross cut of the excavation.

PHOTO NO. 14

Date: 09-19-91 Picture Taken by: Ken Goodman Direction Facing: ---

Picture Description: Photograph taken before sampling BH-02; note black stained soil under the sand base.

PHOTO NO. 15

Date: 09-19-91 Picture Taken by: Mark Maki Direction Facing: West

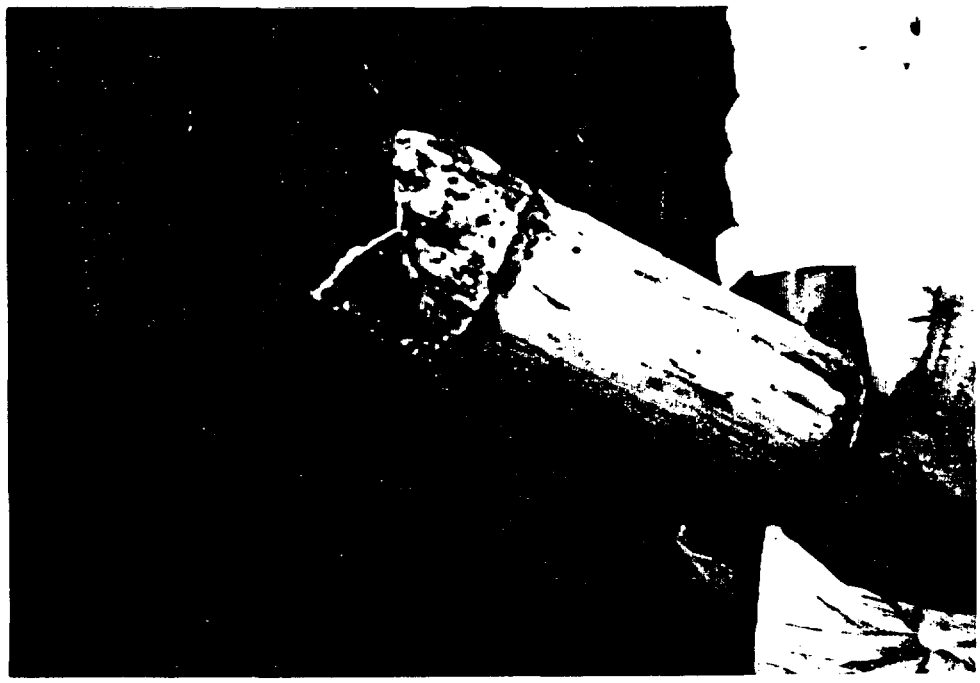
Picture Description: PRC personnel hand-augering at BH-03 location; note the switch track mechanical arms about 18 inches below the ground surface.

PHOTO NO. 16

Date: 09-19-91 Picture Taken by: Mark Maki Direction Facing: ---

Picture Description: Soil sample recovered from BH-03; note the visible contamination in the soil.

PHOTO NO. 17



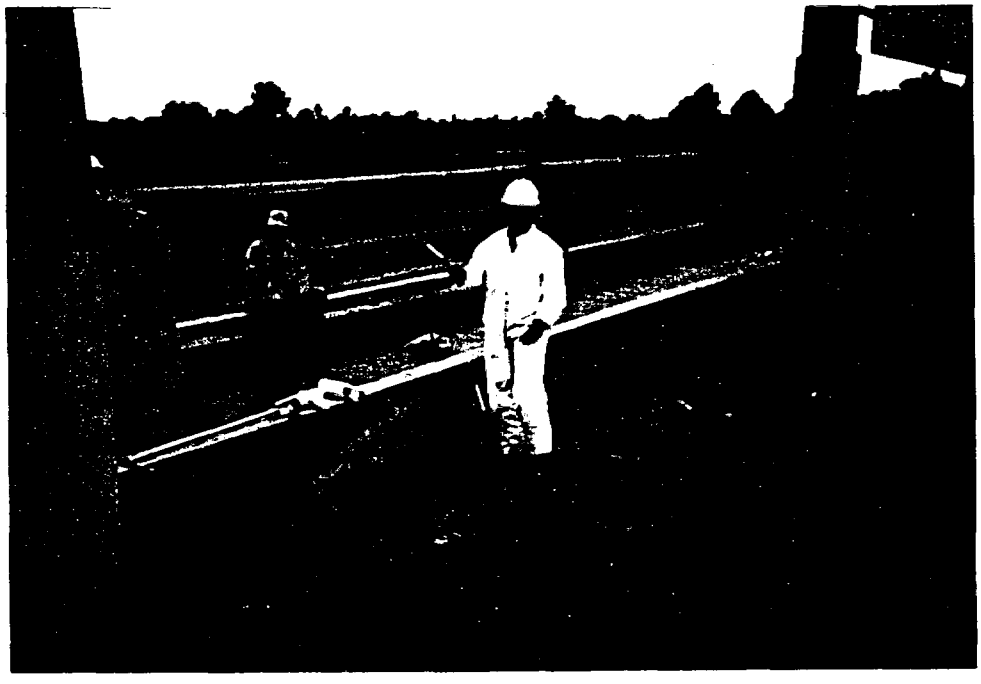
Date: 09-19-91 Picture Taken by: Mark Maki Direction Facing: ---

Picture Description: Hand auger bit recovered from BH-03 after encountering ground water; note the sheen on the auger bit.

PHOTO NO. 18

Date: 09-19-91 Picture Taken by: Ken Goodman Direction Facing: North-Northeast
Picture Description: BH-05 location; note excavated area along edge of concrete pad.

PHOTO NO. 19



Date: 09-19-91 Picture Taken by: Mark Maki Direction Facing: Southwest
Picture Description: BH-05 location

PHOTO NO. 20

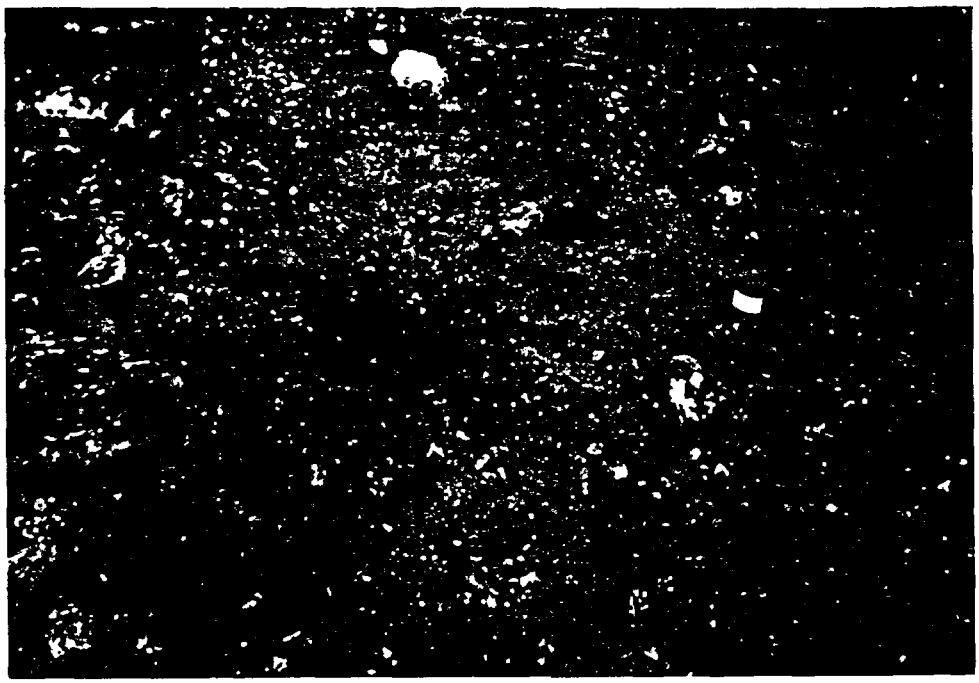
Date: 09-19-91 Picture Taken by: Ken Goodman Direction Facing: South-Southwest
Picture Description: Soil samples recovered from BH-05; note samples placed on visqueen.

PHOTO NO. 21

Date: 09-19-91 Picture Taken by: Mark Maki Direction Facing: Southwest

Picture Description: Landfill sampling location (LFUP) on upper portion of ramp, note the excavated material, concrete, and tie timbers deposited in landfill. The other landfill sample location (LFLO) was at the base of this ramped area.

PHOTO NO. 22



Date: 09-19-91 Picture Taken by: Ken Goodman Direction Facing: ---

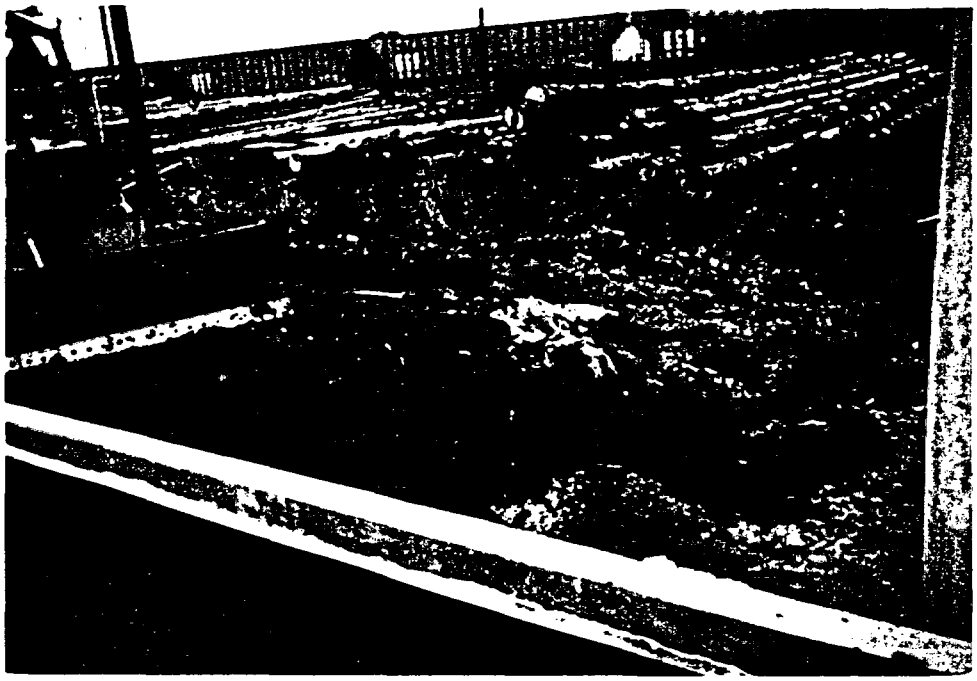
Picture Description: Soil sampling location (LFLO) at lower end of ramp in landfill area; note the black waste material in center left portion of photograph.

PHOTO NO. 23

Date: 09-19-91 Picture Taken by: Mark Maki Direction Facing: West

Picture Description: PRC personnel removing about 6 inches of cover material at landfill area on the ramp (LFUP)

PHOTO NO. 24



Date: 09-19-91 Picture Taken by: Mark Maki Direction Facing: West-Southwest
Picture Description: Colfax backfilling excavated areas along concrete pad; note the stained soil. This soil was excavated from this area in order to construct the concrete pad.

PHOTO NO. 25

Date: 09-19-91 Picture Taken by: Mark Maki Direction Facing: Southwest
Picture Description: Colfax backfilling excavated areas along concrete pad; note the stained soil. This soil was excavated from this area in order to construct the concrete pad.

REFERENCE 3

RCRA FACILITY ASSESSMENT EVALUATION

PRELIMINARY REVIEW AND VISUAL SITE INSPECTION

(NO SAMPLING VISIT)

Region 6, RCRA Permits Closure Section

FACILITY'S NAME(S): Colfax Creosoting Company

EPA ID NUMBER: LAD008184616

ADDRESS: Wadley Road, Pineville, Louisiana

LOCATION: Lat. 31° 19' 10" N, Long. 92° 26'00" W, approximately one mile south of Pineville, Louisiana.

DATE OF INSPECTION: April 4-5, 1988

SITE DESCRIPTION: Wood treater, creosote, PCP and CCA

PREPARED BY: Ecology and Environment DATE PREPARED: September 2, 1988

REVIEWED BY: Jon Rinehart DATE REVIEWED: _____

FACILITY STATUS: Undergoing closure.

ANTICIPATED DRAFT PERMIT DATE: September 1989

ANY ON-GOING STATE/FED 264, 265, or 270 CORRECTIVE ACTION OR CERCLA ACTION:
YES ____ NO X

DOES FACILITY HAVE A CERCLA FILE? YES ____ NO X

DOES FACILITY HAVE UIC WELL? YES ____ NO X

TYPE OF DRINKING WATER SUPPLY WITHIN A 3-MILE RADIUS: Ground water which varies from 90-2056 feet.

TARGET POPULATION WITHIN A 3-MILE RADIUS: The population of Pineville is 12,500, and Alexandria is 66,100.

RECOMMENDATIONS: ____ S.V. X R.F.I. ____ I.M. ____ No Further Action under RFA

(Indicate only one unless I.M. is marked)

X 3004(u) ____ 3007

Possible Enforcement Action: ____ 3008(a) ____ 3008(h)

Form Rev. 6/17/87
LD:ggr6/23/87
caf:1-9-89

I. EVALUATION

A. NUMBER OF SWMU(s)/AOC(s) INVESTIGATED DURING THE PR/VSI: 29

1. NUMBER OF SWMU(s) INVESTIGATED DURING THE PR/VSI: 27

SWMU#	NAME OF SWMU	REGULATED BY RCRA* (SUBTITLE C)	STATUS**
1.	Northeast Treated Wood Storage Area	N	A
2.	Southeast Treated Wood Storage Area	N	A
3.	West Treated Wood Storage Area	N	A
4.	Southwest Treated Wood Storage Area	N	A
5.	Recovery Pond	Y	C
6.	Settling Pond #1	Y	C
7.	Settling Pond #2	Y	C
8.	Railcar Separator	N	C
9.	Main Runoff Pathway	N	A
10.	Truck Washing Area	N	A
11.	Untreated Wood Landfill	N	A
12.	Ground Water Recovery Tank	N	A
13.	Penta/Creosote Sump Containment	N	A
14.	CCA Containment System	N	A
15.	Creosote Dehydrator	N	A
16.	Creosote Separator #1	N	A
17.	Creosote Separator #2	N	A
18.	Creosote Separator #3	N	A
19.	Penta Reclaiming Hopper	N	A
20.	Penta Separator	N	A
21.	Penta Blowdown Tank	N	A
22.	Creosote Blowdown Tank	N	A
23.	CCA Waste Water Storage Tank #1	N	A
24.	CCA Waste Water Storage Tank #2	N	A
25.	Cooling Pond	N	A
26.	Waste Water Storage Tank	N	A
27.	Visual Observation Pit	N	A

2. NUMBER OF AREAS OF CONCERN: 2

A. West Runoff Pathway
B. Creosote Unloading Area

* Y = Yes, N = No
** A = Active, I = Inactive, U = Unknown

TABLE 1
SWMUs / AOCs

B. NUMBER OF SWMU(s)/AOC(s) FOR WHICH AN RFI IS RECOMMENDED: 11 / 2
(Except RCRA units subject to Subpart F ground water issues refer to Section D)

1. NUMBER OF SWMU(s)/AOC(s) AT WHICH RELEASES HAVE BEEN IDENTIFIED: 6 / 0

#	SWMU/ AOC #	NAME OF UNIT	MEDIA	RATIONALE/CONCERN	STATUS
1.	1.	Northeast Treated Wood Storage Area	Soil GW* SW**	Stained soil was observed in the treated wood storage areas during the VSI. These storage areas receive wood treated with any of the three preservatives used at this facility: creosote, penta, or CCA, which may have released hazardous constituents to the soil, ground water, and surface water.	A
2.	2.	Southeast Treated Wood Storage Area	Soil GW SW	Stained soil was observed in the treated wood storage areas during the VSI. These storage areas receive wood treated with any of the three preservatives used at this facility: creosote, penta, or CCA. These preservatives may have released hazardous constituents to the soil, ground water and surface water.	A
3.	3.	West Treated Wood Storage Area	Soil GW SW	Stained soil was observed in the treated wood storage areas during the VSI. These storage areas receive wood treated with any of the three preservatives used at the facility: creosote, penta, or CCA. These preservatives may have released hazardous constituents to the soil, ground water, and surface water.	A
4.	4.	Southwest Treated Wood Storage Area	Soil GW SW	Stained soil was observed in the treated wood storage areas during the VSI. These storage areas receive wood treated with any of the three preservatives used at the facility: creosote, penta, or CCA. These preservatives may have released hazardous constituents to the soil, ground water, and surface water.	A

* GW = Ground water
** SW = Surface water

A = Active
C = Closed/Removed

#	SWMU/ AOC #	NAME OF UNIT	MEDIA	RATIONALE/CONCERN	Status
5.	8.	Railcar Separator	Soil GW SW	This unit is an 8,000-gallon separator which is a converted railroad tank car. The separator is 7 feet in diameter and 32 feet in length. Creosote waste was pumped from the recovery pond into the separator, where further separation of creosote occurred. During the VSI, a creosote-like material was observed on a valve on the separator and the soil directly beneath it. Releases of hazardous constituents to soil, ground water, and surface water are highly possible.	~~Closed~~ C
6.	9.	Main Runoff Pathway	Soil GW SW	The main runoff pathway begins onsite and flows to the southwest near the process area. During this time, the main runoff pathway served as the discharge ditch for waste water generated by the penta and creosote processes. This unit does not appear to have any type of liner. During the VSI, a tar-like material was observed along the sides of the main runoff pathway. Release of hazardous constituents to soil, ground water and surface water is highly possible.	Active

3 004

2. ~~NUMBER OF SWMU(s)/AOC(s) AT WHICH A RELEASE IS HIGHLY POSSIBLE:~~ ~~13~~ 1

#	SWMU/ AOC #	NAME OF UNIT	MEDIA	RATIONALE/CONCERN	Status
1.	10.	Truck Washing Area	Soil GW SW	This area is used to wash equipment and trucks which transport the treated wood products. The vehicles are washed on a 10-by-30-foot concrete pad. The area is not contained, and waste water produced by the washing of potentially contaminated vehicles is discharged into the main runoff pathway. The release potential to soil, ground water and surface water is high.	C
2.	11.	Untreated Wood Landfill	Soil GW SW	The unlined landfill is approximately one acre in size. Untreated wood scraps and sawdust are used to fill the depressed area. During the VSI, several pieces of treated wood were observed in the landfill. Release potential to soil, ground water and surface water is high.	A
3.	12.	Ground Water Recovery Tank	Soil GW SW	This unit is a 3,000-gallon tank which is used to contain contaminated ground water (creosote constituents) from piezometer well P-1. This tank is located on bare ground. The potential for release to soil, ground water and surface water is high.	C. ~~Removed~~
4.	13.	Penta/Creosote Sump Containment	Soil GW SW	This unit is comprised of a sloped concrete pad surrounded by a concrete dike and a berm system. Portions of the concrete pad have been in use since the company began operation in 1948. High potential for contamination of the soil and ground water existed prior to installation of the concrete dike and berm system.	A
5.	14.	CCA Containment System	Soil GW SW	This unit consists of a sloped concrete pad surrounded by a concrete berm and dike system,	A

#	SWMU/ AOC #	NAME OF UNIT	MEDIA	RATIONALE/CONCERN	
	(SWMU #14 continued)			two rain water pumps, a concrete door pit and a waste water pump. The potential for release was high before the concrete dike and berm was installed.	
6.	15.	Creosote Dehydrator	~~Soil~~ ~~GW~~ ~~SW~~	This unit is a 9,971-gallon tank which receives recovered sludge from Creosote Separator #3, then dries it to acceptable moisture levels and pumps it to the Reclaimed Creosote Storage Tank. This unit has a secondary containment of a concrete dike and berm system. Potential for contamination of soil existed prior to the installation of the concrete dike and berm system. This dehydrator has been in use at this facility since 1948. The waste handled is creosote waste water sludge.	A
7.	16.	Creosote Separator #1	~~Soil~~ ~~GW~~	This unit is an 8,000-gallon converted railroad tank car, which is located near the middle of the process area on the west side of the cooling pond and adjacent to Creosote Separator #2. High potential for release to soil and ground water existed prior to the installation of the concrete dike and berm system.	C
8.	17.	Creosote Separator #2	~~Soil~~ ~~GW~~	This unit is an 8,000-gallon converted railroad tank car, which is located near the middle of the process area on the west side of the cooling pond and adjacent to Creosote Separator #1. High potential for release to soil and ground water existed prior to the installation of the concrete dike and berm system.	C
9.	18.	Creosote Separator #3	~~Soil~~ ~~GW~~ ~~SW~~	This unit is an 8,000-gallon converted railroad tank car, which is located near the	C

#	SWMU/ AOC #	NAME OF UNIT	MEDIA	RATIONALE/CONCERN	
	(SWMU #18 continued)			middle of the process area on the west side of the cooling pond and adjacent to Creosote Separator #2. Waste water is pumped into this separator from the surface of Creosote Separator #2. High potential for release to soil and ground water existed prior to the installation of the concrete dike and berm system.	
10.	19.	Penta Reclaiming Hopper	Soil GW	This unit is a 20,000-gallon cone-bottom tank which is located in the far southeast portion of the process area north of the penta mix tank. This tank serves as a large separation funnel for the reclaimed penta pumped here from the penta separator. This unit is surrounded by the concrete dike and berm system, but prior to installation of this system, release potential was high to soil and ground water.	A
11.	20.	Penta Separator	Soil GW	This unit is an 8,000-gallon converted railroad tank car, and is located near the middle of the process area on the west side of the cooling pond and adjacent to Creosote Separator #3. Prior to the installation of a concrete dike and berm system, the potential for release to soil and ground water was high.	C
12.	25.	Cooling Pond	Soil GW SW	This unit is a 40-foot by 30-foot concrete pond, which is located in the middle of the process area on the west side of the treating room. Process waste water circulates through the pond providing coolant needed to operate the vacuum system utilized within the	C

3 007

#	SWMU/ AOC #	NAME OF UNIT	MEDIA	RATIONALE/CONCERN
	(SWMU #25 continued)			treatment cylinders. This cooling pond was originally built in 1948, and was assumed to be unlined. It was reconstructed in 1986. A high potential for releases to soil, ground water, and surface water existed before reconstruction.
13.	B.	Creosote Unloading Area	~~Soil~~ ~~GW~~ ~~SW~~	This unit is the area that has been used as a creosote unloading area since the company began operation in 1948. The concrete pad was originally constructed in 1958, and reconstructed in 1982. Considering the long period of operation at this unit, and the two periods of reconstruction, a high potential exists for past releases to soil, surface water, and ground water. A

3. NUMBER OF SWMU(s)/AOC(s) WHERE A DETERMINATION CANNOT BE MADE DUE TO LACK OF INFORMATION: 0 / 1

#	SWMU/ AOC #	NAME OF UNIT	COMMENTS
1.	A.	West Runoff Pathway	This unit is a runoff pathway which drains approximately the western 15 percent of the site used to air-dry the treated wood (SWMU #1). During the VSI, an indication of the presence of two substances (an orange sediment and a white sheen) which do not appear to be native to the west ditch was noted. These foreign substances need to be sampled to determine what their compositions are.

A

C. NUMBER OF SWMU(s)/AOC(s) FOR WHICH AN RFI IS NOT RECOMMENDED: 6 / 0
(Documentation is necessary for a unit to be included in this category.)

#	SWMU/ AOC #	NAME OF UNIT	COMMENTS
1.	21.	Penta Blowdown Tank	This unit is a 200-gallon tank, which is mounted directly on top of the penta waste water separator. A low potential exists for a release to any media originating from this unit due to the concrete dike and berm system surrounding the process area.
2.	22.	Creosote Blowdown Tank	This unit is a 200-gallon tank, which is mounted directly on top of Creosote Separator #1. A low potential exists for a release to any media originating from the concrete dike and berm system surrounding the process area.
3.	23.	CCA Waste Water Storage Tank #1	This unit is a 17,000-gallon tank, which is located in the far east portion of the process area northeast of the penta mix tank. This unit is located inside a concrete dike and berm system; therefore, the release potential for any media is low.
4.	24.	Waste Water Storage Tank #2	This unit is a 6-foot by 18-foot tank, which is located in the eastern portion of the process area to the southeast of the CCA Concentrate Storage Tank. A low potential exists for a release to any media from this unit.
5.	26.	Waste Water Storage Tank	This unit is an 18,000-gallon tank, which is located in the western portion of the process area to the northwest of the cooling pond and north of the creosote storage tank. Waste water from the creosote and penta separators is stored here prior to being discharged to the City of Pineville sewer system. A low potential for release exists for all media from this unit.
6.	27.	Visual Observation Pit	This unit is a 10-foot by 20-foot open concrete tank. Waste water from the storage tank in conveyed into the open-aired tank before it leaves the site via the sewer outfall pipe. A low potential for release exists for all media.

D. SUPPLEMENTAL INFORMATION ON RCRA REGULATED UNITS: # OF UNITS: 3

#	SWMU/ AOC #	NAME OF UNIT	COMMENTS
1.	5.	Recovery Pond	This unit is approximately one acre in size and contains four smaller sludge pits along its eastern boundary. The company terminated discharge of waste water to the pond in 1983, when contamination by phenol was detected in a downgradient monitoring well. The pond was officially closed on October 23, 1986. (Is closure certified by the State?) This portion of the facility is in post-closure phase and a remedial program of waste recovery has been implemented.
2.	6.	Settling Pond #1	This pond was approximately 990 square feet in surface area and had a volume of 290 cubic yards. This pond was part of a system utilized to recover penta and creosote from waste water generated by these wood treatment processes. This pond was officially closed on October 23, 1986. (Is this unit certified closed by the State?) Contaminated ground water has been identified in downgradient well MW-3. Sampling conducted by LDEQ on March 16, 1983, showed concentrations of phenols at 0.14 ppm.
3.	7.	Settling Pond #2	This pond was approximately 1,070 square feet in surface area and had a volume of 240 cubic yards. This pond was part of a system used to recover penta and creosote from waste water. Analytical data from a routine compliance sampling of monitoring wells at this facility, conducted by LDEQ on March 16, 1983, showed concentrations of phenols at 0.14 ppm in downgradient monitoring well MW-3. This pond was officially closed on October 23, 1986. (Has this unit been certified and approved by the State?)

II. FINDINGS

A. RECOMMENDATIONS

CONTRACTOR: The following units are recommended by the contractor to be included in an RFI:

1) SWMU #1: Northeast Treated Wood Storage Area
2) SWMU #2: Southeast Treated Storage Area
3) SWMU #3: West Treated Wood Storage Area
4) SWMU #4: Southwest Treated Wood Storage Area
5) SWMU #8: Railcar Separator
6) SWMU #9: Main Runoff Pathway
7) SWMU #10: Truck Washing Area
8) SWMU #11: Untreated Wood Landfill
9) AOC A: West Runoff Pathway
10) AOC B: Creosote Unloading Area

EPA: The following units are recommended by EPA to be included in an RFI:

1) SWMU #1: Northeast Treated Wood Storage Area
2) SWMU #2: Southeast Treated Wood Storage Area
3) SWMU #3: West Treated Wood Storage Area
4) SWMU #4: Southwest Treated Wood Storage Area
5) SWMU #8: Railcar Separator
6) SWMU #9: Main Runoff Pathway
7) SWMU #10: Truck Washing Area
8) SWMU #11: Untreated Wood Landfill
9) SWMU #12: Ground Water Recovery Tank
10) SWMU #13: Penta/Creosote Sump Containment
11) SWMU #14: CCA Containment System
12) SWMU #15: Creosote Dehydrator
13) SWMU #16: Creosote Separator #1
14) SWMU #17: Creosote Separator #2
15) SWMU #18: Creosote Separator #3
16) SWMU #19: Penta Reclaiming Hopper
17) SWMU #20: Penta Separator
18) SWMU #25: Cooling Pond
19) AOC A: West Runoff Pathway
20) AOC B: Creosote Unloading Area

CONCUR: _____ DATE: _____

III.5.A.

ECOLOGY AND ENVIRONMENT, INC.

DALLAS, TEXAS

MEMORANDUM

RECEIVED
JUN 9 1988
HAZARDOUS WASTE COMPLIANCE
TECHNICAL SECTION

To: David Vineman, Region VI RPO

Thru: FOR K. H. Malone, Jr., FITOM

Thru: I. Sekelyhidi

From: Raymond Wayne, FIT Ground Water Hydrologist

Date: June 8, 1988

Subj: RCRA Facility Assessment at the Colfax Creosoting Company, Pineville, LA (LAD008184616)
TDD# F06-8709-35
PAN# FLA0239CAA

This memorandum is a follow-up to discussions with Lonnie Ross on June 2 and 3, 1988 following the RCRA training session, concerning the deposits of unknown substances in the uncontrolled surface water runoff paths at the Colfax Creosoting Company site.

Figure 1 is a sketch of the Colfax facility with the approximate locations of the runoff pathways and areas where unknown substances in the pathways were photographed. The photographs (1 through 9) were taken during the FIT RCRA Facility Assessment Visual Site Inspection (VSI) on April 4 and 5, 1988.

Main Runoff Pathway

The main ditch begins on-site and flows southwest near the process area (process area runoff is contained). The ditch receives off-site runoff from a residential area and from an adjacent railroad track. A second runoff path flowing toward the northeast merges with the main ditch at a culvert beneath the track. The combined flow moves southeast next to the former surface water impoundment and a scrap wood landfill. The flow exits the site through an underground pipe. The main runoff pathway drains approximately 85 percent of the site.

The main ditch was used from 1948 to 1975 as an open, unlined conduit to dispose of untreated process water. The process water flowed into the local surface water runoff path and entered the Red River approximately two miles from the site. From 1975 to 1983, a pipe in the main ditch was used to transport the process water to the former surface impoundment for recycling. After 1983, use of the impoundment and pipe were discontinued.

The substance in the main ditch (Photographs 1 through 6) appears to be a creosote-like tar. The light colored portion of the substance in Photographs 5 and 6 feels hard when stepped on, while the darker areas (Photograph 6) feel pliable. The abrupt edges on the substance (Photograph 6) suggest that the substance may be eroding during heavy runoff. Hnu reading taken several inches away from the substance did not show the presence of volatile organics.

West Runoff Pathway

The western runoff path flows uncontrolled along the southeast side of the railroad track at the northwest boundary of the facility. The branches flowing southwest and northeast of the ditch merge at a culvert (Photograph 7) and exit the site beneath the track. The western ditch begins on-site and receives runoff from the railroad track and from a portion of the facility used for storing/drying treated wood. The western runoff pathway drains approximately 15 percent of the site.

An orange sediment-like substance (Photograph 7) was observed near the culvert in the southwest branch of the west ditch. In addition, a white sheen was observed (Photographs 8 and 9) further upstream in the southwest branch of the west ditch. A similar appearing sheen was observed in a puddle in the treated wood storage/drying area near the west ditch. The Hnu did not show any elevated readings in the west runoff path.

Concerns

It appears that unknown substances have been deposited in both surface water runoff pathways at Colfax Creosoting Company, which may migrate to the Red River, approximately two miles downstream. One of the substances appears to be a creosote tar-like material. Portions of the tar-like substance appear eroded. Neither pathway has any containment controlling the off-site migration of the substances.

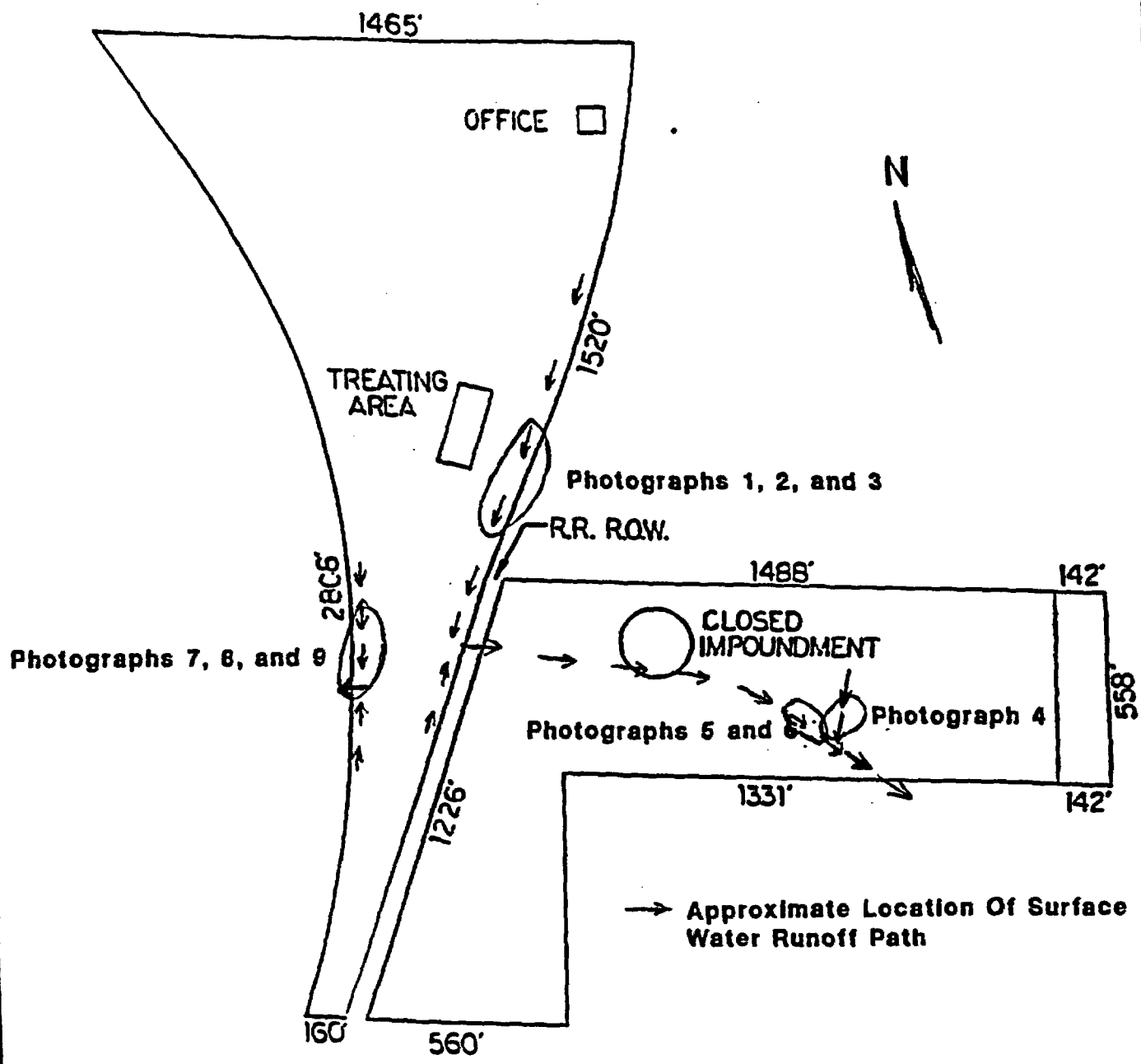


Figure 1. Approximate Locations Of Observed Substances In The Surface Water Runoff Paths. SCALE: 1"=400'

(after Ball Engineering, Inc., 1986)

3 014

Colfax Creosoting Company
Pineville, Louisiana
LAD008184616

NO. 1

PHOTOGRAPHER/WITNESS
I. Sekelykidi / Ray Wayne

DATE / TIME / DIRECTION
4/5/88 / 10:44 / Northwest

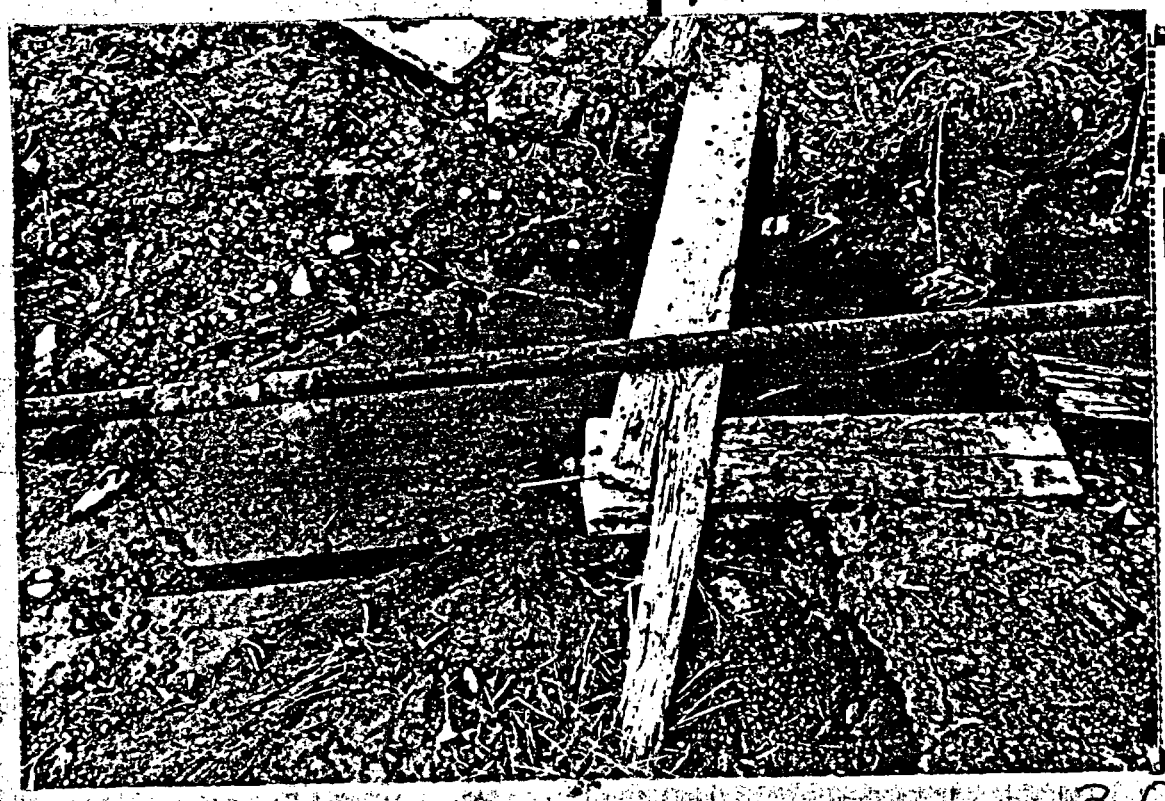
COMMENTS
Discharge points of process effluent water (pipes). Tar-like substance along ditch (center).

PHOTOGRAPHER/WITNESS
I. Sekelykidi / Ray Wayne

DATE / TIME / DIRECTION
4/5/88 / 10:46 / Northwest

COMMENTS
Close-up of drainage ditch. Tar-like substance at lower right and upper left.

NO. 2



Colfax Creosoting Company
Pineville, Louisiana
LAD 008184616

NO. 3

PHOTOGRAPHER/WITNESS
I. Sekelsky / Ray Wayne

DATE / TIME / DIRECTION
4/5/88 / 10:46 / Southwest

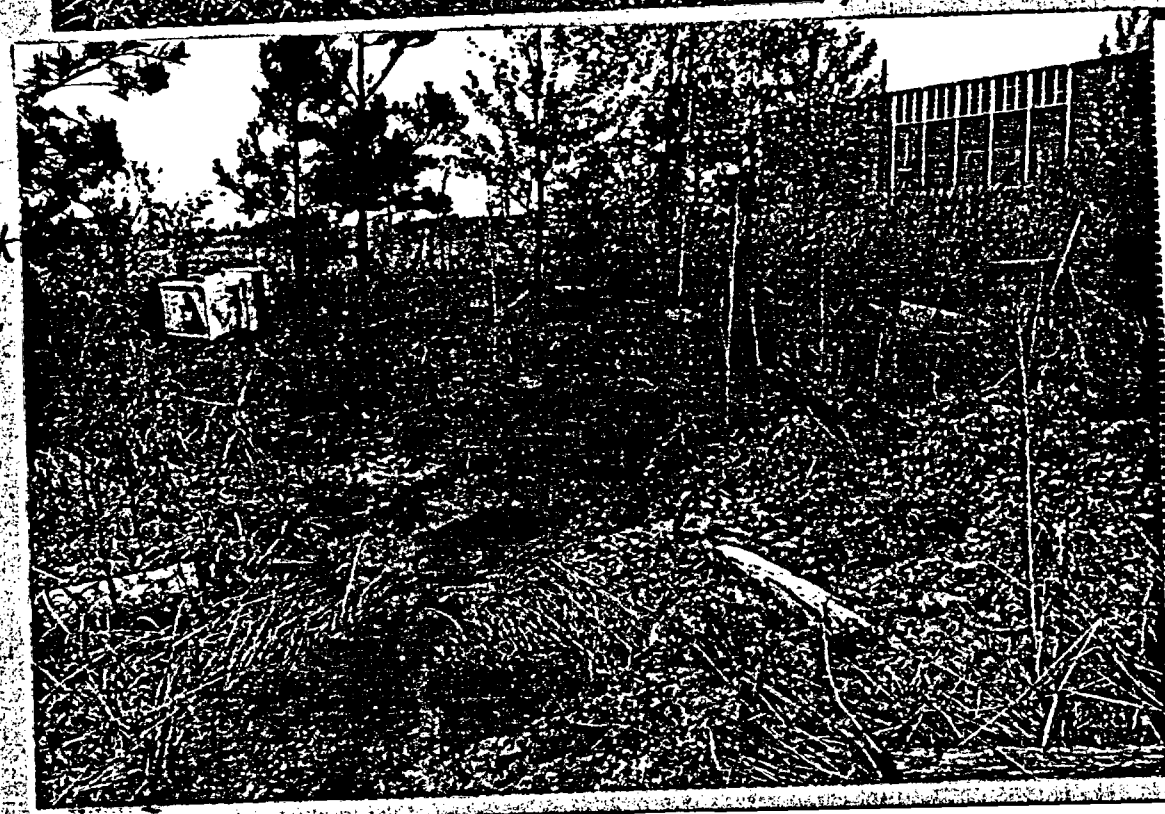
COMMENTS
Deposits of tar-like substance (dark area on banks of ditch) in drainage ditch leading to the former recovery pond.

PHOTOGRAPHER/WITNESS
/ Ray Wayne

DATE / TIME / DIRECTION
4/5/88 / 11:03 / Southwest

COMMENTS
Small on-site ditch flowing southwest into main ditch south of former pond. Picture taken approximately 15 feet upstream of main ditch. ⊗

NO. 4



⊗ Note: Tar-like substance (dark area) along bank.

Colfax Creosoting Company
Pineville, Louisiana
LAD 008184616

NO. 5

PHOTOGRAPHER/WITNESS
Ray Wayne / [illegible]
DATE / TIME / DIRECTION
4/4/88/16:09/West
COMMENTS
Main on-site surface water pathway. Tar-like substance (white area) in creek. School building in rear.

PHOTOGRAPHER/WITNESS
Ray Wayne / [illegible]
DATE / TIME / DIRECTION
4/4/88/16:07/Northeast
COMMENTS
Main surface water pathway. Close-up of tar-like substance.

NO. 6

Colfax Creosoting Company
Pineville, Louisiana
LAD008184616

NO. 7

PHOTOGRAPHER/WITNESS
I. Sekelytaidi / Ray Wayne

DATE / TIME / DIRECTION
4/5/88 / 11:40 / West, Down

COMMENTS
Culvert draining surface water runoff from site (beneath railroad track). West drainage path. Discolored sediment at lower right.

PHOTOGRAPHER/WITNESS
I. Sekelytaidi / Ray Wayne

DATE / TIME / DIRECTION
4/5/88 / 11:52 / North Down

COMMENTS
West drainage path approximately 60 feet northeast of culvert. Sheen on ditch bed.

NO. 8

Colfax Creosoting Company
Pineville, Louisiana
LAD008184616

NO. 19

PHOTOGRAPHER/WITNESS
I. Sekelywich / Ray Wayne

DATE / TIME / DIRECTION
4/5/88/12:05/Northeast

COMMENTS
West drainage path, approximately 80 feet northeast of culvert. Sheen on ditch bed.

PHOTOGRAPHER/WITNESS

DATE / TIME / DIRECTION

COMMENTS

NO.

Branch Mgr

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY
REGION VI
ALLIED BANK TOWER AT FOUNTAIN PLACE
1445 ROSS AVENUE
DALLAS, TEXAS 75202

March 17, 1988

MEMORANDUM

Subject: Transmittal of Preliminary Review Report

From: Erlece P. Allen, Chief
Technical Section (6H-CT) Erlece P. Allen

To: William K. Honker, Chief
Permit Section (6H-CP)

Attached please find a copy of the following Preliminary Review (PR):

° Facility Name: Colfax Creosoting Co.

° EPA ID Number: LAD008184616

The PR report for this facility is currently under review in the Technical Section. A copy of the PR Evaluation will be sent to you as soon as it is completed.

Attachment

cc: Sam Becker (6H-C)

3 020

Colfax Creosoting Company

Wood Treatment Facility

Preliminary Review

LAD008184616

Draft 2

RECEIVED
FEB 19 1988
HAZARDOUS WASTE COMPLIANCE
TECHNICAL SECTION

3 021

1. INTRODUCTION

1.1 PURPOSE AND SCOPE OF THE RFA PROGRAM

The 1986 Hazardous Solid Waste Amendments (HSWA) give the EPA new authority to require comprehensive corrective actions of solid waste management units (SWMU), and other areas of concern at interim status hazardous waste management facilities. HSWA applies particularly to facilities applying for RCRA permits. Corrective actions are intended to address unregulated releases of hazardous constituents to air, surface water, soil and ground water, and the generation of subsurface gas.

A major segment of this program consists of RCRA Facility Assessments (RFA) to identify releases or potential releases requiring further investigation. According to the EPA RCRA Facility Assessment Guidance Document, the four-fold purpose of the RFA is to:

1. Obtain data about releases at RCRA regulated facilities.

2. Evaluate SWMUs and other areas of concern for releases to all media, and evaluate regulated units for releases other than ground water.

3. Determine releases of concern and the need for further actions and interim measures at the facility.

4. Screen from further investigations those SWMUs which do not pose a threat to human health and the environment.

The three basic steps of the RFA consist of a preliminary review (PR) of available information, a visual site inspection (VSI) to obtain additional information on releases, and a sampling visit (SV) to fill data gaps by obtaining field and analytical data.

1.2 CONTENTS OF REPORT

This report contains the results of the preliminary review of the Colfax Creosoting Company Wood Treatment Facility in Pineville, Louisiana. Information was obtained from the Facility Closure Plan and Groundwater Monitoring Program submitted by Colfax to the Louisiana Department of Environmental Quality (LADEQ), RCRA investigative reports from the state and EPA, correspondence between Colfax and LADEQ, and analytical results obtained by state representatives and Colfax contractors. These documents were obtained from file searches of the EPA Regional Office in Dallas and LADEQ in Baton Rouge.

3 022

Section 2 of this report describes the Colfax facility, and its historical and current operations. Individual SWMUs are identified, with a summary description of the wastes managed by the facility. Section 3 offers an overview of the facility's environmental setting, comprising meteorology and air quality, floodplain and surface water, geology and soil, ground water, and receptor information. Section 4 assesses release pathways, covering the potential for release to soil, ground water, surface water, and air. Section 5 details documented releases and the SWMUs associated with the release. Section 6 presents conclusions, summarizing areas of concern and indicates where further investigation is warranted.

2. FACILITY DESCRIPTION

2.1 LOCATION

Colfax Creosoting Company, located on Wadley Road, Pineville, Rapides Parish, Louisiana (Figure 1 and Figure 2), is comprised of two separate parcels of property. Parcel A (Figure 3), owned by the Kansas City Southern Railroad, and leased to the company on a year-to-year basis, contains the wood treatment and processing facilities. Parcel B (Figure 3), owned by the Kansas City Southern Railroad, and leased to the company on a year-to-year basis, contains the wood treatment and processing facilities. Parcel B, a 40 acre tract of land owned by the company, contains several surface impoundments which were once utilized in a hazardous waste recovery system operated on the premises. Colfax Creosoting Company is located at 92° 26′ 00" longitude, ~~81°~~ 31 19′ 10" latitude, Township 4 North, Range 1 West, Section 21.

2.2 HISTORICAL AND CURRENT OPERATIONS

Colfax Creosoting Company is a branch of Roy O. Martin Lumber Co., Inc., established in 1923 by Roy O. Martin. Colfax Creosoting has been in operation at this facility since 1948, when the plant was moved to this location from Colfax, Louisiana. The methods of wood treatment utilized creosote, pentachlorophenol (penta), and copper, chromium and arsenic (CCA). Although the company uses all of these preservatives, creosote accounts for approximately 80% of the total, while penta production is approximately 19%. CCA treatment is usually less than 1% of the total plant production.

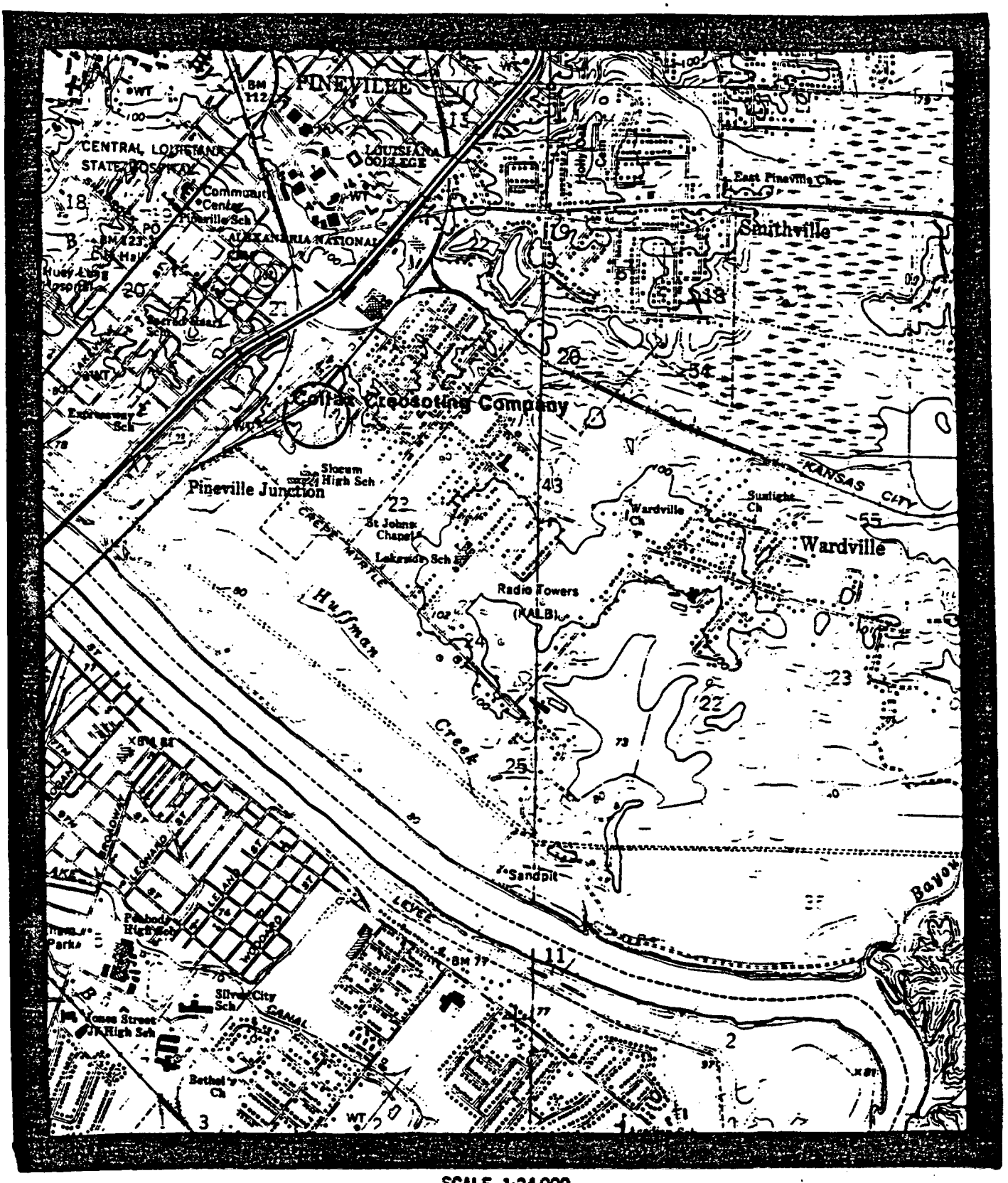
The CCA process differs from the penta and creosote processes in that CCA is process water-demanding, while penta and creosote are process water-bearing methods. In the CCA method, any process spill generated at the CCA portion of the plant is captured together with stormwater runoff, and stored in above-ground steel tanks. The collected water is used to dilute the concentrated CCA solution for the next batch of preservative. The CCA method also utilizes additional make-up water from an outside source and generates little process water. On the other hand, the creosote and penta systems generate approximately 10,000 gallons of process water per day.

The process water generated by the penta and creosote processes more than satisfies the water need of the CCA method, therefore, the surplus water needs to be discharged.

Until late 1983, all process water was released to a surface impoundment south of the production facility. Water not reclaimed in the CCA process was evaporated through a spray system. When ground water contamination was detected in a well downgradient of the surface impoundment, the state ordered that no further discharge be made, and

Figure 1

Colfax Creosoting Company



SCALE 1:24 000

1 ½ 0 1 MILE

1000 0 1000 2000 3000 4000 5000 6000 7000 FEET

1 .5 0 1 KILOMETER

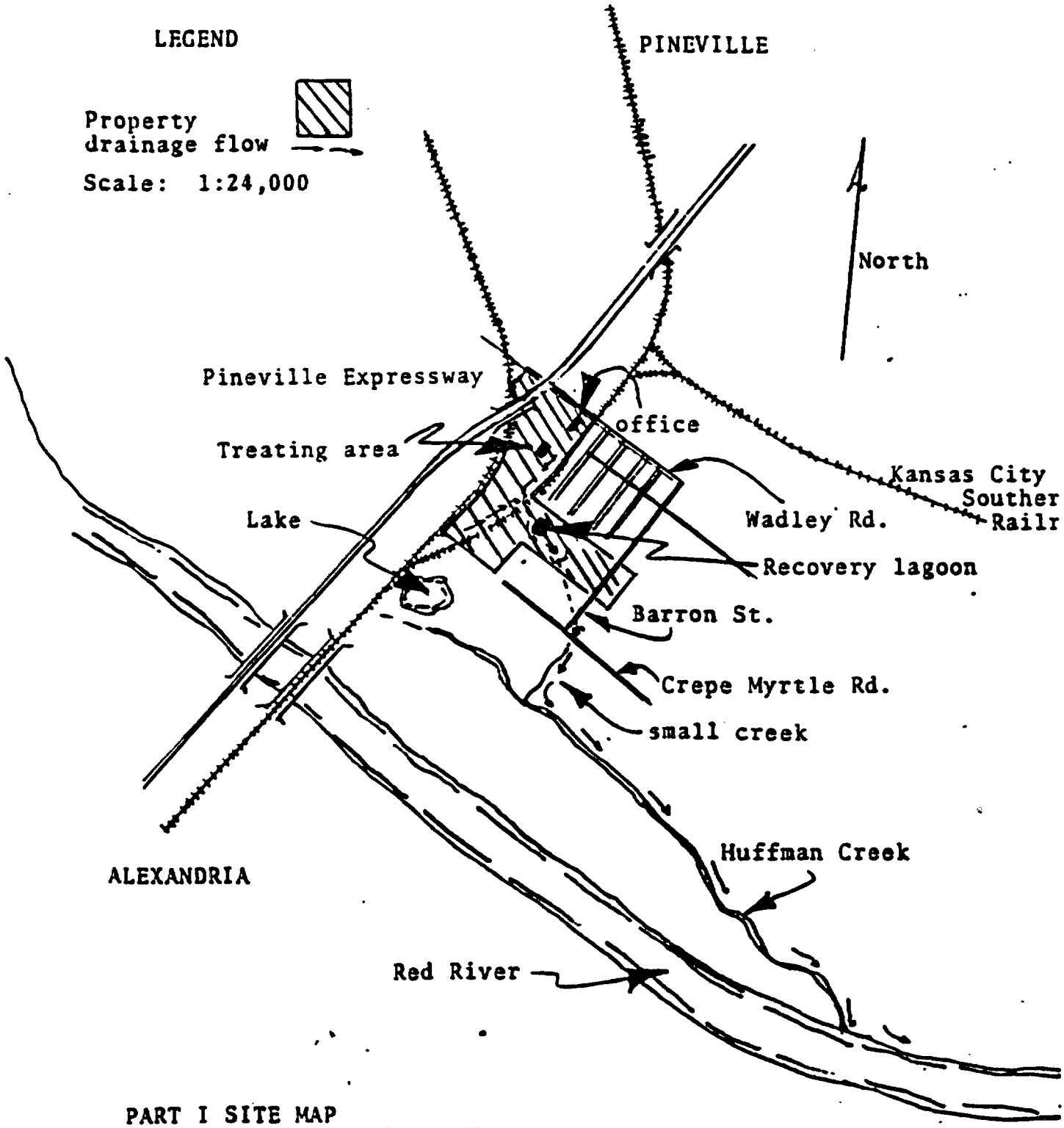
QUADRANGLE LOCATION

CONTOUR INTERVAL 10 FEET
DOTTED LINES REPRESENT 5-FOOT CONTOURS
NATIONAL GEODETIC VERTICAL DATUM OF 1929

ALEXANDRIA,
SW/4 ALEXANDRIA 15' QUAD
N3115—W9222.5/7

3 025

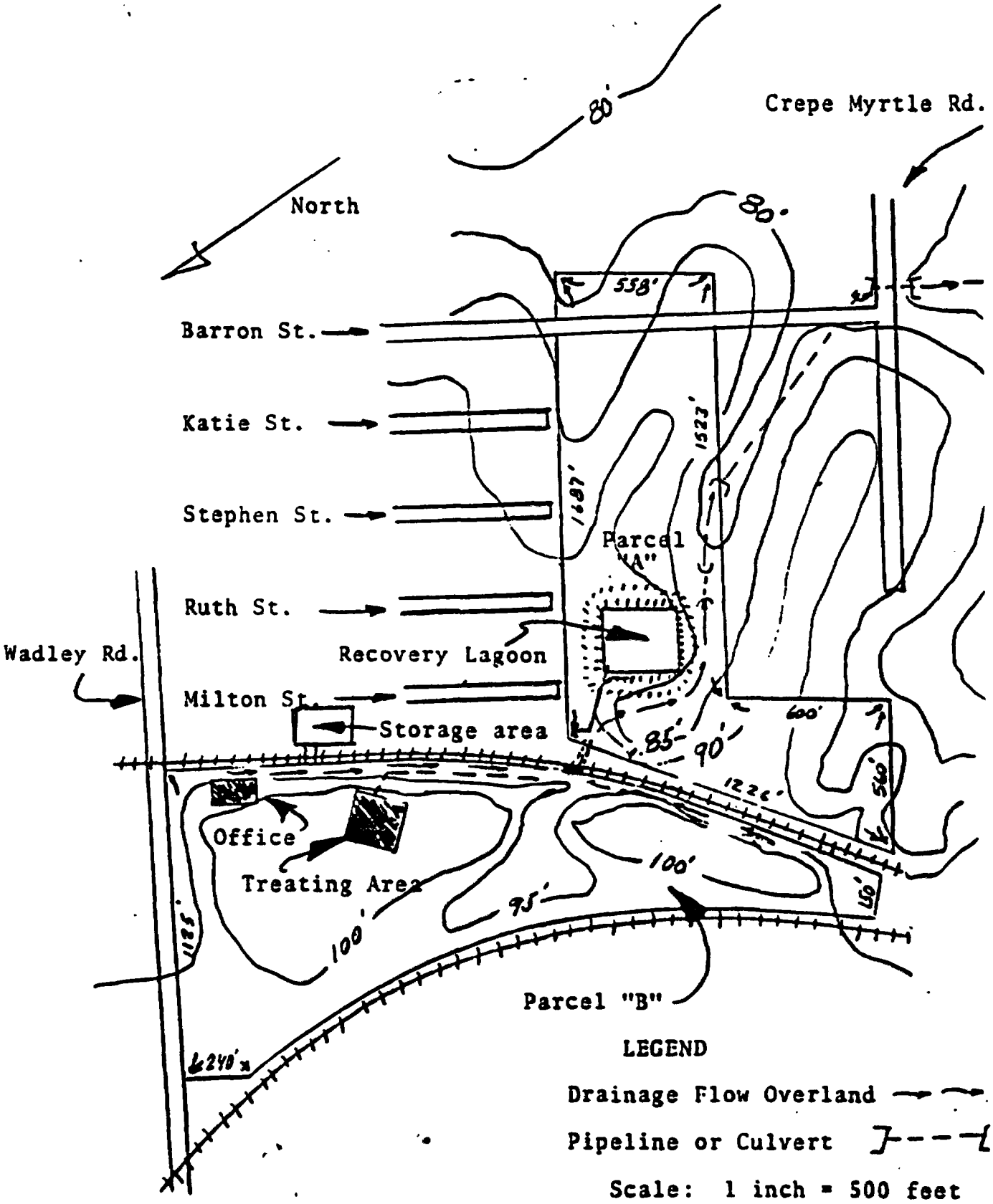
Figure 2



PART I SITE MAP
COLFAX CREOSOTING COMPANY
PINEVILLE, LA.

Note: surface contours, etc. shown on other sheets

Figure 3



PART I CONTOUR AND PROPERTY DIMENSION MAP
COLFAX CREOSOTING COMPANY
PINEVILLE, LA.

3 027

that the company officially close the surface impoundment. Subsequently the impoundment was closed, and it is currently in the post-closure phase of remediation.

The company currently operates an above-ground process water recovery system and a water treatment facility to handle the generated process water. Treated process water is discharged into the Pineville sewer system under a permit issued by the City of Pineville.

2.3 IDENTIFICATION OF SOLID WASTE MANAGEMENT UNITS

Forty-two potential SWMUs have been identified (Table 1) during the preliminary review.

Solid Waste Management Units

#1 Treated Wood Storage Areas - Four (Table 1, Ref. 1-4, and Figure 4) of the identified solid waste management units are areas for treated wood storage. These areas may be contaminated from continual dripping of preservatives from the treated wood onto the ground.

#2 Pits and Impoundments - Eight (Table 1, Ref. #5-12, and Figure 5) of the identified solid waste management units are associated with the surface impoundments. These were utilized as a discharge and recovery system for process water generated by the penta and creosoting processes. Documentation shows that these eight SWMUs contribute to the contamination of the ground water downgradient of the impoundments.

#3 Process area units - Twenty eight(Table 1, Ref #13-40, and Figure 6) of the solid waste management units assosciated with the process area are included due to the fact that they are continually utilized in the storing, processing and recovery of the hazardous wastes present at this facility.

#4 Contaminated Soils - Solid waste management unit 41 (Table 1, Ref. #41) was referred to in an inspection report from LADEQ, dated 8/29/85. This report identified only the presence of contaminants in the process area. No exact location was given.

#5 Drummed Creosotes - Solid waste management unit 42 (Table 1, Ref #42) was referred to in an inspection report from LADEQ, dated 12/20/84. This report identified only the presence of contaminants in the process area. No exact location was given.

3 028

Table 1

Solid Waste Management Units For Colfax Creosoting

REF. #	Location	Documented Release
1	Treated Wood Storage	No
2	Treated Wood Storage	No
3	Treated Wood Storage	No
4	Treated Wood Storage	No
5	Contaminated soil	Yes
6	Waste Recovery Pond	Yes
7	Waste Recovery Pond	Yes
8	Surface Impoundment	Yes
9	Sludge Pit	Yes
10	Sludge Pit	Yes
11	Sludge Pit	Yes
12	Sludge Pit	Yes
13	Creosote Cylinder	No
14	CCA Cylinder	No
15	Penta Cylinder	No
16	Steaming Cylinder	No
17	CCA Storage Tank	No
18	Creosote Water Tank	No
19	Penta Water Tank	No
20	CCA Water Tank	No
21	WR Water Tank	No
22	Duratreat Water Tank	No
23	Duratreat Conc Storage	No
24	Penta Storage& Mix Tank	No
25	Penta Mix Tank	No
26	Penta Unloading Area	No
27	Creosote Unloading Area	No
28	Treating Room	No
29	Creosote Storage	No
30	Creosote Storage	No
31	Creosote Storage	No
32	Cooling Pond	No
33	Water Storage	No
34	Creosote Storage	No
35	Creosote Storage	No
36	Creosote Separator	No
37	Creosote Storage	No
38	Creosote Separator	No
39	Creosote Separator	No
40	Penta Separator	No
41 *	Contaminated top soils	No
42 *	Drummed Creosote	No

* SWMU DOCUMENTED WITHOUT PRECISE LOCATION

Anayltical Results for Colfax Creosoting Company

Monitoring Well Results in ppm of Phenols

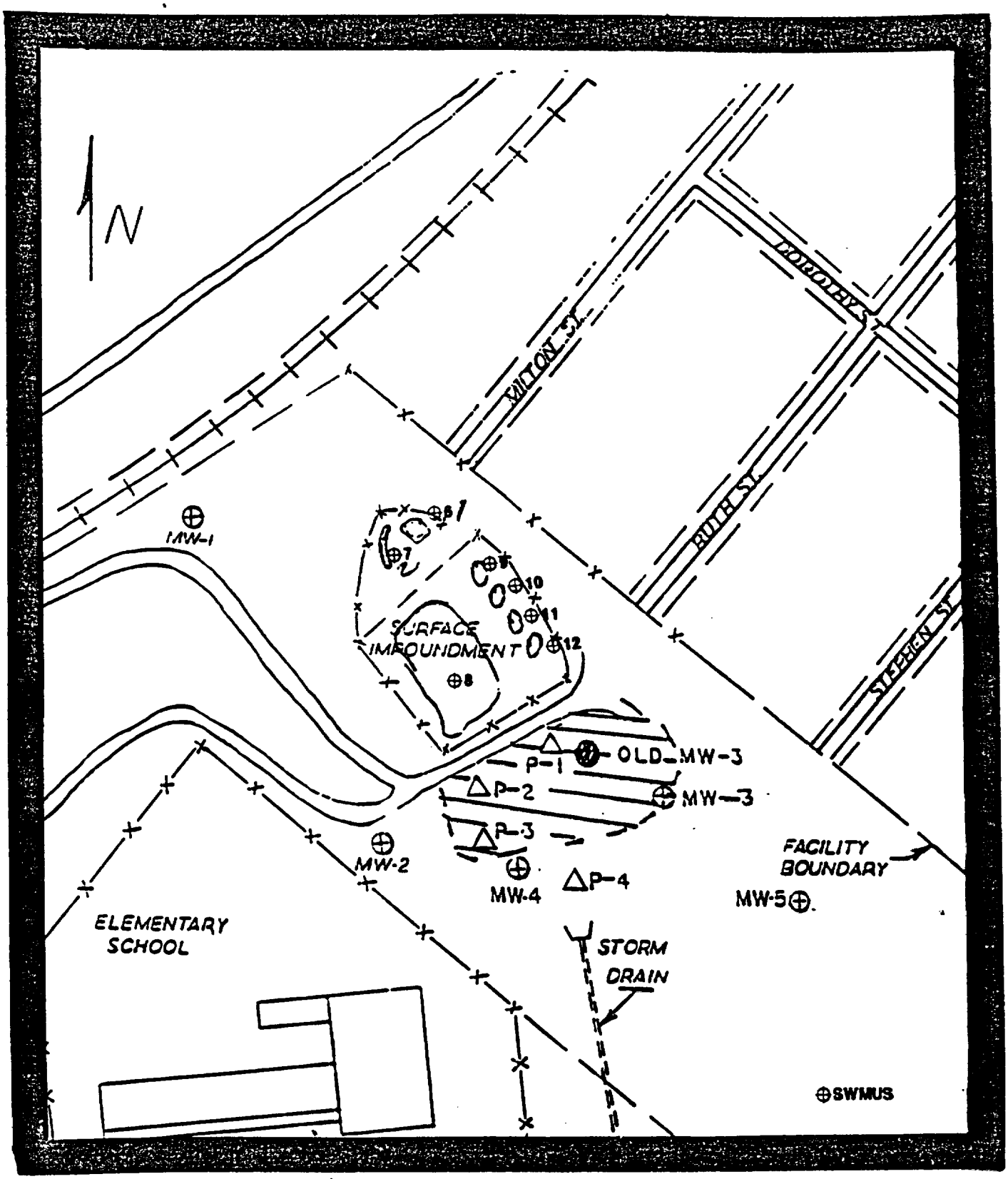
Date of Sampling	MW1	MW2	MW3	NMW3	MW4
3/16/83	.001	.001	.14	na	na
9/7/84	U	.02	na	.05	U
12/10/85	<005	<007	na	.072	<005

Borings Sample Results in ppm Total K001 Constituents and ppm Total Phenols

Boring Cell #	1	2	4	5	8	9
Total K001	.2	2.13	4.3	.04	.038	3.53
Total Phenols	.08	.03	3.9	.03	.03	2.41

Figure 5

Impoundment Diagram



Colfax Creosoting Company

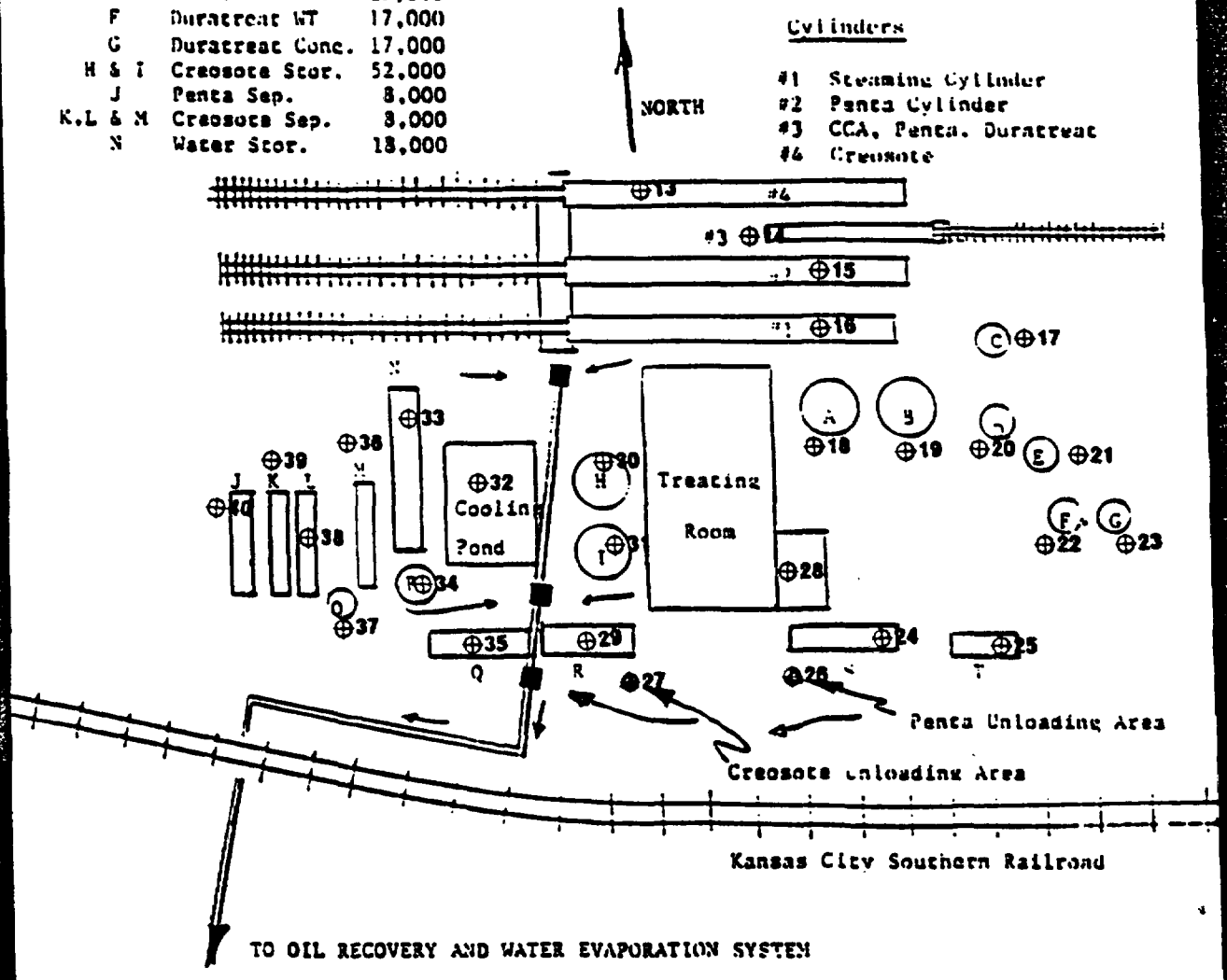
Pineville La.

LAD008184616

3 031

Facility Diagram

Tank	Contents	Volume, Gal.
A	Creosote WT	53,000
B	Penta WT	55,000
C	CCA Conc.	17,000
D	CCA WT	17,000
E	WR WT	17,000
F	Duratreat WT	17,000
G	Duratreat Conc.	17,000
H & I	Creosote Stor.	52,000
J	Penta Sep.	8,000
K,L & M	Creosote Sep.	8,000
N	Water Stor.	18,000



Tank	Contents	Volume, Gal.
O	Creosote Stor.	17,658
P	Creosote Stor.	23,000
Q	Creosote Stor.	9,671
R	Coal tar Stor.	17,626
S	Penta Stor.&Mix	10,400
T	Penta Mix	7,700

SWMUS DOCUMENTED WITHOUT PRECISE LOCATION

⊕41 Contaminated top soil piles

⊕42 Drummed creosote by products

⊕SWMUS

Colfax Creosoting Company

Pineville La.

LAD008184616

2.4 SUMMARY OF WASTES PRESENT

Creosote, penta chloraphenol, chromium, copper, and arsenic are the hazardous wastes of concern on-site. These contaminants and their by-products may be present in varying concentrations in the top soils, surface water, and groundwater within the site boundary and surrounding area. Creosote by-products (Table 2) and penta have been documented in the borings taken from the impoundment sludges. Groundwater contamination by phenols and chloride has been documented in monitoring well #3 downgradient of the impoundment.

3 033

CREOSOTE COMPOUNDS

	Formula	Boiling Point	Concentration Range
Coumarone	C_8H_6O	174	A
p-Cymene	$C_{10}H_{14}$	177	A
Indene	C_9H_8	182	A
Phenol	C_6H_6O	181	A
O-Cresol	C_7H_8O	190	A
Benzonitrile	C_7H_5N	191	A
m-Cresol	C_7H_8O	202	A
Naphthalene	$C_{10}H_8$	218	D
Thionaphthene	C_8H_6S	222	A
Quinoline	C_9H_7N	243	A
2-Methylnaphthalene	$C_{11}H_{10}$	241	B
Isoquinoline	C_9H_7N	238	A
1-Methylnaphthalene	$C_{11}H_{10}$	245	A
4-Indanol	$C_9H_{10}O$	245	B
2-Methylquinoline	$C_{10}H_9N$	247	A
Indole	C_8H_7N	252	A
Diphenyl	$C_{12}H_{10}$	255	A
1, 8-Dimethylnaphthalene	$C_{12}H_{12}$	262	A
2, 3-Dimethylnaphthalene	$C_{12}H_{12}$	266	A
Acenaphthene	$C_{12}H_{10}$	281	D
Dibenzofuran	$C_{12}H_{10}O$	287	D
Fluorene	$C_{13}H_{10}$	299	D

Table

Table 2
(cont.)

	Formula	Boiling Point	Concentration Range
1-Naphthonitrile	$C_{11}H_7N$	297	A
3-Methyldiphenylene	$C_{13}H_{10}O$	298	B
2-Naphthonitrile	$C_{11}H_7N$	304	A
9, 10-Dihydroanthracene	$C_{14}H_{10}$	305	B
2-Methylfluorene	$C_{14}H_{12}$	318	B
Diphenylene Sulfide	$C_{12}H_8S$	332	B
Phenanthrene	$C_{14}H_{10}$	340	D
Anthracene	$C_{14}H_{10}$	342	C
Acridene	$C_{13}H_9N$	346	A
3-Methylphenanthrene	$C_{13}H_{12}$	350	B
Carbazole	$C_{12}H_9N$	352	B
4, 5-Methylenephenanthrene	$C_{15}H_{10}$	353	B
2-Methylanthracene	$C_{15}H_{12}$	360	A
9-Methylanthracene	$C_{15}H_{12}$	361	B
2-Methylcarbazole	$C_{13}H_{11}N$	363	B
Fluoranthene	$C_{16}H_{10}$	382	D
1, 2-Benzodiphenylene	$C_{16}H_{10}O$	395	B
Pyrene	$C_{16}H_{10}$	393	B
Benzofluorene	$C_{17}H_{12}$	413	B
Chrysene	$C_{18}H_{12}$	448	B
Unidentified Compounds in Distillate			D

A = Compounds having a concentration less than 0.5%
B = Compounds having a concentration greater than 0.5% and less than 3.0%
C = Compounds having a concentration greater than 3.0% and less than 5.0%
D = Compounds having a concentration greater than 5.0%

3. ENVIRONMENTAL SETTING

3.1 METEOROLOGY AND AIR QUALITY

The climate in the Pineville-Alexandria area is warm and humid. Annual mean relative humidity is 73%. The average high temperature in the area (July) is 93°F; the average low temperature (February) is 41°F. Annual precipitation is 60 inches per year. The prevailing winds are in a northerly direction. A wind rose is presented in Figure 7.

3.2 FLOODPLAIN AND SURFACE WATER

The Red River 100-year floodplain extends onto the southern portion of the Colfax facility (Figure 8), and is approximated by the 90-foot topographic contour line. The floodplain borders the western half of the surface impoundment, and includes the contaminated drainage ditch west of the impoundment (see Figure 5).

The Red River is the closest major downstream surface water body (Figures 8 and 9). All surface runoff from the facility flows south in an intermittent stream for approximately 0.5 mile before discharging into the Huffman Creek, which flows southwest and discharges into the Red River. The surface water runoff path from the facility boundary to the Red River is 1.7 miles.

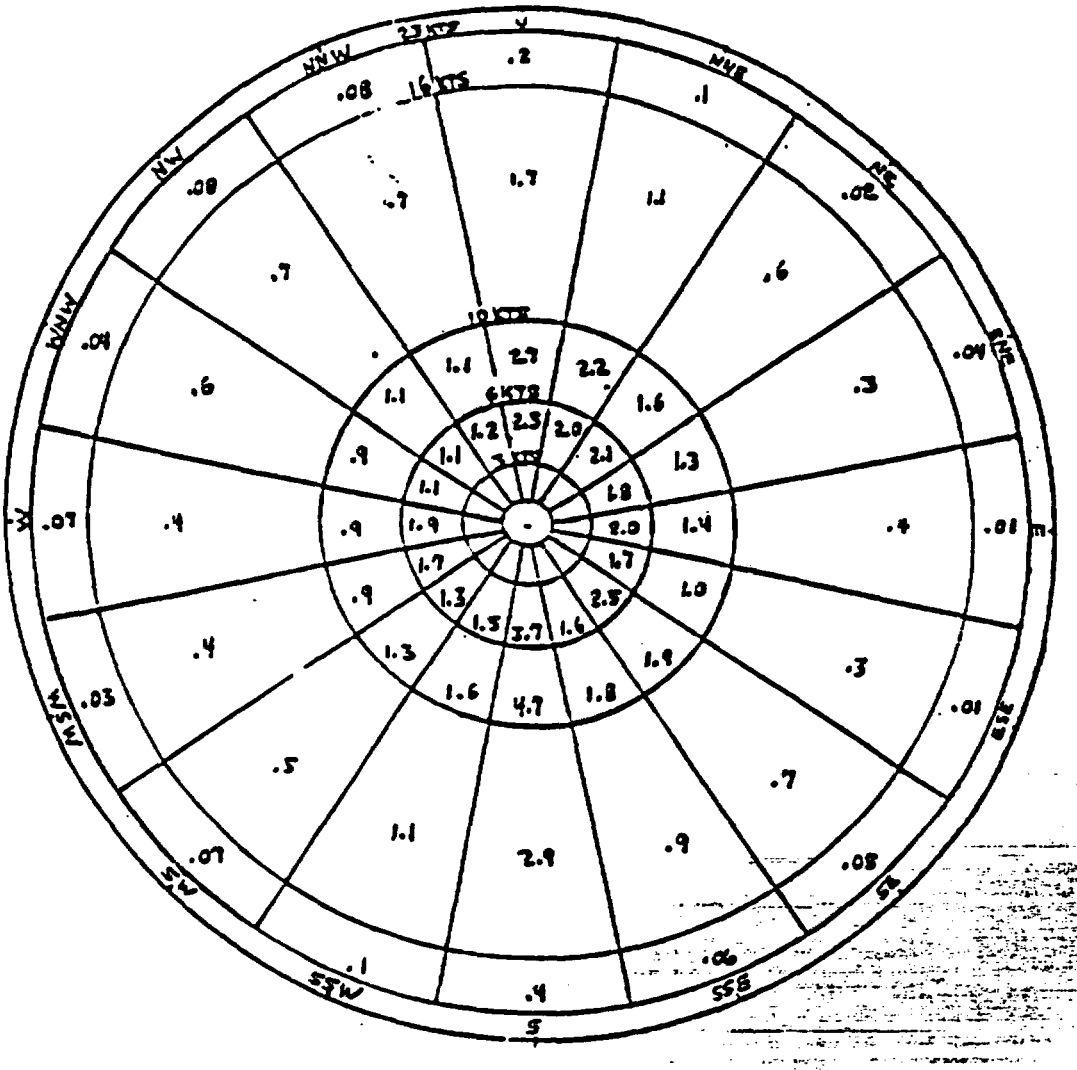
3.3 GEOLOGY AND SOILS

The Red River Valley Alluvium immediately underlies the facility. This stratigraphic unit consists of clay and silt. Several on-site soil borings revealed this unit at a depth of 5 to 15 feet below land surface. Allowing for land surface elevation, the unit appears to have a relatively horizontal base at the facility.

Pleistocene Upland deposits underlie the alluvium. Upland deposits are generally less than 100 feet thick in the region of the facility. The deposits are generally sandy, with gravel in the lower depths. There are substantial amounts of clay in the upper part of the unit in some areas. The color of the near surface material is most commonly influenced by the relative amounts of yellow and iron-red sediments.

The Upland deposits are underlain by Miocene age sands. These sediments contain thick, predominantly sand intervals, alternating with thinner clayey zones. The Miocene sand beds are approximately 1,000 feet thick beneath the facility. This unit is the deepest fresh-water bearing unit under the facility.

3 236



Annual Wind Rose Diagram for Alexandria La.

Colfax Creosoting Company

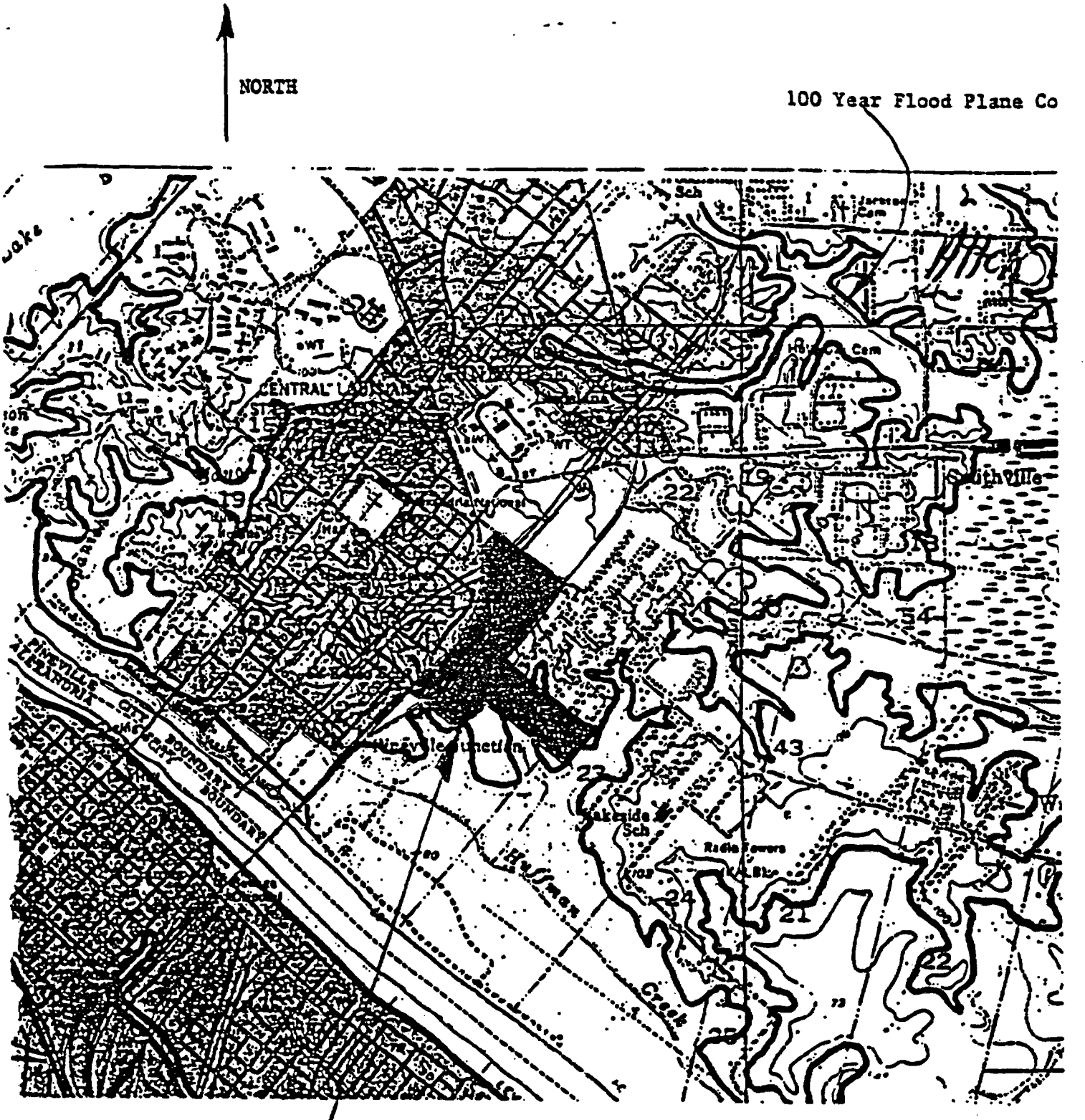
Pineville La.

LAD008184616

3037

Fig. A

Figure 8



100 YEAR FLOOD PLANE MAP

3 038

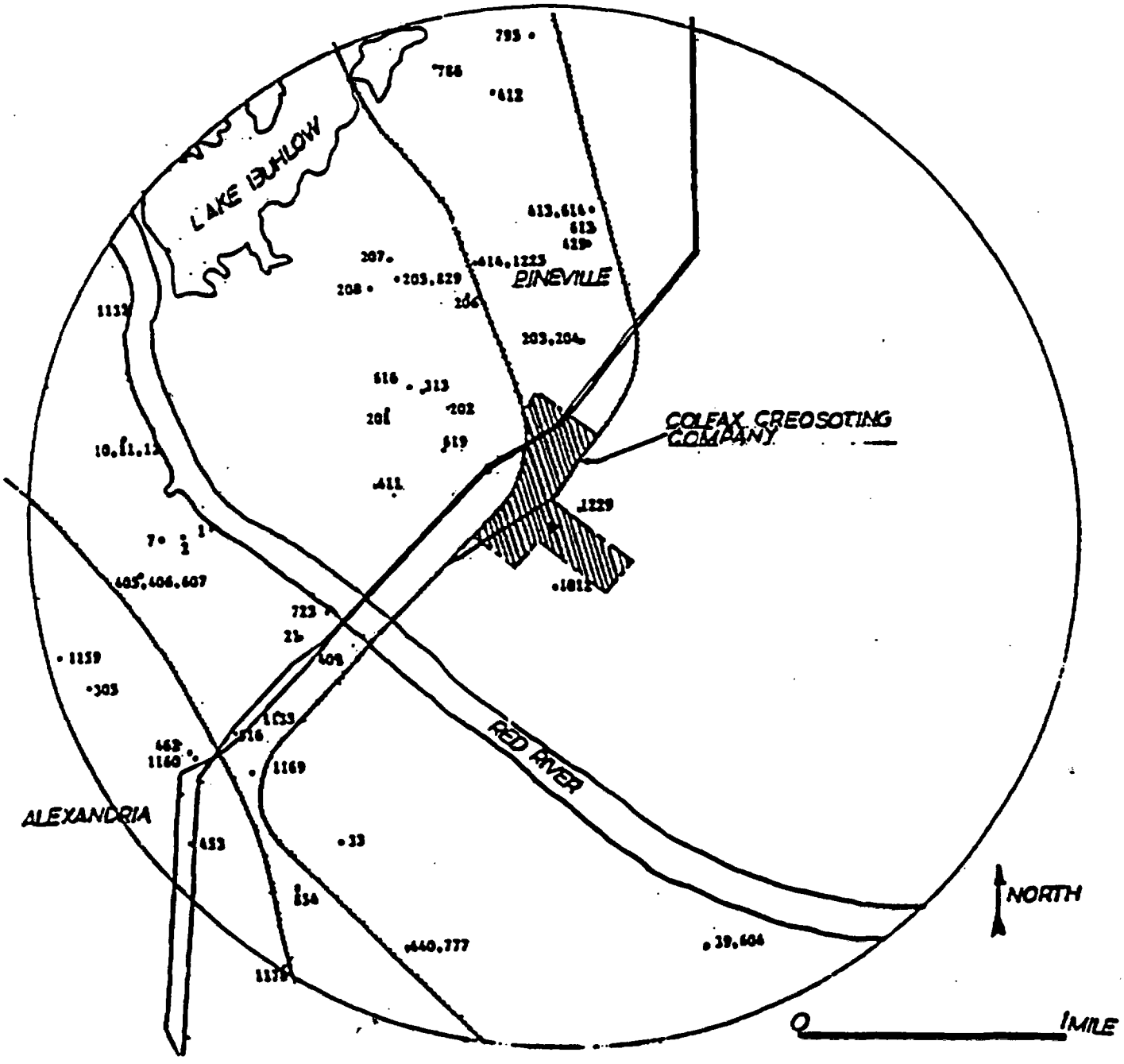


FIGURE 2

LOCATION OF WATER WELLS WITHIN 2 MILES OF IMPOUNDMENT BASED ON LA. DEPARTMENT OF PUBLIC WORKS RECORDS

3 039

3.4 GROUND WATER

A perched water table was reported in the Red River Valley Alluvium. Depths to the perched water table were reported in two of the three boreholes: eight feet in one and nine feet in another.

The water table beneath the facility is located in the Pleistocene Upland deposits. The depth to water is approximately thirty feet below land surface. Ground water in the Pleistocene aquifer flows toward the southeast.

Recharge to the Pleistocene aquifer occurs mostly through rainfall percolation. Hydraulic conductivities as high as 10^{-1} cm/sec were reported. Wells in this unit generally yield 100 to 200 gallons per minute (gpm). The water is soft, acidic, and contains less than 150 parts per million (ppm) of dissolved solids.

Hydraulic conductivities in the Miocene sands generally range from 10^{-3} to 10^{-2} cm/sec. Wells in the Alexandria area generally yield 300 gpm from this unit. The sodium bicarbonate water in the Miocene sands is soft and slightly alkaline. Dissolved solids generally are less than 500 ppm.

3.5 RECEPTOR INFORMATION

Colfax Creosoting Company is located in a residential and commercial area in Pineville. Within a one mile radius, there are five schools, one university, fifteen churches, two hospitals, the Pineville City Hall and a community center. Approximately 2,000 people live within a one-mile radius of the facility.

Fifty-two wells have been identified within a 2-mile radius of the facility (Figure 9). Twenty-four of the wells are located on the same side of the Red River as the facility.

3 040

4. RELEASE PATHWAYS

4.1 AIR RELEASE PATHWAYS

Some wastes utilized at this facility (creosote, penta and creosote by-products) are organic in nature and may be volatilized. The high temperatures of the region increase the chance for volatilization; however, the high humidity (73%) would significantly decrease the chance for release of these compounds into the atmosphere. Due to these conflicting environmental factors, release of hazardous constituents into the atmosphere would be minimal.

4.2 SURFACE WATER PATHWAYS

Runoff from the facility enters a ditch and flows to an intermittent stream south of the property (see Figure 2). Process area runoff is not contained.

The ditch contains deposits of a substance resembling K001 with a distinct creosote smell. Runoff from the site could pick up hazardous substances from the process, and other areas, and transport them to the Red River. The drainage ditch is within the Red River 100-year floodplain.

4.3 SOIL PATHWAY

A creosote-like substance in the soil was reported in the process area, at the bottom of the unlined surface impoundments, and at other unspecified areas. There is no documentation indicating any containment structures which would prevent the migration of contaminants in the soil.

4.4 GROUND WATER PATHWAY

Ground water contamination has been documented downgradient of the large surface impoundment. The upgradient monitoring well has not shown contamination, but K001 constituents have been identified in at least one downgradient monitoring well.

The only documented ground water sampling data were obtained near the surface impoundments. The possibility of additional on-site sources of ground water contamination cannot be excluded.

3 041

5. DOCUMENTED RELEASE

5.1 GROUND WATER RELEASE

A documented release to ground water was observed by LADEQ on March 16, 1983 during a routine compliance sampling of the Colfax ground water monitoring system. A concentration of .14 ppm phenols were detected downgradient of the impoundment in monitoring well #3. As a consequence of this contamination, a new monitoring well #3 was installed downgradient of the original monitoring well #3. Monitoring well #2 was installed in December, 1983, in response to an order issued by LADEQ.

All existing monitoring wells were sampled again in September, 1984. No significant concentrations of phenols were detected. Sampling in December 1985 showed a high concentration of phenols in the new monitoring well #3. Once again, Colfax installed a new downgradient well (#5) to determine the plume of contamination. No contaminants were detected in monitoring well #5.

5.2 SOLID WASTE MANAGEMENT UNITS RESPONSIBLE FOR RELEASE

It is stated in a ground water assessment plan for Colfax, dated July 7, 1984, that the downgradient ground water contamination originates from the surface impoundments (Ref. #5-12). Borings taken from sludges in the area of the large surface impoundment (Ref. #8) show contamination by phenols. No borings were taken from the other units within the area of the large surface impoundment (Ref. #5-7, 9-12); however, there is documentation stating that the contents of the two process water ponds and the four sludge pits contain the same hazardous wastes as found in the large surface impoundment. Therefore, it can be concluded from these factors that these units are also contributing to the downward migration of hazardous wastes into the ground water pathway.

The contaminated soil (Ref. #5) is indicated to be a waste pile, located approximately 50 yards west of the surface impoundment. There is documentation stating that the pile appears to consist of the same material as that accumulated at the bottom of the large surface impoundment. It is likely that this material is seeping into the ground and contributing to the downward migration of contaminants into the groundwater pathway.

5.3 MITIGATIVE ACTION

Colfax Creosoting Company is currently in the post-closure phase of remediation for the two smaller waste recovery ponds (Ref. #6, 7), the large surface impoundment (Ref. #8), and the four sludge pits (Ref. # 9-12).

3 042

6. CONCLUSIONS

A review of EPA and LADEQ files of the Colfax Creosoting Company resulted in the following conclusions:

1. There has been a documented release of hazardous waste to the ground water from the large surface impoundment (SWMU Ref. #8).

2. File documents indicate that the smaller impoundments (SWMU Ref. #6, 7, 9, 10, 11 and 12) have released contaminants into the soil, and possibly into the ground water.

3. File documents suggest that the waste pile west of the impoundments (SWMU Ref. #5) has released contaminants into the soil and the surface water runoff pathway.

4. File documents also indicate spills in the process area, and storage of contaminated materials without proper containment structures. The exact locations were not specified in the files.

With the exception of one waste pile (SWMU Ref. #5) and the surface impoundments (SWMUs Ref. #6 through #12), the files do not contain sufficient detail to determine spills from other SWMUs. There is no information available to identify the process units which produced spills; the frequency of spills, and the locations of storage areas containing hazardous wastes. A visual inspection of each SWMU, and interviews with state regulators and facility representatives is necessary to fill the information gaps.

3 D 43

REFERENCE 4

TASK I: PRELIMINARY REPORT: DESCRIPTION OF CURRENT CONDITIONS

FOR

COLFAX CREOSOTING COMPANY
PINEVILLE, LA

Report Prepared By

BALL ENGINEERING, INC.
23 Wood Manor
Tuscaloosa, AL 35401-4969
205-345-6399

April 22, 1991

Certification

I certify under penalty of law that this document and all attachments were prepared under my direction or supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the information, the infomation submitted is, to the best of my knowledge and belief, true, accurate, and complete. I am aware that there are significant penalties for submitting false information, including the possibility of fine and imprisonment for knowing violations.

Clyde M. Norton Date April 18, 1991
Clyde M. Norton, Vice President
Colfax Creosoting Co.

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of Louisiana.

JOHN E. BALL J. E. Ball
Date 4/22/91 Registration No. 15774

TASK I: PRELIMINARY REPORT: DESCRIPTION OF CURRENT CONDITIONS

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TASK I: PRELIMINARY REPORT
DESCRIPTION OF CURRENT CONDITIONS

COLFAX CREOSOTING CO.
PINEVILLE, LOUISIANA

1 INTRODUCTION

On January 22, 1991, Colfax Creosoting Company, a wood treatment facility in pineville, Louisiana, was granted by the EPA and Louisiana Department of Environmental Quality a Post Closure Permit as required by Subtitle C of the Resources Conservation and Recovery Act (RCRA) and the 1984 Hazardous and Solid Waste Amendments (HSWA). Part B, Section G of the Post Closure Permit requires the facility to conduct a RCRA Facility Investigation (RFI) to obtain information on the nature and extent of any releases that may have occurred from 27 potential Solid Waste Management Units (SWMU's) identified during the RCRA Facility Assessment (RFA) conducted by Ecology and Environment, Inc. as contracted by EPA.

1.1 Purpose and Scope of Report

The Post Closure Permit for Colfax Creosoting Company requires the RFI to be conducted in a series of five steps or "tasks." These are:

Task I: Description of Current Conditions
Task II: RFI Workplan
Task III: Facility Investigation
Task IV: Investigation Analysis
Task V: Reports

Task I of the RFI is designed to provide background informaiton on the facility, contamination present, and interim corrective measures. It includes data gathered during any previous investigations conducted at the site. Task I is subdivided into three areas for investigation,

review, and summary: 1) facility background summary; 2) nature and extent of contamination; and 3) implementation of other measures.

1.2 Report Contents

This preliminary report describes the current conditions at the facility as required for Task I of the RFI. Section 2 of this report summarizes the facility location, history, spills and response, studies, contamination, borings, and environmental permits for Colfax Creosoting Company. Section 3 gives information on the nature and extent of contamination at the site and lists the individual SWMU's noted during the RFA. This seciton also discusses the existing degree of contaminants, and environmental impact and assessment data. Interim measures already in place at the facility are detailed in Section 4 giving design details, as well as monitoring and progress report schedules. A preliminary RFI activities schedule is presented in Section 5.

2 FACILITY BACKGROUND

2.1 Facility Location

2.1.1 Geographic Location

Colfax Creosoting Company is located in Pineville, a city in the northern half of Rapides Parish, Louisiana. The company property is situated approximately three quarters of a mile north-east of the Red River near Pineville Junction. Previously, the company was situated on two separate parcels of property, one of which was owned by the company and the other leased from the Kansas City Southern Railroad as described in the RFA. However, since the time the RFA was conducted, the company has purchased the leased parcel and now owns the entire site. Figure 2.1 is taken from the 7.5 minute USGS Alexandria, Louisiana quadrangle map showing the site location in relation to the city of Pineville.

2.1.2 Property Lines

The facility property lines are shown in Figure 2.2 and also detailed on the revised facility map located at the back of this document. As stated earlier, the facility site was previously divided into two parcels A and B. Parcel A was leased by the company from the Kansas City Southern Railroad and contains the plant offices, treating area, and most of the inventory storage area. This parcel is now owned by the company.

Parcel B consists of two tracts owned by the company and is located southeast of Parcel A as shown in Figure 2.2. Tract 1 is the site of the closed surface impoundments which once processed wastewater generated from the wood treating plant. Tract 2 is a vacant lot south of Barron Street, and is not presently used by the company.

The names of owners of all property adjacent to the facility are given in Table 2.1 which references lot numbers found in the facility map at the back of this report.

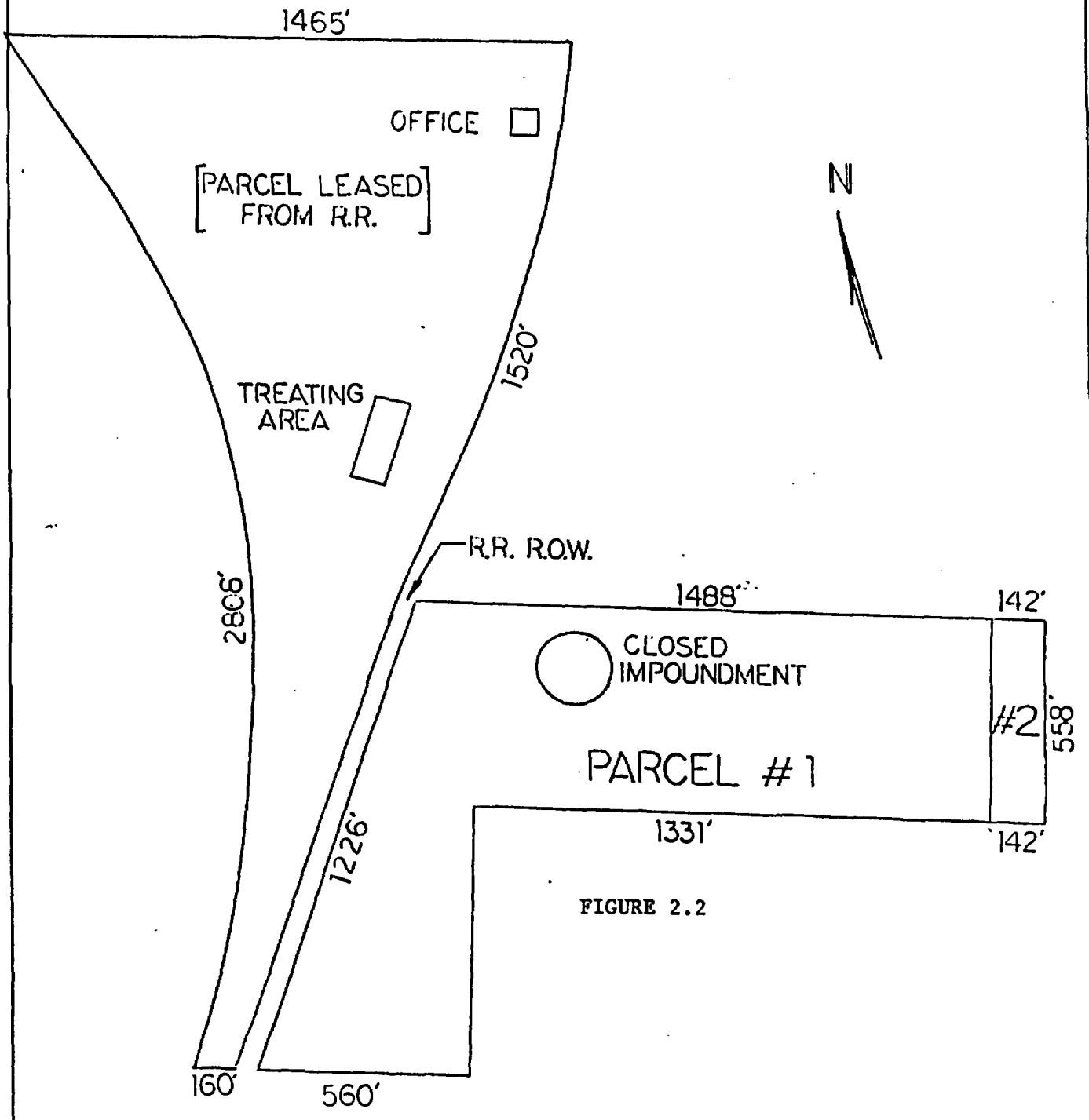

1465'
OFFICE
PARCEL LEASED FROM R.R.
N
1520'
TREATING AREA
R.R. R.O.W.
2806'
1488'
142'
CLOSED IMPOUNDMENT
#2
558'
PARCEL #1
1331'
142'
1226'
160'
560'
SCALE: 1"=400'

FIGURE 2.2

TABLE 2.1

Adjacent Property Owners

1. (b) (6) [redacted], EtAl.
2. Louisiana College
3. Louisiana & Arkansas R. Y. Co.
4. Parks Wood Products, Inc.
5. (b) (6) [redacted]
6. (b) (6) [redacted]
7. (b) (6) [redacted]
8. (b) (6) [redacted]
9. (b) (6) [redacted]
10. (b) (6) [redacted]
11. (b) (6) [redacted]
12. (b) (6) [redacted]
13. (b) (6) [redacted]
14. (b) (6) [redacted]
15. (b) (6) [redacted]
16. (b) (6) [redacted]
17. (b) (6) [redacted]
18. (b) (6) [redacted]
19. (b) (6) [redacted], EtAl.
20. Rapides Parish School Board
21. Roy O. Martin Lumber Co.
22. Roy O. Martin Lumber Co.
23. (b) (6) [redacted]
24. (b) (6) [redacted]
25. (b) (6) [redacted]
26. (b) (6) [redacted]
27. (b) (6) [redacted]
28. (b) (6) [redacted]
29. (b) (6) [redacted]
30. (b) (6) [redacted]
31. (b) (6) [redacted]
32. (b) (6) [redacted]
33. (b) (6) [redacted]
34. (b) (6) [redacted]
35. (b) (6) [redacted]
36. (b) (6) [redacted]
37. (b) (6) [redacted]
38. (b) (6) [redacted]

2.1.3 Topography

The facility map depicts the topography of the facility as compiled from USGS high altitude photographs, quadrangle sheets, and local topographic surveys made at the facility. The highest point of relief at the facility is located at the northwest end of the plant and measures over 100′ NGVD. The terrain slopes gradually to the southern end of the plant where the lowest elevation is below 80′ NGVD.

A majority of the stormwater from Parcel A drains to a culvert extending under the Kansas City Southern track near the center of the southern boundary of the parcel. The culvert discharges to a shallow ditch which runs through Parcel B and discharges to a storm drain located near the center of the western boundary of the tract. From there, it is conveyed to another open ditch which drains into Huffman Creek, a tributary of the red river. The facility map illustrates drainage patterns at the facility.

There are no designated wetlands at the facility, however the southeastern most part of Parcel B is located within the 100-year floodplain for the area.

2.1.4 Surrounding Land Use

Zoning maps prepared for the City of Pineville show that the land occupied by Colfax Creosoting is zoned industrial. This zoning extends west from Crepe Myrtle Drive to the eastern boundary of parcel B and north from Wayne Street to U.S. highway 167. A wood products manufacturer operates in this industrially zoned section north of parcel A, while the land west of parcel B is owned by the Rapides Parish School Board and is the site of an elementary school. The land west of Crepe Myrtle Drive is zoned residential but is used primarily for agricultural purposes. Land east of parcel B is zoned single family residential and commercial. A subdivision is located in this area. The land due north of the plant property is

owned by Louisiana College and is marked residential on the city zoning maps. Figure 2.3 is an excerpt from the city zoning map for the area.

2.1.5 Hazardous Waste TSD Areas

Colfax Creosoting Company does not operate any active treatment, storage, or disposal areas for hazardous waste. Hazardous waste is generated by the facility from time to time due to routine cleaning of the plant equipment. This waste is produced in small quantities and is shipped off site to a TSD facility, and no waste is stored at the plant for longer than 90 days.

During the period from 1975 to 1983, the company operated a series of surface impoundments in parcel B to handle process water generated from the plant. The process water was first discharged to a creosote recovery lagoon where free preservative was collected for re-use. Discharge from this unit was then directed to two settling ponds and then routed to the city sewer system. Over the operational life of these impoundments sludge containing pentachlorophenol and creosote constituents accumulated on the bottom of the units. This sludge is listed by the EPA as a hazardous waste designated K001. Due to the detection of groundwater contamination from the units in 1983, the units were ordered to be closed under RCRA guidelines for TSD facilities. Final closure was approved in 1988 and the impoundments are currently in the post-closure phase of RCRA regulations. The location of this unit is shown on the facility map accompanying this document.

2.1.6 Solid Waste Management Unit Locations

During the course of the RFA, twenty-seven potential solid waste management units (SWMU's) were identified. Of these units, Table 2.2 lists those selected for study in the HSWA Permit. The locations of each of the potential SWMU's

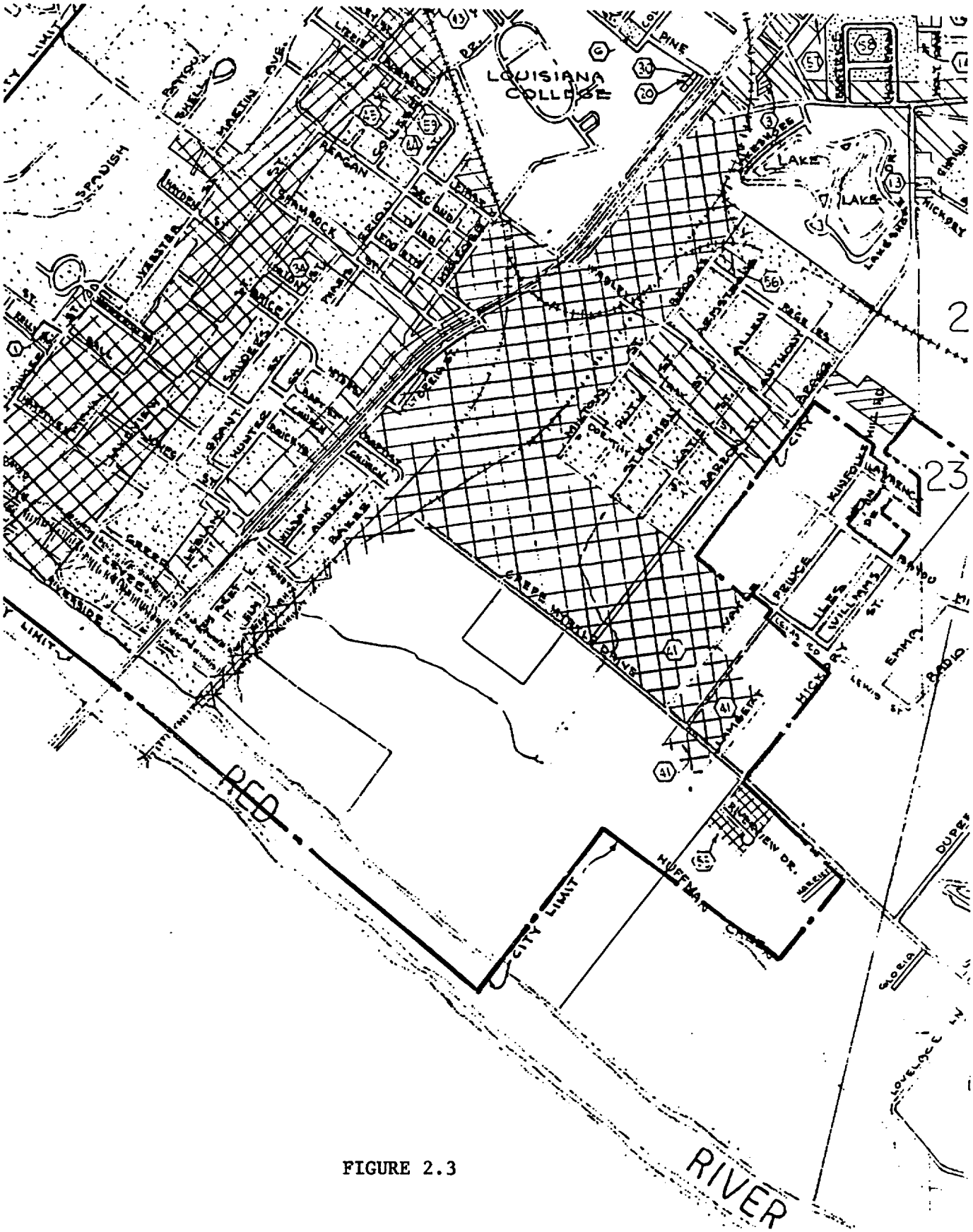

LOUISIANA COLLEGE
LAKE
LAKE
PINE
SPANISH
MARTIN AVE.
REAGAN
SHAMROCK
SANDERS
GRANT
HUNTER
BAKER
GREEN
LEVEE
RIVERSIDE
CITY LIMIT
CREPE MYRTLE DRIVE
PRINCE
ILES
WILLIAMS
HICKORY
EMMA
RADIO
HUFFMAN
RIVERVIEW DR.
GLORIA
LOVELACE LN
RED
RIVER
23

FIGURE 2.3

is given on the facility map.

TABLE 2.2
SWMU's LISTED IN HSWA PERMIT
Colfax Creosoting Co.

RFA SWMU No.	Unit Name
1	Northeast Treated Wood Storage Area
2	Southeast Treated Wood Storage Area
3	West Treated Wood Storage Area
4	Southwest Treated Wood Storage Area
8	Railcar Separator
9	Main Runoff Pathway
10	Truck Washing Area
11	Untreated Wood Landfill
12	Groundwater Recovery Tank
13	Penta/Creosote Sump Containment
14	CCA Containment System
15	Creosote Dehydrator
16	Creosote Separator No. 1
17	Creosote Separator No. 2
18	Creosote Separator No. 3
19	Penta Reclaiming Hopper
20	Penta Separator
25	Cooling Pond
AOC A	West Runoff Pathway
AOC B	Creosote Unloading Area

2.1.7 Water Well Locations

2.1.7.1 On Site Wells

Colfax Creosoting currently operates twelve monitoring and recovery wells at the site. These wells are located in parcel B as shown on the facility map, and are used to monitor groundwater contamination that originated from the surface impoundment units when they were in operation. Table 2.3 presents a summary of the function, location, and relevant parameters of each of the on site wells.

TABLE 2.3
FACILITY WELL SUMMARY
Colfax Creosoting Co.

Well	[1]Well Elev	Total [2]Depth	Well Type	Status
MW-1	97.72′	49.9′	4" PVC	Monitor
MW-2	92.80′	52.6′	4" PVC	Monitor
MW-3	92.50′	59.0′	4" PVC	Monitor
MW-4	83.68′	58.0′	4" PVC	Monitor
MW-5	81.93′	40.0′	2" PVC	Monitor
MW-6	85.55′	66.0′	2" PVC	Monitor
MW-7	96.32′	56.0′	2" PVC	Monitor
MW-7D	96.97′	73.5′	2" PVC	Monitor
P-1R	91.39′	63.5′	4" SS/PVC	Recovery
P-2R	89.46′	59.6′	4" SS/PVC	Recovery
P-3	84.02′	64.0′	2" PVC	Monitor
P-4R	88.55′	48.0′	4" SS/PVC	Recovery

[1]NGVD Measured at Top of Casing
[2]Measured from Top of Well Casing to Bottom of Well

2.1.7.2 Off Site Wells

According to records obtained from the Louisiana Department of Transportation and Development, there are thirty wells currently in use within a one mile radius of the facility. Thirteen of these wells are domestic or public supply wells, six are used by industries, one is used for irrigation and ten are maintained as observation or monitoring wells. A major portion of these wells are on the same side of the river as can be observed from Figure 2.4. Of these wells, eight are used for domestic or public supply, two produce water for industry or commercial use and five are used as observation or monitoring wells. Several abandoned wells also exist within a one-mile radius of the plant, however they are not included in Figure 2.4.

None of the domestic or public supply wells in the area were shallower than 250′. Only one industrial well was under 100′ deep and the observation wells ranged from 20′ to 406′ deep. The probability plot shown as Figure 2.5 gives

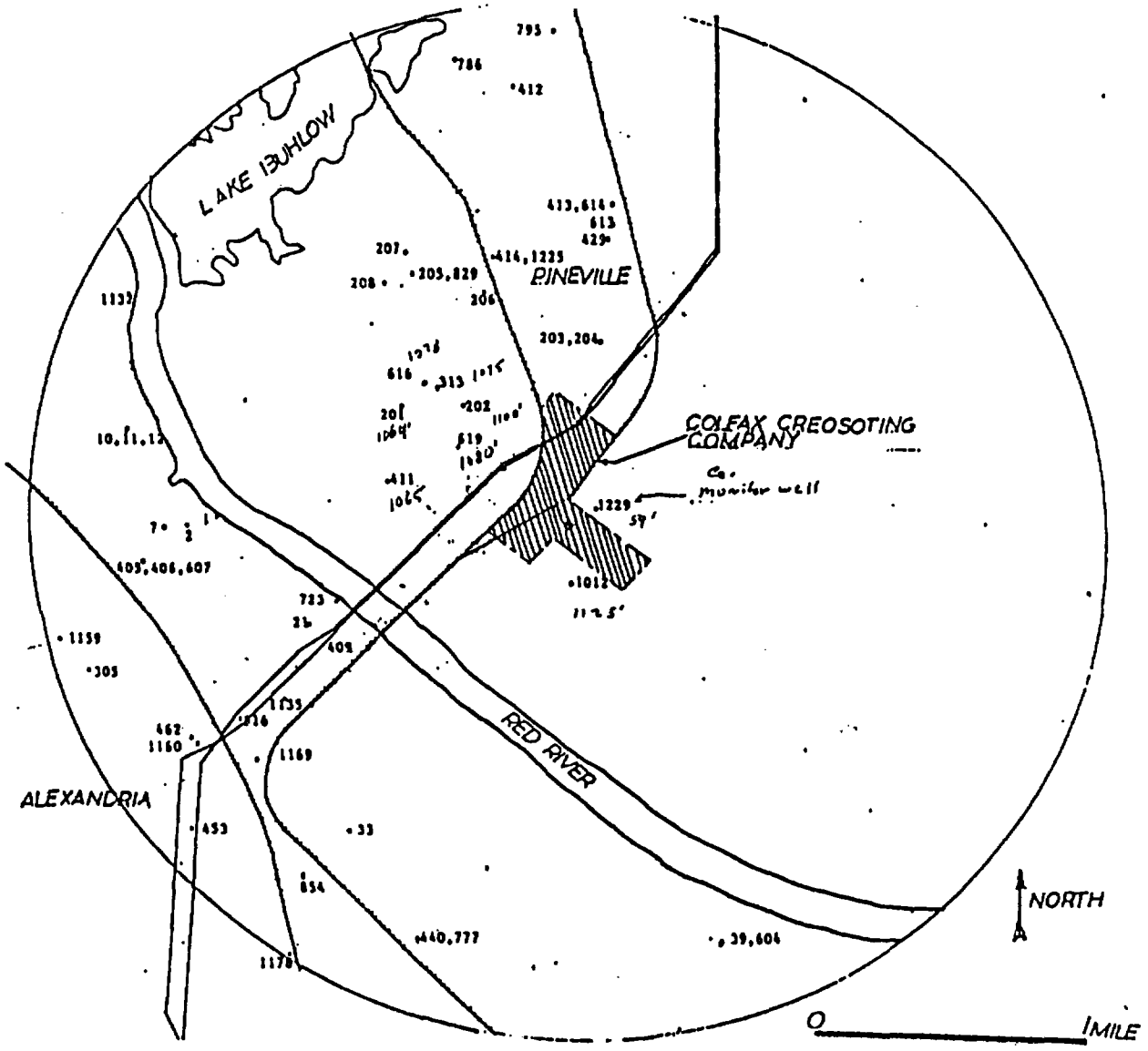

LAKE BUHLOW
PINEVILLE
COLFAX CREOSOTING COMPANY
RED RIVER
ALEXANDRIA
NORTH
0
1MILE

FIGURE 2.4

Colfax Creosoting

Public Supply Wells Near the Facility

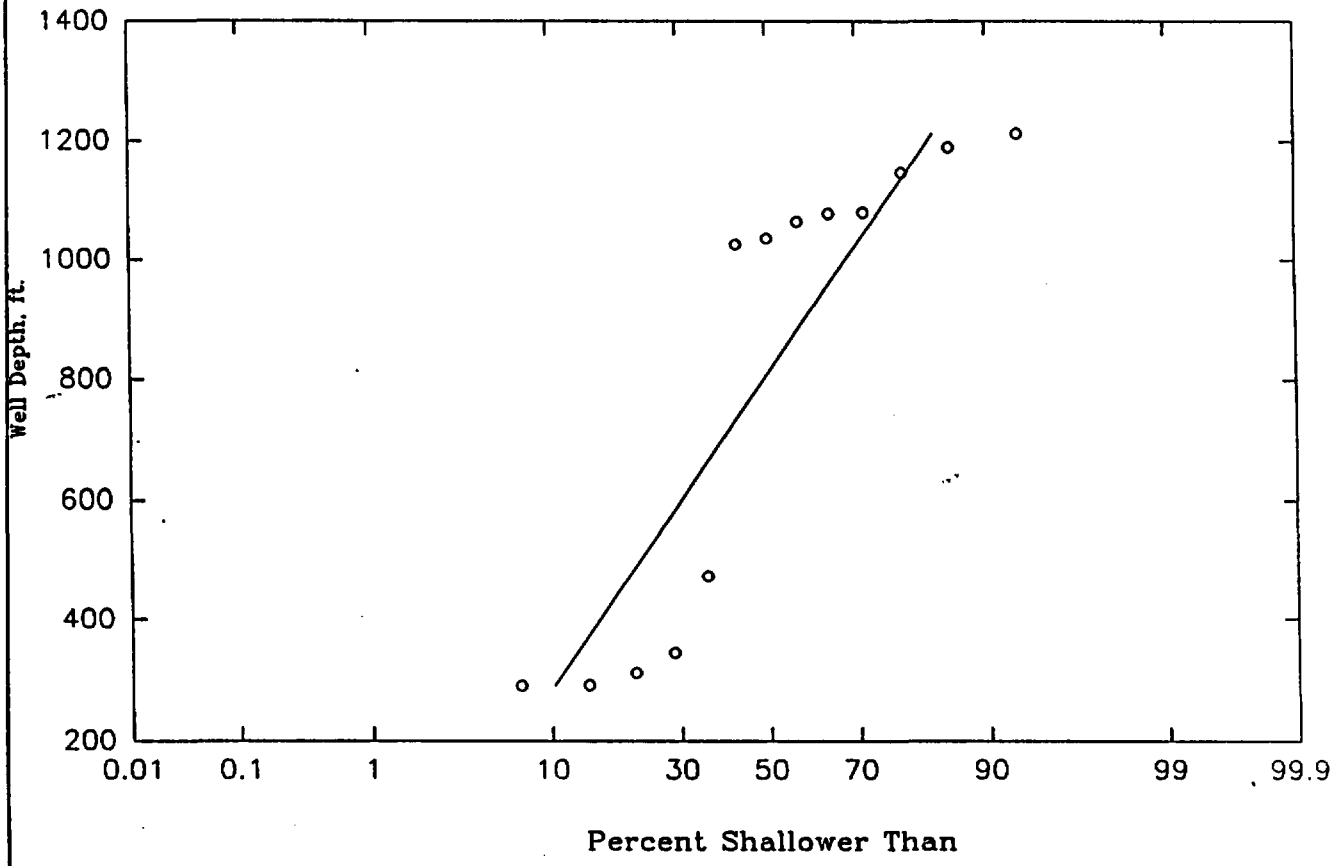


Figure 2.5

the depths of the public supply wells in the area. As noted from this graph there are two major depth ranges for the public supply wells. One extends from approximately 300′ to 500′ and the other extends from 1000′ to 1200′. According to publications of the Louisiana Department of Conservation, Geological Survey, and Department of Public Works, Miocene sand deposits are the principle source of ground water for municipal and industrial use in the area. These deposits are divided into two formations, the Fleming and The Catahoula with the latter containing the primary fresh-water-bearing sands under the Alexandria area. Three important water-bearing sands have been identified by the depth with which they occur within the city. These are known as the "400-foot," "700-foot," and "1,000-foot" sands. Sands below the "1,000-foot" sand contain saline water. Well depths in the area seem to fall into these general ranges as illustrated by Figure 2.5.

In addition to the public supply wells mentioned in the area, there are seventeen industrial and observation wells near the facility. As with the public supply wells, Figure 2.6 also shows the depth range that these wells occupy. With the exception of one industrial well drilled to a depth of sixty feet, the production wells are screened into the "400-foot" and "1,000-foot" sands. The observation wells are screened at shallow depths to monitor the relationship between groundwater and the Red River.

2.1.8 Extent of Known Contamination

Groundwater contamination at the facility is known to exist in the area south of the old surface impoundment system. This has been verified by analysis of water samples taken form groundwater monitoring wells during post-closure monitoring of the surface impoundments. Data prior to the Fall or 1990 indicated groundwater contamination to exist as shown in Figure 2.7 which presents isopleths of contaminant

Colfax Creosoting

Well Depths Near the Facility

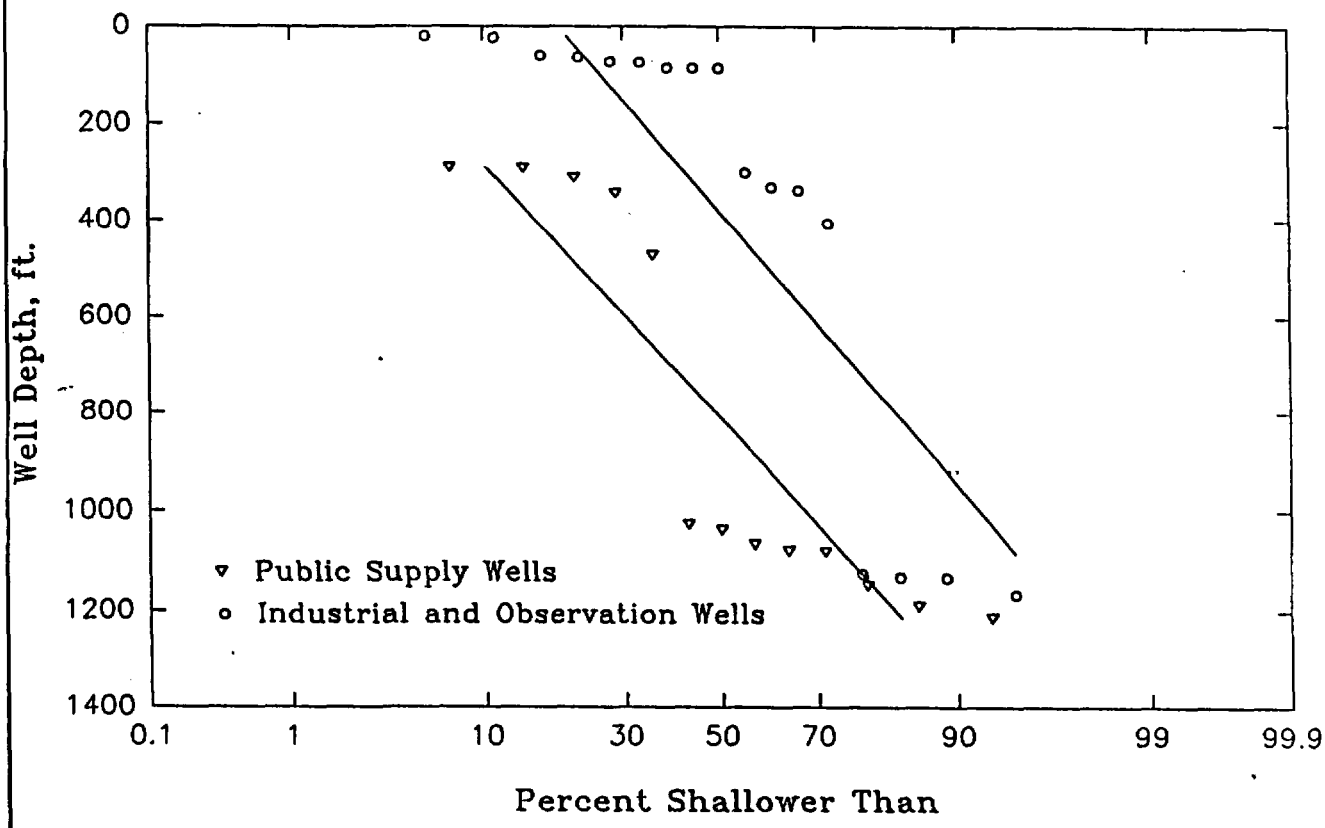
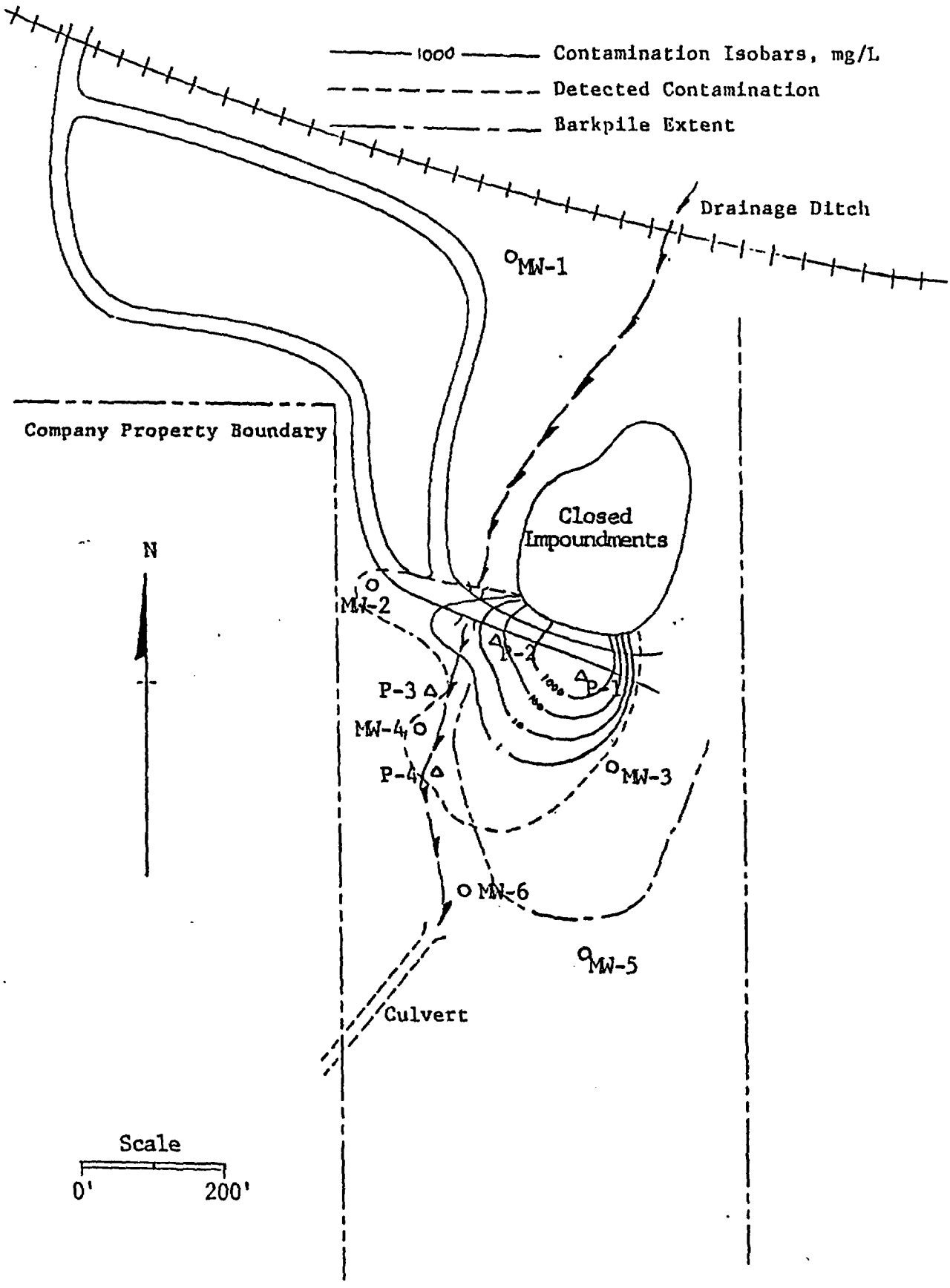


Figure 2 .6

Figure 2.7
EXTENT OF CONTAMINATION PLUME
Colfax Creosoting Company



levels found at the site. Data for last sampling events are presented in Figure 2.8.

2.2 Facility History

2.2.1 Ownership and Operation

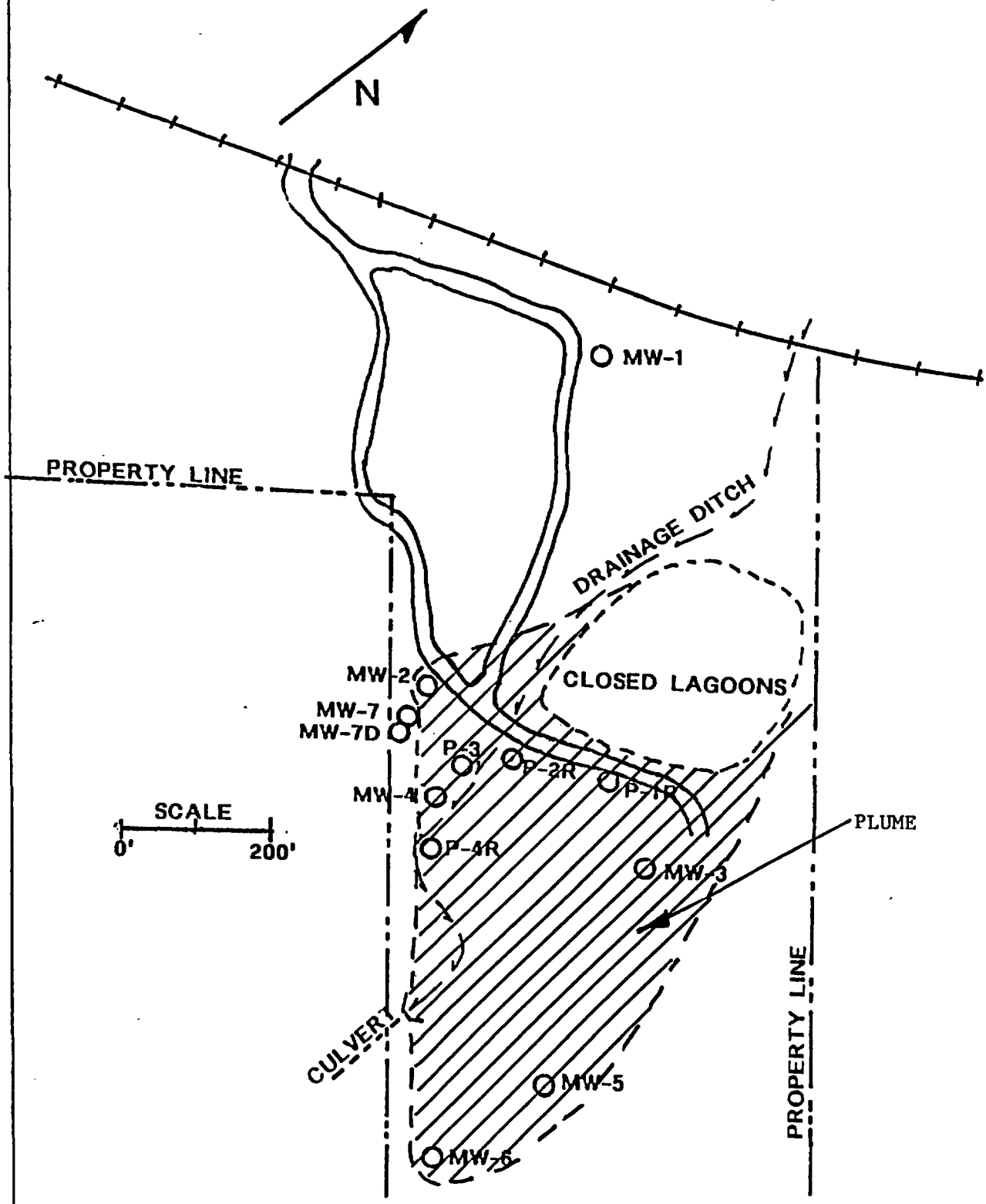
Colfax Creosoting Company was established in 1923 by the Roy O. Martin Lumber Co., Inc. at Colfax Louisiana. The operation was moved to the present Pineville site in 1948 where creosote treated wood was the only product manufactured at the plant. In 1958 the company added a pentachlorophenol treating system to the plant and in 1972, the company began using copper, chromium and arsenic (CCA) also as a preservative. The CCA system was shut down in 1990 and is no longer used for wood preservation at the plant, however, creosote and pentachlorophenol operations continue.

According to data gathered from the plant, 70% of the plant production is creosote treated wood, while penta and CCA treated wood account for 29% and 1% respectively. Since the CCA system has been phased out of production, timber treated with creosote should account for around 70% and penta treated wood should account for 30% of the total production.

2.2.1.1 Plant Operation

During the operational life of the facility, the actual preservation process has not changed, although equipment upgrades have improved production. The overall plant operation involves receiving, preparing and storing untreated material, preserving the material, and shipping the finished product.

Of major interest for this study is the material preservation process which is the only plant operation responsible for the generation of hazardous substances. Wood is preserved at the facility by first loading untreated



COLFAX CREOSOTING COMPANY
FIGURE 2.8 EXTENT OF CONTAMINATION

or "white" wood onto trams which are then pushed into one of three cylinders for preservative addition. One technique to remove water from the wood is to boil it in preservative. The first step is to flood the cylinder with preservative from "work tanks" that cycle the material from storage to the cylinders and back after each treating run. High pressure steam is then introduced into a series of coils in each cylinder to bring the temperature of the preservative above the boiling point of water. By executing this step, the pore space in the wood is opened to accept the preservative and moisture is boiled from the wood. The moisture is collected by drawing a vacuum on the head-space between the preservative and the top of the cylinder, and discharged into the process water treating system.

The more common technique for removing water from the wood is to first all water over the steam coils at the bottom of the cylinder. Then steam is introduced into the coils and the water flooding them is then turned to steam within the cylinder. The hot steam surrounds the wood and boils out the water.

Process water is also generated in a "flash steaming" step at the end of some treating runs. In this step, live steam is injected into the cylinder after the wood has been treated and the cylinder is void of preservative. This step is required in some of the wood specifications to remove any debris and preservative from the surface of the wood. Since some preservative adheres to the surface of the cylinder walls after each treating run, water condensing from this steaming process becomes contaminated and is treated in the process water system.

After the moisture in the wood is reduced, high pressure is placed on the cylinder thereby forcing the preservative into the wood. Holding times are known by trial and error that will result in a predetermined retention of preservative in the wood. Excess preservative

is then pumped from the pressure vessel and excess preservative remaining on the outside of the wood is allowed to drip within the confines of the cylinder. A vacuum is also pulled on the cylinder during this step of the process so that any excess moisture or preservative in the wood will be removed before it leaves the chamber. After a period of about two hours, the wood laden trams are then removed from the cylinder to a drip pad constructed in front of the treating units. Here containment is provided to minimize the chance of any drippage that might still come from the wood from coming into contact with the ground.

After adequate detention time has been allowed for drippage, the treated materials are then removed to the storage yard, trucks, or rail cars for shipment. Since income is only generated by the sale of preserved wood, treated wood remains in storage for a *minimum* amount of time at the facility. However, the company must maintain a minimum stock at the facility at all times.

2.2.1.2 Wastewater Treatment History

According to documentation contained in the RFA Report for the facility, there is no evidence to suggest that wastewater discharge was controlled prior to the implementation of RCRA regulations. Discharge of wastewater prior to 1975 was to the main drainage ditch detailed on the facility map along with stormwater runoff from the plant. Water collected by this drainage ditch eventually made its way to Huffman Creek and subsequently to the Red River nearby.

After RCRA regulation became effective, the company constructed a series of surface impoundments located in Parcel B of the plant property to handle water generated during the preservation process at the plant. Since creosote has a higher specific gravity than water, discharge from the plant was first made into a recovery lagoon which

possessed sufficient retention time so that preservative carried by the wastewater could settle to the bottom for removal and recycling. Water from this pond was then transferred via pump into a series of smaller settling ponds before being discharged into the City of Pineville sewer system. Creosote pumped off the bottom of the treating units was then transferred back to the plant for re-use. In order to avoid spillage of the ponds, surface sprayers were also employed in this system to aid in evaporating some of the water generated.

As stated earlier in section 2.1.5 of this report, the wastewater treating units were used from 1975 until 1983 when groundwater contamination was detected in the area. During this operational period, sludge containing pentachlorophenol and creosote constituents accumulated on the bottom of the units. This sludge is listed by the EPA as a hazardous waste designated K001 and thus the units fell under RCRA regulation as TSD units. Due to the groundwater contamination from the units, they were ordered closed under RCRA guidelines for such facilities. Final closure was approved in 1988 and the impoundments are currently in the post-closure phase of RCRA regulations. The location of the impoundments is shown on the facility topographic map.

Prior to the cessation of process water discharge to the impoundments, the company began treating water at the plant in salvaged railroad tank cars. Wastewater generated at the treating plant was segregated according to the process which generated the water and treated to remove valuable preservative from the stream prior to discharge into the City of Pineville sewer system. At the time the RFA was conducted in 1988, this treating system was still in place with the process water being treated as described in the following sections.

2.2.1.2.1 Penta Wastewater Units

Figure 2.9 presents the pentachlorophenol (penta) wastewater process system showing all tanks, lines and pumps in use during the RFA. Little change has been made to this portion of the system since that time. Penta contaminated water is generated from eight different sources within the manufacturing area as follows:

1. Water drawoff from penta work tank B;
2. Stormwater collecting in diked area containing tanks A & B;
3. Stormwater from around penta cylinder (cylinder #2);
4. Water collecting in the door sump at the penta cylinder (cylinder #2);
5. Water drawoff from tank S;
6. Water drawoff from tank X;
7. Stormwater collecting in diked area around tanks S, X, and T; and
8. Penta cylinder blowdown.

Containment in the area of tanks A & B was, and still is, provided by an eight inch thick reinforced concrete dike constructed to a height of eighteen inches above an eight inch thick reinforced concrete slab. Joint seals were used for the construction of this containment unit. Water drawn off from the penta work tank labeled "B" in Figure 2.9 is discharged to the diked area to gravitate along with the stormwater collecting in that area to the southwest corner of the containment structure to be accumulated in a concrete trench which empties into a sump of similar construction on the north side of the treating room. Stormwater falling around the east end of the penta cylinder is collected by a concrete slab and gravitates to the same sump where all the water is then pumped to the penta blowdown tank Y.

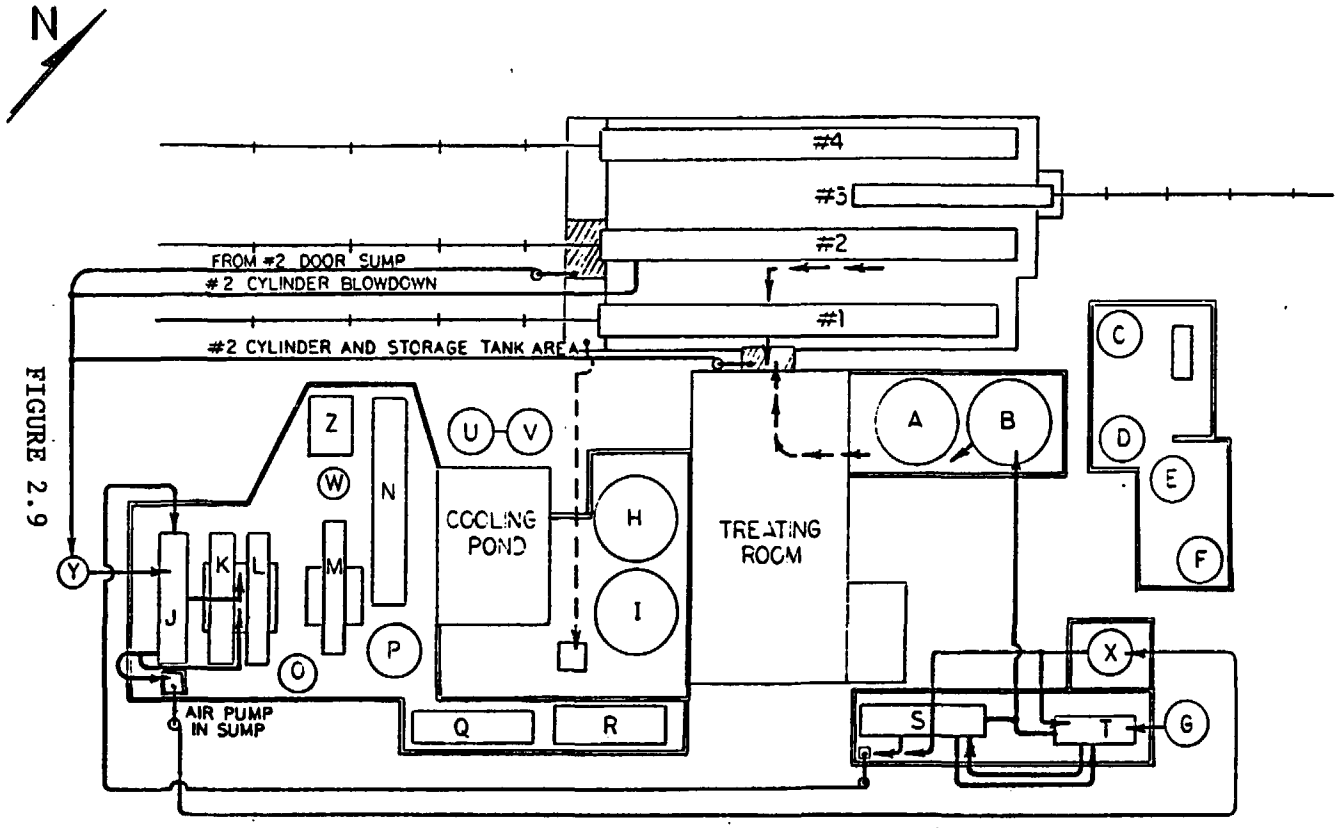


FIGURE 2.9

TANK	CONTENTS	VOLUME
A	CREOSOTE WORK TANK (#3)	62,177gal
B	PENTA WORK TANK (#4)	57,286
C	CCA CONCENTRATE	12,690
D	CCA WORK TANK	12,690
E	CCA WORK TANK	17,000
F	CCA WASTEWATER	17,000
G	DIESEL (FOR PENTA)	17,000
H	CREO. PETROLEUM BLEND(#2)	52,000
I	CREO. COAL TAR(#1)	52,000
J	PENTA SEPARATOR	8,000
K	CREOSOTE SEPARATOR(#3)	8,000
L	CREOSOTE SEPARATOR(#2)	8,000
M	CREOSOTE SEPARATOR(#1)	8,000
N	WATER STORAGE	18,000
O	CREO. PETROLEUM BLEND(#4)	17,65
P	CREOSOTE TANK #1	23,000
Q	DEHYDRATOR	9,671
R	CREO. COAL TAR	17,626
S	PENTA STORAGE TANK	10,400
T	PENTA MIX TANK	7,700
U	CREO. PETRO. SOLUTION	21,000
V	CREO. PETRO. SOLUTION	21,000
W	CREOSOTE BLOWDOWN	
X	CONE BOTTOM TANK(ELEVATED)	
Y	BLOWDOWN TANK (PENTA)	
Z	VISUAL OBSERVATION PIT	

CYLINDERS

#1 STEAM, BOULTONIZING
#2 STEAM, PENTA
#3 CCA
#4 STEAM, BOULTONIZING, CREOSOTE

NOTE: TANKS W & Y ARE MOUNTED ABOVE THE SEPARATORS, THEY ARE SHOWN ON THE SIDE FOR CLARITY.

Tanks G, S, and T are used to store penta components and mix the components to the proper treating solution concentration. Tank G stores the diesel fuel carrier and tank S stores penta concentrate. Measured quantities of penta and diesel from tanks G and S are pumped to tank T for blending and then the mixed solution is pumped to the penta work tank B for use in #2 cylinder. Blowdown from the cylinder is discharged to blowdown tank Y where it mixes with water from the stormwater sump described earlier. At the time of the RFA, water from blowdown tank Y was then directed to a rail tank car which served as an oil/water separation tank. Reclaimed preservative from this tank was then pumped to the elevated cone bottom tank X for further de-watering. Preservative from tank X is then directed back into the treating cycle and water removed from the bottom of the tank is then discharged to a sump which collects stormwater from the containment area for the penta storage and mix tanks S and T. This water was then pumped back to separator tank J to close this segment of the cycle. Water drawn from the bottom of the separator tank is directed into a concrete collection sump where it mixes with water from the creosote wastewater system for further treatment and ensuing discharge to the city sewer.

As stated earlier in this section, there has been little change to the penta wastewater treatment system since the time of the RFA. The only major change has been to replace the railcar separator tank with an API design oil/water separator specifically constructed for that waste stream. This was done to provide better removal of the penta carrying diesel fuel from the water.

2.2.1.2.2 Creosote Wastewater Units

Figure 2.10 is a diagram of the creosote process water system in use at the time of the RFA. Unlike the penta process water system which has undergone little change since

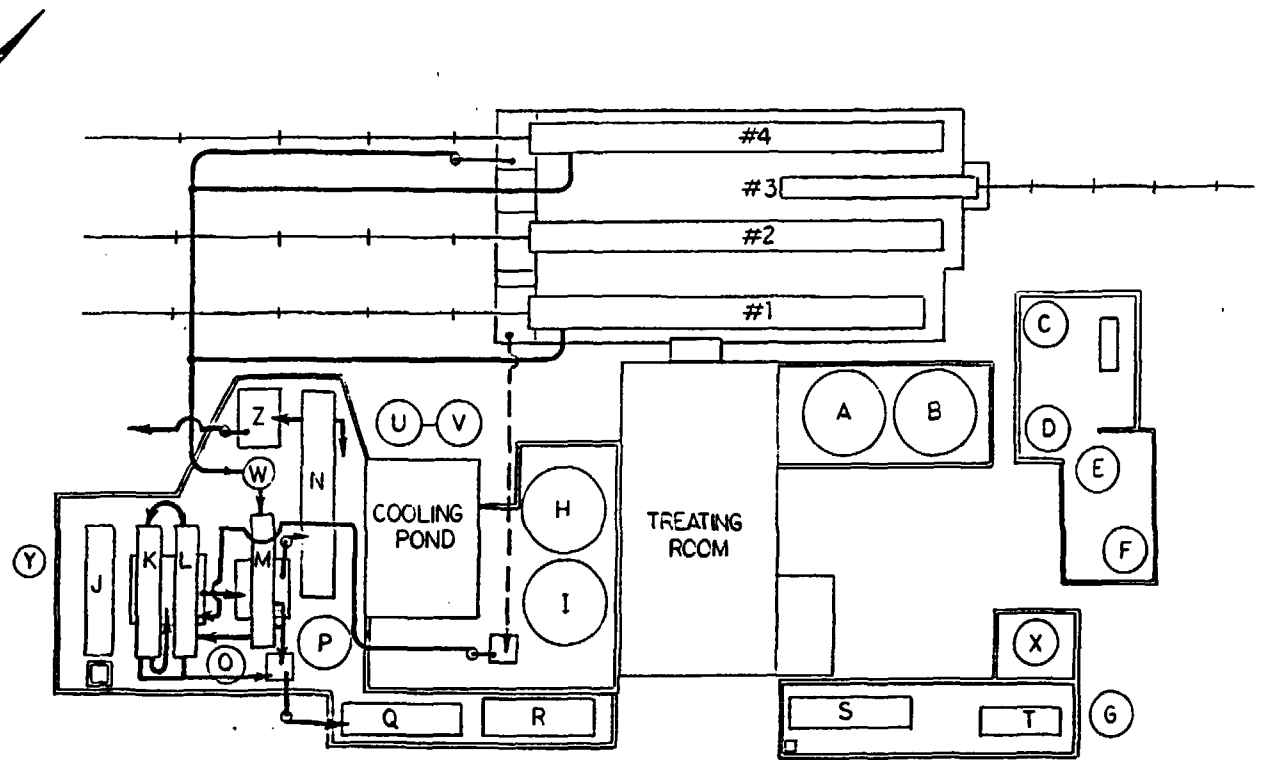


FIGURE 2.10

TANK	CONTENTS	VOLUME
A	CREOSOTE WORK TANK (#3)	62,177gal
B	PENTA WORK TANK (#4)	57,286
C	CCA CONCENTRATE	12,690
D	CCA WORK TANK	12,690
E	CCA WORK TANK	17,000
F	CCA WASTEWATER	17,000
G	DIESEL (FOR PENTA)	17,000
H	CREO. PETROLEUM BLEND(#2)	52,000
I	CREO. COAL TAR(#1)	52,000
J	PENTA SEPARATOR	8,000
K	CREOSOTE SEPARATOR(#3)	8,000
L	CREOSOTE SEPARATOR(#2)	8,000
M	CREOSOTE SEPARATOR(#1)	8,000
N	WATER STORAGE	18,000
O	CREO. PETROLEUM BLEND(#4)	17,65[illegible]
P	CREOSOTE TANK #1	23,00[illegible]
Q	DEHYDRATOR	9,671
R	CREO. COAL TAR	17,626
S	PENTA STORAGE TANK	10,400
T	PENTA MIX TANK	7,700
U	CREO. PETRO. SOLUTION	21,000
V	CREO. PETRO. SOLUTION	21,000
W	CREOSOTE BLOWDOWN	
X	CONE BOTTOM TANK(ELEVATED)	
Y	BLOWDOWN TANK	
Z	VISUAL OBSERVATION PIT	

CYLINDERS

#1 STEAM, BOULTONIZING
#2 STEAM, PENTA
#3 CCA
#4 STEAM, BOULTONIZING, CREOSOTE

NOTE: TANKS W & Y ARE MOUNTED ABOVE THE SEPARATORS, THEY ARE SHOWN ON THE SIDE FOR CLARITY.

that time, major changes have been made to the creosote process water system. However, creosote process water is still generated from four major sources at the sites:

1. Stormwater collecting within the diked area for tanks H and I;

2. Stormwater collecting within the diked area for the creosote recovery tanks;

3. Stormwater accumulation from around cylinders #1 and #4 and in the cylinder door sumps; and

4. Blowdown from cylinders #1 and #4.

Any stormwater falling within the diked areas of tanks H and I gravitates to a sump shown in Figure 2.10. Stormwater falling in the area of the recovery tanks J-R and Z gravitates to a concrete recovery sump shown below tanks K, L, and M in the process diagram.

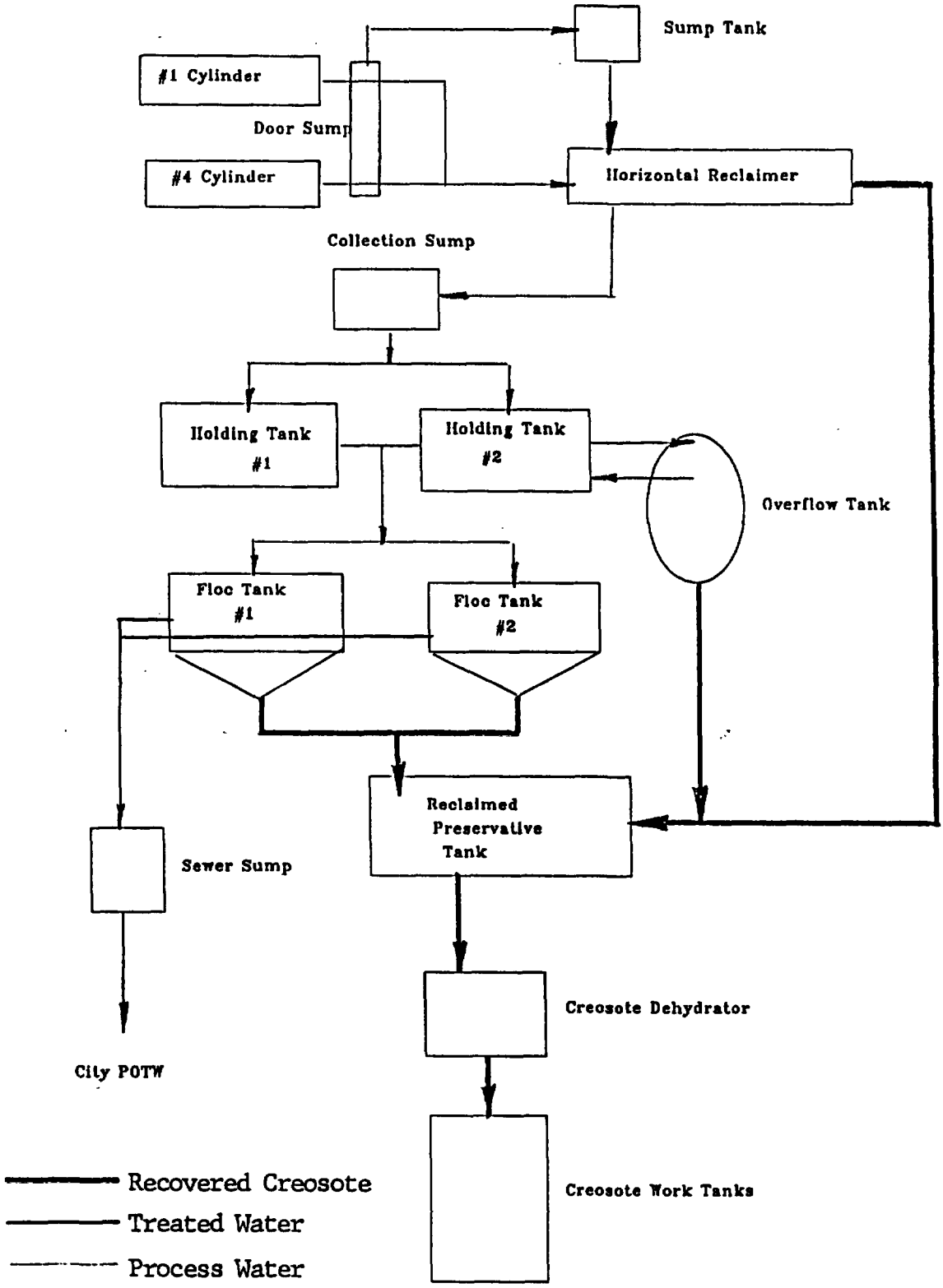
At the time of the RFA, water was pumped from these sumps into a series of railroad tank cars which acted as oil/water separators in the system. Blowdown discharge was made into a blowdown tank W which also received door sump accumulations and stormwater from around the cylinders.

Water from the central sump was pumped into oil/water seperator tank L and water from the concrete recovery sump was transferred by pump to water separator tank N. Tanks M, L, and K acted as three oil/water separator units in series. Each tank was provided with a bottom drawoff where unused creosote was drained to the creosote recovery sump between tanks M and L. Water from the last tank in the series, tank K, gravitated to sumps under tank K, L, and M and was then transferred to tank N which served as a surge tank for process water going to the city sewer system. Effluent from tank N was discharged into the open top concrete tank Z for visual observation before being pumped to the city sewer system.

2.2.1.2.3 Current System

During the time since the RFA was completed, the company has upgraded the water treatment system for the process water from creosote treating. The main objective of this system is to recover preservatives from the process water prior to discharging it to the city sewer system. In order to accomplish this, the company replaced the horizontal oil/water separator tanks in the system with several large volume cone bottom tanks which are more effective in the removal of heavy creosote material from the waste stream. Figure 2.11 presents a diagram of the process water system as it is currently operated.

In this new system, process water generated during treating and any stormwater collecting in the door pits are sent to a verticle holding tank and then gravity drained into a vertical sump tank. This allows heavy coal tar distillates to settle out and be collected in a creosote reclaim sump. The reclaimed crsosote is pumped to a reclaiming tank where it is dewatered. Water from the horizontal reclaiming tank is then discharged into concrete sumps. The water is then pumped into one of two cone bottom reclaiming tanks. Any additional creosote that settles out of the water in these tanks is then drawn from the bottom of the cone and sent to the creosote reclaim storage tank as well. Water from the holding tanks is then sent into one of two floc tanks where chemical coagulation and flocculation are allowed to occur. The flocculent material is then transferred to the creosote reclaiming tank and the treated water is discharged into the city sewer system under the authority of an SID permit. In the creosote reclaim tank, the preservative is de-watered by dehydration and then pumped back into the creosote work tanks. Since the tanks used in the reclaiming process are designed for the removal of material settling to the bottom of the tanks, bottom sediment sludge, the listed waste K001, is not allowed to



Colfax Creosoting

Process Water System

FIGURE 2.11

accumulate in this system. All the tanks are above ground and contained within a concrete bermed area adjacent to the treating building. Note that the waste stream from the penta system is introduced into this system in the concrete collection sump.

One other major change made to the system worth mentioning here is the elimination of the cooling pond that was located in the central portion of the tank farm. The wooden cooling tower and pond has been replaced by a mechanical cooling tower and the pond area has been steam cleaned and is now used to house two creosote work tanks.

2.2.1.2.4 CCA Process Water

Unlike the penta and creosote process water systems (both past and current), a CCA system *is water-demanding* in that the preservative is introduced into the wood in a aquatic solution. Water generated during treating, and stormwater collected in containment areas around tanks was pumped into a tank used to store make-up water for the CCA solution. Concentrated CCA was mixed with this water in a dilution tank from which it was transferred to a work tank. Since the CCA treating process was a closed system, no CCA contaminated water entered the waste stream from the plant. The CCA process water system is now, however, a moot point since the CCA operations were discontinued at the plant in 1990. The equipment has not been dismantled, however, no preservative of this type remains at the plant.

2.2.2 Hazardous Waste Generation

It has been the company policy for many years to generate as little hazardous waste as possible and the company has plans in place to minimize hazardous waste production as much as possible.

Historically, hazardous waste has been generated at the facility in two areas:

1. During closure of the process water impoundments; and

2. During routine cleaning of the plant equipment.

Since the promulgation of new regulations by Congress on December 6, 1990, a third category is scheduled to be added to this list as of June 6, 1991. However, this deadline has not been finalized by EPA. Under new revisions to sections of 40 CFR (specifically 40 CFR 260 et. al.), process water generated from wood treating plants will be classified as hazardous wastes designated F032, F034, and F035 depending upon the treatment process used. Since Colfax Creosoting has a RCRA permit, modifications to that permit will be applied for in order to continue operation of the wastewater treatment systems. This issue will be addressed in subsequent reports to EPA and LDEQ.

Table 2.4 summarizes hazardous waste production at the facility since 1985. Waste generation is presented graphically in Figure 2.12 as well.

TABLE 2.4
HAZARDOUS WASTE GENERATION SUMMARY
Colfax Creosoting Co.

[1]Date	[2]Tons Generated	Waste Code
April, 1985	57	K001
July, 1985	1,296	[3]K001
August, 1985	3,413	[3]K001
January, 1986	3,451	[3]K001
February, 1986	2,355	[3]K001
March, 1986	1,548	[3]K001
August, 1986	35	K001
March, 1988	62	K001

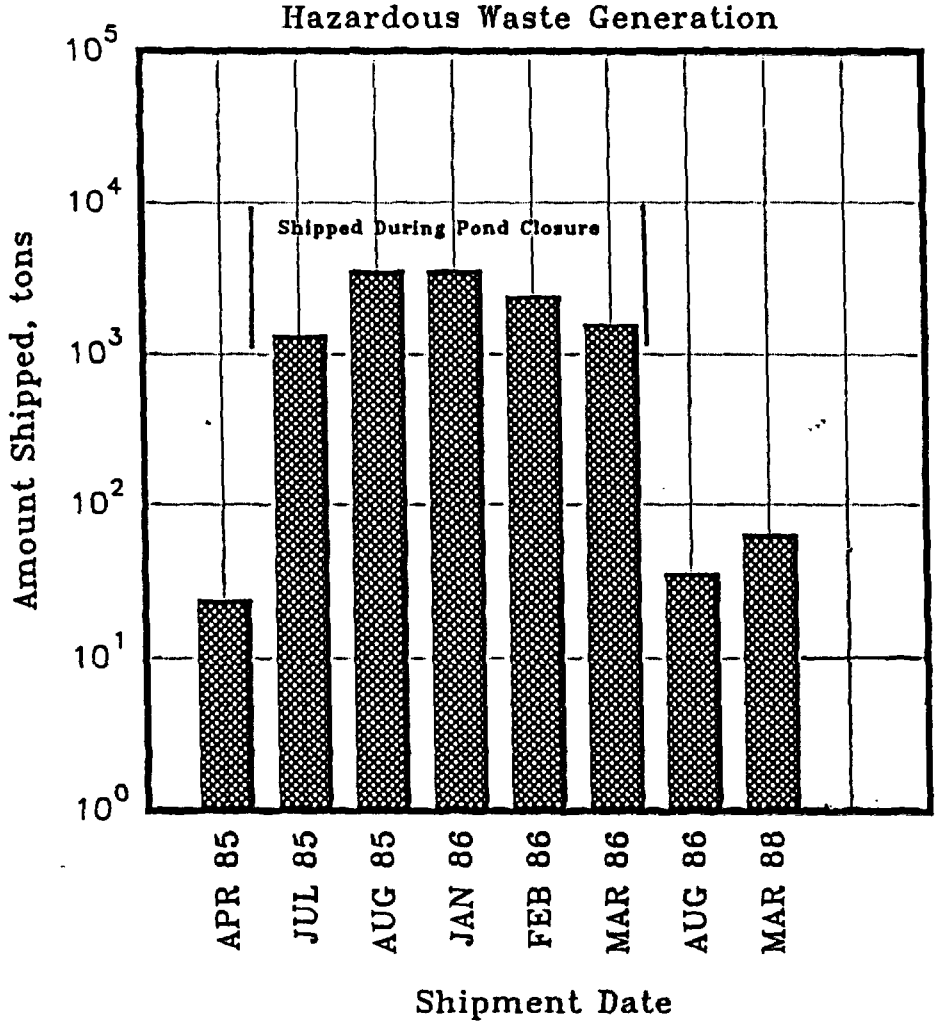
[1]Month shipment was made from plant
[2]Amount removed during month
[3]Removed from impoundments during closure operations

Hazardous waste production figures were obtained from company manifests on file at the facility. It must be noted

FIGURE 2.12

Colfax Creosoting Company

Hazardous Waste Generation



however, that only part of the records were available as several of the manifests had been subpoenaed from Colfax by the FBI and have not been returned. The period in question was May, 1985 to July, 1986. The quantities reported during this time were obtained from the company Closure Certification Document and represent waste removed from the impoundments prior to closure.

With the exception of the large quantities of hazardous waste removed from the facility during closure, the company produces very little waste as a result of routine cleaning of such units as treating cylinders, sumps, and other miscellaneous equipment. Hazardous waste is not a routine by-product of the treating process under current laws. This situation will change however, when new regulations classifying process water as hazardous waste go into effect.

2.2.3 TSD Activities

Before the process water impoundments were closed, Colfax Creosoting Company had no intention of becoming a TSD facility. However, since groundwater contamination was detected at the facility, clean closure could not be achieved. Therefore, the company decided to solidify and close some of the contaminated material found on the bottom of the units in place as reported in the Closure Certification Document from the facility dated August 26, 1986. With this action taken, the company then fell under RCRA regulation as a closed TSD facility and began pursuing a Post Closure Permit for the site. The company moved from interim status to permitted facility status on January 22, 1991 when the permit was finally issued. The company is currently in the post-closure monitoring and remediation phase for the closed TSD facility.

The wood preserving facility is operated under small quantity generator status with no hazardous waste being stored at the facility for over 90-days. During the routine

maintenance and housekeeping operations that now produce hazardous waste at the site, hazardous material is properly drummed and stored according to RCRA regulation and shipped to an off site TSD or recycling facility within the allotted time frame.

2.3 Spills and Response

For the purposes of this document, spills will be considered any sudden release of preservative, or waste derived from the preservative to the environment. With this in mind, the following summary is given for waste spills at the facility:

2.3.1 Preservative Releases

According to company operating records, there have been no spills of preservative from the plant.

2.3.2 Waste Spills

Since the impoundments became regulated as a TSD facility after they were closed, there have been no sudden releases or spills of material from these units. However, this does not imply that a release did not occur prior to closure. Groundwater contamination from the site has been well documented and is currently being remediated. This topic is discussed in detail in section 3 of this report.

2.4 Environmental Studies Summary

Environmental studies performed by Colfax Creosoting have primarily focused on the closed TSD units and their impact on the environment around the facility. These studies have concentrated on two areas: 1) work done in preparation for closure; and 2) groundwater and remediation assessment studies. These studies are summarized as follows:

2.4.1 Facility Closure

2.4.1.1 Closure Plan

On October 1, 1985, the company filed with the LDEQ a facility closure plan for closure of the three surface impoundments at the facility. The objective of the plan was to provide an acceptable closure that met the applicable requirements of the Louisiana Hazardous Waste Regulations. The plan outlined the steps that the company would follow in the closure process. One important piece of information detailed in this plan of particular importance for this report is the spatial extent of the impoundments summarized in Table 2.5.

TABLE 2.5
IMPOUNDMENT SIZE PRIOR TO CLOSURE
Colfax Creosoting Company

Impoundment	Surface Area, ft^2	Total Depth, ft.	[1]Waste Volume, yd^3
One Acre Surface Impoundment	48,950	10	4,700
Small Pond #1	990	8	0
Small Pond #2	1,070	6	0

[1]K001 sludge present, does not include contaminated soil

Estimations were given in this document on the total amount of waste that would have to be removed from the impoundments during closure. From the previous table, 4,700 yd^3 of K001 sludge was to be removed from the 1 Acre Impoundment. To this was added 2,100 yd^3 of K001 contaminated soil from all three of the impoundments for an estimated total of 6,800 yd^3 of material to be removed.

2.4.1.2 Closure Certification Report

Closure certification was made to the LDEQ in a report dated August 20, 1986. This report outlined operations as they actually occurred at the facility during the closure of the impoundments and certifies that each of the steps in the closure plan was followed. The report states that early in the closure process, the company realized that clean closure could not be achieved at this site. Therefore the company choose to monitor the area as a closed TSD facility under a post-closure permit.

The steps followed in closure were reported as follows:

1. Free and storm water was pumped from the ponds to the plant process water system for treatment from November, 1984 to July, 1986.

2. Sludge suitable for preservative recovery at the plant was pumped from the impoundments for recycling and re-use. Table 2.6 presents the recovery volumes reported.

TABLE 2.6
PRESERVATIVE RECOVERY
DURING CLOSURE OPERATIONS
Colfax Creosoting Company

Month	Volume Recovered, gal.
November, 1984	26,000
December, 1984	30,600
January, 1984	10,000
March, 1985	20,000
April, 1985	25,000
Total,	111,600

3. 12,063 tons of K001 sludge and contaminated soil were removed from the impoundments which is 32% more material than that estimated in the closure plan. This material was shipped to a re-cycle/reuse facility in Morgan City, Louisiana.

4. Soil samples were taken from the bottom of the impoundments for analytical analysis and

comparison with samples taken prior to contaminant removal. These results indicate that a major portion of the contamination was indeed removed from the site. Figures 2.13, 2.14, and 2.15 show probability plots for five of the analities tested in sludge and soil samples before and after contaminant removal. Figure 2.15 gives concentrations representative of the material closed in place at the site.

5. All closure equipment was decontaminated by the contractor.

6. The impoundments were then backfilled with a clay layer which was then covered and re-graded with topsoil from the surrounding area. The area was then seeded and fertilized for erosion control.

2.4.2 Groundwater Quality Reports

2.4.2.1 Assessment Plan

On December 3, 1983, before closure of the impoundments, the company proposed a groundwater quality assessment plan to the LDEQ to address and delineate any adverse impact that the waste facility (impoundments) may have had on the groundwater. In addition to outlining the scope of the work involved for the assessment, the plan summarized data that was available to the facility at the time of the report. According to the plan, a preliminary subsurface investigation of the site was done on April 18, 1983 by Geotechnical Testing Lab, Inc. of Alexandria, Louisiana. Three soil borings were made around the impoundment area as shown in Figure 2.16 and revealed three strata of interest for investigation. The first strata is a reddish brown and gray clay which contains the impoundment. The hydraulic conductivity of this strata was measured to be 3×10^{-9} cm/sec. The second strata is a stiff reddish tan sandy-clay existing between the first strata and the water table. No permeability data was available for this strata. The last strata discussed in the plan is the sand layer that

FIGURE 2.13

Colfax Creosoting Company

Impoundment Sludge Sampling Prior to Closure

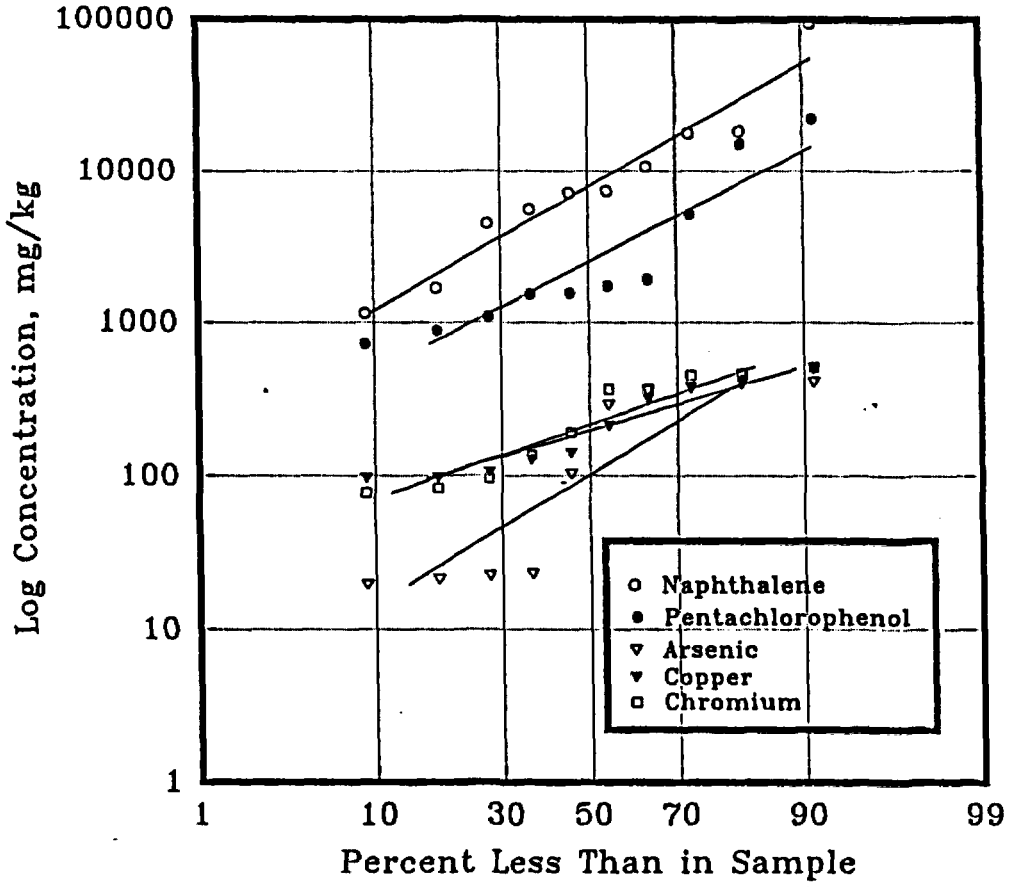


FIGURE 2.14

Colfax Creosoting Company

Impoundment Soil Sampling Prior to Closure

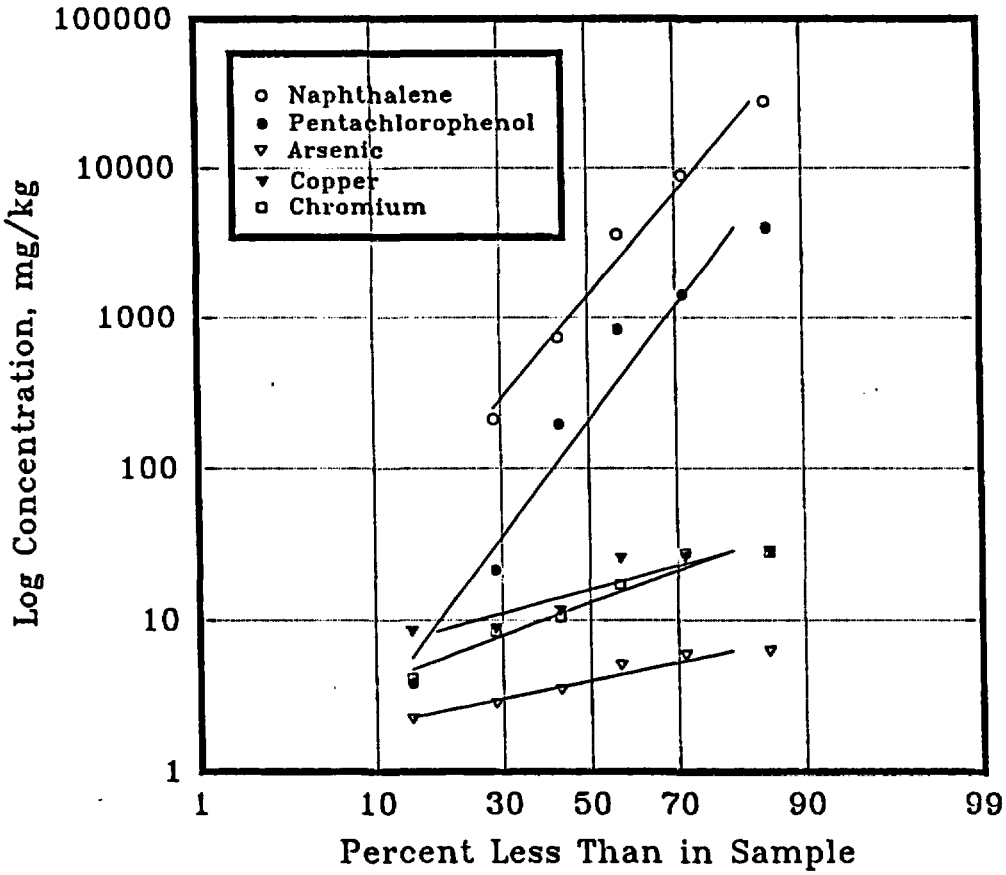
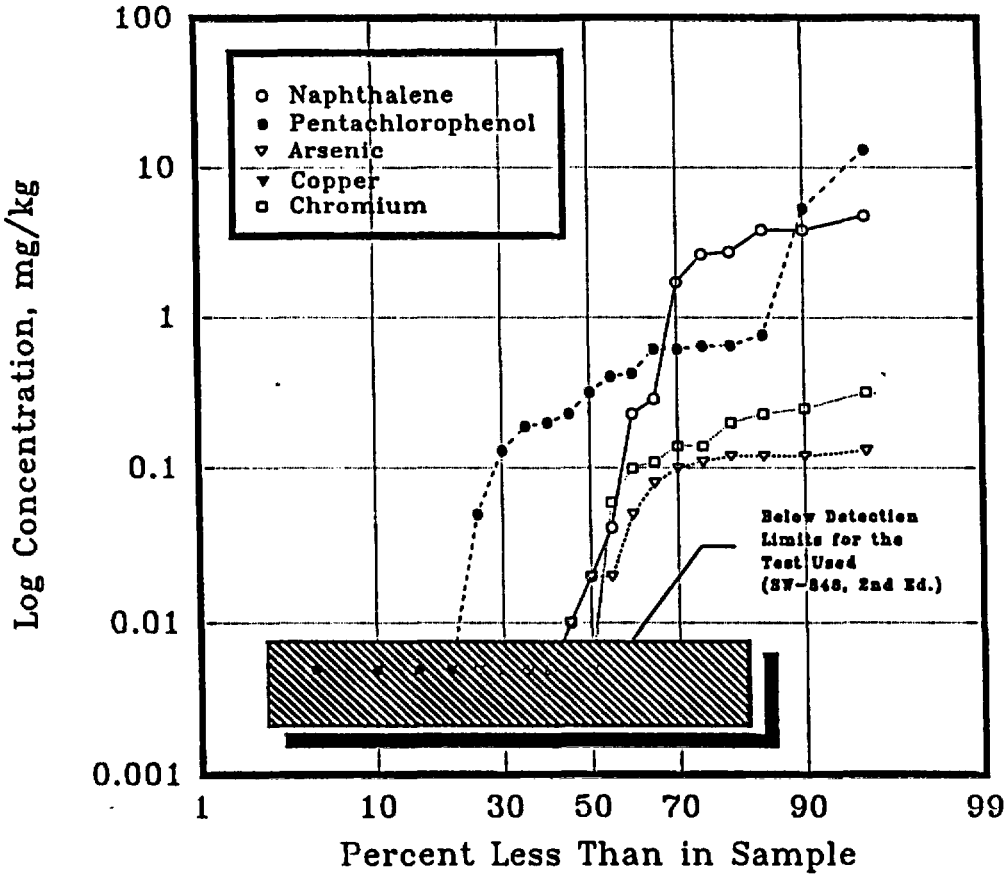


FIGURE 2.15

Colfax Creosoting Company

Impoundment Soil Sampling After Contaminant Removal During Closure



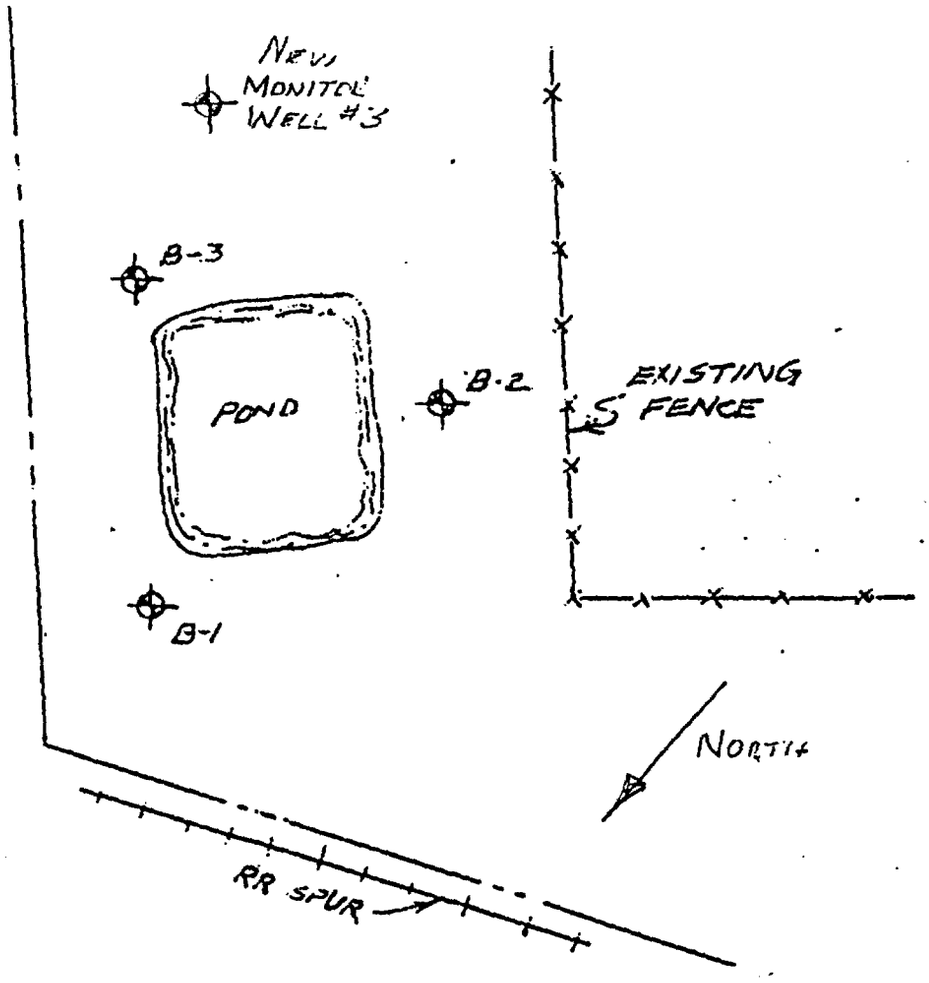


FIGURE 2.16

LOCATION OF BORINGS AND WELL #3

begins at the water table and extends downward approximately twenty-five feet. Figure 2.17 was taken from the assessment plan and shows the stratigraphy as defined from the preliminary borings.

