

ŞEPA Superfund **Record of Decision:**

Perdido Ground Water, AL

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None

EPA/ROD/RO4-88/042
Perdido Groundwater Contamination, AL
First Remedial Action - Final

16. ABSTRACT (continued)

The selected remedial action for this site includes: ground water pump and treatment using air stripping or activated carbon adsorption with reinjection of treated water back into the aquifer, and air monitoring during operations; and ground water monitoring to measure success of the cleanup. The estimated capital cost for this remedial action is \$169,000 with estimated annual O&M cost of \$103,000.

REMEDIAL ALTERNATIVE SELECTION

SITE

Perdido Groundwater Contamination Site Perdido, Alabama

STATEMENT OF PURPOSE

This decision document represents the selected remedial action for this site developed in accordance with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA), and to the extent practicable, the National Contingency Plan (40 CFR Part 300).

STATEMENT OF BASIS

This decision is based on the Administrative Record which encompasses those documents describing the site-specific conditions and the analysis of the cost effectiveness of the remedial alternatives for the Perdido site. The attached index (Appendix A) identifies the items which comprise the administrative record upon which the selection of the remedial action is based.

The State of Alabama has been consulted and concurs on the selected remedy.

DESCRIPTION OF THE SELECTED REMEDY

The groundwater at the Perdido site is contaminated with Benzene. Consultations with the Alabama Department of Environmental Management have been conducted to determine the cleanup levels and the preferred remedial alternative.

The selected remedy for the groundwater contamination consists of:

- recovery of the contaminated groundwater by means of a recovery well field;
- treatment of the recovered contaminated groundwater based on the cleanup levels established for Benzene and;
- reinjection of the treated groundwater back into the aquifer.

Operation and maintenance activities required to ensure the continued effectiveness of the remedy include:

- periodic monitoring of the pump and treat system to ensure continued effectiveness in attaining cleanup standards;
- periodic groundwater monitoring to ensure that long term performance goals have been achieved.

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

Jatuil M 166m Ja GREER C. TIDWELL, REGIONAL ADMINISTRATOR

SUMMARY OF REMEDIAL ALTERNATIVE SELECTION PERDIDO GROUNDWATER CONTAMINATION SITE PERDIDO, BALDWIN COUNTY, ALABAMA

Prepared By:

U. S. ENVIRONMENTAL PROTECTION AGENCY

Region IV
Atlanta, Georgia

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Enforcement Record of Decision Summary of Remedial Alternative Selection

Perdido Groundwater Contamination Site Perdido Baldwin County, Alabama

1.0 Introduction

The Perdido site was proposed for inclusion on the National Priorities List (NPL) on December 1, 1982 and ranks 655. Placement of the Perdido site on the NPL became final on September 1, 1983. The Perdido site has been the subject of a Remedial Investigation (RI) and Feasibility Study (FS) performed by the responsible party, CSX Transportation, Inc., under an Administrative Order by Consent, dated October 11, 1985. The RI report, which examines air, soil, surface water and groundwater contamination at the site, was completed on May 1988. The FS, which develops and examines alternatives for remediation of the site, was issued in draft form to the public in May 1988.

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

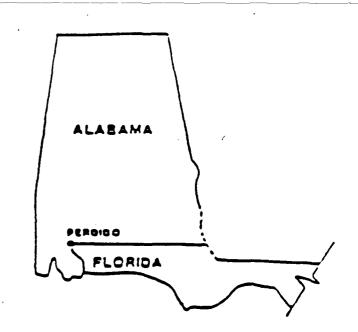
1.1 Site Location and Description

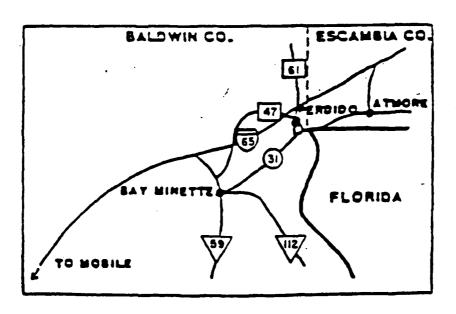
The Perdido Groundwater Contamination Site is located in the town of Perdido, Baldwin County, Alabama near the intersection of State Roads 47 and 61 (figure 1-1). The site consists of groundwater contamination originating from a 1965 train derailment by the Louisville and Nashville Railroad (now CSX Transportation, Inc.) which occurred approximately 200 yards east of the intersection of State Roads 47 and 61. Chemicals from the derailed tanks were spilled into the drainage ditches along State Road 61. As a result of the spill, the chemical Benzene penetrated through the soil and entered the groundwater aquifer used by area residents for their domestic well water.

The total area investigated during the remedial investigation covers an area of approximately 125 acres. The area of groundwater contamination covers approximately 15 acres and is centered downgradient about 300 yards from the derailment site.

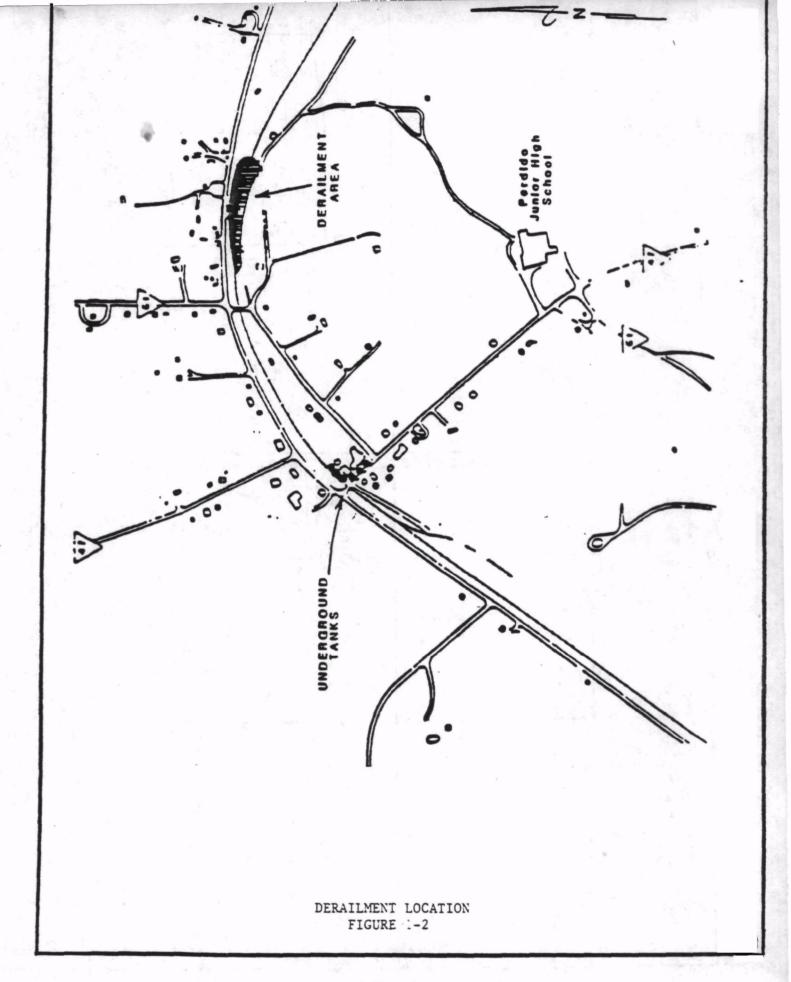
1.2 Site History

A train derailment occurred on May 17, 1965 in which 21 cars of the 122 cars in the train derailed. The rail cars left the track near the intersection of county Highway 61 and Railroad Street, along the eastern portion of a curve in the track (figure 1-2). Approximately 75% of the Benzene contents of the ruptured car was spilled. On the morning of May 19, 1965 the derailed cars were accidentally ignited by a cutting torch. The fire consumed the remaining Benzene.





SITE LOCATION FIGURE 1-1



Health, Division of Public Water Supply (ADPWS) first documented reports of taste and odor problems in Perdido residents' domestic water supply wells. Two wells were sampled in February 1982 that showed Benzene contamination. In August and September 1982, the Alabama Department of Solid and Hazardous Waste (ADSHW) sampled 27 additional wells and found 6 of these contaminated with Benzene. As a result of the Benzene contaminated wells, the Baldwin County Health Officer recommended that residents within a one mile radius of the derailment stop drinking or bathing with their well water. This affected approximately 250 residents in the area and over 300 students attending the junior high school. The National Guard provided two water tanks at the post office and the affected residents carried water home in plastic jugs.

In September 1982, the Center for Disease Control (CDC) tested the urinary phenol levels of 30 residents whose wells were being tested for Benzene. None of the residents tested showed an elevated level of urinary phenol, so none could be shown to have had Benzene exposure at the time of the testing. Most of the people tested for urinary phenols had stopped drinking their well water long before the urine sampling.

Following the determination of the contaminated wells, the ADSHW requested support from the U.S. Environmental Protection Agency (U.S. EPA) to determine the extent of the groundwater contamination. During October 1982, ADSHW and the U.S. EPA conducted groundwater sampling of 49 domestic water wells. A total of nine wells were determined to be contaminated in the Perdido area. As a result of the findings of contaminated groundwater in Perdido, the U.S. EPA proposed on December 1, 1982 that the site be placed on the National Priorities List (NPL) under the Comprehensive Environmental Response, Compensation, and Liability Act of 1980 (CERCLA) otherwise known as Superfund. Placement of the Perdido site on the NPL became final on September 1, 1983.

In early 1983, state and county officials requested that EPA provide Perdido with funding assistance under Superfund so that an alternate supply of drinking water could be provided to the community. Immediate removal funding was provided by EPA in February 1983 in order to construct a water line that would extend six miles from the nearby town of Atmore, Alabama and connect to the approximately 150 Perdido homes within a one mile radius of the derailment site. At the suggestion of EPA Region IV, Seaboard System Railroad (now CSXT) voluntarily provided funds for and installed the Perdido water system. The water line and hookup was completed July 1983.

As a result of the determination of Benzene contamination in the Perdido groundwater, several studies were initiated to define the extent of contamination.

Geophysical surveys were performed by the U.S. EPA's Field Investigation Team (FIT) contractors in 1982 and 1983. FIT also developed the Remedial Action Master Plan (RAMP) in September 1983. CSX Transportation, Inc. contractor, P.E. LA Moreaux (PELA), conducted a field investigation in late 1983.

On October 11, 1985, CSXT executed an Administrative Order on Consent (Docket No. 86-02-C) with the EPA to conduct a Remedial Investigation and Feasibility Study (RI/FS) on the site. The RI was begun in 1986 and completed in November 1987. In March of 1987 EPA's Groundwater Technology Unit and the Environmental Response Group conducted a solute transport model and a soil vapor survey respectively. Based on review of the data EPA requested additional monitoring wells to be installed further downgradient. The supplemental report was completed in May 1988. The RI confirmed the presence of Benzene in the groundwater. The FS was submitted to EPA in May 1988 and recommends groundwater extraction and treatment as the preferred remedial alternative for the site.

The objectives of the site investigation were to determine:

- * The human health and environmental receptors at risk;
- * The routes of exposure:
- * The concentrations and areal extent of contaminants, and the environmental fate and transport;
- * Hydrogeological factors; and
- * The extent to which the substances have migrated or are expected to migrate from the area of their original location and whether future migration may pose a threat to public health, or the environment.

2.0 Enforcement Analysis

2.1 Enforcement History

In late 1982 after domestic water well sampling by EPA and ADSHW showed the presence of Benzene contamination in 9 wells, Alabama state and county officials requested that EPA provide Perdido with funding assistance under Superfund so that an alternate drinking water supply could be provided to the community. Immediate removal funding was provided by EPA in February 1983 in order to construct a water line that would connect to the nearby town of Atmore, Alabama. At the suggestion of EPA Region IV, Seaboard System Railroad (now CSXT) voluntarily provided funds for and installed the Perdido water system. The water line and hookup was completed in July 1983.

On October 11, 1985, CSXT executed an Administrative Order on Consent (Docket No.86-02-C) with the EPA to conduct The RI/FS for the site. The RI was completed in November 1987 and the FS in May 1988.

CSXT has participated in the community relations program by presenting the results of the RI/FS and the preferred alternative during the public meeting held in Bay Minette, Alabama on July 14, 1988. An exemption to Special Notice Letter for Remedial Action was issued to CSXT on July 1, 1988.

3.1 <u>Hydrogeologic Characteristics</u>

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The town of Perdido, Alabama lies within the Southern Pine Hill subsection of the Coastal Plain Physiographic Province. The Southern Pine Hills define an elevated, southward-sloping, dissected plain developed on Miocene age estuarine-deltaic deposits. These deposits have resulted in relatively subdued topography characterized by low, rounded hills and low relief. Surface elevations in the Perdido area range from about 190 to 280 feet above mean sea level.

Figure 3-1 shows a topographic map of the Perdido area. The most important surface water drainage divide occurs immediately east of Highways 47 and 61 and trends generally north-south. East of this divide, surface water drainage is predominantly east and intercepts the Perdido River approximately 1 mile to the east. West of this divide, surface water drainage has a predominant westward component of movement and intercepts Bushy Creek which flows into Dyas Creek which is a tributary of the Perdido River.

Two units characterize the geology underlying the Perdido site. The undifferentiated Miocene outcrops at lower elevations and provides water to most of the wells in the area. The Citronelle Formation outcrops at higher elevations south of Perdido. Both units consist of clay, silt, sand, and gravel in a wide range of combinations and exhibit complex interfingering, lenses, and lateral facies changes which make correlation on a small scale difficult. The cross-sections are shown on figures 3-2 and 3-3.

In the Perdido area, the Miocene aquifer acts as an unconfined, semi-confined, and confined aquifer depending on the presence or absence of the overlying Citronelle Formation. Water level readings from domestic and monitoring wells during the PELA and ERT studies were used to construct groundwater flow maps which indicate a southwesterly direction of flow (figure 3-4). The average groundwater flow rate is approximately 0.23 ft. per day.

