United States
Environmental Protection
Agency

Office of
Emergency and
Remedial Response

EPA/ROD/R06-92/075
September 1992
PB93-964206

EPA

Superfund Record of Decision:

Gulf Coast Vacuum Services (Operable Unit 2), LA

NOTICE

The appendices listed in the index that are not found in this document have been removed at the request of the issuing agency. They contain material which supplement, but adds no further applicable information to the content of the document. All supplemental material is, however, contained in the administrative record for this site.

50272-101

REPORT DOCUMENTATION PAGE	1. REPORT NO. EPA/ROD/R06-92/075	2.	3. Recipient's Accession No.

4. Title and Subtitle SUPERFUND RECORD OF DECISION Gulf Coast Vacuum Services (Operable Unit 2), LA First Remedial Action - Interim	5. Report Date 09/30/92 6.
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12. Sponsoring Organization Name and Address U.S. Environmental Protection Agency 401 M Street, S.W. Washington, D.C. 20460	13. Type of Report & Period Covered 800/000 14.

15. Supplementary Notes

PB93-964206

16. Abstract (Limit: 200 words)

The 12.8-acre Gulf Coast Vacuum Services site is a former vacuum truck and oil field drilling mud plant in Vermilion Parish, Louisiana. Land use in the surrounding area is predominantly agricultural, and the site is situated in the low-lying flatland of the Atlantic Gulf Coastal Plain. Ten residences, located within a half mile, use the ground water below the site, the Chicot Aquifer, for drinking water as well as irrigation. The site is bounded to the east and south by the D.L. Mud Superfund site, which is being evaluated separately. From 1969 to 1984, several owners used the site as a trucking terminal for transporting various materials, primarily waste generated from oil exploration and production. The site contains two open waste pits, specifically, the Washout Pit and the West Pit, as well as two areas covered with vegetation, known as the Former West Pit. The Former West Pit, located south of the West Pit, was used for disposal. Additionally, there are four vertical storage tanks, horizontal tanks, and three underground storage tanks. Unpermitted disposal of contaminated materials, primarily oil industry-related waste, occurred in the unlined pits, ditches, and soil at the site. In 1980, a citizen's complaint through the Vermilion Association for Protection of the Environment prompted several site

(See Attached Page)

17. Document Analysis a. Descriptors

Record of Decision - Gulf Coast Vacuum Services (Operable Unit 2), LA
First Remedial Action - Interim
Contaminated Media: soil, sludge, sw
Key Contaminants: VOCs (benzene, PCE, TCE, toluene, xylenes), other organics (dioxins, PAHs, PCBs, pesticides, phenols), metals (arsenic, chromium, lead)

b. Identifiers/Open-Ended Terms

c. COSATI Field/Group

18. Availability Statement	19. Security Class (This Report) None	21. No. of Pages 76
	20. Security Class (This Page) None	22. Price

(See ANSI-Z39.18) *See Instructions on Reverse* OPTIONAL FORM 272 (4-77) (Formerly NTIS-35) Department of Commerce

Abstract (Continued)

investigations by EPA. EPA has conducted three removal actions at the site, addressing contaminated overflow from the Washout and West pits in 1990, overflow from the West pit into a previously constructed secondary containment area in 1991, and critical rainwater accumulation in the Washout Pit and the West Pit in 1992. All three removals involved pumping, treating, and discharging the wastewaters to prevent offsite migration and human exposure. This ROD provides an interim remedy for OU2, the rainfall accumulation, contaminated overflow, and offsite migration from the Washout and West Pits. The primary contaminants of concern affecting the soil, sludge, and surface water (rainwater) are VOCs, including benzene, PCE, TCE, toluene, and xylenes; other organics, including dioxins, PAHs, PCBs, pesticides, and phenols; and metals, including arsenic, chromium, and lead.

The selected remedial action for this site includes excavating 2,700 cubic yards of contaminated sludge and 550 cubic yards of associated soil from the Washout Pit to 2 feet below where contaminant levels exceed the remedial action goals, and consolidating these materials into the West Pit to achieve positive drainage; backfilling the excavated areas with clean soil, and covering the West Pit with an impermeable synthetic membrane cover; pumping and onsite treatment of 1,700,000 gallons of contaminated rainwater, with onsite discharge; abandoning three onsite water supply wells; and monitoring air during the excavation. The estimated present worth cost for this remedial action is $525,200, which includes an annual O&M cost of $5,000.

<u>PERFORMANCE STANDARDS OR GOALS</u>: Chemical-specific remedial action goals were developed for the accumulated rainwater based on state effluent pollution concentration limits, and for the soil and sludge based on health-risk values. Soil and sludge excavation levels include arsenic 16 ug/kg; barium 5,400 mg/kg; benzene 0.66 mg/kg; and carcinogenic PAHs 3 mg/kg.

RECORD OF DECISION

GULF COAST VACUUM SERVICES
VERMILION PARISH, LOUISIANA

INTERIM SOURCE ACTION
OPERABLE UNIT 2

UNITED STATES ENVIRONMENTAL PROTECTION AGENCY

SEPTEMBER 1992

RECORD OF DECISION
CONCURRENCE DOCUMENTATION
FOR THE
GULF COAST VACUUM SERVICES SUPERFUND SITE
INTERIM ACTION OPERABLE UNIT 2

Kathleen Lohry
Site Remedial Project Manager

for Nelly Shirer
Office of Regional Counsel
Site Attorney

Stephen Gilrein, Chief
ALNM Section 6H-SA

Carl Edlund, Chief
Superfund Programs Branch 6H-S

for Barbara Greenfield
Associate Regional Counsel
Waste Branch, 6C-W

George Alexander, Jr.
Office of
Regional Counsel 6C

Allyn M. Davis
for Hazardous Waste Management
Division 6H

DECLARATION
GULF COAST VACUUM SERVICES
RECORD OF DECISION
INTERIM SOURCE ACTION, OU2
SEPTEMBER 1992

SITE NAME AND LOCATION

Gulf Coast Vacuum Services
Vermilion Parish, Louisiana

STATEMENT OF BASIS AND PURPOSE

This decision document presents the selected remedial action for Operable Unit No. 2, Interim Source Action, for the Gulf Coast Vacuum Services site (the site) in Vermilion Parish, Louisiana, which was chosen in accordance with the Comprehensive Environmental Response, Compensation and Liability Act of 1980 (CERCLA), as amended by the Superfund Amendments and Reauthorization Act of 1986 (SARA) and, to the extent practicable, the National Oil and Hazardous Substances Pollution Contingency Plan (NCP). This decision is based on the administrative record file for this site.

The State of Louisiana concurs with the selected remedy.

ASSESSMENT OF THE SITE

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

DESCRIPTION OF THE SELECTED REMEDY

There are two operable units for the site. This Record of Decision (ROD) for Operable Unit No. 2, Interim Source Action, provides for a limited action to control rainfall accumulation, contaminated overflow, and off-site migration from the two on-site, open pits; the Washout Pit and the West Pit. The interim action will be implemented prior to the Final Source Action described in a separate Record of Decision. The ROD for Operable Unit No. 1, Final Source Action, addresses the long-term remedial action for all of the sources of contamination at the site. The areas addressed in the Final Source Action include the pit sludges and associated soils, buried pits, tank contents, site soils, sediments and the ground water.

The interim remedy will address the short term risk due to overflow of contaminated water from the two open site pits. It will also minimize the potential for human exposure and direct contact with the contaminants in the overflow. The remedy is designed to address these areas until the Final Source Action is implemented. The accumulated rainwater will be treated to below established discharge standards set by the Louisiana Department of Environmental Quality.

The Interim Action will be accomplished by eliminating the threat of overflow from the Washout Pit, clean closing it and consolidating this material into the West Pit. The West Pit will then be covered with a synthetic impermeable membrane. Soil/sludge from the Washout pit will be excavated to below the final remedial objectives which are 16 ppm arsenic; 5400 ppm barium; .66 ppm benzene; 3 ppm Total Carcinogenic PAHs (expressed as B(a)P equivalents); and to a Hazard Index of 1 for the Total Non-carcinogenic PAHs. (If during the course of the Interim Action additional soils are needed to provide material stability within the West Pit prior to cover placement, one or both buried contaminated waste pits will be excavated for this purpose).

Added benefits of this interim action are that an "attractive nuisance" from the ponding of rainwater will be removed, the potential for ground water contamination will be reduced since the driving force, the hydraulic head, will be removed, and EPA will be able to more accurately estimate the volume of soil to be treated in the Final Source Action. The buried material in the Washout Pit represents an unknown quantity of material to be excavated and subsequently treated in the Final Source Action. Knowledge of the volume of this material will enable EPA to accurately prepare the design for the implementation of the Final Source Remedial Action.

The major components of the selected remedy include:

- On-site pumping, treatment of the accumulated rainwater in the Washout Pit and West Pit;

- Segregation of the paraffin layer in the West Pit;

- Excavation of the sludge/soil from the Washout Pit and consolidation into the West Pit;

- Placement of an impermeable synthetic membrane over the consolidated material in the West Pit;

- Backfilling of the Washout Pit with clean soil.

The estimated total cost of this remedy (present worth) is $525,200.

STATUTORY DETERMINATIONS

This interim action is protective of human health and the environment, complies with Federal and State applicable or relevant and appropriate requirements for this limited-scope action to the extent practicable and is cost-effective. Because this action does not constitute the final remedy for the site, the statutory preference for remedies that employ treatment that reduces toxicity, mobility, or volume as a principal element is not necessary; although waste mobility will be reduced on a temporary basis. Threats posed by the conditions at this site will be fully addressed by the Final Response Action. This interim action is protective of human health and the environment and it is fully consistent with the Final Source Action, Operable Unit No. 1.

for B.J. Wynne
Regional Administrator
Region 6

9-30-92
Date

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RECORD OF DECISION

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I. LOCATION AND DESCRIPTION

The Gulf Coast Vacuum Site (GCV) was a vacuum truck and oilfield drilling mud plant operation from approximately 1969 to 1980. During the period that the facility was in operation, unpermitted disposal of organic and inorganic-contaminated materials, primarily oil industry-related waste, occurred in several open pits.

The Gulf Coast Vacuum site is located 3.5 miles southwest of the town of Abbeville in Vermilion Parish, Louisiana, on Parish Road P-7-31 (Figure 1). The site occupies 12.8 acres in an agricultural area.

The site is situated in the low-lying flatland of the Atlantic Gulf Coastal Plain. The apparent natural relief across the site is approximately six feet, trending from fourteen feet Mean Sea Level (MSL) at the southeastern property to eight feet MSL at the northwestern boundary. The site is bounded to the north and west by pasture land and to the east and south by the D.L. Mud Superfund site and the LeBoeuf Canal (Figure 2).

The most outstanding physical features of the site are the two open waste pits, designated the Washout Pit and the West Pit, and a mounded area covered with vegetation designated the Former West Pit (Figure 2). The Former West Pit adjoins the West Pit to the south and apparently was used for disposal, but was subsequently filled in and now supports a vegetative cover. This area is currently the highest point on the site at approximately 18.5 feet MSL. To the immediate west of the West Pit is a bermed area designated the Secondary Containment pit. This pit was constructed in March 1990, by the EPA Region 6, Emergency Response Branch, as part of a removal action, to collect overflow from the West Pit. There are two other areas of concern that are covered with vegetative cover. The areas appear to have been sludge pits which were subsequently covered with soil. (They can be seen on the 1974 aerial photos included in the administrative record). One of these buried pits is located to the east of the West Pit (under the aboveground storage tank). Another area is located southeast of the Washout Pit and is designated the Southeast area.

Other site features, include four above ground vertical storage tanks, one above ground horizontal tank and three underground storage tanks. There are also three relatively open areas, designated the East and West Site Fields and the Northeast Area, located in the northern part of the site property that were also used for disposal of oilfield-related wastes and possibly other types of waste. In addition, there are several buildings still present at the site that were constructed during the operation of the facility and used as office buildings and as equipment maintenance areas.