The scope of the Groundwater Assessment Plan can be summarized as follows:

1. An investigation of the suitability of the soil types pertaining to the impoundment as containment media for the impoundment was to be conducted;

2. The horizontal and vertical extent of contamination in the area was to be evaluated;

3. Borings were to be mapped; and

4. The relationship of each soil horizon to the waste facility was to be determined.

In order to carry out this project, the plan called for obtaining data on:

1. The continuity of soil strata encountered in previous studies over the site;

2. The characterization of the strata above and below the water table as to grain size, hydraulic conductivity and porosity;

3. Dike construction and structural analysis; and

4. Flow-net analysis on the impoundment and groundwater table to predict flows between the impoundment and downgradient monitor wells.

2.4.2.2 Groundwater Assessment Report

Work required by the assessment plan was completed and reported to the LDEQ on July 20, 1984 in the Groundwater Assessment Plan Final Report. Figure 2.18 is taken from the final report and shows the impoundment and well configuration at the site upon completion of the assessment. The figure also shows the horizontal extent of contamination

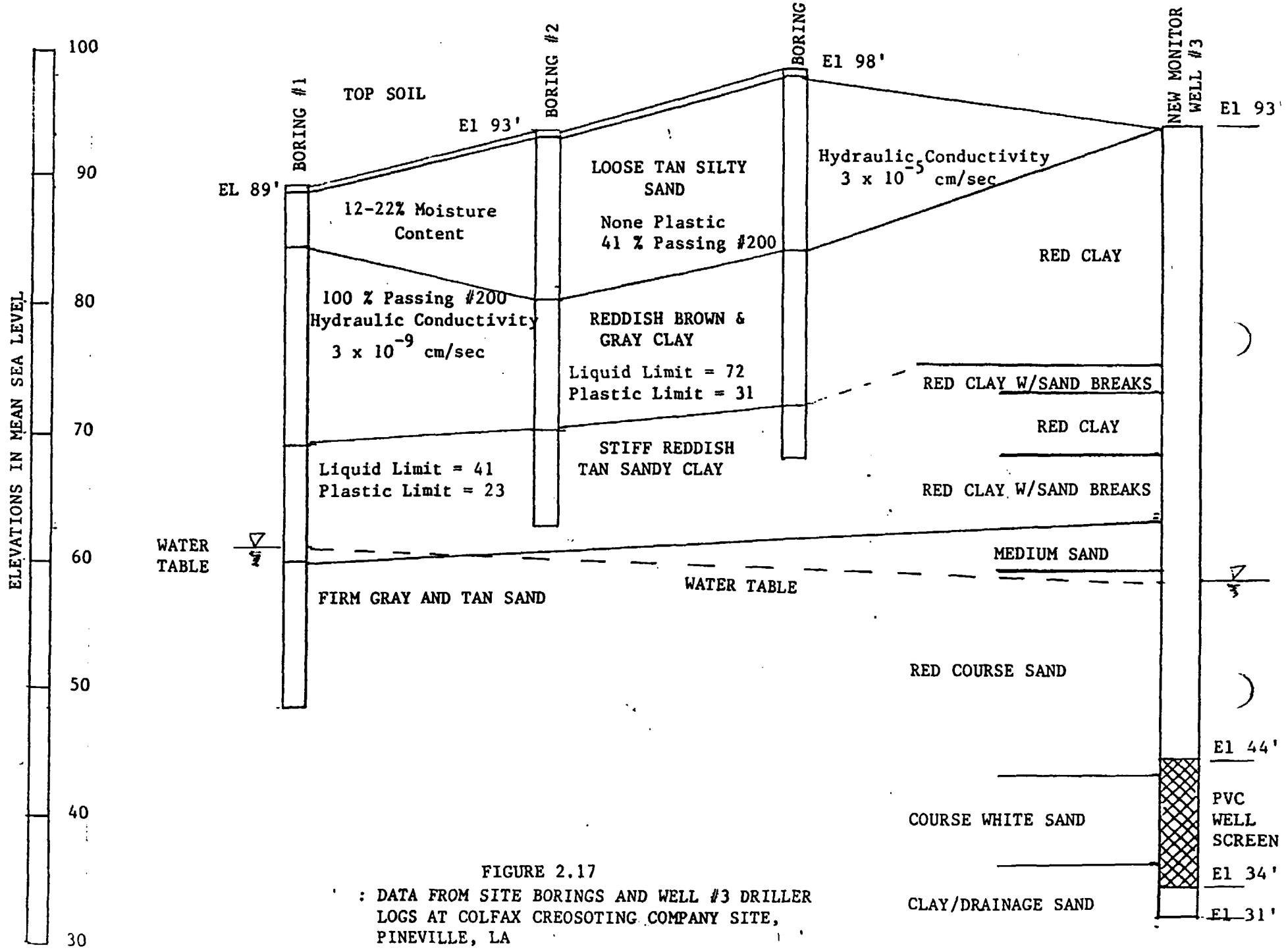


FIGURE 2.17

: DATA FROM SITE BORINGS AND WELL #3 DRILLER LOGS AT COLFAX CREOSOTING COMPANY SITE, PINEVILLE, LA

Ball Engineering, Inc.
11/27/83

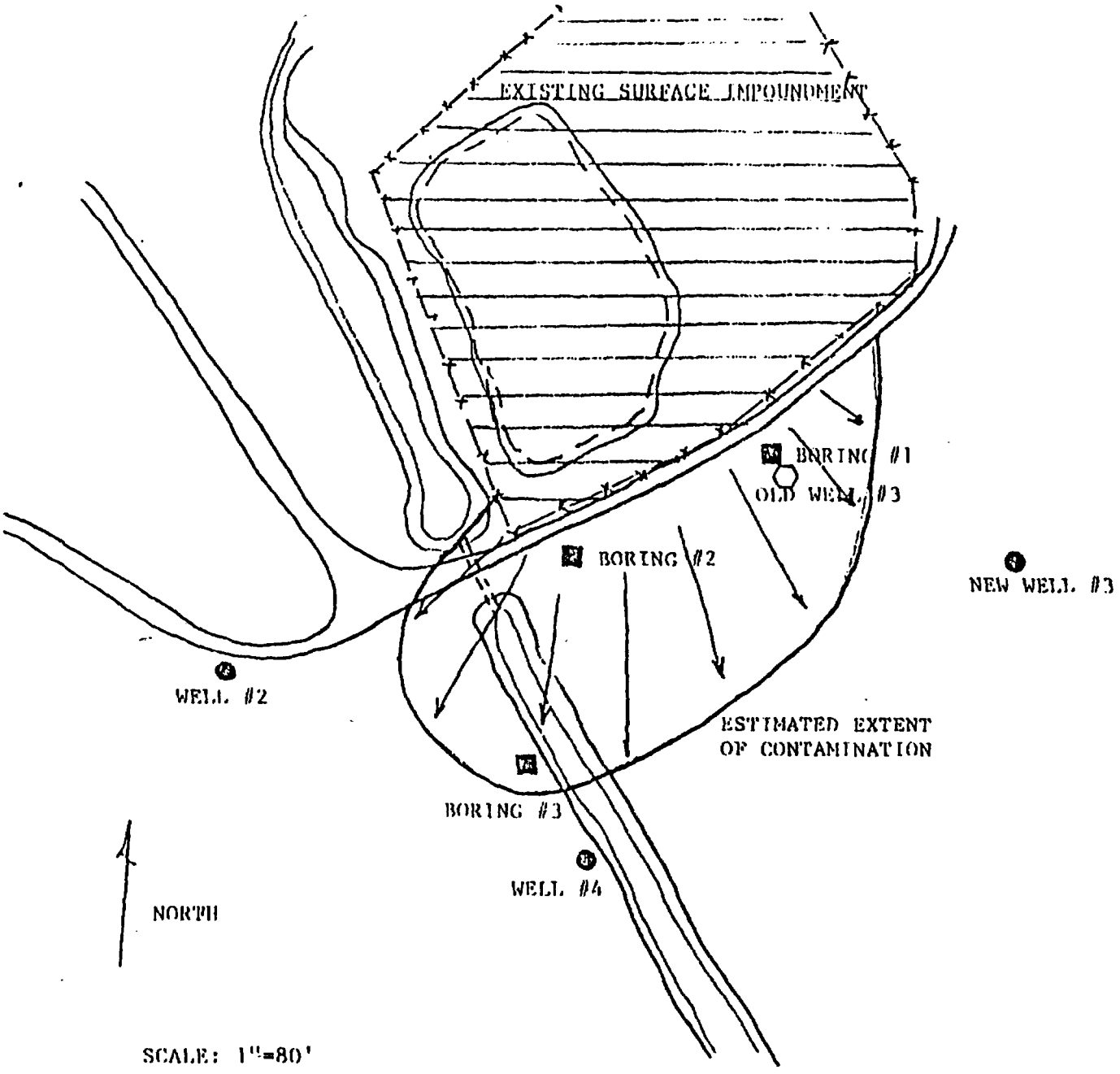


FIGURE 2.18

PLAN VIEW OVERLAY OF FIGURE 2 SHOWING ESTIMATED EXTENT OF CONTAMINATION
COLFAX CREOSOTING COMPANY

defined at the time of the report.

The final report states that during assessment, monitor well MW-4 was installed and sampled showing no contamination at the time. Monitor well MW-3 showed creosote contamination during a routine inspection prior to assessment which prompted the drilling of a new well to replace MW-3. The casing in the contaminated MW-3 was pulled and the well plugged with cement in April of 1983. Two borings were also completed at the site along the southern side of the impoundment dike and a third boring was later made between boring 2 and MW-4.

Based on drilling and sampling information from this series of wells, several conclusions were made from each of the borings. The assessment report concluded:

1. The impoundment was the source of contamination of the sandy clay layer that exists approximately 60 feet below the surface.

2. The vertical extent of contamination is the sandy clay layer.

3. The horizontal extent of contamination is probably limited to a maximum distance of 150 feet from the impoundment dike.

4. The rate of horizontal movement is probably on the order of a few feet per year.

5. Three downgradient wells that were uncontaminated at the time of the report were installed to detect further movement.

6. Current monitor well water samples do not indicate the presence of contamination.

7. The sludge and water within the impoundment are well below the sides of the dike.

8. The slope of the dike is stable and has a large factor of safety.

The assessment report also characterized the permeability of the aquifer as reported in Table 2.7.

TABLE 2.7
AQUIFER PERMEABILITY DATA
GROUNDWATER ASSESSMENT REPORT
Colfax Creosoting Co.

Well	Permeability, cm/sec
MW-1	9×10^{-4}
MW-2	1×10^{-3}
MW-3	2×10^{-4}
MW-4	2×10^{-6}
Boring 1	1×10^{-4}
Boring 2	2×10^{-4}

2.4.2.3 Annual Groundwater Reports

Groundwater reports have been submitted annually for the company to LDEQ since 1986. These reports essentially summarize the previous year's groundwater monitoring work and data. These reports are summarized as follows:

2.4.2.3.1 February 28, 1986 Report

1. Well MW-3 was found contaminated and redrilled.

2. Statistical results indicate high specific conductance and TOH values in MW-2. Well MW-3 (new) was found to be contaminated with K001 constituents.

3. Groundwater elevations indicate that wells MW-2, MW-3, and MW-4 are all downgradient from MW-1.

4. The horizontal extent of contamination was defined as presented in Figure 2.19.

5. A complete listing of the wells existing at the time of the 1986 report is given in Table 2.8

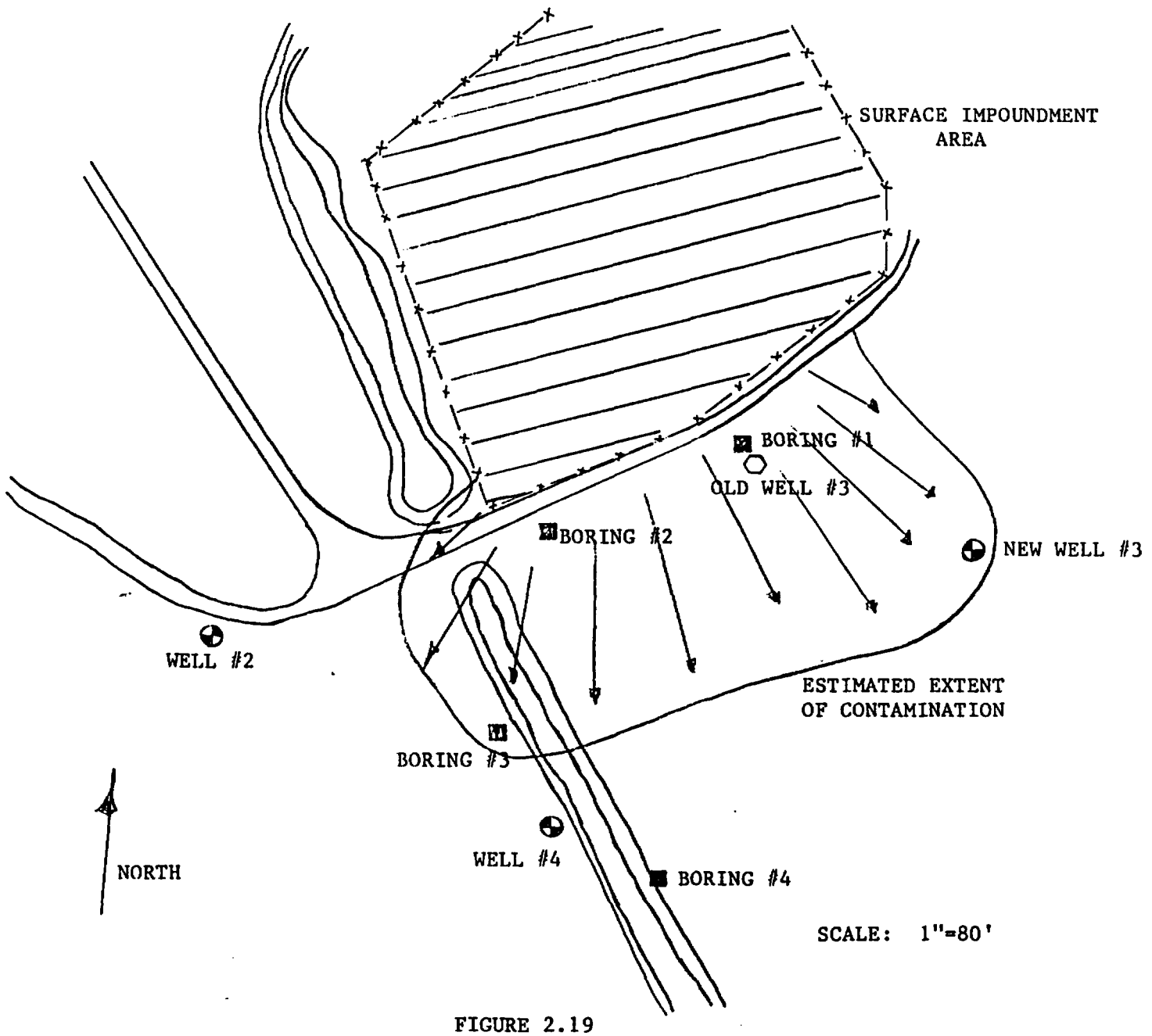


FIGURE 2.19

HORIZONTAL EXTENT OF CONTAMINATION: 0.97 ACRES
DEPTH OF CONTAMINATION: 60 FEET.

ESTIMATED EXTENT OF CONTAMINATION, COLFAX CREOSOTING COMPANY

TABLE 2.8
1986 WELL LISTING
Colfax Creosoting Co.

Well No.	Casing Size	Casing Type	Screen Depth	Screen Length
MW-1	4"	PVC	49.9'	10'
MW-2	4"	PVC	52.6'	10'
MW-3 OLD	4"	PVC	57.5'	10'
MW-3	4"	PVC	59.0'	10'
MW-4	4"	PVC	58.0'	10'
B-1	4"	PVC	58.9'	10'
B-2	2"	PVC	59.5'	5'
B-3	2"	PVC	64.0'	10'
B-4	1.5"	PVC	56.0'	15'

2.4.2.3.2 February 22, 1987 Report

1. Impoundment closure was reported complete.

2. A new monitoring well MW-5 was added to the groundwater monitoring system.

3. Groundwater remediation was proposed on November 4, 1986 (See Section 2.4.3 on remediation).

2.4.2.3.3 February 29, 1988 Report

1. Remedial action proposed in 1986 was started for evaluation.

2. Well elevations indicated that all wells were downgradient from the closed unit and MW-1. No new well installations were recommended.

3. Borings B-1, B-2, B-3, and B-4 were renamed P-1, P-2, P-3, and P-4. Well P-1 was selected as a recovery well for remediation evaluation.

4. Trace phenolic concentrations measured in P-4 were attributed to drilling and the installation of a new downgradient well was considered.

2.4.2.3.4 February 20, 1989 Report

1. Groundwater elevations indicate well samples were taken downgradient from the closed surface units.

2. Well P-1 was operated as a recovery well and a second recovery pump was to be installed in well P-2. An additional monitoring well MW-6 was proposed.

3. The mean hydraulic gradient at the site was calculated to be 3.789×10^{-3} ft./ft. The mean hydraulic conductivity of the aquifer was determined to be 4×10^{-4} cm/sec, and the porosity was measured to be 30%. Groundwater movement was calculated to be 5.2 feet per year to the south.

4. Figure 2.7 is taken from the 1989 report and presents the extent of the contamination plume based on monitoring data current at the time.

2.4.2.3.5 February 9, 1990 Report

1. Groundwater elevations indicate well samples were taken downgradient from the closed surface units.

2. It was suspected that the well screen in P-4 had became plugged and re-drilling was proposed.

3. Due to occasional contamination detected in MW-2, the company proposed to install a seventh monitoring well at the site downgradient of MW-2.

4. Mean aquifer parameters were determined to be:

Porosity	30%
Mean Hydraulic Gradient	4.2×10^{-3} ft/ft
Mean Hydraulic Conductivity	4.0×10^{-4} cm/sec
Groundwater Flow Rate	5.8 ft/yr

5. Wells used for corrective action plugged and plans were made to re-install these units.

2.4.2.3.6 February 23, 1991 Report

The 1991 report is the most extensive annual groundwater report filed by the company. Topics covered

include groundwater elevations, groundwater contamination, rate and extent of contamination, corrective action, well installation in 1990, and assessment work proposals for 1991.

According to the report, first half 1990 sampling under the company's groundwater monitoring plan was to coincide with the installation of three new wells, MW-6, MW-7, and MW-7D and improvement of recovery wells P-1R, P-2R and P-4R. However, due to flood conditions from the Red River only two of the wells (MW-7 and MW-7D) could be installed. By November of 1990, all wells had been installed and sampled. Groundwater elevation readings and boring logs indicated that MW-7D was screened in a lower aquifer that the other wells at the facility, and all other wells were downgradient from the closed impoundments except during the flood earlier in the year.

The report also discussed groundwater contamination found during sampling at the site. First half monitoring samples from the site were taken from wells MW-2, MW-3, MW-4 and MW-5. No contamination was found above detection limits for K001 constituents. For second half monitoring in November, samples were taken from wells MW-6, MW-7, MW-7D, MW-4 and MW-5. All of the wells sampled showed contamination above detection limits. It was hypothesized that contamination moving to previously uncontaminated wells was attributed to an increased hydraulic gradient caused by flooding earlier in the year. These wells were then re-sampled and contamination was confirmed in all wells with the exception of MW-7 and MW-7D.

From this information, the extent of contamination was defined as shown in Figure 2.8 which is taken from the report. This work indicates that contamination may have moved off-site to adjoining property and must be assessed and a recommendation was made in the report to begin work to re-define the limits of the contamination plume. The

horizontal rate of contamination movement was calculated to be 11 feet per year to the south based on a mean gradient of 8×10^{-3} feet per foot, a hydraulic conductivity of 4×10^{-4} cm/sec, and a porosity of 30%.

The report indicated that wells P-1, P-2, and P-4 were re-drilled and installed with 4" diameter stainless steel screens and placed into operation as recovery wells P-1R, P-2R and P-4R. A total of 90,220 gallons of water and free oil was pumped from the aquifer during 1990 using this recovery system. Using an average naphthalene concentration of 407 mg/L based on monthly sampling, and a ratio of naphthalene to total K001 constituents of 15, approximately 45,937 pounds of K001 contaminants were removed from the aquifer during the year.

During the installation of the new monitoring wells, additional data was gathered on the soil stratigraphy below the area. From this data it was concluded that:

1. Four layers appear to be continuous downgradient from the closed impoundments. Beginning at the surface and proceeding downward, they are a red/brown clay followed by a red/brown silty clay, a tan/gray silty sand, and a blue clay.

2. The silty sand is the strata that has shown most of the contamination and is the strata to which all wells, except MW-5 and MW-7D are completed. MW-5 is monitoring the silty clay strata above the silty sand. Additional downgradient assessment wells need to be completed to the silty sand strata.

3. The lower aquifer well, MW-7D, is into the first permeable strata below the blue clay which is described as a gray sand. A second blue clay layer is below the gray sand. At least two more lower aquifer wells need to be completed into the gray sand.

The report concluded by proposing to continue assessment by installing additional downgradient wells in the upper and lower strata. The work would specifically explore the eastern extent of contamination of the upper aquifer, locate the southern extent of contamination off the company property, and install additional lower aquifer wells.

Well data and historical monitoring and sampling data has been gathered and is presented in the appendix to this report. A summary of all the wells currently in operation at the site was presented earlier in Table 2.3.

2.4.3 Corrective Measures Studies

Corrective action in the area of the closed impoundments was initiated on November 4, 1986 in a letter to the LDEQ which proposed a corrective action and sampling program for the facility. In the letter, it was recommended that an air lift pump be installed in well P-1 to produce a cone of depression around the well. By doing this, it was anticipated that contaminated groundwater would flow to the well for removal and subsequent recycling in the plant process water system. To determine the feasibility of corrective action, the pump would be monitored and recovery amounts would be determined from discharge samples from the system. This program was approved in a letter from the LDEQ on February 2, 1987.

2.4.3.1 Groundwater Modeling Study

In order to verify any results obtained from the feasibility study of the corrective action program, a recovery well modeling study was conducted for the site. The study used a computer simulation of the aquifer based on parameters measured in the field to predict the effectiveness of pumping as a corrective measure. A mass transport model was used as a basis for the computer

algorithm for the project. Using current aquifer data, the algorithm produced predicted groundwater contours over the site that would result from pumping well P-1. Results indicated that the cone of depression created would yield a wide capture zone around the well, thus removing contamination from the aquifer. Figure 2.20 presents the contours predicted from this study that would develop based on a 90 day pumping period at a discharge rate of 1.5 gallons per minute.

2.4.3.2 Corrective Action Plan

Based on data gathered during the operation of P-1 as a recovery well from April 1987 to October 1988, the company submitted the feasibility results of corrective action and a plan to continue this action for the site. The report indicated good success with aquifer pumping for contaminant containment and removal. Table 2.9 gives the recovery data obtained from the study.

TABLE 2.9
CONTAMINATION RECOVERY
DURING FEASIBILITY STUDY
Colfax Creosoting Co.

Month	Water Pumped, gallons	[1]Total Concentration mg/L	K001 Recovered lbs.
April	11,880	51.51	5.11
May	12,276	21.87	2.24
June	11,880	7.87	.78
July	----	----	----
August	13,380	26.82	2.99
September	13,591	87.40	9.91
October	15,370	55.46	7.11
November	16,702	328.74	45.82
December	16,577	214.19	29.63
January	19,313	1,673.04	269.67
Total	130,969	----	373.26

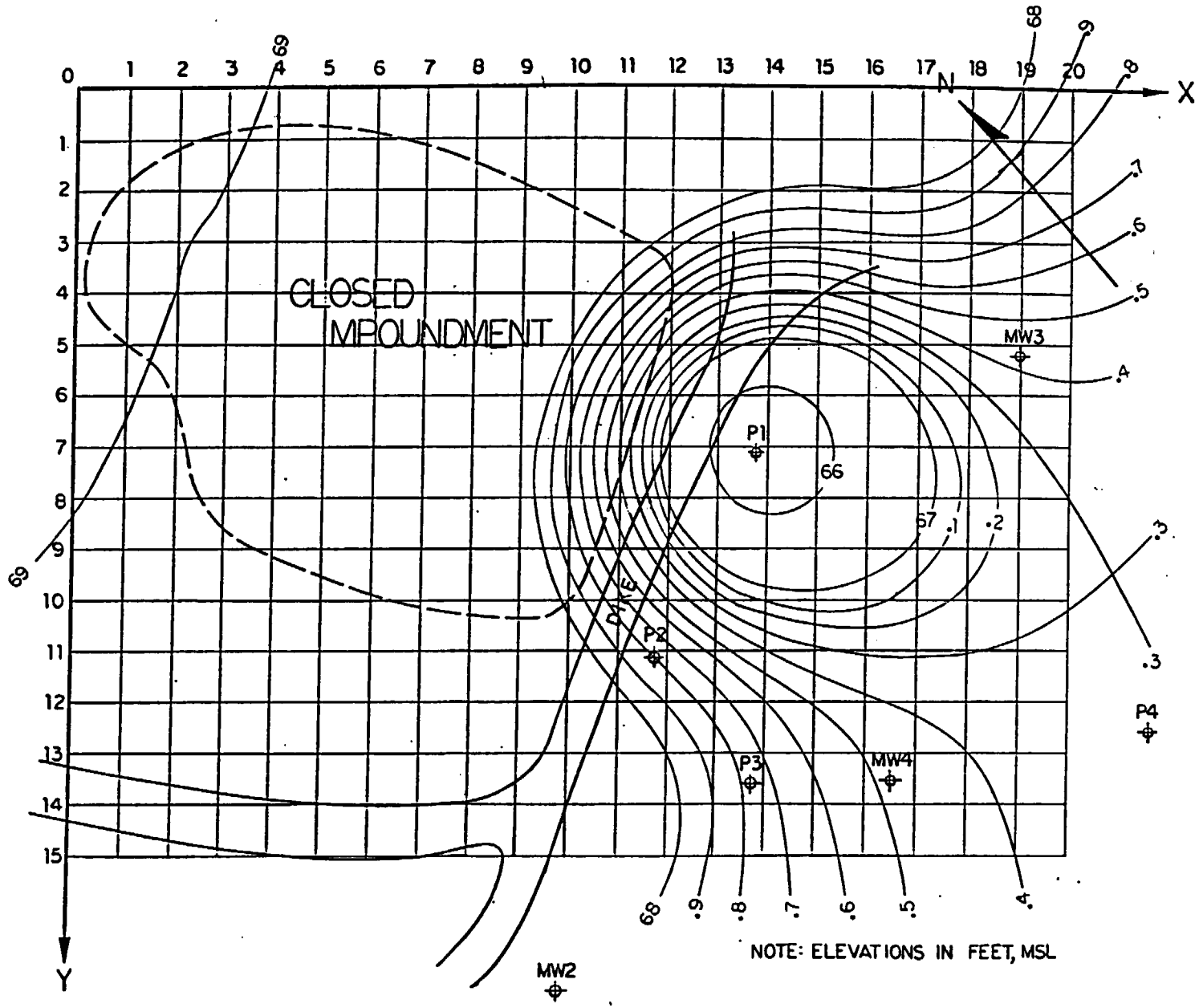
[1]Total K001 Concentration (SW-846, 2nd Ed.)

GRID MODEL

COLFAX CREOSOTING CO.
PINEVILLE, LA

SIMULATED CONTOURS

90 DAY PUMPING PERIOD



SCALE
0' 50' 100'

Ball Engineering, Inc.

Figure 2.20

During this time period, the report indicated that the pump only operated at a rate of 0.36 gpm which was well below the 1.5 gpm used for the modeling study. Therefore, it was anticipated that the cone of depression resulting from pumping would take longer to develop. However, the report did state that a drawdown trend was observed in the wells near the recovery well. Based on these findings, the program was recommended for continuation and expansion to include other wells for recovery.

2.5 Facility Drainage Contamination

The only information available on contamination in creeks and drainages on the facility is documented in the RFA and the annual groundwater report for 1990. During the installation of MW-6 at the site, a series of borings were made to locate a visually uncontaminated area in the drainage ditch south of the closed impoundments. The groundwater report states that "it took six attempts to locate a visually uncontaminated boring before new well MW-6 could be installed." The RFA indicates that this is an area of concern and should be investigated to quantify any contamination in the area. According to the RFA, "a tar-like substance was observed along the sides of the main drainage pathway..." No other drainages have been documented to be contaminated. However, the company expects to explore drainage pathway contamination during Task III of the RFI.

2.6 Deep Well Boring Summary

Currently there are a total of twelve wells used for groundwater monitoring at the facility. None of these wells are screened at a depth greater than 80′ below the ground surface. A typical construction diagram for the upper aquifer wells that are operational at the facility are given in Figure 2.21.

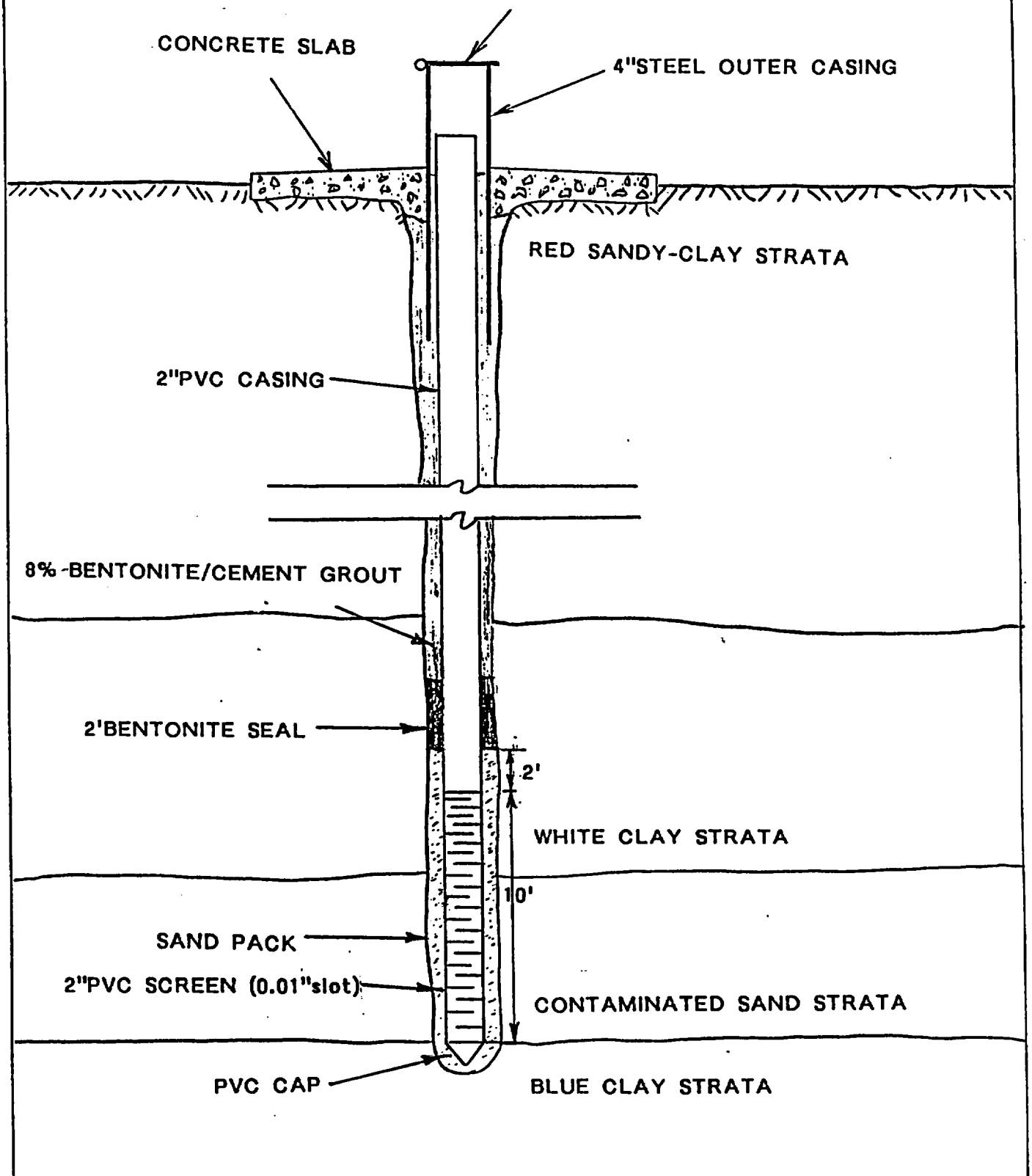


FIGURE 2.21
UPPER AQUIFER MONITOR WELL

2.7 Environmental Permit Summary

The company is in possession of two environmental permits in addition to the RCRA Post Closure Permit for the closed surface impoundments. These are:

2.7.1 SID Permit for Waste Water Discharge

Colfax Creosoting is allowed by the City of Pineville under the authority of a SID permit to discharge pretreated industrial wastewater into the City of Pineville sewer lines. In order to do this, the company must maintain the monitoring requirements given in Table 2.10.

TABLE 2.10
SID DISCHARGE REQUIREMENTS
Colfax Creosoting Co.

Parameter	Limit
Oil & Grease	100 mg/L
Arsenic	4 mg/L
Chromium	4 mg/L
Copper	5 mg/L

AVERAGE DAILY DISCHARGE--NO LIMIT

MONITORING REQUIREMENTS

Monitoring	Frequency
Unscheduled	As Needed
Self Reporting	4/yr 1/qtr

The permit makes provisions for pollutants that cannot be introduced into the waste stream. These are: 1) Pollutants that create a fire or explosion hazard to the POTW; 2) Corrosive pollutants; 3) Solid or viscous pollutants which can cause obstruction to the flow in sewers or other interferences to the POTW; 4) Pollutants such as BOD with sufficient strength to interfere with the POTW operation; and 5) Heat in amounts which will inhibit biological

activity in the POTW. This discharge permit is renewed annually by the City of Pineville.

2.7.2 Boiler Permit

The company holds a boiler permit from the LDEQ Air Pollution Division. This permit allows the company to operate two natural-gas fired boilers at the facility. Although no monitoring is required by the facility of the boiler, routine boiler inspections are conducted. Also, personnel from the LDEQ Air Pollution Division make an annual inspection of the site.

3 NATURE AND EXTENT OF CONTAMINATION

3.1 SWMU Summary

As stated earlier in section 2.1.6, twenty-seven potential SWMU's were identified during the RFA. Of these units, twenty were named for investigation in the HSWA section of the post closure permit. These units are listed in Table 3.1 which gives the current status of each of the units.

TABLE 3.1
SWMU SUMMARY
Colfax Creosoting Co.

SWMU No.	Unit Name	Status
1	Northeast Treated Wood Storage Area	[1]Active
2	Southeast Treated Wood Storage Area	Active
3	West Treated Wood Storage Area	Active
4	Southwest Treated Wood Storage Area	Active
8	Railcar Separator	[2]Removed
9	Main Runoff Pathway	Active
10	Truck Washing Area	Removed
11	Untreated Wood Landfill	Active
12	Groundwater Recovery Tank	Removed
13	Penta/Creosote Sump Containment	Active
14	CCA Containment System	Active
15	Creosote Dehydrator	Active
16	Creosote Separator No. 1	Removed
17	Creosote Separator No. 2	Removed
18	Creosote Separator No. 3	Removed
19	Penta Reclaiming Hopper	Active
20	Penta Separator	Removed
25	Cooling Pond	Removed
AOC A	West Runoff Pathway	Active
AOC B	Creosote Unloading Area	Active

[1]"Active" indicates that a unit is still in existence
[2]"Removed" indicates that a unit has been either removed or replaced.

In order to evaluate the current status of each of the potential SWMU's listed in the RFA, two preliminary site visits were conducted by Ball Engineering, Inc. The first visit on November 8, 1990 was conducted to determine if any of the SWMU's listed were no longer in existence and the

second visit on February 14, 1991 was conducted to follow up on questions raised during the first visit. The results of these two visits are discussed in the following sections.

3.2 Site Specific Hazardous Wastes

Since the company has used only three types of preservatives in the past, site specific wastes will be found in any SWMU's identified. The chemicals from which waste may be derived include:

1. Creosote;
2. Pentachlorophenol; and
3. Arsenic or chromium from CCA.

Material safety data sheets for the chemicals used by Colfax in the preserving process are presented in the Appendix to this report. Currently, any waste that may be found in an area would be considered hazardous if any of the following criteria were met:

1. The material meets toxicity requirements of 40 CFR Part 261;
2. The material meets the requirements of a listed waste in 40 CFR Parts 261.31; or
3. The material is, or derived from, a K001 waste.

The hazardous wastes, waste codes, and specific constituents in each waste specified by these criteria are listed in Table 3.2 which is taken from 40 CFR Parts 260 et. al. No other hazardous wastes are generated by this facility.

TABLE 3.2
HAZARDOUS WASTES
OF PRIMARY CONCERN
Colfax Creosoting Co.

Hazardous Waste	EPA Hazardous Waste Code	Hazardous Constituents
[1]Wastewaters, process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that currently use or have previously used chlorophenolic formulations	F032	Benz(a)anthracene, benzo(a)pyrene, dibenz(a,h)-anthracene, indeno(1,2,3cd)-pyrene, pentachlorophenol, arsenic, chromium, tetra-, penta-, hexa-, heptachlorodibenzo -p-dioxins, tetra-, penta-, hexa-, heptachlorodibenzo -furans.
[1]Wastewaters, process residuals, preservative drippage, and spent formulations from wood preserving processes generated at plants that use inorganic preservatives containing arsenic or chromium	F035	Arsenic, chromium, lead.

TABLE 3.2 Cont.

Hazardous Waste	Code	Constituents
Bottom sediment sludge from the treatment of wastewaters from wood preserving processes that use creosote and/or pentachlorophenol	K001	Pentachlorophenol, phenol, 2-chlorophenol, p-chloro-m-cresol, 2,4-dimethylphenyl, 2,4-dinitrophenol, trichlorophenols, tetrachlorophenol 2,4-dinitrophenol, cresote, chrysene, naphthalene, fluoranthene, benzo(b)-fluoranthene, benzo(a)pyrene, indeno(1,2,3-cd)pyrene, benz(a)anthracene, dibenz(a)anthracene, acenaphthalene
Toxicity Characteristic Waste	D004 D007 D023 D024 D025 D026 D037	Arsenic Chromium o-Creosol m-Creosol p-Creosol Total Creosol Pentachlorophenol
Discarded commercial chemical products, off-specifications species, container residues, and spill residues thereof	U051 F027	Creosote Discarded unused formulations containing tri-, tetra-, or pentachlorophenol or discarded unused formulations containing compounds derived from these chlorophenols.

[1]Scheduled to become effective June 6, 1991

3.3 Individual SWMU Descriptions

3.3.1 SWMU No. 1
Northeast Treated Wood Storage Area

3.3.1.1 Location

The northeast treated wood storage area is located in the northeast corner of parcel A and comprises the section of the property just north of U.S. Highway 28 and west of Wadley road. This area is labeled on the facility map presented with this document. The RFA documents that this area is used for storage of CCA, pentachlorophenol, and/or creosote treated wood prior to shipment. During the preliminary Task I visit, it was verified that this area is still used for wood storage operations.

3.3.1.2 Waste Quantities

As stated in section 4.1 of the RFA, this area is used to store process wood prior to shipment and is not specifically designated a solid waste management unit by the company. The RFA further states that the potential for contamination of soils exists from preservative drippage from the treated wood onto the ground. The existence of discolored soil was also mentioned, however, it is not known at this time if this soil meets the requirements for a hazardous waste. Also, the quantity of any waste that may be present is not known at this time.

3.3.1.3 Waste Constituents

Since this area is used for storage of treated wood, the possibility exists for soil contamination from preservative dripping from the wood. Therefore, any wastes that may be found would be classified as TC wastes, U051 or F027 under current legislation.

3.3.1.4 Additional Information Needed

There is no existing analytical evidence to suggest that this area is managing solid waste. Also, no other testing has been preformed in this area to determine if waste transport has or can occur if waste exists in this area. Therefore, additional information is needed in these areas:

1. Chemical determination if a waste is present;
2. Waste Transport data; and
3. Drainage characterization to determine potential waste receptors.

3.3.2 SWMU No. 2 Southeast Treated Wood Storage Area

3.3.2.1 Location

The southeast treated wood storage area is located adjacent to Parcel A, on the east side of the Kansas City Southern railroad which borders the southeast side of the parcel. This area is shown on the facility map with this report. According to the RFA, this area is used to store CCA, Pentachlorophenol, or creosote treated wood. However, at the time of the preliminary Task I inspection, the only wood impounded in this area was creosote treated cross-ties.

3.3.2.2 Waste Quantities

This area is used to store processed wood prior to shipment and is not specifically designated by the company as a hazardous waste storage area. Any contamination in this area would be as a result of preservative drippage from the treated wood onto the soil. The RFA states that the potential for contamination exists in this area, however it is not known at this time if any of the soil in the area meets the requirements to be classified as hazardous. Therefore, the quantity of any waste present in the area is not known at this time.

3.3.2.3 Waste Constituents

The only production activity in the southeast treated wood storage area is the storage of treated wood prior to shipment. Therefore, the possibility exists for soil contamination from excess preservative drippage from the wood onto the soil surface. Any wastes that may be found in this area would be classified as TC wastes, U051 or F027 under current legislation.

3.3.2.4 Additional Information Needed

There is no existing analytical evidence to suggest that this area is managing solid waste. Also, no soil testing has been conducted in this area to determine if waste transport has or can occur if waste exists in this area. Therefore, additional information is needed in these areas:

1. Chemical determination if a waste is present;
2. Waste transport data; and
3. Drainage characterization to determine potential waste receptors.

3.3.3 SWMU No. 3 West Treated Wood Storage Area

3.3.3.1 Location

The west treated wood storage area is located near the intersection of the Minden and Shreveport lines of the Kansas City Southern Railroad at the western side of Parcel A. This area is designated on the facility map with this document. The RFA states that this area may receive CCA, pentachlorophenol, or creosote treated wood prior to shipment from the plant. However, at the time of the Task I inspection, the majority of the wood in storage in this area was "white" or untreated wood awaiting treatment. No CCA wood was observed because CCA operations have been discontinued at the facility.

3.3.3.2 Waste Quantities

The company has not designated this area specifically for the storage of hazardous waste and it is mainly utilized for storage of treated and untreated wood. The RFA documents the presence of "stained soil" in the area, however no analytical evidence exists to determine if any of the soil in this area meets the requirements for a hazardous waste. Therefore, the quantity of any waste that may be present is not known at this time.

3.3.3.3 Waste Constituents

Since the west treated wood storage area may receive treated wood for storage, the possibility exists for soil contamination from preservative drippage. Therefore, any wastes that may be found would be classified as TC wastes, U051 or F027 under current legislation.

3.3.3.4 Additional Information Needed

There is no existing analytical evidence to suggest that this area is managing solid waste. Also, no other testing has been performed in this area to determine if waste transport has or can occur from this area. Therefore, additional information needed in these areas is:

1. Chemical determination if a waste is present;
2. Waste transport data; and
3. Drainage characterization to determine potential waste receptors.

3.3.4 SWMU No. 4 Southwest Treated Wood Storage Area

3.3.4.1 Location

The location of the southwest treated wood storage area as shown on the facility map is at the northwest section of Parcel B. The area is accessible by a road across the Kansas City Southern Railroad bordering the eastern side of

Parcel A. RFA documentation indicates that this area receives treated wood prior to shipment from the CCA, creosote and/or pentachlorophenol treatment systems. However, at the time of the Task I visits, only pentachlorophenol and creosote treated poles were observed in the area. Since CCA treatment has been discontinued by the plant, no preserved wood of this type was found.

3.3.4.2 Waste Quantities

Colfax Creosoting does has not specifically designated this area of the plant property for the storage of hazardous waste. According to the RFA, the potential for soil contamination due to preservative drippage exists in this area and discolored soil was observed during the VSI. It is not known at this time if this soil meets the requirements for classification as a hazardous waste, therefore the quantities of any wastes that may be present are not known.

3.3.4.3 Waste Constituents

Since this area is utilized for the storage of treated wood, the possibility exists for soil contamination from preservative dripping from the wood. Therefore, any wastes that may be found would be classified as TC wastes, U051 or F027 under current legislation.

3.3.4.4 Additional Information Needed

There is no existing analytical evidence to suggest that this area is managing solid waste. Also, no other testing has been done in this area to determine if waste transport has or can occur if waste exists in the area. Therefore, additional information needed in this area is:

1. Chemical determination if a waste is present;
2. Waste transport data; and
3. Drainage characterization to determine potential waste receptors.

3.3.5 SWMU No. 8
Railcar Separator

3.3.5.1 Location

At the time the RFA VSI was conducted, a salvaged railroad tank car was located near the northern end of the closed TSD impoundments at the plant property. This tank car had been used prior to closure in the treatment and recovery system for sludge from the impoundments. However at the time of the Task I visit, the separator had been removed from the site. According to Clyde Norton, the company Vice President, the unit was moved from the impoundment area to the plant where it was decontaminate and dismantled for sale as scrap metal sometime after the VSI.

3.3.5.2 Waste Quantities

The RFA reports that the tank car measured thirty-two feet in length and was seven feet in diameter. No information was given to the amount of material in the unit. However, the RFA reported "a creosote-like material was observed on a valve on the separator and the soil directly beneath it." It must be noted that the separator and stained soil was located within the confines of the old surface impoundments which makes the point moot.

3.3.5.3 Waste Constituents

The unit process sludge from the impoundments were considered K001 by the EPA and LDEQ. However, waste is no longer stored in the unit since the unit is no longer at the site.

3.3.5.4 Additional Information Needed

Since the unit is no longer in service at the plant, it should be removed from further consideration under the RFI and no additional information is needed.

3.3.6 SWMU No. 9 Main Runoff Pathway

3.3.6.1 Location

The main runoff pathway identified for investigation drains the eastern and western portions of parcel A to a culvert which extends under the Minden line of the Kansas City Southern Railroad which borders the southwest side of the parcel. From the culvert, runoff follows the pathway diagonally through parcel B where it is then discharged to an underground pipe that conveys stormwater to a tributary of Huffman Creek. The extent of this pathway is shown on the facility map. This unit is still responsible for draining a large portion of the plant property.

3.3.6.2 Waste Quantities

In section 2.2 of this report, it was stated that the main runoff pathway received process water discharge until the surface impoundments began operating in 1975. At this time the unit handled only stormwater discharge from the plant property. Since the unit received process water from creosote and pentachlorophenol wood preserving processes, any waste found in this unit would be considered K001 contaminated soil. Although no analytical evidence was presented in the RFA documenting the presence of hazardous waste, it was noted that a "tar-like material" was observed along the sides of the runoff pathway. This was also noted during the Task I preliminary visits. An attempt was made in the RFA to ascertain the amount of process water that had been handled by the RFA to be in excess of seventy million gallons over the operational life of the unit. However, this was based on the assumption that the plant has always produced wastewater at current rates. In fact, wastewater production is a function of the amount of wood treated, which has not remained constant. Therefore, the amount of process water handled by this facility is probably less than

the figure quoted in the RFA. Based on these observations, it is impossible to quantify any waste that may be present in this unit using current information.

3.3.6.3 Waste Constituents

Since this unit received process water from the plant, any wastes found would be classified as K001 contaminated soil.

3.3.6.4 Additional Information Needed

There is no existing analytical evidence to determine if this unit is managing solid waste. Also, no other testing has been done in this area to determine if waste transport has or can occur if waste exists in this area. Therefore, additional information is needed in these areas:

1. Chemical determination if a waste is present;
2. The extent of any contamination found; and
3. The quantities involved.

3.3.7 SWMU No. 10 Truck Washing Area

3.3.7.1 Location

The site of the truck washing area is on the concrete pad located near the facility maintenance building as shown on the facility map. The RFA reports that this area was used to wash equipment used in handling the treated wood products.

3.3.7.2 Waste Quantities

The amount of waste that may be present in this area is not known, since no analysis of soil from the site has been conducted.

3.3.7.3 Waste Constituents

This unit is used for washing equipment used for handling treated wood, therefore any waste found would be

classified TC wastes under current legislation.

3.3.7.4 Additional Information

There is no existing analytical evidence to determine if this unit is managing solid waste. Therefore, additional information needed for this unit is:

1. Chemical determination if a waste is present;
2. The extent of any contamination found; and
3. The quantities involved.

3.3.8 SWMU No. 11 Untreated Wood Landfill

3.3.8.1 Location

The untreated wood landfill is located in the eastern end of Parcel B immediately south of the dike to the closed surface impoundments. As reported in the RFA, this area is used by the company for filling of cuttings, unusable wood, and some sawdust from the plant. Colfax Creosoting is currently pursuing a permit for this area as a trash-fill for this debris.

3.3.8.2 Waste Quantities

The RFA listed this area as a solid waste management unit for RCRA regulation due to the fact that some treated wood was observed in the area. The RFA further states that the potential exists for a release to groundwater from the treated wood placed in the fill. However, two important factors were overlooked by the RFA investigators. First, treated wood is not a hazardous waste, and therefore it is not subject to RCRA regulation when landfilled. Second, the premise for release was based upon the decay of the wood. It is worthy of noting that the primary reason for treating wood is to *prevent* the wood from decaying. If such releases from wood were common, then any area where treated wood is used for construction (i.e. railroads, pilings, piers, etc.)

should be considered solid waste management units by this reasoning.

The RFA document also states that "analysis of samples taken from the on-site monitoring wells may provide a rough indication of whether any leachate migration is taking place from the waste wood landfill." Analysis of samples from MW-5, which is hydraulically downgradient from this unit, has never shown any contamination until recently. This contamination was attributed to releases from the surface impoundments prior to closure, an observation enhanced by the degree to which this well was contaminated (see analysis tabulations in the appendix). Based on these observations, it is recommended that this unit be removed from further consideration.

3.3.8.3 Waste Constituents

This unit does not receive hazardous waste from the facility and should be removed from further consideration under the RFI.

3.3.8.4 Additional Information

No additional information is needed for this unit.

3.3.9 SWMU No. 12 Groundwater Recovery Tank

3.3.9.1 Location

The groundwater recovery tank discussed in the RFA was located near recovery well P-1R and served as a collection tank for the recovery wells in the area. This unit was a chemical transport tank for a tractor-trailer truck and was used to store and haul contaminated groundwater from the recovery system to the plant process water system. The unit that was in service at the time of the RFI VSI has been replaced with a new tanker unit of similar construction.

3.3.9.2 Waste Quantities

Both the former unit and the new unit will hold approximately 3,000 gallons and is certified for the transport of chemicals. This unit is not subject to RCRA regulation as a tank because, according to 40 CFR Part 260.10, a tank is "a *stationary* device designed to contain an accumulation of hazardous waste which is constructed primarily of non-earthen materials which provide structural support." Since company personnel empty the tanker every other week, the recovery pumps produce less than 3,000 gallons of water every other week, and there is a float control cutoff on the tank, there is no chance of overflow from this unit. The RFA states that a documented release has not occurred from this unit, and no evidence of a release was found during the RFA VSI. Therefore, it is suggested that this unit be removed from further investigation as recommended by the RFA.

3.3.9.3 Hazardous Constituents

This unit is used for the collection of contaminated groundwater which the EPA and LDEQ consider hazardous as K001 contaminated water.

3.3.9.4 Additional Information Needed

No additional information is needed from this unit.

3.3.10 SWMU No. 13 Penta/Creosote Sump Containment

3.3.10.1 Location

The penta/creosote sump containment system provides secondary containment for the process water and preservative storage tanks in use at the facility. This area is shown on the facility map and detailed in Figures 2.9 and 2.10. The containment is provided to prevent preservative or hazardous waste from coming into contact with the soil in the area

should a spill occur. The unit is comprised of a structurally supportive concrete slab provided with a concrete berm and is of sufficient size to contain a spill from the largest tank in the system plus ten percent. The pad directs rainfall and any spills that may occur to concrete collection sumps within the containment, where it is then transferred to the company process water system. The RFA reports that "a low potential exists for contaminants migrating from the process area due to the facility's containment of waste streams as they are produced." The company also has a contingency plan on file with LDEQ to be implemented should a tank suffer structural failure and spill the contents into the containment system.

3.3.10.2 Waste Quantities

The company has not specifically designated this area for the storage of hazardous waste, and it is not company policy to collect waste in this area, as the system provides secondary containment for the process water system. At the time of the RFA, no waste was noted in the area, nor was any waste evident during the Task I visit.

3.3.10.3 Waste Constituents

The tank units in this containment system are used to recover creosote from process water generated during wood treating operations. This material meets the definition of K001 sludge, however since the material is reclaimed in a closed-loop reclamation process, it is not considered solid or hazardous waste, as stated in the preamble to the July 14, 1986 rule which amended 40 CFR Parts 260 et. al. for hazardous waste storage tanks. If, however a spill did occur in this area, any waste *not reclaimed* would be classified as U051 and/or F027 wastes. However, there have been no spills into this unit, and therefore no releases from this unit at this time. As stated in the RFA, further

investigation is not recommended for this unit.

3.3.10.4 Additional Information Needed

No additional information is needed from this unit.

3.3.11 SWMU 14
CCA Containment System

3.3.11.1 Location

The CCA containment system provides secondary containment for the tanks that were used for storage of CCA treating chemicals at the northern end of the treating plant. The CCA treating system was discontinued from use in 1990 and no chemicals are stored in this area. This containment system is located on the facility map and also in Figures 2.9 and 2.10. This unit is comprised of a structurally supportive concrete slab, 18" concrete berm, and a sump and pump system. The unit provided secondary containment for the CCA chemical storage tanks when they were in operation, and it also collected stormwater falling in the area for use as CCA chemical make-up water. The unit was not recommended for RFI in the RFA.

3.3.11.2 Waste Quantities

This area is not specifically designated for solid waste storage by the company, and it is not company policy to collect waste in this area. The purpose of this unit was to provide secondary containment for the CCA storage tanks. At the time of the RFA and the Task I visit, no waste was noted in the area.

3.3.11.3 Waste Constituents

The CCA storage tanks in this area were used to hold the preservative solution which contained arsenic, chromium and copper salts. These tanks were emptied of preservative prior to the cessation of CCA treating operations, therefore

no chemicals are stored in the area. Prior to shutting down the operation, any waste resulting from a spill would have been classified as toxicity characteristic waste due to the arsenic and chromium content. However, no releases from this unit have ever been documented and none were observed during the RFA VSI. As stated in the RFA, further investigation is not recommended for this unit.

3.3.11.4 Additional Information Needed

No additional information is needed for this unit.

3.3.12 SWMU No. 15 Creosote Dehydrator

3.3.12.1 Location

At the time of the RFA VSI, the creosote dehydrator was located within the containment system on the eastern side of the treating plant. Since that time, the company has moved dehydration operations to a new tank installed in the area where the cooling pond was formerly located and removed the tank formerly used for dehydration. The locations of these tanks are shown in Figures 2.9 and 2.10.

3.3.12.2 Waste Quantities

The old creosote dehydrator in place at the time of the RFA VSI could hold 9,971 gallons of preservative for dehydration. However, by the interpretation given of 40 CFR Part 260.31 in the preamble to that rule,

> "Today's final rule does not apply, however, to tank systems that are integrally tied to reclamation operations that are considered part of a closed-loop reclamation process and, hence, not storing solid and hazardous waste." (Federal Register, Vol. 51, No. 134, July 14, 1986)

According to this rule, the material that was stored in the unit is not considered waste since it is routed directly back into the treatment process for re-use. Therefore this unit is not considered a solid waste management unit.

Secondary containment was provided for the unit by the creosote containment slab and dike, however no spills or releases have ever been documented from this tank. At the time of the RFA, no spills were noted from this unit and the unit was not recommended for RFI in the report resulting from the assessment.

3.3.12.3 Waste Constituents

Under 40 CFR Part 260.13, exclusion from regulation as a solid waste management unit is given to tanks which are part of a closed-loop reclamation process. Since the tank in question is an integral part of the recycling process at the plant, it falls under this exclusion. Any material that was stored in the tank is considered product destined for re-use and not a hazardous waste. Any releases from this unit would be considered pure product spills, and contaminated soil would be classified as U051 and/or F027 waste. However, no spills have ever been documented from this unit and none were apparent during the RFA VSI. The point is inconsequential because secondary containment is provided for this tank which would prevent any spillage from coming into contact with the soil below the unit, and the unit is no longer in service for creosote dehydration. Therefore, as recommended in the RFA, this unit should be excluded from further RFI work.

3.3.12.4 Additional Information Needed

No additional information is needed from this unit.

3.3.13 SWMU's No. 16, 17, and 18 Creosote Separator's No. 1, 2, and 3

3.3.13.1 Location

The series of creosote separators present at the time of the RFA were located in the diked containment area of the plant as shown in Figure 2.10. These units are no longer in

operation and have been replaced by the new process water system described in section 2.2 of this report. The units consisted of three 9,000 gallon salvaged railroad tank cars and were operated in series to serve as oil/water separators for the reclamation of creosote from the process water.

3.3.13.2 Waste Quantities

As discussed in section 3.3.12.2, material processed in a closed loop system is not considered as a solid or hazardous waste if it is destined for re-use. The separators were provided in this system as the first step in this reclamation process, and were exempt as solid waste management units. Secondary containment was provided for these units by the creosote containment slab and dike, and no spills or releases have ever been reported from these tanks. At the time of the RFA, no spills were noted from this unit and the units were not recommended for RFI work.

3.3.13.3 Waste Constituents

Since the tanks in question were part of a closed-loop reclamation process to recover usable preservative from the process water stream, the materials accumulating in the tanks were not considered as a hazardous waste. If, however a spill had occurred onto soil in the area, the resulting material would probably be considered as K001 contaminated soil. This point is irrelevant since 1) containment was provided for the units, 2) no spills have ever been documented from the units, and 3) the units are no longer in service. Therefore, it is recommended that these units be excluded from further RFI work.

3.3.13.4 Additional Information Needed

No additional information is needed for these units.

3.3.14 SWMU No. 19
Penta Reclaiming Hopper

3.3.14.1 Location

The penta reclaiming hopper is an elevated cone-bottom tank located at the northeast corner of the treating plant and contained within the limits of the creosote/penta containment system. Figure 2.9 gives the location of this unit in relation to other treatment units at the site. This unit is a 20,000 gallon cone bottom tank that receives reclaimed penta solution from the oil/water separator in the penta wastewater treatment train. The cone bottom tank provides additional water separation before preservative reclaimed by this unit can be introduced back into the chemical work tanks.

3.3.14.2 Waste Quantities

From arguments presented earlier in this report, tanks that are a part of a closed-loop treatment train are excluded from regulation under 40 CFR Part 260.13 because:

1. Secondary materials (recovered penta solution) are returned to the original process in which they were generated;

2. The process is closed by being contained in an enclosed means of conveyance;

3. Combustion is not involved;

4. Secondary materials are not stored for over twelve months in the unit; and

5. The reclaimed material is not used to produce a fuel.

3.3.14.3 Waste Constituents

K001 sludge cannot accumulate because the tank is provided with a cone bottom from which the tank discharges.

Therefore, the material stored in this tank is not a hazardous waste. The tank is provided with secondary containment, thus if a spill should occur from this unit the spillage would be contained. No spills have ever been documented from this unit and it is recommended that the unit be removed from further consideration for RFI work as stated in the RFA.

3.3.14.4 Additional Information Needed

No additional information is needed from this unit.

3.3.15 SWMU No. 25 Cooling Pond

3.3.15.1 Location

At the time of the RFA VSI, the company operated a cooling tower and pond near the center of the creosote/penta containment area to process cooling water from a closed loop heat exchanger and barometric condenser utilized in the treating operations. This unit required the periodic addition of fresh water into the system because water was continually evaporated in the unit. On occasion, when water was added into the cooling pond as a result of storm flows, the excess was discharged into the plant process water system. According to statements in the RFA, the potential existed for releases of waste from this unit prior to the installation of the concrete pad and berm system for the unit. However, it must be noted that the unit has always been provided with containment in order to hold the cooling water. The company removed the unit from operations in 1988 when an industrial cooling tower was installed at the plant. The area is now used by the creosote storage and work tanks.

3.3.15.2 Waste Quantities

No waste is present in this unit because the area was cleaned prior to removing it from operation. No releases

were ever documented from this unit because containment was provided by the concrete lined pond and any overflow from the unit was directed into the plant process water system.

3.3.15.3 Waste Constituents

Prior to removing this unit from operation, the potential existed for K001 sludge to accumulate on the concrete bottom of the pond. This accumulation is mitigated because of the extreme turbulence maintained in the pond by the circulation of water being cooled. K001 sludge accumulate due to the natural coagulation of particles in the waste stream due to Brownian motion. The turbulence produced would prevent flocculation and tend to destabilize any particles that might otherwise settle. Again, the point is irrelevant because the unit was provided with containment and it is now no longer in service. No further RFI work is recommended for this unit as stated in the RFA.

3.3.15.4 Additional Information Needed

No additional information is needed from this unit.

3.3.16 AOC A West Runoff Pathway

3.3.16.1 Location

The west runoff pathway drains the western portion of parcel A as indicated on the facility map with this report. This drainage ditch conveys runoff from the portion of the facility near the dry kiln to a ditch which parallels the southeast side of the Kansas City Southern rail line to Shreveport.

3.3.16.2 Waste Quantities

According to the RFA, visual inspection of this unit indicated the presence of two substances in this drainage. An "orange sediment and white sheen" were observed, however

no analytical data exists to qualify this as a hazardous waste. Since the visit was conducted in early April, this material may have been algae growing in the stream, which is native to the area. At this time, however it is not known if any waste is present in this drainage pathway.

3.3.16.3 Waste Constituents

The material described to exist in the ditch during the time of the RFA is unlike any waste material resulting from plant operations. In general, CCA contaminated material usually has a green cast while creosote and penta contaminated soils are usually dark-brown to black and have a pronounced phenolic odor. No odor was noted during the RFA VSI from this material. Since waste of this type is produced at the site, the constituents of this material are not known.

3.3.16.4 Additional Information Needed

In order to determine if a hazardous waste exists in the west drainage pathway additional information is needed:

1. Chemical or physical determination if a waste is present;
2. The extent of any contamination found; and
3. The quantities involved.

3.3.17 AOC B Creosote Unloading Area

3.3.17.1 Location

The creosote unloading area is located on the east side of the creosote/penta sump containment. At the time of the RFA VSI, this unit consisted of a bermed concrete pad provided with a pipe connection for unloading preservative shipments. Since the time of the RFA, the company has replaced this unit with a winged steel box and secondary containment. Any preservative that may drip from the hose

connection during unloading operations is contained by the steel pan and conveyed by pipe into the creosote recovery system. Due to the secondary containment, this area has a low potential for release.

3.3.17.2 Waste Quantities

It was noted in the RFA report that no evidence of a release from this unit could be found, and the company does not allow material to accumulate in this unit. All preservative dripping into the sump pan is sent to the creosote recovery system, therefore there is no waste in this unit.

3.3.17.3 Waste Constituents

The unit is used for containing drippage from unloading preservative at the facility. Any drippage into the unit is removed for recovery and use in the preserving process. If the unit were not provided with secondary containment and it should leak, the resulting soil contamination would be considered as U051 waste. However, since the unit is comprised of a steel collection pan with secondary containment, this is not likely to occur. Therefore it is recommended that this unit be removed from further consideration during RFI work.

3.3.17.4 Additional Information Needed

No additional information is needed from this unit.

3.4 SWMU Summary for Further RFI Work

Based upon the findings of this report, the units given in Table 3.3 are recommended for further investigation at this facility.

TABLE 3.3
SWMU's FOR FURTHER
INVESTIGATION
Colfax Creosoting Co.

SWMU No.	Unit Name
1	Northeast Treated Wood Storage Area
2	Southeast Treated Wood Storage Area
3	West Treated Wood Storage Area
4	Southwest Treated Wood Storage Area
9	Main Runoff Pathway
10	Truck Washing Area
AOC A	West Runoff Pathway

3.5 Degree and Extent of Contamination

As reported earlier in section 2, the only documented and analytically verified contamination at the facility exists due to releases to the groundwater from the impoundments prior to their closure. No analytical work has been done at the site to determine if contamination is present in any of the potential SWMU's listed in Table 3.3 However, some soil staining was reported during the RFA VSI in these areas indicating that one of the wastes listed in Table 3.2 may be present.

3.5.1 Levels of Contamination Present

3.5.1.1 Known Areas of Contamination

Groundwater contamination is known to exist downgradient from the closed impoundments as was described in the environmental report summary of section 2. Low levels of groundwater contamination were detected in the early 1980's during routine monitoring of the first aquifer below the units. The problem was quantified as "slight" at that time, however subsiquent monitoring data indicated the problem was more severe, especially in the area immediately below the dike to the ponds.

A revied of the sampling data from 1987 to 1990 indicates that contamination is detected sporadically in the

outlying wells at trace levels. Monitor well MW-2 recorded low levels (0.083 mg/L) of total phenols early in 1988 and then higher levels in the second half of that year and the first half of 1989. Since that time no contamination has been detected in the well. A similar senerio is indicated by MW-3 sampling history. The well was first sampled for K001 constituents in 1987 and was analtyically clean. Then in two succeeding sampling events that same year, the well reported 0.78 and 0.33 mg/L total K001 constituents. Since that time, the well has shown contamination only once in 1989 when 0.04 mg/L total K001 constituents were found in the sample. Well MW-4 was contaminated at low levels the first time it was tested in 1987 when 0.02 mg/L total phenols were detected and has not been contaminated since until the Red River flooded in 1990. 0.19 mg/L of heavier pAH compounds were discovered in November of 1990 and a December 1990 resample indicated 0.02 mg/L of these same compounds

Occasional contamination has also been decected in MW-5 only recently. 1990 data shows 2.16 mg/L K001 pAH compounds present in early November and the December resample confirmed the presence of contamination at 0.031 mg/L. The newly installed MW-6 showed similar contaminant levels of 0.366 mg/L pAH compounds in November and then 0.130 mg/L in December. This was unexpected because the well was installed in an area beyond the previously defined horizontal extent of the contamination plume. Wells MW-7 and MW-7D also tested positive for contamination in November, however resampling showed both to be clean by December of that year. The irregular presence of low level contaminants in the outer downgradient wells may indicate that portions of the plume have migraged to this extent and is now becoming detectable.

The recovery well system is located in the most contaminated portion of the plume as is proven from samples

of the recovered groundwater. Figure 3.1 graphs the recovery trends from well P-1 (now P-1R) from the time the recovery program began. Please note that the results reported between 600 and 800 operation days are somewhat biased since these are totals of indicator parameters naphthalene and total phenols only. All other amounts represent total K001 constituents. At the time the program began, groundwater recovered from this unit contained 51.54 mg/L total K001 constituents in 1987. This has increased to the current rate of 5,473.146 mg/L. Other wells in the system show similar results. Table 3.4 gives the maximum contaminant levels detected at the site from well P-1R.

TABLE 3.4
MAXIMUM CONTAMINANT LEVELS
Colfax Creosoting Co.

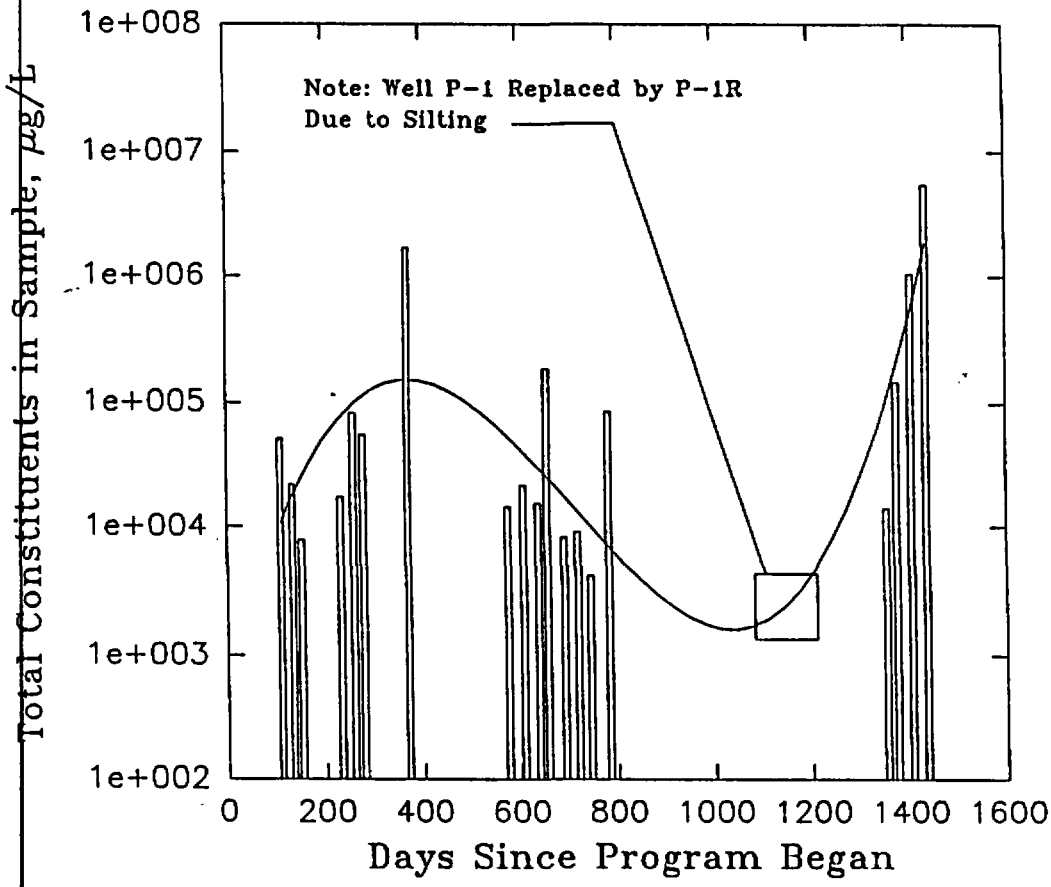
Parameter	Total Constituent, mg/L
2-Chlorophenol	<0.005
Phenol	109.892
2,4-Dimethylphenol	442.500
2,4,6-Trichlorophenol	888.940
p-chloro-m-cresol	149.690
Tetrachlorophenol	<0.010
2,4-Dinitrophenol	1326.600
Pentachlorophenol	97.950
Acenaphthene	51.044
Naphthalene	746.880
Phenanthrene+Anthracene	85.750
Carbazole	49.340
Fluoranthene	345.870
Pyrene+Benzo(a)anthracene	726.740
Chrysene	100.010
Benzo(b,k)fluoranthene	91.300
Benzo(a)pyrene	198.270
Indeno(1,2,3-cd)pyrene +Dibenzo(a)anthracene	62.370

Historical sampling data from all the well present at the facility can be found in the appendix to this document. Figures presented earlier in section 2 present the horizontal extent of the contamination at the site.

FIGURE 3-1

Colfax Creosoting

Well P-1 Recovery Trends



Soil contamination was documented in the strata containing the ponds prior to their closure. Section 2 gave discussion to the amounts of material removed and the level of contaminants closed in place in these ponds. The ponds are currently covered by the post closure permit as closed TSD facilities.

3.5.1.2 Areas for Investigation

The only documentation of contamination at other areas of the facility property are reported in the RFA. Qualitative information from that document discusses the existence of "stained soil" in the wood storage areas and drainage pathways at the plant. However, no data is currently available to quantify or confirm the presence of waste in these areas. Hence these areas should be addressed in further RFI work.

3.5.2 Migration Pathways

Since the chemicals of concern at this site are comprised of non-volatile constituents, there are three primary modes of contaminant migration from this facility. These are:

1. By erosion of contaminated soil;
2. Movement of contaminated groundwater; and
3. Drainage of any contaminated surface water.

3.5.2.1 Soil Erosion

The RFA identified two likely soil migration pathways at the facility: 1) Contaminated soil from the yard being washed into surface water runoff paths; and 2) Spalling of discolored soils along the sides of the runoff paths during rainfall events. Both of these modes are viable means for contaminant transport off the facility property, however it is not known at this time if either of these two mechanism are currently active.

Data taken during the topography mapping of the facility indicates the presence of seven surface water runoff paths that drain the two parcels. The majority of the runoff from the plant is carried by the main runoff pathway (SWMU No. 9) and very little erosion has been detected in this area or in any of the other pathways. No further data has been gathered at this time to quantify the degree to which erosion is or can occur from plant property. This subject will be investigated further in the RFI workplan.

3.5.2.2 Groundwater Movement

Groundwater movement at the plant has been studied in detail since monitoring wells were installed at the plant. The uppermost aquifer at the facility is encountered at an mean elevation of 60′ to 70′ NGVD over the site. Current data from borings and wells in the area indicate this aquifer to be contained by gray silty clay below which another lower piezometric surface can be detected.

Groundwater elevations are influenced by the Red River which is within one mile of the plant property (see Figure 2.1). Figures 3.2 to 3.5 show plots of daily river elevations as recorded at the Alexandria, Louisiana gaging station near the plant from 1987 to 1990 by the Army Corps of Engineers. This data was correlated with groundwater elevations in the wells at the facility as illustraited by Figure 3.6 to yield a Pearson's correlation coefficient of 0.836. Observation of this data indicates that for a majority of the time, groundwater flow is to the river. However, on occasion when flooding is prevalent in the area, the groundwater is fed by the river. Figure 3.7 plots groundwater data against river data over the past four years showing times when this occurred. Using the graphs in Figure 3.6 and 3.7, it can be concluded that the river serves as a discharge source for groundwater in the area.

FIGURE 3-2

Colfax Creosoting Company

1987 Red River Gage Readings

Alexandria Gage

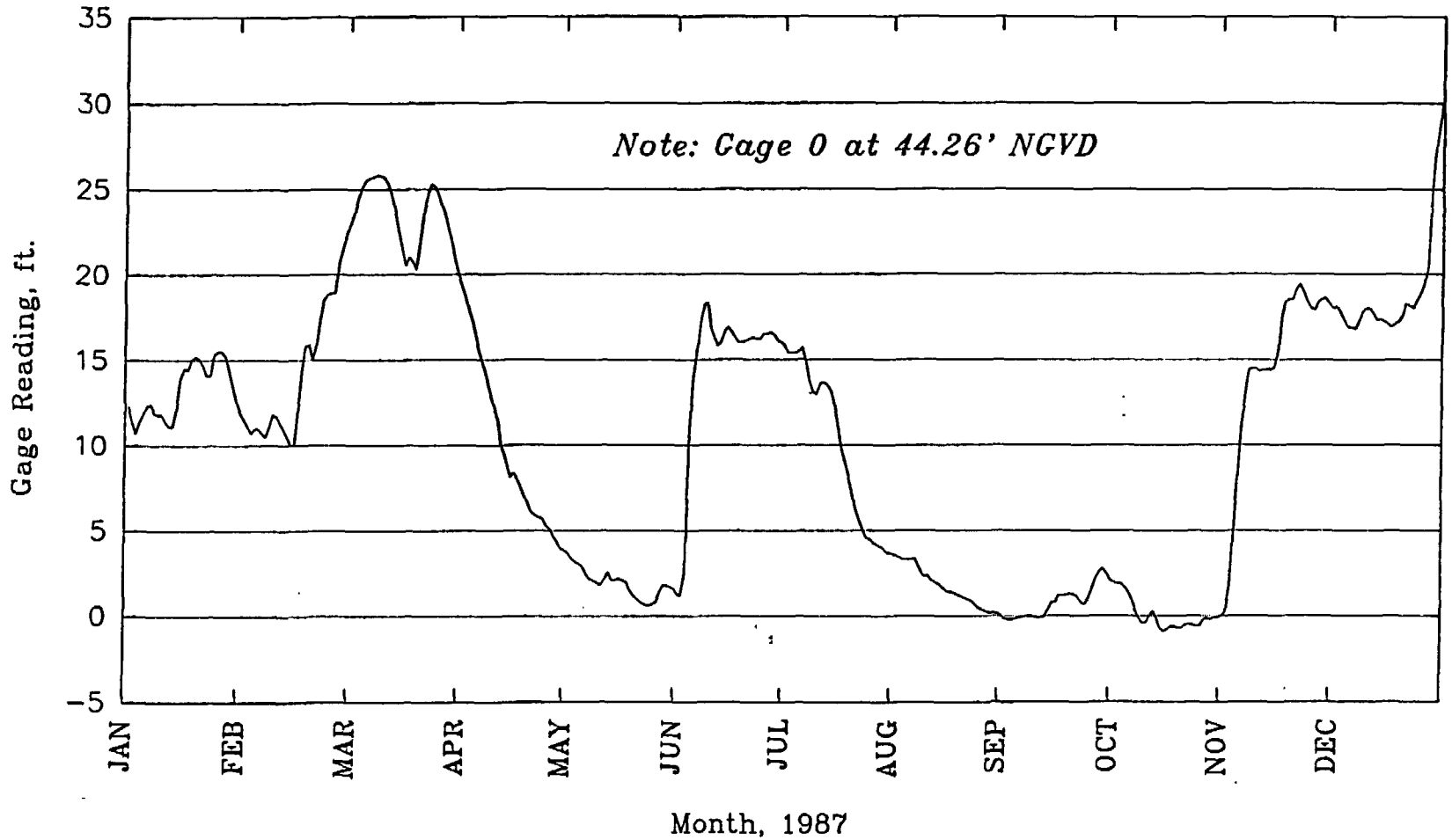


FIGURE 3-3

Colfax Creosoting Company

1988 Red River Gage Readings

Alexandria Gage

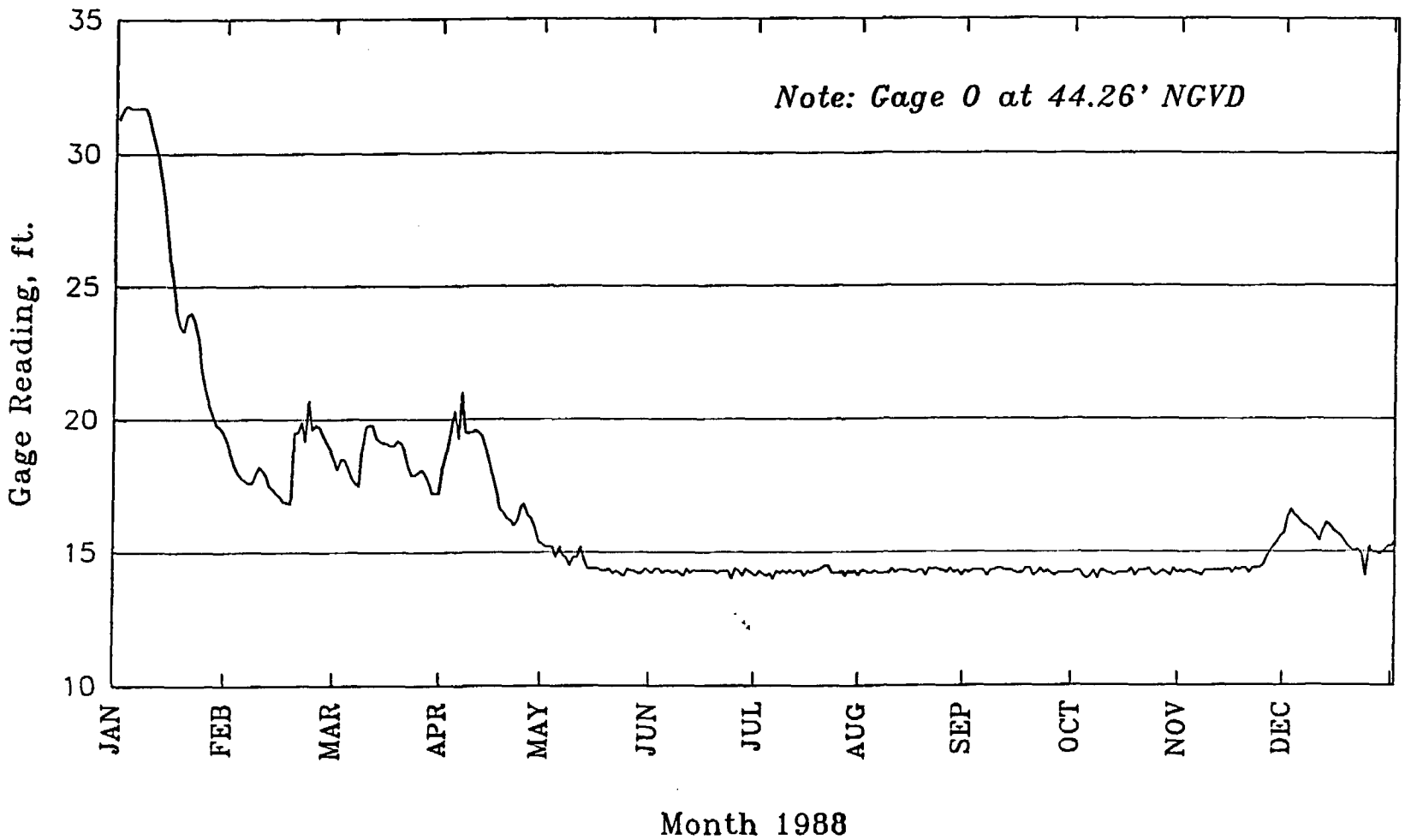
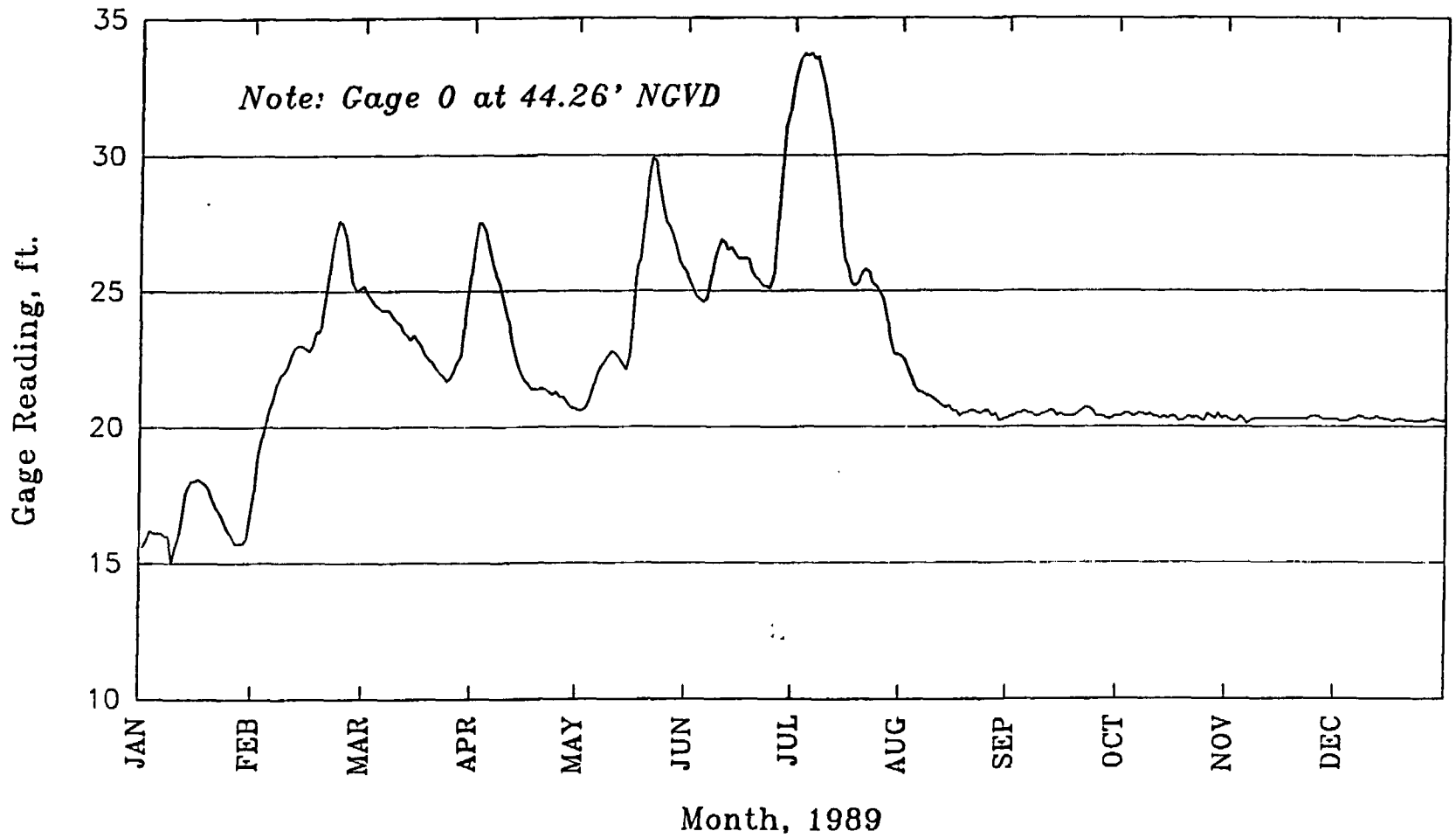


FIGURE 3-4

Colfax Creosoting Company

1989 Red River Gage Readings

Alexandria Gage



CCC RFI

FIGURE 3-5

Colfax Creosoting Company

1990 Red River Gage Reading
Alexandria Gage

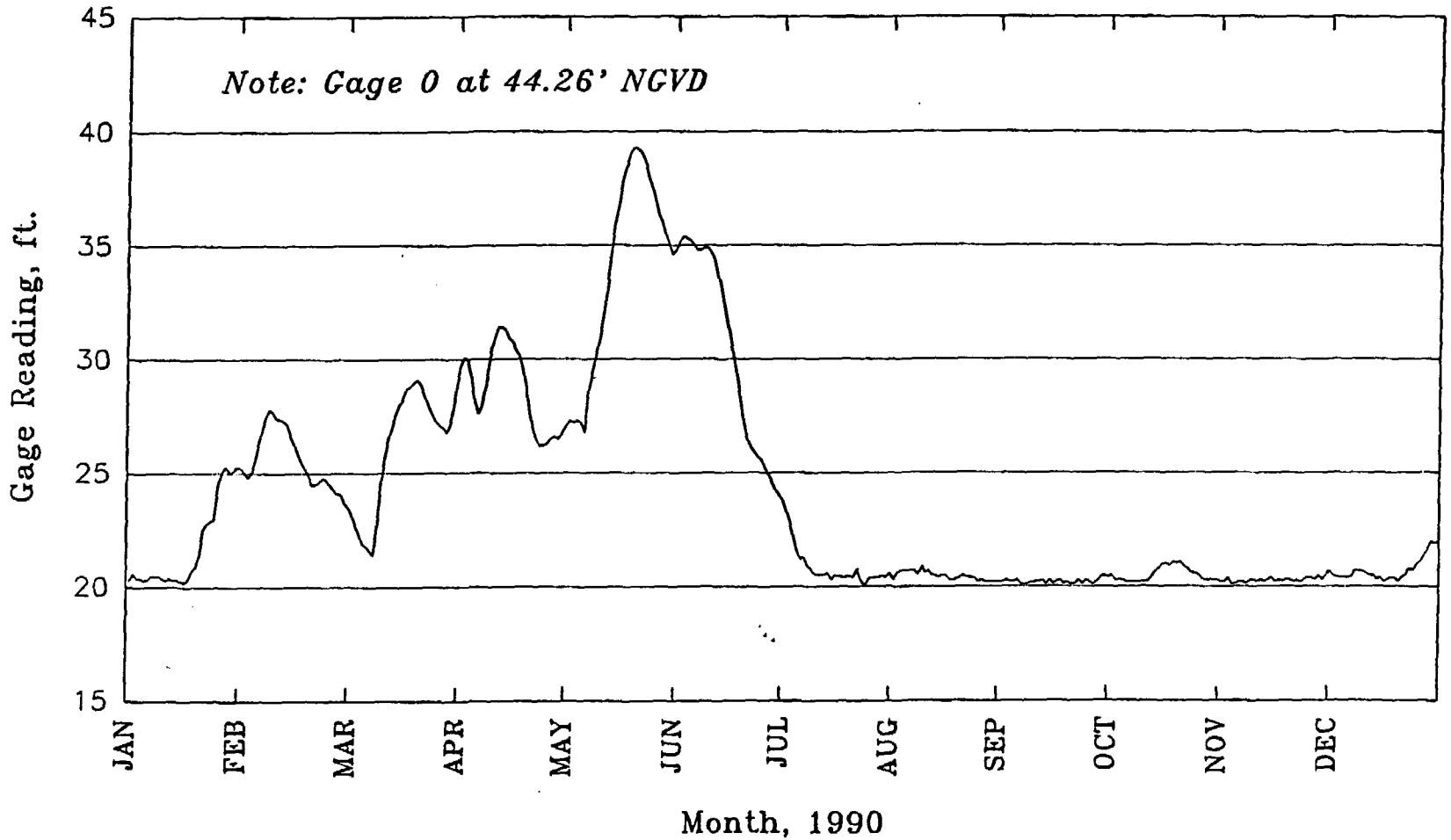


FIGURE 3.6

Colfax Creosoting Company

Groundwater Elevation Correlation to the Red River, Alexandria Gage

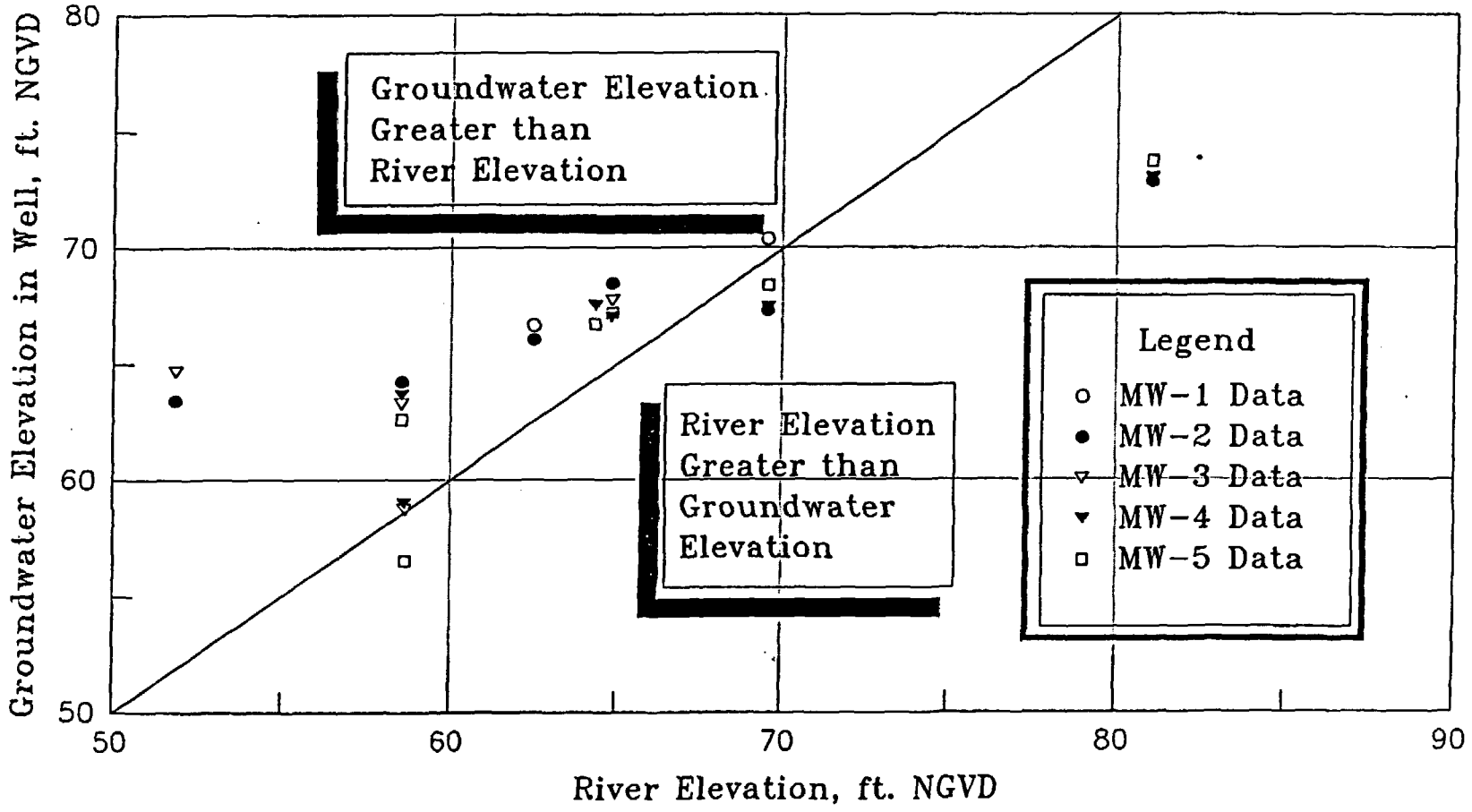
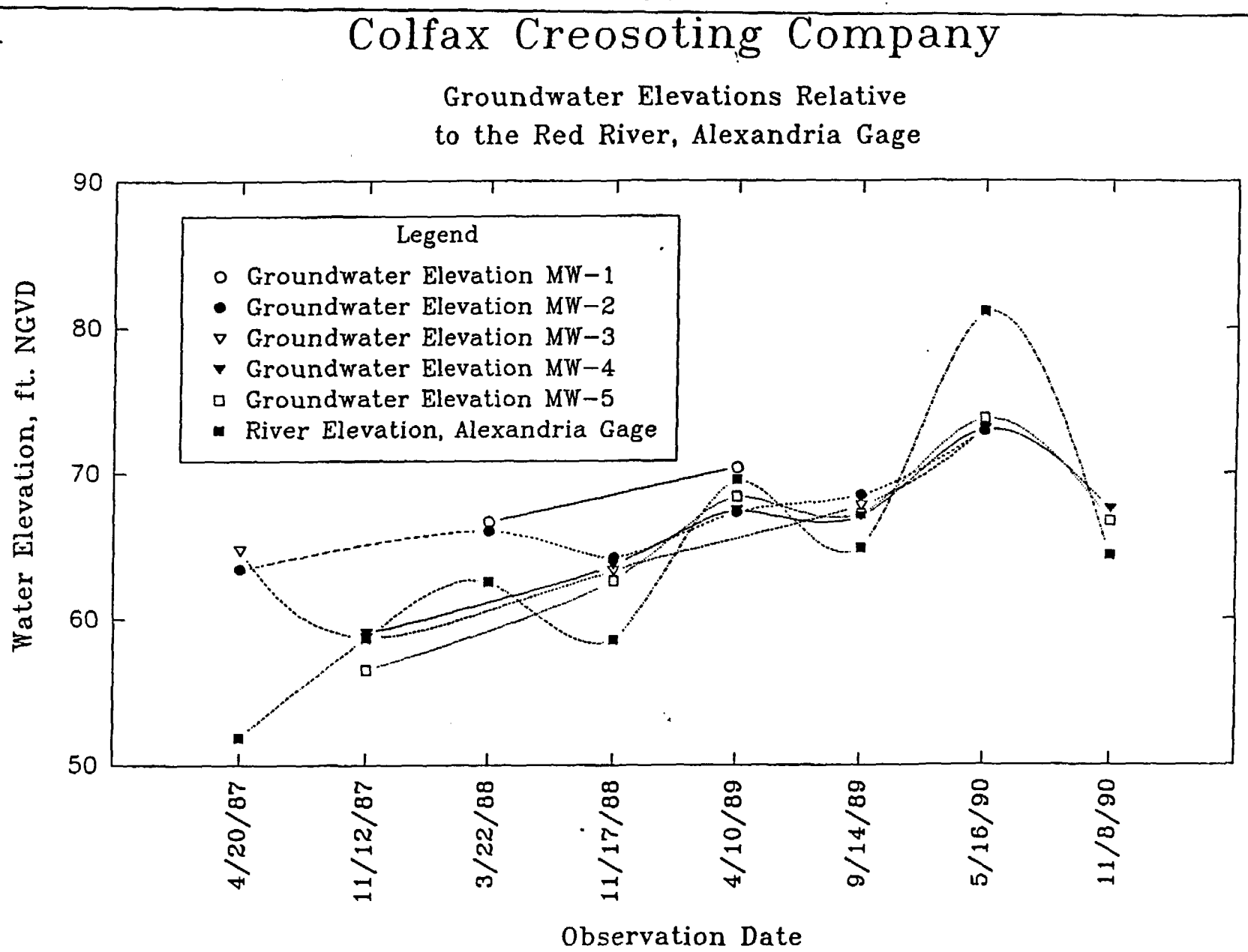


FIGURE 3.7


Colfax Creosoting Company
Groundwater Elevations Relative
to the Red River, Alexandria Gage
Legend
Groundwater Elevation MW-1
Groundwater Elevation MW-2
Groundwater Elevation MW-3
Groundwater Elevation MW-4
Groundwater Elevation MW-5
River Elevation, Alexandria Gage
Water Elevation, ft. NGVD
90
80
70
60
50
4/20/87
11/12/87
3/22/88
11/17/88
4/10/89
9/14/89
5/16/90
11/8/90
Observation Date

Future assessment work is scheduled to address the issue of contamination moving away from the river.

Based on these observations, contamination in the shallow aquifer at the facility would most likely enter into the Red River if unchecked. However, due to the extreme distance to the river from the site and the diffusion associated with this discharge, the chance of detection is minimized. Nevertheless, the company plans to remediate the contaminated aquifer.

Discussion was also given in the RFA as to the existence of groundwater contamination elsewhere at the site. Of particular interest in the report was the wood storage yards. Several factors mitigate the chance of groundwater contamination in these areas:

1. The distance from the surface to the groundwater;
2. The amount chemical in question; and
3. Plant operating practices.

These factors will be addressed in future RFI work to determine the potential for further groundwater contamination.

3.5.2.3 Stream Contamination

Seven runoff pathways were identified at the site during topographic surveying work, however contamination in these area has not been determined. Runoff from the entire site eventually discharges into a tributary of Huffman Creek which then discharges into the Red River. This transport mechanism will be the subject of future study in RFI work.

3.5.3 Environmental Impact

3.5.3.1 Human Health

According to data available at this time, any releases of hazardous constituents to the environment have are confined to property owned by Colfax Creosoting and there have been no reports of any adverse effects on human health

in the area. Some of the constituents such as the chloronated phenolic compounds are suspected of being carcenogenic and/or toxic in varying amounts.

3.5.3.2 Demography

The area around the facility is zoned residential and commercial as previously discussed in section 2. Approximately 2,000 people reside within a one mile radius of the facility.

3.5.3.3 Ground Water Use

Ground water in this area is the principle source for drinking water in the area, however the primary water bearing formations are three sand formations ranging at depths of 400′, 700′, and 1000′. Figure 2.5 and 2.6 verified this data by showing the depth to which wells in the area were drilled.

3.5.3.4 Surface Water Use

The largest surface water source within a three-mile radius is the Red River which is used for recreational and navagational purposes.

3.5.3.5 Land Use

Land use around this facility was discussed earlier in section 2.1 of this report.

3.5.4 Aerial Photographs

Table 3.5 is a listing of all known aerial photographs available to the facility at this time. The list results from an EROS data search by the U.S. Geological Survey. Several of these photographs are readily available to the facility from the Army Corps of Engineers′ office in Vicksburg, Mississippi. These photo′s may prove valuable in determining the existance of contamination at the site.

4 IMPLEMENTATION OF OTHER CORRECTIVE MEASURES

A number of other measures have been taken to improve pollution control at the facility that are not requirements of the permit. These include the following:

1. Installing three new corrective action recovery wells downgradient from the closed impoundments.
2. Additional assessment wells downgradient from the closed impoundments.
3. Changes to the waste water treatment train at the treating plant.
4. Additional dikes in the treating area tank farm.
5. Replacing the cooling water system at the treating plant.
6. General cleanup and housekeeping activities at the facility.
7. New sheds and concrete pads under design and construction at the facility.

4.1 Interim Measures Objectives

The pollution control objectives of each of the above seven measures are outlined below:

4.1.1 Recovery Wells

The most contaminated wells at the facility were the two piezometers (P-1 and P-2) installed just south of the dike on the south side of the closed impoundments as described previously in Section 3 . These wells were used for recovery on a trial basis with the understanding that the PVC screens would likely become clogged because of the softening caused by high concentrations of preservative. Clogging did occur in 1989 after an estimated 13,761 gallons of contaminated ground water was recovered from both wells.

The company proposed to install two newly designed recovery wells having the design described in Section 3. The new wells were a significant improvement with a collection/separation leg located below the screen, a 4 inch diameter size, and the change to stainless steel for that

portion in direct contact with preservative. The company also decided to install a third recovery well at existing piezometer P-4. This location showed significant concentrations of creosote and penta contamination.

By September, 1990, the three new recovery wells (P-1R, P-2R, and P-4R) were installed and in operation. It was estimated that a total of 45,937 pounds of contaminants were removed from the three wells by the end of 1990. The wells are continuing to function as designed with no indication of clogging.

4.1.2 Additional Assessment Wells

Three new assessment wells were installed during the summer of 1990 for the purpose of continuing to assess the area downgradient from the closed impoundments. Until the summer flood which occurred during the time the wells were being installed, it was thought that the extent of contamination in the upper aquifer had been reasonably well determined. The purpose for the additional work was to begin to investigate the second aquifer and to install a well between clean wells MW-4 and MW-5 as located in Section 3. The new well between MW-4 and MW-5 was to be numbered MW-6. While attempting to install MW-6, it was found that considerable contamination existed to the east and parallel with the drainage ditch. Well MW-6 was finally installed in a location where visual contamination did not exist after completing five borings with contamination. Later sampling of MW-6 indicated low level contamination.

As part of the additional assessment work, a well nest consisting of an upper aquifer well (MW-7) and a lower aquifer well (MW-7D) was installed downgradient from exiting MW-2. The purposes were to define the next aquifer and to determine if was contaminated. The new lower aquifer well was to be the first of at least three wells that would be needed to define the direction of flow for this aquifer. Well logs and a difference in piezometric surface indicated

that MW-7D was completed to a lower aquifer.

The above described work and sampling after the flood that occurred during the summer of 1990 indicated that more downgradient wells need to be installed. A proposal for additional wells was included with the 1990 Annual Groundwater Report to the LDEQ. A proposal to install the wells has been received from the drilling company and permission obtained from the school board to continue assessment work this summer.

4.1.3 Changes to Waste Water Treatment System

A number of recent changes have been made to the facility waste water treatment system. The primary changes have been to the portion that receives the creosote waste water and to the floc system.

The original creosote waste water system consisted of a series of settling tanks modified from railroad tank cars. The system was not efficient because of the lack of volume and the fact that they were horizontal rather than vertical tanks. Since creosote settles to the bottom of the water, it has been determined that a cone bottom vertical tank is a more efficient separator than a horizontal API type separator. Therefore, the three rail cars were replaced by a large blow down tank followed by two vertical cone-bottom separator tanks. This has given better control of the system and more recovery of usable creosote.

Two cone-bottom vertical floc tanks were installed to receive the combined settled wastewater from the penta separator and the creosote separators. The floc tanks have functioned very well consistently producing a treated waste water that meets the 100 mg/L oil & grease permit standard. Because the only chemicals added in the floc tank are a polyelectrolyte and for pH control, the sludge produced can be pumped to the creosote recovery tank for reuse.

The existing penta waste water separator was also a modified railroad tank car. This separator was replaced by

an API design open top horizontal separator.

4.1.4 Additional Dikes

Some additional dike work has been constructed in the waste water treating area because of the changes to the waste treatment system as described above and because some of the old dikes were deteriorating. All new dikes are to contain additional reinforcing steel and water stop in construction joints. The primary objective of this work is to help control preservative or waste water spills within the treating area.

4.1.5 Replacing the Cooling Tower

The original cooling tower was replaced two years ago because it was in poor repair and not functioning properly. The old tower was removed and replaced by a new prefabricated unit that is located above a new cooling water storage tank along the south side of the treating area tank farm. Because of the replacement, the old location was free to be used for additional tankage such as the new creosote work and reclaimer tanks. Also, with the old tower removed, the waste water treating area is now more accessible to workers. This is because the old tower sprayed a fine mist of cooling water into the air thereby discouraging workers from inspecting the area for leaks and properly performing housekeeping duties.

4.1.6 General Housekeeping

The company has devoted more time to general cleanup and housekeeping at the facility. This has included improving the road system through the site and the drainage. The objectives of this effort are to improve working and operational conditions, and to improve the ability to spot problem areas, particularly with regard to pollution control. The company is continuing to foster and improve the general housekeeping at the site.

4.1.7. New Sheds and Concrete Pads

The company has begun a program to add covered concrete

pads throughout the facility. The purpose of the pads is to provide places to store treated material after it is removed from the tram cars. The benefits will be in pollution control.

4.2 Operations Management

The following table lists the seven "Other Corrective Measures" defined above and the individual or group that is in charge of operations management. The only completed item is number 5 which is the replacement of the cooling tower.

TABLE 4.1
TABLE OF OPERATIONS MANAGEMENT
FOR
OTHER CORRECTIVE MEASURES
Colfax Creosoting Co.

ITEM	DESCRIPTION	INDIVIDUAL OR GROUP
1	Recovery Wells	Plant Manager
2	Assessment Wells	Ball Engineering
3	Waste Water System	Treat. Plant Supt.
4	Additional Dikes	Treat. Plant Supt.
5	Cooling Tower	N/A Completed
6	Housekeeping	Plant Manager
7	New Sheds & Pads	Vice President

4.2.1 Recovery Wells

Recovery Well management is supervised by Mr. Carl Johnson, the Plant Manager. An hourly worker is given the task to inspect and operate the system on a daily basis. The worker originates repair orders as required. He handles the transfer of recovered ground water to the waste water treatment plant. Also, the worker obtains the monthly samples for analysis and completes the monthly operating record.

4.2.2 Assessment Wells

Assessment wells are sampled by Ball Engineering, Inc. according to the steps outlined in the "Ground Water

Monitoring Plan" which is made part of the permit. Additional assessment is conducted by Ball Engineering, Inc. as required to determine the rate and extent of contamination.

4.2.3 Waste Water Treatment System

The waste water treatment system is operated by hourly personnel and supervised by Mr. Jim Brodtman, Treating Plant Superintendent. The treatment given each batch is decided upon by the Superintendent. Waste water samples are obtained quarterly and shipped to Ball Engineering, Inc. for analysis.

Mr. Brodtman originates changes to the treatment system as he perceives a need. Engineering design help is obtained as necessary.

4.2.4 Additional Dikes

As changes are made to the waste water treating system and the treating plant, the Treating Plant Superintendent, Mr. Jim Brodtman, follows up to see that the integrity of the spill control and containment dike is maintained. He gives orders to construct additional dikes as necessary.

4.2.6 General Housekeeping

Hourly workers have standing assignments to keep the area clean. The Plant Manager, Mr. Carl Johnson, gives additional orders, as necessary, to take other housekeeping measures as appropriate.

4.2.7 New Sheds and Concrete Pads

The Vice President, Mr. Clyde Norton, has begun a program to construct a series of new sheds and concrete pads for storing treated materials. The first step in this effort was to conduct a detailed survey of the facility. This include preparing a contour map and detail track layout. Next, a contractor was selected to begin the construction phase. Because of cost constraints, the company is not certain how much area will be covered with pads and sheds. This work is continuing.

4.3 Operations Scheduling

The following table was prepared to list the scheduling of activities for the "Other Corrective Measures". As shown on the table, not all of the items can be formally scheduled, but are ongoing operations such as the housekeeping efforts and new dike construction.

TABLE 4.2
TABLE OF OPERATIONS SCHEDULING
FOR
OTHER CORRECTIVE MEASURES
Colfax Creosoting Co.

ITEM	DESCRIPTION	SCHEDULE
1	Recovery Wells	Continuous Operation Monthly Reporting Monthly Sampling Semi-Annual LDEQ Report
2	Assessment Wells	Semi-Annual Sampling Install as Required Annual LDEQ Reporting
3	Waste Water System	Daily Operation Quarterly Sampling Quarterly Reporting Install as Required
4	Additional Dikes	Install as Required
5	Cooling Tower	N/A Completed
6	Housekeeping	Continuous
7	New Sheds & Pads	Completed in 1991

4.4 Progress Report Schedule

It is proposed to submit progress reports for certain items in the table above as part of the RFI. These would include those measures not being reported to LDEQ under other regulations or permit requirements. The items would include 1) changes to the design and operation of the waste water treatment system, 2) changes to the dike system, and 3) the final layout and description of new sheds and pads constructed for the purpose of storing treated materials. It is proposed to submit reports for the three items in the

above paragraph within the quarter that the work is completed.

5 PRELIMINARY RFI ACTIVITIES SCHEDULE

The preliminary RFI activities schedule is as follows:

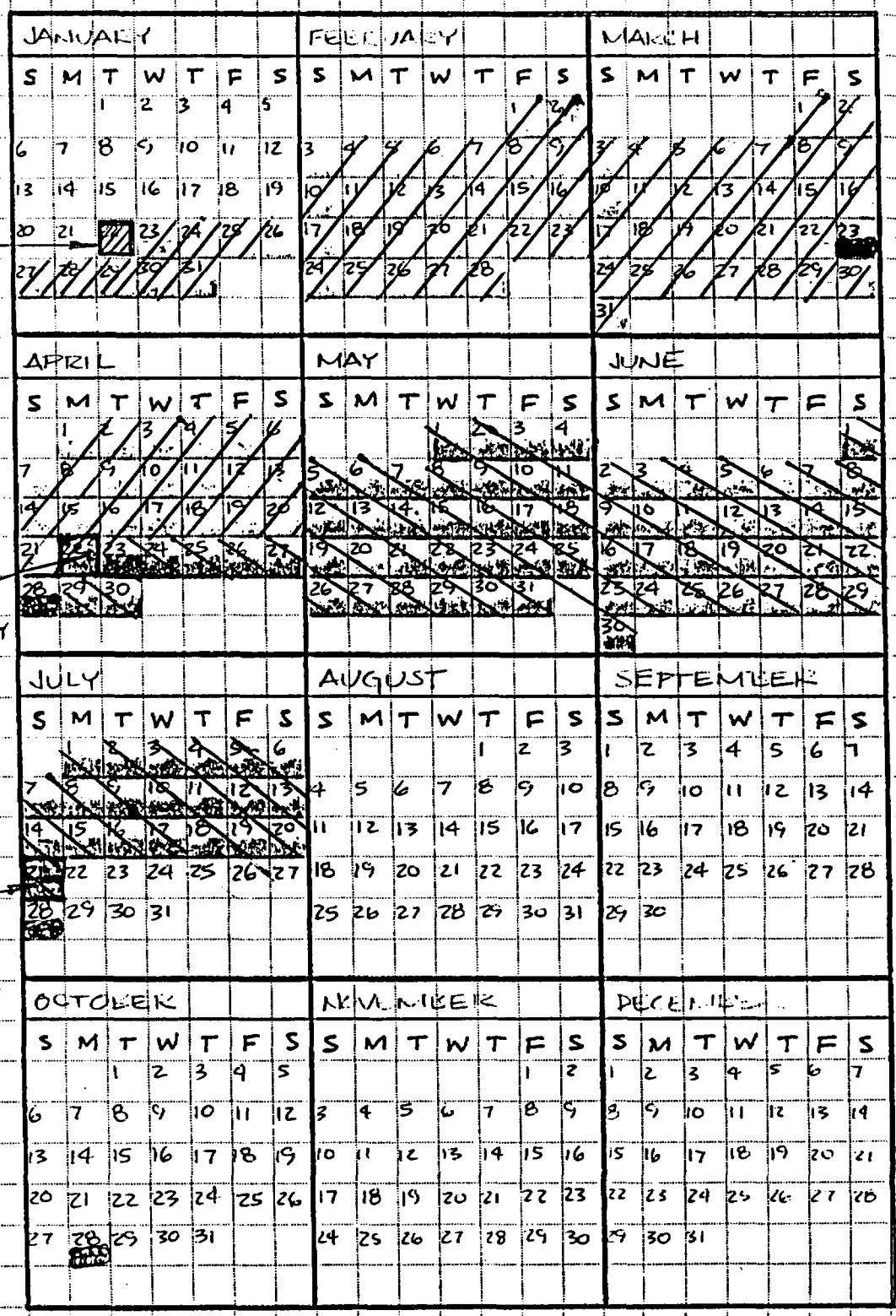
1. Effective Date of Permit -- January 22, 1991
2. Quarterly Reports Submitted -- March 23, 1991 (submitted)
   -- April 28, 1991
   -- July 28, 1991
   -- October 28, 1991
3. Preliminary Report -- April 22, 1991 (submitted)
4. RFI Workplan for SWMU's identified at time of permit issuance -- July 21, 1991
5. Revised RFI Workplan -- as specified in N.O.D.
6. RFI Report and Summary Report -- 60 days after completion of RFI.
7. Revised RFI Report and Summary -- as specified in N.O.D.
8. CMS Report -- 120 days after notification of requirement to conduct CMS.

Figure 5.1 shows the current preset dates for this RFI.

Ball Engineering, Inc.
P.O. BOX 789
APALACHICOLA, FLORIDA 32320
(904) 653-9355

JOB CCC U1
SHEET NO. ____ OF ____
CALCULATED BY J. BUNNER DATE 1/28/91
CHECKED BY ____ DATE ____
SCALE ____

RCRA FACILITY INVESTIGATION (REVISED) CALENDER
YEAR 1991



6 Appendix

6.1 Material Safety Data Sheets

6.2 Well Sampling Data

Allied Chemical

CHEMICALS COMPANY

PRODUCT SAFETY DATA SHEET

A. GENERAL INFORMATION

TRADE NAME (COMMON NAME OR SYNONYM)	☒ C.A.S. NO. ☐ ALLIED PRODUCT CODE #
Creosote	61789-28-4

CHEMICAL NAME

2, 3 and 4 ringed polynuclear aromatic hydrocarbons including some substituted compounds

FORMULA	MOLECULAR WEIGHT
Mixture of organic compounds	130-210

COMPANY/PLANT ADDRESS (No., STREET, CITY, STATE AND ZIP CODE)

Chemicals Company
P.O. Box 1053R
Morristown, New Jersey 07960 Attention: Tar Products Department

CONTACT	PHONE NUMBER	ISSUED DATE	REVISED DATE
Manager, Technical & Environmental Services	201-455-5611	August 1980	

B. FIRST AID MEASURES

EMERGENCY PHONE NUMBER 614-533-1040

INHALATION: Remove to fresh air. If not breathing, give artificial respiration; preferably mouth to mouth. If breathing is difficult, give oxygen. Call a physician.
SKIN CONTACT: Remove with waterless hand cleaners or soap and water. Avoid solvents.
EYE CONTACT: Flush eyes immediately with large amounts of water or mineral oil for at least 15 minutes. Call a physician.
INGESTION: First induce vomiting, then take 2 tablespoons of activated charcoal - USP (drug grade) in water. Get immediate medical assistance.

C. HAZARDS INFORMATION

FIRE AND EXPLOSION

FLASH POINT	AUTO IGNITION TEMPERATURE	FLAMMABLE LIMITS IN AIR (% BY VOL.)
> 70 °C ☐ OPEN CUP ☒ CLOSED CUP	°C	LOWER UPPER

UNUSUAL FIRE AND EXPLOSION HAZARDS

Water/fog can control unconfined fires, but water may cause frothing or eruption in closed tanks. When heated to elevated temperatures, it emits lower molecular weight hydrocarbons.

HEALTH

INHALATION Overexposure to vapor may result in irritation to respiratory tract. Prolonged exposure in significant excess of permissible air concentrations can result in acute toxic effects, such as respiratory difficulty, convulsions and possible cardiovascular collapse.

INGESTION Irritation of the gastro intestinal tract followed by nausea and vomiting, abdominal discomfort, rapid pulse, etc. Cardiovascular collapse may occur. Fatal dose is approximately 0.1 g/kg of body weight.

SKIN Contact with skin can result in irritation which when not washed off or when accentuated by sunlight, can result in minor burns.

EYES Overexposure to product vapors can result in irritation. Eye contact with product will result in irritation, which in the absence of recommended first aid can result in minor burns to the eyes.

PERMISSIBLE CONCENTRATION: AIR (SEE SECTION J) OSHA exposure limit - TWA 8 hours is 0.2 mg/m^3 (PPAH) BIOLOGICAL

UNUSUAL CHRONIC TOXICITY

Prolonged and repeated skin exposure over many years in the absence of recommended hygiene practices may lead to changes in skin pigmentation, benign skin growths and may in some cases, result in skin cancer.

I. ENVIRONMENTAL

DEGRADABILITY

Due to its low vapor pressure and extremely low evaporation rate, the volatility rate at 20°C is almost zero. Upon heating, at extremely high temperatures, hydrocarbons will be emitted and some degradation will take place.

OCTANOL/WATER PARTITION COEFFICIENT

WASTE DISPOSAL METHODS*

Burial or incineration.

*DISPOSER MUST COMPLY WITH FEDERAL, STATE AND LOCAL DISPOSAL OR DISCHARGE LAWS.

J. REFERENCES

PERMISSIBLE CONCENTRATION REFERENCES

OSHA General Industry 29 CFR 1910. Coal Tar Pitch Volatiles (CTPV)

REGULATORY STANDARDS

NIOSH Criteria Document - Coal Tar Products
DOT CFR 49 Parts 100-199
USEPA 40 CFR 112

GENERAL

National Fire Prevention Association, Fire Protection Hand Book,
NFPA 325 m, NFPA 491 M
Encyclopedia of Occupational Health and Safety, Vol. I, McGraw Hill

K. ADDITIONAL INFORMATION

See attached Technical Data Report (PC-7)
"Using Coal Tar Products With Safety"

THIS PRODUCT SAFETY DATA SHEET IS OFFERED SOLELY FOR YOUR INFORMATION, CONSIDERATION AND INVESTIGATION.
ALLIED CHEMICAL PROVIDES NO WARRANTIES, EITHER EXPRESS OR IMPLIED, AND ASSUMES NO RESPONSIBILITY FOR THE ACCURACY OR COMPLETENESS OF THE DATA CONTAINED HEREIN.

F. PHYSICAL DATA

MATERIAL IS (AT NORMAL CONDITIONS):	APPEARANCE AND ODOR	
☒ LIQUID ☐ SOLID ☐ GAS ☐ _____	Dark brown liquid with a penetrating smokey odor and a burning caustic taste.	
BOILING POINT 210-425 °C MELTING POINT °C	SPECIFIC GRAVITY (H_2O = 1) 1.03 - 1.18	VAPOR DENSITY (AIR = 1) >1
SOLUBILITY IN WATER (% by weight) Insoluble	pH.	VAPOR PRESSURE (mm Hg at 20° C) 100°C - 80 MM 125°C - 225 MM 150°C - 370 MM
EVAPORATION RATE (Butyl Acetate = 1) <1	% VOLATILES BY VOLUME (At 20°C)	

G. REACTIVITY DATA

STABILITY	CONDITIONS TO AVOID
☐ UNSTABLE ☒ STABLE	None known

INCOMPATIBILITY (MATERIALS TO AVOID)

None known

HAZARDOUS DECOMPOSITION PRODUCTS

Material does not decompose.

HAZARDOUS POLYMERIZATION	CONDITIONS TO AVOID
☐ MAY OCCUR ☒ WILL NOT OCCUR	"Open flame and intense heat."

H. HAZARDOUS INGREDIENTS (Mixtures Only)

MATERIAL OR COMPONENT	%	HAZARD DATA (SEE SECT. J)
(See attached sheet)		

CC124-283

D. PRECAUTIONS/PROCEDURES

VENTILATION

Avoid breathing vapors, ventilate work area, wear respirator, goggles, or face shield.

NORMAL HANDLING

Wear clothing closed at the neck, long sleeves and non-porous type gloves.

STORAGE

Recommended temperature for storage is about 38°C (100°F)

PRECAUTIONARY LABEL ☐ ATTACHED ☒ NOT ATTACHED

SPILL OR LEAK

Avoid breathing vapors and contact with skin and eyes. Avoid sources of ignition (sparks or open flame). Contain the spill or leak with solids, such as sand, earth, etc., dispose of in approved landfill or burn in approved incinerator.

FIRE EXTINGUISHING AGENTS RECOMMENDED

Water/fog, carbon dioxide, foam, dry chemicals, sand, or steam.

CIAL FIRE FIGHTING PRECAUTIONS

Water/fog is recommended for the control of unconfined oil fires, but water may cause frothing or eruption in closed tank.

FIRE EXTINGUISHING AGENTS TO AVOID

See: Special Fire Fighting Precautions.

SPECIAL PRECAUTIONS/PROCEDURES Self-contained respirator equipment and full protective clothing should be worn when fumes and/or smoke are present. A complete soap and water shower should be taken at the end of each working day. Scott Air-Pack should be available.

E. PERSONAL PROTECTIVE EQUIPMENT

RESPIRATORY PROTECTION

Use a NIOSH approved respirator with suitable organic vapor cartridge.

EYES AND FACE

Safety glasses, goggles or face shield.

HANDS, ARMS, AND BODY

Long-sleeved clothing closed at the neck and non-porous gloves. For exposed skin, use approved creams (e.g. Pro-Tek, Fend A-2, Safeticote Skin Protector No. 83734).

OTHER CLOTHING AND EQUIPMENT

A complete change of work clothes should be used each day if contaminated.

Allied Chemical
An ALLIED Company

TAR PRODUCTS DEPARTMENT
P.O. Box 1053-R
Morristown, N.J. 07960

TAR PRODUCTS

TECHNICAL DATA REPORT

PC.- 7
3 - 1 - 66
Rev. 9 - 81

USING COAL TAR PRODUCTS WITH SAFETY

Frequent, prolonged or occasional but intensive contact of the skin with tars, creosotes, tar distillates, heavy oils, pitches, pitch dusts - also their compositions such as cements, paints, enamels etc. often cause skin irritation somewhat like sunburn. This skin irritation is accentuated by sunlight. Continued or repeated exposure can cause skin disorders such as dermatitis, tar warts, rough skin. Prolonged and repeated skin exposure over many years in the absence of recommended hygiene practices may lead to changes in skin pigmentation, benign skin growths and may, in some cases, result in skin cancer.

Some individuals are more susceptible than others to skin disorders. Fair-haired, light-complexioned persons are more apt to be affected than dark-haired, dark-skinned people.

Precautionary measures should be given to and followed by workers handling coal-tar products. Personnel can help themselves to avoid or reduce the severity of such skin affections by keeping tars, oils, pitches and such materials off the body and by promptly and thoroughly cleansing in the case of accidental contamination. Adequate ventilation should be maintained and breathing of vapors avoided.

Personal cleanliness is most important in preventing skin irritation. Work garments should be washed with reasonable frequency - not less than once a week. If protective creams are used, apply before starting work and after each periodic washing. When halting work to eat or at the end of work shift, cleanse hands and arms thoroughly with mild soap and warm water using soft brush when needed. Do not use coal tar, petroleum, or other such solvents for removal of tar or oil from the skin. Such solvents defat the skin and may cause dermatitis or aggravate existing skin diseases.

Workmen handling coal tar products should wear clothing closed at the neck, and should wear long sleeves and impermeable gloves. Contaminated gloves, clothing, etc. should be removed immediately and cleaned prior to reuse, or disposed of.

If workmen are exposed to fumes or dusts and ventilation is not adequately suitable, respirators and goggles should be provided. The American Optical Company is a leading manufacturer of such equipment that will give protection under adverse conditions.

Irritation of the skin and sunburn reactions in handling coal tar products can usually be alleviated or prevented by the use of protective creams and sunscreen agents. Protective or "barrier-creams" form a film that acts both as a chemical and physical "barrier" between the skin and the contaminant and tends to resist penetration of the contaminant into the pores of the skin. In applying "barrier" creams, be sure the skin is clean and dry. Sunscreen agents filter out most of the ultra-violet rays from the sun.

A suggested application is to use a high protection sunscreen (sun protection factor 15 or greater) such as Coppertone Super Shade Lotion applied to clean skin and allowed to dry (5 minutes). This sunscreen blocks out most ultra-violet lengths of the sun's rays. Ultra-violet rays are emitted throughout the day and evening, regardless of cloud cover. Next, a protective barrier cream such as Ply-9, which is solvent resistant and water soluable (for easier clean-up) should be applied. This cream will occlude the skin pores and form a "barrier" so that the chemicals cannot penetrate. Creams that are not solvent resistant such as Jergins SBS44, West Chemical's 411, or MSA's FEND should be avoided. Repeat applications each time after washing or after rough work which would remove the protective film by abrasion. To remove, wash skin with warm water and mild soap. One of the advantages of protective creams is that it makes it easier to clean tars, oils, etc. off the skin.

Vi-lan cleaner is a product which has been used with success to remove coal tar products from the skin. The exposed skin is washed with Vi-lan and rinsed well with water.

NOTICE: The information herein is presented in good faith, but no warranty is given, nor is freedom from any patent to be inferred.

Barrier products that appear to offer worthwhile protection are:

Coppertone Super Shade Sunblocking Lotion.	Plough, Inc. Memphis, Tenn. 38151
Ply #9	The Milburn Company 3246 E. Woodbridge Detroit, Michigan 48207

For skin cleaning:

Vi-lan Antiseptic Skin Cleaner	Dameron Enterprises, Inc. 7635 National Turnpike Louisville, Kentucky 40214 (502) 368-1641

FIRST AID MEASURES

INHALATION: Remove to fresh air. If not breathing, give artificial respiration; preferably mouth to mouth. If breathing is difficult, give oxygen. Call a physician.

SKIN CONTACT: Remove with waterless hand cleaners or soap and water. Avoid solvents. For relief from irritation, creams such as Topicort, Cortaid and Lanacort have been useful.

Topicort Emollient Cream	Hoechst - Roussel Pharmaceuticals, Inc. Somerville, New Jersey 08876

EYE CONTACT: Flush eyes immediately with large amounts of water or mineral oil for at least 15 minutes. Call a physician.

INGESTION: First induce vomiting, then take 2 tablespoons of activated charcoal - USP (drug grade) in water. Get immediate medical attention.

CREOSOTE COMPOUNDS

	Formula	Boiling Point	Concentration Range
Coumarone	C_8H_6O	174	A
p-Cymene	$C_{10}H_{14}$	177	A
Indene	C_9H_8	182	A
Phenol	C_6H_6O	181	A
O-Cresol	C_7H_8O	190	A
Benzonitrile	C_7H_5N	191	A
m-Cresol	C_7H_8O	202	A
Naphthalene	$C_{10}H_8$	218	D
Thionaphthene	C_8H_6S	222	A
Quinoline	C_9H_7N	243	A
2-Methylnaphthalene	$C_{11}H_{10}$	241	B
Isoquinoline	C_9H_7N	238	A
1-Methylnaphthalene	$C_{11}H_{10}$	245	A
4-Indanol	$C_9H_{10}O$	245	B
2-Methylquinoline	$C_{10}H_9N$	247	A
Indole	C_8H_7N	252	A
Diphenyl	$C_{12}H_{10}$	255	A
1, 6-Dimethylnaphthalene	$C_{12}H_{12}$	262	A
2, 3-Dimethylnaphthalene	$C_{12}H_{12}$	266	A
Acenaphthene	$C_{12}H_{10}$	281	D
Dibenzofuran	$C_{12}H_{10}O$	287	D
Fluorene	$C_{13}H_{10}$	299	D

	Formula	Boiling Point	Concentration Range
1-Naphthonitrile	$C_{11}H_7N$	297	A
3-Methyldiphenylene	$C_{13}H_{10}O$	298	B
2-Naphthonitrile	$C_{11}H_7N$	304	A
9, 10-Dihydroanthracene	$C_{14}H_{10}$	305	B
2-Methylfluorene	$C_{14}H_{12}$	318	B
Diphenylene Sulfide	$C_{12}H_8S$	332	B
Phenanthrene	$C_{14}H_{10}$	340	D
Anthracene	$C_{14}H_{10}$	342	C
Acridene	$C_{13}H_9N$	346	A
3-Methylphenanthrene	$C_{13}H_{12}$	350	B
Carbazole	$C_{12}H_9N$	352	B
4, 5-Methylenephenanthrene	$C_{15}H_{10}$	353	B
2-Methylanthracene	$C_{15}H_{12}$	360	A
9-Methylanthracene	$C_{15}H_{12}$	361	B
2-Methylcarbazole	$C_{13}H_{11}N$	363	B
Fluoranthene	$C_{16}H_{10}$	382	D
1, 2-Benzodiphenylene	$C_{16}H_{10}O$	395	B
Pyrene	$C_{16}H_{10}$	393	B
Benzofluorene	$C_{17}H_{12}$	413	B
Chrysene	$C_{18}H_{12}$	448	B
Unidentified Compounds in Distillate			D

A = Compounds having a concentration less than 0.5%
B = Compounds having a concentration greater than 0.5% and less than 3.0%
C = Compounds having a concentration greater than 3.0% and less than 5.0%
D = Compounds having a concentration greater than 5.0%

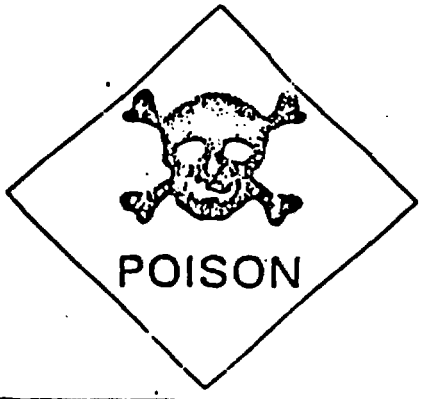
CHEMICAL SPECIALTIES, INC.

OLD CLYATTVILLE ROAD • PHONE (912) 242-4813 • P.O. BOX 1745
VALDOSTA, GEORGIA 31601

SAFETY INFORMATION

TOXICITY: Greenwood Concentrate is classed as a Class B Poison - E.P.A. Category I.

The following excerpts from the registered label should be read and the safety instructions followed:



KEEP OUT OF REACH OF CHILDREN

DANGER POISON

STATEMENT OF PRACTICAL TREATMENT

IF SWALLOWED: Call physician at once. Dilute stomach contents by giving patient 2-4 glasses of milk or water. Induce vomiting by finger in throat. Repeat until vomit is clear. Give 4 oz. of milk of magnesia followed by whites of 2 eggs beaten in a glass of water, or glass of milk. Keep patient calm and warm to avoid shock. (Never give anything by mouth to an unconscious person.)

IF IN EYES OR ON SKIN: Causes irreversible eye damage. Flush eyes or skin for 15 minutes with plenty of water, preferably warm. For eyes, be sure to wash under eyelids; call physician. After flushing, wash skin with soap thoroughly. Remove contaminated clothing at once. (Wash before reusing, discard contaminated shoes.) For severe or persistent skin irritation, consult physician promptly.

SEE LEFT PANEL FOR ADDITIONAL PRECAUTIONARY STATEMENTS.

PRECAUTIONARY STATEMENTS

Hazards to Humans and Domestic Animals

DANGER

- Corrosive. Causes irreversible eye damage, skin or mucous membrane irritation.
- Harmful or fatal if swallowed. Do not swallow liquid or inhale dust.
- Handle in well ventilated area. Open drum with care to vent any pressure.
- Do not get in eyes, on skin, or on clothing.
- Wear goggles or face shield and rubber gloves. Wash thoroughly with soap and water after handling.

Environmental Hazards

This product is toxic to fish and wildlife. Do not apply directly to water. Do not contaminate water by cleaning equipment or disposal of wastes.

DIRECTIONS FOR USE

(It is a violation of Federal Law to use this product in a manner inconsistent with its labeling.)

STORAGE AND DISPOSAL

PROHIBITIONS: Do not contaminate water, food or feed by storage or disposal. Open dumping is prohibited.

SPILLS: Cover liquid with enough lime to neutralize acid and form alkaline paste. Shovel into steel or polyethylene container for disposal. Do not flush into sewer or stream.

PESTICIDE DISPOSAL: Pesticide, spray mixture or rinsate that cannot be used according to label instructions must be disposed of according to Federal, State or Local procedures under the Resource Conservation and Recovery Act.

METAL DRUM DISPOSAL: The empty container must be triple rinsed (or equivalent) and offered for recycling or reconditioning, or disposed of in a sanitary landfill or by other approved State and local procedures.

In case of accident

IF THIS HAPPENS	DO THIS
Fire	Cannot burn, although if it comes in contact with certain organic materials, a fire may result. On small fires use dry chemicals or carbon dioxide. On large fires use water fog (preferably) or water spray. Notify authorities that run-off may create toxic hazard.
Exposure	Do not get in eyes, on skin, on clothing. Wear face shield, complete impervious protective clothing, rubber gloves and rubber boots when handling. If mist or aerosol is present, wear National Institute of Safety and Health (NIOSH) approved respiratory protection. In case of contact, immediately remove all contaminated clothing, including shoes, and flush skin with plenty of water for at least 15 minutes. Flush eyes for 15 minutes and get immediate medical attention in all cases. Wash clothes before reuse. WASH THOROUGHLY AFTER HANDLING.

Methods of Handling Accidental Spills of CCA· Concentrate 50% Liquid Concentrate

Volume of CCA-Concentrate Spilled	Quality of Neutralizing Agent Required	
	Lime	Cement
50 gallons	200 pounds	800 pounds
500 gallons	1 ton	4 tons
1,000 gallons	2 tons	8 tons
3,000 gallons	6 tons	24 tons
5,000 gallons	10 tons	40 tons

While prepared from sources and data believed reliable, Koppers makes no warranty that the information is, in all cases, correct or sufficient.

Koppers Company, Inc., Pittsburgh, Pa. 15219

CCA · Concentrate Wood Preservative

Arsenical mixture—Class B poison

HAZARDS

FIRE Strong oxidizing agent. Concentrate will not burn. May cause fire on contact with combustibles.

EXPOSURE May be fatal if swallowed, absorbed through the skin, or the mist (aerosol) breathed in. Causes severe burns to the skin and eyes.

In case of accident

IF THIS HAPPENS	DO THIS
Spill or Leak	Limit the spread of spill and keep people away. Dike spill area with lime, cement, sand or soil. Sawdust or wood chips may be used for liquid absorption. IMPORTANT! All contaminated sawdust must be recovered and neutralized. Clean-up efforts should not begin until material is treated with lime or cement for absorption and neutralization (see chart on back side). If feasible and without risk, repair the leaking tank to limit spill. Handle neutralized material with care. It is poisonous by skin contact or ingestion. Collect in stainless or carbon steel drums or equipment. Sweep up or vacuum area thoroughly to remove all material. Run-off to sewers or streams may create toxic hazard; notify health and pollution control authorities.

FIRST AID INSTRUCTIONS

Call a Physician.

In case of contact, immediately remove all contaminated clothing and shoes while flushing the skin or eyes with plenty of water for at least 15 minutes; get medical attention. Wash clothing before reuse and discard contaminated shoes.

If swallowed and if conscious, make patient vomit immediately (finger down throat) and call A PHYSICIAN. Give patient lime water and make vomit, repeat until doctor arrives. If lime water is not available, use a tablespoon of salt in a glass of warm water and repeat until fluid is clear.

Section V — HEALTH HAZARD DATA

THRESHOLD LIMIT VALUE
Mixture - See Individual TLV's in Section II

LD50 oral (rats) 90 mg/kg
LD50 skin (rabbits) 40 mg/kg

EFFECTS OF OVEREXPOSURE
Mist (not vapors) or spray causes severe irritation of the nose and throat. Depending on ntact time, corrosive to the skin and irritating to the eyes. May cause ulceration and erforation of nasal septum upon prolonged exposure to mist.

EMERGENCY AND FIRST AID PROCEDURES
swallowed and if conscious, make patient vomit immediately by sticking finger down throat. all a physician. Give patient lime water and make vomit; repeat until physician arrives. If ime water is not available, use salty water. Inhalation - remove to fresh air. kin and Eyes - flush with plenty of water for at least 15 minutes.

Section VI — REACTIVITY DATA

STABILITY (Check One)		CONDITIONS TO AVOID
	UNSTABLE	Powerful reducing agents (react with chromic acid and may reduce
x	STABLE	arsenic acid to arsine gas).

INCOMPATIBILITY (Materials to avoid)
lascent hydrogen, alkaline materials, reducing agents

HAZARDOUS DECOMPOSITION PRODUCTS
rsenical compounds

HAZARDOUS POLYMERIZATION (Check One)		CONDITIONS TO AVOID
	MAY OCCUR	Avoid contact with organic materials which may be easily
x	WILL NOT OCCUR	oxidized.

Section VII — SPILL OR LEAK PROCEDURES

STEPS TO BE TAKEN IN CASE MATERIAL IS RELEASED OR SPILLED
c not breathe mist or spray. Do not contact skin, eyes, clothing, or shoes. Use protective asures outlined in Section VIII below. Use sand, soil, sawdust, etc. to dam (contain) L. Preferably use a liquid recovery type vacuum cleaner to recover. Use an inert rbent to complete clean-up. IMPORTANT! All contaminated sawdust must be neutralized h lime or cement before clean-up efforts begin. Use ratio of 200 lbs. lime or 800 lbs. ment per 50 gallons 50% Concentrate.

WASTE DISPOSAL METHOD
referably recycle to treating process. Disposal must be carried out in accordance with cal, state and federal regulations. Handle waste with care. It is poisonous by skin ntact or ingestion.

Section VIII — SPECIAL PROTECTION INFORMATION

RESPIRATORY PROTECTION (Specify type) *Only in the presence of a spray or mist of the solution. NIOSH USBM) approved TC-21C respirators for mists having a TWA of not less than 0.05 mg/M³

VENTILATION	LOCAL EXHAUST	SPECIAL
	N.A.	N.A.
	MECHANICAL (General)	OTHER
	N.A.	*requirement change pending due to OSHA regulations under development at press time.

PROTECTIVE GLOVES
bber

EYE PROTECTION
Chemical goggles

OTHER PROTECTIVE EQUIPMENT
veralls and rubber apron. Rubber shoes or boots.

Section IX — SPECIAL PRECAUTIONS

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORING
re in a closed, properly labeled container.
ep out of reach of children.

OTHER PRECAUTIONS
l prolonged and/or repeated inhalation of mist or spray, or contact with the skin or s. Do not take internally. Use respiratory devices only where oxygen level is at least , otherwise use self-contained units. If spilled to a stream or sewer, notify health pollution control authorities.

KOPPERS Chemicals and Coatings

MATERIAL SAFETY DATA SHEET

(Approved by U.S. Department of Labor "Essentially Similar" to Form LSB-005-4)

WHILE THE INFORMATION AND RECOMMENDATIONS SET FORTH HEREIN ARE BELIEVED TO BE ACCURATE AS OF THE DATE HEREOF, KOPPERS COMPANY MAKES NO WARRANTY WITH RESPECT THERETO AND DISCLAIMS ALL LIABILITY FROM RELIANCE THEREON.

Specialty Wood Chemicals

DATE OF PREP.: March 31, 1975

Section I — PRODUCT IDENTIFICATION

MANUFACTURER'S NAME: KOPPERS COMPANY, INC.

EMERGENCY TELEPHONE NO.: 412/391-3300 780 or X-2252

STREET ADDRESS: Koppers Building

CITY, STATE, AND ZIP CODE: Pittsburgh, Pennsylvania 15219

MANUFACTURER'S CODE IDENTIFICATION: PPL-0399 RO1 203M2 EPA Reg. No. 61-128

PRODUCT CLASS:

TRADE NAME: CCA-CONCENTRATE 50%

Section II — HAZARDOUS INGREDIENTS

INGREDIENT	PERCENT	TLV PPM	TLV mg/M³	REMARKS
Chromic Acid (CrO_3)	23.75		0.5	as Chromium
Cupric Oxide (CuO)	9.25		1.0	as Copper
Arsenic Pentoxide (As_2O_5)	17.00		0.5*	1.[illegible]% water soluble arsenic
				*as As (change pending)

Section III — PHYSICAL DATA

BOILING RANGE	N.A.	FREEZING POINT	N.A.
PERCENT VOLATILE BY VOLUME	N.A.	VAPOR PRESSURE AT 25° C	N.A.
SPECIFIC GRAVITY (H₂O = 1)	N.A.	EVAPORATION RATE (BUTYL ACETATE = 1)	N.A.
VAPOR DENSITY	N.A.	SOLUBLE IN WATER - % WT.	100

APPEARANCE AND ODOR: heavy liquid, dark brown color

Section IV — FIRE AND EXPLOSION HAZARD DATA

FLASH POINT (METHOD USED): None - water solution

FLAMMABLE LIMITS: N.A. Lel Uel

EXTINGUISHING MEDIA: N.A.

UNUSUAL FIRE AND EXPLOSION HAZARDS: Concentrate will not burn but chromic acid content makes this product a strong oxidizing agent. May cause fire if contact with organic combustible materials. Upon intimate contact with powerful reducing agents, it may cause violent explosions.

SPECIAL FIRE FIGHTING PROCEDURES: Use self-contained breathing apparatus - NIOSH approved.

DOW CHEMICAL U.S.A. MIDLAND MICHIGAN 48640 EMERGENCY PHONE: 517-636-4400

EFFECTIVE DATE: 13 SEP 79 . PRODUCT CODE: 58851

PRODUCT NAME: PENTACHLOROPHENOL DP-2 MSD: 1031

INGREDIENTS (TYPICAL VALUES-NOT SPECIFICATIONS)	%
ACTIVE INGREDIENTS:	
PENTACHLOROPHENOL	85
OTHER CHLOROPHENOLS	10
INERT INGREDIENTS	5
EPA REGISTRATION # 464-388	

SECTION 1 PHYSICAL DATA

BOILING POINT: 527F, 275C : SOL. IN WATER: .01G/100G @ 20C
VAP PRESS: 400 MMHG @ 284C : SP. GRAVITY: 1.97 (SOLID)
VAP DENSITY (AIR=1): NOT APPL. : % VOLATILE BY VOL: NOT APPL.
APPEARANCE AND ODOR: LIGHT TAN SOLID - PHENOLIC ODOR.

SECTION 2 FIRE AND EXPLOSION HAZARD DATA

FLASH POINT: ---- : FLAMMABLE LIMITS (STP IN AIR)
METHOD USED: ---- : LFL: ---- UFL: ----
EXTINGUISHING MEDIA: LARGE FIRES; WATER FOG, FOAM. SMALL FIRES; CARBON DIOXIDE, OR DRY CHEMICAL.
SPECIAL FIRE FIGHTING EQUIPMENT AND HAZARDS: GAS MASK (ORGANIC OR ACID CANISTER). IF WATER IS USED, PREVENT RUN-OFF FROM ENTERING SEWERS OR WATERWAYS. HYDROGEN CHLORIDE GAS IS EVOLVED DURING BURNING.

SECTION 3 REACTIVITY DATA

STABILITY: WILL NOT IGNITE IN AIR WHEN TESTED TO 550C.
INCOMPATIBILITY: VERY STRONG OXIDIZERS.
HAZARDOUS DECOMPOSITION PRODUCTS: HYDROGEN CHLORIDE.
HAZARDOUS POLYMERIZATION: WILL NOT OCCUR.

SECTION 4 SPILL, LEAK, AND DISPOSAL PROCEDURES

ACTION TO TAKE FOR SPILLS (USE APPROPRIATE SAFETY EQUIPMENT): CLEAN UP ALL TRACES. SHOVEL UP AS MUCH AS POSSIBLE INTO CLEAN, DRY CONTAINERS. ON HARD SURFACES USE ABSORBENT MATERIAL TO PICK UP REMAINDER; ON LOOSE

(CONTINUED ON PAGE 2)
(R) INDICATES A REGISTERED OR TRADEMARK NAME OF THE DOW CHEMICAL COMPANY

6 38617

EFFECTIVE DATE: 13 SEP 79 PRODUCT CODE: 58851
PRODUCT (CONT'D): PENTACHLOROPHENOL DP-2 MSD: 1031

SECTION 4 SPILL, LEAK, AND DISPOSAL PROCEDURES (CONTINUED)

ACTION TO TAKE FOR SPILLS (USE APPROPRIATE SAFETY EQUIPMENT): (CONTINUED)
SURFACES SHOVEL UP CONTAMINATED LAYER. AVOID USE OF WATER; PRODUCT IS HIGHLY TOXIC TO AQUATIC LIFE.

DISPOSAL METHOD: LOCAL REGULATIONS MAY PERMIT BURNING. OTHERWISE, KEEP MATERIAL IN CLOSED CONTAINERS AND CALL SUPPLIER FOR ADVICE.

SECTION 5 HEALTH HAZARD DATA

INGESTION: MODERATE SINGLE DOSE ORAL TOXICITY; LD50 (RAT FEMALE) 135; (MALE) 205 MG/KG.

EYE CONTACT: UP TO SLIGHT IRRITATION, POSSIBLE MILD TRANSIENT CORNEAL INJURY.

SKIN CONTACT: UP TO SLIGHT TO MODERATE IRRITATION, EVEN A SLIGHT BURN UPON PROLONGED, REPEATED CONTACT.

SKIN ABSORPTION: POWDER NOT LIKELY TO BE ABSORBED IN TOXIC AMOUNTS; STRONG SOLUTIONS READILY ABSORBED IN TOXIC AMOUNTS.

INHALATION: OSHA GUIDE AND ACGIH TLV 0.5 MG/M3. NOT LIKELY A PROBLEM BECAUSE OF GOOD WARNING PROPERTIES.

EFFECTS OF OVEREXPOSURE: DUSTS IRRITATING TO NOSE AND THROAT. BY INGESTION, MAY CAUSE ELEVATION OF BODY TEMPERATURE.

SECTION 6 FIRST AID--NOTE TO PHYSICIAN

FIRST AID PROCEDURES:

EYES: PROMPTLY FLUSH WITH WATER FOR AT LEAST 15 MINUTES. GET MEDICAL ATTENTION PROMPTLY.

SKIN: IN CASE OF CONTACT, IMMEDIATELY FLUSH SKIN WITH PLENTY OF WATER FOR AT LEAST 15 MINUTES WHILE REMOVING CONTAMINATED CLOTHING AND SHOES. CALL A PHYSICIAN. WASH CONTAMINATED CLOTHING BEFORE REUSE. DESTROY CONTAMINATED SHOES.

INHALATION: REMOVE TO FRESH AIR IF EFFECTS OCCUR. CALL A PHYSICIAN AND/OR TRANSPORT TO MEDICAL FACILITY.

INGESTION: IF SWALLOWED, INDUCE VOMITING IMMEDIATELY BY GIVING TWO GLASSES OF WATER AND STICKING FINGER DOWN THROAT. CALL A PHYSICIAN. NEVER GIVE ANYTHING BY MOUTH TO AN UNCONSCIOUS PERSON.

NOTE TO PHYSICIAN:

EYES: MAY CAUSE MODERATE IRRITATION. STAIN FOR EVIDENCE OF CORNEAL INJURY. IF CORNEA IS BURNED, INSTILL ANTIBIOTIC STEROID PREPARATION FREQUENTLY. CONSULT OPHTHALMOLOGIST.

SKIN: MAY CAUSE MODERATE IRRITATION. MAY CAUSE SLIGHT BURN WITH PROLONGED CONTACT. IF RASH IS PRESENT, TREAT AS ANY CONTACT DERMATITIS. IF BURN IS PRESENT, TREAT AS ANY THERMAL BURN.

(CONTINUED ON PAGE 3)

(R) INDICATES A REGISTERED OR TRADEMARK NAME OF THE DOW CHEMICAL COMPANY

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EFFECTIVE DATE: 13 SEP 79 PRODUCT CODE: 58851
PRODUCT (CONT'D): PENTACHLOROPHENOL DP-2 MSD: 1031

SECTION 6 FIRST AID--NOTE TO PHYSICIAN (CONTINUED)

NOTE TO PHYSICIAN: (CONTINUED)
POWDER - NOT LIKELY TO BE ABSORBED IN ACUTELY TOXIC AMOUNTS.
LIQUID - MAY BE ABSORBED IN ACUTELY TOXIC AMOUNTS. CONTAMINANTS MAY CAUSE CHLORACNE.

RESPIRATORY: MAY CAUSE SEVERE IRRITATION. ADMINISTER OXYGEN IF AVAILABLE. BRONCHODILATORS, EXPECTORANTS, AND ANTITUSSIVES MAY BE OF HELP. GOOD WARNING PROPERTIES.

ORAL: TOXIC BY INGESTION.

SYSTEMIC: METABOLIC STIMULANT. CONSIDER HYPOTHERMIA. NO SPECIFIC ANTIDOTE. TREATMENT BASED ON THE SOUND JUDGMENT OF THE PHYSICIAN AND THE INDIVIDUAL REACTIONS OF THE PATIENT. IN ANIMALS HIGH EXPOSURE MAY CAUSE LIVER AND KIDNEY DAMAGE.

SECTION 7 SPECIAL HANDLING INFORMATION

VENTILATION: RECOMMEND CONTROL OF DUSTS TO SUGGESTED GUIDE.
RESPIRATORY PROTECTION: NIOSH APPROVED RESPIRATORY PROTECTION REQUIRED IN ABSENCE OF PROPER ENVIRONMENTAL CONTROL. IF REQUIRED, USE AN APPROVED DUST RESPIRATOR.
PROTECTIVE CLOTHING: CLEAN, BODY-COVERING CLOTHING. PLASTIC GAUNTLETS AND CLEAN, CLOTH GLOVES.
EYE PROTECTION: SAFETY GLASSES WITH SIDE SHIELDS.

SECTION 8 SPECIAL PRECAUTIONS AND ADDITIONAL INFORMATION

PRECAUTIONS TO BE TAKEN IN HANDLING AND STORAGE: DO NOT GET IN EYES. AVOID SKIN CONTACT. AVOID BREATHING DUSTS.

ADDITIONAL INFORMATION: REVISIONS 9/13/79 - SOLUBILITY IN WATER.

LAST PAGE
(R) INDICATES A REGISTERED OR TRADEMARK NAME OF THE DOW CHEMICAL COMPANY

THE INFORMATION HEREIN IS GIVEN IN GOOD FAITH, BUT NO WARRANTY, EXPRESS OR IMPLIED, IS MADE.

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WELL MW-1 Historical Sampling Data

(Note: All units in ug/L) Sampling Date

Parameter	11/17/88	9/14/89			
2-Chlorophenol	<5	<5			
Phenol	<5	<5			
2,4-Dimethylphenol	<10	<10			
2,4,6-Trichlorophenol	<10	<10			
p-Chloro-m-cresol	<10	<10			
Tetrachlorophenol	<10	<10			
2,4-Dinitrophenol	<10	<10			
Pentachlorophenol	<10	<10			
Naphthalene	<5	<5			
Acenaphthene	<5	<5			
Phenanthrene+Anthracene	<10	<10			
Carbazole	<10	<10			
Fluoranthene	<10	<10			
Pyrene+Benzo(a)anthracene	<10	<10			
Chrysene	<10	<10			
Benzo(b,k)fluoranthene	<10	<10			
Benzo(a)pyrene	<10	<10			
Indeno(1,2,3-cd)pyrene +Dibenzo(a,h)anthracene	<10	<10			
Total Phenols	0	0	0	0	0

WELL MW-2 Historical Sampling Data

(Note: All units in ug/L) Sampling Date

Parameter	4/20/87	3/22/88	11/17/88	4/10/89	7/27/89	9/14/89	5/16/90
2-Chlorophenol			13	65	<5	<5	<5
Phenol			37	31	<5	<5	<5
2,4-Dimethylphenol			35	<10	<10	<10	<10
2,4,6-Trichlorophenol			149	24	<10	<10	<10
p-Chloro-m-cresol			31	22	<10	<10	<10
Tetrachlorophenol			<10	<10	<10	<10	<10
2,4-Dinitrophenol			<10	<10	<10	<10	<10
Pentachlorophenol			<10	<10	<10	<10	<10
Acenaphthene			30	8	<5	<5	<5
Naphthalene	<5	<10	231	61	<5	<5	<5
Phenanthrene+Anthracene			74	<10	<10	<10	<10
Carbazole			<10	<10	<10	<10	<10
Fluoranthene			<10	<10	<10	<10	<10
Pyrene+Benzo(a)anthracene			21	8	<10	<10	<10
Chrysene			<10	<10	<10	<10	<10
Benzo(b,k)fluoranthene			<10	<10	<10	<10	<10
Benzo(a)pyrene			<10	<10	<10	<10	<10
Indeno(1,2,3-cd)pyrene +Dibenzo(a,h)anthracene			<10	<10	<10	<10	<10
Total Phenols	<5	83	265	142	0	0	0

WELL MW-3 Historical Sampling Data

(Note: All units in ug/L) Sampling Date

Parameter	4/20/87	5/29/87	6/1/87	11/12/87	11/17/88	9/14/89	5/16/90
2-Chlorophenol	<10	10	110	<10	<5	<5	<5
Phenol	<10	<10	10	<10	<5	<5	<5
2,4-Dimethylphenol	<10	30	20	<10	<10	<10	<10
2,4,6-Trichlorophenol	<10	30	<10	<10	<10	<10	<10
p-Chloro-m-cresol	<10	<10	<10	<10	<10	<10	<10
Tetrachlorophenol	<10	<10	<10	<10	<10	<10	<10
2,4-Dinitrophenol	<10	650	<10	<10	<10	<10	<10
Pentachlorophenol	<10	<10	130	<10	<10	<10	<10
Acenaphthene	<10	<10	<10	<10	<5	26	<5
Naphthalene	<10	<10	<10	<10	<5	<5	<5
Phenanthrene+Anthracene	<10	20	10	<10	<10	<10	<10
Carbazole	<10	10	10	<10	<10	14	<10
Fluoranthene	<10	10	20	<10	<10	<10	<10
Pyrene+Benzo(a)anthracene	<10	20	20	<10	<10	<10	<10
Chrysene	<10	<10	<10	<10	<10	<10	<10
Benzo(b,k)fluoranthene	<10	<10	<10	<10	<10	<10	<10
Benzo(a)pyrene	<10	<10	<10	<10	<10	<10	<10
Indeno(1,2,3-cd)pyrene +Dibenzo(a,h)anthracene	<10	<10	<10	<10	<10	<10	<10
Total Phenols	0	720	270	0	0	0	0

WELL MW-4 Historical Sampling Data

(Note: All units in ug/L) Sampling Date (2nd Sample)

Parameter	11/12/87	11/17/88	4/10/89	9/14/89	9/14/89	5/16/90	11/8/90	12/4/90
2-Chlorophenol		<5	<5	<5	<5	<5	<5	<5
Phenol		<5	<5	<5	<5	<5	<5	<5
2,4-Dimethylphenol		<10	<10	<10	<10	<10	<10	<10
2,4,6-Trichlorophenol		<10	<10	<10	<10	<10	<10	<10
p-Chloro-m-cresol		<10	<10	<10	<10	<10	<10	<10
Tetrachlorophenol		<10	<10	<10	<10	<10	<10	<10
2,4-Dinitrophenol		<10	<10	<10	<10	<10	<10	<10
Pentachlorophenol		<10	<10	<10	<10	<10	<10	<10
Acenaphthene		<5	<5	<5	<5	<5	<5	<5
Naphthalene	<10	<5	<5	<5	<5	<5	<5	<5
Phenanthrene+Anthracene		<10	<10	<10	<10	<10	<10	<10
Carbazole		<10	<10	<10	<10	<10	<10	<10
Fluoranthene		<10	<10	<10	<10	<10	130	<10
Pyrene+Benzo(a)anthracene		<10	<10	<10	<10	<10	<10	<10
Chrysene		<10	<10	<10	<10	<10	<10	20
Benzo(b,k)fluoranthene		<10	<10	<10	<10	<10	60	<10
Benzo(a)pyrene		<10	<10	<10	<10	<10	<10	<10
Indeno(1,2,3-cd)pyrene +Dibenzo(a,h)anthracene		<10	<10	<10	<10	<10	<10	<10
Total Phenols	20	0	0					

WELL MW-5 Historical Sampling Data

(Note: All units in ug/L) Sampling Date

Parameter	11/12/87	11/17/88	4/10/89	9/14/89	5/16/90	11/8/90	12/4/90
2-Chlorophenol		<5	<5	<5	<5	<5	<5
Phenol		<5	<5	<5	<5	<5	<5
2,4-Dimethylphenol		<10	<10	<10	<10	<10	<10
2,4,6-Trichlorophenol		<10	<10	<10	<10	<10	<10
p-Chloro-m-cresol		<10	<10	<10	<10	<10	<10
Tetrachlorophenol		<10	<10	<10	<10	<10	<10
2,4-Dinitrophenol		<10	<10	<10	<10	<10	<10
Pentachlorophenol		<10	<10	<10	<10	<10	<10
Acenaphthene		<5	<5	<5	<5	<5	11
Naphthalene	<10	<5	<5	<5	<5	<5	<5
Phenanthrene+Anthracene		<10	<10	<10	<10	<10	<10
Carbazole		<10	<10	<10	<10	<10	<10
Fluoranthene		<10	<10	<10	<10	530	20
Pyrene+Benzo(a)anthracene		<10	<10	<10	<10	1630	<10
Chrysene		<10	<10	<10	<10	<10	<10
Benzo(b,k)fluoranthene		<10	<10	<10	<10	<10	<10
Benzo(a)pyrene		<10	<10	<10	<10	<10	<10
Indeno(1,2,3-cd)pyrene +Dibenzo(a,h)anthracene		<10	<10	<10	<10	<10	<10
Total Phenols	43	0	0				

WELL MW-6 Historical Sampling Data

(Note: All units in ug/L) Sampling Date

Parameter	11/8/90	12/4/90					
2-Chlorophenol	<5	<5					
Phenol	<5	<5					
2,4-Dimethylphenol	<10	<10					
2,4,6-Trichlorophenol	<10	<10					
p-Chloro-m-cresol	<10	<10					
Tetrachlorophenol	<10	<10					
2,4-Dinitrophenol	<10	<10					
Pentachlorophenol	<10	<10					
Acenaphthene	56	<5					
Naphthalene	<5	<5					
Phenanthrene+Anthracene	<10	<10					
Carbazole	<10	<10					
Fluoranthene	<10	<10					
Pyrene+Benzo(a)anthracene	<10	<10					
Chrysene	<10	30					
Benzo(b,k)fluoranthene	100	<10					
Benzo(a)pyrene	<10	<10					
Indeno(1,2,3-cd)pyrene +Dibenzo(a,h)anthracene	210	100					
Total Phenols	0	0					

WELL MW-7 Historical Sampling Data

(Note: All units in ug/L) Sampling Date

Parameter	11/8/90	12/4/90					
2-Chlorophenol	<5	<5					
Phenol	<5	<5					
2,4-Dimethylphenol	<10	<10					
2,4,6-Trichlorophenol	<10	<10					
p-Chloro-m-cresol	<10	<10					
Tetrachlorophenol	<10	<10					
2,4-Dinitrophenol	<10	<10					
Pentachlorophenol	<10	<10					
Acenaphthene	<5	<5					
Naphthalene	<5	<5					
Phenanthrene+Anthracene	<10	<10					
Carbazole	<10	<10					
Fluoranthene	<10	<10					
Pyrene+Benzo(a)anthracene	<10	<10					
Chrysene	370	<10					
Benzo(b,k)fluoranthene	<10	<10					
Benzo(a)pyrene	<10	<10					
Indeno(1,2,3-cd)pyrene +Dibenzo(a,h)anthracene	<10	<10					
Total Phenols	0	0					

WELL MW-7D Historical Sampling Data

(Note: All units in ug/L)	Sampling Date						
Parameter	11/8/90	12/4/90					
2-Chlorophenol	<5	<5					
Phenol	<5	<5					
2,4-Dimethylphenol	<10	<10					
2,4,6-Trichlorophenol	<10	<10					
p-Chloro-m-cresol	<10	<10					
Tetrachlorophenol	<10	<10					
2,4-Dinitrophenol	<10	<10					
Pentachlorophenol	<10	<10					
Acenaphthene	<5	<5					
Naphthalene	<5	<5					
Phenanthrene+Anthracene	<10	<10					
Carbazole	<10	<10					
Fluoranthene	<10	<10					
Pyrene+Benzo(a)anthracene	350	<10					
Chrysene	<10	<10					
Benzo(b,k)fluoranthene	<10	<10					
Benzo(a)pyrene	<10	<10					
Indeno(1,2,3-cd)pyrene +Dibenzo(a,h)anthracene	<10	<10					
Total Phenols	]	0					

WELL P-1 Historical Sampling Data

(Note: All units in ug/L)	Sampling Date								
Parameter	4/20/87	5/14/87	6/1/87	8/20/87	9/16/87	10/6/87	1/5/88	7/29/88	8/30/88
2-Chlorophenol	1510	630	470	2720	12600	11100	63700	29	410
Phenol	4710	2170	510	8770	10100	9730	23200	1620	292
2,4-Dimethylphenol	3100	1930	170	610	1500	440	26400	3920	284
2,4,6-Trichlorophenol	220	160	100	120	11100	8770	438000	660	210
p-Chloro-m-cresol	170	40	220	<10	<10	<10	66100	370	821
Tetrachlorophenol	<10	<10	<10	<10	<10	<10	<10	<10	<10
2,4-Dinitrophenol	21800	15100	5790	<10	<10	<10	<10	6590	157
Pentachlorophenol	<10	<10	<10	270	570	4820	368000	1070	494
Acenaphthene	150	90	40	220	720	3330	61900	<10	1980
Naphthalene	17400	250	70	1060	26100	1620	10400	50	6570
Phenanthrene+Anthracene	1540	1100	210	3170	10200	7110	307000	<10	6320
Carbazole	600	130	30	150	600	620	49700	50	792
Fluoranthene	220	90	30	<10	2310	2770	121000	40	1930
Pyrene+Benzo(a)anthracene	100	180	230	190	5660	4670	95000	10	154
Chrysene	20	<10	<10	<10	810	280	22900	40	614
Benzo(b,k)fluoranthene	<10	<10	<10	<10	<10	<10	15200	<10	404
Benzo(a)pyrene	<10	<10	<10	<10	<10	200	4540	<10	<10
Indeno(1,2,3-cd)pyrene +Dibenzo(a,h)anthracene	<10	<10	<10	<10	<10	<10	<10	<10	<10
Total Phenols	31510	20030	7260	12490	35870	34860	985400	14259	2668

WELL P-1 Historical Sa[illegible] Data

(Note: All units in ug/L) Sampling Date

Parameter	4/20/87	5/14/87	6/1/87	8/20/87	9/16/87	10/6/87	1/5/88	7/29/88	8/30/88
2-Chlorophenol	1510	630	470	2720	12600	11100	63700	29	410
Phenol	4710	2170	510	8770	10100	9730	23200	1620	292
2,4-Dimethylphenol	3100	1930	170	610	1500	440	26400	3920	284
2,4,6-Trichlorophenol	220	160	100	120	11100	8770	438000	660	210
p-Chloro-m-cresol	170	40	220	<10	<10	<10	66100	370	821
Tetrachlorophenol	<10	<10	<10	<10	<10	<10	<10	<10	<10
2,4-Dinitrophenol	21800	15100	5790	<10	<10	<10	<10	6590	157
Pentachlorophenol	<10	<10	<10	270	570	4820	368000	1070	494
Acenaphthene	150	90	40	220	720	3330	61900	<10	1980
Naphthalene	17400	250	70	1060	26100	1620	10400	50	6570
Phenanthrene+Anthracene	1540	1100	210	3170	10200	7110	307000	<10	6320
Carbazole	600	130	30	150	600	620	49700	50	792
Fluoranthene	220	90	30	<10	2310	2770	121000	40	1930
Pyrene+Benzo(a)anthracene	100	180	230	190	5660	4670	95000	10	154
Chrysene	20	<10	<10	<10	810	280	22900	40	614
Benzo(b,k)fluoranthene	<10	<10	<10	<10	<10	<10	15200	<10	404
Benzo(a)pyrene	<10	<10	<10	<10	<10	200	4540	<10	<10
Indeno(1,2,3-cd)pyrene +Dibenzo(a,h)anthracene	<10	<10	<10	<10	<10	<10	<10	<10	<10
Total Phenols	31510	20030	7260	12490	35870	34860	985400	14259	2668

Note: P-1 Replaced by P-1R

9/30/88	10/18/88	11/22/88	12/20/88	1/13/89	2/21/89	9/15/90	10/7/90	11/6/90	12/7/90
410	1040								<5
369	3120								109892
363	1960								442500
324	14560								888940
1120	1840								149690
<10	<10								<10
160	14300								1326600
477	18400								97950
1980	17800								51044
219	1840	3530	4430	780	83000	13320	141170	1031000	746880
6390	49500								85750
824	5880								49340
1930	18500								345870
207	33000								726740
600	2400								100010
<10	<10								91300
<10	<10								198270
<10	<10								62370
4643	55220	4750	4750	3420	2500	750	3750	10880	3015572

WELL P-2 Historical Sampling Data

(Note: All units in ug/L) Sampling Date

Parameter	4/20/87	5/29/87	6/1/87	11/12/87	11/17/88	4/11/89	5/31/89	6/9/89	7/21/89
2-Chlorophenol	1010	610	350	2090	27				
Phenol	2300	580	30	1500	43				
2,4-Dimethylphenol	3680	950	340	1410	450				
2,4,6-Trichlorophenol	2770	1860	160	5830	664				
p-Chloro-m-cresol	410	360	<10	1300	<10				
Tetrachlorophenol	<10	<10	<10	<10	<10				
2,4-Dinitrophenol	41600	29500	37700	<10	<10				
Pentachlorophenol	<10	<10	<10	8480	1170				
Acenaphthene	11400	840	2050	1010	101				
Naphthalene	37600	60	120	31	33	8560	179000	506000	540
Phenanthrene+Anthracene	184000	230	340	131	48				
Carbazole	1980	80	20	265	<10				
Fluoranthene	21200	570	700	1560	220				
Pyrene+Benzo(a)anthracene	1620	310	420	3290	424				
Chrysene	1870	<10	30	108	45				
Benzo(b,k)fluoranthene	<10	<10	<10	169	<10				
Benzo(a)pyrene	<10	<10	<10	<10	<10				
Indeno(1,2,3-cd)pyrene +Dibenzo(a,h)anthracene	<10	<10	<10	<10	<10				
Total Phenols	51770	33860	38580	20610	2354	2280	3800	4250	3800

Note: Well P-2 replaced by P-2R

8/18/89	9/18/89	10/12/89	9/15/90	10/7/90	11/6/90	12/7/90
						714660
						595250
						478140
						1402500
						1254390
						<10
						2493710
						4193850
						1185
16700	910000	690000	714820	672590	54000	4867
						2950
						420
						1810
						3760
						200
						370
						120
						390
4100	75000	450000	2500	15380	990	11132500

WELL P-3 Historical Sampling Data

(Note: All units in ug/L) Sampling Date

Parameter	4/20/87	5/29/87	6/1/87	11/12/87	11/17/88	9/14/89	
2-Chlorophenol	<10	30	320	<10	<5	<5	
Phenol	<10	30	40	<10	<5	<5	
2,4-Dimethylphenol	<10	20	120	<10	<10	<10	
2,4,6-Trichlorophenol	<10	<10	20	<10	<10	<10	
p-Chloro-m-cresol	<10	100	<10	<10	<10	<10	
Tetrachlorophenol	<10	<10	<10	<10	<10	<10	
2,4-Dinitrophenol	<10	<10	<10	<10	<10	<10	
Pentachlorophenol	<10	<10	<10	<10	<10	<10	
Acenaphthene	<10	<10	<10	<10	<5	<5	
Naphthalene	<10	<10	<10	<10	<5	<5	
Phenanthrene+Anthracene	<10	<10	<10	<10	<10	<10	
Carbazole	<10	<10	<10	<10	<10	<10	
Fluoranthene	<10	<10	<10	<10	<10	<10	
Pyrene+Benzo(a)anthracene	<10	<10	20	<10	<10	<10	
Chrysene	<10	<10	10	<10	<10	<10	
Benzo(b,k)fluoranthene	<10	10	20	<10	<10	<10	
Benzo(a)pyrene	<10	<10	<10	<10	<10	<10	
Indeno(1,2,3-cd)pyrene +Dibenzo(a,h)anthracene	<10	<10	<10	<10	<10	<10	
Total Phenols	<10	180	500	0	0	0	0

WELL P-4 Historical Sampling Data

(Note: All units in ug/L) Sampling Date Note: P-4 replaced by P-4R

Parameter	4/20/87	3/22/88	11/17/88	4/10/89	9/14/89	9/15/90	10/7/90	11/6/90	12/7/90
2-Chlorophenol			1360	293	<5				51
Phenol			3010	467	<5				<5
2,4-Dimethylphenol			1300	172	40				<10
2,4,6-Trichlorophenol			14000	1730	<10				<10
p-Chloro-m-cresol			3640	399	<10				1610
Tetrachlorophenol			<10	<10	20				<10
2,4-Dinitrophenol			<10	<10	<10				110
Pentachlorphenol			11700	1800	2000				<10
Acenaphthene			2040	97	260				7
Naphthalene	282	<10	266	44	10	12830	30	1491000	<5
Phenanthrene+Anthracene			7580	155	300				50
Carbazole			486	17	<10				<10
Fluoranthene			3370	44	<10				30
Pyrene+Benzo(a)anthracene			7600	222	90				40
Chrysene			451	<10	<10				770
Benzo(b,k)fluoranthene			<10	<10	<10				<10
Benzo(a)pyrene			<10	<10	<10				<10
Indeno(1,2,3-cd)pyrene +Dibenzo(a,h)anthracene			<10	<10	<10				320
Total Phenols	1300	80	35010	4861	2060	2200	60	13130	1771

REFERENCE 5

GEOLOGY AND GROUND-WATER RESOURCES
OF THE
ALEXANDRIA AREA,
RAPIDES PARISH, LOUISIANA

Water Resources Pamphlet No. 3

Published by
DEPARTMENT OF CONSERVATION
LOUISIANA GEOLOGICAL SURVEY
and
LOUISIANA DEPARTMENT OF PUBLIC WORKS
Baton Rouge, La.
November 1955

5 001

of the Catahoula formation of Miocene age in and in the vicinity of Alexandria, Rapides Parish, was made during May 1955.

The purpose of this report is to make available such data as could be assembled in a short time on local ground-water conditions relative to both quantity and quality of water. This report also supplements the data presented in the cooperatively prepared report published by the Louisiana Geological Survey as Bulletin 17, entitled "Ground-water resources of Rapides Parish, La." by John C. Maher.

The present work was done under the immediate supervision of Rex R. Meyer, District Geologist, and the general supervision of A. N. Sayre, Chief of the Ground Water Branch of the U. S. Geological Survey.

LOCATION AND GENERAL FEATURES OF AREA

Alexandria is approximately in the center of Louisiana and is 131 land miles southeast of Shreveport. (See fig. 1.) The city lies on the eastern edge of the Red River alluvial valley, which is dissected by a number of small streams flowing southwestward into Bayou Boeuf and southeastward into Chatlin Lake Canal. The altitude of the valley in the city is about 70 to 80 feet above mean sea level. To the north and east the Red River alluvial valley is bounded by bluffs which are roughly parallel to the river.

Alexandria is the principal trade center of central Louisiana and is linked to other major trade areas in the state by a network of highways. It is serviced by the Southern Pacific, Missouri Pacific, Kansas City Southern, Texas and Pacific, and Rock Island Railroads. The Delta C. and S. Airline provides air-freight and passenger service and the Continental Trailways bus system provides passenger service. Acording to the 1950 census, the population of Alexandria was 34,913; however, there has been considerable growth since then.

5 002

GENERAL GEOLOGY

The city of Alexandria lies within the West Gulf Coastal Plain province (Fenneman, 1938, p. 102) and is immediately underlain by alluvial deposits of the Red River. Sediments of Pleistocene age blanket the upland areas in the vicinity of Alexandria. In some parts of this area sedimentary rocks of Miocene age are exposed. At Alexandria the alluvial deposits are immediately underlain by south-dipping sedimentary rocks of Miocene age. The rate of dip of the older formation is 50-100 feet per mile (Maher, 1942, p. 9). Sands of the Catahoula formation of Miocene age are the deepest fresh-water aquifers in the Alexandria area.

PREVIOUS INVESTIGATIONS

Several reports have been published that discuss the geology of central Louisiana, of which Alexandria is a part. Of these reports, only three describe the occurrence of ground water in the Alexandria area. A. C. Veatch in 1905 described the geology and general occurrence of ground water in northern Louisiana. From 1905 to 1940 no reports describing ground water in the Alexandria area were published. A report entitled "Ground-water resources of Rapides Parish, La.", by John C. Maher, was published in 1940 by the Louisiana Geological Survey. This report discusses the geology and, in a qualitative manner, the occurrence of ground water in Rapides Parish. Another report, entitled "Ground-water exploration at Alexandria, La.", by John C. Maher and Paul H. Jones, discusses the availability of additional water for public supply from wells in the Bayou Rapides or the McNutt well field northwest of the city.