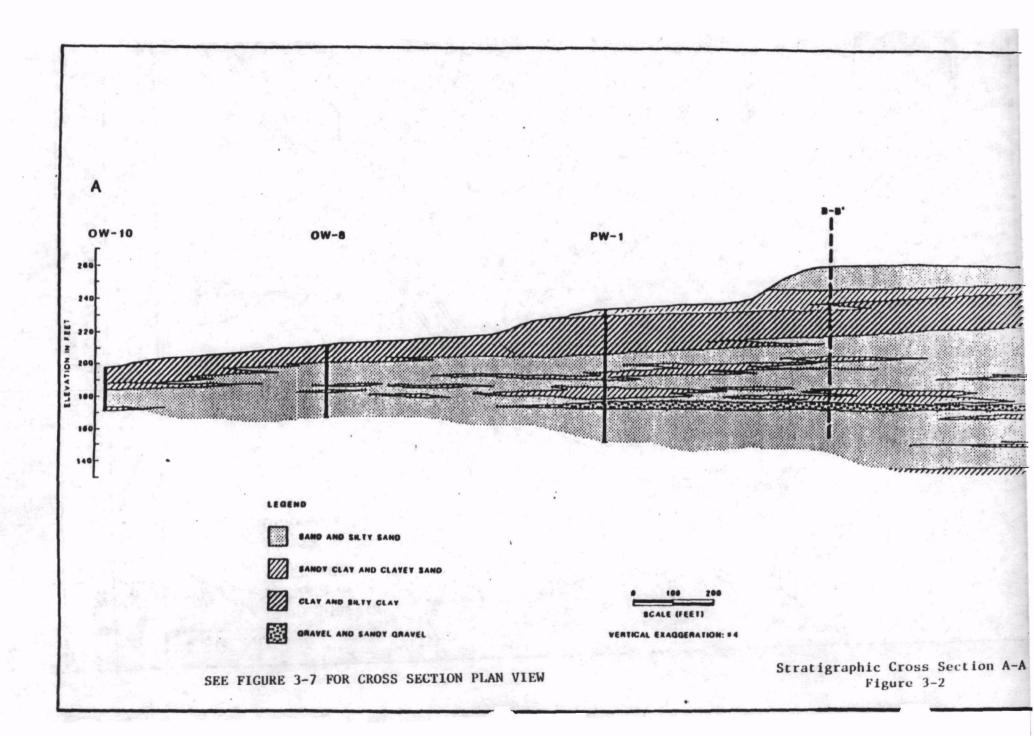
The groundwater from the Miocene aquifer is the only source of portable water for approximately 12.5 miles southwest to the town of Bay Minette.

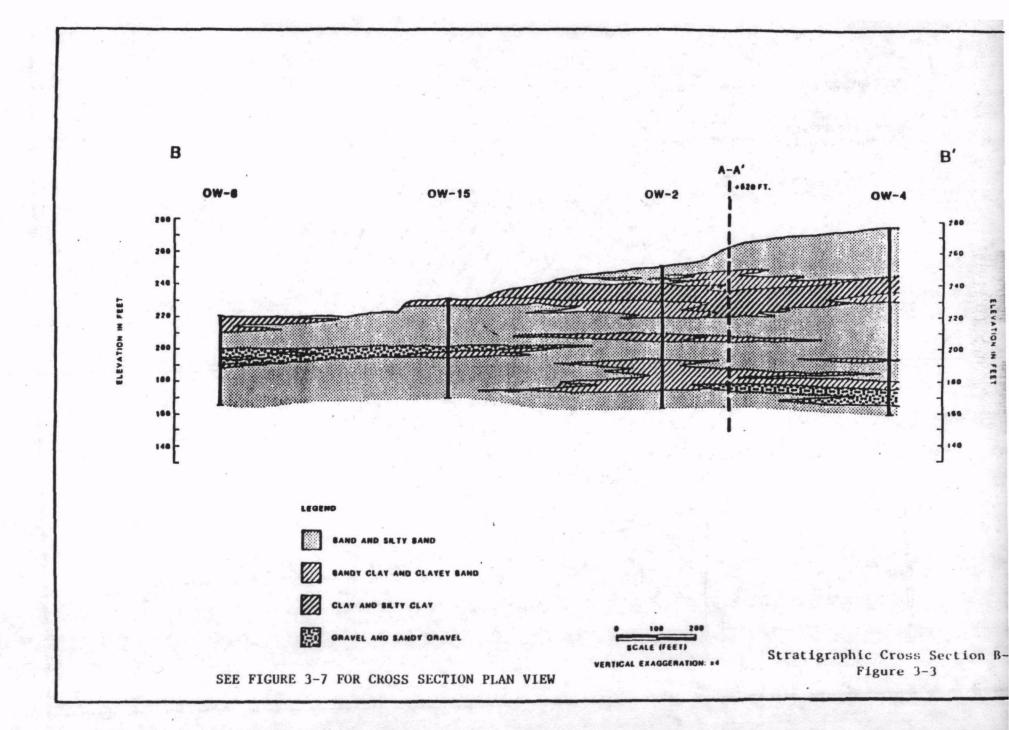
3.2 <u>Site Contamination</u>

Benzene in chemical-grade form, spilled as a result of a 1965 train derailment, is the only contaminant of concern at the Perdido site. Another chemical which spilled as a result of the derailment, Hexamethylene Diamine, was never detected in any groundwater sample. The result of the RI lead to the following conclusions:

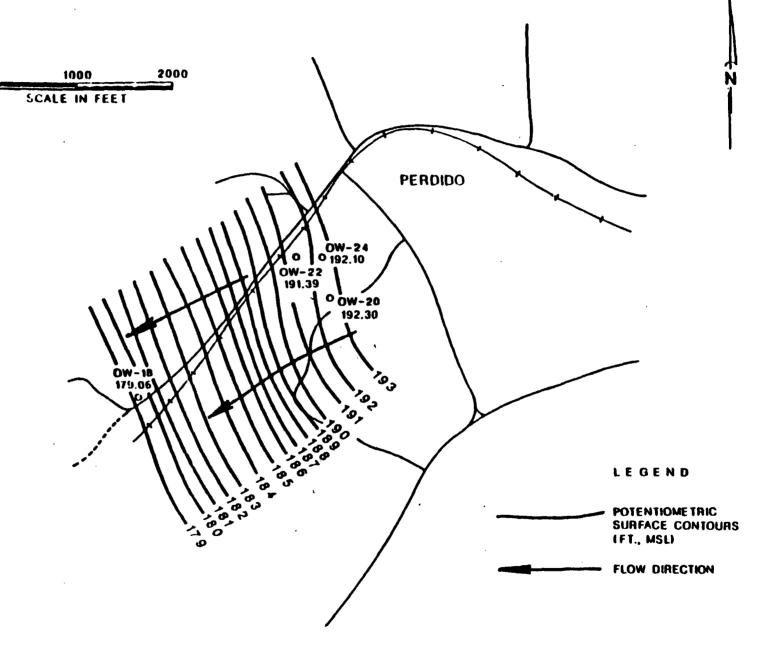
- * Leaching of contaminants from surface and subsurface soils to the groundwater is no longer occurring or is insignificant;
- * Volatilization of Benzene from contaminated surface soil is no longer occuring;

4-A





GROUNDWATER FLOW Figure 3-4



contaminated groundwater discharge to surface water is a concern;

* Subsurface migration of the contaminated groundwater plume to domestic water well users is the principal human health concern.

3.2.1 Groundwater Assessment

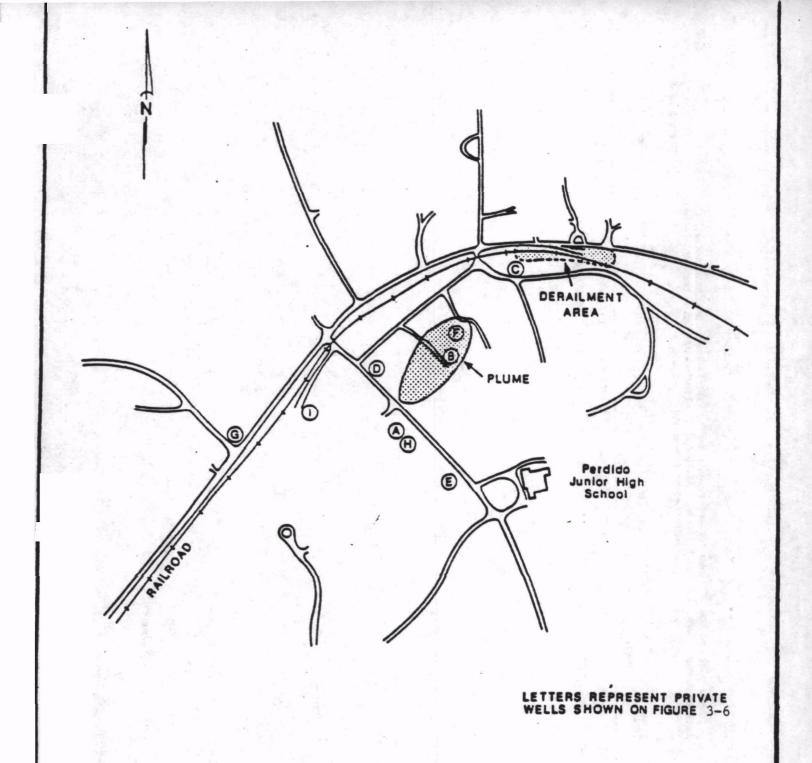
The Miocene aquifer at the Perdido site is a surficial aquifer in the area of the train derailment where the spill occurred. This allowed the Benzene to easily penetrate through the zone of aeration to the water table thereby contaminating the groundwater. Once within the groundwater aquifer the Benzene plume migrated downgradient in a southwesterly direction (figure 3-5). At this location the Miocene aquifer is in a semi-confined condition due to the presence of overlying younger sediments of the Citronelle Formation.

In a attempt to define the extent of the Benzene contaminated groundwater plume, the EPA's FIT performed geophysical surveys in 1982 and 1983. The results of these geophysical resistivity surveys were inconclusive probably as a result of the complexly interlayered sand and clay stratigraphy which did not allow for consistent background readings needed to distinguish between areas contaminated with Benzene and uncontaminated areas.

The 1982-1983 PELA study also investigated the Benzene contaminated groundwater at the site. PELA summarized all the Benzene analyses performed on domestic well water samples taken in 1982-1983. These results are present in table 3-1. Nine wells showed contamination from Benzene. Of the nine wells originally contaminated only four wells remained contaminated in later tests. The locations and Benzene concentrations of the nine wells are shown in figure 3-6.

PELA installed eight wells during their investigation, TW-1 through TW-5, LO-1 and LO-2, and PW-1. The location of most of these wells are shown on figure 3-7. TW-2 and TW-3 are just off the map to the southwest. PW-1 was installed for a pump test to determine aquifer characteristics. The other wells were installed to determine the lithology and geometry of the aquifer. Readings from these wells and the domestic wells were used to map the water level surface. It was then determined that the direction of groundwater movement was to the southwest. Chemical analyses of the groundwater from the monitoring wells failed to detect any Benzene contamination. Chemical analyses of groundwater taken from the pump test well, PW-1, showed Benzene concentrations of 111 ppm decreasing to 38.25 ppm after 270 minutes of pumping.

In the 1986 RI performed by ERT for CSXT sixteen additional wells were installed, monitoring wells, OW-1 through OW-10 and OW-15, and observation wells, OW-11 through OW-14 and OW-17. The observation wells were installed for another pump test on the PW-1 wells. The location of the wells are on figure 3-7. Well OW-16, which was used as an observation well, was a previously existing well.





ESTIMATED PLUME OF CONTAMINATION Figure 3-5

TABLE 3-1

(Summary of benzene analyses for water collected by P.E. LaMoreaux and Associates,
State of Alabama, EPA, and LAN Railroad. All samples collected by PELA unless otherwise
indicated by footnote.)

Page 1 of 6

			1982		DATE	OP COL	ACTION:		3	983					
WELL, NUMBER/OWNER	Q8/Q4	08/18	09/13	09/29-30	01/03	01/04	01/05	01/06	01/18	01/19	01/20	04/11	04/12	04/13	04/14
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6/Velader Jackson	•	ND*	- ,	-	-	ND	-	-	-	-	ND	-	-	-	-
7/Leatha Brown	-	-	-	-	-	ND	-	-	-	-	ND	-	_	-	-
9/Margaret Bryars		-	-	MD**	-	ND	-	_	-	ND .	-	-	-	-	-
10/Fred Centanne	•	-	-	-	- ,	ND	_	-	<u>.</u>	-	-	-	ND	-	-
11/Church of God	-	-	_	Ю•••	- .	ND	-	-	ND	-	-	-	-	-	-
12/Emily Packer	-	-	-	MD***	-	ND	-	-		-	-	-	-	-	-
13/Emily Packer	-	-	-	-	-	ND	· -	-	-	-	-	-	-	-	-
14/Martha Dunn	-	-	-	-	-	-	ND	-	-	-	-	-	ND	-	-
16/Clifford	-	_		_	•	-	ND	_	_	:	-	-	-	_	

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27/Jerry Wiggins	_	-	0.2094 0.3474 ND**			-	-	ND	_	-	ND	-	-	-	-
28/David Mosley	5.005	4.0*	5.22**	_	-	-	-	5	-	-	5	-	-	-	-
29/Johnnie German		-	-	Mass.	-	-	-	nd	-	-		ND	-	-	-
30/Willie Ramer	-	-	_	ND***	_	_	_	ND	-	ND	-	_	_	-	-

			1982		DATE	OF 001.1	ACTION:)	983.					
WETLL NUMBUR/OWNER	08/04	08/18	09/13	09/29-30	01/03	01/04	01/05	01/06	01/18	01/19	01/20	04/11	04/12	04/13	04/14
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36/Betty Minchew	-		ND**	_	- '	-	-	-	ND	- ·	-	-	<u>.</u>	-	-
37/Leona Ramer	•	-	-	ND***	-		-,	-	ND	-	-	-	-	-	-
38/Nebb Nush	-	-	- ,	ND***	-	-	-	-	_	ND	-	-	-	-	-
39/Tuney Hadley		-	-	Mass.	-	~	-	-	-	ND	-	-	-	-	-
40/Mrs. Ernest Weekley	-	-	-	-	-	-	-	-	-	ND	-	-	-	-	-
41/Clara Wolfe	-	-	108/54 41.020	0** 60***	-		-	-	<u>.</u>	111	-	-	-	-	-
42/Earl Johnson	-	-	8.49* 9.947	5	<u> </u>	-	-	-	-	-	ND	_	-	-	_
43/Marie Slay	-	-	-	0.034***	-	-	-	-	-	-	ND	-	-	-	-
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TABLE 3-1 (CONTINUED)