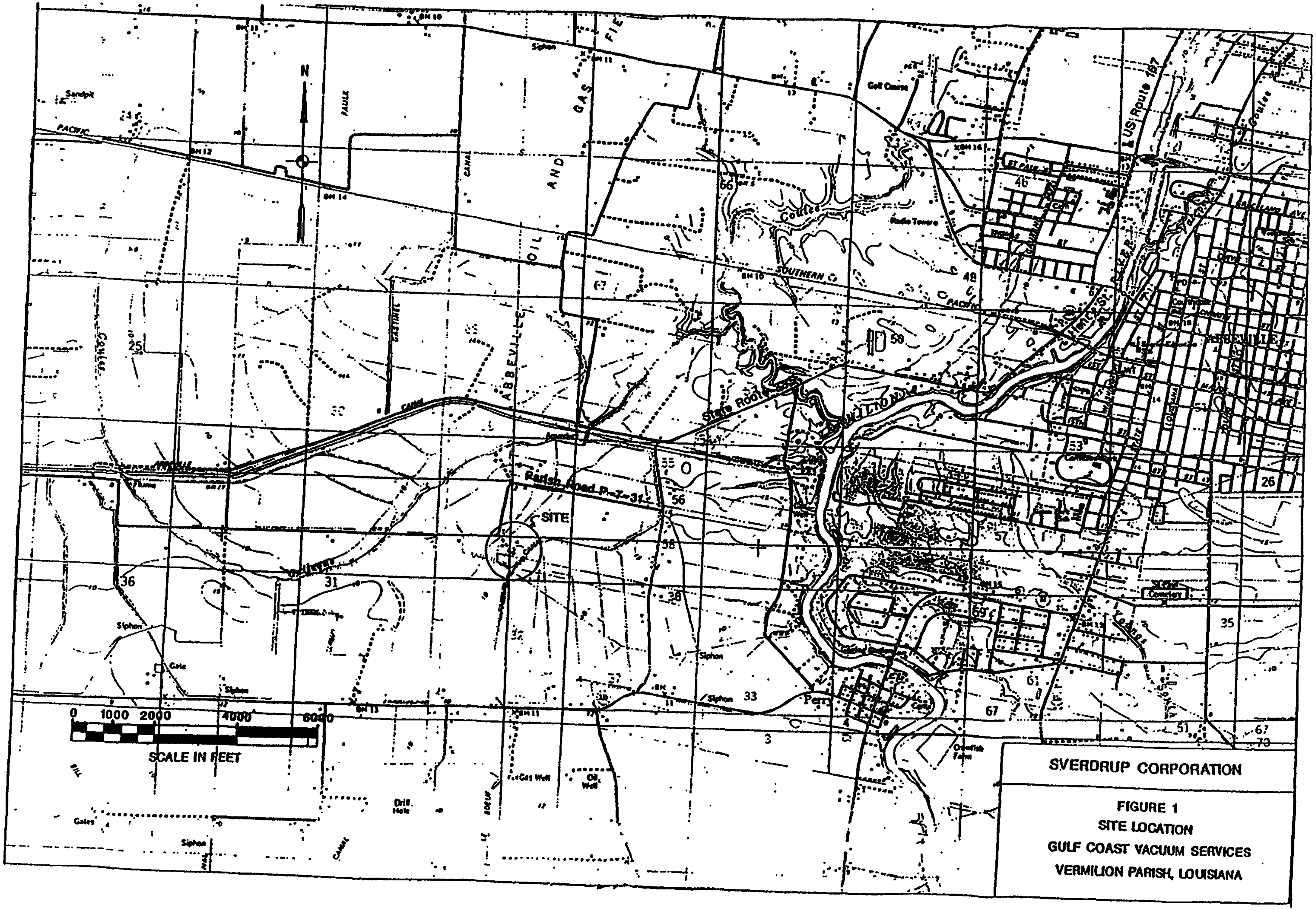

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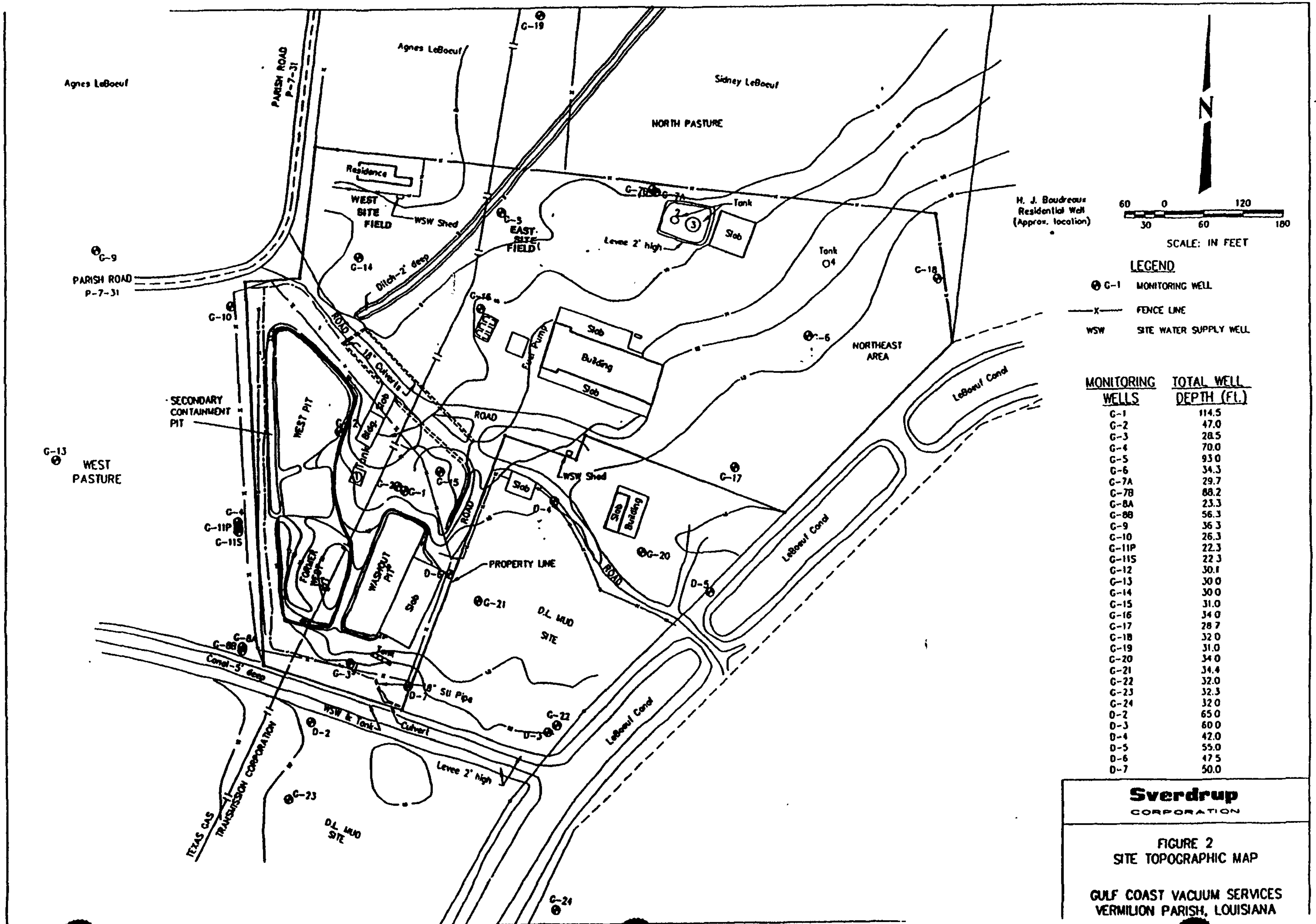
FIGURE 1
SITE LOCATION
GULF COAST VACUUM SERVICES
VERMILION PARISH, LOUISIANA

FIGURE 1



MONITORING WELLS	TOTAL WELL DEPTH (Ft.)
G-1	114.5
G-2	47.0
G-3	28.5
G-4	70.0
G-5	93.0
G-6	34.3
G-7A	29.7
G-7B	88.2
G-8A	23.3
G-8B	56.3
G-9	36.3
G-10	26.3
G-11P	22.3
G-11S	22.3
G-12	30.1
G-13	30.0
G-14	30.0
G-15	31.0
G-16	34.0
G-17	28.7
G-18	32.0
G-19	31.0
G-20	34.0
G-21	34.4
G-22	32.0
G-23	32.3
G-24	32.0
D-2	65.0
D-3	60.0
D-4	42.0
D-5	55.0
D-6	47.5
D-7	50.0

Sverdrup
CORPORATION

FIGURE 2
SITE TOPOGRAPHIC MAP

GULF COAST VACUUM SERVICES
VERMILION PARISH, LOUISIANA

Surface water drainage across the northern portion of the site is generally to the north. Drainage across this area discharges to local ditches that flow into the Coulee Galleque which eventually flows into the Abbeville Canal. The canal along the southern property boundary carries drainage from the southern portion of the site eastward to the LeBouef Canal. The LeBouef Canal is to the east of the site and trends in a northeast, southwest direction. Nearest the site, this canal is segmented into three sections by two eastern bridges. The LeBouef Canal was constructed for irrigation purposes and previously drained into the Vermilion River, located 1.5 miles east of the site. Currently, it is bermed so it does not drain into the river. It only contains water after a rain storm.

Areas adjacent to the site are currently used as pasture land for grazing cattle and for other agricultural uses, predominantly rice and soybean crop raising. A review of historical photographs also indicates that past and current adjacent land use to be predominantly agricultural. Immediately south and east of the site is another Superfund site, the D.L. Mud site, which is being evaluated separately. Ten residences are located within 1/2 mile of the site on Parish Road P-7-31 and Route 335.

The current potential use of the ground water is drinking water purposes, as well as irrigation. A study of the residential wells in the site vicinity indicate that residential well depths range from 80 to 230 feet below ground surface. The homes outside the corporate limits of Abbeville and within the town of Perry get their drinking water supply from private wells. Approximately 39 private wells are located in the vicinity of the site. Of these 39 wells only 20 are listed as being used for domestic water supply. A survey of the well construction records indicate that residential wells depths typically range from 80 to 230 feet below ground surface.

II. SITE HISTORY AND ENFORCEMENT ACTIVITIES

The Gulf Coast Vacuum site, also known as the Galveston Houston Yard and the LeBoeuf Yard, was part of a 25.562 acre parcel owned and operated by Lafayette Highway Equipment Sales and Services, Inc. from September 1969 until May 1975 when the parcel was sold to Gulf Coast Pre-Mix Mud Services, Inc.

Gulf Coast Pre-Mix Service, Inc. owned and operated the site until January 1979 when it merged with Gulf Coast Pre-Mix Trucking, Inc., resulting in G.H. Drilling Fluid, Inc. G.H. Drilling Fluids, Inc. was renamed G.H. Fluid Services, Inc. in August 1979 and the site was owned and operated by G.H. Fluid Services, Inc. until October 1980 when it conveyed 12.780 acres (the Gulf Coast Vacuum site) of its 25.562 acre parcel to Gulf Coast Vacuum Services, which operated the site until 1984, when it declared bankruptcy in 1984. The remaining parcel, is now known as the D.L. Mud Superfund site.

Gulf Coast Vacuum Services, Inc. and its predecessors were using the property as a trucking terminal for the transportation of various materials, including primarily wastes generated from oil exploration and production. Unpermitted disposal occurred in the unlined pits, ditches and site soils during operation.

A citizen's complaint through the Vermilion Association for Protection of the Environment (VAPE) led to site identification by EPA on June 27, 1980. As a result, an EPA Field Investigation Team (FIT) conducted a preliminary assessment and preliminary sampling inspection in July and September of 1980, respectively. A more detailed sampling program was conducted by the EPA Technical Assistance Team (TAT) in July 1985. An Expanded Site Inspection (ESI) was performed in 1987 by the FIT. The site information and sampling data collected in the ESI was used to determine if the site posed a significant environmental and human health risk. The site was proposed for inclusion on the National Priorities List (NPL) in June 1988 and was finalized on the NPL in March 1989, pursuant to Section 105 of the Comprehensive Environmental Response, Compensation, and Liability Act, as amended, (CERCLA), 42 U.S.C. 9605, qualifying the site for investigation and remediation under CERCLA.

In 1988, EPA identified over 400 potentially responsible parties (PRPs) for the site. In August of 1989, EPA Region 6 issued a General Notice letter to these PRPs regarding potential liability and a request for information. Special Notice letters were then issued to the PRPs in December of 1989. The Special Notice letter requested that the PRPs voluntarily perform or finance a Remedial Investigation/Feasibility Study (RI/FS). All of the PRPs given notice either did not respond to the Special Notice letter or declined the opportunity to conduct or finance the RI/FS for the site.

EPA has conducted three removal actions at the site. Due to heavy rainfall in the area, on March 20, 1990, the EPA, Region 6, Emergency Response Branch (ERB) began a Removal Action to address contaminated overflow from both the West Pit and the Washout Pit. During the Removal, a secondary containment levee along the west side of the West Pit was constructed to contain overflow and prevent offsite migration of contaminated water onto an adjacent pasture. The Washout Pit was pumped out and the waste water was treated through a sand filter and subsequently through an activated carbon filter. Discharge of treated wastewater was in accordance with limits established by the Louisiana Department of Environmental Quality (LDEQ), Water Quality Division. In addition, fence repairs were made where needed and a new fence was constructed along the west side of the West Pit to include the new levee.

On February 8, 1991, an Action Memorandum for a second Removal Action, which was designated as a classic emergency, was signed to again address overflow from the West Pit into the secondary containment area. Heavy rainfall during the month of January 1990 (in excess of 13 inches) had placed a burden on the ability of the secondary containment to hold runoff from the West Pit. This Removal Action involved pumping, treating and discharging wastewaters from the West Pit, the secondary containment area of the West Pit and the Washout Pit. Treatment techniques for the wastewater were similar to the March 1990 Removal. A six-foot chain-link fence was constructed around the Washout and West Pit to further restrict site access and to replace the previous barbed wire fence which was again in need of repair. Due to time constraints rising from the emergency situation, five representatives of the PRPs were notified by facsimile notice of the proposed emergency action. The PRPs were given the opportunity to conduct the removal action and were to contact EPA Region 6, ERB by February 11, 1991. The PRPs either declined to undertake the Removal Action or did not respond.