WELL-NUMBERING SYSTEM

Throughout this and other reports on ground-water resources in Louisiana the wells are listed with reference to the parish in which they are situated and in the numerical order in which they are inventoried. For example,

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well R-1, owned by the city of Alexandria, was the first well inventoried by the U. S. Geological Survey in Rapides Parish. The record of each well is on file and its location is plotted and numbered on a map. All wells are located to within the nearest sixteenth section in the township and range, but in the city of Alexandria where congested conditions exist it is necessary to locate wells with reference to city streets.

ACKNOWLEDGMENTS

Thanks and appreciation are expressed to the well owners who kindly supplied information and aided in the collection of field data. Special acknowledgment is due the officials of the city of Alexandria who furnished information about the public water-supply system and made available wells used in pumping tests. Acknowledgment is made also of the information and assistance received from F. H. Coughlin, President, Central Louisiana Electric Co., Inc.; from W. F. Guyton, consulting hydrologist, Austin, Tex.; and from Charles Carpenter, consulting engineer, Little Rock, Ark. Valuable information on pumpage was furnished by personnel of the R. O. Martin Lumber Co., Inc., and L. D. Kellogg Lumber Co., Inc.

WATER-BEARING FORMATIONS

ALLUVIAL DEPOSITS

The sediments of the alluvial valley consist of unconsolidated sand, gravel, and clay deposited by the Red River. The sand and gravel, generally overlain by clay, are a potential source of ground-water supplies. The sand and gravel phase of these deposits ranges in thickness up to about 60 feet, and the base of the deposits is as much as 150 feet below the land surface (Fisk, 1949, pl. 10). Quantitative data for these deposits are rather meager; however, wells screened in the alluvial deposits of the Red River in other areas have been known to yield as much as 1,200 gallons per minute. These deposits are the primary source

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REFERENCE 6

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WATER RESOURCES OF RAPIDES PARISH, LOUISIANA

WATER RESOURCES BULLETIN NO. 8

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Baton Rouge, La.
April 1966

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STATE OF LOUISIANA
DEPARTMENT OF CONSERVATION
GEOLOGICAL SURVEY
and
DEPARTMENT OF PUBLIC WORKS

In cooperation with the
UNITED STATES GEOLOGICAL SURVEY

Water Resources Bulletin No. 8

WATER RESOURCES OF RAPIDES PARISH, LOUISIANA

by

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Geologist, U. S. Geological Survey

and

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Hydraulic Engineer, U. S. Geological Survey

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PUBLIC WORKS

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UNITED STATES GEOLOGICAL SURVEY
Baton Rouge, Louisiana

WATER RESOURCES

OF

RAPIDES PARISH, LOUISIANA

By Roy Newcome, Jr. and Raymond Sloss

WATER RESOURCES BULLETIN No. 8 April 1966

ABSTRACT

Rapides Parish in central Louisiana possesses abundant water resources. Ground water furnishes nearly all water supplies, but the resource has been developed to only a slight extent. Surface water is used little for domestic or industrial supplies but its use for irrigation is increasing.

Ground water occurs in sands of Miocene age, upland Pleistocene deposits, and alluvium of the Red River Valley. Fresh water in the Miocene rocks is available to depths ranging from 200 feet in the northeastern part of the parish to 3,200 feet in the southwest corner. The upland deposits and valley alluvium of Pleistocene age, which cover most of the parish, have a maximum thickness of about 200 feet, and except in a few localities near the northeast corner of the parish, contain fresh water throughout their entire thickness.

Permeability of Miocene sands ranges from 90 to 1,000 gpd (gallons per day) per square foot, and transmissibility ranges from 1,400 to 60,000 gpd per foot. Permeability is generally higher in the Pleistocene material—as

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much as 2,000 gpd per square foot in the alluvium, and transmissibility probably is as much as 100,000 gpd per foot in some places.

Yields as great as 600 gpm (gallons per minute) are obtained from Miocene aquifers, but yields of 300 gpm are more common from municipal wells at Alexandria where these sands have undergone their greatest development. Substantial yields have been obtained from upland Pleistocene deposits, but the irregular thickness of the sands causes great differences in yield. Irrigation wells in the Red River Valley alluvium furnish as much as 1,700 gpm, and some are capable of considerably greater yield. However, in Rapides Parish only four irrigation wells are known to be in use.

Water in the Miocene rocks is a soft, slightly alkaline, sodium bicarbonate type. It generally contains less than 500 ppm (parts per million) of dissolved solids, and rarely has objectionable concentrations of iron. The high fluoride content in water from some sands in the southeastern part of the parish is a quality problem. The upland Pleistocene deposits west of the Red River Valley yield soft, acidic water containing less than 150 ppm of dissolved solids. Water in the valley alluvium is of a calcium magnesium bicarbonate type. It has an average hardness of 500 ppm and an average iron content of 5 ppm. Dissolved solids usually exceed 1,000 ppm. The percent sodium is low, and the water is satisfactory for irrigation supplies.

Water-level declines in the Miocene aquifers are a present or potential problem at Alexandria, Pineville, Lecompte, and Boyce. Redistribution of pumpage by installing additional well fields and by utilizing undeveloped sand beds in present well fields would alleviate the problem.

Miocene aquifers in the southwestern part of Rapides Parish and the alluvium of the Red River Valley constitute the most important potential sources of water. The deep-lying thick beds of sand west of Glenmora are a possible source of large industrial supplies, and the Red River Valley alluvium can provide great quantities of water for irrigation and, with treatment, for industrial and municipal use.

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Except for irrigation and recreation, little use is made of surface water in the parish. Many potential reservoir sites have been investigated to supplement low flow during the dry summer and fall seasons. Reservoirs are needed for irrigation supplies, because some streams are not dependable during periods of low rainfall. The Corps of Engineers is making studies for improving the Red River for navigation purposes.

The quality of Red River water must be improved before using for domestic or industrial supply. At times, the water can be used for irrigation without treatment. The Red River has an average flow of about 32,500 cfs (cubic feet per second) and a minimum flow of 873 cfs. The Calcasieu River has water of good quality. The average flow is 780 cfs and the minimum flow is 15 cfs.

Flood problems exist, but steps have been taken to lessen flood damage by levees and drainage improvements.

6 05

Evaporation-pan studies made in Rapides Parish by the U.S. Weather Bureau indicate that under ideal conditions of measurement about 50 inches of water returns directly to the atmosphere annually. It is probable, however, that under actual conditions 35 to 40 inches of the 56- to 62-inch average annual rainfall are returned to the atmosphere by evaporation and transpiration combined.

Economic Development

The population of Rapides Parish was 111,351 in 1960 (U.S. Census). Half the population is urban, dwelling in and near Alexandria (the parish seat); the remainder is rural, dwelling on farms or in the several small communities of the parish. The rich bottom land of the Red River Valley is ideally suited to the raising of cotton, vegetables, and pasture crops. Sugar cane is an important crop near the southern border. About 60,000 beef and dairy cattle graze the pasture lands, most of which are in the valley.

Forest land covers three quarters of the parish. Slightly more than half the timber is hardwood, the rest pine and cypress. The cutting and processing of timber is the main industry. Oil is produced from several fields, the largest of which are the Big Island and Cheneyville fields.

England Air Force Base (EAFB), a Tactical Air Command installation, is located 5 miles northwest of Alexandria. Its payroll, along with that of other governmental agencies, supports a large part of the parish population.

GROUND WATER

By Roy Newcome, Jr.

Geologic Relationships

Source and Occurrence

Fresh ground water in Rapides Parish occurs in sand beds ranging in age from early Miocene to Recent. All water in rocks of pre-Miocene age is salty. This includes aquifers of the Midway, Wilcox, and Claiborne Groups that supply most of the ground water used in northern Louisiana. The chief source of recharge is rainfall directly on the outcrop areas. Some aquifers of Miocene age are recharged by downward seepage of rainfall through overlying permeable deposits of Pleistocene and Recent age; thus, they are recharged indirectly by rainfall. In the Red River Valley, recharge to the alluvial sands and gravels is by rainfall and by inflow from adjoining water-bearing beds. The alluvial sands and gravels in turn discharge ground water into the Red River and other streams under all but flood conditions of stream stage.

Most ground water in Rapides Parish occurs under artesian conditions because the water is confined under pressure in distinct aquifers. In some areas where sandy material extends from the surface to the zone of saturation, water-table conditions exist in the near-surface deposits. However, even in these places the shallow sands are underlain by hundreds, even a few thousand, of feet of alternating clay and fresh-water-bearing sand beds in which artesian conditions prevail.

Stratigraphy and Structure

The Jackson Group of Eocene age and the overlying Vicksburg Group of Oligocene age together compose a relatively unbroken interval of clay that separates sandy beds of the Claiborne Group and Catahoula Formation. This clay intervals ranges in thickness from 400 to 950 feet in Rapides Parish, being thickest in the western part. It is not exposed in Rapides Parish; its top ranges in depth from 500 feet below sea level at the northernmost tip of the parish to about 5,500 feet below sea level at the southern

margin. No fresh ground water occurs below the top of this thick clayey interval in Rapides Parish.

MIOCENE ROCKS

Fisk (1940) and Welch (1942) divided the rocks of Miocene age in Rapides and Vernon Parishes into the Catahoula Formation and the overlying Fleming Formation, the latter being subdivided into the Lena, Carnahan Bayou, Dough Hills, Williamson Creek, Castor Creek, and Blounts Creek Members. The Carnahan Bayou, Williamson Creek, and Blounts Creek are generally sandy members; the Lena, Dough Hills, and Castor Creek are clayey.

The Fleming nomenclature of Fisk is used by the Louisiana Geological Survey, but has not been accepted for official use by the U.S. Geological Survey; therefore, in this report the usage of Fleming and its members is after Fisk, 1940.

The exposure of Miocene rocks in Rapides Parish is confined to small outcrops in the valley walls of the more deeply cut streams and to a 100-square-mile area in the northwest corner of the parish. Elsewhere deposits of Pleistocene and Recent age mantle the older rocks. In the southern part of the parish the Miocene rocks are buried beneath 150 to 200 feet of younger material. The areal geology and subareal Miocene patterns are generalized in plate 2.

The beds of Miocene age contain thick predominately sandy intervals alternating with thinner clayey intervals. These major sand and clay sections are traceable in the subsurface by means of electrical logs throughout Rapides and Vernon Parishes and for some distance to the south in adjacent parishes. They correlate at the surface with units shown on the areal geologic maps of Fisk (1940) and Welch (1942).

Within each sandy member, individual sand beds may be numbered from the bottom up to facilitate correlation and discussion. For example, in the Alexandria area the CB-O sand is the basal bed of the Carnahan Bayou Member, which overlies the 300 feet of clay composing the Lena Member. It also is the deepest fresh-water-bearing sand in

this area. Sand beds above the CB-O sand are labeled CB-1, CB-2, etc., to indicate their position, in hundreds of feet, above the base of the Carnahan Bayou. Identifying sand beds in this manner should be done with caution because of their lenticularity. It probably is not desirable to extend the individual-bed designation beyond the immediate area of identification.

Rocks of Miocene age have an aggregate thickness of 500 feet in the northwest corner of Rapides Parish and 5,800 feet in the southeast corner. Basal beds of the series dip southward at 75 to 150 feet per mile and are 5,500 feet below sea level along the southern parish boundary. Map A in figure 2 shows the depth below sea level of the base of the Miocene beds.

Within the Miocene section the sandy units thicken regularly in the direction of dip and double their thickness within the parish. As a result, younger beds dip less steeply than older ones at any given locality. The clayey units do not thicken as regularly in any one direction. The Lena Member, for example, has its greatest thickness in the northeastern part of the parish.

Individual sand beds in the Miocene formations generally are difficult to trace more than a few miles—many pinch out in a few hundred feet. Although the most persistent beds appear to be at the base of the sandy members, it is possible that the basal sands in widely separated drill holes are not connected. The irregularity of the sand beds is illustrated on the geologic sections of the Alexandria area (pl. 3).

Significant fresh-water-bearing sand beds range in thickness from 10 to 230 feet, as indicated by about 60 electrical logs of oil-test and water wells made throughout Rapides Parish. The average thickness of Miocene fresh-water sand beds is 44 feet. Sand beds in the Catahoula Formation average 33 feet in thickness; in the Carnahan Bayou Member, 38 feet; in the Williamson Creek Member, 53 feet; and in the Blounts Creek Member, 51 feet. Table 1 lists these sands by location. This table provides useful information on the depth and thickness of fresh-water-bearing sands in areas and at depths not ordinarily tested by water-well drilling.

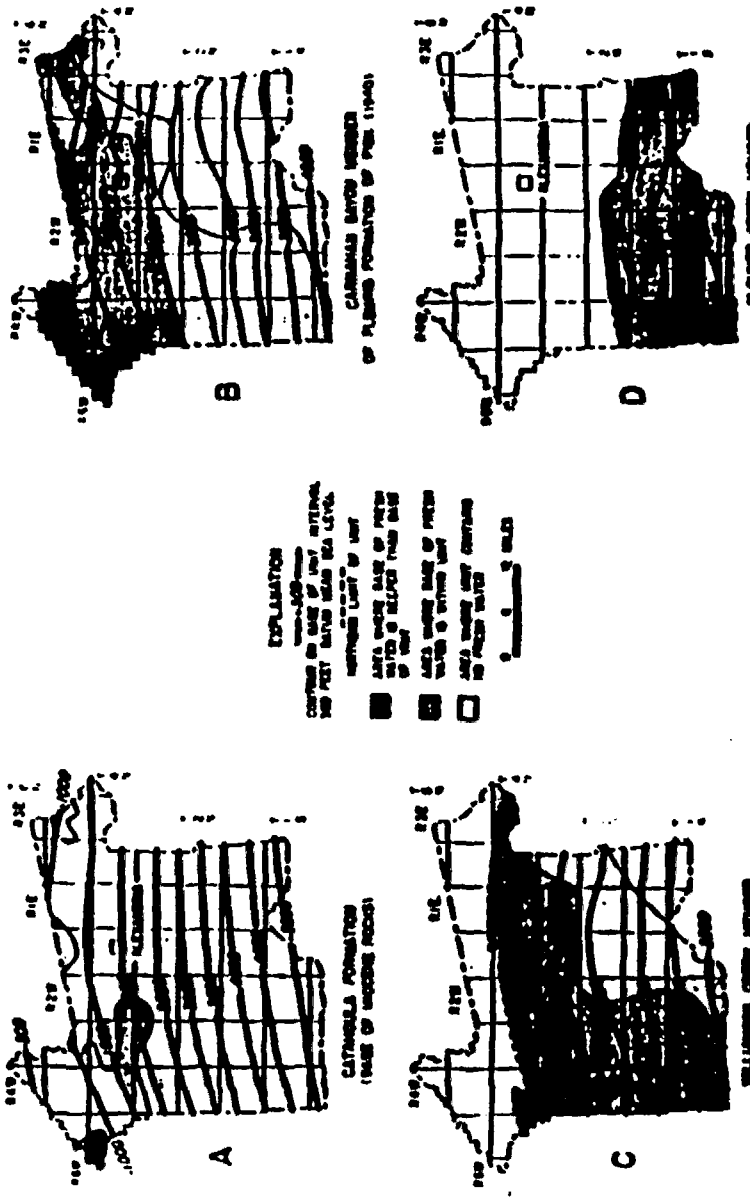

Figure 2. Distribution of fresh ground water and base of Miocene aquifers of Rapides Parish.

Miocene sands differ widely in grain-size distribution, but individual beds in a given locality are fairly even-textured. Sieve analyses indicate that grain sizes generally range from very fine to coarse and commonly are fine to medium sand.

In color the Miocene sands range from light to dark gray, according to their content of dark material—lignite, black and brown chert, and heavy minerals. The finest sands generally are darkest in color; some of the coarse sands are very clean and white.

The only major structural feature apparent in Rapides Parish is the "La Salle nose" in the Catahoula Lake-Big Island area where the base of Miocene rocks has been uplifted 500 feet. There is evidence of two or more north-trending faults in the Alexandria metropolitan area (pl. 3), and additional faults probably exist between Alexandria and Catahoula Lake. The effect of these faults on movement of ground water may be significant to the municipal water supplies at Alexandria and Pineville. The blocking off of aquifers, or conversely the joining together of different aquifers, can exert a great influence on the movement of ground water toward points of discharge. Ground-water levels respond to flow barriers by declining more rapidly and to greater depth with continued pumping of wells. The fence diagram (pl. 4) illustrates the attitude of Miocene beds in the parish and the relation between structure and the occurrence of fresh water.

PLEISTOCENE AND RECENT ROCKS

Sediments deposited during Pleistocene time mantle the rolling uplands, mapped in part as terraces by Fisk (1940), and form valley fill of the Red River and other major streams. The upland deposits form a mantle that covers most of Rapides Parish outside the flood-plain areas (pl. 2). Thickness of these deposits is very irregular, owing to the uneven surface upon which they were laid down and to subsequent erosion. In the northern part of the parish the upland deposits are generally less than 100 feet thick, but in the southern part they are as much as 200 feet thick. They are generally sandy, although substantial amounts of clay occur in the upper part of the deposits in some localities.

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Ordinarily some gravel is present in the basal few feet of the sand. Grain-size distribution is extremely variable in the upland deposits, but typically they are much coarser and more heterogeneous than the Miocene sediments. Colors are yellow, red, brown, and gray, the near-surface material commonly bearing the yellow and red iron-stained aspect.

Alluvium in the broad, deep trench of the Red River Valley constitutes an important hydrologic unit in Rapides Parish. Calcareous red soils developed on the flood plain are derived from the red clay and silt, presumably of Recent age, that form the upper part of the alluvial fill. Brown and gray sand and gravel representing Pleistocene deposition compose the lower, and generally thicker, part of the alluvium. The proportion of fine red material decreases toward the south, as illustrated on plate 5. The aggregate thickness of the valley deposits averages about 110 feet at the northern parish boundary and about 150 feet at the southern boundary.

The sand and gravel filling the part of the trench that underlies the present Red River flood plain is hydraulically connected with terraced upland Pleistocene deposits that flank the valley. At times in the prehistoric past the Red River alluvial plain was much higher and wider, and the present trench represents the latest and deepest downcutting. Evidence points to at least four rejuvenations of the valley.

The alluvial sand is poorly sorted. Coarseness increases with depth, but because of the irregular base of the trench and the mechanics of deposition, little horizontal correlation of particle size can be expected. In the southeastern corner of Rapides Parish, where Red River Valley sediments coalesce with those of the Mississippi River valley, an interfingering of sediments typical of each valley is produced.

WATER LEVELS AND MOVEMENT

Miocene Aquifers

Recharge directly from rainfall on sands of Miocene age takes place in the highlands of northwestern Rapides Parish and the parishes to the north and west where the

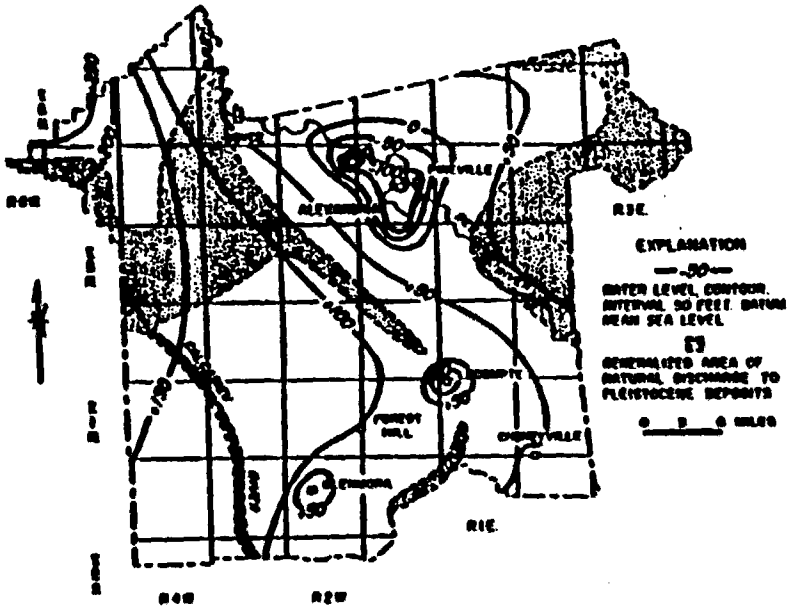

Figure 8. Ground water in Miocene aquifers was moving into overlying Pleistocene aquifers and toward other areas of discharge in 1962.

sands crop out. Elsewhere in Rapides Parish the Miocene beds receive water from overlying deposits of Pleistocene age where hydrostatic pressure in the latter is sufficiently high. The outcrop area of the Miocene is small in Rapides Parish; hence water-table conditions in the sands exist only in the sparsely settled region of the northwest corner of the parish. Land-surface elevations in the recharge area are in the 250- to 300-foot range; consequently, considerable head is imparted to the southward-dipping confined aquifers. This head, or artesian pressure, declines toward the south because of normal losses due to friction resulting from natural discharge into overlying beds, and toward the east because of natural discharge into the Red River Valley alluvium. Static water levels generally are within 100 feet of the land surface in most aquifers in practically all the parish, and in most places water levels are within 50 feet of the surface. Although wells screened in Miocene sands formerly flowed almost anywhere in the low-lying Red River flood plain, municipal pumping at Alexandria, Boyce, and Lecompte has reduced the artesian pressure so much that few

flowing wells now exist. The piezometric surface declines from a maximum elevation of 250-300 feet in the northwest to 100 feet adjacent to the western wall of the Red River Valley. It declines another 50 feet in the valley, and in the Alexandria area it is more than 150 feet below sea level in some places. A comparison of figure 3 and a similar map made by Maher (1940, pl. 4) shows little change in Miocene water levels in the hill lands. On the other hand, water-level declines in the Red River Valley during the past 25 years are approximately 60 feet at Boyce, 90 feet at Lecompte, and 130 feet at Alexandria. The decline at Alexandria since 1900 is nearly 200 feet, although wells screened in the same sand zone still flow in the hill lands near Boyce. Little difference in hydrostatic pressure is apparent between sand beds in the upper and lower parts of the Miocene deposits in unpumped areas; however, where some sands undergo heavy withdrawals, as at Alexandria, substantial differences in pressure develop among the various sand beds. These differences, which were pointed out by Maher (1940, fig. 5), were even more marked in 1962. The contours at and near Alexandria (fig 3) reflect the deepest water levels in the area. The following table contains static water levels

Static water levels, Alexandria area, La.

Sand*	Sand designation by King (1965)	Elevation of static level 1962 (reference, mean sea level)
WC-2	"400-foot" sand	−20 in city
WC-1	"400-foot" sand	−20 in city
CB-7	"400-foot" sand	At sea level near EAFB (England Air Force Base) +15 at armory west of city
CB-5	"700-foot" sand	At sea level to −125 in city −110 near EAFB
CB-3		−90 at armory −175 at EAFB
CB-2	"700-foot" sand	−160 to −185 in city near EAFB
CB-1	"1,000-foot" sand	−25 to −100 in city
CB-0	"1,000-foot" sand	−50 to −160 in city −120 to − 150 in EAFB area At sea level at armory

*WC, Williamson Creek Member; CB, Carnahan Bayou Member. Number refers to number of feet, in hundreds, above the base of the member.

for the various sand beds from which the Alexandria municipal water supply is obtained.

Miocene water levels in the Red River Valley in Rapides Parish have been lowered to the extent that, in some places where hydraulic connection exists between Miocene sands and the alluvial sand and gravel, water moves from the younger material to the older deposits. The amount of water transferred in this manner depends upon the area of mutual contact, the permeability of the beds through which the water moves, and the head difference.

An analysis of Miocene ground-water flow may be made using data from the piezometric map of figure 8 and an estimated value, based on pumping tests, for the coefficient of transmissibility. By constructing flow lines that cross the pressure contours at right angles and form a netlike pattern, the direction and magnitude of flow toward any specified point can be illustrated and evaluated. According to this type of analysis for the Alexandria area, it is estimated that between 10 and 15 mgd (million gallons per day) is moving in the entire fresh-water section of Miocene rocks toward the city from the west, the direction of principal recharge. Small amounts enter from the north, east, and south.

Discharge of this water moving toward Alexandria takes place by withdrawals from wells in the Alexandria area, and naturally by seepage into the alluvium of the Red River Valley. Swamps on the margin of the valley are maintained partly by lateral and upward flow from the Miocene beds.

Recent records (1962) indicate withdrawals averaging 7 mgd for public and industrial water supplies in Alexandria, Pineville, and nearby England Air Force Base. As water levels are declining throughout the Alexandria-Pineville area, withdrawals must exceed replenishment, at least for the principal sand beds tapped by the wells. Concentration of pumping in a few sand beds and in small areas is the cause of the large water-level declines. Half the ground water pumped for the above supplies is from the two deepest fresh-water-bearing sands of the Carnahan Bayou Member (pl. 3). Areas of present pumpage and the percentage of the

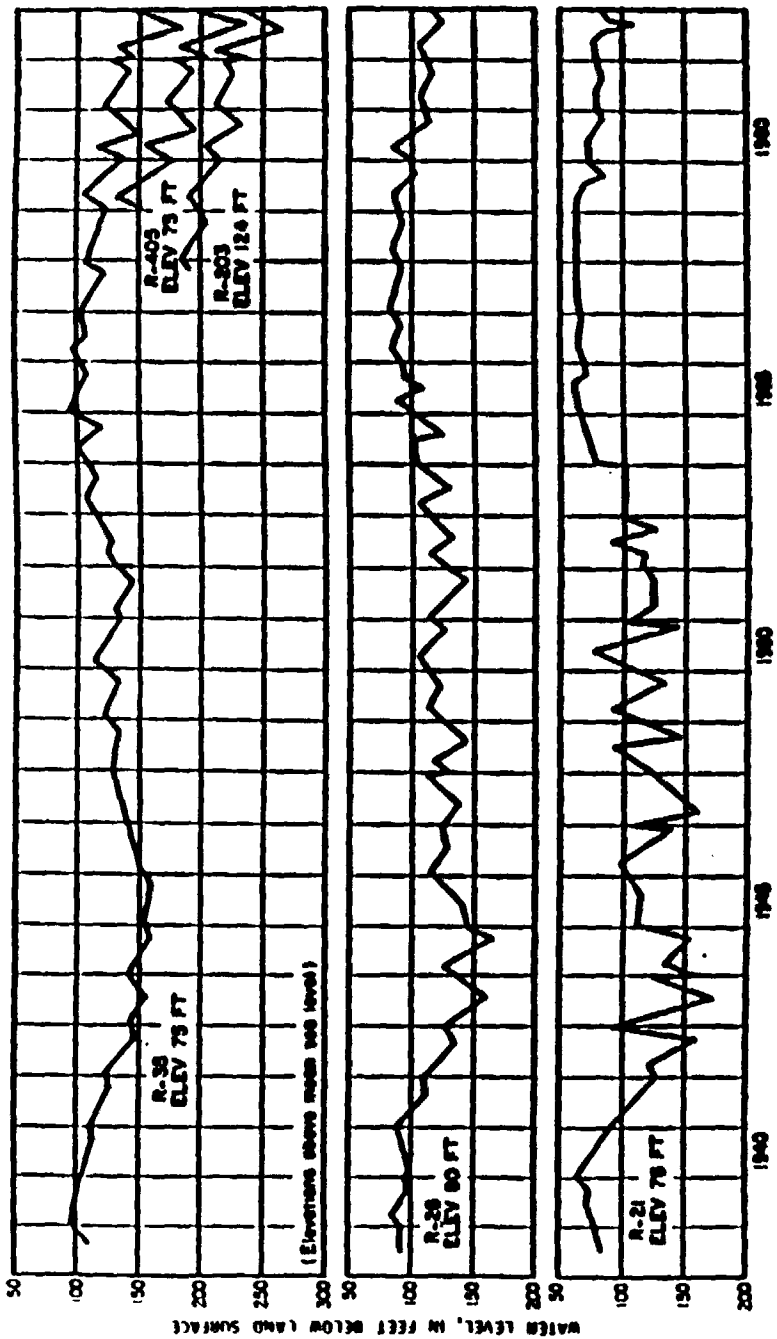

Figure 4. Water levels in Miocene aquifers at Alexandria respond principally to changes in pumping.

total ground-water pumpage in each area are shown on plate 6.

A 25-year water-level record (fig. 4) for wells screened in three of the sands developed for municipal supply at Alexandria shows the effect of long-term withdrawal. Locations of these and other Miocene wells for which water-level records have been obtained are shown on the Alexandria vicinity map on plate 6, and a discussion of the fluctuations shown in figure 4 is in the section "Development of Supplies."

Pleistocene Aquifers

Much of the ground water in upland Pleistocene deposits is under water-table conditions, partly because the deposits are sandy from the surface down in many places and partly because they are well drained by numerous deeply cut stream valleys. Even where several feet of clay overlie the sand and gravel, water levels commonly are within the sand section. Where streams are not numerous or deeply cut, artesian conditions generally occur.

Recharge to these deposits occurs through downward percolation of rainfall and in the small areas delineated on figure 3 by upward movement of water from underlying Miocene sand beds. Elsewhere in Rapides Parish, water in the upland Pleistocene deposits moves downward as recharge to the underlying Miocene sands.

The alluvial sand and gravel aquifer in the Red River Valley is recharged by rainfall that filters through the red clay and silt overlying the aquifer and by inflow from Miocene and upland Pleistocene deposits that form the valley walls. Before extensive development of the Miocene aquifers, the alluvium throughout the valley area received water from those beds, all of which are intersected by the Red River trench.

Water in the alluvial aquifer is imperfectly confined because of the transitional nature of the fine-grained upper deposits and the sand. The aquifer grades from very fine-grained sand at the top to gravel at the base. The existence of a water table in the silt, or so-called quicksand, below which all material is saturated, implies the prevalence of

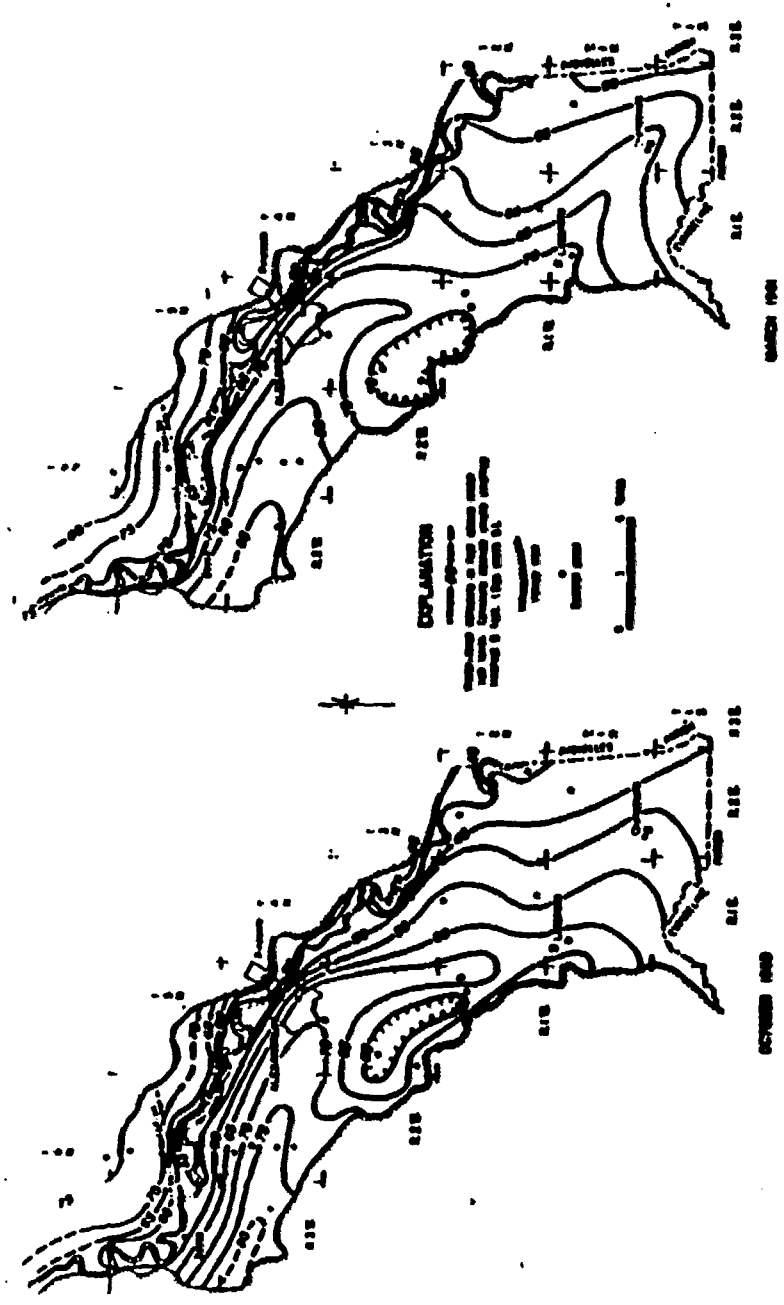

Figure 5. The slope of ground-water levels in the alluvial aquifer shows discharge to Red River during most of the year.

water-table conditions. However, because of the great difference in permeability between the overlying fine saturated material and the sand, the aquifer behaves according to artesian principles, as shown by the low coefficients of storage determined from pumping tests.

Movement of water in the alluvium is mainly toward the Red River whose present bed, between 15 and 35 feet above sea level, is cut into the aquifer along most of its course (pl. 5). Accordingly, at most times water is discharged to the stream. During flood stage the conditions are reversed near the river, and water moves from the river into the aquifer. However, this situation rarely lasts more than a week, and the direction of ground-water flow is reversed only for a short distance from the river. If the river stage remained high, ground-water levels would build up and much of the valley land probably would become waterlogged. Water-level contour maps (fig. 5) illustrate the relation between ground-water levels and river stage at times of low and high water levels in October 1960 and March 1961, respectively. (See also plate 5.)

Hydrographs (figs. 6 and 7) illustrate the fluctuation of ground-water levels in the Pleistocene aquifers. Water in the upland Pleistocene deposits is mostly under water-table conditions, and fluctuations in water level are chiefly in response to seasonal rainfall. The changes generally are of small magnitude. In the alluvial valley aquifer, water levels fluctuate chiefly in response to changes in river stage and to a lesser degree in response to local rainfall. The hydrographs of figure 7 illustrate the variation in magnitude of ground-water-level fluctuations with distance from the river.

The amount of water moving through the alluvium in response to the conditions of head depicted on the maps (fig. 5) can be calculated using coefficients of transmissibility based on pumping tests. About 20 mgd was discharged to the Red River in October 1960. This is an average of 0.4 mgd, or 0.6 cfs, per mile of valley in Rapides Parish. In March 1961 the amount of water transferred was 2 mgd less. The amount of ground water moving

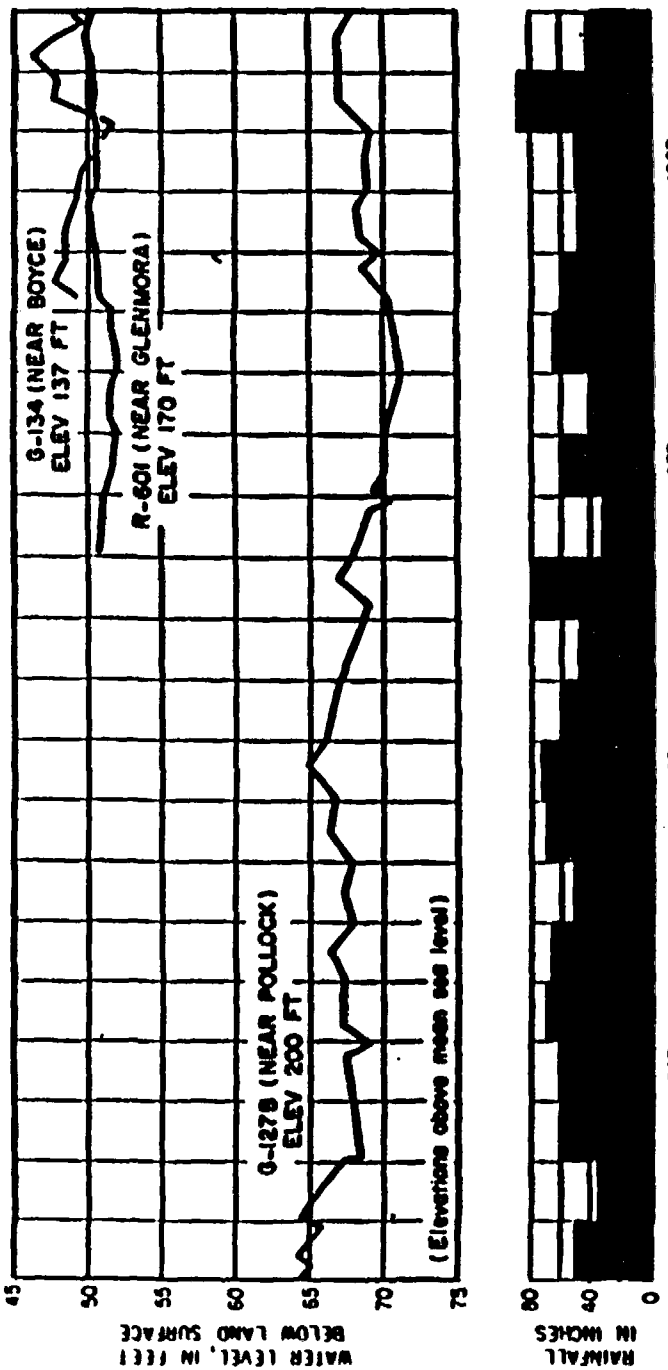

Figure 6. Water levels in the upland Pleistocene deposits fluctuate with rainfall.

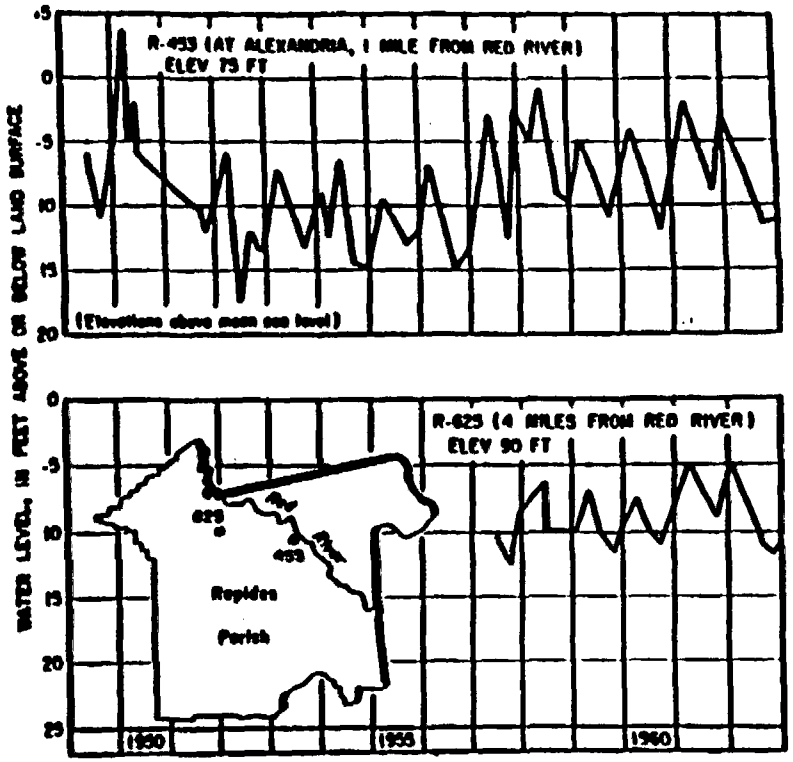

Figure 7. Water-level fluctuations in the Red River Valley alluvium.

toward the river was slightly less in the southern part of the parish than in the northern part in both periods.

The magnitude of discharge from the alluvium to the river is not controlled by the height of ground-water levels alone, but is determined by the head difference between ground-water and stream levels. The greatest ground-water losses occur when times of high ground-water level coincide with low river stages.

QUANTITY OF WATER AVAILABLE

AQUIFER CHARACTERISTICS

Although the grain size in an individual sand bed of Miocene age is fairly uniform within small areas, it may vary considerably with distance and is likely to differ greatly from other sand beds below and above it. Con-

sequently, permeability differs among beds and in the same bed in different places. Values between 200 and 500 gpd per square foot for the field coefficient of permeability[1] are the most common, but extremes of 90 and 1,000 gpd per square foot have been observed. The field coefficient of permeability is determined by dividing the coefficient of transmissibility by the aquifer thickness. Pumping tests provide data from which the coefficient of transmissibility can be computed. Tests involving more than one well provide data that also can be used to compute the coefficient of storage, which indicates the type of ground-water conditions—artesian or water-table. As a general rule, storage coefficients less than 0.01 indicate artesian conditions and those greater than 0.01 indicate water-table conditions. Except at shallow depths in their area of outcrop, the Miocene sands contain water under artesian conditions. Table 2 lists aquifer and well characteristics determined for Rapides Parish.

The potential yield and other economic aspects of an aquifer are dependent chiefly upon its transmissibility. A thick aquifer having low permeability can be a better source of water supply than a thin aquifer having high permeability. Coefficients of transmissibility ranging from 1,400 to 60,000 gpd per foot were determined from pumping tests of wells in Miocene aquifers in Rapides Parish; the average is 16,000. Coefficients of storage range from 0.00006 to 0.00040 and average 0.0002. These values of transmissibility and storage can be used in predicting long-term pumping effects on water levels. The potential effects of hydrologic boundaries are to decrease or add to the amount of predicted drawdown. In Rapides Parish recharging boundaries are caused by aquifer thickening, interconnection between aquifers, permeability increase, and bodies of surface water that are in hydrologic contact with the aquifer. Discharging boundaries are barriers to ground-water flow and consist of aquifer thinning and truncation, reduction of permeability, and mutual interference of pumping wells.

The range of grain size in individual sand beds of

[1] See Glossary of Terms (Appendix I) for definitions of this and other terms.

Pleistocene age is greater than in the Miocene aquifers. However, as Pleistocene material is generally coarser and the proportion of silt and very fine sand is much less than in the Miocene rocks, the permeability is greater, ordinarily being between 1,000 and 2,000 gpd per square foot. Transmissibility values obtained in Rapides Parish average about 50,000 gpd per foot. Storage coefficients determined in most pumping tests indicate artesian conditions; however, the values obtained for upland deposits are higher than those for valley deposits and underlying Miocene rocks, indicating a closer approach to water-table conditions. The Pleistocene aquifers, both in the uplands and in the Red River Valley, are imperfectly confined in most places, and it is difficult to define a sharp contact between aquifer and confining bed.

A graph that illustrates the theoretical drawdown of water levels at various distances caused by a pumping well can be constructed for the different values of transmissibility determined for the Miocene and valley Pleistocene aquifers of Rapides Parish. Because the storage coefficient for the upland Pleistocene sands is significantly higher than that for the other aquifers, the graph of figure 8 excludes the upland Pleistocene. The pumping rate used in constructing the graph was 300 gpm, which is the most common yield of the large Miocene wells. Drawdowns for other pumping rates are directly proportional to those shown. This graph contains no provision for the effects of hydrologic boundaries.

Yields of Wells

Yields of wells depend upon the aquifer characteristics and the efficiency of well construction and development. For purposes of evaluating and comparing wells, specific capacity is a useful measure of well performance. It is the number of gallons per minute yielded for each foot of drawdown of the water level in a pumped well for a given period of time. To provide a standard for comparison, specific capacity values given in table 2 are for a 1-day period of pumping.

Most of the wells screened in sands of Miocene age are low-yield domestic and farm wells, which are 100 to 500

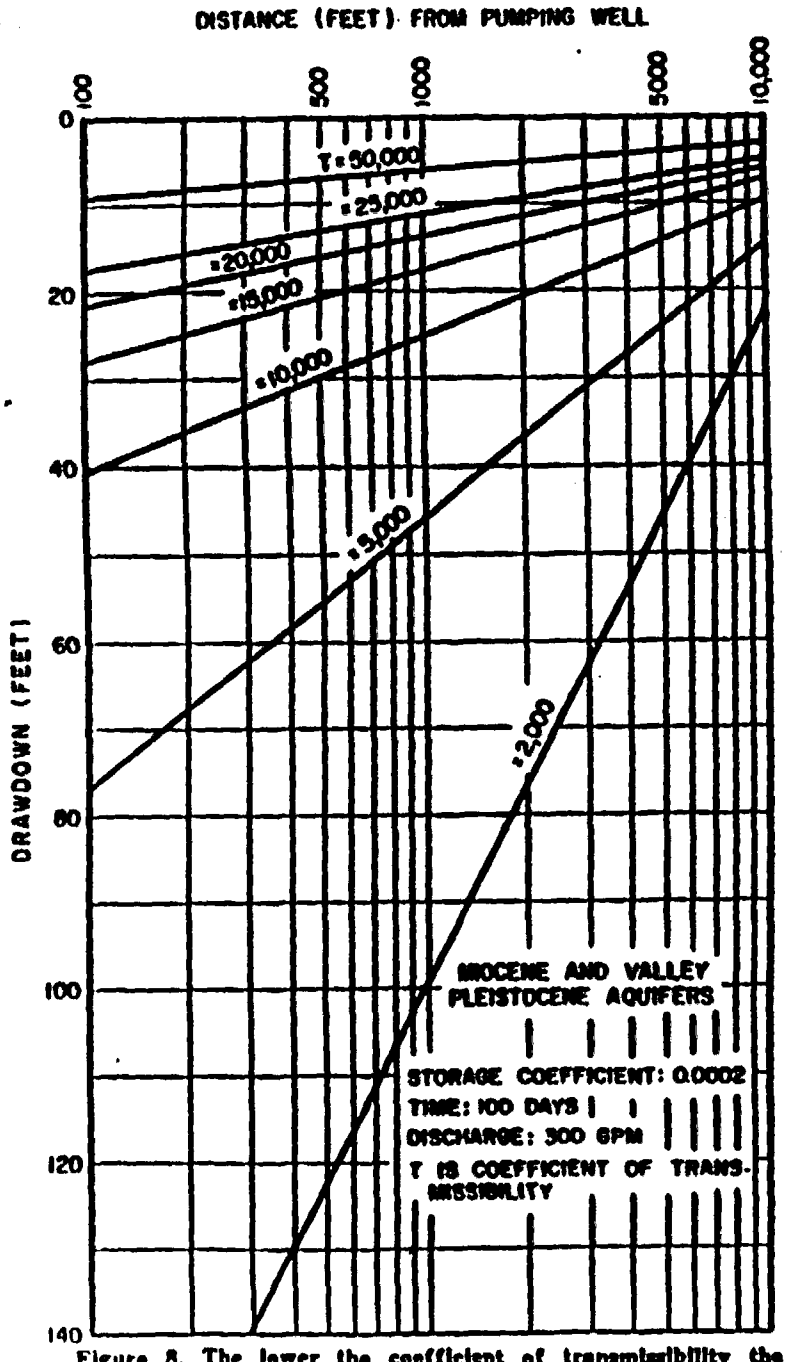

Figure 8. The lower the coefficient of transmissibility the greater the theoretical drawdown.

feet deep. Municipal supply and industrial wells are as deep as 1,300 feet and yield 50 to 600 gpm. The wide range of specific-capacity values for these wells is caused mainly by differences in aquifer thickness and permeability. The specific capacity of 17 municipal supply wells at Alexandria ranges from 1 to 18 gpm per foot of drawdown, and averages about 6 gpm per foot.

The majority of Miocene wells that are in good repair and are pumped regularly are highly efficient. Well efficiency is the percentage obtained by dividing measured specific capacity by the theoretical specific capacity calculated from aquifer characteristics. Poor well efficiency results when the amount of head required to force water from the aquifer into the well is increased by clogging of the well screen or aquifer adjacent to the well, or when high pumping rates induce well-entrance velocities great enough to cause turbulent flow.

An important attribute of the deep Miocene wells is the large available drawdown, which is the distance between the static water level and the deepest practicable pumping water level. Thus some wells having low specific capacity are capable of comparatively large yield.

Upland Pleistocene deposits supply most of the wells in the hilly portion of Rapides Parish, but few high-capacity wells are screened in these sands. Yields of 100 gpm and 260 gpm are obtained from wells in the Pleistocene at Glenmora. During World War II several Pleistocene wells at Camp Claiborne near Forest Hill were pumped at rates of 150 to 600 gpm and had specific capacities ranging from 5 to 20. The Texas Gas Transmission Company compressor station, 5 miles east of Alexandria, has a Pleistocene well that yields 375 gpm and has a specific capacity of 12 gpm per foot of drawdown.

Wells screened in the Red River Valley alluvium are capable of higher sustained yields on the average than wells in the Miocene and upland Pleistocene aquifers. Records of 16 irrigation wells that are in use throughout the Red River Valley in Louisiana indicate normal yields ranging from 250 to 1,700 gpm and averaging 800 gpm. Many of these wells have been tested at considerably higher

yield than that which they normally produce. Yields of four irrigation wells in Rapides Parish also range from 250 to 1,700 gpm. Two wells, 80 feet apart and producing 250 gpm each, are used by the Central Louisiana State Hospital farm just west of Alexandria. A 650-gpm well that has been tested at 1,000 gpm is located on the M. W. Walker farm at the south edge of the Alexandria metropolitan area. The E. L. Klock farm at Cheneyville has a 1,700-gpm well that was tested at 2,800 gpm.

The specific capacities of wells in the alluvial aquifer throughout the Red River Valley differ greatly, but generally are between 15 and 60 gpm per foot of drawdown (Newcome, 1960). The wells typically have an efficiency of about 50 percent—that is, specific capacity is only half what would be expected based on the transmissibility and storage coefficient of the aquifer. As most of the wells are screened in only the lower, more permeable, part of the aquifer the low efficiency may be ascribed to the effects of partial penetration. Methods of well construction and development also influence the efficiency.

An important consideration in evaluating a well's potential performance is the critical yield. This is the maximum rate at which the well can be pumped without inducing well-entrance velocities sufficient to cause turbulent flow, thus reducing sharply the specific capacity. A requisite phase of an adequate well test is a multiple-step drawdown test. The step test involves pumping a well at several successively higher rates, preferably for equal increments of time. The duration of each step need not be long—perhaps half an hour, but a wide range of pumping rates should be covered. The calculated specific capacity for each pumping rate should remain the same or decline only slightly as the discharge is increased until the critical yield is surpassed. A sharp decline in specific capacity identifies the critical yield for that well. There are the situations in which exceeding the critical yield, despite its ill effect on specific capacity, is considered necessary from the standpoint of water-supply requirements. Such situations should be resolved where possible by supplemental supplies, because long-term overpumping may result in excessive fines being drawn, by high velocities, into the successively

coarser layers of material that naturally accrue around a properly developed well. The result is reduced permeability of the aquifer near the well.

CHEMICAL QUALITY AND TEMPERATURE

Water of three general types is obtained from the aquifers of Rapides Parish. The sands of Miocene age yield soft, alkaline, sodium bicarbonate water of moderate total mineralization. Upland Pleistocene deposits contain soft, acidic water of extremely low mineralization. Water in the Red River Valley alluvium is a hard, calcium magnesium bicarbonate type having an alkaline character and containing large concentrations of iron, which may cause undesirable taste and staining.

The most satisfactory water for public supply and for most industrial uses is obtained from the Miocene aquifers. Its dissolved-solids content generally is less than 500 ppm and the hardness seldom exceeds 20 ppm. The odor of hydrogen sulfide (H_2S) is noticeable at many wells, but its intensity is not sufficient to cause objections to use of the water. Iron content in water from deposits of Miocene age is rarely a problem, but in a few places in southern Rapides Parish the fluoride content in some aquifers exceeds the maximum of 1.6 ppm recommended for this region by the Louisiana Board of Health. A report by Maher (1939) describes occurrences of high fluoride concentration in ground water of Avoyelles and Rapides Parishes. Objectionable fluoride concentrations in drinking water can generally be avoided by utilizing other aquifers or by mixing water of high fluoride content with that having low fluoride concentrations. The fluoride content of each public water supply obtained chiefly from ground water in Rapides Parish is listed in the following table. The optimum and maximum figures are those recommended by the Louisiana Board of Health (oral communication, John L. Trygg, 1963).

Fluoride content, in ppm, of selected public supplies

Optimum	Maximum	Alexandria	Boyce	Cheneyville	Englewood AFB	Glenmora	Hot Wells Health Resort	Lecompte	L.S.U. Alex.	Pineville
0.8	1.0	1.4	0.8	4.3	1.6	0.8	0.9	0.6	1.4	0.4

The water in Miocene aquifers, as in other aquifers of Tertiary age in northern Louisiana, is generally unsuitable for irrigation supplies because of its high sodium content. The percent sodium averages 98; the SAR (sodium-adsorption ratio) generally is greater than 10.

Water in all the Miocene sand zones becomes saline with depth. The base of fresh water trends generally with the southward dip of the formations and occurs in successively younger strata, as increasing depth carries the aquifers into the saline-water zone. The effects of river entrenchment and faulting are important factors in the configuration of the base of fresh water in Rapides Parish (pl. 2). The Red River Valley, which is entrenched in all the beds of Miocene age, provides a drain that has dissipated the head in the sands, thus causing the fresh water-saline water interface to be high under the valley area. Faulting, although not generally causing great displacement in the near-surface beds, has blocked off some aquifers and caused saline-water contamination in others.

An anomalous condition in a few places, which may be attributed to faulting or to the incomplete plugging of abandoned oil wells, is the contamination by saline water of individual sand beds in zones otherwise containing fresh water. The contamination is indicated by electrical logs in the Glenmora area. The rarer occurrence of fresh-water-bearing sands beneath a thick section of saline-water-bearing beds is more difficult to explain. Examples of this exist in the northeastern corner of Rapides Parish and south of Bunkie near Gold Dust in Avoyelles Parish. Also in northeastern Rapides Parish, hard water is often obtained from wells screened in sporadic sand beds within the calcareous clay of the Dough Hills Member of the Fleming Formation. Nearby wells that are deeper, yield either fresh soft water or saline water from the Carnahan Bayou Member of the Fleming Formation.

The base of fresh water in Rapides Parish ranges from sea level to minus 3,200 feet, as shown by the contour map in plate 2. In a large part of the parish the great thickness of fresh-water-bearing sands is untapped for water supplies. The location, depth, and thickness of potentially important fresh-water aquifers is presented in table 1.

Water in the upland Pleistocene sands generally is satisfactory for all purposes that can tolerate or compensate for its slightly acidulous character. The common effect of the acidity is excessive iron concentration induced by corrosion of metals in the well casing, pump, or distribution system. A popular means of preventing the corrosive action is by pumping wells with compressed air which aerates the water and consequently raises the pH sufficiently to neutralize the acidity. The water is satisfactory for irrigation; the percent sodium averages 50 and the SAR averages 1. Hard, sometimes salty, water from underlying Miocene beds contaminates the Pleistocene aquifer in the northeast corner of the parish.

Water in the valley alluvium is generally unsuitable for drinking without treatment. Its hardness averages 500 ppm and its iron content 5 ppm. The source of the hardness and iron is the calcareous red silt and clay of the alluvium through which precipitation percolates to the sand and gravel of the aquifer. This water is of best quality near surface-water bodies having levels high enough to recharge the aquifer; there are few such sources of recharge in the valley in Rapides Parish. Cane River Lake in Natchitoches Parish exerts a beneficial influence on water quality in the alluvium in that parish (Newcome, 1963, p. 66).

Water in the alluvium is suitable for irrigation use. Percent sodium rarely exceeds 30; the SAR is less than 2. Specific conductance averages about 1,000 micromhos, slightly more than desirable for irrigation water, but the fact that a significant percentage of the mineral content consists of calcium and magnesium bicarbonate rather than sodium bicarbonate minimizes any detrimental effects of the mineralization. Boron is well within the safe zone for irrigation supply.

Treatment to reduce the hardness and iron content of water in the alluvial aquifer would make it acceptable for public supply and many industrial uses. The availability of large quantities of this water makes consideration of

such treatment a logical step in planning future water supplies and the expansion of existing works.

The following table contains chemical analyses of water

Chemical analyses of water from a selected well in each of the principal aquifers

Rock units	Miocene		Upland Pleistocene		Red River Valley alluvium	
Constituents	epm*	ppm*	epm	ppm	epm	ppm
Silica (SiO_2)	.....	[illegible]	.....	[illegible]	.....	[illegible]
Iron (Fe), total	.....	[illegible]	.....	[illegible]	.....	[illegible]
Manganese (Mn)	.....	[illegible]	.....	[illegible]	.....	[illegible]
Calcium (Ca)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Magnesium (Mg)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Sodium (Na)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Potassium (K)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Bicarbonate (HCO_3)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Sulfate (SO_4)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Chloride (Cl)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Fluoride (F)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Nitrate (NO_3)	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Boron (B)	.....	[illegible]	.....	[illegible]	.....	[illegible]
Dissolved solids	.....	[illegible]	.....	[illegible]	.....	[illegible]
Hardness as $CaCO_3$	.....	[illegible]	.....	[illegible]	.....	[illegible]
Sodium-adsorption ratio (SAR)	.....	[illegible]	.....	[illegible]	.....	[illegible]
Percent sodium	.....	[illegible]	.....	[illegible]	.....	[illegible]
Specific conductance (micromhos at 25°C)	.....	[illegible]	.....	[illegible]	.....	[illegible]
pH	.....	[illegible]	.....	[illegible]	.....	[illegible]

*See Glossary of Terms for explanation of epm and ppm.

from one well in each of the principal aquifers. The examples given represent the different types of water obtained from these aquifers and were chosen from nearly 300 chemical analyses made by U.S. Geological Survey Chemists and other analysts.

Deviations from these examples usually are in the form of higher values for fluoride and chloride in the Miocene aquifers and for iron content in the younger aquifers. Types of water contained in the three principal aquifers are illustrated by bar graphs in figure 9. Mixtures of the Miocene and upland Pleistocene water types occur in places where the two aquifers are in contact and water movement takes place from one to the other. In this manner, Pleistocene-type water may be obtained from a shallow well screened in a Miocene sand just beneath the younger material. Many well owners prefer the more highly mineralized but less acidic water in the Miocene aquifers in order to avoid the iron problem associated with the acidic Pleistocene waters.

The temperature of water from wells in the Miocene

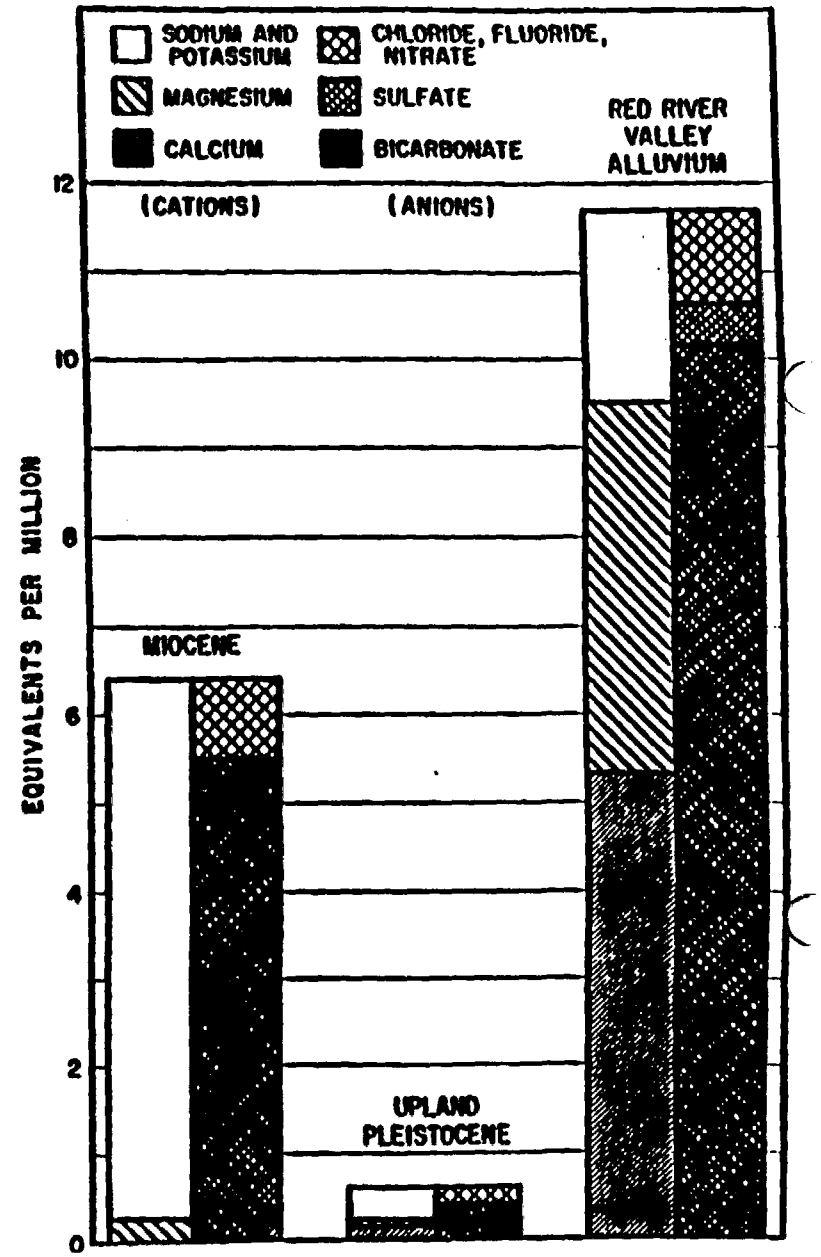

Figure 9. Bar graphs show chemical differences in water from chief aquifers.

formations varies with depth, that near the surface being close to the average annual air temperature of 67°F. Below a depth of 100 feet the ground-water temperature increases at the rate of 1°F for each additional 65 to 70 feet of depth. The warmest water used for public supply in Rapides Parish has a temperature of 84°F.

Water temperatures in the Pleistocene aquifers average about 68°F and because of their shallow depth there is a measurable seasonal variation in temperature in these aquifers. Temperatures measured in two wells in the valley alluvium are shown in the table below.

Monthly temperature (°F), Pleistocene aquifer

Well No.	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
R-721	68	67	67	68	68	68	.....	69	71	69	69	69
-722	68	68	68	69	69	69	.....	69	71	68	69	67

DEVELOPMENT OF SUPPLIES
Past and Present

The city of Alexandria has long been the largest user of ground water in central Louisiana. Annual withdrawals for municipal supply have ranged from 1.13 billion gallons (3.1 mgd) in 1942 to 2.11 billion gallons (5.8 mgd) in 1958. The average for the 22-year period, 1941-62, is 1.48 billion gallons (4.1 mgd). In 1962 the average daily ground-water withdrawal was 5.57 million gallons. The maximum recorded daily pumpage at Alexandria was 10.5 million gallons on August 8, 1962. Another 0.52 mgd of surface water, purchased from an installation developed on Big Creek in Grant Parish, supplemented the ground-water pumpage. Heaviest water use is in August and lightest use is in February. The average daily per capita water use at Alexandria is 62 gallons. Snider and others (1962, p. 167) list Alexandria pumpage by months.

The following public water supplies in Rapides Parish pump an aggregate average of 1.54 mgd.

Ground water withdrawals for public supply
(million gallons per day)

Boyce	Cheneyville	England AFB	Glenmora	Lecompte	Pineville*
0.07	0.07	0.8	0.12	0.12	0.06

*The city of Pineville supplements ground-water withdrawals with about 0.3 mgd from Big Creek in Grant Parish

A dozen or so wells screened in Miocene sands supply several small industries in the vicinity of Alexandria. Their total pumpage probably does not exceed 0.6 mgd. For many years the Alexandria Department of Streets and Parks obtained water for street cleaning and other uses from wells in the alluvial aquifer. These wells have fallen into disuse in recent years, and most of them are inoperable.

During World War II the ground-water resources underwent intensive development at Camps Livingston and Beauregard just north of Pineville and at Camp Claiborne near Forest Hill. Unpublished open-file reports by Maher (1942a and 1942b) describe in detail the testing and development of well fields at these military installations. The wells at Livingston and Beauregard were developed in Miocene aquifers. Individual wells yielded as much as 350 gpm, but resulting declines in water levels limited the life of the well fields. At the height of military activity during the war, these camps withdrew 4 to 5 mgd, and water levels in the Alexandria and Pineville well fields, already declining because of greater municipal pumpage, were drawn down 50 to 100 feet in various aquifers as the result of this increased pumping. With the reduction in pumping that accompanied cessation of military activity in 1945, water levels in Alexandria recovered to their pre-war position (fig. 4).

Camp Claiborne obtained water from wells screened in sands of both Miocene and Pleistocene age. Relatively large yields were obtained, nearly 600 gpm from some of the Pleistocene wells and 350 gpm from one of the Miocene wells. Specific capacities as great as 20 gpm per foot were attained in the Pleistocene wells. Because water levels in the Miocene wells were drawn down excessively as a result of heavy withdrawals, more use was made of the shallow Pleistocene wells.

Perhaps the most significant development of water resources that has taken place in Rapides Parish (since inauguration of the Alexandria municipal water supply) was the installation of the Bayou Rapides well field at the former McNutt Plantation 5 miles northwest of Alexandria. The detailed program of planning and testing that

preceded development of this important addition to the municipal supply is described by Maher and Jones (1945). The wells, which were drilled in 1942-43, relieved considerably the strain on the older well field caused by the wartime pumpage increase. The Bayou Rapides well field, popularly known as the McNutt field, has been expanded, and in 1962 it supplied about one-third of the Alexandria municipal pumpage.

In 1959 the city of Alexandria conducted a test-drilling program in the Castor Plunge area of the Kisatchie National Forest 10 miles southwest of the city. Seven test holes ranging in depth from 206 to 806 feet were drilled in the investigation. Electrical logs were made of six holes, and a pumping test was made at one site where a test well was screened in sand of Miocene age (R-756 in table 2). The well tested had a specific capacity of about 12 gpm per foot of drawdown, better than the average for Alexandria's municipal wells. However, the sand beds, as indicated by electrical logs of the test holes, are discontinuous even in the small area of the testing, and discharging boundaries are indicated by the pumping test. No quantitative tests were made in Pleistocene sands. No municipal supply wells have been installed in this test area.

The city of Bunkie, in Avoyelles Parish but only 1 mile from the southeastern corner of Rapides Parish, conducted a test-drilling program in Rapides Parish a few miles east of Cheneyville during 1960-62. Seven test holes were drilled and two wells were installed in sands of Miocene age. Development of this new well field was undertaken by Bunkie to obtain water of better quality than that supplied by the old Miocene wells in the city. Water from the old wells contained objectionable concentrations of chloride and fluoride, being about 300 ppm and 10 ppm, respectively. The new wells 6 miles northwest of the city provide water containing acceptable concentrations of these constituents, being about 20 ppm and 1.4 ppm, respectively. The two new wells are multiple-screened installations having specific capacities of 6 and 10 gpm per foot of drawdown upon completion. Regular operation of the new well field began in early 1963.

The city of Pineville uses four deep wells screened in the basal fresh-water-bearing sand of the area. Three of the four wells are within 0.4 mile of one another, and drawdown of water levels in all four is severe as a result of long-term pumping. An exploratory test hole drilled at the municipal swimming pool penetrated only a few thin beds of sand; therefore, no wells were completed at the site.

No other community nor any industry in Rapides Parish has made ground-water explorations comparable to those of Alexandria and Bunkie. The towns of Boyce and Glenmora have municipally owned water systems in which a new well is added to the field when failure of a well or expansion of facilities requires it. The same is true of Cheneyville and Lecompte whose utility systems are owned and operated by the Central Louisiana Electric Company. England Air Force Base leases two wells in the McNutt field from the city of Alexandria and supplements them with one well of its own. One well screened in sand of Miocene age supplies water to the Alexandria Branch of Louisiana State University at Chambers. The U. S. Veterans Hospital, Louisiana College, and other institutions on the outskirts of Pineville formerly obtained their entire water supply from wells, but for several years they have obtained most of their water from the surface-water installation that furnishes a supplemental amount to Pineville.

Ground-water supplies for irrigation have received little attention in Rapides Parish. Only four irrigation wells are known to be in use in the Red River Valley. A test well was installed in the valley alluvium at Chambers to provide data by which the aquifer could be evaluated (R-737 in table 2). This well, though not constructed for high yield, indicated the feasibility of 1,000 gpm wells in the alluvial aquifer.

An unusual water-supply development is that for mineral waters at the community of Hot Wells. Originally drilled as an oil test, a flowing water well was completed at a depth near 3,000 feet in the Cockfield Formation of the Claiborne Group. The water is very highly mineralized,

containing about 60,000 ppm dissolved solids, and the temperature is about 115°F. It is used to supply baths at the Hot Wells Health Resort which is owned by the State of Louisiana.

Potential

The aquifers of Rapides Parish have the potential for providing many times the present water requirements of the parish. Most of the populated areas can obtain substantial additional water supplies without going far afield. Major users, such as the cities of Alexandria and Pineville, still have large areas of unexplored or undeveloped ground-water resources in their immediate vicinity. Probably as much as 3 mgd can be obtained from the Miocene sands within 5 miles of the Alexandria southwestern city limits. Pineville can obtain additional supplies from Miocene sands southeast of the city within a distance of 5 miles. The small towns of Cheneyville, Glenmora, and Lecompte should have no difficulty in finding abundant supplies for the future. Boyce, which has only one fresh-water-bearing sand of Miocene age in the town area, may need to explore south of town where sands contain potable water. The geohydrology of localities is described in Appendix III.

Hydrologic units in two large areas of Rapides Parish are believed to hold the most promise for ground-water supply in the future. These are (1) the virtually untapped Miocene aquifers in the southwestern third of the parish, and (2) the alluvium underlying the Red River Valley.

About 400 square miles of sparsely settled pine hills, in Tps. 1 S. through 3 N. and Rs. 2 W. through 4 W., are underlain by fresh-water-bearing Miocene sands to depths ranging from 1,000 to 3,000 feet below sea level (pl. 2). Although definite qualitative or quantitative data are lacking for these deep aquifers, electrical logs of oil-test wells indicate sand beds of great thickness, and the high electrical resistivity shown for the beds indicates a low dissolved-solids content for the water. Descriptions and locations of the electrical logs examined are given in table 1 and figure 4 of this report. Water from these sands most likely is of

the sodium bicarbonate type found elsewhere in the Miocene beds; therefore, it would be unsuitable for irrigation but ideal for almost any other use. Only in parts of Beauregard, St. Tammany, Livingston, Tangipahoa, and East Baton Rouge Parishes does fresh water occur deeper than it does in southwestern Rapides and southeastern Vernon Parishes.

The Red River Valley alluvial aquifer offers the largest quantities of easily obtained water in northwestern Louisiana. Its quality restricts its use to irrigation, cooling, and certain industrial processes at present, but as available supplies of better water decrease in some areas, treatment to reduce the hardness and iron content may become economical. Because of the aquifer's shallow depth, pumping costs are low. In addition, the large yields obtainable from individual wells further enhance the low cost. As yet the aquifer is virtually undeveloped, but the owners of irrigation wells are enthusiastic in their evaluation of the potential of this aquifer. The wells have been described as "insurance" against the effects on agriculture of rains too late in spring and drought in summer.

Aquifers in the upland Pleistocene deposits have a definite place in the water-supply potential of Rapides Parish. As at present, they will continue to supply homes, farms, and schools in most of the parish outside the valley. In many places large supplies for municipal and industrial use can be obtained. Because of the irregular thickness of the sand beds and the acidic character of the water in these deposits, test wells should be installed wherever development of this aquifer is begun. Where the aquifer is sufficiently thick, reliable supplies of this almost chemically pure water can practically be guaranteed.

Emergency Supplies

Wells are an ideal source of water supply in times of emergency. Each well is nearly independent of all others and of outside influences, and even a small yield can furnish a minimum supply for many people.

Alexandria is a designated evacuation area in event of enemy attack. If large numbers of people enter the city from disaster areas elsewhere in the State, the municipal

water system will be heavily taxed. Fortunately, there are enough industrial, institutional, and irrigation wells in Alexandria and its environs to furnish an additional 5 mgd, an amount nearly equal to the average municipal pumpage. Easily installed drive-point wells in the shallow aquifers could provide supplies for individual family and neighborhood shelters (Newcome, 1961).

Well Construction

Nearly all wells in the region are drilled by the hydraulic rotary method. A few shallow wells are bailed down by removing material from within succeeding sections of concrete tile, allowing the tile to settle under its own weight. The standard construction procedure for domestic and farm wells consists of drilling a 4- to 6-inch hole and installing 2- to 4-inch casing with 5 to 20 feet of 2-inch well screen opposite the water-bearing sand. Some drillers pack the area outside the screen with sand or gravel of relatively uniform size; others do this only for certain wells or not at all. Jet pumps or centrifugal-suction pumps usually are installed in the wells designed for low yield.

PROBLEMS AND SOLUTIONS

Problems of ground-water supply in Rapides Parish may be considered in relation to use. Problems related to domestic and farm water supplies are different from those encountered by public, industrial, and irrigation supplies, and their solutions vary accordingly. Common problems and potential problems of the various classes of water supplies in Rapides Parish are listed below with some suggested procedures for their solution.

Problem	Solution
Domestic and Farm Supplies:	
1. Iron in water.	Iron in water from the Red River Valley alluvium can be substantially reduced by aeration and filtration. Softeners aid in iron removal. In the hill lands, the acidic water dissolves, iron from the well and distribution system. Pumping by air lift aerates the water in the well and reduces the acidity. Use of plastic pipe and fittings also helps to avoid iron problems.

Problem	Solution
2. Encrustation of well screens.	Acidizing with a few gallons of muriatic acid may remove encrusting material. Use plastic or other nonmetallic well screen. A new well or screen is often required.
3. Saltiness or excessive fluoride.	Replace well with new well screened in sand containing acceptable water. Ordinarily, but not always, shallower sands are less salty. Test chemically to determine fluoride content. It should not exceed 1.6 ppm if family contains young children.
Public Supplies:	
1. Declining water levels.	Reduce pumpage from existing wells, lower pumps, or install additional properly spaced wells in the same or other aquifers.
2. Excessive chloride and/or fluoride.	Investigate alternate aquifers or well fields for better water that may be mixed with water of excessive chloride and/or fluoride content to form an acceptable composite. Reducing well pumpage may reduce chloride content.
3. Declining well yield.	Rework well, lower or repair pump. Regular checks of specific capacity should be made. If specific capacity decreases substantially, well needs attention. If specific capacity remains constant but yield declines, pump needs attention.
4. Well pumping sand.	Check back-pressure valve at bottom of screen to insure its closure. Check seal. Replace screen or casing. Reduce pumping rate.
5. New well location.	Invest in test drilling, including electrical logging. Maintain adequate well spacing. Seek information from private or public authorities.
Industrial Supplies:	
1. Inadequate quantity.	Consider using water from aquifers of Pleistocene age, employing treatment if necessary.
2. Quality	Aerate to reduce acidity, aerate and filter to reduce iron, and soften if required. Investigate other sources.
Irrigation Supplies:	
1. Sodium hazard, chloride hazard.	Use water from Pleistocene aquifers, not Miocene.

A ground-water problem not related directly to supply is waterlogging of land as a result of inadequate subsurface drainage. In the alluvial valley, water is continually entering the aquifer from one or more directions. If stream levels are maintained at higher than normal stage the aquifer cannot drain properly, and ground water accumulates in the alluvium. In time, ground-water levels may rise so high that a swamp or lake is formed, and formerly productive land cannot be tilled. Any surface-water structures proposed for the Red River or other major streams in Rapides Parish should be designed with consideration of the possibility of the waterlogging of farmlands in the valley.

SURFACE WATER

By Raymond Sloss

The largest source of surface water in Rapides Parish is the Red River, which drains about 66,860 square miles above the parish (5,936 square miles in Texas is noncontributing). About 65 percent of the drainage area is above reservoirs upstream from the parish. Two principal reservoirs regulating the Red River are Lake Texoma and Texarkana reservoir (combined capacities, 8,184,600 acre-feet). Other sources of surface water are the Calcasieu River, Bayou Boeuf, Bayou Cocodrie, Bayou Rigolette, and the tributaries of Catahoula Lake.

During the period 1939-59, the average annual precipitation for the parish was 59 inches. Of this amount 22 inches or 1.6 cfs per square mile ran off in streamflow; assuming no change in ground-water storage, the remainder was evaporated and transpired.

The chief surface-water problems are provision of storage for dependable supplies, provision for proper drainage of storm waters, protection from the Red River floods, quality of the waters, and navigation of the Red River. Distribution to remote areas is a problem in connection with provision of dependable supplies.

Reports on streamflow data and analytical studies of the parish streams are listed in "Selected References." Stream-gaging stations operated by the U.S. Geological Survey within and adjacent to the parish are listed in table 2. Brief descriptions of gaging stations where daily discharges have been determined are in Appendix III.

STREAMFLOW CHARACTERISTICS

Streamflow behavior reflects the topographic and geologic influences on the runoff characteristics of a basin. Streams that have a relatively flat bed gradient or that have swampy areas recede more slowly from a flood peak than streams of steeper gradients. Streams having ground-water storage have higher base flows than streams containing only direct runoff. Bayou Cocodrie near Clearwater recedes from a flood peak more slowly than the Calcasieu River near

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stream side of bridge on U.S. Highway 165, a quarter of a mile upstream from Missouri Pacific Railroad Co. bridge, 2 miles north of Glenmora, and 7.9 miles above confluence with Bayou Cocodrie.

Drainage area. 68.2 sq mi.

Records available. Water years 1954-56 (annual maximum), March 1956 to September 1962.

Gage. Water-stage recorder. Datum of gage is 62.28 ft above mean sea level (Louisiana Geodetic Survey bench mark) Oct. 23, 1953, to Mar. 6, 1956, crest-stage gage at same site and datum.

Average discharge. 6 years, 102 cfs (73,840 acre-ft per year).

Extremes. 1954-62: Maximum discharge, 2,160 cfs Nov. 13, 1957 (gage height, 15.70 ft).
1956-62: Minimum discharge, 22 cfs Sept. 21, 22, 25-30, Oct. 8-19, 1956; minimum gage height, 4.74 ft Sept. 21, 1956.
Maximum stage known since 1886, 20.5 ft in May 1953; flood of June 1886 was similar, from floodmarks and information by local residents.

7-3820 Bayou Cocodrie near Clearwater, La.

Location. Lat 31°06'00", long 92°22'46", in NW1/4SW1/4 sec. 4, T.1 S., R.1 E., Louisiana meridian, on left bank just downstream from bridge on U.S. Highway 167, 1,000 ft downstream from Bayou Cocodrie Dam, 1.0 mile downstream from Chicago, Rock Island and Pacific Railroad Co. bridge, 1 1/2 miles east of Clearwater, 4 miles south of Mecker, and 5 miles downstream from Hurricane Creek.

Drainage area. 240 sq mi.

Records available. May 1922 to January 1925 (published as "near Mecker"), October 1927 to September 1962. Monthly discharge only for October 1927.

Gage. Water-stage recorder. Datum of gage is 40.00 ft above mean Gulf level (datum of Corps of Engineers). May 1922 to January 1925, staff gage at site 500 ft downstream at datum about 1 1/2 ft lower. October to December 1927, staff gage at same site at datum 40.00 ft lower. Jan. 1, 1928, to Mar. 29, 1940, staff gage at same site and datum. Since Jan. 22, 1945, auxiliary staff gage 6.6 miles downstream at datum 25.10 ft above mean sea level (Louisiana Geodetic Survey bench mark).

Average discharge. 27 years (1922-24, 1927-62), 424 cfs (307,000 acre-ft per year).

Extremes. 1922-25, 1927-62: Maximum discharge, 28,200 cfs May 18, 1953 (gage height, 28.72 ft); reverse flow Nov. 13-15, 1922, probably caused by heavy rains in basin below station; minimum discharge unaffected by backwater or temporary diversion upstream, 50 cfs June 18, 1960.

Remarks. Slight regulation at low flow by Lake Cocodrie (usable capacity, 9,000 acre-ft). Storage began Jan. 23, 1959.

7-3850 Chatlin Lake Canal near Lecompte, La.

Location. Lat 31°37'10", long 92°20'40", in NW1/4 sec. 26, T.2 N., R.1 E., near center of span on downstream side of bridge on

State Highway 457, 1.2 miles downstream from Indian Bayou, and 3.7 miles northeast of Lecompte.

Drainage area. 75.9 sq mi. Flow includes diversion from Bayou Boeuf through Bayou Lamourie which is a considerable portion of the low-water flow.

Records available. August 1942 to September 1953.

Gage. Wire-weight gage read twice daily. Datum of gage is 39.96 ft above mean sea level (Louisiana Geodetic Survey bench mark). Prior to Sept. 8, 1953, at datum 3.00 ft higher. Since Nov. 10, 1944, auxiliary staff gage 1 mile upstream read twice daily.

Average discharge. 11 years, 234 cfs (169,400 acre-ft per year).

Extremes. 1942-53: Maximum discharge, 2,600 cfs May 18, 1953 (gage height, 19.51 ft; datum then in use); minimum, 0.1 cfs July 25, 1947.

Remarks. Entire flow of Bayou Lamourie, which formerly entered Bayou Boeuf is diverted by canal into Bayou du Lac and thence in Bayou des Glaises. Some flow is now diverted from Bayou Boeuf into canal through Bayou Lamourie. Some natural diversion at extremely high stages through Bayou Wilson 0.2 mile upstream. Diversions above and below station for irrigation.

8-0120 Calcasieu River near Glenmora, La.

Location. Lat 30°59'45", long 92°40'25", in SE1/4SE1/4 sec. 4, T.1 S., R.2 W., Louisiana meridian, on right bank on downstream side of bridge on State Highway 113, 1.0 mile upstream from Prairie Branch, and 4.6 miles northwest of Glenmora.

Drainage area. 499 sq mi.

Records available. August 1943 to September 1962.

Gage. Water-stage recorder. Datum of gage is 110.77 ft above mean sea level (Louisiana Geodetic Survey bench mark). Prior to Nov. 19, 1949, wire-weight gage at same site and datum.

Average discharge. 19 years, 786 cfs (569,000 acre-ft per year).

Extremes. 1943-62: Maximum discharge, 59,900 cfs May 19, 1953 (gage height, 21.55 ft); minimum, 15 cfs Sept. 27, 28, Oct. 7-9, 1954, Oct. 18, 1956; minimum gage height, 3.86 ft Oct. 18, 1956.

EXPLANATION

APPROXIMATE EXTENT OF SIGNIFICANT WATER-YIELDING SAND BEDS

SCREENED INTERVAL

RESISTIVITY IN OHMS M^2/M

DATUM MEAN SEA LEVEL

424 U S GEOLOGICAL SURVEY NUMBER, AND RAPIDES PARISH WATER WELL

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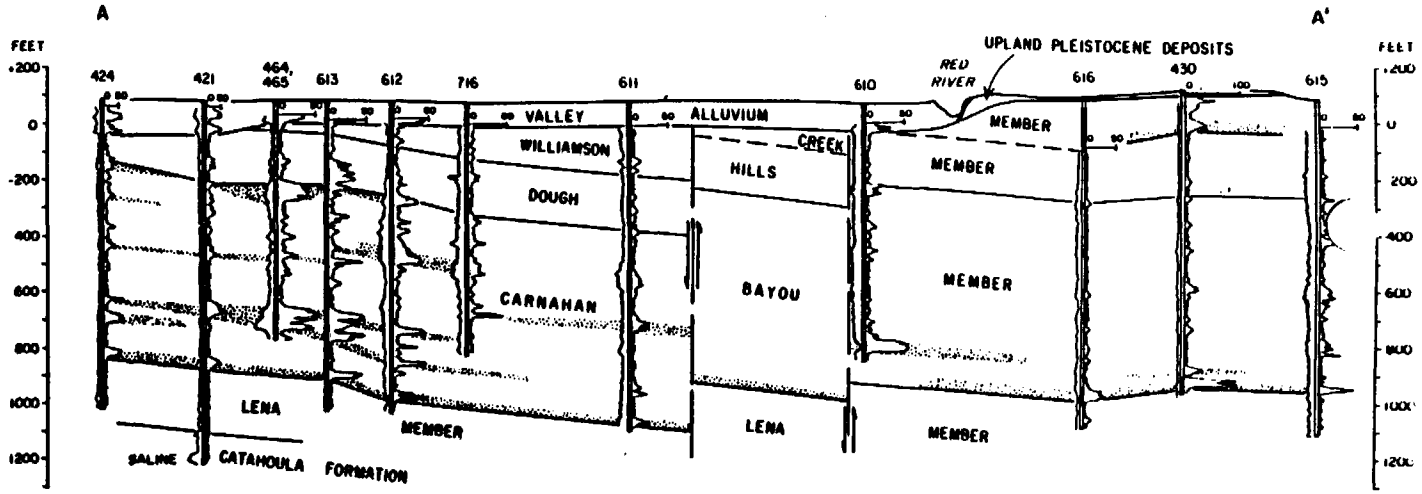

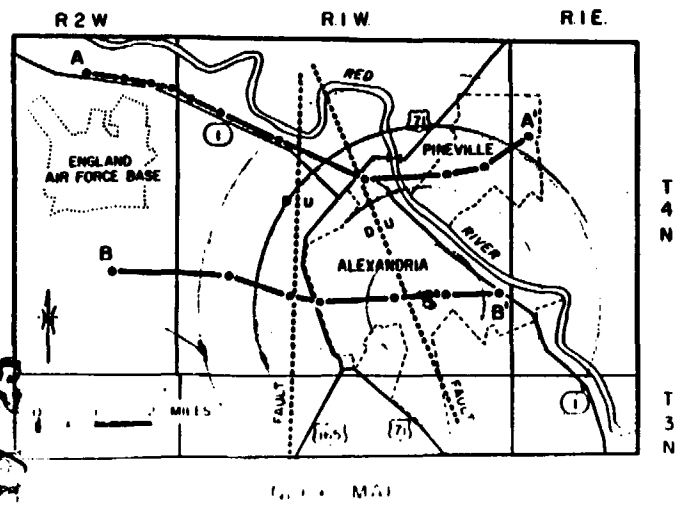

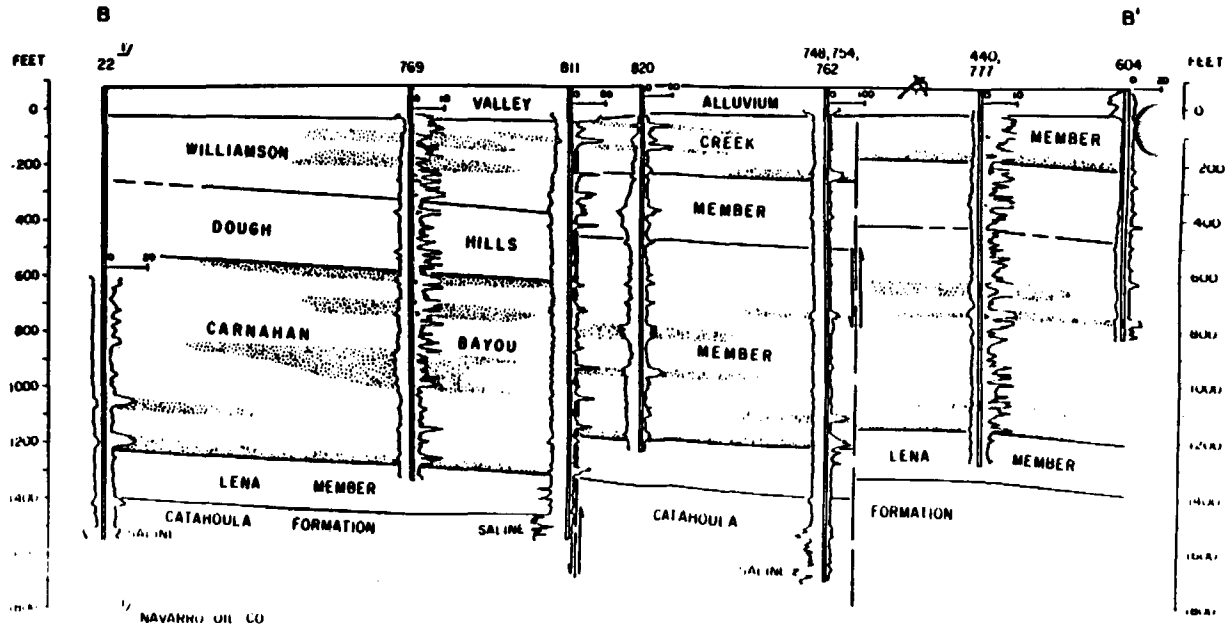

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(SEE TABLE 1 IN PLATE 4)

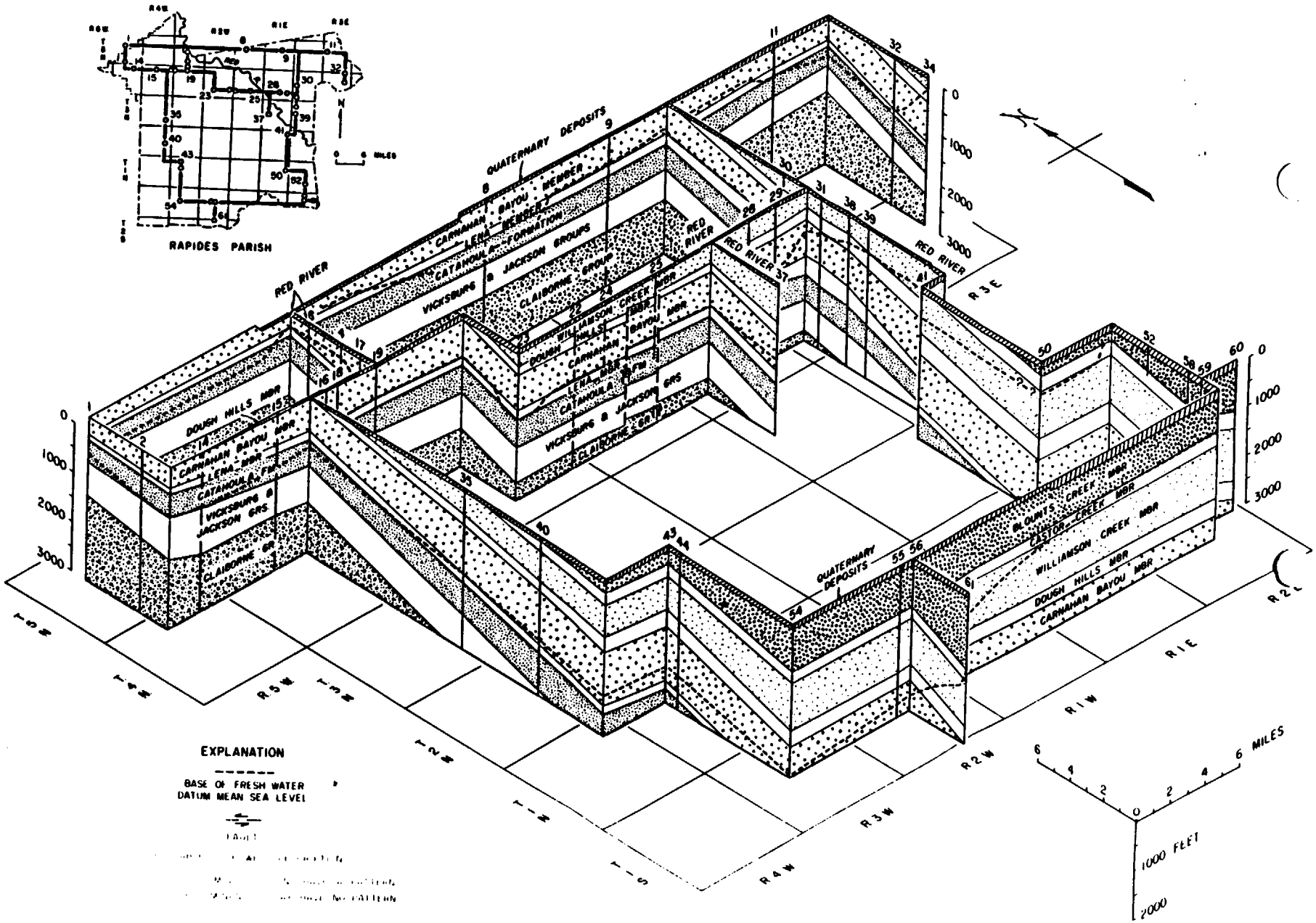

PLATE 4. FENCE DIAGRAM SHOWS THAT THE DEPTH OF GEOLOGIC UNITS AND FRESH WATER INCREASES SOUTHWARD IN RAPIDES PARISH.

REFERENCE 7

GROUND-WATER RESOURCES OF RAPIDES PARISH, LOUISIANA

Geological Bulletin No. 17

01

ABSTRACT

Ground water constitutes the principal source of water used in Rapides Parish, supplying six municipal systems and many domestic supplies. It is obtained from wells that draw from Miocene sands and the overlying formations of the Pliocene (?), Pleistocene, and Recent.

The Miocene formations consist principally of alternating sands, clays, and shales that dip regionally southeastward at a rate of 50 to 100 feet to the mile. Locally the formations dip from the highlands on both sides of the Red River flood plain toward the center of the valley, forming a synclinal trough which extends from a point a few miles southeast of Lecompte to a point a few miles northwest of Zimmerman. This feature is responsible in part for the numerous flowing wells along Bayou Rapides.

Sand, gravel, and clay of Pliocene (?), Pleistocene, and Recent age overlie the Miocene formations in most of the Parish. The Pliocene (?) sediments are found in the highlands and the Pleistocene and Recent are found in the lowlands along the main streams. In general, all of these materials thicken southeastward.

Sands of the Miocene formations contain water under sufficient artesian pressure to flow in some areas of Rapides Parish. The principal recharge of the Miocene sands occurs in the highlands where the sands lie at or near the surface. Static levels of the water in wells penetrating the Miocene sands in various parts of the Parish range from 24 feet above the surface to 180 feet below the surface depending upon the topography and the proximity of pumping wells.

Water in the Pliocene (?), Pleistocene, and Recent materials may or may not be under artesian pressure. Water-table conditions are usually found in the shallow

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wells, ranging from 20 to 50 feet in depth. The water of the deeper wells ranging from 50 to 160 feet in depth usually rises a considerable distance in the casing and may overflow in areas of low altitude.

The principal industrial and municipal supplies are derived from deep wells penetrating Miocene sands. These sands yield water which is soft and usually has a relatively high content of sodium and bicarbonate and a large total of dissolved solids. A small amount of fluoride has been found in most of this water, but this amount is generally within the limits set by the U. S. Public Health Service. The water levels of these Miocene sands have declined considerably with a relatively small amount of pumpage indicating that, although the quantity of water from these sands is generally sufficient for the present-day needs, increased demands in the future may necessitate the use of water from other sources.

Most of the rural wells in the highlands of the Parish penetrate shallow sands of the Pliocene (?). These sands yield soft water with a small total of dissolved solids. The quantity of this water available varies considerably with the locality but seems to be adequate for domestic and livestock purposes.

Large quantities of shallow water are available from the Pleistocene and Recent sediments present in the lowlands of the Parish. This water is hard and contains varying amounts of iron. In the vicinity of Catahoula Lake in the northeastern portion of the Parish, the mineralization of this water is large enough to render the water unsatisfactory for domestic or public consumption.

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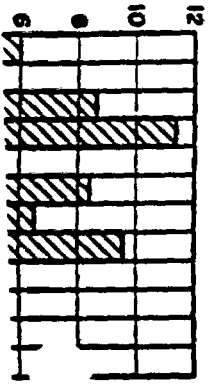

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GEOLOGY

General features

The predominantly clayey and sandy materials found at the surface throughout the entire State of Louisiana represent the near-shore deposition of sediments in the Gulf Coast Geosyncline during Cenozoic time. The maximum thickness of the Cenozoic deposits in Louisiana has been estimated by Howe (1936, p. 3) at 30,000 to 40,000 feet along the coast. This large thickness of sedimentary beds includes formations that range in age from Eocene to Recent. Regionally these formations dip toward the Gulf of Mexico and thicken considerably down the dip. The rate of dip ranges from about 20 feet per mile, in northern Louisiana, to more than 200 feet per mile in southern Louisiana (Howe, 1936, p. 20).

The main structural features consist of the Sabine uplift, the Monroe uplift, the Angelina-Caldwell flexure, and the Mobile-Tunica flexure (Howe, 1936, p. 20). The most prominent feature is the Sabine uplift, which occupies most of the northwestern portion of the State, separated from the Monroe uplift in the northeastern part by a synclinal area containing salt domes and minor folds. South of this area the general southward dip is interrupted by the Angelina-Caldwell flexure. This is a monoclinal fold developed in Tertiary time along a line of weakness extending in a northeasterly direction from Sabine Parish through central Louisiana to Caldwell Parish. A similar fold is found east of the Mississippi River in the "Florida Parishes" of Louisiana. This feature, according to Howe (1936, p. 20), reaches from near the mouth of Mobile Bay to the Tunica Hills of Wilkinson County, Miss., and the northern part of East and West Feliciana Parishes, La. Howe has named this feature the Mobile-Tunica flexure.

15 04

Geologic formations and their water-bearing properties

The oldest formation penetrated in drilling water wells in Rapides Parish is the Catahoula sandstone, of Miocene age. The principal aquifers below the Miocene — the Cockfield (Yegua) and the Sabine (Wilcox) formations of Eocene age — which furnish potable water in northern Louisiana, are deeply buried. Veatch (1906A, p. 84; 1906B, p. 328) reported brackish water from the Cockfield (Yegua) formation at the town of Colfax, which is located in Grant Parish, just north of the Rapides Parish boundary. Brackish water may also be expected in the Cockfield (Yegua) and older sediments in Rapides Parish. This fact, together with the cost of drilling to the necessary depth, would tend to discourage any attempt to develop water supplies from the Eocene formations.

Miocene series

The Miocene series in Rapides Parish is represented by 500 to 6,000 (?) feet (Fisk, personal communication) of argillaceous and arenaceous sediments underlain by the Vicksburg group (Oligocene) and overlain in part by sands, gravels, and clays formerly subdivided into Pliocene and Pleistocene but now considered only as Pleistocene by Fisk (1938, pp. 149-172). The relationship of the Miocene sediments to the underlying Oligocene materials has been the basis of contention over a period of years. (See Hilgard, 1881, p. 58; Harris and Veatch, 1899; Matson, 1916B; Howe, 1938; Chawner, 1936, p. 132; Fisk, 1938, p. 129.) The most recent information (Fisk, 1938, p. 129) indicates the probability of the relationship being transitional and conformable. According to Howe (1936, p. 30) and others, the lower Miocene is represented by the Catahoula sandstone which is reported to be 500 to 2,000 feet thick in this Parish (Fisk, personal communication). The overlying Miocene sediments are not differentiated in this report though they have been subdivided in the past into Pascagoula and Hattiesburg clay (Matson, 1916B, pp. 224, 225).

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The sediments now classed as lower Miocene or Catahoula in age were first described by Wailes (1854) under the name of Grand Gulf. The name Grand Gulf was retained in the literature by Hilgard (1860), Vaughan (1896), and others until 1906, when Veatch (1906A, pp. 42, 43; 1906B, p. 288) proposed the term Catahoula. The Catahoula was still regarded as Oligocene in age by Matson and others until the Tampa limestone, regarded as its equivalent in Florida (Matson, 1916B, pp. 225, 226; Maury, 1902), was referred to the Miocene by Cooke and Mossom (1928).

The description of the Catahoula sandstone by Matson (1916B, p. 226) may well be considered to apply to the entire Miocene series in Rapides Parish because of the lithologic similarity of all of the Miocene sediments. Matson states:

> "The Catahoula sandstone consists of alternating sandstones and sands, with lenticular beds of clay, the arenaceous sediments predominating. Conglomerates are rare, though small quartz and chert pebbles occur in some of the layers of sand, and pebbles of clay are found at many localities and at different stratigraphic horizons. The formation is non-marine but was deposited near the strand line, where small bodies of brackish water were isolated and, on evaporation, formed precipitates of salt and gypsum. The streams that transported the materials now constituting the formation had varying velocities and made deposits ranging in texture from clay to fine-grained conglomerates. The floods that transported the coarse materials eroded the surface of existing clay deposits, thus forming irregular contacts and incorporating more or less rounded fragments of the clay in the sands. The fossils, which are rare, are mostly leaves, but molluscan remains occur at a few places."

Among the few macrofossils found in the Miocene formations is the turret-shaped gastropod, *Potamides matsoni*. This gastropod was originally described by Dall (1913) from a dug well in sec. 28, T. 3 N., R. 2 W., a few miles southwest of Alexandria. A distinctive assemblage

of microfossils accompanies the *Potamides matsoni* shells and the zone in which both occur may be used for correlation purposes.

The presence of volcanic ash or tuff in various stages of alteration in the Miocene formations has been noted by several writers (Howe, 1933, pp. 637-639; Chawner, 1936, p. 125; Fisk, 1938, pp. 145-149).

Chawner (1936, pp. 124, 140) noted that some of the material is altered to bentonite. Many of the sandstones appear to have a matrix of weathered volcanic ash, and in adjacent Vernon Parish beds of bentonite are being utilized commercially in the making of drilling mud.

The outcrop of the Catahoula sandstone (see pls. 5, 6, and 7) forms the line of hills across Louisiana termed the Kisatchie Wold by Veatch (1906A, pp. 42, 43; 1906B, p. 287). These hills occupy the northwestern portion of Rapides Parish. Regionally the formations dip southeastward away from the Kisatchie Hills at a rate of 50 to 100 feet per mile. Locally, however, the formations slope from the highlands on both sides of the Red River flood plain toward the center of the valley, forming a synclinal trough which extends from a point southeast of Lecompte to a point considerably northwest of Zimmerman. This structural feature is shown by a cross section (pl. 2) from Camp Beauregard in the hill land north of Alexandria to Camp Packard situated in the upland southwest of the Red River. A steepening of the dip with depth in the section is apparent from these correlations and is to be expected in deltaic deposits such as these. The most persistent key beds in this area are the small hard rock bed or zone found at a depth of 400 to 500 feet in Alexandria and the "1,000-foot sand" at Alexandria.

The general structure from Alexandria to Meeker is represented by a cross section (pl. 3) made up from the drilling records of a line of wells located near the center of the synclinal trough in the flood-plain area.

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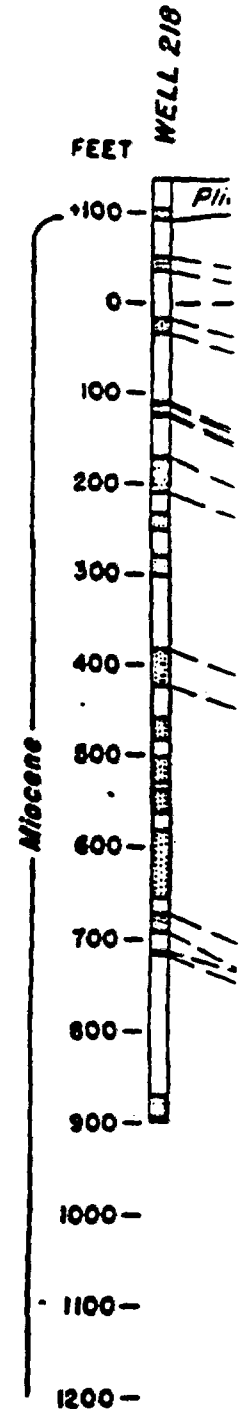

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The sands range considerably in thickness and shale content, and often are bifurcate down the dip.

The Miocene formations furnish the principal industrial and municipal water supplies of this area. The water-bearing sands are found in several parts of the Miocene section, those in the lower part yielding brackish water and gas. These sands vary considerably in thickness and extent. Artesian conditions are present in all of the Miocene water sands except in the recharge areas. Field determinations have indicated that the Miocene sands in general are not very permeable.

The most important water-bearing sands of the Miocene in the vicinity of Alexandria have been designated locally by the depth at which they generally occur within the city. The "400-foot sand" ranges in thickness from 20 to 40 feet. This bed is well developed at the City Park but partially grades into sandy shale in other areas. The "700-foot sand" is about 45 feet thick near the Monroe Street station. However, it varies considerably in thickness and composition toward the southeast. The "1,000-foot sand" is the most uniform and persistent aquifer in the area. In most places it is about 50 feet thick and is composed of a medium coarse sand. Relatively large supplies of water have been developed from this sand not only in Alexandria but also at several places in Pineville, the U. S. Veterans Hospital, and Camp Beauregard. The deeper Miocene sands at Alexandria penetrated by wells 10, 13, and 23 (see fig. 5 for location and table 5 for logs of wells 10 and 13) have yielded only salt water and gas at depths ranging from 1,400 to 1,880 feet.

Pliocene (?) series

The formations overlying the Miocene series in Rapides Parish, which consist of alternating sands, gravels, and clays, were regarded by Veatch (1906A, pp. 44-50; 1906B, pp. 291-312) as Pliocene, Pleistocene, and Recent in age. The deposits which he regarded as of Pliocene age were originally termed the Lafayette

formation by Hilgard (1891). The formation was renamed by Matson (1916A), when he substituted the name Citronelle formation. In 1933 Howe (1933, pp. 648-655) questioned the Pliocene age of this formation, and in 1936, Chawner (1936, pp. 136, 137) regarded it as Pleistocene. In later work by Fisk (1938, pp. 149-172) the formation was included in a series of terraces classed as Pleistocene in age. A description of these materials in Rapides Parish is now in preparation by Fisk.

The high lands of Rapides Parish are terraced with sands, gravels, and clays belonging to the Citronelle formation. (See pl. 8, fig. 1.) The formation is not present in the Red River flood plain. The thickness of this formation increases considerably in the southern portion of the Parish, where the city of Glenmora has a well in it at a depth of 147 feet. Its lithology was described by Matson (1916A, pp. 173-175) as follows:

> "The Citronelle formation is predominantly sandy but contains varying amounts of clay in the form of thin layers or lenses. The relative proportion of materials of different kinds varies from place to place, and in any one section it varies from top to bottom, though in general sand is everywhere abundant and at many places there is some gravel. . .
>
> "The sands of the Citronelle formation are sufficiently rounded to indicate that they have been subjected to extensive attrition. The pebbles vary greatly in degree of rounding; many of them are much waterworn and resemble pebbles found on the beach, others are only slightly rounded, and still others are subangular. The sand is predominantly quartz, and the pebbles in the Mississippi embayment are mostly chert, with a somewhat smaller percentage of crystalline quartz and quartzite. Many of the chert pebbles contain cavities lined with chalcedony in the form of agates or geodes, and a large number of them are fossiliferous, containing fragments of corals, crinoid stem, and other organic remains such as are common in the Paleozoic limestones and chert. . .
>
> "The clays vary greatly in character, some of the beds being relatively pure and others distinctly sandy.

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On the whole the sandy clays predominate, and in many places thin layers of sand are found in the clay beds. . .

"The texture of the formation in any particular locality depends entirely on the arrangement and relative percentages of the different kinds of materials. In general, the sands form more or less continuous beds containing lenses of pebbles or clay that in some places have considerable horizontal extent and in others are limited to only a few feet. Many clay lenses are only a few feet to a few rods in extent, though in places they interlock with other lenses lying above and below them, and in that way present the appearance of a continuous bed, unless it is possible to examine a section in detail. In the sands cross-bedding and cross lamination are the rule rather than the exception, the layers of clay and pebbles in many places being inclined at high angles. Smooth, even bedding is comparatively rare except in the clay lenses."

Large boulders such as the one shown in plate 8, figure 2, were reported by Veatch (1906A, p. 46; 1906B, p. 293) in the Citronelle in northern Louisiana. These boulders probably have been rafted to their present location by ice or floating tree roots. The Citronelle formation in most of southern Louisiana yields large quantities of water and is one of the chief water-bearing formations. In Rapides Parish the amount of water available from this formation varies in a general way with the thickness of the sand and gravel present. Large supplies of water may be developed in the southern part of the Parish where the deposits of sand and gravel are more than 100 feet thick, but only small supplies are found in the northern part of the Parish, where the sand and gravel are relatively thin. The water is usually under artesian pressure though water-table conditions are present in shallow wells less than 50 feet in depth.

Pleistocene and Recent series

The lowlands along the main streams and their tributaries in Rapides Parish are blanketed with Pleistocene and Recent sediments consisting principally of silt, clay,

and sand with some gravel lenses. (See logs, table 5.) The clay, which has a red color typical of the Red River alluvium, grades downward into fine sand and then into coarse sands and gravels with interbedded clay. Carbonized wood is often found near the base of the Pleistocene materials. The thickness of these deposits ranges from a few feet to about 160 feet, apparently increasing somewhat southeastward. Small domestic and livestock water supplies may be obtained from the fine sands at a depth of 30 to 80 feet. This water is usually under little or no artesian pressure. Large quantities of water are available from the coarser sands and gravels lying between 100 and 160 feet below the surface. This water is under artesian pressure and usually rises within 20 feet of the top of the casing of wells penetrating these coarser materials. The relatively small development of this source is probably due in part to the hardness of the water.

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WATER SUPPLIES

Springs

There are numerous springs in the Kisatchie Hills although none is large enough to receive special notice. Several bayous receive most of their water from springs, most of which are in the formations overlying the Miocene sediments. Castor Bayou, about 10 miles south of Alexandria, is an example of the spring-fed streams in the region.

Wells

The water supplies of Rapides Parish are obtained from wells that range in depth from 15 feet to over 1,200 feet. The records of 311 wells in Rapides Parish are shown in table 1, in pocket. The water is obtained in varying quantity and quality from sands of Miocene age and from sands and gravels overlying the Miocene.

There are approximately 175 deep wells in the Parish which derive water from Miocene sands. These wells range from 1½ inches to 12 inches in diameter and from 150 feet to over 1,200 feet in depth. The rural wells are generally less than 4 inches in diameter and less than 700 feet in depth. In the farm and industrial wells, 4 to 10 feet of screen usually are set, while the larger municipal wells may have a total of 10 to 40 feet of screen set at various depths. The deeper wells are drilled by rotary methods, though numerous wells 400 to 500 feet in depth have been drilled by jetting processes. The industrial and municipal wells have turbine pumps or air-lift installations which pump from 200 to 550 gallons a minute. The wells used for domestic purposes have equipment ranging from pitcher pumps to automatic pressure systems. The capacity of the rural wells is usually less than 30 gallons a minute.

Of the 175 wells in Miocene formations, about 50 wells in the Red River valley have enough pressure to

overflow at the surface. The shut-in pressures of these wells range at the present time from about one foot to 24 feet above the land surface, or approximately 81 to 118 feet above mean gulf level. The flow of these wells ranges from a fraction of a gallon a minute to about 25 gallons a minute. As the flowing wells are used only for domestic and livestock purposes, this volume of water is entirely adequate.

The yield of wells which penetrate Miocene formations ranges from a few gallons to about 500 gallons a minute. The yield may be expressed in terms of specific capacity, which is the number of gallons discharged per unit of drawdown or loss of head. The specific capacity is significant for comparison of the yield of different wells and for estimating the drawdown that will result if the yield of the well is increased by pumping. Well 209, at the Veterans Hospital near Pineville, which is equipped with a submerged air line and pressure gage for measuring the static and pumping level of the water, afforded an opportunity to approximate the specific capacity of the larger wells. This well is 10 inches in diameter, 650 feet deep, and has 30 feet of screen. On June 16, 1938, the static level was 154 feet below the gage and the pumping level was 179 feet while the well was being pumped at a rate of 130 gallons a minute, giving a specific capacity of about 5.2 gallons a minute per foot of drawdown.

The specific capacities of the flowing wells are between 1 and 1½ gallons a minute per foot of drawdown. For example, well 124, a 2-inch well with 10 feet of screen, had a pressure head of 15.6 feet at the discharge pipe, and a flow of about 23 gallons a minute. Using 15.6 feet as the drawdown, the specific capacity is about 1.5 gallons a minute per foot of drawdown.

The wells that furnish water from the formations overlying the Miocene sediments range in depth from 15 to 150 feet and in diameter from 2 inches to 14 feet. These are used mostly for domestic and stock purposes.

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There are a few drilled, driven, and dug wells, but most of the wells are bored wells with tile or wooden curbing. Some cylinder pumps and pitcher pumps are used, but most of the wells are equipped with a rope and bucket system. The shallow wells on the uplands which are terraced with gravel furnish relatively soft water suitable for all domestic purposes. However, the shallow wells in the bottom land supply hard water which contains iron, and water from many of the wells is used only for stock.

Public supplies

Public water supplies have been developed at Alexandria, Pineville, Glenmora, Boyce, Lecompte, and Cheneyville. The total pumpage of these towns approximates 3½ million gallons a day. Glenmora is the only one using water from a source other than the Miocene sands. A satisfactory water supply has been developed there in the Citronelle formation.

Alexandria

The municipal waterworks of Alexandria has ten deep wells, 10 and 12 inches in diameter, pumping an average of about 3,067,000 gallons daily into three reservoirs. All of the water is obtained from Miocene sands (Catahoula). The water is not treated before distribution in the city mains.

Only four of the ten wells are pumped continuously; the remainder serve as supplementary units. The wells are separated into two groups; one group near the City Park station and the other near the Monroe Street station. (See fig. 5.)

There are four wells equipped with electric turbine pumps at the City Park station. Two of these wells, wells 15 and 17 (see fig. 5), have screens in the "1,000-foot sand" which is at a depth of about 1,200 feet in this vicinity. These wells are pumped almost continuously. The other two wells, wells 14 and 18, supply water from

the "400-foot sand" and are pumped alternately. The four wells at the City Park station furnished an average of about 1,987,000 gallons daily in 1938.

The group of municipal wells near the Monroe Street station is composed of six wells (see fig. 5), wells 1, 2, 7, 9, 11, and 12, located within a radius of one-fourth mile of the station. It is reported that three wells (wells 9, 11, and 12) have screens in the "700-foot sand"; two (wells 1 and 2) in the "1,000-foot sand" (with the possibility of a second screen at 700 feet in well 1); and one (well 7) has two screens, one in each of the above sands. Well 7 is pumped continuously, being supplemented in dry weather by wells 11 and 12. All three wells are equipped with electric turbine pumps. The other three wells (wells 1, 2, and 9) have air-lift installations primarily for emergency usage. The average daily pumpage of this group of wells in 1938 was approximately 1,080,000 gallons.

Pineville

The Pineville water franchise is owned by the Louisiana Ice & Electric Co. One well (No. 201), equipped with an electric turbine pump, is continuously operated and another well (No. 202), equipped with an air lift, is maintained for emergencies. Both wells are 10 inches in diameter and have screens set in a Miocene sand at a depth of about 1,100 feet. The consumption of water approximates 170,000 gallons a day. The water is not treated.

Glenmora

The city water supply at Glenmora is obtained from a single 8-inch well (No. 254), 147 feet deep, which penetrated Pliocene (?) gravel. A supply of 100,000 to 125,000 gallons a day is pumped by air lift. The water is not treated.

Boyce

One air-lift well at the municipal power plant supplies 45,000 to 55,000 gallons a day to the citizens of Boyce.

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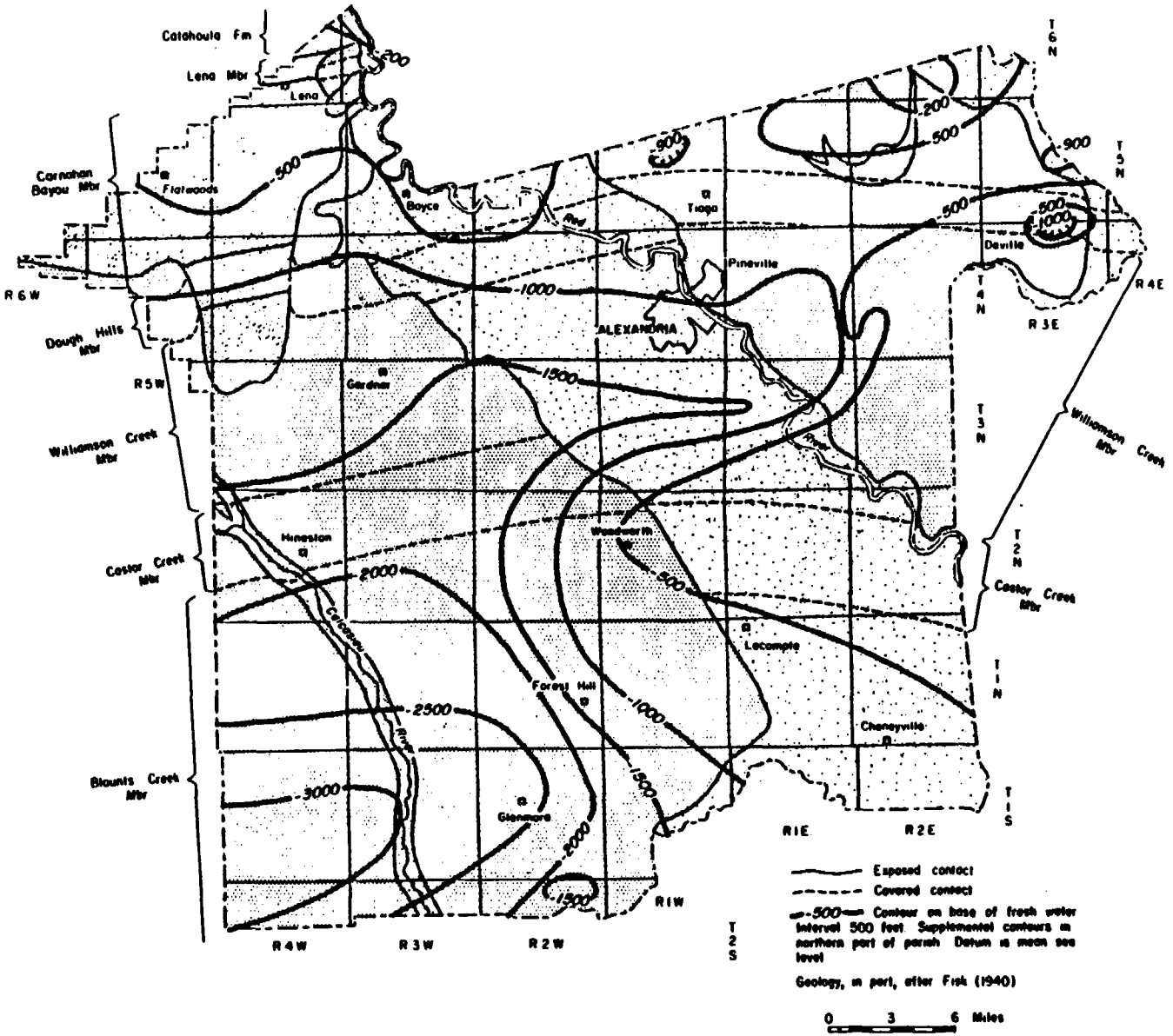
This well (No. 134) is 6 inches in diameter and about 310 feet deep with 20 feet of screen. The water is chlorinated before it is pumped into the city mains.

Lecompte

The town of Lecompte is supplied with water by the Louisiana Ice & Electric Co. The water is pumped from two 8-inch wells with screens set in a Miocene sand between 430 and 470 feet below the surface. Well 68 is pumped daily by means of an electric turbine. Well 67 is equipped with an air lift and is used only as a reserve source of supply. The consumption of water amounts to about 35,000 gallons of water a day. The water is not treated.

Cheneyville

The Louisiana Ice & Electric Co. furnishes about 15,000 gallons a day to consumers in Cheneyville from two wells penetrating a Miocene sand between 380 and 420 feet below the surface. Well 81 is 10 inches in diameter and is pumped by means of an electric turbine. Well 80 is 8 inches in diameter and is equipped with an air lift. The water is not treated.



EXPLANATION

QUATERNARY

Recent

Valley alluvium
Thickness 50-170 ft.

Sand and gravel in lower half of alluvium yield large quantities of hard, iron-bearing water. Source of irrigation supply

Pleistocene

Upland deposits
Thickness 0-200 ft.

Sand and gravel yield moderate quantities of soft water of low mineral content but acid-treading nature. Water-table conditions common

TERTIARY

Miocene

Fleming Formation of Fisk, 1940

Alternating sandy and clayey units

Blounts Creek Member
Thickness 7-1, 200 ft.

Sandy unit. Source of deep-well supplies in southern Rapides Parish. Thick beds of sand yield moderate supplies of soft water. High fluoride content in places

Castor Creek Member
Thickness 200-350 ft.

Fossiliferous clay, with sporadic beds of sand

Williamson Creek Member
Thickness 600-1, 600 ft.

Sandy unit. Supplies shallow municipal wells at Alexandria. Chief source of water supply for south-central Rapides Parish

Dough Hills Member
Thickness 150-500 ft.

Clay, with a few lenses of sand. Water in sand beds is hard

Carnahan Bayou Member
Thickness 500-1, 200 ft.

Sandy unit. Chief source of municipal and industrial supplies in the Alexandria area. Contains fresh water at depths exceeding 3, 000 feet in southwestern Rapides Parish

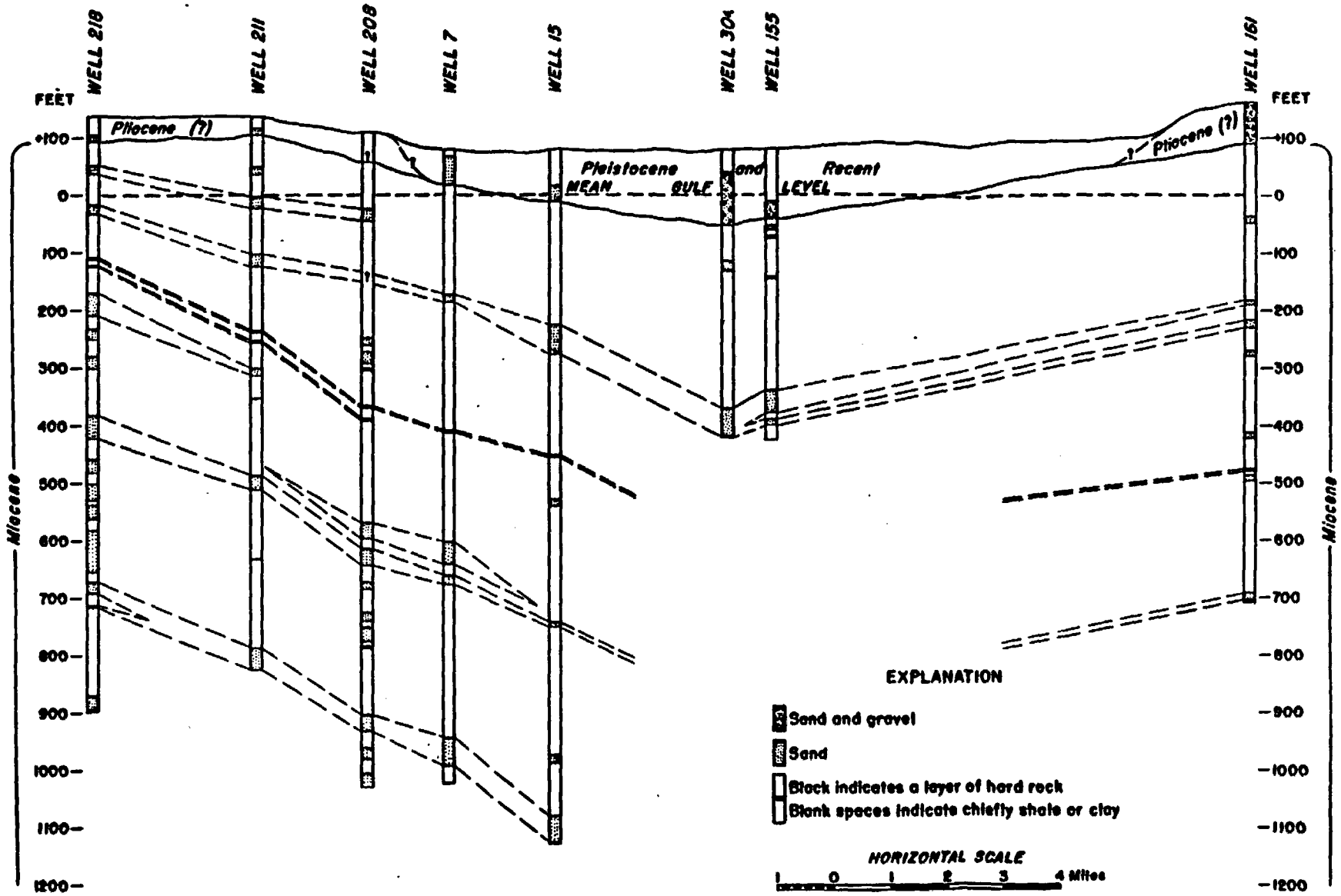
Lena Member
Thickness 100-400 ft.

Clay, with a few lenses of sand

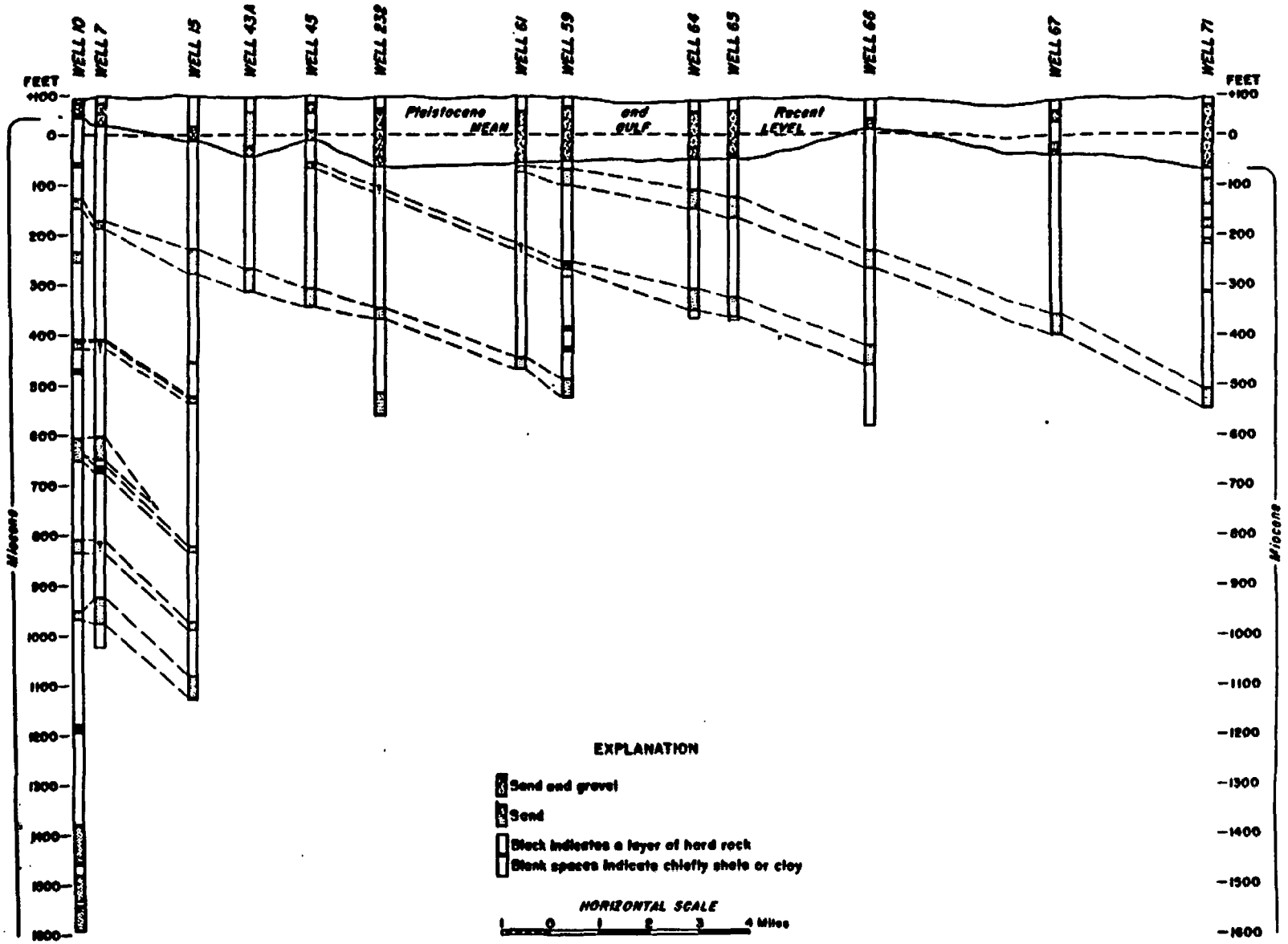
Catahoula Formation
Thickness 500-1, 000 ft.

Sandy unit. Contains fresh water in only a few small areas at the northern margin of Rapides Parish. Potentially important aquifer in these areas

PLATE 2. GENERALIZED GEOLOGY AND CONTOURS ON THE BASE OF FRESH WATER IN RAPIDES PARISH.



GEOLOGIC CROSS SECTION FROM CAMP BEAUREGARD TO CAMP PACKARD ALONG LINE AA' SHOWN ON PLATE I



GEOLOGIC CROSS SECTION FROM ALEXANDRIA TO MEEKER ALONG LINE BB' SHOWN ON PLATE I

14B

REFERENCE 8

RECORD OF COMMUNICATION

TYPE: Telephone Call **DATE:** 1-20-89 **TIME:** 1:35 p.m.

TO: Richard Brackney
Pineville Courthouse
Pineville, Louisiana
318-45-1431

FROM: Michelle Scanlon
FIT Geologist
ICF Technology, Inc.
Dallas, Texas
214-744-1641

SUBJECT: Water Use in the Pineville Area (LAD981054067)

SUMMARY OF COMMUNICATION:

The City of Pineville is on ground water; they have nine wells which are approximately 1,000 feet deep. About 20,000 people are serviced by these wells: 13,000 in Pineville and 7,000 in outlying areas. Five of the wells are located in the downtown area of Pineville, and the remaining four are spread about, but all are within the 4-mile radius. The city mixes its water for distribution.

The Red River Commission is developing a park and a boat ramp which they expect to be a highly used recreation area when the lock and dam project is done. The boat ramp will have access to the Red River and is located adjacent to Buhlow Lake, which is north of Pineville.

Presently at Buhlow Lake, an average of 5 or 6 cars are there whenever you pass by, and on nice days that number increases.

The nearest downstream lock or dam is at Ruby.

REFERENCE 9

RECORD OF COMMUNICATION

TYPE: Telephone Call **DATE:** 1-17-89 **TIME:** 1:30 p.m.

TO: Charles Miller
Superintendent
Alexandria, Louisiana
318-473-1261

FROM: Michelle Scanlon
FIT Geologist
ICF Technology, Inc.
Dallas, Texas
214-744-1641

SUBJECT: Water Supplies in Alexandria, Louisiana LAD 981054067

SUMMARY OF COMMUNICATION:

Mr. Miller said there are 64 wells, located in the City of Alexandria. These wells service about 60,000 people. In addition to servicing the City of Alexandria, they service the paper mill across the river (Red River), England Air Force Base and three small water districts: Chambers, Poland (south) and Rapides Island (west). There are not many private wells in the area; Alexandria services about a 10-mile area. The City of Alexandria mixes its water before distribution.

REFERENCE 10

BLUELINE

BLUELINE

MADE WITH RECYCLED PAPER

Record

ICF TECHNOLOGY, INC.

PROJECT MANAGER Kristine Lloyd

CONTRACT NAME PRCS

PROJECT CODE 37631-120-01

SITE: Colfax Creosoting

CITY / STATE: Pineville, LA

CERCLIS # LAD008184616

OTHER SITE #'s

START / FINISH DATES /

BOOK: _____ OF _____

BLUELINE

5/26/93 Called Mr Carl Johnson to set up a tentative date for on-site meeting. Left my name and phone number with secretary (318) 442-2467

6/1/93 Called and left message to have Mr. Johnson return my call 1500. Called Mr. Johnson. Explained who I was, etc. and that will like to do a meeting at Colfax next week. He said that they are already in full compliance with RCRA and did not understand why Superfund (CERCLA) has to look at the site. He said if they had to have an inspection, they'd like it on Tuesday, June 8, 1993. He will call their environmental contractor Ball Engineering and have Dr. Ball contact me to get more information regarding the EPA Superfund Section's need to look at Colfax.

6/7/93 Called Mr. Johnson to confirm inspection date on June 8, 1993. Told Mr. Johnson we'd be there after 10:00 a.m.

note: Hecico letter was Federal Expressed to Mr Johnson on 6/1/93. He returned the signed letter to the EPA on 6/7/93.

6/7/93 [illegible]

Colfax Creosoting

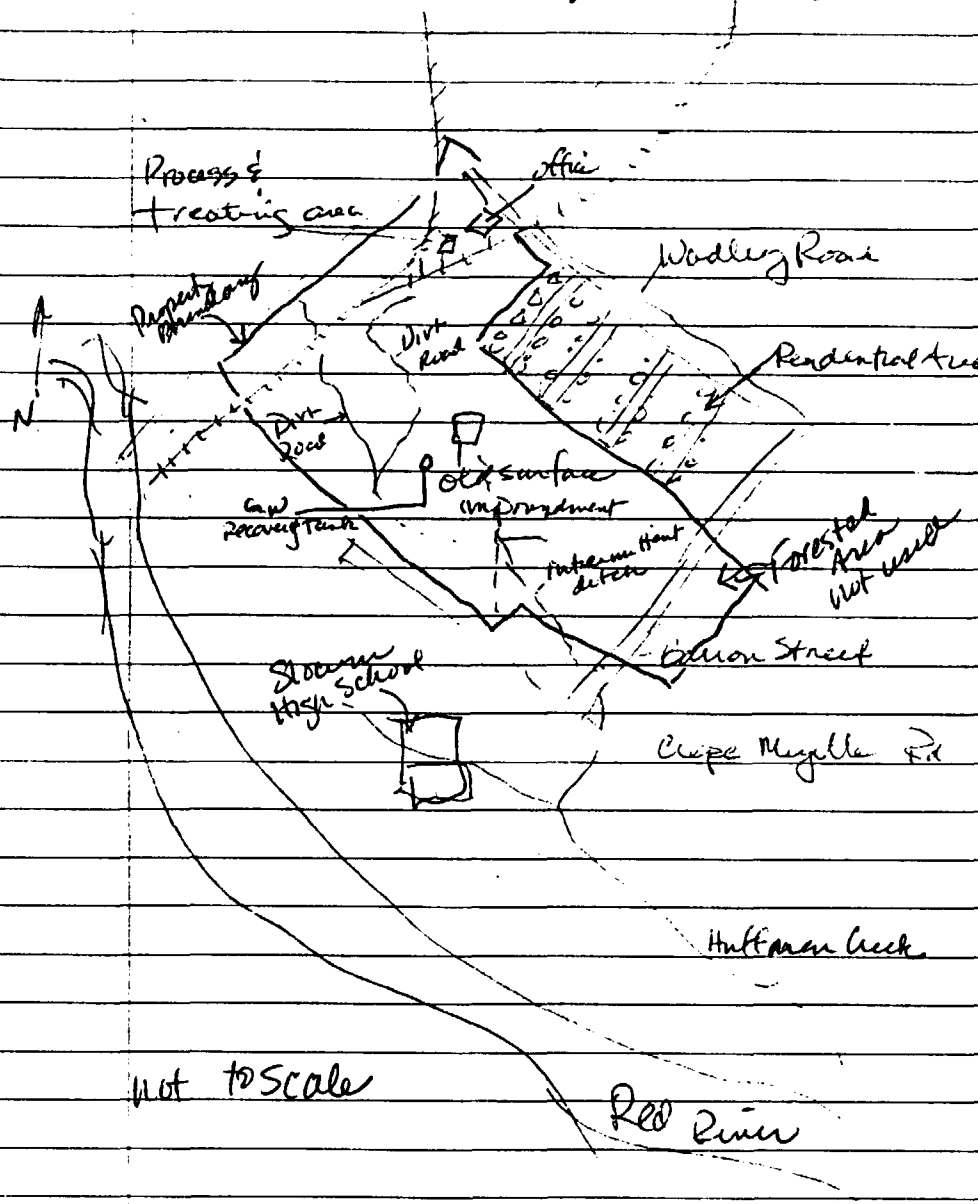
6/8/93 Lana Ocker and Kristine Lloyd depart Dallas 6/8/93 at 7.
0805. to arrive in Alexandria LA.
0935 Arrive Alexandria LA.
No rent cars available, will have
to wait 20-30 minutes.
1100 Pick-up HNu and RAM-4 at
Federal Express in Bolton Ave. Alexandria
Drive to Pineville to perform on-site
reconnaissance at Colfax Creosoting.
1200 Location on site map is marked
incorrectly. Will rectify.
1205 Call Mr. Johnson at Colfax to get
directions to Colfax. He will be out of
the office until after 1:00 pm.
1205-1300 Lunch - Locate Huey Long Hospital - Pineville
1305 Arrive at Colfax Creosoting.
Warm up HNu and calibrate.
1310 Enter Colfax Office and ask for Mr.
Johnson. Introduce Lana Ocker
& myself. Mr. Johnson again wanted
to know the reason that the Superfund
Division needed to investigate Colfax when
they are under RCRA jurisdiction and have
just completed an RFI. I explained to
him that Superfund was investigating
all wood treating facilities (as STM
John Jones told me to). Mr. Johnson
6/8/93 Kristine Lloyd

Colfax Creosoting

said he would take us to the
closed and abandoned surface impoundment.
Mr. Johnson said Colfax Creosoting
covers approximately 70-80 acres.
Has 180 employees. Most of the facility
is fenced and Colfax has a guard
on duty after hours.
Mr. Johnson drove us to the closed
surface impoundment which is located
on the east side of the property. The
surface impoundment was used until
1983 to collect the process water from
the penta and creosote processes.
Numerous monitoring wells have been
drilled to monitor ground water. A
recovery well is also used to capture
ground water (contaminated) into a tank.
Samples are collected quarterly and analyzed.
All monitoring wells on the facility are
checked at least once a week to insure
the security of the wells.
Again, Mr. Johnson wants to know why they
are being investigated by another division
within the EPA.
The closed surface impoundment was
seeded and grassed. The nearest
resident is approximately ~~1,000~~ 400 feet
to the northeast & residential area is

Colfax Creosoting - Continued

6/8/93 on the northeast side of the facility.



6/8/93 R

6/8/93 - Colfax Creosoting Cont'd.

J.S. Slocum School rd Calvo KA Mazelle Street

62 residences are located within 1/4 mile radius of site.

40 residences located within 1/2 mile radius - Will get remaining population from TGENIS Database.

The Slocum High School is approximately 600 feet from the closed surface impoundment.

It borders the property line on the south side.

No daycares are located within 200 feet from the property.

There is no agriculture or livestock grazing on-site or in the area.

Photo Log.

1325 NE - N - NW - 3 Photos of closed surface impoundments.

1326 W - Photo of Recovery Tank used to collect recovered ground water. Contents are removed ~~every 30 days~~ every other week. Tank has float control auto off if tank should near its capacity.

Film is not advancing correctly.

Head to the Processing Area. Area seems to have good housekeeping practices.

Ride to the apparent storage areas of the processed poles, etc.

Colfax receives water from City of Pineville.

No drinking water wells on site.

6/8/93 R

06

6/8/93 Colfax - continued

Mr. Johnson would like a copy of the PA report for ~~there~~ their file. I gave him the address of the FOL Office to request it. Mr. Johnson said that detailed information regarding the closed impoundment, storage and disposal of hazardous waste, etc. should be in the RFI.

1135 Lana Odom & K. Lloyd exit property.

Note: HNu w/ 10.2 probe was calibrated in front of Colfax Office and taken on-site. No readings above background were recorded at the closed surface impoundments or process areas. —

REFERENCE 11

LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT

BATON ROUGE

WELL0040 LOUISIANA DOTD - WATER WELL REGISTRATION SYSTEM PAGE 1

DATE: 06/08/93 WATER WELL REPORT SELECTION CRITERIA

		PARISH BOUNDARIES			
		MAX-N	MIN-S	MIN-E	MAX-W
PARISH(ES) REQUESTED :	079 - RAPIDES	313102	305328	920422	925851

USES REQUESTED : ALL - ALL USES

AQUIFERS REQUESTED : ALL - ALL AQUIFERS

WITHIN A 4.0000 MILE RADIUS OF LATITUDE 311910 LONGITUDE 922600

COMMENTS : REQUESTED BY:ICF TECH., INC. REFERENCE:3763112001

NUMBER OF RECORDS SELECTED = 320

LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT

BATON ROUGE

6/08/93 LOUISIANA DOTD - WATER WELL REGISTRATION SYSTEM PAGE 1

WELLRQ01 - REGISTERED WATER WELLS IN RAPIDES -- SORTED BY WELL NUMBER

REQUESTED BY:ICF TECH., INC. REFERENCE:3763112001

WITHIN A 4.0000 MILE RADIUS OF LATITUDE 311910 LONGITUDE 922600

IDENTIFICATION NUMBER	OWNER'S NAME	WELL NUMBER	OWNR NO.	GEOLOGIC UNIT / DRILLER	TOWN SECT	SHIP	RANGE	WELL USE	DEPTH SUB USE	CASING DIAMETER MATERIAL	SCREEN DIAMETER INTERVAL	DATE COMPL	AVAIL INFO
311854092265301	ALEXANDRIA, LA -	1		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					1140	12		1938	D Q W
				WHITE I B	009	04N	01W	ABANDONED	-D				
311852092270001	ALEXANDRIA, LA -	2		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					1086	12		1938	D Q
				WHITE I B	009	04N	01W	ABANDONED	-D				
311825092270401	ALEXANDRIA, LA -	3		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					575	12		0138	W
				UNKNOWN	009	04N	01W	ABANDONED	-D				
311825092270801	ALEX ICE/C STOR -	5		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					1100	6		0138	W
				UNKNOWN	009	04N	01W	ABANDONED	--				
311825092270501	ALEX ICE/C STOR -	6		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					1100	6		0138	
				UNKNOWN	009	04N	01W	ABANDONED	--				
311851092270501	ALEXANDRIA, LA -	7	7	CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					1072	12X12	12	0935	D Q W
				WHITE I B	009	04N	01W	PUBLIC SUPPLY	-P	METAL	MULTIPLE		
311855092270401	ALEXANDRIA, LA -	8		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					650	18		0138	
				WHITE I B	009	04N	01W	ABANDONED	-D				
311858092270001	ALEXANDRIA, LA -	9		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					743			0138	Q
				WHITE I B	009	04N	01W	ABANDONED	-D				
311910092271302	ALEXANDRIA, LA -	10		CATAHOULA FORMATION					1670	10		0837	D
				WHITE I B	010	04N	01W	ABANDONED	--				
311910092271301	ALEXANDRIA, LA -	11		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					722	12	12	1137	D Q W
				WHITE I B	010	04N	01W	ABANDONED	-D		676-722		
311911092271401	ALEXANDRIA, LA -	12	12	CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					722	12	12	0538	D Q W
				WHITE I B	010	04N	01W	PUBLIC SUPPLY	PA	METAL	676-722		
311831092282201	ALEXANDRIA, LA -	13		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					1300	12			D
				WHITE I B	035	04N	01W	ABANDONED	-D		1190-1230		
311731092270801	ALEXANDRIA, LA -	14		WILLIAMSON CREEK MEMBER OF FLEMING FORMATION					345	12			D Q
				WHITE I B	042	04N	01W	ABANDONED	-D				
311730092270801	ALEXANDRIA, LA -	15	15	CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					1202	12	12	0635	D Q PW
				WHITE I B	007	04N	01W	ABANDONED	--	METAL	1159-1202		
311730092270701	ALEXANDRIA, LA -	16	PAR9	CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					1227	10	10	0735	D
				WHITE I B	007	04N	01W	ABANDONED	-D		1171-1212		
311718092270801	ALEXANDRIA, LA -	17	PAR2	CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					1194	12		0330	ED Q PW
				WHITE I B	042	04N	01W	ABANDONED	-D		1146-1194		
311727092270901	ALEXANDRIA, LA -	18	PAR2	WILLIAMSON CREEK MEMBER OF FLEMING FORMATION					406	12	10	1930	E Q PW
				WHITE I B	007	04N	01W	OBSERVATION	-G				

WELLRQ01 - REGISTERED WATER WELLS IN RAPIDES -- SORTED BY WELL NUMBER
REQUESTED BY:ICF TECH., INC. REFERENCE:3763112001
WITHIN A 4.0000 MILE RADIUS OF LATITUDE 311910 LONGITUDE 922600

IDENTIFICATION NUMBER	OWNER'S NAME	WELL NUMBER	OWNR NO.	GEOLOGIC UNIT / DRILLER	TOWN SECT	SHIP	RANGE	WELL USE	DEPTH SUB USE	CASING DIAMETER / MATERIAL	SCREEN DIAMETER / INTERVAL	DATE COMPL	AVAIL INFO
311720092270301	ALEXANDRIA, LA -	19	TEST	CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					520			0538	D
				WHITE I B	042	04N	01W	TEST HOLE	PA				
311721092271801	ALEXANDRIA, LA -	20	20	WILLIAMSON CREEK MEMBER OF FLEMING FORMATION					390	10	10	1921	D Q PW
				UNKNOWN	042	04N	01W	ABANDONED	--	METAL	370-390		
311831092263401	ALEXANDRIA, LA -	21		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					590	6		1890	W
				ANDREWS WELL CO	007	04N	01W	ABANDONED	-D				
311721092282301	-	22		WILLIAMSON CREEK MEMBER OF FLEMING FORMATION					180	8		0138	Q W
				WHITE I B	033	04N	01W	DOMESTIC	--				
311722092283101	NATATORIUM -	23		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					1880	6		1911	D
				CLIFFORD L B	033	04N	01W	ABANDONED	--				
311854092270401	ALEX ICE/C STOR -	24A		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					487	8X8		0135	DMQ
				WHITE I B	009	04N	01W	OTHER	-U		MULTIPLE		
311854092270402	ALEX ICE/C STOR -	24B		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					1080			0135	D Q
				WHITE I B	009	04N	01W	OTHER	-U				
311844092264301	BENTLEY HOTEL -	25		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					1250	6	6	0118	W
				HINCEY TOM	009	04N	01W	ABANDONED	--		1030-1250		
311850092273401	MO PAC RR -	26		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					1100	10		1915	E PW
				UNKNOWN	040	04N	01W	OBSERVATION	-W				
311918092275401	LOUISVILLE, LA -	27		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					915	3		1228	Q W
				KELLY	014	04N	01W	INDUSTRIAL	99		875-915		
311805092263201	ROCK ISLAND RR -	28		RED RIVER ALLUVIAL AQUIFER					60			0118	W
				UNKNOWN	007	04N	01W	PUBLIC SUPPLY	PA				
311805092262701	-	29		PLEISTOCENE SERIES						4		0138	W
				UNKNOWN	007	04N	01W	ABANDONED	--				
311727092250901	-	30		RED RIVER ALLUVIAL AQUIFER					60	4		0138	W
				UNKNOWN	007	04N	01W	INDUSTRIAL	99				
311750092262401	RUSTON MACHINE -	31		RED RIVER ALLUVIAL AQUIFER					104	4		0108	Q W
				UNKNOWN	006	04N	01W	ABANDONED	--		64-104		
311749092262501	KELLOGG LMBR CO -	32		WILLIAMSON CREEK MEMBER OF FLEMING FORMATION					260			0138	
				UNKNOWN	007	04N	01W	ABANDONED	-D				
311750092262402	KELLOGG LMBR CO -	33		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					1098	6		1926	Q W
				WHITE I B	007	04N	01W	ABANDONED	-D		1018-1098		
311738092262901	PINE PROD CO -	34		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					1100	4			Q W
				WHITE I B	006	04N	01W	ABANDONED	--				

6/08/93

LOUISIANA DOTD - WATER WELL REGISTRATION SYSTEM
WELLRQ01 - REGISTERED WATER WELLS IN RAPIDES -- SORTED BY WELL NUMBER
REQUESTED BY:ICF TECH., INC. REFERENCE:3763112001
WITHIN A 4.0000 MILE RADIUS OF LATITUDE 311910 LONGITUDE 922600

IDENTIFICATION NUMBER	OWNER'S NAME	WELL NUMBER	OWNR NO.	GEOLOGIC UNIT / DRILLER	TOWN SECT SHIP RANGE	WELL USE	DEPTH / SUB USE	CASING DIAMETER / MATERIAL	SCREEN DIAMETER / INTERVAL	DATE COMPL	AVAIL INFO
311715092262501	PINE PROD CO	- 35		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION BALL	005 04N 01W	ABANDONED	1187 --	6	1147-1187	0130	W
311728092264501	MARTIN LUMBER	- 36		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION BLEVINS L P	006 04N 01W	INDUSTRIAL	1130 99	6		0138	Q W
311748092264301	KELLOGG LMBR CO	- 37		MIOCENE SERIES UNKNOWN	006 04N 01W	ABANDONED	-D	4		0138	W
311706092255501	KOPPERS CO	- 38		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION WHITE I B	003 04N 01W	ABANDONED	960 -D			0138	Q
311731092250501	RAPIDES PACKING	- 39		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION WHITE I B	002 04N 01W	ABANDONED	885 -D	8	865-885	1924	Q W
311703092263801	ARK OAK & FLOOR	- 40		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION UNKNOWN	042 04N 01W	ABANDONED	1200 -D	6			Q W
311731092270902	KELLOGG LMBR CO	- 41		WILLIAMSON CREEK MEMBER OF FLEMING FORMATION WHITE I B	042 04N 01W	ABANDONED	400 -D	6		1900	Q W
311650092263001	MO PAC RR	- 42		WILLIAMSON CREEK MEMBER OF FLEMING FORMATION LAYNE-ARK	054 04N 01W	INDUSTRIAL	402 99	16		0532	Q W
311645092263102	MO PAC RR	- 43A	1	WILLIAMSON CREEK MEMBER OF FLEMING FORMATION UNKNOWN	054 04N 01W	OTHER	386 -S	8	343-386	0525	D W
311645092263201	MO PAC RR	- 43B	2	WILLIAMSON CREEK MEMBER OF FLEMING FORMATION WHITE I B	054 04N 01W	PLUGGED	389 PA	8	338-382	0925	D
311645092263301	MO PAC RR	- 44		WILLIAMSON CREEK MEMBER OF FLEMING FORMATION WHITE I B	055 04N 01W	INDUSTRIAL	400 99	16		0129	W
311555092262101	MO PAC RR	- 45	13	WILLIAMSON CREEK MEMBER OF FLEMING FORMATION WHITE I B	045 03N 01W	ABANDONED	423 -D	10X6	6 382-423	1029	D Q W
311615092264201		- 46		RED RIVER ALLUVIAL AQUIFER TANNER W L	046 03N 01W	DOMESTIC	84 --	1.25		0127	Q W
311945092292101		- 151		DOUGH HILLS MEMBER OF FLEMING FORMATION KELLY	013 04N 01W	DOMESTIC	290 --	1.50	278-290	0837	Q W
311938092290901		- 152		DOUGH HILLS MEMBER OF FLEMING FORMATION HARPER F	080 04N 01W	PUBLIC SUPPLY	240 -R	3	230-240	0137	Q W
311628092274801		- 187		RED RIVER ALLUVIAL AQUIFER GUNNER	051 04N 01W	IRRIGATION	75 --	2	72-75	0638	Q W
311848092255002	L & A RAILROAD	- 200		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION UNKNOWN	021 04N 01W	INDUSTRIAL	1134 99	6	MULTIPLE	0533	D W

LOUISIANA DOTD - WATER WELL REGISTRATION SYSTEM

WELLRQ01 - REGISTERED WATER WELLS IN RAPIDES -- SORTED BY WELL NUMBER

REQUESTED BY:ICF TECH., INC. REFERENCE:3763112001

WITHIN A 4.0000 MILE RADIUS OF LATITUDE 311910 LONGITUDE 922600

IDENTIFICATION NUMBER	OWNER'S NAME	WELL NUMBER	OWNR NO.	GEOLOGIC UNIT / DRILLER	TOWN / SECT SHIP RANGE	WELL USE	DEPTH / SUB USE	CASING DIAMETER / MATERIAL	SCREEN DIAMETER / INTERVAL	DATE COMPL	AVAIL INFO
311916092261201	CEN LA ELEC CO	- 201		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION / UNKNOWN	019 04N 01W	ABANDONED	1064 --	10	10 1004-1064	1928	D Q W
311917092255901	CEN LA ELEC CO	- 202		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION / UNKNOWN	019 04N 01W	ABANDONED	1100 --	10		1938	W
311929092252801	LA COLLEGE	- 203		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION / WHITE I B	013 04N 01W	PUBLIC SUPPLY	1060 PA	6	1020-1060	1920	E Q W
311930092252801	LA COLLEGE	- 204		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION / UNKNOWN	013 04N 01W	PUBLIC SUPPLY	1040 PA	4		1906	W
311942092261001	LA STATE HOSPTL	- 205	A	CARNAHAN BAYOU MEMBER OF FLEMING FORMATION / UNKNOWN	018 04N 01W	PUBLIC SUPPLY	1080 PA	12X10 METAL	MULTIPLE	1936	Q W
311938092255501	LA STATE HOSPTL	- 206	B	CARNAHAN BAYOU MEMBER OF FLEMING FORMATION / UNKNOWN	018 04N 01W	PUBLIC SUPPLY	1100 PA	10	8 1040-1100	1930	W
311946092261201	LA STATE HOSPTL	- 207	C	CARNAHAN BAYOU MEMBER OF FLEMING FORMATION / UNKNOWN	017 04N 01W	PUBLIC SUPPLY	1100 PA	10			W
311941092261601	LA STATE HOSPTL	- 208	D	CARNAHAN BAYOU MEMBER OF FLEMING FORMATION / UNKNOWN	017 04N 01W	PUBLIC SUPPLY	1100 PA	6		1923	D W
312112092262401	VA HOSPITAL	- 209	B-103	CARNAHAN BAYOU MEMBER OF FLEMING FORMATION / WHITE I B	002 04N 01W	ABANDONED	650 --	10	10 600-630	0130	D Q W
312120092262401	VA HOSPITAL	- 210		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION / UNKNOWN	002 04N 01W	ABANDONED	652 -D	12	612-652	1917	W
312112092260801	VA HOSPITAL	- 211		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION / UNKNOWN	002 04N 01W	ABANDONED	950 -D	10		1917	W
312109092260301	VA HOSPITAL	- 212		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION / UNKNOWN	002 04N 01W	ABANDONED	940 -D	10	900-940	1926	W
312118092255601	VA HOSPITAL	- 213		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION / UNKNOWN	002 04N 01W	PUBLIC SUPPLY	644 PA	10		1917	D Q W
312200092241301	LA DEPT CORRECT	- 223	WELL	CARNAHAN BAYOU MEMBER OF FLEMING FORMATION / WHITE I B	039 05N 01E	PUBLIC SUPPLY	765 -R	10	6 MULTIPLE	0337	Q W
311652092243001		- 233		WILLIAMSON CREEK MEMBER OF FLEMING FORMATION / BLEVINS L A	004 04N 01E	DOMESTIC	390 --	6	375-390	0634	Q W
312221092250501		- 274		BENTLEY FORMATION / SMITH	036 05N 01W	DOMESTIC	62 --	14 WOOD		0238	Q W
312139092244201		- 275		UPLAND TERRACE DEPOSITS / BLEVINS L A	036 05N 01E	DOMESTIC	115 --	6		0135	D Q W

6/08/93 LOUISIANA DOTD - WATER WELL REGISTRATION SYSTEM PAGE 5

WELLRQ01 - REGISTERED WATER WELLS IN RAPIDES -- SORTED BY WELL NUMBER

REQUESTED BY:ICF TECH., INC. REFERENCE:3763112001

WITHIN A 4.0000 MILE RADIUS OF LATITUDE 311910 LONGITUDE 922600

IDENTIFICATION NUMBER	OWNER'S NAME	WELL NUMBER	OWNR NO.	GEOLOGIC UNIT / DRILLER	TOWN SECT	SHIP	RANGE	WELL USE	DEPTH SUB USE	CASING DIAMETER MATERIAL	SCREEN DIAMETER INTERVAL	DATE COMPL	AVAIL INFO
312147092244501		- 276		BENTLEY FORMATION					60	6		0937	Q W
				CROOKS M	036	05N	01E	PUBLIC SUPPLY	-P		58-60		
312018092250301		- 277		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					291			0338	Q
				BLEVINS L A	015	04N	01W	DOMESTIC	--				
312001092244401		- 278		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					204	2		0838	D
				WYNTER	007	04N	01E	DOMESTIC	--				
312134092261301		- 288		UPLAND TERRACE DEPOSITS								0135	Q W
				BOTTOM J	035	05N	01W	PUBLIC SUPPLY	-R				
311905092222001		- 297		UPLAND TERRACE DEPOSITS					43	6		0131	W
				ROLAND	025	04N	01E	DOMESTIC	--	TILE			
311926092232801		- 298		WILLIAMSON CREEK MEMBER OF FLEMING FORMATION					300	4		0127	
				BLEVINS L A	017	04N	01E	DOMESTIC	--				
312017092222701		- 299		UPLAND TERRACE DEPOSITS					35	8		0136	Q W
				BROWN R	009	04N	01E	DOMESTIC	--	WOOD			
311914092234001		- 300		UPLAND TERRACE DEPOSITS								0135	W
				UNKNOWN	017	04N	01E	DOMESTIC	--				
311821092272301	OLD COTTON BROS	- 905		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					620	6		1238	D Q W
				UNKNOWN	040	04N	01W	INDUSTRIAL	PA		590-620		
312117092263101	VA HOSPITAL	- 312	B-110	CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					645	10	10	0739	EDMQ W
				CARLOSS	002	04N	01W	ABANDONED	--	METAL	615-645		
311919092260401	PINEVILLE, LA	- 313	2	CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					1075	10		1139	DM W
				UNKNOWN	020	04N	01W	ABANDONED *	-D				
311812092264901	ALEXANDRIA, LA	- 316		RED RIVER ALLUVIAL AQUIFER					92	6		0840	D W
				UNKNOWN	007	04N	01W	ABANDONED	-D		71-92		
312124092245001		- 384		UPLAND TERRACE DEPOSITS					90	4		0837	D W
				CROOKS B M	006	04N	01E	OTHER	-U				
311843092274601	ALEXANDRIA, LA	- 404	404	WILLIAMSON CREEK MEMBER OF FLEMING FORMATION					253	8	8	0241	Q PW
				UNKNOWN	038	04N	01W	ABANDONED	-D	METAL	213-253		
311843092271001	ALEXANDRIA, LA	- 405	405	CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					1103	12		0241	E MQ W
				UNKNOWN	009	04N	01W	ABANDONED	-D		1040-1103		
311843092271002	ALEXANDRIA, LA	- 406	406	CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					580	10		0341	MQ PW
				UNKNOWN	009	04N	01W	ABANDONED	-D		540-580		
311801092283504	ALEXANDRIA, LA	- 407A		RED RIVER ALLUVIAL AQUIFER					120			0548	DMQ
				HINCEY TOM	033	04N	01W	ABANDONED	-D		100-120		

WELLRQ01 - REGISTERED WATER WELLS IN RAPIDES -- SORTED BY WELL NUMBER

REQUESTED BY:ICF TECH., INC. REFERENCE:3763112001

WITHIN A 4.0000 MILE RADIUS OF LATITUDE 311810 LONGITUDE 922600

IDENTIFICATION NUMBER	OWNER'S NAME	WELL NUMBER	OWNR NO.	GEOLOGIC UNIT / DRILLER	TOWN SECT	SHIP	RANGE	WELL USE	DEPTH SUB USE	CASING DIAMETER MATERIAL	SCREEN DIAMETER INTERVAL	DATE COMPL	AVAIL INFO
311801092283503	ALEXANDRIA, LA	- 407B		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					850	12X12X12	12	0548	
				HINCEY TOM	033	04N	01W	ABANDONED	--	STEEL	MULTIPLE		
311801092283502	ALEXANDRIA, LA	- 407C		CATAHOULA FORMATION					1550			0548	
				HINCEY TOM	033	04N	01W	ABANDONED	--		1540-1550		
311801092283501	ALEXANDRIA, LA	- 407D		CATAHOULA FORMATION					1580			0548	
				HINCEY TOM	033	04N	01W	ABANDONED	--		1570-1580		
311825092262701	ALEXANDRIA, LA	- 408		WILLIAMSON CREEK MEMBER OF FLEMING FORMATION					311	12		0841	MQ W
				BLEVINS L P	007	04N	01W	ABANDONED	--	METAL			
311825092262702	ALEXANDRIA, LA	- 409	409	CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					780	12		0841	MQ
				UNKNOWN	007	04N	01W	ABANDONED	-D				
311843092274602	ALEXANDRIA, LA	- 410	410	CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					1160	12		1950	E Q PW
				UNKNOWN	038	04N	01W	ABANDONED	-D	METAL			
311900092261601	PINEVILLE, LA	- 411		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					1065	12X6	6	0841	D Q W
				UNKNOWN	021	04N	01W	PUBLIC SUPPLY	-P	METAL	1015-1065		
312019092254701	PINEVILLE, LA	- 412	1	CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					1026	12	12	0342	M W
				WHITE I B	012	04N	01W	PUBLIC SUPPLY	PA		986-1026		
311955092252501	PINEVILLE, LA	- 413	2	CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					1050	12	12	0442	W
				UNKNOWN	012	04N	01W	ABANDONED	-D		1010-1050		
311945092255301	PINEVILLE, LA	- 414	3	CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					1042	12	12	0442	W
				UNKNOWN	019	04N	01W	ABANDONED	--		994-1042		
311945092291801		- 427		DOUGH HILLS MEMBER OF FLEMING FORMATION					260	2		1241	Q W
				SIMPSON	013	04N	01W	PUBLIC SUPPLY	-R		252-260		
311959092261401	LA STATE HOSPTL	- 428	PINE	CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					1043	12		0744	E M P
				UNKNOWN	018	04N	01W	OTHER	PA				
311955092252501	LA COLLEGE	- 430	2	CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					1072	12	8	0545	E W
				BLEVINS, L P	021	04N	01W	PUBLIC SUPPLY	PA		1030-1070		
312109092255001	VA HOSPITAL	- 431		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					779	8		1941	Q W
				CARLOSS	001	04N	01W	OBSERVATION	-Q	STEEL	745-779		
311729092261001	ALEXANDRIA, LA	- 440	JONES	CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					740	13X6	6	0961	ED Q PW
				BLEVINS L P	005	04N	01W	PUBLIC SUPPLY	PA	METAL	710-740		
311736092271201	ALEXANDRIA, LA	- 441A		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					825	12	12	1955	E Q PW
				EUNICE IRON	007	04N	01W	ABANDONED	-D	METAL	795-825		
311736092271202	ALEXANDRIA, LA	- 441B	441	CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					1190	12X8	8	0867	E MQ W
				HENRY, L. B.	007	04N	01W	PUBLIC SUPPLY	PA	METAL	1140-1200		

LOUISIANA DEPARTMENT OF TRANSPORTATION AND DEVELOPMENT

BATON ROUGE

6/08/93

LOUISIANA DOTD - WATER WELL REGISTRATION SYSTEM

WELLRQ01 - REGISTERED WATER WELLS IN RAPIDES -- SORTED BY WELL NUMBER

REQUESTED BY:ICF TECH., INC. REFERENCE:3763112001

WITHIN A 4.0000 MILE RADIUS OF LATITUDE 311810 LONGITUDE 922600

IDENTIFICATION NUMBER	OWNER'S NAME	WELL NUMBER	OWNR NO.	GEOLOGIC UNIT / DRILLER	TOWN SECT SHIP RANGE	WELL USE	DEPTH / SUB USE	CASING DIAMETER / MATERIAL	SCREEN DIAMETER / INTERVAL	DATE COMPL	AVAIL INFO
311832092265801		- 444		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION / UNKNOWN	009 04N 01W	INDUSTRIAL	1300 / 99	4			
311746092264001	KELLOGG LMBR CO	- 445		WILLIAMSON CREEK MEMBER OF FLEMING FORMATION / UNKNOWN	007 04N 01W	INDUSTRIAL	350 / 99	3		0161	
312148092240001	PINECREST S SCH	- 452		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION / HENRY, L. B.	036 05N 01E	ABANDONED	702 / --	10X8 / METAL	578-702	0365	D W
311748092270001	ALEXANDRIA, LA	- 453		UPLAND TERRACE DEPOSITS / UNKNOWN	007 04N 01W	PUBLIC SUPPLY	114 / PA	6	94-114		Q W
311728092264502	MARTIN LUMBER	- 454		WILLIAMSON CREEK MEMBER OF FLEMING FORMATION / BLEVINS L P	006 04N 01W	INDUSTRIAL	341 / 99	6	6 / 311-341	0749	Q
311709092265701	ALEXANDRIA, LA	- 455		UPLAND TERRACE DEPOSITS / UNKNOWN	036 04N 01W	ABANDONED	114 / --	10	94-114		Q W
311723092275001	ALEXANDRIA, LA	- 456		UPLAND TERRACE DEPOSITS / UNKNOWN	035 04N 01W	ABANDONED	114 / --		94-114		Q
311737092271201	ALEXANDRIA, LA	- 457		UPLAND TERRACE DEPOSITS / UNKNOWN	007 04N 01W	ABANDONED	114 / --		94-114		Q
311737092271202	ALEXANDRIA, LA	- 458		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION / UNKNOWN	007 04N 01W	PLUGGED	341 / PA	10			M
311808092270001		- 462		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION / UNKNOWN	007 04N 01W	ABANDONED	1115 / --	6	1070-1110	0640	E M
311731092250502		- 604		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION / UNKNOWN	002 04N 01W	ABANDONED	856 / --	8	8 / 834-856	0356	E
311843092271003	ALEXANDRIA, LA	- 607	607	CARNAHAN BAYOU MEMBER OF FLEMING FORMATION / LA WELL CO	009 04N 01W	PUBLIC SUPPLY	578 / PA	16X10 / STEEL	10 / 548-578	1056	ED Q PW
311713092273201	ALEXANDRIA, LA	- 608	608	WILLIAMSON CREEK MEMBER OF FLEMING FORMATION / UNKNOWN	042 04N 01W	ABANDONED	290 / --	16X10	255-290	1056	EDM W
311732092260701	ALEXANDRIA, LA	- 609	TEST	NO WELL MADE, LOG DEPTH SHOWN / LA WELL CO	005 04N 01W	ABANDONED	1200 / --			0456	E
311918092274001	ALEXANDRIA, LA	- 610	610	CARNAHAN BAYOU MEMBER OF FLEMING FORMATION / LA WELL CO	010 04N 01W	PUBLIC SUPPLY	892 / -P	16X10 / METAL	10 / 852-892	0556	ED Q PW
311948092291101	ALEXANDRIA, LA	- 611	TEST	NO WELL MADE, LOG DEPTH SHOWN / LA WELL CO	013 04N 01W	TEST HOLE	1204 / --			0556	ED
311955092252502	PINEVILLE, LA	- 614	4	CARNAHAN BAYOU MEMBER OF FLEMING FORMATION / BLEVINS L P	012 04N 01W	PUBLIC SUPPLY	1040 / -P	12X6	6 / 985-1040	1256	ED PW

WELLRQ01 - REGISTERED WATER WELLS IN RAPIDES -- SORTED BY WELL NUMBER

REQUESTED BY:ICF TECH., INC. REFERENCE:3763112001

WITHIN A 4.0000 MILE RADIUS OF LATITUDE 311910 LONGITUDE 922600

IDENTIFICATION NUMBER	OWNER'S NAME	WELL NUMBER	OWNR NO.	GEOLOGIC UNIT / DRILLER	TOWN SECT	SHIP	RANGE	WELL USE	DEPTH SUB USE	CASING DIAMETER / MATERIAL	SCREEN DIAMETER / INTERVAL	DATE COMPL	AVAIL INFO
311958092244301	PINEVILLE, LA	- 615	KEES	NO WELL MADE, LOG DEPTH SHOWN					1200			1056	ED
				BLEVINS L P	007	04N	01E	TEST HOLE	--				
311920092260801	PINEVILLE, LA	- 616	2	CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					1078	12X6	6	1256	E Q W
				UNKNOWN.	019	04N	01W	PUBLIC SUPPLY	-P		1038-1078		
311907092260101	PINEVILLE, LA	- 619		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					1080	12X6	6	0357	E PW
				UNKNOWN	021	04N	01W	PUBLIC SUPPLY	-P		1020-1080		
311918092275301	ALEXANDRIA, LA	- 628	628	CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					909	16X10	10	1156	D Q PW
				UNKNOWN	014	04N	01W	PUBLIC SUPPLY	-P	METAL	868-909		
311908092230301		- 701		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					554	2	2	0857	E W
				HENRY, L. B.	017	04N	01E	DOMESTIC	--		542-554		
311912092221701		- 715		AQUIFER UNKNOWN					475			0158	E
				HENRY, L. B.	016	04N	01E	OTHER	-U				
311630092261001	U S GEOL SURVEY	- 722		RED RIVER ALLUVIAL AQUIFER					87	1.25	1.25	0258	D Q W
				U.S.G.S.	050	04N	01W	OBSERVATION	-W	METAL	84-87		
311836092262701	U S GEOL SURVEY	- 723		RED RIVER ALLUVIAL AQUIFER					75	1.25	1.25	0358	D Q W
				U.S.G.S.	007	04N	01W	OBSERVATION	-W	STEEL	72-75		
311831092263402		- 728		MIOCENE SERIES					285	2.50	2.50		Q W
				THIELS, JOHN	008	04N	01W	DOMESTIC	--		275-285		
311908092230201		- 747		MIOCENE SERIES					274	2	2	1058	W
				HENRY, L. B.	017	04N	01E	OTHER	-U		266-274		
311727092270801	ALEXANDRIA, LA	- 748	748	CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					1213	13X8	8	1159	ED Q PW
				LAYNE (LA)	007	04N	01W	PUBLIC SUPPLY	-P	METAL	1178-1213		
311728092270901	ALEXANDRIA, LA	- 754	754	WILLIAMSON CREEK MEMBER OF FLEMING FORMATION					344	10X8	8	1059	D Q PW
				LAYNE (LA)	007	04N	01W	PUBLIC SUPPLY	-P	METAL	324-344		
311727092271101	ALEXANDRIA, LA	- 762	762	CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					1302	12X8X8	8	0862	ED Q PW
				LAYNE (LA)	042	04N	01W	PUBLIC SUPPLY	PA	STEEL	1272-1302		
311729092261101	ALEXANDRIA, LA	- 777	JONES	CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					1147	13X6	6	0662	M PW
				BLEVINS L P	005	04N	01W	PUBLIC SUPPLY	PA	METAL	1123-1147		
311830092264801	SOUTHERN BELL	- 784		NO WELL MADE, LOG DEPTH SHOWN					200			0462	E
				GREEN K	009	04N	01W	CATHODIC	--				
312024092260101		- 786		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					818	4X2	2	0762	E MQ W
				UNKNOWN	011	04N	01W	DOMESTIC	--		798-818		
312031092253901		- 795		WILLIAMSON CREEK MEMBER OF FLEMING FORMATION					472	4	3	0962	W
				UNKNOWN	012	04N	01W	DOMESTIC	--		452-472		

6/08/93 LOUISIANA DOTD - WATER WELL REGISTRATION SYSTEM PAGE 9

WELLRQ01 - REGISTERED WATER WELLS IN RAPIDES -- SORTED BY WELL NUMBER

REQUESTED BY:ICF TECH., INC. REFERENCE:3763112001

WITHIN A 4.0000 MILE RADIUS OF LATITUDE 311910 LONGITUDE 922600

IDENTIFICATION NUMBER	OWNER'S NAME	WELL NUMBER	OWNR NO.	GEOLOGIC UNIT / DRILLER	TOWN SECT	SHIP	RANGE	WELL USE	DEPTH SUB USE	CASING DIAMETER MATERIAL	SCREEN DIAMETER INTERVAL	DATE COMPL	AVAIL. INFO
311551092261401	R SCHOOL BOARD	- 805		WILLIAMSON CREEK MEMBER OF FLEMING FORMATION					413	4X3	3	0152	
				SIMPSON	044	03N	01W	PUBLIC SUPPLY	-T		393-413		
312040092223101		- 807		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					762	4X2	2	1062	E W
				HENRY, L. B.	004	04N	01E	DOMESTIC	--		752-762		
311726092290301	ALEXANDRIA, LA	- 811		NO WELL MADE, LOG DEPTH SHOWN								1162	E
				BLEVINS L P	084	04N	01W	TEST HOLE	PA				
311716092230701	BODCAW CO	- 813		NO WELL MADE, LOG DEPTH SHOWN					1548			0860	E
				LAYNE (LA)	036	04N	01E	TEST HOLE	--				
311936092225901		- 818		WILLIAMSON CREEK MEMBER OF FLEMING FORMATION					272	2	2	1262	E W
				HENRY, L. B.	017	04N	01E	DOMESTIC	--		262-272		
311722092283106	ALEXANDRIA, LA	- 820	820	WILLIAMSON CREEK MEMBER OF FLEMING FORMATION					225	12X6	6	0363	E PW
311655 922828	-REV. COORDS.			UNKNOWN	032	04N	01W	PUBLIC SUPPLY	-P	METAL	210-225		
311722092283105	ALEXANDRIA, LA	- 820A		WILLIAMSON CREEK MEMBER OF FLEMING FORMATION					220			0363	E Q W
				BLEVINS L P	032	04N	01W	TEST HOLE	--		215-220		
311722092283104	ALEXANDRIA, LA	- 820B		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					885			0363	E Q W
				BLEVINS L P	032	04N	01W	TEST HOLE	--		880-885		
311722092283103	ALEXANDRIA, LA	- 820C		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					1040			0363	E Q W
				BLEVINS L P	032	04N	01W	TEST HOLE	--		1035-1040		
311722092283102	ALEXANDRIA, LA	- 820D		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					1265			0363	E Q W
				BLEVINS L P	032	04N	01W	TEST HOLE	--		1260-1265		
311612092270603	ALEXANDRIA, LA	- 823	823	WILLIAMSON CREEK MEMBER OF FLEMING FORMATION					432	12X6	6	0663	EDMQ PW
				BLEVINS L P	047	03N	01W	PUBLIC SUPPLY	-P		MULTIPLE		
311612092270604	ALEXANDRIA, LA	- 824	824	CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					995	12	6	1963	
				UNKNOWN	047	03N	01W	ABANDONED	-D		931-995		
311612092270601	ALEXANDRIA, LA	- 825	825	CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					1272	12X6		0963	D Q W
				BLEVINS L P	047	03N	01W	PUBLIC SUPPLY	-P	STEEL	1240-1272		
311612092270602	ALEXANDRIA, LA	- 827	827	CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					995	12X6	6	0164	D Q W
				BLEVINS L P	047	03N	01W	PUBLIC SUPPLY	PA		935-995		
312045092223101		- 828		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					874	2		1063	E Q W
				ACME	004	04N	01E	DOMESTIC	--	METAL	MULTIPLE		
311942092261201	LA STATE HOSPTL	- 829		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					1026	12X8	8	0964	EDMQ PW
				MUSTANG DRLG	018	04N	01W	PUBLIC SUPPLY	PA	STEEL	994-1026		
311915092275401	ALEXANDRIA, LA	- 830		RED RIVER ALLUVIAL AQUIFER					67	6	6	0464	D Q PW
				BLEVINS L P	014	04N	01W	TEST HOLE	--	METAL	57-67		

WELLRQ01 - REGISTERED WATER WELLS IN RAPIDES -- SORTED BY WELL NUMBER

REQUESTED BY:ICF TECH., INC. REFERENCE:3763112001

WITHIN A 4.0000 MILE RADIUS OF LATITUDE 311910 LONGITUDE 922600

IDENTIFICATION NUMBER	OWNER'S NAME	WELL NUMBER	OWNR NO.	GEOLOGIC UNIT / DRILLER	TOWN SECT	SHIP	RANGE	WELL USE	DEPTH / SUB USE	CASING DIAMETER / MATERIAL	SCREEN DIAMETER / INTERVAL	DATE COMPL.	AVAIL INFO
311742092263601	KELLOGG LMBR CO - 854			CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					1120	6	6	0866	E Q W
				UNKNOWN	007	04N	01W	ABANDONED	-D		1080-1120		
311614092252001	U S GEOL SURVEY - 949			RED RIVER ALLUVIAL AQUIFER					66	1.25	1.25	1169	D Q W
				U.S.G.S.	070	04N	01W	OBSERVATION	-W	METAL	63-66		
311840092253501	LA PUBLIC WORKS -1012			CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					1125	4X2	3	1973	EDMQ W
				THOMAS, DOYLE	021	04N	01W	TEST HOLE	PA	STEEL	1110-1120		
312040092254801	LA PUBLIC WORKS -1038			CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					920	4X2	3	1973	EDMQ PW
				THOMAS, DOYLE	001	04N	01W	TEST HOLE	PA	STEEL	910-920		
312038092254701	PINEVILLE, LA -1080			CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					932	12X8	8	0274	D Q W
				UNKNOWN	001	04N	01W	PUBLIC SUPPLY	-P	METAL	882-932		
311936092271201	U S GEOL SURVEY -1132			RED RIVER ALLUVIAL AQUIFER					55	1.25	1.25	0178	D Q W
				U.S.G.S.	016	04N	01W	OBSERVATION	-W	METAL	52-55		
311815092263701	U S GEOL SURVEY -1135			RED RIVER ALLUVIAL AQUIFER					85	1.25	1.25	0178	D Q W
				U.S.G.S.	007	04N	01W	OBSERVATION	-W	METAL	82-85		
311843092274603	U S GEOL SURVEY -1138			RED RIVER ALLUVIAL AQUIFER					74	1.25	1.25	0278	D Q W
				U.S.G.S.	038	04N	01W	TEST HOLE	--	METAL	71-74		
311937092285301	U S GEOL SURVEY -1139			RED RIVER ALLUVIAL AQUIFER					63	1.25	1.25	0278	D Q W
				U.S.G.S.	017	04N	01W	TEST HOLE	--	METAL	61-63		
311723092283001	U S GEOL SURVEY -1144			RED RIVER ALLUVIAL AQUIFER					95	1.25	1.25	0278	D Q W
				U.S.G.S.	032	04N	01W	TEST HOLE	--	METAL	92-95		
311756092285701	U S GEOL SURVEY -1145			RED RIVER ALLUVIAL AQUIFER					91	1.25	1.25	0278	D Q W
				U.S.G.S.	031	04N	01W	TEST HOLE	--	METAL	88-91		
311612092270605	U S GEOL SURVEY -1151			RED RIVER ALLUVIAL AQUIFER					76	1.25	1.25	0278	D Q W
				U.S.G.S.	047	03N	01W	TEST HOLE	--	METAL	73-76		
311717092244201	U S GEOL SURVEY -1153			RED RIVER ALLUVIAL AQUIFER					74	1.25	1.25	0278	D Q W
				U.S.G.S.	002	04N	01E	OBSERVATION	-W	METAL	71-74		
311730092270901	U S GEOL SURVEY -1154			RED RIVER ALLUVIAL AQUIFER					86	1.25	1.25	0378	D Q W
				U.S.G.S.	007	04N	01W	TEST HOLE	--	METAL	83-86		
311810092274501	U S GEOL SURVEY -1155			RED RIVER ALLUVIAL AQUIFER					73	1.25	1.25	0378	D Q W
				U.S.G.S.	037	04N	01W	ABANDONED	-D	METAL	70-73		
311717092273301	U S GEOL SURVEY -1157			RED RIVER ALLUVIAL AQUIFER					93	1.25	1.25	0378	D Q W
				U.S.G.S.	042	04N	01W	OBSERVATION	PA	METAL	90-93		
311814092281401	U S GEOL SURVEY -1158			RED RIVER ALLUVIAL AQUIFER					74	1.25	1.25	0378	D Q W
				U.S.G.S.	035	04N	01W	OBSERVATION	-W	METAL	71-74		