Page 4 of 6

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WELL NUMBER/OWNER	08/04	08/18	09/13	09/29-30	01/03	01/04	01/05	01/06	01/18	01/19	01/20	- 04/11	04/12	04/13	04/14
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47/Fzi															
Johnson	-	-	••	MD***	-	-	-	-	-	-	-	-	-	-	-
48/Ihigo															
Roger 6	-	-	-	MD***	-	-	-	-	-	- .	-	-	-	-	-
49/Etta B.						ř								•	
Thompson	-	-	-	ND***	-	-	-	-	-	-	-	-	-	-	ND
50/Connie						•								•	
Barbarow	-	-	-	MD***	•	-	-	-	· -	-	-	- .	ND	-	-
51/Vance Turner								•							
(old house)	-	-	-	-	-	-	-	-	-	-	-	-	ND	-	-
52/Rugene				•											
Weaver	-	-	-	MD***	-	-	-	-	-	-	-	-	-	-	-
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57/Nuford						•									
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58/James															
Bryars	-	-	-	-	-	-	-	-	-	-	-	-	ND	-	-
59/Leon															
Coleman	-	-	-	-	-	-	-	-	-	-	-	-	ND	-	-
60/George															
Hayes	-	-	-	~	-	-	-	-	-	- '	-	-	ND	-	-

TABLE 3-1 (CONTINUED)

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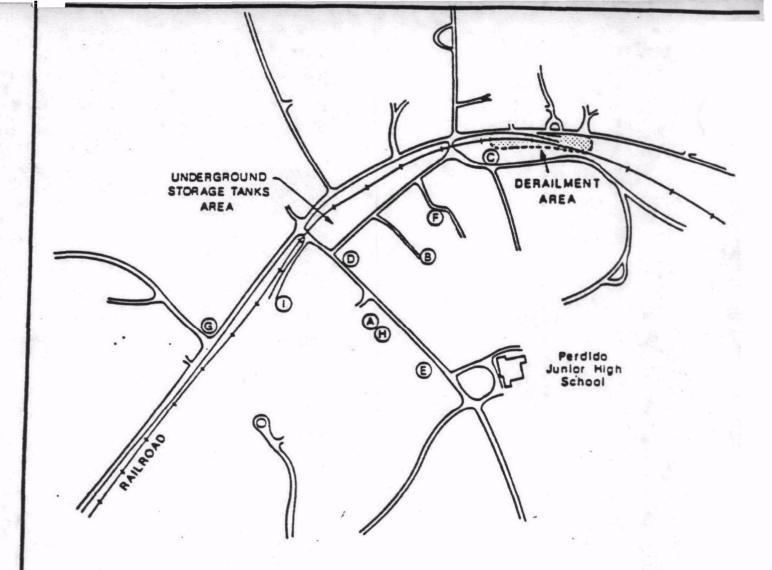
			1982		DATE	OF COLL	ELTION:	-]	983					
WELL NUMBER/OWNER	08/04	08/18	09/13	09/29-30	01/03	01/04	01/05	01/06	01/18	01/19	01/20	04/11	04/12	04/13	04/14
	PENZEN	R CONC	NTRATIC	N (ppm)			·	N	NZFNE O	NCENTRA	TION (pp	m)		···	
61/Trd															
Presley	-	-	-	ND***	-	-	_	-	-	- '	-	-	ND	-	-
62/Charles				•1											
Stacey	-	-	-	-	-	- '	-	-	-	-	-	-	ND	-	-
63/Vance															
Turner	-	-	•	ND***	-	-	-	-	-	- '	-	-	ND		-
64/Vance						•									
Turner	-	-	-	-	-	- 、	-	-	-	-	-	-	ND	-	-
65/Charles														•	
Fickling	-	-	-	-	-	-	-	-	-	-	-	-	ND	-	-
66/Josephine				•			•								
Peacock	-	-	-	ND***	-	-	-	-	-	-	-	-	ND	-	-
67/Georgia				,											
A1haugh	-	-	-	-	-	-	-	-	-	-	-	-	ND	-	-
60/IIrss					•										
Stewart .		-	_	-	-	-	-	-	-	-	-	-	ND	-	-
69/Nertha														450	
Dumons	-	-	•	•	-	-	-	-	-	-	-	-	-	ND	-
70/Joe1														ND	
Downey	-		-	-	-	-	-	-	-	-	-	-	-	N.	-
71/Vance						•						_	_	ND	_
Turner	-	_	-	-	-	-	-	-	-	-	-	_	_		_
72/Forcest											_	_	_	ND	_
Weekley	-	-	•	-	-	-	-	-	-	-	-	-	-	NO.	_
71/G. T .												_	_	ND	_
Heek Ley	-	-	-	-	-	-	-	-	-	-	-	-	_	inu.	-
74/Gerald												_	_	ND	_
zalfas '	-	-	-	-	-		-	-	-	-	-	-	-	WU	-

TABLE 3-1 (CONTINUED)

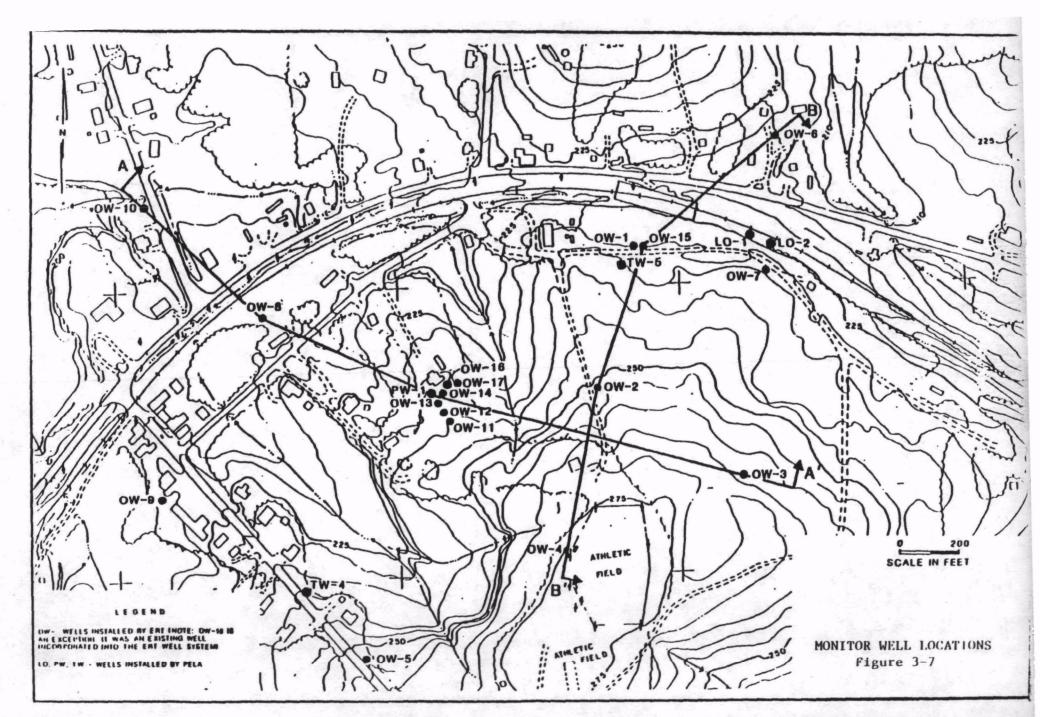
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					DATE	OF COLL	ACTION:			······································					
MD1 +			1982						1	983			•		
WELL, NI PRI UR/OWNER	08/04	08/18	09/13	09/29-30	01/03	01/04	01/05	01/06	01/18	01/19	01/20	04/11	04/12	04/13	04/14
	HENES	E CONCI	NIRATIO	M (ppm)				Ņ	NZFNE O	ONCENTRA	TION (P	3m)	·		
75/J. E. Ammona	•	-	-	-	-	-	-	-	-	-	-	-	_	ND	-
76/Bradley Hadley	-	-	~	-	-	-	-	-	-	-	_		-	ND	_
77/Ezra Turner	_	_	•••	_	-	-	-	-	-		-	_		ND	**
78/John T. Foster	-	-	-	_		-	_	_	-	•	_	. -	_	ND	_
79/T. F. Rainer	-	-	-	-	-	-			**		-	-	-	_	ND
BO/Lillian Curry	_	**	-	-	-	-	-	-		-	-	-	-	•••	ND
81/P. W. Ellicon	-	-	-	-	-	-	-	_	-	-	-	-	-	-	ND
82/Webb Bush (store)	<u>-</u>	_	-	-	. <u>-</u>	-	-	-	_	-	-	-	-	_	ND

ND - None Détected
Sampled by ADEN
Sampled by LAN Railroad
Sampled by EPA



Code	Owner	Senzene Conc. (PPM)	Date	Well Code	Owner	Benzene Conc. (PPR)	Date	
A .	F. Weekly	ND ND ND	08/04/82 09/13/82 01/05/83 01/20/83	. G	E. Johnson	8.49 9.947 5.0	09/13/82 09/13/82 09/30/82 01/20/83	
•	P. Schultz	65 70 51	01/05/83 01/06/83 01/19/83		M. Slay	0.034 MD	09/30/82 01/20/82	
c	H.L. Bryess	0.022 ND ND	09/13/02 01/05/03 01/19/03	1	International Paper	4.601 4.570 <1.0 0.009	08/18/62 09/13/82 09/13/82 01/86	
D	J. Wiggins	0.209 0.347 ND ND	09/13/82 09/13/82 09/13/82 01/05/83 01/19/88		Note: ND	None_Detected		
	D. Mosley	5.005 4.8 5.22 5.0 5.0	08/04/82 08/18/82 09/13/82 01/06/83 01/20/83	*				
*	C. Wolfe	108.5 41.020 60.0 111.0 6.493	09/13/82 09/13/82 09/30/82 11/19/83 01/86		AND BENZ	WATER WELL ENE ANALYSIS Figure 3-6	LOCATION	



wells are shown in figure 3-8. Results from the domestic well water samples are given in table 3-2. Of the 13 wells tested only two showed Benzene contamination, the Clara Wolfe property well had 6493 ppb Benzene and the International Paper Company well had 9 ppb and 10 ppb from a split sample. Both of these wells tested positive for Benzene in previous testing, although at higher levels. The other domestic water wells that showed Benzene contamination in 1982-1983 were not able to be sampled because of various obstructions in the wells. The wells have been out of use since the availability of the public water supply.

From March 1, 1986 through April 15, 1986 ERT sampled 10 of the monitoring wells that they installed plus the 8 wells that PELA had previously installed (figure 3-7). Results of the groundwater sample analyses are given in table 3-3. Of the 18 wells tested, only the PW-1 well had Benzene contamination with 28.03 ppm. This well sampled positive for Benzene in the previous PELA study. Two of the wells, OW-15 and TW-5, are directly downgradient of the spill site and did not detect Benzene contamination. This indicates a lack of any continued source contamination from the soils in the spill area.

The EPA Groundwater Technology Unit constructed a solute transport groundwater model from the available data and predicted the extent of the groundwater plume in the Perdido area. This model also predicts that the Benzene plume will migrate past the Perdido public water supply in 75 years at concentrations dangerous to human health.

Based on this model and the soil vapor survey performed by the EPA's Environmental Response Team, eight more wells were installed further downgradient and sampled in December 1987/January 1988 (figure 3-9). Results from the sample analysis indicated below detection limit for the 33 selected parameters.

In March, 1988 EPA requested that the Environmental Services Division (ESD) sample specific wells in the Perdido groundwater contamination area for volatile organic contaminants (specifically Benzene) to confirm analytical data obtained from past studies.

Ten groundwater samples were collected. Several of the domestic wells were requested to be sampled during this investigation. When ESD arrived on site they found the pumps had been removed from the domestic wells and many were not capped. Various obstructions in the wells prevented the entry of pumps and bailers in all but one of the abandoned domestic wells (Ramer well). One well had been completely removed (PELA 53 International Paper). The domestic wells that could not be sampled are listed below and all well locations are depicted on figure 3.10.

PELA #18 (PETER SCHULTZ)
PELA #27 (JERRY WIGGINS)
PELA #19 (POST OFFICE)
PELA #43 (MARIE SLAY)
PELA #28 (DAVID MOSELY)
PELA #53 (INTNL. PAPER)
PELA #42 (EARL JOHNSON)

6-A

TABLE 3-2

DOMESTIC WELL WATER ANALYSIS RESULTS SUMMARY PERDIDO CROUNDMANTER CONTAMINATION SITE (SAMPLES COLLECTED IN DECEMBEDR 1985 AND JANUARY 1986)