An Action Memorandum for a third Removal Action, which was designated as a classic emergency, was signed on March 30, 1992 to address critical rainwater accumulation in the Washout Pit and the West Pit. This Removal Action, like the previous two removals, employed pumping, treating and discharging wastewater from the West Pit and the Washout Pit, to prevent off-site migration and human exposure to contaminated overflow. Due to time constraints rising from the emergency situation, on March 30, 1992, twenty-eight (28) representatives of the PRPs were notified by facsimile notice of the proposed emergency action. The PRPs were given the opportunity to conduct the removal action and were to contact EPA Region 6 ERB by April 1, 1991. The PRPs either declined to undertake the Removal Action or did not respond.

III. HIGHLIGHTS OF COMMUNITY PARTICIPATION

This decision document presents the selected interim remedial action for the GCV Superfund site, in Abbeville, Louisiana, chosen in accordance with CERCLA, as amended by the Superfund Amendments and Reauthorization Act and, to the extent practicable, the National Contingency Plan (NCP). The decision for this site is based on the administrative record.

The requirements of CERCLA Sections 113(k)(2)(B)(i-v) and 117, 42 U.S.C. §§9613(k)(2)(B)(i-v) and 9617, which require community participation, were met during the remedy selection process, as illustrated in the following discussion.

A series of community interviews were conducted in May of 1990. During the community interviews, EPA representatives had face-to-face meetings with citizens and gained information about the site history and past practices. Fact Sheets on the site's progress were mailed out in May 1990, April 1991, January 1992, and July 1992. These fact sheets were mailed out to all individuals on the Site mailing list, which has been continually updated as Site activities progressed. A Community Open House was held in Abbeville on Wednesday, September 26, 1990, to discuss the planned RI/FS activities. On February 23, 1991, a "Superfund Citizens Workshop" was held at the Vermilion Parish Hospital to inform citizens about the Superfund program and the process EPA uses to remediate Superfund sites.

An informal Open House was held on July 1, 1992 at the Hospital in Kaplan, Louisiana to discuss the findings of the RI/FS. The RI and FS Reports and the Proposed Plan for the Gulf Coast Vacuum site were released to the public on July 13, 1992. These documents were made available to the public through the Administrative Record and the information repositories maintained at the Vermilion Parish Library, Abbeville, Louisiana, Louisiana Department of Environmental Quality, Baton Rouge, Louisiana and EPA's Region 6 Library. A summary of the Proposed Plan and the notice of availability of these documents and the Administrative Record was published in the Abbeville Meridional on July 12, 1992. The public comment period was from July 13, 1992 through August 11, 1992. During this period, a request for an extension to the public comment period was made. As a result, the public comment period was extended to September 10, 1992.

Additionally, a public meeting was held on July 29, 1992. Representatives from EPA and LDEQ participated in this meeting and answered questions about development of the RI/FS for the site and the remedial alternatives under consideration. A response to the comments received during this public comment period, including those expressed verbally at the public meeting, is included in the Responsiveness Summary of the ROD.

IV. SCOPE AND ROLE OF RESPONSE ACTION

There are two operable units for the site. This (ROD) is for Operable Unit No. 2, Interim Source Action, which provides for a limited action to address rainfall accumulation and resulting contaminated overflow and off-site migration from the open pits on-site. The areas addressed include contaminated rainwater in the Washout Pit and the West Pit. The interim action will be implemented prior to the Final Source Action.

A separate ROD was developed for Operable Unit No. 1, Final Source Action, which addresses the long-term remedial action for all of the sources of contamination at the site. The areas addressed in the Final Source Action include the pit sludges and associated soils, buried pits, tank contents, site soils and sediments and ground water.

Source material is defined as material that includes or contains hazardous substances, pollutants or contaminants that acts as reservoir for migration of contamination to the ground water or a surface water, or acts as a source for direct exposure. Ground water is considered to be a non-source material.

Principal threat wastes are those source materials considered to be highly toxic or highly mobile that generally cannot be reliably contained or would present a significant risk to human health or the environment should exposure occur. They include liquids, highly mobile materials, or materials having high concentrations of toxic compounds.

The accumulated rainwater that is in contact with the contaminated pit sludges (contaminated with organic and inorganic constituents) is identified as a principal threat material, due to the nature of this waste. This material is considered to be both highly mobile and toxic.

The remedial action objectives for the accumulated rainwater are to prevent oral and dermal human and environmental exposure, to prevent contamination of adjacent soils due to overflow of the Washout and West Pits, and to prevent migration of contamination to the ground water.

V. SUMMARY OF SITE CHARACTERISTICS

During the Remedial Investigation (RI) all potential contaminant sources were evaluated in two phases of field investigation. These areas included the Washout Pit and the West Pit, the rainwater accumulation on the pits, the Former West Pit, the two buried pits, all site soils, the Northeast area and the West and East site fields. The aboveground and underground storage tanks were also investigated. Contaminant migration through surface water runoff was investigated through surface water and sediment sampling. Migration to subsurface soils and the ground water were also investigated through exploratory borings and the installation of ground water monitoring wells. In addition, exploratory trenches were constructed to visually evaluate the extent of subsurface contamination. Trenches were located in areas of suspected contamination.

A. Regional Geology

The site is located within unconsolidated sediments of the Atlantic Coastal Plain physiographic province. These sediments are of Pleistocene Age and were deposited by the ancestral Mississippi River that derived sediment and flow from the central part of the North American Continent. The sediments were deposited in a complex series of alternating beds of sand, gravel, silt, and clay. The beds dip toward the south and southeast and vary in thickness from less than 100 feet in southwestern Louisiana to more than 7,000 feet beneath the Gulf of Mexico.

B. Area Soils

Two surface soil types have been identified at the Gulf Coast site, which include the Frost Silt Loam, Patoutville Silt Loam (0-1% slopes), and the Patoutville Silt Loam (1-3% Slopes). The Frost Silt Loam is nearly level and has a slightly acid, dark gray silt loam surface layer about seven inches thick. The Patoutville Silt Loam is a nearly level, loamy soil which has a medium acid, dark grayish brown silt loam surface layer about eight inches thick. This soil is somewhat poorly drained, with slow to medium runoff.

C. Regional Hydrogeology

The major hydrogeologic unit in the site vicinity is the Chicot Aquifer System. The system is divided into the Upper and Lower Chicot Aquifers. The Chicot Aquifer System generally consists of a coarsening downward sequence of clays, silts, sands, and gravels. The medium- to coarse-grained sand and gravel aquifer units dip and thicken southward toward the Gulf of Mexico, (See Figure 3 and Figure 4). The regional groundwater gradient, shown by the arrow in Figure 4, is toward the northwest with a hydraulic gradient of 0.0002 ft/ft. The gradient is being controlled mainly by the groundwater pumping at Eunice and Lake Charles, Louisiana.

Locally, the Upper Chicot Aquifer has been subdivided further into the Abbeville Unit and the Upper Sand Unit. The Abbeville Unit has been described as the shallow, saturated sand unit in the lower Vermilion River basin, generally consisting of fine to sandy silt at the top that grades downward within a few tens of feet into sand and gravel. The sand thickness is generally between 100 to 250 feet. Since the contaminants at the site were limited vertically to the upper 20-30 feet of the saturated zone under the site, no impacts to the Upper Sand unit were detected.

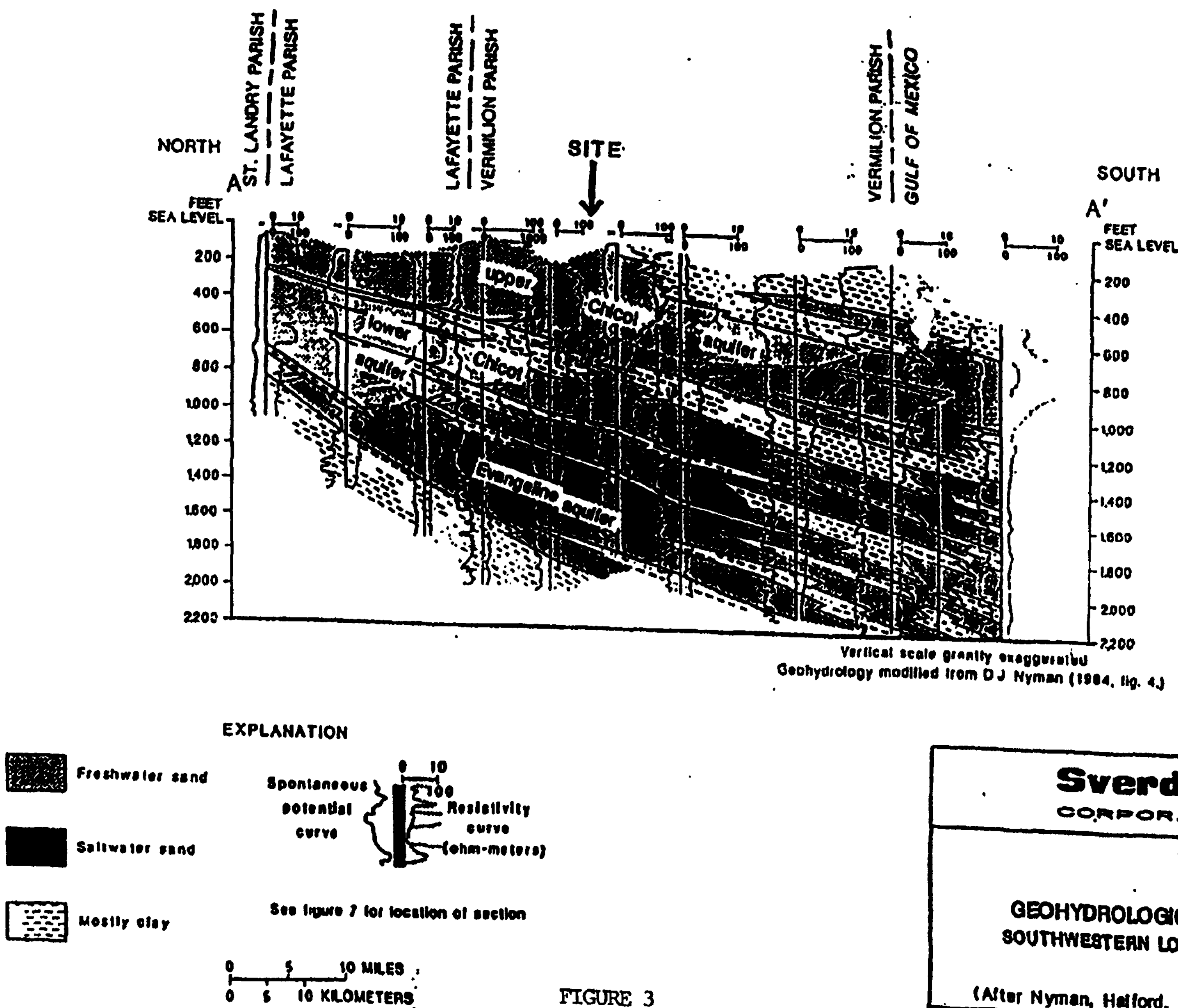


FIGURE 3

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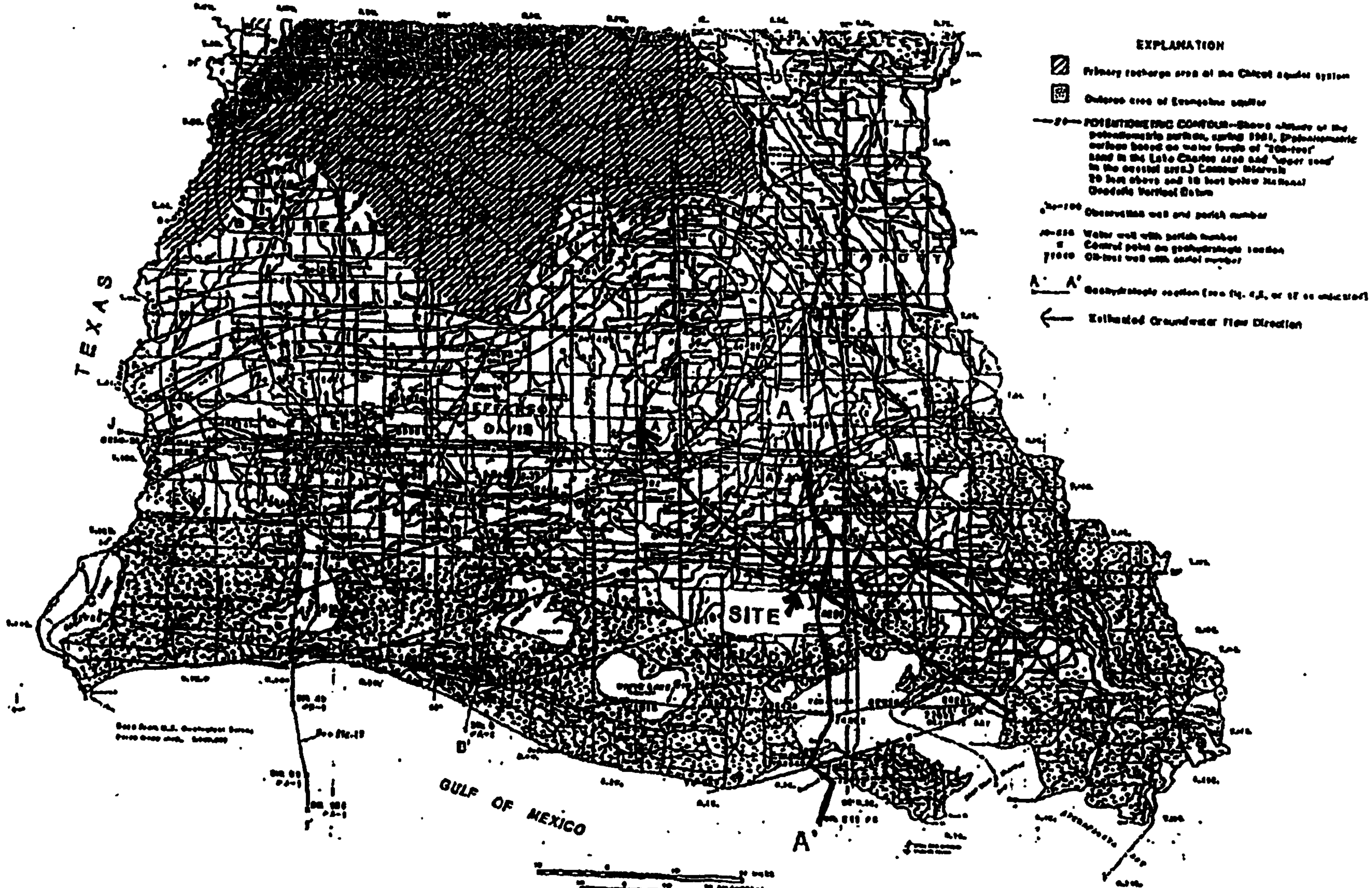
GEOHYDROLOGIC SECTION
SOUTHWESTERN LOUISIANA, A–A'

(After Nyman, Halford, and Martin, 1990)



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POTENTIOMETRIC SURFACE
CHICOT AQUIFER SYSTEM
SOUTHWESTERN LOUISIANA, SPRING 1981

(After Nyman [illegible])

FIGURE 4

Recharge to the Chicot Aquifer System occurs primarily through the direct infiltration of rainfall in the interstream, upland outcrop-subcrop areas. Recharge also occurs through (1) the Atchafalaya alluvium, (2) downward rainfall movement through the clays south of the primary recharge area, and (3) limited recharge from the Vermilion and Calcasieu rivers.