6/08/93 LOUISIANA DOTD - WATER WELL REGISTRATION SYSTEM PAGE 11

WELLRQ01 - REGISTERED WATER WELLS IN RAPIDES -- SORTED BY WELL NUMBER

REQUESTED BY:ICF TECH., INC. REFERENCE:3763112001

WITHIN A 4.0000 MILE RADIUS OF LATITUDE 311910 LONGITUDE 922600

IDENTIFICATION NUMBER	OWNER'S NAME	WELL NUMBER	OWNR NO.	GEOLOGIC UNIT / DRILLER	TOWN SECT	SHIP	RANGE	WELL USE	DEPTH SUB USE	CASING DIAMETER MATERIAL	SCREEN DIAMETER INTERVAL	DATE COMPL	AVAIL INFO
311827092272901	U S GEOL SURVEY	-1159		RED RIVER ALLUVIAL AQUIFER					75	1.25	1.25	0378	D Q W
				U.S.G.S.	038	04N	01W	TEST HOLE	--	METAL	72-75		
311805092265901	U S GEOL SURVEY	-1160		RED RIVER ALLUVIAL AQUIFER					85	1.25	1.25	0378	D Q W
				U.S.G.S.	007	04N	01W	TEST HOLE	--	METAL	82-85		
311637092274001	U S GEOL SURVEY	-1167		RED RIVER ALLUVIAL AQUIFER					90	1.25	1.25	0578	D Q W
				U.S.G.S.	052	04N	01W	OBSERVATION	-W	METAL	87-90		
311804092264601	U S GEOL SURVEY	-1169		RED RIVER ALLUVIAL AQUIFER					66	1.25		0678	D Q W
				U.S.G.S.	008	04N	01W	OBSERVATION	-W	METAL	63-66		
311805092274601	U S GEOL SURVEY	-1175		RED RIVER ALLUVIAL AQUIFER					86	1.25	1.25	0978	D Q W
				U.S.G.S.	037	04N	01W	ABANDONED	--	METAL	83-86		
311724092263801	LA PACIFIC CORP	-1178	4	CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					1165	8X8		0568	E W
				BLEVINS L P	006	04N	01W	INDUSTRIAL	99	STEEL	1125-1165		
311736092271203	ALEXANDRIA, LA	-1202	1202	CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					1190	12X8	8	0282	EDMQ W
				STAMM-SCHEELE	007	04N	01W	PUBLIC SUPPLY	-P		1153-1190		
311612092270606	ALEXANDRIA, LA	-1203	1203	CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					990	12X8	8	0382	EDMQ W
				STAMM-SCHEELE	047	03N	01W	PUBLIC SUPPLY	-P		937-990		
312039092234801	PINEVILLE, LA	-1204		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					640	12	8	1181	EDM W
				CALHOUN	005	04N	01E	PUBLIC SUPPLY	-P	STEEL	610-640		
311906092225201	PINEVILLE, LA	-1206,		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					933	12	8	0282	EDM W
				CALHOUN	016	04N	01E	PUBLIC SUPPLY	-P	STEEL	898-933		
312118092262201	VA HOSPITAL	-1212		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					632	12	6	0482	DMQ W
				CONTINENTAL	002	04N	01W	PUBLIC SUPPLY	-T		592-632		
311657092285201		-1213		RED RIVER ALLUVIAL AQUIFER					120	6	6	0981	D W
				LEE PLUMBING	029	04N	01W	IRRIGATION	--	PLASTIC	100-120		
312227092245801	RAPIDES W W D 3	-1224	4	CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					792	12X8	8	0483	EDMQ W
				LAYNE (LA)	025	05N	01W	PUBLIC SUPPLY	-P	STEEL	760-792		
311944092255201	PINEVILLE, LA	-1225		CARNAHAN BAYOU MEMBER OF FLEMING FORMATION					1036	12	8	0582	EDM W
				CALHOUN	018	04N	01W	PUBLIC SUPPLY	-P	STEEL	968-1036		
311855092253001	COLFAX CREOSOT	-1229	3	WILLIAMSON CREEK MEMBER OF FLEMING FORMATION					59	4	4	0483	D
				MORPHIS	021	04N	01W	MONITOR	--	PLASTIC	49-59		
311859092291001	U S CORPS ENGRS	-1312	L1-1	RED RIVER ALLUVIAL AQUIFER					74	1.25	1.25	0487	DM W
				U.S. ARMY (VED)	021	04N	01W	OBSERVATION	-O	PLASTIC	71-73		
311859092291011	U S CORPS ENGRS	-1312P	L11S	RED RIVER ALLUVIAL AQUIFER					24	1.25	1.25	0487	D W
				U.S. ARMY (VED)	021	04N	01W	OBSERVATION	-O	PLASTIC	22-24		

WELLRQ01 - REGISTERED WATER WELLS IN RAPIDES -- SORTED BY WELL NUMBER
REQUESTED BY:ICF TECH., INC. REFERENCE:3763112001
WITHIN A 4.0000 MILE RADIUS OF LATITUDE 311910 LONGITUDE 922600

IDENTIFICATION NUMBER	OWNER'S NAME	WELL NUMBER	OWNR NO.	GEOLOGIC UNIT / DRILLER	TOWN SECT SHIP RANGE	WELL USE	DEPTH SUB USE	CASING DIAMETER MATERIAL	SCREEN DIAMETER INTERVAL	DATE COMPL	AVAIL INFO
311724092290801	U S CORPS ENGRS	-1314	L2-1	RED RIVER ALLUVIAL AQUIFER U.S. ARMY (VED)	029 04N 01W	OBSERVATION	74 -0	1.25 PLASTIC	1.25 71-74	0487	DM W
311724092290811	U S CORPS ENGRS	-1314P	L21S	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT U.S. ARMY (VED)	029 04N 01W	OBSERVATION	13 -0	1.25 PLASTIC	1.25 11-13	0487	D W
311713092252801	U S CORPS ENGRS	-1318	L4-1	RED RIVER ALLUVIAL AQUIFER U.S. ARMY (VED)	002 04N 01W	OBSERVATION	74 -0	1.25 PLASTIC	1.25 71-73	0487	DM W
311713092252811	U S CORPS ENGRS	-1318P	L41S	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT U.S. ARMY (VED)	002 04N 01W	OBSERVATION	16 -0	1.25 PLASTIC	1.25 13-16	0487	D W
311725092264001	LA PACIFIC CORP	-1334		WILLIAMSON CREEK MEMBER OF FLEMING FORMATION J.D.'S	006 04N 01W	INDUSTRIAL	330 24	4 PLASTIC	4 310-330	1187	D W
311725092264002	LA PACIFIC CORP	-1335		WILLIAMSON CREEK MEMBER OF FLEMING FORMATION J.D.'S	006 04N 01W	INDUSTRIAL	338 24	4 PLASTIC	4 318-338	1187	D W
311729092261002	ALEXANDRIA, LA	-1357	JONES	CARNAHAN BAYOU MEMBER OF FLEMING FORMATION CONTINENTAL	005 04N 01W	PUBLIC SUPPLY	723 -P	16 STEEL	10 689-723	1291	EDMQ PW
311805092252601		-1382		AQUIFER CODE NOT ASSIGNED PEART'S	024 04N 01W	IRRIGATION	100 --	2 PLASTIC	2 90-100	1091	D W
311854092253101	COLFAX CREOSOT	-5003Z		RED RIVER ALLUVIAL AQUIFER LEE PLUMBING	020 04N 01W	PLUGGED	61 PA				
311853092253101	COLFAX CREOSOT	-5009Z	4	RED RIVER ALLUVIAL AQUIFER PEART'S	021 04N 01W	MONITOR	58 --	4 PLASTIC	4 48-58	1283	D W
311644092233001	INTERNAT PAPER	-5048Z	B-17	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT STS	038 04N 01E	MONITOR	34 --	2 PLASTIC	2 24-34	0384	DM W
312135092250701	S CENTRAL BELL	-5083Z	MW-1	UPLAND TERRACE AQUIFER CONFINING UNIT UNKNOWN	036 05N 01W	MONITOR	12 PA	4			
311857092293401		-5111Z		WILLIAMSON CREEK MEMBER OF FLEMING FORMATION MAXIM'S	025 04N 01W	DOMESTIC	217 --	2 PLASTIC	2 207-217	0885	D W
312121092262601	VA HOSPITAL	-5119Z		NO WELL MADE, LOG DEPTH SHOWN COLE'S	002 04N 01W	HEAT PUMP	200 HH			0186	D
311845092253001	COLFAX CREOSOT	-5136Z	MW-5	AQUIFER CODE NOT ASSIGNED BALL		MONITOR	40 --	2 PLASTIC	2 30-40	0686	D W
312052092282301		-5162Z		RED RIVER ALLUVIAL AQUIFER PEART'S	004 04N 01W	DOMESTIC	90 --	2 PLASTIC	2 80-90	0886	D W
312135092250702	S CENTRAL BELL	-5269Z	MW-2	UPLAND TERRACE AQUIFER CONFINING UNIT UNKNOWN	036 05N 01W	MONITOR	9 PA	4			

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WELLRQ01 - REGISTERED WATER WELLS IN RAPIDES -- SORTED BY WELL NUMBER

REQUESTED BY:ICF TECH., INC. REFERENCE:3763112001

WITHIN A 4.0000 MILE RADIUS OF LATITUDE 311810 LONGITUDE 922600

IDENTIFICATION NUMBER	OWNER'S NAME	WELL NUMBER	OWNR NO.	GEOLOGIC UNIT / DRILLER	TOWN SECT	SHIP	RANGE	WELL USE	DEPTH SUB USE	CASING DIAMETER MATERIAL	SCREEN DIAMETER INTERVAL	DATE COMPL	AVAIL INFO	
311847092283301	FAST TRACK	-5278Z		NO WELL MADE, LOG DEPTH SHOWN					300			0888	D	
				COLE'S	019	04N	01W	HEAT PUMP	HH					
312135092250703	S CENTRAL BELL	-5289Z	MW-3	UPLAND TERRACE AQUIFER CONFINING UNIT					9	4				
				UNKNOWN	036	05N	01W	MONITOR	PA					
311803092284501	EXXON CO USA	-5298Z	MW-1	AQUIFER CODE NOT ASSIGNED					15	4	4	0792	D	W
				PSI/PTL	032	04N	01W	MONITOR	--	PLASTIC	3-15			
312002092294901	SOUTHLAND CORP	-5301Z	MW-1	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT					13		4	0888	D	W
				IT CORPORATION	079	04N	01W	MONITOR	--	PLASTIC	1-13			
312002092294902	SOUTHLAND CORP	-5302Z	MW-2	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT					14	4	4	0888	D	
				IT CORPORATION	079	04N	01W	MONITOR	PA	PLASTIC	2-14			
311717092283001	SOUTHLAND CORP	-5303Z	MW-1	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT					13		4	0888	D	W
				IT CORPORATION	032	04N	01W	MONITOR	--	PLASTIC	1-13			
311717092283002	SOUTHLAND CORP	-5304Z	MW-2	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT					15	4	4	0888	D	W
				IT CORPORATION	032	04N	01W	MONITOR	--	PLASTIC	1-15			
312051092264601	RED RIVER COMM	-5307Z		UPLAND TERRACE DEPOSITS					69	4				
				UNKNOWN	002	05N	01W	PLUGGED	PA					
311859092280601	CIRCLE K	-5386Z	MW-1	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT					13	4	4	0389	D	W
				PETRON, INC.	015	04N	01W	ABANDONED	-D	PLASTIC	2-13			
311859092280602	CIRCLE K	-5387Z	MW-2	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT					13	4	4	0389	D	W
				PETRON, INC.	015	04N	01W	ABANDONED	-D	PLASTIC	2-13			
311859092280603	CIRCLE K	-5388Z	MW-3	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT					13	4	4	0389	D	W
				PETRON, INC.	015	04N	01W	ABANDONED	-D	PLASTIC	2-13			
311859092280604	CIRCLE K	-5389Z	MW-4	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT					13	4	4	0389	D	W
				PETRON, INC.	015	04N	01W	ABANDONED	-D	PLASTIC	2-13			
311859092280605	CIRCLE K	-5390Z	MW-5	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT					13	4	4	0389	D	W
				PETRON, INC.	015	04N	01W	ABANDONED	-D	PLASTIC	2-13			
312149092243301	MID STATE SAND	-5393Z	MW-1	UPLAND TERRACE DEPOSITS					43	4	4	0589	D	W
				PETRON, INC.	036	05N	01E	ABANDONED	-D	PLASTIC	30-43			
312149092243302	MID STATE SAND	-5394Z	MW-2	UPLAND TERRACE DEPOSITS					43	4	4	0589	D	W
				PETRON, INC.	036	05N	01E	ABANDONED	-D	PLASTIC	30-43			
312149092243303	MID STATE SAND	-5395Z	MW-3	UPLAND TERRACE DEPOSITS					43	4	4	0589	D	W
				PETRON, INC.	036	05N	01E	ABANDONED	-D	PLASTIC	30-43			
311745092284601		-5396Z	1	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT					14	4	4	0689	D	W
				PETRON, INC.	031	04N	01W	MONITOR	--	PLASTIC	4-14			

WELLRQ01 - REGISTERED WATER WELLS IN RAPIDES -- SORTED BY WELL NUMBER

REQUESTED BY:ICF TECH., INC. REFERENCE:3763112001

WITHIN A 4.0000 MILE RADIUS OF LATITUDE 311910 LONGITUDE 922600

IDENTIFICATION NUMBER	OWNER'S NAME	WELL NUMBER	OWNR NO.	GEOLOGIC UNIT / DRILLER	TOWN SECT	SHIP	RANGE	WELL USE	DEPTH SUB USE	CASING DIAMETER MATERIAL	SCREEN DIAMETER INTERVAL	DATE COMPL	AVAIL INFO
311745092284602		-5397Z	2	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT					14	4	4	0689	D W
				PETRON, INC.	031	04N	01W	MONITOR	--	PLASTIC	4-14		
311745092284603		-5398Z	3	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT					14	4	4	0689	D
				PETRON, INC.	031	04N	01W	MONITOR	--	PLASTIC	4-14		
311830092273101	MCCARTNEY OIL	-5399Z	1	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT					12	4	4	0889	D W
				PETRON, INC.	039	04N	01W	MONITOR	--	PLASTIC	2-12		
311830092273102	MCCARTNEY OIL	-5400Z	2	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT					13	4	4	0889	D W
				PETRON, INC.	039	04N	01W	MONITOR	--	PLASTIC	3-13		
311830092273103	MCCARTNEY OIL	-5401Z	3	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT					12	4	4	0889	D W
				PETRON, INC.	039	04N	01W	MONITOR	--	PLASTIC	2-12		
311830092273104	MCCARTNEY OIL	-5402Z	4	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT					13	4	4	0889	D W
				PETRON, INC.	039	04N	01W	MONITOR	--	PLASTIC	3-13		
311709092270901	A H LATHAM INC	-5403Z	1	NO WELL MADE, LOG DEPTH SHOWN					7			0689	
				PETRON, INC.	042	04N	01W	MONITOR	PA				
311709092270902	A H LATHAM INC	-5404Z	1A	NO WELL MADE, LOG DEPTH SHOWN					13		4	0689	D W
				PETRON, INC.	042	04N	01W	MONITOR	--	PLASTIC			
311709092270101	HUC INC	-5424Z	MW-2	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT					10		4	1189	D W
				PETRON, INC.	063	04N	01W	MONITOR	--	PLASTIC	1-10		
311709092270102	HUC INC	-5425Z	MW-3	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT					10		4	1189	D W
				PETRON, INC.	063	04N	01W	MONITOR	--	PLASTIC	1-10		
311709092270103	HUC INC	-5426Z	MW-4	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT					13	4	4	1189	D W
				PETRON, INC.	063	04N	01W	MONITOR	--	PLASTIC	3-13		
311709092270104	HUC INC	-5427Z	MW-5	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT					13	4	4	1189	D W
				PETRON, INC.	063	04N	01W	MONITOR	--	PLASTIC	3-13		
311717092283003	SOUTHLAND CORP	-5437Z	MW-3	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT					15	4	4	0390	D W
				IT CORPORATION	027	04N	01W	MONITOR	--	PLASTIC	1-15		
312141092244901	MID STATE SAND	-5438Z	690A	UPLAND TERRACE DEPOSITS					38	2	2	0689	D W
				FOUNDATION	036	05N	01E	MONITOR	--	PLASTIC	28-38		
311940092283301	T L JAMES	-5444Z		RED RIVER ALLUVIAL AQUIFER					70	4	4	0290	D W
				PEART'S	015	04N	01W	OTHER	PA	PLASTIC	50-70		
311940092283302	T L JAMES	-5445Z		RED RIVER ALLUVIAL AQUIFER					70	4	4	0290	D W
				PEART'S	015	04N	01W	OTHER	PA	PLASTIC	50-70		
311848092252901	COLFAX CREOSOT	-5463Z	MW-6	RED RIVER ALLUVIAL AQUIFER					62	2	2	0790	D
				SOUTHWESTERN	021	04N	01W	MONITOR	--	PLASTIC	52-62		

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WELLRQ01 - REGISTERED WATER WELLS IN RAPIDES -- SORTED BY WELL NUMBER

REQUESTED BY:ICF TECH., INC. REFERENCE:3763112001

WITHIN A 4.0000 MILE RADIUS OF LATITUDE 311910 LONGITUDE 922600

IDENTIFICATION NUMBER	OWNER'S NAME	WELL NUMBER	OWNR NO.	GEOLOGIC UNIT / DRILLER	TOWN SECT SHIP RANGE	WELL USE	DEPTH / SUB USE	CASING DIAMETER / MATERIAL	SCREEN DIAMETER / INTERVAL	DATE COMPL	AVAIL INFO
311851092253501	COLFAX CREOSOT	-5464Z	MW-7	RED RIVER ALLUVIAL AQUIFER SOUTHWESTERN	021 04N 01W	MONITOR	54 --	2 PLASTIC	2 44-54	0590	D
311851092253502	COLFAX CREOSOT	-5465Z	MW7D	RED RIVER ALLUVIAL AQUIFER SOUTHWESTERN	021 04N 01W	MONITOR	74 --	2 PLASTIC	2 64-74	0590	D
311853092253301	COLFAX CREOSOT	-5466Z	P-1R	RED RIVER ALLUVIAL AQUIFER SOUTHWESTERN	021 04N 01W	RECOVERY	58 --	4 STEEL	4 53-58	0590	D
311852092253401	COLFAX CREOSOT	-5467Z	P-2R	RED RIVER ALLUVIAL AQUIFER SOUTHWESTERN	021 04N 01W	RECOVERY	59 --	4 STEEL	4 54-59	0590	D
311850092253301	COLFAX CREOSOT	-5468Z	P-4R	RED RIVER ALLUVIAL AQUIFER SOUTHWESTERN	021 04N 01W	RECOVERY	48 --	4 STEEL	4 43-48	0790	D
311730092291001	G & B OIL	-5469Z	1	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT PETRON, INC.	031 04N 01W	MONITOR	13 --	4 PLASTIC	4 3-13	1090	D W
311730092291002	G & B OIL	-5470Z	2	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT PETRON, INC.	031 04N 01W	MONITOR	13 --	4 PLASTIC	4 3-13	1090	D W
311730092291003	G & B OIL	-5471Z	3	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT PETRON, INC.	031 04N 01W	MONITOR	13 --	4 PLASTIC	4 3-13	1090	D W
311730092291004	G & B OIL	-5472Z	4	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT PETRON, INC.	031 04N 01W	MONITOR	13 --	4 PLASTIC	4 3-13	1090	D W
311853092253001	COLFAX CREOSOT	-5480Z	P-1	RED RIVER ALLUVIAL AQUIFER UNKNOWN	021 04N 01W	MONITOR	55 PA				
311852092253402	COLFAX CREOSOT	-5481Z	P-2	RED RIVER ALLUVIAL AQUIFER UNKNOWN	021 04N 01W	MONITOR	55 PA				
311850092253302	COLFAX CREOSOT	-5482Z	P-4	RED RIVER ALLUVIAL AQUIFER UNKNOWN	021 04N 01W	MONITOR	46 PA				
311840092284401	RYDER TRUCK	-5483Z	MW-1	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT LAW (TX)	020 04N 01W	MONITOR	15 --	2 PLASTIC	2 5-15	1190	D W
311840092284402	RYDER TRUCK	-5484Z	MW-2	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT LAW (TX)	020 04N 01W	MONITOR	15 --	2 PLASTIC	2 5-15	1190	D W
311840092284403	RYDER TRUCK	-5485Z	MW-3	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT LAW (TX)	020 04N 01W	MONITOR	16 --	2 PLASTIC	2 6-16	1190	D W
311840092284404	RYDER TRUCK	-5486Z	MW-4	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT LAW (TX)	020 04N 01W	MONITOR	16 --	2 PLASTIC	2 6-16	1190	D W
31203009224360		-5509Z		AQUIFER CODE NOT ASSIGNED UNKNOWN	007 04N 01E	HEAT PUMP	130 HS	4 PLASTIC	4 120-130	0779	W

WELLRQ01 - REGISTERED WATER WELLS IN RAPIDES -- SORTED BY WELL NUMBER
REQUESTED BY:ICF TECH., INC. REFERENCE:3763112001
WITHIN A 4.0000 MILE RADIUS OF LATITUDE 311910 LONGITUDE 922600

IDENTIFICATION NUMBER	OWNER'S NAME	WELL NUMBER	OWNR NO.	GEOLOGIC UNIT / DRILLER	TOWN SECT SHIP RANGE	WELL USE	DEPTH / SUB USE	CASING DIAMETER / MATERIAL	SCREEN DIAMETER / INTERVAL	DATE COMPL	AVAIL INFO
311716092282102	SOUTHLAND CORP	-5513Z	MW-5	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT U.E.I.	033 04N 01W	MONITOR	20 --	4 PLASTIC	4 2-20	0692	D W
311830092273106	RAPIDES BANK	-5515Z	MW-1	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT PETRON, INC.	039 04N 01W	MONITOR	15 --	2 PLASTIC	2 5-15	0391	D W
311830092273107	RAPIDES BANK	-5516Z	MW-2	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT PETRON, INC.	039 04N 01W	MONITOR	13 --	4 PLASTIC	4 3-13	0391	D W
311830092273108	RAPIDES BANK	-5517Z	MW-3	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT PETRON, INC.	039 04N 01W	MONITOR	13 --	4 PLASTIC	4 3-13	0391	D W
311830092273109	RAPIDES BANK	-5518Z	MW-4	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT PETRON, INC.	039 04N 01W	MONITOR	13 --	4 PLASTIC	4 3-13	0391	D W
311830092273110	RAPIDES BANK	-5519Z	MW-5	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT PETRON, INC.	039 04N 01W	MONITOR	13 --	4 PLASTIC	4 3-13	0391	D W
312145092234801	PINECREST S SCH	-5556Z	MW-1	UPLAND TERRACE AQUIFER CONFINING UNIT PETRON, INC.	037 05N 01E	MONITOR	15 --	4 PLASTIC	4 5-15	0791	D W
312000092253001	DURA-WOOD TREAT	-5571Z	MW-6	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT GEOTECHNICAL-	003 04N 01W	MONITOR	20 PA	2		0684	
311657092255501	DURA-WOOD TREAT	-5572Z	MW5C	RED RIVER ALLUVIAL AQUIFER SOUTHWESTERN	003 04N 01W	MONITOR	74 --	2 PLASTIC	2 61-71	0691	D W
311658092255901	DURA-WOOD TREAT	-5573Z	MW6R	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT SOUTHWESTERN	003 04N 01W	RECOVERY	24 --	4 STEEL	4 20-25	0691	D W
311659092260101	DURA-WOOD TREAT	-5574Z	MW7R	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT SOUTHWESTERN	003 04N 01W	RECOVERY	24 --	4 STEEL	4 20-25	0691	D W
311702092260301	DURA-WOOD TREAT	-5575Z	W10C	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT SOUTHWESTERN	003 04N 01W	MONITOR	25 --	2 PLASTIC	2 15-25	0691	D W
311700092260201	DURA-WOOD TREAT	-5576Z	W16R	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT SOUTHWESTERN	003 04N 01W	RECOVERY	24 --	4 STEEL	4 20-25	0691	D W
311701092260301	DURA-WOOD TREAT	-5577Z	W17R	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT SOUTHWESTERN	003 04N 01W	RECOVERY	24 --	4 STEEL	4 20-25	0691	D W
311703092255901	DURA-WOOD TREAT	-5578Z	MW18	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT SOUTHWESTERN	003 04N 01W	MONITOR	26 --	2 PLASTIC	2 17-27	0691	D W
311700092255601	DURA-WOOD TREAT	-5579Z	MW19	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT SOUTHWESTERN	003 04N 01W	MONITOR	26 --	2 PLASTIC	2 17-27	0691	D W
311659092255501	DURA-WOOD TREAT	-5580Z	MW20	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT SOUTHWESTERN	003 04N 01W	MONITOR	26 --	2 PLASTIC	2 16-26	0691	D W

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WELLRQ01 - REGISTERED WATER WELLS IN RAPIDES -- SORTED BY WELL NUMBER

REQUESTED BY:ICF TECH., INC. REFERENCE:3763112001

WITHIN A 4.0000 MILE RADIUS OF LATITUDE 311910 LONGITUDE 922600

IDENTIFICATION NUMBER	OWNER'S NAME	WELL NUMBER	OWNR NO.	GEOLOGIC UNIT / DRILLER	TOWN SECT SHIP RANGE	WELL USE	DEPTH / SUB USE	CASING DIAMETER / MATERIAL	SCREEN DIAMETER / INTERVAL	DATE COMPL	AVAIL INFO
311657092255301	DURA-WOOD TREAT	-5581Z	MW21	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT SOUTHWESTERN	003 04N 01W	MONITOR	26 --	2 PLASTIC	2 17-27	0691	D W
312145092234902	PINECREST S SCH	-5582Z	MW-2	UPLAND TERRACE AQUIFER CONFINING UNIT PETRON, INC.	037 05N 01E	MONITOR	19 --	4 PLASTIC	4 9-19	0791	D W
312145092234903	PINECREST S SCH	-5583Z	MW-3	UPLAND TERRACE AQUIFER CONFINING UNIT PETRON, INC.	037 05N 01E	MONITOR	17 --	4 PLASTIC	4 7-17	0791	D W
311854092253701	COLFAX CREOSOT	-5586Z	MW-8	RED RIVER ALLUVIAL AQUIFER SOUTHWESTERN	021 04N 01W	MONITOR	80 --	2 PLASTIC	2 70-80	0791	D W
311848092253601	COLFAX CREOSOT	-5587Z	MW-9	RED RIVER ALLUVIAL AQUIFER SOUTHWESTERN	021 04N 01W	MONITOR	80 --	2 PLASTIC	2 70-80	0791	D W
312145092234904	PINECREST S SCH	-5594Z	MW-4	UPLAND TERRACE AQUIFER CONFINING UNIT PETRON, INC.	037 05N 01E	MONITOR	15 --	4 PLASTIC	4 5-15	0991	D W
312145092234905	PINECREST S SCH	-5595Z	MW-5	UPLAND TERRACE AQUIFER CONFINING UNIT PETRON, INC.	037 05N 01E	MONITOR	15 --	4 PLASTIC	4 5-15	0991	D W
311716092282101	SOUTHLAND CORP	-5600Z	MW-4	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT J.E.I.	033 04N 01W	MONITOR	20 --	4 PLASTIC	4 2-17	0991	D W
312028092255701	LA DOTD	-5605Z	MW-1	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT PROFESSIONAL	012 04N 01W	MONITOR	24 --	2 PLASTIC	2 9-24	0392	D W
312030092255701	LA DOTD	-5606Z	MW-2	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT PROFESSIONAL	012 04N 01W	MONITOR	22 --	2 PLASTIC	2 7-22	0392	D W
312028092255801	LA DOTD	-5607Z	MW-3	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT PROFESSIONAL	012 04N 01W	MONITOR	20 --	2 PLASTIC	2 8-20	0392	D W
312029092255701	LA DOTD	-5608Z	MW-4	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT PROFESSIONAL	012 04N 01W	MONITOR	24 --	2 PLASTIC	2 4-24	0392	D W
312028092255702	LA DOTD	-5609Z	MW-5	RED RIVER ALLUVIAL AQUIFER CONFINING UNIT PROFESSIONAL	012 04N 01W	MONITOR	21 --	2 PLASTIC	2 6-21	0392	D W
311803092284502	EXXON CO USA	-5610Z	MW-2	AQUIFER CODE NOT ASSIGNED PSI/PTL	032 04N 01W	MONITOR	20 --	4 PLASTIC	4 2-20	0792	D W
311803092284503	EXXON CO USA	-5611Z	MW-3	AQUIFER CODE NOT ASSIGNED PSI/PTL	032 04N 01W	MONITOR	15 --	4 PLASTIC	4 3-15	0792	D W
311643092262801	UNION PACIFIC	-5612Z	MW-1	AQUIFER CODE NOT ASSIGNED ZIMMERMAN	055 04N 01W	MONITOR	22 --	4 PLASTIC	4 2-22	0792	D W
311645092262801	UNION PACIFIC	-5613Z	MW-2	AQUIFER CODE NOT ASSIGNED ZIMMERMAN	055 04N 01W	MONITOR	12 --	4 PLASTIC	4 2-12	0792	D W

WELLRQ01 - REGISTERED WATER WELLS IN RAPIDES -- SORTED BY WELL NUMBER

REQUESTED BY:ICF TECH., INC. REFERENCE:3763112001

WITHIN A 4.0000 MILE RADIUS OF LATITUDE 311810 LONGITUDE 922600

IDENTIFICATION NUMBER	OWNER'S NAME	WELL NUMBER	OWNR NO.	GEOLOGIC UNIT DRILLER	TOWN SECT SHIP RANGE	WELL USE	DEPTH SUB USE	CASING DIAMETER MATERIAL	SCREEN DIAMETER INTERVAL	DATE COMPL	AVAIL INFO
311644092262701	UNION PACIFIC	-5614Z	MW-3	AQUIFER CODE NOT ASSIGNED ZIMMERMAN	055 04N 01W	MONITOR	12 --	4 PLASTIC	4 2-12	0792	D W
311641092262701	UNION PACIFIC	-5615Z	MW-4	AQUIFER CODE NOT ASSIGNED ZIMMERMAN	055 04N 01W	MONITOR	12 --	4 PLASTIC	4 2-12	0792	D W
311643092262901	UNION PACIFIC	-5616Z	MW-5	AQUIFER CODE NOT ASSIGNED ZIMMERMAN	055 04N 01W	MONITOR	12 --	4 PLASTIC	4 2-12	0792	D W
311645092262601	UNION PACIFIC	-5617Z	MW-6	AQUIFER CODE NOT ASSIGNED ZIMMERMAN	055 04N 01W	MONITOR	12 --	4 PLASTIC	4 2-12	0792	D W
312128092250201	EXXON CO USA	-5621Z	MW-1	AQUIFER CODE NOT ASSIGNED PROFESSIONAL	001 04N 01W	MONITOR	20 --	4 PLASTIC	4 5-20	0992	D W
312128092250202	EXXON CO USA	-5622Z	MW-2	AQUIFER CODE NOT ASSIGNED PROFESSIONAL	001 04N 01W	MONITOR	20 --	4 PLASTIC	4 5-20	0992	D W
312128092250203	EXXON CO USA	-5623Z	MW-3	AQUIFER CODE NOT ASSIGNED PROFESSIONAL	001 04N 01W	MONITOR	20 --	4 PLASTIC	4 5-20	0992	D W
312000092245001	EXXON CO USA	-5633Z	MW-1	AQUIFER CODE NOT ASSIGNED PROFESSIONAL	007 04N 01E	MONITOR	15 --	4 PLASTIC	4 2-15	1192	D W
312000092245002	EXXON CO USA	-5634Z	MW-2	AQUIFER CODE NOT ASSIGNED PROFESSIONAL	007 04N 01E	MONITOR	15 --	4 PLASTIC	4 2-15	1192	D W
312000092245003	EXXON CO USA	-5635Z	MW-3	AQUIFER CODE NOT ASSIGNED PROFESSIONAL	007 04N 01E	MONITOR	15 --	4 PLASTIC	4 2-15	1192	D W
311708092282801	EXXON CO USA	-5636Z	MW-1	AQUIFER CODE NOT ASSIGNED PROFESSIONAL	031 04N 01W	MONITOR	15 --	4 PLASTIC	4 2-15	1192	D W
311708092282902	EXXON CO USA	-5637Z	MW-1	AQUIFER CODE NOT ASSIGNED PROFESSIONAL	031 04N 01W	MONITOR	15 --	4 PLASTIC	4 2-15	0292	D W
311708092282903	EXXON CO USA	-5638Z	MW-3	AQUIFER CODE NOT ASSIGNED PROFESSIONAL	031 04N 01W	MONITOR	15 --	4 PLASTIC	4 2-15	1192	D W
311850092253701	COLFAX CREOSOT	-5639Z	MW-10	AQUIFER CODE NOT ASSIGNED SOUTHWESTERN	021 04N 01W	MONITOR	30 --	2 PLASTIC	2 20-30	0692	D W
311851092260001	COLFAX CREOSOT	-5640Z	MW-12	AQUIFER CODE NOT ASSIGNED SOUTHWESTERN	021 04N 01W	MONITOR	22 --	2 PLASTIC	2 12-22	0692	D W
311851092260101	COLFAX CREOSOT	-5641Z	MW-13	AQUIFER CODE NOT ASSIGNED SOUTHWESTERN	021 04N 01W	MONITOR	24 --	2 PLASTIC	2 14-24	0692	D W
311853092255801	COLFAX CREOSOT	-5642Z	MW-14	AQUIFER CODE NOT ASSIGNED SOUTHWESTERN	021 04N 01W	MONITOR	22 --	2 PLASTIC	2 12-22	0692	D W

6/08/93 LOUISIANA DOTD - WATER WELL REGISTRATION SYSTEM PAGE 19

WELLRQ01 - REGISTERED WATER WELLS IN RAPIDES -- SORTED BY WELL NUMBER

REQUESTED BY:ICF TECH., INC. REFERENCE:3763112001

WITHIN A 4.0000 MILE RADIUS OF LATITUDE 311810 LONGITUDE 922600

IDENTIFICATION NUMBER	OWNER'S NAME	WELL NUMBER	OWNR NO.	GEOLOGIC UNIT / DRILLER	TOWN SECT	SHIP	RANGE	WELL USE	DEPTH SUB USE	CASING DIAMETER MATERIAL	SCREEN DIAMETER INTERVAL	DATE COMPL	AVAIL INFO
311902092255101	COLFAX CREOSOT	-5643Z	MW-15	AQUIFER CODE NOT ASSIGNED					22	2	2	0692	D W
				SOUTHWESTERN	021	04N	01W	MONITOR	--	PLASTIC	12-22		
311906092254201	COLFAX CREOSOT	-5644Z	MW-17	AQUIFER CODE NOT ASSIGNED					32	2	2	0692	D W
				SOUTHWESTERN	021	04N	01W	MONITOR	--	PLASTIC	22-32		
311913092254601	COLFAX CREOSOT	-5645Z	MW-16	AQUIFER CODE NOT ASSIGNED					24	2	2	0692	D W
				SOUTHWESTERN	021	04N	01W	MONITOR	--	PLASTIC	14-24		
311851092255401	COLFAX CREOSOT	-5646Z	MW-11	AQUIFER CODE NOT ASSIGNED					29	2	2	0692	D W
				SOUTHWESTERN	021	04N	01W	MONITOR	--	PLASTIC	19-29		
311830092270101		-5651Z	W-1	AQUIFER CODE NOT ASSIGNED					65	6	6	1292	D W
				MORETRENCH	008	04N	01W	DEWATERING	--	PLASTIC	45-65		
311830092270102		-5652Z	W-2	AQUIFER CODE NOT ASSIGNED					63	6	6	1292	D W
				MORETRENCH	008	04N	01W	DEWATERING	--	PLASTIC	43-63		
311830092270103		-5653Z	W-3	AQUIFER CODE NOT ASSIGNED					63	6	6	1292	D W
				MORETRENCH	008	04N	01W	DEWATERING	--	PLASTIC	43-63		
311830092270104		-5654Z	W-4	AQUIFER CODE NOT ASSIGNED					62	6	6	1292	D W
				MORETRENCH	008	04N	01W	DEWATERING	--	PLASTIC	42-62		
311830092270105		-5655Z	W-5	AQUIFER CODE NOT ASSIGNED					61	6	6	1292	D W
				MORETRENCH	008	04N	01W	DEWATERING	--	PLASTIC	41-61		
311830092270106		-5656Z	W-6	AQUIFER CODE NOT ASSIGNED					61	6	6	0193	D W
				MORETRENCH	008	04N	01W	DEWATERING	--	PLASTIC	41-61		
311830092272901	R BANK & TRUST	-5663Z	MW-A	AQUIFER CODE NOT ASSIGNED					12	4	4	0493	D W
				J.E.I.	039	04N	01W	DOMESTIC	--	PLASTIC	2-12		
311830092272902	R BANK & TRUST	-5664Z	MW-B	AQUIFER CODE NOT ASSIGNED					12	4	4	0493	D W
				J.E.I.	039	04N	01W	DOMESTIC	--	PLASTIC	2-12		
311830092272903	R BANK & TRUST	-5665Z	MW-C	AQUIFER CODE NOT ASSIGNED					12	4	4	0493	D W
				J.E.I.	039	04N	01W	DOMESTIC	--	PLASTIC	2-12		
311830092272904	R BANK & TRUST	-5666Z	MW-D	AQUIFER CODE NOT ASSIGNED					12	4	4	0493	D W
				J.E.I.	039	04N	01W	DOMESTIC	--	PLASTIC	2-12		

NUMBER OF WELLS SELECTED IN PARISH = 320

REFERENCE 12

PREFACE

U.S. DEPARTMENT OF COMMERCE
Luther H. Hodges, Secretary

WEATHER BUREAU
F. W. Reichelderfer, Chief

TECHNICAL PAPER NO. 40

RAINFALL FREQUENCY ATLAS OF THE UNITED STATES

for Durations from 30 Minutes to 24 Hours and Return Periods from 1 to 100 Years

Prepared by
DAVID M. HERSHFIELD
Cooperative Studies Section, Hydrologic Services Division
for
Engineering Division, Soil Conservation Service
U.S. Department of Agriculture

THIS ATLAS IS OBSOLETE FOR THE FOLLOWING 11 WESTERN STATES: Arizona, California, Colorado, Idaho, Montana, Nevada, New Mexico, Oregon, Utah, Washington, and Wyoming.

NOAA ATLAS 2: PRECIPITATION-FREQUENCY ATLAS OF THE WESTERN UNITED STATES (GPO: 11 Vols., 1973) supersedes the Technical Paper 40 data for these states.

All but 3 of the 11 state volumes are out of print, and no reprint is presently planned.

Institutions in the eleven western states likely to have copies of these volumes for their state for public inspection are:

US Department of Agriculture Soil Conservation Service Offices
US Army Corps of Engineers Offices
Selected University Libraries
National Weather Service Offices (may also have volumes for adjacent states).
National Weather Service Forecast Offices (may have all eleven volumes)

Elsewhere, libraries of universities where hydrology and meteorology degree programs are offered may shelve some of the eleven volumes.

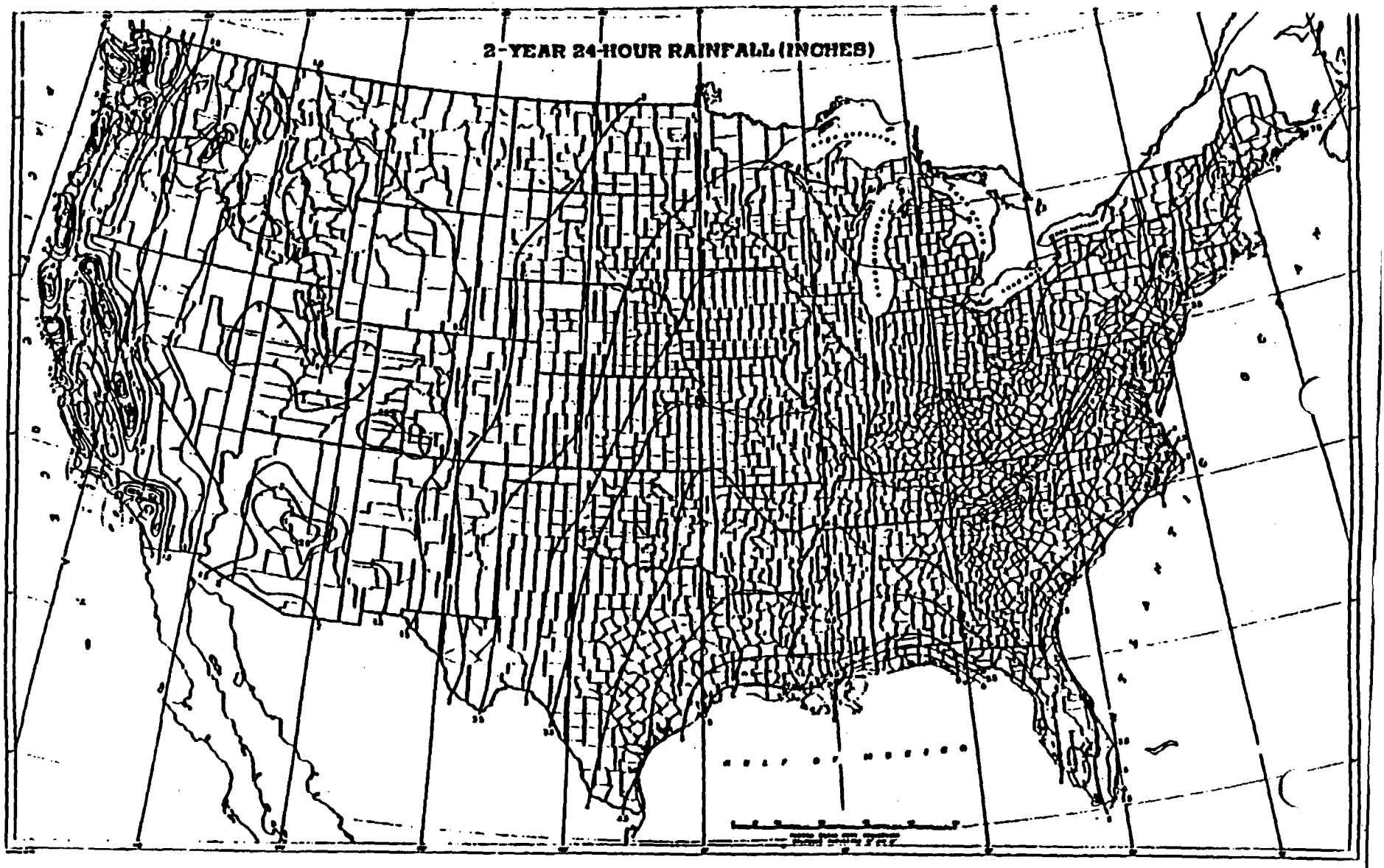
The three volumes in print as of 1 Jan 1983 at the GPO are:

Vol	State	GPO Stock Number	Price
IV	New Mexico	003-017-00158 0	$10.00
VI	Utah	003-017-00160 1	12.00

NOTICE

Rainfall-frequency information for durations of 1 hour and less for the Central and Eastern States has been superseded by NOAA Technical Memorandum NWS HYDRO-35 Five to Sixty-Minute Precipitation Frequency for the Eastern and Central United States. This publication (Accession No. PB 272-112/AS) is obtainable from:

National Technical Information Service
5285 Port Royal Road
Springfield, VA 22161


2-YEAR 24-HOUR RAINFALL (INCHES)

REFERENCE 13

SOIL SURVEY OF

Rapides Parish, Louisiana

United States Department of Agriculture
Soil Conservation Service and
Forest Service
In cooperation with
Louisiana Agricultural Experiment Station

in describing soils can be found in the Glossary, and more detailed information about the terminology and methods of soil mapping can be obtained from the Soil Survey Manual (*9*).

Acadia Series

The Acadia series consists of nearly level to very gently sloping, somewhat poorly drained, very slowly permeable soils on broad flats and side slopes on uplands. These soils have a loamy surface layer and a clayey subsoil. They formed in clayey alluvial sediment.

In a representative profile the surface layer is dark grayish-brown silt loam about 3 inches thick. The subsurface layer is light brownish-gray silt loam about 3 inches thick. The subsoil is yellowish-brown silt loam to a depth of 16 inches. Below this, it is acid, light grayish-brown and gray clay and silty clay mottled with brown and red.

Most of the acreage of these soils is wooded or is in pasture. A small acreage is cultivated.

Representative profile of Acadia silt loam, 0 to 1 percent slopes, on a fire lane one-fourth mile northeast of gravel road, north corner of Spanish Land Grant, sec. 29, T. 4 N., R. 2 E.:

A1—0 to 3 inches, dark grayish-brown (10YR 4/2) silt loam; many, fine, distinct, dark-brown mottles; weak, medium, granular structure; friable; few, fine, dark-colored concretions; medium acid; clear, wavy boundary.

A2—3 to 6 inches, light brownish-gray (10YR 6/2) silt loam; many, fine, distinct, red mottles; weak, medium, subangular blocky structure; friable; many, fine, brown concretions; medium acid; abrupt, irregular boundary.

B1—6 to 16 inches, yellowish-brown (10YR 5/4) silt loam; common, fine, faint, dark-brown and brownish-yellow mottles; weak, coarse, subangular blocky structure; friable; many, fine pores; few, fine, soft, dark-colored bodies; interfingering A2 material; strongly acid; clear, irregular boundary.

B21t—16 to 26 inches, light brownish-gray (10YR 6/2) silty clay; many, coarse, faint, yellowish-brown (10YR 5/6) mottles and common, coarse, prominent, red (2.5YR 4/8) mottles; moderate, coarse, subangular blocky structure; firm; light-gray silt loam 2 to 5 millimeters thick between peds; thin, patchy clay films on vertical surfaces of peds; strongly acid; clear, wavy boundary.

B22t—26 to 33 inches, gray (10YR 5/1) clay; many, coarse, faint, yellowish-brown (10YR 5/6) and grayish-brown (10YR 5/2) mottles and common, coarse, prominent, red (2.5YR 4/6) mottles; moderate, medium, subangular blocky structure; firm; thin, patchy clay films on vertical surfaces of peds; strongly acid; clear, wavy boundary.

B3t—33 to 44 inches, gray (10YR 6/1) silty clay; common, medium, distinct, light olive-brown (2.5Y 5/6) mottles; moderate, medium, subangular blocky structure; firm; few, fine, dark-colored concretions; thin, patchy clay films on vertical surfaces of peds; dark-colored stains on peds; strongly acid; clear, wavy boundary.

C—44 to 72 inches, gray (10YR 5/1) silty clay; common, medium, faint, light olive-brown (2.5Y 5/6) mottles; massive; firm; few, fine, dark-colored concretions; dark-colored stains on peds; medium acid.

The A horizon ranges from 5 to 14 inches in thickness. It is very strongly acid to medium acid. The A1 horizon is dark brown, dark grayish-brown, or brown. The A2 horizon is gray, light brownish gray, or pale brown. The B1 horizon is more than 40 percent pale brown, brown, or yellowish brown and is mottled with shades of brown and yellow. It is silt loam or silty clay loam. The B2t horizon is gray, grayish brown, or light brownish gray mottled with shades of brown and red. It is silty clay or clay that is very strongly acid or strongly acid. The C horizon is gray silty clay or clay mottled with shades of red, yellow, or brown. It is very strongly acid to neutral.

Acadia soils are associated with Gore, Kolin, and Wrightsville soils. They are more poorly drained than Gore and Kolin soils. They are not so gray in the upper part of the solum as Wrightsville soils and are better drained than those soils.

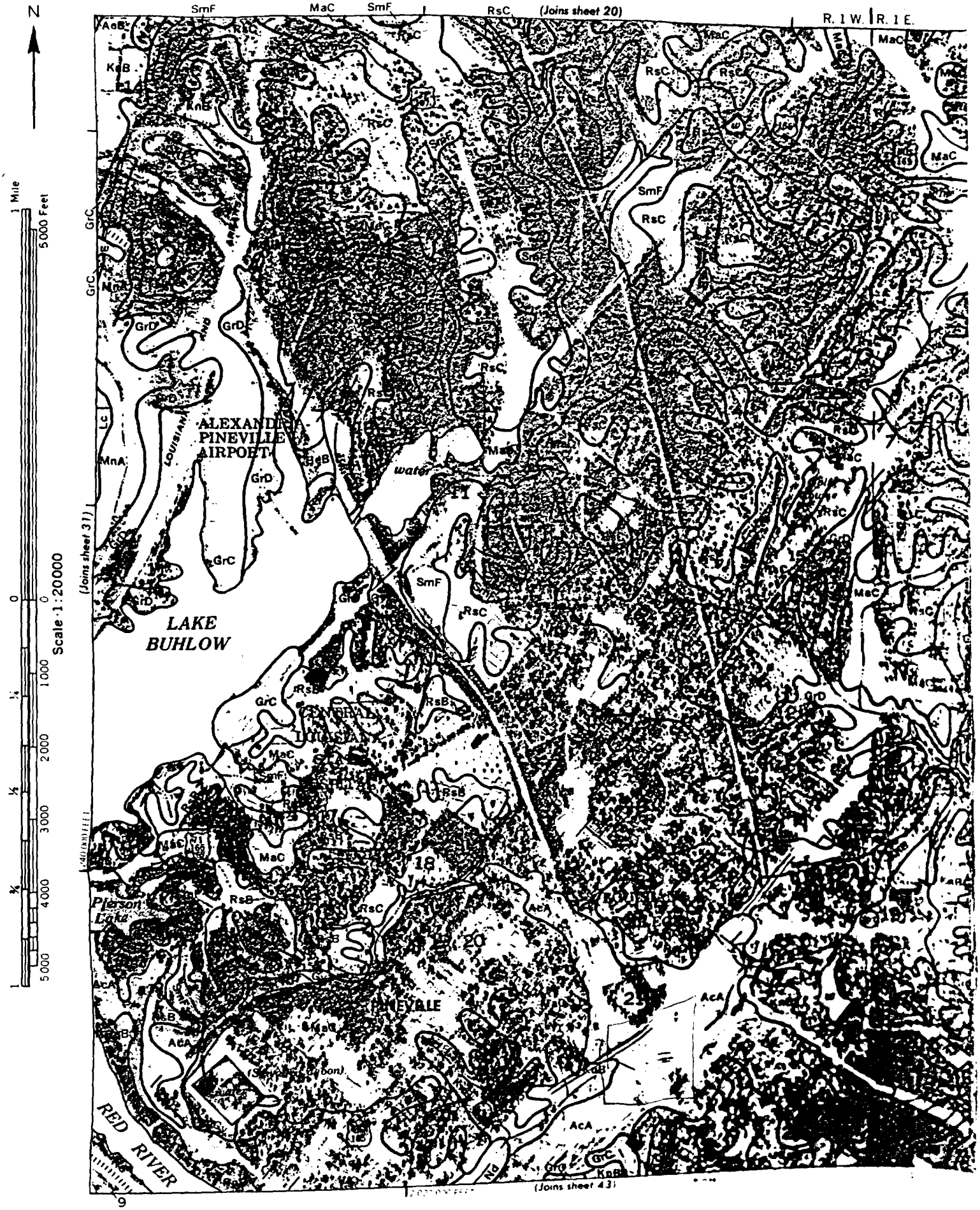
AcA—Acadia silt loam, 0 to 1 percent slopes. This is a nearly level, somewhat poorly drained soil. It has a loamy surface layer and a clayey subsoil. This soil is on broad flats on uplands. It has the profile described as representative of the series.

Included with this soil in mapping are small areas of Gore, Kolin, and Wrightsville soils and areas of soils that have a slightly acid or neutral subsoil.

This soil has low natural fertility. Runoff is slow after rains, and water moves very slowly through the subsoil. The soil is wet for long periods during winter and spring. A seasonal high water table is at a depth of 2 to 4 feet from December through April. Plants are likely to be damaged by a lack of moisture during dry periods in summer and in fall. Wetness, high shrink-swell potential of the clayey subsoil, and low strength are the main limitations.

Most of the acreage is in pine trees and pasture. A small acreage is in crops. Suitable crops are grain sorghum and soybeans. Suitable pasture plants are common bermudagrass, Pensacola bahiagrass, ryegrass, and southern wild winter pea. Wetness may delay planting. Surface crusting is common, and the soil is somewhat difficult to keep in good tilth. Proper crop residue management helps to improve tilth. Drainage is needed in depressions. Response of crops to fertilizer is good. Lime is generally needed. Capability unit IIIw-1; woodland suitability group 2w8.

AcB—Acadia silt loam, 1 to 3 percent slopes. This is a very gently sloping, somewhat poorly drained soil. It has a loamy surface layer and a clayey subsoil. This soil is on side slopes on uplands.


N
(Joins sheet 20)
R. 1 W. | R. 1 E.
(Joins sheet 31)
(Joins sheet 43)
ALEXANDRIA-PINEVILLE AIRPORT
LOUISIANA
LAKE BUHLOW
water
CENTRAL LOUISIANA
Pierson Lake
PINEVILLE
RED RIVER
1 Mile
5000 Feet
Scale 1:20000

REFERENCE 14

Ball Engineering, Inc.

March 12, 1993

CERTIFIED — Return Receipt Requested (P 159 127 503) EPA
(P 159 127 504) EPA

Mr. William K. Honker, P.E., Chief
RCRA Permits Branch
U.S. Environmental Protection Agency
1445 Ross Avenue, Suite 1200
Dallas, Texas 75202-2733

Re: **Transmittal of RCRA Facility Investigation Phase I Report:**
Colfax Creosoting Company, LAD 008 184 616

Dear Mr. Honker:

Enclosed are two copies of the RCRA Facility Investigation Phase I report and one copy of the laboratory summary reports (32 volumes) as requested in your letter dated February 9, 1993 for Colfax Creosoting Company, Pineville, Louisiana. Due to the large volume of material associated with this report, it is being shipped as two parcels.

If you have any questions or comments about the report, please contact me at (205) 345-6399. We will be available to meet with you to discuss the investigation should you request.

Sincerely,

Jonathan R. Bonner

Jonathan R. Bonner,
Engineer

Enclosure

cc: Mr. Clyde M. Norton, Vice Pres.
Colfax Creosoting Company

Mr. Timothy Hardy, Director (P 159 127 505) DEQ
DEQ Hazardous Waste Division (P 159 127 506) DEQ
(P 159 127 507) DEQ

Mr. Rick Kaiser
DEQ Groundwater Division

Mr. O.T. Bourgoyne
DEQ Permits Division

23 WOOD MANOR, TUSCALOOSA, ALABAMA 35401-4969 TELEPHONE (205) 345-6399

RCRA FACILITY INVESTIGATION PHASE I REPORT

for

COLFAX CREOSOTING COMPANY

LAD 008 184 616
74 Wadley Road
Rapides Parish
Pineville, Louisiana 71360-4600

prepared by:

BALL ENGINEERING, INC.
23 Wood Manor
Tuscaloosa, Alabama 35401-4969

March 12, 1993

Highest Quality
Creosote and Penta
Treated Forest Products

COLFAX CREOSOTING COMPANY

P. O. BOX 4600
PINEVILLE, LOUISIANA 71361-4600

Telephone 318-442-2467
FAX 318-442-8086

March 11, 1993

CERTIFICATION

I certify under penalty of law that this document and all attachments were prepared under my direct supervision in accordance with a system designed to assure that qualified personnel properly gather and evaluate the information submitted. Based on my inquiry of the person or persons who manage the information, the information submitted is, to the best of my knowledge and belief, true, accurate and complete. I am aware that there are significant penalties for submitting false information including the possibility of fine and imprisonment for knowing violations.

Clyde M. Norton, Vice President
Colfax Creosoting Company

I hereby certify that this plan, specification, or report was prepared by me or under my direct supervision and that I am a duly Registered Professional Engineer under the laws of the State of LA.

JOHN E. BALL John E. Ball

Date 3/12/93 Registration No. 15174

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1 EXECUTIVE SUMMARY REPORT

Colfax Creosoting Company is a wood preserving plant located in Pineville, Louisiana. In 1991, the company received a post closure permit for a closed TSD impoundment once used to handle process water from the plant. In the HSWA portion of the permit, the company was required to conduct a RCRA facility investigation for 19 solid waste management units and four areas of concern listed in a 1988 RCRA facility assessment by EPA.

Field Operations began on June 1, 1992 based on work plans approved by the EPA and LDEQ. Specific locations were investigated using a hollow-stem auger (and backhoe in one SWMU). Soil samples were taken continuously on two foot intervals with stratigraphy logged by an on-site geologist. Borings were to a minimum depth of eight feet if field detectable contaminants were not present. When contamination was found, drilling continued until either clean soil was encountered or groundwater detected. Analytical samples were composited from each core. Field screening included the use of a photoionization detector (PID), by visual observation and odor, and by the use of an on-site infrared spectroscopy. The company completed 66 borings and 14 trenches for the study

The site was found to be contaminated with 47 volatile and semi-volatile compounds commonly associated with wood preserving plants. Over half of the contamination detected consisted of phenanthrene, naphthalene, and fluoranthene. Pentachlorophenol represented 3.2% of the total constituents detected. Metals contamination was not found to be a problem at this facility.

Limited contamination was found in the process area. The heaviest organic contamination was found along the main runoff pathway, particularly at four locations: downgradient from the treating plant, immediately upgradient from the culvert inlet draining

parcel A, immediately upgradient from the closed impoundment site, and at the culvert inlet draining parcel B. Contamination at the first location seems to have originated from process water pipes once used to transport water to downgradient ponds. The second location is the site of the first series of process water ponds at the facility. The third location was the former site of three small process water ponds. The final area was caused by water impounding upstream from the culvert inlet. Additional investigation is recommended for these areas.

Some surface contamination was detected in wood storage yards, however, this was limited to no more than two feet below the most visually contaminated locations. Creosote constituents were detected in a boring at the north end of the west runoff pathway. The source may have been a blow-down line once located in a ditch near this point. The study determined the site has been impacted by past activity from the former Louisiana and Arkansas Railroad yard where a diesel plume was detected. The railroad will be notified of their problem.

2 INTRODUCTION

On January 22, 1991, Colfax Creosoting Company, a wood preserving facility in Pineville, Louisiana, was granted by the EPA and Louisiana Department of Environmental Quality a post closure permit. This permit was required by Subtitle C of the Resources Conservation and Recovery Act (RCRA) and the 1984 Hazardous and Solid Waste Amendments (HSWA) for operation of a closed impoundment once used to handle process water from the facility.

Prior to closure, the impoundment was determined to be managing the listed hazardous waste K001. In 1986, the company decided to close the process water pond rather than seek a TSD permit for an active site. After closure documentation was accepted by the Agency, Colfax began operating under interim status while application was made for a post closure permit.

The HSWA portion of the permit granted to the Company required a RCRA facility investigation (RFI) be conducted to investigate potential releases from 27 other units on plant property identified as solid waste management units (SWMUs) during a 1988 RCRA facility assessment (RFA) by the Environmental Protection Agency. The investigation was to be conducted in a series of steps or "tasks" listed in the HSWA permit. These are:

Task I:	Description of current conditions
Task II:	RFI work plan
Task III:	Facility investigation
Task IV:	Investigation analysis
Task V:	Reports

In 1991, the company began submitting a series of reports to accomplish these tasks. This work culminated with the submittal of a RFI work plan on December 12, 1991. This work

was later revised according to EPA and LDEQ recommendations and the final work plan corrections were submitted in a quarterly report dated April 28, 1992. Scheduling and mobilization for the field portion of the project was complete and field investigation operations began on June 1, 1992.

The work plan introduced a "phased" approach to the investigation. Phase I work targeted individual units by collecting water and soil samples from borings made in and around each SWMU. The scope of this work involved:

(1) Determining if a unit is actively managing solid waste,

(2) Determining if releases have been made from the unit, and

(3) Examine receptors of the release.

Figure 2-1 on the following page is a site map showing the locations of the SWMUs listed for investigation. More detailed maps showing boring locations and SWMUs are found in following chapters.

This report details the findings from Phase I of the RFI. Over 600 individual samples were collected during field work. Field screening reduced the total number sent for complete analysis to 230 including QA/QC samples. From these samples, over 250 pounds of analysis documentation and reports was generated.

This data was managed by constructing a "master database" using LOTUS 1-2-3™ software. All ensuing calculations and tables made for the study used data extracted from this database. Thus the possibility for error was mitigated. A base map of the site was made from surveying data. This was digitized using AutoCAD™ and all other maps and drawings were built on the original and saved as a separate file. All spreadsheets, drawings, graphs, and surface plots have been archived in their final form for future reference. Data attachments to this report represent worksheets compiled from the original database. Individual laboratory summary books are included as 32 separate volumes.

3 INVESTIGATION METHODS

Field investigation methods were selected to produce data useful to determine if a solid waste management unit (SWMU) had released contaminants into the environment. Screening methods were used where possible to: (1) reduce the number of samples submitted for analysis, (2) reduce analytical costs, (3) provide qualitative data delineating the extent of contamination, and (4) provide qualitative and/or quantitative data for samples not submitted for analysis. Subsurface exploration was performed using a hollow-stem auger rig where possible. Trenching was performed using a backhoe where the auger was refused due the subsurface obstructions.

3.1 Field Methods

3.1.1 Borings

In most areas, SWMU's were investigated for subsurface releases using a hollow-stem auger. This work was done by Southwestern Laboratories, Inc., Shreveport, Louisiana. The company provided a geologist, rig operator, and one or two drill hands. Core samples were taken continuously on two-foot centers and classified by the geologist. A representative analytical sample was composited from the core by Ball Engineering Inc. personnel.

The field engineer determined boring locations in one of three ways. First, many of the boring locations were mandated by the RFI Work Plan[1] and drilling sites were selected as close as possible to these locations. Second, boring locations in the wood storage yards were discretionary. In these instances, at least one boring was positioned in or near a drainage pathway, and one boring was positioned in an area exhibiting high visual contamination. The remaining required borings were distributed evenly over the unit. Finally, some additional borings were drilled that were beyond the scope of the work plan. These were done in an

[1]RFI Work Plan Final Revisions, RCRA Facility Investigation 1992 First Quarterly Report for Colfax Creosoting Company. Ball Engineering, Inc. January 20, 1992.

attempt to further explore contaminated areas detected in the field.

The drilling crew used a CME Model 550 Buggy-type drill rig with an eight inch auger. In three instances, the drillers used a ten inch auger to set outer casings in contaminated strata enabling the team to continue deeper without running the risk of spreading contamination. Soil cores were collected using either a hammer driven split-spoon sampler or Shelby tube according to the soil type.

The investigation team encountered some drilling problems during the field portion of the study. These problems were related to: (1) unexpected field conditions, (2) mechanical malfunctions associated with the drill rig or equipment, and (3) other miscellaneous problems.

Most of the problems associated with drilling were presented by abnormal field conditions. Early in the project the team concluded that SWMU 11, the untreated wood landfill, contained too much wood debris for subsurface exploration by augering Therefore a proposal was made to EPA and LDEQ officials to excavate trenches in the landfill using a backhoe and collect samples from the trenches. At SWMU 12, the ground water recovery tank, three boring attempts were made by the drill crew and each attempt was refused due to buried debris. Subsequently, this site was investigated by trenching. Two other boring sites were determined to be inaccessible to the drill rig. Extreme slopes and bark fill at the location of boring 61 in the west runoff pathway would not provide a stable operations platform for drilling. In the presence of this safety threat, the field engineer decided to use a post-hole digger for boring 61. Boring 52 was also not assessable to the buggy rig and it was dug by hand as well. The last problem came while drilling boring B-66 near the tank truck unloading area. After advancing the boring five feet, water flooded the hole, presumably from a ruptured or leaking water line near the boring and a few feet below the surface. At this point the hole was terminated and water samples were collected from the boring because the team feared contamination could be carried to lower aquifers if the boring were to continue.

Mechanical problems were encountered during the investigation. Foremost of these was rig downtime due when the rig's rear axle was broken during the first week of work. Boring 7 was to be positioned in a drainage pathway near the south corner of SWMU 4, the southwest

wood storage area. This area is covered in dense vegetation and shallow but steep embankments wall the ditch. While he attempted to position the rig to drill B-7, the operator backed down one of the embankments. Upon attempting to drive the rig up the same embankment, the rear axle broke. The rig's condition was assessed by the field team to determine if any fluids were leaking. After seeing this was not the case, the field engineer had the crew auger boring B-7. A dozer was then used to tow the rig back to the maintenance shop for repairs. RFI activities were postponed until Monday of the following week. On two other occasions the rig developed small hydraulic leaks. These leaks were contained by plastic sheeting placed on the ground underneath the rig. In each instance, boring operations were suspended until the leaking hose or fitting could be repaired.

Other problems also occurred. While drilling boring B-48, LDEQ personnel noticed that the geologist was not logging cores taken from the boring below the water table. This resulted from a misunderstanding about the work plan requirements and was corrected. Also while pulling the auger in boring B-48, bentonite pellets formed a bridge between the casing and auger causing the casing to be pulled up with the auger. In order to correct this, the hole was plugged and abandoned and a new well was drilled by the previous boring.

Borings B-30 and B-33, both eight feet deep, were lost when they were accidentally ran over by a front-end loader before the drill team could grout the holes. This happened while the loader was attempting to position a concrete drilling platform in the main drainage pathway for the team to work from. Boring B-33 was only surfically sealed and could be grouted. However boring B-30 was sealed completely from top to bottom and could not be grouted.

3.1.2 Trenches

In SWMU's 11 and 12 the auger was refused or could not be used due to debris. In these areas trenches were excavated at the selected boring sites using a backhoe. One additional trench was also constructed which was beyond the scope of the work plan. This trench extended from near the edge of the main runoff pathway to the concrete culvert at the location of boring B-36 and was approximately six to eight feet deep. No problems were encountered during trenching operations.

3.1.3 Sampling

Analytical samples were collected from surface water, subsurface water, and subsurface soils according to the sampling protocol from the RFI work plan. Eighteen surface water samples were collected to determine if hazardous constituents were being transported off site in runoff from the site. These were grab samples collected during two rain events and during one low flow period. Analysis was for the same parameters as ground water samples.

Thirty-one ground water samples were collected for analysis from borings extending to the ground water surface. In most instances, samples were collected from temporary wells installed in the boring. On one instance, the sample was taken directly from the bore-hole to see if this procedure was feasible. Three other ground water samples were collected directly from the auger. In each instance, samples were collected using a non-dedicated bailer that had been decontaminated using the EPA decontamination procedure for non-dedicated equipment. These samples were collected in much the same manner as the surface water samples, however one exception was made. VOA samples were collected by first filling a stainless steel bowl with water from the boring. The vials were then filled and capped underwater. This was done for three reasons. First, it was discovered that the vials could not be properly filled directly from the bailer without bubbles forming. Second, due to the amount of silt present in the water, the bailer check valve leaked the sampler empty before the vials could be filled. Third, most of the wells were had a low yield and water had to be conserved to obtain a complete sample.

Since the samples could not be collected directly from the bailer, de-gassing of volatiles was a concern. This was resolved by: (1) gently lowering and retrieving the bailer from the water column, and (2) carefully pouring the bailer contents into the water basin to avoid turbulence.

Three hundred and ninety-six soil samples were taken during the project. All of these were screened by the field methods and infrared spectroscopy. Sixty-four were then selected for analysis. Each sample was taken according to the soil sampling protocols found in the RFI work plan. Each two foot core was mixed in a stainless steel bowl and three jars of soil were filled for each sample. Two of the jars were collected for possible organic analysis while the

third was taken for the IR screen and possible metals analysis. All samples were sealed with chain-of-custody and black vinyl tape. The samples were then frozen until they could be shipped for analysis.

Only one sampling related problem occurred during the project. While sampling surface water, two members of the field team accidentally assigned the same sample identification number to two sets of samples. Two samples collected from the inlet to the culvert draining Parcel B in the main runoff pathway were designated SW-13 and SW-14 respectively. Concurrently, two other samples collected from elsewhere in the pathway by another member of the team were also assigned the same numbers. Upon reaching the field lab, this discrepancy was corrected by changing the number of the last two samples to SW-13A and SW-14A.

3.2 Field Screening Methods

During the investigation, the team employed four different screening methods to determine if a sample was contaminated. Three of the evaluations were conducted at the boring site while the fourth method was conducted in a field laboratory established on plant property. These were: (1) photoionization detector (PID), (2) visual observation, (3) odor evaluation, and (4) infrared spectroscopy (IR).

3.2.1 Methods Used

PID readings were taken using an HNu model GP-101 photoionization detector with a 10.2 eV probe from each sample using closed head-space sampling techniques. The PID was calibrated daily by the team geologist according to the manufacturers specifications using span gas cylinders provided with the detector. During sampling, a portion of soil mixed from each two-foot core was collected in a plastic zip-lock bag and allowed to equilibrate in the sun. The PID probe was then inserted into the bag and a reading was recorded by the geologist on the field boring logs and by the sampling team on the sampling logs.

Samples were also screened visually by the sampling team. This was done by assigning each sample a value on a scale of one to five on the sampling log. Samples with free oil observed in the matrix were usually assigned five while those with no visible contamination were assigned zero. The presence of odors from the matrix was also noted on the sampling log.

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Odors were classified as light, medium, and heavy and an attempt was made to identify the odor (e.g. creosote, diesel, etc.).

After each sample was collected and sealed in the field, they were taken back to the field laboratory for IR analysis. The protocol given in the work plan revisions was used to screen a portion of each sample. The following steps were used:

(1) 10 grams of soil were weighed from the sample into a 125 ml erlenmeyer flask,

(2) 50 ml of carbon disulfide were added to the flask and the flask was stoppered,

(3) the flask was agitated for one minute and the solvent was filtered into a vial,

(4) the filtrate was then analyzed by infrared spectroscopy using a Perkin-Elmer model 1600 spectrometer, and

(5) a paper plot of the spectrograph was produced.

The resulting spectral plot was then used to determine if hydrocarbons were extracted from the soil matrix.

3.2.2 Method Performance

A statistical comparison of the field screening methods was made against the analytical results obtained to determine the reliability of screening. The results from each method were also correlated against each other as in internal check on the screens.

First, the screening data was checked to see if the method was a good "on/off" test for the presence of contamination. From Table 3-1, all of the samples appear to have a success ratio of approximately 65%. However, statistical analysis of the results reveal that these figures are misleading. Table 3-1 shows that the level of false positives present in the population to have a wide range of variance between screening alternatives. PID readings indicated uncontaminated samples to be contaminated 21% of the time. The visual screen also performed

TABLE 3-1: RESULTS FROM COMPARISON BETWEEN FIELD SCREENING DATA AND ACTUAL TOTAL CONTAMINATION DETECTED IN SAMPLE BY GC/MS ANALYSIS.

SCAN	PID	VISUAL	ODOR	IR
% Correct	65.5%	68.4%	69.0%	64.9%
% Incorrect	34.5%	31.6%	31.0%	35.1%
% False Pos.	21.4%	23.8%	16.7%	16.7%
For Samples above 1 mg/kg				
% Correct	63.5%	92.9%	90.6%	88.2%

at this level, showing false positives in 24% of the uncontaminated samples. Odor and IR screens showed fewer false positives in uncontaminated samples. When these data were analyzed, a large amount of statistical error was present in the PID and Odor screens. Therefore, the success ratios for these screens is probably due to chance.

The data was then analyzed statistically to determine the accuracy and minimum detectable contamination levels for each screening method. This analysis showed some of the methods did not accurately indicate the levels of contamination present. Figure 3-1 is a probability plot of the analytical results from the contaminated samples. The plot shows total constituents detected in ranked order and indicates that the data is log-normally distributed. A regression line is shown characterizing the data. Since this data is linearly distributed, it is assumed that the screening results should be also if it accurately portrays the contaminant levels. A similar analysis of the screening data sets shows some not to be linear.

The PID screen was the worst case of non-linearity. Figure 3-2 is a plot of the PID data against the actual contamination level detected for each sample and shows a large amount of scatter present in the data. Please note the Y-axis of this plot represents those samples with a pollutant level of zero ppb (logarithmic plots cannot show "0", therefore they were plotted at an arbitrarily low level). The graph shows along the X-axis the large number of false negatives given by the PID from samples with a contaminant range from 8,000,000 ppb down to 1,000

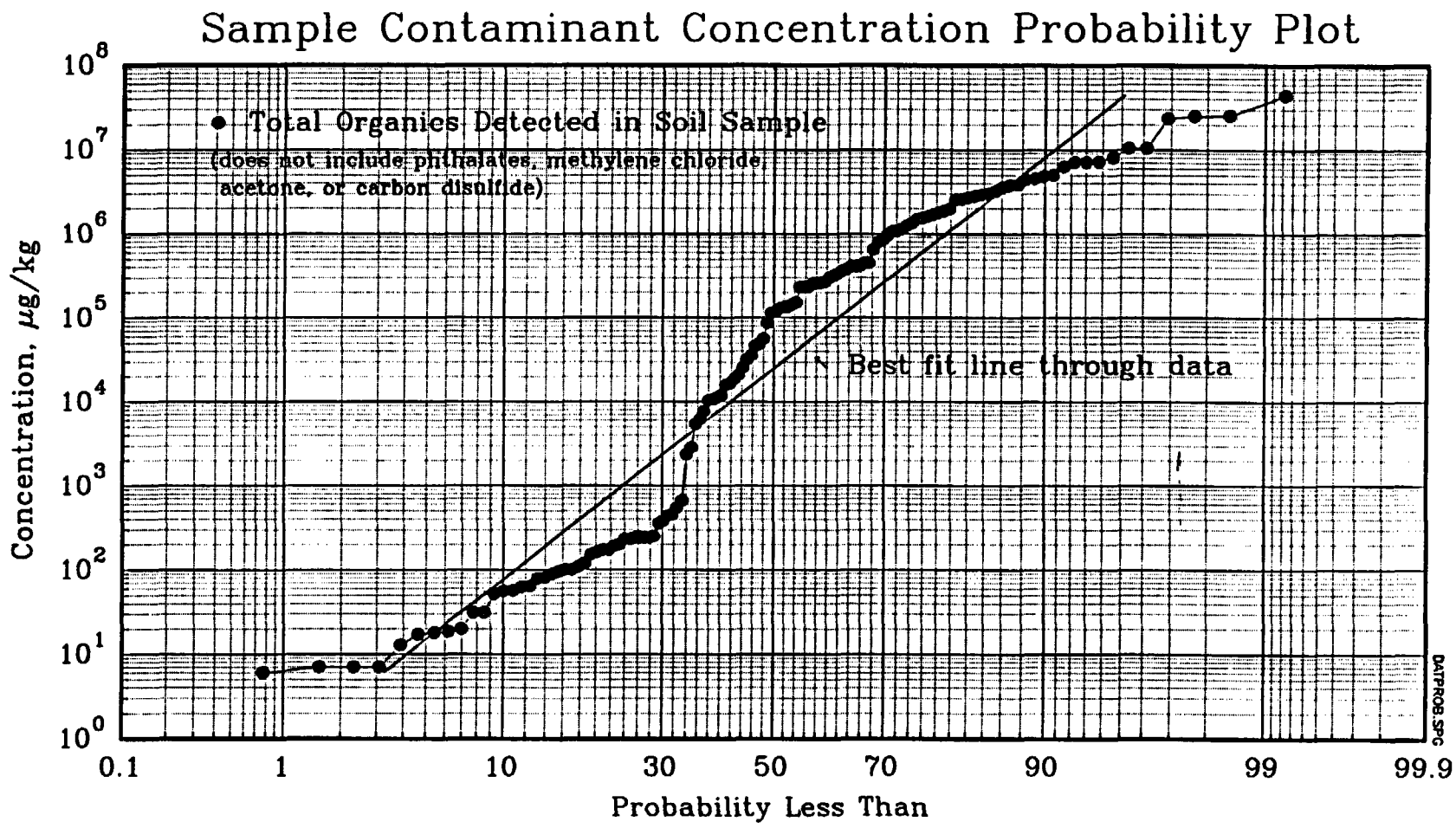

FIGURE 3-1: LOG-NORMAL DISTRIBUTION OF TOTAL CONSTITUENTS DETECTED IN SOIL SAMPLES TAKEN DURING RFI.

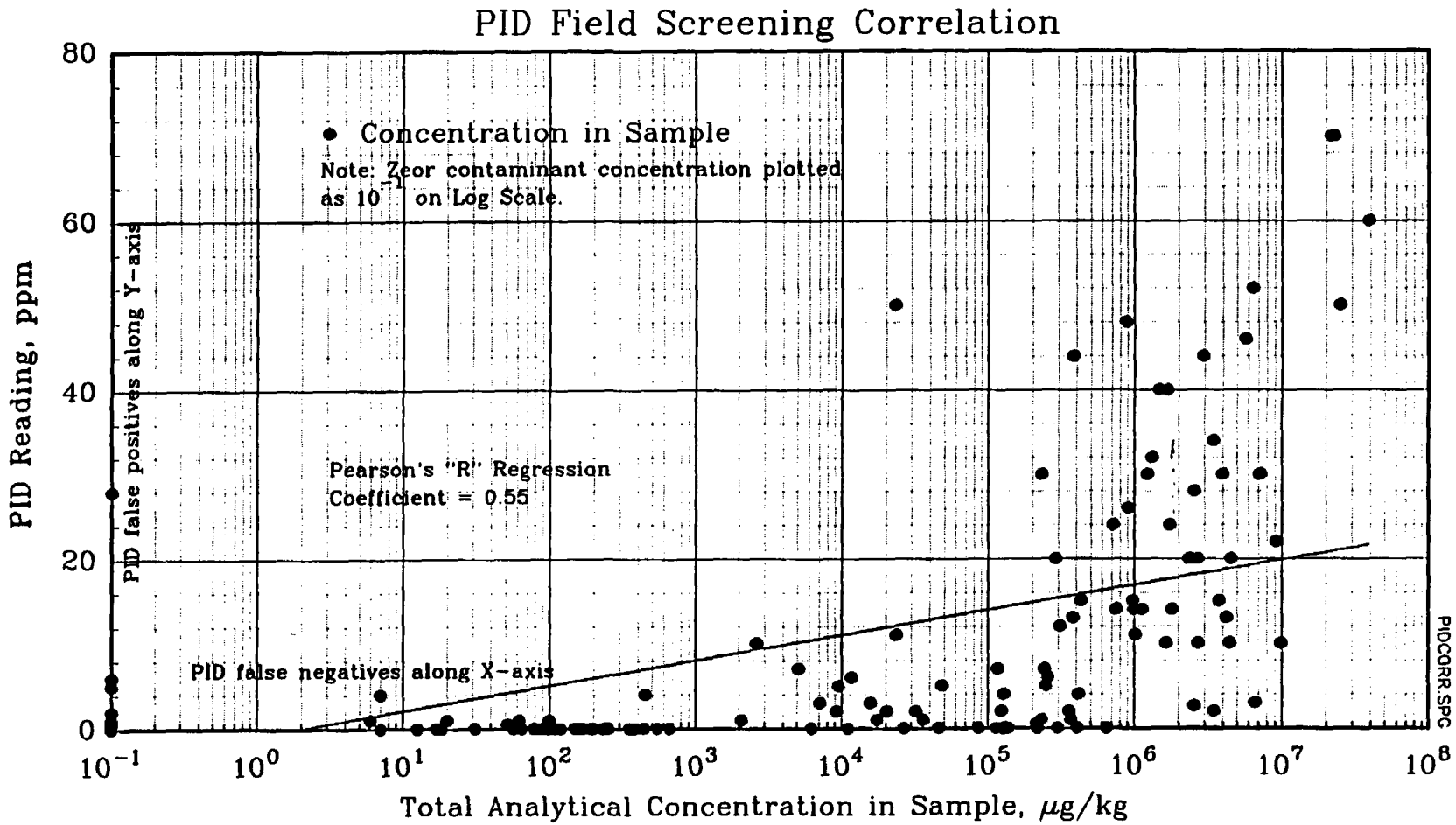

FIGURE 3-2: PLOT OF PID FIELD SCREENING VS. TOTAL ANALYTICAL CONCENTRATION IN SAMPLE. NOTE SAMPLES WITH ZERO CONSTITUENTS ARE ARBITRARILY PLOTTED ALONG X-AXIS ON LOG SCALE.

ppb. False positives are also shown along the Y-axis. Figure 3-3 is a second plot of the data with the PID readings grouped into ranges roughly corresponding to the rankings used in other screening methods. The error bars indicate the standard deviation about the geometric mean of each set and the line through the data represents a high-order regression of the data. This plot shows the mean of each set to be roughly equal and therefore also equal to the mean of the population. Table 3-2 presents t-statistics calculated to compare each set mean with the mean of the entire population. With the exception of the two extreme sets, this analysis showed the mean of each set was not significantly different from the mean of the entire population. If the PID were truly measuring the contaminants present, we would expect only the middle range to be the same as the mean of the analysis data. Since this is not the case, the method seems to be measuring some parameter other than contaminant levels. This hypothesis is strengthened by Figure 3-4 which is a log-normal probability plot showing the ranked analysis data by PID range. Here it is obvious that the first four ranges are essentially from the same population. Also, the wide range of error in PID readings less than 5 can be seen.

The linearity of PID data was checked by formulating a regression equation of the data and then calculating a standardized residual from predicted contaminant levels against actual levels. The resulting data was plotted and presented as Figure 3-5. The plot shows a wide range of scatter with the values clustered at one end of the X-interval shown. Therefore it is concluded that the data is not homoscedastic and a regression is meaningless.

A similar analysis of the odor ratings given to each sample indicates that the PID was actually monitoring the odor of each sample. Figure 3-6 plots the odor rating assigned for each sample against the sample constituent concentration. Please note the similarities between this figure and Figure 3-3. Table 3-3 presents the comparison results between the mean of each set shown in the figure against the population mean. Like the PID data, the t-statistic demonstrates the mid-scale ranges to be measures of the population mean and the extreme ranges are significantly different. Figure 3-7 shows the ranked data, indicating four distinct ranges. Those samples given a "medium" and "light" odor rating essentially belong to the same population, thus combining two ranges. One significant difference is noticed between this figure and

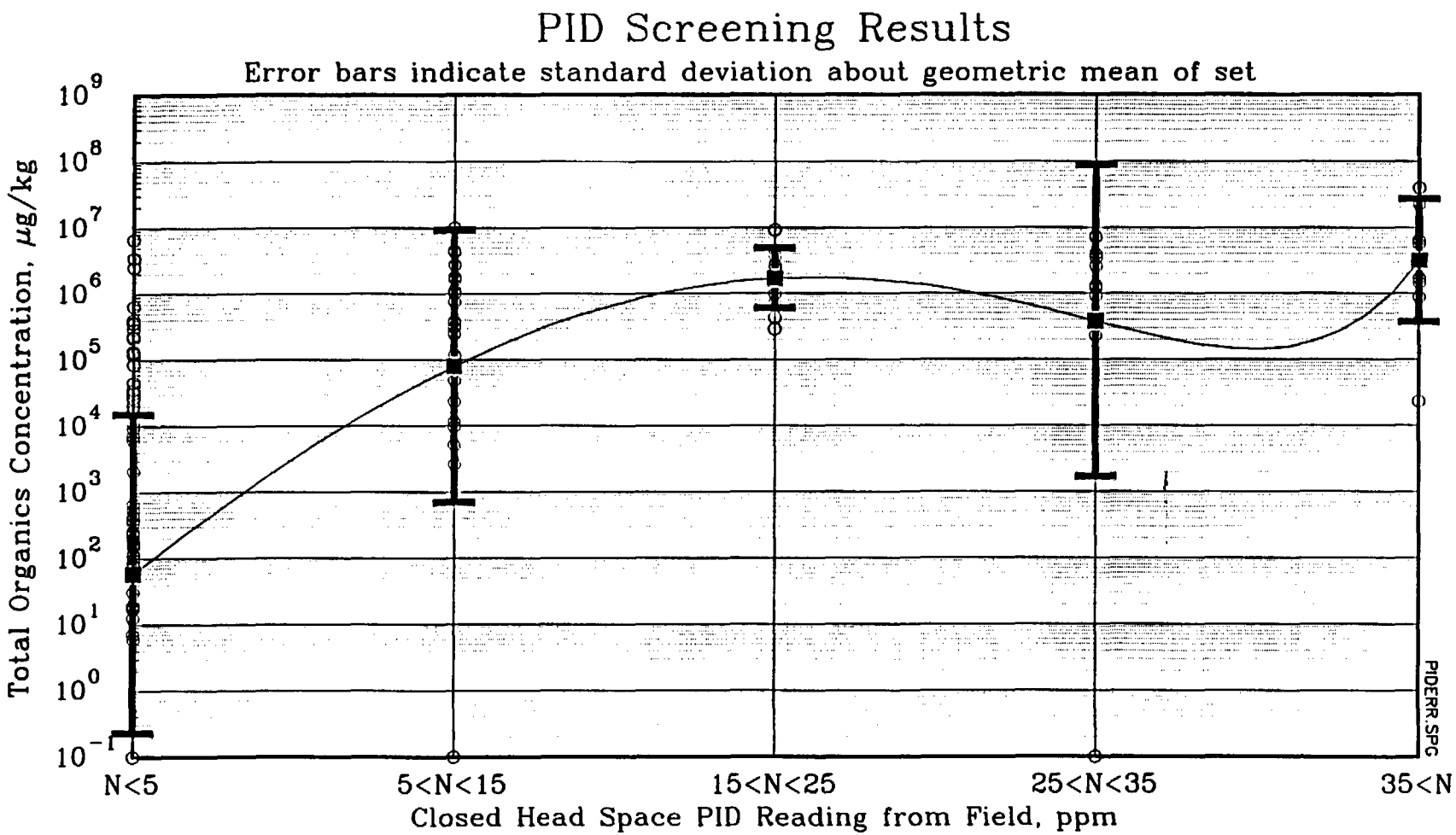

FIGURE 3-3: PID READINGS BY RANK GROUPING.

Ball Engineering, Inc.

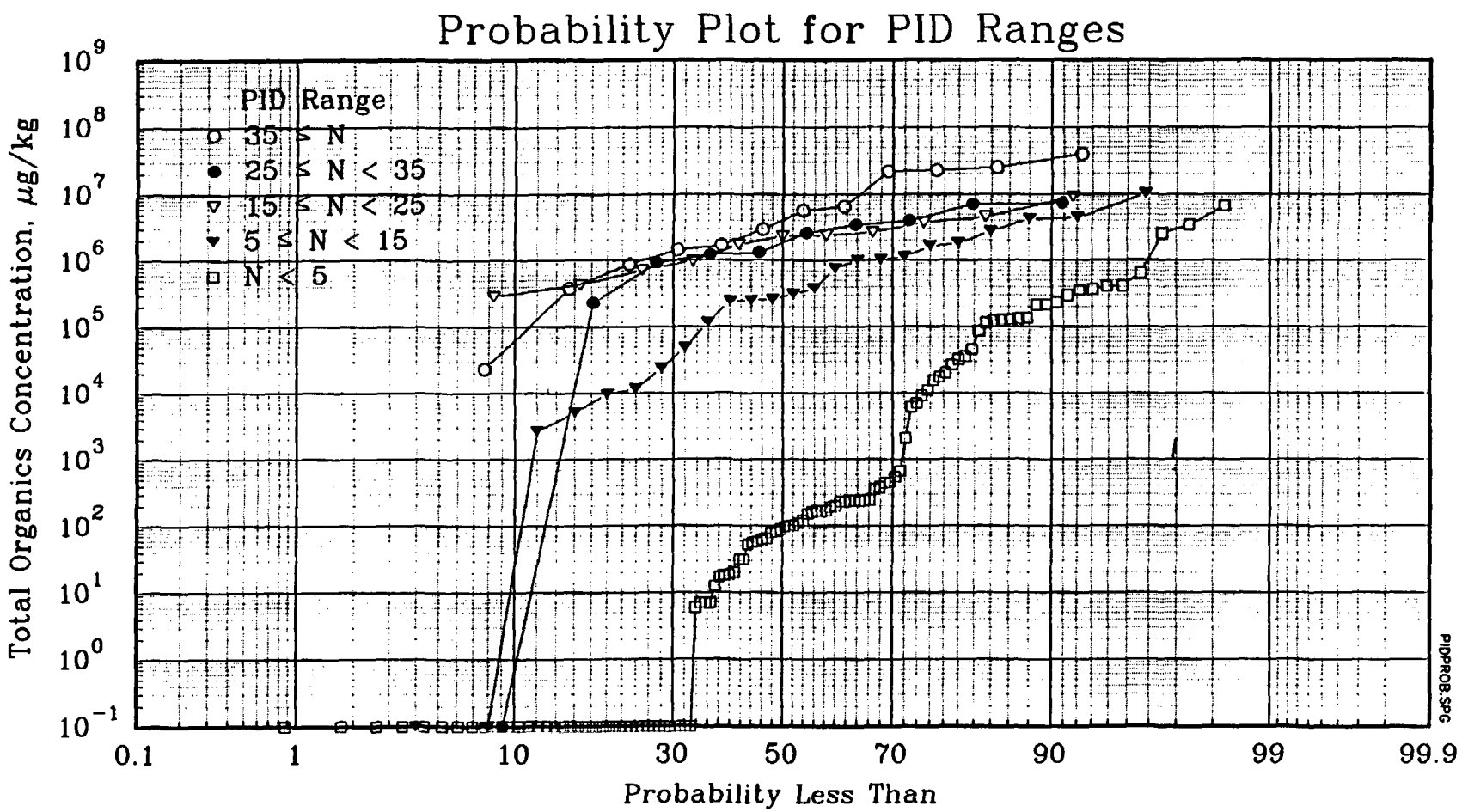

FIGURE 3-4: RANKED ANALYSIS DATA BY PID RANGE. NOTE ZERO CONCENTRATION ARBITRARILY PLOTTED AT 10^{-1}.

Ball Engineering, Inc.

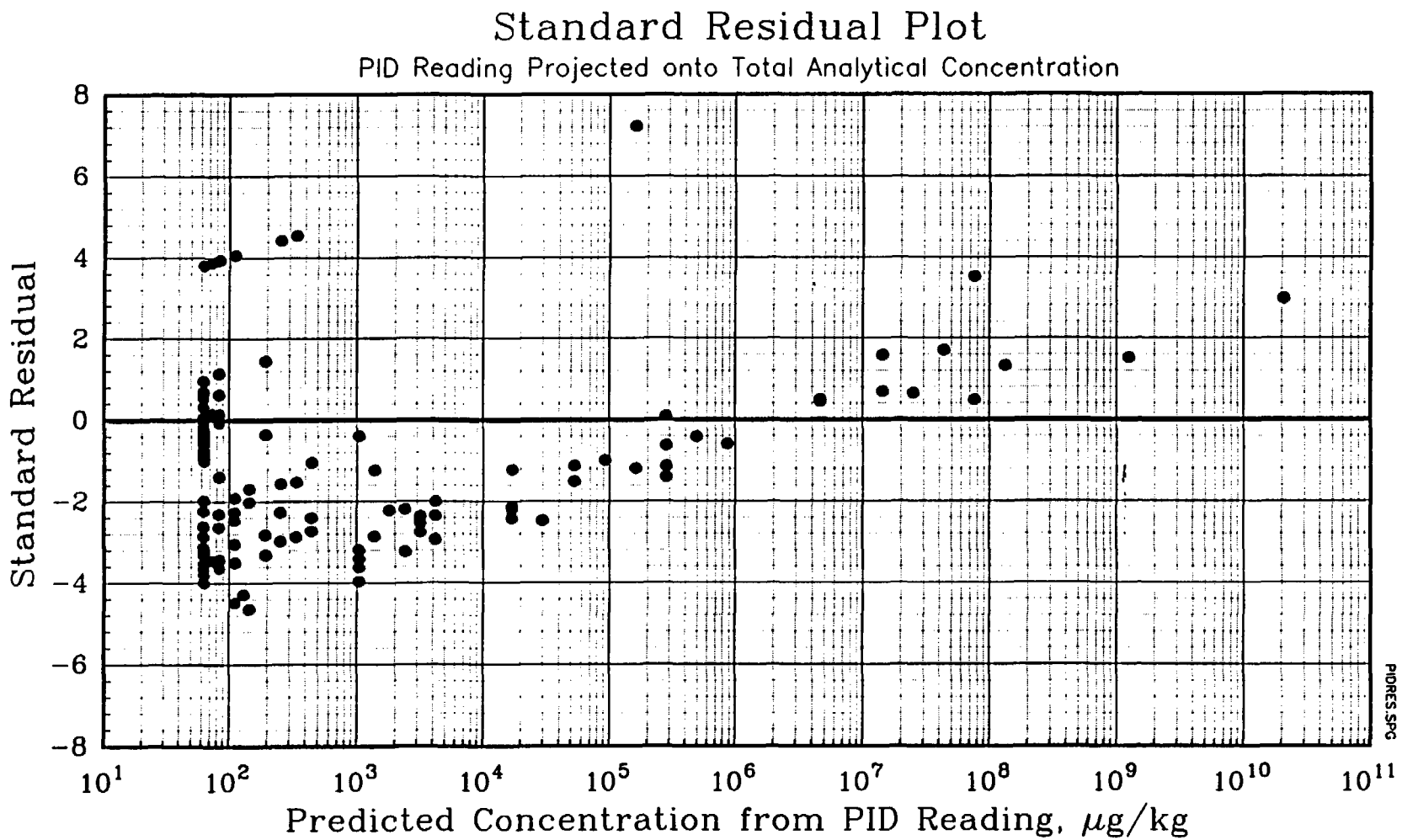

FIGURE 3-5: STANDARD RESIDUAL PLOT FROM PROJECTING PID READING ONTO ANALYTICAL DATA.

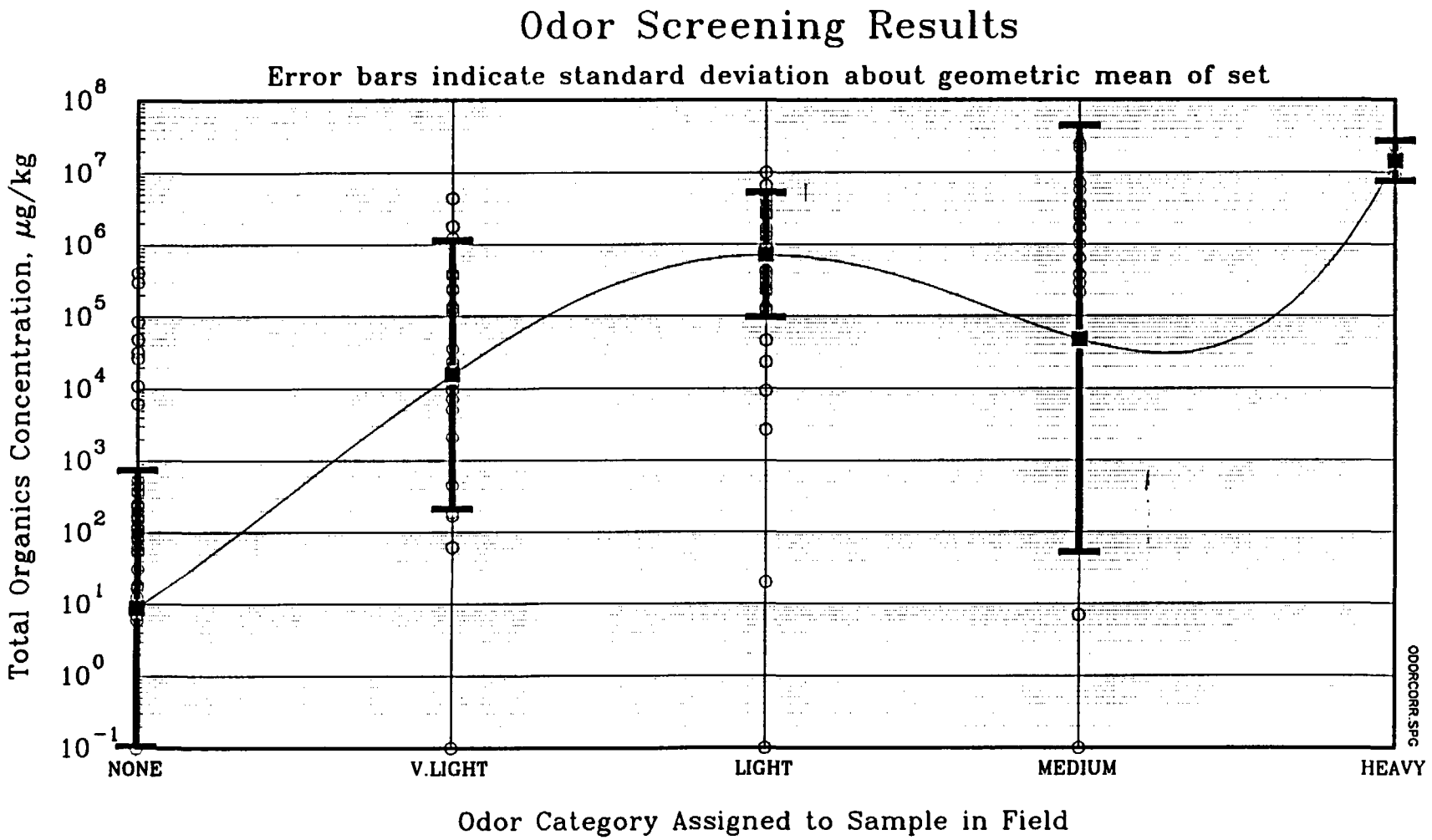

FIGURE 3-6: ODOR SCREENING RESULTS.

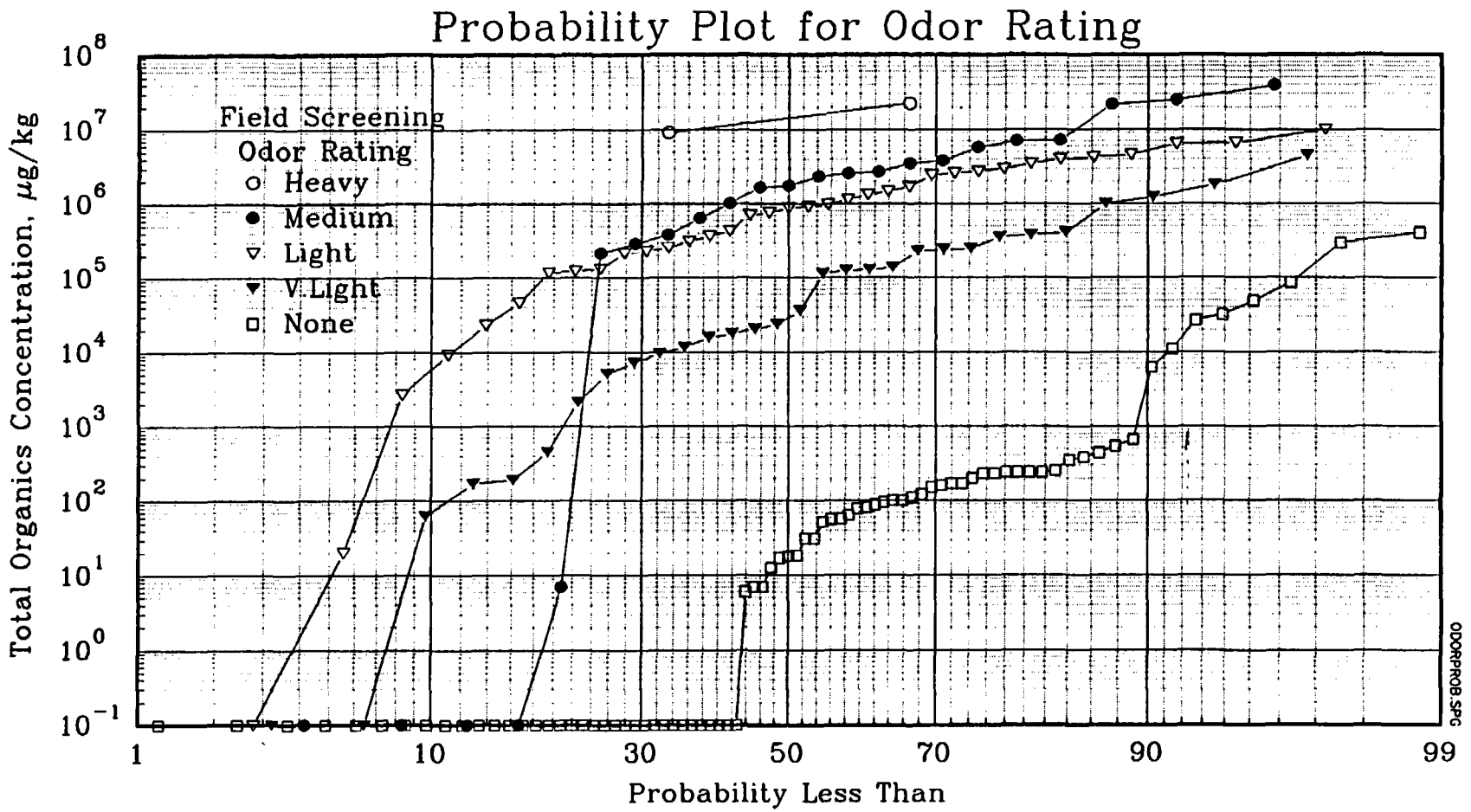

FIGURE 3-7: RANKED ANALYTICAL DATA BY ODOR RANGE.

TABLE 3-2: T-STATISTIC COMPARISON BETWEEN ANALYSIS DATA MEANS BY PID SET AND POPULATION MEAN

PID PERFORMANCE ANALYSIS STATISTICS					
Population Statistics[a]					
Mean					1357432.62
Standard Deviation					4461639.56
Standard Error					341190.10
Population Size					171
Sample Statistics					
PID Range	35<N	25<N<35	15<N<25	5<N<15	N<5
Mean	10647699.75	2795598.00	2644447.45	1267339.58	225167.06
Std Dev.	12991673.83	2626024.41	2559121.38	2253837.06	901455.00
Std Error	3750373.19	830421.83	771604.13	460062.56	104091.06
Size	12	10	11	24	75
t-Statistic	2.48	1.73	1.67	-.2	-10.88
Sig. t	2.12	2.26	2.23	2.07	2

[a]Population consists of total volatile and semi-volatile constituents detected in 171 soil samples analyzed.

Figure 3-4. The range of samples exhibiting no odor shows a significantly lower actual concentration range than those samples having a zero PID reading.

Due to the similarities between the two, a regression was done of the PID reading on the odor rating. The odor data was projected onto an ordinal scale with zero indicating no odor and four indicating heavy odor. The resulting correlation with the PID data gave a Pearson's R correlation coefficient of 0.66 which is a moderate to high correlation. Figure 3-8 is a plot of the data showing the regression line between the two sets.

The homoscedasticity of the PID and odor data was checked by using the regression equation to predict odor level ratings from PID readings. The resulting standardized residuals were then plotted against the predicted ratings in Figure 3-9. Although the data is somewhat

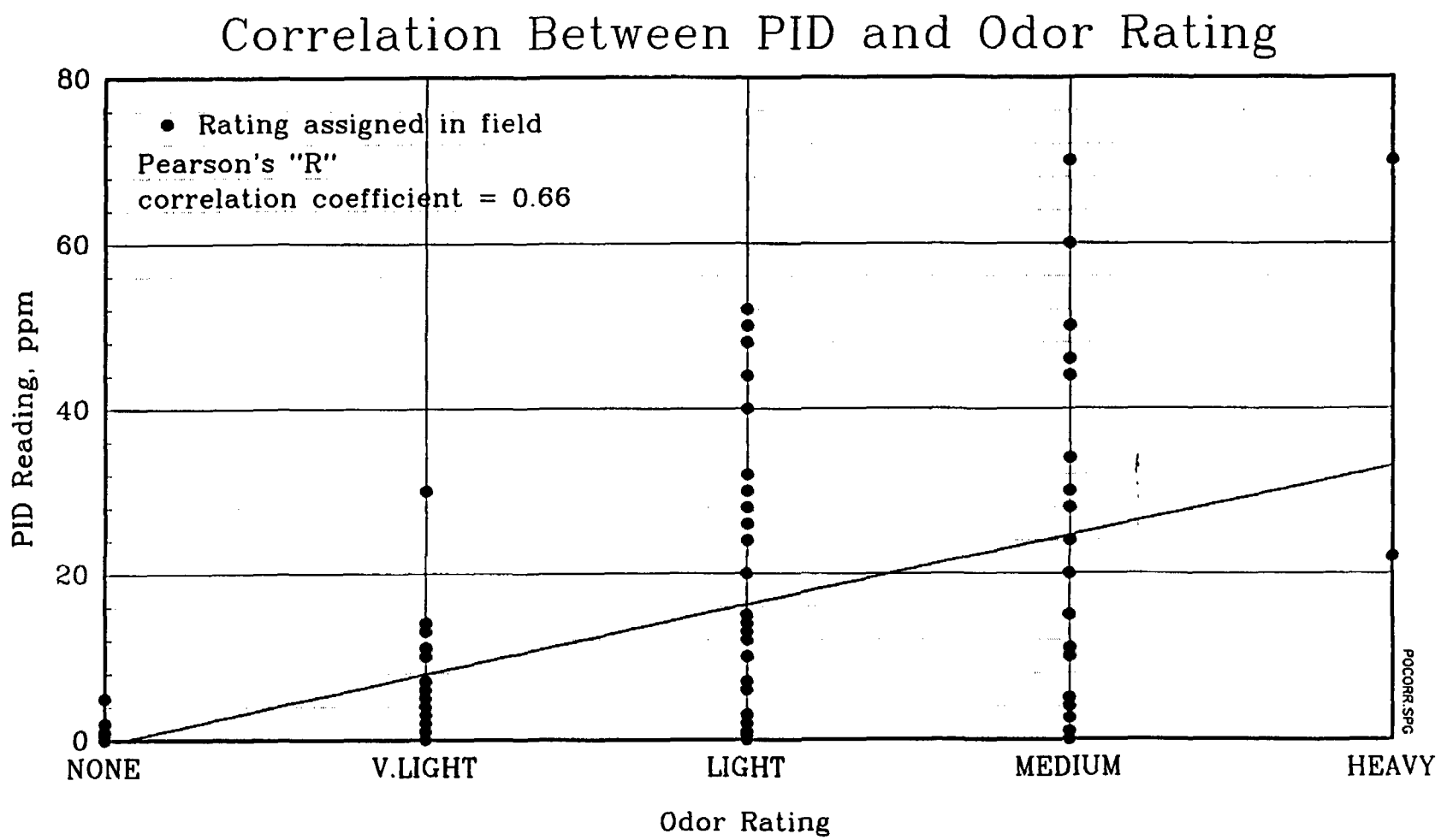

FIGURE 3-8: CORRELATION BETWEEN PID READINGS AND ODOR RATING FOR SOIL SAMPLES.

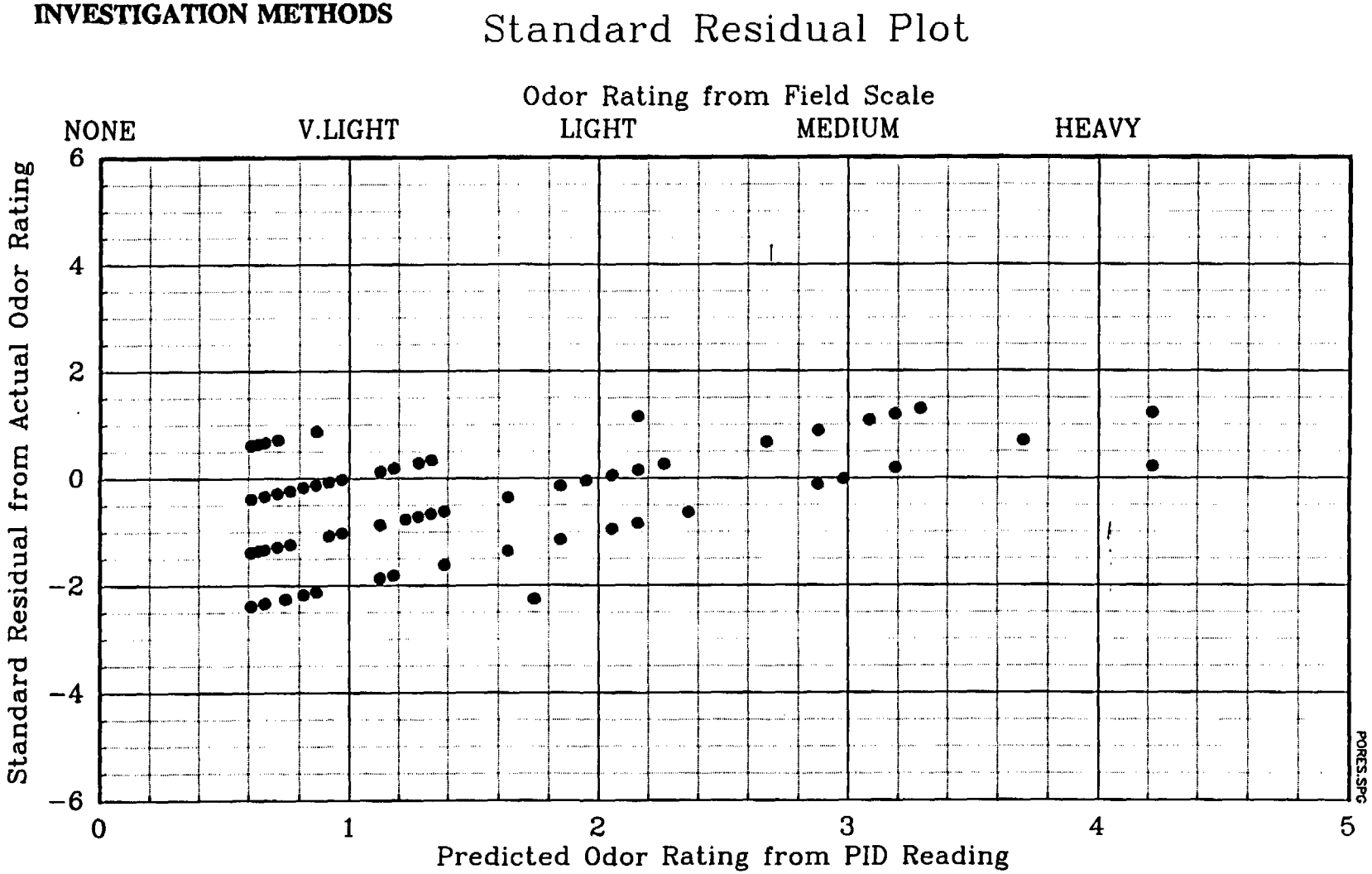

FIGURE 3-9: STANDARDIZED RESIDUAL PLOT FROM REGRESSION OF PID READING ON ODOR RATING.

concentrated near the lower end of the X-interval, it is fairly evenly distributed about the zero line of the plot.

Since Figure 3-9 shows the data to be homoscedastic, and Figure 3-8 indicates linearity, it can be concluded that the PID meter actually measured the level of odors given off by each sample. This theory is enhanced by observations made of the contaminants. The site is contaminated by chemicals distilled from coal tar produced during coal coking processes. Light hydrocarbons such as naphthalene are distilled from the coal tar and sold. Creosote oil consists of some light compounds, but is mostly composed of larger compounds such as phenanthrene and pyrene. These compounds do not volatize readily in air and therefore cannot be smelled as easily. On the other hand, light compounds do volatize on a larger scale and thus have a more prominent odor, thus the characteristic naphthalene or "moth-ball" aroma associated with creosote. The PID meter measures only those photoionizable chemicals which it can detect that have volatized in air drawn into the instrument. Similarly, olfactory receptors can only detect odors from those chemicals which are present in the air.

The only area where the PID did not perform equally with the odor screen was in the level and number of false negatives and false positives (34.5% and 21.4% respectively). It is likely that the PID monitored background levels of chemicals in the air from the wood treating operation itself to account for false positives. However, approximately 40% of the samples showing no reading by the PID had contaminant levels above 1000 ppb (1 ppm). In contrast only 10% of the samples with an odor rating of "none" had contamination above 1000 ppb. This probably came about because of the 10 eV lamp used in the PID. Since most of the heavy compounds associated with creosote are not photoionizable at this energy level, the instrument is limited to detecting lighter compounds, while the odor screen is only limited to the sensitivity of the olfactory nerves in the sampler's nose. Any compound in the air taken in by the technician could be potentially smelled.

TABLE 3-3: T-STATISTIC COMPARISON BETWEEN ANALYSIS DATA MEANS BY ODOR RATING AND POPULATION MEAN

ODOR EVALUATION ANALYSIS STATISTICS					
Population Statistics[a]					
Mean					1357432.62
Standard Deviation					4461639.56
Standard Error					341190.10
Population Size					171
Sample Statistics					
Odor Range	Heavy	Medium	Light	Very Light	None
Mean	15876535.5	5494472.83	1773108.26	367237.73	11347.06
Std Dev.	9477019.14	9796885.56	2317218.77	877119.27	56355.05
Std Error	6701264.5	2042791.85	391681.46	160139.34	6261.67
Size	2	23	35	30	81
t-Statistic	2.17	2.03	1.06	-6.18	-214.97
Sig. t	2.12	2.26	2.23	2.07	2

[a]Population consists of total volatile and semi-volatile constituents detected in 171 soil samples analyzed.

Results from the IR and visual screens proved to have the best correlation with the analysis results. The visual screen/analytical data regression has a Pearson's R correlation coefficient of 0.76 which is in the high category. Also, the data is linearly distributed on a log scale. Figure 3-10 shows a plot of the data and indicates four distinct ranges. Those samples given a rating of 1 and 2 are probably from the same population, as are those given a 3 and 4 rating. The results from statistical tests of the range means is tabulated in Table 3-4. T-statistic's indicate that those samples given a rating of 4 and 3 are not significantly different from the mean of the entire population. Although ranges assigned a 1 or 2 are statistically different, they are most likely not different from each other. The log-normal probability plot of the ranges, Figure 3-11, tends to confirm these observations. One other observation can be

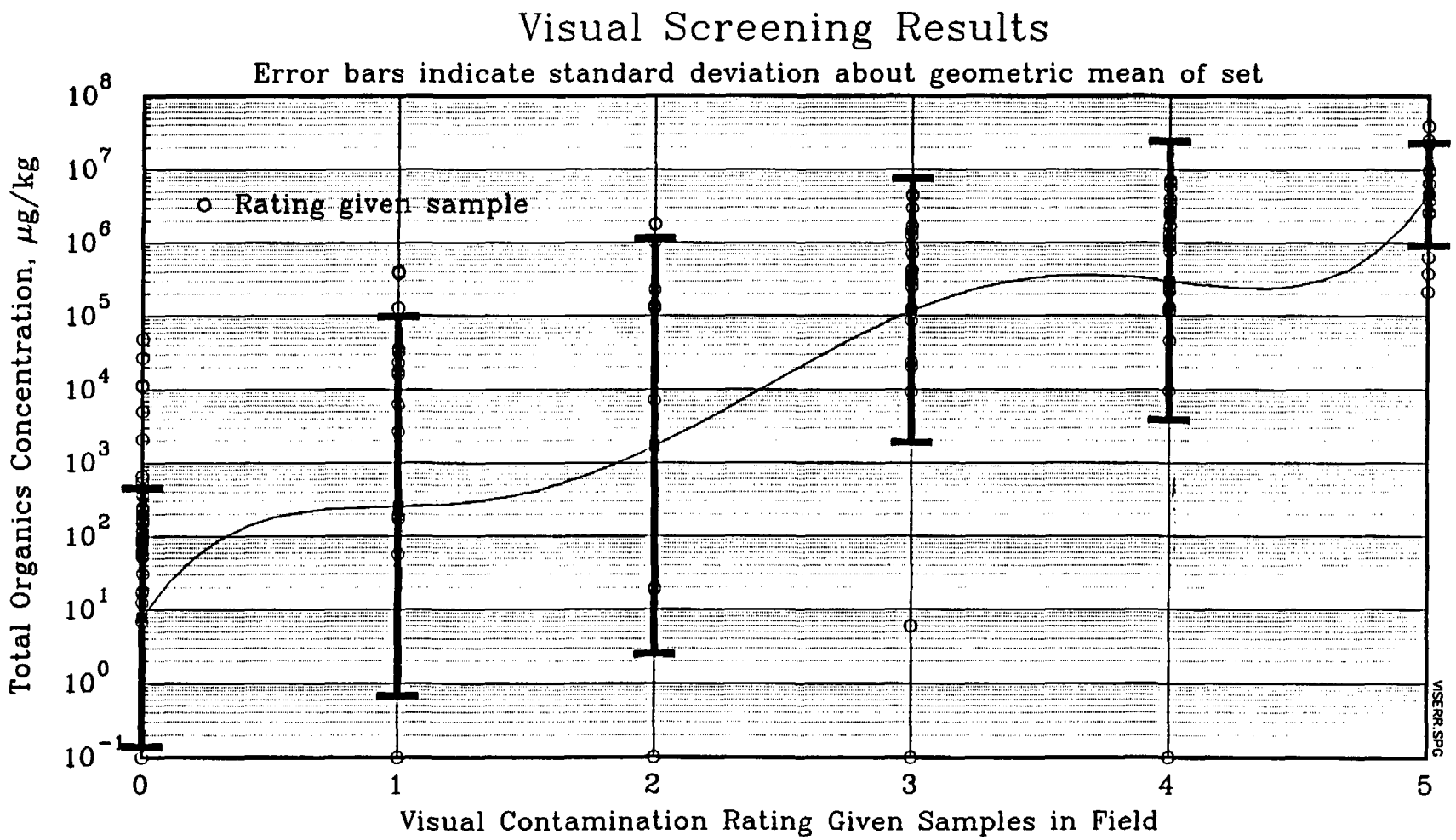

FIGURE 3-10: VISUAL SCREENING RESULTS.

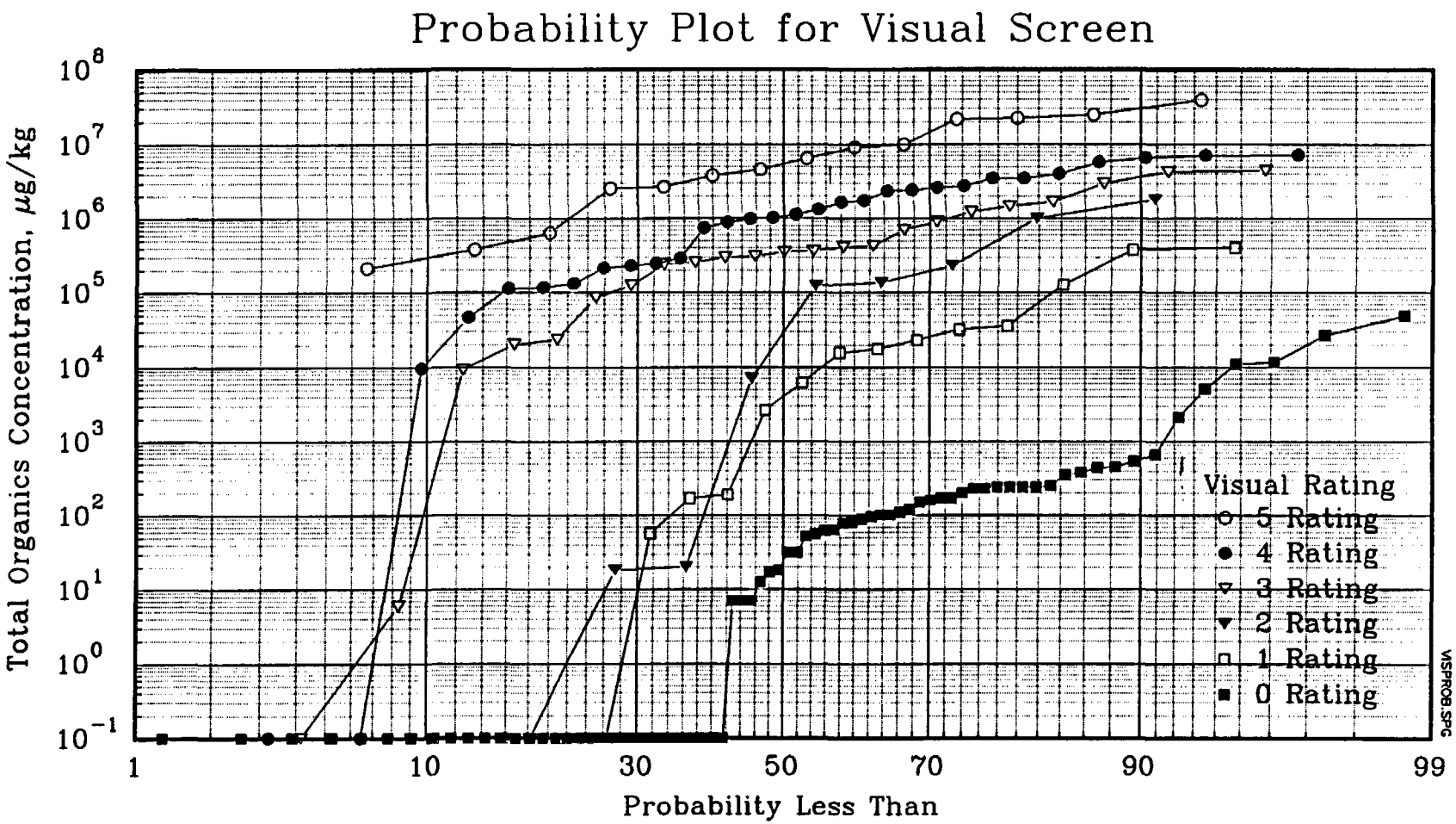

FIGURE 3-11: PROBABILITY PLOT OF RANKED ANALYTICAL DATA BY VISUAL OBSERVATION RATING.

made from Figure 3-11: of the samples assigned a zero contamination rating in the field, only eleven percent exhibited levels above 1000 ppb or 1 ppm.

IR data gathered during the investigation proved to be the best indicator of contaminant levels. Linear regression analysis of the data indicates a Pearson's R of 0.76 exists between the actual results and IR contaminant ratings assigned to the samples. To perform this analysis, a contaminant rating was assigned to each plot on an ordinal scale of 0 to 4, with 4 being highest. A plot of this data is shown as Figure 3-12. The line through the data sets is a high-order regression of the results. The data probability plot, Figure 3-13, shows distinct, linear sample sets on a log-normal scale for each rating. The plot shows that data rated 2 and 3 most likely come from the same population since the means are very close. This gives four distinct ranges,

TABLE 3-4: T-STATISTIC COMPARISON BETWEEN ANALYSIS DATA MEANS BY VISUAL RATING AND POPULATION MEAN

VISUAL EVALUATION ANALYSIS STATISTICS						
Population Statistics[a]						
Mean						1357432.62
Standard Deviation						4461639.56
Standard Error						341190.10
Population Size						171
Sample Statistics						
Rating	5	4	3	2	1	0
Mean	10616588.43	1947962.6	894824.52	331118.34	58120.04	1467.82
Std Dev.	11848704.31	2213534.07	1295893.12	603202.63	125284.34	6531.07
Std Error	3166699.43	404134.18	270212.39	190749.42	29529.8	749.17
Size	14	30	23	10	18	76
t-Statistic	2.92	1.46	-1.71	-5.38	-44.00	-1809.97
Sig. t	2.16	2.04	2.07	2.26	2.11	2

[a]Population consists of total volatile and semi-volatile constituents detected in 171 soil samples analyzed.

each of which is statistically different from the other. T-test data presented in Table 3-5 for the

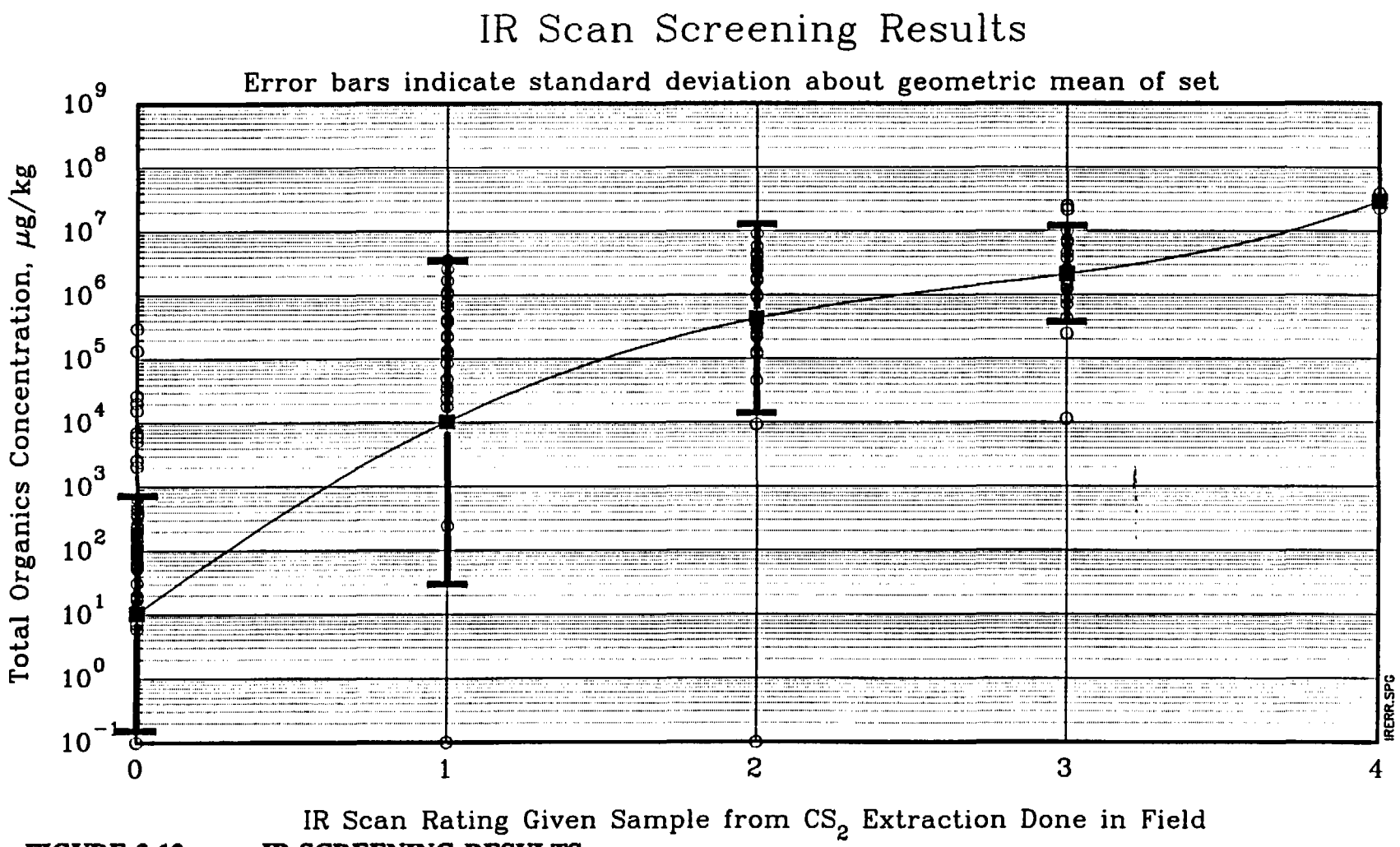

FIGURE 3-12: IR SCREENING RESULTS.

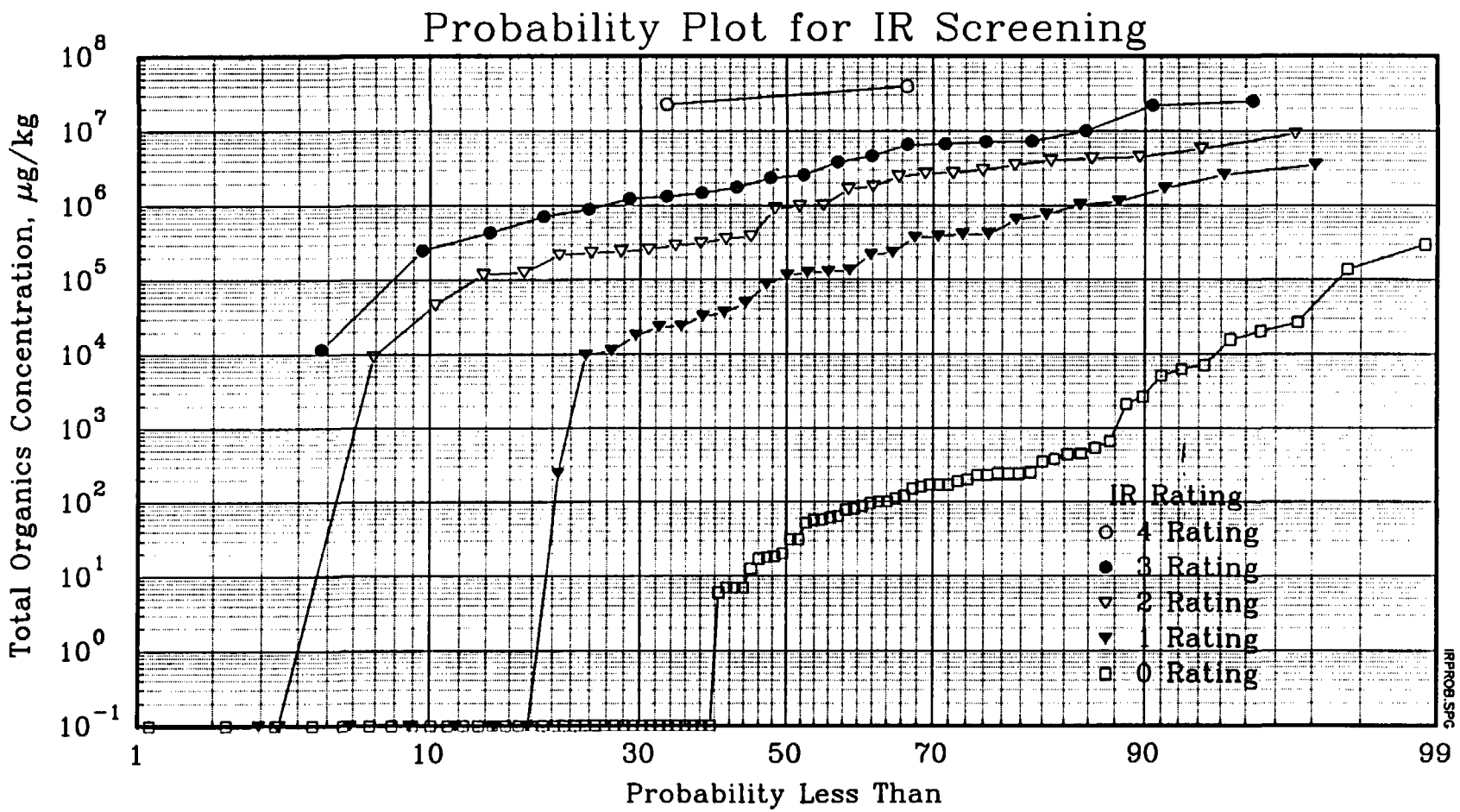

FIGURE 3-13: LOG-NORMAL PROBABILITY PLOT OF RANKED ANALYTICAL DATA BY IR SCREENING RATING.

TABLE 3-5: T-STATISTIC COMPARISON BETWEEN ANALYSIS DATA MEANS BY IR SCAN RATING AND POPULATION MEAN

IR SCAN RATING ANALYSIS STATISTICS					
Population Statistics[a]					
Mean					1357432.62
Standard Deviation					4461639.56
Standard Error					341190.10
Population Size					171
Sample Statistics					
IR Rating	4	3	2	1	0
Mean	30852200	5254186.15	1811787.64	426559.51	5981.11
Std Dev.	11701768.7	6802927.4	2188208.36	783656.9	34775.48
Std Error	8274400	1521180.81	413532.51	136417.16	3707.08
Size	2	20	28	33	88
t-Statistic	3.56	2.56	1.10	-6.82	-364.56
Sig. t	2.12	2.09	2.05	2.04	2

[a]Population consists of total volatile and semi-volatile constituents detected in 171 soil samples analyzed.

ranges show each range to be significantly different from the mean of the analytical data (with the exception of the mid-range which *should* predict the mean of the population) and predicts discrete levels of contamination. From the zero rating curve in Figure 3-13, it can be concluded that of those samples given that rating, approximately 11% were above 1000 ppb (1 ppm). Since the sample cell used for the spectrometry was designed to detect constituent levels at 1 ppm, it can be concluded that the instrument effectively operated at this level.

Originally, it was anticipated that the IR screen would be conducted and interpreted in much the same manner as a TPH test on soil with the following exceptions: (1) carbon disulfide (CS_2) is used as a solvent, and (2) the soxhlet extraction is replaced by agitation. The spectral plot would then be compared to plots of chemical standards made from preserving solutions at

the plant and quantified. Each spectrograph was to be compared to the standard to determine which species was predominant, and thus which curve to use. However, after the field portion of the project was completed, it was determined that this level of quantification could not be achieved. This was, for the most part, due to the varying constituency of chemicals contained in the soil matrix. Samples collected from the site show the preserving compounds to be highly "weathered" with individual species not in the same ratios as the original parent compound. Thus a good comparison between the sample scan plots and standards could not be achieved. Also, scans of uncontaminated soil showed several absorbance peaks in the 2730 cm^{-1} range which was to be used for quantification as in the TPH test. These peaks varied from sample to sample and were not always present. It is speculated that this peak represents nitrate, nitrite, and/or ammonia in the soil, however no research was done to confirm this hypothesis. Due to these factors, it was determined that a qualitative analysis based on the number and relative size of peaks other than that at the 2730 wavelength would be more accurate. This was acceptable since the primary objective of the IR scan was to determine if chemicals were present in samples collected from the borings. Since this was accomplished, no further attempt was made to correlate the contaminant and peak absorbance levels, although this may be done as more data is needed from the site.

3.2.3 Method Performance Summary

Four field screening techniques were used for evaluating soil samples: (1) Photoionization detector, (2) visual inspection, (3) odor evaluation, and (4) infrared spectroscopy (IR). Statistical comparison between the screening data and analytical data indicates:

(1) IR screening was the most accurate method for predicting the presence of contaminants.

(2) The PID measured odor levels from the samples, and

(3) "Weathering" of preservative compounds prevented accurate quantification using IR data.

Table 3-6 summarizes the sensitivity and statistical analysis of each method.

TABLE 3-6: STATISTICAL PERFORMANCE SUMMARY OF FIELD SCREENING METHODS.

	PID	ODOR	VISUAL	IR
Evaluation of Pearson's R between data and screening range	0.58 Meaningless	0.65 Meaningless	0.76 Moderate/Low	0.75 Moderate
Percent of samples correctly identified as contaminated	65.5% Chance	69.0% Chance	68.4% Significant	64.9% Significant
Samples rated as non-contaminated above 1 ppm	63.5% Poor	9.4% Good	7.1% Good	11.8% Good
Amount of variance in sample distribution	High	High	Moderate	Low
Assumptions of linearity and homoscedasticity violated?	Yes	Yes	Fair Linearity	Linear and Homoscedastic
Overall reliability of method	Poor	Poor	Fair	Good

Table 3-7 on the following page summarizes the regression statistics for each data set. Comparisons are made between each of the five data sets: IR, PID, visual, odor ratings, and actual analysis data. Each regression output cell in the top portion of the table contains constants for the regression equation:

$$Y' = mX + B$$

where Y' is the estimate, m is the X coefficient, X is the predictor, and B is the constant.

3.3 Analytical Methods

Samples were tested for a variety of volatile and semi-volatile chemicals, arsenic, chromium, and copper. Water samples were also analyzed for total petroleum hydrocarbons (TPH). Organic and metals analysis used methods specified in SW-846, 3rd Edition. Laboratory QA/QC methodology was according to SW-846 and the U.S. EPA Contract Laboratory Program (CLP). TPH analysis was by EPA method 418.1.[2] Table 3-8 on page

[2]U.S. EPA. Methods for Chemical Analysis of Water and Wastes. EPA-600/4-79-020. Environmental Monitoring and Support Laboratory. Cincinnati, OH. 1983. p. 442.

TABLE 3-7: REGRESSION STATISTICS FOR SCREENING METHODS.

IR VS PID

Regression Output:

Constant		-0.37286
Std Err of Y Est		10.32921
R Squared		0.509206
No. of Observations		171
Degrees of Freedom		169
Pearson's R		0.713586
X Coefficient(s)	9.3749	
Std Err of Coef.	0.707989	

PID VS VIS

Regression Output:

Constant		1.103348
Std Err of Y Est		1.462999
R Squared		0.375435
No. of Observations		171
Degrees of Freedom		169
Pearson's R		0.612727
X Coefficient(s)	0.076932	
Std Err of Coef.	0.007633	

VIS VS ODOR

Regression Output:

Constant		0.142675
Std Err of Y Est		0.656733
R Squared		0.677179
No. of Observations		171
Degrees of Freedom		169
Pearson's R		0.822909
X Coefficient(s)	0.513813	
Std Err of Coef.	0.027289	

IR VS VIS

Regression Output:

Constant		0.553602
Std Err of Y Est		1.155468
R Squared		0.610412
No. of Observations		171
Degrees of Freedom		169
Pearson's R		0.781289
X Coefficient(s)	1.288752	
Std Err of Coef.	0.079199	

PID VS ODOR

Regression Output:

Constant		0.610728
Std Err of Y Est		0.871033
R Squared		0.432126
No. of Observations		171
Degrees of Freedom		169
Pearson's R		0.657363
X Coefficient(s)	0.051534	
Std Err of Coef.	0.004544	

VIS VS ACTUAL

Regression Output:

Constant		0.978663
Std Err of Y Est		1.907956
R Squared		0.571175
No. of Observations		171
Degrees of Freedom		169
Pearson's R		0.755761
X Coefficient(s)	1.189482	
Std Err of Coef.	0.079281	

IR VS ODOR

Regression Output:

Constant		0.351448
Std Err of Y Est		0.798581
R Squared		0.522667
No. of Observations		171
Degrees of Freedom		169
Pearson's R		0.722957
X Coefficient(s)	0.744601	
Std Err of Coef.	0.054737	

PID VS ACTUAL

Regression Output:

Constant		2.099707
Std Err of Y Est		2.372047
R Squared		0.337189
No. of Observations		171
Degrees of Freedom		169
Pearson's R		0.580679
X Coefficient(s)	0.114749	
Std Err of Coef.	0.012375	

ODOR VS ACTUAL

Regression Output:

Constant		1.347795
Std Err of Y Est		2.213304
R Squared		0.422934
No. of Observations		171
Degrees of Freedom		169
Pearson's R		0.650334
X Coefficient(s)	1.639291	
Std Err of Coef.	0.147295	

IR VS ACTUAL

Regression Output:

Constant		1.259767
Std Err of Y Est		1.931125
R Squared		0.560697
No. of Observations		171
Degrees of Freedom		169
Pearson's R		0.748797
X Coefficient(s)	1.943995	
Std Err of Coef.	0.132364	

Note: Actual analytical data is log-normally distributed, therefore regression analysis uses log of concentration. Other data is normally distributed on an ordinal scale.

PEARSON'S "R" CORRELATION COEFFICIENT
FOR CONTAMINANT CONCENTRATIONS

	IR	PID	VISUAL	ODOR	ACTUAL
IR	1.000	0.714	0.781	0.723	0.749
PID		1.000	0.613	0.657	0.581
VIS			1.000	0.823	0.756
ODOR				1.000	0.650
ACTUAL					1.000

SCANCOR.WK3, RANGE A:P3..A:AA61

M-2/75/1/1.75

INVESTIGATION METHODS

3-30 is a sampling summary giving the analytical methods used for each media type.

TABLE 3-8:ANALYTICAL METHODS SUMMARY

Media	Parameter	Container	Pres.	Method[a]
Soil	Semi-Volatile Organics (K001)	2-4 oz. G/T[b]	Iced[c]	8040, 8100, 8270
	Arsenic, Copper, Chromium	1-4 oz. G/T[b]	HNO_3	7060,7061,7190,7210
	Volatile Organics	2-4 oz. G/T[b,d]	Iced[c]	8240
Water	Semi-Volatile Organics (K001)	2-1 Liter BG/T[e]	Iced[c]	8040, 8100, 8270
	Arsenic, Copper, Chromium	1 Liter BG/T[e]	Iced[c]	7060,7061,7190,7210
	Volatile Organics	2-40 ml vials	Iced[c]	8240
	Total Petroleum Hydrocarbons	1 Liter BG/T[e]	HNO_3	EPA Method 418.1

[a]SW-846, 3rd Edition unless otherwise noted.
[b]G/T – 4 ounce glass jar with teflon lined lid.
[c]Iced-refrigerated then iced for shipment.
[d]Volatile organic analysis done from same containers as semi-volatile organic analysis.
[e]BG/T – 1 liter brown glass bottle with teflon lined cap.

Organic chemicals for analysis consisted of volatile and semi-volatile chemicals taken from the U.S. EPA's CLP target compound list. Table 3-9 lists these chemicals. Only those chemicals detected in each media type are listed in the summary sheets in the appendices.

TABLE 3-9: RFI ANALYTICAL TARGET ORGANIC CHEMICALS LIST

Volatile Organic Compounds			
CAS Number	Compound	CAS Number	Compound
74-87-3	Chloromethane	78-87-5	1,2-Dichloropropane
74-83-9	Bromomethane	10061-01-5	cis-1,3-Dichloropropane
75-01-4	Vinyl chloride	79-01-6	Trichloroethene
75-00-3	Chloroethane	124-48-1	Dibromochoromethane
75-09-2	Methylene Chloride	79-00-5	1,1,2-Trichloroethane
67-64-1	Acetone	71-43-2	Benzene
75-15-0	Carbon Disulfide	10061-02-6	trans-1,3-Dichloropropene
75-35-4	1,1-Dichloroethene	75-25-2	Bromoform
75-34-3	1,2-Dichloroethane	108-10-1	4-Methyl-2-Pentanone
540-59-0	1,2-Dichloroethene	591-78-6	2-Hexanone
67-66-3	Chloroform	127-18-4	Tetrachloroethene
107-06-2	1,2-Dichloroethane	79-34-5	1,1,2,2-Tetrachloroethene
78-93-3	2-Butanone	108-88-3	Toluene
71-55-6	1,1,1-Trichloroethane	108-90-7	Chlorobenzene
56-23-5	Carbon Tetrachloride	100-41-4	Ethylbenzene
108-05-4	Vinyl Acetate	100-42-5	Styrene
75-27-4	Bromodichloromethane	1330-20-7	Xylene (total)
Semi-Volatile Organic Compounds			
108-95-2	Phenol	99-09-2	2-Nitroaniline
111-44-4	bis(2-Chloroethyl)Ether	83-32-9	Acenaphthene
95-57-8	2-Chlorphenol	51-28-5	2,4-Dinitrophenol
541-73-1	1,3-Dichlorobenzene	100-02-7	4-Nitrophenol
106-46-7	1,4-Dichlorobenzen	132-64-9	Dibenzofuran
95-50-1	1,2-Dichlorobenzene	121-14-2	2,4-Dinitrotoluene
95-48-7	2-Methylphenol	84-66-2	Diethylphthalate
106-44-5	4-Methylphenol	7005-72-3	4-Chlorophenyl-phenylether

621-64-7	N-Nitroso-Di-n-Propylamine	86-73-7	Fluorene
67-72-1	Hexachloroethane	100-01-6	4-Nitroaniline
98-95-3	Nitrobenzene	534-52-1	4,6-Dinitro-2-methylphenol
78-59-1	Isoprone	86-30-6	N-Nitrosodiphenylamine
88-75-5	2-Nitrophenol	101-55-3	4-Bromophenyl-phenylether
105-67-9	2,4-Dimethylphenol	118-74-1	Hexachlorobenzene
111-91-1	bis(2-Chloroethoxy)Methane	87-86-5	Pentachlorophenol
120-83-2	2,4-Dichlorophenol	85-01-8	Phenanthrene
120-82-1	1,2,4-Trichlorobenzene	120-12-7	Anthracene
91-20-3	Naphthalene	84-74-2	Di-n-Butylphthalate
106-47-8	2-Chloroaniline	206-44-0	Fluoranthene
87-68-3	Hexachlorobutadiene	129-00-0	Pyrene
59-50-7	4-Chloro-3-Methylphenol	85-68-7	Butylbenzylphthalate
91-57-6	2-Methylnaphthalene	91-94-1	3,3'-Dichlorobenzidine
77-47-4	Hexachlorocyclopentadiene	56-55-3	Benzo(a)Anthracene
88-06-2	2,4,6-Trichlorophenol	218-01-9	Chrysene
95-95-4	2,4,5-Trichlorophenol	117-84-0	Di-n-Octyl Phthalate
91-58-7	2-Chloronaphthalene	205-99-2	Benzo(b)Fluoranthene
88-74-4	2-Nitroaniline	207-08-9	Benzo(k)Fluoranthene
131-11-3	Dimethylphthalate	50-32-8	Benzo(a)Pyrene
208-96-8	Acenaphthylene	193-39-5	Indeno(1,2,3-cd)Pyrene
606-20-2	2,6-Dinitrotoluene	53-70-3	Dibenz(a,h)Anthracene
191-24-2	Benzo(g,h,i)perylene	218-01-9	Chrysene

4 DATA SUMMARY

RFI data was collected from several sources to characterize contaminant releases. Aerial photographs taken of the site from 1950 to 1990 were purchased from the US Geological Survey. Past land usage was researched by Colfax personnel. During field work, data was collected from:

(1) site land surveys,
(2) soil borings and trenches,
(3) surface water samples,
(4) ground water samples,
(5) subsurface soil samples, and
(6) QA/QC sampling.

Soil boring and trench data was reported in the form of driller's logs. Analytical contaminant levels were determined using gas chromatography/mass spectroscopy, atomic absorption, or infrared spectroscopy. Site research and organic analysis results are summarized in this chapter. Metals analysis are summarized in Chapter 5 along with a discussion of the results. Toxicological and chemical data was collected from EPA's IRIS database and published HEAST tables.

4.1 Past Land Usage

Research by Colfax personnel indicates the site has had a long history of industrial use. The land has been used as a railroad maintenance yard, wood preserving operation, and a veneer mill. The property was first developed by the Louisiana and Arkansas Rail Road for locomotive maintenance, fueling, and switching operations. During the field investigation an engine fueling complex was discovered near the railroad junction at the west end of the property. Property adjacent to this area, not owned by Colfax, housed a large tank farm operation. Further

discussion of railroad operations is given in Chapter 6. In 1948, Colfax Creosoting and Lumber Company built the wood treating plant on this site. In 1956, the treating plant was purchased by the current owner, Roy O. Martin Lumber Company. Also operating near the northeast side of the site was the Indiana Wirebound Box Company. They were engaged in manufacturing hardwood veneer and making boxes. The company went out of business sometime in the 1970's and Colfax began utilizing this area for lumber and some white wood storage. The Louisiana and Arkansas Rail Road Company still operates in the state, although they do not have any operations on this property (other than the rail lines). Colfax Creosoting and Lumber Company and the Indiana Wirebound Box Company are no longer in business.

4.2 Aerial Photography Summary

Film negatives and positives of high altitude aerial and satellite photography of the site were obtained from the US Geological Survey before field work began. Table 4-1 presents a summary of this acquisition. It was anticipated that these photographs would aid in the field investigation process. However, problems were encountered in developing the negatives and film positives. A local vendor with the capabilities of enlarging small, specific portions of the 8" x 8" film could not be secured. Therefore, an aerial mapping firm produced intermediate negatives and prints from the original negatives of the desired areas. The resulting resolution

TABLE 4-1: AERIAL AND HIGH-ALTITUDE SATELLITE FILM POSITIVES AND NEGATIVES OBTAINED PRIOR TO BEGINNING RFI FIELD WORK.

PHOTO DATE	SOURCE	FILM TYPE
February 7, 1952	Airplane	B & W Negative
March 8, 1955	Airplane	B & W Negative
February 22, 1971	Airplane	B & W Negative
May 12, 1975	LANDSAT	CIR Positive
March 3, 1990	LANDSAT	CIR Positive
March 3, 1990	LANDSAT	B & W Negative

was not high enough to be of any practical use for the investigation.

After field work was completed, a graphic arts firm was located having the equipment necessary to enlarge and develop the prints at an acceptable level of resolution. Large 20" x 20" prints were made from each film for review. Then, areas of interest were selected for further enlargement on 20" x 20" paper. Also, 8½" x 11" copies the prints were produced. Copies of these prints are included in Appendix A.

The aerial photographs have proven to be an extremely valuable record of past activities conducted at the site. Potential contamination sources were located using these photos. The Company was able to identify five possible preservative recovery cells operated prior to the installation of the large impoundment closed in 1986. Four or five other potential contamination sources were also identified from various photographs. All but one of the sources were associated with the main runoff pathway. A summary of these photographs is presented in the following sections. Photographs can be found in Appendix A.

4.2.1 February 22, 1952 Photograph

This photograph is the earliest available of the site and was taken from a high-altitude air plane. The photograph covers a wide area of the region, extending from Esler field north of Alexandria to several miles south of the city. Therefore, the resolution is very low. Photo 1 in Attachment A is an 8½" x 11" enlargement of the plant property from the photograph. A 24" x 24" print was also made of the same area. The enlargements indicate the plant was operating in 1952 with only one treating cylinder and two storage tanks. The portion of the facility designated northeast wood storage area was the site of a veneer mill. The west wood storage area near the railroad junction seems to be developed and used by either the railroad or a quarry operation. Drainage from the plant was to the south along the main runoff pathway which follows the current drainage patterns. Due to the low resolution no recovery cells are observed in this photograph.

4.2.2 March 8, 1955 Photograph

This black and white photograph was taken from an airplane at a low altitude and presents the highest resolution of the site. Photo's 2 through 5 in Appendix A are enlargements made from the negative. The location of the veneer mill is clearly shown in Photo's 2 and 4.

Also shown in Photo 3 are two formerly unknown preservative recovery cells operating at this time. These cells were located near the culvert draining the northern parcel into the southern parcel. Here a rail spur angles toward the main runoff pathway to what is now the maintenance shop. This spur is still in use by the company.

The two cells existed between the spur and main runoff pathway. The upgradient cell appears to have been used to recover preservative from the process water and the second to receive overflow from the upper cell. The lower cell discharged to the ditch near the inlet of the culvert. This discharge point seems to be slightly lower than the culvert inlet. Thus, the area may not have drained well.

Three other low spots can be observed in the photograph. Two are very small and existed near the center of the impoundment closed in 1986. The third spot was near the confluence of the main runoff pathway and a drainage ditch from Grace Subdivision. This confluence was near the present site of the inlet to the last culvert in the main runoff pathway. Figure 4-1 presents the locations and relative sizes of cells on a facility map. The cells were located by triangulation from the photograph using current landmarks that existed when the picture was taken.

Early prints made from intermediate negatives showed what was originally believed to be a third impoundment operating near the veneer mill just north of the present dry kiln location. This finding was reported in the 1992 Third Quarterly RFI Report dated November 2, 1992. At that time, this cell was believed to be the source of contamination detected in perched water from boring 60. However, this is no longer believed to be the case.

Subsequent enlargements of the area (please see Appendix A, photo 4) reveal this feature may not be holding water after all. Or, if it is, the condition most likely resulted from debris blocking the drainage path and was not a permanent fixture in the area. Three observations made from the photograph strengthen this hypothesis: (1) there is no strong shadow along the east edge of the area[1], (2) some shadows are visible along the *west* side of the feature, and (3) the actual

[1]Based on other shadows in the photograph, the picture was taken on the morning of March 8, 1955 at approximately 9:00 am.

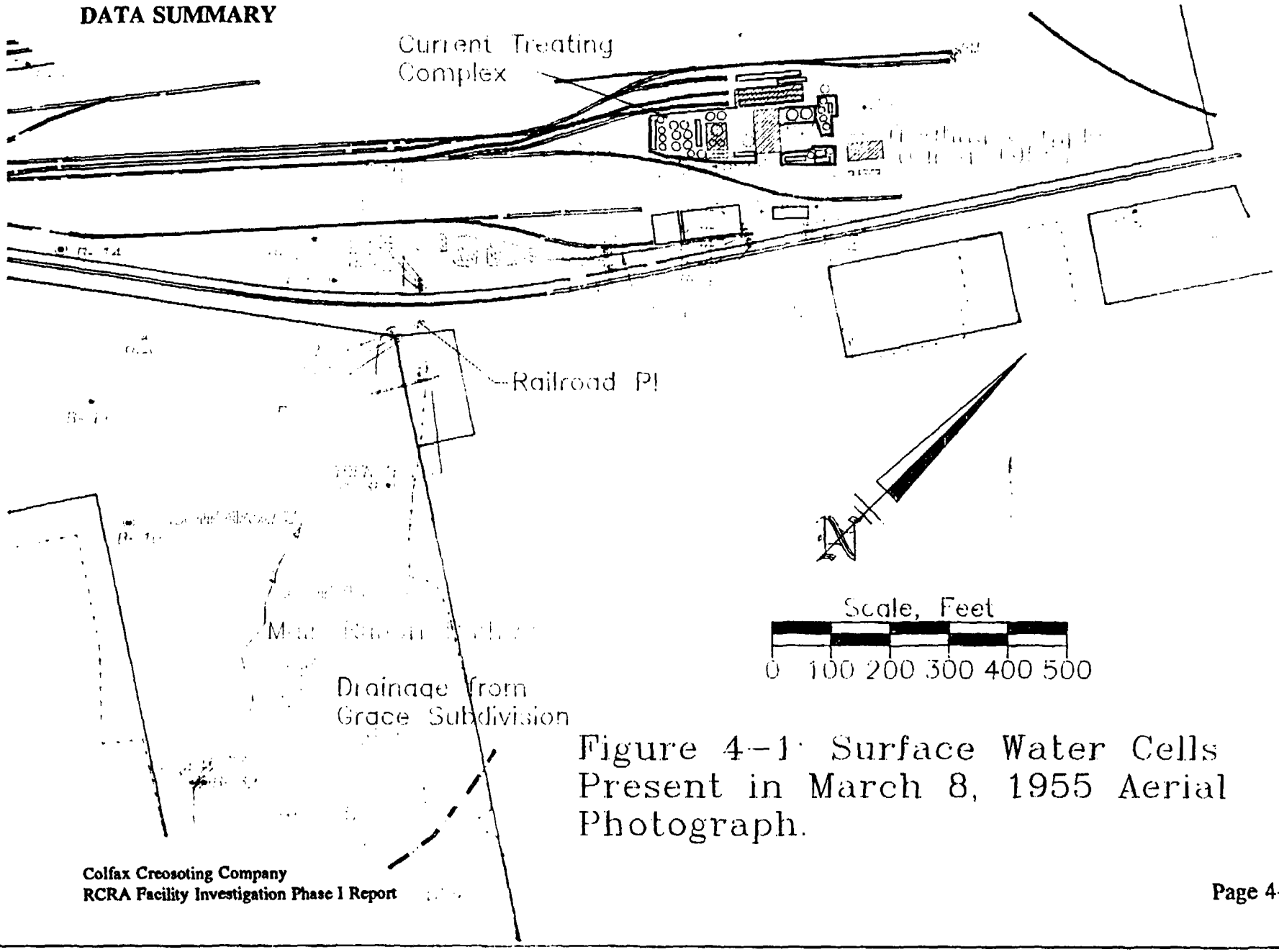

Figure 4-1 Surface Water Cells Present in March 8, 1955 Aerial Photograph.

ditch draining the land around the veneer mill runs along the east side of the feature. Research done by Colfax personnel also indicates that the Indiana Wirebound Box Company did not operate a pond as a water source. The third quarterly report stated that storm water "may have been conveyed...from around the cylinder" to the pond. Further study revealed that storm water from the cylinder gravitated to the recovery cells in operation at this time. Water falling north of the road around the wood preserving complex did not mix with any storm water from the facility.[2] Therefore it is unlikely that the drainage patterns observed around the veneer mill are the source of contaminants found in boring 60. Further discussion regarding this boring can be found in Chapter 6.

One other observation is made from Photo 5: the activities conducted by the railroad near the junction of the two tracks had been abandoned by this date. Footings for above-ground tanks found in the area during field work are visible. However, no tanks, buildings or other activity can be detected.

4.2.3 February 22, 1971 Photograph

This image was taken after the highway and overpass were constructed near the northeast corner of the plant property. It is a moderately high resolution photograph. Photo 6 is an enlargement of Colfax property from this photograph. The photo indicates that by 1971 all of the cells observed in the 1955 photo no longer existed. The land where the cells were located was converted to wood storage areas by 1971. Three new small shallow cells can be observed located just south of the culvert outlet and north of the closed impoundment. A triangulation of the cell locations indicates the northern most cell was cut by a test trench excavated during the RFI.

From the photograph, it appears process water was piped to the cells from the plant. Storm water may have been routed around the three cells and overflow from the most down gradient cell entered the ditch at a point just north of the large impoundment closed in 1984. Recovered preservative was most likely pumped to a tank truck and hauled back to the plant.

[2]Norton, C. Personal interview with Ball Engineering, Inc., January 14, 1993.

The photo also indicates drainage was obstructed in the main runoff pathway at the inlet of the southern-most culvert. Storm water can be observed impounding at this location. The plant had also developed a portion of Parcel B just west of the three cells as a small pole de-barking mill. Figure 4-2 shows the locations of these cells relative to current operations.

4.2.4 May 12, 1975 Photograph

This is an early LANDSAT false color infrared (hereafter "CIR") image of the region. An excerpt covering the plant area is presented as Photo 7 in Appendix A. The CIR image shows by 1975 all previous small cells no longer existed and the large impoundment closed in 1986 had begun operation. The impoundment was supplied process water from the plant via the concrete pipeline identified as AOC D during the RFI. The pipeline trench scar is visible due to the enhanced color of the photograph and can be traced back to the railroad. Storm water from the facility was routed around the impoundment in the main runoff pathway. However, the pathway was moved just west of previous locations. Plant personnel working for the company at the time state that process water was first piped to the impoundment by the concrete pipeline. According to Mr. Clyde Norton, the plant Vice President, the concrete line was replaced with first PVC and then steel pipe due to leaks in the concrete line. Overflow from the impoundment was discharged to the City of Pineville sanitary sewer under a city discharge permit. Preservative was recovered from the bottom of the impoundment and trucked back to the plant. Between 1975 and the time the impoundment closed, the company also added six shallow pits along the north and northeast side of the pond to aid in the preservative recovery. These pits were closed along with the large impoundment in 1986.

Four other observations are made from the 1975 image. First, the area of Parcel B immediately south of the impoundment dam is cleared, however it is not possible to determine if wood debris is being landfilled. Second, land along both sides of the main runoff pathway at the location of the small de-barking mill and the three previous cells is cleared. The area appears to be covered with bark from the mill. Third, the inlet to the south culvert is no longer impounding water. The east bank of the drainage pathway has been cleared and a well defined ditch is visible. Finally, the point of land north of the highway 28 overpass in the

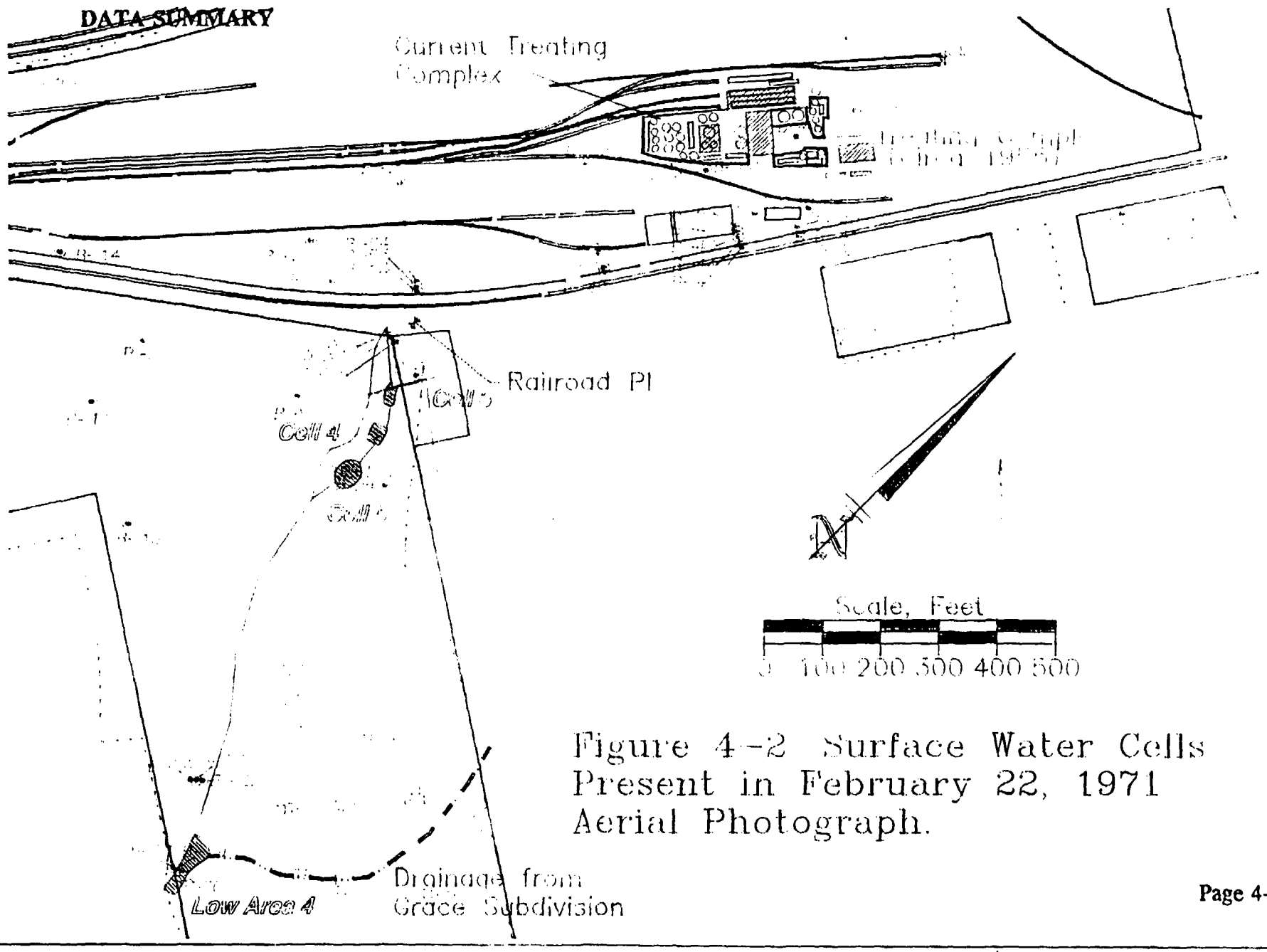

Figure 4-2 Surface Water Cells Present in February 22, 1971 Aerial Photograph.

northeast wood storage area is not being used by the company. Figure 4-3 on the following page gives the locations of impoundment operations existing at this time.

4.2.5 Closure Photographs

Photographs of the impoundment just prior to closure from the company's closure certification were also reviewed. By the time of closure in 1986, the impoundment observed in the 1975 photograph was still in use. The company had also constructed a series of shallow pits along the north and northeast sides of the unit within the diked area. These pits were less than 20' in diameter with an estimated depth of three to five feet. The closure certification indicates the contaminated soil and sludge existing in these pits and impoundment was removed and they were closed along with the large impoundment.

4.2.6 March 30, 1990 Photographs

This recent LANDSAT image was available in both CIR and black and white. Both were purchased to aid RFI planning. Photo 8 is an enlargement of the plant area from the image. CIR photographs were obtained to identify any stressed vegetation that may exist at the site from subsurface contamination. In CIR imagery, healthy vegetation is given tints and shades of red. Stressed vegetation has a blue-green color[3]. The 1975 photo was useful in determining that no large scale areas of stressed vegetation existed. However, the 1990 image was less useful because it was taken in early spring before new foliage had a chance to develop. Therefore, only winter grasses and evergreens appear healthy in the picture.

4.2.7 Surface Water Cell Summary

From the aerial photograph series, five previously unknown recovery cells and four "low" areas were identified. Table 4-2 on page 11 summarizes the sizes and usage dates for each unit. Surface areas for each unit were determined from scaled AutoCAD® drawings of the features developed from aerial photographs of the site. The program's planimetry feature was then used to calculate the surface area. The accuracy was calculated to be $\pm$ 25 ft^2.

[3]Christenson, J.W. *Environmental Assessment Using Remotely Sensed Data.* Intralab Project No. 75-5. National Aeronautics and Space Administration. Goddard Space Flight Center, Greenbelt Maryland. 1989.

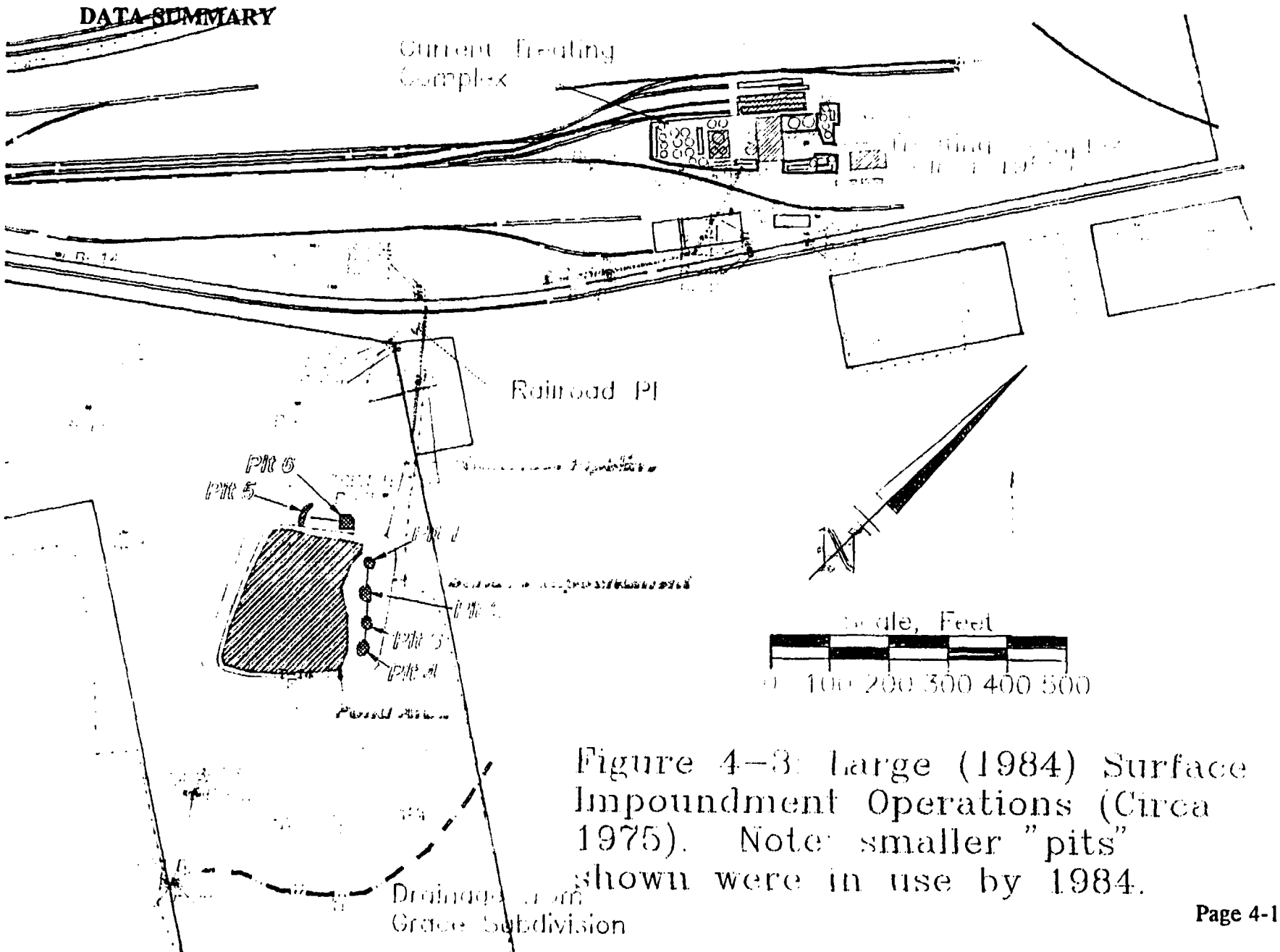

Figure 4-3: Large (1984) Surface Impoundment Operations (Circa 1975). Note smaller "pits" shown were in use by 1984.

TABLE 4-2: SURFACE WATER CELLS AND LOW AREAS IDENTIFIED FROM HISTORICAL AERIAL PHOTOGRAPHY OF COLFAX CREOSOTING PLANT PROPERTY.

Feature	Surface Area[a], ft^2	First Observed	Date Gone[b]
Cell 1	3,150	March 8, 1955	February 22, 1971
Cell 2	2,070	March 8, 1955	February 22, 1971
Cell 3	700	February 22, 1971	May 12, 1975
Cell 4	860	February 22, 1971	May 12, 1975
Cell 5	1,790	February 22, 1971	May 12, 1975
Low Area 1	250 to 1,000	March 8, 1955	February 22, 1971
Low Area 2	100	March 8, 1955	February 22, 1971
Low Area 3	330	March 8, 1955	February 22, 1971
Low Area 4[c]	-----	February 22, 1971	May 12, 1975
Impoundment[d]	63,090	May 12, 1975	1986[e]

[a]Areas determined by planimetry of feature on scaled AutoCAD® drawings developed from aerial photographs of the site.
[b]Dates determined from aerial photographs available of the site. Actual dates the company ceased usage may be earlier.
[c]Area formed at the confluence of two drainage pathways and not large enough to planimeter from aerial photographs.
[d]Area of entire diked portion is given. Actual pond area was less at 41,700 ft^2 (0.96 acres). See Figure 4-3.
[e]Closure certification was accepted in a letter from John Koury, Assistant Secretary, LDEQ dated March 8, 1988. The impoundment was certified closed on May 2, 1986.

4.3 Soil Borings and Trenches

A total of 66 borings and 13 trenches were made during the investigation. The work plan called for borings extending to a minimum depth of eight feet or until uncontaminated soil was detected. A ground water sample was to be collected from borings extending to the water-table. This procedure was followed for all borings.

A standard protocol was not developed in the RFI work plan for trenching because no trenches were planned. However, as stated earlier in Section 3.1, abnormal field conditions in SWMUs 11 and 12 prevented drilling as required by the work plan. Therefore, EPA and LDEQ officials gave the company permission to conduct the investigation in these SWMUs by excavating trenches. The following standard operating procedure (SOP) was used:

DATA SUMMARY

(1) A trench was made at each boring location indicated in the work plan,

(2) Trenches were constructed with a backhoe using a 24 inch wide bucket,

(3) Trenches were logged and sampled two feet on centers as were the borings,

(4) Trenches were excavated to a minimum depth of eight feet or until natural soil was encountered,

(5) A ground water sample was to be collected from trenches extending down to the water table,

(6) Material excavated from the trench was used as backfill, and

(7) The locations of each trench were surveyed and recorded on the RFI site map.

4.3.1 Soil Boring and Trench Logs

Soil boring and trench logs are presented in Appendix B. The site geology is characterized by the Louisiana Geological Survey as fluviatile and deltaic terrace deposits of Pleistocene age. Two Pleistocene formations are observed at the facility consisting of Bently and Montgomery depositions which are primarily comprised of red clays and brown silts typical of Red-River flood plain sediments. The upper sediments of the Bently also contain some well sorted sands and gravel lenses. The Montgomery Terrace consists of loose, fairly well-bedded sands and layers of red clays and silts[4].

Borings logs completed during the RFI show the area to be fairly typical of these deposits. In general, the soils encountered during drilling of the first fifteen to twenty feet tended to consist of silty sands, silty low plasticity red clay, and high plasticity slickensided red clay. Stratification tended to be very well defined. In order the strata usually consisted of a silty-sand to silty clay followed by a low-plasticity clay or silt. In most cases, the upper silt was continuous, however some thin interbedded localized clays were found. Usually below the upper clay a saturated silty sand was encountered followed by a high-plasticity slickensided red clay having a very low moisture content. It is believed due to the nature of the fluviatile and deltaic

[4]Fisk, H.N., Ph.D., Geology of Avoyelles and Rapides Parishes. Geological Bulletin No. 18. Department of Conservation, Louisiana Geological Survey. New Orleans, La. 1940.

deposits that the silty-clays are, for the most-part, continuous. Sand deposits are more likely to be localized and lenticular in nature.

4.3.2 Site Hydrology

At the time of drilling, it was determined that upper saturated zones encountered were probably perched water units contained below by the high-plasticity, or "fat" clays. However, since the RFI work plan called for sampling subsurface water when it was encountered, temporary wells were usually set in this vadose zone on top of the lower clay. Although all of these wells produced water at the time of drilling, some wells in Parcel A were found to be dry when an attempt was made to collect a water sample.

Close observation of the materials from the borings indicated the upper sandy- to clayey-silts to be fairly dense and/or firm. The upper clays, on the other hand tended to be stiff and silty. They were also fractured with the voids filled with silts or sands. The lower silts tended to be more dense and sandy. Lower clays tended to be stiff, highly plastic and slickensided. Throughout both clay strata, small root holes could be observed running perpendicular to the layer. Each clay unit seemed to serve as an aquitard to the silt units above. However, due to the presence of the root holes, fractures, and slickensides (microfractures) the in situ permeability is probably higher than usually expected for these deposits.

Based on these observations, it is hypothesized that the silts and clays comprise the vadose zone and water found in most of the borings is perched. However, interconnection to the upper aquifer probably exists. This interconnection is due to: 1) the presence of small high-permeability filled voids through the medium, 2) variations in the composition of the clay itself, and 3) any breaks in continuity of the clay strata that may exist over the site. Fence diagrams of the borings are presented with the discussion of findings by individual SWMUs. A more detailed discussion of localized subsurface conditions is presented in subsequent chapters.

Figure 4-4 presents contours of the perched phaeritic surface observed during RFI field work in June, 1992. This drawing was constructed using water elevations detected in borings at the time of drilling and does not represent a single sampling event. Contours were constructed using SURFER® software and projected onto a map of the site.

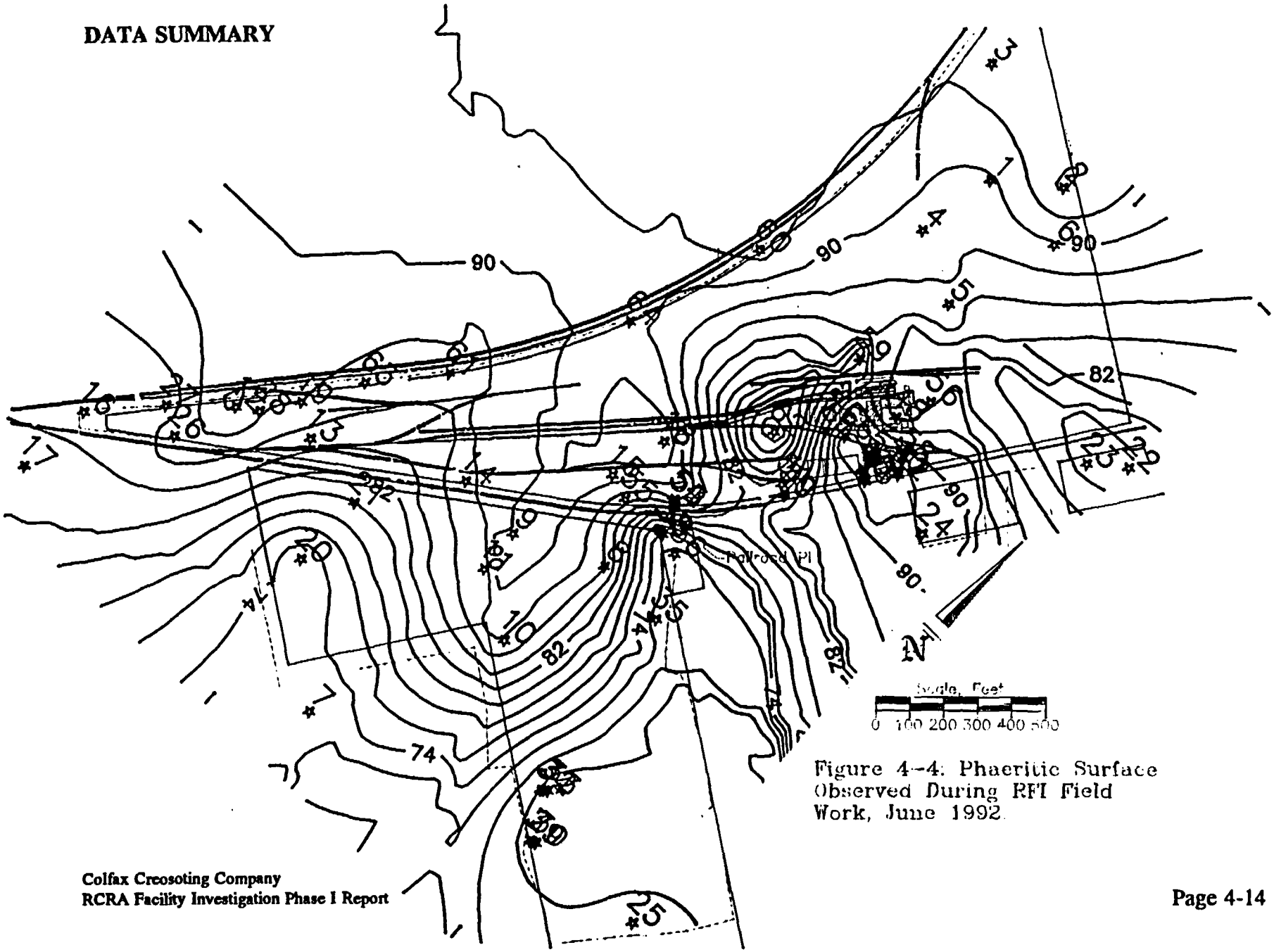

Figure 4-4: Phaeritic Surface Observed During RFI Field Work, June 1992.