Page 1 of 5

	Roring Number:	DH-1	•	DW-2		DW-2		DH-4		DH-4	
٠.	Sample Number: Reported In:	(ppb)	Detection Limit	DMV- 002- 1A (µpb)	Detection Limit	DIAI- 002- 18 (ppb)	Detection Limit	DHH- 004- 01 (ppb)	Detection Limit	Dia/- 004- 02 (ppb)	Detection Limit
]V	Acrolein	BDL	100	PDL	100	NOL.	100	BDL.	100	BDL	100
2V	Acrylonitrile	BDL	100	HX	100	HDL.	100	HDL.	100	BOL	100
3 v	Penzene	6493	1 "	9	10	10	1	(BA)	1	HDL	i
4V	Dis(chloromethyl)ether	BDL	5	FDL	5	m,	5	KET,	5	HDL	5
5V	Bromoform	BDL	5	EDI.	5	MY.	5 .	M),	5	BDL	5
6V	Carbon Tetrachloride	BDL	3	RDL	3	m,	3	JOH	3	HOL	3
77	Chiorobenzene	BDL.	1	FDL	1	HM,	3	MOL	1	BDL	ì
AV	Ch torodibromomethane	BDL	5	FDL	5	HDI.	5	MOL	- 5	BDL	. 5
9V	Chioroethane	BOL	5	HA	· 5	iva.	5	PDI.	5	BDL	5
10V	2-Chioroethylvinyl Ether	HDL	5	FDL	5	ADI.	5	ML	5	BDL	5
117	Chioroform	BDL	5	9	5 \	tot.	5	HIL.	5	BDL	5
12V	Dichlorobromomethane	BDL	5	HDL	5	.KPI	5	LAN'	5	HDL	· 5
13V	Dichtorodifluoromethane	HDL	5	RDL	5	IDL.	5 .	fax.	5	EDL	5
14V	1,1-Dichloroeth ane	96	5	HDL	5	m,	5	RDI.	5	HDL	5
15V	1,2-Dichtoroethane	EDL.	3	HIL	3 4	ADL	3	HDL.	3	BDL	3
16V	1,1-Dichloroethyl ene	PDL	5	FDL	5	en.	5	EDL,	5	HDL	5
170	1,2-Dichloropropane	BDI.	5	FDL	5	101.	5	IIX.	5	EDL	5
1 RV	1,2-Dichloropropylene	BDL	· 5	H)L	5	ma.	5	HDL	5	HDL	5
197	Ethylbenzene	BDL	1	HL	1	TOL.	1	IDL	1	HDL	1
20V	Methyl Bromide	BOL	5	RDL	5	TTM.	5	PDL.	5	BDL	5
217	Methyl Chioride	ROL	5	FDI,	5	EDI.	5	HDL.	5	RDL	5
22V	Methylene Chioride	FOL	5	FDL	5	POL.	5	TN.	5	BDL	5
210	1,1,2,2-Tetrachloroethane	BDL	5	FDL	5	HDI,	5	(TX)	5	EDL.	5
24V	Tetrachioroethylene	RDL	3	RDL	3	ITM.	3	RDL	3	HDL.	3
25V	Toluene	BDL	1	FDL	1	IDL.	3	ADL	1	BDL	1
26V	1,2-trans-Dichloroethylene	BDL	5	HDL.	5	147.	5	1OL	5	BDL	5
210	1,1,1-Trichloroethane	HDL	5	PDL	5 `	FEM.	5	PDf,	5	BDL	5
28V	1,1,2-Trichioroethane	BDL	5	ĦL	5	PDL.	5	MC	5	HDL.	5
29V	Trichloroethylene	BDL	1	FDL	1	1	1	H)L	` 1	BDL	1
30V	Trichlorof luoromethane	FDL	5	BOL	Š	IOL	5	FDL	5	HDL	5
317	Vinyl Chloride	EDL	1	FUL	Ī	HW.	ì	PIN.	1	PDL	1
32V	Xylenes	HDL	5	RDL	5	IDI.	5	FEX.	5	BDL	5
33V	Iso-Octane	HDL	5	IDL	5	len.	5	M)C	5	BDL	5
	_										

^{*} EPA Method 624 - Reference: Method for Organic Chemical Analysis of Municipal and Industrial Wastewater, EPA-600/4-82-057, July 1982.

Notes: RDL - Relow Detection Limits

TABLE 3-2 (Continued)

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	Boring Number	DW-5		DH-6		DW-6		DH-7		DM-8	
	Sample Number:	DIAV- 005- 01	Detection Limit	DIAN- 6	Detection Limit	DIAI- 006- 02	Detection Limit	DM- 7	Detection Limit	DM- 008- 01	Detection Limit
	Reported In ——-:	(क्कि)		(Ppb)		(ppb)		(ciqq)		(ppb)	
	÷;										
ľ	Acrolein	HDL	100	M).	100	m.	100	MIL.	100	PDL	100
2V	Acrylonitrile	HDL.	100	er.	100	roi.	100	MM,	100	IDL	100
3V	Renzene	BDL	1	MY.	1	IWN,	1	FDL,	1	PDL	i
4 V	Bis(chloromethyl)ether	MC	5	RDI.	5	PDI.	5	mi.	5	ADI.	5
5V	Bromoform	PDI.	5	HN.	5	FUN.	5	PDL,	5	FDL	5
6V	Carbon Tetrachloride	PDL	3	PEN.	3	M).	3	, KPI	3	PDI.	3
7٧	Chlorobenzene	HDL.	1	PDL	1	PDI,	1	HN.	1	PDL	1
8V	Chlorodibromomethane	HDL	5	ITM.	5	FD),	5	HDI,	5	HDL	5
9V	Chioroethane	BDL	5	JUP.	5 .	FTM.	5	MN,	5	FDL	5
JOV	2-Chioroethylvinyl Ether	RDL.	5	TOIL.	5	18N.	5	TOP.	5	RDI.	5
117	Chtoroform	FIDL	5	FIX.	5	MX.	5	ITH,	5	RDL	5
12V	Dichlorobromomethane	BDL	5	MAIS.	5	ITH,	5	,KPI	5	RDL	5
130	Dichlorodifluoromethane	HDL	5	HDL,	`5	ith.	5	FDL	5	RDL.	5
14V	1,1-Dichloroethane	H)L	5	M).	5	IDI,	5	IDI,	5	PDL	5
15V	1,2-Dichloroethane	FDL	3	W	3	H),	3	IVY.	3	PDL.	3
]6V	1,1-Dichloroethylene	FIDL	5	fux,	5	(T)	5	FIX.	5	FDL	5
1/V	1,2-Dichloropropane	BDL	5	M	5	MAY,	5	NDI,	5	RDL	5
187	1,2-Dichloropropylene	FIDE	5	FDL	5	MIN.	5	EDI,	5	HDL	5
197	Et hy I benzene	MDC.	l	HX.	1	M).	1	IDL	1	PDL.	1
20V	Methyl Bromide	FDL	5	M)	5	WY.	5	ıv,	5	PDL	5
21V	Methyl Chioride	BDL	5	FDL	5	IDI.	5	PDL,	5	FDL	5
22V	Methylene Chloride	IDL	5	MY,	5	M),	5	HM.	5	PDL	5
23V	1,1,2,2-Tetrachloroethane	PDL	5	PDL.	5	.KFI	5	.xel	5	PDL,	5
24V	Tetrachioroethylene	EDL	· 3	M),	3	IDI.	3	IDL.	3	BDL	3
25V	Toluene	8DL	1	RL	1	FD).	1	IDL	1	HDL	1
26V	1,2-trans-Dichloroethylene	PDL.	5	IDI.	5	ETN.	5	1DL	5	RDL.	5
27 V	1,1,1-Trichloroethane	FDL	5	HDL.	5	MDL	5	IDL	5	BDL	5
28V	1,1,2-Trichloroethane	BDL	5	M	٠ 5	IDI.	5	IDE.	5	PIDE.	5
29V	Trichloroethylene	PDI.	1	FDL	1	(KB)	1	HDL	1	FDL	1
30V	Trichlorof luoromethane	EDL.	5	PDL.	5	FDL.	5	HDL.	5	RDL	5
31V	Vinyl Chloride	EDL	1	HDL .	1	H)	1	IDI.	1	PDC.	1
32V	Xylenes	24	5	HDL.	5	IW.	5	PDL	5	HDL.	5
33V	Iso-Octane	HDL.	5	M)	5	PDL.	5	IDI.	5	HDL,	5

TABLE 3-2 (Continued)

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	Boring Number	DM-8		DH-9		DW-9		DW-10		DW-10	
	Sample Number: Reported In:	DM/- 008- 02 (ppb)	Detection Limit	(<u>bhp)</u>	Detection fimit	Lab No 85- 3697-142 (pph)	Detection Limit	(bbp) 010- 010-	Detection Limit	010- 02 (ppb)	Detection Limit_
•	,				•••						
) V	Acrolein	BDL	100	HDI,	100	HDI.	100	HD(,	100	BOL	100
2V	Acrylonitrile	RDL	100	HDL	100	ITM.	100	ADL,	100	HDL	100
3V	Penzene	PDL	1	PDL .	1	IAN'	1	RIH,	1	PDL.	1
4V	Dis(chloromethyl)ether	ADL	5	RDL:	5	HDI.	5	FDI.	5	HDL	5
5 V	Bromoform	HDL	5	IDL	5	IEM.	5	IDI.	5	H)C	5
6V	Carbon Tetrachloride	FDL	3	MA	3	MAY.	3	idh.	3	PDL,	3
70	Chlorobenzene	PDL	1	IDI.	1	,KPI	1	TCH.	1	HDL	1
8V	Chlorodibromomethane	RDL	5	ID),	5	lan'	5	(E)	5	RDL.	5
9V	Chlornethane	PDL	5	ith.	5	MH.	5	'KBF	5	FDL	5
100	2-Chioroethylvinyl Ether	MDL	5	. ,KBI	5	lan.	5	(KB)	5	FDL	5
117	Chloroform	PDL -	5	IDL.	5	ITH.	5	14%	5	AX	5
) 2V	Dichlorobromomethane	PDL	5	RDI,	√ 5	FD),	5	(EX.	5	BDL	5
130	Dichlorodifluoromethane	ML	5	M)	5	MAY.	5	IDL	5	FDL	5
14V	1,1-Dichloroethane	an.	5	M)	5	FOI,	5	ITM.	5	PDL	5
150	1,2-Dichloroethane	BDL	3	HIL	3	.KE	3	FDX,	3	HDL	3
16V	1,1-Dichloroethylene	ADL.	5	MN.	5	! 1 01.	5	M),	5	BDL	5
170	1,2-Dichloropropane	PIDL.	. 5	EWYL.	5	PDI.	5	LOXF.	5	BDL	5
) AV	1,2-Dichloropropylene	PDL.	5	EDK.	5	IDL	5	m,	5	PDL.	5
19V	Ethy Ibenzene	MDL'	1	JKFF	1	MDE.	1	FIN.	1	RDL	1
20V	Methyl Bromide	FDL	5	MDL	5	JATI	5	FDL	5	HDL	5
2 ł V	Methyl Chloride	DDL	5	PDL.	5	MI,	5	EDI.	5	BDL	5
22V	Methylene Chioride	PDL.	5	(TOL	5	fDI.	5	M	5	HDL,	5
23V	1,1,2,2-Tetrachloroethane	MOC	5	M)	5	M).	5	MN,	5	EDL	5
24V	Tetrachloroethylene	PDL	3	IDL	3	IDI.	3	MX,	3	ML	3
25V	Toluene	BDL	i	RDL	ì	MX.	ī	FDL	1	PDC.	ĭ
26V	1,2-trans-Dichloroethylene	PDL.	5	BDL	Š	MX,	5	RDL	5	HDC.	5
210	1,1,1-Trichloroethane	RDL	5	FDL	5	SAN'	5	RDL	5	HDL	5
28V	1,1,2-Trichloroethane	BDL	5	HDL.	۱ 5	HDI.	5	HDL	5	HDL	5
29V	Trichloroethylene .	RDL	ĭ	PDL.	ĩ	PDL,	ī	PDL	Ĭ	RDL.	ĩ
30V	Trichlorofluoromethane	HDL	5	IDL.	ŝ	in.	5	MDL	Š	BDL.	5
317	Vinyl Chloride	IDL	ĭ	FEX.	í	MA,	ī	PDL.	ī	RDL	ĩ
12V	Xylenes	FIDL	Š	HDI.	5	FEN.	5	IDA.	Š	RDL	5
337	Iso-Octane	RDL	5	PDL	š	IDI.	5	MX.	Š	BDL.	Š
<i>3</i> ,4		1274	•	•	•	1441	•	,	•		•

TABLE 3-2 (Continued)

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	Boring Number —:	DH-11		DW-11		DW-11		DW-11		DW-11	
	Sample Number:	D IM- 011-	Detection	D W/- 011-	Detection	D M- 011-	Detection	DM- 011-	Detection	DIMI-	Mahamblan
	soubte winner —:	011- 01A	Limit	01B	Limit	02	Limit	031-	Limit	011- 04	Detection Limit
	Reported in:	(क्कि)		(ppb)		(ppb)		(ppb)	LIMIC	(ppb)	Limit
ìv	Acrolein	ROL	100	HDL	100	PDL	100	PDL.	100	FEX.	100
2V	Acrylonitrile	PDC.	100	HDL	100	NDL.	100	MDL	100	BDL	10υ
3 v	Benzene	. ACA	1	HDL	1	IDL.	1	PDL	1	ADL	ì
4V	Ris(chloromethyl)ether	RDL	5	FDL	5	FDI.	5	FDL	5	FDL	5
5V	Bromoform	8DL	5	WF	5	PDL	5	IDL	5	BDL	5
6V	Carbon Tetrachloride	BDL,	3	PDC.	3	H)L	3	IDI.	3	FDL	3
7v	Chiorobenzene	HOL.	1	PDL	1	PDL.	1	PDL	1	BDL	1
BV	Chiorodibromomethane	BDL	5	HDI.	5	FIDL	5	HDL	5	FIDL	5
9V	Chloroethane	RDL.	5	HDL	5	PDL	.5	HDL	5	BDL	5
10V	2-Chioroethylvinyl Ether	POL	5	PDL	5	EDI.	5	MDL	5	PDL	5
117	Chioroform	BOL	5	PDL	5	(IDI)	5	FIDL	5	PDL	5
12V	Dichlorobromomethane	BDL	5	FIDL '	` 5	HDł.	5	PDL	5	FDL	5
13v	Dichtorodifluoromethane	BDL	5	EOL,	5	IDL	5	HDF.	5	FDL	5
14V	1,1-Dichloroethane	BDL	5	HN,	5	MY,	5	HDL	5	HDL	5
15V	1,2-Dichloroethane	BOL	3	HDL	3	JCFF	· 3	FOL	3	RDL	3
16V	1,1-Dichioroethylene	BOL	5	FDL	5	FDL	5	FDL	5	HDL	5
17V	1,2-Dichloropropane	PDL	5	PIDE.	5	JAM,	5	PDL	5	BDL	5
187	1,2-Dichioropropylene	FIDL	5	PDL	5	JKF1	5	PDL.	5	HDL.	5
19V	Ethylbenzene	HDL	1	FDL	1	PDL.	1	PDL	1	PDL	1
20V	Methyl Browide	HOL	5	PDL	5	FDL	5 .	PDL .	5	BDL	5
21V	Methyl Chioride	BDL	5	RDL	5 .	MDL	5	PDL	5	FIDL	5
22V	Methylene Chloride	BDL	5	MOL	5	KPI,	5	PDL	5	FIDL	5
23V	1,1,2,2-Tetrachloroethane	BOL	5	PDL	5	POL	5	POL	5	BDL	5
24V	Tetrachloroethylene	BIOL	3	PDL.	3.	PDL	3	PDL -	3	BDL	3
25V	Toluene	BDL	1	PDL	1	PDL	1	HDL	1	FIDL	1
26V	1,2-trans-Dichloroethylene	BDL.	5	HDL	5	IDL.	5	PDL	5	PDL	5
277	1,1,1-Trichloroethane	BOL	5	ADL ,	. 5	MAL.	5	PDL	5	PDL	5
28V	1,1,2-Trichloroethane	RDL	. 5	HDL.	5	HDL	5	ML	5	BDL	5
29V	Trichioroethylene	EDL	1	PDL	1	FDL	1	PDL	1	HDL	1
30V	Trichiorofluoromethane	BDL	5	HDL	5	BDL	5	PDL	5	FIDL	5
317	Vinyl Chioride	HDL,	1	RD L	1	PDL	1	HDL	1	PDL	1
32V	Xylenes	BDL,	5	PDL.	5	POL.	5	EEXL.	5	HDL	5
33V	Iso-Octane	HDL	5	BDL	5	FIM.	5	FDL	5	HDL	5