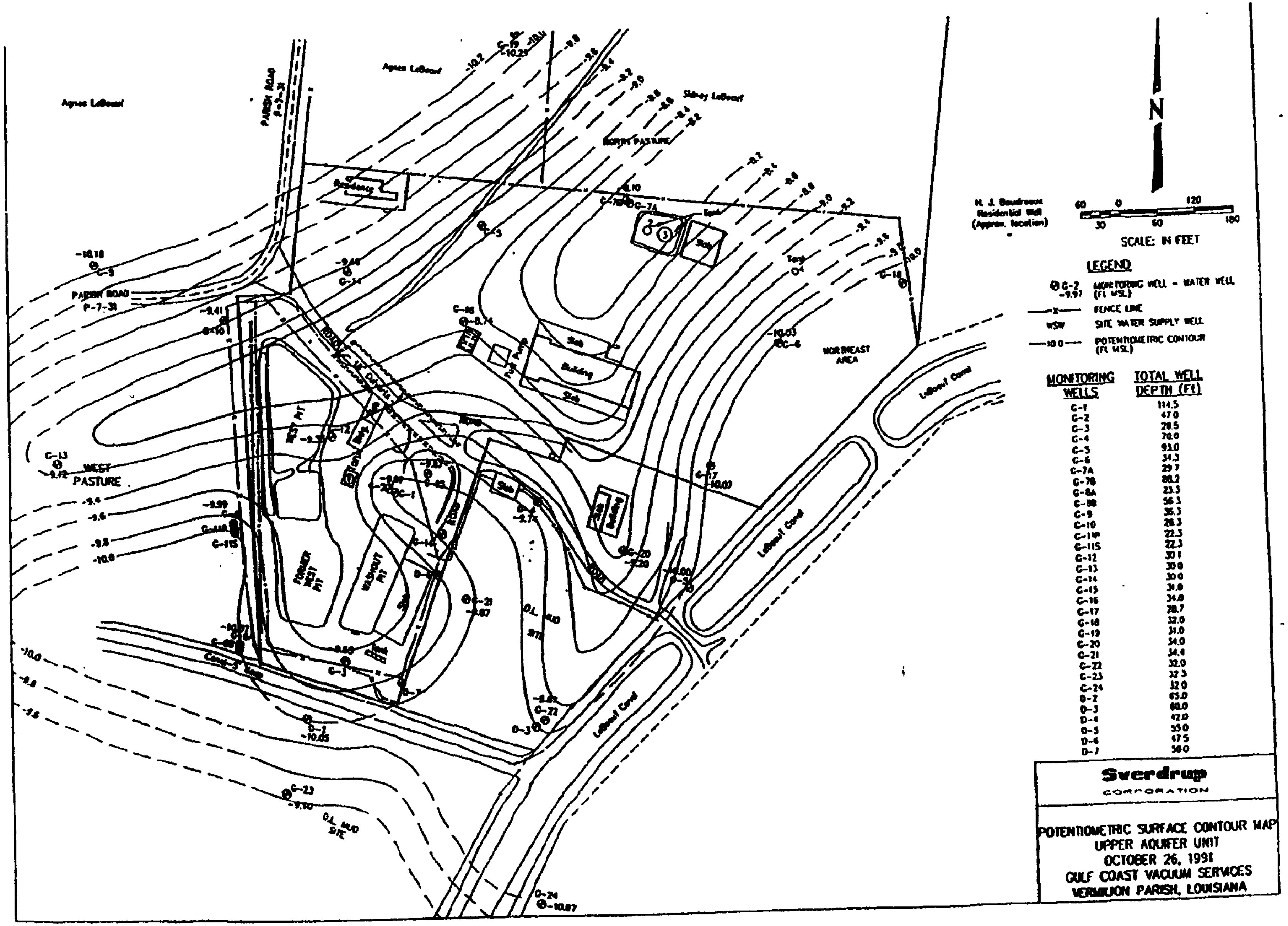
Prior to the extensive pumping of the Chicot Aquifer System (early 1900s), artesian wells could be found in the site vicinity. As industrial and municipal pumpage increased, water levels declined and the wells ceased flowing. Also, as a result of the increased flow to pumping centers, movement of water through the surface clays reversed (from south to north) and the coastal marsh areas became recharge areas for the Chicot.

A brief study of residential wells in the site vicinity was conducted by examining well construction records from the Louisiana Department of Transportation and Development and the U.S. Geological Survey. Information on some of the local groundwater users was also obtained through interviews with residents in the immediate site vicinity. The survey of the well construction records indicate that residential well depths typically range from 80 to 230 feet below ground surface. The wells are typically constructed with two to four-inch diameter, schedule 40 PVC casing and slotted PVC screen. Surface mounted, deep well jet pumps are usually utilized for groundwater pumpage.

Four residential wells were sampled during the RI field activities. Interviews with two of the well owners indicate that the well at the J.J. Matthews residence (located approximately 3,000 ft north of the site) is 80 feet deep and is constructed with 2-inch PVC casing. The well at the H.J. Boudreaux residence (located approximately 2,000 ft northeast of the site) is 105 feet deep and is constructed with 2-inch PVC casing. Two additional water supply wells were sampled, the Richards' residence and the Fairview Farms irrigation well. Information on the construction of these wells is not known. No site-related contaminants were observed in the residential wells.

D. Site Hydrogeology

Twenty-two groundwater monitoring wells were drilled and installed, and information from these wells coupled with information from the five existing monitoring wells was utilized to investigate the hydrogeologic regime of the site (See Figure 5). Groundwater level observations from eight monitoring wells (designated D-1 through D-8) on the D.L. Mud Superfund site located to the east and south of the site, were also incorporated into this investigation.


N
SCALE: IN FEET
LEGEND
MONITORING WELL - WATER WELL (Ft MSL)
FENCE LINE
SITE WATER SUPPLY WELL
POTENTIOMETRIC CONTOUR (Ft MSL)
MONITORING WELLS / TOTAL WELL DEPTH (Ft)
C-1 114.5
C-2 47.0
C-3 28.5
C-4 70.0
C-5 93.0
C-6 34.3
C-7A 29.7
C-7B 88.2
C-8A 23.3
C-8B 56.3
C-9 35.3
C-10 28.3
C-11P 22.3
C-115 22.3
C-12 30.1
C-13 30.0
C-14 30.0
C-15 34.0
C-16 34.0
C-17 28.7
C-18 32.0
C-19 31.0
C-20 34.0
C-21 34.4
C-22 32.0
C-23 32.3
C-24 32.0
D-2 65.0
D-3 60.0
D-4 42.0
D-5 55.0
D-6 47.5
D-7 50.0
Sverdrup CORPORATION
POTENTIOMETRIC SURFACE CONTOUR MAP
UPPER AQUIFER UNIT
OCTOBER 26, 1991
GULF COAST VACUUM SERVICES
VERMILION PARISH, LOUISIANA
N. J. Boudreaux Residential Well (Approx. location)
NORTHEAST AREA
NORTH PASTURE
WEST PASTURE
FORMER WEST PIT
WASHOUT PIT
WEST PIT
O.L. MUD SITE
PARISH ROAD P-7-31
Agnes LeBoeuf
Sidney LeBoeuf
LeBoeuf Canal
Residence
Building
Slab

URE 5

Three hydrogeologic units, designated the Perched Unit, Upper Aquifer Unit, and Lower Aquifer Unit were identified during the field investigation. These units will be described within the framework of the regional hydrogeologic system that was discussed in the preceding section. Observations from the exploratory drilling investigation were coupled with water level measurements and chemical analyses to develop a conceptual model of the groundwater flow regime under the site.

E. Exploratory Drilling and Water Level Observations

The shallowest saturated unit that was observed during the exploratory drilling is the Perched Unit. This unit is located within the brown and gray mottled clay zone at depths ranging from 8.5 to 20 ft. below ground surface. Thin, sandy silt lenses saturated with water were noted interbedded with the clay during the drilling and installation of monitoring wells G-8A, G-11P, and G-11S. Water levels in this unit are relatively high compared to other monitoring points. For example, on December 6, 1991, water levels in those wells ranged from -3.98 to -2.07 ft MSL which is approximately eight ft higher than the nearby deeper wells. This unit was observed only in the West Pasture and northeast corner of the site. At monitoring well G-18 in the Northeast Area, no saturated silt lenses were observed during the drilling phase. However, the water level in that well is comparable to the other wells completed in the Perched Unit. The Perched Unit is discontinuous across the site.

The next hydrogeologic unit encountered is the alternating brown sand, silt and clay lens unit and is designated as the Upper Aquifer Unit. It is the first continuous, saturated unit underlying the site, and most likely corresponds to the "water table" layer of the Chicot Aquifer System. Thirteen monitoring wells are completed in this unit with their screen intervals intersecting the groundwater surface in the Upper Aquifer Unit. Three wells are completed deeper in this same unit. As seen on the contour map in Figure 5 a ridge in the potentiometric surface trends southwest to northeast across the site. Locally, these features are affecting the direction of groundwater flow and hydraulic gradients within that unit. Groundwater flow north of the ridge axis is toward the northwest. Flow south of the ridge axis is generally to the southeast. Recharge from the open waste pits appears to be influencing the hydraulic gradient in that area, with flow being more or less radially outward along that axis.

The deepest unit encountered at the site is the olive gray sand designated the Lower Aquifer Unit in this report. On a regional scale, this unit corresponds to the Abbeville Unit of the Chicot

Aquifer System. Discontinuous olive gray clay lenses partially separate this lower unit from the Upper Aquifer Unit. Deep monitoring wells are completed in the Lower Aquifer Unit, with total well depths ranging from 88 to 114.5 feet below ground surface. Based on these measurements, a gradient of 0.0001 ft/ft is calculated by triangulation, with a flow direction generally toward the northwest. This is consistent with the regional flow direction and gradient of the Upper Chicot Aquifer System.

The potentiometric levels in the Perched Unit (and to some degree the Upper Aquifer Unit) respond most dramatically to local precipitation, while the Lower Aquifer Unit responds very little. The Lower Aquifer Unit most likely receives a significant part of its recharge from the primary recharge area of the Chicot Aquifer system.

These observations do not preclude the vertical movement of groundwater downward toward deeper units. Downward vertical hydraulic gradients exist between the hydrogeologic units under the site, as indicated by the difference in water levels at the monitoring well clusters. For example the vertical gradient measured at G-1 and G-2 is 0.005 ft/ft; G-7A and G-7B is 0.04 ft/ft; and G-8A and G-8B is 0.23 ft/ft. These downward vertical hydraulic gradients, coupled with the discontinuous nature of the clay lenses between the units, indicate that the potential for downward movement of groundwater (and contaminants) exists. See Figure 7 for groundwater impacts.

F. Nature and Extent of Contamination - Accumulated Rainwater and Pit Sludges

During the RI, borings were drilled in the West Pit, the Washout Pit and the pits buried under vegetative cover. Discrete samples of the sludge and underlying soils were collected. Both the Washout Pit and the West Pit contain water which accumulates from rainfall. The West Pit also supports an approximate 1 foot thick layer of paraffin that floats on top of the water. A surface water sample from each of these pits was taken.