4.3.3 Soil Trenching Logs

Trenching logs from SWMU 11 revealed the fill to average less than eight feet thick. This fill consisted of wood debris, including sawdust, bark chips, pole cutoffs, construction debris, and soil. Soils underneath the fill were similar to that found elsewhere around the site. More detailed discussions of SWMUs 11 and 12 are given in Chapter 6. Soil trenching logs are presented in Appendix B.

4.4 QA/QC Results

QA/QC samples were collected using the standard protocol detailed in the RFI work plan. The plan called for five types of QA/QC samples to be carried through the analysis process:

(1) Replicates to be collected once for every ten field samples,

(2) One trip blank for every 20 field samples or each shipping container,

(3) One field blank for every 20 field samples or each shipping container,

(4) One rinsate sample for every 20 field samples or each shipping container, and

(5) Background samples for copper, chromium and arsenic from each of the three soil types identified at the site and a sample from the City of Pineville drinking water.

In addition, laboratory QA/QC samples were to be analyzed. Analysis results for a matrix spike and matrix spike duplicate were to be reported once for every twenty samples. A unique alpha-numeric number was assigned to each sample category. Laboratory QA/QC samples were tagged "MS" and "MSD" for spikes and spike duplicates. Table 4-3 on the following page explains the field numbering system. Results for field QA/QC samples are summarized in Table 4-4 on page 17. Laboratory QA/QC is addressed in the sample result books provided by the contract laboratory.

QA/QC summary sheets for analytical samples are given as tables at the end of this chapter. In these tables, results for chemicals of interest from the analytical samples are shown. Constituents detected in laboratory background samples are shown in bold italic. Constituent concentrations estimated below method quantitation limits are in shaded boxes.

Sampling logs and chain-of-custody forms were required in the sampling plan. Copies of the chain-of-custody forms returned from the contract laboratory are in Appendix C.

TABLE 4-3: DESIGNATION GIVEN TO ANALYTICAL SAMPLES COLLECTED DURING RCRA FACILITY INVESTIGATION.

Source	Designation	Explanation
Soil	B*n*S*m*	Soil samples from borings where "n" is the boring number and "m" is the coring interval.
	SS*n*	Special soil sample where "n" represents the chronological number of the sample.
	T*n*S*m*	Soil sample collected from a trench. "n" is the trench number and "m" is the two foot interval number ("1" represents 0-2', "2" is 2'-4', etc.).
Water	SW-*n*	Surface water sample where "n" is the sequential sample number of this type.
	GW-*n*	Ground water sample where "n" is the sequential sample number of this type.
QA/QC	BG*n*	Background sample where "n" is the sequential sample number of this type.
	TB*n*	Trip blank number "n".
	FB*n*	Field blank number "n".
	DC*n*	Decontamination (or rinsate) sample number "n".
	B*n*S*m*D	Duplicate field soil sample of B*n*S*m*.

DATA SUMMARY

TABLE 4-4: QA/QC SAMPLING ANALYSIS SUMMARY AND STATISTICS

Cas No.	87-86-5	84-74-2	85-68-7	218-01-9	191-24-2	75-09-2	67-64-1	75-15-0	67-66-3	78-87-5	108-88-3	1330-20-7	Meth. 418.1
Compound	Penta-chlorophenol	Di-n-Butyl phthalate	Butylbenzyl phthalate	Chrysene	Benzo(g,h,i) Perylene	Methylene chloride	Acetone	Carbon Disulfide	Chloroform	1,2-Dichloro propane	Toluene	Xylene (Total)	TPH mg/L
TB1						5	2						0.60
TB2						3							0.59
TB3						58	170						N/A
TB4						16	51						N/A
TB5				200		7		7					N/A
TB6				7		8		40	100	6			0.87
TB7						16		6					N/A
TB8						27							N/A
TB9						10	140	110	47		10		14.37
TB10						21		14					N/A
TB11						5		11					0.59
TB12						48	130				20		N/A
TB13		9				9	180	99	26		11	6	3.04
TB14													N/A
TB15						26	82	4					N/A
TB16		1600				32	46	12			7		N/A
TB17						21	54						N/A
TB18						5	2	3			15		
TB19						20	7				38		N/A
TB20						21	31				6		
DC1						12							
DC2							54	35	95				
DC3						2	170	91					
DC4													
DC5				18		10		41	72				
DC6			10										
DC7		6				15							
DC8						2		6					2.47
DC9					0.05	5		12					0.84
DC10						5	110	65					
DC11	11					4	150	77					
DC12		13				13		50					
DC13		14				13		70					
DC14		10				13	65	44			4		
DC15		14				6		78					2.81
DC16						16	11	28					4.36
DC17						5		9	54				
DC18						7	11		110				
FB1						4							
FB2						3							
FB3						22							N/A
FB4						20	29						N/A
FB5						7		6					N/A
FB6				10		8	62	77	67				
FB7						13		4					N/A
FB8						40	20						N/A
FB9						11	99	110	46		11		
FB10		740				34							N/A
FB11						4							
FB12						31							N/A
FB13						7		21					
FB14						6		90			6		N/A
FB15						33	120						N/A
FB16													N/A
FB17						22	180	5			19		N/A
FB18						7		4			11		
FB19						19					22		N/A
FB20						9	11		120				0.66
Samples	1	6	1	4	1	53	26	31	10	1	13	1	11
Average	11.00	301.00	10.00	58.75	0.05	14.92	76.04	40.35	75.70	6.00	13.85	6.00	0.89
Std Dev.	ERR	583.54	ERR	94.28	ERR	12.11	60.16	37.01	31.43	ERR	9.23	ERR	2.57
Maximum	11	1600	10	200	0.05	58	180	110	120	6	38	6	14.37
Minimum	11	6	10	7	0.05	2	2	3	26	6	4	6	0.59

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits.
Bold italic quantities indicate constituent was detected in laboratory background samples.

QA/QCSUM.WK3, RANGE A:C30..A:P109

DATA SUMMARY

Trip blanks were prepared in the field lab by filling two sample containers with filter pack sand. The samples were sealed and accompanied the sampling team into the field and back. Field blanks were usually prepared over each wellhead from filter sand being poured down the well annulus. Rinsate samples were prepared either in the field lab by pouring deionized water over sampling equipment or at the decontamination area by pouring deionized water through a down-hole sampling device or auger.

4.4.1 Discussion of QA/QC Results

As stated earlier, the sampling plan called for including one of each QA/QC sample type for every twenty samples or one per shipping container. Since it was not practical to ship twenty samples in each container, this parameter did not control. Therefore, with one exception, QA/QC samples were analyzed at a higher frequency. Twenty each of trip blanks and field blanks were analyzed. Eighteen rinsate or "decon" samples were collected and analyzed. For each QA/QC sample type this gives respectively 7.9%, 7.9% and 7.1% of the total samples taken. The minimum required for each was 5%. However, 3.2% duplicate samples were analyzed which is below the 5% minimum. This happened because most of the samples which were duplicated did not require analysis according to field screening. Duplicate samples were collected for 10% of the soil samples collected, however the majority of these contained no field detectable contaminants, thus 5% were not considered. However, more than 5% of the samples were subjected to duplicate IR analysis.

4.4.2 Laboratory Contaminants and Sources

Table 4-4 indicates three common laboratory contaminants were present in detectable levels in QA/QC samples. These are: (1) methylene chloride, (2) acetone, and (3) carbon disulfide. Methylene chloride was used by the contract laboratory for extractions. Acetone is a common laboratory solvent and was also used by the sampling team for equipment cleaning. Also, carbon disulfide was used as a solvent for IR screening. Summary tables of field samples also show these three chemicals to be present. None of these three chemicals are considered to have originated in the field.

4.4.3 Field Contaminants and Sources

Four species of phthalates were detected in QA/QC and field samples. Phthalates are not commonly associated with contamination from wood preserving operations and probably originated from other sources.

The most likely source of these chemicals is from plastic sampling equipment. Phthalates are commonly associated with plasticizers used in manufacturing plastic resins such as teflon, PVC, nylon, and latex. The sampling team utilized latex gloves, PVC bailers, nylon chord, and teflon lined container caps. Therefore, these contaminants were expected.

Phthalate contamination ranged from 6 to 210,000 μg/kg. Higher levels are attributed to sample dilution calculations. It is hypothesized that one or more creosote compounds in the soil samples acted as a solvent on the plastic matrix, thus releasing the phthalates. Figure 4-5 is a plot of the individual phthalate species concentration against the total contaminants detected in each sample containing phthalates. The figure shows the samples to be linearly distributed on a log-log plot and indicates a good correlation exists between the two. This would tend to confirm the stated hypothesis. Thus, phthalate contamination is considered a field contaminant and not to have originated from the wood preserving operation.

4.4.4 Other Field Contaminants Present

Other field contaminants were also detected which may have originated from the site. First, DC11 contained pentachlorophenol at a level of 11 μg/L. This rinsate sample was collected by pouring deionized water through a section of decontaminated auger used in completing boring 46. The decon sample was shipped in cooler number 11 along with trip and field blanks 13, and ground water samples 18 through 24. A review of these samples show no pentachlorophenol detected in either of the other QA/QC samples. With the exception of GW-19, which is uncontaminated, the ground water samples have pentachlorophenol levels ranging from 3,600 to 14,000 μg/L. Since GW-19 was not contaminated with the chemical, DC11 was most likely not cross-contaminated during shipping. Thus, the material probably originated from the auger section. However, no other decon samples exhibited pentachlorophenol contamination.

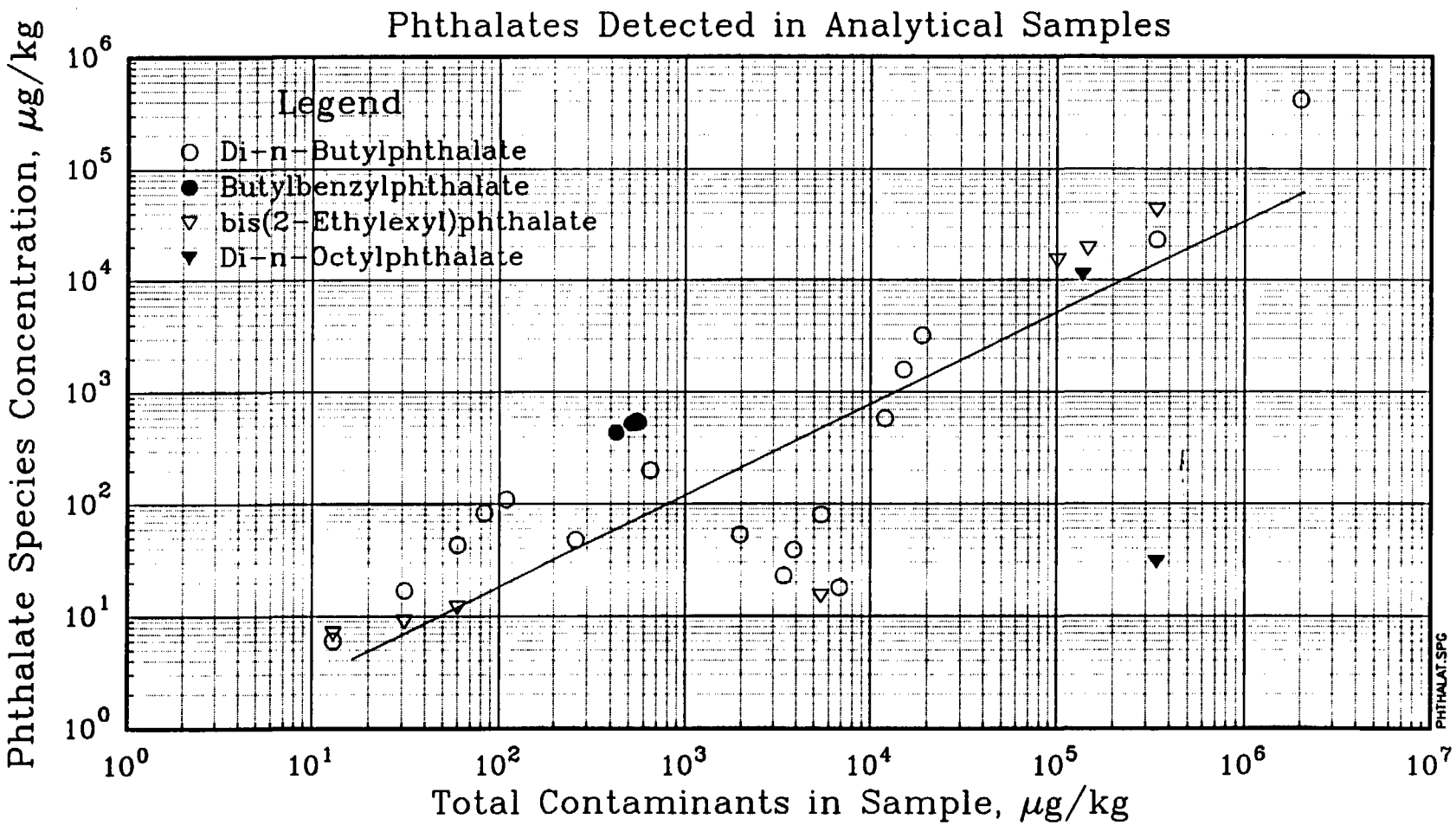

FIGURE 4-5: PHTHALATE SPECIES DETECTED IN ANALYTICAL SAMPLES. NOTE LINE THROUGH DATA REPRESENTS BEST FIT CURVE.

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Second, 18 μg/L of chrysene, a major constituent in creosote, was found in DC5. DC5 was shipped in cooler 8 along with trip and field blanks 7 and samples from borings 22, 23 and 24. However, this result is questionable because it was also detected in laboratory background samples. Chrysene was detected in neither of the other QA/QC samples in the cooler, and it was found in low concentrations (660 μg/kg) in only one of the soil samples. Field records indicate DC5 was collected from deionized water poured over a pan used for sample collection. This is an unlikely source for the contaminant since this equipment was easiest to decontaminate.

Chrysene contamination was also detected in two trip blanks and one field blank. The chemical was detected below the method quantitation limits in trip blanks 5 and 6 and estimated to be 200 and 7 μg/kg respectively. Field blank 6 was quantified containing 10 μg/kg. Trip blank 5 accompanied samples from borings 15 through 22 to the lab, only one of which contained chrysene (B20S1 at 380 μg/kg). Therefore, cross contamination is highly unlikely.

Trip and field blanks 6 were shipped in cooler 7 along with ground water samples 1 through 7. None of these samples were contaminated with chrysene. Laboratory reports indicate chrysene was detected in laboratory QA/QC background samples analyzed along with FB6 and TB6, therefore this contamination may have resulted from cross contamination at the laboratory.

One other constituent commonly associated with creosote was detected in DC9. Trace amounts of benzo(g,h,i)perylene were detected and estimated at 0.05 μg/L. DC9 was shipped along with samples GW-12 through 16, none of which contained the chemical. DC9 was collected as a rinsate sample from a split spoon decontaminated after completing borings 38 and 39. No samples from either boring contained the chemical.

4.4.5 Field Contamination of Volatiles

Analysis results also identified thirteen volatile chemicals, some of which are not commonly identified with creosote or any other preserving solution used by the company. Volatile chemicals detected consisted of:

(1) Chloroform,
(2) 2-Butanone,

(3) Carbon Tetrachloride,
(4) Trichloroethene,
(5) Benzene,
(6) 4-Methyl-2-Pentanone,
(7) Tetrachloroethene,
(8) 1,1,2,2-Tetrachloroethene,
(9) Toluene,
(10) Chlorobenzene,
(11) Ethylbenzene,
(12) Styrene, and
(13) Xylene.

Concentrations of each of these are given in the summary tables attached to this chapter.

Chloroform was unexpected and appeared in ten QA/QC samples and two analytical samples. The source of this contamination was found to be the City water supply. Sample BG4, the City water background sample, contained 6, 9, 5, and 3 μg/L chloroform, bromodichloromethane, dibromochloromethane, and bromoform respectively. Upon learning of these results, Colfax personnel contacted the Mayor's office and the results were verified.

Other volatiles present such as benzene and toluene are not commonly associated with creosote in high amounts. Creosote is produced by the fractional distillation of coal tar, a by-product from the production of coke. In this process, coal tar is distilled to produce light hydrocarbons such as toluene and benzene, heavier compounds such as naphthalene, and creosote which is the remaining compound. Although over two-hundred chemicals have been identified to exist at varying levels in creosote, the majority is limited to those medium and heavy compounds listed in the EPA's K001 classification[5]. Figures 4-6 and 4-7 on the following pages show isopleths and a 3-D surface plot of toluene contamination detected in soil borings. For soil borings, the highest toluene concentration detected in the boring was used to produce the figures. These figures show the contamination to cover a large portion of the plant property. Therefore volatiles contamination, and especially toluene, may have originated from a one or a combination of five sources:

[5]Bart, T. The Origin of Creosote. Tar Products Department Creosote Technical/Environmental Seminar. West Orange, New Jersey. 1984. pp. 1-14.

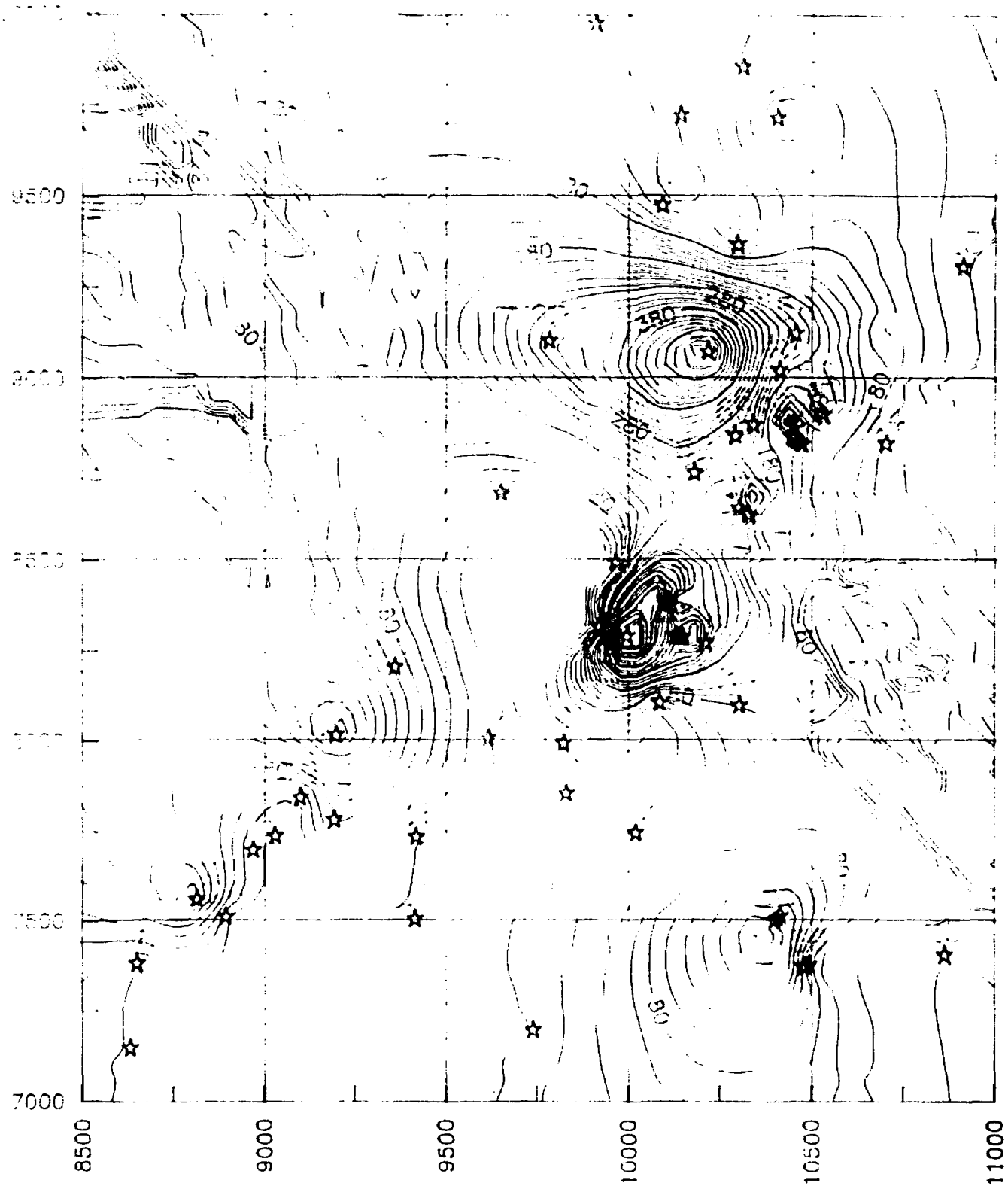

FIGURE 4-6: TOLUENE ISOPLETHS DEVELOPED FROM HIGHEST CONCENTRATIONS DETECTED IN SOIL BORING SAMPLES.

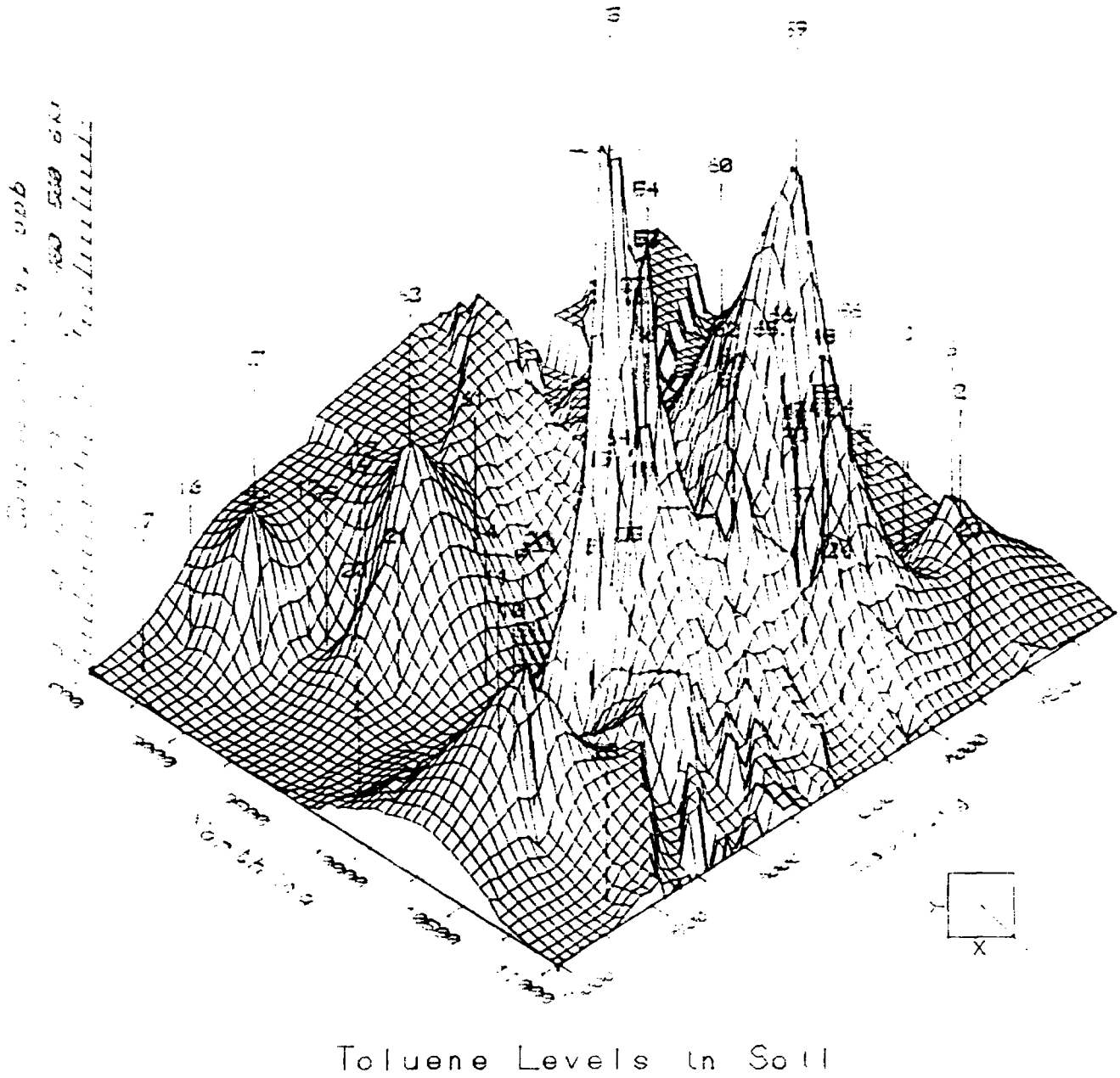

FIGURE 4-7: 3-D SURFACE PLOT SHOWING TOLUENE LEVELS DETECTED IN SOIL BORING SAMPLES.

DATA SUMMARY

(1) The production process chemicals, especially diesel fuel,

(2) Bio-degradation of soil contamination,

(3) Laboratory contamination,

(4) IC engines operating near the sampling sites, and

(5) Past train maintenance activity by the L and A Railroad Company.

First, the contamination may have originated from the production process itself. As stated earlier, volatiles are not commonly associated with creosote, however they may exist at low levels. The highest concentration of volatile compounds detected at the site was detected in boring 55 which is near the former location of Cells 1 and 2. These may have been the source for these constituents in this area. Also, after the field work was completed, it was discovered that toluene is used in small amounts as a solvent in the company's wood testing laboratory. Currently, the solvent is recycled. Although past disposal practices are not known, laboratory use is not considered to be a significant source.

Second, these chemicals may result to a limited extent from bio-degradation of contamination in the soil. However, it is believed that this is a minute source. Although micro-organisms do exist in the soil capable of degrading chemicals found in creosote, they must also have two other ingredients to do so: nutrients and oxygen. After the first two to three feet of soil, both commodities are sparse and would limit any bio-reactions that may be possible. Photoionization may also play a part in degrading chemicals in the first foot of soil, however gross contamination tended to be deeper or covered by vegetation and fill.

A third possible source for the contaminants is laboratory contamination. This is especially true for the solvents detected such as carbon tetrachloride and toluene. Toluene was detected in one laboratory background sample analyzed along with sample FB14. Also, 13 of 38 field QA/QC samples contained toluene between 4 and 38 ppb.

Toluene (and other volatiles) may also have resulted from IC engine exhaust or constituents present in the air. This is certainly the most likely source for contamination detected in field QA/QC samples. During sampling, it was not possible to locate a sampling station not subject to exhaust vapors from the drilling rig. Since sampling protocol called for

homogenization of the core samples, air was entrained into the matrix. Any constituents present in the exhaust may have been trapped in the soil and sampling container.

One other probable source for toluene and volatiles contamination is past maintenance operations conducted at the site by the Louisiana and Arkansas Railroad. As stated earlier, the site was previously used by the railroad for all maintenance operations on the company's locomotives. Since toluene is a common industrial solvent, the chemical may have been used as a de-greaser or cleaning agent. High concentrations were found in borings drilled near the Pineville Junction. This area has not been used for chemical storage by the creosoting company. However, artifacts located in the area indicate this portion of the property was once used for fueling operations by the railroad.

According to Colfax personnel, several buried tanker cars filled with waste IC engine oil were found in this area approximately five years ago. These were remediated by the railroad, however other tanks may exist that contained the solvent. The railroad also once operated a grease pit near the present site of the treating complex. Figure 4-1 presented earlier on page 5 shows the location of this structure located due southeast of boring 56 as determined from aerial photography. The pit has since been filled, however it may have been a source of for volatile contamination in the area.

It is very likely that volatiles contamination originated from a combination of any of these sources. Figure 4-8 is a log-log plot of total constituents detected verses toluene and xylene levels in each analytical sample collected for the RFI. Points plotted along the $y=10^{-1}$ line represent those samples containing no toluene or xylene. The plot indicates an almost zero correlation between toluene and other contaminants. Those points in the mid-range tend to be have uniform random scatter. The upper range between 10^5 and 10^8 may show a relationship to exist, indicating the contamination is a function of other constituent concentrations. Xylene, on the other hand, shows a relationship may exist. High concentrations of total constituents are accompanied by high concentrations of xylene.

Figures 4-9a and 4-9b analyzes trends in the relationship between total semi-volatile constituents and three constituents of interest: toluene, xylene and pentachlorophenol. These

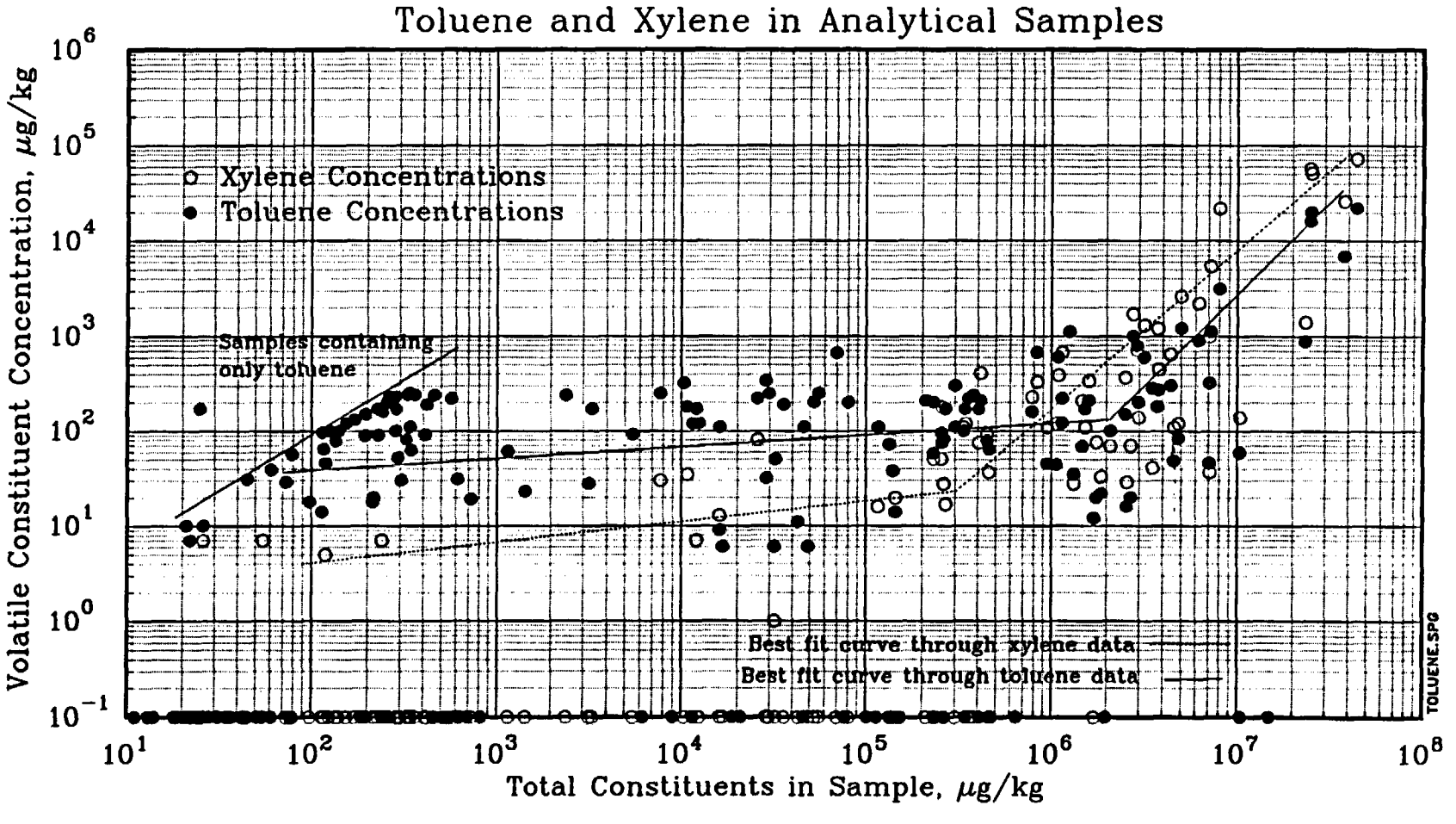

FIGURE 4-8: TOLUENE AND XYLENE CONTAMINATION FOUND AT SITE. NOTE POINTS ALONG $Y=10^{-1}$ LINE REPRESENT THOSE SAMPLES CONTAINING NO TOLUENE OR XYLENE.

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Figure 4-7a

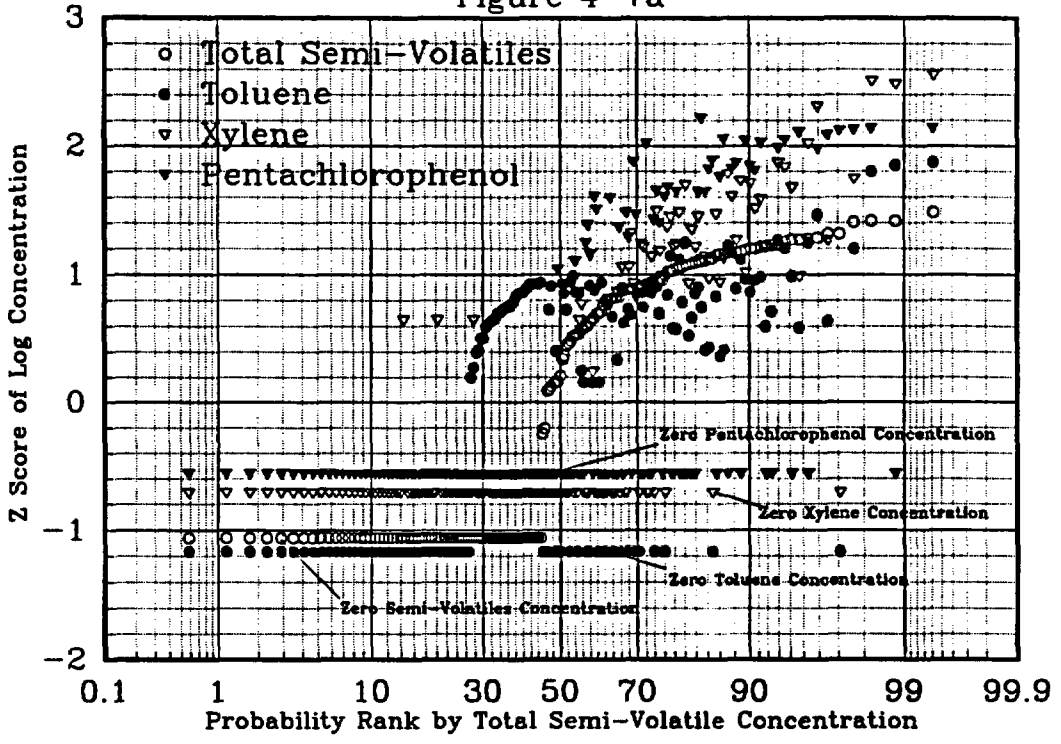


Figure 4-7b

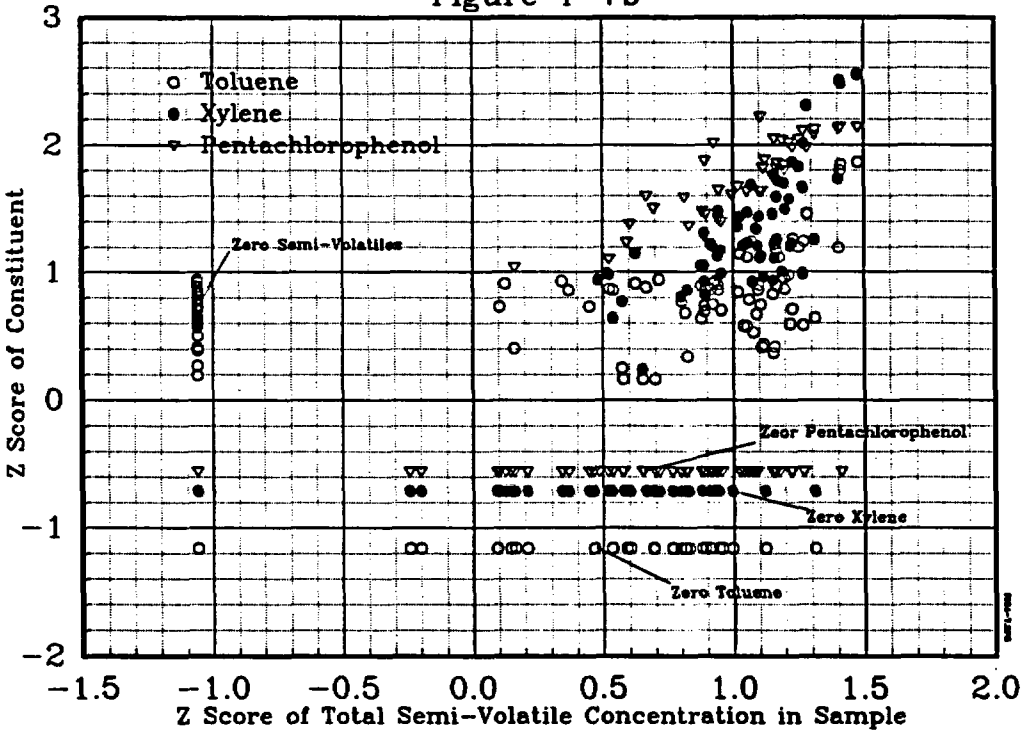


FIGURE 4-9: TRENDS BETWEEN VOLATILE SEMI-VOLATILE CHEMICALS.

graphs were produced by calculating z scores for the concentration of each constituent by:

$$Z = \frac{X - \mu}{\sigma}$$

where X is the individual concentration, μ is the average constituent concentration, and σ is the standard deviation of the sample population. Since the data is log-normal, sample statistics were calculated from populations consisting of the log of each sample constituent concentration.

In Figure 4-9a, data sets were ranked by the total semi-volatile concentration in each sample and plotted on a probability scale. From this figure several trends become more obvious. First, several samples contained only toluene. These possibly resulted from air-born emissions from nearby IC engine equipment or sources other than the SWMU's related to the timber treating process. Second, as semi-volatile concentrations begin to rise, a large amount of scatter is present in toluene concentrations. This would tend to indicate the two contaminants are not related in some areas and an outside source exists. Third, a good relationship exists near the end of the range. Here toluene concentrations are well correlated with concentrations of semi-volatile species found in the same sample.

On the other hand, Figure 4-9a does show a good relationship exists between trends in xylene concentrations and semi-volatile constituents present at the site. Pentachlorophenol exhibits a moderate relationship between the two trends as would be expected: no effort was ever made to segregate pentachlorophenol process water from creosote process water.

Figure 4-9b plots z-scores for each chemical against z-scores for total semi-volatile chemicals from each sample collected. The plot shows a good correlation exists between xylene, pentachlorophenol and total semi-volatiles. However, toluene shows much more scatter except in the higher ranges. This would tend to confirm the observations made from Figure 4-9a.

Although it seems possible that several sources for toluene (and possibly other volatile chemicals) exists around the property, the point may be a moot one. Only eight soil samples (<5.0%) collected contained toluene above the US EPA drinking water standard of 1 mg/L. Three of the eight were above 10 mg/L, however these are attributed to high dilution

calculations because of other chemicals present. No samples were above the drinking water standard for xylene at 10 mg/L.

4.5 Analysis Results

Analysis results are summarized in tabular form in Appendices D through F. Detailed analysis results are given in the contract laboratory's result books. In these summary sheets, samples detected but estimated to be below method quantitation limits (MQL's) are shaded. Those constituents detected in laboratory background samples are printed in bold italic numerals. Each sheet presents chemical quantities in columns under each sample number. A total is presented for each column along the bottom of each sheet. Please note that this total does not include concentrations of chemicals not attributed to the site (e.g. di-n-octylphthalate).

Samples were analyzed for EPA's Contract Laboratory Program (CLP) volatiles and semi-volatiles. Copper, chromium, arsenic, and TPH analysis was also performed. Metals analysis is discussed in chapter 7.

The organic chemicals detected are those commonly associated with wood preserving sites. A major fraction of those detected were contained in soil samples. Of these, 59% were also detected in ground water samples and 39% were found in surface water samples. Amounts found in each individual SWMU are discussed in later chapters. Table 4-5 lists those chemicals detected during the RFI. Laboratory contaminants are labeled. The last column in the table gives the percentage of borings in which each chemical was detected.

Figure 4-10 on page 4-32 shows the relative percentages of each chemical detected for each matrix type in two pie-charts. These were developed by dividing the collective amount of each chemical detected by the overall total of all chemicals detected. Therefore the charts give an overall picture of the levels of each chemical type present at the site.

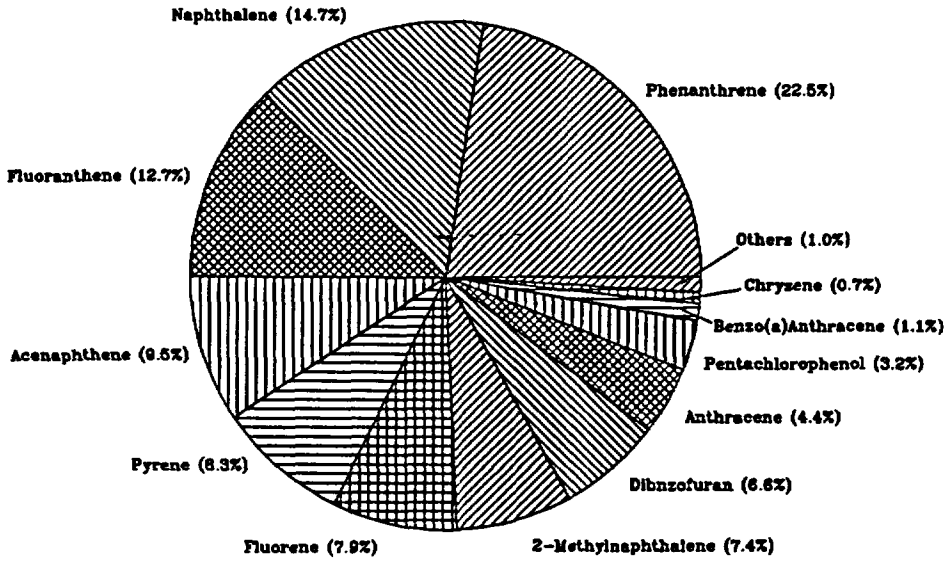
Figure 4-10a shows 99% of soil contamination at the site is comprised of only ⅓ of all the chemicals identified present in the matrix. Interestingly enough, pentachlorophenol made up 3.2% of the total in the soil, however Figure 4-10b shows it comprises almost 40% of the total contamination detected in water. Naphthalene was second in both categories, but still existed at higher proportions in water samples than in soil. Other constituents detected in soil

DATA SUMMARY

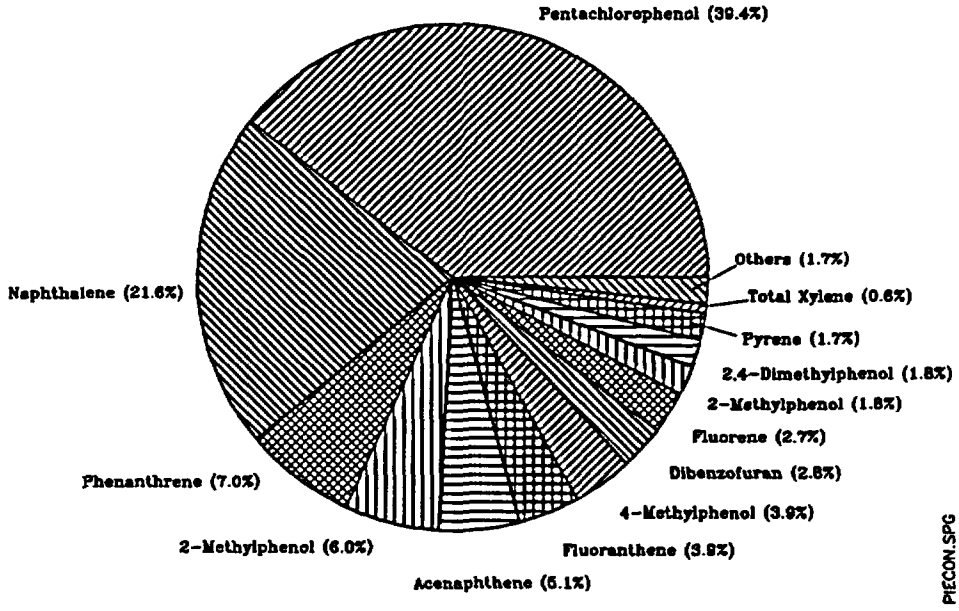
TABLE 4-5: CHEMICALS DETECTED IN ANALYTICAL SAMPLES.

Cas No.	Compound	Matrix Type			
Semi-Volatiles Detected		Soil	Ground Water	Surface Water	% Borings Containing
108-95-2	Phenol	Present			4.5%
111-44-4	bis(2-Chloroethyl)Ether	Present			1.5%
541-73-1	1,3-Dichlorobenzene	Present			1.5%
95-48-7	2-Methylphenol	Present	Present		3.0%
106-44-5	4-Methylphenol	Present	Present	Present	7.6%
98-95-3	Nitrobenzene	Present			1.5%
78-59-1	Isophorone	Present			1.5%
105-67-9	2,4-Dimethylphenol		Present		----------
91-20-3	Naphthalene	Present	Present	Present	42.4%
106-47-8	4-Chloroaniline	Present			1.5%
59-50-7	4-Chloro-3-Methlyphenol	Present			3.0%
91-57-6	2-Methylnaphthalene	Present	Present	Present	39.4%
88-06-2	2,4,6-Trichlorophenol	Present			1.5%
95-95-4	2,4,5-Trichlorophenol	Present			1.5%
91-58-7	Chloronaphthalene		Present		----------
88-74-4	2-Nitroaniline	Present			3.0%
208-96-8	Acenaphthylene	Present	Present		9.1%
606-20-2	2,6-Dinitortoluene	Present			3.0%
99-09-2	3-Nitroaniline	Present			3.0%
83-32-9	Acenaphthene	Present	Present	Present	45.5%
132-64-9	Dibenzofuran	Present	Present	Present	43.9%
86-73-7	Fluorene	Present	Present		43.9%
100-01-6	4-Nitroaniline	Present			3.0%
86-30-6	N-Nitrosodiphenylamine	Present			1.5%
87-86-5	Pentachlorophenol	Present	Present	Present	37.9%
85-01-8	Phenanthrene	Present	Present		48.5%
120-12-7	Anthracene	Present	Present		43.9%
84-74-2	Di-n-Butylphthalate	Field Cont.	Field Cont.		PLASTICIZER
206-44-0	Fluoranthene	Present	Present	Present	53.0%
129-00-0	Pyrene	Present	Present	Present	54.5%
85-68-7	Butylbenzylphthalate	Field Cont.			PLASTICIZER
91-94-1	3,3-Dichlorobenzidine	Present			1.5%
56-55-3	Benzo(a)Anthracene	Present	Present		42.4%
218-01-9	Chrysene	Present	Present	Present	34.8%
117-81-7	bis(2-Ethylexyl)Phthalate	Field Cont.	Field Cont.		PLASTICIZER
117-84-0	Di-n-Octyl Phthalate	Field Cont.			PLASTICIZER
205-99-2	Benzo(b)Fluoranthene	Present			27.3%
207-08-9	Benzo(k)Fluoranthene	Present			7.6%
50-32-8	Benzo(a)Pyrene	Present			16.7%
193-39-5	Indeno(1,2,3-cd)Pyrene	Present			1.5%
53-70-3	Dibenz(a,h)Anthracene	Present			1.5%
191-24-2	Benzo(g,h,i)Perylene	Present			1.5%
Volatile Compounds Detected					
75-09-2	Methylene Chloride	Lab Cont.	Lab Cont.	Lab Cont.	100.0%
67-64-1	Acetone	Lab Cont.	Lab Cont.	Lab Cont.	74.2%
75-15-0	Carbon Disulfide	Lab Cont.	Lab Cont.	Lab Cont.	87.9%
67-66-3	Chloroform	Background	Background	Background	----------
107-06-2	1,2-Dichlorethane		Present		----------
78-93-3	2-Butanone	Present	Present		6.1%
56-23-5	Carbon Tetrachloride	Present			1.5%
75-27-4	Bromodichloromethane			Present	----------
79-01-6	Trichloroethene	Present		Present	1.5%
124-48-1	Dibromochloromethane			Present	----------
71-43-2	Benzene	Present	Present	Present	19.7%
75-25-2	Bromoform			Present	----------
108-10-1	4-Methyl-2-Pentanone	Present	Present		1.5%
127-18-4	Tetrachloroethene	Present			----------
79-34-5	1,1,2,2-Tetrachloroethane	Present			1.5%
108-88-3	Toluene	Present	Present	Present	62.1%
108-90-7	Chlorobenzene	Present	Present		1.5%
100-41-4	Ethylbenzene	Present	Present	Present	37.9%
100-42-5	Styrene	Present			1.5%
1330-20-7	Xylene (Total)	Present	Present	Present	43.9%

TABLE4_5.WK3



Relative Constituent Levels in Soil Samples



Relative Constituent Levels in Water Samples

FIGURE 4-10: RELATIVE CHEMICAL LEVELS FOR EACH MATRIX TYPE.

FIGURE 4-11: CHEMICAL OCCURRENCE IN SOIL SAMPLES.

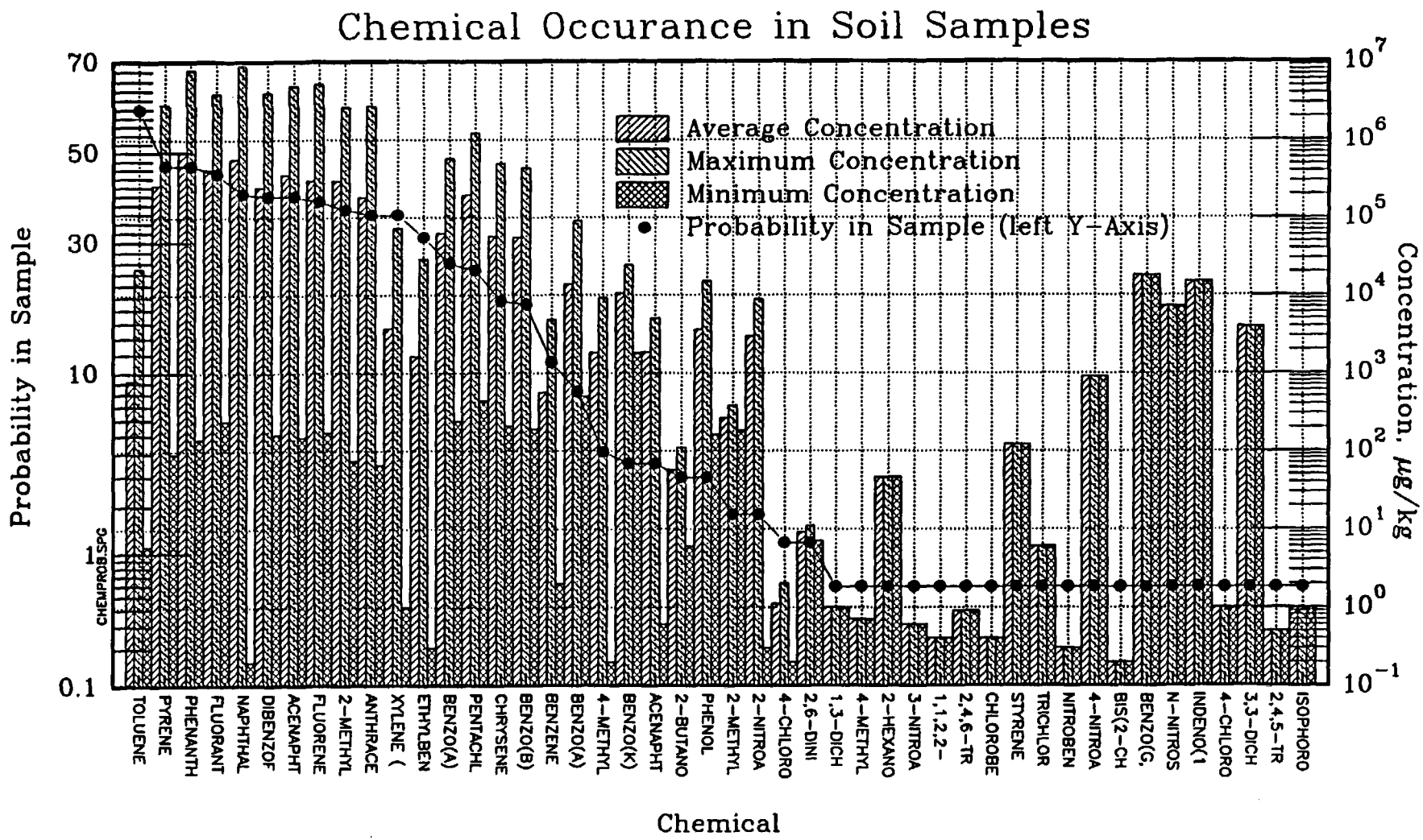


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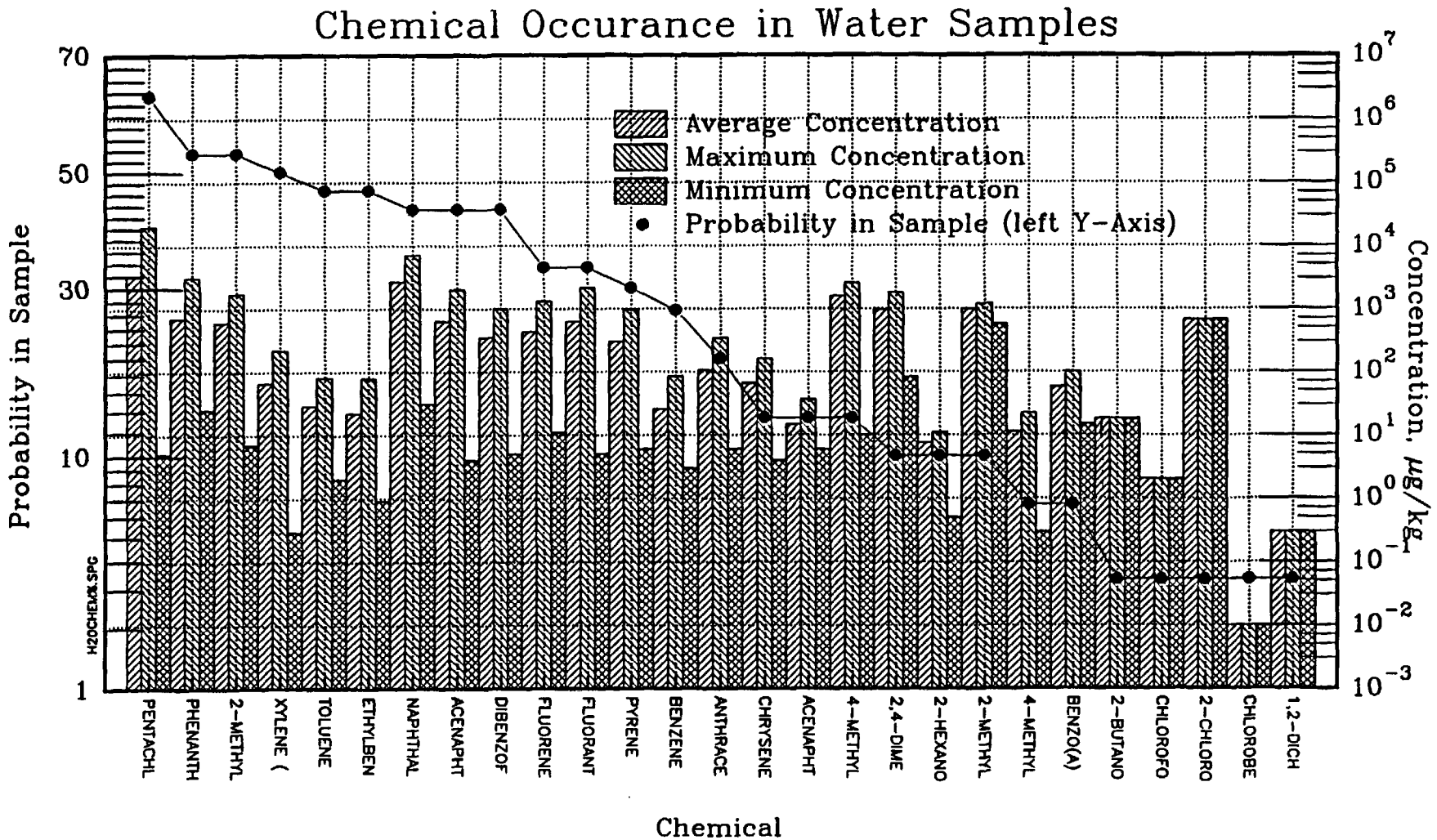
FIGURE 4-12: CHEMICAL OCCURRENCE IN WATER SAMPLES.



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samples were not as prevalent in water samples.

Figures 4-11 and 4-12 on the previous pages show the ranked occurrence and concentration ranges for each chemical by matrix type. Probability of occurrence for each chemical was calculated by dividing the total number of samples containing each particular chemical by the total number of samples collected. While Figures 4-10a and b show relative amounts of each chemical present, these plots are an indicator of the relative distribution of each chemical species over the site. Concentration averages and extremes are indicated by the bar graph using the right y-axis. Bars for each chemical ending at the same concentration indicate only one sample contained that particular species.

DATA SUMMARY

TABLE 4-6: SOIL SAMPLE QA/QC CONTAMINATION SUMMARY

Cas No.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Compound	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
B154					29	18													
B254					21														
B256					14														
B354					23		6												
B354D					39		3												
B453					35	150													
B553					27	160	3												
B651			42000	30	33	190	4												
B654					46	160	3								110				
B754					40	8													7
B854		520			8	16	12												
B954		430			9	360													
B1054					14														
B1151			15000		10		23												
B1152					10		14												
B1155					9		11												
B1251			19000		10		14												
B1254					9		45												
B1256					12		12												
B1351					10	110													
B1352					34		9												
B1354					34	17	6								91				
B1451					32		6												
B1452					26														
B1454					20	29	6												
B1654					15		6												
B1656					11														
B1751					6		9												
B1752					10		12												
B1755					10		9												
B1781					10		12												
B1784					9		10												
B1851					12		10												
B1852					8		10												
B1853					8		10												
B1951					20	11	11						0.7		0.4	8	0.4	0.3		1
B1952					8		8												
B1954					11		10												
B2051					16	73													
B2051D					55	16													
B2056					11		11												
B2151					12		6												
B2152					11		2												
B2156					11		8												
B2251					15		10				8								
B2254					10		14												
B2256					20	14													
B2351					13	8													
B2351D					7		6												
B2352					10	210	13												7
B2357					18		10												
B2451					10	31						4				8		6		13
B2452					10		6												
B2455					9											10				7
Number	0	2	3	1	54	18	34	0	0	0	1	1	1	0	1	5	1	2	0	5
Average	ERR	475.00	25333.33	30.00	17.37	69.17	10.29	ERR	ERR	ERR	8.00	4.00	0.70	ERR	0.40	45.20	0.40	3.15	ERR	7.00
Std. Dev.	ERR	63.64	14871.86	ERR	11.30	102.00	7.36	ERR	ERR	ERR	ERR	ERR	ERR	ERR	ERR	50.96	ERR	4.03	ERR	4.24
Maximum	ERR	520.00	42000.00	30.00	55.00	360.00	45.00	ERR	ERR	ERR	8.00	4.00	0.70	ERR	0.40	110.00	0.40	6.00	ERR	13.00
Minimum	ERR	430.00	15000.00	30.00	8.00	8.00	2.00	ERR	ERR	ERR	8.00	4.00	0.70	ERR	0.40	8.00	0.40	0.30	ERR	1.00
% Total	0.00%	3.70%	5.56%	1.85%	100.00%	33.33%	70.37%	0.00%	0.00%	0.00%	1.85%	1.85%	1.85%	0.00%	1.85%	9.26%	1.85%	3.70%	0.00%	9.26%

Quantities shown in shaded cells indicate the compound was estimated

because it was detected below the method detection limits

Bold italic quantities indicate constituent was detected in laboratory background samples

SUM1 – 24.WK3, RANGE A:C66, A:W166

Hall Engineering, Inc.

DATA SUMMARY

TABLE 4-6 CONTINUED

CAS No.	84-74-2	85-68-7	117-81-7	117-84-0	75-09-2	67-64-1	78-10-0	67-66-3	75-83-2	95-53-4	78-93-3	71-43-2	108-10-1	95-48-7	127-18-4	75-34-3	108-88-3	108-90-7	100-41-4	100-42-5	1330-20-7
Compound	Di-n-Butyl phthalate	Butylbenzyl phthalate	bis(2-Ethylhexyl) phthalate	Di-n-Octyl phthalate	Methylene chloride	Acetone	Carbon Disulfide	Chloroform	2-Butanone	Carbon Tetrachloride	Trichloro-ethene	Benzene	4-Methyl 2-Pentanone	2-Hexanone	Tetrachloro ethene	1,1,2,2-Tetra chloroethane	Toluene	Chloro benzene	Ethyl benzene	Styrene	Xylene (Total)
B25510					17	15															
B25514					16		7														
B2651					35																
B2655					30		7														
B2751					19		4														
B2755					36		6														
B27511					13	12											170				
B2854					27	42	8														
B2952					47	160	34		21			2					20		13		70
B2956					13							8					59		64		140
B2956					44	110	16					6		46			44		42		120
B3054					48	86			110								22		10		33
B3056					47												16		23		26
B3058					44	80	10		72								20		26		76
B3151					58														10		
B3156					1600	11000											3100		5300		22000
B3156					31	61	10					12					160		130		230
B3251					50		27														
B3256					32																
B3257					8																
B3353					44		26										200		61		140
B3354					170	700											120		44		120
B3356					34		22												20		37
B3452					220												240				
B3453					46	11											79				
B34530					63												64				
B3456					39		19										170				
B3651					39	140											46		36		37
B3653					42												79		37		93
B36510		530			38		13										31				
B3652	410000				69	200											100				69
B3653					50							35					210		62		410
B36511					23		23										250				
B3752					28		30										200		49		61
B3753					39		10										75		130		160
B37530					52												100		86		110
B3754					24		26										170		120		110
B3756					2000	2300											1100		2200		5400
B3852					45		32					23					210		190	120	340
B3857					52	190	9										45		36		110
B3858					58	290	7										58				
B3856					39	90	63					32					160		170		370
B3858					64	80	75					73					600		750		1300
B38510					43	32	7										8				
B4051					45		47												17		28
B4052					38		13										220				
B4056					45		11										200				
B4151					69	45	9										170		6		17
B4152					61		8										240				
B4156					62	48	11										240				
B4251					28		16										150				
B4253					22												67				
B4256					14												31				
B4352					72	130	40										62				
B4354					28	170											20				
B4356					29	140	10										100				
Number	1	2	0	0	54	21	33	0	3	0	0	8	0	1	0	8	44	0	28	10	28
Average	410000.00	265.00	ERR	ERR	197.73	672.67	20.00	ERR	67.67	ERR	ERR	23.75	ERR	46.00	ERR	0.00	213.48	0.00	371.92	12.00	1216.16
Std. Dev.	ERR	374.77	ERR	ERR	332.49	2246.86	15.76	ERR	44.68	ERR	ERR	23.40	ERR	ERR	ERR	0.00	480.65	0.00	1066.29	37.95	4368.24
Maximum	410000.00	530.00	ERR	ERR	2000.00	11000.00	75.00	ERR	110.00	ERR	ERR	73.00	ERR	46.00	ERR	0.00	3100.00	0.00	5300.00	120.00	22000.00
Minimum	410000.00	0.00	ERR	ERR	6.00	11.00	4.00	ERR	21.00	ERR	ERR	2.00	ERR	46.00	ERR	0.00	0.00	0.00	6.00	0.00	17.00
% Total	1.79%	3.57%	0.00%	0.00%	100.00%	42.86%	58.93%	0.00%	5.36%	0.00%	0.00%	14.29%	0.00%	1.79%	0.00%	14.29%	78.57%	16.07%	46.43%	17.86%	46.43%

Quantities shown in shaded cells indicate the compound was
estimated because it was detected below the method detection limits.
Bold italic quantities indicate compound was detected in laboratory background samples

SUM26-44, RANGE A:C99..AX146

Wall Engineering, Inc.

DATA SUMMARY

TABLE 4-6 CONTINUED

Cas No.	84-74-2	95-48-7	117-81-7	117-84-0	75-09-2	67-64-1	75-15-0	67-66-3	56-23-5	108-90-7	95-50-1	75-01-4	108-10-1	127-18-4	79-34-5	108-88-3	108-90-7	100-41-4	100-42-5	1330-20-7
Compound	Di-n-butyl phthalate	Butylbenzyl phthalate	Bis(2-Ethylhexyl) phthalate	Di-n-Octyl phthalate	Methylene Chloride	Acetone	Carbon Disulfide	Chloroform	2-Butanone	Carbon Tetrachloride	Trichloro-ethene	Benzene	4-Methyl 2-Pentanone	Tetrachloro ethene	1,1,2,2-Tetra chloroethane	Toluene	Chloro benzene	Ethyl benzene	Styrene	Xylene (Total)
B4481					43	440	33					91				160		17		1200
B4486					17	36	10									110				10
B4490	900				10	50	12									10				
B4492					10	32	21									94		21		21
B4494					10		10									35		7		20
B4495					230	1100										1000		370		1700
B4501					47	860	100					30				300		170		650
B4505					90	900	120									700		800		720
B4506					50	270	20									270		170		490
B4701					20	100	9													
B4702					100	700	32									90		130		210
B4708					10	20										6				
B4802					20	100	13									100				
B4806					64	210	9									63				
B40813					50	100	7									61				
B4907					100	10000	5200					850				10000		22000		67000
B4908					7100		940					3000				22000		29000		75000
B4909					10		17					6				14		6		80
B5004					80	370	90					1000				870		900		1400
B5007					9000		3700					4000				20000		22000		51000
B5008	23000				70	180	63									170				120
B5103					50		50									100				
B5104	850				23	30	29													
B5201					20		27									190				
B5202					10	100	41		73							200				41
B5302																				
B5303					61											220		310		1000
B5304					45	15	11									100		30		30
B5305					42	22	33									670		95		330
B5404					34	10	32									1100		100		1100
B5405					41	17	20									220		90		92
B5502					65		20									690		700		2200
B5504					70		50									1200		1200		2000
B5505																				
B5603					30	31										200				
B5703					82	11														
B5801					120		320									40		90		110
B5802					27		7									120				
B5803D					97		10									170				
B5803					33	50	10									95				
B5901					100		30									84		23		120
B5902					120		40									600		90		300
B5904					30															
B6002					40	10	14					8				40				8
B6004					70	12										200				
B6007					14		10									320				
B6101					9		6									7				
B6102					13		6									90				
B6202					10		10									72				
B6204					18	7	10									230				
B6212					41	41										100				
B6213					31	20										230				
B6304					25	40	7									250				
B6406					10	67	7									10				
B6501					120	200	90									170				
B6502					20	23						8				93				
B6504					20	6										220				
B6601					24	21	7		6			26				200		7		30
B6603					13	120	87									170		23		71
B6606					22	42										170				7
Number	3	0	0	0	33	39	44	0	2	0	0	10	0	0	0	54	0	28	0	30
Average	7919.67	ERA	ERA	ERA	538.26	858.96	247.86	ERA	50.50	ERA	ERA	1042.00	ERA	ERA	ERA	1324.07	ERA	5118.92	ERA	9499.67
Std. Dev.	13063.72	ERA	ERA	ERA	1538.47	2949.43	930.03	ERA	47.50	ERA	ERA	1720.04	ERA	ERA	ERA	4487.90	ERA	8007.05	ERA	16379.02
Maximum	23000.00	ERA	ERA	ERA	9000.00	10000.00	5200.00	ERA	73.00	ERA	ERA	4000.00	ERA	ERA	ERA	22000.00	ERA	29000.00	ERA	75000.00
minimum	200.00	ERA	ERA	ERA	9.00	6.00	6.00	ERA	6.00	ERA	ERA	6.00	ERA	ERA	ERA	6.00	ERA	6.00	ERA	5.00
% Total	9.09%	0.00%	0.00%	0.00%	94.07%	88.89%	79.87%	0.00%	3.37%	0.00%	0.00%	16.67%	0.00%	0.00%	0.00%	90.00%	0.00%	91.07%	0.00%	90.00%

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits

Bold italic quantities indicate constituent was detected in laboratory background samples

SUM44-04.WK3, RANGE A:C66..AW166

Ball Engineering, Inc.

DATA SUMMARY

TABLE 4-6 CONTINUED

Cas No.	84-74-2	85-68-7	117-81-7	117-84-0	75-09-2	67-64-1	75-15-0	67-66-3	78-93-3	85-23-5	79-01-6	71-43-2	108-10-1	127-18-4	79-34-5	108-88-3	108-90-7	100-41-4	100-42-5	1330-20-7
Compound	Di-n-Butyl phthalate	Butylbenzyl phthalate	bis(2-Ethylhexyl) phthalate	Di-n-Octyl phthalate	Methylene Chloride	Acetone	Carbon Disulfide	Chloroform	2-Butanone	Carbon Tetrachloride	Trichloro-ethene	Benzene	4-Methyl 2-Pentanone	Tetrachloro ethene	1,1,2,2-Tetra chloroethane	Toluene	Chloro benzene	Ethyl benzene	Styrene	Xylene (Total)
T152					28	200	8													
T153					33	230														
T154					9		11													
T252					12		13									100				
T253					9		13									38				
T254					10	18	16									130				
T352					13		8									11				
T353					12		14									23				
T354					11															
T452					16		11									110				
T453					13		10									32				
T454					12	83	8									14				
T651					160	1200						230				220	950	190		670
T652					20											91				
T651					14	180										28				
T652					20	190	11		66							210				
T653					22	310	16		18							300				
T752					65	1700	84									600				
T753				11000	29	770	42									38				
T754					23	450	38									120				
T852					180	210	46									250				
T853					84	210	25									200				
T854					47	170										50				
T951					23	38	32				7			8		94				
T952					40	40	34									84				
T953					24		29									29				
T1051					16	370	15	11		9	6			9		120				
T1052					7	230	18		19							30				
T1152					41	65	43									89				
T1153					52	210	79									200				
T1154					80	160	97		17							340				
T1252					55	240	74		23							110				
T1253					44	200	31									30				
T1254					46	130	20									18				
T1351					1900	2000	670					780				6900		4600		26000
T1451					69	310										110				
T1452						7														
T14520					11											10				
S51					45	180										12				
S52					1900															
S53					25	140														
Number	0	0	0	1	40	29	29	1	5	1	2	2	0	2	0	34	1	2	0	2
Average	ERR	ERR	ERR	11000.00	122.98	352.34	51.52	11.00	30.60	9.00	7.50	505.00	ERR	7.00	ERR	318.94	950.00	2395.00	ERR	13335.00
Std. Dev.	ERR	ERR	ERR	ERR	381.34	479.29	121.55	ERR	20.84	ERR	0.71	388.91	ERR	1.41	ERR	1170.59	ERR	3110.34	ERR	17911.01
Maximum	ERR	ERR	ERR	11000.00	1900.00	2000.00	670.00	11.00	66.00	9.00	8.00	780.00	ERR	8.00	ERR	6900.00	950.00	4600.00	ERR	26000.00
Minimum	ERR	ERR	ERR	11000.00	7.00	7.00	6.00	11.00	17.00	9.00	7.00	230.00	ERR	6.00	ERR	10.00	950.00	190.00	ERR	670.00
% Total	0.00%	0.00%	0.00%	2.44%	97.56%	70.73%	70.73%	2.44%	12.20%	2.44%	4.88%	4.88%	0.00%	4.88%	0.00%	82.93%	2.44%	4.88%	0.00%	4.88%

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits.
Bold italic Quantities indicate constituent was detected in laboratory background samples

SUMT1991.WK3, RANGE A:C79..A:W132

Wall Engineering, Inc.

DATA SUMMARY

TABLE 4-7: GROUND WATER QA/QC CONTAMINATION SUMMARY

Cas No.	84-74-2	117-81-7	75-09-2	67-64-1	75-15-0	67-66-3	107-06-2	78-93-3	79-00-5	71-43-2	108-10-1	591-78-6	108-88-3	108-90-7	100-41-4	1330-20-7	Meth. 418.1
Compound	Di-n-Butyl phthalate	bis(2Ethylexyl) phthalate	Methylene Chloride	Acetone	Carbon Disulfide	Chloroform	1,2-Dichloro ethane	2-Butanone	1,1,2-Trichloro ethane	Benzene	4-Methyl 2-Pentanone	2-Hexanone	Toluene	Chloro benzene	Ethyl benzene	Xylene (Total)	TPH mg/L
GW-1			2														3.90
GW-2		6	5														6.61
GW-3		7	6														<0.20
GW-4			2														No Sample
GW-5	43	12	4														<0.20
GW-6	17	9	6	91													<0.20
GW-7	6	7	2														3.34
GW-8			6	40	2			18		15		11	31		12	27	0.32
GW-9			4							6			25		26	66	19.19
GW-10			4	2						19	22	11	41		21	54	21.16
GW-11			3		1								27		29	96	46.44
GW-12	23		10													22	66.34
GW-13	39		10							5			9		11	34	69.97
GW-14	60	15	3														1.32
GW-15	53		6														0.30
GW-16	46		7														139.07
GW-17																	<0.20
GW-18	1600		25										12		11	26	No Sample
GW-19	63		5		2												521.65
GW-20			9							17			32		16	62	655.60
GW-21			12	96						56			61		76	220	445.93
GW-22	3200		12							3			18		23	66	632.65
GW-23	16		21		3								12		10	29	656.26
GW-24	560		19										29		26	94	437.17
GW-25													7		9	36	6.55
GW-26																	2.94
GW-27					12												1.17
GW-28	110																0.70
GW-29			4														5.66
GW-30			100	110	5					64			60		34	110	1.34
GW-31			9	13	4	2	0.30				0.30	0.50	2	0.01	0.90	0.30	1.43
Number	14	6	26	6	7	1	1	1	0	6	2	3	14	1	14	15	31
Average	421.43	9.33	11.46	59.00	4.14	2.00	0.30	18.00	ERR	25.63	11.15	7.50	29.00	0.01	22.06	65.69	121.01
Std. Dev.	906.60	3.50	19.00	46.63	3.72	ERR	ERR	ERR	ERR	26.99	15.34	6.06	24.49	ERR	16.64	53.99	223.71
Maximum	3200.00	15.00	100.00	110.00	12.00	2.00	0.30	18.00	ERR	64.00	22.00	11.00	61.00	0.01	76.00	220.00	656.26
Minimum	6.00	6.00	2.00	2.00	1.00	2.00	0.30	18.00	ERR	3.00	0.30	0.50	2.00	0.01	0.90	0.30	0.00
% Total	45.16%	19.35%	83.87%	19.35%	22.58%	3.23%	3.23%	3.23%	0.00%	25.81%	6.45%	9.68%	45.16%	3.23%	45.16%	48.39%	100.00%

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits.

Bold italic quantities indicate constituent was detected in laboratory background samples

GW1-31:WK3, RANGE A:C50..A:T94

Ball Engineering, Inc.

DATA SUMMARY

TABLE 4-8: SURFACE WATER QA/QC CONTAMINATION SUMMARY

CAS NO.	106-44-5	91-20-3	91-57-6	83-32-9	132-64-9	87-86-5	208-44-0	129-00-0	218-01-9	75-09-2	67-64-1	75-15-0	127-18-4	56-87-3	75-27-4	124-48-1	75-25-2	71-43-2	108-88-3	100-41-4	1330-20-7	Max. 418.1
Compound	4-Methyl phenol	Naphthalene	2-Methyl naphthalene	Ace naphthene	Dibenzo furan	Pentachloro phenol	Fluor-anthene	Pyrene	Chrysene	Methylene Chloride	Acetone	Carbon Disulfide	Tetrachloro ethene	Chloroform	Bromodichloro methane	Dibromochloro methane	Bromoform	Benzene	Toluene	Ethyl benzene	Xylene (total)	TPH mg/L
SW-1						35			6													1.41
SW-2						100				4												0.94
SW-3						110				8	7											4.94
SW-4				5		13	27	18		4	8											0.24
SW-5						73	10	5		4												0.62
SW-6						47	8	8		4												0.31
SW-7				4		33	12	8		3												0.66
SW-8										10												0.26
SW-9										4	8											1.19
SW-9D										4												N/A
SW-10						6				3			7									
SW-11																						0.23
SW-12										2		1										1.19
SW-13						6	4	3														
SW-13A										10												0.26
SW-14																						1.73
SW-14A																						2.88
SW-15						290	13			4												
SW-16	90	210	42	260	58	1000		68						6	9	6	3	7	12	180	15	
BG-4																						
TB-1										6	2											0.60
FB-1										4												
TB-2										3												0.59
FB-2										3												
TB-4										10	51											Broken
FB-4										20	29											Broken
TB-9										10	140	110		47					10			14.37
FB-9										11	99	110		46					11			
TB-10										6	2	3							15			
FB-10										7		4							11			

Quantities shown in shaded cells indicate the compound was estimated because it was detected below method detection limits.
Bold italic quantities indicate contaminant was detected in laboratory background sample. SWDATA.WK3, RANGE A:C36..Y76

Hall Engineering, Inc.

5 METALS ANALYSIS

The RFI plan called for specific metals analysis because the company had used CCA (Copper, Chromium, Arsenic) as a preservative. The CCA operation was relatively limited compared to the use of creosote and penta both in duration and quantity. All CCA treating was performed in a single small diameter cylinder dedicated to this process with tanks, pumps and lines separate from the other treating operations. CCA treating must be segregated from other types of treating because it is a water borne process as opposed to oil borne. This means that CCA drippings and contaminated storm water are typically captured and used to dilute the concentrated CCA solution for the next batch of treating solution. Unlike creosote and penta treating, the CCA process is a water using operation rather than a generator of excess water. Therefore, it is in a wood treaters best interest to capture all excess and contaminated waters to reduce fresh water purchase.

CCA treating at Colfax Creosoting ended in October, 1989 because the market was flooded by small companies. CCA treating was performed for a relatively few years and was a relatively small percentage of the plant throughput. Because of the size and duration of the CCA operation and the fact that it was a water user, one would expect little contamination of the site by copper, chromium and arsenic. The CCA cylinder had a concrete drip pad and all tanks, pumps and piping were within concrete diked areas.

5.1 RFI Requirements

The RFI work plan called for obtaining samples from each boring, surface water location, ground water sample, and de-con sample along with those for organics. Since trenching was used in place of borings in the fill south of the closed impoundments, metals samples were taken from each trench. With regard to the boring and trench samples, the work plan called for an

analysis of the upper layer first. If copper, chromium and arsenic were found in concentrations significantly above background soil samples, subsequent layers would be analyzed. As soon as a layer was found to have these metals below the upper limit based on a 95 percent confidence level, no lower samples would be analyzed.

5.2 Background Samples

The US Soil Conservation Service recognizes three soil types at the Colfax facility. These include an Acadia Silty Loam we designated BG1, Gore Fine Silty Loam designated BG2, and Kolin Silt Loam designated BG3. Their approximate coverage at the site is shown in Figure 5-1. Background soil BG1 existed along the northern edge of the property and through the center of Parcel A. Soil BG2 covered much of Parcel B from the railroad track south eastward to the end of the study area and along a ridge in the western section of Parcel B. Background soil BG3 covered the remainder of the facility which is the western part of Parcel A and the middle of the treating plant area.

Samples were taken to represent each of the three types of soils at locations shown in Figure 5-1. Four replicates were determined for each soil type and analyzed for copper, chromium and arsenic. Please refer to the first table on page 5-7 of the results for the values, averages and 95 percent confidence limits. All three metals were expected in these soils. The second table on the same page presents ranges for the metals arsenic, copper and chromium in typical soils and compares these to the range found during this study. Arsenic had the lowest range followed by copper and then chromium which is typical for most soils.

The 95 percent confidence limits calculated from the background soil replicate data were used to determine if a sample analyzed from a layer in a boring or trench had a concentration significantly greater than one would expect from the particular soil type in that area.

5.3 Soil Boring Analysis

The results on pages 5-8 through 5-11 are for samples taken from the borings. The results are separated into background soil types. The first results in each table represents the appropriate background upper 95 percent confidence limit. For example, the first table is for soil type BG1. There was only one boring in this type soil and it was designated B60S1 by the

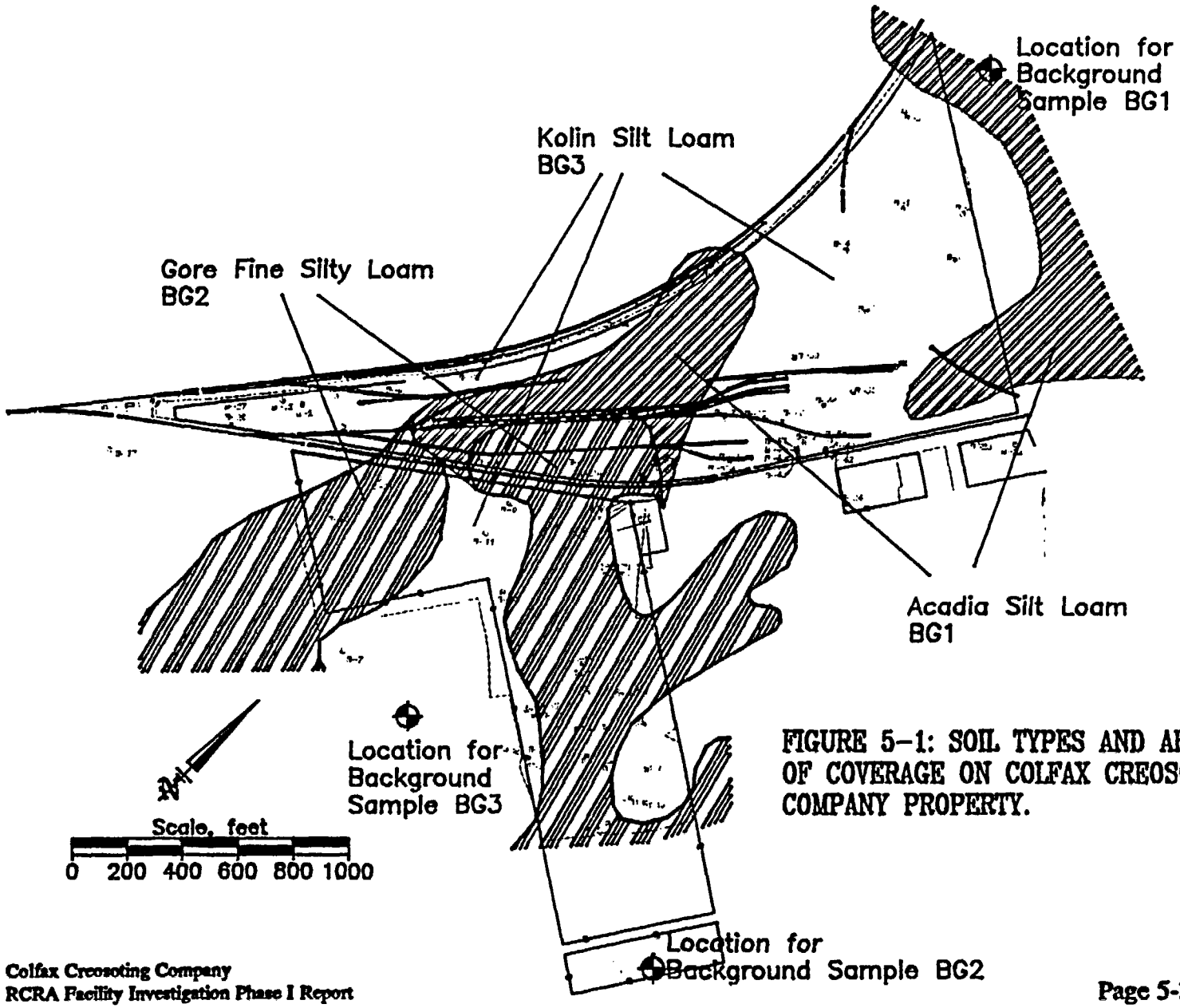

FIGURE 5-1: SOIL TYPES AND AREA OF COVERAGE ON COLFAX CREOSOTING COMPANY PROPERTY.

sampling team. This means that the sample was the first layer (S1) in boring 60. None of the results for boring B60 layer S1 were above the upper 95 percent confidence limit for soil type BG1.

The second set of data on page 5-8 is for soil type BG2. There were 11 borings in this soil type with four samples (values shown in bold letters) having copper concentrations above the upper 95 percent confidence limit. Therefore, the next layer of soil (S2) was analyzed for copper at these four borings.

The third set of data beginning on page 5-8 and ending on page 5-9 is for background BG3 borings. Of the 55 locations there were 10 samples (values shown in bold letters) having copper concentrations above the upper 95 percent confidence limit. Therefore, the next layer of soil (S2) was analyzed for copper at these locations.

The first set of data on page 5-10 presents the copper analysis of the four BG2 soils. Of these, two samples were above the limit. The second set of data is for soil type BG3. From these analyses there were no results above the confidence limit.

Page 5-11 shows the analysis from the third level of soils in the BG2 group that failed at the S2 level. Both samples passed at the S3 level.

5.4 Trench Sample Analysis

The trench samples were analyzed and reported in the same way as those from the borings. Page 5-12 presents the trench data indicating no BG1 type soil for that area. Except for one sample (T7S1), all failures involved copper. The first layer from trench 7 indicated a failure for chromium as well as copper. Second layer samples for the seven locations of S1 failure are presented on page 5-13. Only one sample passed the S2 layer and trench T7 failed copper and chromium the second time. At the third layer one of the six locations passed. Trench 14 had no third layer taken. The third layer for trench 7 passed with regard to chromium. Fourth layer samples were analyzed where available. Each of the three remaining samples failed the limits.

5.5 Surface Water Samples

Page 5-16 of the results shows the analysis of 18 surface water samples. These results

were compared to the drinking water standards for arsenic and chromium. All results were below the detection limits except for SW-14A, SW-15 and SW-16 for arsenic. However, the values determined were all below the drinking water standard.

5.6 Ground Water Samples

Page 5-17 of the results shows the analysis of 30 ground water samples. These results were compared to the drinking water standards for arsenic and chromium. All results were below the detection limits except for GW-8, GW-21, GW-23, GW-29, and GW-30 for arsenic. However, the values determined were all below the drinking water standard.

5.7 Decontamination Water Samples

Page 5-18 of the results shows the analysis of 18 decon water samples. These results were compared to the drinking water standards for arsenic and chromium. All results were below the method detection limits.

5.8 Summary

Because the CCA operation was very limited at the facility, was discontinued several years ago, and was a self contained water borne operation, no significant contamination of the site was expected. Except for one trench sample in the fill south of the closed surface impoundments, the only constituent found above the 95 percent confidence limits in the borings and trench samples was copper. Out of 66 boring samples only 14 had copper above the limit. No boring sample failed at the third layer. The trench samples indicated a greater percentage of copper failure and one arsenic failure. However, none of these failures were exceptionally high or above the published results for copper and arsenic. It was believed that the trench samples failed more often for copper because they were in the fill and did not necessarily represent background sample material. Experience at other locations where CCA is present produce chromium and arsenic as well as copper in high concentrations. There was none of this type of result at the Colfax site.

Metals in the surface water, ground water and decon water were mostly below detection limits. For those few that provided results, the data was below the drinking water standard.

5.9 Conclusions

Based on the above data it is concluded that the Colfax Creosoting Company site is not contaminated with copper, chromium and arsenic from the treating operation taking place in the past. It is recommended that no further investigations include analysis for these parameters.

METALS ANALYSIS

Ball Engineering, Inc.

COLFAX CREOSOTING COMPANY: RFI METALS ANALYSIS

Report date: 11/24/92 Page 1

Background Soil Sample Analysis using Four Replicates

Soil No.	Code	Sample	As, mg/kg	Cu, mg/kg	Cr, mg/kg
1	BG1	Rep.#1	2.01	8.14	5.43
		Rep.#2	2.32	6.78	5.65
		Rep.#3	2.31	7.51	5.78
		Rep.#4	2.24	8.04	5.74
		Average	2.22	7.61	5.65
		95%Conf.	2.48	8.76	5.94
2	BG2	Rep.#1	1.13	5.81	21.1
		Rep.#2	1.15	4.59	18.3
		Rep.#3	1.97	6.25	12.5
		Rep.#4	2.11	6.62	13.2
		Average	1.59	5.82	16.3
		95%Conf.	2.55	7.44	23.8
3	BG3	Rep.#1	4.28	13.8	27.6
		Rep.#2	2.31	10.8	21.5
		Rep.#3	3.47	6.94	20.8
		Rep.#4	2.39	11.7	17.5
		Average	3.11	10.8	21.9
		95%Conf.	4.84	16.1	29.6

Notes: Rep. = replicate analysis
Average= mean of four replicates
95% Conf.= upper limit of 95% confidence interval of four replicates

Table of Values Presenting Ranges for Metals in Soils

Metal	Study Range(1) ppm	Pub. Range (2) ppm
Arsenic	1.13-4.28	0.01-40
Copper	4.59-13.8	2-100
Chromium	5.43-27.6	5-3000

(1) Range covers replicate values for background soils BG1, BG2, and BG3 above

(2) Allaway, W.H., 1968, 'Agronomic Controls over the Environmental Cycling of Trace Elements,' A.G. Norman(ED.), "Advances in Agronomy," 20:235-274, Academic Press, N.Y.

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Ball Engineering, Inc.

COLFAX CREOSOTING COMPANY: RFI METALS ANALYSIS

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Soil Sample Analysis from Borings at the Upper Level (S1 Samples)

Soil Code	Boring	As, mg/kg	Cu, mg/kg	Cr, mg/kg	
BG1	N/A	2.48	8.76	5.43	(Upper 95% Confidence Limit)
	B60S1	2.01	5.92	5.33	

Soil Code	Boring	As, mg/kg	Cu, mg/kg	Cr, mg/kg	
BG2	N/A	2.55	7.44	23.8	(Upper 95% Confidence Limit)
	B8S1	1.40	**10.8**	16.1	
	B14S1	2.24	6.41	7.05	
	B15S1	0.56	5.13	10.3	
	B18S1	1.19	**47.1**	16.2	
	B20S1	1.75	6.25	12.5	
	B21S1	1.15	4.81	9.62	
	B25S1	2.36	5.03	15.1	
	B52S1	0.76	5.41	10.8	
	B53S1	0.19	6.21	6.80	
	B54S1	1.51	**12.6**	6.29	
	B55S1	0.56	**18.5**	9.26	

Soil Code	Boring	As, mg/kg	Cu, mg/kg	Cr, mg/kg	
BG3	N/A	4.83	16.00	29.6	(Upper 95% Confidence Limit)
	B1S1	1.64	6.06	6.67	
	B2S1	3.57	14.3	7.14	
	B3S1	3.73	7.14	14.3	
	B4S1	2.33	11.6	12.8	
	B5S1	1.44	11.1	12.2	
	B6S1	0.27	5.47	15.9	
	B7S1	1.88	12.9	5.46	
	B9S1	1.08	5.38	10.7	
	B10S1	1.61	10.4	12.5	
	B11S1	2.03	5.81	11.6	
	B12S1	3.75	**46.9**	20.8	
	B13S1	1.75	**36.1**	25.8	
	B16S1	0.65	10.1	10.8	
	B17S1	1.16	5.26	26.3	
	B19S1	1.79	**32.6**	16.3	
	B22S1	0.92	**16.3**	27.1	
	B23S1	1.53	9.23	23.5	
	B24S1	2.18	6.06	12.1	
	B26S1	0.61	9.26	10.2	
	B27S1	0.31	**81.6**	10.2	
	B28S1	1.81	4.65	13.9	Values in Bold numbers exceed
	B29S1	1.85	10.6	15.6	95% Confidence limits

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Ball Engineering, Inc.

COLFAX CREOSOTING COMPANY: RFI METALS ANALYSIS

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Soil Sample Analysis from Borings at the Upper Level (S1 Samples)

Soil Code	Boring	As. mg/kg	Cu. mg/kg	Cr. mg/kg	
BG3	N/A	4.83	16.00	29.6	(Upper 95% Confidence Limit)
	B30S1	0.86	11.5	17.2	
	B31S1	1.29	10.7	16.3	
	B32S1	0.73	5.21	10.4	
	B33S1	2.05	10.2	15.3	
	B34S1	2.09	14.9	29.1	
	B35S1	1.46	12.2	18.3	
	B36S1	0.23	5.81	11.6	
	B37S1	1.11	5.49	16.5	
	B38S1	0.63	5.71	11.4	
	B39S1	2.02	10.1	15.1	
	B40S1	0.23	11.6	23.1	
	B41S1	2.14	19.9	15.4	
	B42S1	2.33	5.81	11.6	
	B43S1	0.58	5.85	11.7	
	B44S1	1.85	27.8	18.5	
	B45S1	2.37	48.4	27.3	
	B46S1	1.48	6.45	7.09	
	B47S1	1.27	29.3	1.27	
	B48S1	2.06	5.29	9.75	
	B49S1	0.54	5.41	5.95	
	B50S1	0.74	6.13	12.3	
	B51S1	2.71	12.3	13.5	
	B56S1	2.98	5.96	11.9	
	B57S1	1.97	5.05	10.1	
	B58S1	0.96	6.02	12.1	
	B59S1	2.64	4.98	14.9	
	B60S1	2.01	5.92	5.33	
	B61S1	2.85	12.1	13.3	
	B62S1	0.77	10.3	11.3	
	B63S1	0.56	16.8	11.2	
	B64S1	3.4	6.17	12.4	
	B65S1	1.99	11.1	12.2	Values in Bold numbers exceed
	B66S1	2.29	5.71	11.4	95% Confidence limits

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METALS ANALYSIS

Ball Engineering, Inc.

COLFAX CREOSOTING COMPANY: RFI METALS ANALYSIS

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Soil Sample Analysis from Borings at the Second Level (S2 Samples)

Soil Code	Boring	As, mg/kg	Cu, mg/kg	Cr, mg/kg	
BG2	N/A	2.55	7.44	23.8	(Upper 95% Confidence Limit)
	B8S2	N/A	8.6	N/A	
	B18S2	N/A	4.85	N/A	
	B54S2	N/A	6.74	N/A	
	B55S2	N/A	45.7	N/A	

Soil Code	Boring	As, mg/kg	Cu, mg/kg	Cr, mg/kg	
BG3	N/A	4.83	16.00	29.6	(Upper 95% Confidence Limit)
	B12S2	N/A	4.01	N/A	
	B13S2	N/A	2.55	N/A	
	B19S2	N/A	6.2	N/A	
	B22S2	N/A	9.33	N/A	
	B27S2	N/A	6.19	N/A	
	B41S2	N/A	2.89	N/A	
	B44S2	N/A	4.14	N/A	
	B45S2	N/A	5.08	N/A	
	B47S2	N/A	4.14	N/A	Values in Bold numbers exceed
	B63S2	N/A	5.14	N/A	95% Confidence limits

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Ball Engineering, Inc.

COLFAX CREOSOTING COMPANY: RFI METALS ANALYSIS

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Soil Sample Analysis from Borings at the Third Level (S3 Samples)

Soil Code	Boring	As. mg/kg	Cu. mg/kg	Cr. mg/kg
BG2	N/A	2.55	7.44	23.8 (Upper 95% Confidence Limit)
	B8S3	N/A	6.52	N/A
	B55S3	N/A	6.42	N/A

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METALS ANALYSIS

Ball Engineering, Inc.

COLFAX CREOSOTING COMPANY: RFI METALS ANALYSIS

Report date: 11/24/92 PAGE 6

Soil Sample Analysis from Trench Samples at the First Level (S1 Samples)

Soil Code	Trench	As. mg/kg	Cu. mg/kg	Cr. mg/kg	
BG2	N/A	2.55	7.44	23.8	(Upper 95% Confidence Limit)
	T1S1	1.39	7.21	10.6	
	T2S1	0.66	5.96	13.2	
	T3S1	0.12	21.9	15.1	
	T5S1	1.58	15.8	14.5	
	T6S1	0.17	20.7	16.8	
	T8S1	0.17	6.92	8.62	
	T9S1	0.13	8.44	17.5	
	T12S1	1.72	18.1	11.8	
	T14S1	0.16	33.5	15.1	

Soil Code	Trench	As. mg/kg	Cu. mg/kg	Cr. mg/kg	
BG3	N/A	4.83	16.00	29.6	(Upper 95% Confidence Limit)
	T4S1	0.26	14.9	12.8	
	T7S1	0.19	65.9	31.3	
	T10S1	0.69	10.1	4.38	Values in Bold numbers exceed
	T11S1	0.68	9.04	3.39	95% Confidence limits

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Soil Sample Analysis from Trench Samples at the Second Level (S2 Samples)

Soil Code	Trench	As. mg/kg	Cu. mg/kg	Cr. mg/kg	
BG2	N/A	2.55	7.44	23.8	(Upper 95% Confidence Limit)
	T3S2	N/A	20.1	N/A	
	T5S2	N/A	6.67	N/A	
	T6S2	N/A	69.4	N/A	
	T9S2	N/A	12.6	N/A	
	T12S2	N/A	19.6	N/A	
	T14S2	N/A	19.5	N/A	

Soil Code	Trench	As. mg/kg	Cu. mg/kg	Cr. mg/kg	
BG3	N/A	4.83	16.00	29.6	(Upper 95% Confidence Limit)
	T7S2	N/A	26.2	39.3	

Values in Bold numbers exceed 95% Confidence limits

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Soil Sample Analysis from Trench Samples at the Third Level (S3 Samples)

Soil Code	Trench	As, mg/kg	Cu, mg/kg	Cr, mg/kg	
BG2	N/A	2.55	7.44	23.8	(Upper 95% Confidence Limit)
	T3S3	N/A	**16.1**	N/A	
	T6S3	N/A	**18.1**	N/A	
	T9S3	N/A	4.81	N/A	
	T12S3	N/A	**8.47**	N/A	
	T14S3	N/A	*	N/A	* No third level taken at T14

Soil Code	Trench	As, mg/kg	Cu, mg/kg	Cr, mg/kg	
BG3	N/A	4.83	16.00	29.6	(Upper 95% Confidence Limit)
	T7S3	N/A	**18.1**	19.7	

Values in Bold numbers exceed 95% Confidence limits

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Soil Sample Analysis from Trench Samples at the Fourth Level (S4 Samples)

Soil Code	Trench	As. mg/kg	Cu. mg/kg	Cr. mg/kg	
BG2	N/A	2.55	7.44	23.8	(Upper 95% Confidence Limit)
	T3S4	N/A	**14.8**	N/A	
	T6S4	N/A	*	N/A	* No fourth level taken at T6
	T12S4	N/A	**13.5**	N/A	

Soil Code	Trench	As. mg/kg	Cu. mg/kg	Cr. mg/kg	
BG3	N/A	4.83	16.00	29.6	(Upper 95% Confidence Limit)
	T7S4	N/A	**18.1**	N/A	

Values in Bold numbers exceed 95% Confidence limits

Note: No fifth level samples were taken in the trenches

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Water Sample Analysis of Surface Waters

Code No.	Date	As, mg/L	Cu, mg/L	Cr, mg/L	
N/A	N/A	0.05	N/A	0.05	US EPA Drinking Water Standards
SW-1	6/1/92	<0.002	<0.02	<0.05	
SW-2	6/1/92	<0.002	<0.02	<0.05	
SW-3	6/1/92	<0.002	<0.02	<0.05	
SW-4	6/1/92	<0.002	<0.02	<0.05	
SW-5	6/1/92	<0.002	<0.02	<0.05	
SW-6	6/1/92	<0.002	<0.02	<0.05	
SW-7	6/1/92	<0.002	<0.02	<0.05	
SW-8	6/1/92	<0.002	<0.02	<0.05	
SW-9	6/1/92	<0.002	<0.02	<0.05	
SW-10	6/1/92	<0.002	<0.02	<0.05	
SW-11	6/2/92	<0.002	<0.02	<0.05	
SW-12	6/8/92	<0.002	<0.02	<0.05	
SW-13	6/9/92	<0.002	<0.02	<0.05	
SW-13A	6/16/92	<0.002	<0.02	<0.05	
SW-14	6/9/92	<0.002	<0.02	<0.05	
SW-14A	6/16/92	0.021	<0.02	<0.05	
SW-15	6/16/92	0.012	<0.02	<0.05	
SW-16	6/26/92	0.009	<0.02	<0.05	

Note: None of the Results were above Drinking Water Limits

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Code No.	Date	As, mg/L	Cu, mg/L	Cr, mg/L	
N/A	N/A	0.05	N/A	0.05	US EPA Drinking Water Standards
GW-1	6/1/92	<0.002	<0.02	<0.05	
GW-2	6/1/92	<0.002	<0.02	<0.05	
GW-3	6/1/92	<0.002	<0.02	<0.05	
GW-5	6/11/92	<0.002	<0.02	<0.05	
GW-6	6/11/92	<0.002	<0.02	<0.05	
GW-7	6/11/92	<0.002	<0.02	<0.05	
GW-8	6/15/92	0.027	<0.02	<0.05	
GW-9	6/16/92	<0.002	<0.02	<0.05	
GW-10	6/16/92	<0.002	<0.02	<0.05	
GW-11	6/16/92	<0.002	<0.02	<0.05	
GW-12	6/16/92	<0.002	<0.02	<0.05	
GW-13	6/16/92	<0.002	<0.02	<0.05	
GW-14	6/18/92	<0.002	<0.02	<0.05	
GW-15	6/18/92	<0.002	<0.02	<0.05	
GW-16	6/18/92	<0.002	<0.02	<0.05	
GW-17	6/22/92	<0.002	<0.02	<0.05	
GW-18	6/23/92	<0.002	<0.02	<0.05	
GW-19	6/23/92	<0.002	<0.02	<0.05	
GW-20	6/23/92	<0.002	<0.02	<0.05	
GW-21	6/24/92	0.013	<0.02	<0.05	
GW-22	6/24/92	<0.002	<0.02	<0.05	
GW-23	6/24/92	0.036	<0.02	<0.05	
GW-25	6/25/92	<0.002	<0.02	<0.05	
GW-26	6/25/92	<0.002	<0.02	<0.05	
GW-27	6/25/92	<0.002	<0.02	<0.05	
GW-28	6/26/92	<0.002	<0.02	<0.05	
GW-29	6/26/92	0.021	<0.02	<0.05	
GW-30	6/26/92	0.014	<0.02	<0.05	
GW-31	6/30/92	<0.002	<0.02	<0.05	

Note: No Samples were above drinking water limits

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Code No.	Date	As, mg/L	Cu, mg/L	Cr, mg/L	
N/A	N/A	0.05	N/A	0.05	US EPA Drinking Water Standards
DC-1	6/2/92	<0.002	<0.02	<0.05	
DC-2	6/9/92	<0.002	<0.02	<0.05	
DC-3	6/10/92	<0.002	<0.02	<0.05	
DC-4	6/11/92	<0.002	<0.02	<0.05	
DC-5	6/11/92	<0.002	<0.02	<0.05	
DC-6	6/16/92	<0.002	<0.02	<0.05	
DC-7	6/16/92	<0.002	<0.02	<0.05	
DC-8	6/16/92	<0.002	<0.02	<0.05	
DC-9	6/16/92	<0.002	<0.02	<0.05	
DC-10	6/23/92	<0.002	<0.02	<0.05	
DC-11	6/22/92	<0.002	<0.02	<0.05	
DC-12	6/26/92	<0.002	<0.02	<0.05	
DC-13	6/26/92	<0.002	<0.02	<0.05	
DC-14	6/26/92	<0.002	<0.02	<0.05	
DC-15	6/26/92	<0.002	<0.02	<0.05	
DC-16	6/22/92	<0.002	<0.02	<0.05	
DC-17	6/26/92	<0.002	<0.02	<0.05	
DC-18	6/30/92	<0.002	<0.02	<0.05	

Note: No Samples were above drinking water limits

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6 ORGANIC ANALYSIS

6.1 Introduction

Nineteen SWMUs and four areas of concern (AOCs) were investigated in this study. Evidence of surface or subsurface releases to soil and groundwater was gathered from soil borings installed around each unit's location. Sixty-six borings and 14 trenches were installed during field work to accomplish the project objectives. Soil corings were collected on two foot intervals for a minimum depth of eight feet at boring locations established in the sampling plan. Groundwater samples were collected from those borings extending to the first phaeritic surface found due to continuous soil contamination above. Table 6-1 lists the SWMUs investigated.

During field work, it became apparent that discrete releases from some small-area SWMUs could not be distinguished from larger releases made by nearby units. This was particularly apparent in the main runoff pathway, SWMU 9. Therefore, units are grouped together in four main areas in this chapter. These groupings are: (1) wood storage yard SWMUs, (2) process area SWMUs, (3) SWMUs associated with the main runoff pathway, and (4) SWMUs associated with the west runoff pathway.

In addition to the individual SWMUs identified, other areas of concern discovered during the investigation are discussed in each appropriate section. Primarily these consist of: (1) releases made by other companies once operating on the parcel, (2) releases from water bodies previously existing at the site, and (3) releases from adjacent landowners.

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TABLE 6-1: SWMUs INVESTIGATED DURING RFI.

Unit Type	SWMU No.	Unit Name
Wood Storage Yard	1	Northeast Wood Storage Area
	2	Southeast Wood Storage Area
	3	West Wood Storage Area
	4	Southwest Wood Storage Area
Process Area SWMUs	13	Penta/Creosote Sump Containment
	14	CCA Containment System
	15	Creosote Dehydrator
	16	Creosote Separator Number 1
	17	Creosote Separator Number 2
	18	Creosote Separator Number 3
	19	Penta Reclaiming Hopper
	20	Penta Separator
	25	Cooling Pond
	AOC B	Creosote Unloading Area
Main Runoff Pathway	8	Railcar Separator
	9	Main Runoff Pathway
	10	Truck Washing Area
	AOC D	Concrete Wastewater Pipe
Other SWMUs	11	Untreated Wood Landfill
	12	Groundwater Recovery Tank
	AOC A	West Runoff Pathway
	AOC C	Truck Servicing Lot

6.2 Wood Storage Yards

Four wood storage yards were investigated: the northeast wood storage area, the southeast wood storage area, the west wood storage area, and the southwest wood storage area. Locations of these yards, designated SWMUs 1, 2, 3, and 4 respectively, are shown in Figure 6-1. Table 6-2 gives the total number and depths of borings drilled to investigate these SWMUs.

The wood storage yards are used by the company to stage untreated "white" timbers and poles and treated wood awaiting shipment to consumers. During the investigation, wood was usually stacked on skids in well defined areas adjacent to roads networked over the property. Areas are not designated to any particular type of wood; however, timber products tend to be stored on the northeast side of the property and poles on the south and west. Stained soil can be observed underneath some of the treated material. One major objective of the study was to determine if de minimis or incidental drippage has impacted the subsurface environment.

Storage yards were typically covered with gravel fill, especially near the property's center and northern side. This fill usually consisted of coarse gravel, such as "Winn" rock and clayey sand. Subsurface stratigraphy was typical of the site and tended to follow the general description presented earlier in Chapter 4. Local stratigraphy is discussed with each SWMU.

Table 6-3 summarizes sampling data from the storage yards. Creosote contamination in these SWMUs was found to be limited to the first two feet of soil. In most instances field screening indicated soils exhibiting high visual surface contamination ended within six inches of the surface. Figure 6-2 is a graph showing the depths and total concentration of constituents detected in subsurface samples below the surface. With only six exceptions, all of the contaminated samples came from the top two feet of soil in the yards. Samples B13S4, B15S5, B22S8, B24S5, and B27S11 showed trace amounts of chrysene and/or toluene. However, in all cases uncontaminated soil was collected from strata above the contaminated interval. Also, none of the samples were contaminated above the 10—100 μg/kg range. This evidence suggests: (1) contamination in the wood storage yards is limited to the upper two feet of soil, and (2) deeper contamination has migrated from other sources.

The data in Table 6-3 suggests that releases have not been made to the ground

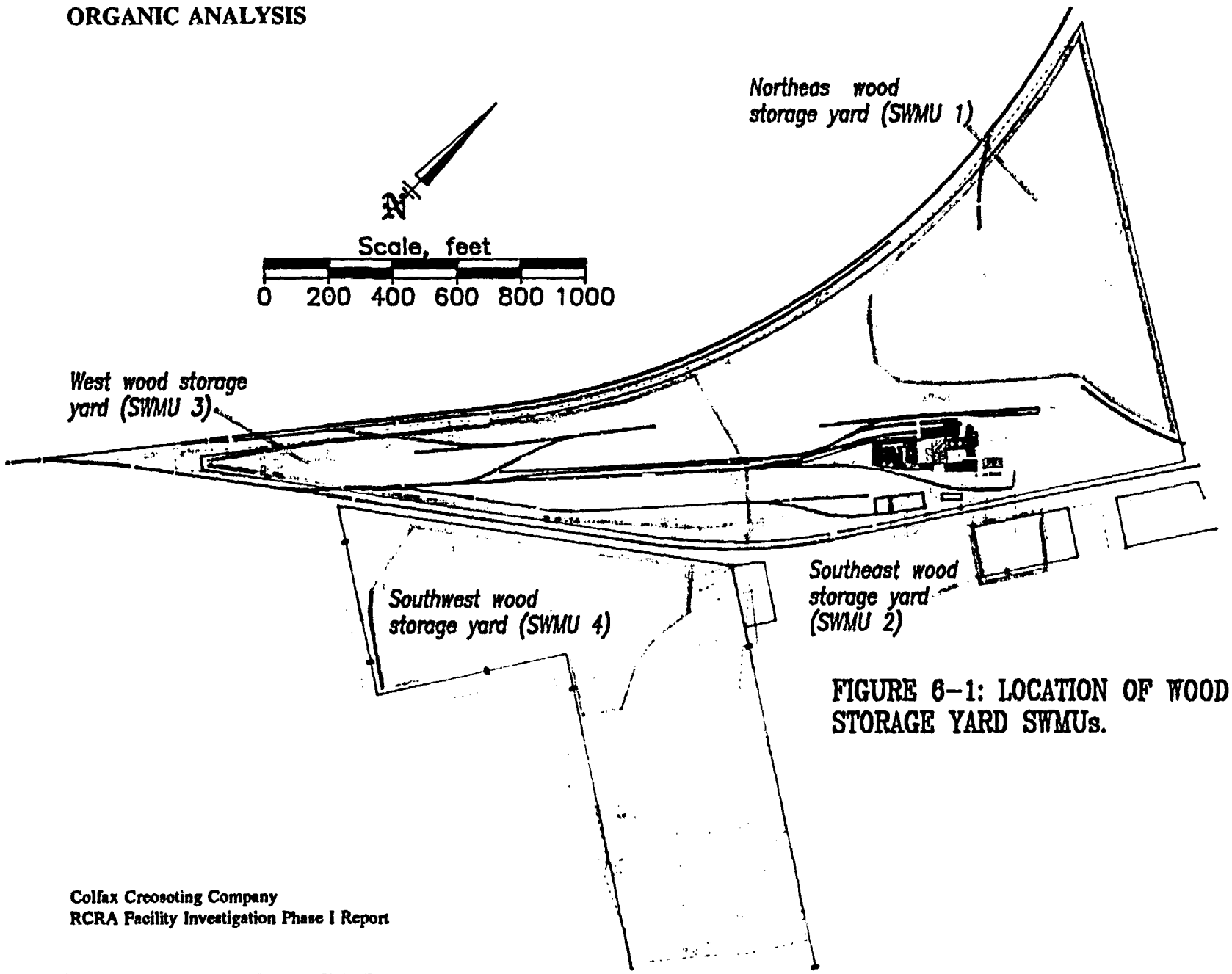

FIGURE 6-1: LOCATION OF WOOD STORAGE YARD SWMUs.

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TABLE 6-2: INVESTIGATORY BORINGS COMPLETED IN WOOD STORAGE YARDS.

Boring	Depth, ft.	Comments
		SWMU 1, Northeast Wood Storage Area
B-1	24	Boring to water at 15', piezometer installed
B-2	15	Boring to water at 10', temporary well set. Boring in drainage pathway from SWMU.
B-3	8	Random boring
B-4	8	Random boring
B-5	8	Random boring
B-6	8	Most visually contaminated area in SWMU
		SWMU 2, Southeast Wood Storage Area
B-24	15	Boring to water at 9', temporary well set. Boring in drainage pathway from SWMU.
		SWMU 3, West Wood Storage Area
B-12	10	Boring to water at 8', temporary well set.
B-13	8	Random boring
B-14	8	Random boring
B-15	10	Boring to water at 5', temporary well set.
B-16	10	Boring defining diesel plume
B-17	8	Boring on adjacent property defining diesel plume. Boring beyond scope of work plan.
B-18	10	Boring to water at 7', temporary well set.
B-19	12	Boring defining diesel plume
B-26	22	Boring to water at 10' with 8½" casing grouted in. Boring continued to 22' and piezometer was installed to monitor diesel plume. Outside scope of work plan.
B-27	24	Ditto.
B-28	22	Ditto.
		SWMU 4, Southwest Wood Storage Area
B-7	8	Boring in drainage pathway from SWMU.
B-8	13	Boring to water at 6', temporary well set.
B-9	8	Random boring
B-10	8	Random boring
B-11	8	Random boring at visually contaminated spot.
B-20	29	Boring to water at 22', piezometer set.
B-21	8	Random boring at most visually contaminates spot.

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TABLE 6-3: CHEMICAL SPECIES QUANTIFIED IN WOOD STORAGE YARDS.

Sample No.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Compound	2-Methylnaphthalene	Acenaphthylene	Acenaphthene	Dibenzofuran	Fluorene	N-Nitrosodiphenylamine	Phenanthrene	Anthracene	Fluoranthene	Pyrene	3,3'-Dichlorobenzidine	Benzo(a)anthracene	Chrysene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-cd)pyrene	Dibenz(a,h)anthracene	Benzo(g,h,i)perylene	Benzoic Acid	Phenol	Chlorobenzene	Dibenzofuran	Bis(2-Ethylhexyl)phthalate
B188																								
B294																								
B298																								
B354																								
B354D																								
B453																								
B553																								
B651		1700	3300	1900	3900			59000		32000	53000		20000		47000	24000	23000	15000	15000					
B654																					110			
B754																								7
B854																								
B954																								
B1054																								
B1151								3400	1300	18000	29000		6400		14000	8700	4000							
B1152																								
B1155																								
B1251			11000		2400		18000	7500	7000	29000	29000		18000		1900	1900	2900							
B1254																								
B1256																								
B1351							10000	1700		18000	6900		2900		4700	4000								
B1352																								
B1354														200							91			
B1451			15000	2100	15000		4000	43000				3900	23000		38000		10000							
B1452																								
B1454																								
B1654																								
B1655														240										
B1651							20000	5600	150000	110000	270000		19000		50000		14000							
B1652																								
B1655																								
B1751																								
B1754																								
B1851																								
B1852																								
B1855																								
B1951											11000					21000					6	0.4	0.3	1
B1952																								
B1954																								
B2051							440																	
B2051D														380										
B2056	0.3	0.6																						
B2151										14000	42000		11000		47000									
B2152	3	0.6																						
B2156																								
B2451	5500					7200														4	9		8	13
B2452																								
B2455																					10			7
B2651																								
B2656																								
B2751										1900	2400				2300									
B2756																								
B2511																					170			
B2654																								

Quantities shown in shaded cells indicate the compound was estimated
because it was detected below the method detection limits
Bold italic quantities indicate contaminant was detected in laboratory background samples

SUM1 - 24,WK3, RANGE A:C159..A:AA217

Hall Engineering, Inc.

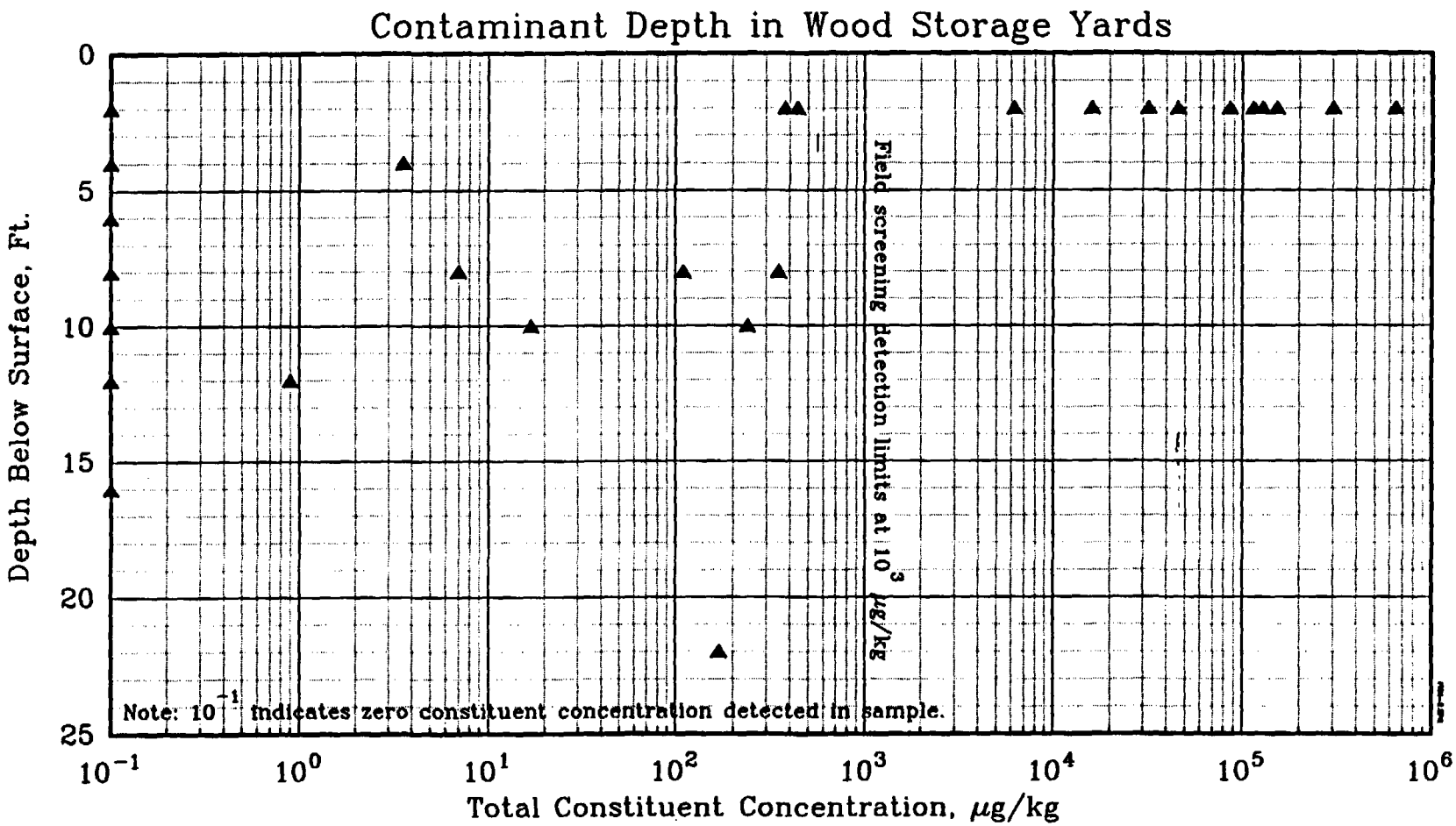

FIGURE 6-2: PLOT SHOWING DEPTHS AND CONCENTRATIONS OF TOTAL CONSTITUENTS DETECTED IN WOOD STORAGE YARD SWMUs.

water from the wood storage areas because the majority of contamination is surficial. Under new regulations promulgated by EPA in 1991, wood preserving operations are to have in place a plan addressing the timely removal of "de minimis" or incidental drippage occurring in storage areas. Currently the company has such a plan in place to remove such drippage contaminated soil from the storage yards. Also, the company has installed covered drip pads with leachate detection/collection systems and secondary containment to collect drippage as well as made process changes to reduce drippage. This reduces the amount of preservative released incidentally to the storage yards. These factors would also tend to mitigate the chance of possible future releases from the storage yards.

6.3 Findings by SWMU

Sampling data indicates that past activities conducted on the property may have significantly impacted the environment.

6.3.1 Northeast Wood Storage Area, SWMU 1

Six borings were completed in this area to investigate possible releases from the unit. The general stratigraphy of the unit is shown as a fence diagram in Figure 6-3 on the following page. Subsurface strata generally consisted of sandy silty clays, silty sands and sandy clays.

Water samples were collected from two of the borings. No constituents were detected in soil or water samples from any of the borings from this SWMU with the exception of boring 6. This boring was completed in a portion of the yard directly underneath a large stack of treated wood which was moved by Colfax personnel. The area was the most visually contaminated area of the yard. Sample B6S1 taken from the 0—2 ft interval contained 300,700 μg/kg total volatile and semi-volatile constituents. Pentachlorophenol was not detected. Below this interval, no constituents were detected except toluene which was quantified at 110 μg/kg in the 6—8 ft interval soil sample. However, this result is questionable because toluene was not detected in any of the other surrounding borings at similar depths. In any case, the toluene concentration detected is below the U.S. EPA drinking water standard of 1 mg/L. The boring was terminated at eight feet because no constituents were detected by any of the field screening methods below two feet. Groundwater was not encountered in this boring.

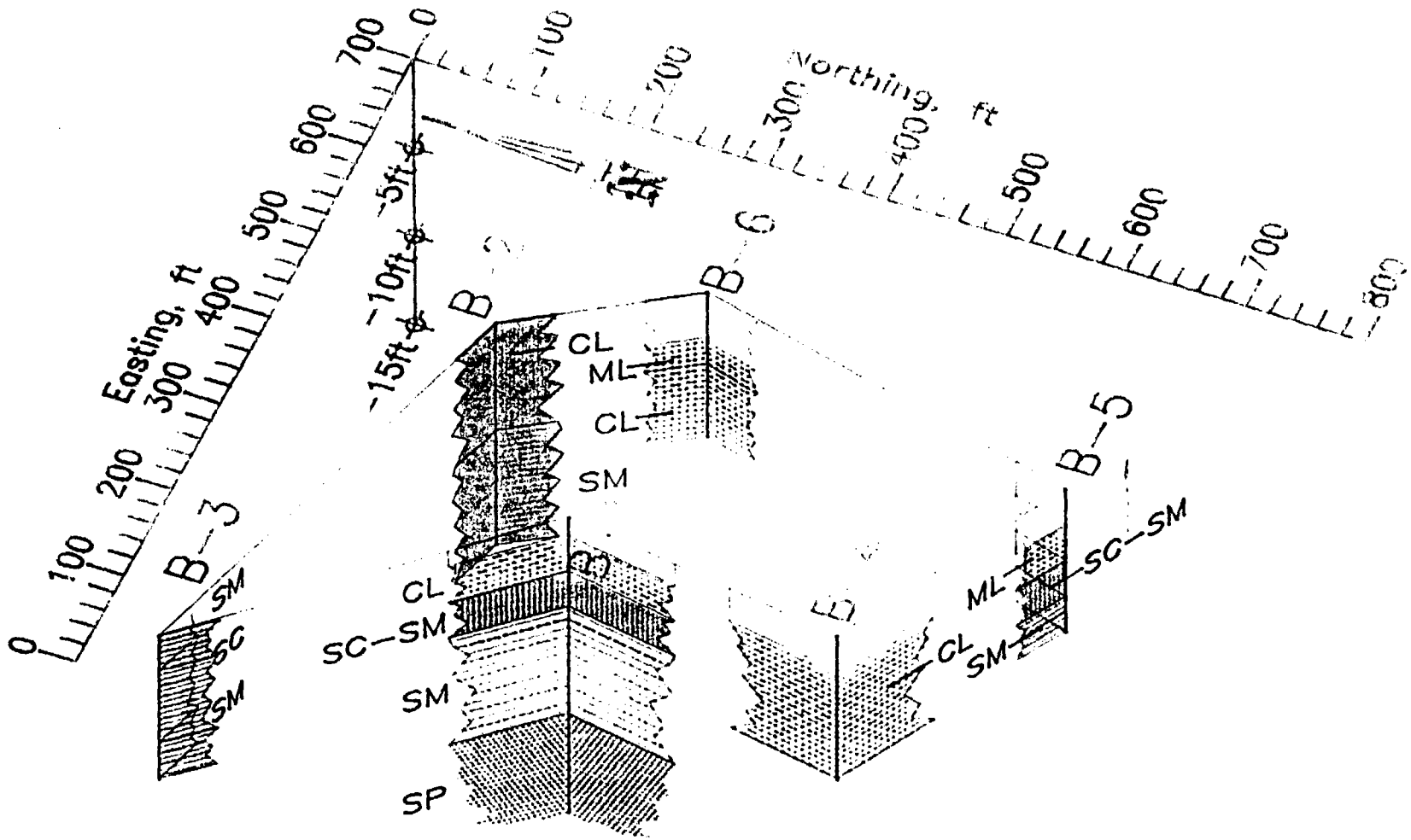

FIGURE 6-3: NORTHEAST WOOD STORAGE AREA (SWMU 1) FENCE DIAGRAM.

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A phaeritic surface was encountered in borings 1 and 2 at depths of 15 and 10 feet respectively in a thick sand/silty sand unit. A permanent piezometer was installed in boring 1 and a temporary sampling well was set in boring 2. Water found in boring 2 may have been perched or vadose water since a thin clay strata was found just below the water surface at 10½ ft. This level was significantly higher than in boring 1. However, sufficient water was present in boring 2 to collect a sample. No clay was evident in this strata in boring 1 and it is believed that the water levels represents the true phaeritic surface in this area.

TPH levels in water samples collected from the two wells were 6.61 and 3.9 mg/L for wells 1 and 2 respectively. These amounts were typical for the site. Since no creosote constituents or pentachlorophenol was detected in either wells, an outside source is suspected. The most likely source would be the highway 28 overpass. Storm drains are located at regular intervals along the overpass and discharge to Colfax property below. Very low TPH levels were detected in surface water samples containing runoff from the highway. More discussion is given to subsurface water in Chapter 8.

The RFI findings for this area are summarized as follows:

(1) Wood preserving chemical constituents in the most visually contaminated areas are limited to the first two feet of soil in this wood storage yard.

(2) Chemical constituents were not detected in subsurface water samples collected from borings completed in the unit.

(3) Low levels of TPH contamination was detected in borings 1 and 2. This contamination most likely results from surface water runoff from the highway 28 overpass through the area.

(4) "De minimis" drippage in wood storage yards is regulated by new drip pad legislation and the company has a plan in place to address this material.

(5) No further work is recommended for this area.

6.3.2 Southeast Wood Storage Area, SWMU 2

One boring to the water table was required by the work plan in this storage area. Boring 24 was located near the southeast corner of the SWMU where surface soil was visibly

contaminated and in a small drainage pathway from the unit. The phaeritic surface was encountered at nine feet and the boring was terminated at 15 ft where a temporary well was set. Subsurface stratigraphy consisted of a clayey silt which began grading to clay at two feet. This stiff, silty clay ended at 8 ft were a firm silty sand was found. This material continued down to 13 ft where a more dense stratum extended to 15 ft. The phaeritic surface was located in the firm sand layer. Boring logs show some thin clay layers were found at this interval, therefore the water was probably a perched condition or vadose water in sufficient amounts to fill a well.

Contamination was found in the first four feet of drilling. The first and second two foot corings had a PID reading of 50 and 6 respectively and some visual contamination was noted. Also, each core had an odor similar to kerosene. IR scans also indicated hydrocarbons were present. Volatile and semi-volatile analysis show two creosote constituents, 2-nitroaniline and N-nitrosodiphenylamine, present at 8800 and 7200 μg/kg respectively in the upper two feet. However, both of these chemicals are minor fractions of the preservative. 2-nitroaniline was estimated because it was detected below the MQL. Low amounts of benzene (4 μg/kg), toluene (9 μg/kg), ethylbenzene (6 μg/kg) and xylene (13 μg/kg) were also detected. Trace amounts of toluene and xylene (10 and 7 μg/kg) were also present at 8—10 ft. However, intermediate samples showed no contaminants.

While working in the area, it was noted an automotive repair shop was located on adjacent property within 15 feet of the boring. The sampling team attributed field detectable contamination in the upper soil cores to this source. However, further investigation was beyond the scope of the work plan.

Groundwater sampling presented a problem in this unit. As stated previously, a saturated silty sand stratum was present at nine feet. Alternating clay layers were present in this silty sand, however sufficient water was available in the unit to yield a sample. Drilling was continued to 15 feet where a temporary well was set. However, when the sampling team came back to the well on the following day to collect a ground water sample, the well would not yield enough water. The team decided to allow the well more time to recharge. Several subsequent attempts were made to sample the well, none were successful. The boring was found to be dry

on one final attempt on June 25 and was plugged and abandoned. Therefore, any conclusions about the ground water conditions are based on the last (saturated) core sample taken from the silt layer.

Based on these findings, the following conclusions are made:

(1) Soil contamination from creosoting operations is limited to the upper two feet of soil and does not appear to be impacting subsurface water.

(2) A solvent plume was detected in the first four feet of soil. This plume most likely originates from an automotive repair operation on adjacent property.

(3) Trace toluene and xylene contamination detected in the last two foot interval may have originated from one of three sources:

   (a) IC engine exhaust operating nearby,

   (b) Cross-contamination at the contract laboratory, or

   (c) Other nearby units such as the main runoff pathway.

(4) Toluene and xylene concentrations were below the U.S. EPA drinking water standards for the two chemicals.

(5) No further work is recommended for this area.

6.3.3 West Wood Storage Area, SWMU 3

This unit is the most extensive one investigated. Figure 6-4 presents a generalized stratigraphic section through the unit near Pineville Junction. Drilling operations began near the junction of the two railroad lines with Boring 12 and progressed sequentially over the SWMU. Some borings listed previously in Table 6-2 were drilled in areas displaying high visual surface contamination. Colfax personnel moved several stacks of treated poles to expose ground surfaces underneath for Borings 12, 13, 16, and 19. Surficially, all of these areas showed high visual contamination. Borings 15 and 18 were placed between pole stacks. Except for boring 15, soil samples collected from the first and second core intervals of all borings listed above were analyzed for the target constituents.

Table 6-3 indicates creosote constituents and pentachlorophenol to be present in first interval in the 10^5—10^6 μg/kg range. However, constituents are no longer detected in the second

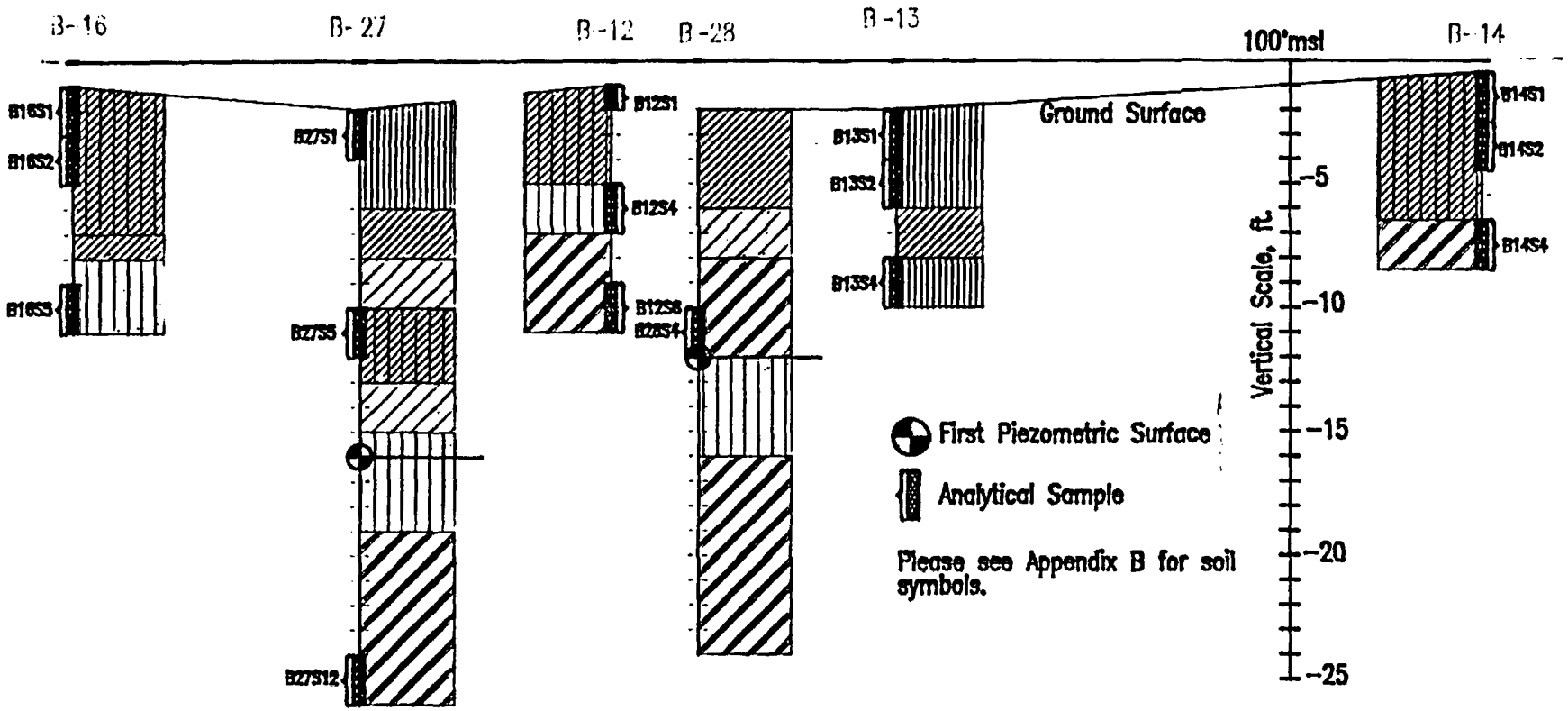

FIGURE 6-4: FENCE DIAGRAM FROM B-16 TO B-14 ACROSS WEST WOOD STORAGE AREA (SWMU 3).

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interval. This tends to confirm observations made about the previous two wood storage areas: contaminated is limited to the first two feet of soil in wood storage areas. Clean soil beneath this layer indicates releases are not being made to ground water by these SWMU's.

Only two samples taken from cores lower than two feet contained detectable constituents. Sample B13S4 was found to contain chrysene estimated at 260 μg/kg and 91 μg/kg toluene. Sample B15S5 also contained chrysene estimated at 240 μg/kg. The chrysene results from B13S4 are questionable because: (1) no surrounding borings contained the chemical, (2) chrysene was not detected in the first core interval from the boring, and (3) chrysene does not readily dissolve in water, therefore it probably did not migrate to this area from another source. Chrysene was not present in boring 14 also. This boring is in line between borings 13 and 15, which is the most direct route from the SWMU 9 where high levels of the chemical exist. Chrysene contamination in boring 15 may have migrated from the nearby main runoff pathway.

Three borings in the SWMU intercepted a phaeritic surface at the time of drilling. These were borings 12, 15, and 27. A saturated sandy silt layer was found at 4—6 ft in boring 12. However at the time of drilling, it was questionable if this zone could produce enough water for a sample. Nevertheless, due to the presence of heavy diesel contamination in the layer, the team decided to install a temporary well at this point and not progress deeper. Enough sample was collected for volatile, semi-volatile, and metals analysis, however not enough was available for a TPH test. No volatile or semi-volatile constituents from the target compound list (TCL) were detected in boring 12. Water samples taken from boring 27 also showed no TCL constituents present. Subsurface water was present in boring 15 at a depth of five feet. Therefore, as required by the SOP, the boring was advanced to ten feet where a temporary well was set. An attempt was made to sample the well on the following day, however it would not produce enough water to close the check valve on a bailer. Later attempts showed the well to be dry and it was finally pulled, plugged and abandoned. However, no contamination was detected by field screening in any of the soil samples from this boring. Therefore, only the last sample (B15S5) was submitted for complete analysis. As previously discussed, the last sample did contain low levels of chrysene, however the amount was significantly higher than chrysene levels found in

other subsurface water samples (mean = 66 ± 60 μg/L). Thus any chrysene present in subsurface water is probably in smaller amounts than that found in the last soil sample.

Although creosote contamination was limited in the wood storage yards, the team determined the environment was being impacted by past industrial practices at this site. While installing Boring 12 the sampling team discovered a large diesel plume. As stated earlier, boring 12 was advanced to a depth of four feet when heavy diesel contamination was found in the 4—6 ft core. The sample registered a PID reading of 28 which was high for the site. Also, visual, odor and IR screens detected the fuel. The next core contained lighter amounts of the chemical, and the final 8—10 ft core contained no detectable amounts. Both of these intervals were a high-plasticity, slickensided red clay. Cores above this interval were silts. The diesel fuel was not expected since Colfax had never used this area for anything other than wood storage. However, evidence suggests that this end of the property was used heavily by the Kansas and Arkansas Railroad in the past.

Upon first detecting the plume, the team met to discuss options for the area. The team decided:

(1) A limited reconnaissance would be conducted to locate possible sources for the contamination.

(2) All subsequent wells drilled in the area would be terminated on top of the slickensided clay when it was encountered.

(3) A water sample would be collected from the silt strata if possible.

(4) Additional borings would be installed in this area to define the horizontal extent of the plume.

(5) Three wells would be installed outside of the work plan's scope to monitor ground water in the area. Precautions to be taken were:

   (a) An eight inch casing would be installed on top of the slickensided clay to seal off the silt layer.

   (b) The inner casing would be installed in the first saturated zone below the slickensided clay.

(c) Ground water elevations would be collected to characterize ground water flow in the area.

The most probable source of the diesel plume was located during the site reconnaissance. Figure 6-5 gives the location of artifacts located on the Railroad's property at the junction. Here the team located:

(1) At least one, possibly three, underground storage tanks. What appeared to be a tank was open to the surface via an 8" pipeline. A weighted tape lowered into the opening revealed the bottom to be 16 feet below surface.

(2) A concrete trench divided into three foot sections running parallel to the north track (Shreveport Line). The trench was filled with soil, thus the extent and function could not be determined.

(3) A concrete slab having a plugged 1" pipe extending from the northeast corner of it's surface. A depression in the ground existed at the northeast corner and may indicate the presence of a second tank.

(4) A building foundation near the slab.

(5) A diesel fueling island and slab. Debris in the island sump consisted of heavily contaminated sawdust and soil. Pipelines were found extending from the slab.

(6) What is possibly an 8" well head and elevated tank foundation. The well head was plugged with a substance resembling tar. USGS quadrangle sheets do show that a water tower once existed near this area.

(7) A rusting, collapsed 4" pipeline extended from the fueling island to a slab covering an underground opening. A riveted tank bottom was sitting on the slab. Also, elevated tank foundations were located around the slab.

In the late 1980's Colfax personnel also discovered a railroad tanker car buried near here filled with what appeared to be spent motor oil. The company notified railroad personnel who remediated the tank. Aerial photographs of this portion of the site show these activities had been abandoned prior to 1955. In the earliest available photo, above-ground tank footings can be

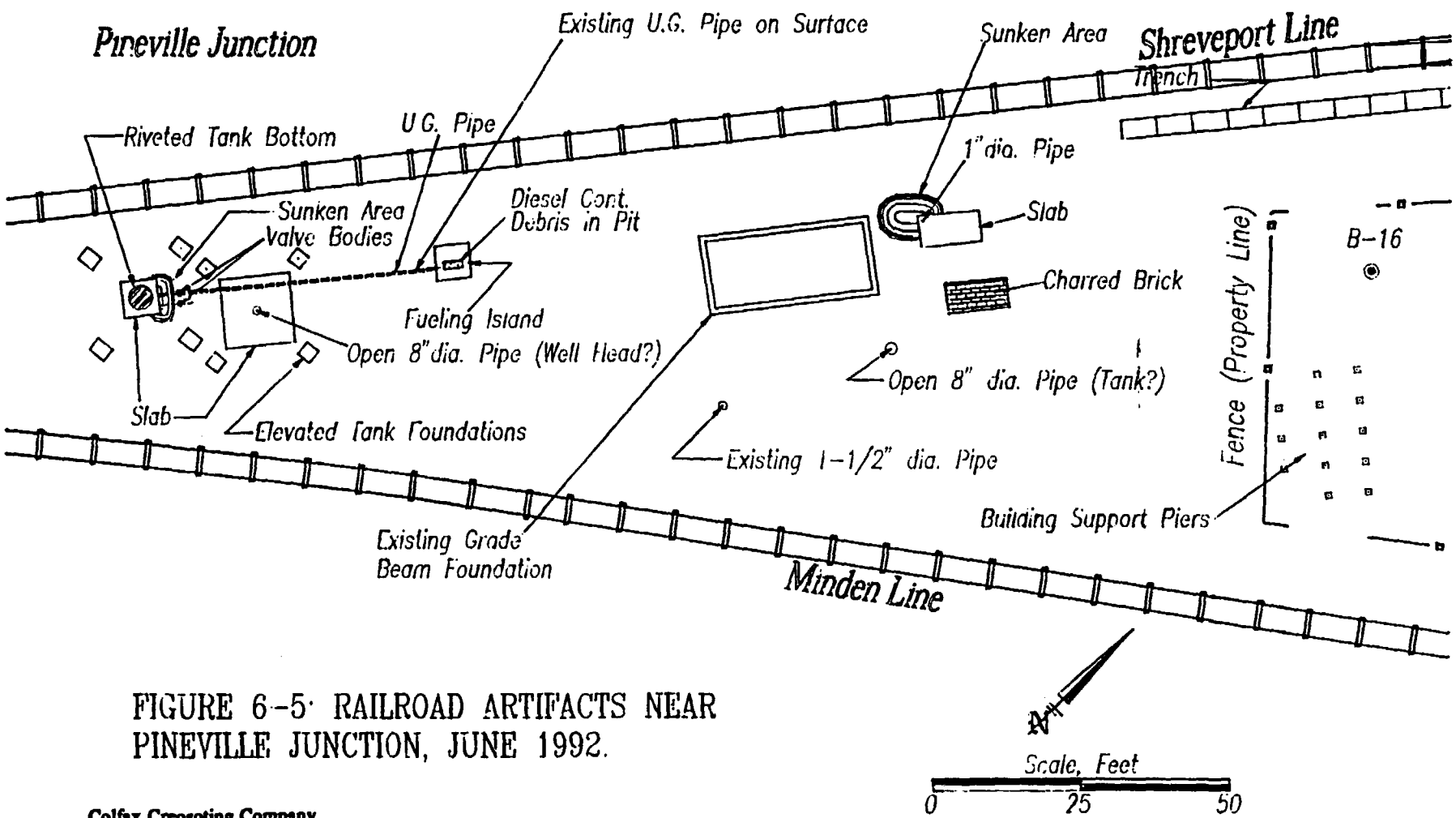

FIGURE 6-5: RAILROAD ARTIFACTS NEAR PINEVILLE JUNCTION, JUNE 1992.

easily seen, however all other structures have been removed. Photo 5 in Appendix A shows the junction as it appeared from the air in 1955. It is known that the railroad company operated a switching and maintenance yard on this property. An abandoned turntable can be observed in aerial photographs of the site up until 1955. A photograph taken in 1971 does not show the turntable. All evidence suggests this portion of the site was used to fuel locomotive engines, and they may have been serviced here also. According to Colfax personnel, the area directly across the railroad around boring 17 was formerly used for bulk petroleum storage. This operation had ceased at least by 1955, however aerial photographs do show buildings existed along the southeast side of the Minden railroad that may have been used in conjunction with this operation.

Other borings were drilled in an attempt to locate and verify the plume source. Diesel fuel was found off company property in boring 16 between boring 12 and the suspected source. Concentrations seemed to be less than in the previous boring, however the contamination was encountered at a shallower depth. Borings 13, 17, and 19 were all determined to be outside the plume by field screening methods. Therefore, wells were later set in borings 26, 27, and 28.

It is not possible to quantify the diesel contamination at this time because the analysis specified in the work plan requirements did not include the fuel as an analytical parameter in soil samples. Since the plume did not appear to have migrated into lower slickensided clays, borings were terminated at this horizon to prevent carrying diesel fuel to lower strata. Perched water was found in only Boring 12. TPH Analysis of a water sample collected from the first half of boring 27 showed the zone to contain approximately 1.2 mg/L total petroleum hydrocarbons. This boring was upgradient from boring 12 which contained the highest levels of field detectable contaminants. However boring 12 would only yield enough water for volatile and semi-volatile organic and metals analysis. Therefore, no TPH data exists for this boring. Borings 26 and 28 were not fully completed for sampling until after field operations were terminated at the end of June. Therefore, only depth to water measurements were taken from these wells.

Data from the borings and wells suggests the diesel plume moved onsite from three possible sources: (1) a leaking underground tank or other railroad equipment, (2) the trench

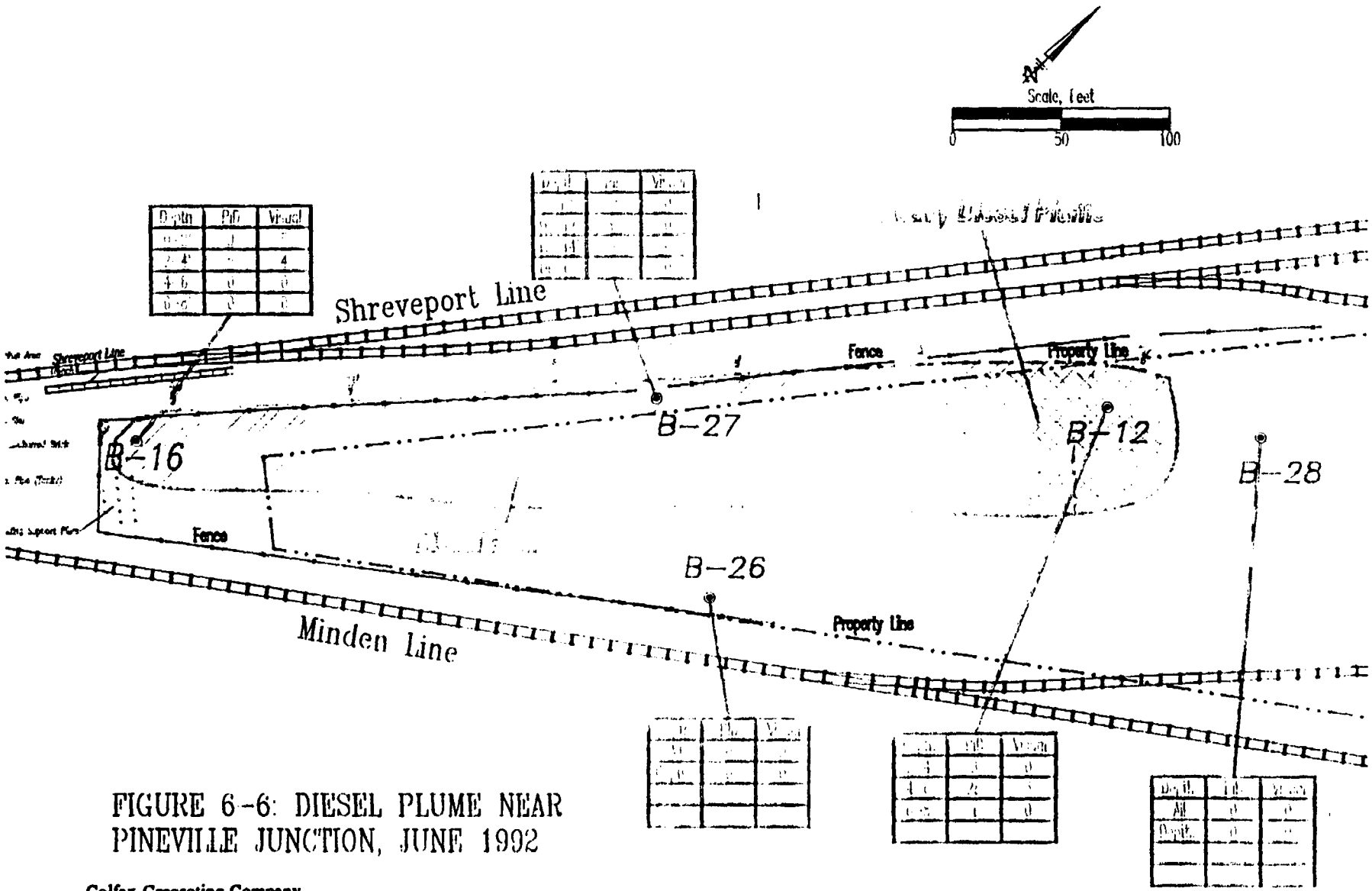

FIGURE 6-6: DIESEL PLUME NEAR PINEVILLE JUNCTION, JUNE 1992

alongside the Minden Line, or (3) a release to the railroad ditch along the Minden Line. No documentation exists to verify any of these sources. Figure 6-6 on the previous page shows the probable extent of the diesel plume determined by borings completed in the area. The fuel seems concentrated in the vicinity of boring 12 at a depth of 4—6 ft. However, some traces were also observed in borings 16 and 27 at 2—4 ft and 12—14 ft respectively. This condition may result from an intermittent release migrating from around the Pineville Junction, or a release alongside the Minden Line. Judging from the age of the artifacts discovered at the Junction, the contamination source may already be depleted. In any case, it is the company's position this problem is the responsibility of the Kansas and Arkansas Railroad.

Information collected from SWMU 4 indicates:

(1) Soil contamination from creosoting operations is limited to the upper two feet of soil and does not appear to be impacting subsurface water.

(2) A large diesel plume was detected near the Pineville Junction in at depths above 14 ft. This plume most likely originates from locomotive refueling and repair operations conducted by the Louisiana and Arkansas Railroad in the past.

(3) Toluene concentrations in borings 13 and 15 were below the U.S. EPA drinking water standard for the chemical.

(4) Railroad Officials should be notified about the possible existence of underground storage tanks and the diesel plume at the Pineville Junction.

(5) No further work by Colfax Creosoting is recommended for this SWMU.

6.3.4 Southwest Treated Wood Storage Area, SWMU 4

Seven borings were completed in SWMU 4: 7 through 11, 20, and 21. Please see Table 6-2 for a summary of the analysis results. A Temporary well was installed in boring 8 and a permanent piezometer was completed in boring 20. Figure 6-7 on the following page shows the subsurface stratigraphy revealed by core samples. The subsurface environment is characterized by low-plasticity (stiff) sandy/silty and high plasticity "fat" clay layers interbedded with lenticular silty sand deposits. Perched water was found in some of these sand lenses. Boring 20 showed a thick stiff clay (CH) from 14 to 22 ft below the surface followed by a dense

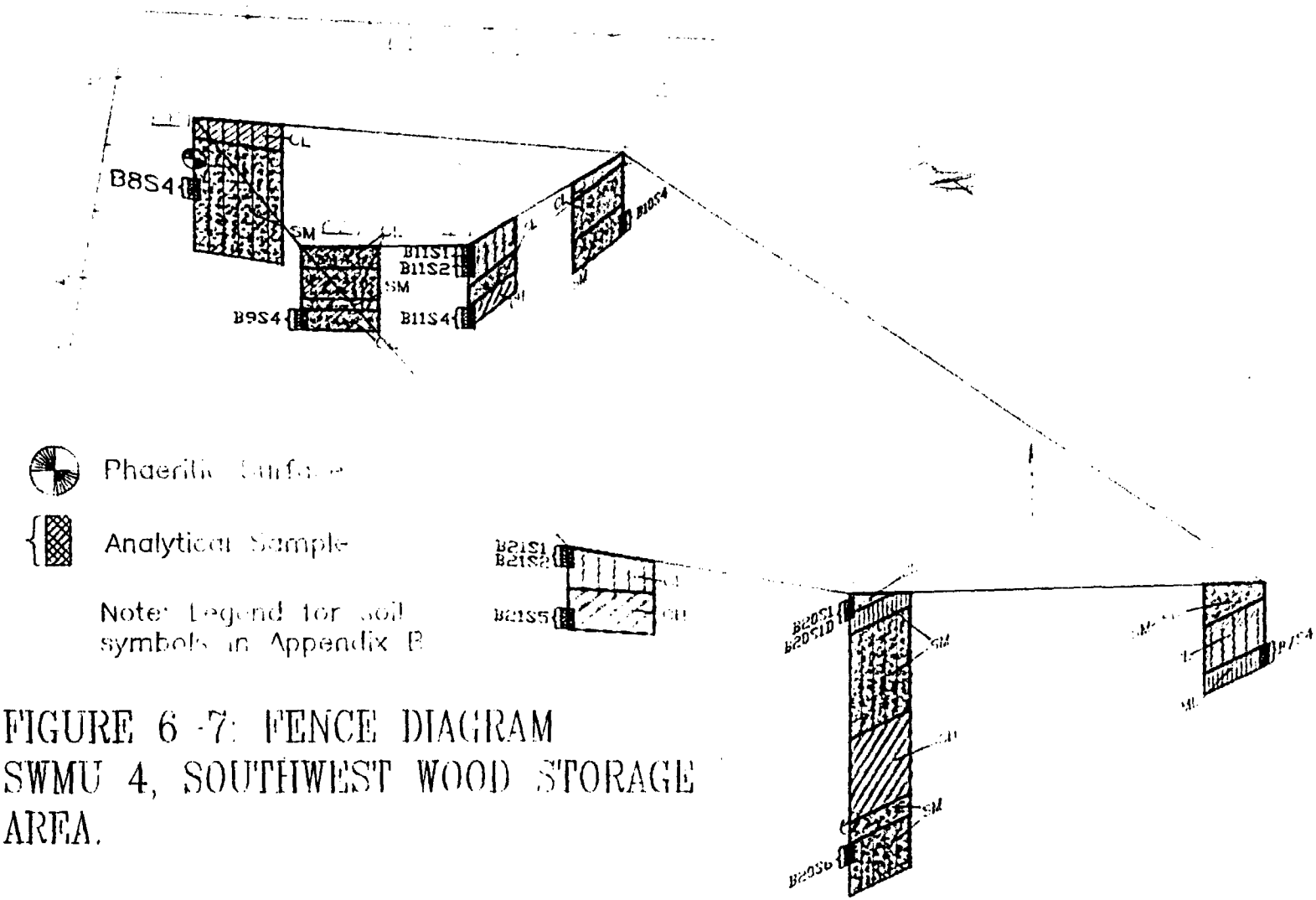

FIGURE 6-7: FENCE DIAGRAM SWMU 4, SOUTHWEST WOOD STORAGE AREA.

silty sand extending below 29 ft underground. A permanent piezometer was cased in this formation.

Boring 11 was located in the most visually contaminated area of the yard. Results show the first two feet to be contaminated with creosote constituents, however subsequent layers contained no detectable organic compounds. No pentachlorophenol was found in the boring. Boring 7 was drilled in an overgrown ditch receiving storm water falling on the southern side of the SWMU. No contamination was detected in the boring by field screening methods, however analytical results show 7μg/kg xylene present in the fourth core. Since no xylene or other compounds were detected above this interval, and other borings between this site and the plant were clean, this may represent laboratory contamination. The sand formation which yielded the sample is contained above by a silty clay which diminishes the chance of xylene percolating downward from the surface. In any case, the concentration is below U.S. EPA drinking water standards for xylene.

Boring 20 was completed as a permanent piezometer in the first water bearing zone near the SWMU's southwestern side. Number 2 grade wood is stockpiled downgradient from this well awaiting sale to landscaping companies. Low levels of pentachlorophenol and chrysene (440 and 380 μg/kg) were found in the first core interval of the boring. Deeper samples were uncontaminated according to field screening. However, 2-nitroaniline and acenaphthylene were detected below the MQLs in the final sample taken from the boring. Groundwater sample GW-6 collected from the well was also contaminated with 5 μg/L pentachlorophenol. More ground water samples should be collected from the well to confirm these results.

Subsurface water was also intercepted by boring 8 at a depth of six feet. This phaeritic surface was found in what appears to be a lenticular dense silty sand layer extending from 2 to 15 ft belowground. A formation was found in boring 9 nearby from 5 to 6 ft and exhibiting similar texture and color characteristics (10YR 7/6). This is most likely the westward extent of the lens. The formation was also found in borings completed in SWMU 9 beginning at 15 feet (please see discussion of boring trisect 37, 38 and 39 in discussion of SWMU 9). Here in SWMU 9 free phase oil was found in this formation. No detectable constituents were found in

the soil sample collected from boring 8, however water sample GW-5 collected from a temporary well installed in the hole was found to be contaminated with dibenzofuran at 5 μg/L. Since evidence indicates this sand layer is most likely continuous to the main runoff pathway, SWMU 9 is the probable source of this contamination.

Conclusions and recommendations for SWMU 4 are:

(1) Soil contamination from creosoting operations is limited to the upper two feet of soil.

(2) A water sample collected from the first phaeritic surface in boring 20 indicates trace amounts 2-nitroaniline and acenaphthylene estimated to be present at the part per trillion level. It is recommended a second water sample be collected from the piezometer to confirm these results.

(3) A water sample collected from the first phaeritic surface in boring 8 indicates dibenzofuran to be present at 5 μg/L. The water sample was collected from a lenticular sand formation that extends to SWMU 9 which is the likely source for this contamination.

(4) Xylene contamination in boring 7 may have resulted from:

   (a) laboratory cross-contamination, or

   (b) field cross-contamination from nearby IC engine exhaust.

   The xylene concentration is below U.S. EPA drinking water standards.

(5) Other than that listed above, no further action is recommended for this area.

6.4 Process Area SWMU's

Nine process area SWMUs and one AOC identified during the RCRA Facility Assessment (RFA) were listed in the HSWA permit for investigation. These are:

(1) SWMU 13 -- Penta/Creosote Sump Containment

(2) SWMU 14 -- CCA Containment System

(3) SWMU 15 -- Creosote Dehydrator

(4) SWMU 16 -- Creosote Separator Number 1

(5) SWMU 17 -- Creosote Separator Number 2

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(6) SWMU 18 -- Creosote Separator Number 3

(7) SWMU 19 -- Penta Reclaiming Hopper

(8) SWMU 20 -- Penta Separator

(9) SWMU 25 -- Cooling Pond

(10) AOC B -- Creosote Unloading Area

When the HSWA permit was issued, many of these units no longer existed. With the exception of AOC B, all were/are contained within the Penta/Creosote Sump Containment system. Since each SWMU listed was in such close proximity, and all were contained by the sump system around the plant tank farm, the company was allowed to investigate all ten units as a single system. Boring locations were specified by EPA personnel during the work plan approval process. However, where EPA had located borings in paved areas, the company was allowed to move the location away from the unit to the pavement's edge. This was required for four of the holes. Figure 6-8 on the following page shows the locations of eight borings completed for this portion of the investigation. Paved portions of the property adjacent to the wood preserving plant are noted in the drawing.

Entities emphasized in Figure 6-8 by red hatchures are visible in 1955 aerial photography of the site. Other construction has been more recent. Most of the items present in the 1955 photo (please see Photos 2 and 3, Appendix A) are still in use by the current owners. Specifically these are: the treating room, cylinder housing, cooling pond (now containment for product tanks), and two work tanks. However, the photograph shows two horizontal tanks and a building, located due southeast of boring 56 that are no longer present. Colfax personnel state that what was believed to be a grease pit was once located where the building stood. A rail spur extended to this building. The building and pit may have been used for locomotive maintenance by the railroad. The function of the tanks is not known.

6.4.1 Subsurface Stratigraphy

Figure 6-9 on page 26 is a fence diagram showing subsurface stratigraphy in this area. Strata is shown along two lines; one running north and south from boring 62 to boring 56, and a second east-west line from boring 59 to boring 24. The additional borings were included to

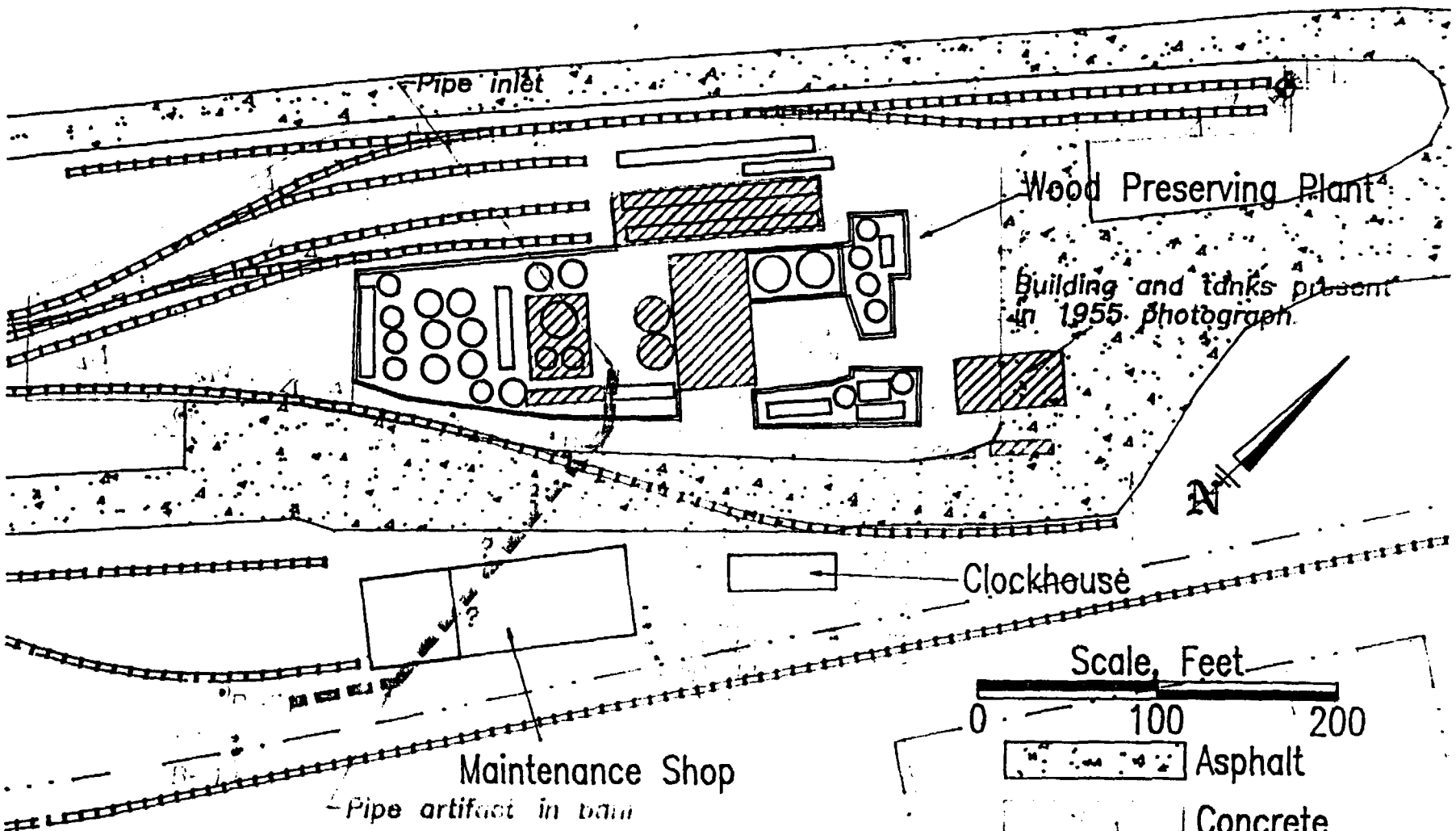

FIGURE 6-8: PROCESS AREA BORINGS.

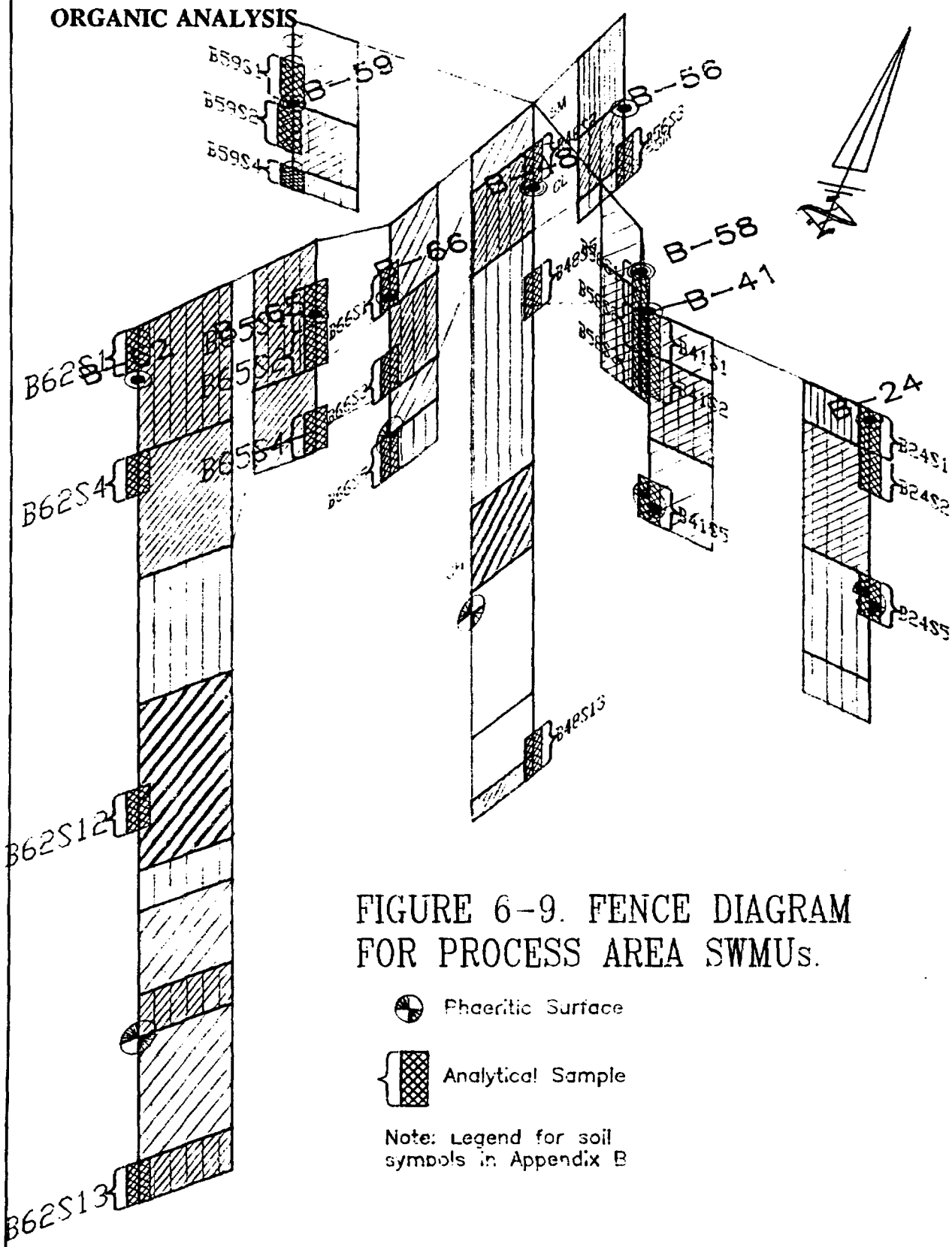

FIGURE 6-9. FENCE DIAGRAM FOR PROCESS AREA SWMUs.

Phaeritic Surface

Analytical Sample

Note: Legend for soil symbols in Appendix B

show the horizontal extent of subsurface strata.

Soils below the process area were found to consist of fairly well defined clay and sand strata containing varying amounts of silt. The first six to ten feet consists of a sandy to fine-sandy, low plasticity clay. Portions of this material have been removed for construction and backfilled with gravel. This stiff clay tended to be thicker and more silty near boring 62. Progressing toward boring 56, the unit grades to a sandy silt. Similar material was also found along the line from boring 59 to boring 24. Below this zone a continuous sand layer exists. The sand stratum tended to be silty near the top and dense, fine and somewhat silty near the bottom. At a depth of 18 ft in boring 62, the sandy silt strata gives way to a very stiff slickensided clay ranging in thickness from eight to four feet. Corings from the clay were found to be very dry. However slickensided micro-fractures, organic stains, and small root holes ran throughout the stratum.

Owing to the nature of the fluvatile and deltic deposits of the Montgomery, Bently, and Prairie Terraces, the clay bed may represent a pleistocene age backswamp formed in the river floodplain. If this material is indicative of a swamp formed from flood-plain sediment, then it may be, for the most part, continuous over the site. Similar deposits are found in boring 20, SWMU 4, and borings 27 and 28, SWMU 3. Although micro-fractures and root holes serve to enhance the porosity and permeability of the material, the unit may contain relatively immobile creosote constituents in the more porous sand stratum above. In short, the clay may serve as a "leaky" aquitard.

Silty sands above and below this clay bed may also have resulted from a process similar to that at work in nearby Bayou Maria Basin. According to work done by the Louisiana Geological Survey, Maria Bayou was once a rim-swamp stream in Prairie time. The mouth of the Bayou was blocked by levee development along the Red River in post-Prairie time, thus drowning the lower course. Sediments impounded waters forming Bayou Maria Basin which checked gradients of tributaries to the Bayou at the basin level. Consequently, upstream valleys

alluvially drowned with high-water alluvial fans.[1] This environment of broad flats over which streams anastomose during floods would be conducive to deposition and gradation of sediment observed beneath the property.

Sediments below the clay layer consisted of fine sands, silts, and clayey, silty sands at boring 62 and dense medium to coarse sand in boring 48. This evidence strengthens the swamp hypothesis since coarser sediment was found on top of the slickensided clay layer, and sediment becomes coarser below the clay. Boring 62 was the deepest drilled in the process area at 42 ft and terminated in a clayey silt with fine sand. Boring 48 ended in a gravely sand resting on a plastic sandy clay.

Two phaeritic surfaces were encountered by the borings. The first is most likely perched water contained below by the slickensided clay. This zone was present in borings 24, 41, and 66. However, only boring 66 would yield enough water for a sample. Sufficient water was found in the other two borings to yield a sample at the time of drilling. However, when attempts were made to collect water from borings the day after wells were installed, they would not produce enough water to seal the check valve on a bailer. The second phaeritic surface was located by borings 48 and 62. Boring 48 was completed near the center of the wood preserving complex near the CCA containment system. Boring 62 was drilled near the southeast corner of the creosote containment system. Both borings located this second piezometric surface below the slickensided clay layer described earlier (see Figure 6-9). In boring 48, the level was immediately below the clay. However, the saturated zone was detected approximately six feet deeper in boring 62 in a second silty clay layer. Judging from ground water data collected from monitoring wells in the area, this is the same phaeritic surface monitored by well MW-1.[2]

6.4.2 Sampling Results

Soil sampling data from process area borings are summarized in Table 6-4. All

[1]Fisk, H. N., Ph.D. *Geology of Avoyelles and Rapides Parishes*. Department of Conservation, Louisiana Geological Survey. New Orleans, LA. 1940. p 90.

[2]Ball Engineering, Inc. *1992 Annual Ground Water Monitoring Report for Colfax Creosoting Company, Pineville, Louisiana*. Tuscaloosa, AL. January 1992. p. 10.

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TABLE 6-4: CHEMICALS PRESENT IN PROCESS AREA BORINGS. CONCENTRATIONS ARE GIVEN IN μg/kg.

Cas No.	108-95-2	95-48-7	106-44-5	91-20-3	91-57-6	83-32-9	120-94-5	86-73-7	85-01-8	120-12-7	206-44-0	129-00-0	56-55-3	218-01-9	75-09-2	67-64-1	75-15-0	75-05-8	71-43-2	108-88-3	100-41-4	1330-20-7
Compound	Phenol	2-Methylphenol	4-Methylphenol	Naphthalene	2-Methylnaphthalene	Acenaphthene	Dibenzofuran	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)Anthracene	Chrysene	Methylene Chloride	Acetone	Carbon Disulfide	2-Butanone	Benzene	Toluene	Ethylbenzene	Xylene (Total)
B4652															28	150	12			150		
B4655															64	210	9			62		
B46513															56	180	7			61		
B5653															59	31				240		
B5753															32	11						
B5651				410000	120000	360000	230000	330000	1600000	320000	810000	390000			120		320			48	86	110
B5652															27		7			120		
B56520															97		16			170		
B5653															33	58	16			88		
B5651				370000	390000	590000	410000	390000	1500000	140000	640000	420000			160		20			84	23	120
B5652				140000	97000	150000	80000	89000	290000	35000	130000	79000			130		40			600	80	390
B5654					130	190	1300	410	6200		2500	670			20							
B6252						1300			7800	1900	49000	46000	14000	13000	10		16			72		
B6254															12	7	18			230		
B62512															41	41				160		
B62513															31	25				230		
B6551	180		180	120	73	150	160	200	740	66	560	240			120	300	98			170		
B6552	160		270	470	270	330	250	350	1600		1200	440			20	32			8	92		
B6554				320											20	6				220		
B6651	720	180	710	2100	800	850	870	560	880	94					24	21	7	6	25	250	7	30
B6653				96000	46000	47000	35000	36000	74000	11000	37000	21000			13	120	57			170	33	75
B6655	1900	380	1400	670	250	350	380	420	1700	780	2300	910	270	210	22	42				170		7

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits.

Bold italic quantities indicate constituent was detected in laboratory background samples

SUM44-88.WK3, RANGE B:C89..B:Y116

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contaminants listed are creosote constituents. No pentachlorophenol was detected in any of the borings. This sampling indicates releases have been made by one or more process area SWMUs. In particular, borings 59, 65 and 66 suggest subsurface releases have been made. Other borings in the area show only surficial contamination, thus indicating limited releases similar to those in the wood storage yards.

Except for samples B57S3 and B59S4, all samples were found contaminated with toluene at levels below U.S. EPA drinking water standards. No good correlation exists between this chemical and other hydrocarbons present in the soil samples. Therefore it is again inconclusive if toluene contamination originated from the wood preserving process or from other sources. Figure 6-8, presented previously, shows a building that may have housed a grease pit used by the Louisiana and Arkansas Railroad that was once located near boring 56. This may be a source of toluene in the area.

Borings 48 and 56 indicate no releases to the processing area's northern end. Boring 48 was completed near the treating complex center as near as possible to the CCA containment system. As discussed earlier in Chapter 5, no metals contamination was observed. Core samples collected from the well contained no detectable contaminants except toluene ranging from 62 to 190 μg/kg. Ground water in the boring was not contaminated. However, toluene was quantified in the last soil core at 81 μg/kg. Boring 56 was free of creosote constituents but did contain toluene.

Borings 57, 58, 59 and 62 were relocated according to EPA's agreement not requiring drilling through paved surfaces. Boring 57, located at the west corner of the green shed, was not contaminated. Boring 58 at the green shed's northern corner was contaminated only with heavy "weathered" creosote constituents such as pyrene and fluoranthene in the first two feet. This would be indicative of an older surface release. Lower strata showed no signs of these contaminants. These borings were of particular interest because they were targeted to determine if the penta reclaiming hopper, SWMU 19, had made a release. Since no pentachlorophenol was detected, it is concluded that units handling pentachlorophenol have maintained their integrity.

Boring 62 was located to monitor possible releases from the penta separator, SWMU 20,

and the process area containment system. Again, older, weathered, three or more ring constituents were present in the 2—4 ft core at total levels not exceeding 20 ppm. However no lower layers were contaminated with these compounds. Toluene did persist throughout the boring. Groundwater samples from the boring contained no detectable pollutants. The boring indicates a subsurface release has not been made in this direction since it contained no creosote constituents or pentachlorophenol.

Other borings completed around the process area do show releases have been made. However, some of these releases may be from sources other than the creosote containment system. Boring 59 was located adjacent to the cylinder door sumps, across the access road running along the treating complex's northwest side. Core samples reveal heavy, old contamination similar to that found in boring 58 to be present. Chemical concentrations were also in comparable ratios between the two borings. Contamination was highest at the top of the boring. Lower levels were found in subsequent layers. Again, this would tend to indicate a surface release. However, one marked difference between this and boring 58 exists: contamination persists *below* the first two feet of soil. This was not expected since both borings show similar strata below the surface. The analytical data probably signifies an old release made at around the same time as that detected in boring 58. However, this release probably resulted from a leak rather than a surface spill. Company officials now believe the former owners of the facility, the Colfax Creosoting and Timber Company, may have had a steam blow-down line running down a ditch in this direction. This theory would also help to explain the presence of contamination in boring 60. Boring 59 was terminated at eight feet because field screening methods failed to detect contamination in the lowest clay layer. However, GC/MS analysis indicates continuous contamination decreasing from approximately 5000 mg/kg at the surface to 11 mg/kg eight feet down. This is near the lower limit of field screening methods. Screening did detect contaminants above eight feet. Since other areas have shown creosote constituents to be relatively immobile, it is believed contaminants are limited to the ditch area, however the horizontal and vertical extent of contamination at this point are not defined.

Borings 65 and 66 were designed to monitor releases from a dike around the process area

and the creosote unloading area, AOC B. Both borings indicate releases have been made from these units. First, boring 65 was competed very close to a construction joint crack in the southeast containment wall. Samples from the upper four feet contain low levels of creosote constituents, including phenol. B65S1 and B65S2 had total creosote constituent concentrations of 3 mg/kg and 5 mg/kg respectively. Most of the contaminant quantities were estimated since the levels were below the method quantitation limits. However, naphthalene was detected in the final core, B65S4, at 0.3 mg/kg. This was below field screening detection limits and the boring was terminated at eight feet.