TABLE 3-2 (Continued)

										Trip BI	lank	Page 5 o	
	Boring Number ←:	DH-12		DH-12		DW-13		DW-14		Trip Black DN-214		DH-3(14)	
	Sample Number —:	DIA/- 012 01	Detection Limit	012- 02	Detection Limit	DIAI- 013- 01	Detection	DMI- 014-	Detection	Lab No. 86-	Detection		
	Reported In	(क्कि)	DIMIC	(क्रिका	Dimit	(ppb)	Limit	(bbp) 01	Limit	208-2 (ppb)	<u>Limit</u>	195-7 (ppb)	
]V	Acrolein	PDL.	100	PDL	100	RDL.	100	ent,	100	PDL	100	MDE,	
2V	Acrylonitrile	HDL	100	M).	100	MI,	100	BDL	100	H)L	100	HIX,	
3V	Benzene	HDL	1	HDL.	1	M),	1	FDL.	1	HDL	1	EAN'	
4V	Ris(chloromethyl)ether	HDL	5	HDL,	5	POL,	5	HDL	5	FDL	5	IDL	
SV	Bromoform	HDL	5	HDL,	5	FDL	5	9DI,	5	HDL.	5	FOL	
6V	Carbon Tetrachloride	BDL	3	PDL	3	MX,	3	HDL,	3	HDL.	3	, Jeni	
7V	Chlorobenzene	BDL	1	PDL.	1	MA,	1	FDL	1	PDL.	1	HX,	
BV	Chiorodibromomethane	HDL	5	PDL	5	ML	5	ML	5	HDL,	5	FIDI,	
9V	Chloroethane	FDL	5	HDL.	5	PDI,	5	HDL	5	BDL	5 .	TOT.	
104	2-Chioroethylvinyi Ether	PDL	5	PDL,	5	m,	5	HDL.	5	PDL	5	KF3	
) I V	Chloroform	BDL	5	9	5	HTL.	5	HDL.	5	PDL	5	HAX.	
12V	Dichlorobromomethane	BDL	5	RDL .	. 5	MC	5	TDL.	5	PDL	5	HOL	
) 3V	Dichlorodifluoromethane	PDL	5	PDL.	5	PDL.	5.	IDL.	5	HDL,	5	MAN,	
)4V	l,l-Dichloroethane	HDL	5	FDL	5	FDI.	5	IDL	5	FDL	5	HDI.	
15V	1,2-Dichloroethane	BDL	3	FD(,	3	MDL	3	FDL	3	PDL	3	JOH	
)6V	1,1-Dichloroethylene	BDL	5	HDL.	5	MDL	5	FDL	5	PDL .	5	IDE	
170	1,2-Dichloropropane	EDL	5	BDL	5	TOP.	5	PDL.	5	HX.	5	HW.	
) BV	1,2-Dichloropropylene	BDL	5	FDL	5	M	5	HDL	5	PDL	5	PDL.	
19V	Ethylbenzene	RDL	1	RDL	1	TOP.	1	IDL	ı	PDL,	1	PDL.	
20V	Methyl Browlde	HDL	5	PDL	5	M	5	PDL,	5	RDL,	5	FEX.	
21V	Methyl Chloride	BDL	5	PDL.	5	EDL.	5	MI,	5	PDL	5	HOI.	
22V	Methylene Chioride	BDL	5	RDL	5	M	5	FDL	5	BDL	5	PDL,	
23V	1,1,2,2-Tetrachloroethane	HDL	5	FDL	5	PDY,	5	PDL	5	BDL	5	HDL	
2 4 V	Tetrachloroethylene	BDL	3	PDL	3	M	3	PDL.	3	PDL	3	HDL.	
25V	Toluene	BDL	1	PDL	1	FDL	1	HDL	1	PDL	1	PDI,	
26V	1,2-trans-Dichloroethylene	POL	5	EDL	5	PDL	5	FDL	5	FDL	5	IDL,	
27V	1,1,1-Trichloroethane	HDL	5	FDL	5	HV.	5	PDL.	5	HDL	5	HAX.	
28V	1,1,2-Trichloroethane	BDL	5	HDL '	5	M	5	PDL	5	HDL	5	T(F)	
29V	Trichloroethylene	2	1	2	1	MY.	1	PDI.	1	PDL	1	IDL	
30V	Trichlorofluoromethane	HDL	5	HDL,	5	RDL	5	RDL	5	HDL	5	HDL	
317	Viny1 Chloride	HDL	1	HDL,	1	MY	1	FIDL	1	HDL.	1	HDL	
32V	Xylenes	HDL	5	BDL	5	PDI.	5	FIX.	5	HDL	5	HDI,	
33V	Iso-Octane	HDL	5	PDL	5	MN,	5	RDL	5	BDL	5	IDL	

TABLE 3-3 MONITOR WELL WATER ANALYSIS RESULTS SUMMARY PERDIDO GROUNDMATER CONTAMINATION SITE (SAMPLES COLLECTED BURING MARCH AND APRIL 1986)

Page 1 of 6

	Poring Number:	OH-2		OH-2		OH-3		OH-4		0+-5	
	Sample Number: Reported In:	PA- CHH- 002-01 (pph)	Detection Limit	PA- ONM- 002-02 (ppb)	Detection Limit	PA- OM- 003-01 ((r/b)	Detection Limit	PA- OMI- 004-01 (Ppb)	Detection Limit	(bbp) 002-01 by-	Detection Limit
1V 2V	Acrolein Acrylonitrile	BDL ADL	100 100	ADE ADE	100 100	HDL HDL	100 100	HDL.	100 100	EDL EDI,	100 100
3V 4V	Benzene Bis(chloromethyl)ether	HDL HDL	5	PDL PDL	1 5 5	, KOT	5	NOL,	1 5	HDL IDL	1 5
5V 6V 7V	Bromoform Carbon Tetrachioride Chiorobenzene	BDC BDC BDC	3	FIDE FIDE FIDE	3 1	TAN TAN TAN	5 3 1	NA, PDL	3	IDF TOL	5 3
8V 9V	Chlorodibromomethane Chloroethane	PDL BDL	5	PDL PDL	5	ight ight	5	, KIP , KIP , KIP	5	TOL JOH JOH	1 5 5
10V 11V	2-Chioroethylvinyl Ether Chioroform	PDL PDL	5	POL POL	· 5	NDF NDF	5	PDI,	5 5	PDL PDL	5
12V 13V	Dichlorobromomethane Dichlorodifluoromethane	BDL BDL	5 5	PDL PDL	5 \ 5	ADF.	5	NDt. NDt.	5	HDL .	5
34V 15V	1,1-Dichloroethane	EDL EDL	5	PIDE PIDE	5 3	ade Tabl	5	HDL HDL	5 3	HDL HDL	5 3
16V 17V	1,1-Dichloroethylene 1,2-Dichloropropane	BDL BDL	5	POL BOL	5 5	FDL FDL	5	PDL,	5 5	BDF BDF	5
18V 19V	1,2-Dichloropropylene Ethylbenzene	BDL BDL BDL	1	RDL RDL	5 1	LOF.	5	PDL PDL	1	RDL BDL	5 1
20V 21V 22V	Methyl Browide Methyl Chioride Nethylene Chioride	HDL HDL	5	PDL PDL BDL	5 5 5	MOG MOG MOG	5 5 5	PDL PDL PDL	5	ADC ADC ADC	5 5 5
23V 24V	1,1,2,2-Tetrachloroethane Tetrachloroethylene	BDL BDL	5	PDL BDL	5 3	BDL BDL	5	PDL PDL	5	BDL BDL	5
25V 26V	Toluene 1,2-trans-Dichloroethylene	RDL RDL	1 5	POL BOL	1 5	PDL PDL	1 5	BDL BDL	1 5	HDL, HDL	1 5
27V 28V	1,1,1-Trichloroethane 1,1,2-Trichloroethane	edl edl	5 5	ROL RDL	5 ·	PDL PDL	5 5	PDL PDL	5 5	BDL BDL	5 5
.29V 30V	Trichloroethylene Trichlorofluoromethane	BDL BDL	1 5	PDL PDL	.5 .5	PDL PDL	1 5	FDL, FDI,	1 5	HDL HDL	1 5
31V 32V 33V	Viny1 Chloride Xy1enes Iso-Octane	HDL HDL HDL	1 5 5	RDL RDL RDL	1 5 5	PDL PDL PDL	1 5 5	HDL HDL HDL	1 5 5	HDL HDL HDL	1 5 5

TABLE 3-3 (Continued)

Page 2 of 6

	Boring Number:	OH-6		OH-6		OH-6		OH-7		OH-7	
	Camila Makan	PA- CHM-	Detection	PA- OM-	Detection	PA- OM-	Data et las	PA-	5. A A. 4	PA-	
	Sample Number:	006-01	Limit	006-02	Limit	006-03	Detection Limit	0 M- 007-01	Detection	OM-	Detection
•	Reported In:	(bbp)	DIMIC	(ppb)	Dimic	(Mp)		(ppb)	_Limit_	007-02 (ppb)	Limit
ìv	Acrolein	EDL	100	RDL	100	BDL,	100	PDL.	100	EDL.	100
2V	Acrylonitrile	BDL	100	FDL	100	IIDL.	100	FIDL	100	TDL.	100
3V	Nenzene	BDL	1	PDI.	1	RDI.	1	ADI.	1	FDL.	i
4 V	Bis(ch)oromethyl)ether	PDL	5·	PDL	5	LDI'	5 .	INI.	5	PDL.	5
5V	Bromoform	EDL	5	ADI,	5	ADI"	5	PDL	5	PDL.	5
6V	Carbon Tetrachloride	EDL .	3	PDL .	3	MAI,	3	PDL	3	HDL	3
7V	Chlorohenzene	BDL	1	PDL	1	EDI.	1	PDI.	1	HDL,	i
8v	Chiorodibromomethane	BDL.	5	M)	5	PDI,	5	HDf.	5	IDI,	5
9V	Chilornethane	PDL	5	PDL	5	, KIB	5	PDI.	5	PDL	5
10V	2-Chioroethylvinyl Ether	BDL	5	MOL	. 5	IAN'	5	HDL.	5	RDL	5
HV	Chioroform	HDL	5	FDL	5	FDL	5	PDL	5	HDL.	5
12V	Dichlorobromomethane	BDL	5	PDL	5 ×.	FDL	5	PDL	5	EDL.	5
13V	Dichlorodifluoromethane	PDL	5	PDL	5	H)C	5	PDL	5	BDL '	5
14V	1,1-Dichloroethane	EDL	5	FDL	5	FDL,	5	HDL	5	PDL.	5
15V	1,2-Dichloroethane	BDL	3	PDL.	3	PDL	3	PDL	3	HDL.	3
16V	1,1-Dichloroethylene	HDL	5	PDL	5	IDL.	5	PDL	5	HDL.	5
170	1,2-Dichloropropane	PDL.	5	MD(,	5	TDL,	5	PDL	5	HDI.	5
1 AV	1,2-Dichloropropylene	RDL	5	MOC	5	FDL	5	PDL	5	PDL	5
) 9V	Ethy Ibenzene	BDL	1	PDC.	1	IDL.	1	PDL	1	PDL.	1
20V	Hethyl Bromide	BDL.	5	HDL,	5	IDL.	5	ADI.	5	FDL	5
21V	Methyl Chloride	BDL.	5	FIDL	5	Jeri.	5	PDf.	5	PDI.	5
22V	Hethylene Chloride	BDL	5	PDL	5	MPL	5	PDL	5	adi.	5
23V	1,1,2,2-Tetrachloroethane	RDL	5	PDL	5	tan'	5	HDL.	5	HDL.	5
24V	Tetrachloroethylene	BDL	3	RDL	3	HDL	3	PDI.	3	PDL.	3
25V	Toluene	BDL	1	PIDL.	1	IDL	1	BDL	1	ADL.	1
26V	1,2-trans-Dichloroethylene	BDL.	5	EDL	5	PDL	5	PDL	5	HM.	5
27V	1,1,1-Trichloroethane	BDL	5	HDL	5	PDL	5	PDL	5	BDL	5
28V	1,1,2-Trichloroethane	BDC	5	BDL	5'	HDL.	5	PDL	5	EDL	5
29V	Trichloroethylene	BDL	1	HDL.	1	FIX	1	FDL	1	BDL	1
30V	Trichlorof luoromethane	BDL	5	HDL	5	IDL	5	PDL	5	BDL	5
31V	Vinyl Chloride	EDL.	1	FDL	· 1	PDL	1	FDL	1	H)L	1
32V	Xylenes	EIDL,	5	HDL	5	HDL	5	FDL	5	PDL	5
33V	Iso-Octane	BDL	5	HDL	5	BDL,	5	EDL.	5	BDL	5

TABLE 3-3 (Continued)