The thickness of the sludge varies in each of the pits. The West Pit has a sludge thickness of approximately 5 feet to 7 feet. The Washout Pit has approximately 6 feet to 9 feet of sludge. The Former West Pit has a sludge thickness of approximately 6 feet to 8.5 feet. The buried pit to the east of the West Pit contains some sludge material, however, the full extent of this material could not be defined due to the presence of the tank. The buried pit in the Southeast area has a sludge layer approximately 1 foot thick at a depth of 4 feet.

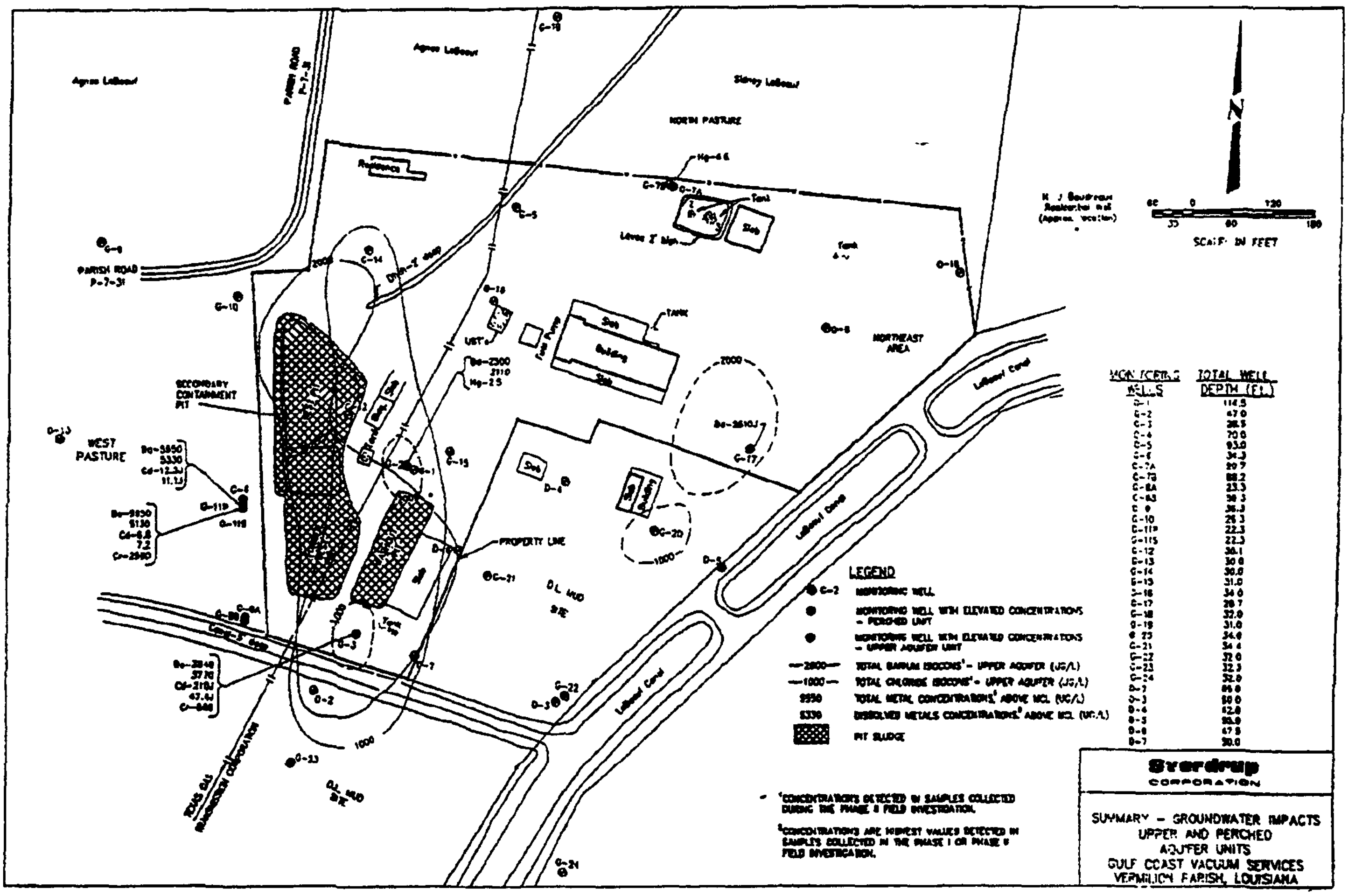

NORTH PASTURE
WEST PASTURE
NORTHEAST AREA
SECONDARY CONTAINMENT PIT
PROPERTY LINE
SCALE IN FEET
LEGEND
MONITORING WELL
MONITORING WELL WITH ELEVATED CONCENTRATIONS - PERCHED UNIT
MONITORING WELL WITH ELEVATED CONCENTRATIONS - UPPER AQUIFER UNIT
PIT SLUDGE
Sverdrup
CORPORATION
SUMMARY - GROUNDWATER IMPACTS
UPPER AND PERCHED
AQUIFER UNITS
GULF COAST VACUUM SERVICES
VERMILION PARISH, LOUISIANA

FIGURE 7

Pit sludges and soil samples were found to contain a number of volatile and semivolatile compounds. In addition, the Total Petroleum Hydrocarbon (TPH) analysis from the pit sludges ranged from 2900 parts per million (ppm) to 700,000 ppm. Benzene concentrations ranged from 2.6 ppm to 529 ppm. The inorganic contaminants of concern included arsenic with concentrations ranging from 18.2 ppm to 73.7 ppm and barium with concentrations ranging from 2,460 ppm to 47,800 ppm.

Various surface water samples were taken of the accumulated rainwater in the West Pit and the Washout Pits between 1980 and 1991. Sample results indicated that the many of the organic and inorganic contaminants found in the pits were also present in the accumulated rainwater on the tops of the pits.

The estimated size of the pits, volumes of contaminated pit material, and volume of accumulated rainwater are:

o West Pit - Size - 28,000 square feet
- Sludge Volume - 5,000 cubic yards
- Accumulated Rainwater - 1,300,000 gallons

o Washout Pit - Size - 12,000 square feet
- Sludge Volume - 2,700 cubic yards
- Accumulated Rainwater - 400,000 gallons

VI. SUMMARY OF SITE RISKS

A. Risk Assessment Description

An evaluation of the potential risks to human health and the environment from site contaminants was conducted as part of the baseline risk assessment. The risk assessment was conducted as part of the RI. The baseline risk assessment is an analysis of the potential adverse human health effects (both current and future) resulting from exposures of humans to hazardous substances in surface soil, sludge, sediment, groundwater and surface water at the Gulf Coast Vacuum Superfund site near Abbeville, Louisiana. By definition, a baseline risk assessment evaluates risks that may exist under the no-action alternative (that is, in the absence of any remedial actions to control or mitigate releases). The baseline risk assessment provides the basis for taking the remedial action and indicates the exposure pathways that need to be addressed by the remedial action.

The risk assessment presents a compilation and evaluation of data collected in the site investigation in order to estimate the upper limit of potential health risk which may be present at the site. In the evaluation of potential human exposure scenarios, on-site sampling and analysis results were used in conjunction with current federal and state guidance documents and professional judgement to estimate the potential human health risk attributable to contamination resulting from past site-related operations.

The "risk" values generated within this human health risk assessment will reflect the plausible upper limit to the actual risk of cancer posed by the site under the exposure scenarios evaluated. These estimates were compared to the EPA's risk range of concern range of 1 X 10^{-4} to 1 X 10^{-6} for hazardous waste site remediation. The NCP stipulates a 1 X 10^{-6} risk level as a point of departure in risk management. Such estimates, however, do not necessarily represent an actual prediction of the risk. Non-carcinogenic impacts are quantified by the "Hazard Index" which is the ratio of site concentrations of a contaminant of concern to a reference concentration that causes a non-carcinogenic impact. EPA's remedial goal is to reduce the "Hazard Index" at a site to less than 1.0. These risk values are discussed more fully in the following sections.

The Summary of Site Risks section of the ROD summarizes the results of the baseline risk assessment. Calculations and a more detailed analysis may be found in the site risk assessment contained in the administrative record.

B. Human Health Risks

The baseline risk assessment was divided into two parts: the human health evaluation and the ecological evaluation. The baseline risk assessment for the human health risks was based on Reasonable Maximum Exposure (RME). The human health evaluation considered all contaminated media, such as pit sludge, surface soils, subsurface soils, sediments, surface water and ground water. The risk assessment evaluated the potential risk to the following populations which are most likely to be exposed to materials at the

Gulf Coast site:

- o Current onsite trespassers
- o Current offsite residents (adults and children) using ground water as a drinking water source
- o Future onsite resident farmers (adults and children)

The risk assessment conducted at the Gulf Coast Vacuum site was done in accordance with EPA guidance, specifically the Risk Assessment Guidance for Superfund: Volume I: Human Health Evaluation Manual (Part A) (Interim Final, EPA/540/1-89/002, December 1989). The major components of the baseline risk assessment are: identification of contaminants of concern, exposure assessment, toxicity assessment, and risk characterization.

Highlights of the findings for the major components of the risk assessment for the site are summarized below.

C. Identification of Chemicals of Concern

Analytical data from the sludge, soil, surface water and sediments were evaluated to identify contaminants of potential concern at the site. For the purposes of this interim action, only data from soil, sludge and surface water sampling of the Washout Pit and the West Pit is of concern. Any chemical detected in any sample from these areas was considered to be a potential contaminant of concern. A summary of the chemicals detected on site for each medium and their frequency of detection is presented in Figure 8. Chemicals were eliminated from consideration only if they are essential nutrients and are nontoxic at the levels encountered on site. Seventy-seven (77) chemicals were selected as contaminants of potential concern for the entire site and are listed in Figure 9. However, only arsenic, barium, dioxins and PAHs, carcinogenic and non-carcinogenic, were found to significantly contribute to the risk.

D. Exposure Assessment

The potentially exposed populations and the pathways through which they could be exposed for current site conditions and future onsite conditions are discussed below.

1. Current Land Use and Exposure Pathways

Areas adjacent to the site are currently used as pasture land for grazing cattle and for other agricultural uses. A review of historical photographs also indicates the past and current adjacent land use to be predominantly agricultural. Immediately south and east of the site is another Superfund site, the D.L. Mud site, which is being evaluated separately.

The current potential use of the ground water is for drinking water purposes, as well as for irrigation. Although the Chicot Aquifer does not have an official classification, the groundwater is considered suitable for drinking water purposes. A study of the residential wells in the site vicinity indicates that residential well depths range from 80 to 230 feet below ground surface. The regional and site hydrogeology is discussed in detail above in the Summary of Site Characteristics section.

Under current site conditions, there are no people who live or work onsite. Therefore, a trespasser scenario was selected as representative of the population most likely to be exposed on the site under current conditions. The trespasser was assumed to be an area resident who began exposure at age seven and continued until

SUMMARY OF CHEMICALS DETECTED ON-SITE AT GULF COAST

Chemical Name	Surface Soil	Subsurface Soil	Sediment	Sludge	Surface Water	Groundwater	Total
Volatiles:							
Acetone	13/45	45/117	2/4	6/19	2/5	0/21	68/211
Benzene	1/45	3/117	0/4	14/19	1/5	2/21	21/211
Butanone, 2-	2/43	28/112	1/1	3/19	0/5	0/21	34/201
Carbon disulfide	0/45	5/117	0/4	3/19	1/5	0/21	9/211
Chlorobenzene	1/45	0/117	0/4	2/19	1/5	0/21	4/211
Chloroform	0/45	1/117	0/4	0/19	0/5	0/21	1/211
Chloromethane	1/45	0/117	1/4	0/19	0/6	0/21	2/212
Dichloroethane, 1,1-	0/45	0/117	0/4	1/19	0/5	0/21	1/211
Ethylbenzene	4/45	12/117	0/4	16/19	1/5	1/21	34/211
Methylene chloride	9/45	13/117	0/4	0/19	0/5	1/29	23/219
Tetrachloroethene	2/45	4/117	0/4	2/19	0/5	1/21	9/211
Toluene	8/45	13/117	0/4	16/19	1/5	0/21	38/211
Trichloroethene	1/45	2/117	0/4	1/19	0/5	0/29	4/219
Vinyl acetate	0/34	0/72	0/3	0/14	1/4	0/8	1/135
Xylene (total)	6/45	20/117	0/4	17/19	1/5	0/21	44/211
Semi-Volatiles:							
Benzoic acid	0/34	0/73	1/4	0/14	0/5	0/2	1/132
Dibenzofuran	3/45	8/118	0/4	2/19	0/5	2/20	15/211
Dichlorobenzene, 1,4-	0/45	0/118	1/4	0/19	0/5	0/20	1/211
Dinitrotoluene, 2,4-	0/45	1/118	0/4	0/19	0/5	0/20	1/211
N-Nitrosodiphenylamine	1/45	0/118	0/4	3/18	0/5	0/21	4/211
Pentachlorophenol	0/45	0/118	1/4	0/18	0/5	0/21	1/211
Phenol	0/45	1/118	0/4	0/19	0/5	0/20	1/211
Acenaphthene	0/45	5/118	0/4	2/19	0/5	0/20	7/211
Anthracene	2/45	2/118	0/4	3/18	0/5	1/21	8/211
Benzo(a)anthracene	1/45	0/118	0/4	2/18	0/5	0/21	3/211
Benzo(a)pyrene	0/45	0/118	1/4	3/18	0/5	0/21	4/211
Benzo(b)fluoranthene	1/45	0/118	0/4	1/18	0/5	0/21	2/211
Benzo(g,h,i)perylene	2/45	0/118	1/4	0/18	0/5	0/21	3/211
Benzo(k)fluoranthene	0/45	0/118	0/4	3/18	0/5	0/21	3/211
Chrysene	2/45	3/118	2/4	4/18	0/5	0/21	11/211
Fluoranthene	1/45	3/118	0/4	2/18	0/5	0/21	6/211
Fluorene	2/45	10/118	1/4	9/19	0/5	0/20	22/211
Methylnaphthalene, 2-	6/45	18/118	1/4	18/19	1/5	1/21	45/212
Naphthalene	4/45	15/118	0/4	16/19	1/5	0/21	36/212
Phenanthrene	7/45	20/118	1/4	14/18	1/5	2/21	45/211
Pyrene	6/45	8/118	2/4	7/18	0/5	0/21	23/211
Bis(2-ethylhexyl)phthalate	20/45	42/118	2/4	4/18	0/5	20/29	88/219
Butylbenzylphthalate	1/45	1/118	0/4	1/18	0/5	0/21	3/211
Di-n-butylphthalate	1/45	3/118	0/4	1/18	0/5	0/21	5/211
Di-n-octylphthalate	1/45	0/118	1/4	1/18	0/5	0/21	3/211
Diethylphthalate	1/45	2/118	0/4	0/19	0/5	0/20	3/211
Dimethylphthalate	0/45	1/118	0/4	1/19	0/5	0/20	2/211
Pesticides/PCBs:							
Aldrin	0/34	1/77	0/4	0/19	0/5	0/21	1/160
alpha-Chlordane	0/34	0/77	0/4	0/19	0/5	1/21	1/160
Arochlor-1248	0/34	2/77	0/4	5/19	0/5	1/21	8/160
beta-BHC	0/34	0/77	0/4	0/19	0/5	3/21	3/160
DDD, 4,4-	0/34	0/77	0/4	1/19	0/5	0/21	1/160
DDT, 4,4-	1/34	0/77	0/4	0/19	1/5	1/21	3/160
delta-BHC	0/34	2/77	0/4	1/19	0/5	0/21	3/160
Dieldrin	0/34	0/77	0/4	0/19	0/5	3/21	3/160
Endosulfan I	0/34	0/77	0/4	0/9	0/5	1/21	1/150
Endosulfan II	0/34	0/77	0/4	1/9	0/5	0/21	1/150