Second, boring 66 exhibited creosote constituents for the entire depth. However, the data may be inconclusive due to problems with the boring. Cores taken from the boring were typical of the site to a depth of ten feet, consisting of silty sandy strata interbedded with low plasticity red clay layers. At ten feet, a saturated silt was found and determine to be perched water. The team decided to auger an additional two feet into the silt and set a temporary well. However, upon advancing the auger, the bore hole around the auger began to flood with water from higher layers. Drilling was ceased to locate the source of this water. Unfortunately before this determination could be made, the annulus filled to the surface. Water also leaked into the hollow auger stem, but at a much lower rate. It is believed the source may have been either: (1) storm water perched near the surface in the gravel fill vibrated loose by drilling, or (2) a water leak from nearby buried water lines. Colfax personnel stated that several water lines were located near this area. However, none of the lines were hit during drilling causing a rupture. In any case, the hole was quickly terminated, sampled and plugged.

Soil samples collected from the boring prior to this incident represent the actual soil quality present. However, the final core was pulled from inside the auger after the hole began to flood. The first soil sample taken just below the fill material contained creosote constituents totaling 7364 μg/kg. Core interval number three showed much more contamination at 367,000 μg/kg. The 10—12 ft core exhibited contaminant concentrations in levels comparable to those found in the first interval. This may represent constituents washing downward in the boring, or it may be representative of actual conditions. In any case, soil sampling indicates a release

was made near this point. The release at this point is probably from a subsurface leak since contaminant concentrations *increased* with depth to 8—10 ft and then began decreasing.

It is not likely that this release resulted from the creosote unloading area, AOC B for two reasons. First, due to the nature of the area of concern, only surface releases could be made. Second, other SWMUs exhibiting surface releases show constituents do not migrate below two feet. Therefore, another source is suspected.

While working in this area, the field team located the inlet to the concrete pipeline, AOC D, just inside the creosote containment wall. This pipe was once used to convey process water to the large surface impoundment in parcel B. Since it is known that the line did leak in parcel B, it probably leaked here also. Company officials indicate that the pipeline inlet was plugged with concrete before the pond was closed. However the portion running from the plant to the ditch was never excavated and removed. The exact route of the line is not known, although the company believes it exits the containment system very near the location of boring 66, angles toward the maintenance shop to the main runoff pathway, and then ran down the ditch to parcel B. Portions of the pipeline are shown in Figure 6-8 presented previously.

A water sample was collected directly from the auger stem after the boring had began to fill. Also, a surface water sample was collected from the annulus formed between the auger stem and boring wall. Analytical results from these two samples are compared in Table 6-4. Please note pentachlorophenol was detected in the samples near 1 mg/L. None of the soil samples contained pentachlorophenol. It is highly unlikely this chemical could be suspended in the water and not contained in the soil matrix. Also, the water sample has higher levels of most constituents that the final soil sample. Therefore, there is a high probability that contamination found in sample B66S5 was carried in by water from above. However, more exploration is needed to be conclusive.

6.4.3 Conclusions for Process Area SWMUs

Conclusions and recommendations for process area SWMUs are:

(1) SWMU 13 -- Penta/Creosote Sump Containment

(a) Releases from this SWMU were not detected at the north and south end.

(b) A release limited to the first eight feet of soil was detected in boring 65.

TABLE 6-4: COMPARISON OF ANALYTICAL RESULTS BETWEEN SURFACE WATER (SW-16) AND GROUND WATER (GW-30) SAMPLES FROM BORING 66.

Chemical Present	GW-30, µg/L	SW-16, µg/L
2-Methylphenol	560	
4-Methylphenol	1300	90
Naphthalene	1400	210
2-Methylnaphthalene	240	42
Acenaphthene	450	260
Dibenzofuran	220	56
Pentachlorophenol	1100	1600
Phenanthrene	180	
Fluoranthene	74	
Pyrene	57	68
Benzene	84	7
Toluene	80	12
Ethylbenzene	34	150
Xylene (Total)	110	15

Boring 65 was completed near a construction joint (crack) in the containment wall.

(c) Surface release were found in the first two feet of soil in boring 58. However, the contamination probably originated from another source other than SWMU 13.

(d) Releases detected in borings 59 and 66 probably originated from subsurface conduits and not SWMU 13.

(e) Groundwater samples collected from borings 48 and 62 show no creosote constituents or pentachlorophenol.

(f) No further work is recommended for this SWMU.

(2) SWMU 14 -- CCA Containment System

(a) Copper, chromium, and arsenic levels in soils around this SWMU were within ranges expected for natural soil.

(b) Copper, chromium, and arsenic was not detected in groundwater samples from boring 48.

(c) Sampling indicates no release of copper, chromium, and arsenic have been made from this unit.

(d) No further work is recommended for SWMU 14.

(3) SWMU 15 -- Creosote Dehydrator

(a) This unit was no longer present when RFI field work began.

(b) Releases from this unit would have been contained by the Penta/Creosote Sump Containment System (SWMU 14).

(c) Please see item (1) above for further conclusions and recommendations.

(d) No further work is recommended for this SWMU.

(4) SWMUs 16, 17, and 18

(a) These units were no longer present when RFI field work began.

(b) Releases from these units would have been contained by the Penta/Creosote Sump Containment System (SWMU 14).

(c) Please see item (1) above for further conclusions and recommendations.

(d) No further work is recommended for these SWMUs.

(5) SWMU 19 -- Penta Reclaiming Hopper

(a) This SWMU is contained within the Penta/Creosote Sump Containment System (SWMU 14)

(b) Please see item (1) above for further conclusions and recommendations.

(c) No further work is recommended for this SWMU.

(6) SWMU 20 -- Penta Separator

(a) This SWMU is contained within the Penta/Creosote Sump Containment

System (SWMU 14)

(b) Please see item (1) above for further conclusions and recommendations.

(c) No further work is recommended for this SWMU.

(7) SWMU 25 -- Cooling Pond

(a) This SWMU is contained within the Penta/Creosote Sump Containment System (SWMU 14)

(b) Please see item (1) above for further conclusions and recommendations.

(c) No further work is recommended for this SWMU.

(8) AOC B -- Creosote Unloading Area

(a) Creosote contamination was detected in boring 66 drilled near this AOC.

(b) Contamination in boring 66 increased with depth indicating it does not originate from a surface release.

(c) Since releases from this AOC would be made to surface soils, it is not likely that a release has been made from this unit.

(d) No further work is recommended for this AOC.

(9) Creosote constituents were detected in borings 59 and 66.

(a) This contamination *increased* with depth indicating a subsurface release was made near these borings.

(b) Contamination in boring 59 may have originated from a blow-down line operating in a ditch near this area by the former owners.

(c) Contamination in boring 66 most likely originated from the concrete pipeline, AOC D, used to send process water from the wood preserving plant to the large surface impoundment.

(d) The horizontal extent of these releases has not been determined.

(e) Contamination detected below eight feet was not above 1 ppm.

(f) Groundwater results from boring 66 are inconclusive due to a subsurface anomaly which flooded the boring during drilling.

(g) More investigation of these two releases is recommended.

6.5 Main Runoff Pathway SWMUs and AOCs

SWMUs and AOCs associated with the main runoff pathway are:

(1) SWMU 9 -- The Main Runoff Pathway

(2) SWMU 8 -- Railcar Separator

(3) SWMU 10 -- Truck Washing Area

(4) AOC D -- Concrete Wastewater Pipe

Also, five former process water cells and four stagnation points were identified from aerial photographs dating back to 1952. Soil borings were positioned along SWMU 9 and at strategic points around other units to determine if releases had been made. However, due to large amounts of contamination found in SWMU 9, it was not possible to determine if discrete releases had been made from SWMUs 8 and 10. To aid in the discussion of findings from these SWMUs, it was decided that the main runoff pathway should be considered in two sections: the northern half in parcel A, and the southern half bisecting parcel B.

6.5.1 Main Runoff Pathway, Northern Half

This section of the main runoff pathway has been used to convey storm water away from portions of parcel A since the land was developed. The pathway extends parallel to Louisiana and Arkansas Railroad's "Minden Line." The ends of the ditch are both up gradient from a culvert located near the middle of the unit which discharges water underneath the railroad to parcel B. Chapter 7 details drainage characteristics of the unit.

6.5.1.1 Historical Use

The main runoff pathway was apparently used by former owners of the treating facility to discharge process water generated during production. Water is typically generated in the preserving process when sap is removed from wood in the retort and from steam condensate. The wastewater would contains chemicals in the preservative from contacting the cylinder walls and piping. Since usage of pentachlorophenol preserving solutions began in the 1970's, water discharged prior should contain only creosote constituents.

In 1948, Colfax Creosoting and Lumber Company, a predecessor to the current owners,

began operations. Nothing is known about the wood preserving process, or the quality or quantity of wastewater during this time. However, aerial photography shows only one cylinder and two storage tanks were operating in 1955. Therefore, production was probably less than at present. Also, the 1955 photo shows approximately two-thirds of the company's inventory to be cross-ties and timbers. Cross-ties are air dried which reduces the amount of water generated during treating.

The earliest available aerial photograph was taken in 1952, four years after treating operations began. The image was taken from a high altitude and is very grainy, however, it does indicate the main runoff pathway did exist at this time. Also, close inspection revealed the company used two surface water cells for preservative recovery from wastewater. These cells can be easily seen in the 1955 image. The locations and relative sizes of these cells were presented earlier in Figure 4-1 on page 4-5.

Information regarding usage of these cells can also be gathered from the 1955 photograph. A portion of this photo showing the cells appears in Appendix A as Photo 3. The cells were located just upgradient from the culvert inlet on the main runoff pathway's north bank between the pathway and a rail spur which is still in use by Colfax. This area is also downgradient from the current location of the maintenance shop. The upgradient cell, a pear-shaped body covering approximately 3150 ft^2, appears darkly stained in the photo. A ditch ran from the northeast end parallel to the main runoff pathway to a point due east of the treating plant where the green shed is currently located. At the time of the photograph, the cell appears to be almost empty. Comparisons between shadows cast by the cell banks and nearby houses indicate it to be between six to ten feet deep.

A small dam can be seen separating this cell from the second one. Staining is visible in the photograph near the dam's center may represent a discharge structure such as a sloped culvert acting as an oil/water separator. Cell 2 is almost round in shape and appears to be filled with water. Lesser amounts of staining are visible around this unit. The lower bank appears to be an earthen berm which overflows to the main runoff pathway near the culvert inlet. Land downgradient from the berm does not appear to be well drained. This portion of the ditch is

labeled Low Area 1.

Soil at the upper end of the service ditch to Cell 1 also appears stained in the 1955 picture. This would explain the zone of contaminated soil currently visible along the back side of the green shed. Colfax personnel believe blowdown tanks may have been located here at sometime in the past, although it is not possible tell from the photograph. However, discharge from the plant's process water system was made in this direction. A rail spur also extends to this point, and the area may have been used to receive shipments of preservative by rail.

Almost mid-way along the service ditch between it and treating plant, a small building can be observed. This structure appears to be a post mill with a roller bed extending from the southwest side. A bright area behind the structure is probably sawdust and wood debris from the operation.

It is theorized that the company used the pond system to recovery preservative lost to wastewater in the treating process. Water may have been either discharged to blow down tanks near the main runoff pathway, or conveyed by pipe to the end of the service ditch rather than directly into the main runoff pathway. Operating in this manner would have prevented storm water from overflowing the cells. Wastewater then gravity drained to Cell 1 which acted as an oil/water separation device discharging to cell 2. Typically, such ponds were periodically drained and the preservative collecting on the pond bottom was pumped back into the treating system for reclamation.

By 1971, the treating operation had been purchased by Roy O. Martin Lumber Company. An aerial photograph taken in February, 1971 shows that cells 1 and 2 were closed and the area used for pole storage. The post mill and service ditch did not exist at this time either.

6.5.1.2 SWMU Investigation

6.5.1.2.1 First Boring Set

Sixteen borings were completed along the main runoff pathway's northern half. Figure 6-10 on the following page shows the locations of the borings completed along the northern half of the pathway. Former pond locations have been superimposed on the drawing. Two of the borings shown, borings 46 and 47, were drilled to evaluate possible releases from SWMU 10,

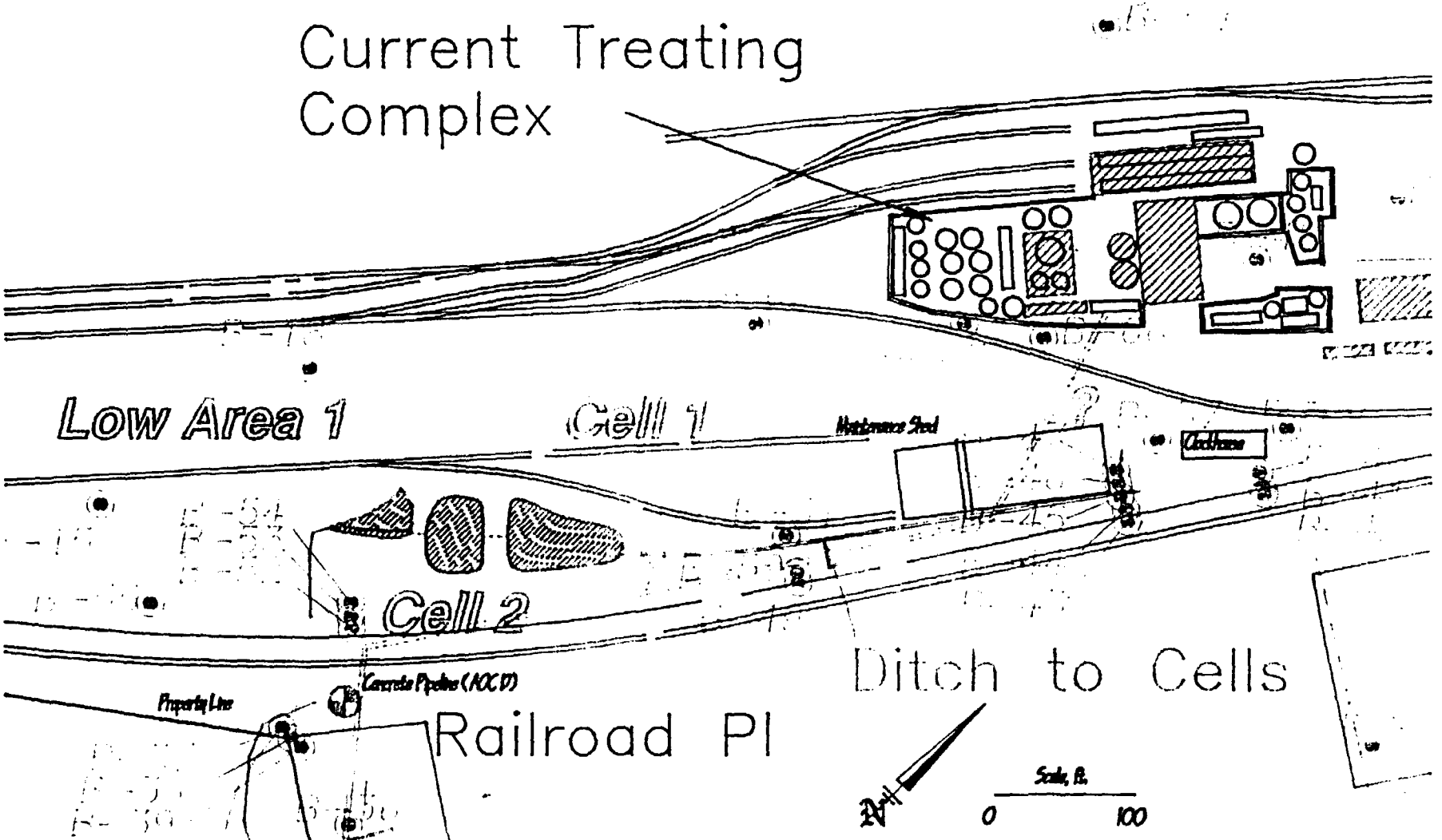

FIGURE 6-10: NORTHERN HALF OF SWMU 9.

the truck washing area. SWMU 10 was an area adjacent to the maintenance shop where equipment was being washed at the time of the RFA. Since then, the company has constructed a building at this location to house equipment washing operations. Wash water is contained by a bermed concrete pad sloped to a large sump. From the sump, water is pumped to the plant's process water system for treatment. The entire washing area is now housed by a one bay, wood frame, metal sheeted building. Approval was given by the regulatory agency to investigate SWMU 10 by advancing borings along the building's northeast side.

The remaining borings 40 to 45 and 49 to 55 were drilled along the pathway in sets consisting of three borings placed perpendicular to the ditch centerline. One hole was placed as near as possible to the ditch's center and the remaining two were placed ten feet on either side. Boring 55 was to be drilled without the two additional borings at the ditch's southern end. Table 6-5 on the following page presents analysis results of core samples collected from these holes. Since borings 57 and 58 were within 50 feet of the unit, they are included as well.

Cores taken from these borings proved to be some of the most contaminated samples collected during the project. This was especially true of the set containing B-49, 50, and 51. The northeast end was less contaminated, as was the southern end. However, in most cases perched water was reached before uncontaminated soil was encountered.

Drilling began in the visually contaminated horizon directly behind the company clockhouse (a.k.a. green shed). Figure 6-11 page 6-43 is a fence diagram constructed using soil data gathered from borings 58, 40 through 42, and 24. This line runs from the north corner of the green shed (clockhouse), across SWMU 9, and into the southeast wood storage yard. This first three feet of boring 58 are classified as clayey silty sand which turns to a silty clay zone. This zone extends across the transect and was detected in boring 24. Silty and/or clayey sand was detected in all borings below this layer.

Here, at the ditch's northern end, surficial contamination was detected in both borings 40 and 41. Boring 41 was advanced near the centerline of the ditch, and 40 was placed 10 ft northwest of this point. No contamination was found in any of the three samples analyzed from boring 42 which was 10 ft away from the ditch centerline on the railroad side of the pathway.

ORGANIC ANALYSIS BY SWMUs

TABLE 6-5: CHEMICAL COMPOUNDS DETECTED ALONG NORTHERN HALF OF MAIN DRAINAGE PATHWAY. NOTE: CONCENTRATIONS GIVEN IN $\mu g/kg$.

Cas No.	108-95-2	95-48-7	106-44-5	91-20-3	91-57-6	83-32-9	120-12-7	86-73-7	193-39-5	87-86-5	85-01-8	129-00-0	206-44-0	118-74-1	87-68-3	319-84-6	319-85-7	319-86-8	79-01-6	57-64-1	78-59-1	78-93-3	77-47-4	193-39-5	193-39-5	1330-20-7
Compound	Phenol	2-Methylphenol	4-Methylphenol	Naphthalene	2-Methylnaphthalene	Acenaphthene	Dibenzofuran	Fluorene	4-Nitrophenol	Pentachlorophenol	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Trichloroethene	Acetone	Carbon Disulfide	2-Butanone	Benzene	Toluene	Ethylbenzene	Xylene (total)
84081				5700	6100	14000	9600	14000		120000	41000	6400	16000	25000					46		47				17	26
84082																			96		13			220		
84084																			46		11			200		
84181				20000	10000	33000	21000	27000		7500	80000	8400	41000	10000					89	68	9			170	6	17
84182				100	100	170	860	870			770	72	800	90					61		6			240		
84183																			62	68	11			240		
84281																			29		18			190		
84282																			22					87		
84283																			14					31		
84362																			72	180	40			62		
84365																			20	170				20		
84366																			20	140	18			100		
84481					100000					67000	900000	800000	1000000	800000	64000	68000	180000		43	440	34		91	190	17	1200
84484				17000	7200						43000	4300	18000	24000	1700	1200	1000		17	30	18			110		16
84485				100							870								16	90	18			18		
84582				38000	21000	24000	21000	23000		2300	44000	14000	32000	30000	2600	2000	2500		18	32	21			94	21	21
84584				200000	100000	130000	60000	90000			300000	33000	110000	100000	80000		14000		18		18			38	7	20
84585				400000	200000	210000	170000	200000			600000	67000	380000	180000					230	1700				1000	370	1700
84681				330000	360000	450000	350000	410000		330000	540000	370000	440000	200000	68000	70000			47	600	100		36	300	170	690
84682				400000	260000	270000	160000	220000		83000	900000	67000	290000	180000					68	600	120			790	300	720
84683				720000	380000	420000	310000	350000		78000	680000	100000	370000	210000					65	870	68			870	170	400
84781				210000	130000	430000	270000	470000		820000	2700000	380000	2000000	1000000	190000		370000	91000	26	190	9					
84782				190000	120000	190000	110000	180000			310000	78000	190000	140000	80000				190	750	32			68	190	810
84784		230	900	1300	1100	1700	900	1100	900		4000	870	2000	1900			600		10	60				6		
84987				8700000	1900000	3000000				700000	6300000	1400000	2900000	2300000	820000		370000		190	10000	6200		890	10000	22000	37000
84988				8000000	3400000	4000000	4000000	5100000		700000	7900000	2700000	5000000	2000000	870000	800000	430000		7100		940		3000	25000	20000	72000
84989				22000	14000	10000	18000	18000			32000	4300	18000	10000					18		17		6	14	6	20
85484				4300000	1000000	1900000	1400000	1900000		630000	6300000	700000	3900000	1400000					30	370	90		1000	870	800	1400
85687				6100000	2400000	2900000	2100000	2700000			8600000	400000	1700000	1300000					8600		3700		4000	20000	22000	61000
85688	18000		9200	62000	20000	32000	20000	31000			66000	8100	17000		3000	2000			76	100	63			170		120
85182																			20		20			100		
85184																			23	34	20					
85281										10000				14000		2600			24		27			100		
85282						200000	20000	60000		360000	100000	210000	1200000	200000	100000	220000			10	100	41	73		200		41
85283				600000	63000	100000	140000	190000		130000	840000	90000		140000												
85363				1200000	670000	670000	650000	680000			1000000	260000	900000	530000					41					320	310	1000
85364				270	300	600	900	1100		690	2000	430	1400	1000					46	16	11			100	20	36
85483				130000	70000	100000	75000	83000			100000	20000	70000	50000	10000	10000			43	82	33			670	66	330
85484				60000	100000	140000	100000	120000			300000	47000	170000	80000	24000	22000			36	10	32			1100	150	1100
85486				1700	850	1700	2000	2200		1900	7100	900	4000	2100					41	17	20			230	30	82
85682				850000	300000	600000	410000	610000		370000	1400000	190000	810000	420000	90000	84000			62		20			890	740	2200
85684				820000	330000	840000	420000	450000		250000	1900000	170000	460000	300000					78		50			1200	1200	2000
85686				2000	670	270	2300	870		4400	7900	830	1400	410												
85783																			32	17						
85881				410000	120000	300000	230000	330000			1000000	330000	810000	300000					130		320			46	90	110
85882																			27		7			180		
85882D																			27		19			170		
85883																			23	50	10			98		

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits.
Bold italic quantities indicate constituent was detected in laboratory background samples

SUM44-96WKS, RANGE C:C98..C:AC126

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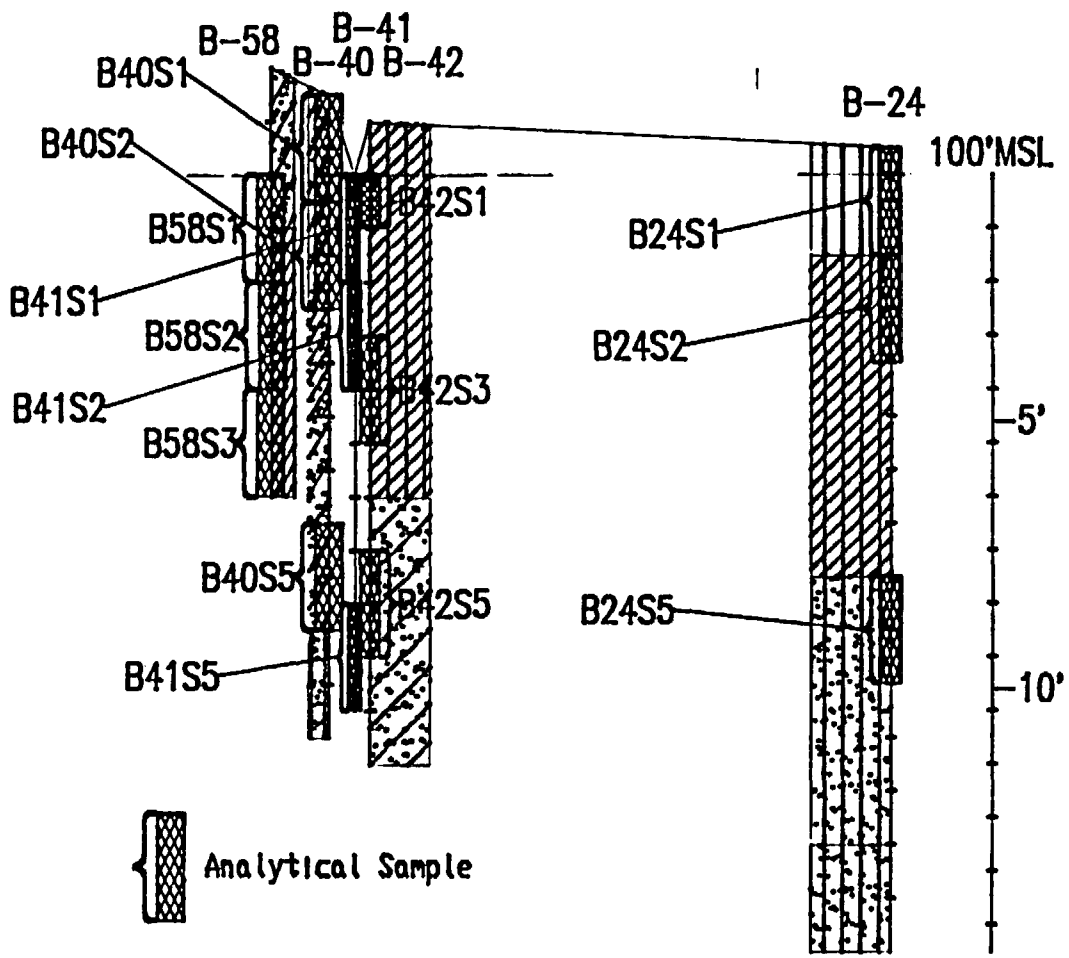
FIGURE 6-11: FENCE DIAGRAM FROM BORINGS 58-24 EXTENDING BEHIND GREEN SHED.



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Thus, gross soil contamination does not appear to extend beyond the centerline of SWMU 9 at this point. Contamination persisted to a depth of four feet in boring 41 in the centerline of the ditch. Surface contaminant levels totaled 268,000 μg/kg in the first core taken from boring 41 and 247,000 μg/kg in boring 40. Samples selected from the 2—4 ft interval showed no creosote constituents in boring 40. Constituents were still detectable in this interval in 41 at 2,100 μg/kg. However, at ten feet, no semi-volatile contaminants were detected. Surprisingly, pentachlorophenol was detected in the 0—2 ft intervals from both borings. Boring 40, situated on the plant side of the ditch, contained 120,000 μg/kg pentachlorophenol at the 0—2 ft depth. No pentachlorophenol was detected lower in the boring. Pentachlorophenol at 7,500 μg/kg was detected in soil taken from the same interval in boring 41. Below this interval, the chemical was not detected. This evidence suggests a surface release made to this portion of the plant after the 1971 implementation of pentachlorophenol treatment. The source of this contamination is not known, however the concrete pipeline is suspected. Creosote constituents were expected here, as discussed in the previous section, and their origin is believed to be from blowdown tanks or the conduit which transferred process water to cells 1 and 2. The horizontal extent of contamination is limited to the ditch centerline, as indicated by the absence of chemicals in Boring 42. The vertical extent is limited to the upper two of soil along the northwest bank of the pathway and upper four to six feet in the ditch's centerline.

Perched water was found in all three of these borings located within the last sandy clay layer. This phaeritic surface existed above the eight foot minimum boring depth, however, field detectable contamination was not present. Temporary sampling wells were installed in each boring, however, the low-yield formation would not produce enough water to retrieve a sample with a bailer. The wells were checked daily until they were pulled and plugged, nevertheless, the team was not able to collect a sample. Therefore, groundwater quality assumptions are based on soil samples collected from the saturated zone.

Boring 58 was located 50' northwest of the ditch directly upgradient from the first boring transect. Here, surface contamination was much higher, totaling 4,570,000 μg/kg. However, this did not persist below the first two feet. Also, no pentachlorophenol was detected at this

point. Again, the presence of surface contamination of creosote compounds here and in boring 40 reinforces the theory suggested by the 1955 photograph.

6.5.1.2.2 Second Boring Set

The next set of borings, numbered 43 to 47, were drilled across, in, and perpendicularly away from the ditch to SWMU 10. Figure 6-12 shows soil types found in the borings as well as analytical sample depths. Running between the green shed and the maintenance shop, most of these borings in this set were contaminated for the entire depth. No contamination was found ten feet away from the ditch's southeast side in the railroad right-of-way. This again indicates the ditch centerline to be the southeastern extent of contamination. In the ditch centerline, semi-volatile creosote constituents totaled 4,000,000 μg/kg at 0—2 ft, 116,000 μg/kg at 6—8 ft and 650 μg/kg at 8—10 ft where water was detected. Borings 45 and 46 showed high levels of contamination throughout averaging 3,000,000 μg/kg. However, lesser amounts of contamination (254,000 μg/kg) were detected between 2—4 ft than 6—8 ft (1,000,000 μg/kg) in boring 45. Boring 47 was highly contaminated from 0—2 ft at 1% (10,000,000 μg/kg) total constituents. At 12 ft in boring 47, 17,000 μg/kg creosote constituents were detected. On the other hand, boring 57 located approximately 25 ft north of boring 47, was not contaminated.

Two things are noted for this set from the data presented in Table 6-5. First, contamination near the ditch centerline (boring 44) *decreases* with depth. Second, contamination between the ditch and plant *increases* with depth. The trend begins to reverse (*i.e.* contamination again decreases with depth) in boring 47 nearest to the plant. Since soil formations are essentially the same across the set, the difference must be attributed to the release source. Data suggests the ditch centerline to be contaminated, for the most part, from a surface release. Chemicals detected between the ditch and plant must come from a shallow (now buried) ditch or pipeline. The most likely source is the concrete pipeline, AOC D. The presence of pentachlorophenol in the samples further strengthens this argument. Pentachlorophenol quantities were estimated in the first interval from the ditch centerline due to the low concentration present. Below that, the chemical was no longer detectable. However, the constituent was quantified or estimated in the full depth of the other borings. Since process

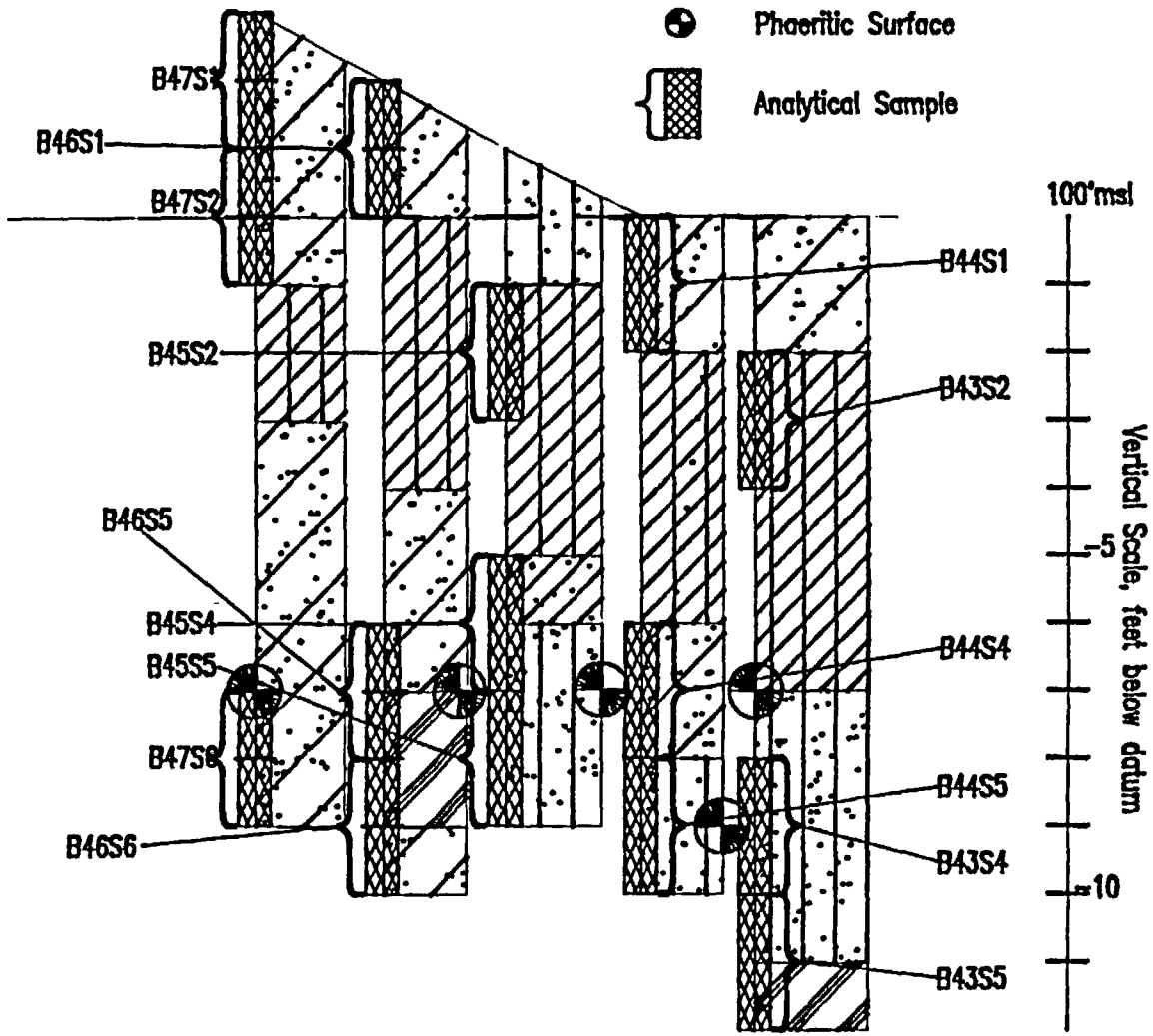

FIGURE 6-12: FENCE DIAGRAM FROM SECOND BORING SET IN NORTHERN HALF OF SWMU 9.

water from the penta-system was conveyed from the treating operation to the impoundment closed in 1986 by the concrete pipeline, the constituent would be expected in soils receiving leaks from this source. Broken pieces of the pipeline are visible along the northwest bank of the ditch downgradient from the maintenance shop. However, the exact pipeline route from this point to the treating plant is not known. As stated in an earlier section, during the final weeks of field work, the inlet of this pipeline was discovered imbedded in concrete near the former cooling pond location (SWMU 25). The plant treating engineer who is responsible for physical maintenance of the system stated that this line was plugged with concrete. Due southeast of this inlet, other iron piping and valve bodies are observed jutting from the northwest bank of the main runoff pathway. In all likelihood, the concrete conduit runs parallel and very close to the 43-47 boring series. This also may have been the point of entry for the service ditch draining to Cells 1 and 2.

Due to the presence of free product in samples from this boring series, the contamination most likely *did not* originate from truck washing operations. Also, further investigation of this area as a distinct SWMU is moot since contamination here cannot be discerned from other contamination along the pathway. It is recommended that this be considered either part of the main runoff pathway or the concrete pipeline for future work.

All borings were terminated in this set due to the presence of a phaeritic surface approximately eight to ten feet below ground. Water sample GW-18 was collected in boring 46 from this perched phaeritic surface. Here the water contained approximately 15,000 μg/L total volatile and semi-volatile constituents. Pentachlorophenol was also detected at 3,100 μg/L. A problem similar to that met with boring 24 described in a previous section also happened here. The first ground water detected represented perched water resting on a lower clay. At the time of drilling, a substantial amount of water was detected in each boring of this set. However, not enough water could be obtained to complete a sample even after repeated attempts. Fortunately, boring 46 did yield a sample because it was advanced to 12 ft after water was found at 9½ ft. The effort was further aided by suspending a bailer in the well and extracting the sample over a four hour period. Due to the close proximity of the wells in this series, GW-18 is believed

to be representative of perched water quality at this location.

A high plasticity clay similar to the pleistocene clay described in section 6.4.1 was found in the bottom of boring 46. However, it is believed that this is localized and not part of the same stratum. This hypothesis is supported by the fact the clay was found much higher in the boring. Deep borings completed near Pineville Junction show similar structure, however a second slickensided clay is found below a higher clay stratum with similar characteristics and at elevations comparable to that in borings 48 and 66. All of these layers have similar coloring (Munsell 5YR 4/6 to 5/6), however the upper clays are somewhat lighter.

6.5.1.2.3 Third Boring Set

The third series of borings was scheduled to be situated near the south corner of the maintenance shop. However, this location was moved further downstream at the request of LDEQ personnel on site. Located midway between the previous set and the culvert inlet, borings 49 and 50 yielded the most contaminated samples discovered during the investigation. Boring 49 also gave the most contaminated ground water sample collected. For this reason, boring 51 was moved ten feet further north than planned due to the conditions found in 49 and 50. Cores from this boring were not contaminated to a depth of eight feet. As seen in Figure 6-10, this location is near the site where recovery cells 1 and 2 were once located. In fact, the borings are situated very near the service ditch to these cells. These cells are believed to be the source of contamination in this area.

Figure 6-13 is a horizontal section between this boring set. Boring 49 was constructed ten feet southwest of the ditch centerline on the railroad right-of-way. The first ten feet of the boring consisted of low-plasticity red clays interbedded with sandy silts to silty sand stringers. At ten feet boring logs show a fine silty sand (Unified Classification "SM"). This strata contained very heavy hydrocarbon staining to 14 ft where a fine sand was located. Here free oil filled voids in the core sample which registered a PID reading of 50. A PID reading of 70 was taken from the auger stem. This compelled drilling personnel to began using respirators to complete the boring. Perched water was found at 15½ ft and a very stiff, slickensided red clay (Unified "CH", Munsell color 5YR 4/4) was found at 16 feet. Due to the depth of the clay

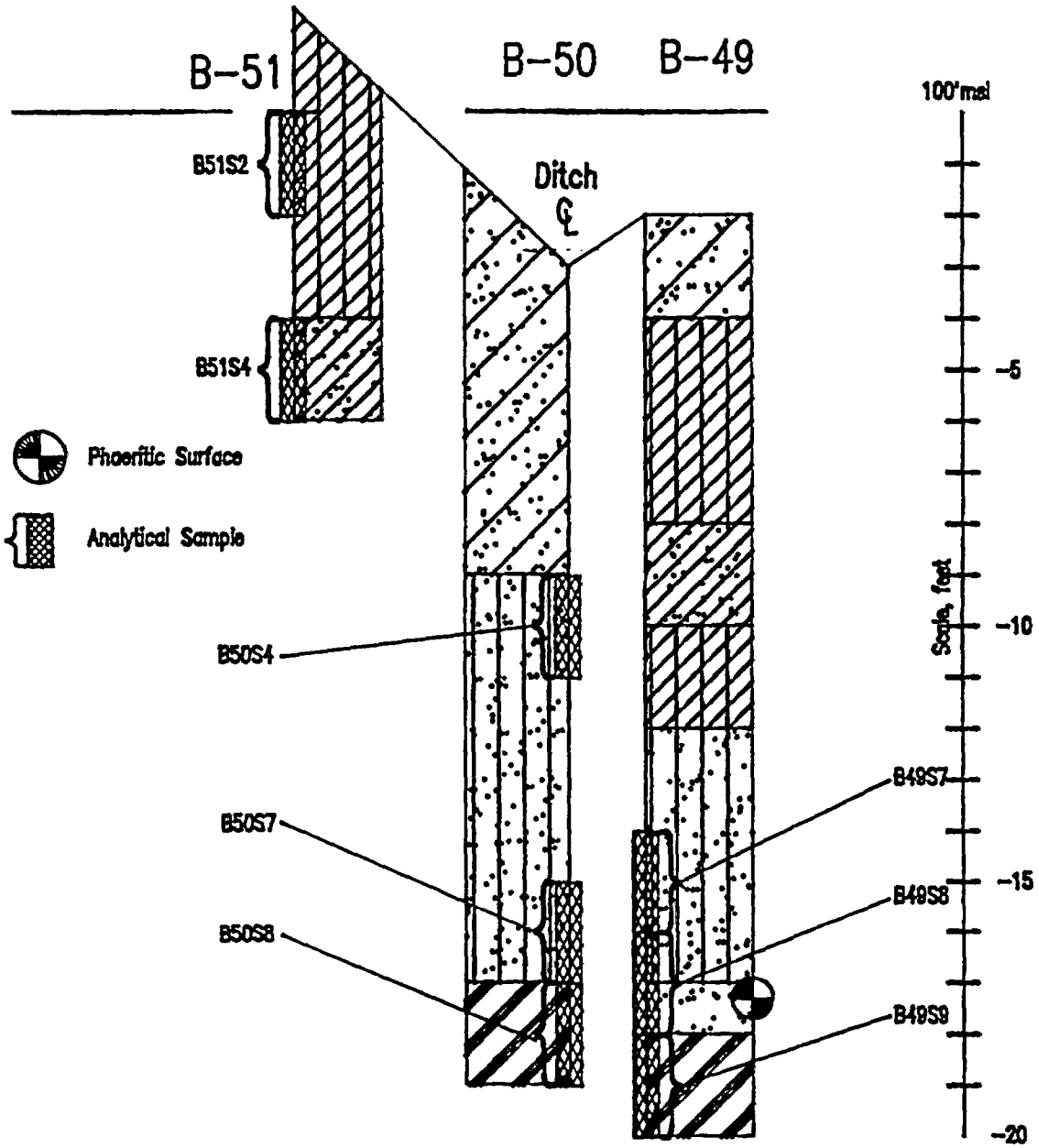

FIGURE 6-13: FENCE DIAGRAM FOR BORINGS 49 THROUGH 51, SWMU 9

zone, this horizon is believed to represent the top of the Pleistocene backswamp formation described earlier on page 6-27. The boring was terminated in this formation at 18 feet and a temporary well was set for a water sample.

Field screening indicated significant contamination begins six feet below surface. Samples from 12 to 18 feet, B49S7, 'S8, and 'S9 were selected for full analysis (B49S8 contained free oil, 'S7 was from the silt above and 'S9 from the containing clay below). B49S8 contained 50,530,000 μg/kg, or 5%, volatile and semi-volatile compounds. The lower pleistocene clay contained 143,400 μg/kg; a 99.7% reduction from the fine sand above. A groundwater sample from this boring, GW-21, was also highly contaminated. Containing 27,300 μg/L total constituents, this water sample was more contaminated than any other water sample collected during the project.

Boring 50 in the ditch centerline showed similar contamination in slightly lower amounts. Stratification tended to be almost identical to boring 49 except the clay was intercepted slightly higher at 14 feet. Samples were analyzed from the 6—8 ft, 12—14 ft and 14—16 ft intervals. The highest field screening ratings came from 6—8 ft core sample. Contamination ranged from 20,000,000 to 30,000,000 μg/kg between samples B50S4 and 'S7. Here again, the slickensided clay held 343,000 μg/kg which represents a 98.6% reduction from the silt above. This decrease agrees with the "leaky aquitard" theory presented during discussion of the process area SWMUs. No water sample was collected from this boring due it's close proximity to boring 49.

Boring 51 scheduled ten feet north of the centerline was moved an additional ten feet away in an attempt to define the horizontal extent of contamination. The hole progressed eight feet and no contamination was found, therefore the boring was terminated. Surface elevation data obtained after field work was completed indicates that the boring most likely stopped above the contaminated strata. Therefore the horizontal extent of contamination is not defined by this well.

The locations of these borings were superimposed on the 1955 aerial photograph. This analysis revealed the borings 49 and 50 to be almost in the service ditch leading to cell 1. Therefore, contamination in this area is believed to have originated from this system. However,

none of the borings in this transect intercepted the separation cells, nor was the contamination extent defined.

6.5.1.2.4 Fourth Boring Set

The final transect of borings located near the culvert inlet may represent soil quality downgradient from Cells 1 and 2 where they overflowed to SWMU 9. A stratigraphic section compiled from the core samples is given in Figure 6-14. The boring between the pathway centerline and railroad had to be completed by hand auger which limited it to a depth of five feet. All borings in this series were continuously contaminated as can be seen in Table 6-5. However, contaminant levels in this boring set were generally an order of magnitude lower that the previous transect. Also, the concentrations decreased with depth. Water quality in the area, as determined from samples GW-22 and 23, ranged from 7000 μg/L in boring 52 to 19,000 μg/L total constituents in boring 53. Water from boring 52 probably represents water seeping to the hole from the runoff pathway. Water from boring 53 is from deeper perched conditions.

It was hoped that the final boring in the northern half of the pathway would delineate the western extent of contamination found in previous transects. However, boring 55 was also contaminated at comparable levels to borings 52, 53 and 54. Thus, water discharging from upgradient cells may have stagnated here too. Concentrations found in the cores decrease with depth signifying a release was made to the ground surface and percolated downward.

6.5.1.3 Summary and Conclusions

Sampling indicates the main runoff pathway's northern half is managing solid waste contaminated with wood preserving solutions. Contamination was found in the unit beginning adjacent, and possibly continuing to the treating complex. Concentration levels from 1% to 5% were detected in the unit near the historical location of two surface water cells identified from early aerial photographs. Contamination was also identified at the SWMUs western end. It is hypothesized that releases were made to this portion of SWMU 9 from older units that no longer exist. It is not possible to determine if SWMU 10, the truck washing area, has released contamination due to the presence of contamination from other sources. Any waste that may have originated in SWMU 10 is probably insignificant when compared to other nearby sources.

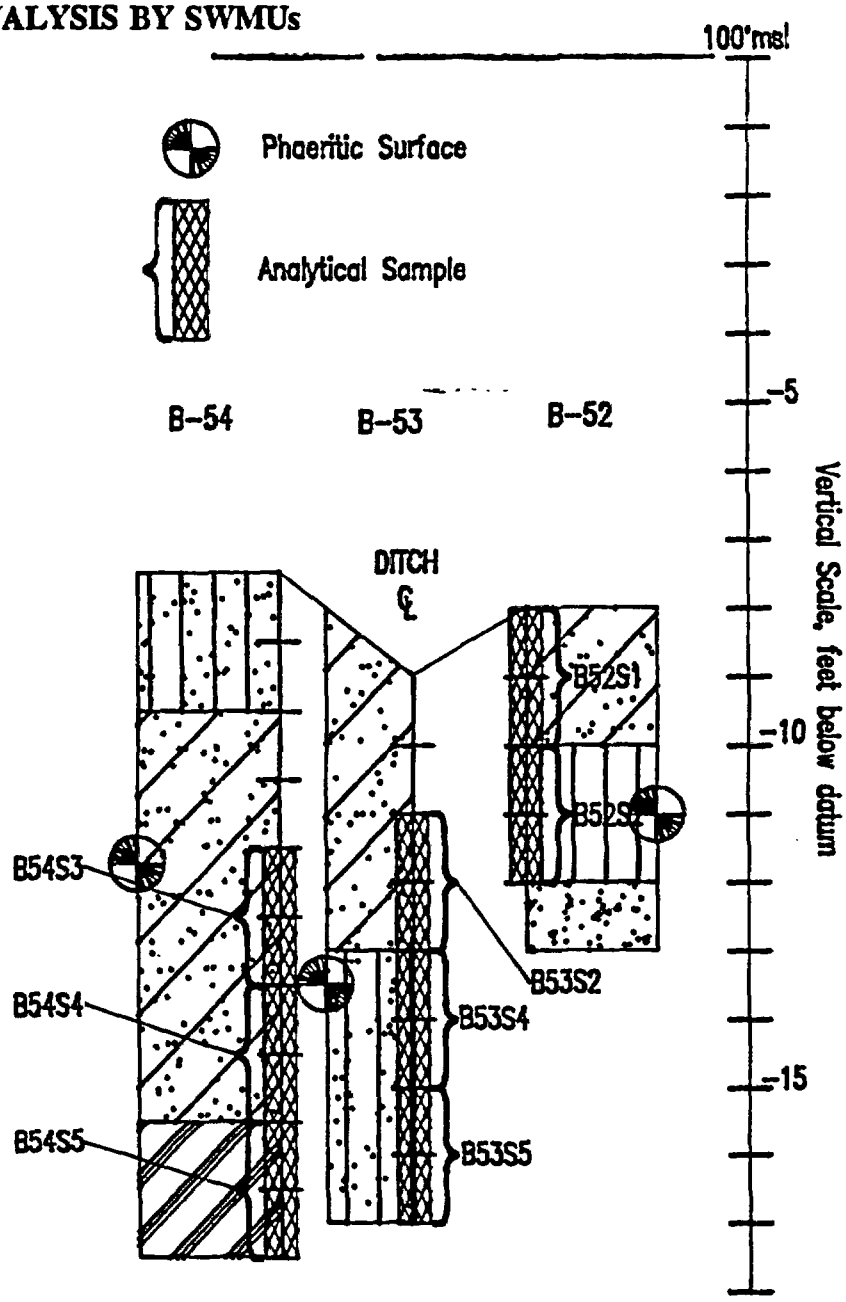

FIGURE 6-14: FENCE DIAGRAM FROM BORINGS 52 THROUGH 54, SWMU 9.

Therefore, this area should be considered part of SWMU 9.

The following conclusions are made for SWMUs 9 and 10:

(1) Wood preserving constituents detected in the first boring set result from a surface release, possibly from either tanks once located near here or discharge to a ditch conveying water to two surface ponds further downstream.

(2) The horizontal extent of this surface contamination is limited to the centerline of the main runoff pathway (SWMU 9).

(3) Chemicals detected in the second boring set result from surface and sub-surface releases. Subsurface releases did not extend 10 ft beyond the ditch centerline. The presence of pentachlorophenol in these samples indicates this release originated from the concrete pipeline running through the area. Surface releases came from tanks or other conveyances upstream.

(4) Contamination from the third boring set originates from two surface water cells once located between the railroad spur and the pathway.

(5) Contamination in the fourth boring set and boring 55 probably results from water discharges made by the two upgradient cells.

(6) The southeast horizontal extent of contamination at the northeast end of SWMU 9 is defined by borings 42 and 43. It is not defined at borings 49, 50 and 51. At the west end, the southeast extent is defined by borings 8 and 9 completed in the southwest wood storage area.

(7) The northwest extent of contamination probably reaches to the treating plant due to the concrete wastewater pipeline. Boring 62 was not contaminated, therefore establishing a northwest limit in this direction. Boring 15 may define the northwest extent at the western end.

(8) The vertical extent of contamination at the SWMU's northeast end is limited to the first four to six feet of soil. The investigation did not define the vertical extent in other portions of the unit.

(9) A slickensided clay stratum was found approximately 15 ft below surface and

tended to be significantly less contaminated than upper silts. This clay may serve as a "leaky aquitard" and help to contain contamination above. It is believed this horizon represents a pleistocene backswamp and is continuous over the site.

(10) More work is recommended for this portion of SWMU 9 and the portion of the concrete pipeline extending to the treating complex.

6.5.2 Main Runoff Pathway, Southern Half

The southern half of SWMU 9 receives northern half discharge from parcel A and begins at the culvert outlet located midway along the northern half. From here it drains in a dendritic pattern southward bisecting parcel B. The ditch empties into a concrete culvert midway along the southwest side of the parcel. This long 48 inch diameter conduit eventually empties into a tributary of Huffman Creek about ½ mile west of the facility. Huffman Creek is a tributary of the Red River. The area of study was limited to that portion of the pathway on company property.

6.5.2.1 Historical Use

The southern half of SWMU 9 was used by the company to receive process water from oil/water separation ponds located at the upper reach of this half of the SWMU. The unit also drains storm water away from parcel A and most of parcel B.

In 1955, the southern half was undeveloped and not used for industrial activity. The pathway extended from the northern half discharge point to an area very near the present culvert location. Here it was met by another ditch draining land northeast from what is now Grace Subdivision. From this confluence, the stream flowed unrestricted to Huffman Creek.

By 1971, Colfax Creosoting had removed recovery cells 1 and 2 and began using three smaller cells depicted previously in Chapter 4 as Figure 4-2. These cells were positioned along the northeast side of the southern half of SWMU 9 near it's source. Process water was apparently piped from the treating plant to the cells which were also connected by piping. Discharge from the lower cell entered SWMU 9 just downgradient from a small pole mill constructed on the ditch's southwest side. Storm water from parcel A was routed around the triad of cells.

Also by 1971, the culvert into which SWMU 9 discharges had been installed at the property boundary. Water appears to have stagnated here forming another surface water body, Low Area 4. Land west of the ditch was developed, housing a small pole mill and wood storage.

Between 1971 and 1975, Cells 3, 4 and 5 had been removed and Low Area 4 had been remediated to allow unrestricted flow into the culvert. The company had also constructed the large surface water impoundment closed in 1986. SWMU 9 had been moved and straightened just north and around the western side of the impoundment to it's current location. Process water discharge was made to the impoundment by the concrete culvert, AOC D, and storm water flowed around the system in the drainage pathway. Excess water from the impoundment was pumped to the city sewer under authority of a city discharge permit. Land north of the impoundment was cleared and apparently covered with wood debris from the pole mill. Land south of the dam is also cleared and may have been used for disposal of bark and other wood debris. In 1986 the impoundment was closed and the area has changed little since that time.

6.5.2.2 SWMU Investigation

Borings were constructed at the north and south ends of this half of the SWMU. Three were completed in the middle and on either side of the ditch at the northern end, just upgradient from the former location of Cell 3. One boring was advanced near the center of the concrete pipeline. Six borings were drilled at the southern end. Three were placed perpendicular to and across the ditch at the southern culvert inlet while three more were located approximately 100 feet upgradient from this point. One additional boring was drilled to evaluate SWMU 8, the railcar separator, adjacent to the ditch at the upper end of the closed impoundment. Also, a trench was cut from the ditch to a point near AOC D's middle to a depth of eight feet. Although it was unknown at the time, the trench also cut the north end of Cell 3. Analytical results for this portion of the SWMU are on the following page as Table 6-6. Figure 6-15 gives the locations of the borings and previous pond sites on a facility map.

6.5.2.2.1 First Boring Set

The upgradient end of SWMU 9 was evaluated by placing borings 37 through 39 near

ORGANIC ANALYSIS BY SWMUs

TABLE 6-6: CHEMICALS DETECTED IN BORINGS COMPLETED ALONG SOUTHERN HALF OF MAIN DRAINAGE PATHWAY, SWMU 9. CONCENTRATIONS ARE GIVEN IN μg/kg.

Cat No.	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
Compound	[illegible]	2-[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]	[illegible]
B2952	6000	34000		130000	84000	160000	380000	480000	440000	460000	320000	81000	84000	52000		47	180	34	21	2		20	13		70
B2956	180000	1000000		1200000	840000	1200000	480000	3000000	29000	1200000	870000	120000	200000	14000	13000	13				6		58	64		140
B2956	110000	72000		75000	84000	83000	25000	310000	78000	84000	80000	19000	19000	11000	5700	44	110	16		5	48	44	42		17
B3084	84000	48000	5900	88000	110000	120000	63000	450000	69000	590000	120000	30000	30000	18000	6200	48	89		110			22	16		
B3085	340000	230000		14000	230000	240000	84000	800000	42000	340000	340000	85000	80000	33000	7800	47						16	23		2[illegible]
B3086	190000	88000		8900	120000	120000	25000	440000		540000	130000	25000	29000	16000	5200	44	89	10	72			20	26		70
B3151							8700		38000	5000	5900	730		9800		89							10		
B3156	1200000	790000	4100	44000	830000	1000000	240000	1800000	80000	840000	870000	110000	180000	12000	11000	1000	11000					3100	8300		22000
B3158	89000	80000		4800	70000	78000	31000	290000		84000	75000	18000	18000	8400		31	81	16		12		180	130		230
B3291	3700	3700		17000	12000	20000	5400	45000	12000	54000	44000	8800		8100	1300	80		27							
B3286	12000	7200	380	12000	12000	12000		42000	3800	14000	13000	2900	2400	1600	600	32									
B3287	1900	1700		840	2000	1200	1700	6300		2300	1600	240		180		8									
B3353	820000	170000		310000	290000	270000	110000	610000		410000	290000	45000				44		26				200	81		140
B3354	190000	180000		180000	110000	120000		250000		110000	76000					179	780					120	44		120
B3398	71000	88000		68000	38000	48000		120000		88000	28000					34		22					20		37
B3452																220						240			
B3453																46	11					78			
B3453D																83						84			
B3498																30		19				170			
B3651	130000			880000	240000	490000	880000	1700000	440000	1800000	840000	200000	220000			30	140					48	38		37
B3653	16000	8000		34000	17000	19000	5000	110000	20000	100000	63000	16000	17000	8100		42						79	37		83
B3810																30		13				31			
B3652	4000						1200000	88000	320000			30000		84000		80	200					100			80
B3653	88000	19000		40000	27000	33000	28000	100000	18000	44000	31000	4800	8300			50				36		210	82		410
B3811					28000	29000		140		240	120					23		23				280			
B3752	8500			40000	13000	14000		87000		37000	31000					50		30				200	48		81
B3753	160000	18000		17000				32000		15000	10000					30		16				78	130		180
B3753D	47000	30000			28000	28000		120000		83000	33000					82						180	88		110
B3754	38000	34000		38000	630000	620000		63000		38000	36000					24		26				170	120		110
B3798	180000	2600000		830000				2100000		1600000	830000					3000	2300					1100	2200		8400
B3810																34	17								
B3852	220000	180000		190000	140000	140000	25000	390000	70000	170000	180000					46		32		23		210	190	120	340
B3857	180000	110000		88000	100000	71000		270000	28000	77000	50000					82	190	8				46	38		110
B3859								430		230000	91					80	280	7				68			
B3856	380000	740000			170000	100000		480000	44000	490000	72000	19000	22000			30	80	83		32		150	170		370
B3858	640000	380000		310000	330000	230000		1000000	100000	420	180000					64	89	75		73		800	760		1300
B3810	81	86		180	190	170		820		47000	220					43	32	7				8			

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits.

Bold italic quantities indicate compound was detected in laboratory background samples.

SUM25-44.WK3, RANGE C:C199..C:AB141

Ball Engineering, Inc.

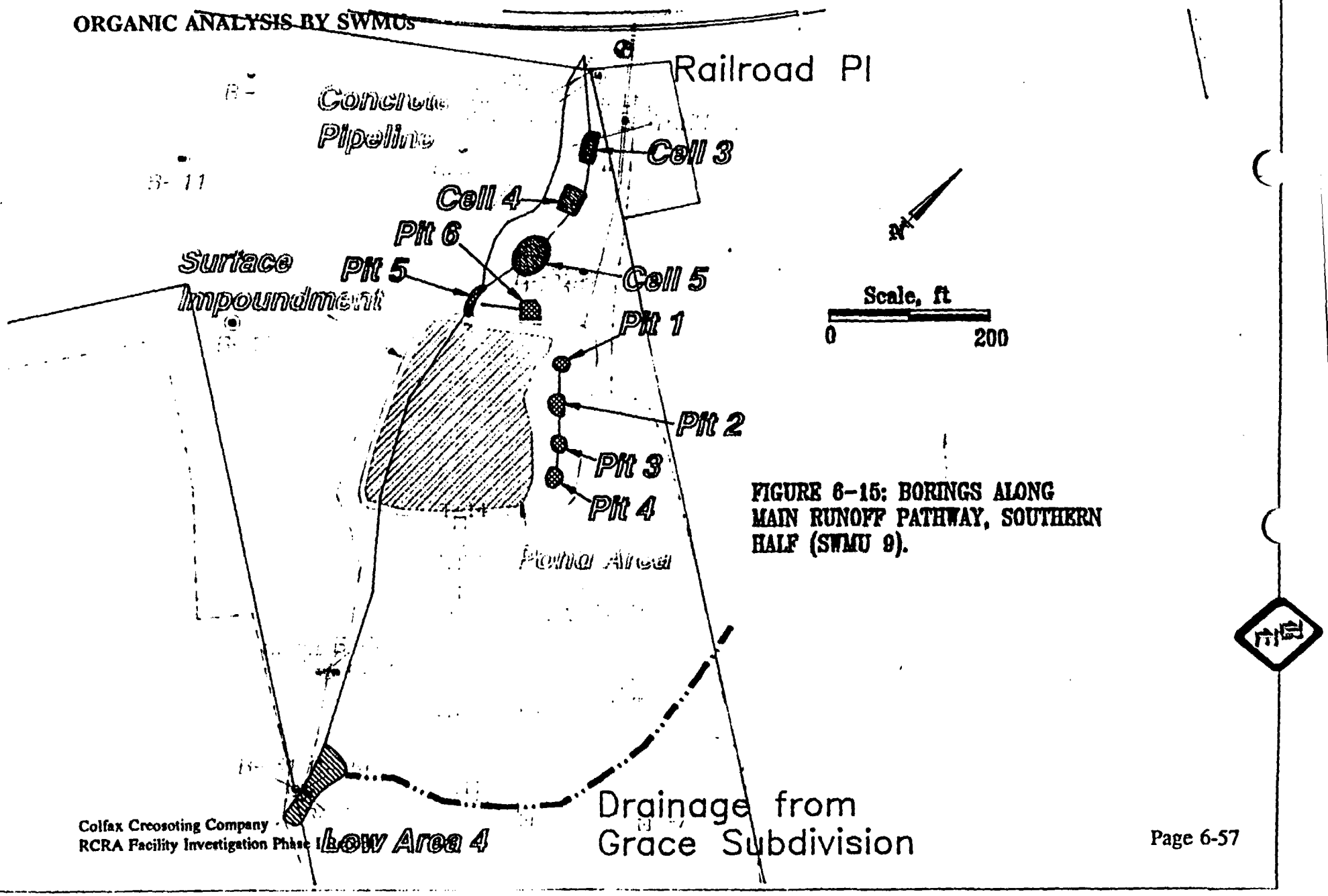

FIGURE 6-15: BORINGS ALONG MAIN RUNOFF PATHWAY, SOUTHERN HALF (SWMU 9).

the culvert outlet draining parcel A. This location is approximately 50 ft upgradient from the former sites of Cells 3, 4 and 5.

Figure 6-16 on the next page presents subsurface strata found by these borings. Note boring 36 is included in this cross-section also. The most striking feature observed in this figure is the slickensided red clay layer extending from approximately 7 to 15 ft below the ground surface in the area. This clay seems to be a continuation of that found in borings completed in parcel A because it exhibits similar texture and color characteristics (Munsell 5YR 4/4) and contained small root holes. The stratum in this area is quite thick between the ditch centerline and boring 36. However, the surface appears to be eroded in boring 37 where it is found at a much lower elevation. If the pleistocene swamp theory is correct, this anomaly may represent entrenchment of a predecessor stream through the formation. More discussion is given to this topic in Chapter 8. Below the clay zone, a silty/clayey sand stratum exists. This layer averages three feet thick and contains the first phaeritic surface. Although some evidence suggests this water may be perched, there were no problems collecting water samples from wells set in the formation. A second clay exhibiting similar characteristics to the first (e.g. Munsell color 5YR 4/*n*, slickensided, small root holes) is found in borings 36 and 38 below the sand stratum. It was not detected in boring 37 which was finished at a lower elevation, or boring 39 which terminated at nearly the same elevation as boring 38.

Boring 36 was completed first to determine if a release had been made by the concrete pipeline, AOC D. The portion of pipeline outcropping along SWMU 9 was broken near the middle and at each end using a company loader. The line was found to be filled with heavily contaminated soil and fine sediment which was sampled as SS1, SS2, and SS3. Table 6-7 on the page 6-60 presents the results from this sampling. Samples were collected from inside the pipeline which was approximately ⅓ full of darkly stained sediment. When the northern half of the pipeline was broken, water was found to be trapped inside. However, it was not possible to collect a sample before the void had drained. Due to the presence of field detectable contaminants within the pipeline, boring 36 was advanced near the unit's center.

The quality of soil found in the first four feet under the pipeline is represented by sample

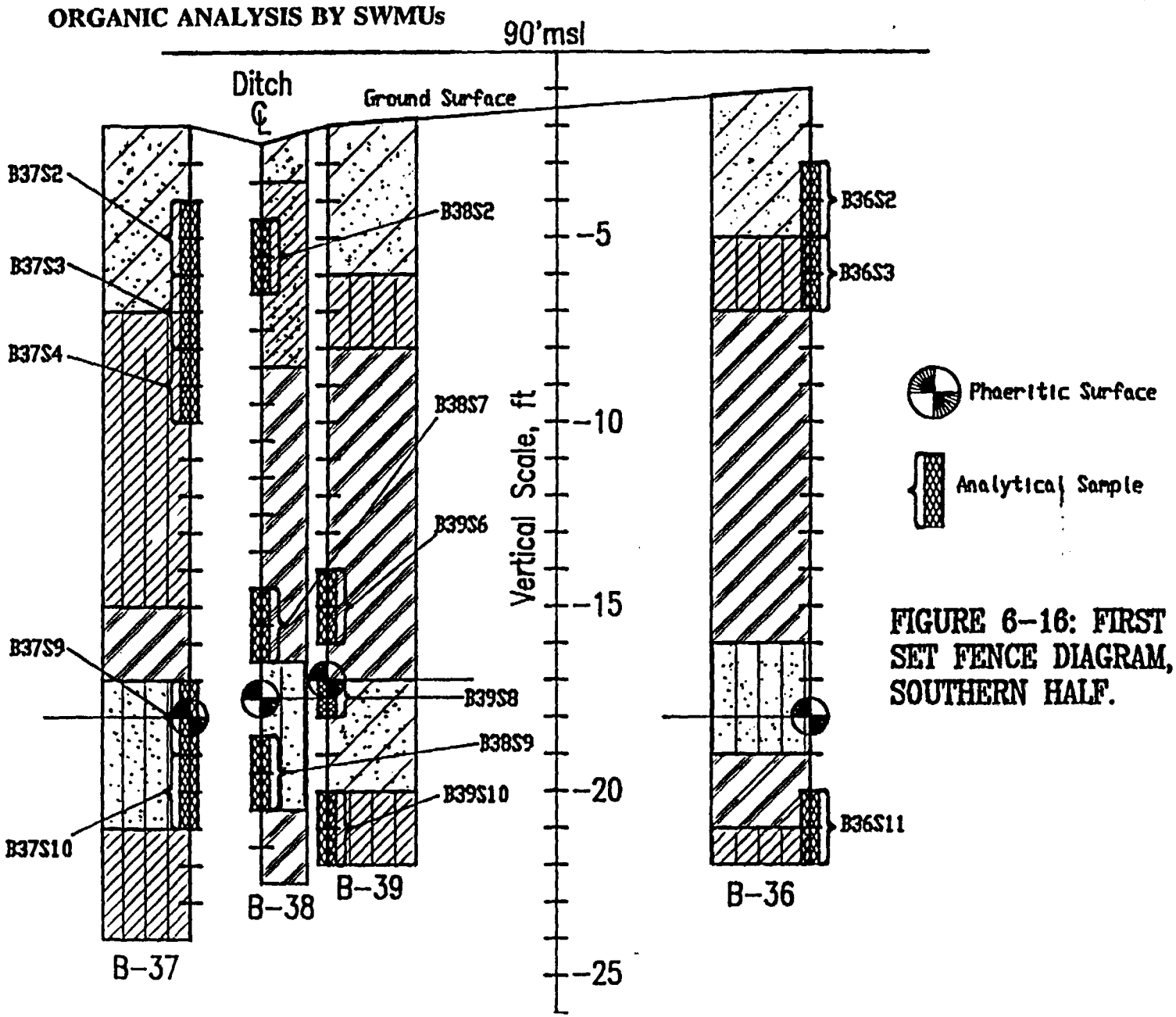

FIGURE 6-16: FIRST BORING SET FENCE DIAGRAM, SWMU9, SOUTHERN HALF.

TABLE 6-7: CHEMICALS DETECTED IN SOIL SAMPLES COLLECTED FROM INSIDE CONCRETE PIPELINE, AOC D. CONCENTRATIONS GIVEN IN μg/kg.

CAS Number	Chemical	SS1[a]	SS2[b]	SS3[c]
91-20-3	Naphthalene		200000j	
91-57-6	2-Methylnaphthalene		150000j	
83-32-9	Acenaphthene		1500000	46000j
132-64-9	Dibenzofuran		960000	
86-73-7	Fluorene		1800000	22000j
87-86-5	Pentachlorophenol	200000	870000j	
85-01-8	Phenanthrene	55000	5400000	49000
120-12-7	Anthracene	580000		
206-44-0	Fluoranthene	180000		160000
129-00-0	Pyrene	250000	3000000	120000
56-55-3	Benzo(a)Anthracene	59000	510000	20000j
205-99-2	Benzo(b)Fluoranthene	240000	370000	51000
50-32-8	Benzo(a)Pyrene	83000	120000j	
193-39-5	Indeno(1,2,3-cd)Pyrene	28000j		
191-24-2	Benzo(g,h,i)Perylene	28000j		
75-09-2	Methylene Chloride	45b	1600b	25b
67-64-1	Acentone	180		140
108-88-3	Toluene	12		

aSS1 collected from north end of pipeline.
bSS2 tanken from mid-section of pipe.
cSS3 collected from south end of pipeline.
j - Detected in sample below method detection limit
b - Detected in laboratory background samples.

B36S2. Detectable amounts of heavy creosote constituents and pentachlorophenol were found in this clayey sand layer. However, the next unit down, a silty clay resting on the tighter slickensided red clay layer, contained more constituents at lower concentrations. A sample was

not collected from the tight clay stratum because other strata contained more constituents by fieldscreening methods. Field screening detected slight amounts of contamination in the upper portion of the red clay layer. Micro-fractures, slickensides, and minuscule root holes all exhibited some visual contamination, odor, or PID reading. Nevertheless, this did not persist for the entire depth of the stratum.

Low amounts of preservative constituents were present in the silty/clayey sand stratum immediately below the red clay. Some heavy four ring compounds were detected below MQLs, although dibenzofuran and fluorene were present in elevated amounts. Observations of the red clay made in the field suggest that this contamination probably did not result from the concrete pipeline. Borings 37, 38 and 39 all intercepted this stratum. In these three borings, analytical samples collected from the layer's upper half were contaminated with total creosote constituents ranging from approximately 3,000,000 to 7,000,000 μg/kg. Pentachlorophenol was not detectable in this layer. Below this half of the stratum, constituents were no longer detectable, or at substantially reduced levels (see results for B38S9 and B37S10). One explanation for this can by hypothesized from the location of the piezometric surface in the stratum. All four borings reached water in this layer approximately one foot below the red clay layer. Furthermore, the red clay was 78% thinner in boring 37 where contamination was at it's highest level in the sand layer. Therefore, free and emulsified oil may be leaking here through the clay from contaminated units above. Contaminants leaking from the bottom of the clay then float on the phaeritic surface.

A trench, labeled "Trench 13" in Figure 6-15, was excavated perpendicular to SWMU 9 across a barren patch of ground to the location of boring 36. Although it was unknown at the time, this six foot deep trench cut across the north end of Cell 3. Observations made from the trench at the time of construction, and maps locating the cell verify the cell was cut. The original purpose of this trench was to determine if a horizon of stained soil near an apparent ditch bank running parallel with the concrete pipeline originated from the pipe. Information gathered from the trench may also aid in explaining contaminant transport in this alluvial environment.

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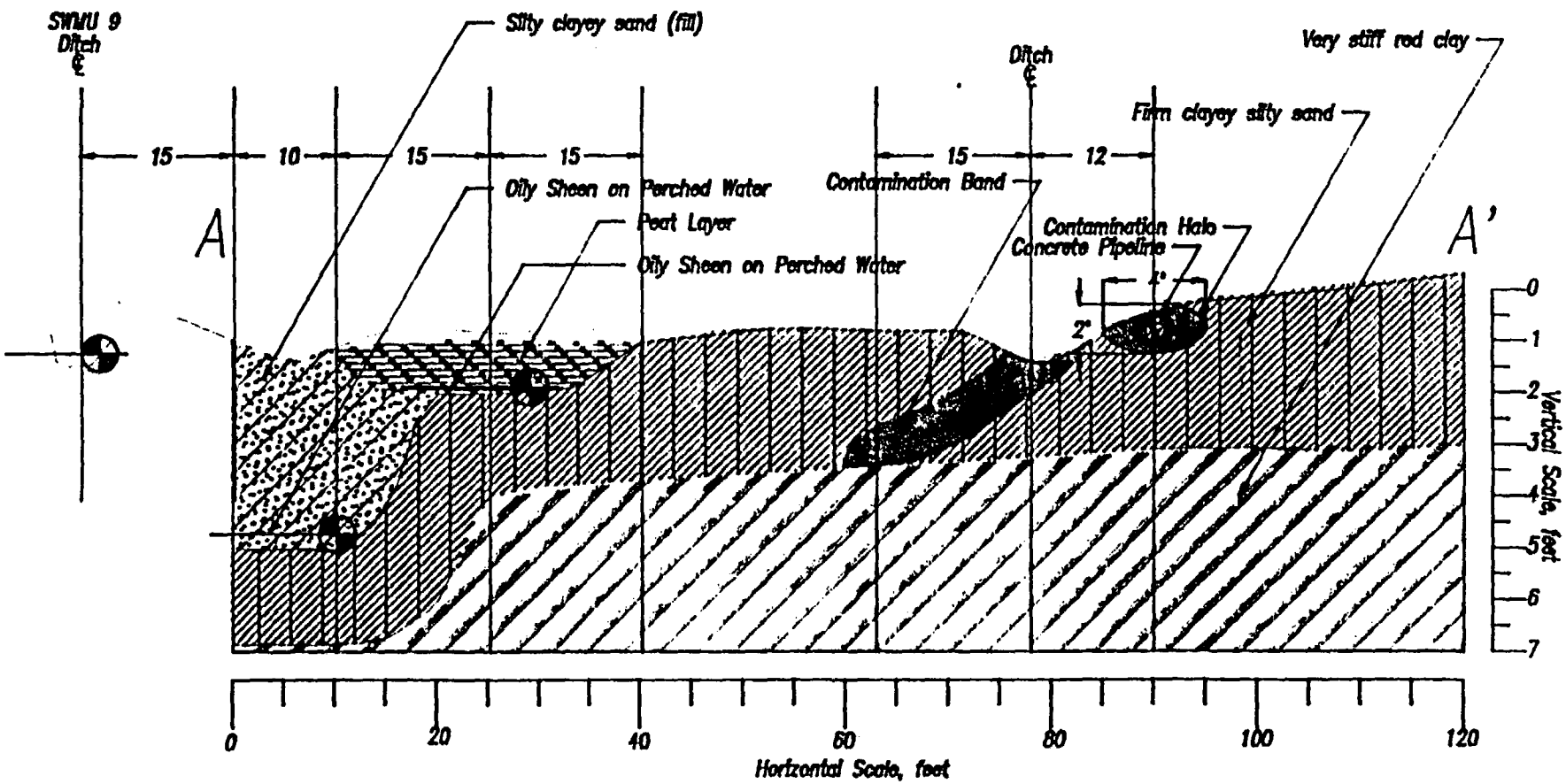
Figure 6-17 on the following page is a log of the trench. One foot of silty to sandy fill was found in the trench sidewalls. Next a thin "peat" layer could be observed beginning 25 ft from SWMU 9's centerline and extending laterally about 15 ft toward the concrete pipeline. Below this layer, a two to four foot layer of gray silt was observed. Underneath the gray silt, ranging from five to six feet below surface, a red silty clay was discovered. This horizon coincides with the red slickensided clay found in borings 36, 38 and 39. During excavation, water could be observed seeping from the sidewalls from a thin "peat" layer one foot below the surface. An oily sheen was apparent from the seepwater. A determination was later made that this "peat" layer was sawdust and wood debris, possibly from the small post mill once on the west bank of the main runoff pathway. The horizon formed between the peat layer and soil below most likely represents the bottom of Cell 3. At the concrete pipeline, a one foot band of slightly stained soil was visible extending from the pipe toward SWMU 9 running along the top of the slickensided clay. A two by four foot elliptical "halo" of contamination was also observed around the pipeline. The horizon of stained soil mentioned on the previous page was apparently representative of the ditch bank location when Cells 1 and 2 were in operation. Sample T13S1 was collected from the peat layer and contained 38,070,000 μg/kg creosote constituents. Pentachlorophenol was detected below the MQL.

Two very important conclusions can be made from trench 13. First, the halo of contamination around the pipeline indicates that free product leaking from pipeline is absorbed onto the soil within the first two to four feet. A elliptical halo of contamination measuring approximately two by four feet was apparent around the pipeline. The elliptical shape indicates horizontal diffusion is approximately twice as great as vertical diffusion in this soil stratum. Second, the band of contamination extending along the top of the red clay unit indicates water containing emulsified or dissolved oil migrates downward to the first relatively impermeable surface where it then begins spreading laterally. Since the top of the clay unit is pitched toward SWMU 9, the contamination moved in this direction. In all likelihood, some contamination percolates downward through the confining unit, but at a much slower rate. Root holes and micro-fractures enhance this migration. Unfortunately in the area near SWMU 9, much of the

FIGURE 6-17: TRENCH 13 LOG



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confining clay is eroded as evidenced by boring 37. Here, the artificial gradient produced by the triad of cells would tend to move water-born contaminants downward through the clay and laterally along the next more pervious unit. Thus contamination detected in the deeper silty sand unit probably originated from those cells. Since all borings in the area detected contamination, the horizontal extent is not defined. However, it probably does not extend far beyond boring 36 since the last interval was contaminated just over 50 mg/kg which is a 98% reduction from amounts detected from the same zone in boring 39.

6.5.2.2.2 Second Boring set

The second two boring sets, borings 29 through 30 and 32 through 34, were completed to investigate a horizon of heavily visibly stained soil near the inlet to the culvert draining SWMU 9. Figures 6-18 and 6-19 show subsurface stratigraphy from the borings. The company has since remediated surficial contamination, however deeper contamination was found during drilling. The area between the two boring sets was once the site of a small low area that impounded surface water in the early 1970's. This unit is visible in the 1971 aerial photograph of the site. It appears the water body was formed due to poor drainage resulting from the installation of the culvert. Covering an area approximately 20 by 100 ft, the low area probably allowed for sediment and emulsified oil to settle to the bottom. A 1975 photograph of the site shows the area was cleared at that time and the impoundment no longer apparent.

Just prior to remediation, a six to eight inch thick layer of darkly stained soil could be observed along the northeast side of the drainage pathway. Some soil staining was also apparent along the southwest side, however it was not as extensive. The stream had entrenched itself through the contaminated media into the soil below. However, the contaminated media was not friable and had a consistency like soft asphalt.

Subsurface stratigraphy at the northern end of the area consisted of clayey silty sands followed by the red slickensided clay layer thought to be continuous over the site. In this boring section, the clay was drilled at increasingly higher elevations moving away from the ditch centerline. The upper clay unit was not found in boring 30. As in borings completed at the northern end of the pathway, this seams to indicate a stream cut through the clay after it was

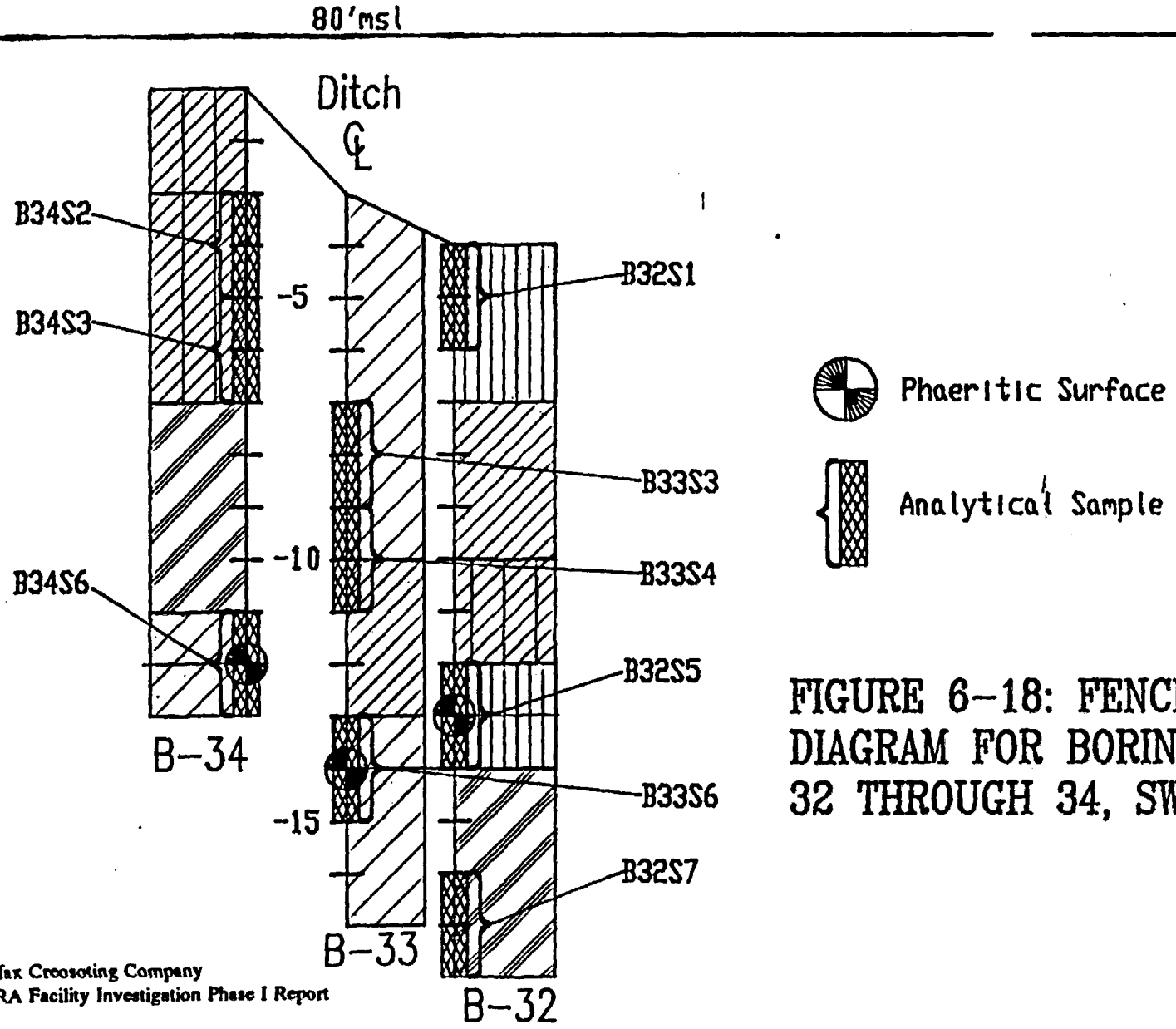

FIGURE 6-18: FENCE DIAGRAM FOR BORINGS 32 THROUGH 34, SWMU 9.

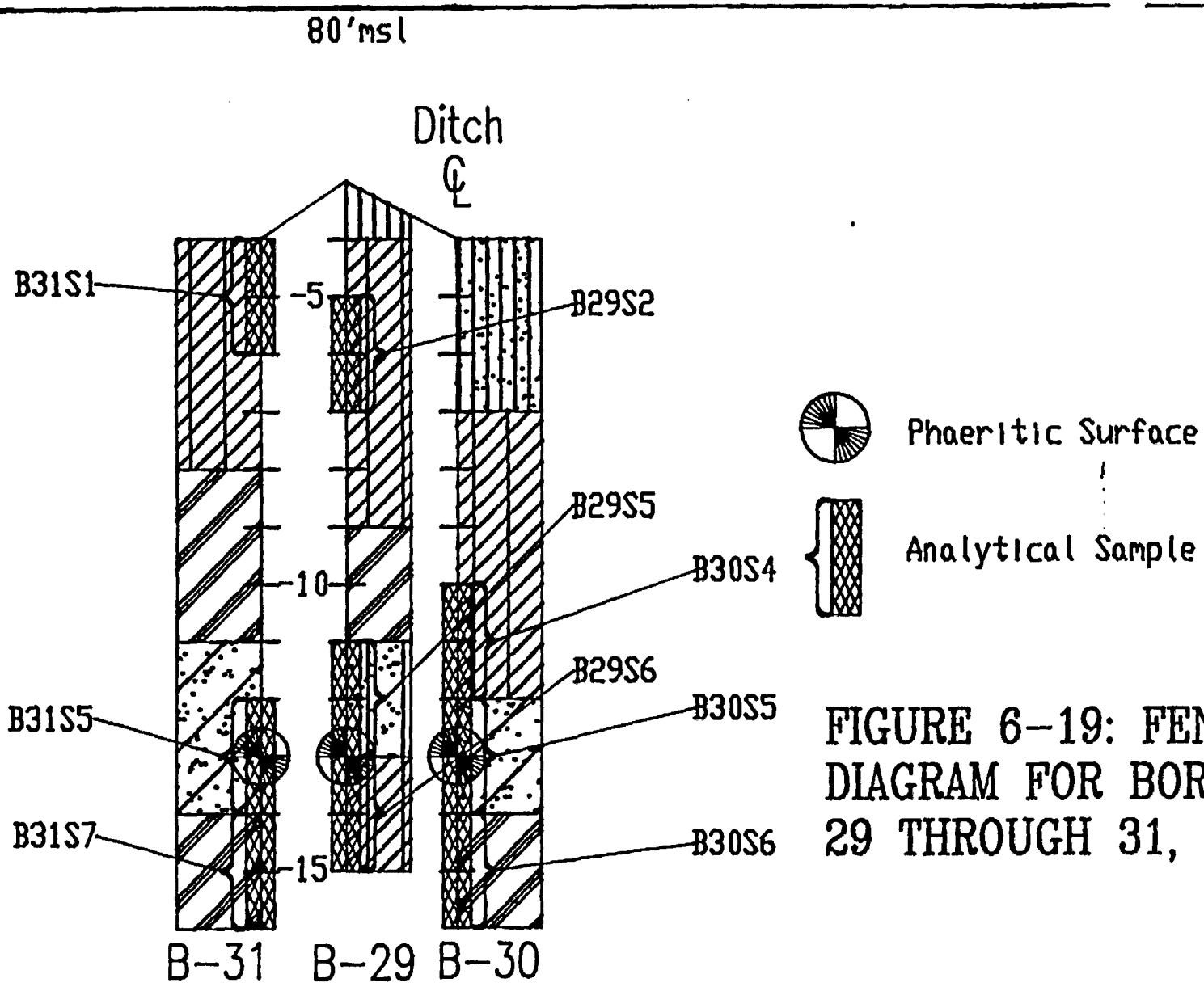

FIGURE 6-19: FENCE DIAGRAM FOR BORINGS 29 THROUGH 31, SWMU 9

deposited by the River during Pleistocene time. A similar scenario was found in the last three borings completed in the SWMU. Below this clay, a dense silty to clayey sand was located. This was followed by a second red clay. This clay also contained slickensided fractures and very small root holes.

A phaeritic surface was found just below the first clay layer approximately nine feet underground. This water appeared to be perched on the lower red clay. Water samples were collected from two borings in both sets. The other two borings were lost before they could be sampled when a front-end loader working in the area accidentally ran them over.

The upper boring set was found to be somewhat less contaminated with preservative constituents that the lower set. Cores from boring 34, set on the southeast bank of the pathway, contained no detectable chemical constituents. However, water samples did contain approximately 6,000 μg/L total constituents. Boring 33 was contaminated throughout, however concentrations did diminish with increased depth. Pentachlorophenol was present below MQLs from 4—6 ft. Boring 32 was also contaminated the entire depth, however a sample taken from the second red clay at 12—14 ft held concentrations less than 10 mg/kg. Pentachlorophenol was not detected below the 0-2 ft interval.

6.5.2.2.3 Third Boring Set

The final boring set in SWMU 9 was actually the first completed in this portion of the unit. This transect was completed approximately ten feet from the culvert inlet receiving runoff from the ditch. This point would be very close to the center of the low area observed in the 1971 photograph. Here the phaeritic surface was found in the same geologic unit as the upstream set. However, much more contamination was detected. Boring 29, completed near the ditch centerline, was the most contaminated. A soil sample taken 8—10 ft below the surface just underneath the red clay layer held almost 12,000,000 μg/kg total constituents. Pentachlorophenol was estimated at 480,000 μg/kg. These levels diminished by 91% in the next red clay layer, indicating some degree of containment is provided by the next lower soil stratum. This reduction was also found to be true in the other two borings, although the decrease was not as great.

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Data from these final boring sets is indicative of a surface release originating from the low area observed in 1971 aerial photography. Artificially induced hydraulic gradients produced by the impounded water seems to have induced downward movement of emulsified and free oil to lower soil strata where it began lateral spreading over lower, more impermeably red clay units. However this containment was not complete due to the presence of microfractures and rootholes throughout the stratum. Possibly entrenchment by a predecessor stream has also eroded the surface of the confining clay units near the SWMU's centerline until the clay is either so thin material can pass through in a shorter time, or the clay has been entirely worn away and provides no containment. More discussion on contaminant movement is given in Chapter 8.

6.5.2.2.4 Railcar Separator, SWMU 8

Boring 35 was advanced in a small drainage pathway near the west end of the site where the railcar separator was once located. Stained soil could be observed at the point where the auger was advanced. Two attempts were made at the boring. The first located the hole at a point which would be almost directly underneath the west end of the separator. However, the auger was refused at one foot when a four inch steel line was struck. This line probably represents a conduit from the plant to the impoundment located near here. After the drill rig was moved a few feet south of the line, boring 35 was advanced 22 feet. Figure 6-20 on page 6-69 shows subsurface strata revealed by the boring at this location. The red slickensided clay unit was present in this boring at six feet and was found to be 11 ft thick. Just underneath a firm silty sand was found containing a phaeritic surface 18 ft below ground. This level corresponds well to that found in upgradient borings.

Soil samples from the boring were found to be contaminated with somewhat "weathered" preservative constituents. The 0—2 ft interval contained 7,120,000 μg/kg total constituents. A sample composited from the 4—6 ft core showed a 94% reduction to 448,300 μg/kg. Uncontaminated soil was collected from the 20—22 ft interval. Pentachlorophenol was quantified below MQLs in the first two samples and was not detected in the last.

A water sample collected from a temporary well installed in the boring contained just detectable amounts of preservative constituents. Approximately 200 μg/L total constituents were

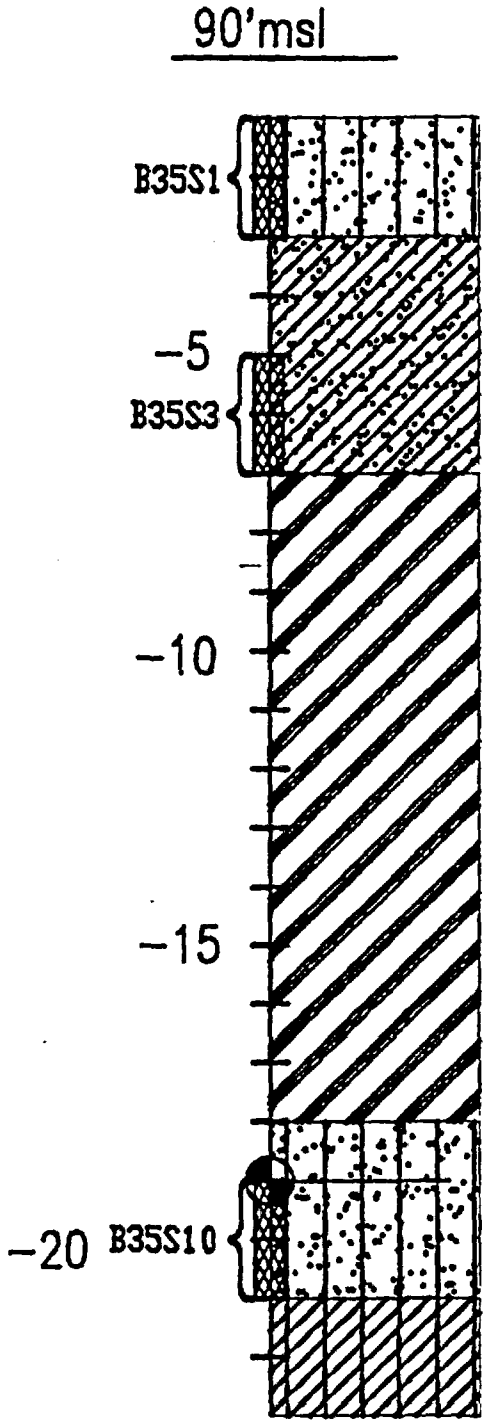
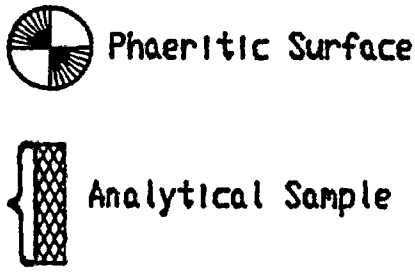


FIGURE 6-20: BORING 35 STRATIGRAPHY NEAR RAILCAR SEPARATOR.



detected in the sample, 70% of which was pentachlorophenol. Since pentachlorophenol was present in very low levels in higher strata, it is believed that this contamination originated fromthe large surface impoundment or the last of the three smaller cells.

Soil contamination does indicate a surface release was made here. The most likely source for this contamination is the separator. However, contaminants appear to be limited to the first six feet of soil and seem to be relatively immobile. Accordingly, the following conclusions and recommendations apply:

(1) A surface release was made by the railcar separator which was once located near the location of boring 35.

(2) The release is contained within the first six feet of soil underneath the site.

(3) Subsurface water contamination probably does not result from this SWMU since uncontaminated soil was located above the piezometric surface.

(4) The red slickensided clay layer was found in boring 35.

(5) No further work is recommended for this SWMU.

6.5.2.3 Summary

Contamination exists along the southern half of SWMU 9. The source of these contaminants is probably a series of surface water cells used in the past for preservative recovery. Contamination at the lower end of the SWMU most likely originated from water stagnating in the area when the southern culvert was installed.

The following conclusions are made for this portion of SWMU 9:

(1) Three small preservative recovery cells were operated by the company in the late 1960's and early 1970's near the upgradient end of this portion of SWMU 9. Locations of these cells is given in Figure 6-15 presented earlier.

(2) Possible blockage at the south end of SWMU 9 caused water to impound just upgradient from the last culvert's inlet. Contamination found in this area seems to have originated from this source.

(3) Wood preserving constituents detected in the most upgradient borings results from the three recovery cells mentioned in item (1).

(4) Wood preserving chemicals were detected in sediment contained within the concrete pipeline, AOC D.

(5) A trench cut from near the center of SWMU 9 across Cell 3 and the concrete pipeline indicates contamination was released by the line. Measurements of a contamination halo around the pipeline indicate horizontal diffusion is twice as great as that in the vertical direction.

(6) Slickensided red clays believed to represent a pleistocene swamp may serve as a "leaky" aquitard. Contamination seems to spread horizontally in more permeably soils over the clay stratum. However, the clay surface is eroded near the center of SWMU 9 to a greatly reduced thickness, thus allowing contamination to pass to lower stratum.

(7) The horizontal extent of contamination was not defined along the northeast side of SWMU 9 at the upgradient end. Soils taken from boring 34 on the southwest bank did not contain preservative constituents. However, the horizontal extent was not defined in the last boring set.

(8) The vertical extent of contamination was not defined by the borings.

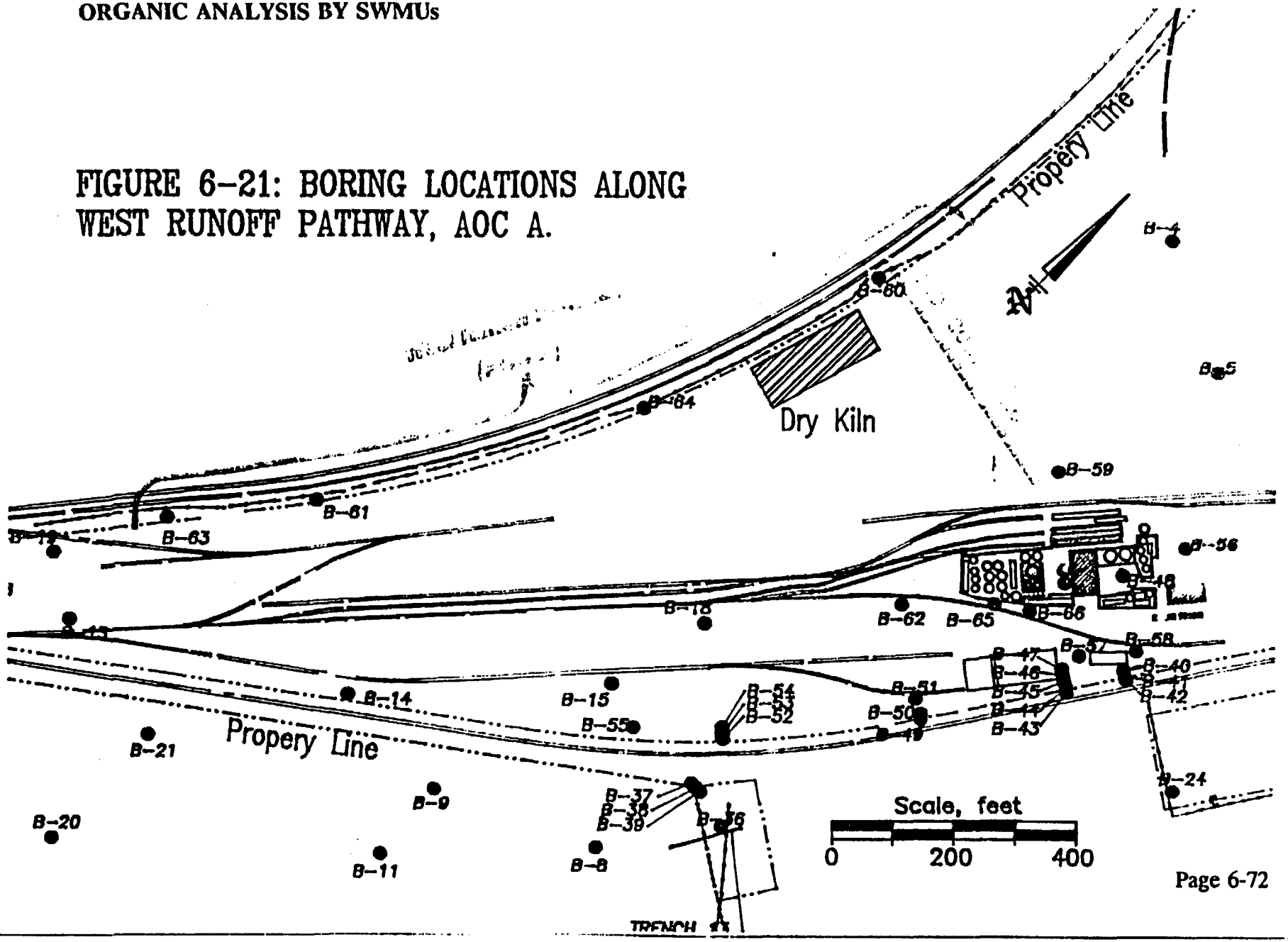
(9) More work is recommended to determine if a contamination plume has moved offsite from any of the surface water cells along this portion of SWMU 9.

(10) The company has removed and properly disposed of the concrete pipeline in this portion of the SWMU. Therefore no further work is recommended for this portion of AOC D.

6.6 Other SWMUs

Two other areas of concern and two additional SWMUs were also evaluated. AOC A, the west runoff pathway, and AOC C, the truck servicing area were investigated by subsurface drilling. The untreated wood landfill, SWMU 11, was evaluated by thirteen trenches and one boring. SWMU 12, the ground water recovery tank, was investigated by constructing a trench near the downgradient end.

FIGURE 6-21: BORING LOCATIONS ALONG WEST RUNOFF PATHWAY, AOC A.



6.6.1 West Runoff Pathway, AOC A

Four borings, 60, 61, 63, and 64 were located along the southeast side of this area of concern, approximately at the quarter points as shown by Figure 6-21 on the previous page. This area of concern extends along the entire northwest side of parcel A. The unit receives runoff from the northwest half of Parcel A and the Arkansas and Louisiana Railroad's Shreveport railway. Subsurface geology consisted of a series of clayey sandy silts and interbedded silty sands at the northern end. The southern end was typified by clayey silty sands and stiff red slickensided clays found in other borings throughout the property. Boring 61 had to be completed by hand auger because the site was not safely accessible by the drill rig. Therefore the depth was limited. Nevertheless, water was found in this boring at three feet. Near the boring, water was observed impounding below the inlet to the culvert draining the pathway to the northwest ditch along the railway. Both levels were at approximately the same elevation. Since the water elevations correlate very closely, subsurface water probably seeps in the formation from pathway.

Table 6-7 presents analytical results from the borings along this AOC. Soil contamination was detected in none of the borings except boring 60. This was highly unexpected since no wood preserving operations were known to have been conducted at this location. The boring showed clean soil down to the 6—8 ft interval where field detection methods began indicating chemicals were present. Subsurface water was found at 10 ft and an oily sheen was present on sampling equipment used at this depth. Sample B60S4 held 3,780,000 μg/kg total constituents. A deeper sample collected from the water bearing zone showed only 10,300 μg/kg total constituents present. A water sample taken from the borings contained 4,270 μg/L total constituents. Pentachlorophenol was not present in the samples. The majority of constituents present consisted of two and three ring aromatic compounds such as naphthalene and pyrene.

Soil data indicates this contamination probably originated from a subsurface release. Due to the fact that the water bearing stratum was less contaminated that those above, the material was probably not transported here by hydraulic movement. Rather, water contamination exists

TABLE 6-7: ANALYTICAL RESULTS FROM BORINGS COMPLETED ALONG WEST RUNOFF PATHWAY, AOC A. CONCENTRATIONS GIVEN IN $\mu g/kg$.

Cas No.	91-20-3	91-57-6	83-32-9	208-96-8	86-73-7	85-01-8	120-12-7	206-44-0	129-00-0	56-55-3	218-01-9	205-99-2	207-08-9	75-09-2	67-64-1	75-15-0	71-43-2	108-88-3	1330-20-7
Compound	Naphthalene	2-Methylnaphth	Acenaphthene	Dibenzofuran	Fluorene	Phenanthrene	Anthracene	Fluoranthene	Pyrene	Benzo(a)Anthrac	Chrysene	Benzo(b)Fluoran	Benzo(k)Fluoran	Methylene Chlori	Acetone	Carbon Disulfide	Benzene	Toluene	Xylene (Total)
B60S2														*40*	*10*	14	5	48	5
B60S4	19000	57000	52000	48000		50000	15000	56000	58000	6200	6900	3500	3200	*76*	*12*			240	
B60S7			560	1300	1100	3400	280	1600	910	250	300	290		*14*		10		320	
B61S1														*9*		6		7	
B61S2														*13*		6		98	
B63S4														*35*	*46*	7		250	
B64S6														*16*	*57*	7		18	

Quantities shown in shaded cells indicate the compound was estimated because it was detected belowthe method detection limits.
Bold italic quantities indicate constituent was detected in laboratory background samples

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at near solubility levels expected for the contaminants and therefore probably results from hydraulic movement through contaminated media in higher soil zones.

Colfax personnel were consulted about the possible source for this contamination. The company believes previous management operated a blowdown line in a ditch extending from the plant in this direction. This hypothesis is supported by data collected from boring 54 where similar contamination was detected. The extent of contaminants detected in boring 60 are not known.

Very low levels of pentachlorophenol were also found in water samples taken from borings 64 and 61 (33 and 66 μg/L respectively). No other constituents were found in the water samples. Since water from boring 61 is believed to infiltrate from the ditch, this contamination may result from this source. Pentachlorophenol in boring 64 may result from this source also. Pentachlorophenol was found in a surface water sample collected from the ditch near the location of boring 61. This sample contained 33 μg/L of the chemical.

Conclusions and recommendations for AOC A are:

(1) Wood preserving constituents were detected in subsurface soil at the north end of AOC A. Data indicates a subsurface release was made, possibly from a blowdown line once extending in this direction. The extent of this contamination is not known.

(2) Soil cores taken from the last interval in other borings along the pathway were not contaminated.

(3) Subsurface water samples collected from borings 61 and 64 contained low levels of pentachlorophenol. Surface water samples collected from water standing near the inlet of the culvert draining the pathway showed similar levels of the chemical. Therefore, this is believed to be the source of the material.

(4) The culvert inlet was blocked by wood debris. It is recommended that this inlet be cleaned and kept open to allow water to freely drain from the unit. This would prevent water from impounding in the area and thus carrying pentachlorophenol to lower zones.

(5) No further work other than in item (4) is recommended.

6.6.2 Truck Servicing Area, AOC C

AOC C is a lot adjacent to, and across the Minden railway from the company's office. Here, tractor-trailer trucks are fueled and some limited equipment maintenance was conducted in the past in a building on the property. The investigation for AOC C was targeted to determine if: (1) releases have occurred from diesel fueling operations, and (2) truck maintenance operations have impacted the site.

Two borings were installed in the parcel assess possible releases in the area. First, boring 22 was drilled in the berm around the diesel tanks. Second boring 23 was drilled in a drainage pathway from the area (which eventually joins SWMU 9). Chemical analysis detected contamination in only three samples from the borings. Sample B22S8 contained 660 μg/kg of chrysene and B22S1 showed trichloroethene to be present at 6 μg/kg. The 2—4 ft interval from boring 23 contained xylene at 7 μg/kg. Both volatile compounds are sometimes associated with diesel fuel, however the chrysene results are questionable. Samples collected from other borings over Colfax property show chrysene to be relatively immobile, usually contained within the first two feet of soil in highly contaminated areas. The chemical was not found in samples collected from higher intervals within the boring. A water sample taken from boring 23 (between boring 22 and the wood preserving plant) was also free of the chemical. Thus it is highly unlikely that any contamination was transported to this area by subsurface hydraulic movement.

Infrared spectroscopy did indicate some hydrocarbons to be present very near the method detection limit of 1 mg/kg in the 6—8 ft interval from boring 22. A duplicate sample showed similar results. Field screening did not detect contaminants below this interval. A water sample taken from boring 23 showed TPH levels of 3.3 mg/L in a firm coarse sand extending from 19 to 30 ft below ground. This concentration is comparable to that found in borings 1 and 2 in SWMU 1.

The field screening and TPH data suggests that some diesel fuel may exist in subsurface units. The probable source of this material is from storm water filtering through surface soils containing fuel underneath the storage tanks. Therefore the following conclusions and

recommendations are made:

(1) Very low amounts of hydrocarbon contaminants were detected in borings completed near the diesel fueling area. The fueling area is the likely source of this contamination.

(2) Surface soils underneath the diesel fueling tanks should be removed and disposed as a solid waste.

(3) A concrete slab and berm containment system should be constructed to contain the fuel tanks and fueling island.

(4) The berm system should be covered to prevent storm water from coming in contact with fuel spillage to the containment system.

(5) Any floating oil in storm water discharge from the berm area should be removed with sorbent booms or other oil skimming device(s).

(6) No further work is recommended for the area.

6.6.3 Groundwater Recovery Tank, SWMU 12

The RFI workplan originally intended for this unit to be investigated by completing one boring at the downgradient end of the tank site. However, three attempts were made with the hollow-stem auger which was refused each time. Subsequently, regulatory officials allowed the company to investigate the SWMU by completing a trench at the borings site using a back-hoe. Trench 12 was excavated to a depth of eight feet for this purpose. Side-wall material consisted of decaying wood-waste and soil fill down to four feet below surface. Below that a natural red silty clay was found. This unit did not exhibit the same coloration (Munsell 7½ YR 4/3) or texture as the deeper red slickensided clay. Surface contamination was not apparent.

Three samples were sent for analytical analysis from the trench. Composited from two-foot intervals down the trench side-wall, samples T12S2, 'S3, and 'S4 were checked for TCL parameters. Results are found in Table 6-8 in the following section. The last two samples were collected from the clay stratum. The first sample collected from the fill material was found to contain creosote constituents at levels between 10 and 100 mg/kg. This is probably contained in treated wood debris included in the fill. Both samples from the natural clay were

uncontaminated.

The investigation indicates that a release has probably not been made by the groundwater recovery tank. This is supported by the following conclusions:

(1) The groundwater recovery project was implemented only one year prior to the EPA's RFA. During this time, no releases were documented from the tank.

(2) No releases have occurred since the RFA.

(3) Any release from the unit would be made to surface soils. No surface release was apparent during the RFI.

(4) Chemicals present in the fill downgradient from the unit most likely originated from treated wood debris included in the soil matrix.

(5) Chemical constituents were not present in natural soils below the fill material. Therefore, the compounds are not impacting subsurface soils.

(6) The company has installed a curbed concrete pad and recovery sump to contain releases from the tanker. The system is inspected daily.

(7) No further work is recommended for this unit.

6.6.4 Untreated Wood Landfill, SWMU 11

Thirteen trenches were excavated and one boring drilled to determine if this unit is impacting the environment. A Case backhoe was used to excavate the trenches for a minimum depth of eight feet or to natural soil. The trenches were located as closely as possible to the center of cells constructed by projecting a grid on a map of the SWMU. Boring 25 was completed on top of a small undisturbed hill overlooking the south side of the unit. On page 6-78, Table 6-8 presents analysis results from samples collected from the trenches and boring 25. Figure 6-22 following the table shows the locations of the trenches and boring 25.

Fill material in the SWMU was found to be much thinner than expected. Averaging four to five feet in thickness, the fill matrix consisted of wood cutoffs and debris in various stages of decay, soil, and some construction debris. Fill thickness is greatest along the southern edge of the unit where recent wood cutoffs are being placed. This edge seems to be between six to eight feet thick.

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TABLE 6-8: ANALYTICAL RESULTS FROM TRENCH SAMPLES COLLECTED IN THE UNTREATED WOOD LANDFILL, SWMU 11. CONCENTRATIONS GIVEN IN $\mu g/kg$.

Sample No.	91-20-1	91-21-1	91-22-1	91-24-1	91-25-1	91-26-1	91-26-1	91-27-1	91-28-1	91-29-1	91-30-1	91-31-1	91-32-1	91-33-1	91-34-1	91-35-1	91-36-1	91-37-1	91-38-1	91-39-1	91-40-1	91-41-1	91-42-1	91-43-1	91-44-1	91-45-1	91-46-1	91-47-1	91-48-1	91-49-1	91-50-1	91-51-1	91-52-1	91-53-1
Compound	Naphthalene	2-Methylnaphthalene	Acenaphthylene	Dibenzofuran	Phenanthrene	Fluorene	Acenaphthene	Anthracene	Phenanthrene	Pyrene	Benzo(a)anthracene	Chrysene	Benzo(b)fluoranthene	Benzo(k)fluoranthene	Benzo(a)pyrene	Indeno(1,2,3-cd)pyrene	Dibenz(a,h)anthracene	Benzo(g,h,i)perylene	2-Methylphenol	4-Methylphenol	Acetophenone	Carbazole	2-Nitroaniline	Dibenzofuran	Carbazole	2-Nitroaniline	Dibenzofuran	Phenanthrene	Anthracene	Dibenzofuran	Total Compounds Detected	Chlorobenzene	Ethylbenzene	Xylenes (Total)
T152		870	6600	4900	9100	1900	39000	870		17000	9600		3400						29	200	9													
T153			160	130	220	370	2000	660	2300	1600	640		610						29	230														
T154																			9		11													
T252																			12		13										100			
T253																			9		13										39			
T254																			19	15	19										130			
T352	2000	800	3600	2300	3400		3600	860	6600	6900	2500		4000						17		4										11			
T353							300		660	300									17		14										23			
T354																			11															
T452									6900	7700	1700	3700							19		11										110			
T453	770	880	1300	910	1600		7000	880	4900	6900	1200	1600							13		10										32			
T454																			17	65	4										14			
T551	220000	38000	77000	46000	69000		190000	41000	340000	130000	67000		44000						100	1700								330			220	860	190	870
T552	640								460										20												61			
T651	110	84	86	97	88	800	300	190	410	850	180	370							14	180											98			
T652	1900	910	4600	1700	2400	3200	31000	27000	48000	68000	8800	18000	8400	7900					30	180	11		88								710			
T653	8000	4100	13000	7600	11000	3700	51000	13000	71000	72000	11000	18000	7100	6100	6000				28	310	10		18								300			
T752									15000	36000	6400	16000							88	1700	84										880			
T753						3400	11000	3800	11000	62000	9400	19000	11000						28	170	43										38			
T754							2400		3700	6900									20	490	38										120			
T852									7000	13000			8300						180	210	49										260			
T853						3900	3100	3100	11000	11000	2800		13000					6700	84	210	38										200			
T854	760		700	400	780	860	3700	3700	7300	6400	2300		4300			1100	860		47	170											80			
T951			8400	4800	19000		74000	39000	180000	110000	17000	34000							30	38	38						7			8	84			
T952			8400		4400	3700	37000	6200	79000	78000	18000	14000	20000						40	40	34										84			
T953																			24		30										30			
T1051									3100	3900	1600	2300							10	370	10	11		8		8				8	170			
T1052																			7	230	10		10								30			
T1153																			41	88	43										88			
T1153							6300		30000	26000	3700	3300	12000						69	910	39										200			
T1154			2100				8600		8100	7800			8600						60	180	37		17								240			
T1252	17000	4100	19000	13000	19000	21000	84000	11000	48000	80000	14000		21000		6800		3800		86	840	74		33								110			
T1253																			44	800	31										30			
T1254																			48	130	30										19			
T1351	7500000	1800000	3000000	2100000	3600000	3800000	7800000	3600000	3600000	8600000	2300000	320000							1900	20000	870							790			6600		4600	26000
T1451	840	330	1800	1700	1900	2000	6900	4400	14000	6400	3100		1300						69	310											110			
T1452							870		230											7														
T1452D																			11												10			

Qualifiers shown at end of file indicate the compound was estimated because it was detected below the method detection limits.
Bold indicates indicates contaminant was detected in laboratory background samples
"Total Compounds Detected" does not include phthalates, methylene chloride, acetone or carbon disulfide.

SUMT1991.WK3, RANGE B:C75, S:AQ119

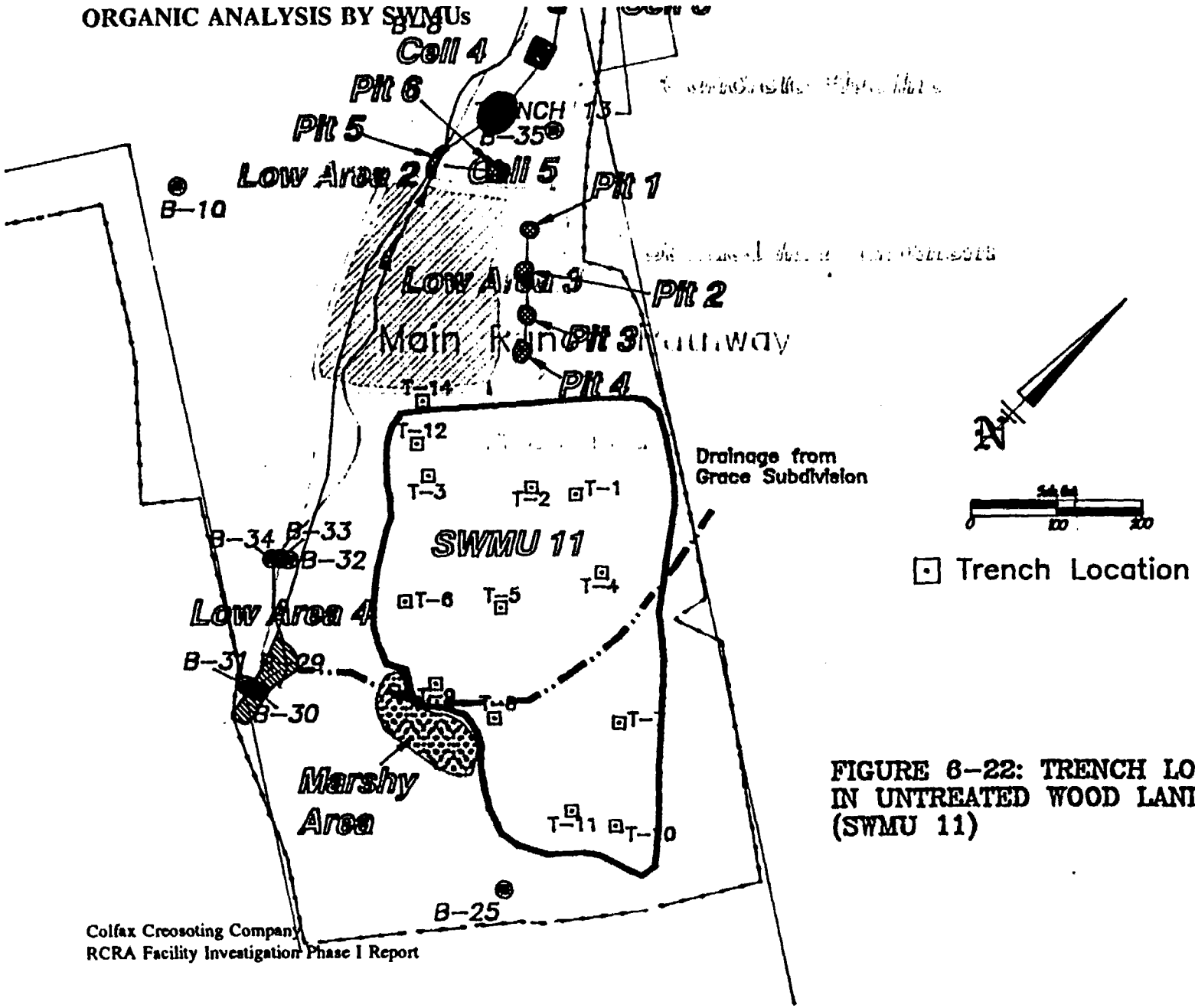

FIGURE 6-22: TRENCH LOCATIONS IN UNTREATED WOOD LANDFILL (SWMU 11)

ORGANIC ANALYSIS BY SWMUs

Conclusions regarding subsurface soil conditions under SWMU 11 are made based on observations from boring 25 and boring transects near the end of SWMU 9. Boring 25 was completed on an undisturbed hill overlooking the fill. The elevation differential between the site of the boring and the landfill ranges from four to eight feet. Soils found in the borings consisted of one foot of topsoil followed by a seven feet thick layer of stiff clay containing silt lenses. Below this zone a dense fine sand was detected extending down 12 ft below the surface. Underneath the boring intercepted the first slickensided clay containing microfractures and small root holes. Color comparison between this unit and natural soil found below the landfill indicates the fill is resting on this unit. At boring 25, the clay was found to be 12 ft thick. In borings completed along the main runoff pathway, the clay was found to be eroded near the center of the pathway until it was either no longer found, or only a few feet thick. Below the clay, a thin sand layer was sampled followed by a second slickensided clay.

The fill site is actually a valley formed by a drainage pathway once extending from Grace Subdivision to where the culvert draining SWMU 9 is presently located. Aerial photography shows sometime prior to 1975 and after 1971, the company began using the valley as a disposal area for wood debris and cutoffs. Judging from borings completed along SWMU 9, and site topography, the valleys were formed by stream entrenchment in the subsurface slickensided clay layer. However, evidence suggest this erosion may have not been as great along the valley arm extending northeast into the subdivision. This hypothesis is supported by two observations: (1) this valley is much shorter than that drained by SWMU 9, and (2) the boring log from well MW-8, located in the second valley, shows the clay stratum has not been eroded to the degree found along SWMU 9. The boring log for MW-8, presented as Figure 6-23 on the following page, agrees very well with that from boring 25. Water was found in the sand stratum between the clay units in boring 25.

Storm water runoff from Grace Subdivision drains to the northeast side of the fill area where it enters the fill matrix. The water infiltrates through the material, most likely along the former stream bed between the fill and clay layer, and emerges in a small marshy area on the southeast side. This marsh is located very near the former confluence of the main runoff

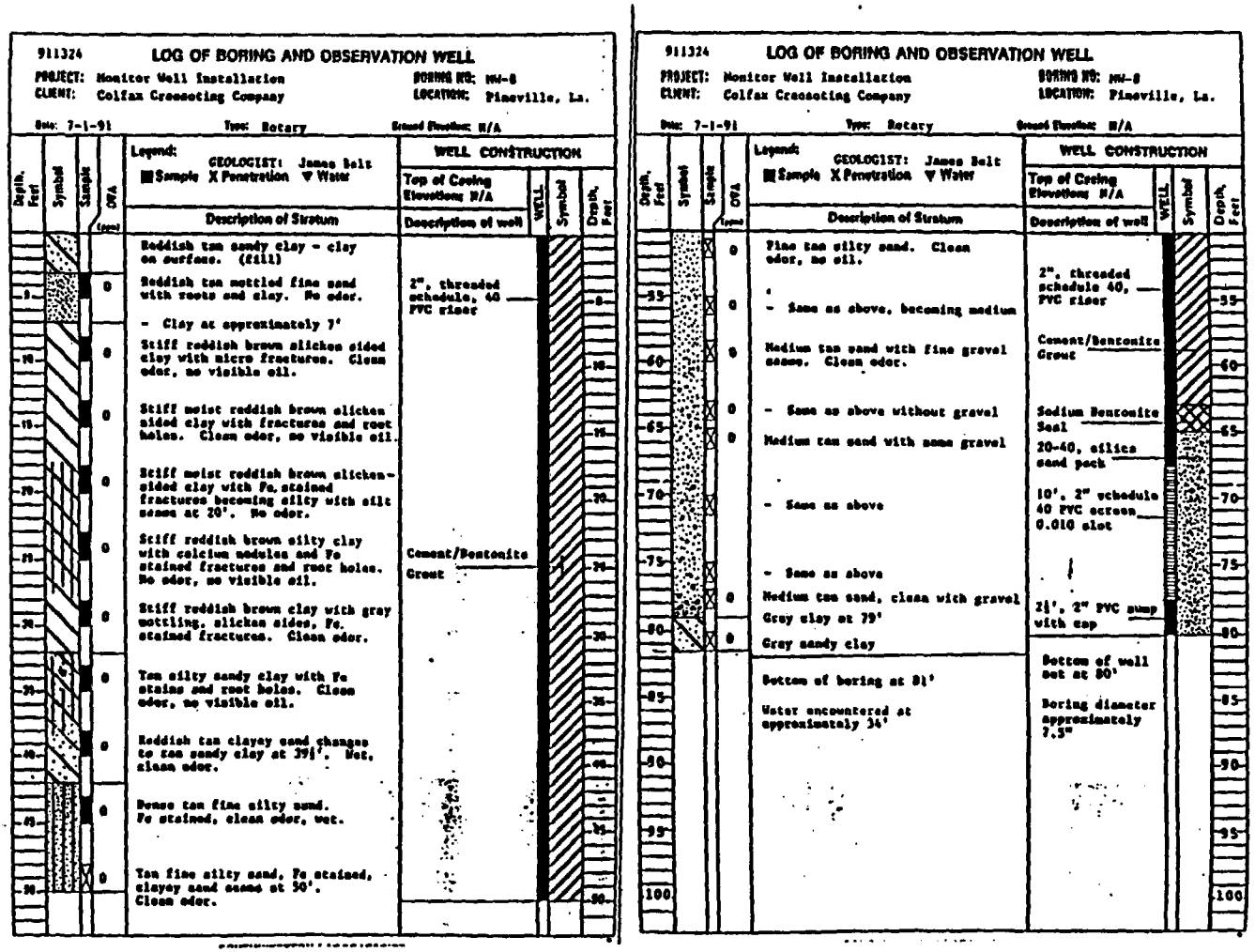

FIGURE 6-23: MW-8 BORING LOG

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pathway and the dendrite draining the subdivision. Heavy vegetation consisting mainly of cattails and willow bushes has overgrown the marshy area. Surface water samples were collected from the marsh.

The Company had stated before beginning the project that sludge from any portion of the plant had not been deposited in the fill. This was verified by trench excavation and analysis. The investigation did reveal that some treated wood cut-offs containing both creosote and pentachlorophenol had been placed in the fill. Sampling targeted material in the fill resembling treated wood, and the results show some of the material sampled is indeed treated. However, from Table 6-8, no trends in the results are obvious (*e.g.* contamination does not increase or decrease with depth). This would be expected from random filling of material.

Although treated wood debris was found in the fill, the material does not seem to be impacting the subsurface environment. Analytical samples were collected from the natural soil underneath the fill in seven trenches. Wood preserving constituents were not detected in any of these samples. At least one sample, T9S3, collected from the fill (i.e. material resembling treated wood waste) was found to be uncontaminated. A second sample taken from trench 5 contained just over 1 mg/kg total constituents. Other samples taken from the fill contained total preservative constituents at levels ranging from 10 to 100 mg/kg, much of which was pyrene and fluoranthene. Since preservative constituents were present in the fill and absent in subsurface soils, it can be concluded that the chemicals do not readily leach from the wood waste.

This argument was strengthened by surface water samples collected in the marsh during a storm event and from a low flow period. Sample SW-9 and it's duplicate were taken from the marsh on June 1 during a one inch rain. Sample SW-13A was collected from water draining from the marsh on June 16 during a low flow period. No wood preserving constituents were present in either of these two samples. More discussion of these samples is found in the next chapter.

Wood preserving chemical constituents were also absent in a permanent piezometer installed in boring 25. Sample GW-19 did not contain any TCL chemicals, but it did exhibit extremely high TPH levels. Analysis revealed a TPH concentration of 522 mg/L in this sample.

However, these results are questioned because only one other sample from the entire site indicated contamination at higher levels. Sample GW-22 collected from boring 53 near the former site of cells 1 and 2 contained 632 mg/L TPH. In this sample, free oil could be observed on the water surface. No oil was detected in any sample, water or otherwise, from boring 25 by field screening. Therefore, this result probably indicates cross-contamination from some outside source. Accordingly, it is recommended that this well be re-sampled for TPH analysis.

Conclusions for SWMU 11 are:

(1) The fill depth averages between four and five feet over the unit. Fill depths are greatest along the south side of the SWMU.

(2) Analysis shows some treated wood has been placed in the fill. Chemical levels ranged from 10 to 100 mg/kg total constituents in wood debris samples.

(3) Data indicates chemical constituents detected in the fill originated from treated wood cut offs and not sludge from the wood preserving process.

(4) Samples collected from natural soil underneath the fill was found to be analytically clean. Runoff samples from the marsh receiving drainage from the SWMU were also free of wood preserving chemical constituents.

(5) An elevated TPH level was found in a water sample from boring 25. This may represent cross-contamination. The well should be resampled to confirm to result.

(6) The fill does not seem to be impacting the subsurface environment.

(7) Other than that recommended by item (5), no further investigation is recommended for this unit.

7 SURFACE WATER RUNOFF

The objective of this portion of the investigation was to determine if preservative constituents are released to soil and/or surface water from surface water runoff and to characterize the nature, extent, and rate of migration of any releases to the respective medium. This objective was accomplished by collecting surface water samples from drainage pathways at several points within and along property boundaries.

7.1 Drainage Area Delineation

Parcel A at Colfax consists of nineteen small watersheds, designated A1 through A19, as shown in Figure 7-1 on the following page. The delineation of these areas is based upon the current prevailing drainage patterns existing at the site. These patterns have been imposed by the topography of the land and the presence of physical structures such as rail spurs and access roads at the plant. Following is a description of these drainage patterns as they appear to emerge during storm events:

(1) Areas A6, A7, A8, A9 and A10 discharge to area A5 which then discharges to Parcel B.

(2) Areas A1, A2, A4 and A16 drain to area A17.

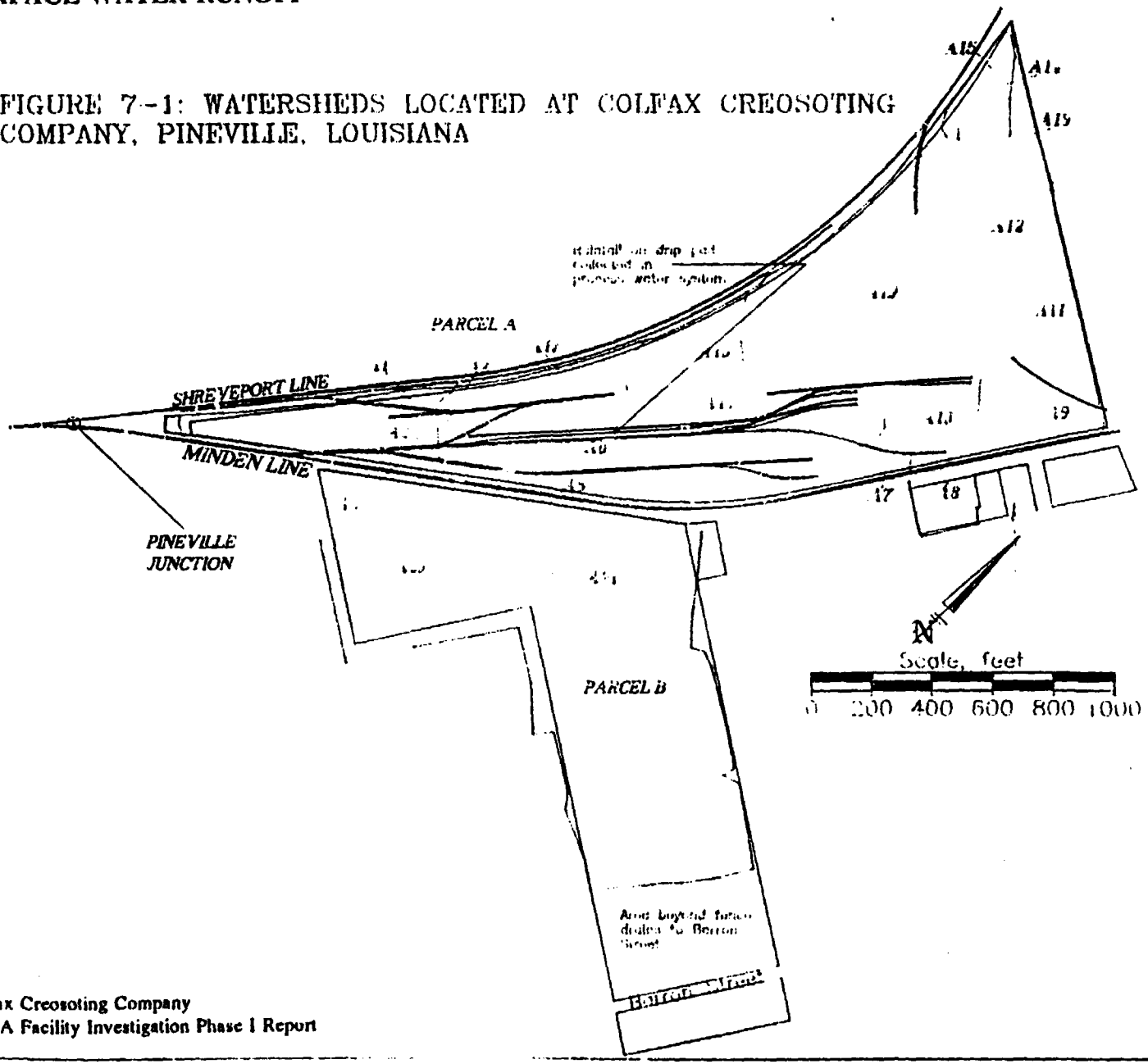
(3) Drainage areas A14 and A15 drain to area A13.

(4) Drainage areas A11, A12, A18 and A19 have their own outfalls.

Parcel B is divided into two drainage areas: A20 and A21. A divide exists between these areas running north from the school's north property corner to a point almost due north to the railroad. Water falling east of the divide joins with runoff from Parcel A in the main runoff pathway. Water from the north west basin, area A20, drains to a ditch that meanders through dense vegetation to Huffman Creek. Table 7-1 presents the total area of each watershed in square feet. These areas were determined by planimetry using the site topographic maps

SURFACE WATER RUNOFF

FIGURE 7-1: WATERSHEDS LOCATED AT COLFAX CREOSOTING COMPANY, PINEVILLE, LOUISIANA



developed for the project by Integrity, Inc., Shreveport, Louisiana.

TABLE 7-1: PLANIMETERED AREA OF WATERSHEDS EXISTING AT COLFAX CREOSOTING COMPANY.

Watershed	Area, ft^2	Watershed	Area, ft^2
A1	19,913	A2	123,040
A3	20,104	A4	21,058
A5	143,589	A6	145,434
A7	21,312	A8	8,143
A9	101,854	A10	73,162
A11	111,651	A12	145,052
A13	84,486	A14	24,238
A15	25,130	A16	106,626
A17	70,935	A18	102,618
A19	348,697	A20	341,250
A21†	765,000		

†Note: This watershed also includes a portion of Grace Subdivision located adjacent to the Parcel's northeast side. The amount shown only includes that portion of the area on company property.

7.2 Discharge Points and Drainage Patterns

Sixteen of the watersheds join together to form three discrete drainage basins, each with a separate discharge point conveying water away from the property. Five of the watersheds have individual discharge points. These outfalls are located in areas A11, A12, A13, A17, A18, A19, A20, and A21.

Drainage patterns over the property are mainly dictated by railroad spurs throughout the property. Areas A11, A12, and A13 are bounded to the West by an abandoned railroad bed and discharge east to storm sewers along Wadley Road. Treated and untreated timbers are located in these basins. Area A12 also receives storm water from the highway overpass.

Rail spurs converted to drip pads form a major divide along Parcel A's southwest-northeast axis. All basins north of this divide drain to the west runoff pathway, AOC A. Three culverts exist along this pathway sending water to the north ditch along Louisiana and Arkansas's

Shreveport rail line. From these points, water drains west along the railroad approximately one mile to discharge into Huffman Creek. Water falling south of the divide collects in the main runoff pathway, SWMU 9. This includes storm water draining from: the plant office building, outside the treating complex dike, around the maintenance shop, and portions of the west wood storage yard. Water falling on the drip pad is not included since it is collected and treated in the process water system. A culvert midway along the main runoff pathway sends runoff to Parcel B.

Parcel B is characterized by three drainage divides, two of which confluence within the parcel. Sometime prior to 1971 before the company began filling wood cutoffs in SWMU 11, a ditch ran from within Grace Subdivision to a point near the last culvert in SWMU 9. Here it was joined by the main runoff pathway from Parcel A and continued unchecked to a small tributary to Huffman Creek south of Baron Street. This drainage pattern can be seen in the 1955 aerial photograph in Appendix A. However, after the company began using this property for cutoff storage, the drainage from Grace Subdivision was dammed by the fill. Water from this pathway now filters underneath the fill to emerge in the marshy area on the south side of SWMU 11 and overflows into the main runoff pathway. The third divide in the western portion of Parcel B begins area A20. Here a small dendritic ditch is formed which conveys runoff west to a second tributary to Huffman Creek.

Regional drainage from the property is illustrated by Figure 7-2 on the following page. This is an excerpt from the USGS's Alexandria 7½' Quadrangle of the area.

7.3 Site Runoff

Daily rainfall readings from May 1 to July 31, 1992 taken from a rain gauge maintained onsite by the company are presented using a bar graph as Figure 7-3. As can be seen from this graph, several storm events were recorded during RFI field work. During these events, runoff was observed to aid in delineating the outfalls presented in Figure 7-1. Outfalls were also observed during periods of no rainfall. During these "low flow" periods, water was always present in the main runoff pathway in Parcel B, indicating this is a receiving stream. Water was

SURFACE WATER RUNOFF

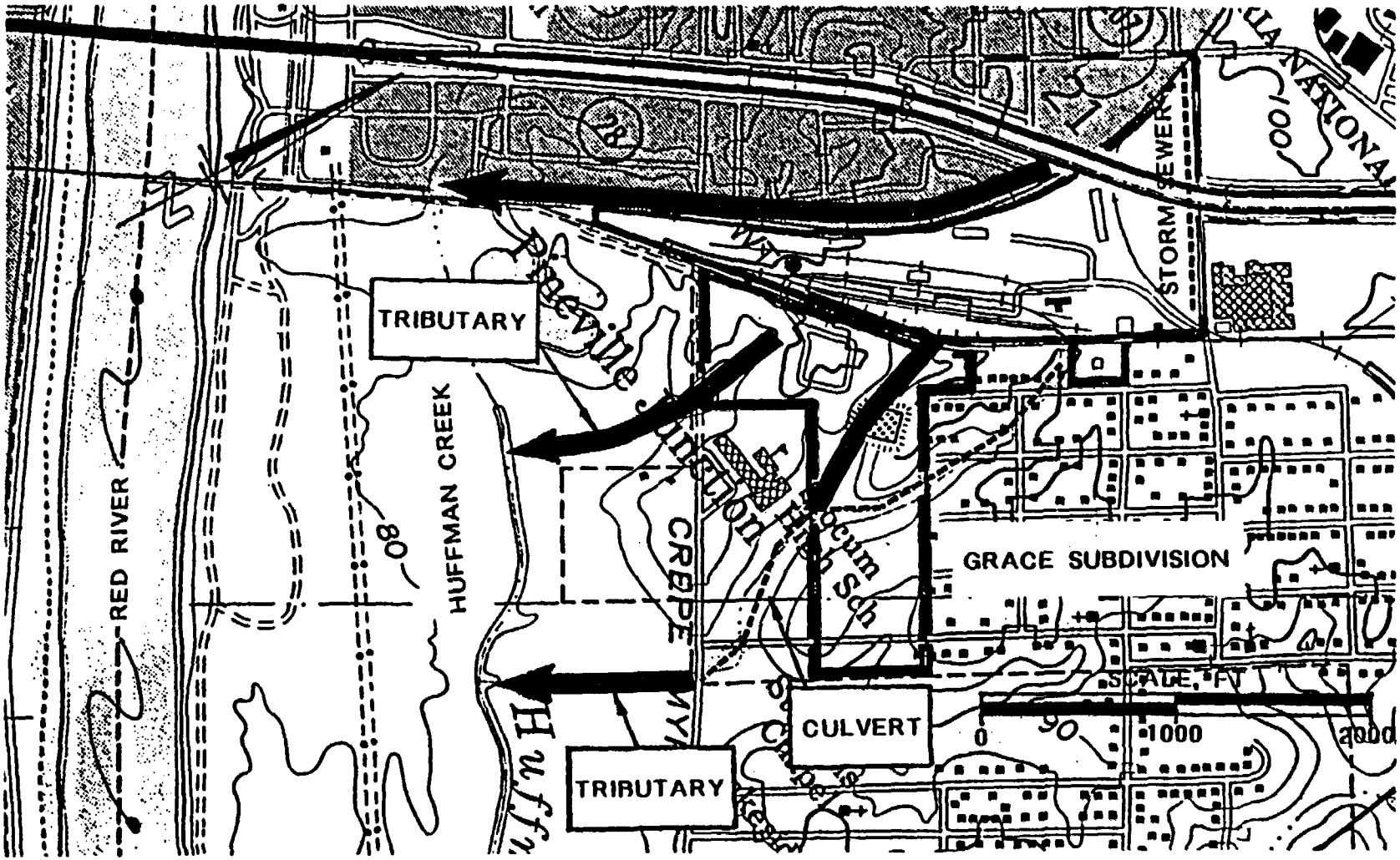


FIGURE 7-2: REGIONAL DRAINAGE AROUND COLFAX CREOSOTING COMPANY PROPERTY, PINEVILLE, LOUISIANA. (SOURCE: ALEXANDRIA, LOUISIANA 7½ MINUTE QUADRANGLE, USGS)

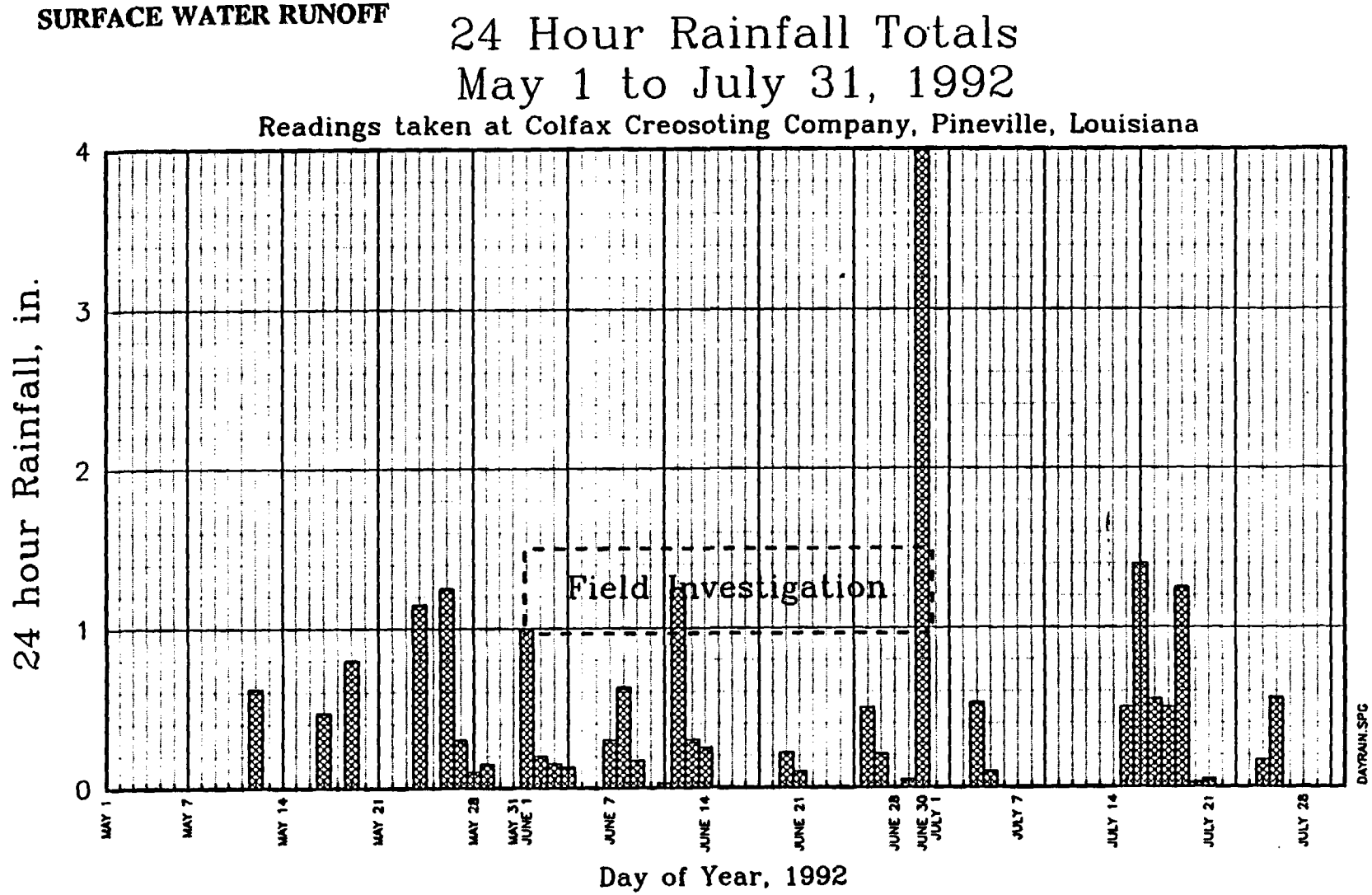


FIGURE 7-3: RAINFALL AMOUNTS FROM MAY 1 TO JULY 31, 1992 RECORDED FROM RAIN GAUGE LOCATED AT COLFAX CREOSOTING COMPANY, PINEVILLE, LOUISIANA.

also observed near the middle sections of the west runoff pathway. Water was also always found in the marshy area adjacent to SWMU 9.

Twenty-four hour runoff volumes from each watershed were estimated from site rainfall readings and a runoff coefficient was estimated at 0.35 for semi-pervious soils[1]. Table 7-2 on the following page presents this analysis. Figure 7-4 on page 7-9 gives a graphical representation of runoff volumes discharged within a 24 hr period for a unit rain. From this figure, the major outfalls are located in drainage areas A17, A19, A20 and A21.

7.4 Sample Collection

Surface runoff samples were collected from most of the outfalls after three different rainfall events and during one low flow period. Due to similarities in size and inventory between areas A11, A12, and A13, only one sample was collected from area A12. The first rain sampled was on June 1, 1992 with 1 inch of rain occurring. The second was on June 8, 1992 with 0.63 inches of rain occurring. The third was on June 9, 1992 with 0.17 inches of rain occurring. Three low flow samples were taken from the main runoff pathway on June 16 when particularly dark water was observed in the unit. These samples were collected from the same locations as previous samples for comparison purposes.

Surface water samples were analyzed for volatile and semi-volatile compounds, arsenic, copper, chromium, and total petroleum hydrocarbons (TPH). Grab sampling locations are indicated on the map in Figure 7-5 on page 7-10. Organic analysis results are also summarized in this figure. Metals results were discussed earlier in chapter 5. Table 7-3, page 7-11, summarizes organic analytical results from surface water sampling.

7.5 Release Calculations

A total estimated release of volatile and semi-volatile compounds was calculated based on the rainfall amount collected on June 1, 1992 which was one inch of rain. The calculations were performed separately for each outfall area in order to determine the contribution from each

[1]Wright, P.H. and R.J. Paquette. 1979. Highway Engineering. John Wiley & Sons, New York. p. 286.

TABLE 7–2: ESTIMATED RUNOFF VOLUMES FROM WATERSHEDS LOCATED AT COLFAX CREOSOTING, PINEVILLE, LOUISIANA

RUNOFF COEFFICIENT =		35.00% (SEMI-PERVIOUS SOILS)		
		Total Runoff from Area, gallons		
	Area	June 1	June 8	June 9
Watershed	sq-ft	1	0.43	0.17
A1	19913	4344	2737	739
A2	123040	26843	16911	4563
A3	20104	4386	2763	746
A4	21058	4594	2894	781
A5	143589	31326	19736	5325
A6	145434	31729	19989	5394
A7	21312	4650	2929	790
A8	8143	1777	1119	302
A9	101854	22221	13999	3778
A10	73162	15962	10056	2713
A11	111652	24359	15346	4141
A12	145052	31645	19937	5380
A13	84486	18432	11612	3133
A14	24239	5288	3332	899
A15	25130	5482	3454	932
A16	106626	23262	14655	3955
A17	70935	15476	9750	2631
A18	102618	22388	14104	3806
A19	348697	76074	47927	12933
A20	341254	74450	46904	12657
A21	765021	166902	105148	28373

FLOW CHARTS, TOTAL VOLUME LEAVING, GALLONS

June 1, 1992 Rain

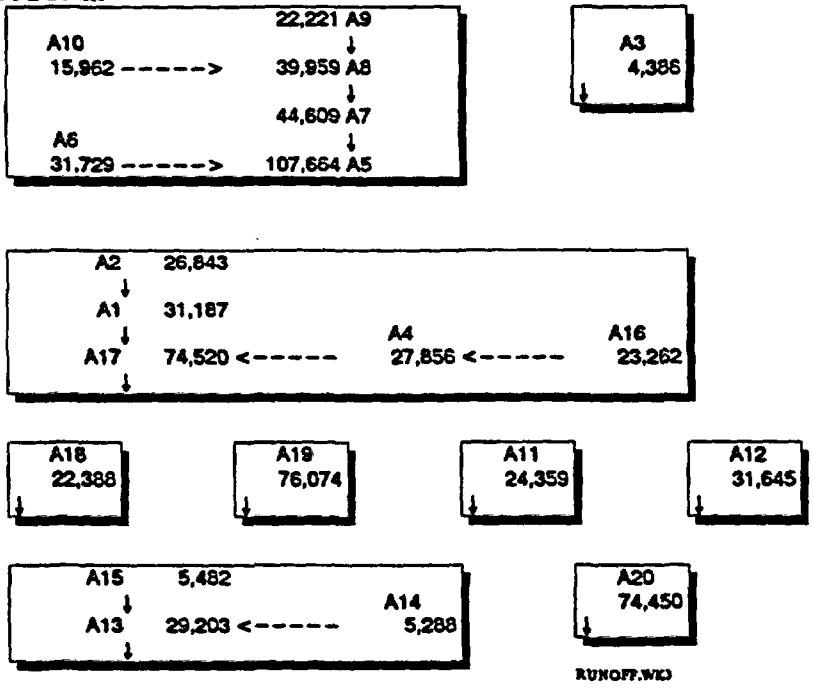
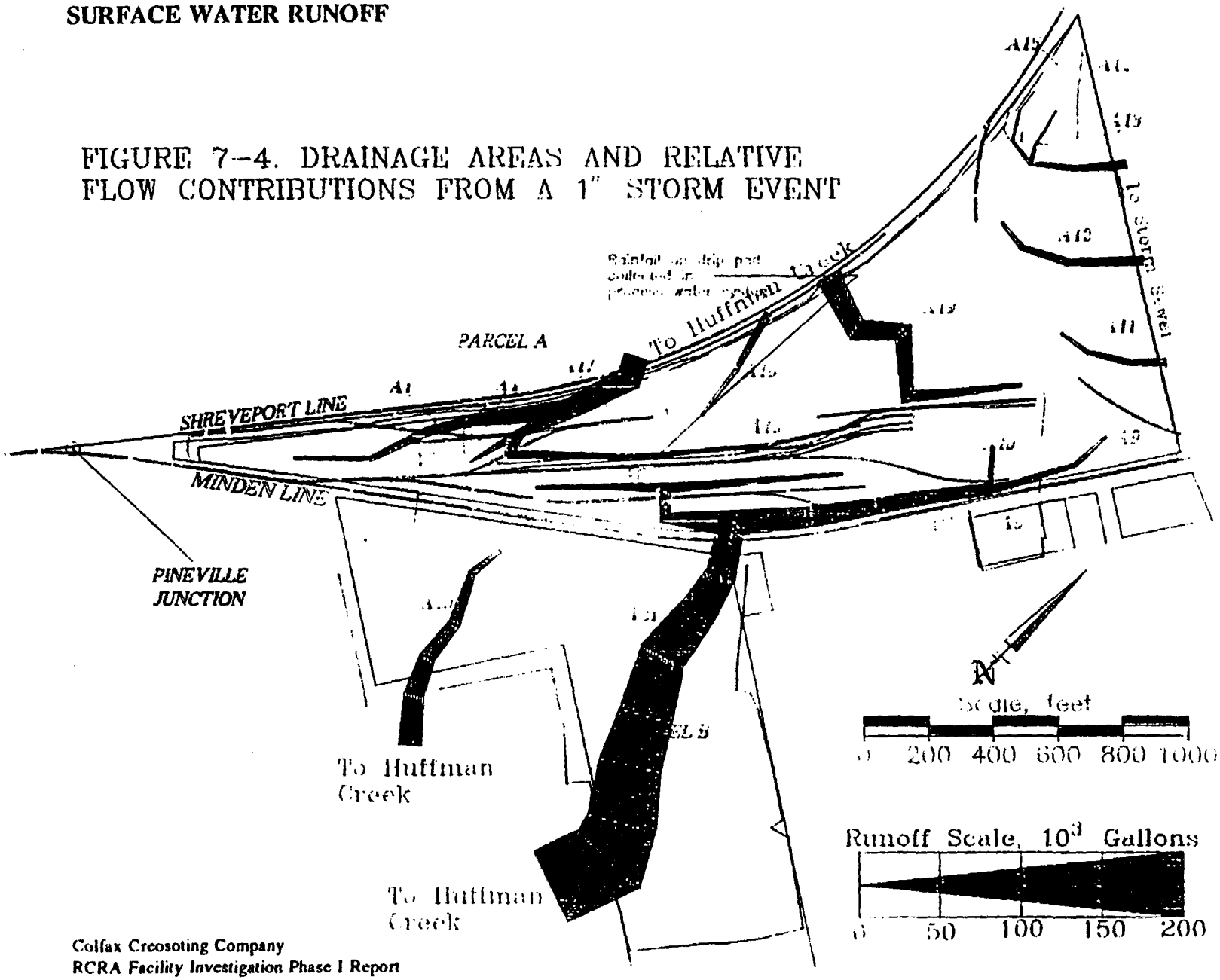


FIGURE 7-4. DRAINAGE AREAS AND RELATIVE FLOW CONTRIBUTIONS FROM A 1" STORM EVENT



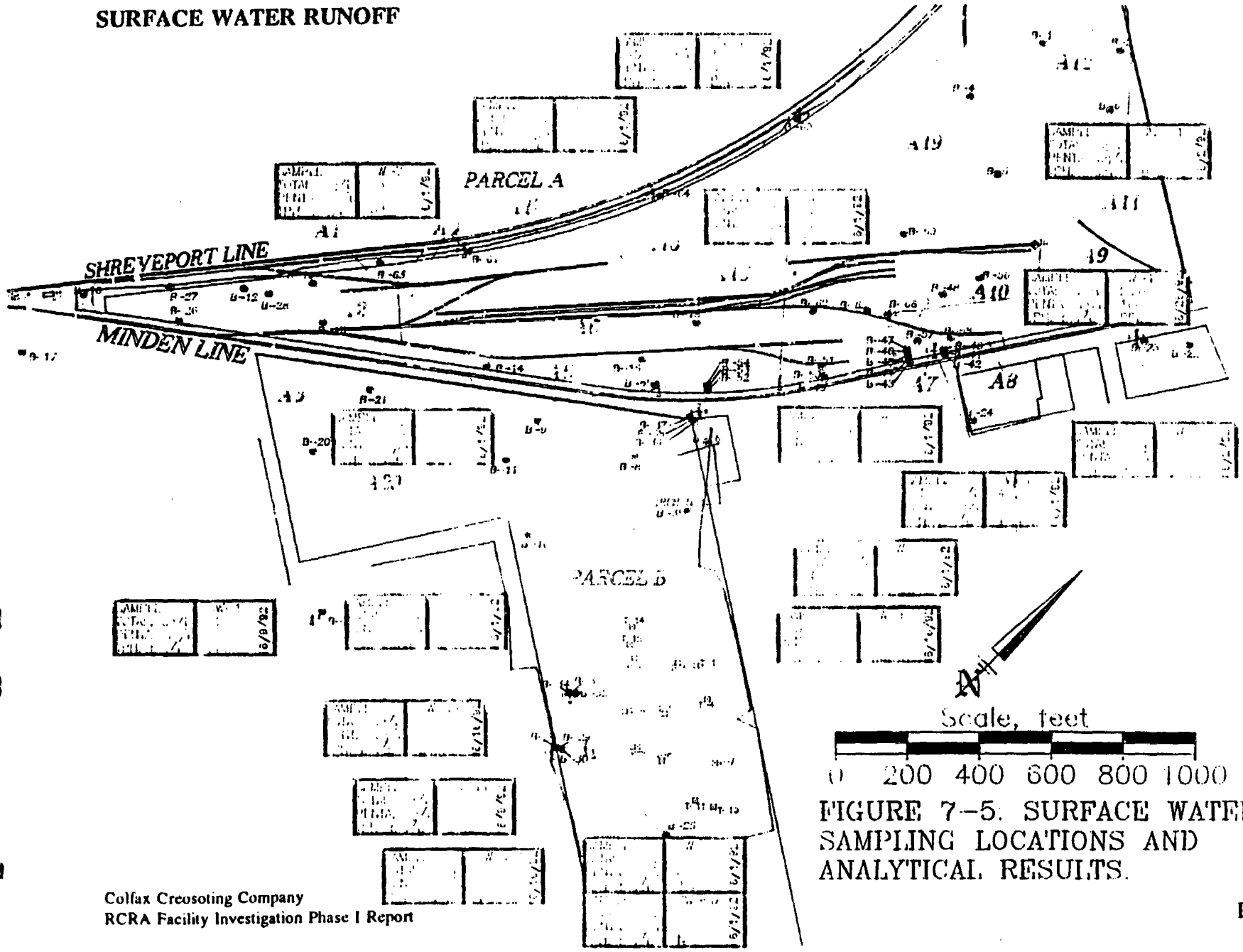


FIGURE 7-5. SURFACE WATER SAMPLING LOCATIONS AND ANALYTICAL RESULTS.

TABLE 7-3: SURFACE WATER SAMPLING SUMMARY BY CONSTITUENT

Cas No.	108-44-5	91-20-3	91-57-6	83-32-9	132-64-9	87-86-5	206-44-0	129-00-0	218-01-9	75-09-2	67-64-1	75-15-0	127-18-4	56-67-3	75-27-4	124-48-1	75-25-2	71-43-2	108-88-3	100-41-4	1330-20-7	Meth. 418.1
Compound	4-Methyl phenol	Naphthalene	2-Methyl naphthalene	Ace naphthene	Dibenzo furan	Pentachloro phenol	Fluo-ranthene	Pyrene	Chrysene	Methylene Chloride	Acetone	Carbon Disulfide	Tetrachloro ethene	Chloroform	Bromodichloro methane	Dibromochloro methane	Bromoform	Benzene	Toluene	Ethyl benzene	Xylene (Total)	TPH mg/L
SW-1						30			6													1.41
SW-2						100				4												0.94
SW-3						110				8	7											4.64
SW-4				5		13	27	15		4	6											0.24
SW-5						73	10	5		4												0.62
SW-6						47	6	6		4												0.31
SW-7				4		33	12	9		3												0.86
SW-8										10												0.26
SW-9										4	6											1.16
SW-9D										4												NA
SW-10						6				3			7									
SW-11																						0.23
SW-12										2		1										1.19
SW-13						5	4	3														
SW-13A										10												0.26
SW-14																						1.73
SW-14A																						2.58
SW-15						290	13			4												
SW-16	90	210	42	200	56	1600		68										7	12	150	15	
BG-4														6	9	5	3					
TB-1										5	2											0.60
FB-1										4												
TB-2										3												0.59
FB-2										3												
TB-4										10	51											Broken
FB-4										20	29											Broken
TB-8										10	140	110		47					10			14.37
FB-9										11	99	110		44					11			
TB-10										5	2	3							15			
FB-10										7		4							11			

Quantities shown in shaded cells indicate the compound was estimated because it was detected below method detection limits.
Bold italic quantities indicate constituent was detected in laboratory background samples.

SWDATA.WK3, RANGE A:C30..Y75

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drainage area. Chemical concentrations were taken from the organic analysis data summary, Table 7-3. The results are tabulated in the sections below for each of the drainage basins.

7.5.1 Results

Drainage areas A5, A6, A7, A8, A9 and A10 have a total runoff volume of 107,664 Gallons per inch of rain. Table 7-4 gives the total surface area represented by each surface water sample and total compounds in each sample. The total estimated release to Parcel B follows the table.

TABLE 7-4: ESTIMATED RELEASES FROM TO PARCEL B FROM PARCEL A

Sample Number	Total Drained Area Represented by Sample, ft^2	Total Compounds Detected in Sample, $\mu g/L$
1	21,312	45
2	21,312	100
3	143,588	110
4	143,588	63
5	143,588	88
TOTAL COMPOUNDS IN SAMPLES		406

Calculating the release:

$$\frac{107664\,gal}{1''rain} \times \frac{406\,\mu g}{L} \times \frac{1\,kg}{10^9\,\mu g} \times \frac{3.785\,L}{gal} = \frac{0.165\,kg}{1''rain}$$

Drainage areas A1, A2, A4, A16 and A17 have a total runoff volume of 74,820 Gallons per inch of rain.

TABLE 7-5: ESTIMATED RELEASES FROM AREAS A1, A2, A4, A16, AND A17.

Sample Number	Total Drained Area Represented by Sample, ft^2	Total Compounds Detected in Sample, $\mu g/L$
7	341,570	58
TOTAL COMPOUNDS IN SAMPLE		58

SURFACE WATER RUNOFF

From this release:

$$\frac{74820\,gal}{1^{\prime\prime}rain} \times \frac{58\,\mu g}{L} \times \frac{1\,kg}{10^{9}\,\mu g} \times \frac{3.785\,L}{gal} = \frac{0.0164\,kg}{1^{\prime\prime}rain}$$

Drainage area A19 has a runoff volume of 76,074 gallons per inch of rain.

TABLE 7-6: ESTIMATED RELEASES FROM AREA A19.

Sample Number	Total Drained Area Represented by Sample, ft^2	Total Compounds Detected in Sample, $\mu g/L$
10	348,697	13
TOTAL COMPOUNDS IN SAMPLE		13

From this release:

$$\frac{76074\,gal}{1^{\prime\prime}rain} \times \frac{13\,\mu g}{L} \times \frac{1\,kg}{10^{9}\,\mu g} \times \frac{3.785\,L}{gal} = \frac{0.0037\,kg}{1^{\prime\prime}rain}$$

Drainage area A20 has a runoff volume of 74,450 gallons per inch of rain.

TABLE 7-7: ESTIMATED RELEASES FROM AREA A20.

Sample Number	Total Drained Area Represented by Sample, ft^2	Total Compounds Detected in Sample, $\mu g/L$
13	341,250	12
TOTAL COMPOUNDS IN SAMPLE		12

From this release:

$$\frac{74450\,gal}{1^{\prime\prime}rain} \times \frac{12\,\mu g}{L} \times \frac{1\,kg}{10^{9}\,\mu g} \times \frac{3.785\,L}{gal} = \frac{0.0034\,kg}{1^{\prime\prime}rain}$$

Drainage area A21 receives runoff from parcel A and water falling within it's own area. It also receives runoff from Grace Subdivision, however this additional volume was not

considered. The total volume received excluding the subdivision's contribution is 166,902 gallons per inch of rain. Also, release calculations were based on sample SW-6 which was taken approximately 200 ft above the outfall of this watershed prior to dilution from the subdivision drainage. Two additional samples taken at the outfall, SW-14 and SW-14A taken on June 9 and June 16 respectively, contained no detectable constituents. Subsequently, the estimate calculated below is taken as the most conservative case.

TABLE 7-8: ESTIMATED RELEASES FROM AREA A21.

Sample Number	Total Drained Area Represented by Sample, ft^2	Total Compounds Detected in Sample, $\mu g/L$
6	1,114,905	61
TOTAL COMPOUNDS IN SAMPLE		61

From this release:

$$\frac{166902\,gal}{1''rain} \times \frac{61\,\mu g}{L} \times \frac{1\,kg}{10^9\,\mu g} \times \frac{3.785\,L}{gal} = \frac{0.039\,kg}{1''rain}$$

7.5.2 Release Summary

Releases are summarized on the following page in Table 7-9.

7.6 Discussion of Results

From the results obtained in the previous section, it can be seen that the major portion of chemical migration in the surface water runoff results from area A5 draining into Parcel B with a release estimated at 0.165 kg/in rain. Area A5 also accumulates drainage from areas A6, A7, A8, A9 and A10 which, as it can be seen from the drainage area diagram in Figure 7-1, are areas located along SWMU 9 which may explain the high concentration of chemicals found in the runoff. However, results show that by the time this water is discharged from Parcel B, it contained only 61 $\mu g/L$ 200 ft upgradient from the outfall on June 1, and no detectable constituents *at the outfall* on June 9 and again on June 16.

SURFACE WATER RUNOFF

TABLE 7-9: SUMMARY OF ESTIMATED RELEASES TO SURFACE WATER FROM STORM WATER RUNOFF AT COLFAX CREOSOTING COMPANY, PINEVILLE, LOUISIANA.

Watershed Containing Outfall	Total Estimated Release from Area, kg/1" rain	Receiving Stream
A5	0.165	SWMU 9, Parcel B[a]
A11/A12/A13[b]	0	City of Pineville Storm Sewer
A17	0.0164	Railroad Ditch to Huffman Creek
A18	0	Railroad Ditch to Huffman Creek
A19	0.0037	Railroad Ditch to Huffman Creek
A20	0.0034	Tributary to Huffman Creek West of Colfax Property
A21	0.039[c]	Tributary to Huffman Creek South of Colfax Property

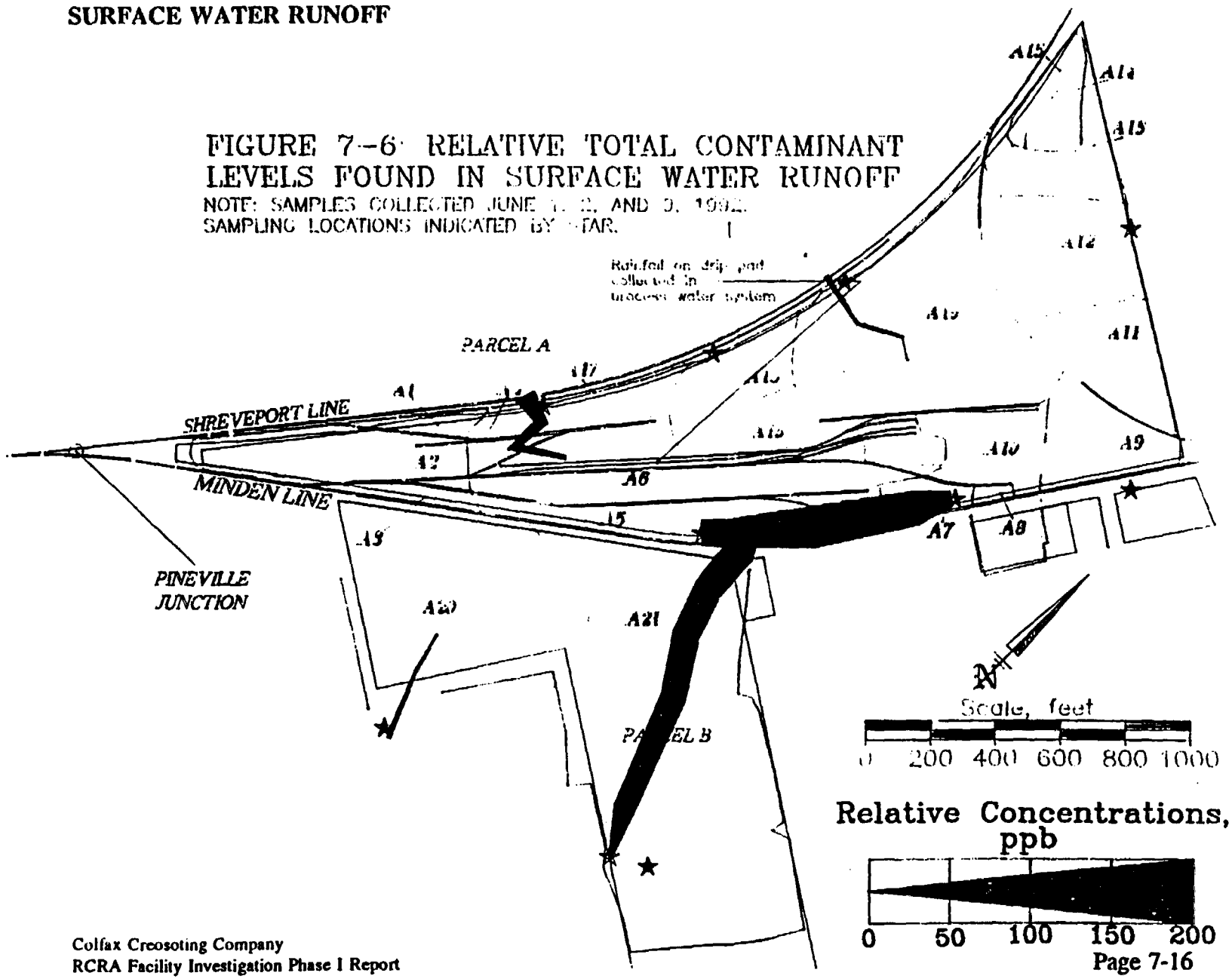
[a]Note this release is internal to Colfax property. See release from A21 for outfall along this drainage path.
[b]Areas A11, A12, and A13 are considered to be statistically similar in area and inventory, therefore this estimate represents each area.
[c]Release based on sample collected 200' upstream from outfall. Additional samples on June 9 and June 19 show no detectable constituents at the outfall. Therefore, this is a conservative estimate.

Figure 7-6 illustrates the relative concentrations of volatile and semi-volatile constituents found in the drainage pathways over the site. From this figure, the main runoff pathway exhibits the highest concentrations beginning near the green shed to the former site of SWC-2 and SWC-3. Here a sheen can sometimes be observed on water seeping from the north bank of the ditch during low flow conditions.

By the time water reached the outfall from Parcel B, chemical levels dropped drastically. This was verified on three sampling occasions. During storm flow periods, the concentration was found to be approximately one-half that observed in Parcel A. Other samples taken later in the project contained no detectable contaminants. This is probably due to dilution as suggested by Figure 7-4. Two low flow samples were collected from the main runoff pathway as SW-15 and SW-14A on June 16 when the water appeared especially dark. Sample SW-15 revealed a low flow concentration of 303 μg/L total constituents (290 μg/L pentachlorophenol) at the upper end of SWMU 9 in Parcel B. Storm water flows on June 1 had approximately one

FIGURE 7-6 RELATIVE TOTAL CONTAMINANT LEVELS FOUND IN SURFACE WATER RUNOFF

NOTE: SAMPLES COLLECTED JUNE 1, 2, AND 3, 1992.
SAMPLING LOCATIONS INDICATED BY STAR.



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third that amount. However, no constituents were found in a sample collected at the outfall end. The area where SW-15 was taken is a shallow pool scoured out by effluent from the culvert draining Parcel A. Very little flow was observed from this pool at the time of sampling. However, bank storage downstream from here provided substantial flow to the ditch thus diluting the concentration below detection limits in SW-14A.

Similarly, samples were taken from the marshy area adjacent to SWMU 11. During periods of rain, SW-9 and it's duplicate SW-9D showed no contamination. A follow-up low flow sample, SW-13A, also showed no constituents.

Other outfalls showing contamination were: A17, A19, and A20. A17 (sample SW-7) contained the highest amounts totaling 58 μg/L, half of which was pentachlorophenol. Other levels were shown previously in Figure 7-5.

7.6.1 Pentachlorophenol Results

Interestingly enough, pentachlorophenol comprised the major fraction of chemicals found in runoff. This was especially true with samples SW-1, SW-2, SW-3, SW-5, and SW-15 where total constituents ranged from 83% to 100% pentachlorophenol and averaged 93%. Other samples containing the chemical ranged from 41% to 58% and averaged 48%.

These averages were compared statistically to determine if they came from the same population. Specifically the hypothesis tested:

$$H_o: \mu_1 - \mu_2 = 0$$
$$H_a: \mu_1 - \mu_2 \neq 0$$

Where:

μ_1 = sample mean of data set from ditch samples.

μ_2 = sample mean of data set containing other samples.

Table 7-10 on the following page presents the sample populations and corresponding statistics for each set. A t-statistic of 4.5 is calculated from this data which is well beyond t_{crit} of 2.262.[2] Therefore H_o is rejected which implies a statistically significant difference exists.

[2]Hinkle, D.E., W. Wiersman and S.G. Jurs. 1988. Applied Statistics for the Behavioral Sciences. Houghton Mifflin Company, Boston. p. 650.

TABLE7-10: STATISTICAL COMPARISON OF PERCENT PENTACHLOROPHENOL OF TOTAL CONTAMINANTS IN SURFACE WATER SAMPLES.

Set #1: Samples from SWMU 9	Set #2: Samples from Other Locations
86.7% 100.0% 100.0% 83.0% 95.7%	77.0% 41.7% 20.6% 56.9% 46.2% 63.7%
$n_1 = 5$ $\bar{u}_1 = 93.1$ $s_1 = 7.8$ $s_{u1} = 7.85 \div (5^{-2}) = 3.5$	$n_2 = 6$ $\bar{u}_2 = 51.0$ $s_2 = 19.5$ $s_{u2} = 19.5 \div (6^{-2}) = 8.0$
$\alpha = 0.05$ $df = 9$ $t_{crit} = t_{(\alpha,df)} = 2.262$ $s_{u1-u2} = 9.3$ t-statistic $= (\bar{u}_1 - \bar{u}_2) \div s_{u1-u2} = 4.5$	
H_o: $\mu_1 - \mu_2 = 0$ H_a: $\mu_1 - \mu_2 \neq 0$ $t > t_{crit}$ ∴ Reject H_o ⇒ Sample means come from different populations.	

This analysis can be interpreted in one of two ways: (1) a source of pentachlorophenol contamination exists between the sites of SW-1 and SW-5/SW-15, or (2) other contaminants are not transported from this area. Confidence intervals are calculated for the two populations of pentachlorophenol data in Table 7-11. These confidence intervals show the sets to include separate ranges, thus verifying the populations are statistically different. Therefore a source for pentachlorophenol to dissolve in the runoff probably exists in this portion of SWMU 9.

Confidence intervals are calculated for the two populations of pentachlorophenol data in Table 7-11. These confidence intervals show the sets to include separate ranges. This tends to verify the results are from statistically different populations. Therefore, a source for pentachlorophenol to dissolve in the runoff seems to exist.

Pentachlorophenol solubility in water is temperature and pH dependant. The chemical

TABLE 7-11: 95% CONFIDENCE INTERVAL CALCULATION FOR SAMPLING RESULTS FROM PENTACHLOROPHENOL DATA SETS.

Pentachlorophenol Levels from Ditch	Pentachlorophenol Levels from Other Areas
39 100 110 88 290	13 33 6 47 5
$n_1 = 5$ $\bar{u}_1 = 84.3$ $s_1 = 31.5$ $s_{u1} = 31.5 \div (5^{.5}) = 14.1$ $df = 4$	$n_1 = 5^a$ $\bar{u}_1 = 20.8$ $s_1 = 18.5$ $s_{u1} = 18.5 \div (5^{.5}) = 8.3$ $df = 4$
95% Confidence Interval for Set #1 $C.I._{95} = \bar{u} \pm t_{crit} s_u$ $C.I._{95} = 84.3 \pm 39.1$ $C.I._{95} = 45.2 \leq X \leq 123.4$	
95% Confidence Interval for Set #2 $C.I._{95} = \bar{u} \pm t_{crit} s_u$ $C.I._{95} = 20.8 \pm 23.0$ $C.I._{95} = -2.2 \leq X \leq 43.8^b$	

[a]Sample SW-16 was not included because it is an outlier.
[b]Range actually spans 0 to 43.8 since a sample cannot have "negative" pentachlorophenol (e.g. -2.2).

has a solubility in water of 14 mg/L at 20°C and 20 mg/L at 30°C.[3] Solubility also increases slightly with an increase in pH which controls the ionic characteristic it takes. As solution pH increases, the extent of ionization also increases resulting in it existing primarily as an anion near a pH of 7.0.[4] Since storm water usually exhibits a near neutral pH, concentrations from the suspected sources would not be expected to exceed the solubility limit.

Two sources for the pentachlorophenol are likely: storm water contact with surface and subsurface soil in the ditch, or storm water contacting raw pentachlorophenol blocks awaiting mixing. The storage tank(s)/farm are not suspected because they are contained within a dike

[3]Pentachlorophenol Toxicant Profile. 1983. The Center for Biomedical and Toxicological Research, Florida State University, Tallahassee, Florida. 40 pp.

[4]U.S. EPA. 1980. Ambient Water Quality Criteria for Pentachlorophenol. Office of Water Regulations and Standards, Criteria and Standards Division, Washington, D.C. EPA 440/5-80-065.

system. Soil contact is the most likely source. First, this section of SWMU 9 was once the location of a concrete pipeline (AOC D) which conveyed wastewater from the creosoting plant to the surface impoundment. Sludge samples collected from sections of this pipeline in Parcel B exhibited high levels of pentachlorophenol (see sampling results for SS-1, SS-2 and SS-3 in Appendix D). Therefore the material may be leaching from soil which received leak releases from the pipeline. Surface soils in and along the ditch also contain levels of pentachlorophenol to allow for dissolution in water.

Second, prior to the RFI, the company placed solid pentachlorophenol blocks on the concrete pavement near the dike surrounding the penta mixing tanks north of the green shed. Although company policy is to dissolve these blocks in tanks for use when received, some excess inventory was stored in the area. These blocks are wrapped when received, however trace levels may have solubilized in the rain water. SW-16 was collected from a puddle near this area and contained 1600 μg/L pentachlorophenol (64% of the total contaminants). Calculations made using the surface area of these blocks and a one inch rain show approximately 60 μg/L should be dissolved in water contacting the blocks. The company has since stopped storing the blocks in this area, thus removing this possible source.

7.6.2 TPH Results

TPH results showed a wide range of variance over the site and ranged from no detectable TPH to 8.24 mg/L. This may be attributed to levels of emulsified oil present in runoff. Typically, the north and northwest discharge points contained TPH levels below 1 mg/L. Levels along SWMU 9, Parcel A ranged from 1 to 8 mg/L.

High levels were expected at the outfall of AOC C, the truck servicing area, since a diesel fueling station is located here. This runoff is represented by sample SW-12 which does indicate 1.19 mg/L TPH to be leaving the area. However, this is not statistically higher than other portions of the site. Similar levels were found in other samples from this portion of SWMU 9 with two exceptions. SW-3 was taken just upgradient from the culvert draining this portion of the ditch. Here TPH levels were found to be almost 5 mg/L which is more than one standard deviation away from the mean concentration. Sample SW-4 taken from the west end

of the pathway was also high with 8.24 mg/L present. However, these results are suspect because of their proximity to the railroad bed. Inherently, railroad beds contain petroleum hydrocarbons from train lubricants and leakage. Since the ballast represents a very porous medium with an extremely large surface area, a high probility exists for storm water filtering through the media to wash contaminants to the ditch.

Some petroleum hydrocarbons were also detected on two occasions in water taken from the marshy area adjacent to SWMU 9. On June 1 and June 16, 1.18 mg/L and 1.73 mg/L respectively were present. This is probably due to water filtering through fill material having some petroleum hydrocarbon content.

7.7 Potential Exposure Pathways

Common release mechanisms in surface water are surface runoff, episodic overland flow and ground water seepage. Surface water samples evaluated releases by storm water runoff and overland flow. Ground water seepage is considered in other chapters.

The eventual receptor of runoff from the site is Huffman Creek as described earlier in section 7.2. Transport is via three drainage pathways as shown previously in Figure 7-2. These pathways are contributors to three regional drainage basins depicted in Figure 7-7 which is derived from the USGS 7½' Alexandria, Louisiana quadrangle sheet. Two of the basins are quite large and cover over eight million square feet (approximately 200 acres). The third basin is smaller with just over one million square feet of coverage. All areas are either wooded or grassy/turfed and urbanized. Therefore a coefficient of 35% is used for calculating regional discharges to Huffman Creek.

Estimated loading to the stream was calculated based on effluent concentrations detected in runoff samples from the micro-watersheds on Colfax property. Release concentrations were not calculated for the three areas along Wadley Road since they drain to storm sewer. Table 7-12 on page 23 presents the release estimates.