Page	3	of	6

	Boring Number	OH-8		OH-9		OH-10		OH-15		TW-1	
		PA-		PA-		PA-		PA		PA-	
	Sample Number:	CHH-	Detection	OM-	Detection	CHM-	Detection	CHM-	Detect ion	TW-	Detection
		008-01	Limit_	009-01	Limit	010 <u>-01</u>	<u>Limit</u>	015-01	Limit	001-01	Limit
	Reported In:	(bhp)		(bibp)		(hbp)		(thip)		(ppb)	
	.•										
lv	Acrolein	RDL.	100	PDL	100	PDI.	100	HDL.	100	HDL	100
2V	Acrylonitrile	HDL,	100	HIL	100	ITM.	100	M),	100	HDL,	100
3V	Nenzene	ed.	1	PDL,	1	H)L	3	ITN,	1	HIX.	3
4 V	Bis(chloromethyl)ether	ed)L	5	PENL	5	, KPI	5	,KFI	5	MDI,	5
5V	Bromoform	PDL.	5	M)L	5	IRM.	5	EAN.	5	PDL,	5
6V	Carbon Tetrachloride	RDI.	3	IDL	3	18 M.	3	IDL	3	RDL	3
7V	Chlorobenzene	EDL.	1	BDL.	1	HDI.	1	IDE,	1	MM.	1
87	Chlorodibronomethane	ADI.	5	PEN.	5	(KF)	5	ITA,	5	FIX	5
9V	Chioroethane	BDL	5	MAN.	5	MA.	5	IDL	5	ADI,	5
100	2-Chioroethylvinyl Ether	HYL	5	HDL	5	18N.	5	ITN.	5	BDL	5
117	Chloroform	RDL	5	BDL	' 5	rox.	5	PDL.	5	PDL.	5
12V	Dichlorobromomethane	的心	5	ML	5	MDL	5	FIDI,	5	RDI,	5
110	Dichlorodifluoromethane	BDL	5	PDL	5. 5.	ITM.	5	ITM.	5	EDL .	5
14V	1.1-Dichloroethane	FDL	5	POL	5	IAN'	5	IDI.	5	HDL	5
15V	1,2-Dichloroethane	HDL.	3	8	3	JCFI	3	HDI,	3	HDL	3
16V	1,1-Dichloroethylene	BDL	5	RDL.	5	PDL.	5	KH,	Š	BDL	5
177	1,2-Dichloropropane	BOL	5	RDL.	5	PDI.	5	HVL.	Š	HDL.	5
187	1,2-Dichloropropylene	HDL	5	RDL	5	FRM.	5 .	FIXL	5	BDL	5
190	Ethylbenzene	TOL .	ĭ	RDL	ĭ	PDL.	1	PDL	ī	BDL	í
20V	Methyl Branide	DDL	Š	RDL.	5	TOL.	5	FDC.	Ŝ	BDL	5
217	Methyl Chloride	BDL	Š	BUL	5	NOT.	Š	PDL.	Š	BDL	5
22V	Methylene Chloride	ML	5	IDL	ζ.	TOL.	Š	ITN.	Š	M).	Š
23V	1,1,2,2-Tetrachloroethane	PDL.	5	M	Š	TOL.	ś	FDL.	Š	EX.	Š
24V	Tetrachloroethylene	H)L	š	HOL	3	IDI.	3	HDL	3	RDL	3
25V	Toluene	BDL	ែរ	RDL	3	M	3	nor.	1	HDL.	1
26V	1,2-trans-Dichloroethylene	PDL.	5	RIXL.	5	IDI.	5	IDL	Ś	ROL	5
27V	1.1.1-Trichloroethane	PDL	ś	BDL	5	in.	5	147L	Ś	RDL	,
287	1,1,2-Trichloroethane	ADC.	5	HX.	5,	ICA,	5	IGN.	ζ	FIDL	5
29V	Trichloroethylene	RDC	í	EDE.	3°	EDL.	1	HX.	i	HX.	1
30V	Trichlorof luoromethane	BDL	5	PDL	Ś	HW.	5	MA,	Š	ADL	Ė
		FDL FDL	.	HDL HDL		-	7) 1	RDL	3
317	Vinyl Chloride	_	i c		. I	HDL.	i c	M),	ı	RDL	5
32V	Xylenes	FDL,	5	NDL .	5	iDi.	5	FDL,	5		_
33V	Iso-Octane	HDL,	5	BL	5	TIL	5	(B)L	5	RDL	5

	Boring Number:	TH-1		TW-2		TW-2		TW-3	
	Sample Number:	PA- TWW- 001-02	Detection Limit	PA- TWV- 002-01	Detection Limit	PA- T MI- 002-02	Detection	PA-	Detection
	Reported In:	([#b)	LIMIC	(t4pp)	Dimit	(labp)	<u> Limit</u>	(bbp) 003-01	Limit
1V	Acrolein	EDL	100	EDL	100	PDC.	100	EDE,	100
2V	Acrylonitrile	BDL	100	BDL	100	IDL,	100	ADL.	100
3V	Penzene	BDL.	1	PDt,	1	, KPI	1	PDL	ì
4V	Bis(chloromethyl)ether	PDC.	5	HDL	5	KFI,	5	HDL,	5
5V	Bromoform	BDL	5	FIDL	5	PDI.	5	TENE	5
6V	Carbon Tetrachloride	BDL	3	HDL,	3	MA,	3	PDL	3
7v	Chiorobenzene	BDL	1 .	PDL	1	MI,	ì	HDC,	ī
8V	Chiorodibromomethane	BDL	5	HDL	5	6	5	RDL.	Š
9V	Chioroethane	FDL	5	IIDI,	5	fux,	5	PDL	5
10 V	2-Chloroethylvinyl Ether	BDL	5	PDC.	5	ITH.	5	H)L	5
117	Chloroform	BDL	5	PDL	5	15	5	HDL.	5
12V	Dichlorobronomethane	BDL	5	PIDL	、 5	fun,	5	tant"	5
13V	Dichlorodifluoromethane	PDC.	5	JOH,	5	er,	5	HDt.	5
14V	1,1-Dichloroethane	POL	5	PDI,	5	IDI,	5	M	5
15V	1,2-Dichloroethane	RDL.	3	HDL.	3	HH.	3	PDL	3
16V	1,1-Dichloroethylene	BDL	5 '	FDL	5	H)C	5	HDL.	5
177	1,2-Dichloropropane	HDL,	5	PDL,	5	PDL	5	HDL	5
1 8V	1,2-Dichloropropylene	HDL	5	HDL	5	ITH,	5	IDL	5
19V	Ethylbenzene	PDL .	1	HDL	1	NDL.	1	RDI.	1
20V	Methyl Bromide	HDL	5	BDL	5	PDI.	5	FDL	5
21V	Methyl Chloride	PDL	5	HDL	5	EAM.	5	PDL.	5
22V	Methylene Chloride	HDL	5	FDL	5	JCF1	5	HDL.	5
23V	1,1,2,2-Tetrachloroethane	BDL	5	HDL	5	HDL	5	FDL	5
24V	Tetrachloroethylene	BDL	3	HDL.	3	FIDL	3	HOL	3
25V	Toluene	BDL.	1	25	· 1	EDL.	1	2	1
26V	1,2-trans-Dichloroethylene	PDL,	5	FIDE,	5	PDL	5	PDL.	5
27V	1,1,1-Trichloroethane	EDL.	5	PDI.	5	FIDL.	5	HDL	5
28V	1,1,2-Trichloroethane	BDL	5	FDL	`5	HDL	5	. ADG	5
29V	Trichloroethylene	RDL	1	HDL	1	PDL	1	PDL.	1
30 V	Trichlorofluoromethane	HDL	5	RDL	5	FOL	5	HDL	5
31V	Vinyl Chloride	HDL	.1	ED¢,	1	PDL.	1	FDL	1
32V	Xylenes	BDL	5	BDL	5	FIDL	5	EDL	5
33V	Iso-Octane	FDL	5	POL	5	HAN,	5	HDL .	5

TABLE 3-3 (Continued)

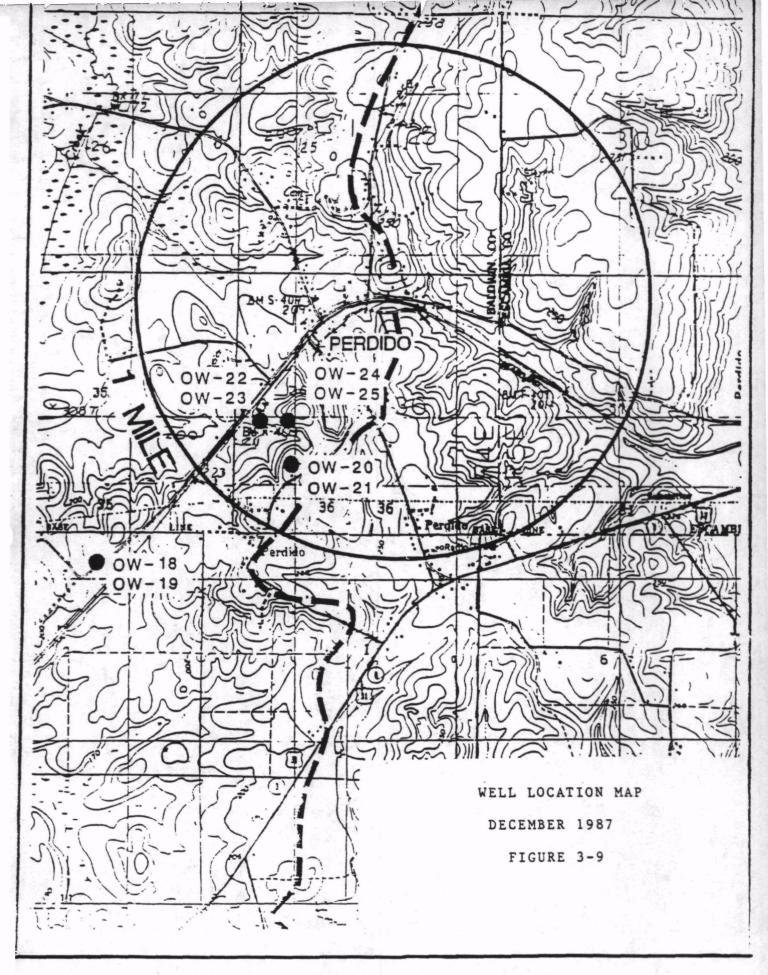
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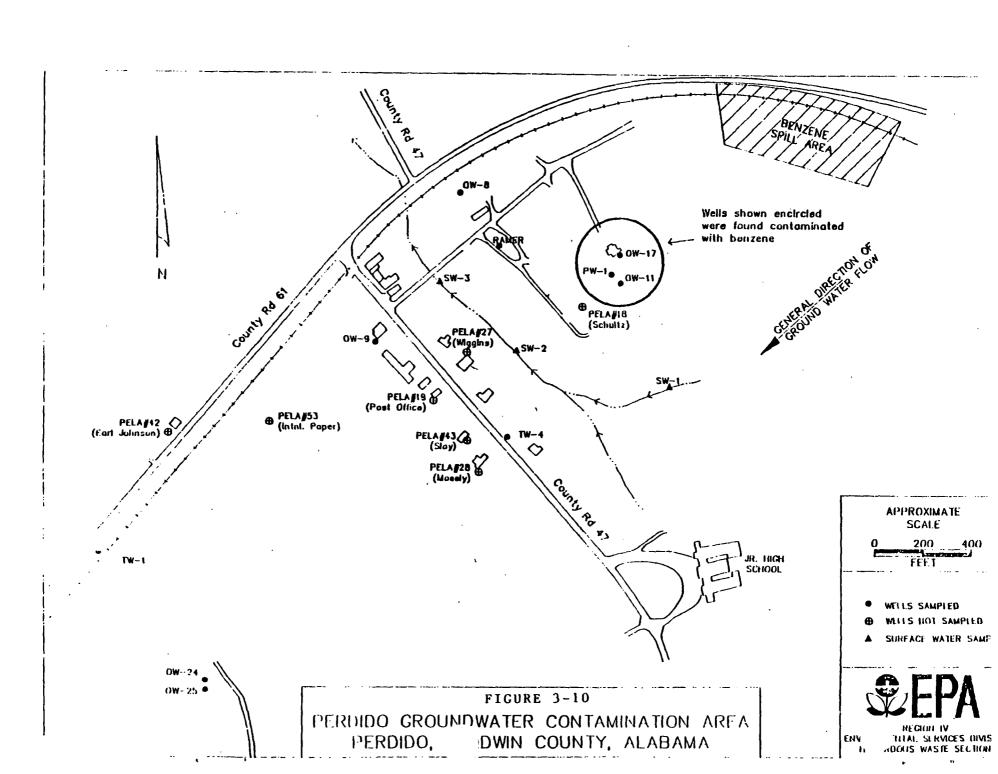
	Boring Number:	TW-4		TW-5		to-1		1.0-2		101-2	
		PA-		PA-		PA-		PA		PA-	
	Sample Number:	TW-	Detection	TWW-	Detection	LOW-	Detection	I/W-	Detection	LOH-	Detection
	Reported In:	004-01 (四句)	Limit_	005-01 (ppb)	Limit	(l4p) 001-01	<u>Limit</u>	(bbp) 005-01	Limit	<u>002-02</u> (ppb)	Limit
۱v	Acrolein	PDL.	100	BDL.	100	HDL.	100	HDL.	100	BDL	100
2V	Acrylonitrile	BDL	100	HDL	100	PDL	100	HDL	100	BDL	100
3V	Benzene	BDL	1	PDL	1	NDI,	1	RDL.	1	HDL.	i
4V	Bis(chloromethyl)ether	BOL	5	PDL.	5	PD),	5	BDL.	5	HDL	5
5V	Bromoform	BIDL	5	PDL	5	HDL.	5	PDL	5	RDL.	5
6V	Carbon Tetrachloride	PDL	3	PDL	3	PDL,	3	PDL	3	BDL.	3
7 v	Chlorobenzene	BDL	1	FDL	1	PDL	1	BOL	1	BDL.	i
βV	Chlorodibronomethane	BDL	5	FDL	5	M),	5	PDL.	5	RDL	5
9V	Chloroethane	BDL	5	FDL	5	IDL	5	PDL	5	FIDL	5
10V	2-Chioroethylvinyl Ether	FIDL.	5	HDL.	5	, KPI	5	PDI.	5	HDL	5
117	Chioroform	EDL.	5	EDL	5	IDI.	5	HDI.	5	PDL.	5
12V	Dichiorobromomethane	BDL	5	H)L	5	JUF	5	TOT.	5	BDL	5
13V	Dichiorodifluoromethane	BDL	5	PDL	` 5	MA,	5	PDL.	5	BDL	5
147	1,1-Dichloroethane	FIDE.	5	HDL,	5	PDI.	5	HDL.	5	BDL	5
15V	1,2-Dichloroethane	BDL	3	FDL	3	HDL,	3	PDL	3	HDL	3
16V	1,1-Dichloroethylene	BDL.	5	HDL	5	HDL	. 5	FDL	5	BDL	5
17V	1,2-Dichloropropane	BDL	5	BDL	5 `	HH,	5	RDL	5	PDL	5
18V	1,2-Dichloropropylene	BDL	5	HDL	5	w,	5	PDL	5	BDL	5
19V	Ethy Ibenzene	BDE.	1	POL	1	KH)	1	FIDL	1	PDL.	3
20V	Methyl Browide	BDL	5	HDL.	5	HDL	5	EDL	5	BDL	5
217	Methyl Chloride	HDL.	5	HDL	5	PDI.	5	PDL.	5	PDL	5 .
22V	Methylene Chloride	PIDL	5	HDL	5 -	FULL	5	HDL,	5	BDL	5
23V	1,1,2,2-Tetrachloroethane	BDL.	5	BDL	5	PDL	5	BDL	5	BDL	5
24V	Tetrachioroethylene	BDL	3	PDL	3	PDL	3	HDL	3	FDL	3
25V	Toluene	12	1	HDL	1	EDI.	1	2	1	FDL	1
26V	1,2-trans-Dichloroethylene	HDL,	5	HDL	5	HDL	5	BD(,	5	BDL	5
277	1,1,1-Trichloroethane	BOL	5	PDL.	5	EDL.	5	FDL	5	FDL	5
28V	1,1,2-Trichloroethane	HDL	5	BDL	, 5	ADF.	5	PDL	5	FDL.	5
29V	Trichioroethylene	BDL	1	HDL	1	HDL.	1	FDL	1	HDL	1
30V	Trichlorof luoromethane	BDL	5	RDL.	5	RDI.	5	BDL	5	BDL	5
317	Vinyi Chloride	BDL	1	BDL _.	1	HIN,	1	FDL	1	PDL	1
32V	Xylenes	HDL	5	RDL	5	H)L	5	HDL	5	BDL	5
33V	1so-Octane	HDL,	5	HDI.	5	HDL	5	HDL	5	HDL	5