FIGURE 8

- continued

Chemical Name	Surface Soil	Subsurface Soil	Sediment	Sludge	Surface Water	Groundwater	Total
Pesticides/PCBs - continued							
Endosulfan sulfate	0/34	1/77	0/4	0/19	0/5	0/21	1/160
Endrin	0/34	0/77	0/4	0/16	0/5	1/21	1/157
gamma-Chlordane	0/34	0/77	0/4	0/19	0/5	3/21	3/160
gamma-BHC	0/34	0/77	0/4	1/19	0/5	1/21	2/160
Heptachlor	0/34	0/77	0/4	0/19	0/5	1/21	1/160
Heptachlor epoxide	0/34	0/77	0/4	0/19	0/5	2/21	2/160
Inorganics:							
Aluminum	45/45	117/117	4/4	20/20	4/4	18/21	208/211
Antimony	1/14	0/50	0/4	0/9	0/4	4/21	5/102
Arsenic	44/45	110/117	4/4	20/20	0/6	20/29	198/221
Barium	45/45	117/117	4/4	20/20	4/4	21/21	211/211
Beryllium	40/45	113/117	2/4	9/20	0/4	5/21	169/211
Cadmium	25/45	29/117	3/4	19/20	0/4	10/21	86/211
Calcium	45/45	117/117	4/4	20/20	4/4	21/21	211/211
Chloride	41/[illegible]	96/112	2/4	18/20	5/5	21/21	183/208
Chromium	45/45	117/117	4/4	20/20	2/4	12/21	200/211
Cobalt	43/45	107/117	3/4	17/20	0/4	14/21	184/211
Copper	43/45	115/117	4/4	20/20	1/4	14/21	197/211
Cyanide	11/37	6/99	0/4	0/11	0/4	0/9	17/164
Iron	45/45	117/117	4/4	20/20	3/4	21/21	210/211
Lead	41/41	111/111	4/4	20/20	3/3	15/21	194/200
Magnesium	45/45	117/117	4/4	20/20	4/4	21/21	211/211
Manganese	45/45	111/111	4/4	17/17	4/4	21/21	202/202
Mercury	29/45	24/117	3/4	19/20	0/4	6/21	81/211
Nickel	43/45	114/117	4/4	20/20	0/4	13/21	194/211
Potassium	41/45	114/117	4/4	15/20	4/4	20/21	198/211
Selenium	18/45	25/113	0/4	7/20	0/3	0/21	50/206
Silver	10/45	12/117	0/4	16/20	0/4	0/15	38/205
Sodium	40/45	105/117	1/4	18/20	4/4	21/21	189/211
Thallium	10/45	24/117	0/4	5/20	0/3	1/21	40/210
Vanadium	45/45	117/117	4/4	20/20	0/4	15/21	201/211
Zinc	43/43	115/115	4/4	20/20	4/4	16/21	202/207
Dioxins/Furans	11/11	3/4	6/6	9/9	0/0	0/1	29/31

FIGURE 8 (cont.)

Figure 9

Volatiles

Acetone
Benzene
Butanone, 2-
Carbon disulfide
Chlorobenzene
Chloroform
Chloromethane
Dichloroethane, 1,1-
Ethylbenzene
Methylene chloride
Tetrachloroethene
Toluene
Trichloroethene
Vinyl acetate
Xylene (total)

Semivolatiles

Benzoic acid
Dibenzofuran
Dichlorobenzene, 1,4-
Dinitrotoluene, 2,4-
N-Nitrosodiphenylamine
Pentachlorophenol
Phenol
Bis(2-ethylhexyl)phthalate
Butylbenzylphthalate
Di-n-butylphthalate
Di-n-octylphthalate
Diethylphthalate
Dimethylphthalate

PAHs

Acenaphthene
Anthracene
Benzo(a)anthracene
Benzo(a)pyrene
Benzo(b)fluoranthene
Benzo(g,h,i)perylene
Benzo(k)fluoranthene
Chrysene
Fluoranthene
Fluorene
Methylnaphthalene, 2-
Naphthalene
Phenanthrene
Pyrene

Pesticides/PCBs

Aldrin
Alpha chlordane
Arochlor-1248
Beta-BHC
DDD, 4,4'-
DDT, 4,4'-
Delta-BHC
Dieldrin
Endosulfan I
Endosulfan II
Endosulfan sulfate
Endrin
Gamma chlordane
Gamma-BHC
Heptachlor
Heptachlor epoxide

Inorganics

Aluminum
Antimony
Arsenic
Barium
Beryllium
Cadmium
Chloride
Chromium
Cobalt
Cyanide
Lead
Manganese
Mercury
Nickel
Silver
Sodium
Thallium
Vanadium

Dioxins/Furans

TCDD-equivalent

age sixteen. It was assumed that the trespasser moved about the site at random, coming into contact with all accessible media.

There are 10 residences located within 1/2 mile of the site. Nearby residents might be exposed to site contaminants by using ground water from residential wells or they may be exposed while trespassing onsite. The closest major population center is Abbeville, located about 3.5 miles northeast of the site.

2. Future Land Use and Onsite Conditions

In the future it is possible that the site might be developed for residential, agricultural or industrial use. As the site currently exists, development for agricultural uses with possible onsite residence of farmers was considered the most likely, since the surrounding land is primarily used for pasture land and for residences. Therefore, the resident-farmer scenario was selected as the most representative of the population most likely to be exposed in the future.

Reasonable exposure pathways affecting present and future populations are discussed below.

a) Exposure to Soil - Since all humans ingest small amounts of soil and other soil-like material each day through hand to mouth activity both indoors (i.e. intake of house dust) and outdoors (i.e. while playing or gardening), ingestion of contaminated surface soil was selected as an exposure route for both adults and children for quantitative assessment. Likewise, dermal contact is a route of exposure. Exposure to subsurface soil was not evaluated for any population since the contaminant concentrations for this media were low.

Evaluation of soil done was in five subareas (exposure points), because the distribution of soil contamination is not uniform across the site. Exposures of future residents were evaluated in the Northeast Area and in an area located between the West Pit and the Washout Pit (the "Pit Area"). Exposures to current site trespassers were evaluated at the West Pit Area, the Washout Pit Area and in the northwest portion of the site ("the site Field Area").

b) Exposure to Homegrown Vegetables, Beef and Milk - Humans can be indirectly exposed to soil contamination through the ingestion of garden vegetables grown in contaminated soil. Since future agricultural use of the site is reasonable, this pathway was considered and may be a significant source of exposure. Therefore, exposure for this pathway was quantified for future residents. Likewise, humans may be indirectly exposed to soil contamination via the ingestion of meat and milk from animals raised in contaminated areas. Therefore, considering the future agricultural land use of the site, this pathway was also evaluated.

c) Exposure to Contaminants in Air - Air monitoring data during an Air Emission Pilot Study conducted at the Gulf Coast Vacuum site in August 1991 indicated that volatile compounds are currently not released from undisturbed soil and that only low levels are released from disturbed soils. Therefore, exposure to volatiles from soil or pit sludges was not evaluated.

d) Exposure to Contaminants in Ground water - Ground water monitoring data indicated the presence of inorganic and to a lesser degree, organic contamination in the shallow aquifers (i.e. Perched Unit and Upper Aquifer Unit). Under current conditions, there are no known human populations who employ the shallow aquifers near the site for drinking or other uses. However, in the future, it is possible that onsite or offsite residents might install shallow wells for drinking water and other indoor uses. Therefore, the three exposure pathways which were evaluated in the risk assessment for the future onsite resident included ingestion, dermal contact and inhalation. In addition, because of the likelihood of interconnection between the Upper Aquifer Unit and the Lower Aquifer Unit, an exposure pathway for current offsite residents was evaluated quantitatively using monitoring data from the ground water monitoring wells in the Lower Aquifer Unit.

e) Exposure to Contaminants in Surface Water and Sediments - There are two primary channels for surface water runoff from the site. One is the north ditch which drains runoff or overflow from the pits and runs through the Site Fields and into the North Pasture. The other is a canal which runs east and west in between the Gulf Coast Vacuum site and the D.L. Mud site and towards the LeBoeuf Canal. Under current conditions humans may be exposed to the surface water or sediments while trespassing on the site through oral ingestion or dermal contact.

f) Exposure to Contaminants in Sludge - The pit sludges are highly contaminated with inorganic and organic materials. Under current conditions humans may be exposed to the Washout Pit Area and/or the West Pit Area while trespassing this area through oral ingestion or dermal contact. In addition, future onsite exposure to residents, through both oral ingestion and dermal contact, is also a reasonable exposure pathway and was evaluated as part of the risk assessment.

A summary of the exposure pathways used for quantitative evaluation are summarized in shown in Figure 10.

Exposure in the risk assessment was quantified using standard default values. Figure 11 summarizes the assumptions used in the risk assessment for the Gulf Coast Vacuum site. (See Appendix III for Figure 11 references).

E. Toxicity Assessment

The toxic effects of a chemical generally depend on the level of exposure (dose), the route of exposure (oral, inhalation, dermal), and the duration of exposure (acute, subchronic, chronic or lifetime). Thus, a full description of the toxic effects of a chemical includes a listing of what adverse health effects the chemical may cause (both cancer and noncancer), and how the occurrence of these effects depends upon dose, route, and duration of exposure.

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

Reference doses (RfDs) have been developed by EPA for indicating the potential for adverse health effects from exposure to contaminant(s) of concern exhibiting noncarcinogenic effects. RfDs, which are expressed in units of mg/kg-day, are estimates of lifetime daily exposure levels for humans, including sensitive individuals. Estimated intakes of contaminant(s) of concern from environmental media (e.g., the amount of a contaminant(s) of concern ingested from contaminated drinking water) can be compared to the RfD. RfDs are derived from human epidemiological studies or animal studies to which uncertainly factors have been applied (e.g., to account for the use of animal data to predict effects on humans).

For the three major sets of exposure pathways utilized for this

SUMMARY OF EXPOSURE SCENARIOS SELECTED FOR QUANTIFICATION

Land Use	Exposed Population	Exposure Point	Exposure Media	Exposure Routes
Current	Trespasser[a]	On-site (West Pit Area, Washout Pit Area, Northwest Site Field)	Soil Sludge Sediment Surface Water	Oral/Dermal Oral/Dermal Oral/Dermal Dermal
Current	Resident	Off-site Residential Wells	Groundwater	Oral/Dermal
Future	Resident	On-site[b] (Pit Area, Northeast Area)	Soil Groundwater Garden Vegetables Beef Milk	Oral/Dermal Oral/Dermal/Inhal (VOCs) Oral Oral Oral
Future	Resident	On-site[c] (Pit Area)	Sludge Garden Vegetables Beef Milk	Oral/Dermal Oral Oral Oral

(a) Scenarios in which a trespasser is exposed at various sources on-site may also apply to hypothetical future on-site residents.
(b) Assumes current site conditions (i.e., sludge is located in pits).
(c) Assumes pit sludge is excavated and spread on surrounding land.