The release calculations show runoff to be highly diluted when it reaches the receiving stream. Therefore the impact to the environment is considered minimal. All release concentrations are well below those considered harmful by EPA standards. TPH, by definition,

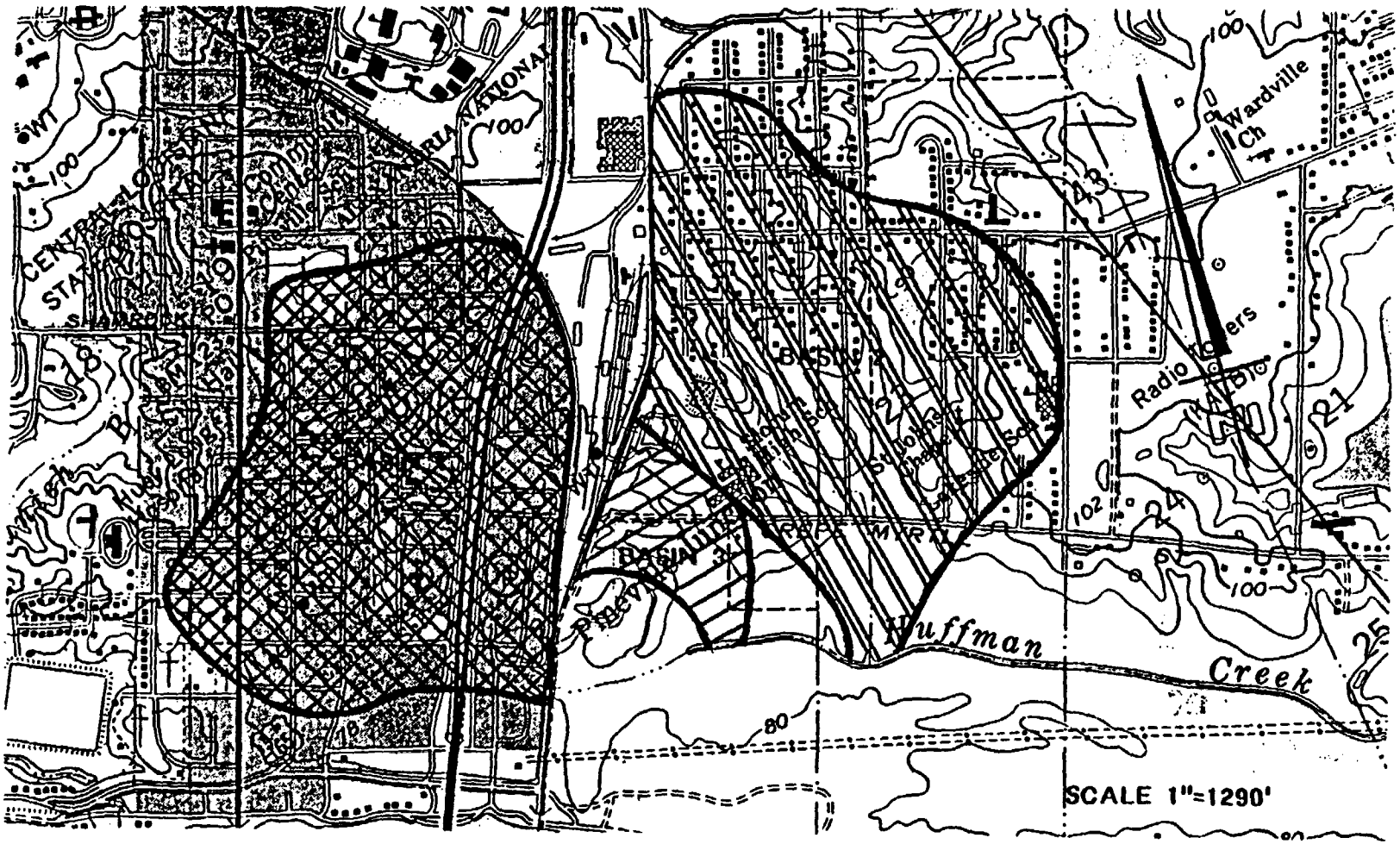

FIGURE 7-7: REGIONAL DRAINAGE BASINS RECEIVING RUNOFF FROM COLFAX PROPERTY (SOURCE: ALEXANDRIA, LOUISIANA 7½ MINUTE QUADRANGLE, USGS).

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TABLE 7-12: ESTIMATED CONSTITUENT LOADING TO HUFFMAN CREEK FROM REGIONAL DRAINAGE BASINS BY COLFAX CREOSOTING.

Regional Basin[a]	Basin Area 10^6 ft^2	Estimated[b] Runoff Collected from 1" Rain, 10^6 gal	Colfax Watersheds Discharging to Basin[c]	Watershed Contribution[d] to total Constituent Loading from Basin, lbs/MG/1"Rain	Average Concentration to Huffman Creek, µg/L
TPH LOADING					
1	8.82	2.097	A17, A18, A19	0.28	34
2	1.132	0.322	A20	NONE	NONE
3	8.546	1.973	A21	0.219[d]	26
TOTAL VOLATILE AND SEMI-VOLATILE CONSTITUENT LOADING					
1	8.82	2.097	A17, A18, A19	0.021	3
2	1.132	0.322	A20	0.023	3
3	8.546	1.973	A21	0.043[d]	5
PENTACHLOROPHENOL LOADING					
1	8.82	2.097	A17, A18, A19	0.019	2
2	1.132	0.322	A20	0.0096	1
3	8.546	1.973	A21	0.033[d]	4

[a]See Figure 7-7 for regional drainage basins.
[b]Based on runoff coefficient of 35% for wooded, urbanized areas.
[c]Calculated using data from samples collected June 1, 1992.
[d]Based on sample collected 200 ft upstream from outfall. This is considered a conservative estimate.

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is any material recovered as a substance soluble in trichlorotrifluoroethane (freon)[5] and not absorbed by silica jel. The company has a current oil and grease limit of 15 mg/L set for storm water at company outfalls. Since TPH is a *portion* of oil and grease, discharges are acceptable by National Pollution Discharge Elimination System standards.

Acute toxicity effects for pentachlorophenol are of highest concern since it is a major fraction of the semi-volatile and volatile compound loading. In Huffman Creek, potential bio-receptors would be those freshwater fish and invertebrate species present in the stream. EPA reports the chemical to be acutely toxic to freshwater fish species with 96-hour LC_{50} values from 34 to 600 μg/L; salmonid LC_{50} values range from 34 to 128 μg/L, and non-salmonid LC_{50} values from 60 to 600 μg/L. Fresh water invertebrate 48-hour LC_{50} show: cladocerans (Daphnia magna) — 240 to 800 μg/L (Daphnia pulex— 2000 μg/L), and worm (Tubifex tubifex) — 286 to 1,294 μg/L. The wide range for tubifex was attributed to the effects of pH on the pentachlorophenol species present. Chronic toxicity levels are reported to be 57 to 64 μg/L for fathead and sheepshead minnow. Cladoceran show a chronic toxicity of 240 μg/L. Growth and survival are impaired above levels of 73 μg/L, however reproduction is unaffected[6].

No pentachlorophenol was detected in "low-flow" samples collected at the outfall of SWMU 9. Therefore, releases result from episodic overland flow (e.g. storm water runoff). Hence, acute toxicity effects will probably control the fate of bio-receptors in the receiving stream. Table 7-12 shows expected levels of pentachlorophenol in Huffman Creek resulting from episodic release to be well below acute toxicity levels (and much less than chronic exposure levels). Figure 7-3 presented earlier shows the largest rain received between May 1 and July 31, 1992 totaled four inches. Therefore the expected highest concentration to Huffman would be 16 μg/L from outfall A21. This high release estimate is also below the acute and chronic toxicity levels presented. Therefore, it can be concluded these releases do not adversely impact

[5]Greenberg, A.E., L.S. Clesceri and A.D. Eaton. 1992. Standard Methods for the Examination of Water and Wastewater, Eighteenth Edition. American Public Health Association, Washington, D.C. p. 5-24.

[6]U.S. EPA. 1980. Ambient Water Quality Criteria for Pentachlorophenol. Office of Water Regulations and Standards, Criteria and Standards Division, Washington, D.C. EPA 440/5-80-065.

animal species in the receiving stream.

7.8 Conclusions

Based on surface water sampling data collected from Colfax Creosoting Company, the following conclusions are made:

1. Volatile and Semi-volatile constituents are released from the property during episodic storm events. The primary constituents are: acenapthtene, pentachlorophenol, fluoranthene, and pyrene.
2. Constituent concentrations are substantially diluted by storm water when they reach the outfalls.
3. A source for pentachlorophenol seems to be located between the sites of SW-1 and SW-5/SW-15.
4. Low flow samples show no volatile and semi-volatile constituents to leave the plant by surface water runoff.
5. The receiving stream for runoff is Huffman Creek.
6. Chemical concentrations at confluence points with the receiving stream are calculated to be below the acute and chronic toxicity levels for aquatic life.
7. TPH values are below discharge limits established by the company's NPDES permit for storm water runoff.

8 CONTAMINANT TRANSPORT AND SUBSURFACE WATER MOVEMENT

Data collected during the RFI indicates that contaminant movement in the subsurface environment is controlled by three factors:

(1) Permeability and porosity differences between geological units beneath the plant property.

(2) Vadose water movement through subsurface stratum.

(3) Diffusion of chemicals in soils receiving releases.

Before the project began, the conceptual model for contaminant transport was similar to that expected for hydrocarbon releases such as diesel fuel from leaking underground tanks. It was hypothesized that releases may percolate downward through soils receiving releases as a homogeneous dense non-aqueous phase liquid (DNAPL) plume. Upon reaching the water table, the plume would then separate into a light, floating phase, and a dense, sinking phase. Light phase material, it was believed, would move at a rate comparable to that of the groundwater following Darcy's law:

$$v = -K\frac{dh}{dl}$$

The DNAPL plume would sink through the aquifer to the first confining layer where it would spread and diffuse lighter chemicals into the phaeritic zone.

This theory was based impart on data collected and observations made from monitoring wells placed downgradient from the impoundment closed in the mid 1980's. Here, a DNAPL plume is being recovered by pumping from two wells screened in the upper aquifer.

CONTAMINANT TRANSPORT

Preservative constituents are periodically detected in surrounding downgradient monitoring wells, however the levels were usually just above MDLs. Therefore, it was assumed that constituents detected in the wells resulted from dissolution of chemicals from the DNAPL plume. Groundwater movement rates (and thus light-phase plume movement rates) were predicted by Darcy's equation using hydraulic gradients calculated from groundwater elevation data and permeability values measured from the wells. By this approach, movement rates were figured to be 8 ft/yr to the southwest in the 1992 Annual Groundwater Monitoring Report.

However, the conceptual model does not agree with observations made of groundwater elevation data and its relation to corresponding stages of the Red River. Groundwater elevations taken from five monitoring wells between 1987 and 1990 are shown in Figure 8-1 which is a graph on the following page. Corresponding river elevations are also plotted also using a solid square symbol (■). As seen in this figure, a relationship seems to exist between the river stage and groundwater elevations. Although the cyclical movement of the river elevation line is more exaggerated than that of the individual well plots, the data seems to be interrelated. Figure 6-2 on the following page shows the correlation between the river and groundwater elevations. A regression line drawn through the data indicates a good relationship exists. Pearson's R correlation coefficient of 0.84 was calculated from the data and confirms the high correlation. Bank storage response to river elevation changes would not be expected to be this rapid based on current aquifer permeability data. Also, plume expansion is more widespread than that predicted using the impoundment as the source and calculated movement rates. Assuming the current gradient to be average since use of the impoundment began, movement should be:

$$8\ ft/yr \times 20\ yr = 160\ ft$$

Since contaminants have been detected in wells further from the source than predicted by this method, other models have been developed. New theories incorporate RFI findings from both subsurface soil and water quality as well as geological evidence garnered from borings completed during the project.

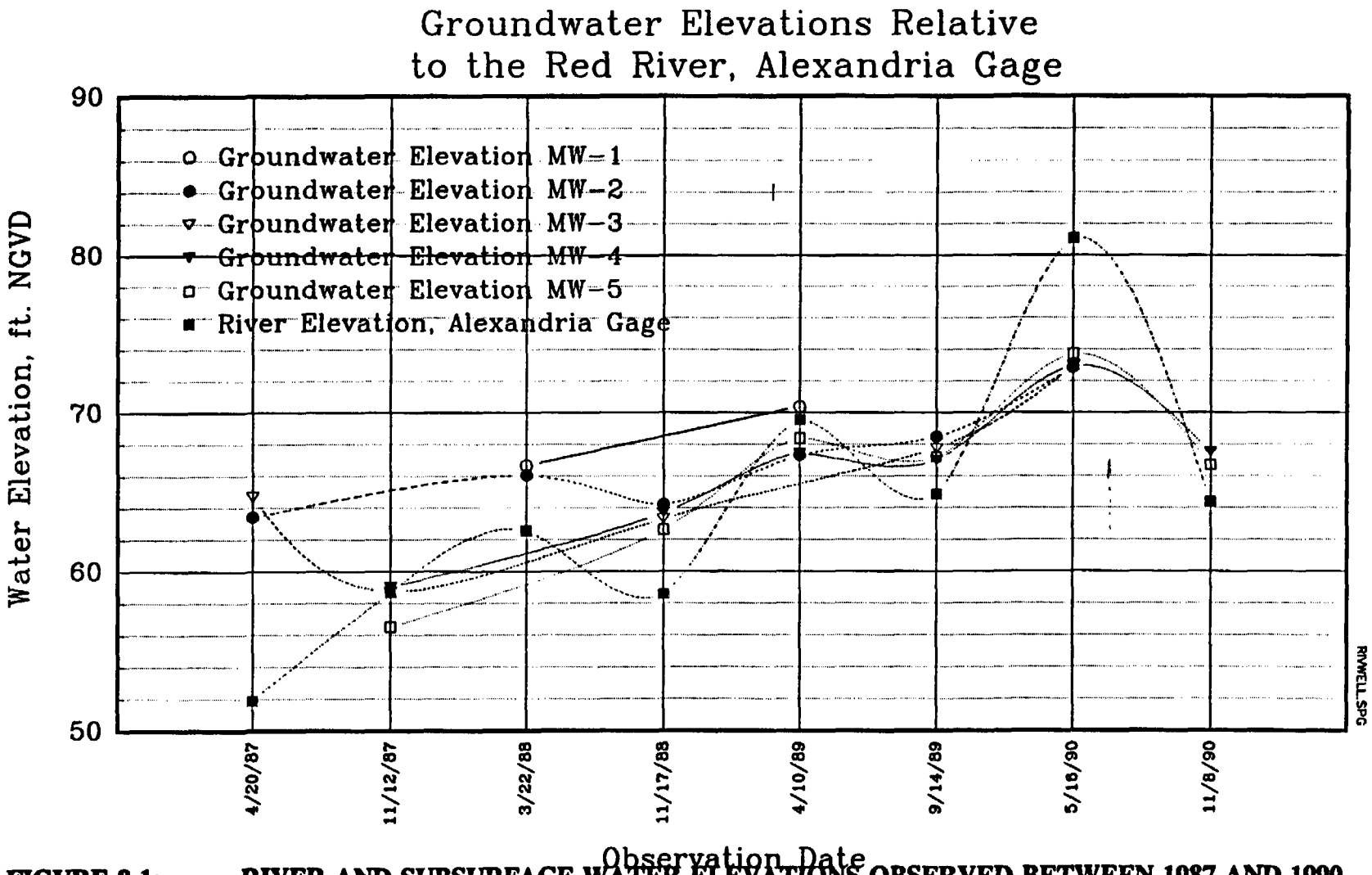


FIGURE 8-1: RIVER AND SUBSURFACE WATER ELEVATIONS OBSERVED BETWEEN 1987 AND 1990.

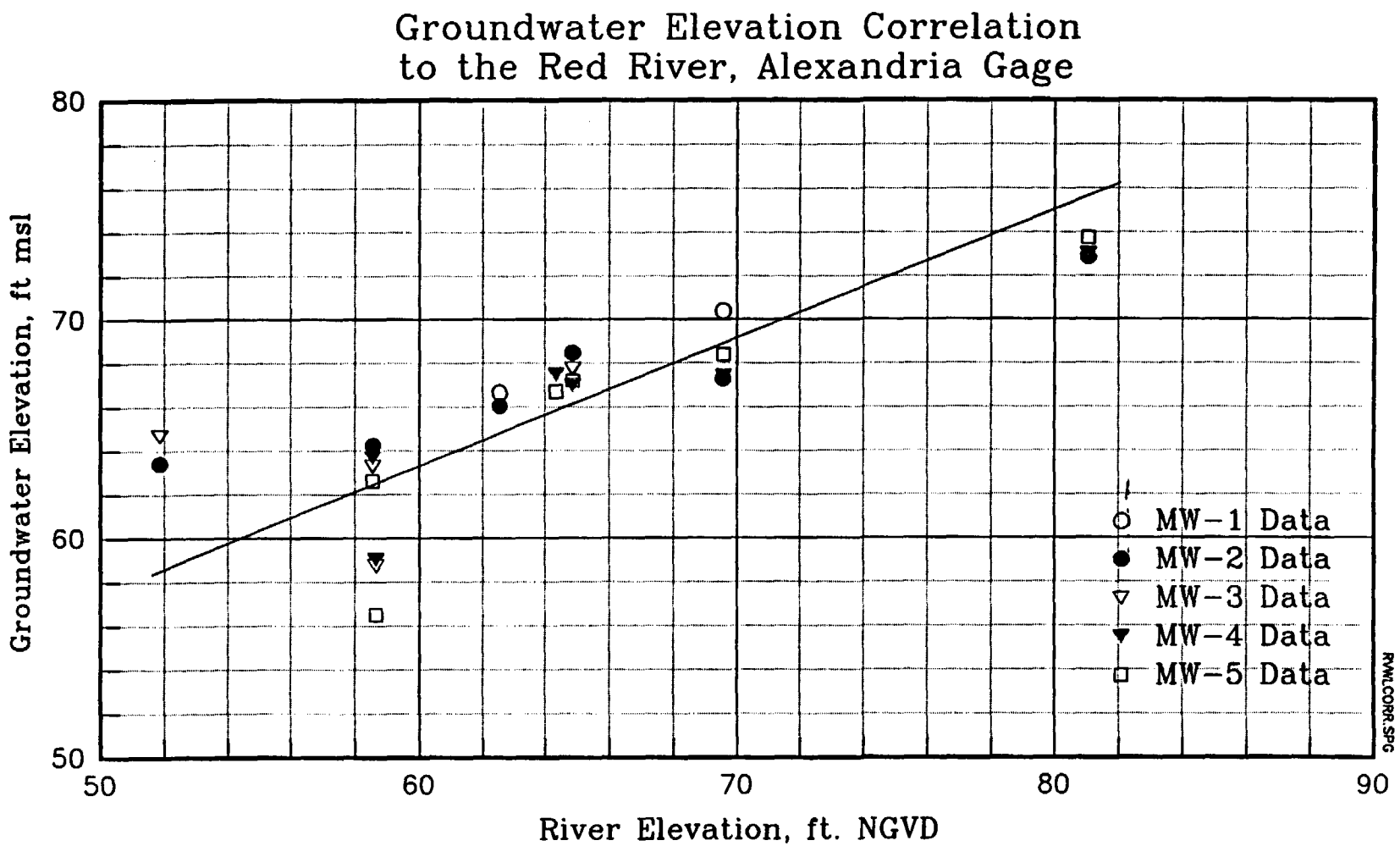


FIGURE 8-2: CORRELATION BETWEEN RIVER AND GROUNDWATER ELEVATIONS.

CONTAMINANT TRANSPORT

8.1 Geological Setting

Chapter 6 alluded to boring evidence indicating the plant property is in an area which was once a Pleistocene age backwater swamp formed by the Red River. This conclusion is based largely on the presence of a thick red slickensided clay layers containing tiny root holes discovered below the site in most borings. These layers were discovered in Prairie terrace deposits which underlie most of the plant property. The slickensided red clay discovered is typical of sediment deposition which gives the nearby river it's name. Munsell color ranged from reddish brown (5YR 4/4) to dark brown (7.5YR 4/3). The most striking feature of the material was the presence of minute, dendritic root holes throughout the material. Some organic matter was discovered in the clay also. Core samples of the clay split along a plane parallel to the boring revealed root hole structures similar to fibrous root systems of monocotyledons. This would be indicative of marsh grasses, sedges, cattails and other similar plants indigenous to marshy terrain.[1] For the most part, this structure was observed throughout the clay formation. Since most root-zones end within the first few feet of surface, the stratum appears to have been deposited over a long period of time. Portions of the layer were encountered in a majority of the borings, indicating it to have once been continuous. Coarser sediments were discovered both above and below the clay layer(s). Silty sands and clays tended to be reddish to gray, and most likely represents deposition of headward erosion of other terrace deposits by dendritic streams.

Figure 8-3 on the following page was constructed from a USGS 7½ minute topographic map of Alexandria and shows formations local to company property as determined by the Louisiana Geological Survey. The site consists of two major terrace remnants constructed by the Red River. The Montgomery terrace remnant, indicated by purple shading, is the older formation. Maps produced by the Geological Survey indicate approximately ⅓ of parcel A, beginning near the north corner, is located on this formation. The remainder of the site is located on a larger expanse of Prairie terrace deposits as indicated by green shading and hatching

[1]Raven, P.H., R.F. Evert, and H. Curtis. Biology of Plants, Third Edition. Worth Publishers, New York, NY. 1981. 686 pp.

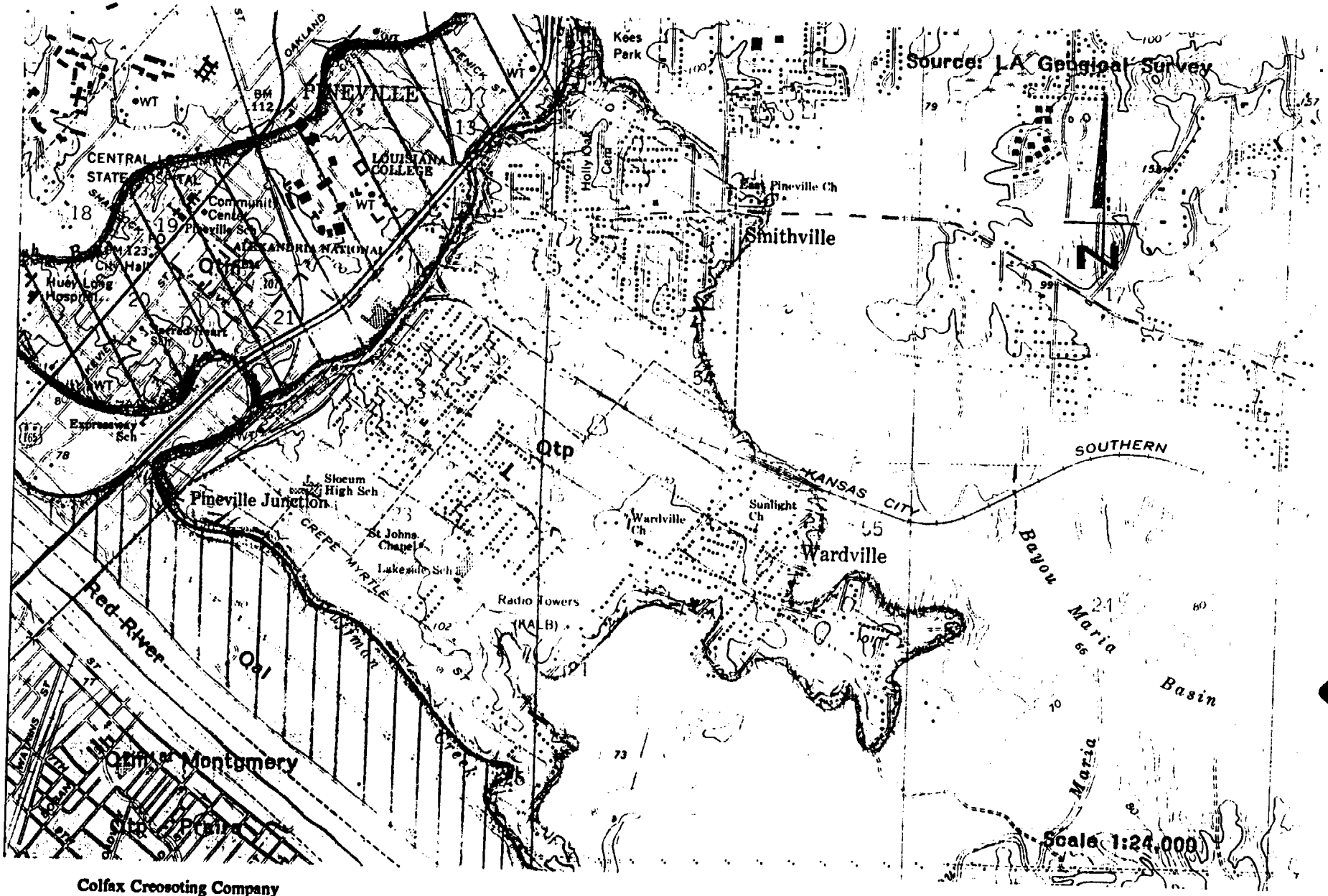


FIGURE 8-3: GEOLOGIC FORMATIONS

in Figure 8-3. The clay layer(s) indicates that this area was once a pre-Prairie backswamp formed behind Red River levee deposits and drained by rim-swamp streams similar to the predecessor of nearby Maria Bayou where it exits Bayou Maria Basin (See Figure 8-3).

Prairie aggradation on pre-Prairie drainage through the clay seems to have played a key role in forming the subsurface environment. The Geological Survey reports that in pre-Prairie time all tributaries now draining into Bayou Maria Basin were dendritic headwaters of a main truck stream which flowed southwestward. During Prairie time, the truck stream became blocked and the lower course drowned. Upstream valleys carved by the tributaries would have alluvially drowned, forming broad flats and depositing sediment in previous entrenchments[2]. This scenario seems to fit well with observations of the clay and layers above and below it.

Boring logs indicate the clay surface is heavily eroded near the center of the main runoff pathway. In some borings near the centerline of the ditch, this erosion was complete. A contour map and three dimensional representation of the clay surface was constructed to determine the extent and location of erosion through the unit. Elevations of the unit's top were calculated from boring logs and their corresponding surface elevations. Using SURFER™ software, these elevations were then contoured by computer utilizing a kriging algorithm. The resulting plots are presented on the pages following as Figures 8-4 and 8-5. Boring locations have been projected onto the surfaces to aid in orienting the figures to the site.

The figures clearly show the clay surface has been cut by stream entrenchment and headward erosion, possibly by a tributary to the trunk stream discussed earlier. Headward erosion is apparent in the clay beginning along the northwest side of parcel A. However, surface plots show most entrenchment begins just underneath the treating plant and extends along and down the valley formed by the main runoff pathway. Several "holes" are observed in the surface plot beginning near the triad of borings at the upper end of the main runoff pathway's southern leg. Here, entrenchment may have been complete. The valley is also very deep where the pathway exits the property. The clay unit encountered here may be a lower surface not

[2]Fisk, H.N., Ph.D. *Geology of Avoyelles and Rapides Parishes*. Geological Bulletin No. 18. Department of Conservation, Louisiana Geological Survey. New Orleans, LA. 1940. 240pp.

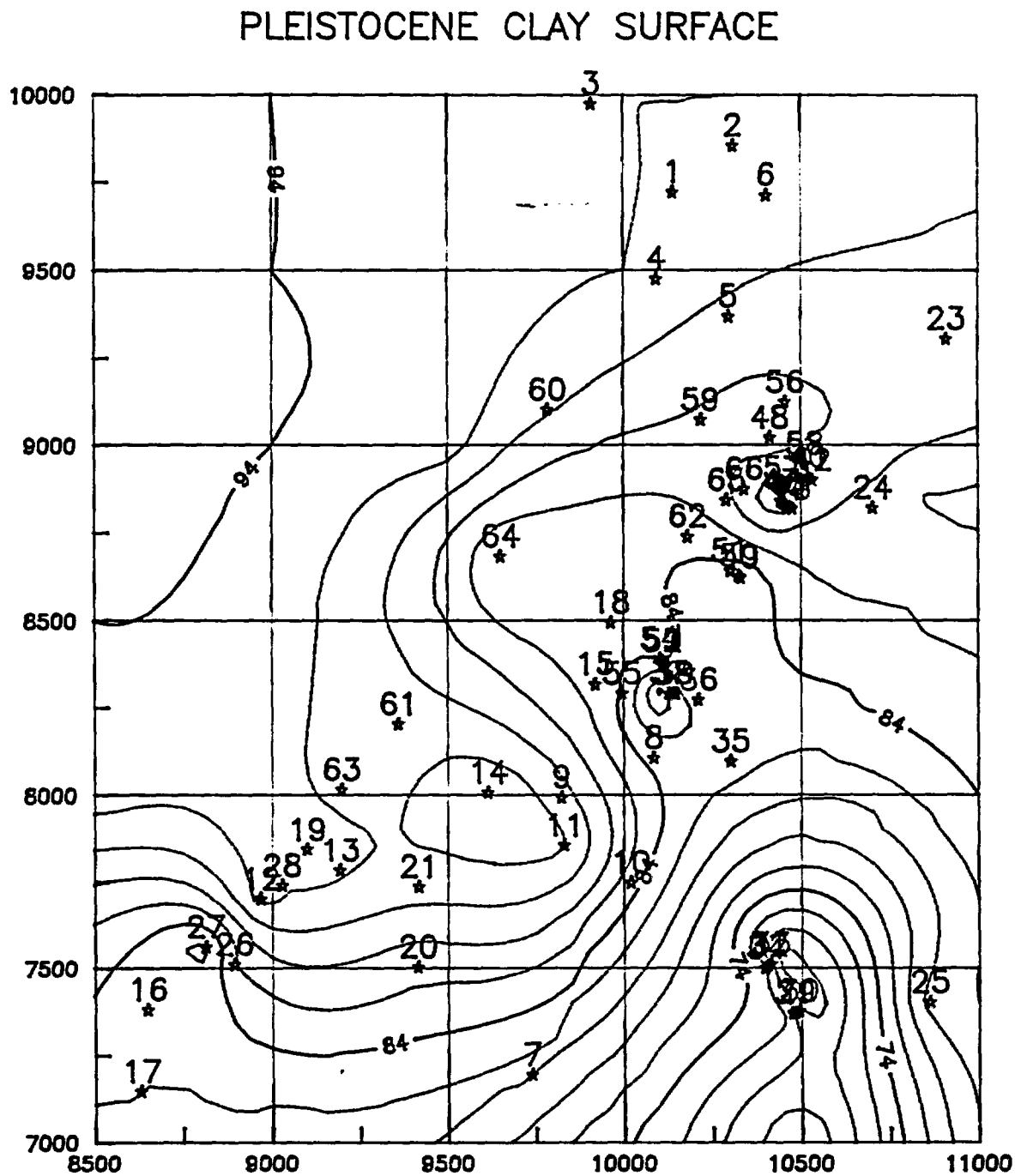


FIGURE 8-4: SURFACE MAP OF RED SLICKENSIDED CLAY.

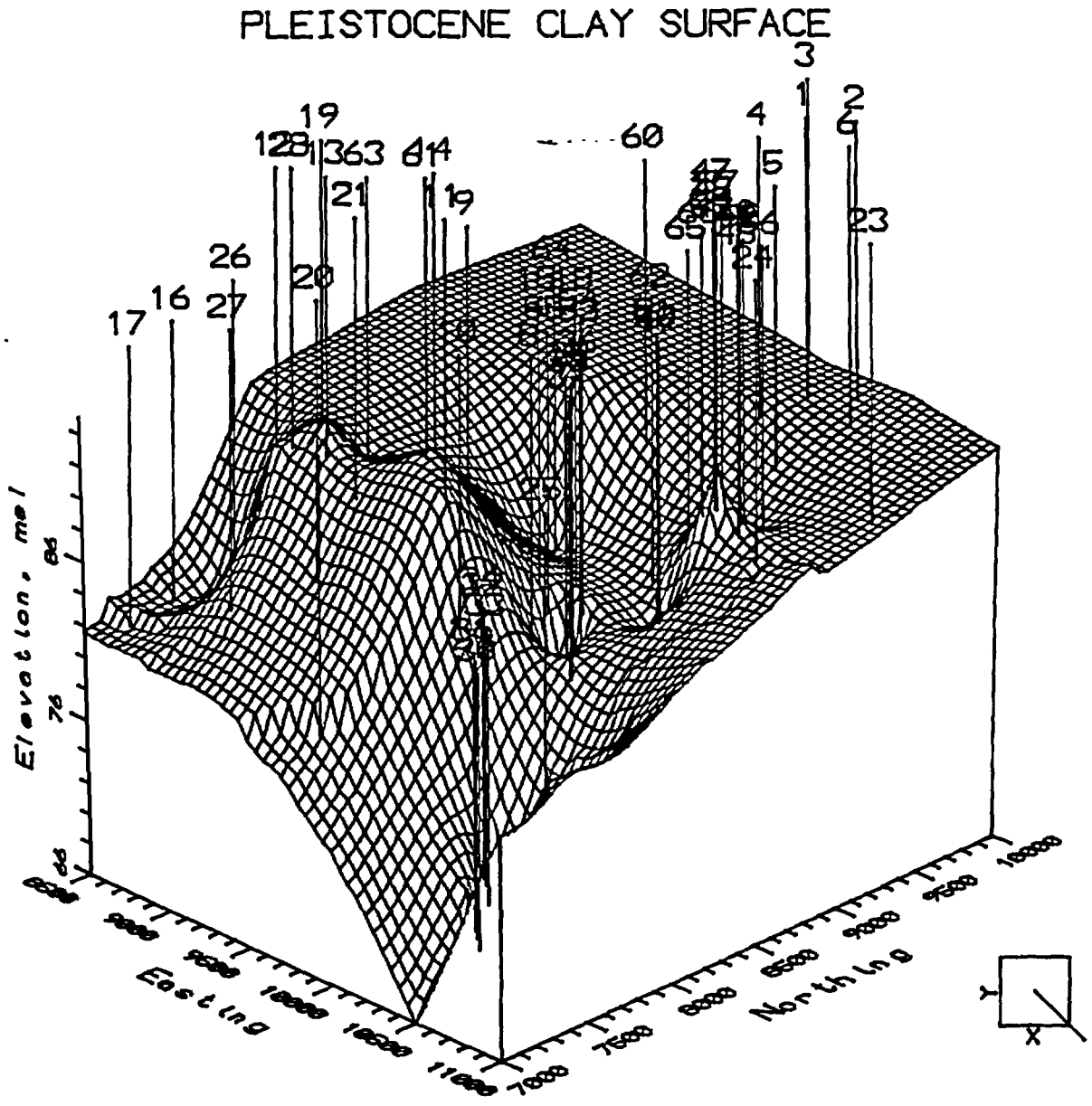


FIGURE 8-5: 3-D REPRESENTATION OF CLAY SURFACE.

reached by upgradient borings.

It is theorized that the clay layer represents one or a series of backswamps built up over a long period of time by flooding of the Red River. At some point, the backswamp was drained by a dendritic stream, possibly a tributary to the River. Consequently aggradation was accomplished when the valley formed by the stream was alluvially drowned, filling with coarse sediments eroded from upland deposits. Deposition conformed to the topography built during previous periods, thereby aiding in forming the small valley containing the main runoff pathway present today.

8.2 Contaminant Transport

If the previous theory is correct, it would serve to explain a myriad of observations made at the site. Primarily, contaminant transport and plume movement could be explained more easily.

First, field data indicates there are three types of releases at this facility:

(1) Those releases made to surface soils from concentrated sources (*e.g.* spills from tanks).

(2) Those releases made from slightly diluted sources to subterranean soil (*e.g.* releases from the concrete pipeline).

(3) Releases of concentrated and dissolved constituents made from pond bottoms.

Surface releases from concentrated are releases similar to that found underneath treated wood stacks in the wood storage yard. Once this release is received by the soil, it is absorbed into the soil matrix within the first few inches of soil as seen in the wood storage yards. Once here, the material is much like asphaltic cement; it does not move. Therefore, contaminant transport would be governed not by the rate of chemical migration, but by migration of the particle containing the chemical (*i.e.* erosion of the soil). Particle movement is limited by the chemicals because they act as *binders* and tend to keep the soil in place (again, the asphalt analogy). This phenomenon was observed in stiff horizons of visually contaminated soils behind the green shed and along the main runoff pathway. To a certain extent, some chemicals are released by overland flow of stormwater as detected in runoff samples. However, releases due

to runoff are mitigated by the chemical's solubility in water. Again, runoff concentrations indicate this to be very low. Type 1 releases were found in several areas of the plant: wood storage yards, surface contaminated soils in the main runoff pathway, and around the closed impoundment. These releases seem to present the least threat to the environment.

The second type of release is exemplified by the concrete pipeline. Here, process water leaked from the pipe carrying with it dissolved and emulsified oil in surrounding soil. In this instance, the soil seems to act as a "filter," absorbing oil from the water before it can migrate far from the release area. However, some dissolved constituents are carried by the water to the first relatively impermeable soil zone where it begins to spread laterally and percolate downward through the aquitard. This could be seen in the boring series near the northeast corner of the maintenance building and also in trench 13 where a zone of contamination was observed extending from an old drainage ditch run downward to the slickensided clay. This release is controlled by the rate of water movement through the soil stratum and probably follows Darcy's law.

A final release type was observed from the pond systems. In these areas two mechanism were operating. First, free oil and sludge collected on pond bottoms. In substantial amounts, this material saturates soils underneath the unit. Once there, it begins to disperse slowly through the stratum at a rate independent to the water movement rate due to the extreme viscosity difference. At some point in time, the oil disperses to an extent that it can be contained by the soil. That is, with the source depleted, the soil matrix "soaks up" the oil. Second, water containing dissolved oil percolates downward through soil voids as in the release described previously. Upon reaching the first aquitard, this oily water begins to spread horizontally on top of the aquitard. This aqueous-phase oil then moves along the top of the confining unit. Also, as fresh water moves through oily soils containing DNAPLs, some chemicals dissolve into the water column and begin migrating elsewhere. In essence, the oily soil "leaks" constituents.

Earlier in Chapter 4, two pie-charts were presented representing the percentages of constituents found to be present in soil samples and in water samples. From this graph, it was discovered that some constituents contained by soils in relatively small amounts represented a

major portion of those found in groundwater samples. Pentachlorophenol represented only 4% of the total contamination detected in soil samples. However, it made up over 40% of that found in water samples. Other chemicals leached from soil in lesser amounts. Therefore, these chemicals are more prone to move from grossly contaminated soils.

Aqueous phase liquids seem to be contained by the slickensided clay layer. Most contamination detected was found in silty/clayey sands resting over this layer. Comparisons made between total contaminant levels in samples taken from the clay and samples taken just above the clay show, on average, a 95% reduction between the two. Thus, most of the contamination does not migrate into the clay. However, this containment is not complete. Close examination of clay cores reveal root-holes and slickensides to be filled with oil that has coalesced in the soil zone above. In some areas of the property, this is not critical. However, where the clay is eroded, the oily matter can pass through more easily and begin leaking to the next unit below. This was particularly apparent in the last boring set in the main runoff pathway.

These observations may help to explain plume movement from the closed impoundment as recorded from monitoring wells installed in the area. First, there are times when groundwater contamination is detected and other times when it is not. If just-detectable contamination in wells results from a DNAPL plume near the recovery wells, the contamination should reach some predictable, fairly stable level that is a function of constituent solubility. This would be especially true for the slow calculated groundwater movement rate. However, the water elevation graphs show groundwater movement is probably much faster that previously thought. Thus, contaminants detected in monitoring wells may actually be those being released from the bottom of the clay layer. The clay's entrenched stream scar would tend to channel contamination first to the ditch's centerline, then downgradient. Releases would be made to lower stratum monitored by the well system where the clay has eroded most.

Early in the project, it was determine that subsurface water intercepted by the borings was a perched condition. Nevertheless, the work plan called for sampling groundwater when it was encountered. At the time of drilling, wells were installed in formations that would yield

enough water for a sample. However, some temporary wells would not fill deep enough to seal the check valve of a bailer and could not be sampled. But for the most part, subsurface water samples were taken successfully. These samples revealed that much of the concentrated contamination is actually in perched water units above the upper aquifer. Movement of this water is dictated by several factors: (1) evapotranspiration, (2) sediment permeability, and (3) the topography of the confining clay layer. Figure 8-6 shows perched water contours based on water elevations found in borings at the time of drilling. Please note that these borings were completed over a 30 day period and the figure is a composite of this data. However, the figure does show that a good relationship does exist between the clay surface contours and perched water elevations. Contaminants in this zone are in a quasi-aqueous state. When water is present in the zone, constituents migrate along the top of, and into the clay unit; leaking through where possibly. When water is not present, (*i.e.* during periods of low rainfall) the contaminants are relatively immobile. This may explain the periodic detection of constituents in site monitoring wells.

8.3 Rate of Movement

Calculated contaminant movement rates may not accurately represent actual conditions in the field since several complex mechanisms are at work. That rate which contaminants move through the aquifer in dissolved form, as detected by monitoring wells, must follow Darcy's law. This has been calculated to be 8 ft/yr based on currently available data. Second, the rate which aqueous-phase liquids move out of perched formations will vary with time as a function of the availability of water above the saturated zone. The last contour map presented indicates very little hydraulic gradient exists within the vadose zone. In effect, from Darcy's law:

$$\frac{dh}{dl} \rightarrow 0, \therefore v \rightarrow 0$$

Therefore, movement in this zone is controlled by chemical dispersion rather than flow.

Dispersion coefficients were calculated based on analytical chemical levels found in borings and levels expected to be present from release sources. For those borings thought to

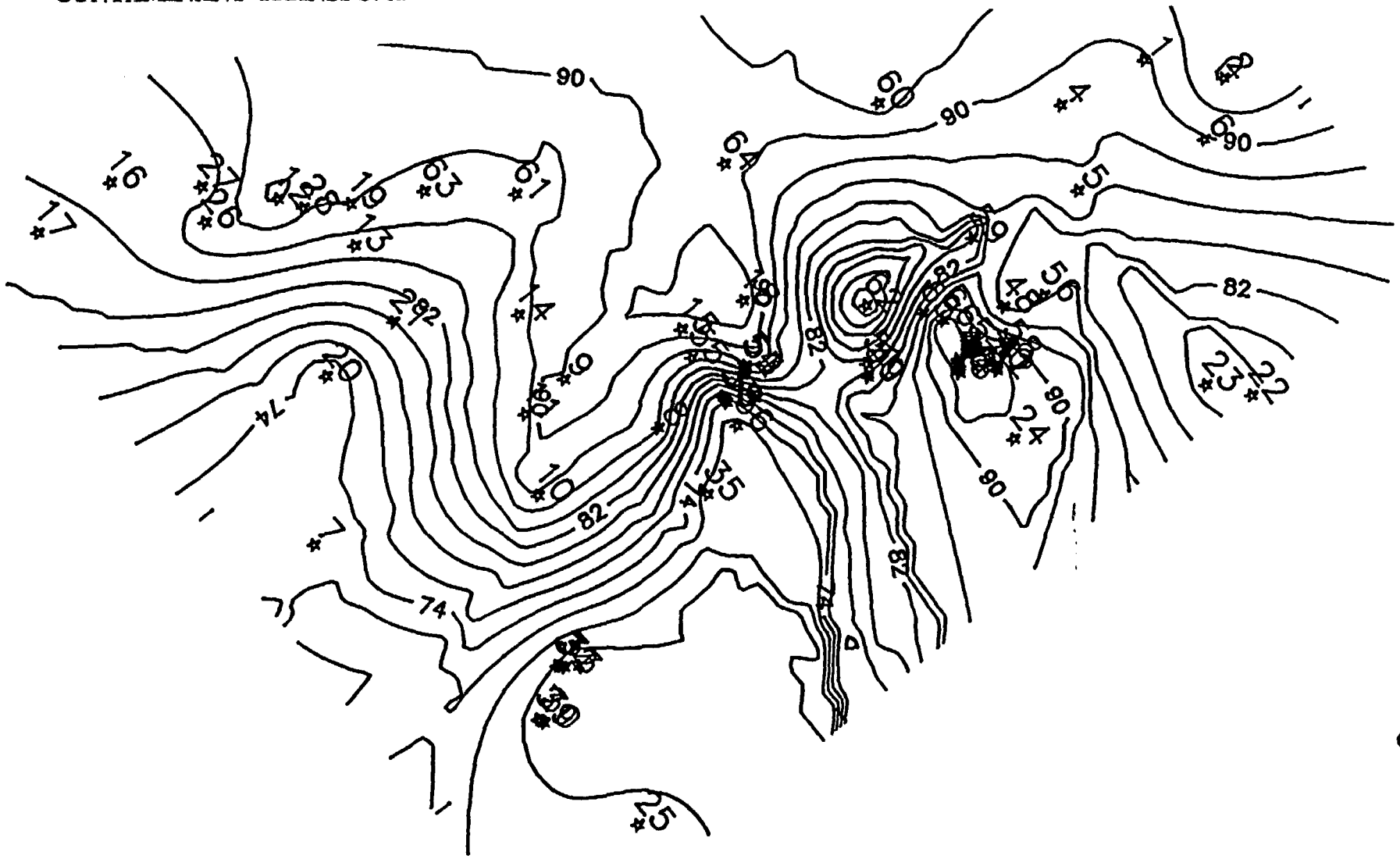


FIGURE 8-6: PERCHED WATER CONTOURS, JUNE 1992.

contain releases from the concrete pipeline, actual concentrations from SS1, SS2 and SS3 were used. In borings thought to contain releases from surface water units, source levels were estimated based on analytical closure data from the large surface water impoundment. Times for dispersion were taken as the longest period that could be determined by aerial photography. Dispersion was calculated from the equation:

$$\frac{C}{C_o} = erfc\frac{x}{2\sqrt{D_e t}}$$

where:

C	=	observed concentration some distance from the source, m/L^3
C_o	=	original concentration at the source, m/L^3
x	=	the distance between the source and observed concentration, ft
t	=	the time interval since the release, yr
D_e	=	the dispersion coefficient, ft^2/yr.

Error functions were determined from published mathematical tables.[3] Table 8-1 gives the statistical results of this analysis.

Table 8-1 on the previous page shows coefficients calculated for four chemicals: pentachlorophenol, 2-methyphenol, naphthalene, and pyrene. These were then divided into groups by soil layer to determine if movement is controlled by the soil or by the constituent. First, the 95% confidence interval indicates constituent dispersion for the entire population is between 5 and 10 ft^2/yr. This interval was then compared statistically with sub-populations from each soil and chemical type. The analysis determined that movement rates were significantly differently between soil stratum and no significant difference existed between the three chemicals. In Table 8-1, the first clay represents the slickensided clay. Here movement is calculated to be between 1 and 6 ft^2/yr. Second clays and silts represent those materials found above and below the slickensided clay. These gave higher ranges as reported by the table. This analysis tends to confirm the initial hypothesis stating that the clay layer is serving as a leaky

[3]Freeze, R.A., and J.A. Cherry. Groundwater. Prentice-Hall, Inc., Englewood Cliffs, N.J. 1979. p 104.

TABLE 8-1: DISPERSION COEFFICIENT DETERMINATION

DISPERSION COEFFICIENT DETEMINATION

	PENTA	2-METHYL	NAPHTHA	PYRENE	N	AVG	STDS	STD ERR	T
FIRST SILT	2.3E-07	5.8E-08	1.4E-07	3.2E-08	12	9.0E-08	9.6E-08	2.8E-08	5.35467
	9.8E-08	4.4E-08	4.2E-08	6.1E-08		CRITICAL T =		2.201	
	3.2E-07			1.3E-10	95% CONF. INT. =		2.9E-08	< U <	1.5E-07
	5.1E-08				FT^2/YR		0.904983	< U <	4.748029
	1.1E-10								
FIRST CLAY	5.7E-08	3.8E-07	1.7E-07	8.7E-08	10	9.8E-08	1.1E-07	3.4E-08	4.080601
		4.0E-08	4.2E-08	4.2E-08		CRITICAL T =		2.228	
		3.3E-08	8.9E-08	3.4E-08	95% CONF. INT. =		2.1E-08	< U <	1.7E-07
					FT^2/YR		0.667654	< U <	5.49448
SECOND SILT	4.6E-08	2.7E-08	2.5E-08	3.6E-08	29	2.0E-07	3.0E-07	5.5E-08	0.664757
	1.9E-07	4.1E-07	1.1E-06	1.1E-06		CRITICAL T =		2.045	
	8.9E-08	2.3E-08	2.3E-08	2.3E-08	95% CONF. INT. =		8.8E-08	< U <	3.1E-07
		7.0E-08	5.4E-08	9.0E-08	FT^2/YR		2.788177	< U <	9.901909
		2.4E-07	2.3E-07	2.8E-07					
		3.0E-07	1.6E-07	8.2E-07					
		6.3E-08	6.0E-08	1.8E-07					
		3.4E-08	3.4E-08	3.7E-08					
				8.9E-08					
				2.3E-08					
SECOND CLAY	2.3E-07	4.1E-07	3.8E-08	2.2E-07	16	5.0E-07	4.4E-07	1.1E-07	-2.41815
	1.4E-06	7.9E-07	2.2E-07	5.8E-07		CRITICAL T =		2.12	
	1.6E-06	3.5E-07	4.0E-07	6.0E-07	95% CONF. INT. =		2.7E-07	< U <	7.4E-07
	3.1E-07	7.0E-08	3.1E-07	5.2E-07	FT^2/YR		8.532534	< U <	23.19859
BY CHEMICAL	13	17	17	20	N	POP	N	67	
	3.6E-07	2.0E-07	1.8E-07	2.4E-07	AVERAGE	STATS	AVERAGE	2.4E-07	
	5.2E-07	2.2E-07	2.6E-07	3.1E-07	STDS		STDS	3.3E-07	
	1.4E-07	5.2E-08	6.3E-08	7.0E-08	STD ERR		STD ERR	4.0E-08	
	-0.81715	0.786737	0.866427	-0.05801	T	95% C.I.	1.6E-07	< U <	3.2E-07
	2.179	2.11	2.11	2.093	CRITICAL T	FT^2/YR	5	< U <	10

DIFFSTAT.WK3

aquitard and contains much of the contamination in higher, more permeable layers.

8.4 Subsurface Water Quality

Figures 8-7, 8-8, 8-9, and 8-10 present maps of the site showing subsurface water quality determined by samples collected from temporary wells installed in the boings. The most elevated levels were detected along the main runoff pathway near former pond locations. In most all instances, constituents detected in the perched formations were only a fraction of that found in soils from the same borings. This is particularly evident in boring 49 where 27,288 μg/L were found while soil samples contained over 10,000,000 μg/kg. This represents less that ¼ of one percent of the total amount present in soil samples. This also supports the contaminant transport models.

8.5 Conclusions

The following conclusions are made about contaminant transport and movement at the Colfax site:

(1) The site is underlain by a once continuous slickensided clay layer thought to represent the surface of a backswamp formed by the river. The clay layer varies in thickness from just a few feet to over ten feet thick.

(2) The slickensided clay layer has been eroded by stream entrenchment along the current path of the main runoff pathway. In some places this erosion is complete.

(3) Aggredation of the area occurred during Prairie time. Deposits above the clay are more porous than the clay layer.

(4) The contaminant releases are classified in three types. Type 1 releases are those in the wood storage yards. Type 2 and 3 releases are made from subsurface units and pond bottoms.

(5) Type 2 and 3 releases are comprised of DNAPL and aqueous phase liquids. DNAPLs are contained within vadose zone which acts as a "filter" for the material. Aqueous phase liquids move to the first impervious layer and begin spreading laterally along it's surface.

(6) Depending on the availability of water in the vadose zone, aqueous phase liquids

FIGURE 8-7 TOTAL VOLATILE AND SEMI-VOLATILE COMPOUNDS IN PERCHED GROUND WATER SAMPLES

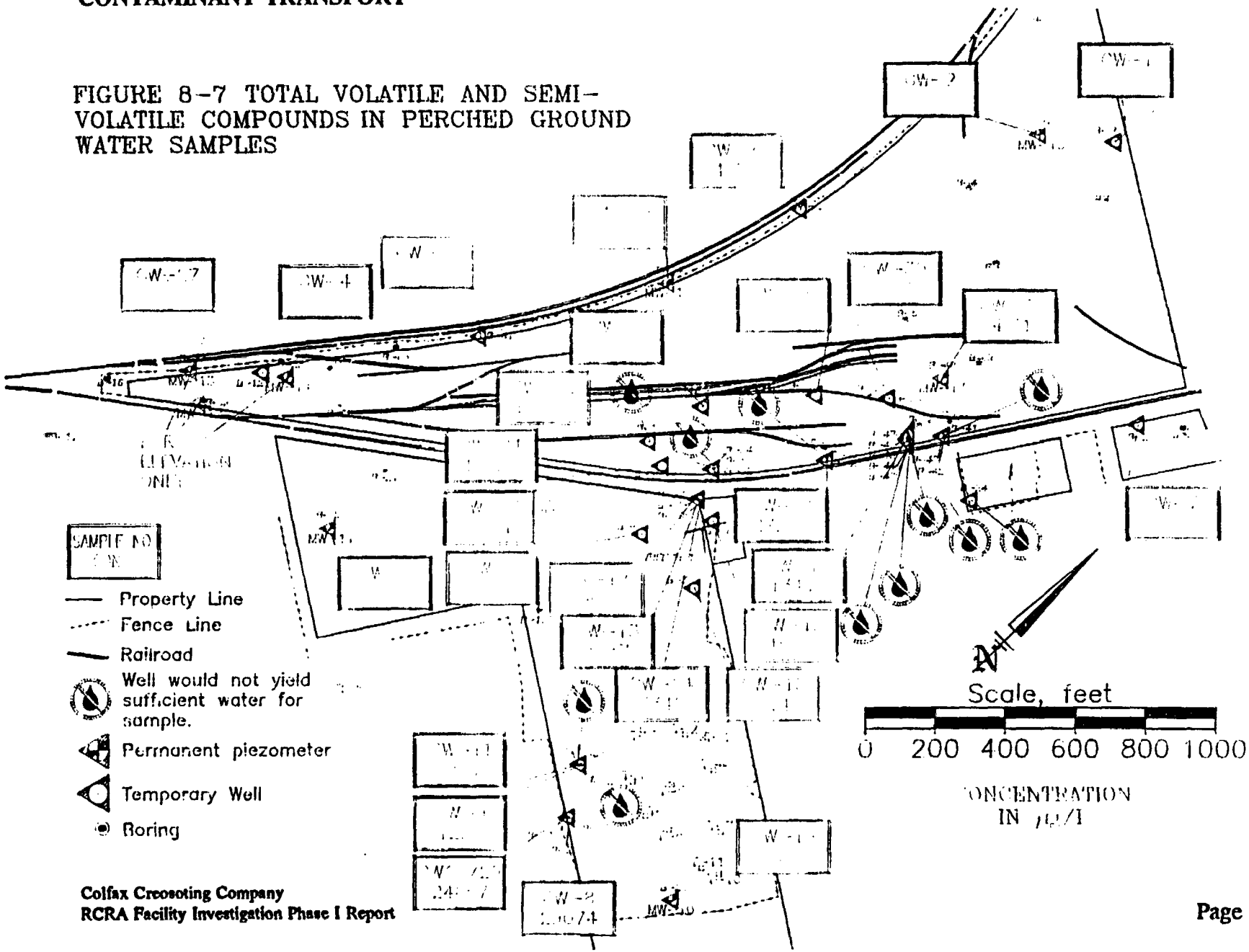


FIGURE 8-8: PENTACHLOROPHENOL DETECTED IN PERCHED GROUND WATER

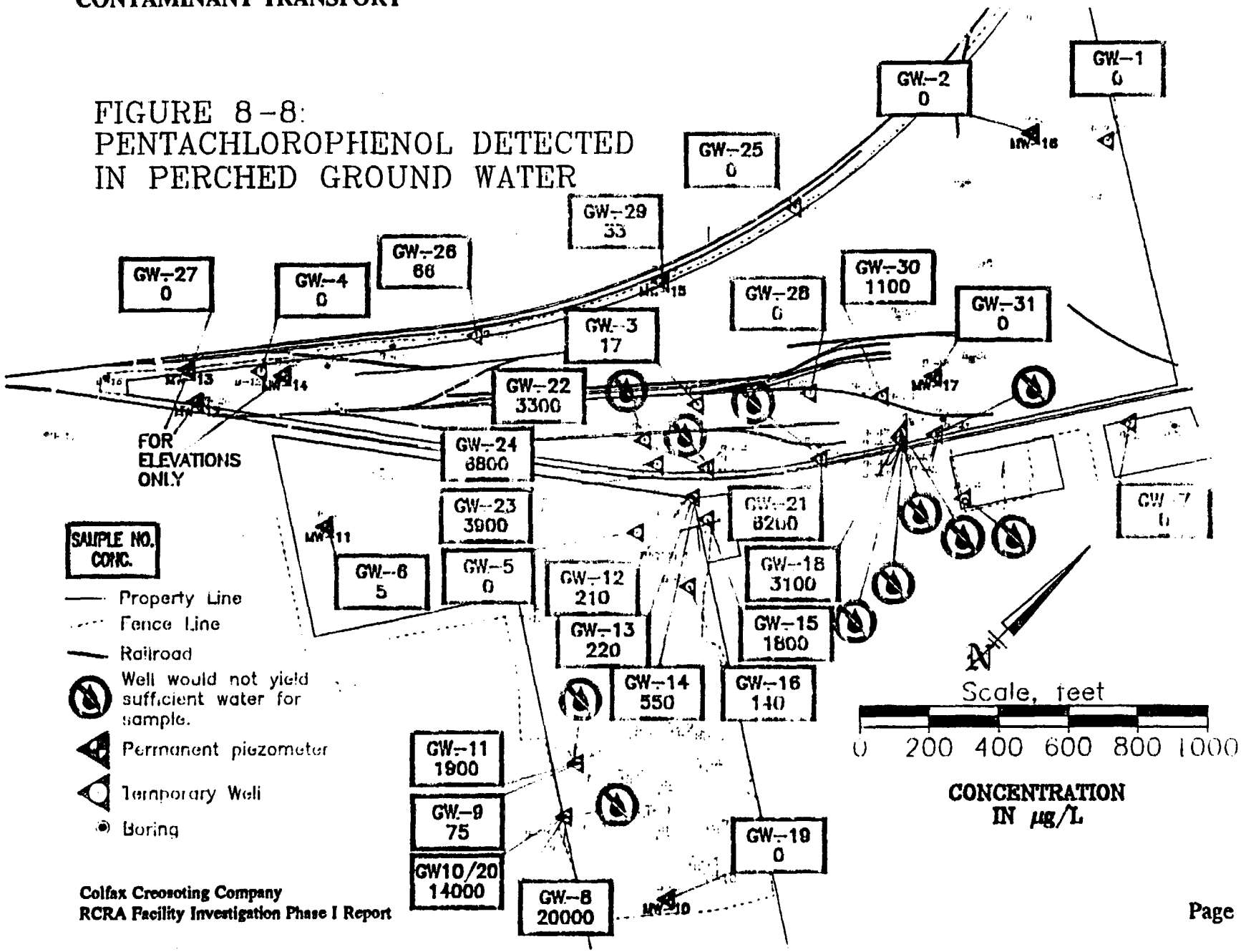


FIGURE 8-9
TOTAL VOLATILE COMPOUNDS FOUND IN PERCHED GROUND WATER

(PREDOMINANT SPECIES: TOLUENE, CHLOROBENZENE ETHYLBENZENE, AND TOTAL XYLENE)

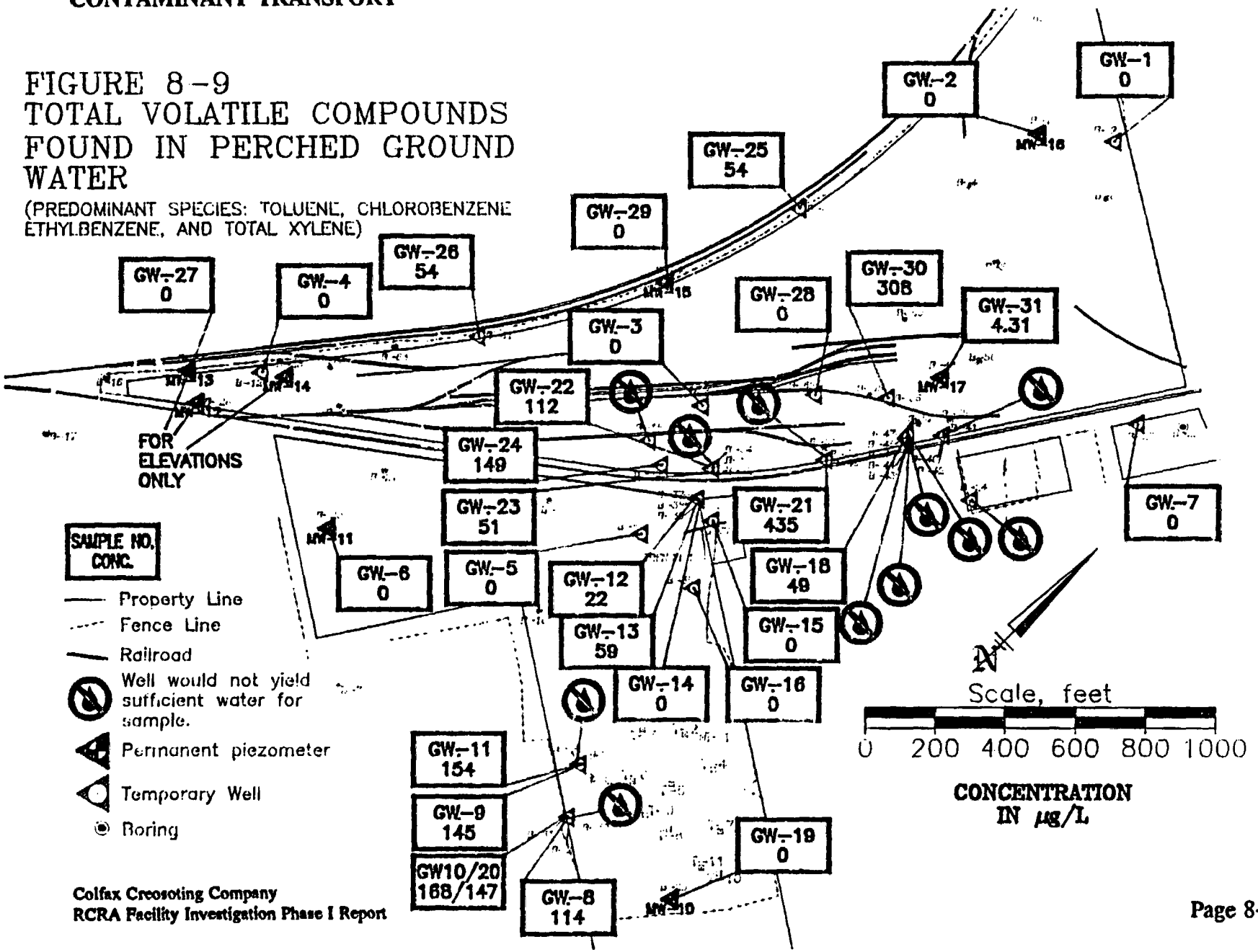
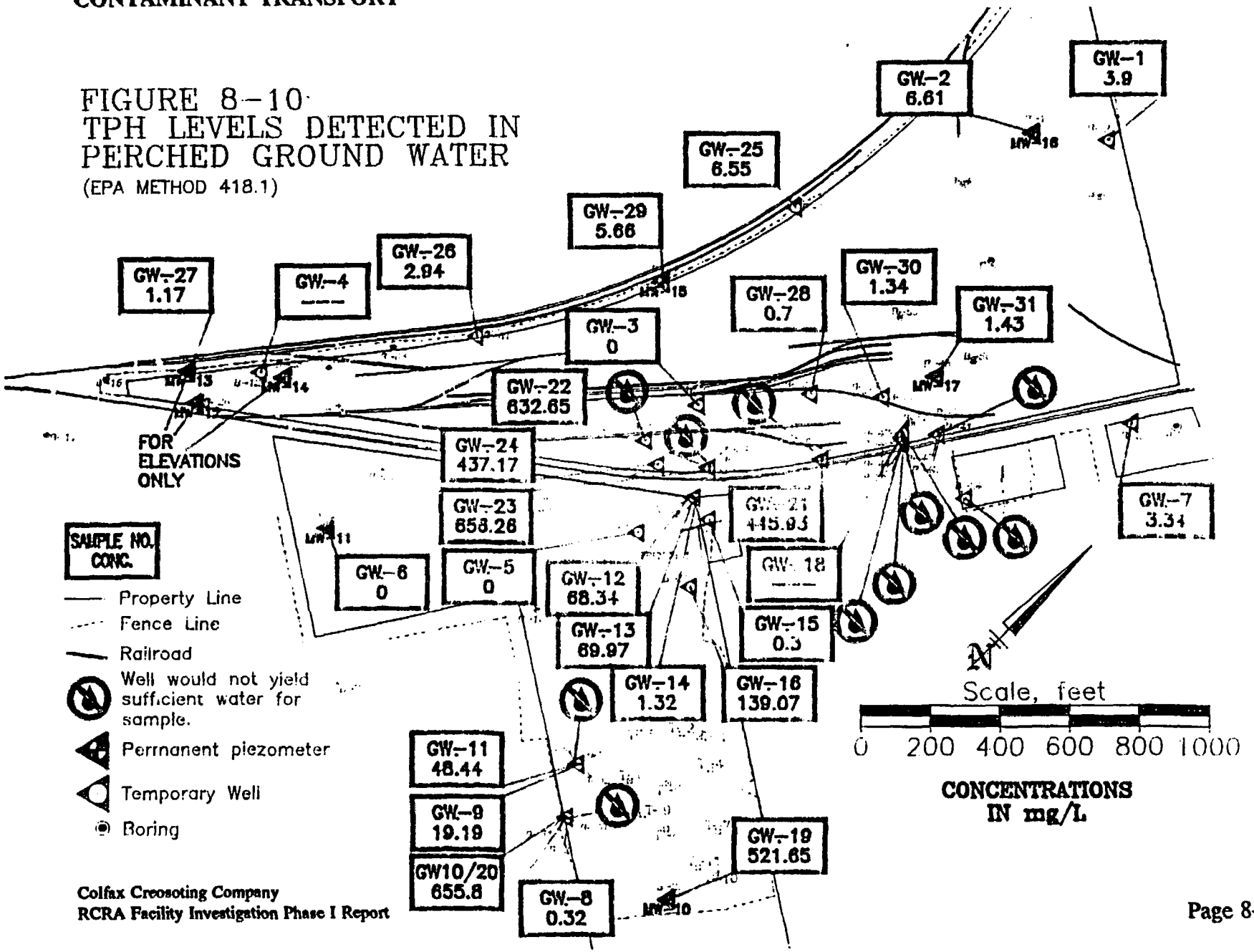


FIGURE 8-10
TPH LEVELS DETECTED IN PERCHED GROUND WATER
(EPA METHOD 418.1)



exist in a quasi-aqueous state. When these water is present in the zone, movement by dispersion results. During dry periods contaminants stay, for the most part, in place.

(7) The presence of erosional pathways, slickensided microfractures, and small root holes in the confining clay make it a "leaky" aquitard. Migration of constituents in the water column does, however, appears to be channeled by the clay. In spots where the clay is thin, chemicals can move through the unit more easily.

(8) Sampling indicates constituents found in sub-surface water samples represents ¼ of one percent of that found in soil samples. Thus, for the most part, DNAPL material is contained by the soil matrix.

(9) The dispersion rate for four common constituents is between 5 and 10 ft^2/yr. The rate in the red clay is substantially less ranging from 1 to 6 ft^2/yr. ft

9 SUMMARY

The following are from the conclusions and recommendations made in previous chapters of this report.

9.1 Wood Storage Yard Summary (SWMUs 1-4)

Four wood storage yards were investigated: the northeast wood storage area, the southeast wood storage area, the west wood storage area, and the southwest wood storage area. The wood storage yards are used by the company to stage untreated "white" timbers and poles and treated wood awaiting shipment to consumers. Stained soil can be observed underneath some of the treated material. Creosote contamination in these SWMUs was found to be limited to the first two feet of soil. In most instances field screening indicated soils exhibiting high visual surface contamination ended within six inches of the surface. Releases have not been made to the groundwater from the wood storage areas because the majority of contamination is surficial. Currently the company has plans in place to remove drippage from the storage yards as it occurs. Also, the company has installed covered drip pads to collect drippage and made process changes to reduce drippage. This reduces the amount of preservative released incidentally to the storage yards. No further work is recommended in these areas originating from drippage.

9.2 Diesel Plume, SWMU 3

Information collected from SWMU 3 indicates that a diesel plume exists near the Pineville Junction at depths within 14 ft of the surface. This plume most likely originated from locomotive refueling and repair operations conducted by the Louisiana and Arkansas Railroad in the past. Railroad officials should be notified about the possible existence of abandoned

underground storage tanks and the diesel plume at the Pineville Junction. No further work by Colfax Creosoting is recommended for this SWMU.

9.3 Process Area SWMU's

Conclusions and recommendations for process area SWMUs are:

9.3.1 SWMU 13 -- Penta/Creosote Sump Containment

Releases from this SWMU were not detected at the north and south end. A release limited to the first eight feet of soil was detected in boring 65 which was completed near a construction joint (crack) in the containment wall. Surface release was found in the first two feet of soil in boring 58, however, the contamination probably originated from another source. Releases detected in borings 59 and 66 probably originated from subsurface piping and not SWMU 13. Groundwater samples collected from borings showed no creosote constituents or pentachlorophenol. No further work is recommended for this SWMU.

9.3.2 SWMU 14 -- CCA Containment System

Copper, chromium, and arsenic levels in soils around this SWMU were within ranges expected for natural soil. Copper, chromium, and arsenic was not detected in groundwater samples. No further work is recommended for SWMU 14.

9.3.3 SWMU 15, 16, 17, 18, and 25

These units were no longer present when RFI field work began. Releases from these units would have been contained by the Penta/Creosote Sump Containment System (SWMU 14). No further work is recommended for these SWMUs.

9.3.4 SWMU 19 and 20

These SWMUs are contained within the Penta/Creosote Sump Containment System (SWMU 14). Please see section 9.3.1 above for further conclusions and recommendations. No further work is recommended for this SWMU.

9.3.5 AOC B -- Creosote Unloading Area

Creosote contamination was detected in boring 66 drilled near this AOC. Contamination in this boring increased with depth indicating it did not originate from a surface release. Since releases from this AOC would be made to surface soils, it is not likely that a release has been

made from this unit. No further work is recommended for this AOC.

9.3.6 Creosote constituents detected in borings 59 and 66.

Contamination increased with depth indicating a subsurface release near these borings. Contamination in boring 59 may have originated from a blow-down line operating in a ditch near this area by the former owners. Contamination in boring 66 most likely originated from the concrete pipeline, AOC D, used to send process water from the wood preserving plant to the large surface impoundment. The horizontal extent of these releases has not been determined. Contamination detected below eight feet was not above 1 ppm. Groundwater results from boring 66 are inconclusive due to a subsurface anomaly which flooded the boring during drilling. More investigation of these two releases is recommended.

9.4 Northern Half of Main Runoff Pathway, SWMU 9

Sampling indicates the main runoff pathway's northern half is managing solid waste contaminated with wood preserving solutions. Contamination was found in the unit beginning adjacent, and possibly continuing to the treating complex. Concentration levels from 1% to 5% were detected in the unit near the historical location of two surface water cells identified from early aerial photographs. Contamination was also identified at the SWMUs western end. It is hypothesized that releases were made to this portion of SWMU 9 from older units that no longer exist. It is not possible to determine if SWMU 10, the truck washing area, has released contamination due to the presence of contamination from other sources. Any waste that may have originated in SWMU 10 is probably insignificant when compared to other nearby sources. Therefore, this area should be considered part of SWMU 9. More work is recommended for this portion of SWMU 9 and the portion of the concrete pipeline extending to the treating complex.

9.5 Southern Half Main Runoff Pathway SWMU 9

Contamination exists along the southern half of SWMU 9. The source of these contaminants is probably a series of surface water cells used in the past for preservative recovery. Contamination at the lower end of the SWMU most likely originated from water stagnating in the area when the southern culvert was installed. The horizontal extent of

contamination was not defined along the northeast side of SWMU 9 at the upgradient end. Soils taken from boring 34 on the southwest bank did not contain preservative constituents. However, the horizontal extent was not defined in the last boring set. The vertical extent of contamination was not defined by the borings. More work is recommended to determine if a contamination plume has moved offsite from any of the surface water cells along this portion of SWMU 9. The company has removed and properly disposed of the concrete pipeline in this portion of the SWMU. Therefore no further work is recommended for this portion of AOC D.

9.6 Railcar Separator, SWMU 8

A boring completed near the former location of this SWMU revealed a surface release was made by the railcar separator which was once located near the location of boring 35. The release is contained within the first six feet of soil underneath the site. Subsurface water contamination probably does not result from this SWMU since uncontaminated soil was located above the piezometric surface. No further investigation is recommended for this SWMU.

9.7 West Runoff Pathway, AOC A

Soils collected from three borings along the west runoff pathway were not contaminated. A boring at the north end of the unit did show deep contamination indicating a release has migrated to this spot. Wood preserving constituents were detected in subsurface soil at the north end of AOC A. Data indicates a subsurface release was made, possibly from a blowdown line once extending in this direction. The extent of this contamination is not known. More work is recommended for this portion of AOC A.

9.8 Truck Servicing Area, AOC C

A diesel tank farm was investigated in AOC C. Findings are that very low amounts of hydrocarbon contaminants were detected in borings completed near the diesel fueling area. The fueling area is the likely source of this contamination. Surface soils underneath the diesel fueling tanks should be removed and disposed as a solid waste. A concrete slab and berm containment system should be constructed to contain the fuel tanks and fueling island. The berm

system should be covered to prevent storm water from coming in contact with fuel spillage to the containment system. Any floating oil in storm water discharge from the berm area should be removed with sorbent booms or other oil skimming device(s). No further investigation is recommended for the area.

9.9 Groundwater Recovery Tank, SWMU 12

The groundwater recovery tank located in parcel B was investigated by completing and sampling a downgradient trench. Findings for this SWMU are that no releases have been documented. Any release from the unit would have been made to surface soils. No surface release was apparent during the RFI. Chemicals present in the fill downgradient from the unit most likely originated from treated wood debris included in the soil matrix. The company has installed a curbed concrete pad and recovery sump to contain releases from the tanker. The system is inspected daily. No further work is recommended for this unit.

9.10 Untreated Wood Landfill, SWMU 11

Conclusions for the untreated wood landfill are that the fill depth averages between four and five feet over the unit. Fill depths are greatest along the south side of the SWMU. Analysis shows some treated wood has been placed in the fill. Chemical levels ranged from 10 to 100 mg/kg total constituents in wood debris samples. Data indicates chemical constituents detected in the fill originated from treated wood cut offs and not sludge from the wood preserving process. Samples collected from natural soil underneath the fill was found to be analytically clean. Runoff samples from the marsh receiving drainage from the SWMU were also free of wood preserving chemical constituents. An elevated TPH level was found in a water sample from boring 25. This may represent cross-contamination. The well should be resampled to confirm to result. The fill does not seem to be impacting the subsurface environment. Other than to resample boring 25, no further investigation is recommended for this unit.

APPENDIX A - Aerial Photographs

Photo 1: Excerpt from February 7, 1952 Aerial Photograph, Alexandria, Louisiana. . . . . Page A-1

Photo 2: Excerpt from March 8, 1955 Aerial Photograph, Alexandria, Louisiana.. . . . . Page A-2

Photo 3: Enlargement from Excerpt of March 8, 1955 Aerial Photograph, Alexandria, Louisiana.. . . . . Page A-3

Photo 4: Enlargement from Excerpt of March 8, 1955 Aerial Photograph, Alexandria, Louisiana.. . . . . Page A-4

Photo 5: Enlargement from Excerpt of March 8, 1955 Aerial Photograph, Alexandria, Louisiana.. . . . . Page A-5

Photo 6: Excerpt from February 22, 1971 Aerial Photograph, Alexandria, Louisiana.. . . . . Page A-6

Photo 7: Excerpt from May 12, 1975 Aerial Photograph, Alexandria, Louisiana.. . . . . Page A-7

Photo 8: Excerpt from March 30, 1990 Aerial Photograph, Alexandria, Louisiana.. . . . . Page A-8

PHOTO 1
Excerpt from February 7, 1952
Aerial Photograph, Alexandria, LA

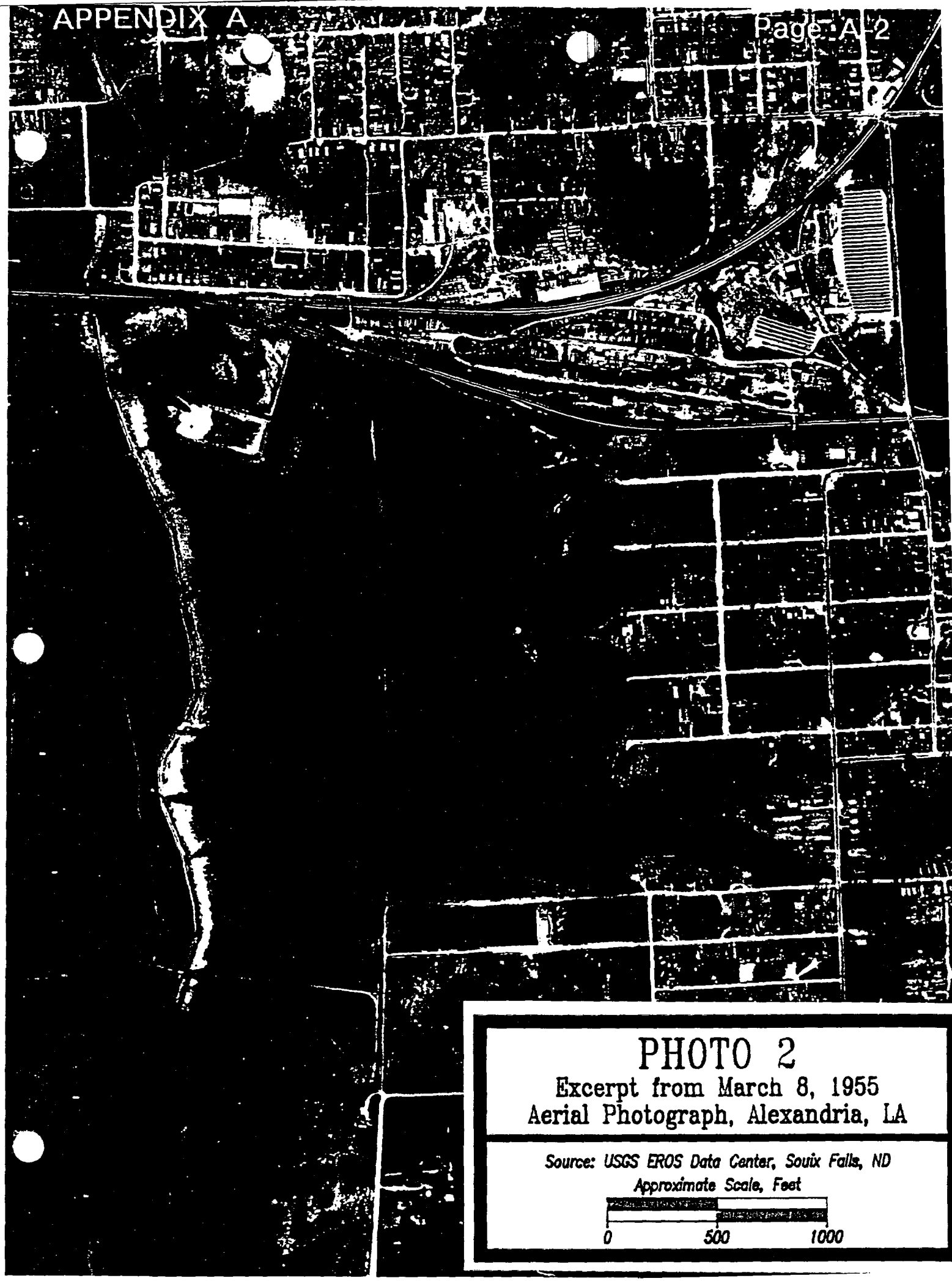


PHOTO 2

Excerpt from March 8, 1955
Aerial Photograph, Alexandria, LA

Source: USGS EROS Data Center, Souix Falls, ND

Approximate Scale, Feet

0 500 1000

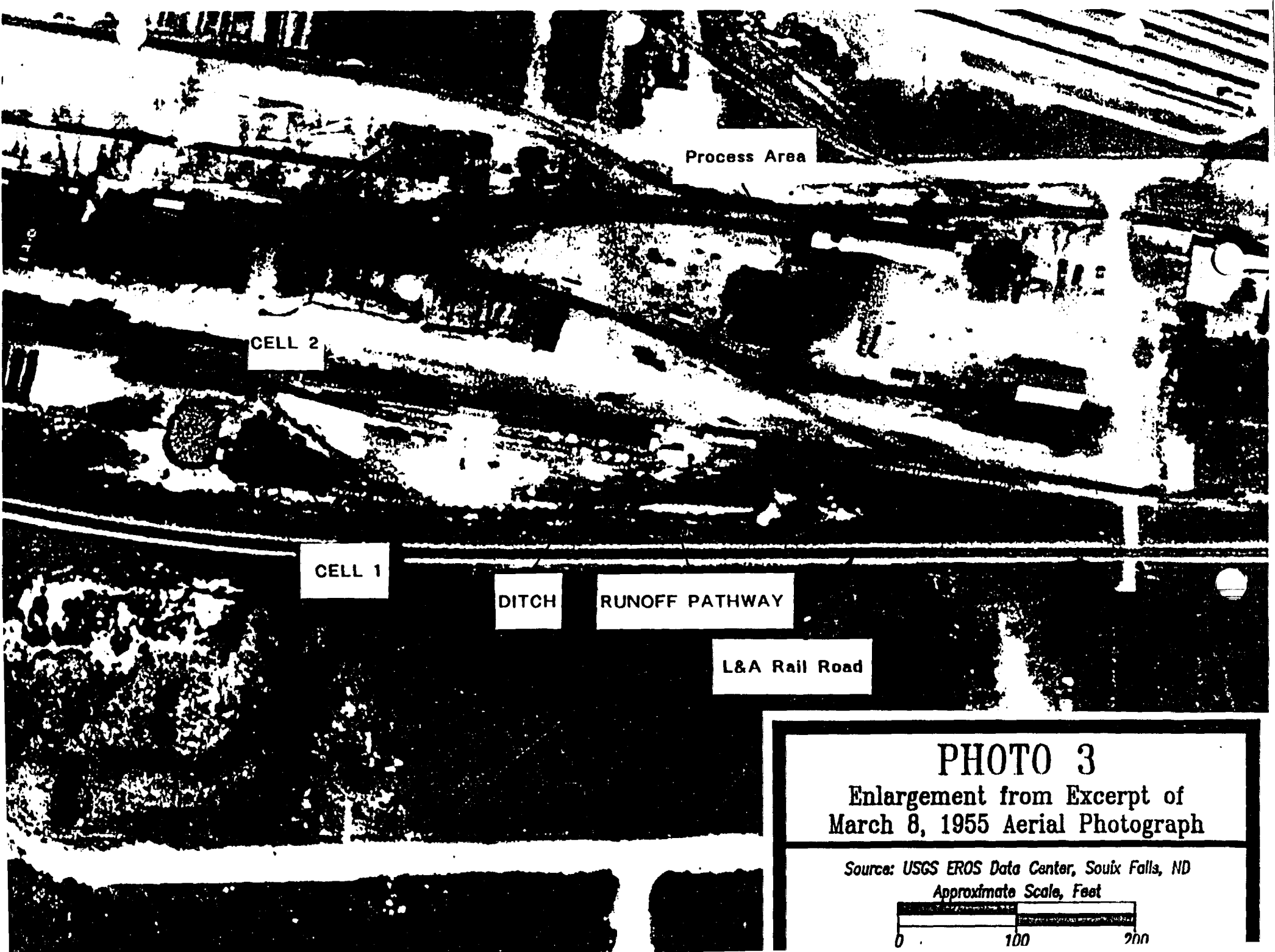


PHOTO 3

Enlargement from Excerpt of March 8, 1955 Aerial Photograph

Source: USGS EROS Data Center, Souix Falls, ND

Approximate Scale, Feet

APPENDIX A

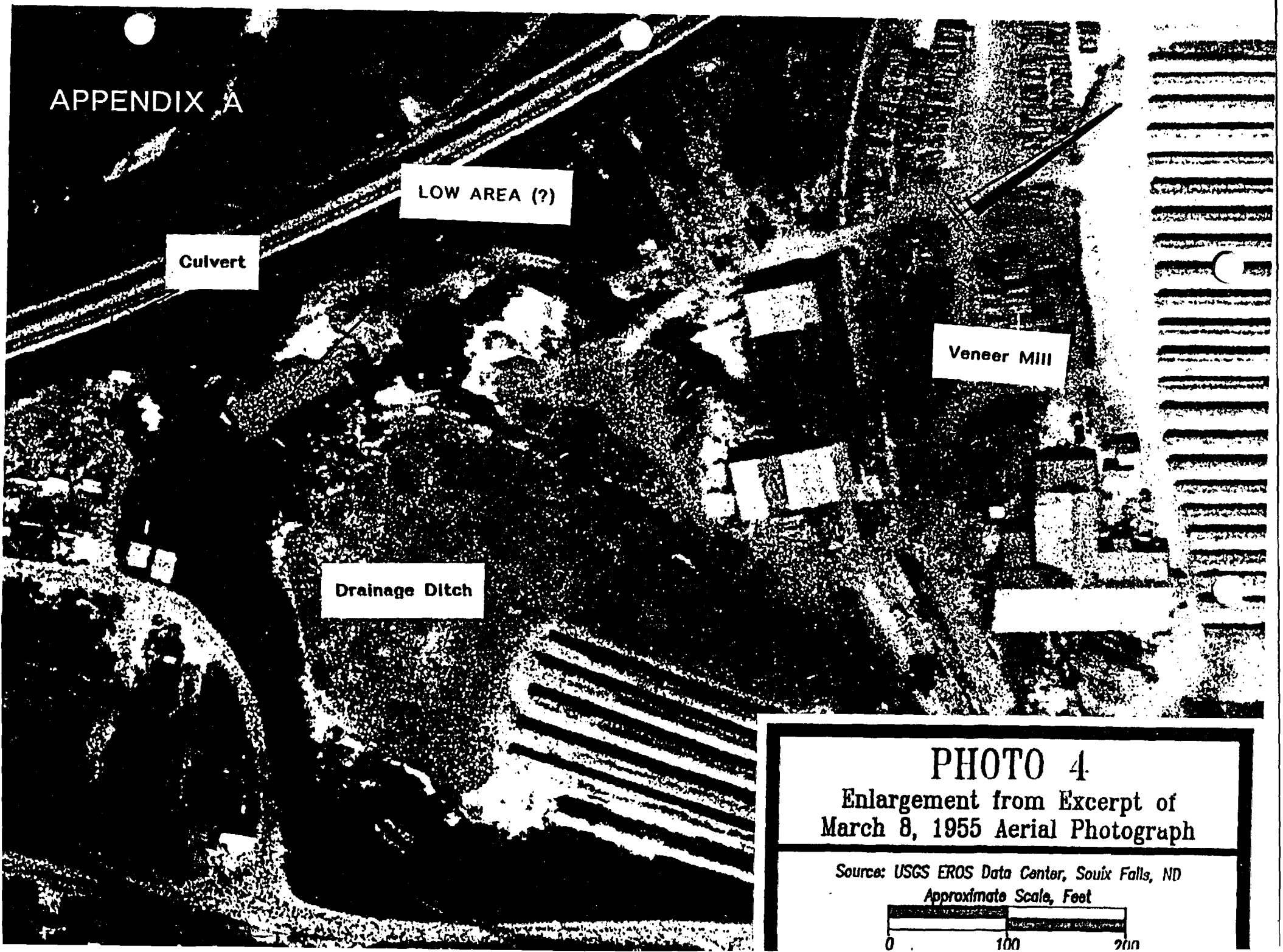


PHOTO 4

Enlargement from Excerpt of March 8, 1955 Aerial Photograph

Source: USGS EROS Data Center, Souix Falls, ND

Approximate Scale, Feet

0 100 200

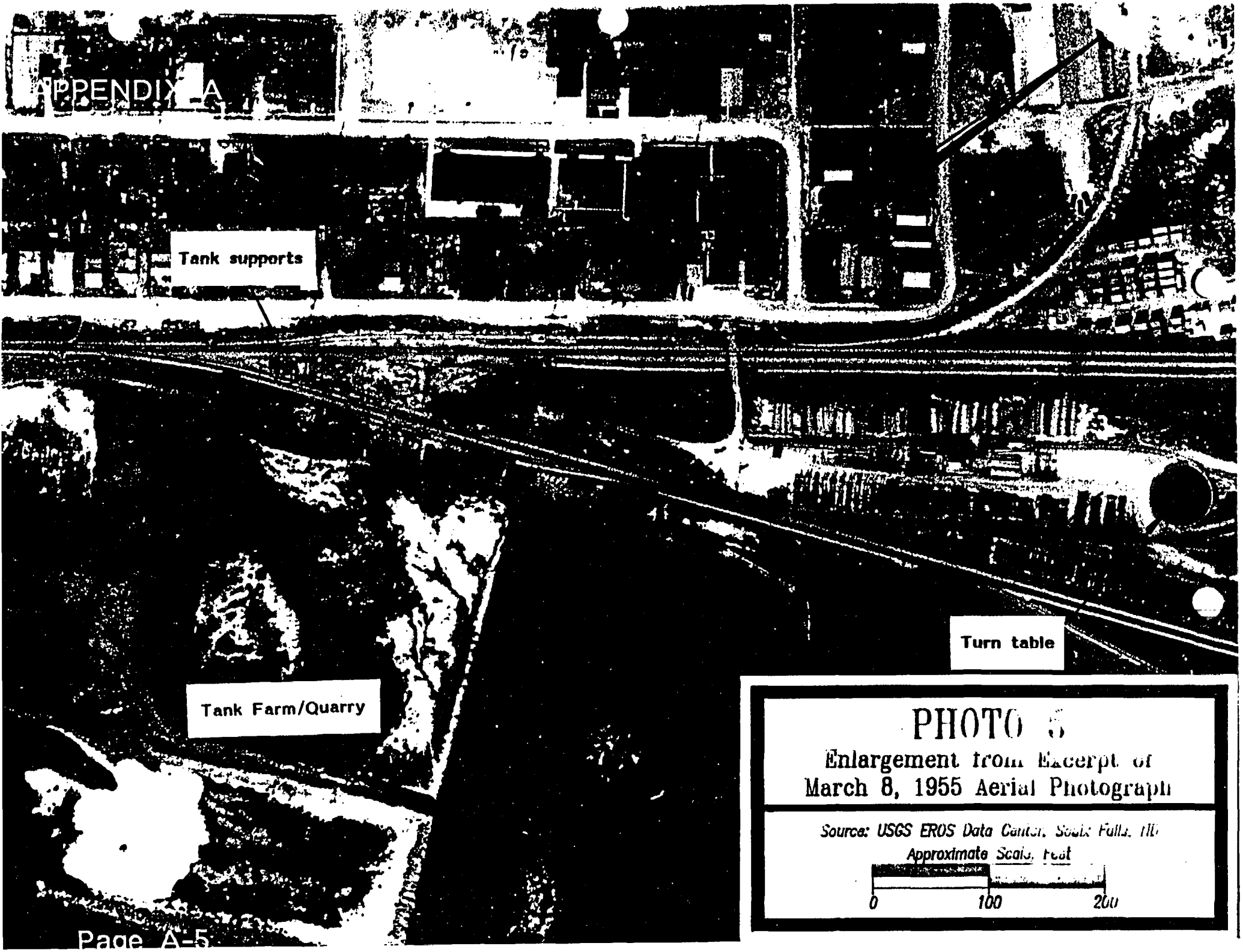


PHOTO 5

Enlargement from Excerpt of March 8, 1955 Aerial Photograph

Source: USGS EROS Data Center, Sioux Falls, ND

Approximate Scale, Feet

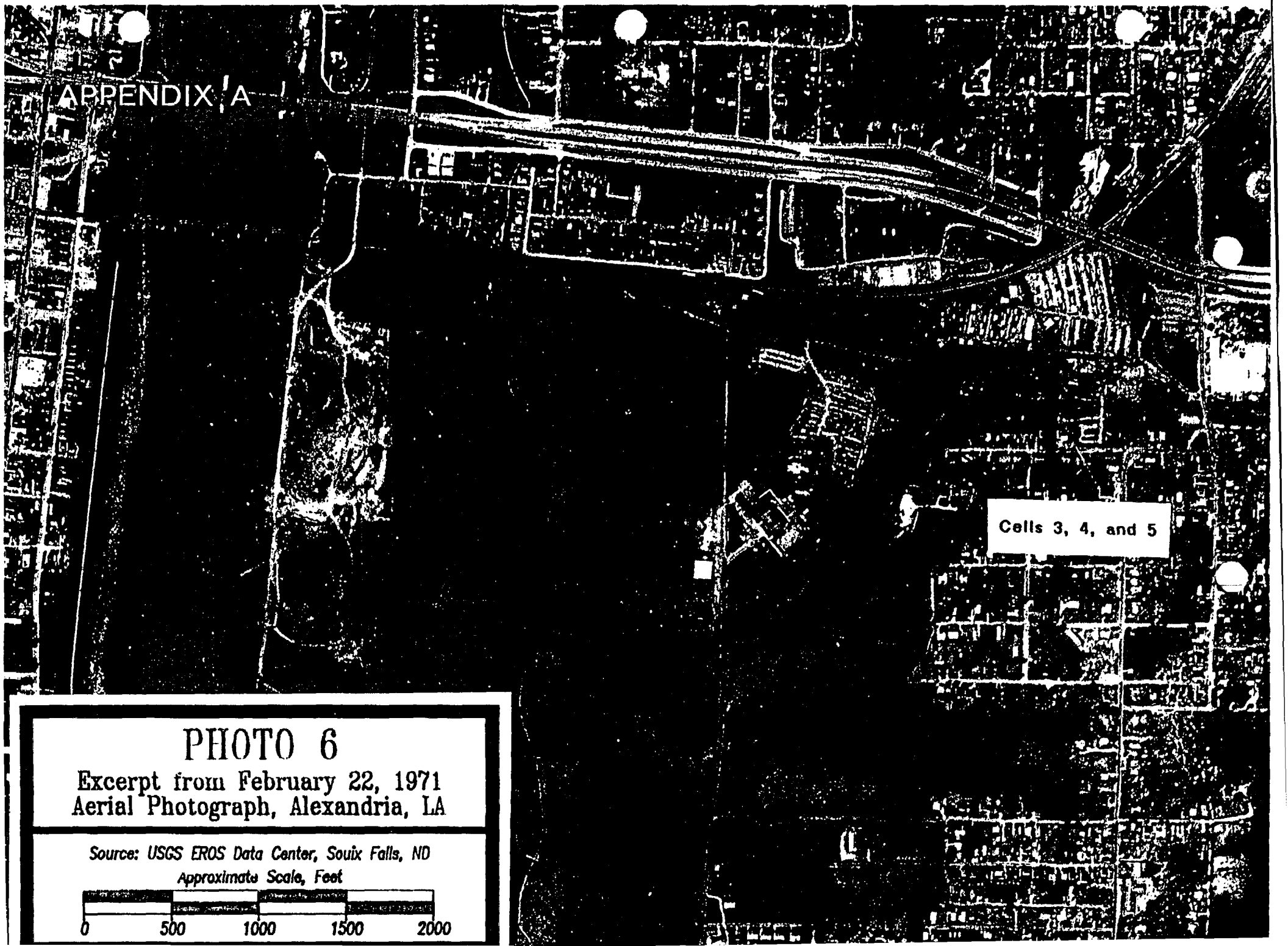


PHOTO 6

Excerpt from February 22, 1971
Aerial Photograph, Alexandria, LA

Source: USGS EROS Data Center, Souix Falls, ND

Approximate Scale, Feet

0 500 1000 1500 2000

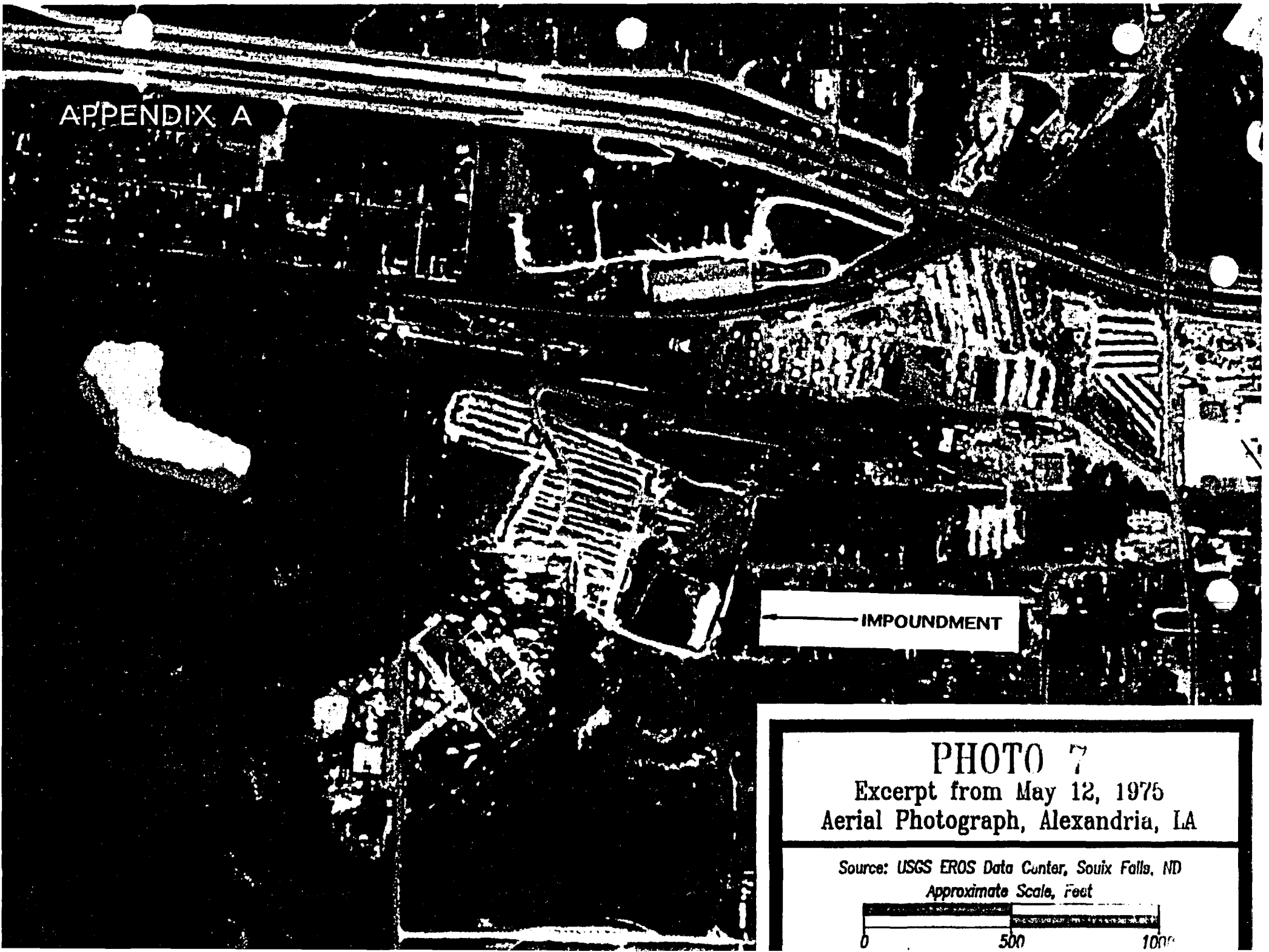


PHOTO 7
Excerpt from May 12, 1975
Aerial Photograph, Alexandria, LA

Source: USGS EROS Data Center, Souix Falls, ND
Approximate Scale, Feet

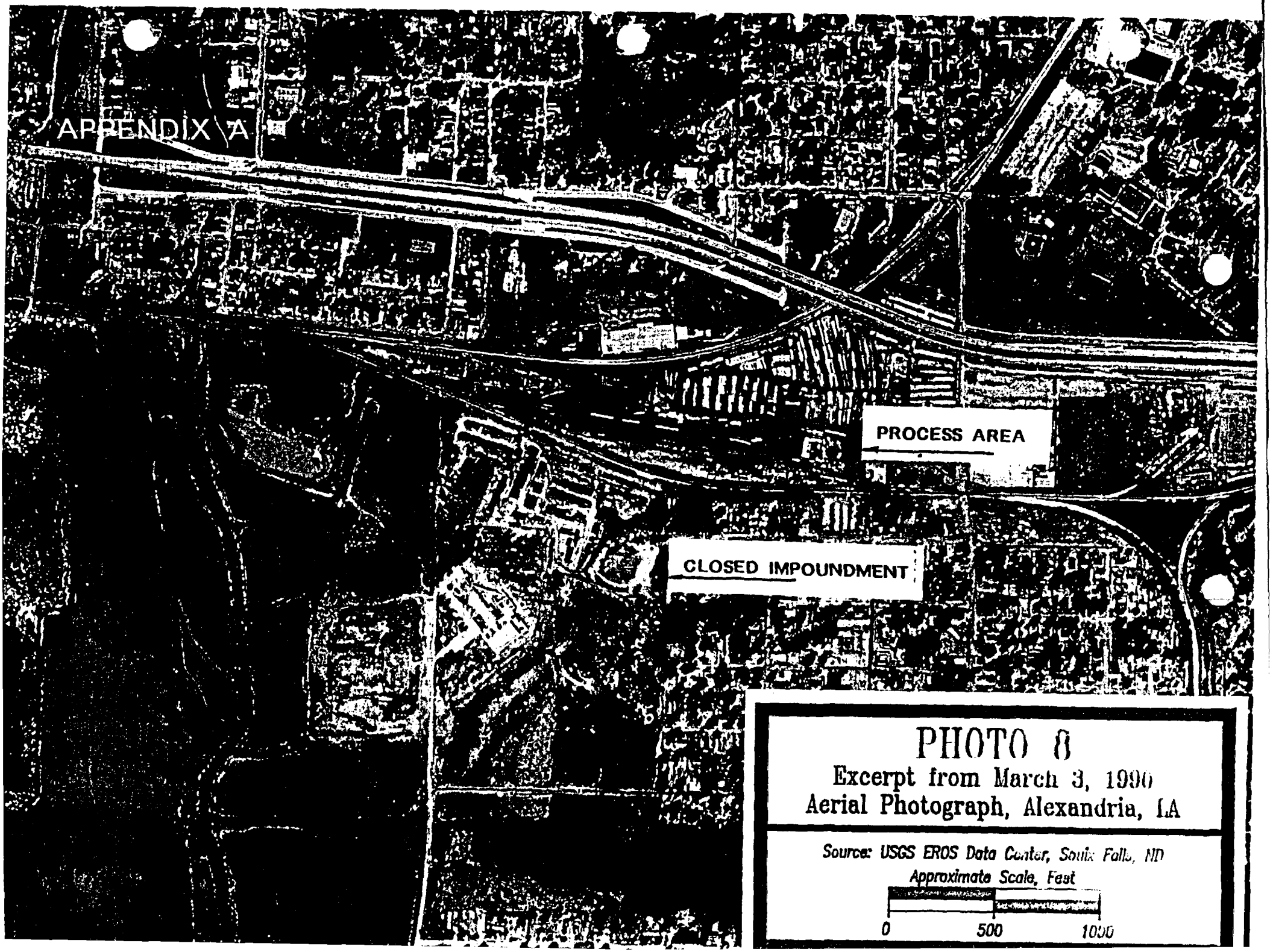


PHOTO 8
Excerpt from March 3, 1990
Aerial Photograph, Alexandria, LA

Source: USGS EROS Data Center, Sioux Falls, ND
Approximate Scale, Feet

APPENDIX B - Soil Boring and Trench Logs

SUBSURFACE EXPLORATION

FOR

RCRA FACILITY INVESTIGATION
PINEVILLE, LOUISIANA

PREPARED FOR

BALL ENGINEERING, INC.
ATTN: MR. JONATHON BONNER
23 WOOD MANOR
TUSCALOOSA, ALABAMA 35401-4969

JANUARY 8, 1993

SWL FILE NO. 920954

SwL

SOUTHWESTERN LABORATORIES

Materials, environmental and geotechnical engineering, nondestructive, metallurgical and analytical services

7222 Greenwood Rd. • P.O. Box 37577 • Shreveport, LA 71133-7577 • 318/636-3673

January 8, 1993

Ball Engineering, Inc.
23 Wood Manor
Tuscaloosa, Alabama 35401-4969

Attention: Mr. Jonathon R. Bonner

Reference: Subsurface Exploration
RCRA Facility Investigation
Colfax Creosoting Company
Pineville, Louisiana
SwL File No. 920954

Gentlemen:

Enclosed are the boring logs for the above referenced project.

If we can be of any further assistance concerning this project, please do not hesitate to call on us.

Sincerely,

SOUTHWESTERN LABORATORIES

Gene Gardner

Gene Gardner, P.E.
Geotechnical Engineer

Roy D. Jones, P.E.
Geotechnical Manager

GG/RDJ:my

LOG OF BORING NO. B-1

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/2/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Water encountered at 15 feet.

FIELD DATA				LABORATORY DATA									
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	DESCRIPTION OF STRATUM
													Brown sandy clay fill with gravel, topsoil and roots 1.0
													Stiff sandy silty clay (CL); HNU=0 Light yellowish brown; 10YR 6/4 3.0
													Firm slightly clayey silty sand (SC-SM); HNU=0 Light yellowish brown; 10YR 6/4 5.0
	5		N=31										Firm fine silty sand (SM); HNU=0 Pale brown; 10YR 6/3 Dense fine silty sand (SM); HNU=0 Very pale brown; 10YR 7/4
			N=27										Firm fine silty sand (SM); HNU=0 Light gray; 10YR 7/2 10.0
	10		N=11										Firm fine sand (SP); HNU=0 Moist, light gray; 10YR 7/2
			N=15										Firm fine sand (SP); HNU=0 Moist, light gray; 10YR 7/2
			N=16										Firm fine sand (SP); HNU=0 Wet light gray; 10YR 7/2
	15												
	20												Wet light gray sand 24.0
	25												Bottom of Boring Well Set - 10' .010 Slot Screen - PVC 2" - 15' PVC Riser, Schedule 40 PVC 2" Sand Pack; 20-40 Silica Sand 24' to 12' Bentonite Seal; 3/8" Pellets to 10' Annulus grouted 6-3-92, 10' to surface protection casing set. Grout weight in 13.7 lb/gal Grout weight out 13.8 lb/gal
	30												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-2

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/2/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Water encountered at 10 feet.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Stiff sandy silty clay (CL) fill with small gravel; HNU=0 Dark grayish brown; 10YR 4/2 Sandy clay fill to 2 1/2'
													Stiff sandy silty clay (CL); HNU=0 Light brownish gray; 10YR 6/2
													Stiff very sandy clay (CL); HNU=0 Light gray with Fe stains and nodules; 10YR 7/2 Black organic inclusions, resembling cinders
	5												6.0
													Firm silty sand (SM) with some clay; HNU=0 Light gray; 10YR 7/2
			N=30										Dense fine silty sand (SM) Moist; HNU=0 Light gray; 10YR 7/2
	10		N=25 ▼										Firm fine silty sand (SM) Wet; HNU=0 Fe stained; 10YR 7/2
													Very thin gray clay seams at 10 1/2'
	15												15.0
													Bottom of Boring 6 1/2" Diameter Temporary Well Set - 5' .010 Slot Screen - 12 1/2' PVC Riser Sand Pack; 8' Pellets; 6' Annulus plugged with bentonite at surface. Temporary well pulled and annulus grouted to surface. Grout weight in 13.9 lb/gal Grout weight out 13.9 lb/gal
	20												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-3

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/2/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: No water encountered.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Firm very fine silty sand (SM) with Fe stains, slightly clayey; HNU=0 Light gray; 10YR 7/2 2.0
	5												Firm very fine clayey sand (SC) with Fe stains; HNU=0 Light gray; 10YR 7/2 Firm fine clayey sand (SC) with Fe stains; HNU=0 Light yellowish brown; 10YR 6/4 6.0
													Firm fine slightly clayey silty sand (SM) with Fe stains; HNU=0 Light gray; 10YR 7/2 8.0
	10 15 20												Bottom of Boring Borehole grouted at full depth. Grout weight in 13.9 lb/gal Grout weight out 13.9 lb/gal

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-4

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/2/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: No water encountered.

FIELD DATA				LABORATORY DATA									
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	DESCRIPTION OF STRATUM
													No sample taken. Grayish brown slightly silty sand fill with wood chips and gravel 2.0
			N=14										Stiff sandy silty clay (CL); HNU=0 Yellowish brown; 10YR 5/4 4.0
	5												Stiff sandy clay (CL) with Fe stains and nodules; HNU=0 Light yellowish brown; 10YR 6/4 Stiff very sandy clay (CL) with Fe stains becomes firm fine silty sand at 7 1/2'; HNU=0 Very pale brown; 10YR 7/3 8.0
	10												Bottom of Boring Borehole grouted at full depth. Grout weight in 13.8 lb/gal Grout weight out 13.8 lb/gal
	15												
	20												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING No. B-5

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/3/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: No water encountered.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													No sample taken. Grayish brown clayey silty sand fill with wood chips and gravel 2.0
													Firm slightly clayey fine sandy silt (ML) becomes sandy silty clay; HNU=0 Gray; 10YR 6/1 4.0
	5												Firm very fine clayey silty sand (SC-SM); HNU=0 Brown; 10YR 5/3 6.0
													Firm silty sand with some clay (SM); HNU=0 Light yellowish brown; 10YR 6/4 8.0
	10												Bottom of Boring Borehole grouted at full depth. Grout weight in 13.8 lb/gal Grout weight out 13.8 lb/gal
	15												
	20												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-6

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/3/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: No water encountered.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Grayish brown clayey silty sand fill with gravel and wood chips, approximately 2" oil stain 2.5
													Fill to 2 1/2' changes to firm very fine sandy silt (ML); HNU=0 Gray; 10YR 5/1 4.0
	5												Stiff very silty clay with fine sand (CL), Fe stained; HNU=0 Brownish gray; 10YR 6/2
													Stiff very silty clay with fine sand (CL), Fe mottled; HNU=0 Light gray; 10YR 7/2 8.0
	10												Bottom of Boring Borehole grouted at full depth. Grout weight in 13.8 lb/gal Grout weight out 13.9 lb/gal
	15												
	20												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-7

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/3/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: No water encountered.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Loose fine clayey sand with silt (SM-SC) to 18" changes to soft silty clay with organic (CL); HNU=0 Very dark grayish brown; 10YR 3/2 — 1.5
	5												Soft silty clay with organic changes to stiff clay; HNU=0 10YR 3/2; 2 1/2YR 4/4 — Medium silty clay with calcium nodules; HNU=0 2 1/2YR 4/4 — 6.0
													Loose clayey silt (ML) with fine sand; HNU=0 10YR 4/6 — 8.0
	10												Bottom of Boring Borehole grouted at full depth. Grout weight in 13.9 lb/gal Grout weight out 13.9 lb/gal
	15												
	20												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SWL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-8

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/8/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Water encountered at 6 feet

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Gravel fill with wood debris 1.0
													Stiff silty clay (CL); HNU=0 Strong brown; 10YR 5/6 2.0
													Firm silty sand (SM); HNU=0 Yellow; 10YR 7/6
			N=83										Dense silty sand (SM); HNU=0 Yellow; 10YR 7/6
	5												
			N=46										Dense silty sand (SM); HNU=0 Yellow; 10YR 7/6
	10												13.0
	15												Bottom of Boring Temporary Well Set - 5' .010 Slot Screen 2' PVC - 10' Riser - 13-6' 20/40 Silica Sand - 6-5' Bentonite Pellets 3/8" Temporary well pulled and borehole grouted to surface. Grout weight in 14.1 lb/gal Grout weight out 14.1 lb/gal
	20												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS:

920954

SwL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-9

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/8/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: No water encountered.

FIELD DATA				LABORATORY DATA									
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	DESCRIPTION OF STRATUM
													Fill with gravel, stiff silty clay (CL); HNU=0 Light gray; 10YR 7/2 2.0
													Stiff sandy clay (CL); HNU=0 Light gray; 10YR 7/2 Stiff sandy clay (CL); HNU=0 Yellowish brown; 10YR 5/6 5.0
	5												Firm silty sand (SM); HNU=0 Brownish yellow; 10YR 6/6 6.0
													Stiff sandy clay (CL); HNU=0 Strong brown; 7 1/2YR 5/6 8.0
													Bottom of Boring Borehole grouted on 6-8-92. Grout weight in 13.6 lb/gal Grout weight out 13.6 lb/gal
	10												
	15												
	20												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. _-10

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/8/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: No water encountered.

FIELD DATA				LABORATORY DATA									
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	DESCRIPTION OF STRATUM
													Stiff silty clay (CL); HNU=0 Very pale yellow; 10YR 8/4 1.0
													Very stiff silty sandy clay (CL); HNU=0 Brownish yellow; 10YR 6/6 Stiff silty sandy clay (CL); HNU=0 Light gray; 10YR 7/2 Stiff silty sandy clay (CL); HNU=0 Light gray; 7.5YR 7/2 5.0
	5												Fine silty sand (SM); HNU=0 Reddish yellow; 7.5YR 6/6 Dense silty sand (SM); HNU=0 Reddish yellow; 7.5YR 6/8 8.0
	10												Bottom of Boring Borehole grouted on 6-8-92. Grout weight in 13.6 lb/gal Grout weight out 13.6 lb/gal
	15												
	20												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SWL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. -11

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/8/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: No water encountered.

FIELD DATA				LABORATORY DATA									
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	DESCRIPTION OF STRATUM
													Gravel fill; HNU=0 (1.0)
													Stiff silty clay (CL); HNU=0 Brownish yellow; 10YR 6/6 Stiff silty clay (CL); HNU=0 Yellow; 10YR 8/6 (4.0)
	5												Very stiff silty sandy clay (CL); HNU=0 Very pale brown; 10YR 7/3 (6.0)
													Very stiff fat clay (CH); HNU=0 Strong brown; 7.5YR 4/6 (8.0)
	10												Bottom of Boring Borehole grouted on 6-8-92. Grout weight in 13.6 lb/gal Grout weight out 13.6 lb/gal
	15												
	20												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. 3-12

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/8/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: No water encountered.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Wood and debris; HNU = 0 1.0
													Stiff silty clay (CL) with Fe stain; HNU = 0 Yellow; 10YR 6/6 Stiff silty clay (CL) with Fe stain; HNU = 0 Gray; 10YR 7/1 4.0
	5												Firm sandy silt (SM); HNU = 26 Pale brown; 10YR 6/3 6.0
													Stiff fat clay (CH) with sand seams; HNU = 1 Strong brown; 7.5YR 5/6 Stiff fat clay (CH) with sand seams (wet); HNU = 0 Strong brown; 7.5YR 5/6 10.0
	10												Bottom of Boring Set Temporary Well - 10' deep - 5' .010 Screen - 5' Riser - 6' Sand 10/40 - 1' 3/8" Pellets Temporary well pulled and borehole grouted to surface. Grout weight in 13.9 lb/gal Grout weight out 13.9 lb/gal
	15												
	20												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-13

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/8/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: No water encountered.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Gravel fill; HNU=0 2.0
													Firm sandy silty (SM); HNU=0 Gray with sandy clay at 4'; 10YR 6/1 4.0
	5												Stiff sandy clay (CL) with Fe stains and sand lenses; HNU=0 Light gray; 10YR 7/1 6.0
													Firm clayey silt (SM) with Fe stains and clay lenses; HNU=0 Light gray; 10YR 7/1 8.0
	10 15 20												Bottom of Boring Borehole grouted on 6-8-92. Grout weight in 13.6 lb/gal Grout weight out 13.6 lb/gal

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SWL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-14

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/9/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: No water encountered.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Gravel fill 1.5
	5												Stiff silty clay (CL); HNU=0 Very pale brown with Fe stains; 10YR 7/4 Stiff silty clay (CL); HNU=0 Light gray with sand lenses and Fe stains; 10YR 7/2 6.0
													Very stiff clay (CH); HNU=0 Strong brown with calcium nodules and sand lenses; 7.5YR 5/8 8.0
	10 15 20												Bottom of Boring Borehole grouted on 6-9-92. Grout weight in 13.9 lb/gal Grout weight out 13.9 lb/gal

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-15

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/9/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Water encountered at 5 feet.

FIELD DATA				LABORATORY DATA									
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	DESCRIPTION OF STRATUM
													Gravel fill 1.0
													Stiff silty clay (CL); HNU=0 Yellowish brown with Fe stains and sand lenses; 10YR 5/6 2.0
													Stiff silty sandy clay (CL); HNU=0 Yellowish brown with silt lenses; 10YR 5/6 4.0
	5												Firm sandy silt (SM); HNU=0 Reddish yellow layers; 7.5YR 5/6 6.0
			N=20										Firm silty sand (SM); HNU=0 Reddish yellow with clay layers; 7.5YR 6/6
													Firm silty sand (SM); HNU=0 Reddish yellow with clay layers; 7.5YR 6/6 10.0
	10												Bottom of Boring Temporary Well Set - 2" PVC at 10' - 5' .010 Slot Screen - 5' Riser - 10-4' 20/40 Silica Sand - 4-2.5' Bentonite Pellets 1/2" Temporary well pulled and borehole grouted to surface. Grout weight in 13.6 lb/gal Grout weight out 13.6 lb/gal
	15												
	20												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SWL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-16

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/9/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: No water encountered.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Gravel fill 2.
	5												Medium stiff silty clay (CL); HNU = 5 Light gray with Fe stains and sand lenses; 10YR 7/1 Stiff silty clay (CL); HNU = 0 Light gray with sand lenses and Fe stains; 10YR 7/1 6.0
													Stiff silty sandy clay (CL); HNU = 0 Yellowish brown becoming silty sand at 7'; 10YR 5/6 7.0
	10		N = 33										Dense silty sand; HNU = 0 Yellowish brown with silt lenses; 10YR 5/8 10.0
													Bottom of Boring Borehole grouted on 6-9-92. Grout weight in 13.9 lb/gal Grout weight out 13.9 lb/gal
	15												
	20												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-17

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/9/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Water encountered at 6.5 feet.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Very stiff silty clay (CL); HNU = 0 Light gray with sand partings and Fe stains; 10YR 7/2
													Very stiff silty clay (CL); HNU = 0 Reddish yellow with sand lenses; 7.5YR 6/8
	5		N = 35										Very stiff silty clay (CL); HNU = 0 Reddish yellow silty sand at 6'; 7.5YR 6/8
													6.0
													Dense silty sand (SM); HNU = 0 Yellowish brown; 10YR 5/8
													8.0
	10												Bottom of Boring Boring backfilled with cuttings per instructions of Ball Engineering.
	15												
	20												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-18

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/9/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Water encountered at 7 feet.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM	
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI		
													2" asphalt at surface	0.2
													Asphalt and gravel fill to 2'	2.0
													Asphalt and gravel fill	4.0
	5												Medium stiff silty clay (CL); HNU = 0 Gray with silt partings; 10YR 6/1	
													Medium stiff silty clay (CL); HNU = 0 Brownish yellow with silt lenses; 10YR 6/8	8.0
	10												Bottom of Boring Temporary Well Set - 10' PVC 2" - 5' .010 Slot Screen - 5' Riser - 10-3' 20/40 Silica Sand - 3-0' Bentonite Pellets 1/2" Temporary well pulled and borehole grouted to surface. Grout weight in 13.9 lb/gal Grout weight out 13.9 lb/gal	
	15													
	20													

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-19

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/9/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Water encountered at 10 feet.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Creosote stained soil with organic matter 1.0
													Stiff silty clay (CL); HNU=0 Yellow with sand lenses and Fe stains; 10YR 7/8 Stiff silty clay (CL); HNU=0 Yellow with sand partings and Fe stains; 10YR 7/6 4.0
	5												Stiff clay (CH); HNU=0 Strong brown with vert fractures and silty sand; 7.5YR 5/6 5.9
													Stiff silty clay (CL); HNU=0 Yellowish brown grading to silty sand at 8'; 10YR 5/6 7.9
	10												Dense silty sand (SM) Yellowish brown (wet at 10'); 10YR 5/6 Dense silty sand (SM) Yellowish brown; 10YR 5/6 11.9
	15 20												Bottom of Boring Borehole grouted on 6-9-92. Grout weight in 13.9 lb/gal Grout weight out 13.9 lb/gal

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SWL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-20

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/10/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Water encountered at 22 feet.

FIELD DATA				LABORATORY DATA									
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	DESCRIPTION OF STRATUM
													Wood and fill 0.5
													Stiff silty clay (CL); HNU=0 2.0
													Brownish yellow with sand lenses; 10YR 6/6
													Firm clayey silt (SM); HNU=0 4.0
	5		N=26										Reddish yellow with sand partings; 7.5YR 6/8
			N=38										Firm silty sand (SM); HNU=0
													Reddish yellow; 7.5YR 6/6
													Dense silty sand (SM); HNU=0
													Reddish yellow with 6" clay layers at 7'; 7.5YR 6/6
													Dense silty sand (SM); HNU=0
	10												Yellowish brown with 2" clay layers at 9'; 10YR 5/6
													14.0
	15		N=22										Very stiff clay (CH)
													Dark yellowish brown; 10YR 4/6
	20												
													22.0
													Sand at 22' (wet)
													24.0
	25												Dense silty sand (SM); HNU=0
													Yellowish brown 10YR 5/6
													29.0
	30												Bottom of Boring
													Permanent Well Set - 2" PVC
													- 10' .010 Slot Screen
													- 20' Riser
													- 2 1/5' Riser
													- 29-17.4' Silica Sand
	35												- 17.4-15.5' Bentonite Pellets 3/8"
													Water added at 10:00 a.m.
													Grout weight in 13.7 lb/gal
													Grout weight out 13.7 lb/gal

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-21

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/10/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: No water encountered.

FIELD DATA				LABORATORY DATA									
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	DESCRIPTION OF STRATUM
													Gravel and fill; HNU=0 — 0.5
													Stiff silty clay (CL); HNU=0 Yellow with Fe stains; 10YR 7/6 — 2.0
													Stiff silty clay (CL); HNU=0 Brownish yellow with silt partings and Fe stains; 10YR 6/6 — 4.0
	5												Stiff silty clay (CH); HNU=0 Strong brown increasing clay with depth; 7.5YR 7/6 Stiff clay (CH); HNU=0 Strong brown becoming silty sand (SM) at 7.5'; 7.5YR 7/6 — 8.0
	10												Bottom of Boring Borehole grouted 6/10/92. Grout weight in 13.6 lb/gal Grout weight out 13.6 lb/gal
	15												
	20												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-22

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/10/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: No water encountered.

FIELD DATA				LABORATORY DATA									
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	DESCRIPTION OF STRATUM
													Stiff sandy clay (CL); HNU = 1 Brownish yellow fill with gravel; 10YR 6/6 2.0
													Stiff silty clay (CL); HNU = 0 Yellow with silt partings and Fe stains; 10YR 7/8 4.0
	5												Stiff sandy clay (CL); HNU = 0 Light gray with silt partings and Fe stains; 10YR 7/1 6.0
													Firm silty sand (SM); HNU = 0 Very pale brown at 7' with silt lenses; 10YR 7/4
													Firm silty sand (SM); HNU = 0 Brownish yellow silty clay layers at 9'; 10YR 6/6
	10		N = 27										Firm silty sand (SM); HNU = 0 Yellow; 10YR 7/6
			N = 42										Dense silty sand (SM); HNU = 0 Yellow; 10YR 7/8
			N = 31										Dense silty sand (SM); HNU = 0 Yellow (wet at 16'); 10YR 7/8
	15												16.0
													Bottom of Boring Borehole grouted 6/10/92. Grout weight in 13.6 lb/gal Grout weight out 13.6 lb/gal
	20												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SWL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-23

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/10/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: No water encountered.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
	5												Medium stiff silty clay (CL); HNU=1 Light yellowish brown fill with asphalt and gravel; 10YR 6/4 Medium stiff silty clay (CL); HNU=4 Light gray with Fe stains and organic matter; 10YR 7/1 Stiff silty clay (CL); HNU=5 Light gray with Fe stains and silt partings; 10YR 7/1 Stiff silty clay (CL); HNU=4 Reddish yellow becoming sandy at 8'; 7.5YR 6/6 8.0
	10		N=33										Firm silty sand (SM); HNU=1 Brownish yellow with silt lenses; 10YR 6/6 Dense silty sand (SM); HNU=0 Brownish yellow with silt lenses and clay at 11'; 10YR 6/6
	15												16.0
													Very stiff clay at 16' 19.0
	20												Dense sand at 19'
	25		N=50										Firm coarse sand White (wet); 10YR 8/2
	30												30.0
	35												Bottom of Boring Temporary Well Set - 29' - 2" PVC - 5' .010 Slot Screen - 29-19' 20/40 Silica Sand - 19-17' Bentonite Pellets Temporary well pulled and borehole grouted to surface. Grout weight in 13.9 lb/gal Grout weight out 13.9 lb/gal

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-24

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/11/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Water encountered at 9 feet.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Firm clayey silt (SM); HNU=50 Light brownish gray becoming clayey at 2'; 10YR 6/2 2.0
	5												Stiff silty clay (CL); HNU=6 Yellow with silt partings and Fe stains; 10YR 7/6 Stiff silty clay (CL); HNU=0 Light gray with silt partings; 10YR 7/2 Stiff silty clay (CL); HNU=0 Light gray becoming more silty at 8' (wet); 10YR 7/2 8.0
	10												Firm silty sand (SM); HNU=0 Brownish yellow with alt clay layers; 10YR 6/8 Firm silty sand (SM); HNU=0 Yellow with silt lenses; 10YR 7/6 13.0
			N=34										Dense silty sand (SM) Brownish yellow with clay layers; 10YR 6/6 15.0
	15												Bottom of Boring Temporary Well Set - 15' - 2" PVC - 5' .010 Slot Screen - 10' Riser - 15-6.5' 20/40 Silica Sand - 6.5-5' Bentonite Pellets 3/8" Temporary well pulled and borehole grouted to surface. Grout weight in 13.9 lb/gal Grout weight out 13.9 lb/gal
	20												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-25

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/11/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Water encountered at 24 feet.

FIELD DATA				LABORATORY DATA									
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	DESCRIPTION OF STRATUM

Topsoil with organic — 1.0

Stiff silty clay (CL); HNU = 0
Light gray with organic matter; 10YR 7/2
Very stiff silty clay (CL); HNU = 1
Light gray with Fe stains and silt lenses; 10YR 7/1
Very stiff silty clay (CL); HNU = 1
Yellow with silt and sand lenses with Fe stains and roots; 10YR 7/6
Hard silty clay (CL); HNU = 2 — 8.0
Yellow with silt lenses and roots becoming silty at 8'; 10YR 7/6

Dense silty fine sand (SM); HNU = 0
Very pale brown clay at 10'; 10YR 7/4
Dense silty fine sand; HNU = 0 — 12.0
Brownish yellow clay at 11'; 10YR 6/8

Very stiff clay (CH); HNU = 1
Strong brown slickensided and vertical fracture sand fillings; 7.5YR 5/6
Hard clay (CH); HNU = 1
Strong brown slickensided and roots; 7.5YR 5/6
Hard clay (CH); HNU = 0
Strong brown with slickensided and roots; 7.5YR 5/6
Hard clay (CH); HNU = 2
Strong brown with slickensided and roots; 7.5YR 5/6
Hard clay (CH); HNU = 1
Strong brown slickensided; 7.5YR 5/6
Hard clay (CH); HNU = 1
Strong brown slickensided with roots becoming sand at 24'; 7.5YR 5/6 — 24.0

Dense fine sand (SM); HNU = 0
Yellowish brown grading to sand at 25'; 10YR 5/6 — 26.0

Hard clay (CH); HNU = 0
Strong brown with slickensided Fe stains and roots; 7.5YR 5/6 — 30.0

Bottom of Boring
Permanent Well Set - 10' .010 Slot Screen
- 25' Riser (2 at 10', 1 at 5')
- Silica Sand 20/40
- Bentonite Pellets
Grout to surface.
Grout weight in 14.1 lb/gal
Grout weight out 14.1 lb/gal

REMARKS: Munsell color notations are for moist samples.

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

920954

SwL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-26

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/27/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Water encountered at 10 feet.

FIELD DATA				LABORATORY DATA									
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	DESCRIPTION OF STRATUM
													Firm clayey silty sand fill with Fe stains; HNU=0 10YR, 7/4 to 7.5YR 5/8 2.
													Stiff very sandy clay (CL) with Fe nodules, contains fill to 3'; HNU=0 10YR 6/6 Stiff sandy clay to 5' becomes very stiff silty clay (CL) with sand; HNU=0 10YR 6/6; 5YR 4/6 5.
	5												Medium very silty clay (CL) with Fe sand becomes firm silty sand (SM); HNU=0 5YR 4/6; 7.5YR 5/6 7.
	10		▼										Firm very fine silty sand (SM) becomes moist at 9'; HNU=0 5YR 4/6 Firm fine silty sand (SM); HNU=0 Yellowish red with clay layer at 11'; 5YR 4/6 12.
	15												Stiff clay (CH) with Fe stains; HNU=0 Yellowish red; 5YR 4/6 Stiff clay (CH) slickensided with silt and sand lenses with Fe stains; HNU=0 Strong brown; 7.5YR 5/6 Stiff clay (CH) slickensided with silt and sand partings with Fe stains; HNU=0 Strong brown; 7.5YR 5/6 Stiff clay (CH) with Fe nodules; HNU=0 Strong brown; 7.5YR 5/6
	20												Stiff clay (CH) with Fe nodules; HNU=0 Strong brown; 7.5YR 5/6 22.0
	25												Bottom of Boring 10 feet of 8.5" O.D. PVC casing with pellet seal (6/15/92) Permanent Well Set - 2" PVC at 22' - 10' .010 Slot Screen - 20' Riser - 22-10' Silica Sand 20/40 - 10-8' Bentonite Pellets 3/8" Grout to surface Grout weight in 13.6 lb/gal Grout weight out 13.6 lb/gal
	30												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-27

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/25/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Water encountered at 14 feet.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM	
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI		
													Firm clayey sandy silt (ML), visual oil stain, no odor; HNU=0 10YR 3/2 to 8" becomes 5/3 Firm slightly clayey sandy silt (ML), no stain, no odor; HNU=0 10YR 5/6 to 7/1	4.0
	5												Stiff silty very sandy clay (CL), Fe stained becomes very silty; HNU=0 10YR 6/4 mottled 7/1	6.0
													Firm fine clayey silty sand (SM-SC); HNU=0 5YR 5/6	8.0
	10												Stiff silty clay (CL) with sand pockets; HNU=0 5YR 4/4 becomes less sandy and silty with depth Wet very silty clay (CL) and clayey silt (ML) with fine sand; HNU=0; 5YR 4/4	11.0
													Fine clayey silty sand (SC-SM) becomes very stiff clay (CH); HNU=2; 5YR 4/4	13.0
	15		▼										Firm very wet silty sand (SM) becomes very stiff clay (CH) at 15'; HNU=0 Clean, no odor; 5YR 4/4 Very fine sand, wet becomes stiff clay (CH) at 17'; HNU=0; 5YR 4/4	17.0
	20												Very stiff slickensided clay (CH); HNU=0 No odor; 5YR 4/4 Very stiff slickensided clay (CH); HNU=0 Clean odor; 5YR 4/4 Very stiff slickensided clay (CH) with sand seams; HNU=0 Clean odor; 5YR 4/4	24.0
	25												Bottom of Boring Bottom of Boring at 10 feet (6-16-92) Permanent Well Set - 10' Screen - 17' Riser - 24-12' Silica Sand 20/40 - 12-10' Bentonite Pellets 3/8" Grout to surface Grout weight in 13.9 lb/gal Grout weight out 13.9 lb/gal	
	30													

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-28

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/27/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Water encountered at 10 feet.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Sandy silt with gravel, Winnrock and wood Oil stained to 1' — 2.0
													Stiff sandy clay (CL) mottled with Fe stains; HNU=0 10YR 6/3 — 4.0
	5												Firm clayey silty sand (SM-SC); HNU=0 Mottled; 7.5YR 4/6, 7.5YR 7/2 — 6.0
													Stiff clay (CH); HNU=0 Mottled; 5YR 4/6, 5YR 7/1 Stiff clay (CH) to 9' becomes wet and very sandy at 9.5'; HNU=1 5YR 4/6 — 9.5
	10		▼										Firm very fine silty sand (SM); HNU=0 Yellowish red and wet; 5YR 4/6 Firm very fine silty sand (SM); HNU=0 Yellowish red; 5YR 4/6 — 14.0
	15												Stiff clay (CH); HNU=0 Yellowish red with Fe stains and silt lenses; 5YR 4/6 Stiff clay (CH); HNU=0 Yellowish red with Fe nodules; 5YR 4/6 Stiff clay (CH) with Fe nodules and silt partings; HNU=0 Slickensided; 5YR 4/6 Stiff clay (CH) with Fe nodules and silt partings; HNU=0 Slickensided; 5YR 4/6 — 22.0
	20												
	25												Bottom of Boring 10 feet of 8.5" O.D.PVC casing set 10/15/92 Permanent Well Set at 22 feet - 2" PVC - 10' .010 Slot Screen - 15' Riser - 22-10' 20/40 Silica Sand - 10-8' Bentonite Pellets 3/8" Grout to surface Grout weight in 13.9 lb/gal Grout weight out 13.9 lb/gal

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-29

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/16/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Water encountered at 9.5 feet.

FIELD DATA				LABORATORY DATA									
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	DESCRIPTION OF STRATUM
													Loose clayey silt (ML) to 28" becomes soft silty clay (CL) at 2'; HNU = 2 Heavy oil stained creosote with odor; 5YR 4/4 — 1.0
	5												Medium silty clay (CL); HNU = 2.6 Visual stain and creosote odor 4-6", heavy stained layers at 2.5' 5YR 4/4 Medium silty clay (CL); HNU = 3 Visual sheen on slickensides, odor of creosote; 5YR 4/4 — 6.0
													Stiff clay (CH) becomes very fine clayey silty sand; HNU = 20 Visual stain and strong odor; 7.5YR 4/2 — 7.5
			P										Firm silty sand (SM); HNU = 22 Iridescent sheen strong odor, very wet at 9.5', pockets of creosote stains; 7.5YR 3/4 — 10.0
	10												Stiff silty clay (CL); HNU = 15 Stained slickensided fissures and root holes; 5YR 4/6 — 12.0
	15												Bottom of Boring Borehole grouted at full depth on 6-15-92. Grout weight in 13.9 lb/gal Grout weight out 13.8 lb/gal
	20												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SWL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-30

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/16/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Water encountered at 9.5 feet.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Firm clayey sandy silt (ML) fill; HNU = 0 5YR 4/6
													Loose clayey sandy silt (ML) with oil stain & odor of creosote becomes medium silty clay (CL) at 3' with visible oil; HNU = 12 5YR 5/4 — 3.0
	5												Stiff silty clay (CL) with visible oily sheen & creosote odor; HNU = 5 5YR 4/4
													Stiff silty clay (CL) with oily sheen on slickensided fractures & creosote filled voids becomes very sandy at 8'; HNU = 24 8.0
			▼										Firm clayey silty sand (SC-SM), free phase product visible; HNU = 20 Very strong odor, wet at 9.5'; 5YR 4/6 to 5/1 10.0
	10												Stiff clay (CH), free oil in fractures and voids at top; HNU = 10 Staining product throughout; 5YR 4/4 12.0
													Bottom of Boring Borehole covered by dozer.
	15												
	20												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

LOG OF BORING NO. B-31

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/16/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Water encountered at 9 feet.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Dark creosote crust at 6" stained clayey sandy silt (ML) soft very silty clay (CL) to 2'; HNU=0 5YR 4/6 Medium silty clay (CL); HNU=0 Slickensided, no odor; 5YR 4/6 — 4.0
	5												Stiff clay (CH); HNU=0.5 Slickensided with calcium nodules; 5YR 4/6 Stiff clay (CH); HNU=0.5 Slickensided with calcium nodules and root holes becomes very sandy with depth; 5YR 4/6 — 7.0
	10		▼										Loose very wet clayey silty sand (SC-SM) with heavy oil stains throughout; visible free product; HNU=30 5YR 4/3 — 10.0 Very stiff clay (CH), visual contamination with creosote in rootholes and fractures, sandy clay contact just below 10'; HNU=24 — 12.0
	15												Bottom of Boring Temporary Well Set - 2" PVC - 5' Slot Screen - 10' Riser - Silica Sand to 5' - Bentonite Pellets to 3' Temporary well pulled and borehole grouted to surface. Grout weight in 13.9 lb/gal Grout weight out 13.9 lb/gal
	20												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-32

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/16/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Perched water at 9.5 feet

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Very soft clay and clayey sandy silt (ML); HNU = .5 Visible creosote stains and odor; 10YR 4/2
													Soft clayey sandy silt (ML) becomes medium sandy silty clay (CL); HNU = 0 Slight odor and some stains; 10YR 6/2 — 3.0
	5												Medium sandy silty clay (CL); HNU = 0 No visible oil or odor; 10YR 6/1 — 6.0
													Stiff silty clay (CL) with silt filled fractures; HNU = 0 No odor; 5YR 4/4 — 8.0
													Loose clayey sandy silt or very fine sand (ML); HNU = 2 Slight odor and some sheen at rootholes, wet at 9'; 5YR 4/4 — 10.0
	10												Very stiff clay (CH) with slickensided fractures, rootholes and calcium nodules; HNU = 1 No visible oil and slight apparent odor; 5YR 4/4 Very stiff clay (CH) with slickensided fractures and rootholes; HNU = 1 Slight odor present throughout; 5YR 4/4 — 14.0
	15												Bottom of Boring Borehole grouted on 6-16-92. Grout weight in 13.8 lb/gal Grout weight out 13.8 lb/gal
	20												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC

LOG OF BORING NO. B-33

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/16/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Water encountered at 11 feet.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Firm clayey silty sand (SC-SM) fill with some staining; HNU = 0
													Very loose moist clayey sand (SC) with wood debris and organic visible stain with creosote odor; HNU = 10 10YR 5/4
	5												Very loose moist clayey sand (SC), free oil visible, creosote odor throughout; HNU = 10 10YR 4/2
													Very loose clayey sand (SC) to 6', oil sheen creosote odor becomes medium very sandy clay (CL); HNU = 11 Mottled; 10YR 6/1 mottled 7.5YR 5/6 — 7.0
													Stiff sandy clay (CL) becomes very sandy at 10' with creosote odor and some staining; HNU = 4 Mottled; 10YR 6/1 7.5YR 5/6 — 10.0
	10												Firm clayey sand and fine silty sand (SC, SM) Very wet; 10YR 7/1
													Mottled, visible free phase product, oily sheen in voids, odor of creosote; HNU = 4 7.5YR 5/6 — 14.0
	15												Bottom of Boring Temporary Well Set - 10' Riser - 5' Slot Screen - Silica Sand to 7' - Bentonite Pellets to 5' Temporary well pulled and borehole grouted to surface. Grout weight in 14.1 lb/gal Grout weight out 14.1 lb/gal
	20												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-34

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/16/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Perched water encountered at 11 feet.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Loose clayey sandy silt (ML) fill with wood debris, organics and roots; HNU=0
													2.(
													Medium sandy very silty clay (CL); HNU=0 Some fill at top; 5YR 4/6
	5												Medium silty clay (CL); HNU=0 5YR 4/4
													6.(
													Stiff clay (CH) with some silt; HNU=0 5YR 4/4
													Stiff clay (CH) becomes very silty (CL) fine clayey silty sand (SM-SC) at 9.5'; HNU=0 5YR 4/4 to 5/4
													9.!
	10												Firm very fine slightly clayey silty sand (SM); HNU=0 Very wet with a slight odor present; 5YR 4/4
			▼										12.(
													Bottom of Boring Borehole grouted at full depth on 6-16-92. Grout weight in 13.7 lb/gal Grout weight out 13.8 lb/gal
	15												
	20												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC

LOG OF BORING NO. B-35

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/17/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Water encountered at 18 feet.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Firm very fine silty sand with roots, organics and heavy creosote stains and odor; HNU=3 Very dark gray; 2.5YR 3/0 2.0
	5												Stiff very sandy silty clay (CL) with heavy creosote stains and odor; HNU=5 Sandy contact just below 2' Stiff sandy clay (CL) with creosote stains and strong odor becomes silty sand (SM) with free oil; HNU=15 5YR 4/6 6.0
	10												Very stiff clay (CH) with slickensided fractures and rootholes; HNU=0 Sandy at 6' with some odor; 5YR 4/6 Very stiff clay (CH) with slickensided fractures, calcium deposits and clean odor; HNU=0 5YR 4/6 Very stiff clay (CH) with rootholes; HNU=0 5YR 4/6 Very stiff clay (CH); HNU=0 5YR 4/6 Very stiff clay (CH) with slickensided fractures; HNU=0 5YR 4/6
	15												Very stiff clay (CH) to 17' changes to firm moist silty sand (SM); HNU=0 17.0 7.5YR 6/6
	20		▼										Firm silty sand (SM) becomes clayey silt (ML) at 20'; HNU=0 Very wet; 7.5YR 6/6 20.0
													Medium very silty clay (CL) becomes stiff clay (CH) at 19' changes to medium very silty clay; HNU=0 5YR 4/6 to 10YR 5/4 22.0
	25												Bottom of Boring Temporary Well Set - 5' Slot Screen - 15' Riser - Silica Sand to 13' - Bentonite Pellets to 11' Temporary well pulled and borehole grouted to surface. Grout weight in 13.6 lb/gal Grout weight out 13.6 lb/gal

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SWL SOUTHWESTERN LABORATORIES, INC

LOG OF BORING NO. B-36

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/17/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Water encountered 18 to 19 feet.

FIELD DATA				LABORATORY DATA									
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	DESCRIPTION OF STRATUM

Firm clayey silty sand with faint odor becomes sandy silty clay at 10"; HNU = 1
5YR 4/6

Firm clayey silty sand (SC-SM) with creosote stains and odor becomes very stiff clay (CH) with odor at 3.5'; HNU = 40
7.5YR 5/2 — 4.0

Firm clayey silty sand (SC-SM) with free oil and strong odor becomes very; stiff clay (CH) with creosote odor; HNU = 44
7.5YR 5/2 to 5YR 4/4 — 6.0

Very stiff clay (CH) with silt filled fractures and some visible creosote and odor throughout; HNU = 6
5YR 4/4

Very stiff clay (CH) with slight odor at top; HNU = 0
5YR 4/4

Very stiff clay (CH) with slickensided fractures and slight odor; HNU = 1
5YR 4/4

Very stiff clay (CH) with slickensided fractures, Fe stained with slight odor at top; HNU = 0
5YR 4/4

Very stiff clay (CH) with slickensided fractures with slight odor changes to firm silty sand (SM) at 15'; HNU = 9
Moist but not wet; 5YR 4/4 — 15.0

Firm silty sand (SM); HNU = 0

Firm very fine silty sandy (SM) becomes very silty with clay seams; HNU = 0
Wet at 18' — 18.0

Very stiff clay (CH) with rootholes and slickensided fractures becomes very silty below 20'; HNU = 0
7.5YR 5/6 — 20.0 — 21.0

Bottom of Boring
Temporary Well Set - 5' Slot Screen
- 15' Riser
- Silica Sand to 13'
- Bentonite Pellets to 11'

Temporary well pulled and borehole grouted to surface.
Grout weight in 13.7 lb/gal
Grout weight out 13.7 lb/gal

REMARKS: Munsell color notations are for moist samples.

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

LOG OF BORING NO. B-37

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/17/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Water encountered at 16

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Firm moist very fine silty sand (SM) with some clay and odor becomes very clayey at 2'; HNU=0 10YR 5/2 Loose clayey silty sand (SC-SM) to 5'; HNU=0 Very stained and creosote odor; 2.5YR 3/0 Loose clayey silty sand (SC-SM) to 5' becomes stiff very sandy clay (CL); HNU=12 5.
	5												Oil stains and odor; 10YR 7/2 to 5YR 5/6 Medium sandy silty clay with creosote stains and odor becomes silty clay with silt filled fractures, stains and creosote odor; HNU=26 5YR 4/6 Stiff silty clay (CL) with silty fine sand filled fractures, creosote stains and odor; HNU=22 5YR 4/6 Stiff silty clay (CL) with silt filled fractures and creosote dor; HNU=2 5YR 4/6 Very stiff clay (CH) with silt filled fractures, creosote odor and stains; HNU=4 13.
	10												5YR 4/6 Very stiff clay (CH) with stained fractures and creosote odor changes to firm silty sand (SM); HNU=30 15.
	15												Very stained at 15'; 5YR 4/6 Firm silty sand (SM) with visible free oil and strong odor; HNU=30 Very wet 19.
	20												Firm clayey silt, very wet becomes medium very silty clay (CL) at 20.5'; HNU=1 Very slight odor; 5YR 4/6 22.
	25												Bottom of Boring Temporary Well Set - 5' Slot Screen - 15' Riser - Silica Sand to 13' - Bentonite Pellets to 11' Temporary well pulled and borehole grouted to surface. Grout weight in 13.8 lb/gal Grout weight out 13.8 lb/gal

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, IN

LOG OF BORING NO. B-38

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/18/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Water encountered at 15 feet.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Firm clayey silty sand (SC-SM) with creosote stains and odor becomes clayey below 1'; HNU=34 10YR 3/1 to 5YR 4/6 — 1.0
	5												Medium very sandy clay (CL) with creosote stains and odor throughout, very sandy above 3'; HNU=40 10YR 7/2 to 5YR 5/6
													Very sandy clay (CL) with creosote stains and odor becomes stiff silty clay (CL) at 5'; HNU=32 5YR 4/6 — 6.0
	10												Very stiff clay (CH) with creosote filled fractures; HNU=10 5YR 4/6
													Very stiff clay (CH) with ferris deposits and creosote odor; HNU=11 5YR 4/6
													Very stiff clay (CH) with creosote stained fractures, rootholes and odor of creosote; HNU=13 5YR 4/6
													Very stiff clay (CH) with free creosote in fractures, heavy stained silty sand at 14'; HNU=48 5YR 4/6 — 14.0
	15		▼										Firm silty sand (SM); HNU=42 Very oily with creosote odor, wet; 7.5YR 5/2 — 18.0
	20												Very stiff clay (CH) with slight creosote odor, very silty with fine sand at 18'; HNU=1 — 20.0
	25												Bottom of Boring Temporary Well Set - 5' Slot Screen - 15' Riser - Silica Sand to 11' - Bentonite Pellets to 9' Temporary well pulled and borehole grouted to surface. Grout weight in 13.9 lb/gal Grout weight out 13.9 lb/gal

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-39

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/18/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Water encountered at 15 feet.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM	
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI		
													Loose clayey silty sand (SC-SM) with creosote stains becomes very sandy clay at 1'; HNU=0 10YR 4/4; 7.5YR 4/6 Firm clayey sand (SC-SM) with creosote odor and some staining becomes very silty clay (CL) at 3.5'; HNU=40 5YR 4/6	3.5
	5												Stiff silty clay (CL) with creosote filled fractures; HNU=3 5YR 4/6	6.0
	10												Very stiff clay (CH) with creosote stained fractures, odor and visible free creosote in voids; HNU=7 Very stiff clay (CH) with creosote stained fractures, odor and visible free creosote in voids; HNU=13 Very stiff clay (CH) heavily stained with ferris deposits and free oil; HNU=20 Very stiff clay (CH) with creosote stains on slickensided fractures and calcium deposits with sand pockets at bottom; HNU=10 5YR 4/6 6" Stiff clay, 6" firm sand with strong odor; HNU=44	15.0
	15												Firm slighty clayey silty sand (SM); HNU=34 Oily sheen, strong odor, very wet; 10YR 5/3	18.0
													Wet clayey silt (ML) becomes stiff silty clay; HNU=5 5YR 4/6	20.0
	20 25												Bottom of Boring Temporary Well Set - 5' Slot Screen - 15' Riser - Silica Sand to 11' - Bentonite Pellets to 9' Temporary well pulled and borehole grouted to surface. Grout weight in 13.9 lb/gal Grout weight out 13.9 lb/gal	

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-40

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/22/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION:
Perched water encountered at 7 feet.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Firm clayey silty sand (SC-SM); HNU=5 Heavy stains to 6"; 10YR 5/1 to 6/3 Firm clayey silty sand (SC-SM) with creosote stain to medium very sandy clay (CL); HNU=2 10YR 5/1 to 10YR 6/4
													4.0
	5												Stiff sandy silty clay (CL); HNU=0 10YR 6/2 to 6/6
													6.0
													Firm slightly clayey silty sand (SM); HNU=0 Very wet; 7.5YR 5/6
													10.0
	10												Very wet sand changes to stiff clay (CH) changes to firm dry silty sand at 11'; HNU=0 5YR 5/6
													12.0
													Bottom of Boring Temporary Well Set - 5' Slot Screen - 5' Riser - Silica Sand to 3' - Bentonite Pellets to 1' Temporary well pulled and borehole grouted to surface. Grout weight in 13.7 lb/gal Grout weight out 13.7 lb/gal
	15												
	20												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC

LOG OF BORING NO. B-41

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/22/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Perched water encountere at 9 feet.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Firm clayey silty sand (SC-SM) with oil stains and creosote odor becomes very silty clay with fine sand (CL); HNU = 7 10YR 6/4 2.0
	5												Medium very silty clay with fine sand (CL); HNU = 7 Slight odor; 10YR 6/4 Stiff silty clay with fine sand (CL) becomes very stiff sandy silty clay; HNU = 0 Slight odor at top; 10YR 6/4 to 7/1 6.0
													Firm clayey silty sand (SC-SM); HNU = 0 Moist; 7.5YR 5/6 Firm wet clayey silty sand (SC-SM) changes to stiff clay (CH); HNU = 0 5YR 4/4 10.0
	10												Bottom of Boring Temporary Well Set - 5' Slot Screen - 5' Riser - Silica Sand to 3' - Bentonite Pellets to 1' Temporary well pulled and borehole grouted to surface. Grout weight in 13.6 lb/gal Grout weight out 13.6 lb/gal
	15												
	20												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-42

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/22/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Perched water encounter at 7 feet.

FIELD DATA				LABORATORY DATA									
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	DESCRIPTION OF STRATUM
													Firm clayey silty sand (SC-SM) fill; HNU = 0 10YR 6/4
													Fill to 3' changes to stiff very silty clay with fine sand; HNU = 0 Mottled; 10YR 6/2 to 6/6
	5												Very stiff silty clay (CL); HNU = 0 10YR 6/2 mottled 6/6 with Fe nodules
													7.0
													Stiff silty clay (CL) changes to clayey silty sand at 7'; HNU = 0 Wet; 5YR 4/4
	10												Wet clayey silty sand changes to stiff clay (CH); HNU = 0 Back to silty sand at 11.5'; 5YR 4/6 at 10.1'
													12.0
	15												Bottom of Boring Temporary Well Set - 5' Slot Screen - 5' Riser - Silica Sand to 3' - Bentonite Pellets to 1' Temporary well pulled and borehole grouted to surface. Grout weight in 13.9 lb/gal Grout weight out 13.9 lb/gal
	20												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

LOG OF BORING NO. B-43

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/22/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Perched water encountere at 7 feet.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM	
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI		
													Firm clayey silty sand (SC-SM) fill with some gravel; HNU=0 10YR 6/4	2.0
	5												Firm clayey silt with fine sand (ML) fill at top; HNU<1 10YR 6/4 Medium very silty clay (CL) with fine sand; HNU=0 10YR 6/4	7.0
	10												Firm clayey silty sand to fine silty sand; HNU=1 Slight stain, odor of creosote, wet at 7'; 7.5YR 4/6 Wet silty sand at 10' becomes stiff clay (CH) with sand seams 11 to 12'; HNU=0 5YR 4/4	11.0 12.0
	15 20												Bottom of Boring Temporary Well Set - 5' Slot Screen - 5' Riser - Silica Sand to 3' - Bentonite Pellets to 1' Temporary well pulled and borehole grouted to surface. Grout weight in 13.9 lb/gal Grout weight out 13.9 lb/gal	

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-44

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/22/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Perched water encountere at 9 feet.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Firm clayey silty sand fill; HNU = 15 Heavy stain and creosote odor; 2.5YR 2/0 to 10YR 2/2 2.0
	5												Soft very silty clay; HNU = 11 Moderate stains and creosote odor; 10YR 6/2 Stiff very silty clay (CL) becomes very sandy clay at 6'; HNU = 12 Some stains and odor; 10YR 4/1 to 6/4 6.0
													Firm clayey silty sand; HNU = 7 Wet, visible creosote odor throughout; 7.5YR 4/6 8.0
	10		▼										Firm silty sand with clay (CH) seams; HNU = 4 Slight odor; 5YR 4/6 10.0
	15												Bottom of Boring Temporary Well Set - 5' Slot Screen - 5' Riser - Silica Sand to 3' - Bentonite Pellets to 1' Temporary well pulled and borehole grouted to surface. Grout weight in 13.7 lb/gal Grout weight out 13.7 lb/gal
	20												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-45

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/22/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Perched water encountered at 8 feet.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Silty sand (SM) with some clay and gravel fill; HNU = 0 Heavy stains; 10YR 2/1 — 2.0
	5												Medium very silty clay (CL); HNU = 30 Creosote stains and odor; 10YR 6/4 Stiff very silty clay (CL) with fine sand becomes very sandy at 6'; HNU = 1 Slight hydrocarbon odor; 10YR 6/4 — 6.0
													Stiff sandy clay (CL) with creosote stains become very moist silty sand at 7'; HNU = 30 — 7.0 Oil stains and creosote odor; 7.5YR 4/6
	10												Firm silty sand (SM) with clayey seams; HNU = 28 Very wet, oil sheen and creosote odor; 7.5YR 4/6 — 10.0
													Bottom of Boring Temporary Well Set - 5' Slot Screen - 5' Riser - Silica Sand to 3' - Bentonite Pellets to 1' Temporary well pulled and borehole grouted to surface. Grout weight in 13.7 lb/gal Grout weight out 13.7 lb/gal
	15												
	20												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-46

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/22/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Perched water encountered at 9.5 feet.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Sandy oil stained fill with gravel 1.
													Firm clayey silty sand (SC-SM) to very silty clay with wood debris, creosote stains and odor; HNU = 20 2.
													Stiff sandy very silty clay (CL) with creosote stains and odor; HNU = 10 10YR 6/4 to 6/1 Very stiff very silty clay (CL) with creosote stains and odor becomes very sandy at 6'; HNU = 14 7.5YR 4/6 6.
	5												
													Firm clayey silty sand (SC-SM) with creosote stains and odor; HNU = 16 Moist; 5YR 4/4 Firm clayey silty sand (SC-SM) with free creosote oil, strong odor and wet clay seams at 9'; HNU = 20 5YR 4/4 to 3/1 9.
			▼										
	10												Stiff clay (CH) seams at 10' and heavy stained silty sand (SM), very wet to 11.5', stained clay and clayey sand to 12'; HNU = 34 Strong odor; 5YR 4/4 11.5 12.
													Bottom of Boring Temporary Well Set - 5' Slot Screen - 7' Riser - Silica Sand to 5' - Bentonite Pellets to 3' Temporary well pulled and borehole grouted to surface. Grout weight in 13.7 lb/gal Grout weight out 13.7 lb/gal
	15												
	20												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SWL SOUTHWESTERN LABORATORIES, INC

LOG OF BORING NO. B-47

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/22/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Perched water encountere at 10 feet.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Sandy fill with gravel, wood debris; HNU=10 Heavy stains and strong odor; 2.5YR 4/0 to 3/0 2.0
													Loose clayey silty sand fill (SM-SC) changes to stiff very sity clay with fine sand; HNU=32 Heavy stains and odor; 10YR 6/4 4.0
	5												Stiff very silty clay with fine sand; HNU=6 Creosote stains and odor; 10YR 6/4 6.0
	10												Firm clayey silty sand (SM-SC); HNU=28 Creosote stains and odor; 7.5YR 4/6 Firm clayey silty sand (SM-SC) with clay seams; HNU=6 Very moist, faint odor; 5YR 4/6 Firm clayey very silty sand (SM-SC) with clay seams throughout; HNU=3 Very wet with faint creosote odor; 5YR 4/6 12.0
	15 20												Bottom of Boring Borehole grouted 6/22/92. Grout weight in 13.9 lb/gal Grout weight out 13.9 lb/gal

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC

LOG OF BORING NO. B-48

PROJECT: RCRA Facility Investigation

SHEET 1 of 2

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/23/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Water encountered at 21.5 feet.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Sandy gravel fill 1.0
													Firm clayey sandy silt with some gravel fill; HNU=2 Hydrocarbon odor; 10YR 6/4 2.0
	5												Stiff very silty clay (CL) with fine sand; HNU=0 Hydrocarbon odor; 5YR 5/1 mottled 10YR 6/6
													Stiff very silty clay (CL) with fine sand; HNU=0 Very light odor; 10YR 6/4 mottled 5YR 5/1 6.0
	10												Firm silty sand with some clay; HNU=1 7.5YR 5/4
													Firm very silty sand with few roots; HNU=1 Dry old stains; 7.5YR 5/4 to 5/6
													Firm very silty sand with few roots and very thin wet seams; HNU=0
	15												Firm very fine silty sand changes to very stiff clay (CH) back to silty sand at 14.5', thin wet seams at 13'; HNU=0 5YR 4/4
													Firm very fine silty sand, moist; HNU=3 7.5YR 5/6
													Dense silty sand (SM), very wet at 17.5' changes to very stiff clay at 17.5'; HNU=0 5YR 4/6 17.5
	20												Very stiff clay (CH) with slickensided fractures changes to fine sand at 20'; HNU=0 5YR 4/6 to 10YR 7/2

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-48

PROJECT: RCRA Facility Investigation

SHEET 2 of 2

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/23/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Water encountered at 21.5 feet.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													6" Stiff clay at 20.25' changes to dense fine sand (SM) at 21', very wet at 21.5'; HNU=0 10YR 7/2 — 21.0
	25												Dense very wet sand (SM); HNU=0 2.5YR 6/6 Dense sand; HNU=0 2.5YR 6/6 Dense sand, medium gravel with some clay; HNU=0 2.5YR 6/6 — 28.0
	30												Dense sand, medium to coarse; HNU=0 2.5YR 6/6 Coarse sand with some gravel to stiff very plastic sandy clay (CL); HNU=0 Light gray; 5YR 7/2 — 31.0 32.0
	35 40												Bottom of Boring Permanent Well Set - 10' Slot Screen PVC 2" - 25' Riser Schedule 40 PVC 2" - 32-20' Silica Sand 20/40 - 20-17.5' Bentonite Pellets 3/8" Annulus grouted 6/24/92. Grout weight in 13.7 lb/gal Grout weight out 13.7 lb/gal

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC

LOG OF BORING NO. B-49

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/23/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Perched water encountere 15.5 to 16 feet.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Firm clayey silty sand fill (SC-SM); HNU=0 2.0
	5												Stiff very silty clay with fine sand (CL); HNU=0 10YR 6/4 Stiff very silty clay with fine sand (CL) becomes very sandy at 6'; HNU=1 7.5YR 5/6 6.0
													Stiff very sandy clay (CL) to 7.5' with slight odor becomes loose slightly wet clayey silt with heavy stains and strong odor; HNU=30 5YR 4/6 8.0
	10												Stiff silty clay (CL) with sand seams; HNU=32 Creosote stains and odor; 5YR 4/6 10.0
													Firm moist fine silty sand (SM) with creosote stains and hydrocarbon odor; HNU=46 Firm moist fine silty sand (SM) with heavy creosote stains and oil odor; HNU=50 Firm wet fine sand (SM) with stiff clay seams at 15' with lots of free oil; HNU=60 15.0
	15		▼										16.0
													Firm very moist sand to 16' changes to very stiff clay (CH) Slickensided sides with slight odor; 5YR 4/4 18.0
	20												Bottom of Boring Temporary Well Set - 5' Slot Screen - 12.5' Riser Temporary well pulled and borehole grouted to surface. Grout weight in 13.7 lb/gal Grout weight out 13.7 lb/gal

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SWL SOUTHWESTERN LABORATORIES, INC

LOG OF BORING NO. B-50

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/23/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: No water encountered.

FIELD DATA				LABORATORY DATA									
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	DESCRIPTION OF STRATUM
													Firm very clayey silty sand (SC-SM); HNU=28 Light stain and odor above 1'; 10YR 5/2
													Firm very clayey silty sand to 3' becomes stiff very silty clay (CL); HNU=20 5YR 4/6
													Firm moist clayey sand with creosote stain and odor, clay at 6'; HNU=36
	5												6.0
													Firm silty sand (SM) with lots of free oil, 6' clay seams; HNU=70 Heavy stain; 5YR 4/4
													Firm silty sand (SM) with some clay seams; HNU=70 Oil stain and creosote odor; 10YR 5/2
	10												Firm silty sand (SM) with heavy oil stains, very moist at clay layers; HNU=70
													Firm silty sand (SM) with heavy stains and strong odor with clay seams; HNU=70 10YR 3/1
													14.0
	15												Very stiff clay (CH) with oil stains and slickensided fractures; HNU=20 5YR 4/4
													16.0
													Bottom of Boring Borehole grouted 6/24/92. Grout weight in 13.8 lb/gal Grout weight out 13.8 lb/gal
	20												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-51

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/23/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: No water encountered.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Gravel fill with wood and metal debris 1.0
	5												Medium very sandy silty clay (CL); HNU=0 10YR 5/6 Stiff very silty clay (CL) with fine sand; HNU=1 10YR 5/4 mottled 5/8 Stiff very silty clay (CL) with fine sand; HNU=0 10YR 6/4 mottled 5/6 6.0
													Stiff very sandy clay (CL); HNU=0 5YR 5/6 mottled 4/6 8.0
	10 15 20												Bottom of Boring Borehole grouted 6/23/92. Grout weight in 13.8 lb/gal Grout weight out 13.8 lb/gal

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-52

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/24/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Water encountered at 3 feet.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Firm clayey silty sand fill (SC-SM); HNU = 1 Slight creosote odor; 7.5YR 4/6 2.0
													Very soft wet clayey silt with wood debris; HNU = 2 Creosote odor; 10YR 3/1 4.0
													Wood debris 5.0
	5												Bottom of Boring Borehole grouted 6/24/92. Grout weight in 13.7 lb/gal Grout weight out 13.7 lb/gal
	10												
	15												
	20												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC

LOG OF BORING NO. B-53

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/24/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Water encountered at 4.5 feet.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Loose clayey silty sand (SC-SM) fill; HNU = 10 Oily sheen; slight odor Firm clayey silty sand (SC-SM) fill becomes very silty clay (CL); HNU = 14 Silty sand (SM) at 4'; oily sheen, slight odor; 7.5YR 4/4
													4.0
	5												Loose very wet silty sand becomes clayey sand (SC-SM); HNU = 52 Heavy oil stains and odor; 7.5YR 4/2 Loose very wet silty sand; HNU = 5 Visible creosote and odor; 7.5YR 5/4
													8.0
	10												Bottom of Boring Temporary Well Set - 5' Slot Screen - 3' Riser Temporary well pulled and borehole grouted to surface. Grout weight in 13.8 lb/gal Grout weight out 13.8 lb/gal
	15												
	20												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-54

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/24/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Water encountered at 4 feet.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Firm very fine silty sand (SM) fill with wood debris and gravel; HNU = 1 Some stains; 10YR 3/2 2.0
	5												Firm very moist clayey silty sand; HNU = 2 Slight stains at top; 7.5YR 4/6 Very loose wet clayey silty sand (SC-SM); HNU = 14 Visible creosote; 10YR 6/4 Loose wet clayey silty sand (SC-SM) becomes stiff clay (CH) at 8'; HNU = 14 Visible oil sheen, creosote odor; 7.5YR 4/6 8.0
	10												Very stiff clay (CH) with fine sand filled fractures; HNU = 11 Very slight creosote odor; 5YR 4/6 10.0
	15												Bottom of Boring Temporary Well Set - 5' Slot Screen - 5' Riser - Silica Sand to 3' - Bentonite Pellets to 1' Temporary well pulled and borehole grouted to surface. Grout weight in 13.8 lb/gal Grout weight out 13.8 lb/gal
	20												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SWL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-55

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/24/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Water encountered at 5 feet.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Firm clayey silty sand (SC-SM) fill with gravel at surface; HNU = 1 Oil stains and creosote odor; 2.5YR 4/2 6/4 2.0
	5												Firm silty sand (SM); HNU = 46 Oil stains and creosote odor; 10YR 4/2 Firm silty sand (SM); HNU-10 Oil stains and creosote odor; 10YR 4/1 Firm very fine silty sand with some clay layers; HNU = 20 Oil stains and strong odor, very wet 8.0
	10												Firm silty sand at 8' becomes very stiff clay (CH); HNU = 2 Creosote odor, wet sand seams at 9'; 5YR 4/6 10.0
	15												Bottom of Boring Temporary Well Set - 5' Slot Screen - 5' Riser - Silica Sand to 3' - Bentonite Pellets to surface Temporary well pulled and borehole grouted to surface. Grout weight in 13.8 lb/gal Grout weight out 13.8 lb/gal
	20												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC

LOG OF BORING NO. B-56

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/24/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: No water encountered.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Asphalt and sandy clay gravel 2.0
													Firm sandy silt fill with some clay becomes clayey below 4'; HNU=0 5YR 4/1 to 10YR 6/4 4.0
	5												Stiff very silty clay (CL) with fine sand and roots; HNU=0 Moist; 10YR 6/1 mottled 6/6
													Stiff very silty clay (CL) to 7' changes to firm very fine silty sand; HNU=0 10YR 6/3 7.0
													8.0
	10												Bottom of Boring Borehole grouted 6/24/92. Grout weight in 13.7 lb/gal Grout weight out 13.7 lb/gal
	15												
	20												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-57

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/24/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: No water encountered.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Asphalt and gravel fill 1.0
	5												Stiff very silty clay (CL) with fine sand; HNU=0 2.5YR 6/4 Stiff very silty clay (CL) becomes very sandy at 8'; HNU=0 Slight odor; 2.5YR 6/4 mottled 10YR 6/1 Stiff very silty clay (CL) with sand becomes very sandy at 8'; HNU=0 10YR 6/1 mottled 7YR 4/6 8.0
	10												Bottom of Boring Borehole grouted 6/24/92. Grout weight in 13.7 lb/gal Grout weight out 13.7 lb/gal
	15												
	20												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC

LOG OF BORING NO. B-58

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/24/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: No water encountered.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM	
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI		
													Rocks and gravel with creosote odor	1.0
													Firm clayey silty sand (SC-SM) fill to 3' with some gravel; HNU=13 Moist, creosote stains and odor	3.0
	5												Stiff very silty clay (CL) with fine sand; HNU=0 2.5YR 6/2 mottled 10YR 5/6 Stiff very silty clay (CL) becomes stiff clay (CH) with sand at 8'; HNU=0 5YR 4/6	8.0
	10												Bottom of Boring Borehole grouted 6/24/92. Grout weight in 13.7 lb/gal Grout weight out 13.7 lb/gal	
	15													
	20													

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-59

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/24/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: No water encountered.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Asphalt and sandy gravel fill 1.0
													Firm clayey silty sand (SC-SM) with creosote stains and odor; HNU=10 10YR 5.2 4.0
	5												Stiff very silty clay (CL) with fine sand and some creosote stains and odor; HNU=14 10YR 6/4
													Stiff very silty clay (CL) with some stains and odor, fine sand at 7'; HNU=10 7.0
													Firm very fine silty sand with slight odor; HNU=0 7.5YR 5/6 8.0
	10												Bottom of Boring Borehole grouted 6/24/92. Grout weight in 13.7 lb/gal Grout weight out 13.7 lb/gal
	15												
	20												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-60

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/25/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Water encountered at 10 feet.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Loose wet clayey sandy silt (ML) and silty sand (SM) with wood debris; HNU=0 5YR 4/1 — 1.0
													Loose wet clayey silty sand (SC-SM) with organics; HNU=0 Fill; 5YR 4/1 — 4.0
													Soft very silty clay (CL) with fine sand, sandy fill to 5'; HNU=0 5YR 4/1 to 10YR 6/4 — 5.0
	5												Loose clayey silty sand (SC-SM) with creosote stains and odor; HNU=13 10YR 5/6 — 8.0
													Firm silty sand (SM) with some clay; HNU=1 Slight odor; 7.5YR 5/4
	10												Firm very wet silty sand (SM); HNU=1 7.5YR 5/4
													Firm wet silty sand with oily sheen and creosote odor; HNU=2 — 14.0
	15												Bottom of Boring Temporary Well Set - 5' Slot Screen - 10' Riser Temporary well pulled and borehole grouted to surface. Grout weight in 13.9 lb/gal Grout weight out 13.9 lb/gal
	20												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SWL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-61

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/25/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Water encountered at 3'

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM	
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI		
													6" Bark Loose clayey silty sand (SC-SM); HNU=0 10YR 7/8	1.0
													Loose clayey silty sand (SC-SM); HNU=0 10YR 4/6	3.0
													Bottom of Boring Water encountered at 3' Borehole grouted 6/25/92. Grout weight in 13.6 lb/gal Grout weight out 13.6 lb/gal	
	5													
	10													
	15													
	20													

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-62

PROJECT: RCRA Facility Investigation

SHEET 1 of 2

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/25/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Water encountered at 34 feet.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Asphalt and gravel to 1'
													8" Asphalt at top changes to clayey silty sand (SC-SM); HNU=0 Slight odor; 10YR 6/2 — 1.5
	5												Stiff very silty clay with fine sand; HNU=0 10YR 7/2 mottled 7YR 5/6 Stiff very silty clay (CL); HNU=0 10YR 6/4 — 6.0
	10												Medium sandy silty clay (CL); HNU=0 10YR 7/4 mottled 7YR 5/4 Medium very sandy clay (CL); HNU=0 7.5YR 4/6 Medium very sandy clay (CL) to firm silty sand (SM); HNU=0 7.5YR 4/6 — 12.0
	15												Stiff clay (CH) to 12.5' becomes silty sandy (SM); HNU=0 Dry; 5YR 4/6 Firm slightly wet silty sand (SM) to 14.5', stiff clay (CH) to 15', dense fine sand; HNU=0 7.5YR 4/6 Dense fine silty sand (SM) with clay layers; HNU=0 Wet at 17.5'; 7.5YR 5/6 — 18.0
	20 25												Wet sand at 18' becomes very stiff slickensided clay (CH) with wet silt seams; HNU=0 5YR 4/6 Stiff clay (CH) with slickensided fractures and organic stains; HNU=0 Wet sand seams at 21'; 5YR 4/6 Very stiff clay (CH) with slickensided fractures and organic stains; HNU=0 5YR 4/6 Very stiff clay (CH) with slickensided fractures and organic stains; HNU=0

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

LOG OF BORING NO. B-62

PROJECT: RCRA Facility Investigation

SHEET 2 of 2

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/25/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Water encountered at 34 feet.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													5YR 4/6 — 26.0
													Firm silty sand with some clay becomes very clayey; HNU=0 10YR 7/3 — 28.0
	30												Firm clayey silty sand; HNU=0 10YR 7/3 Firm wet clayey silty sand; HNU=0 10YR 7/3 — 32.0
													Firm very clayey silt with fine sand, very moist; HNU=0 10YR 5/8 — 34.0
	35												Firm wet clayey silty sand (SM-SC) becomes very clayey silt; HNU=0 10YR 5/8 Firm wet clayey silty sand (SC-SM) becomes very silty; HNU=0 10YR 7/3 Firm wet clayey silty sand (SC-SM) becomes very silty; HNU=0 10YR 7/3 — 40.0
	40												Firm clayey silt (ML) with very fine sand; HNU=0 Very wet; 5YR 7/2 — 42.0
	45												Bottom of Boring Temporary Well Set - 10' Slot Screen - 32' Riser Temporary well pulled and borehole grouted to surface. Grout weight in 13.9 lb/gal Grout weight out 13.9 lb/gal
	50												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-63

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/26/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: No water encountered.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Loose clayey silty sand with slight stain, wood debris - fill becomes firm medium very sandy silty clay (CL) at 1.5'; HNU=0 10YR 6/6
													Firm clayey silty sand (SC-SM); HNU=0 7.5YR 4/6
													Firm clayey silty sand (SC-SM) becomes medium silty clay at 5'; HNU=0 7.5YR 4/6
	5												5.0
													Stiff clay (CH) to firm fine silty sand (SM); HNU=0 7.5YR 4/6
													8.0
													Bottom of Boring Borehole grouted 6/26/92. Grout weight in 13.7 lb/gal Grout weight out 13.7 lb/gal
	10												
	15												
	20												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. B-64

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/26/92

SURFACE ELEV:

FIELD DATA | LABORATORY DATA

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Water encountered at 12 feet.

SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	DESCRIPTION OF STRATUM
													Clayey sand fill with gravel and wood debris 2.0
	5												Medium very silty clay (CL); HNU=0 10YR 7/2 Stiff very silty clay (CL); HNU=0 10YR 7/2 mottled 5/6 Stiff very silty clay (CL); HNU=0 10YR 7/2 mottled 7.5YR 4/6 8.0
													Firm moist silty sand (SM) becomes very stiff clay (CH) at 9'; HNU=0 10YR 7/2 to 5YR 4/8 9.0
	10												Stiff clay to wet clayey silty sand (SM-SC); HNU=0 12.0
													Firm very wet silty sand (SM) with clay seams; HNU=0 7.5YR 4/6 Firm wet silty sand (SM) with some clay; HNU=0 7.5YR 4/6
	15												Firm wet silty sand (SM) with clay layers at 17' back to sand; HNU=0 10YR 6/4 to 7.5YR 4/6 17.0 18.0
	20												Wet sand at 18' becomes very stiff clay (CH) with slickensided fractures; HNU=0 5YR 4/6 Very stiff clay (CH) with thin sand layers at 21' to stiff clay; HNU=0 5YR 4/6 22.0
	25												Bottom of Boring Permanent Well Set - 10' .010 Slot Screen 2" Schedule 40 PVC - 15' Riser 2" Schedule 40 PVC - 22-10' Sand Pack 20/40 Silica Sand - 10-8' Bentonite Pellets 3/8" Annulus grouted 6/27/92. Grout weight in 13.7 lb/gal Grout weight out 13.7 lb/gal

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC

LOG OF BORING NO. B-65

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/26/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: No water encountered.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Chert gravel, wood debris and clayey sand fill with heavy stains 2.0
	5												Medium very silty clay (CL) with fine sand and creosote odor; HNU=10 Moist clayey silt (ML) at top; 5YR 6/3 Medium very silty clay (CL) with slight odor of creosote; HNU=7 2.5YR 6/4 mottled 6.6 with sand at 6' 6.0
	10												Medium very silty sandy clay (CL) with slightly creosote odor; HNU=2 10YR 6/4 Stiff sandy silty clay (CL) becomes slightly clayey silty sand (SC-SM) at 9'; HNU=0 7.5YR 4/6 9.0 10.0
	15												Bottom of Boring Borehole grouted 6/26/92. Grout weight in 13.7 lb/gal Grout weight out 13.7 lb/gal
	20												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC

LOG OF BORING NO. B-66

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/26/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: Perched water encountered at 10 feet.

FIELD DATA				LABORATORY DATA									DESCRIPTION OF STRATUM
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	
													Chert gravel, wood debris and oil stains, clayey sandy silt fill (2.0)
													Loose clayey silty sand (SC-SM); HNU = 3 Hydrocarbon odor; 5YR 5/2 (4.0)
	5												Medium very silty clay (CL) with fine sand; HNU = 1 Slight creosote odor; 2.5YR 6/2 mottled 6/8 Medium sandy very silty clay (CL); HNU = 1 Creosote stains at top; 10YR 5/4 (8.0)
													Firm clayey silty sand (SC-SM); HNU = 5 Slight creosote odor; 7.5YR 4/6 (10.0)
	10												Firm wet silty sand (SM) with clayey seams; HNU = 6 7.5YR 4/6 (12.0)
	15												Bottom of Boring Temporary Well Set - 5' .010 Slot Screen - 5' Riser 2" Schedule 40 PVC - 20/40 Silica Sand to 5' - Bentonite Pellets to 2' Temporary well pulled and borehole grouted to surface. Grout weight in 13.9 lb/gal Grout weight out 13.9 lb/gal
	20												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

REMARKS: Munsell color notations are for moist samples.

920954

SwL SOUTHWESTERN LABORATORIES, INC.

LOG OF BORING NO. SB-1

PROJECT: RCRA Facility Investigation

SHEET 1 of 1

CLIENT: Colfax Creosoting Company

LOCATION: Pineville, Louisiana

DATE: 6/27/92

SURFACE ELEV:

DRILLING METHOD(S): Hollow Core Auger

GROUNDWATER INFORMATION: No water encountered.