TABLE 3-3(Continued)

Page 6 of 6

	Boring Number —:	PW-1		PW-1	
	Sample Number — : Reported In —— :	PA- PMI- 001-01 (ppl)	Detection Limit	PA- PWW- 001-02 ([[[]])	Detection Limit
١٧	Acrolein	HDt.	100	DDI.	100
2V	Acrylonitrile		100	IDI.	100
2V 3V	•	, KII		101.	•
3V 4V	Renzene	28030	1		1
	Ris(chloromethyl)ether	M),	5	HDL,	5
5V	Bromoform	FIDE,	5	W.	5
6V	Carbon Tetrachloride	IDL	3	m.	3
7V	Chlorobenzene	PDI,	1	M.	1
BV	Chlorodibromomethane	HDL	5	tail.	5
97	Chloroethane	PDL .	5	ean ⁴	5
100	2-Chloroethylvinyl Ether	POI.	5	IDI.	5
117	Chloroform	M)	5	IDL	<u>5</u>
120	Dichlorohromomethane	HDL	5	M).	` 5
1 3V	Dichlorodifluoromethane	ML	5	M)1.	5
14V	1,1-Dichloroethane	ACE.	5	MH.	5
15V	1,2-Dichloroethane	PDL	3	EDH.	3 🚶
16V	1,1-Dichloroethylene	ADL.	5	MA'	5
17V	1,2-Dichloropropane	BDL	5	IAN'	5
1 AV	1,2-Dichloropropylene	POL,	5	tun.	5
19V	Ethy Ibenzene	IDI.	1	FRM.	1
20V	Methyl Bromide	RDL	5	FFIL.	5
21V	Methyl Chloride	IDI.	5	tol.	5
22V	Methylene Chloride	NDL.	5	IANT.	5
23V	1,1,2,2-Tetrachloroethane	MDL	5	NDL	5
24V	Tetrachloroethylene	RDL.	3	PDL.	3
25V	Toluene	PDL.	ì	3	ĭ
26V	1,2-trans-Dichloroethylene	BDL.	5	BDL	5
217	1,1,1-Trichloroethane	EDL.	5	HDL.	`Š´
28V	1,1,2-Trichloroethane	BDL	5	MDL.	Ś
29V	• •	RDL.	í	BDL.	ĭ
30V		RDL.	5	HV.	5
317	Vinyl Chloride	BDL	í	RDL.	ì
32V	Xylenes	NDL.	5	PDI.	5
33V	Iso-Oct ane	RDL	5	ADL	5
.) .) ♥	IN WILES)	ILIL	5





with Benzene, OW-17(24000 ug/1), OW-11(7900 ug/1) and PW-1(450 J ug/1). These wells are located in the area of the suspected Benzene plume. There were no other contaminants attributable to the 1965 train derailment detected in any of the other wells sampled.

3.2.2 Surface Water Assessment

Currently the surface water bodies in the Perdido area are not affected by the Benzene contaminated groundwater plume. A surface water discharge area 1.5 to 2.2 miles to the southwest would eventually be affected if the plume is allowed to migrate undisturbed.

3.2.3 Soil Assessment

The area of the train derailment and the drainage ditches along Highway 61 were investigated for soil contamination from the Benzene spill. In late 1982 and 1983 PELA conducted a contamination investigation for CSXT. The source characterization phase of the study was performed to identify the area and vertical extent of Benzene contaminated soil. Of 20 soil test holes analyzed, 12 had measurable amounts of Benzene and 4 had trace amounts detected. The highest concentration found in the test holes was 20 ppm.

The 1986 RI conducted by ERT, also performed a source characterization study to identify the extent of Benzene contamination. A total of 45 shallow soil borings were taken by hand auger to a depth of 5 feet or refusal (figure 3-11). Only one boring (DB42) showed Benzene contamination with 1.2 ppm. This boring also contained 4.2 ppm 1,2-Dichloroethane which is not related to the spill. The source of the Benzene from this one isolated sample, that also contained an unrelated contaminant, cannot be definitely attributed to the train spill.

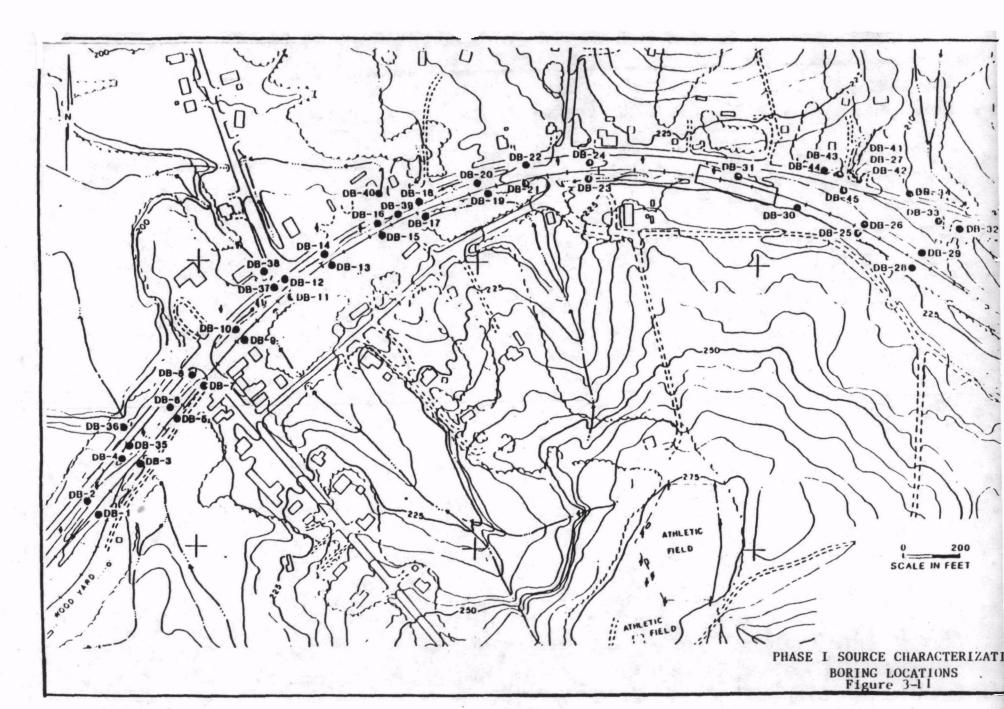
In addition to the 45 shallow soil borings, 19 deep soil borings were taken to investigate for Benzene contaminated soils down to the water table (figure 3-12). These borings ranged in depth from 17 to 122 feet. Analyses for volatile organic compounds (VOC) from these deep borings failed to detect the presence of Benzene or other VOCs. As a result of the source characterization studies for Benzene contaminated soils, it has been concluded that Benzene is no longer present in the soils or is at very low concentration and is not considered to be a significant source contributor.

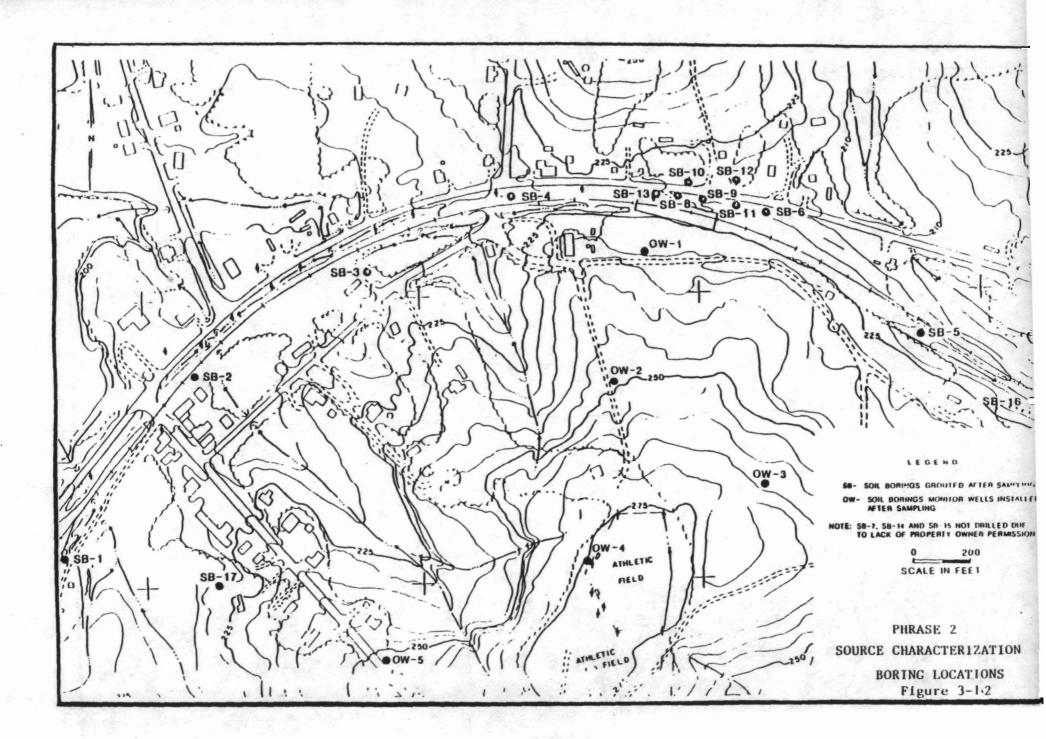
3.2.4 Atmosphere Assessment

Benzene remaining from the 1965 spill has entered the groundwater and/or tightly bounded to the soil at low concentrations. Benzene does not currently impact ambient air quality at the Perdido site.

3.3 Summary of Site Risks

The chemical of concern identified for this site is benzene. The risks to human health and the environment from exposure to benzene at this site is summarized below.





An assessment of current and potential routes of exposure at the Perdido site has identified several exposure pathways. The potential exposure pathways for humans is ingestion of contaminated groundwater. Additional pathways that were investigated were ingestion and dermal contact with surface waters for humans, and ingestion of surface water by cattle. These additional pathways were deleted from further consideration due to the facts that the benzene spill occurred over 20 years ago, that benzene is a highly volatile substance and will volatilize quickly, and that benzene has only been detected in the groundwater.

CERCLA directs the Agency to consider current and potential exposure scenarios in determining the risks from exposure to the sites. In addition, a goal of the Superfund program is to restore groundwater to its beneficial use whenever possible. Given the statutory and programmatic goals, the Agency is considering the risks from potential future use of the groundwater.

3.3.2 Toxicity Assessment

Benzene is a known human carcinogen. The EPA Cancer Assessment Group has estimated that the excess lifetime cancer risk from exposure to benzene at 6.6 ppb is 10(-5). The Superfund protective risk range is 10(-4) to 10(-7), with a point of departure of 10(-6). The protective Maximum Contaminant Level (MCL) for benzene is set at 5 ppb.

3.3.3 Environmental Assessment

The United States Department of the Interior, Fish and Wildlife Service has identified a threatened species, the eastern indigo snake, in Baldwin County. The contaminated groundwater at this site will not pose a threat the survival of this species.

4.0 Cleanup Criteria

The cleanup goal for benzene in groundwater has been established at 5 ppb, the MCL for this substance. Based on the risk assessment conducted for this site (described in section 3.3 above), this cleanup level has been determined to be protective of human health and the environment at this site.

5.0 Alternative Evaluation

The purpose of the remedial action at the Perdido site is to mitigate and minimize contamination in the groundwater, and to reduce potential risks to human health and the environment. The following cleanup objectives were determined based on regulatory requirements and level of contamination found at the site:

- * To protect the human health and the environment from exposure to contaminated groundwater through direct contact and;
- * To restore contaminated groundwater to levels protective of human health and the environment.

Perdido site based on applicable or relevant and appropriate requirements (ARARs) of federal and state statutes or other guidelines (table 5-1).

An initial screening of possible technologies was performed to identify those which best meet the criteria of Section 300.68 of the National Contingency Plan (NCP).

Each of the remaining alternatives for groundwater were evaluated based upon cost, technical feasibility, institutional requirements and degree of protection of public health and the environment.

5.1 Alternatives

Alternative 1: No Action

This alternative would allow for natural attenuation and biodegradation of the Benzene contamination plume. Long term groundwater monitoring would be provided for twenty years to monitor unsafe levels of Benzene approaching domestic water wells. Cost for utilizing monitoring wells was estimated at \$4,000 per year. The natural attenuation of the Benzene plume is not protective of public health and the environment based on the following:

- * the Benzene plume will reach the public water supply in 75 years;
- * domestic well water within the one mile radius is being used for agricultural and recreational purposes;
- * discharge into a surface water body would exceed the ambient water quality criteria.