FIGURE 10

SUMMARY OF HUMAN EXPOSURE ASSUMPTIONS AT GULF COAST

Exposure Pathway	Parameter	Resident Child (Age 0 to 6)	Resident Adult	Trespasser
General	Body weight, kg	15[a]	70[a]	43[a]
	Exposure frequency, days/yr	350[b]	350[b]	60[c]
	Exposure duration, yr	6[a]	30[d]	10[c]
	Averaging time (noncancer), yr	6[d]	30[d]	10[d]
	Averaging time (cancer), yr	--[e]	70[d]	70[d]
Ingestion of Soil, Sediment or Sludge	Daily intake, mg	200[b]	100[b,f]	100[c]
Vegetable Ingestion	Homegrown intake, g/day	40[g]	80[b]	--
Beef Ingestion	Homegrown intake, g/day	36[g]	75[b]	--
Milk Ingestion	Homegrown intake, g/day	408[g]	300[b]	--
Inhalation of VOCs	Breathing rate, m_3/day	18[c]	15[b]	--
Water Ingestion	Daily Intake, L/day	1[a]	2[a]	--
Dermal Exposure to Soil, Sediment, Sludge or Surface Water	Skin surface area exposed, cm^2/event	1,800[h]	5,000[h]	5,000[c]
Dermal Exposure to Groundwater	Skin surface area exposed, cm^2/event	7,200[h]	20,000[h]	--

(a) Default value recommended by USEPA (1989a).
(b) Default value recommended by USEPA (1991a).
(c) Assumed value, based on professional judgment.
(d) The averaging time for subchronic and chronic exposures (used to evaluate noncancer health effects) is equal to the exposure duration. The averaging time for lifetime exposure (used to evaluate cancer effects) is 70 years.
(e) -- = not evaluated.
(f) Soil intake by the adult is calculated as a time-weighted average, assuming 200 mg/day for six years while a child (body weight = 15 kg) and 100 mg/day for 24 years while an adult (body weight = 70 kg).
(g) Guidance from USEPA Region VI.
(h) Estimated according to USEPA guidance (1992b).

risk assessment (current trespassers, current off-site residents, and future on-site residents) and for three age groups (children ages 7-13 years (s), teenagers (c), and 70 year-olds exposed their entire lives (L)), Human Intake Factors (HIFs), also called Chronic Daily Intake Factors (CDIs), were calculated. (See Figure 12.) These HIFs were calculated using the exposure point concentration factors for each medium.

EPA assigns a cancer weight-of-evidence category to each chemical in order to reflect the overall confidence that the chemical is likely to cause cancer in humans. These categories and their meanings are summarized below.

Category	Meaning	Basis
A	Known human carcinogen	Sufficient evidence of increased cancer incidence in exposed humans.
B1	Probable human carcinogen	Sufficient evidence of increased cancer incidence in animals, with suggestive evidence from studies of exposed humans.
B2	Probable human carcinogen	Sufficient evidence of increased cancer incidence in animals, but lack of data or insufficient data from humans.
C	Possible human carcinogen	Suggestive evidence of carcinogenicity in animals.
D	Cannot be evaluated	No evidence or inadequate evidence of cancer in animals or humans.
E	Noncarcinogen	Evidence of noncarcinogenicity for humans.

Toxicity information used to calculate the risk including the slope factor, the weight of the evidence, and the source of the toxicity information is summarized in Figure 12.

F. Human Health Risk Characterization

The risk of cancer from exposure to a chemical is described in terms of the probability that an individual exposed for his or her entire lifetime will develop cancer by age 70. For carcinogens, risks are estimated as the incremental probability of an individual developing cancer over a life-time as a result of exposure to the carcinogen. Excess life-time cancer risk is calculated from the following equation:

SUMMARY OF CARCINOGENIC EFFECTS AND SLOPE FACTORS FOR CONTAMINANTS OF POTENTIAL CONCERN AT GULF COAST[(a)]

Chemical	Tumor Type - Route	Weight of Evidence	Slope Factor, $(mg/kg\text{-}day)^{-1}$ Oral	Slope Factor, $(mg/kg\text{-}day)^{-1}$ Inhalation
Aldrin	Liver carcinoma	B2	1.7E+01	1.7E+01
alpha-Chlordane	Liver-oral	B2	1.3E+00	1.3E+00
Arsenic	Lung-inhalation; skin cancer-oral; limited evidence of other internal cancers both routes	A	1.8E+00	1.5E+01
Benzene	Non-lymphocytic leukemia-inhalation and oral	A	2.9E-02	2.9E-02
Benzo(a)anthracene	(b)	B2	1.2E+01	6.1E+00
Benzo(a)pyrene	Stomach-oral; respiratory tract-inhalation; skin-dermal	B2	1.2E+01	6.1E+00
Benzo(b)fluoranthene	(b)	B2	1.2E+01	6.1E+00
Benzo(k)fluoranthene	(b)	B2	1.2E+01	6.1E+00
Beryllium	Lung cancer-inhalation. Osteo-sarcomas-injection (intravenous or intramedullary)	B2	4.3E+00	8.4E+00
beta-BHC	Liver	C	1.8E+00	1.9E+00
bis(2-ethylhexyl)phthalate	Liver-oral	B2	1.4E-02	--

continued·

(a) Information from IRIS Database (USEPA 1992a) or HEAST Annual-1991 (USEPA 1991b) unless otherwise noted. Only chemicals with slope factors calculated by EPA are included here.
(b) The cancer potency of this PAH is assumed to be equivalent to that of benzo(a)pyrene.

FIGURE 12

- continued

Chemical	Tumor Type - Route	Weight of Evidence	Slope Factor, (mg/kg-day)$^{-1}$ Oral	Inhalation
Cadmium	Lung, prostate-inhalation; insufficient evidence of carcinogenicity-oral	B1 (inhalation)	--	6.3E+00
Chloroform	Kidney and liver-inhalation and oral	B2	6.1E-03	8.1E-02
Chloromethane	Kidney-inhalation	C	1.3E-02	6.3E-03
Chromium (VI)	Lung-inhalation	A (inhalation)	--	4.2E+01
Chrysene	(a)	B2	1.2E+01	6.1E+00
4,4'-DDD	Lung, liver and thyroid-oral	B2	2.4E-01	--
4,4'-DDT	Liver tumors-oral	B2	3.4E-01	3.4E-01
1,4-Dichlorobenzene	Liver tumors-oral	C	2.4E-02	--
Dieldrin	Liver, lung-oral	B2	1.6E+01	1.6E+01
2,4-Dinitrotoluene	Liver, mammary glands, kidney-oral	B2	6.8E-01	--
gamma-BHC	Liver-oral	B2/C	1.3E+00	--
gamma-Chlordane	Liver-oral	B2	1.3E+00	1.3E+00
Heptachlor	Liver-oral	B2	4.5E+00	4.6E+00
Heptachlor epoxide	Liver-oral	B2	9.1E+00	9.1E+00
Lead	Renal tumors-oral (ATSDR 1991c)	B2	--	--

continued-

(a) The cancer potency of this PAH is assumed to be equivalent to that of benzo(a)pyrene.

FIGURE 12 (Cont.)

SUMMARY OF HIF CALCULATIONS

Exposed Population	Exposure Medium	Exposure Route	HIF_S	HIF_C	HIF_L
Current Trespasser	Soil	Oral	--	3.8E-07	5.5E-08
		Dermal	--	1.9E-05	2.7E-06
	Sludge	Oral	--	3.8E-07	5.5E-08
		Dermal	--	3.8E-05	5.5E-08
	Sediment	Oral	--	3.8E-07	5.5E-08
		Dermal	--	1.9E-05	2.7E-06
	Surface Water	Oral	--	5.0E-02	7.1E-03
		Dermal	--		
Current Off-site Resident	Groundwater	Oral	6.4E-02	2.7E-02	1.2E-02
		Dermal	9.2E-02	5.5E-02	2.3E-02
Future On-site Resident	Groundwater	Oral	6.4E-02	2.7E-02	1.2E-02
		Inhalation	1.2E+00	2.1E-01	8.8E-02
		Dermal	9.2E-02	5.5E-02	2.3E-02
	Soil or Sludge	Oral	1.3E-05	3.7E-06	1.6E-06
		Dermal	1.2E-04	6.8E-05	2.9E-05
	Garden Vegetables	Oral	2.6E-03	1.1E-03	4.8E-04
	Beef	Oral	2.3E-03	1.0E-03	4.4E-04
	Milk	Oral	2.6E-02	4.1E-03	1.8E-03

FIGURE 12 (Cont.)

Risk = CDI x SF

where:

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

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

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

These risks are probabilities that are generally expressed in scientific notation (e.g., 1 x 10^{-6} or $1E^{-6}$). An excess lifetime cancer risk of 1 x 10^{-6} indicates that, as a reasonable maximum estimate, an individual has a 1 in 1,000,000 chance of developing cancer as a result of site-related exposure to a carcinogen over a 70-year lifetime under the specific exposure conditions at a site. Again refer to Figure 12 which provides a brief summary of the characteristic cancer effects of chemicals of potential concern at the GCV site and lists available inhalation SFs and cancer weight of evidence categories.

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

The HQ is calculated as follows:

Non-cancer HQ = DI/RfD

where:

DI = Daily Intake (either chronic or sub-chronic)

RfD = reference dose; and

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

Using the average lifetime daily intake values and the slope factors previously shown in Figure 12, cancer risks were calculated for populations who may be chronically or sub-chronically exposed at the Gulf Coast Site. Risk was calculated for several scenarios involving exposure to the pit sludges, the Northwest site fields, the Northeast area and the ground water.

1. Current Risk Characterization

The estimated overall risk of carcinogenic effects of $4X10^{-4}$ for a current trespasser who visits the site 60 times per year and is exposed to the pit sludges is greater than the EPA risk range of concern of $1x10^{-4}$ to $1x10^{-6}$. Contaminants having risk values outside this range are flagged as those which may need to be remediated. The main contaminants contributing to the risk for this current trespasser were total carcinogenic PAHs (polynuclear aromatic hydrocarbons), arsenic, and dioxins. For the current trespasser, noncancer risks did not exceed an HI of 1. An HI of greater than or equal to 1 is of concern to EPA and flags those chemicals that may need to be remediated.

The estimated total risk of carcinogenic effects from exposure to contaminants for a current off-site resident is in the range of $2x10^{-4}$ to $9x10^{-4}$ which is greater than EPA's risk range of concern of $1x10^{-4}$ to $1x10^{-6}$. This risk is driven by the possible ingestion of arsenic in the groundwater. The estimated overall HI of non-carcinogenic effects for a current off-site resident ranges from 1 to 9, due almost entirely to the concentration of arsenic in the groundwater. This HI value is above EPA's value of concern of 1.

2. Future Risk Characterization

The estimated excess cancer risk to a hypothetical future resident in both the West Pit area and the Northeast area of the site is $2x10^{-3}$ which is greater than EPA's risk range of concern of $1x10^{-4}$ to $1x10^{-6}$. Arsenic exposure through groundwater and total carcinogenic PAH exposure through the food chain are the main contributors to this risk. The estimated average risk of $1 \times 10^{+1}$ to $4 \times 10^{+1}$ from noncancer effects is well above EPA's value of concern of an HI of 1 for both children and adults. The noncancer risk is mainly driven by the presence of a number of inorganics in drinking water, some of which are probably naturally occurring in the ground water. Barium in excavated sludge could also contribute to a an HI above 1 through the soil ingestion pathway.

Hypothetical future residents would have very high risks in the scenario of the West Pit being sludge excavated and spread on the Pit Area soils. In this case, total cancer risk would be a total of 5E-01, due mostly to food-chain exposures, but with substantial risks also contributed from direct ingestion (3×10^{-2}) and dermal contact (2×10^{-4}) with the sludge.

3. Risk from Dioxins: The risk investigation shows the dioxin/furan analyses to be less than 1 ppm 2,3,7,8-tetachlorodibenzodioxin (TCDD) equivalents in sludges, surface soils and sediment. It has been determined by EPA and the Agency for Toxic Substances and Disease Registry (ATSDR) that levels between 1 and 10 ppb TCDD equivalents do not represent a significant residential risk provided they are covered with at least 12 inches of clean soil. At GCV, media containing the TCDD equivalents above 10 ppb will be excavated to clean-up standards and treated through incineration as part of the Final Source Action. Remedial Action Goals for the incinerator ash will assure that dioxins do not remain on site above remedial levels.

4. **Evaluation of Lead:** Since there are no EPA-approved RfD values for lead, it is not possible to evaluate the noncancer risks of lead by calculation of a Hazard Index. An alternative approach is to estimate the likely effect of lead exposure on the concentration of lead in the blood (PbB). Summaries of the results using the Uptake/Biokinetic (UBK) model are shown in Figure 13. All input parameters for the GCV site evaluation were taken to be the national average values suggested as defaults by EPA except the concentrations of lead in the soil and water which were site-specific values. Lead exposure for future residents exceeded the EPA-recommended blood lead level (no more than 5% of the population above 10 ug/dL) for the scenario of the site being regraded (sludge spread on-site.)

G. Uncertainties Associated with Human Health Risk Calculations

Within the Superfund process, baseline quantitative risk assessments are performed in order to provide risk managers with a numerical representation of the severity of contamination present at the site, as well as to provide an indication of the potential for adverse public health effects. There are many inherent and imposed uncertainties in the risk assessment methodologies.