FIELD DATA				LABORATORY DATA									
SOIL & ROCK SYMBOL	DEPTH (FT)	SAMPLE TYPE	N: SPT, BLOWS/FT T: THD, BLOWS/FT P: HAND PEN, TSF	MOISTURE CONTENT, %	DRY DENSITY POUNDS/CU.FT	LIQUID LIMIT, %	PLASTIC LIMIT, %	PLASTICITY INDEX, %	MINUS NO. 200 SIEVE, %	COMPRESSIVE STRENGTH, KSF	FAILURE STRAIN (%)	CONFINING PRESSURE PSI	DESCRIPTION OF STRATUM
													8" Topsoil and roots 0.5
													Stiff silty clay (CL) with Fe stains; HNU=0 Light gray; 10YR 7/2 2.0
													Stiff silty sandy clay (CL) with sand layers at 2-2.5', sand lenses and roots, silt; at 6'; HNU=1 Dry; 10YR 7/2 4.0
	5												Firm clayey sandy silt (SM) with roots, silt at 6'; HNU=0 Dry, brownish yellow; 10YR 6/8 6.0
													Stiff silty clay (CL) with silt partings with Fe stains; HNU=1 Yellowish brown; 10YR 5/8 Stiff silty clay (CL) with Fe stains and silt lenses; HNU=0 Moist, yellowish brown; 10YR 5/8 10.0
	10												Bottom of Boring Borehole grouted 6/27/92. Grout weight in 13.8 lb/gal Grout weight out 13.8 lb/gal
	15												
	20												

TUBE SAMPLE	AUGER SAMPLE	SPLIT-SPOON	ROCK CORE	THD CONE PEN.	NO RECOVERY

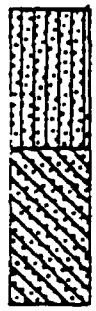
REMARKS: Munsell color notations are for moist samples.

920954

SWL SOUTHWESTERN LABORATORIES, INC

KEY TO SOIL CLASSIFICATION AND SYMBOLS

SOIL TYPES



CONSISTENCY OF COHESIVE SOILS

DESCRIPTIVE TERM	UNCONFINED COMPRESSIVE STRENGTH TON/SQ. FOOT
Very Soft	Less than 0.25
Soft	0.25-0.50
Plastic	0.50-1.00
Stiff	1.00-2.00
Very Stiff	2.00-4.00
Hard	More than 4.00

RELATIVE DENSITY OF COHESIONLESS SOILS

DESCRIPTIVE TERM	STD. PENETRATION RESISTANCE BLOWS/FOOT
Loose	0-10
Firm	10-30
Dense	30-50
Very Dense	More than 50

SOIL STRUCTURE

CALCAREOUS – Containing deposits of calcium carbonate ; generally nodular.

SLICKENSIDED- Having inclined planes of weakness that are slick and glossy in appearance.

LAMINATED –Composed of thin layers of varying color and texture.

FISSURED – Containing shrinkage cracks frequently filled with fine sand or silt. Usually more or less vertical.

INTERBEDDED– Composed of alternate layers of different soil types.

TEST DATA AND SAMPLER SYMBOLS

30% FINER – Percent finer than no. 200 sieve.

▽ – Static water level.

▼ – Hydrostatic water level.

UNDISTURBED SAMPLE

DISTURBED SAMPLE

NO RECOVERY

BORING LOG

PROJECT: CCC–RFI

DRILLER: DELRIE

BORING No.: T–1 DATE: 6/22/92 DRILLING METHOD: BACKHOE

GROUND WATER ELEVATION: GROUND WATER DEPTH: NONE

BORING DEPTH: 8 FEET SAMPLING METHOD: GRAB

STRATA DEPTH FT	SAMPLE DEPTH FT	DESCRIPTION
		Yellow Clay 7.5YR 6/8
	T1S1	Yellow Clay 7.5YR 6/8
		Redish Silty Clay 5YR 6/8
	T1S2	Redish Silty Clay 5YR 6/8
5		Redish Silty Clay 5YR 6/8
	T1S3	Saturated Red Clay 5YR 4/6
		Saturated Red Clay 5YR 4/6
	T1S4	Saturated Red Clay 5YR 4/6
10		
15		
20		
25		

Ball Engineering, Inc.

BORING LOG

PROJECT: CCC–RFI

DRILLER: DELRIE

BORING No.: T–2 DATE: 6/22/92 DRILLING METHOD: BACKHOE

GROUND WATER ELEVATION: GROUND WATER DEPTH: NONE

BORING DEPTH: 8 FEET SAMPLING METHOD: GRAB

STRATA DEPTH FT	SAMPLE DEPTH FT	DESCRIPTION
		Wood Cut–offs
	T2S1	Yellow Clay 10YR 6/8
		Redish Silty Clay 5YR 6/8
	T2S2	Redish Silty Clay 5YR 6/8
5		Redish Silty Clay 5YR 6/8
	T2S3	Redish Silty Clay 5YR 5/8
		Redish Silty Clay 5YR 5/8
	T2S4	Redish Silty Clay 5YR 5/8
10		
15		
20		
25		

BORING LOG

PROJECT: CCC-RFI

DRILLER: DELRIE

BORING No.: T-3 DATE: 6/22/92 DRILLING METHOD: BACKHOE

GROUND WATER ELEVATION: GROUND WATER DEPTH: NONE

BORING DEPTH: 8 FEET SAMPLING METHOD: GRAB

STRATA DEPTH FT	SAMPLE DEPTH FT	DESCRIPTION
		Decomposing Wood and Bark
	T3S1	Decomposing Wood and Bark
		Decomposing Wood and Bark
	T3S2	Decomposing Wood and Bark
5		Red Clay 7.5YR 4/3
	T3S3	Red Clay 7.5YR 4/3
		Red Clay 5YR 3/4
	T3S4	Red Clay 5YR 3/4
10		
15		
20		
25		

Ball Engineering, Inc.

BORING LOG

PROJECT: CCC–RFI

DRILLER: DELRIE

BORING No.: T–4 DATE: 6/22/92 DRILLING METHOD: BACKHOE

GROUND WATER ELEVATION: GROUND WATER DEPTH: NONE

BORING DEPTH: 9 FEET SAMPLING METHOD: GRAB

STRATA DEPTH FT	SAMPLE DEPTH FT	DESCRIPTION
		Decayed Wood and Soil
	T4S1	Decayed Wood and Soil
		Decayed Wood and Soil
	T4S2	Decayed Wood and Soil
5		Decayed Wood and Soil
	T4S3	Sandy Clay
		Red Clay
		Red Clay
	T4S4	Red Clay
10		
15		
20		
25		

Ball Engineering, Inc.

BORING LOG

PROJECT: CCC–RFI

DRILLER: DELRIE

BORING No.: T–5 DATE: 6/22/92 DRILLING METHOD: BACKHOE

GROUND WATER ELEVATION: GROUND WATER DEPTH: NONE

BORING DEPTH: 4.5 FEET SAMPLING METHOD: GRAB

STRATA DEPTH FT	SAMPLE DEPTH FT	DESCRIPTION
		Decayed Wood
	T5S1	Decayed Wood
		Decayed Wood
	T5S2	Decayed Wood
5		Red Silty Sand 7.5YR 4/4
		Ended Trench at 4 feet because of natural ground. Did not want to backfill with contaminated material per R. Kaiser
10		
15		
20		
25		

Ball Engineering, Inc.

BORING LOG

PROJECT: CCC–RFI

DRILLER: DELRIE

BORING No.: T–6 DATE: 6/22/92 DRILLING METHOD: BACKHOE

GROUND WATER ELEVATION: GROUND WATER DEPTH: 5 FEET

BORING DEPTH: 7 FEET SAMPLING METHOD: GRAB

STRATA DEPTH FT	SAMPLE DEPTH FT	DESCRIPTION
		Decayed Wood
	T6S1	Decayed Wood
		Decayed Wood
	T6S2	Decayed Wood
5		Decayed Wood
	T6S3	Clay
10		
15		
20		
25		

Ball Engineering, Inc.

BORING LOG

PROJECT: CCC–RFI

DRILLER: DELRIE

BORING No.: T–7 DATE: 6/22/92 DRILLING METHOD: BACKHOE

GROUND WATER ELEVATION: GROUND WATER DEPTH: NONE

BORING DEPTH: 9 FEET SAMPLING METHOD: GRAB

STRATA DEPTH FT	SAMPLE DEPTH FT	DESCRIPTION
		Wood Chips and Cut–offs
	T7S1	Wood Chips and Cut–offs
		Wood Chips and Cut–offs
	T7S2	Wood Chips and Cut–offs
5		Wood Chips and Cut–offs
	T7S3	Wood Chips and Cut–offs
		Wood Chips and Cut–offs
		Wood Chips and Cut–offs
	T7S4	Gray Clay
10		
15		
20		
25		

Ball Engineering, Inc.

BORING LOG

PROJECT: CCC–RFI

DRILLER: DELRIE

BORING No.: T–8 DATE: 6/22/92 DRILLING METHOD: BACKHOE

GROUND WATER ELEVATION: GROUND WATER DEPTH: NONE

BORING DEPTH: 8 FEET SAMPLING METHOD: GRAB

STRATA DEPTH FT	SAMPLE DEPTH FT	DESCRIPTION
		Wood Chips and Cut–offs
	T8S1	Wood Chips and Cut–offs
		Wood Chips and Cut–offs
	T8S2	Wood Chips and Cut–offs
5		Wood Chips and Cut–offs
	T8S3	Wood Chips and Cut–offs
		Wood Chips and Cut–offs
	T8S4	Very Wet Gray Clay
10		
15		
20		
25		

Ball Engineering, Inc.

BORING LOG

PROJECT: CCC–RFI

DRILLER: DELRIE

BORING No.: T–9 DATE: 6/22/92 DRILLING METHOD: BACKHOE

GROUND WATER ELEVATION: GROUND WATER DEPTH: NONE

BORING DEPTH: 6 FEET SAMPLING METHOD: GRAB

STRATA DEPTH FT	SAMPLE DEPTH FT	DESCRIPTION
		Wood Waste, Cut–offs, Bark
	T9S1	Wood Waste, Cut–offs, Bark
		Wood Waste, Cut–offs, Bark
		Wood Waste, Cut–offs, Bark
5	T9S2	Wood Waste, Cut–offs, Bark
		Red Silty Clay 2.5R 5/8
10		
15		
20		
25		

Ball Engineering, Inc.

BORING LOG

PROJECT: CCC–RFI

DRILLER: DELRIE

BORING No.: T–10 DATE: 6/22/92 DRILLING METHOD: BACKHOE

GROUND WATER ELEVATION: GROUND WATER DEPTH: NONE

BORING DEPTH: 5 FEET SAMPLING METHOD: GRAB

STRATA DEPTH FT	SAMPLE DEPTH FT	DESCRIPTION
	T10S1	Wood Waste, Cut–offs, Bark
		Wood Waste, Cut–offs, Bark
		Wood Waste, Cut–offs, Bark
		Wood Waste, Cut–offs, Bark
5	T10S2	Gray Silty Clay 2.5Y 5/3
10		
15		
20		
25		

Ball Engineering, Inc.

BORING LOG

PROJECT: CCC–RFI

DRILLER: DELRIE

BORING No.: T–11 DATE: 6/22/92 DRILLING METHOD: BACKHOE

GROUND WATER ELEVATION: GROUND WATER DEPTH: NONE

BORING DEPTH: 8 FEET SAMPLING METHOD: GRAB

STRATA DEPTH FT	SAMPLE DEPTH FT	DESCRIPTION
		Wood Waste, Cut–offs, Bark
	T11S1	Wood Waste, Cut–offs, Bark
		Wood Waste, Cut–offs, Bark
	T11S2	Wood Waste, Cut–offs, Bark
5		Wood Waste, Cut–offs, Bark
	T11S3	Wood Waste, Cut–offs, Bark
		Wood Waste, Cut–offs, Bark
	T11S4	Wood Waste, Cut–offs, Bark
10		
15		
20		
25		

BORING LOG

PROJECT: CCC–RFI

DRILLER: DELRIE

BORING No.: T–12 DATE: 6/23/92 DRILLING METHOD: BACKHOE

GROUND WATER ELEVATION: GROUND WATER DEPTH: NONE

BORING DEPTH: 8 FEET SAMPLING METHOD: GRAB

STRATA DEPTH FT	SAMPLE DEPTH FT	DESCRIPTION
		Wood Waste, Cut–offs, Bark
	T12S1	Wood Waste, Cut–offs, Bark
		Wood Waste, Cut–offs, Bark
	T12S2	Wood Waste, Cut–offs, Bark
5		Red Clay 7.5YR 4/3
	T12S3	Red Clay 7.5YR 4/3
		Red Clay 7.5YR 4/3
	T12S4	Red Clay 7.5YR 4/3
10		
15		
20		
25		

BORING LOG

PROJECT: CCC–RFI

DRILLER: DELRIE

BORING No.: T–14 DATE: 6/23/92 DRILLING METHOD: BACKHOE

GROUND WATER ELEVATION: GROUND WATER DEPTH: NONE

BORING DEPTH: 4 FEET SAMPLING METHOD: GRAB

STRATA DEPTH FT	SAMPLE DEPTH FT	DESCRIPTION
		Wood Waste, Cut–offs, Bark
	T14S1	Wood Waste, Cut–offs, Bark
		Red Clay
	T14S2	Red Clay
5		
10		
15		
20		
25		

Ball Engineering, Inc.

APPENDIX D - Soil Sampling Analytical Results

D.1 Soil Boring Sampling Results D-2

D.2 Trench Sampling Results D-23

Colfax Creosoting RCRA Facility Investigation
Soil Boring Sampling Results

Semi-Volatile Compounds Detected, parts per billion

Cas No.	Compound	Sample Concentration, parts per billion									
		B1S6	B2S4	B2S6	B3S4	B3S4D	B4S3	B5S3	B6S1	B6S4	B7S4
108-95-2	Phenol										
111-44-4	bis(2-Chloroethyl)Ether										
541-73-1	1,3-Dichlorobenzene										
95-48-7	2-Methylphenol										
106-44-5	4-Methylphenol										
98-95-3	Nitrobenzene										
78-59-1	Isophorone										
91-20-3	Naphthalene										
106-47-8	4-Chloroaniline	N	N	N	N	N	N	N		N	N
59-50-7	4-Chloro-3-Methylphenol	O	O	O	O	O	O	O		O	O
91-57-6	2-Methylnaphthalene	N	N	N	N	N	N	N		N	N
88-06-2	2,4,6-Trichlorophenol	E	E	E	E	E	E	E		E	E
95-95-4	2,4,5-Trichlorophenol										
88-74-4	2-Nitroaniline	D	D	D	D	D	D	D		D	D
208-96-8	Acenaphthylene	E	E	E	E	E	E	E	1700	E	E
606-20-2	2,6-Dinitrotoluene	T	T	T	T	T	T	T		T	T
99-09-2	3-Nitroaniline	E	E	E	E	E	E	E		E	E
83-32-9	Acenaphthene	C	C	C	C	C	C	C	3300	C	C
132-64-9	Dibenzofuran	T	T	T	T	T	T	T	1800	T	T
86-73-7	Fluorene	E	E	E	E	E	E	E	3900	E	E
100-01-6	4-Nitroaniline	D	D	D	D	D	D	D		D	D
86-30-6	N-Nitrosodiphenylamine										
87-86-5	Pentachlorophenol										
85-01-8	Phenanthrene								58000		
120-12-7	Anthracene										
84-74-2	Di-n-Butylphthalate										
206-44-0	Fluoranthene								32000		
129-00-0	Pyrene								53000		
85-68-7	Butylbenzylphthalate										
91-94-1	3,3-Dichlorobenzidine										
56-55-3	Benzo(a)Anthracene								20000		
218-01-9	Chrysene										
117-81-7	bis(2-Ethylexyl)Phthalate								42000		
117-84-0	Di-n-Octyl Phthalate								30		
205-99-2	Benzo(b)Fluoranthene								47000		
207-08-9	Benzo(k)Fluoranthene								24000		
50-32-8	Benzo(a)Pyrene								23000		
193-39-5	Indeno(1,2,3-cd)Pyrene								15000		
53-70-3	Dibenz(a,h)Anthracene										
191-24-2	Benzo(g,h,i)Perylene								18000		

Volatile Compounds Detected

75-09-2	Methylene Chloride	*26*	*21*	*14*	*23*	*39*	*35*	*27*	*33*	*46*	*40*
67-64-1	Acetone	*16*					*150*	*160*	*180*	*180*	*8*
75-15-0	Carbon Disulfide				5	3		3	4	3	
67-66-3	Chloroform										
78-93-3	2-Butanone										
56-23-5	Carbon Tetrachloride										
79-01-6	Trichloroethene										
71-43-2	Benzene										
108-10-1	4-Methyl-2-Pentanone										
127-18-4	Tetrachloroethene										
79-34-5	1,1,2,2-Tetrachloroethane										
108-88-3	Toluene									110	
108-90-7	Chlorobenzene										
100-41-4	Ethylbenzene										
100-42-5	Styrene										
1330-20-7	Xylene (Total)										7
Total Compounds Detected		0	0	0	0	0	0	0	300700	110	7
Pentachlorophenol Detected		0	0	0	0	0	0	0	0	0	0
Total Semi-Volatile Compounds		0	0	0	0	0	0	0	300700	0	0
Total Volatile Compounds		0	0	0	0	0	0	0	0	110	7

SUM1-24.WK3, SHEET A

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits

Bold italic quantities indicate constituent was detected in laboratory background samples

"Total Compounds Detected" does not include phthalates, methylene chloride, acetone, or carbon disulfide.

Colfax Creosoting RCRA Facility Investigation
Soil Boring Sampling Results

Semi-Volatile Compounds Detected, parts per billion

Cas No.	Compound	Sample Concentration, parts per billion					
		B8S4	B9S4	B10S4	B11S1	B11S2	B11S5
108-95-2	Phenol						
111-44-4	bis(2-Chloroethyl)Ether						
541-73-1	1,3-Dichlorobenzene						
95-48-7	2-Methylphenol						
106-44-5	4-Methylphenol						
98-95-3	Nitrobenzene						
78-59-1	Isophorone						
91-20-3	Naphthalene						
106-47-8	4-Chloroaniline			N		N	N
59-50-7	4-Chloro-3-Methlyphenol			O		O	O
91-57-6	2-Methylnaphthalene			N		N	N
88-06-2	2,4,6-Trichlorophenol			E		E	E
95-95-4	2,4,5-Trichlorophenol						
88-74-4	2-Nitroaniline			D		D	D
208-96-8	Acenaphthylene			E		E	E
606-20-2	2,6-Dinitrotoluene			T		T	T
99-09-2	3-Nitroaniline			E		E	E
83-32-9	Acenaphthene			C		C	C
132-64-9	Dibenzofuran			T		T	T
86-73-7	Fluorene			E		E	E
100-01-6	4-Nitroaniline			D		D	D
86-30-6	N-Nitrosodiphenylamine						
87-86-5	Pentachlorophenol						
85-01-8	Phenanthrene				3400		
120-12-7	Anthracene				1300		
84-74-2	Di-n-Butylphthalate						
206-44-0	Fluoranthene				18000		
129-00-0	Pyrene				28000		
85-68-7	Butylbenzylphthalate	520	430				
91-94-1	3,3-Dichlorobenzidine						
56-55-3	Benzo(a)Anthracene				8400		
218-01-9	Chrysene						
117-81-7	bis(2-Ethylexyl)Phthalate				15000		
117-84-0	Di-n-Octyl Phthalate						
205-99-2	Benzo(b)Fluoranthene				14000		
207-08-9	Benzo(k)Fluoranthene				8700		
50-32-8	Benzo(a)Pyrene				4000		
193-39-5	Indeno(1,2,3-cd)Pyrene						
53-70-3	Dibenz(a,h)Anthracene						
191-24-2	Benzo(g,h,i)Perylene						

Volatile Compounds Detected

75-09-2	Methylene Chloride	5	9	14	10	10	9
67-64-1	Acetone	***15***	380				
75-15-0	Carbon Disulfide	12			23	14	11
67-66-3	Chloroform						
78-93-3	2-Butanone						
56-23-5	Carbon Tetrachloride						
79-01-6	Trichloroethene						
71-43-2	Benzene						
108-10-1	4-Methyl-2-Pentanone						
127-18-4	Tetrachloroethene						
79-34-5	1,1,2,2-Tetrachloroethane						
108-88-3	Toluene						
108-90-7	Chlorobenzene						
100-41-4	Ethylbenzene						
100-42-5	Styrene						
1330-20-7	Xylene (Total)						
Total Compounds Detected		0	0	0	85800	0	0
Pentachlorophenol Detected		0	0	0	0	0	0
Total Semi-Volatile Compounds		0	0	0	85800	0	0
Total Volatile Compounds		0	0	0	0	0	0

SUM1-24.WK3, SHEET B

Quantities shown in shaded cells indicate the ocmpound was estimated because it was detected below the method detection limits
Bold italic quantities indicate constituent was detected in laboratory background samples
"Total Compounds Detected" does not include phthalates, methylene chloride or carbon disulfide.

Colfax Creosoting RCRA Facility Investigation
Soil Boring Sampling Results

Semi-Volatile Compounds Detected, parts per billion

Cas No.	Compound	Sample Concentration, parts per billion B12S1	B12S4	B12S6		
108-95-2	Phenol					
111-44-4	bis(2-Chloroethyl)Ether					
541-73-1	1,3-Dichlorobenzene					
95-48-7	2-Methylphenol					
106-44-5	4-Methylphenol					
98-95-3	Nitrobenzene					
78-59-1	Isophorone					
91-20-3	Naphthalene					
106-47-8	4-Chloroaniline		N	N		
59-50-7	4-Chloro-3-Methlyphenol		O	O		
91-57-6	2-Methylnaphthalene		N	N		
88-06-2	2,4,6-Trichlorophenol		E	E		
95-95-4	2,4,5-Trichlorophenol					
88-74-4	2-Nitroaniline		D	D		
208-96-8	Acenaphthylene		E	E		
606-20-2	2,6-Dinitrotoluene		T	T		
99-09-2	3-Nitroaniline		E	E		
83-32-9	Acenaphthene	11000	C	C		
132-64-9	Dibenzofuran		T	T		
86-73-7	Fluorene	2400	E	E		
100-01-6	4-Nitroaniline		D	D		
86-30-6	N-Nitrosodiphenylamine					
87-86-5	Pentachlorophenol	18000				
85-01-8	Phenanthrene	7500				
120-12-7	Anthracene	7000				
84-74-2	Di-n-Butylphthalate					
206-44-0	Fluoranthene	29000				
129-00-0	Pyrene	29000				
85-68-7	Butylbenzylphthalate					
91-94-1	3,3-Dichlorobenzidine					
56-55-3	Benzo(a)Anthracene	18000				
218-01-9	Chrysene					
117-81-7	bis(2-Ethylexyl)Phthalate	19000				
117-84-0	Di-n-Octyl Phthalate					
205-99-2	Benzo(b)Fluoranthene	1800				
207-08-9	Benzo(k)Fluoranthene	1800				
50-32-8	Benzo(a)Pyrene	2600				
193-39-5	Indeno(1,2,3-cd)Pyrene					
53-70-3	Dibenz(a,h)Anthracene					
191-24-2	Benzo(g,h,i)Perylene					

Volatile Compounds Detected

75-09-2	Methylene Chloride	10	9	12		
67-64-1	Acetone					
75-15-0	Carbon Disulfide	14	45	12		
67-66-3	Chloroform	N	N	N		
78-93-3	2-Butanone	O	O	O		
56-23-5	Carbon Tetrachloride	N	N	N		
79-01-6	Trichloroethene	E	E	E		
71-43-2	Benzene					
108-10-1	4-Methyl-2-Pentanone	D	D	D		
127-18-4	Tetrachloroethene	E	E	E		
79-34-5	1,1,2,2-Tetrachloroethane	T	T	T		
108-88-3	Toluene	E	E	E		
108-90-7	Chlorobenzene	C	C	C		
100-41-4	Ethylbenzene	T	T	T		
100-42-5	Styrene	E	E	E		
1330-20-7	Xylene (Total)	D	D	D		
Total Compounds Detected		128100	0	0		
Pentachlorophenol Detected		18000	0	0		
Total Semi-Volatile Compounds		128100	0	0		
Total Volatile Compounds		0	0	0		

SUM1-24.WK3, SHEET C

Quantities shown in shaded cells indicate the ocmpound was estimated because it was detected below the method detection limits
Bold italic quantities indicate constituent was detected in laboratory background samples
"Total Compounds Detected" does not include phthalates, methylene chloride or carbon disulfide.

Colfax Creosoting RCRA Facility Investigation
Soil Boring Sampling Results

Semi-Volatile Compounds Detected, parts per billion

Cas No.	Compound	Sample Concentration, parts per billion							
		B13S1	B13S2	B13S4	B14S1	B14S2	B14S4	B15S4	B15S5
108-95-2	Phenol								
111-44-4	bis(2-Chloroethyl)Ether								
541-73-1	1,3-Dichlorobenzene								
95-48-7	2-Methylphenol								
106-44-5	4-Methylphenol								
98-95-3	Nitrobenzene								
78-59-1	Isophorone								
91-20-3	Naphthalene								
106-47-8	4-Chloroaniline		N			N	N	N	
59-50-7	4-Chloro-3-Methlyphenol		O			O	O	O	
91-57-6	2-Methylnaphthalene		N			N	N	N	
88-06-2	2,4,6-Trichlorophenol		E			E	E	E	
95-95-4	2,4,5-Trichlorophenol								
88-74-4	2-Nitroaniline		D			D	D	D	
208-96-8	Acenaphthylene		E			E	E	E	
606-20-2	2,6-Dinitortoluene		T			T	T	T	
99-09-2	3-Nitroaniline		E			E	E	E	
83-32-9	Acenaphthene		C		15000	C	C	C	
132-64-9	Dibenzofuran		T		2100	T	T	T	
86-73-7	Fluorene		E		15000	E	E	E	
100-01-6	4-Nitroaniline		D			D	D	D	
86-30-6	N-Nitrosodiphenylamine								
87-86-5	Pentachlorophenol	10000			4000				
85-01-8	Phenanthrene	1700			43000				
120-12-7	Anthracene								
84-74-2	Di-n-Butylphthalate								
206-44-0	Fluoranthene	16000							
129-00-0	Pyrene	6900							
85-68-7	Butylbenzylphthalate								
91-94-1	3,3-Dichlorobenzidine				3900				
56-55-3	Benzo(a)Anthracene	2600			23000				
218-01-9	Chrysene			260					240
117-81-7	bis(2-Ethylexyl)Phthalate								
117-84-0	Di-n-Octyl Phthalate								
205-99-2	Benzo(b)Fluoranthene	4700			36000				
207-08-9	Benzo(k)Fluoranthene	4000							
50-32-8	Benzo(a)Pyrene				10000				
193-39-5	Indeno(1,2,3-cd)Pyrene								
53-70-3	Dibenz(a,h)Anthracene								
191-24-2	Benzo(g,h,i)Perylene								

Volatile Compounds Detected

75-09-2	Methylene Chloride	10	*34*	*34*	*32*	*26*	*26*	*15*	*11*
67-64-1	Acetone	110		*17*			*29*		
75-15-0	Carbon Disulfide		9	6	5		6	6	
67-66-3	Chloroform								
78-93-3	2-Butanone								
56-23-5	Carbon Tetrachloride								
79-01-6	Trichloroethene								
71-43-2	Benzene								
108-10-1	4-Methyl-2-Pentanone								
127-18-4	Tetrachloroethene								
79-34-5	1,1,2,2-Tetrachloroethane								
108-88-3	Toluene			91					
108-90-7	Chlorobenzene								
100-41-4	Ethylbenzene								
100-42-5	Styrene								
1330-20-7	Xylene (Total)								
Total Compounds Detected		45900	0	351	152000	0	0	0	240
Pentachlorophenol Detected		10000	0	0	4000	0	0	0	0
Total Semi-Volatile Compounds		45900	0	260	152000	0	0	0	240
Total Volatile Compounds		0	0	91	0	0	0	0	0

SUM1-14.WK3, SHEET D

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits
Bold italic quantities indicate constituent was detected in laboratory background samples
"Total Compounds Detected" does not include phthalates, methylene chloride, acetone, or carbon disulfide.

Colfax Creosoting RCRA Facility Investigation
Soil Boring Sampling Results

Semi-Volatile Compounds Detected, parts per billion

Cas No.	Compound	Sample Concentration, parts per billion							
		B16S1	B16S2	B16S5	B17S1	B17S4	B18S1	B18S2	B18S3
108-95-2	Phenol								
111-44-4	bis(2-Chloroethyl)Ether								
541-73-1	1,3-Dichlorobenzene								
95-48-7	2-Methylphenol								
106-44-5	4-Methylphenol								
98-95-3	Nitrobenzene								
78-59-1	Isophorone								
91-20-3	Naphthalene								
106-47-8	4-Chloroaniline		N	N	N	N	N	N	N
59-50-7	4-Chloro-3-Methlyphenol		O	O	O	O	O	O	O
91-57-6	2-Methylnaphthalene		N	N	N	N	N	N	N
88-06-2	2,4,6-Trichlorophenol		E	E	E	E	E	E	E
95-95-4	2,4,5-Trichlorophenol								
88-74-4	2-Nitroaniline		D	D	D	D	D	D	D
208-96-8	Acenaphthylene		E	E	E	E	E	E	E
606-20-2	2,6-Dinitortoluene		T	T	T	T	T	T	T
99-09-2	3-Nitroaniline		E	E	E	E	E	E	E
83-32-9	Acenaphthene		C	C	C	C	C	C	C
132-64-9	Dibenzofuran		T	T	T	T	T	T	T
86-73-7	Fluorene		E	E	E	E	E	E	E
100-01-6	4-Nitroaniline		D	D	D	D	D	D	D
86-30-6	N-Nitrosodiphenylamine								
87-86-5	Pentachlorophenol	20000							
85-01-8	Phenanthrene	9800							
120-12-7	Anthracene	150000							
84-74-2	Di-n-Butylphthalate								
206-44-0	Fluoranthene	110000							
129-00-0	Pyrene	270000							
85-68-7	Butylbenzylphthalate								
91-94-1	3,3-Dichlorobenzidine								
56-55-3	Benzo(a)Anthracene	18000							
218-01-9	Chrysene								
117-81-7	bis(2-Ethylexyl)Phthalate								
117-84-0	Di-n-Octyl Phthalate								
205-99-2	Benzo(b)Fluoranthene	50000							
207-08-9	Benzo(k)Fluoranthene								
50-32-8	Benzo(a)Pyrene	14000							
193-39-5	Indeno(1,2,3-cd)Pyrene								
53-70-3	Dibenz(a,h)Anthracene								
191-24-2	Benzo(g,h,i)Perylene								

Volatile Compounds Detected

75-09-2	Methylene Chloride	*8*	*10*	*10*	*10*	*9*	*12*	*8*	*8*
67-64-1	Acetone								
75-15-0	Carbon Disulfide	9	*12*	9	*12*	*19*	*10*	*16*	10
67-66-3	Chloroform								
78-93-3	2-Butanone								
56-23-5	Carbon Tetrachloride								
79-01-6	Trichloroethene								
71-43-2	Benzene								
108-10-1	4-Methyl-2-Pentanone								
127-18-4	Tetrachloroethene								
79-34-5	1,1,2,2-Tetrachloroethane								
108-88-3	Toluene								
108-90-7	Chlorobenzene								
100-41-4	Ethylbenzene								
100-42-5	Styrene								
1330-20-7	Xylene (Total)								
Total Compounds Detected		641800	0	0	0	0	0	0	0
Pentachlorophenol Detected		20000	0	0	0	0	0	0	0
Total Semi-Volatile Compounds		641800	0	0	0	0	0	0	0
Total Volatile Compounds		0	0	0	0	0	0	0	0

SUM1-24.WK3, SHEET E

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits
Bold italic quantities indicate constituent was detected in laboratory back ground samples
"Total Compounds Detected" does not include phthalates, methylene chloride, acetone, or carbon disulfide.

Colfax Creosoting RCRA Facility Investigation
Soil Boring Sampling Results

Semi-Volatile Compounds Detected, parts per billion

Cas No.	Compound	Sample Concentration, parts per billion								
		B19S1	B19S2	B19S4	B20S1	B20S1D	B20S8	B21S1	B21S2	B21S5
108-95-2	Phenol									
111-44-4	bis(2-Chloroethyl)Ether						0.2			
541-73-1	1,3-Dichlorobenzene						1			
95-48-7	2-Methylphenol									
106-44-5	4-Methylphenol						0.2			
98-95-3	Nitrobenzene						0.3			
78-59-1	Isophorone								1	
91-20-3	Naphthalene						0.5		0.2	
106-47-8	4-Chloroaniline		N	N			0.2		2	N
59-50-7	4-Chloro-3-Methylphenol		O	O			1			O
91-57-6	2-Methylnaphthalene		N	N						N
88-06-2	2,4,6-Trichlorophenol		E	E			0.9			E
95-95-4	2,4,5-Trichlorophenol						0.5			
88-74-4	2-Nitroaniline		D	D			0.3		3	D
208-96-8	Acenaphthylene		E	E			0.6		0.6	E
606-20-2	2,6-Dinitrotoluene		T	T			7		11	T
99-09-2	3-Nitroaniline		E	E					0.6	E
83-32-9	Acenaphthene		C	C						C
132-64-9	Dibenzofuran		T	T						T
86-73-7	Fluorene		E	E						E
100-01-6	4-Nitroaniline		D	D						D
86-30-6	N-Nitrosodiphenylamine									
87-86-5	Pentachlorophenol				440					
85-01-8	Phenanthrene									
120-12-7	Anthracene									
84-74-2	Di-n-Butylphthalate									
206-44-0	Fluoranthene							14000		
129-00-0	Pyrene	11000						42000		
85-68-7	Butylbenzylphthalate									
91-94-1	3,3-Dichlorobenzidine									
56-55-3	Benzo(a)Anthracene							11000		
218-01-9	Chrysene					380				
117-81-7	bis(2-Ethylexyl)Phthalate									
117-84-0	Di-n-Octyl Phthalate									
205-99-2	Benzo(b)Fluoranthene							47000		
207-08-9	Benzo(k)Fluoranthene	21000								
50-32-8	Benzo(a)Pyrene									
193-39-5	Indeno(1,2,3-cd)Pyrene									
53-70-3	Dibenz(a,h)Anthracene									
191-24-2	Benzo(g,h,i)Perylene									

Volatile Compounds Detected

75-09-2	Methylene Chloride	*20*	*8*	*11*	*16*	55	*11*	*12*	*11*	*11*
67-64-1	Acetone	*11*			*73*	16				
75-15-0	Carbon Disulfide	11	5	10			*11*	5	2	*8*
67-66-3	Chloroform									
78-93-3	2-Butanone									
56-23-5	Carbon Tetrachloride									
79-01-6	Trichloroethene									
71-43-2	Benzene									
108-10-1	4-Methyl-2-Pentanone	0.7								
127-18-4	Tetrachloroethene									
79-34-5	1,1,2,2-Tetrachloroethane	0.4								
108-88-3	Toluene	*6*								
108-90-7	Chlorobenzene	0.4								
100-41-4	Ethylbenzene	0.3								
100-42-5	Styrene									
1330-20-7	Xylene (Total)	*4*								
Total Compounds Detected		32009	0	0	440	380	12.7	114000	18.4	0
Pentachlorophenol Detected		0	0	0	440	0	0	0	0	0
Total Semi-Volatile Compounds		32000	0	0	440	380	12.7	114000	18.4	0
Total Volatile Compounds		8.8	0	0	0	0	0	0	0	0

SUM1-12.WK3, SHEET F

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits

Bold italic quantities indicate constituent was detected in laboratory back ground samples

"Total Compounds Detected" does not include phthalates, methylene chloride, acetone, or carbon disulfide.

Colfax Creosoting RCRA Facility Investigation
Soil Boring Sampling Results

Semi-Volatile Compounds Detected, parts per billion

Cas No.	Compound	Sample Concentration, parts per billion									
		B22S1	B22S4	B22S8	B23S1	B23S1D	B23S2	B23S7	B24S1	B24S2	B24S5
108-95-2	Phenol										
111-44-4	bis(2-Chloroethyl)Ether										
541-73-1	1,3-Dichlorobenzene										
95-48-7	2-Methylphenol										
106-44-5	4-Methylphenol										
98-95-3	Nitrobenzene										
78-59-1	Isophorone										
91-20-3	Naphthalene										
106-47-8	4-Chloroaniline	N	N		N	N	N	N		N	N
59-50-7	4-Chloro-3-Methylphenol	O	O		O	O	O	O		O	O
91-57-6	2-Methylnaphthalene	N	N		N	N	N	N		N	N
88-06-2	2,4,6-Trichlorophenol	E	E		E	E	E	E		E	E
95-95-4	2,4,5-Trichlorophenol										
88-74-4	2-Nitroaniline	D	D		D	D	D	D	8800	D	D
208-96-8	Acenaphthylene	E	E		E	E	E	E		E	E
606-20-2	2,6-Dinitrotoluene	T	T		T	T	T	T		T	T
99-09-2	3-Nitroaniline	E	E		E	E	E	E		E	E
83-32-9	Acenaphthene	C	C		C	C	C	C		C	C
132-64-9	Dibenzofuran	T	T		T	T	T	T		T	T
86-73-7	Fluorene	E	E		E	E	E	E		E	E
100-01-6	4-Nitroaniline	D	D		D	D	D	D		D	D
86-30-6	N-Nitrosodiphenylamine								7200		
87-86-5	Pentachlorophenol										
85-01-8	Phenanthrene										
120-12-7	Anthracene										
84-74-2	Di-n-Butylphthalate										
206-44-0	Fluoranthene										
129-00-0	Pyrene										
85-68-7	Butylbenzylphthalate										
91-94-1	3,3-Dichlorobenzidine										
56-55-3	Benzo(a)Anthracene										
218-01-9	Chrysene			660							
117-81-7	bis(2-Ethylexyl)Phthalate										
117-84-0	Di-n-Octyl Phthalate										
205-99-2	Benzo(b)Fluoranthene										
207-08-9	Benzo(k)Fluoranthene										
50-32-8	Benzo(a)Pyrene										
193-39-5	Indeno(1,2,3-cd)Pyrene										
53-70-3	Dibenz(a,h)Anthracene										
191-24-2	Benzo(g,h,i)Perylene										

Volatile Compounds Detected

75-09-2	Methylene Chloride	*15*	*10*	*20*	*13*	*7*	*10*	*18*	*10*	*18*	*9*
67-64-1	Acetone			*14*	*5*		210		*31*		
75-15-0	Carbon Disulfide	*10*	14			8	13	10		8	
67-66-3	Chloroform										
78-93-3	2-Butanone										
56-23-5	Carbon Tetrachloride										
79-01-6	Trichloroethene	8									
71-43-2	Benzene								4		
108-10-1	4-Methyl-2-Pentanone										
127-18-4	Tetrachloroethene										
79-34-5	1,1,2,2-Tetrachloroethane										
108-88-3	Toluene								9		10
108-90-7	Chlorobenzene										
100-41-4	Ethylbenzene								6		
100-42-5	Styrene										
1330-20-7	Xylene (Total)						7		13		7
Total Compounds Detected		6	0	660	0	0	7	0	16032	0	17
Pentachlorophenol Detected		0	0	0	0	0	0	0	0	0	0
Total Semi-Volatile Compounds		0	0	660	0	0	0	0	16000	0	0
Total Volatile Compounds		6	0	0	0	0	7	0	32	0	17

SUM1-24.WKS, SHEET G

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits

Bold italic quantities indicate constituent was detected in laboratory background samples

"Total Compounds Detected" does not include phthalates, methylene chloride, acetone, or carbon disulfide.

Colfax Creosoting RCRA Facility Investigation
Soil Boring Sampling Results

Semi-Volatile Compounds Detected, parts per billion

Cas No.	Compound	Sample Concentration, parts per billion							
		B25S10	B25S14	B26S1	B26S5	B27S1	B27S5	B27S11	B28S4
108-95-2	Phenol								
111-44-4	bis(2-Chloroethyl)Ether								
541-73-1	1,3-Dichlorobenzene								
95-48-7	2-Methylphenol								
106-44-5	4-Methylphenol								
98-95-3	Nitrobenzene								
78-59-1	Isophorone								
91-20-3	Naphthalene								
106-47-8	4-Chloroaniline	N	N	N	N		N	N	N
59-50-7	4-Chloro-3-Methlyphenol	O	O	O	O		O	O	O
91-57-6	2-Methylnaphthalene	N	N	N	N		N	N	N
88-06-2	2,4,6-Trichlorophenol	E	E	E	E		E	E	E
95-95-4	2,4,5-Trichlorophenol								
88-74-4	2-Nitrosniline	D	D	D	D		D	D	D
208-96-8	Acenaphthylene	E	E	E	E		E	E	E
606-20-2	2,6-Dinitrotoluene	T	T	T	T		T	T	T
99-09-2	3-Nitroaniline	E	E	E	E		E	E	E
83-32-9	Acenaphthene	C	C	C	C		C	C	C
132-64-9	Dibenzofuran	T	T	T	T		T	T	T
86-73-7	Fluorene	E	E	E	E		E	E	E
100-01-6	4-Nitroaniline	D	D	D	D		D	D	D
86-30-6	N-Nitrosodiphenylamine								
87-86-5	Pentachlorophenol								
85-01-8	Phenanthrene								
120-12-7	Anthracene								
84-74-2	Di-n-Butylphthalate								
206-44-0	Fluoranthene					1500			
129-00-0	Pyrene					2400			
85-68-7	Butylbenzylphthalate								
91-94-1	3,3-Dichlorobenzidine								
56-55-3	Benzo(a)Anthracene								
218-01-9	Chrysene								
117-81-7	bis(2-Ethylexyl)Phthalate								
117-84-0	Di-n-Octyl Phthalate								
205-99-2	Benzo(b)Fluoranthene					2300			
207-08-9	Benzo(k)Fluoranthene								
50-32-8	Benzo(a)Pyrene								
193-39-5	Indeno(1,2,3-cd)Pyrene								
53-70-3	Dibenz(a,h)Anthracene								
191-24-2	Benzo(g,h,i)Perylene								

Volatile Compounds Detected

75-09-2	Methylene Chloride	17	16	35	30	19	36	13	27
67-64-1	Acetone	18						*12*	42
75-15-0	Carbon Disulfide		7		7	4	8		8
67-66-3	Chloroform								
78-93-3	2-Butanone								
56-23-5	Carbon Tetrachloride								
79-01-6	Trichloroethene								
71-43-2	Benzene								
108-10-1	4-Methyl-2-Pentanone								
591-78-6	2-Hexanone								
127-18-4	Tetrachloroethene								
79-34-5	1,1,2,2-Tetrachloroethane								
108-88-3	Toluene							170	
108-90-7	Chlorobenzene								
100-41-4	Ethylbenzene								
100-42-5	Styrene								
1330-20-7	Xylene (Total)								
Total Compounds Detected		0	0	0	0	6200	0	0	0
Pentachlorophenol Detected		0	0	0	0	0	0	0	0
Total Semi-Volatile Compounds		0	0	0	0	6200	0	0	0
Total Volatile Compounds		0	0	0	0	0	0	0	0

SUM25-43.WK3,SHEET A

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits.
Bold italic quantities indicate constituent was detected in laboratory background samples.
"Total Compounds Detected" does not include phthalates, methylene chloride, acetone, or carbon disulfide

Colfax Creosoting RCRA Facility Investigation
Soil Boring Sampling Results

Semi-Volatile Compounds Detected, parts per billion

Cas No.	Compound	Sample Concentration, parts per billion								
		B29S2	B29S5	B29S6	B30S4	B30S5	B30S6	B31S1	B31S5	B31S6
108-95-2	Phenol									
111-44-4	bis(2-Chloroethyl)Ether									
541-73-1	1,3-Dichlorobenzene									
95-48-7	2-Methylphenol	TEXT IN WKS								
106-44-5	4-Methylphenol									
98-95-3	Nitrobenzene									
78-59-1	Isophorone									
91-20-3	Naphthalene	50000	1800000	110000	94000	340000	190000		1200000	68000
106-47-8	4-Chloroaniline									
59-50-7	4-Chloro-3-Methylphenol									
91-57-6	2-Methylnaphthalene	36000	1000000	72000	49000	230000	96000		790000	60000
88-06-2	2,4,6-Trichlorophenol									
95-95-4	2,4,5-Trichlorophenol									
88-74-4	2-Nitroaniline									
208-96-8	Acenaphthylene				5000				4100	
606-20-2	2,6-Dinitrotoluene									
99-09-2	3-Nitroaniline									
83-32-9	Acenaphthene	130000	1200000	75000	88000	14000	8900		44000	4600
132-64-9	Dibenzofuran	96000	950000	84000	110000	230000	120000		930000	70000
86-73-7	Fluorene	160000	1200000	82000	120000	240000	120000		1000000	75000
100-01-6	4-Nitroaniline									
86-30-6	N-Nitrosodiphenylamine									
87-86-5	Pentachlorophenol	390000	480000	25000	83000	54000	25000	5700	240000	31000
85-01-8	Phenanthrene	460000	3000000	310000	450000	600000	440000		1600000	260000
120-12-7	Anthracene	440000	28000	76000	68000	42000		380000	80000	
84-74-2	Di-n-Butylphthalate									
206-44-0	Fluoranthene	450000	1200000	94000	590000	340000	560000	5000	880000	84000
129-00-0	Pyrene	320000	970000	80000	120000	340000	130000	5900	970000	75000
85-68-7	Butylbenzylphthalate									
91-94-1	3,3-Dichlorobenzidine									
56-55-3	Benzo(a)Anthracene	81000	120000	19000	30000	55000	28000	730	110000	15000
218-01-9	Chrysene	94000	200000	18000	30000	50000	26000		160000	15000
117-81-7	bis(2-Ethylexyl)Phthalate									
117-84-0	Di-n-Octyl Phthalate									
205-99-2	Benzo(b)Fluoranthene	52000	14000	11000	18000	33000	16000	6600	12000	8400
207-08-9	Benzo(k)Fluoranthene									
50-32-8	Benzo(a)Pyrene		13000	3700	5200	7800	5200		11000	
193-39-5	Indeno(1,2,3-cd)Pyrene									
53-70-3	Dibenz(a,h)Anthracene									
191-24-2	Benzo(g,h,i)Perylene									

Volatile Compounds Detected

75-09-2	Methylene Chloride	47	13	44	48	47	44	58	1800	31
67-64-1	Acetone	180		110	66		80		11000	51
75-15-0	Carbon Disulfide	34		15			10			18
67-66-3	Chloroform									
78-93-3	2-Butanone	21			110		72			
56-23-5	Carbon Tetrachloride									
79-01-6	Trichloroethene									
71-43-2	Benzene	2	8	5						12
108-10-1	4-Methyl-2-Pentanone									
591-78-6	2-Hexanone			46						
127-18-4	Tetrachloroethene									
79-34-5	1,1,2,2-Tetrachloroethane									
108-88-3	Toluene	20	59	44	22	18	20		3100	160
108-90-7	Chlorobenzene									
100-41-4	Ethylbenzene	13	64	42	10	23	28	10	5300	130
100-42-5	Styrene									
1330-20-7	Xylene (Total)	70	140	120	33	29	76		22000	230
Total Compounds Detected		2709126	10375271	1059957	1861375	2575868	1765294	405940	8041500	786532
Pentachlorophenol Detected		390000	480000	25000	83000	54000	25000	5700	240000	31000
Total Semi-Volatile Compounds		2709000	10375000	1059700	1861200	2575800	1765100	405930	8011100	786000
Total Volatile Compounds		126	271	257	175	68	194	10	30400	532

SUM25-43.WK3,SHEET B

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits.
Bold italic quantities indicate constituent was detected in laboratory background samples.
"Total Compounds Detected" does not include phthalates, methylene chloride, acetone, or carbon disulfide

Colfax Creosoting RCRA Facility Investigation
Soil Boring Sampling Results

Semi-Volatile Compounds Detected, parts per billion

Cas No.	Compound	Sample Concentration, parts per billion B32S1	B32S5	B32S7
108-95-2	Phenol			
111-44-4	bis(2-Chloroethyl)Ether			
541-73-1	1,3-Dichlorobenzene			
95-48-7	2-Methylphenol			
106-44-5	4-Methylphenol			
98-95-3	Nitrobenzene			
78-59-1	Isophorone			
91-20-3	Naphthalene	3700	12000	1900
106-47-8	4-Chloroaniline			
59-50-7	4-Chloro-3-Methlyphenol			
91-57-6	2-Methylnaphthalene	3700	7200	1700
88-06-2	2,4,6-Trichlorophenol			
95-95-4	2,4,5-Trichlorophenol			
88-74-4	2-Nitroaniline			
208-96-8	Acenaphthylene		380	
606-20-2	2,6-Dinitrotoluene			
99-09-2	3-Nitroaniline			
83-32-9	Acenaphthene	17000	12000	840
132-64-9	Dibenzofuran	12000	12000	2000
86-73-7	Fluorene	20000	12000	1200
100-01-6	4-Nitroaniline			
86-30-6	N-Nitrosodiphenylamine			
87-86-5	Pentachlorophenol	8400		1700
85-01-8	Phenanthrene	45000	42000	5300
120-12-7	Anthracene	12000	3800	
84-74-2	Di-n-Butylphthalate			
206-44-0	Fluoranthene	54000	14000	2300
129-00-0	Pyrene	44000	13000	1500
85-68-7	Butylbenzylphthalate			
91-94-1	3,3-Dichlorobenzidine			
56-55-3	Benzo(a)Anthracene	5800	2600	240
218-01-9	Chrysene		2400	
117-81-7	bis(2-Ethylexyl)Phthalate			
117-84-0	Di-n-Octyl Phthalate			
205-99-2	Benzo(b)Fluoranthene	8100	1500	190
207-08-9	Benzo(k)Fluoranthene			
50-32-8	Benzo(a)Pyrene	1300	500	
193-39-5	Indeno(1,2,3-cd)Pyrene			
53-70-3	Dibenz(a,h)Anthracene			
191-24-2	Benzo(g,h,i)Perylene			

Volatile Compounds Detected

75-09-2	Methylene Chloride	***50***	***32***	***5***
67-64-1	Acetone			
75-15-0	Carbon Disulfide	27		
67-66-3	Chloroform			
78-93-3	2-Butanone			
56-23-5	Carbon Tetrachloride			
79-01-6	Trichloroethene			
71-43-2	Benzene			
108-10-1	4-Methyl-2-Pentanone			
591-78-6	2-Hexanone			
127-18-4	Tetrachloroethene			
79-34-5	1,1,2,2-Tetrachloroethane			
108-88-3	Toluene			
108-90-7	Chlorobenzene			
100-41-4	Ethylbenzene			
100-42-5	Styrene			
1330-20-7	Xylene (Total)			
Total Compounds Detected		235000	135380	18870
Pentachlorophenol Detected		8400	0	1700
Total Semi-Volatile Compounds		235000	135380	18870
Total Volatile Compounds		0	0	0

SUM25-43.WK3,SHEET C

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits.
Bold italic quantities indicate constituent was detected in laboratory background samples.
"Total Compounds Detected" does not include phthalates, methylene chloride, acetone, or carbon disulfide

Colfax Creosoting RCRA Facility Investigation
Soil Boring Sampling Results

Semi-Volatile Compounds Detected, parts per billion

Cas No.	Compound	Sample Concentration, parts per billion									
		B33S3	B33S4	B33S6	B34S2	B34S3	B34S3D	B34S6	B35S1	B35S3	B35S10
108-95-2	Phenol										
111-44-4	bis(2-Chloroethyl)Ether										
541-73-1	1,3-Dichlorobenzene										
95-48-7	2-Methylphenol										
106-44-5	4-Methylphenol										
98-95-3	Nitrobenzene										
78-59-1	Isophorone										
91-20-3	Naphthalene	520000	160000	71000					130000	16000	
106-47-8	4-Chloroaniline				N	N	N	N			
59-50-7	4-Chloro-3-Methylphenol				O	O	O	O			
91-57-6	2-Methylnaphthalene	170000	160000	38000	N	N	N	N		8000	
88-06-2	2,4,6-Trichlorophenol				E	E	E	E			
95-95-4	2,4,5-Trichlorophenol										
88-74-4	2-Nitroaniline				D	D	D	D			
208-96-8	Acenaphthylene				E	E	E	E			
606-20-2	2,6-Dinitrotoluene				T	T	T	T			
99-09-2	3-Nitroaniline				E	E	E	E			
83-32-9	Acenaphthene	310000	150000	68000	C	C	C	C	880000	34000	
132-64-9	Dibenzofuran	250000	110000	36000	T	T	T	T	240000	17000	
86-73-7	Fluorene	270000	120000	46000	E	E	E	E	490000	19000	
100-01-6	4-Nitroaniline				D	D	D	D			
86-30-6	N-Nitrosodiphenylamine										
87-86-5	Pentachlorophenol	110000							580000	5000	
85-01-8	Phenanthrene	810000	250000	120000					1700000	110000	
120-12-7	Anthracene								440000	20000	
84-74-2	Di-n-Butylphthalate										
206-44-0	Fluoranthene	410000	110000	50000					1600000	100000	
129-00-0	Pyrene	290000	76000	25000					840000	83000	
85-68-7	Butylbenzylphthalate										530
91-94-1	3,3-Dichlorobenzidine										
56-55-3	Benzo(a)Anthracene	45000							200000	15000	
218-01-9	Chrysene								220000	17000	
117-81-7	bis(2-Ethylexyl)Phthalate										
117-84-0	Di-n-Octyl Phthalate										
205-99-2	Benzo(b)Fluoranthene									6100	
207-08-9	Benzo(k)Fluoranthene										
50-32-8	Benzo(a)Pyrene										
193-39-5	Indeno(1,2,3-cd)Pyrene										
53-70-3	Dibenz(a,h)Anthracene										
191-24-2	Benzo(g,h,i)Perylene										

Volatile Compounds Detected

75-09-2	Methylene Chloride	*44*	*170*	*34*	*220*	*46*	*53*	*39*	*39*	*42*	*39*
67-64-1	Acetone		760			11			140		
75-15-0	Carbon Disulfide	26		22				19			13
67-66-3	Chloroform										
78-93-3	2-Butanone										
56-23-5	Carbon Tetrachloride										
79-01-6	Trichloroethene										
71-43-2	Benzene										
108-10-1	4-Methyl-2-Pentanone										
591-78-6	2-Hexanone										
127-18-4	Tetrachloroethene										
79-34-5	1,1,2,2-Tetrachloroethane										
108-88-3	Toluene	200	120		240	78	64	170	46	79	31
108-90-7	Chlorobenzene										
100-41-4	Ethylbenzene	81	44	20					36	37	
100-42-5	Styrene										
1330-20-7	Xylene (Total)	140	120	37					37	93	
Total Compounds Detected		2985421	1136284	457057	240	78	64	170	7120119	448309	31
Pentachlorophenol Detected		110000	0	0	0	0	0	0	580000	5000	0
Total Semi-Volatile Compounds		2985000	1136000	457000	0	0	0	0	7120000	448100	0
Total Volatile Compounds		421	284	57	240	78	64	170	119	209	31

SUM25-43.WK3, SHEET D

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits.

Bold italic quantities indicate constituent was detected in laboratory background samples.

"Total Compounds Detected" does not include phthalates, methylene chloride, acetone, or carbon disulfide

Colfax Creosoting RCRA Facility Investigation
Soil Boring Sampling Results

Semi-Volatile Compounds Detected, parts per billion

Cas No.	Compound	Sample Concentration, parts per billion B36S2	B36S3	B36S11	B37S2	B37S3	B37S3D	B37S4	B37S9	B37S10
108-95-2	Phenol									
111-44-4	bis(2-Chloroethyl)Ether									
541-73-1	1,3-Dichlorobenzene									
95-48-7	2-Methylphenol									
106-44-5	4-Methylphenol									
98-95-3	Nitrobenzene									
78-59-1	Isophorone									
91-20-3	Naphthalene	4000	69000		8500	165000	47000	39000	150000	
106-47-8	4-Chloroaniline									
59-50-7	4-Chloro-3-Methylphenol									
91-57-6	2-Methylnaphthalene		18000			16000	30000	39000	2600000	
88-06-2	2,4,6-Trichlorophenol									
95-95-4	2,4,5-Trichlorophenol									N
88-74-4	2-Nitroaniline									O
208-96-8	Acenaphthylene									N
606-20-2	2,6-Dinitrotoluene									E
99-09-2	3-Nitroaniline									
83-32-9	Acenaphthene		40000		40000	17000		35000	830000	D
132-64-9	Dibenzofuran		27000	26000	13000		26000	630000		E
86-73-7	Fluorene		33000	29000	14000		25000	620000		T
100-01-6	4-Nitroaniline									E
86-30-6	N-Nitrosodiphenylamine									C
87-86-5	Pentachlorophenol	1200000	26000							T
85-01-8	Phenanthrene	86000	100000	140	87000	32000	120000	93000	2100000	E
120-12-7	Anthracene	320000	15000							D
84-74-2	Di-n-Butylphthalate	410000								
206-44-0	Fluoranthene		44000	240	37000	15000	53000	36000	1000000	
129-00-0	Pyrene		31000	120	31000	10000	33000	36000	530000	
85-68-7	Butylbenzylphthalate									
91-94-1	3,3-Dichlorobenzidine									
56-55-3	Benzo(a)Anthracene	39000	4900							
218-01-9	Chrysene		5300							
117-81-7	bis(2-Ethylexyl)Phthalate									
117-84-0	Di-n-Octyl Phthalate									
205-99-2	Benzo(b)Fluoranthene	58000								
207-08-9	Benzo(k)Fluoranthene									
50-32-8	Benzo(a)Pyrene									
193-39-5	Indeno(1,2,3-cd)Pyrene									
53-70-3	Dibenz(a,h)Anthracene									
191-24-2	Benzo(g,h,i)Perylene									

Volatile Compounds Detected

75-09-2	Methylene Chloride	*69*	*50*	*23*	*28*	*39*	*52*	*24*	***2000***	*34*
67-64-1	Acetone	200							2300	17
75-15-0	Carbon Disulfide			23	30	10		25		
67-66-3	Chloroform									
78-93-3	2-Butanone									
56-23-5	Carbon Tetrachloride									
79-01-6	Trichloroethene									
71-43-2	Benzene		35							
108-10-1	4-Methyl-2-Pentanone									
591-78-6	2-Hexanone									
127-18-4	Tetrachloroethene									
79-34-5	1,1,2,2-Tetrachloroethane									
108-88-3	Toluene	100	210	250	200	75	100	170	1100	
108-90-7	Chlorobenzene									
100-41-4	Ethylbenzene		82		45	130	86	120	2200	
100-42-5	Styrene									
1330-20-7	Xylene (Total)	69	410		51	180	110	110	5400	
Total Compounds Detected		1685169	413937	55750	230796	255385	334296	1528400	7218700	0
Pentachlorophenol Detected		1200000	26000	0	0	0	0	0	0	0
Total Semi-Volatile Compounds		1685000	413200	55500	230500	255000	334000	1528000	7210000	0
Total Volatile Compounds		169	737	250	296	385	296	400	8700	0

SUM25-43.WK3, SHEET E

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits.
Bold italic quantities indicate constituent was detected in laboratory background samples.
"Total Compounds Detected" does not include phthalates, methylene chloride, acetone, or carbon disulfide

Colfax Creosoting RCRA Facility Investigation
Soil Boring Sampling Results

Semi-Volatile Compounds Detected, parts per billion

Cas No.	Compound	Sample Concentration, parts per billion								
		B38S2	B38S7	B38S9	B39S6	B39S8	B39S10	B40S1	B40S2	B40S5
108-95-2	Phenol									
111-44-4	bis(2-Chloroethyl)Ether									
541-73-1	1,3-Dichlorobenzene									
95-48-7	2-Methylphenol									
106-44-5	4-Methylphenol									
98-95-3	Nitrobenzene									
78-59-1	Isophorone									
91-20-3	Naphthalene	220000	150000		380000	680000	81	9700		
106-47-8	4-Chloroaniline									
59-50-7	4-Chloro-3-Methylphenol									
91-57-6	2-Methylnaphthalene	160000	110000		740000	380000	85	6100		
88-06-2	2,4,6-Trichlorophenol									
95-95-4	2,4,5-Trichlorophenol									
88-74-4	2-Nitroaniline									
208-96-8	Acenaphthylene									
606-20-2	2,6-Dinitrotoluene									
99-09-2	3-Nitroaniline									
83-32-9	Acenaphthene	190000	98000			310000	180	14000		
132-64-9	Dibenzofuran	140000	100000		170000	330000	190	9600		
86-73-7	Fluorene	140000	71000		100000	230000	170	14000		
100-01-6	4-Nitroaniline									
86-30-6	N-Nitrosodiphenylamine									
87-86-5	Pentachlorophenol	25000						120000	310000	
85-01-8	Phenanthrene	390000	270000	430	490000	1000000	820	41000	21000	
120-12-7	Anthracene	70000	26000		44000	100000		5500	3100	
84-74-2	Di-n-Butylphthalate									
206-44-0	Fluoranthene	170000	77000	230000	480000	420	47000	16000		
129-00-0	Pyrene	100000	50000	91	72000	150000	220	25000	17000	
85-68-7	Butylbenzylphthalate									
91-94-1	3,3-Dichlorobenzidine									
56-55-3	Benzo(a)Anthracene				19000				2100	
218-01-9	Chrysene				22000				3100	
117-81-7	bis(2-Ethylexyl)Phthalate									
117-84-0	Di-n-Octyl Phthalate									
205-99-2	Benzo(b)Fluoranthene									
207-08-9	Benzo(k)Fluoranthene									
50-32-8	Benzo(a)Pyrene									
193-39-5	Indeno(1,2,3-cd)Pyrene									
53-70-3	Dibenz(a,h)Anthracene									
191-24-2	Benzo(g,h,i)Perylene									

Volatile Compounds Detected

75-09-2	Methylene Chloride	*45*	*52*	*56*	*39*	*64*	*43*	*45*	*38*	*45*
67-64-1	Acetone		190	280	90	*69*	32			
75-15-0	Carbon Disulfide	32	9	7	53	75	7	47	13	11
67-66-3	Chloroform									
78-93-3	2-Butanone									
56-23-5	Carbon Tetrachloride									
79-01-6	Trichloroethene									
71-43-2	Benzene	23			32	73				
108-10-1	4-Methyl-2-Pentanone									
591-78-6	2-Hexanone									
127-18-4	Tetrachloroethene									
79-34-5	1,1,2,2-Tetrachloroethane									
108-88-3	Toluene	210	45	58	150	600	6		220	200
108-90-7	Chlorobenzene									
100-41-4	Ethylbenzene	190	38		170	750		17		
100-42-5	Styrene	120								
1330-20-7	Xylene (Total)	340	110		370	1300		28		
Total Compounds Detected		1605883	952193	230579	2517722	3183143	48752	260945	356520	200
Pentachlorophenol Detected		25000	0	0	0	0	0	120000	310000	0
Total Semi-Volatile Compounds		1605000	952000	230521	2517000	3180420	48746	260900	356300	0
Total Volatile Compounds		883	193	58	722	2723	6	45	220	200

SUM25-43.WK3, SHEET F

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits.
Bold italic quantities indicate constituent was detected in laboratory background samples.
"Total Compounds Detected" does not include phthalates, methylene chloride, acetone, or carbon disulfide

Colfax Creosoting RCRA Facility Investigation
Soil Boring Sampling Results

Semi-Volatile Compounds Detected, parts per billion

Cas No.	Compound	Sample Concentration, parts per billion								
		B41S1	B41S2	B41S5	B42S1	B42S3	B42S5	B43S2	B43S4	B43S5
108-95-2	Phenol									
111-44-4	bis(2-Chloroethyl)Ether									
541-73-1	1,3-Dichlorobenzene									
95-48-7	2-Methylphenol									
106-44-5	4-Methylphenol									
98-95-3	Nitrobenzene									
78-59-1	Isophorone									
91-20-3	Naphthalene	28000	100							
106-47-8	4-Chloroaniline									
59-50-7	4-Chloro-3-Methlyphenol									
91-57-6	2-Methylnaphthalene	18000	100							
88-06-2	2,4,6-Trichlorophenol									
95-95-4	2,4,5-Trichlorophenol									
88-74-4	2-Nitroaniline			N	N	N	N	N	N	N
208-96-8	Acenaphthylene			O	O	O	O	O	O	O
606-20-2	2,6-Dinitrotoluene			N	N	N	N	N	N	N
99-09-2	3-Nitroaniline			E	E	E	E	E	E	E
83-32-9	Acenaphthene	33000	170							
132-64-9	Dibenzofuran	21000	240	D	D	D	D	D	D	D
86-73-7	Fluorene	27000	270	E	E	E	E	E	E	E
100-01-6	4-Nitroaniline			T	T	T	T	T	T	T
86-30-6	N-Nitrosodiphenylamine			E	E	E	E	E	E	E
87-86-5	Pentachlorophenol	7500		C	C	C	C	C	C	C
85-01-8	Phenanthrene	68000	779	T	T	T	T	T	T	T
120-12-7	Anthracene	8400	72	E	E	E	E	E	E	E
84-74-2	Di-n-Butylphthalate			D	D	D	D	D	D	D
206-44-0	Fluoranthene	41000	300							
129-00-0	Pyrene	16000	99							
85-68-7	Butylbenzylphthalate									
91-94-1	3,3-Dichlorobenzidine									
56-55-3	Benzo(a)Anthracene									
218-01-9	Chrysene									
117-81-7	bis(2-Ethylexyl)Phthalate									
117-84-0	Di-n-Octyl Phthalate									
205-99-2	Benzo(b)Fluoranthene									
207-08-9	Benzo(k)Fluoranthene									
50-32-8	Benzo(a)Pyrene									
193-39-5	Indeno(1,2,3-cd)Pyrene									
53-70-3	Dibenz(a,h)Anthracene									
191-24-2	Benzo(g,h,i)Perylene									

Volatile Compounds Detected

75-09-2	Methylene Chloride	*69*	*61*	*62*	*28*	*22*	*14*	*72*	*26*	*29*
67-64-1	Acetone	*45*		*48*				*130*	*170*	*140*
75-15-0	Carbon Disulfide	9	8	11	18			*40*		*16*
67-66-3	Chloroform									
78-93-3	2-Butanone									
56-23-5	Carbon Tetrachloride									
79-01-6	Trichloroethene									
71-43-2	Benzene									
108-10-1	4-Methyl-2-Pentanone									
591-78-6	2-Hexanone									
127-18-4	Tetrachloroethene									
79-34-5	1,1,2,2-Tetrachloroethane									
108-88-3	Toluene	170	240	240	150	57	31	52	20	100
108-90-7	Chlorobenzene									
100-41-4	Ethylbenzene	6								
100-42-5	Styrene									
1330-20-7	Xylene (Total)	17								
Total Compounds Detected		268093	2361	240	150	57	31	52	20	100
Pentachlorophenol Detected		7500	0	0	0	0	0	0	0	0
Total Semi-Volatile Compounds		267900	2121	0	0	0	0	0	0	0
Total Volatile Compounds		193	240	240	150	57	31	52	20	100

SUM25-43.WK3, SHEET G

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits.
Bold italic quantities indicate constituent was detected in laboratory background samples.
"Total Compounds Detected" does not include phthalates, methylene chloride, acetone, or carbon disulfide

Colfax Creosoting RCRA Facility Investigation
Soil Boring Sample Results

Semi-Volatile Compounds Detected, parts per billion

Cas No.	Compound	Sample Concentration, parts per billion								
		B44S1	B44S4	B44S5	B45S2	B45S4	B45S5	B46S1	B46S5	B46S6
108-95-2	Phenol									
111-44-4	bis(2-Chloroethyl)Ether									
541-73-1	1,3-Dichlorobenzene									
95-48-7	2-Methylphenol									
106-44-5	4-Methylphenol									
98-95-3	Nitrobenzene									
78-59-1	Isophorone									
91-20-3	Naphthalene		17000	160	35000	260000	480000	330000	480000	720000
106-47-8	4-Chloroaniline									
59-50-7	4-Chloro-3-Methylphenol									
91-57-6	2-Methylnaphthalene		7200		21000	100000	200000	350000	250000	380000
88-06-2	2,4,6-Trichlorophenol									
95-95-4	2,4,5-Trichlorophenol									
88-74-4	2-Nitroaniline									
208-96-8	Acenaphthylene									
606-20-2	2,6-Dinitrotoluene									
99-09-2	3-Nitroaniline									
83-32-9	Acenaphthene				24000	120000	210000	450000	270000	420000
132-64-9	Dibenzofuran	100000			21000	80000	170000	350000	180000	310000
86-73-7	Fluorene				23000	98000	200000	410000	220000	350000
100-01-6	4-Nitroaniline									
86-30-6	N-Nitrosodiphenylamine									
87-86-5	Pentachlorophenol	97000			2300			320000	83000	76000
85-01-8	Phenanthrene	900000	43000	270	44000	300000	890000	940000	900000	880000
120-12-7	Anthracene	600000	4300		14000	33000	87000	370000	87000	100000
84-74-2	Di-n-Butylphthalate			200						
206-44-0	Fluoranthene	4000000	16000		32000	110000	380000	440000	290000	370000
129-00-0	Pyrene	800000	24000		30000	150000	150000	280000	150000	210000
85-68-7	Butylbenzylphthalate									
91-94-1	3,3-Dichlorobenzidine									
56-55-3	Benzo(a)Anthracene	84000	1700		2800	58000		66000		
218-01-9	Chrysene	62000	1200		2000			74000		
117-81-7	bis(2-Ethylexyl)Phthalate									
117-84-0	Di-n-Octyl Phthalate									
205-99-2	Benzo(b)Fluoranthene	120000	1900		2500	14000				
207-08-9	Benzo(k)Fluoranthene									
50-32-8	Benzo(a)Pyrene									
193-39-5	Indeno(1,2,3-cd)Pyrene									
53-70-3	Dibenz(a,h)Anthracene									
191-24-2	Benzo(g,h,i)Perylene									

Volatile Compounds Detected

75-00-3	Methylene Chloride	43	*17*	*15*	*16*	*18*	*230*	*47*	*86*	*55*
67-64-1	Acetone	440	38	50	32		*1100*	*860*	*980*	*270*
75-15-0	Carbon Disulfide	38	*18*	*12*	*21*	*16*		100	120	29
67-66-3	Chloroform									
78-93-3	2-Butanone									
56-23-5	Carbon Tetrachloride									
79-01-6	Trichloroethene									
71-43-2	Benzene	91						36		
108-10-1	4-Methyl-2-Pentanone									
127-18-4	Tetrachloroethene									
79-34-5	1,1,2,2-Tetrachloroethane									
108-88-3	Toluene	180	110	19	94	35	1000	300	790	270
108-90-7	Chlorobenzene									
100-41-4	Ethylbenzene	17			21	7	370	170	300	170
100-42-5	Styrene									
1330-20-7	Xylene (Total)	1200	16		51	28	1700	650	720	450
Total Compounds Detected		3764488	116426	449	253766	1323070	2770070	4381156	2911810	3816890
Pentachlorophenol Detected		97000	0	0	2300	0	0	320000	83000	76000
Total Semi-Volatile Compounds		3763000	116300	430	253600	1323000	2767000	4380000	2910000	3816000
Total Volatile Compounds		1488	126	19	166	70	3070	1156	1810	890

SUM44-66.WK3, SHEET A

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits.
Bold italic quantities indicate constituent was detected in laboratory background samples
"Total Compounds Detected" does not include phthalates, methylene chloride, acetone, or carbon disulfide

Colfax Creosoting RCRA Facility Investigation
Soil Boring Sample Results

Semi-Volatile Compounds Detected, parts per billion

Cas No.	Compound	Sample Concentration, parts per billion								
		B47S1	B47S2	B47S6	B48S2	B48S5	B48S13	B49S7	B49S8	B49S9
108-95-2	Phenol									
111-44-4	bis(2-Chloroethyl)Ether									
541-73-1	1,3-Dichlorobenzene									
95-48-7	2-Methylphenol			230						
106-44-5	4-Methylphenol			950						
98-95-3	Nitrobenzene									
78-59-1	Isophorone									
91-20-3	Naphthalene	210000	190000	1300				5700000	8600000	22000
106-47-8	4-Chloroaniline				N	N	N			
59-50-7	4-Chloro-3-Methylphenol				O	O	O			
91-57-6	2-Methylnaphthalene	130000	120000	1100	N	N	N	1900000	2400000	14000
88-06-2	2,4,6-Trichlorophenol				E	E	E			
95-95-4	2,4,5-Trichlorophenol									
88-74-4	2-Nitroaniline				D	D	D			
208-96-8	Acenaphthylene				E	E	E			
606-20-2	2,6-Dinitrotoluene				T	T	T			
99-09-2	3-Nitroaniline				E	E	E			
83-32-9	Acenaphthene	430000	160000	1700	C	C	C	3800000	4900000	16000
132-64-9	Dibenzofuran	270000	110000	980	T	T	T		4000000	15000
86-73-7	Fluorene	470000	150000	1100	E	E	E		5100000	15000
100-01-6	4-Nitroaniline			900	D	D	D			
86-30-6	N-Nitrosodiphenylamine									
87-86-5	Pentachlorophenol	620000						700000	700000	
85-01-8	Phenanthrene	2700000	310000	4000				5300000	7600000	32000
120-12-7	Anthracene	380000	75000	270				1400000	2700000	4300
84-74-2	Di-n-Butylphthalate									
206-44-0	Fluoranthene	2600000	190000	2600				2900000	3600000	15000
129-00-0	Pyrene	1600000	140000	1200				2200000	2600000	10000
85-68-7	Butylbenzylphthalate									
91-94-1	3,3-Dichlorobenzidine									
56-55-3	Benzo(a)Anthracene	190000	28000					520000	570000	
218-01-9	Chrysene								500000	
117-81-7	bis(2-Ethylexyl)Phthalate									
117-84-0	Di-n-Octyl Phthalate									
205-99-2	Benzo(b)Fluoranthene	370000		240				370000	430000	
207-08-9	Benzo(k)Fluoranthene									
50-32-8	Benzo(a)Pyrene	91000								
193-39-5	Indeno(1,2,3-cd)Pyrene									
53-70-3	Dibenz(a,h)Anthracene									
191-24-2	Benzo(g,h,i)Perylene									

Volatile Compounds Detected

75-00-3	Methylene Chloride	*25*	*190*	*10*	*28*	*64*	*56*	*190*	*7100*	*19*
67-64-1	Acetone	*100*	*750*	*29*	*190*	*210*	*160*	16000		
75-15-0	Carbon Disulfide	9	32		12	9	7	5200	940	*17*
67-66-3	Chloroform									
78-93-3	2-Butanone									
56-23-5	Carbon Tetrachloride									
79-01-6	Trichloroethene									
71-43-2	Benzene							850	3600	8
108-10-1	4-Methyl-2-Pentanone									
127-18-4	Tetrachloroethene									
79-34-5	1,1,2,2-Tetrachloroethane									
108-88-3	Toluene		68	8	190	62	81	16000	22000	14
108-90-7	Chlorobenzene									
100-41-4	Ethylbenzene		150					22000	29000	8
100-42-5	Styrene									
1330-20-7	Xylene (Total)		210					57000	72000	20
Total Compounds Detected		10461000	1473428	16776	190	62	81	24885850	44226600	143348
Pentachlorophenol Detected		620000	0	0	0	0	0	700000	700000	0
Total Semi-Volatile Compounds		10461000	1473000	16770	0	0	0	24790000	44100000	143300
Total Volatile Compounds		0	428	6	190	62	81	95850	126600	48

SUM44-68.WK3, SHEET B

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits.
Bold italic quantities indicate constituent was detected in laboratory background samples
"Total Compounds Detected" does not include phthalates, methylene chloride, acetone, or carbon disulfide

Colfax Creosoting RCRA Facility Investigation
Soil Boring Sample Results

Semi-Volatile Compounds Detected, parts per billion

Cas No.	Compound	Sample Concentration, parts per billion									
		B50S4	B50S7	B50S8	B51S2	B51S4	B52S1	B52S2	B53S2	B53S3	B53S4
108-95-2	Phenol			15000							
111-44-4	bis(2-Chloroethyl)Ether										
541-73-1	1,3-Dichlorobenzene										
95-48-7	2-Methylphenol										
106-44-5	4-Methylphenol			9200							
98-95-3	Nitrobenzene										
78-59-1	Isophorone										
91-20-3	Naphthalene	4300000	6100000	82000					500000	1200000	220
106-47-8	4-Chloroaniline				N						
59-50-7	4-Chloro-3-Methylphenol				O						
91-57-6	2-Methylnaphthalene	1000000	2400000	26000	N				83000	870000	300
88-06-2	2,4,6-Trichlorophenol				E						
95-95-4	2,4,5-Trichlorophenol										
88-74-4	2-Nitroaniline				D						
208-96-8	Acenaphthylene				E						
606-20-2	2,6-Dinitrotoluene				T						
99-09-2	3-Nitroaniline				E						
83-32-9	Acenaphthene	1900000	2900000	32000	C			200000	160000	870000	690
132-64-9	Dibenzofuran	1400000	2100000	28000	T			22000	140000	650000	900
86-73-7	Fluorene	1800000	2700000	31000	E			58000	160000	680000	1100
100-01-6	4-Nitroaniline				D						
86-30-6	N-Nitrosodiphenylamine										
87-86-5	Pentachlorophenol	650000					19000	360000	130000		680
85-01-8	Phenanthrene	6300000	5500000	65000				190000	580000	1800000	2900
120-12-7	Anthracene	790000	480000	6100				210000	98000	250000	430
84-74-2	Di-n-Butylphthalate			23000		550					
206-44-0	Fluoranthene	3900000	1700000	17000				1200000		680000	1400
129-00-0	Pyrene	1400000	1300000				14000	600000	140000	330000	1800
85-68-7	Butylbenzylphthalate										
91-94-1	3,3-Dichlorobenzidine										
56-55-3	Benzo(a)Anthracene			3200				180000			
218-01-9	Chrysene			2800			2800	220000			
117-81-7	bis(2-Ethylexyl)Phthalate										
117-84-0	Di-n-Octyl Phthalate										
205-99-2	Benzo(b)Fluoranthene										
207-08-9	Benzo(k)Fluoranthene										
50-32-8	Benzo(a)Pyrene										
193-39-5	Indeno(1,2,3-cd)Pyrene										
53-70-3	Dibenz(a,h)Anthracene										
191-24-2	Benzo(g,h,i)Perylene										

Volatile Compounds Detected

75-00-3	Methylene Chloride	*93*	*8500*	*75*	*20*	*23*	*25*	*19*		*41*	*45*
67-64-1	Acetone	370		180		*34*		150			*15*
75-15-0	Carbon Disulfide	*98*	3700	*63*	*20*	*29*	*27*	*41*			*11*
67-66-3	Chloroform										
78-93-3	2-Butanone							73			
56-23-5	Carbon Tetrachloride										
79-01-6	Trichloroethene										
71-43-2	Benzene	1000	4800								
108-10-1	4-Methyl-2-Pentanone										
127-18-4	Tetrachloroethene										
79-34-5	1,1,2,2-Tetrachloroethane										
108-88-3	Toluene	870	20000	170	100		190	280		320	180
108-90-7	Chlorobenzene										
100-41-4	Ethylbenzene	860	22000							310	28
100-42-5	Styrene										
1330-20-7	Xylene (Total)	1400	51000	120				41		1000	35
Total Compounds Detected		23444130	25277800	319590	100	0	35990	3540394	1971000	7111630	10663
Pentachlorophenol Detected		650000	0	0	0	0	19000	360000	130000	0	680
Total Semi-Volatile Compounds		23440000	25180000	319300	0	0	35800	3540000	1971000	7110000	10420
Total Volatile Compounds		4130	97800	290	100	0	190	394	0	1630	243

SUM44-88.WK3, SHEET C

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits.
Bold italic quantities indicate constituent was detected in laboratory background samples.
"Total Compounds Detected" does not include phthalates, methylene chloride, acetone, or carbon disulfide

Colfax Creosoting RCRA Facility Investigation
Soil Boring Sample Results

Semi-Volatile Compounds Detected, parts per billion

Cas No.	Compound	Sample Concentration, parts per billion							
		B54S3	B54S4	B54S5	B55S2	B55S4	B55S5	B56S3	B57S3
108-95-2	Phenol								
111-44-4	bis(2-Chloroethyl)Ether								
541-73-1	1,3-Dichlorobenzene								
95-48-7	2-Methylphenol								
106-44-5	4-Methylphenol								
98-95-3	Nitrobenzene								
78-59-1	Isophorone								
91-20-3	Naphthalene	130000	85000	1700	950000	820000	2600	N	N
106-47-8	4-Chloroaniline							O	O
59-50-7	4-Chloro-3-Methlyphenol							N	N
91-57-6	2-Methylnaphthalene	79000	100000	850	300000	330000	670	E	E
88-06-2	2,4,6-Trichlorophenol								
95-95-4	2,4,5-Trichlorophenol							D	D
88-74-4	2-Nitroaniline							E	E
208-96-8	Acenaphthylene							T	T
606-20-2	2,6-Dinitrotoluene							E	E
99-09-2	3-Nitroaniline							C	C
83-32-9	Acenaphthene	100000	140000	1700	600000	540000	270	T	T
132-64-9	Dibenzofuran	75000	100000	2600	410000	420000	2300	E	E
86-73-7	Fluorene	83000	120000	2200	510000	450000	570	D	D
100-01-6	4-Nitroaniline								
86-30-6	N-Nitrosodiphenylamine								
87-86-5	Pentachlorophenol			1000	370000	250000	4400		
85-01-8	Phenanthrene	180000	360000	7500	1400000	1000000	7500		
120-12-7	Anthracene	28000	47000	980	180000	170000	530		
84-74-2	Di-n-Butylphthalate								
206-44-0	Fluoranthene	78000	170000	4800	910000	460000	1400		
129-00-0	Pyrene	56000	84000	2100	420000	560000	610		
85-68-7	Butylbenzylphthalate								
91-94-1	3,3-Dichlorobenzidine								
56-55-3	Benzo(a)Anthracene	12000	24000		89000				
218-01-9	Chrysene	13000	22000		84000				
117-81-7	bis(2-Ethylexyl)Phthalate								
117-84-0	Di-n-Octyl Phthalate								
205-99-2	Benzo(b)Fluoranthene								
207-08-9	Benzo(k)Fluoranthene								
50-32-8	Benzo(a)Pyrene								
193-39-5	Indeno(1,2,3-cd)Pyrene								
53-70-3	Dibenz(a,h)Anthracene								
191-24-2	Benzo(g,h,i)Perylene								

Volatile Compounds Detected

75-00-3	Methylene Chloride	42	36	41	65	75		59	32
67-64-1	Acetone	***22***	***16***	***17***				***31***	***11***
75-15-0	Carbon Disulfide	33	32	20	20	50			
67-66-3	Chloroform								N
78-93-3	2-Butanone								O
56-23-5	Carbon Tetrachloride								N
79-01-6	Trichloroethene								E
71-43-2	Benzene								
108-10-1	4-Methyl-2-Pentanone								D
127-18-4	Tetrachloroethene								E
79-34-5	1,1,2,2-Tetrachloroethane								T
108-88-3	Toluene	670	1100	220	890	1200		240	E
108-90-7	Chlorobenzene								C
100-41-4	Ethylbenzene	65	150	30	740	1200			T
100-42-5	Styrene								E
1330-20-7	Xylene (Total)	330	1100	82	2200	2600			D
Total Compounds Detected		835065	1254350	25762	6226830	5005000	20850	240	0
Pentachlorophenol Detected		0	0	1000	370000	250000	4400	0	0
Total Semi-Volatile Compounds		834000	1252000	25430	6223000	5000000	20850	0	0
Total Volatile Compounds		1065	2350	332	3830	5000	0	240	0

SUM44-66.WK3, SHEET D

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits.
Bold italic quantities indicate constituent was detected in laboratory background samples
"Total Compounds Detected" does not include phthalates, methylene chloride, acetone, or carbon dis

Colfax Creosoting RCRA Facility Investigation
Soil Boring Sample Results

Semi-Volatile Compounds Detected, parts per billion

Cas No.	Compound	Sample Concentration, parts per billion									
		B58S1	B58S2	B58S2D	B58S3	B59S1	B59S2	B59S4	B60S2	B60S4	B60S7
108-95-2	Phenol										
111-44-4	bis(2-Chloroethyl)Ether										
541-73-1	1,3-Dichlorobenzene										
95-48-7	2-Methylphenol										
106-44-5	4-Methylphenol										
98-95-3	Nitrobenzene										
78-59-1	Isophorone										
91-20-3	Naphthalene	410000				370000	140000			19000	
106-47-8	4-Chloroaniline		N	N	N						
59-50-7	4-Chloro-3-Methylphenol		O	O	O						
91-57-6	2-Methylnaphthalene	120000	N	N	N	390000	97000	130		57000	
88-06-2	2,4,6-Trichlorophenol		E	E	E						
95-95-4	2,4,5-Trichlorophenol										
88-74-4	2-Nitroaniline		D	D	D						
208-96-8	Acenaphthylene		E	E	E						
606-20-2	2,6-Dinitrotoluene		T	T	T						
99-09-2	3-Nitroaniline		E	E	E						
83-32-9	Acenaphthene	360000	C	C	C	580000	150000	190		52000	560
132-64-9	Dibenzofuran	230000	T	T	T	410000	80000	1300		48000	1300
86-73-7	Fluorene	330000	E	E	E	390000	88000	410			1100
100-01-6	4-Nitroaniline		D	D	D						
86-30-6	N-Nitrosodiphenylamine										
87-86-5	Pentachlorophenol										
85-01-8	Phenanthrene	1800000				1500000	290000	6200		50000	3400
120-12-7	Anthracene	320000				140000	35000			15000	280
84-74-2	Di-n-Butylphthalate										
206-44-0	Fluoranthene	810000				840000	130000	2500		59000	1800
129-00-0	Pyrene	690000				420000	79000	870		58000	910
85-68-7	Butylbenzylphthalate										
91-94-1	3,3-Dichlorobenzidine										
56-55-3	Benzo(a)Anthracene									6200	250
218-01-9	Chrysene									6800	300
117-81-7	bis(2-Ethylexyl)Phthalate										
117-84-0	Di-n-Octyl Phthalate										
205-99-2	Benzo(b)Fluoranthene									3500	280
207-08-9	Benzo(k)Fluoranthene									3200	
50-32-8	Benzo(a)Pyrene										
193-39-5	Indeno(1,2,3-cd)Pyrene										
53-70-3	Dibenz(a,h)Anthracene										
191-24-2	Benzo(g,h,i)Perylene										

Volatile Compounds Detected

75-00-3	Methylene Chloride	*120*	*27*	*97*	*33*	*160*	*130*	*20*	*40*	*78*	*14*
67-64-1	Acetone				*56*				*10*	*12*	
75-15-0	Carbon Disulfide	320	7	19	16	20	40		14		10
67-66-3	Chloroform										
78-93-3	2-Butanone										
56-23-5	Carbon Tetrachloride										
79-01-6	Trichloroethene										
71-43-2	Benzene								5		
108-10-1	4-Methyl-2-Pentanone										
127-18-4	Tetrachloroethene										
79-34-5	1,1,2,2-Tetrachloroethane										
108-88-3	Toluene	48	120	170	88	84	600		46	240	320
108-90-7	Chlorobenzene										
100-41-4	Ethylbenzene	86				23	80				
100-42-5	Styrene										
1330-20-7	Xylene (Total)	110				120	390		5		
Total Compounds Detected		4570244	120	170	88	4850227	1091070	11400	56	378040	10310
Pentachlorophenol Detected		0	0	0	0	0	0	0	0	0	0
Total Semi-Volatile Compounds		4570000	0	0	0	4850000	1090000	11400	0	377800	9990
Total Volatile Compounds		244	120	170	88	227	1070	0	56	240	320

SUM44-86.WK3, SHEET E

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits.
Bold italic quantities indicate constituent was detected in laboratory background samples
"Total Compounds Detected" does not include phthalates, methylene chloride, acetone, or carbon disulfide

Colfax Creosoting RCRA Facility Investigation
Soil Boring Sample Results

Semi-Volatile Compounds Detected, parts per billion

Cas No.	Compound	Sample Concentration, parts per billion							
		B61S1	B61S2	B62S2	B62S4	B62S12	B62S13	B63S4	B64S6
108-95-2	Phenol								
111-44-4	bis(2-Chloroethyl)Ether								
541-73-1	1,3-Dichlorobenzene								
95-48-7	2-Methylphenol								
106-44-5	4-Methylphenol								
98-95-3	Nitrobenzene								
78-59-1	Isophorone								
91-20-3	Naphthalene								
106-47-8	4-Chloroaniline	N	N		N	N	N	N	N
59-50-7	4-Chloro-3-Methlyphenol	O	O		O	O	O	O	O
91-57-6	2-Methylnaphthalene	N	N		N	N	N	N	N
88-06-2	2,4,6-Trichlorophenol	E	E		E	E	E	E	E
95-95-4	2,4,5-Trichlorophenol								
88-74-4	2-Nitroaniline	D	D		D	D	D	D	D
208-96-8	Acenaphthylene	E	E		E	E	E	E	E
606-20-2	2,6-Dinitrotoluene	T	T		T	T	T	T	T
99-09-2	3-Nitroaniline	E	E		E	E	E	E	E
83-32-9	Acenaphthene	C	C	1300	C	C	C	C	C
132-64-9	Dibenzofuran	T	T		T	T	T	T	T
86-73-7	Fluorene	E	E		E	E	E	E	E
100-01-6	4-Nitroaniline	D	D		D	D	D	D	D
86-30-6	N-Nitrosodiphenylamine								
87-86-5	Pentachlorophenol								
85-01-8	Phenanthrene			7800					
120-12-7	Anthracene			1900					
84-74-2	Di-n-Butylphthalate								
206-44-0	Fluoranthene			49000					
129-00-0	Pyrene			46000					
85-68-7	Butylbenzylphthalate								
91-94-1	3,3-Dichlorobenzidine								
56-55-3	Benzo(a)Anthracene			14000					
218-01-9	Chrysene			13000					
117-81-7	bis(2-Ethylexyl)Phthalate								
117-84-0	Di-n-Octyl Phthalate								
205-99-2	Benzo(b)Fluoranthene								
207-08-9	Benzo(k)Fluoranthene								
50-32-8	Benzo(a)Pyrene								
193-39-5	Indeno(1,2,3-cd)Pyrene								
53-70-3	Dibenz(a,h)Anthracene								
191-24-2	Benzo(g,h,i)Perylene								

Volatile Compounds Detected

75-00-3	Methylene Chloride	*9*	*13*	*10*	*12*	*41*	*31*	*35*	*16*
67-64-1	Acetone				*7*	*41*	*25*	*46*	*57*
75-15-0	Carbon Disulfide	6	6	16	15			7	7
67-66-3	Chloroform								
78-93-3	2-Butanone								
56-23-5	Carbon Tetrachloride								
79-01-6	Trichloroethene								
71-43-2	Benzene								
108-10-1	4-Methyl-2-Pentanone								
127-18-4	Tetrachloroethene								
79-34-5	1,1,2,2-Tetrachloroethane								
108-88-3	Toluene	7	96	72	230	160	230	250	18
108-90-7	Chlorobenzene								
100-41-4	Ethylbenzene								
100-42-5	Styrene								
1330-20-7	Xylene (Total)								
Total Compounds Detected		7	96	133072	230	160	230	250	18
Pentachlorophenol Detected		0	0	0	0	0	0	0	0
Total Semi-Volatile Compounds		0	0	133000	0	0	0	0	0
Total Volatile Compounds		7	96	72	230	160	230	250	18

SUM44-66.WK3, SHEET F

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits.
Bold italic quantities indicate constituent was detected in laboratory background samples
"Total Compounds Detected" does not include phthalates, methylene chloride, acetone, or carbon disulfide

Colfax Creosoting RCRA Facility Investigation
Soil Boring Sample Results

Semi-Volatile Compounds Detected, parts per billion

Cas No.	Compound	Sample Concentration, parts per billion					
		B65S1	B65S2	B65S4	B66S1	B66S3	B66S5
108-95-2	Phenol	180	160		720		1900
111-44-4	bis(2-Chloroethyl)Ether						
541-73-1	1,3-Dichlorobenzene						
95-48-7	2-Methylphenol				180		380
106-44-5	4-Methylphenol	180	270		710		1400
98-95-3	Nitrobenzene						
78-59-1	Isophorone						
91-20-3	Naphthalene	120	470	320	2100	96000	570
106-47-8	4-Chloroaniline						
59-50-7	4-Chloro-3-Methlyphenol						
91-57-6	2-Methylnaphthalene	73	270		800	46000	250
88-06-2	2,4,6-Trichlorophenol						
95-95-4	2,4,5-Trichlorophenol						
88-74-4	2-Nitroaniline						
208-96-8	Acenaphthylene						
606-20-2	2,6-Dinitrotoluene						
99-09-2	3-Nitroaniline						
83-32-9	Acenaphthene	150	330		650	47000	350
132-64-9	Dibenzofuran	160	250		670	35000	380
86-73-7	Fluorene	200	350		560	36000	420
100-01-6	4-Nitroaniline						
86-30-6	N-Nitrosodiphenylamine						
87-86-5	Pentachlorophenol						
85-01-8	Phenanthrene	740	1600		880	74000	1700
120-12-7	Anthracene	66			94	11000	780
84-74-2	Di-n-Butylphthalate						
206-44-0	Fluoranthene	560	1200			37000	2300
129-00-0	Pyrene	240	440			21000	910
85-68-7	Butylbenzylphthalate						
91-94-1	3,3-Dichlorobenzidine						
56-55-3	Benzo(a)Anthracene						270
218-01-9	Chrysene						210
117-81-7	bis(2-Ethylexyl)Phthalate						
117-84-0	Di-n-Octyl Phthalate						
205-99-2	Benzo(b)Fluoranthene						
207-08-9	Benzo(k)Fluoranthene						
50-32-8	Benzo(a)Pyrene						
193-39-5	Indeno(1,2,3-cd)Pyrene						
53-70-3	Dibenz(a,h)Anthracene						
191-24-2	Benzo(g,h,i)Perylene						

Volatile Compounds Detected

75-00-3	Methylene Chloride	***120***	***20***	***20***	***24***	***13***	***22***
67-64-1	Acetone	***300***	***32***	***6***	***21***	***120***	***42***
75-15-0	Carbon Disulfide	98			7	57	
67-66-3	Chloroform						
78-93-3	2-Butanone				***6***		
56-23-5	Carbon Tetrachloride						
79-01-6	Trichloroethene						
71-43-2	Benzene		5		25		
108-10-1	4-Methyl-2-Pentanone						
127-18-4	Tetrachloroethene						
79-34-5	1,1,2,2-Tetrachloroethane						
108-88-3	Toluene	170	92	220	250	170	170
108-90-7	Chlorobenzene						
100-41-4	Ethylbenzene				7	33	
100-42-5	Styrene						
1330-20-7	Xylene (Total)				30	75	7
Total Compounds Detected		2839	5437	540	7682	403278	11997
Pentachlorophenol Detected		0	0	0	0	0	0
Total Semi-Volatile Compounds		2669	5340	320	7364	403000	11820
Total Volatile Compounds		170	97	220	318	278	177

SUM44-66.WK3, SHEET G

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits.
Bold italic quantities indicate constituent was detected in laboratory background samples
"Total Compounds Detected" does not include phthalates, methylene chloride, acetone, or carbon dis

Colfax Creosoting RCRA Facility Investigation
Trench Sample Results
Semi-Volatile Compounds Detected

Cas No.	Compound	Sample Concentration, parts per billion								
		T1S2	T1S3	T1S4	T2S2	T2S3	T2S4	T3S2	T3S3	T3S4
108-95-2	Phenol									
111-44-4	bis(2-Chloroethyl)Ether									
541-73-1	1,3-Dichlorobenzene									
95-48-7	2-Methylphenol									
106-44-5	4-Methylphenol									
98-95-3	Nitrobenzene									
78-59-1	Isophorone									
91-20-3	Naphthalene							2000		
106-47-8	4-Chloroaniline									
59-50-7	4-Chloro-3-Methylphenol									
91-57-6	2-Methylnaphthalene	870						850		
88-06-2	2,4,6-Trichlorophenol									
95-95-4	2,4,5-Trichlorophenol									
88-74-4	2-Nitroaniline									
208-96-8	Acenaphthylene									
606-20-2	2,6-Dinitrotoluene									
99-09-2	3-Nitroaniline									
83-32-9	Acenaphthene	6800	160					3500		
132-64-9	Dibenzofuran	4500	120					2300		
86-73-7	Fluorene	6100	220					2400		
100-01-6	4-Nitroaniline									
86-30-6	N-Nitrosodiphenylamine									
87-86-5	Pentachlorophenol	1800	270							
85-01-8	Phenanthrene	26000	2000					3800	390	
120-12-7	Anthracene	670	590					8800		
84-74-2	Di-n-Butylphthalate									
206-44-0	Fluoranthene		2300					8900	850	
129-00-0	Pyrene	17000	1800					8500	350	
85-68-7	Butylbenzylphthalate									
91-94-1	3,3-Dichlorobenzidine									
56-55-3	Benzo(a)Anthracene	9500	940					2500		
218-01-9	Chrysene									
117-81-7	bis(2-Ethylexyl)Phthalate									
117-84-0	Di-n-Octyl Phthalate									
205-99-2	Benzo(b)Fluoranthene	3400	510					4000		
207-08-9	Benzo(k)Fluoranthene									
50-32-8	Benzo(a)Pyrene									
193-39-5	Indeno(1,2,3-cd)Pyrene									
53-70-3	Dibenz(a,h)Anthracene									
191-24-2	Benzo(g,h,i)Perylene									

Volatile Compounds Detected

75-00-3	Methylene Chloride	*28*	*33*	*9*	*12*	*9*	*10*	*13*	*12*	*11*
67-64-1	Acetone	200	230				*15*			
75-15-0	Carbon Disulfide	*9*		11	13	13	16	*8*	14	
67-66-3	Chloroform									
78-93-3	2-Butanone									
56-23-5	Carbon Tetrachloride									
79-01-6	Trichloroethene									
71-43-2	Benzene									
108-10-1	4-Methyl-2-Pentanone									
127-18-4	Tetrachloroethene									
79-34-5	1,1,2,2-Tetrachloroethane									
108-88-3	Toluene				100	39	130	11	23	
108-90-7	Chlorobenzene									
100-41-4	Ethylbenzene									
100-42-5	Styrene									
1330-20-7	Xylene (Total)									
Total Compounds Detected		76440	8710	0	100	39	130	42861	1413	0
Pentachlorophenol Detected		1800	270	0	0	0	0	0	0	0
Total Semi-Volatile Compounds		76440	8710	0	0	0	0	42850	1390	0
Total Volatile Compounds		0	0	0	100	39	130	11	23	0

SUMT1SS1.WK3, SHEET A

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits.
Bold italic Quantities indicate constituent was detected in laboratory background samples
"Total Compounds Detected" does not include phthalates, methylene chloride, acetone or carbon disulfide.

Colfax Creosoting RCRA Facility Investigation
Trench Sample Results

Semi-Volatile Compounds Detected

Cas No.	Compound	Sample Concentration, parts per billion							
		T4S2	T4S3	T4S4	T5S1	T5S2	T6S1	T6S2	T6S3
108-95-2	Phenol								
111-44-4	bis(2-Chloroethyl)Ether								
541-73-1	1,3-Dichlorobenzene								
95-48-7	2-Methylphenol								
106-44-5	4-Methylphenol								
98-95-3	Nitrobenzene								
78-59-1	Isophorone								
91-20-3	Naphthalene		770		220000	560	110	1600	6000
106-47-8	4-Chloroaniline								
59-50-7	4-Chloro-3-Methylphenol								
91-57-6	2-Methylnaphthalene		360		36000		24	910	4100
88-06-2	2,4,6-Trichlorophenol								
95-95-4	2,4,5-Trichlorophenol								
88-74-4	2-Nitroaniline								
208-96-8	Acenaphthylene								
606-20-2	2,6-Dinitrotoluene								
99-09-2	3-Nitroaniline								
83-32-9	Acenaphthene		1300		77000		69	4600	13000
132-64-9	Dibenzofuran		910		46000		57	2700	7500
86-73-7	Fluorene		1500		65000		69	5400	11000
100-01-6	4-Nitroaniline								
86-30-6	N-Nitrosodiphenylamine								
87-86-5	Pentachlorophenol						600	5200	3700
85-01-8	Phenanthrene		7000		180000		300	21000	51000
120-12-7	Anthracene		860		41000		180	22000	13000
84-74-2	Di-n-Butylphthalate								
206-44-0	Fluoranthene	2900	4900		240000	450	410	48000	71000
129-00-0	Pyrene	7700	8600		130000		630	56000	72000
85-68-7	Butylbenzylphthalate								
91-94-1	3,3-Dichlorobenzidine								
56-55-3	Benzo(a)Anthracene	1700	1200		62000		180	8800	11000
218-01-9	Chrysene	3700	1500				370	18000	15000
117-81-7	bis(2-Ethylexyl)Phthalate								
117-84-0	Di-n-Octyl Phthalate								
205-99-2	Benzo(b)Fluoranthene				44000			9400	7100
207-08-9	Benzo(k)Fluoranthene							7900	6100
50-32-8	Benzo(a)Pyrene								8000
193-39-5	Indeno(1,2,3-cd)Pyrene								
53-70-3	Dibenz(a,h)Anthracene								
191-24-2	Benzo(g,h,i)Perylene								

Volatile Compounds Detected

75-00-3	Methylene Chloride	***16***	***13***	***12***	***160***	***20***	***14***	***20***	***22***
67-64-1	Acetone			83	1200		180	180	310
75-15-0	Carbon Disulfide	11	10	***5***				***11***	***10***
67-66-3	Chloroform								
78-93-3	2-Butanone							66	18
56-23-5	Carbon Tetrachloride								
79-01-6	Trichloroethene								
71-43-2	Benzene				230				
108-10-1	4-Methyl-2-Pentanone								
127-18-4	Tetrachloroethene								
79-34-5	1,1,2,2-Tetrachloroethane								
108-88-3	Toluene	110	32	14	220	61	28	210	300
108-90-7	Chlorobenzene				950				
100-41-4	Ethylbenzene				190				
100-42-5	Styrene								
1330-20-7	Xylene (Total)				670				
Total Compounds Detected		16110	28932	14	1143260	1071	3027	209786	299818
Pentachlorophenol Detected		0		0	0	0	600	5200	3700
Total Semi-Volatile Compounds		16000	28900	0	1141000	1010	2999	209510	299500
Total Volatile Compounds		110	32	14	2260	61	28	276	318

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits.

SUMT1SS1.WK3, SHEET B

Bold italic Quantities indicate constituent was detected in laboratory background samples

"Total Compounds Detected" does not include phthalates, methylene chloride, acetone or carbon disulfide.

Colfax Creosoting RCRA Facility Investigation
Trench Sample Results
Semi-Volatile Compounds Detected

Cas No.	Compound	Sample Concentration, parts per billion								
		T7S2	T7S3	T7S4	T8S2	T8S3	T8S4	T9S1	T9S2	T9S3
108-95-2	Phenol									
111-44-4	bis(2-Chloroethyl)Ether									
541-73-1	1,3-Dichlorobenzene									
95-48-7	2-Methylphenol									
106-44-5	4-Methylphenol									
98-95-3	Nitrobenzene									
78-59-1	Isophorone									
91-20-3	Naphthalene						760			
106-47-8	4-Chloroaniline									
59-50-7	4-Chloro-3-Methylphenol									
91-57-6	2-Methylnaphthalene									
88-06-2	2,4,6-Trichlorophenol									
95-95-4	2,4,5-Trichlorophenol									
88-74-4	2-Nitroaniline									
208-96-8	Acenaphthylene									
606-20-2	2,6-Dinitrotoluene									
99-09-2	3-Nitroaniline									
83-32-9	Acenaphthene						700	9900	5600	
132-64-9	Dibenzofuran						400	4500		
86-73-7	Fluorene						790	12000	4500	
100-01-6	4-Nitroaniline									
86-30-6	N-Nitrosodiphenylamine									
87-86-5	Pentachlorophenol		5400			2500	880		3700	
85-01-8	Phenanthrene		11000	2400		3100	3700	74000	37000	
120-12-7	Anthracene		2200			3100	3700	29000	9200	
84-74-2	Di-n-Butylphthalate									
206-44-0	Fluoranthene	10000	17000	2700	7000	11000	7300	180000	75000	
129-00-0	Pyrene	38000	52000	5800	13000	11000	5400	110000	78000	
85-68-7	Butylbenzylphthalate									
91-94-1	3,3-Dichlorobenzidine									
56-55-3	Benzo(a)Anthracene	8400	9400			2900	2300	17000	16000	
218-01-9	Chrysene	15000	19000					24000	14000	
117-81-7	bis(2-Ethylexyl)Phthalate									
117-84-0	Di-n-Octyl Phthalate		11000							
205-99-2	Benzo(b)Fluoranthene		11000		9300	13000	4300		20000	
207-08-9	Benzo(k)Fluoranthene									
50-32-8	Benzo(a)Pyrene						1100			
193-39-5	Indeno(1,2,3-cd)Pyrene						880			
53-70-3	Dibenz(a,h)Anthracene									
191-24-2	Benzo(g,h,i)Perylene					5700				

Volatile Compounds Detected

75-00-3	Methylene Chloride	*85*	*28*	*23*	*180*	*84*	*47*	*23*	*40*	*24*
67-64-1	Acetone	1700	770	450	*210*	*210*	*170*	*38*	*40*	
75-15-0	Carbon Disulfide	*84*	*42*	*35*	*46*	*25*		*32*	*34*	*20*
67-66-3	Chloroform									
78-93-3	2-Butanone									
56-23-5	Carbon Tetrachloride									
79-01-6	Trichloroethene							7		
71-43-2	Benzene									
108-10-1	4-Methyl-2-Pentanone									
127-18-4	Tetrachloroethene							8		
79-34-5	1,1,2,2-Tetrachloroethane									
108-88-3	Toluene	*880*	*38*	*120*	250	200	50	64	84	29
108-90-7	Chlorobenzene									
100-41-4	Ethylbenzene									
100-42-5	Styrene									
1330-20-7	Xylene (Total)									
Total Compounds Detected		68060	127038	11020	29550	52500	32260	460477	263284	29
Pentachlorophenol Detected		0	5400	0	0	2500	880	0	3700	0
Total Semi-Volatile Compounds		67400	127000	10900	29300	52300	32210	460400	263200	0
Total Volatile Compounds		660	38	120	250	200	50	77	84	29

SUMT1SS1.WK3, SHEET C

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits.
Bold italic Quantities indicate constituent was detected in laboratory background samples
"Total Compounds Detected" does not include phthalates, methylene chloride, acetone or carbon disulfide.

Colfax Creosoting RCRA Facility Investigation
Trench Sample Results

Semi-Volatile Compounds Detected

Cas No.	Compound	Sample Concentration, parts per billion								
		T10S1	T10S2	T11S2	T11S3	T11S4	T12S2	T12S3	T12S4	T13S1
108-95-2	Phenol									
111-44-4	bis(2-Chloroethyl)Ether									
541-73-1	1,3-Dichlorobenzene									
95-48-7	2-Methylphenol									
106-44-5	4-Methylphenol									
98-95-3	Nitrobenzene									
78-59-1	Isophorone									
91-20-3	Naphthalene						17000			7500000
106-47-8	4-Chloroaniline									
59-50-7	4-Chloro-3-Methylphenol									
91-57-6	2-Methylnaphthalene						4100			1800000
88-06-2	2,4,6-Trichlorophenol									
95-95-4	2,4,5-Trichlorophenol									
88-74-4	2-Nitroaniline									
208-96-8	Acenaphthylene									
606-20-2	2,6-Dinitrotoluene									
99-09-2	3-Nitroaniline									
83-32-9	Acenaphthene					2100	19000			3000000
132-64-9	Dibenzofuran						13000			2100000
86-73-7	Fluorene						19000			2800000
100-01-6	4-Nitroaniline									
86-30-6	N-Nitrosodiphenylamine									
87-86-5	Pentachlorophenol						21000			3600000
85-01-8	Phenanthrene				8300	5500	58000			7500000
120-12-7	Anthracene						11000			2600000
84-74-2	Di-n-Butylphthalate									
206-44-0	Fluoranthene	3100			30000	6100	45000			3500000
129-00-0	Pyrene	3600			25000	7800	50000			2800000
85-68-7	Butylbenzylphthalate									
91-94-1	3,3-Dichlorobenzidine									
56-55-3	Benzo(a)Anthracene	1000			3700		14000			550000
218-01-9	Chrysene	4300			3300					320000
117-81-7	bis(2-Ethylexyl)Phthalate									
117-84-0	Di-n-Octyl Phthalate									
205-99-2	Benzo(b)Fluoranthene				12000	8500	21000			
207-08-9	Benzo(k)Fluoranthene									
50-32-8	Benzo(a)Pyrene						5600			
193-39-5	Indeno(1,2,3-cd)Pyrene									
53-70-3	Dibenz(a,h)Anthracene									
191-24-2	Benzo(g,h,i)Perylene						3600			

Volatile Compounds Detected

75-00-3	Methylene Chloride	*18*	*7*	*41*	*52*	*60*	*55*	*44*	*46*	*1800*
67-64-1	Acetone	370	230	*55*	*210*	*160*	*240*	*200*	*130*	*20000*
75-15-0	Carbon Disulfide	*15*	*18*	*43*	*79*	*97*	*74*	*31*	*20*	670
67-66-3	Chloroform	11								
78-93-3	2-Butanone		19			17	33			
56-23-5	Carbon Tetrachloride	9								
79-01-6	Trichloroethene	6								
71-43-2	Benzene									780
108-10-1	4-Methyl-2-Pentanone									
127-18-4	Tetrachloroethene	8								
79-34-5	1,1,2,2-Tetrachloroethane									
108-88-3	Toluene	*120*	*30*	*89*	200	340	110	30	18	6900
108-90-7	Chlorobenzene									
100-41-4	Ethylbenzene									4800
100-42-5	Styrene									
1330-20-7	Xylene (Total)									26000
Total Compounds Detected		12056	49	89	80500	28357	301443	30	18	38108280
Pentachlorophenol Detected		0	0	0	0	0	21000	0	0	3600000
Total Semi-Volatile Compounds		11900	0	0	80300	28000	301300	0	0	38070000
Total Volatile Compounds		156	49	89	200	357	143	30	18	38280

SUMT1SS1.WK3, SHEET D

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits.
Bold italic Quantities indicate constituent was detected in laboratory background samples
"Total Compounds Detected" does not include phthalates, methylene chloride, acetone or carbon disulfide.

Colfax Creosoting RCRA Facility Investigation
Trench Sample Results

Semi-Volatile Compounds Detected

Cas No.	Compound	Sample Concentration, parts per billion					
		T14S1	T14S2	T14S2D	SS1	SS2	SS3
108-95-2	Phenol						
111-44-4	bis(2-Chloroethyl)Ether						
541-73-1	1,3-Dichlorobenzene						
95-48-7	2-Methylphenol						
106-44-5	4-Methylphenol						
98-95-3	Nitrobenzene						
78-59-1	Isophorone						
91-20-3	Naphthalene	640				200000	
106-47-8	4-Chloroaniline						
59-50-7	4-Chloro-3-Methlyphenol						
91-57-6	2-Methylnaphthalene	330				150000	
88-06-2	2,4,6-Trichlorophenol						
95-95-4	2,4,5-Trichlorophenol						
88-74-4	2-Nitroaniline						
208-96-8	Acenaphthylene						
606-20-2	2,6-Dinitrotoluene						
99-09-2	3-Nitroaniline						
83-32-9	Acenaphthene	1500				1500000	46000
132-64-9	Dibenzofuran	1700				960000	
86-73-7	Fluorene	1900				1800000	22000
100-01-6	4-Nitroaniline						
86-30-6	N-Nitrosodiphenylamine						
87-86-5	Pentachlorophenol	2000			200000	870000	
85-01-8	Phenanthrene	8600	270		55000	5400000	49000
120-12-7	Anthracene	4400			580000		
84-74-2	Di-n-Butylphthalate						
206-44-0	Fluoranthene	14000	230		160000		160000
129-00-0	Pyrene	6400			250000	3000000	120000
85-68-7	Butylbenzylphthalate						
91-94-1	3,3-Dichlorobenzidine						
56-55-3	Benzo(a)Anthracene	3100			59000	510000	20000
218-01-9	Chrysene						
117-81-7	bis(2-Ethylexyl)Phthalate						
117-84-0	Di-n-Octyl Phthalate						
205-99-2	Benzo(b)Fluoranthene	1300			240000	370000	51000
207-08-9	Benzo(k)Fluoranthene						
50-32-8	Benzo(a)Pyrene				83000	120000	
193-39-5	Indeno(1,2,3-cd)Pyrene				28000		
53-70-3	Dibenz(a,h)Anthracene						
191-24-2	Benzo(g,h,i)Perylene				28000		

Volatile Compounds Detected

75-00-3	Methylene Chloride	***69***		***11***	***45***	***1600***	***25***
67-64-1	Acetone	310	***7***		180		140
75-15-0	Carbon Disulfide						
67-66-3	Chloroform						
78-93-3	2-Butanone						
56-23-5	Carbon Tetrachloride						
79-01-6	Trichloroethene						
71-43-2	Benzene						
108-10-1	4-Methyl-2-Pentanone						
127-18-4	Tetrachloroethene						
79-34-5	1,1,2,2-Tetrachloroethane						
108-88-3	Toluene	110		10	12		
108-90-7	Chlorobenzene						
100-41-4	Ethylbenzene						
100-42-5	Styrene						
1330-20-7	Xylene (Total)						
Total Compounds Detected		45980	500	10	1703012	14880000	468000
Pentachlorophenol Detected		2000	0	0	200000	870000	0
Total Semi-Volatile Compounds		45870	500	0	1703000	14880000	468000
Total Volatile Compounds		110	0	10	12	0	0

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits.

SUMT1SS1.WK3, SHEET E

Bold italic Quantities indicate constituent was detected in laboratory background samples

"Total Compounds Detected" does not include phthalates, methylene chloride, acetone or carbon disulfide.

APPENDIX E - Ground Water Sampling Analytical Results

Colfax Creosoting RCRA Facility Investigation
Ground Water Sampling Results

Semi-Volatile Compounds Detected, parts per billion

Cas No.	Compound	Boring 2 GW-1	Boring 1 GW-2	Boring 18 GW-3	Boring 12 GW-4	Boring 8 GW-5	Boring 20 GW-6	Boring 23 GW-7	Boring 29 GW-8	Boring 32 GW-9	Boring 31 GW-10
95-48-7	2-Methylphenol										
106-44-5	4-Methylphenol										SEMI-
98-95-3	2,4-Dimethylphenol								950		VOLATILE
91-20-3	Naphthalene								4400		PORTION
91-57-6	2-Methylnaphthalene								860	820	BROKEN
88-06-2	2-Chloronaphthalene										SEE
208-96-8	Acenaphthylene										GW-20
83-32-9	Acenaphthene			4							FOR
132-64-9	Dibenzofuran					5					RESAMPLE
86-73-7	Fluorene										RESULTS
87-86-5	Pentachlorophenol			17			5		20000	75	
85-01-8	Phenanthrene								1400	240	
120-12-7	Anthracene										
84-74-2	Di-n-Butylphthalate					43	17	6			
206-44-0	Fluoranthene								730		
129-00-0	Pyrene								620		
56-55-3	Benzo(a)Anthracene										
218-01-9	Chrysene										
117-81-7	bis(2-Ethylexyl)Phthalate		6	7		12	9	7			

Volatile Compounds Detected, parts per billion

75-09-2	Methylene Chloride	*2*	*5*	*6*	*2*	*4*	*6*	*2*	*6*	*4*	*4*
67-64-1	Acetone						*91*		40		2
75-15-0	Carbon Disulfide								2		
67-66-3	Chloroform										
107-06-2	1,2-Dichloroethane										
78-93-3	2-Butanone								18		
79-00-5	1,1,2-Trichloroethane										
71-43-2	Benzene								15	6	19
108-10-1	4-Methyl-2-Pentanone										22
591-78-6	2-Hexanone								11		11
108-88-3	Toluene								31	25	41
108-90-7	Chlorobenzene										
100-41-4	Ethylbenzene								12	28	21
1330-20-7	Xylene (Total)								27	86	54
Total Compounds Detected		0	0	21	0	5	5	0	29074	1280	168
Pentachlorophenol Detected		0	0	17	0	0	5	0	20000	75	0
Total Volatile Compounds		0	0	0	0	0	0	0	114	145	168
EPA Method 418.1 **TPH, mg/L**		3.90	6.61	<0.20	NOT ENOUGH SAMPLE	<0.20	<0.20	3.34	0.32	19.19	21.16

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits.

Bold italic quantities indicate constituent was detected in laboratory background samples

"Total Compounds Detected" does not include phthalates, Methylene Chloride, Acetone, or Carbon Disulfide since these are attributed to laboratory contamination.

GW1-31.WK3, SHEET A

Ball Engineering, Inc.

Colfax Creosoting RCRA Facility Investigation
Ground Water Sampling Results

Semi-Volatile Compounds Detected, parts per billion

Cas No.	Compound	Boring 33 GW-11	Boring 37 GW-12	Boring 38 GW-13	Boring 39 GW-14	Boring 36 GW-15	Boring 35 GW-16	GW-17	Boring 46 GW-18	Boring 25 GW-19	Boring 31 GW-20
95-48-7	2-Methylphenol										1200
106-44-5	4-Methylphenol				10			NUMBER			2500
98-95-3	2,4-Dimethylphenol	83						NOT			1800
91-20-3	Naphthalene	3000	1500	2100	3200	31		USED			3400
91-57-6	2-Methylnaphthalene	1000	670	540	460	8	7		590		530
88-06-2	2-Chloronaphthalene										
208-96-8	Acenaphthylene		6	6	11						
83-32-9	Acenaphthene		260	240		11	20		2000		510
132-64-9	Dibenzofuran		200	290	290	12	10		980		360
86-73-7	Fluorene		280	160	230	11	12		1300		
87-86-5	Pentachlorophenol	1900	210	220	550	1800	140		3100		14000
85-01-8	Phenanthrene	230	230	190	230	44	25		3100		210
120-12-7	Anthracene		6	12	44				340		
84-74-2	Di-n-Butylphthalate		23	39	80	53	48		1800	83	
206-44-0	Fluoranthene		9	12	170	5			1800		
129-00-0	Pyrene		7	8	120	6					
56-55-3	Benzo(a)Anthracene				15						
218-01-9	Chrysene				16				160		
117-81-7	bis(2-Ethylexyl)Phthalate				15						

Volatile Compounds Detected, parts per billion

75-09-2	Methylene Chloride	*3*	*10*	*10*	*3*	*8*	*7*		25	5	9
67-64-1	Acetone							NUMBER			
75-15-0	Carbon Disulfide	1						NOT		2	
67-66-3	Chloroform							USED			
107-06-2	1,2-Dichloroethane										
78-93-3	2-Butanone										
79-00-5	1,1,2-Trichloroethane										
71-43-2	Benzene			5							17
108-10-1	4-Methyl-2-Pentanone										
591-78-6	2-Hexanone										
108-88-3	Toluene	27		9					12		32
108-90-7	Chlorobenzene										
100-41-4	Ethylbenzene	29		11					11		16
1330-20-7	Xylene (Total)	98	22	34					26		82
Total Compounds Detected		6367	3400	3837	5346	1928	214	0	13419	0	24657
Pentachlorophenol Detected		1900	210	220	550	1800	140	0	3100	0	14000
Total Volatile Compounds		154	22	59	0	0	0	0	49	0	147
EPA Method 418.1 **TPH, mg/L**		48.44	68.34	69.97	1.32	0.30	139.07	<0.20	NOT ENOUGH SAMPLE	521.65	655.80

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits.

Bold italic quantities indicate constituent was detected in laboratory background samples

"Total Compounds Detected" does not include phthalates, Methylene Chloride, Acetone, or Carbon Disulfide since these are attributed to laboratory contamination.

GW1-31.WK3, SHEET B

Ball Engineering, Inc.

Colfax Creosoting RCRA Facility Investigation
Ground Water Sampling Results

Semi-Volatile Compounds Detected, parts per billion

Cas No.	Compound	Boring 49 GW-21	Boring 53 GW-22	Boring 52 GW-23	Boring 53 GW-24	Boring 60 GW-25	Boring 61 GW-26	Boring 27 GW-27	Boring 62 GW-28	Boring 64 GW-29	Boring 66 GW-30
95-48-7	2-Methylphenol	1200						NONE			560
106-44-5	4-Methylphenol	2400						DETECTED			1300
98-95-3	2,4-Dimethylphenol										
91-20-3	Naphthalene	7100	2600	1200	2600	2300					1400
91-57-6	2-Methylnaphthalene	1700	1300	160	560	300					240
88-06-2	2-Chloronaphthalene			670							
208-96-8	Acenaphthylene					36					
83-32-9	Acenaphthene	1300	1700	580	560	630					450
132-64-9	Dibenzofuran	780	950		200	230					220
86-73-7	Fluorene	750	1100		180	320					
87-86-5	Pentachlorophenol	6200	3300	3900	6800		66			33	1100
85-01-8	Phenanthrene	2900	1500	290	270	250					180
120-12-7	Anthracene	200				34					
84-74-2	Di-n-Butylphthalate		3200	18	580				110		
206-44-0	Fluoranthene	1300	2100			44					74
129-00-0	Pyrene	840	970			72					57
56-55-3	Benzo(a)Anthracene	100									
218-01-9	Chrysene	83			4						
117-81-7	bis(2-Ethylexyl)Phthalate										

Volatile Compounds Detected, parts per billion

Cas No.	Compound	Boring 49 GW-21	Boring 53 GW-22	Boring 52 GW-23	Boring 53 GW-24	Boring 60 GW-25	Boring 61 GW-26	Boring 27 GW-27	Boring 62 GW-28	Boring 64 GW-29	Boring 66 GW-30
75-09-2	Methylene Chloride	12	12	21	19					*4*	***100***
67-64-1	Acetone	98									***110***
75-15-0	Carbon Disulfide			3				12			5
67-66-3	Chloroform								NONE		
107-06-2	1,2-Dichloroethane								DETECTED		
78-93-3	2-Butanone										
79-00-5	1,1,2-Trichloroethane										
71-43-2	Benzene	56	3								84
108-10-1	4-Methyl-2-Pentanone										
591-78-6	2-Hexanone										
108-88-3	Toluene	81	18	12	29	7					80
108-90-7	Chlorobenzene										
100-41-4	Ethylbenzene	78	23	10	26	9					34
1330-20-7	Xylene (Total)	220	68	29	94	38					110
Total Compounds Detected		27288	15632	6851	11323	4270	66	0	0	33	5889
Pentachlorophenol Detected		6200	3300	3900	6800	0	66	0	0	33	1100
Total Volatile Compounds		435	112	51	149	54	0	0	0	0	308
EPA Method 418.1											
TPH, mg/L		445.93	632.65	656.26	437.17	6.55	2.94	1.17	0.70	5.66	1.34

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits.

Bold italic quantities indicate constituent was detected in laboratory background samples

"Total Compounds Detected" does not include phthalates, Methylene Chloride, Acetone, or Carbon Disulfide since these are attributed to laboratory contamination.

GW1-31.WK3, SHEET C

Hall Engineering, Inc.

APPENDIX E

Colfax Creosoting RCRA Facility Investigation
Ground Water Sampling Results

Semi-Volatile Compounds Detected, parts per billion

Cas No.	Compound	Boring 48 GW-31									
95-48-7	2-Methylphenol	NONE									
106-44-5	4-Methylphenol	DETECTED									
98-95-3	2,4-Dimethylphenol										
91-20-3	Naphthalene										
91-57-6	2-Methylnaphthalene										
88-06-2	2-Chloronaphthalene										
208-96-8	Acenaphthylene										
83-32-9	Acenaphthene										
132-64-9	Dibenzofuran										
86-73-7	Fluorene										
87-86-5	Pentachlorophenol										
85-01-8	Phenanthrene										
120-12-7	Anthracene										
84-74-2	Di-n-Butylphthalate										
206-44-0	Fluoranthene										
129-00-0	Pyrene										
56-55-3	Benzo(a)Anthracene										
218-01-9	Chrysene										
117-81-7	bis(2-Ethylexyl)Phthalate										

Volatile Compounds Detected, parts per billion

75-09-2	Methylene Chloride	***9***									
67-64-1	Acetone	***13***									
75-15-0	Carbon Disulfide	4									
67-66-3	Chloroform	2									
107-06-2	1,2-Dichloroethane	0.30									
78-93-3	2-Butanone										
79-00-5	1,1,2-Trichloroethane										
71-43-2	Benzene										
108-10-1	4-Methyl-2-Pentanone	0.30									
591-78-6	2-Hexanone	0.50									
108-88-3	Toluene	2									
108-90-7	Chlorobenzene	0.01									
100-41-4	Ethylbenzene	0.90									
1330-20-7	Xylene (Total)	0.30									
Total Compounds Detected		6.31	0	0	0	0	0	0	0	0	0
Pentachlorophenol Detected		0	0	0	0	0	0	0	0	0	0
Total Volatile Compounds		4.31	0	0	0	0	0	0	0	0	0
EPA Method 418.1											
TPH, mg/L		1.43									

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits.

Bold italic quantities indicate constituent was detected in laboratory background samples

"Total Compounds Detected" does not include phthalates, Methylene Chloride, Acetone, or Carbon Disulfide since these are attributed to laboratory contamination.

GW1-31.WK3, SHEET D

Ball Engineering, Inc.

APPENDIX F - Surface Water Sampling Analytical Results

Colfax Creosoting RCRA Facility Investigation
Surface Water Sampling Results

Semi-Volatile Compounds Detected, parts per billion

Cas No.	Compound	SW-1	SW-2	SW-3	SW-4	SW-5	SW-6	SW-7	SW-8	SW-9	SW-9D
106-44-5	4-Methylphenol										
91-20-3	Naphthalene										
91-57-6	2-Methylnaphthalene										
83-32-9	Acenaphthene				5			4			
132-64-9	Dibenzofuran										
87-86-5	Pentachlorophenol	39	100	110	13	73	47	33			
206-44-0	Fluoranthene				27	10	8	12			
129-00-0	Pyrene				18	5	6	9			
218-01-9	Chrysene	6									

Volatile Compounds Detected, parts per billion

75-09-2	Methylene Chloride		*4*	*8*	*4*	*4*	*4*	*3*	*16*	*4*	*4*
67-64-1	Acetone			*7*	*8*					*6*	
75-15-0	Carbon Disulfide										
127-18-4	Tetrachloroethene										
66-67-3	Chloroform										
75-27-4	Bromodichloromethane										
124-48-1	Dibromochloromethane										
75-25-2	Bromoform										
71-43-2	Benzene										
108-88-3	Toluene										
100-41-4	Ethylbenzene										
1330-20-7	Xylene (Total)										
Total Compounds Detected		45	104	125	75	92	65	61	16	10	4
Pentachlorophenol Detected		39	100	110	13	73	47	33	0	0	0
Benzene, Toluene, Ethylbenz., Xylene		0	0	0	0	0	0	0	0	0	0
EPA Method 418.1											
TPH, mg/L		1.41	0.94	4.84	8.24	0.62	0.31	0.86	0.28	1.18	N/A

SWDATA.WK3, SHEET A

Quantities shown in shaded cells indicate the compound was estimated because it was detected below method detection limits.
Bold italic quantities indicate constituent was detected in laboratory background samples.
Total Compounds Detected" does not include Methylene Chloride, Acetone, or Carbon Disulfide.

Ball Engineering, Inc.

Colfax Creosoting RCRA Facility Investigation
Surface Water Sampling Results

Semi-Volatile Compounds Detected, parts per billion

Cas No.	Compound	SW-10	SW-11	SW-12	SW-13	SW-14	SW-13A	SW-14A	SW-15	SW-16	BG-4
106-44-5	4-Methylphenol									90	
91-20-3	Naphthalene									210	
91-57-6	2-Methylnaphthalene									42	
83-32-9	Acenaphthene									260	
132-64-9	Dibenzofuran									56	
87-86-5	Pentachlorophenol	6			5				290	1600	
206-44-0	Fluoranthene				4				13		
129-00-0	Pyrene				3					68	
218-01-9	Chrysene										

Volatile Compounds Detected, parts per billion

75-09-2	Methylene Chloride	*3*		*2*		*10*			*4*		
67-64-1	Acetone										
75-15-0	Carbon Disulfide			*1*							
127-18-4	Tetrachloroethene	7									
66-67-3	Chloroform										6
75-27-4	Bromodichloromethane										9
124-48-1	Dibromochloromethane										5
75-25-2	Bromoform										3
71-43-2	Benzene									7	
108-88-3	Toluene									12	
100-41-4	Ethylbenzene									150	
1330-20-7	Xylene (Total)									15	
Total Compounds Detected		13	0	3	12	10	0	0	307	2510	23
Pentachlorophenol Detected		6	0	0	5	0	0	0	290	1600	0
Benzene, Toluene, Ethylbenz., Xylene		0	0	0	0	0	0	0	0	184	0
EPA Method 418.1											
TPH, mg/L		<0.20	0.23	1.19	<0.20	0.28	1.73	2.58	<0.20	<0.20	<0.20

SWDATA.WK3, SHEET B

Quantities shown in shaded cells indicate the compound was estimated because it was detected below method detection limits.
Bold italic quantities indicate constituent was detected in laboratory background samples.
Total Compounds Detected" does not include Methylene Chloride, Acetone, or Carbon Disulfide.

Hall Engineering, Inc.

Colfax Creosoting RCRA Facility Investigation
Surface Water Sampling Results

Semi-Volatile Compounds Detected, parts per billion

Cas No.	Compound	TB-1	FB-1	TB-2	FB-2	TB-4	FB-4	TB-9	FB-9	TB-18	FB-18
106-44-5	4-Methylphenol										
91-20-3	Naphthalene										
91-57-6	2-Methylnaphthalene										
83-32-9	Acenaphthene										
132-64-9	Dibenzofuran										
87-86-5	Pentachlorophenol										
206-44-0	Fluoranthene										
129-00-0	Pyrene										
218-01-9	Chrysene										

Volatile Compounds Detected, parts per billion

Cas No.	Compound	TB-1	FB-1	TB-2	FB-2	TB-4	FB-4	TB-9	FB-9	TB-18	FB-18
75-09-2	Methylene Chloride	*5*	*4*	*3*	*3*	*16*	*20*	*10*	*11*	*5*	*7*
67-64-1	Acetone	*2*				*51*	*29*	*140*	*99*	*2*	
75-15-0	Carbon Disulfide							110	110	3	4
127-18-4	Tetrachloroethene										
66-67-3	Chloroform							47	46		
75-27-4	Bromodichloromethane										
124-48-1	Dibromochloromethane										
75-25-2	Bromoform										
71-43-2	Benzene										
108-88-3	Toluene							10	11	15	11
100-41-4	Ethylbenzene										
1330-20-7	Xylene (Total)										
Total Compounds Detected		0	4	3	3	67	49	317	277	25	22
Pentachlorophenol Detected		0	0	0	0	0	0	0	0	0	0
Benzene, Toluene, Ethylbenz., Xylene		0	0	0	0	0	0	10	11	15	11
EPA Method 418.1 TPH, mg/L		0.60	<0.20	0.59	<0.20	*Sample Broken*	*Sample Broken*	14.37	<0.20	<0.20	<0.20

SWDATA.WK3, SHEET C

Quantities shown in shaded cells indicate the compound was estimated because it was detected below method detection limits.
Bold italic quantities indicate constituent was detected in laboratory background samples.
Total Compounds Detected" does not include Methylene Chloride, Acetone, or Carbon Disulfide.

APPENDIX G - TPH Analysis Reports

Ball Engineering, Inc.

Report Date: 01/05/93

Colfax Creosoting Company
P.O. Box 4600
Pineville, LA 71360-4600
Mr. Clyde M. Norton, Vice President

Re: Analysis Results for RCRA Facility Investigation

REPORT OF ANALYSIS

Sample Number	Sample Description	Sample Date	Date Extracted	Analysis Date	Total Petroleum Hydrocarbons mg/L
92-581	GW-1	06/10/92	06/30/92	07/24/92	3.90
92-586	GW-2	06/10/92	06/30/92	07/24/92	6.61
92-587	GW-3	06/10/92	06/30/92	07/24/92	<0.2 mg/L
92-588	GW-5	06/11/92	07/01/92	07/24/92	<0.2 mg/L
92-589	GW-6	06/11/92	07/01/92	07/24/92	<0.2 mg/L
92-590	GW-7	06/11/92	07/01/92	07/24/92	3.34
92-591	GW-8	06/15/92	07/01/92	07/24/92	0.32
92-593	GW-9	06/16/92	07/01/92	07/24/92	19.19
92-594	GW-10	06/16/92	07/01/92	07/24/92	21.16
92-595	GW-11	06/16/92	07/01/92	07/24/92	48.44
92-596	GW-12	06/18/92	07/01/92	07/24/92	68.34
92-597	GW-13	06/18/92	07/01/92	07/24/92	69.97
92-599	GW-14	06/18/92	07/01/92	07/24/92	1.32

Test Method: EPA 418.1

John Ball, Ph.D.
Laboratory Manager

23 WOOD MANOR, TUSCALOOSA, ALABAMA 35401-4969 TELEPHONE (205) 345-6399

Ball Engineering, Inc.

Report Date: 01/05/93

Colfax Creosoting Company
P.O. Box 4600
Pineville, LA 71360-4600
Mr. Clyde M. Norton, Vice President

Re: Analysis Results for RCRA Facility Investigation

REPORT OF ANALYSIS

Sample Number	Sample Description	Sample Date	Date Extracted	Analysis Date	Total Petroleum Hydrocarbons mg/L
92-600	GW-15	06/18/92	07/01/92	07/24/92	0.30
92-601	GW-16	06/18/92	07/01/92	07/24/92	139.07
92-602	GW-24	06/22/92	07/02/92	07/24/92	437.17
92-604	GW-19	06/23/92	07/02/92	07/24/92	521.65
92-605	GW-20	06/23/92	07/02/92	07/24/92	655.80
92-606	GW-21	06/24/92	07/02/92	07/24/92	445.93
92-607	GW-22	06/24/92	07/02/92	07/24/92	632.65
92-608	GW-23	06/24/92	07/02/92	07/24/92	656.26
92-609	GW-25	06/25/92	07/02/92	07/24/92	6.55
92-610	GW-26	06/25/92	07/02/92	07/24/92	2.94
92-611	GW-27	06/25/92	07/02/92	07/24/92	1.17

Test Method: EPA 418.1

John Ball, Ph.D.
Laboratory Manager

23 WOOD MANOR, TUSCALOOSA, ALABAMA 35401-4969 TELEPHONE (205) 345-6399

Ball Engineering, Inc.

Report Date: 01/05/93

Colfax Creosoting Company
P.O. Box 4600
Pineville, LA 71360-4600
Mr. Clyde M. Norton, Vice President

Re: Analysis Results for RCRA Facility Investigation

REPORT OF ANALYSIS

Sample Number	Sample Description	Sample Date	Date Extracted	Analysis Date	Total Petroleum Hydrocarbons mg/L
92-612	GW-28	06/26/92	07/03/92	07/24/92	0.70
92-613	GW-29	06/26/92	07/03/92	07/24/92	5.66
92-614	GW-30	06/26/92	07/03/92	07/24/92	1.34
92-615	GW-31	06/30/92	07/03/92	07/24/92	1.43
92-616	SW-14A	06/16/92	07/01/92	07/24/92	2.58
92-617	SW-1	06/16/92	07/01/92	07/24/92	1.41
92-618	SW-13A	06/16/92	07/01/92	07/24/92	1.73
92-619	SW-2	06/01/92	06/30/92	07/24/92	0.94
92-620	SW-3	06/01/92	06/30/92	07/24/92	4.84
92-621	SW-4	06/01/92	06/30/92	07/24/92	8.24
92-622	SW-5	06/01/92	06/30/92	07/24/92	0.62
92-623	SW-6	06/01/92	06/30/92	07/24/92	0.31

Test Method: EPA 418.1

John Ball, Ph.D.
Laboratory Manager

23 WOOD MANOR, TUSCALOOSA, ALABAMA 35401-4969 TELEPHONE (205) 345-6399

Ball Engineering, Inc.

Report Date: 01/05/93

Colfax Creosoting Company
P.O. Box 4600
Pineville, LA 71360-4600
Mr. Clyde M. Norton, Vice President

Re: Analysis Results for RCRA Facility Investigation

REPORT OF ANALYSIS

Sample Number	Sample Description	Sample Date	Date Extracted	Analysis Date	Total Petroleum Hydrocarbons mg/L
92-624	SW-7	06/01/92	06/30/92	07/24/92	0.86
92-625	SW-8	06/01/92	06/30/92	07/24/92	0.28
92-626	SW-9	06/01/92	06/30/92	07/24/92	1.18
92-627	SW-10	06/01/92	06/30/92	07/24/92	<0.2 mg/L
92-628	SW-11	06/02/92	06/30/92	07/24/92	0.23
92-629	SW-12	06/08/92	06/30/92	07/24/92	1.19
92-630	SW-13	06/09/92	06/30/92	07/24/92	<0.2 mg/L
92-631	SW-14	06/09/92	06/30/92	07/24/92	0.28
92-632	SW-15	06/16/92	07/01/92	07/24/92	<0.2 mg/L
92-633	SW-16	06/26/92	07/03/92	07/24/92	<0.2 mg/L
92-634	DC-1	06/02/92	06/30/92	07/24/92	<0.2 mg/L
92-635	DC-2	06/09/92	06/30/92	07/24/92	<0.2 mg/L
92-636	DC-3	06/10/92	07/01/92	07/24/92	<0.2 mg/L
92-637	DC-4	06/11/92	07/01/92	07/24/92	<0.2 mg/L
92-638	DC-5	06/11/92	07/01/92	07/24/92	<0.2 mg/L

Test Method: EPA 418.1

John Ball, Ph.D.
Laboratory Manager

23 WOOD MANOR, TUSCALOOSA, ALABAMA 35401-4969 TELEPHONE (205) 345-6399

Ball Engineering, Inc.

Report Date: 01/05/93

Colfax Creosoting Company
P.O. Box 4600
Pineville, LA 71360-4600
Mr. Clyde M. Norton, Vice President

Re: Analysis Results for RCRA Facility Investigation

REPORT OF ANALYSIS

Sample Number	Sample Description	Sample Date	Date Extracted	Analysis Date	Total Petroleum Hydrocarbons mg/L
92-639	DC-6	06/16/92	07/01/92	07/24/92	<0.2 mg/L
92-640	DC-7	06/18/92	07/01/92	07/24/92	<0.2 mg/L
92-641	DC-8	06/18/92	07/01/92	07/24/92	2.47
92-642	DC-9	06/18/92	07/01/92	07/24/92	0.94
92-643	DC-10	06/23/92	07/02/92	07/24/92	<0.2 mg/L
92-644	DC-11	06/22/92	07/02/92	07/24/92	<0.2 mg/L
92-645	DC-12	06/26/92	07/03/92	07/24/92	<0.2 mg/L
92-646	DC-13	06/26/92	07/03/92	07/24/92	<0.2 mg/L
92-647	DC-14	06/26/92	07/03/92	07/24/92	<0.2 mg/L
92-648	DC-15	06/26/92	07/03/92	07/24/92	2.81
92-649	DC-16	06/22/92	07/02/92	07/24/92	4.36
92-650	DC-17	06/26/92	07/03/92	07/24/92	<0.2 mg/L
92-651	DC-18	06/30/92	07/03/92	07/24/92	<0.2 mg/L

Test Method: EPA 418.1

John Ball, Ph.D.
Laboratory Manager

23 WOOD MANOR, TUSCALOOSA, ALABAMA 35401-4969 TELEPHONE (205) 345-6399

Ball Engineering, Inc.

Report Date: 01/05/93

Colfax Creosoting Company
P.O. Box 4600
Pineville, LA 71360-4600
Mr. Clyde M. Norton, Vice President

Re: Analysis Results for RCRA Facility Investigation

REPORT OF ANALYSIS

Sample Number	Sample Description	Sample Date	Date Extracted	Analysis Date	Total Petroleum Hydrocarbons mg/L
92-652	FB-2	06/01/92	06/30/92	07/24/92	<0.2 mg/L
92-653	FB-1	06/01/92	06/30/92	07/24/92	<0.2 mg/L
92-654	FB-9	06/17/92	07/01/92	07/24/92	<0.2 mg/L
92-655	FB-6	06/11/92	07/01/92	07/24/92	<0.2 mg/L
92-656	FB-13	06/24/92	07/02/92	07/24/92	<0.2 mg/L
92-657	FB-11	06/18/92	07/01/92	07/24/92	<0.2 mg/L
92-658	FB-18	06/24/92	07/02/92	07/24/92	<0.2 mg/L
92-659	FB-20	06/30/92	07/03/92	07/24/92	0.66
92-660	TB-1	06/01/92	06/30/92	07/24/92	0.60
92-661	TB-2	06/01/92	06/30/92	07/24/92	0.59
92-662	TB-6	06/10/92	06/30/92	07/24/92	0.87
92-663	TB-9	06/17/92	07/01/92	07/24/92	14.37
92-664	TB-11	06/18/92	07/01/92	07/24/92	0.59
92-665	TB-13	06/23/92	07/02/92	07/24/92	3.04
92-666	TB-18	06/23/92	07/02/92	07/24/92	<0.2 mg/L
92-667	TB-20	06/30/92	07/03/92	07/24/92	<0.2 mg/L

Test Method: EPA 418.1

John Ball, Ph.D.
Laboratory Manager

23 WOOD MANOR, TUSCALOOSA, ALABAMA 35401-4969 TELEPHONE (205) 345-6399

Ball Engineering, Inc.

Report Date: 01/05/93

Colfax Creosoting Company
P.O. Box 4600
Pineville, LA 71360-4600
Mr. Clyde M. Norton, Vice President

Re: Analysis Results for RCRA Facility Investigation

REPORT OF ANALYSIS

Sample Number	Sample Description	Sample Date	Date Extracted	Analysis Date	Total Petroleum Hydrocarbons mg/L
92-668	BG4	06/08/92	06/30/92	07/24/92	<0.2 mg/L

Test Method: EPA 418.1

John Ball, Ph.D.
Laboratory Manager

23 WOOD MANOR, TUSCALOOSA, ALABAMA 35401-4969 TELEPHONE (205) 345-6399

APPENDIX H - QA/QC Analytical Results

APPENDIX H

Colfax Creosoting RCRA Facility Investigation

Semi-Volatile Compounds Detected

Cas No.	Compound	Sample Concentration, parts per billion TB1	TB2	TB3	TB4	TB5	TB6	TB7	TB8	TB9	TB10
87-86-5	Pentachlorophenol										
84-74-2	Di-n-Butylphthalate										
85-68-7	Butylbenzylphthalate										
218-01-9	Chrysene					200	7				
191-24-2	Benzo(g,h,i)Perylene										

Volatile Compounds Detected

75-00-3	Methylene Chloride	*5*	*3*	*58*	*16*	*7*	*8*	*16*	*27*	*10*	*21*
67-64-1	Acetone	*2*		*170*	*51*					*140*	
75-15-0	Carbon Disulfide					7	*40*	6		110	14
67-66-3	Chloroform						100			47	
78-87-5	1,2-Dichloropropane						6				
108-88-3	Toluene									10	
1330-20-7	Xylene (Total)										
Total Compounds Detected		7	3	228	67	214	161	22	27	317	35
EPA Method 418.1 **TPH, mg/L**		0.60	0.59	N/A	N/A	N/A	0.87	N/A	N/A	14.37	N/A

QA/QCSUM.WK3, SHEET A

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits.
Bold italic quantities indicate constituent was detected in laboratory background samples.
Soil matrix TPA shown as "NA" because test was not required.

APPENDIX H

Colfax Creosoting RCRA Facility Investigation

Semi-Volatile Compounds Detected

Cas No.	Compound	Sample Concentration, parts per billion									
		TB11	TB12	TB13	TB14	TB15	TB16	TB17	TB18	TB19	TB20
87-86-5	Pentachlorophenol										
84-74-2	Di-n-Butylphthalate			9			1600				
85-68-7	Butylbenzylphthalate										
218-01-9	Chrysene										
191-24-2	Benzo(g,h,i)Perylene										

Volatile Compounds Detected

75-00-3	Methylene Chloride	*5*	***48***	9		***26***	***32***	***21***	*5*	***20***	***21***
67-64-1	Acetone		130	180		***92***	46	***54***	*2*	***7***	***31***
75-15-0	Carbon Disulfide	11		99		***4***	12		3		
67-66-3	Chloroform			26							
78-87-5	1,2-Dichloropropane										
108-88-3	Toluene		20	11			7		15	38	6
1330-20-7	Xylene (Total)			6							
Total Compounds Detected		16	198	340	0	122	1697	75	25	65	58
EPA Method 418.1 **TPH, mg/L**		0.59	N/A	3.04	N/A	N/A	N/A	N/A	<0.20	N/A	<0.20

QA/QCSUM.WK3, SHEET B

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits.
Bold italic quantities indicate constituent was detected in laboratory background samples.
Soil matrix TPA shown as "NA" because test was not required.

Ball Engineering, Inc.

APPENDIX H

Colfax Creosoting RCRA Facility Investigation

Semi-Volatile Compounds Detected

Cas No.	Compound	Sample Concentration, parts per billion									
		DC1	DC2	DC3	DC4	DC5	DC6	DC7	DC8	DC9	DC10
87-86-5	Pentachlorophenol										
84-74-2	Di-n-Butylphthalate							8			
85-68-7	Butylbenzylphthalate						10				
218-01-9	Chrysene					***18***					
191-24-2	Benzo(g,h,i)Perylene									0.05	

Volatile Compounds Detected

75-00-3	Methylene Chloride	***12***		***2***		***10***		***15***	***2***	***5***	***5***
67-64-1	Acetone		***54***	***170***							110
75-15-0	Carbon Disulfide		35	***91***		41			6	12	85
67-66-3	Chloroform		95			72					
78-87-5	1,2-Dichloropropane										
108-88-3	Toluene										
1330-20-7	Xylene (Total)										
Total Compounds Detected		12	184	263	0	141	10	23	8	17.05	200
EPA Method 418.1 **TPH, mg/L**		<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	2.47	0.94	<0.20

QA/QCSUM.WK3, SHEET C

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits.
Bold italic quantities indicate constituent was detected in laboratory background samples.
Soil matrix TPA shown as "NA" because test was not required.

Ball Engineering, Inc.

APPENDIX H

Colfax Creosoting RCRA Facility Investigation

Semi-Volatile Compounds Detected

Cas No.	Compound	Sample Concentration, parts per billion DC11	DC12	DC13	DC14	DC15	DC16	DC17	DC18
87-86-5	Pentachlorophenol	11							
84-74-2	Di-n-Butylphthalate		13	14	10	14			
85-68-7	Butylbenzylphthalate								
218-01-9	Chrysene								
191-24-2	Benzo(g,h,i)Perylene								

Volatile Compounds Detected

Cas No.	Compound	DC11	DC12	DC13	DC14	DC15	DC16	DC17	DC18
75-00-3	Methylene Chloride	4	13	13	13	9	***18***	***5***	***7***
67-64-1	Acetone	150			65		***11***		***11***
75-15-0	Carbon Disulfide	77	50	70	44	78	***28***	9	
67-66-3	Chloroform							54	110
78-87-5	1,2-Dichloropropane								
108-88-3	Toluene				4				
1330-20-7	Xylene (Total)								
Total Compounds Detected		242	76	97	136	101	57	68	128
EPA Method 418.1 **TPH, mg/L**		<0.20	<0.20	<0.20	<0.20	2.81	4.36	<0.20	<0.20

QA/QCSUM.WK3, SHEET D

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits.
Bold italic quantities indicate constituent was detected in laboratory background samples.
Soil matrix TPA shown as "NA" because test was not required.

Ball Engineering, Inc.

APPENDIX H

Colfax Creosoting RCRA Facility Investigation

Semi-Volatile Compounds Detected

Cas No.	Compound	Sample Concentration, parts per billion									
		FB1	FB2	FB3	FB4	FB5	FB6	FB7	FB8	FB9	FB10
87-86-5	Pentachlorophenol										
84-74-2	Di-n-Butylphthalate										740
85-68-7	Butylbenzylphthalate										
218-01-9	Chrysene						***10***				
191-24-2	Benzo(g,h,i)Perylene										

Volatile Compounds Detected

75-00-3	Methylene Chloride	***4***	***3***	***22***	***20***	***7***	***8***	***13***	***40***	***11***	***34***
67-64-1	Acetone				***29***		***62***		20	***99***	
75-15-0	Carbon Disulfide					8	***77***	4		110	
67-66-3	Chloroform						87			46	
78-87-5	1,2-Dichloropropane										
108-88-3	Toluene									11	
1330-20-7	Xylene (Total)										
Total Compounds Detected		4	3	22	49	15	244	17	60	277	774
EPA Method 418.1 **TPH, mg/L**		<0.20	<0.20	N/A	N/A	N/A	<0.20	N/A	N/A	<0.20	N/A

QA/QCSUM.WK3, SHEET E

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits.
Bold italic quantities indicate constituent was detected in laboratory background samples.
Soil matrix TPA shown as "NA" because test was not required.

APPENDIX H

Colfax Creosoting RCRA Facility Investigation

Semi-Volatile Compounds Detected

Cas No.	Compound	Sample Concentration, parts per billion FB11	FB12	FB13	FB14	FB15	FB16	FB17	FB18	FB19	FB20
87-86-5	Pentachlorophenol										
84-74-2	Di-n-Butylphthalate										
85-68-7	Butylbenzylphthalate										
218-01-9	Chrysene										
191-24-2	Benzo(g,h,i)Perylene										

Volatile Compounds Detected

75-00-3	Methylene Chloride	***4***	***31***	***7***	***6***	***33***		***22***	***7***	***19***	***9***
67-64-1	Acetone					120		***160***			***11***
75-15-0	Carbon Disulfide			21	90			5	4		
67-66-3	Chloroform										120
78-87-5	1,2-Dichloropropane										
108-88-3	Toluene				***6***			19	11	22	
1330-20-7	Xylene (Total)										
Total Compounds Detected		4	31	28	102	153	0	206	22	41	140
EPA Method 418.1 **TPH, mg/L**		<0.20	N/A	<0.20	N/A	N/A	N/A	N/A	<0.20	N/A	0.66

QA/QCSUM.WK3, SHEET F

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits.
Bold italic quantities indicate constituent was detected in laboratory background samples.
Soil matrix TPA shown as "NA" because test was not required.

Ball Engineering, Inc.

REFERENCE 15

MITRE

26 May 1988
WEL-[illegible]

Ms. Lucy Sibold
U.S. Environmental Protection Agency
401 M Street, S.W.
Room 2636, Mail Code WH-548A
Washington, D.C. 20460

Dear Ms. Sibold:

Enclosed is a copy of the draft revised HRS net precipitation values for 3,345 weather stations where data were available. The data are presented by state code, station name, latitude longitude, and net precipitation in inches. A list of state codes is also enclosed

The net precipitation values are provided to assist the Phase II - Field Testing efforts. It is suggested that the value from the nearest weather station in a similar geographic setting be used as the net precipitation value for a site.

If there are any questions regarding this material, please contact Dave Egan at (703) 883-7866.

Sincerely,

Andrew M. Platt
Group Leader
Hazardous Waste Systems

AMP:DEE/hme

Enclosures

cc: Scott Parrish

The MITRE Corporation
Civil Systems Division
7525 Colshire Drive, McLean, Virginia 22102-3481
Telephone (703) 883-6000 Telex 248923

OBS	STATE	NAME		LATNUM	LONNUM	NETPREC
1101	16	GRAND COTEAU		30.26	92.02	22.3867
1102	16	COVINGTON 4 NNW		30.32	90.07	23.8247
1103	16	HAMMOND 3 NW		30.32	90.29	26.8570
1104	16	BATON ROUGE WSO	R	30.32	91.08	20.1282
1105	16	MELVILLE		30.41	91.45	22.3342
1106	16	AMITE		30.43	90.30	26.9962
1107	16	BOGALUSA		30.47	89.57	24.1599
1108	16	ELIZABETH		30.52	92.48	26.3992
1109	16	BUNKIE		30.57	92.10	27.3214
1110	16	LEESVILLE		31.09	93.16	22.0141
1111	16	ALEXANDRIA		31.19	92.28	24.2674
1112	16	BELAH FIRE TOWER		31.38	92.11	26.4149
1113	16	NATCHITOCHES		31.46	93.05	20.9529
1114	16	OLLA 3 SSW		31.52	92.16	26.3273
1115	16	WINNFIELD 2 W		31.56	92.41	23.8727
1116	16	SAINT JOSEPH EXP STA		31.57	91.14	24.7117
1117	16	LOGANSPORT 4 ENE		31.59	93.57	20.1961
1118	16	WINNSBORO		32.09	91.42	24.2368
1119	16	TALLULAH 2 SW		32.24	91.13	25.2981
1120	16	SHREVEPORT WSO	R	32.28	93.49	16.6642
1121	16	MONROE FAA AIRPORT		32.31	92.03	21.6628
1122	16	CALHOUN EXP STATION		32.31	92.20	22.3810
1123	16	RUSTON LA POLYTECH INS		32.31	92.39	23.4018
1124	16	MINDEN		32.36	93.18	20.2617
1125	16	HOMER EXP STATION		32.45	93.04	21.7412
1126	16	BASTROP		32.47	91.54	23.2370
1127	16	LAKE PROVIDENCE		32.49	91.12	25.6024
1128	16	COTTON VALLEY		32.49	93.25	21.3857
1129	16	PLAIN DEALING		32.54	93.41	20.9866
1130	17	PORTLAND WSO	//R	43.39	70.19	25.6420
1131	17	LEWISTON		44.06	70.14	26.3577
1132	17	GARDINER		44.13	69.47	25.3548
1133	17	AUGUSTA FAA AIRPORT		44.19	69.48	23.4279
1134	17	BAR HARBOR		44.23	68.12	32.5261
1135	17	BELFAST		44.24	69.00	29.7955
1136	17	RUMFORD 1 SSE		44.32	70.32	23.9090
1137	17	WATERVILLE PUMP STA		44.33	69.39	22.1899
1138	17	JONESBORO		44.39	67.39	31.1300
1139	17	FARMINGTON		44.41	70.09	26.3940
1140	17	BANGOR FAA AP		44.48	68.49	23.1465
1141	17	MADISON		44.48	69.53	21.2056
1142	17	EASTPORT	R	44.55	67.00	25.5849
1143	17	CORINNA		44.57	69.13	24.0225
1144	17	WOODLAND		45.09	67.24	27.6710
1145	17	RIPOGENUS DAM		45.53	69.11	19.8047
1146	17	HOULTON FAA AP		46.08	67.47	20.0847
1147	17	HOULTON		46.08	67.50	19.5627
1148	17	PRESQUE ISLE		46.39	68.00	17.1429
1149	17	CARIBOU WSO	//R	46.52	68.01	18.0141
1150	18	CRISFIELD SOMERS COVE		37.59	75.52	16.0542
1151	18	POCOMOKE CITY		38.04	75.33	18.2727
1152	18	PRINCESS ANNE		38.13	75.41	18.3406
1153	18	SNOW HILL 4 N		38.14	75.23	19.6273
1154	18	SOLOMONS		38.19	76.27	16.3734
1155	18	SALISBURY FAA AIRPORT		38.20	75.30	18.7381

REFERENCE 16

```
TGEMS> 4.8

Enter the next ring distance
TGEMS> 6.4

Enter the next ring distance
TGEMS>

Enter program execution mode: B (batch) or I (interactive)
TGEMS> i


Colfax Creosote
LATITUDE   31:19:10   LONGITUDE   92:26: 0      1990 POPULATION
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KM	0.00-.400	.400-.810	.810-1.60	1.60-3.20	3.20-4.80	4.80-6.40	SECTOR TOTALS
S 1	675	1692	2858	13680	22373	13286	54564
RING TOTALS	675	1692	2858	13680	22373	13286	54564

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press RETURN to continue
 Esc for ATtention, Home to SWitch    ‖      Capture Off          ‖ On: 00:13:20
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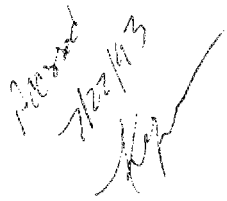


REFERENCE 17

WELLHEAD PROTECTION PROGRAM

STATE OF LOUISIANA

MARCH 1990

DEPARTMENT OF ENVIRONMENTAL QUALITY

23

INTRODUCTION

Section 1428 of the Safe Drinking Water Act Amendments of 1986 requires the Governor or the Governor's designee of each State to submit to the Administrator of the U.S. Environmental Protection Agency (EPA) a State program to protect wellhead areas within their jurisdiction from contaminants which may have any adverse effect on human health. (See Glossary section for definition of terms).

The Louisiana Department of Environmental Quality (DEQ) has been designated the lead agency by the Governor in developing a Wellhead Protection Program (See Governor's letter, Appendix A). The Secretary of the Department of Environmental Quality has assigned responsibility for this program to the Ground Water Protection Division (GWPD) of DEQ.

Programs must be submitted by June 19, 1989 to be eligible for Federal funding under the Safe Drinking Water Act (SDWA). The Ground Water Protection Division of DEQ submitted a program for consideration by EPA within the established deadline.

FUNDING

Section 1428(k) of the SDWA authorizes the Administrator of EPA to make grants to states with approved programs. Specifically, the administrator shall make grants to the State for not less than 50 or more than 90 percent of the cost incurred by a State (as determined by the Administrator) in developing and implementing each State program under the section.

At the present time, funding to states for Wellhead Protection Programs is not available under the Safe Drinking Water Act. The Ground Water Protection Division of DEQ has applied for funding for development of a Wellhead Protection Program and Pilot Project through Section 106 of the Clean Water Act. These monies are also administered by EPA.

REQUIREMENTS OF THE WELLHEAD PROTECTION PROGRAM

According to EPA guidance documents and the Statute, e Wellhead Protection Program (WHP) has to have as a minimum:

(1) A discussion of the program's purpose and a summary;

(2) Specify the roles and duties of State agencies, local governmental entities, and public water supply systems with respect to the development and implementation of Wellhead Protection Programs;

(3) Delineate the wellhead protection area (WHPA) for each wellhead, as defined in subsection 1428(e), based on available hydrogeologic information on ground water flow, recharge and discharge, and other information the State deems necessary to adequately determine the WHPA;

(4) Identify sources of contamination within each WHPA including all potential anthropogenic sources that may have any adverse effect on health;

(5) Develop management approaches which include, as appropriate, technical assistance, financial assistance, implementation of control measures, education, training, and demonstration projects that are used to protect the water supply within WHPA's from such contaminants;

(6) Develop contingency plans for each public water supply system indicating the location and provision of alternate drinking water supplies in the event of well or wellfield contamination;

(7) Site new wells properly to maximize yield and minimize potential contamination;

(8) Ensure public participation by incorporating processes for appropriate involvement in WHP Program elements.

The Table of Contents of this Wellhead Protection Program docume follows the above outline of topics established by EPA.

PURPOSE - GOALS AND PHILOSOPHY OF THE PROGRAM

The fundamental goal of the Wellhead Protection Program is to protect public water supply wellhead areas from contaminants which may have adverse effects on human health.

A Public Water Supply (PWS) is one which provides water to the public and such system has at least 15 service connections or regularly serves an average of at least 25 individuals daily for at least 60 days of the year. A "Wellhead Protection Area" means the surface and subsurface area surrounding a well or wellfield, supplying a public water system through which contaminants are likely to move toward and reach such water well or wellfield.

The objectives of the Wellhead Protection Program coincide with those of the Louisiana Ground Water Protection Strategy. The aim of both programs is to protect the health and well-being of all Louisiana's citizens by safeguarding the ground water they drink and use.

It is also felt that the Wellhead Protection Program adds a degree of protection for the public water supplies of the state, strengthens the overall Ground Water Protection Strategy goal of protecting both the resource and public health, and fosters effective long-term environmental planning.

The thrust of the state's program will be to prevent contamination. This is the most effective and least expensive means of protecting ground water resources. This philosophy of achieving protection through prevention is shared by the Ground Water Protection Strategy.

The goals of the program are achieved by delineating wellhead protection areas, inventorying, inspecting and controlling potential ground water contaminating sources in those areas, and finally assessing the relative threats to public water supplies posed by these various sources.

Many state (and federal) agencies in Louisiana are engaged in some aspect of ground water protection activities. An effective Wellhead Protection Program requires the focusing of these activities toward a comprehensive state drinking water protection plan.

Long term drinking water planning and protection can be fostered through the development of a geographic information system for the Wellhead Protection Program. A GIS would allow DEQ to consolidate key interagency information on potential contamination sources, ground water quality, and water well information.

These efforts will also afford DEQ the ability to communicate environmental information more effectively to the public.

DELINEATION OF WELLHEAD PROTECTION AREAS

The Department of Environmental Quality, the lead agency, will use distance as the criteria for delineation. In confined aquifers the state will use one (1) mile radius circles. For wellheads in recharge areas or unconfined (water table) aquifers, two (2) mile radius circles will be used to delineate the protection areas. These threshold distances are believed to be conservative and therefore at least over-protective of the wellhead. The state recognizes three general categories of threats to wells:

-- Direct introduction of contaminants in the immediate well area

-- Microbial (bacteriological) Contaminants

-- Chemical and Radiological Contaminants

Wellhead Protection Areas will be delineated and inventoried in the order of priority shown below. This priority sequence reflects the concept that public supply wells completed in unconfined aquifers and at relatively shallow depths are more likely to have contaminants infiltrate the aquifer and affect drinking water supplies. Recent studies of Louisiana aquifers indicate that hydraulic conductivity decreases from the youngest aquifers to the oldest.[1] This also supports the order of priority chosen. WHP Pilot project areas have been chosen to include such wells.

(1) PWS Wells in alluvial aquifers
(2) PWS Wells completed at depths of 100 feet or less
(3) PWS Wells completed at depths of 200 feet or less
(4) PWS Wells located in aquifer recharge areas

WHP Radius Distances

The one and two mile WHP radius distances chosen are believed to afford a large measure of protection to PWS wells. Lateral hydraulic conductivity estimated values for the Upper Pleistocene aquifer are 50 - 170 ft./day and 10 - 38 ft./day for the Lower Miocene aquifer. Values are based on 1980 aquifer pumping conditions and model simulation.[2] These travel times allow for evaluation of effects and relocation of wells if needed should surface or near-surface contamination occur within a WHP area.

1 Statistical Analysis of Aquifer-Test Results For Nine Regional Aquifers in Louisiana, U.S.G.S. Water-Resources Investigations Report 87-4001, p. 1.

2 Geohydrology and Regional Ground Water Flow of the Coastal Lowlands Aquifer System in Parts of Louisiana, Miss., Alabama and Florida, U.S.G.S. Water-Resources Investigations Report 88-4100, pp. 11-17.

Rules Regarding the Construction, Location, Testing of Water Wells

The Department of Transportation and Development administers the Water Well Rules, Regulations and Standards for the state of Louisiana. These regulations currently protect wellheads from direct introduction of contaminants and microbial contamination by requiring certain "setbacks" during well construction. These regulations are attached as Appendix C.

In addition, Chapter XII of the State's Sanitary Code has adopted the same "setbacks". Therefore these regulations protect wellheads by requiring construction standards and setbacks be maintained after the well has been built (Chapter XII of the State Sanitary Code is attached as Appendix D).

The third threat to well contamination is from chemical and radiological contamination. The U.S. Environmental Protection Agency has established primary (enforceable) drinking water standards for chemical, radiological, and bacteriological contamination.

In addition, secondary (nonenforceable) drinking water standards are established for parameters such as taste, odor, and color. EPA plans to add a large number of chemical constituents for regulation under the primary drinking water standard list, to be phased in over a period of 3-4 years. (See separate section entitled EPA Drinking Water Standards). Those chemical, radiological, and bacteriological contaminants which are regulated by EPA and formulate the primary drinking water standards will be of primary importance within the scope of the Wellhead Protection Program.

These federal standards are enforced at the state level by the Department of Health and Hospitals (DHH). DHH also reviews sampling results to determine whether PWS wells are meeting established standards.

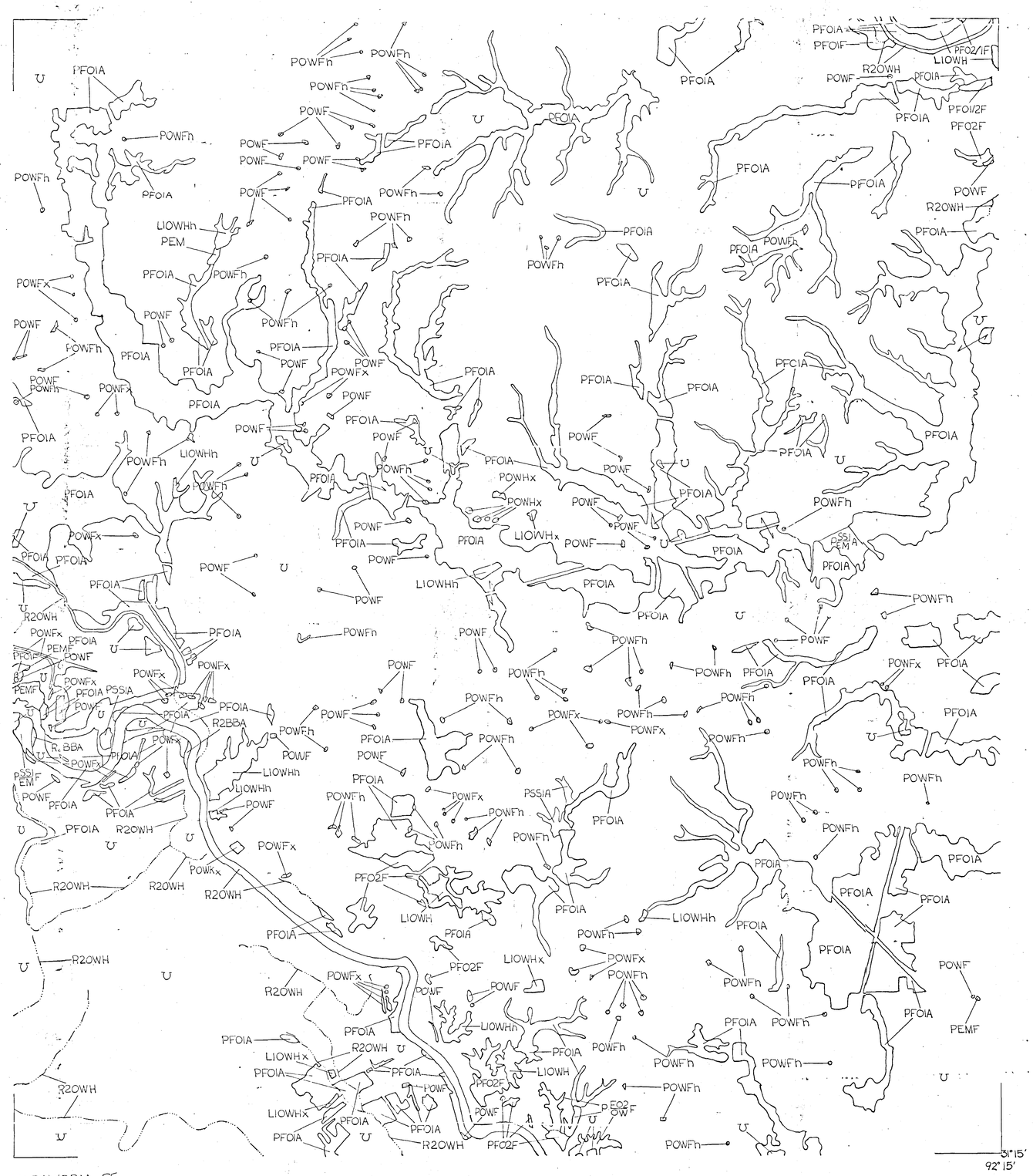
A central idea of the Wellhead Protection Program is to target environmental protection activities toward those PWS wells that are determined to be most threatened by contamination. The degree to which PWS wells meet established drinking water standards is an important measurement guide or milestone to be considered in the program. Additional PWS sampling may be warranted in Wellhead Protection areas.

23 07

REFERENCE 18

NATIONAL WETLANDS INVENTORY

UNITED STATES DEPARTMENT OF THE INTERIOR



SCALE 1:62500

Other information concerning the wetland resources depicted on this document may be available. For information, contact:

Regional Director (ARDE) Region IV
U.S. Fish and Wildlife Service
75 Spring Street S.W.
Atlanta, Georgia 30303

SPECIAL NOTE

This document was prepared primarily by stereoscopic analysis of high altitude aerial photographs. Wetlands were identified on the photographs based on vegetation, visible hydrology, and geography in accordance with "Classification of Wetlands and Deep Water Habitats of the United States (An Operational Draft), Cowardin, et al, 1977. The aerial photographs typically exhibit spectral, textural, spatial, and temporal characteristics that allow interpretation of wetlands. In addition, there is a degree of error inherent in the use of the aerial photographs. Thus, a dataset on the ground and historical analysis of a single site may result in a revision of the wetland boundaries established through photographic interpretation. In addition, some small wetlands and those obscured by dense forest cover may not be included on this document.

Federal, State and local regulatory agencies with jurisdiction over wetlands may define and describe wetlands in a different manner than that used in this inventory. There is no attempt, in either the design or products of this inventory, to define the limits of proprietary jurisdiction of any Federal, State or local government or to establish the geographical scope of the regulatory programs of government agencies. Persons intending to engage in activities involving modifications within or adjacent to wetland areas should seek the advice of appropriate Federal, State or local agencies concerning specified agency regulatory programs and proprietary jurisdictions that may affect such activities.

SYMBOLOGY EXAMPLE

SYSTEM
SUBSYSTEM
CLASS
SUBCLASS, WATER REGIME
UPLAND (NON WETLAND)
PI or PN FARMED WETLANDS
CONTROLLED WATER REGIME

NOTES TO THE USER

- Wetlands which have been field examined are indicated on the map by an asterisk (*).
- Dominance type (either vegetative or sedentary animal) can be added to the map by the interested user.
- Additions or corrections to the wetlands information displayed on this map are solicited. Please forward such information to the address indicated.

AERIAL PHOTOGRAPHY

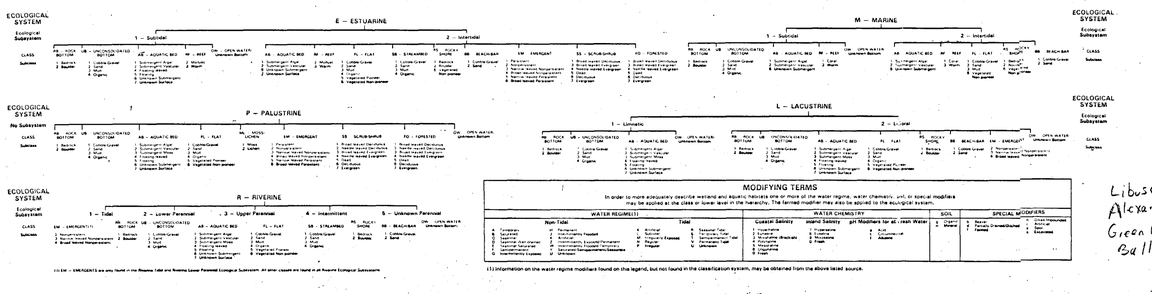
DATE: 11 / 1974
SCALE: 1:120,000
TYPE: CIR
DATE: / /
SCALE:
TYPE:
DATE: / /
SCALE:
TYPE:

U.S. DEPARTMENT OF THE INTERIOR
FISH AND WILDLIFE SERVICE

Prepared by Office of Biological Services for the National Wetlands Inventory

WETLAND LEGEND

U – Primarily represents upland areas, but may include unclassified wetlands such as man-modified areas, non photo-identifiable areas and/or unintentional omissions.



Libuse
Alexandria
Green Gable
Bull

REFERENCE 19

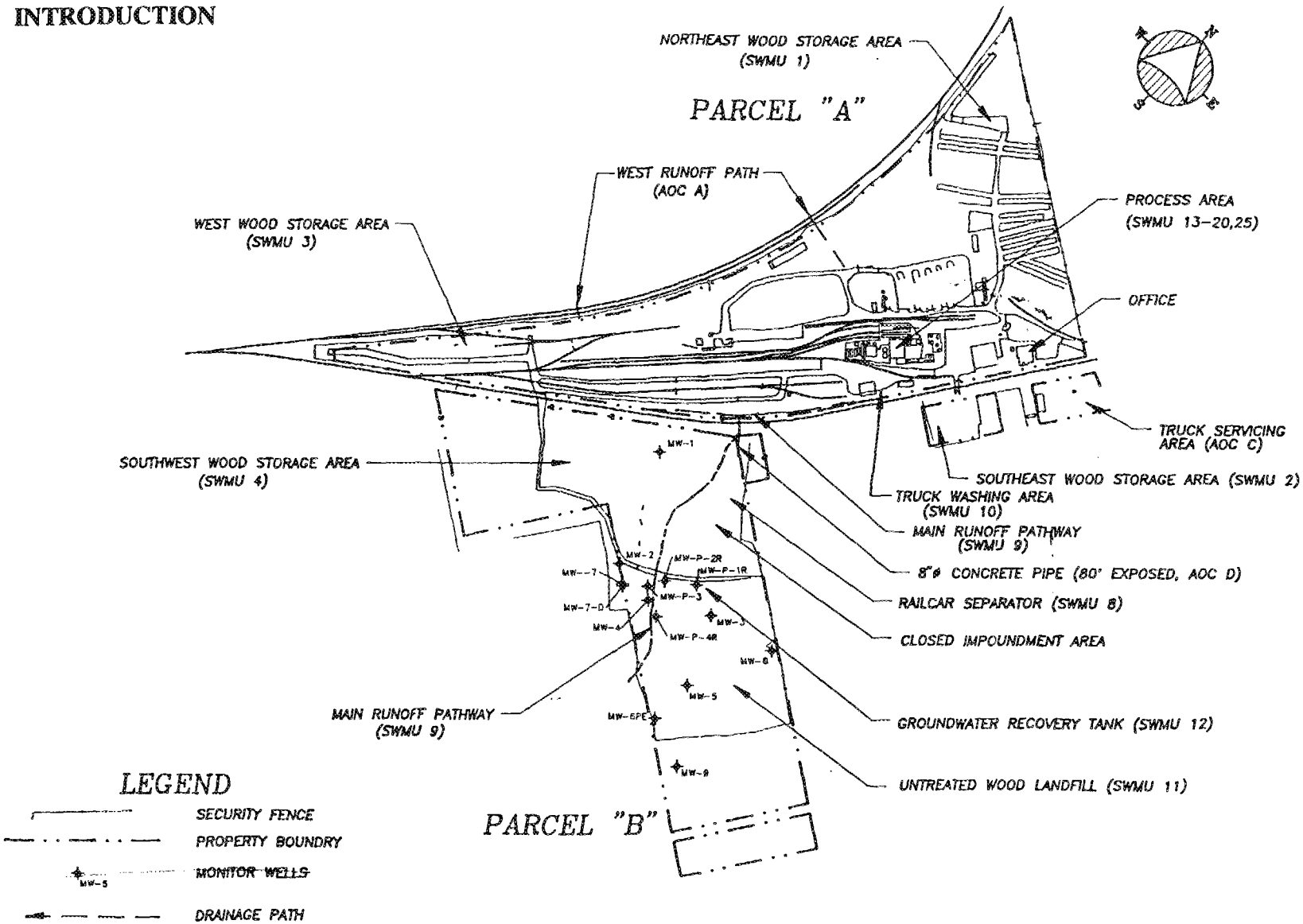


FIGURE 2-1: FACILITY MAP SHOWING SWMU LOCATIONS

Ball Engineering, Inc.

APPENDIX H

Colfax Creosoting RCRA Facility Investigation

Semi-Volatile Compounds Detected

Cas No.	Compound	Sample Concentration, parts per billion DC11	DC12	DC13	DC14	DC15	DC16	DC17	DC18
87-86-5	Pentachlorophenol	11							
84-74-2	Di-n-Butylphthalate		13	14	10	14			
85-68-7	Butylbenzylphthalate								
218-01-9	Chrysene								
191-24-2	Benzo(g,h,i)Perylene								

Volatile Compounds Detected

Cas No.	Compound	DC11	DC12	DC13	DC14	DC15	DC16	DC17	DC18
75-00-3	Methylene Chloride	4	13	13	13	9	***18***	***5***	***7***
67-64-1	Acetone	150			65		***11***		***11***
75-15-0	Carbon Disulfide	77	50	70	44	78	***28***	9	
67-66-3	Chloroform							54	110
78-87-5	1,2-Dichloropropane								
108-88-3	Toluene				4				
1330-20-7	Xylene (Total)								
Total Compounds Detected		242	76	97	136	101	57	68	128
EPA Method 418.1 **TPH, mg/L**		<0.20	<0.20	<0.20	<0.20	2.81	4.36	<0.20	<0.20

QA/QCSUM.WK3, SHEET D

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits.
Bold italic quantities indicate constituent was detected in laboratory background samples.
Soil matrix TPA shown as "NA" because test was not required.

Ball Engineering, Inc.

APPENDIX H

Colfax Creosoting RCRA Facility Investigation

Semi-Volatile Compounds Detected

Cas No.	Compound	Sample Concentration, parts per billion FB11	FB12	FB13	FB14	FB15	FB16	FB17	FB18	FB19	FB20
87-86-5	Pentachlorophenol										
84-74-2	Di-n-Butylphthalate										
85-68-7	Butylbenzylphthalate										
218-01-9	Chrysene										
191-24-2	Benzo(g,h,i)Perylene										

Volatile Compounds Detected

75-00-3	Methylene Chloride	4	31	7	6	33		22	7	19	9
67-64-1	Acetone					120		160			11
75-15-0	Carbon Disulfide			21	90			5	4		
67-66-3	Chloroform										120
78-87-5	1,2-Dichloropropane										
108-88-3	Toluene				6			19	11	22	
1330-20-7	Xylene (Total)										
Total Compounds Detected		4	31	28	102	153	0	206	22	41	140
EPA Method 418.1 TPH, mg/L		<0.20	N/A	<0.20	N/A	N/A	N/A	N/A	<0.20	N/A	0.66

QA/QCSUM.WK3, SHEET F

Quantities shown in shaded cells indicate the compound was estimated because it was detected below the method detection limits.
Bold italic quantities indicate constituent was detected in laboratory background samples.
Soil matrix TPA shown as "NA" because test was not required.

Hall Engineering