Alternative 2: Groundwater/extraction on-site treatment

This alternative involves the installation of approximately three groundwater extraction wells screened in the Benzene contamination plume. The contaminated water would be pumped to the surface and piped to a treatment facility utilizing either air stripping in packed tower(s) or liquid phase extraction using granular activated carbon adsorption. If air stripping technology is utilized, benzene air emissions (anticipated to be insignificant), would be eliminated by carbon absorption. Regardless of which treatment technology is utilized, treated groundwater would be reinjected back into the aquifer. Groundwater would be treated until cleanup levels were attained. Groundwater monitoring would occur for an additional five years to insure cleanup levels were maintained.

Alternative 3: Groundwater withdrawal off-site treatment

This alternative would be performed by using submerged pumps in withdrawal wells to move contaminated groundwater to surface storage. The contaminated water would then be transported to an approved off-site treatment system.

TABLE 5-1 ARAR REQUIREMENT PROVISIONS

RCRA PART 264

o Subpart F - Groundwater Protection

Requires that levels of hazardous constituents in the upper aguifer at site boundary meet limits set by EPA as:

- 1) Background,
- 2) Maximum Contaminant Levels (MCL), or
- 3) An Alternate Concentration Limit (ACL) posing no present or future hazard to human health or the environment.

Note: This feasibility study is based on achieving EPA MCL criteria for benzene in groundwater (5.0 ppb).

OCCUPATIONAL SAFETY AND HEALTH STANDARDS: 29 CFR 1910

Applicable for worker safety during construction and operation of Alternatives 1 and 2.

6.1 Description of Recommended Remedy

The recommended alternative for remediation of groundwater at the Perdido site is groundwater extraction with onsite treatment (Alternative 2).

Approximately three groundwater extraction wells screened in the contamination plume will be installed. The contaminated water will be pumped to the surface and piped to a treatment facility utilizing either air stripping in packed tower(s) or liquid phase using granular activated carbon adsorption. This process is reported to be the best available technology (BAT) for Benzene removal from water under Section 1412 of the Safe Drinking Water Act (SDWA).

Air stripping is a mass transfer separation technique for removal of volatile organic compounds from water. In using the packed tower concept, water enters at the top of the tower and flows downward through the packing, while the airstream flow upward picks up the volatile compounds and exits at the top of the tower, passing through granular activated carbon before release to the atmosphere. The water is collected at the bottom, tested for compliance with the MCL and pumped back into the aquifer.

It is estimated that cleanup of the aquifer will take 5 to 7 years, with three wells pumping at a combined rate of 10 gallons/minute.

6.2 Operation and Maintenance

Groundwater monitoring would occur for an additional five years to ensure cleanup levels were maintained.

Air monitoring during treatment would be necessary to ensure that no threat to the human health or the environment is created by air emissions.

6.3 Cost of Recommended Alternative

The estimated capitol costs are \$169,000. Yearly operations and maintenance costs are \$99,000 and yearly groundwater monitoring costs are \$4,000.

6.4 Preliminary Schedule of Activities

Issue Record of Decision to Public Repos	sitory	9/88
Completion of Enforcement Negotiations	10/88	
Start Remedial Design	11/88	
Complete Remedial Design	3/89	
Start Remedial Action	4/89	
Construction Phase	4/89-	-9/89

6.5 FUTURE ACTION

Additional groundwater and aquifer studies will be performed during the engineering design to define the contamination plume and aquifer characteristics for the purpose of groundwater recovery, treatment, and disposal.

6.6 CONSISTENCY WITH OTHER ENVIRONMENTAL LAWS

In selecting remedial alternatives, primary consideration must be granted under the Superfund Amendments and Reauthorization Act of 1986 to remedies that achieve applicable or relevant and appropriate requirements (ARARs) for protection of public health and the environment. For the Perdido site, such Federal laws include:

- National Environmental Protection Act
- Toxic Substances and Control Act
- Department of Transportation Hazardous Material Transportation Act
- Resource Conservation and Recovery Act
- Clean Air Act
- Safe Drinking Water Act
- Clean Water Act

The requirements of the National Environmental Protection Act (NEPA) have been met by conducting the functionally equivalent remedial investigation and feasibility study. Additionally, the results of these studies have been presented to the public at a public meeting, and the public was given the opportunity to comment on the results of the studies and the proposed plan for remedial action.

The Toxic Substances and Control Act (TSCA) requirements do not apply to any of the remedial alternatives under consideration for the Perdido site. The contaminant found at the Perdido site is not regulated under TSCA, and therefore, there are no ARARs to be considered under this regulation.

For Alternative 2 that includes transportation of spent activated carbon, the Department of Transportation (DOT) Hazardous Material Transportation Act requires that the proper labeling and safety requirements be followed.

Spent activated carbon will also have to be disposed according to the Resource Conservation and Recovery Act (RCRA) regulations.

Since there will be no air emissions, the Clean Air Act (CAA) does not apply to the site.

National Primary Drinking Water Regulations (NPDWRs) established under the Safe Drinking Water Act (SDWA) set the Maximum Contaminant Level (MCL) for Benzene at 5 ppb.

Ambient Water Quality Criteria under the Clean Water Act (CWA) for Benzene is 5.3 ppm. This would apply if a no action alternative was implemented and contaminated groundwater discharged to surface waters.

the remediation of the groundwater at the Perdido site.

7.0 COMMUNITY RELATIONS

Citizens concerns were originally high early in the project until the public water supply system was installed in July, 1983. Since then, there has been little citizen interest with the site.

A community relations plan was prepared by EPA in 1985. This plan includes a community relations history, a summary of issues and concerns, community relations objectives, community relations techniques, and a listing of interested parties.

An information repository was established in 1985 in the town of Bay Minette, Alabama, the county seat of Baldwin County. All required site information and documents were deposited in the repository.

In November 1985 a public meeting was held to discuss the implementation of the RI/FS.

In June 1988, a fact sheet concerning the Perdido site was prepared and distributed to interested citizens, area residents, local press, public officials and the PRP. The fact sheet summarized the site history, current site status, and future plans of the site, as well as announced a public meeting to present the results of the FS. EPA, state, and county contacts were identified. The fact sheet was mailed two weeks prior to the meeting. Also at this time, public notices and press releases were issued to the appropriate media as announcements for the meeting.

The public meeting to discuss the results of the RI/FS and the preferred alternative was held at the Bay Minette City Hall on July 14, 1988. Approximately 30 people attended the meeting mostly interested citizens, but also a representative of the media and an insurance company representative. Only one question was raised and that, by the insurance company representative. The public meeting marked the beginning of a formal 3 week public comment period (7/14/88-8/4/88), during which time the public was encouraged to submit written comments to EPA concerning the RI/FS and the preferred alternative.

Responsiveness Summary

Perdido Ground Water Contamination Site

Perdido, Baldwin County, Alabama

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3.0	SUMMARY OF COMMENTS	Δ

Responsiveness Summary Perdido Ground Water Contamination Site

July 14, 1988

Introduction

In accordance with the U.S. Environmental Protection Agency's (EPA) Community Relations policy and guidance, the EPA Region IV office held a public meeting July 18, followed by a 21-day public comment period. The purpose of the meeting was to obtain comments on the Feasibility Study (FS) for the Perdido Ground Water Contamination Superfund site and on the preferred alternative for the remediation of the contamination problem at the site. The meeting took place from 7:00 p.m. to 9:00 p.m. at the Bay Minette City Hall in Baldwin County, Alabama. Approximately 30 people attended. A public notice announcing the meeting and the public comment period was published in The Baldwin Times July 10, 1988. The report of the FS will be placed in the site information repository located in Bay Minette Public Library, for public review.

1.0 BACKGROUND

A. Site Status

The Perdido Ground Water Contamination site is located in the Town of Perdido, Baldwin County, Alabama. The site consists of approximately two square miles surrounding the location where a 1965 train derailment occurred that spilled chemicals into drainage ditches along State Road 61. As a result of the spill, pure chemical Benzene penetrated the soil and ground water used by area residents for their water supply.

In the early 1980s, the State initiated a sampling program in response to local complaints about petroleum odor in the water. The Alabama Department of Solid Waste and Hazardous Waste enlisted EPA's assistance, following a preliminary assessment and site inspection. Based on the findings of the preliminary assessment and site inspection, The EPA

recommended the site for inclusion on the National Priorities List (NPL), the list of hazardous waste sites eligible for cleanup under the Superfund Program. The site was added in 1983.

In October 1985, CSX Transportation Company (previously the Louisville and Nashville Railroad, which operated the train that derailed) signed an Administrative Order on Consent with the EPA to conduct a remedial investigation/feasibility study (RI/FS) at the site. RI/FS is a two-phase study wherein a site is characterized by investigating toxicity, volume, and form of hazardous substances at and surrounding the site and appropriate technologies are evaluated for cleanup. The Perdido RI, completed in November 1987, detected the presence of benzene in two wells; however, no soil contamination was detected. Based on findings in the RI, contractors began an FS to identify possible alternatives. The FS for the Perdido site evaluated remedial alternatives ranging from no action to pumping and treating the ground water, and narrowed the alternatives down to two in the final FS report. One alternative is no action, which EPA always considers and uses for a baseline to which it compares other alternatives. No action is not preferred for the Perdido site because the plume of benzene contamination traveling underground that emanated from the location of the train derailment will eventually migrate to areas where residents still depend on their domestic wells for drinking water. The second alternative, EPA's preferred alternative, is a ground water withdrawal and treatment method.

EPA described the alternatives in a site information fact sheet it distributed to the public and presented the information at the public meeting. Throughout the 21-day comment period, from July 14, 1988 through August 4, 1988 the Agency received, considered, and responded to public comments on the RI/FS and the preferred alternative. Once the comments have been evaluated and addressed, EPA will make its final decision on the remedy and will sign the Record of Decision (ROD). The ROD presents the choice of remedy and the process and rationale for reaching that choice. Once the ROD is signed, the remedial action (RA), which is the implementation of the chosen cleanup technology, will be initiated.

3. Community Relations

In accordance with its public outreach responsibilities under the Superfund Program, EPA

initiated several community relations activities at the Perdido site. These activities included:

- Establishment of a site information repository at the Bay Minette Public Library. The repository contains site documents and provides a place where interested persons can review reports and other site information.
- Distribution of a site fact sheet to the site community. The fact sheet explains the most current activities at the site, site status, and future activities.
- Presentation of a public meeting that provided the public with an opportunity to hear a report on FS findings and EPA's preferred remedial alternative, and to ask questions regarding EPA's actions. The meeting was held at the Bay Minette City Hall auditorium on July 14, 1988.
 - Provision of a 21-day public comment period on the RI/FS and proposed plan. This comment period ran from July 14, 1988 through August 4, 1988.

Additional public involvement activities will be implemented as cleanup activity at the site gets under way.

2.0 SUMMARY OF PRESENTATIONS

Mr. Larry Meyer, EPA's Remedial Project Manager, (recently succeeded by Gena Townsend) opened the meeting with a brief summary of the site history and a brief account of Superfund program and process, including the results of the recently completed RI/FS.

Mr. Michael Henderson, EPA's Community Relations Coordinator, gave a brief overview of the community relations program. Mr. Henderson explained that the 21-day comment period on the RI/FS and EPA's preferred alternative is designed to provide community members with an opportunity to ask questions and register concerns pertaining to the site.

Mr. Hoyt Clark, the project manager whose firm was hired by CSX to conduct the RI/FS, explained the findings

of the RI/FS and the preferred alternative. Mr. Clark stated that the pump and treat method has been chosen as the preferred cleanup method because it is a permanent remedy for the site, it is protective to human health and the environment, and it is cost effective. He explained the technology, saying that the contractor will install three wells to pump ground water up from underground. The water will then be treated using a method called air stripping (a treatment process in which a current of air passes through contaminated water in a tower system to decontaminate water). This treatment removes benzene from the water and recaptures the benzene vapor in canisters.

Dr. Michael Allred, an Environmental Toxicologist with the Agency for Toxic Substances and Disease Registry (ATSDR), presented information on the health aspects associated with the Perdido Ground Water Contamination site. Dr. Allred discussed the results of the past health study conducted in Perdido, which tested individuals who live in the vicinity of the site. He explained that, to date, there is no evidence of adverse health effects on residents in the vicinity of the site.

3.0 SUMMARY OF COMMENTS

Only one question was asked by a meeting attendee. This participant referred to a draft copy of the FS report which recommended the no action alternative. The questioner wanted to know how EPA moved from the no action alternative to the expenditure of an estimated \$169,000 for implementing the pump and treat technology. EPA's Project Manager, Mr. Larry Meyer, responded by stating that EPA had not released, therefore, had not accepted the draft report to which the speaker referred. He explained, that the RI/FS contractor initially recommended the no action alternative; however, negotiations between EPA, CSXT, and the contractor resulted in the recommendation of the pump and treat alternative.

No other questions were raised and the project manager indicated that should questions or concerns arise, residents could contact EPA by letter or telephone. He stated that a message could be left on the Superfund hotline (800-241-1754) and the appropriate person would return the call as soon as possible.



ALABAMA DEPARTMENT OF ENVIRONMENTAL MANAGEMENT



NB4 L

eigh Pegues, Director

1751 Federal Drive Montgomery, AL 36130 205/271-7700

September 21, 1988

Field Offices:

Unit 806, Building 8 225 Oxmoor Circle Birmingham, AL 35209 205/942-6168 Gena D. Townsend Site Project Manager U.S. EPA, Region IV 345 Courtland Street Atlanta, Georgia 30365

Dear Gena:

P.O. Box 953 Decatur. AL 35602 205/353-1713

We have reviewed the draft copy of the Perdido Groundwater Contamination site record of decision. We concur in the proposed remedial action at the Perdido site.

2204 Perimeter Road Mobile, AL 36615 205/479-2336

As I pointed out to you during a phone conversation, the last sample from PW-1 showed a concentration of .45 ppm of Benzene. Enclosed you will find a graph showing the change in Benzene concentration with Time for PW-1.

Singerely,

/Joseph E. Downey Special Projects

JED/daf

Enclosure

CC: Steve Buser