The uncertainty and the potential bias in the risk estimates are summarized in Figure 14.

Note that the RMEs calculated are intended to represent the upper end of the distribution curve. Therefore, most people are likely to be exposed to lower doses than this calculated value.

H. Central Tendency Exposure

Based on a February 26, 1992, memorandum from Deputy Administrator F. Henry Habicht, EPA is required to evaluate both "reasonable maximum exposure" (RME) and "central tendency" in the risk assessment at Superfund sites. Exposure assumptions discussed to this point in the ROD have been associated with the RME which was used to estimate the baseline risks and ultimately the remedial action goals at sites. The "central tendency" scenario represents the risk from more of an "average" exposure, compared to a "reasonable maximum" exposure. See Figure 15 for the central

SUMMARY OF RISKS TO HYPOTHETICAL FUTURE RESIDENTS[a] FROM EXPOSURE TO LEAD

Exposure Point	Exposure Medium	Exposure Concentration	Mean PbB (μg/dL)	% Population Above 10 μg/dL
Pit Area (current condition)	Soil Groundwater	56 ppm 1.8 μg/L	1.9	0.0
Northeast Area	Soil Groundwater	174 ppm 8.6 μg/L	3.3	0.1
Pit Area (sludge spread on surface)	Sludge Groundwater	580 ppm 1.8 μg/L	6.3	9.0

FIGURE 13

(a) Evaluated for children age 0 to 6 years.

SUMMARY OF PRIMARY SOURCES OF UNCERTAINTY IN THIS RISK ASSESSMENT

Factors that Tend to Underestimate Exposure or Risk

- Lack of RfDs or SFs for all chemicals and all routes
- Nonquantification of some exposure pathways
- Exclusion from consideration of some chemicals possibly present but never detected
- Assumption that chemicals never detected in a medium are absent from that medium

Factors that Tend to Overestimate Exposure or Risk

- Use of conservative human exposure assumptions and values
- Use of conservative RfDs or SFs
- Use of simple rule to predict air exposures to VOCs from water
- Assumption that chemicals detected in a medium are present in all samples of that medium

Factors That Might Underestimate or Overestimate Exposure or Risk

- Use of concentration values that are constant over time
- Use of 1/2 the detection limit to evaluate nondetects
- Possible occurrence of "hot spots"
- Use of models to predict concentration of contaminants in vegetables, beef and milk

FIGURE 14

CENTRAL TENDENCY VS REASONABLE MAXIMUM EXPOSURE ASSUMPTIONS

	Average or Central Tendency	Reasonable Maximum Exposure
Contact Rates (CR)		
Water Ingestion Rates		
Children (1 - 6 yrs)	0.7 L/day	1 L/day
Adults	1.4 L/day	2 L/day
Workers	0.7	1 L/day
Soil Ingestion Rates		
Children (1 - 6 yrs)	200 mg/day	200 mg/day
Adults	100 mg/day	100 mg/day
Workers	50 mg/day	50 mg/day
Fish Ingestion Rates		
Adults	6.5 g/day	54 g/day
Air Inhalation Rates		
Children (1 - 6 yrs)	5 cu. m/day	5 cu.m/day (50%)
Adults	20 cu.m/day	20 cu.m/day (50%)
Dermal Exposure		
Adherence factor (AF)	0.2 mg/cm^2	1 mg/cm^2
Absorption factor (ABS)	Chemical-specific	Chemical-specific
Total Surface Area (SA)		
Children	7,200 cm^2/event	7,200 cm^2/event
Adults	20,000 cm^2/event	20,000 cm^2/event

Figure 15

Body Weights (BW)		
Children (1 - 6 yrs)	16 kg	16 kg (50%)
Adult	70 kg	70 kg (50%)
Workers	70 kg	70 kg (50%)

	Average or Central Tendency	Reasonable Maximum Exposure
Exposure Duration (ED)		
Residential	9 years	30 years
Industrial	9 years	25 years
Exposure Frequency (EF)		
Residential	350 days/year	350 days/year
Industrial	250 days/year	250 days/year
Averaging Time (AT)		
Carcinogenic effects	70 years	70 years
Noncarcinogenic effects	ED	ED

C. References For Central Tendency Exposure Parameters

	Central Tendency	Basis/Reference
Concentration Term (C)		
Site-specific value	95% UCL	US EPA, 1992a
Contact Rates (CR)		
Water Ingestion Rates		
Children (1 - 6 yrs)	0.7 L/day	US EPA, 1989a
Adults	1.4 L/day	US EPA, 1989b
Workers	0.7	50% Adults Ingestion Rate

Figure 15 (Cont.)

Soil Ingestion Rates		
Children (1 - 6 yrs)	200 mg/day	US EPA, 1989c
Adults	100 mg/day	US EPA, 1989c
Workers	50 mg/day	US EPA, 1991
Fish Ingestion Rates		
Adults	6.5 g/day	US EPA, 1989b
	Central Tendency	Basis/Reference
Air Inhalation Rates		
Children (1 - 6 yrs)	5 cu. m/day	US EPA, 1989a
Adults	20 cu.m/day	US EPA, 1989a; US EPA, 1989b
Dermal Exposure		
Adherence factor (AF)	0.2 mg/cm^2	US EPA, 1992b
Absorption factor (ABS)	Chemical-specific	
Total Surface Area (SA)		
Children (1 - 6 yrs)	7,200 cm^2/event	US EPA, 1989a; US EPA 1989b
Adults	20,000 cm^2/event	US EPA, 1992b
Body Weights (BW)		
Children (1 - 6 yrs)	16 kg	US EPA, 1989b
Adult	70 kg	US EPA, 1989b; US EPA, 1991
Workers	70 kg	US EPA, 1991

Figure 15 (Cont.)

Exposure Duration (ED)

Residential	9 years	US EPA, 1989b
Industrial	9 years	to residential

Exposure Frequency (EF)

Residential	350 days/year	US EPA, 1991
Industrial	250 days/year	US EPA, 1991

Averaging Time (AT)

Carcinogenic effects	70 years	US EPA, 1989b
Noncarcinogenic effects	ED	US EPA, 1989b

D. References For Reasonable Maximum Exposure Parameters

Reasonable Maximum
Basis/Reference

Concentration Term (C)

Site-specific value	95% UCL	US EPA, 1992a

Contact Rates (CR)

Water Ingestion Rates

Children (1 - 6 yrs)	1 L/day	US EPA, 1989a
Adults	2 L/day	US EPA, 1989b; US EPA, 1991
Workers	1 L/day	US EPA, 1991

Soil Ingestion Rates

Children (1 - 6 yrs)	200 mg/day	Average value, US EPA, 1989c

Figure 15 (Cont.)

Adults	100 mg/day	Average value, US EPA, 1989c
Workers	50 mg/day	Average value, US EPA, 1991
Fish Ingestion Rates		
Adults	54 g/day	US EPA, 1991
Air Inhalation Rates		
Children (1 - 6 yrs)	5 cu. m/day	US EPA, 1989a
Adults	20 cu.m/day	Average value, US EPA, 1989a; US EPA, 1989b
Adults	30 cu.m/day	Upper bound #, US EPA, 1989a; US EPA, 1989b

	Reasonable Maximum	Basis/Reference
Dermal Exposure		
Adherence factor (AF)	1 mg/cm^2	US EPA, 1992b
Absorption factor (ABS)	Chemical-specific	
Total Surface Area (SA)		
Children (1 - 6 yrs)	7,200 cm^2/event	Average value, US EPA, 1989a; US EPA, 1989b
Adults	20,000 cm^2/event	Average value, US EPA, 1992b

Figure 15 (Cont.)

Body Weights (BW)		
Children (1 - 6 yrs)	16 kg	Average value, US EPA, 1989b
Adult	70 kg	Average value, US EPA, 1989b; US EPA, 1991
Workers	70 kg	Average value, US EPA, 1991
Exposure Duration (ED)		
Residential	30 years	US EPA, 1989b; US EPA 1991
Industrial	25 years	US EPA 1991
Exposure Frequency (EF)		
Residential	350 days/year	Average value, US EPA, 1991
Industrial	250 days/year	Average value, US EPA, 1991
Averaging Time (AT)		
Carcinogenic effects	70 years	US EPA, 1989b
Noncarcinogenic effects	ED	US EPA, 1989b

Figure 15 (Cont.)

<u>Central Tendency References</u>

US EPA. 1989a. Exposure Factors Handbook. EPA/600/8-89/043.

US EPA. 1989b. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual (Part A). EPA/540/1-89/002.

US EPA. 1989c. Interim Final Guidance for Soil Ingestion Rates. OSWER Directive 9850.4.

US EPA. 1991. Risk Assessment Guidance for Superfund, Volume I, Human Health Evaluation Manual, Supplemental Guidance, Standard Default Exposure Factors. OSWER Directive 9285.6-03.

US EPA. 1992a. Supplemental Guidance to RAGS: Calculating the Concentration Term. Publication 9285.7-081.

US EPA. 1992b. Dermal Exposure Assessment: Principles and Applications. EPA/600/8-91/011B.

Figure 15 (Cont.)

tendency risk assumption comparison with the RME.

I. Ecological Risks

The baseline ecological risk assessment provides a qualitative evaluation of the environmental risks at the GCV site. The site ecology was evaluated to determine if contamination from the site was causing a significant adverse ecological impact. The ecological risk assessment is summarized in the following section.

The assessment of environmental risks was limited to consideration of ecological resources on-site and in the vicinity of the site where organisms may become exposed to contaminated surface soil, surface water and sediment. Potential exposures to contaminants in air were not evaluated since air monitoring data indicate that volatile releases are not presently occurring. In addition, the site's vegetation and wet climate tend to minimize dust emissions.

No rare, threatened or endangered populations are likely to be exposed to site contaminants. Rabbits, squirrels and deer are wildlife species that may be exposed at the site. Migratory waterfowl may be exposed to surface water and sediment on a transient basis. Aquatic invertebrates and fish in canals near the site may be exposed to site-related chemicals in water and sediment and serve as food sources to higher trophic levels.

The following are potentially complete exposure pathways at this site:

- Vegetation growing in contaminated soil, ditches or canals
- Aquatic organisms exposed to surface water and sediment

- Terrestrial wildlife coming in direct contact with contaminated media
- Animals that consume organisms that have accumulated site-related chemicals, i.e. a red-tailed hawk

Resident wildlife, which spend less than a lifetime on-site, are likely to receive low to moderate exposures to site contaminants. Small mammals whose home range is contained entirely on-site are likely to receive a proportionately greater exposure than larger mammals and birds that may spend a fraction of their time on-site throughout the year or on a seasonal basis. Migratory waterfowl are likely to receive the lowest exposure to contaminated media on-site. It is assumed that organisms occurring near sample locations are likely to be exposed to measured contaminant concentrations.

A rabbit was selected as an indicator organism from this group for the community of small mammals likely to inhabit the site. It is herbivorous, so it is exposed by the oral route through consumption of vegetation growing in contaminated soil. It may drink water from site and nearby surface waters, so exposure by the drinking water route was evaluated. A second indicator organism selected for quantitative estimation of dose on the predator trophic level was the red-tailed hawk.

Ten metals and 11 organic compounds with known toxic properties are present in soil, sediment and surface water associated with the site. Low levels of toxic metals are present in surface water and sediment that may cause adverse impacts to exposed aquatic life on-site in nearby surface water bodies (ditches and canals).

The toxic metals present in on-site and off-site soil and toxic organic compounds present in on-site soils are at levels that may pose a risk of adverse impacts to exposed organisms. Herbivorous mammals, e.g., rabbits, may be at risk from consumption of vegetation growing in soil contaminated with barium and cadmium at on-site locations and from consuming surface water on-site. Higher level predators, e.g., red-tailed hawks, are unlikely to be impacted by consuming herbivorous prey on-site.

A number of uncertainties are associated with the analysis of potential adverse ecological effects at this site. The detection limits achieved for numerous compounds was high enough to introduce significant uncertainty in the evaluation of the potential for adverse biological effects and selection of chemicals of potential concern for those chemicals with detection limits above effect levels.

Bioavailability is a major uncertainty in interpreting the potential for adverse biological effects from exposure estimates based on measurements of bulk chemical concentrations in environmental media. Chemical and physical changes in environmental media that increase or decrease the solubility of metals also increase or decrease their bioavailability. Synergisms among chemicals present at exposure points may increase the risk of adverse effects occurring in exposed organisms.

Significant uncertainty also exists for (1) literature-to-field extrapolations for toxicity criteria and exposure parameters for home range and dietary estimates, (2) calculation of vegetative and rabbit tissue concentration and assumptions regarding dietary habits of the receptors assessed and (3) representativeness of species selected.

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

VII. REMEDIAL ACTION GOALS

A Remedial Action Goal is a chemical-specific concentration for each chemical of concern that helps determine whether a contaminated media may be left in place or must be addressed by in-situ treatment or excavated. Media exhibiting contaminant concentrations below the remedial action goals may be left in-place without treatment. Those wastes that exceeded the remedial action goals at the site will be addressed to meet requirements set forth in the performance standards for each media. Remedial action goals were developed as part of the final source action for source material at the site including pit sludges and associated soils buried pits, tank contents, and site soils and sediments. Remedial action goals were also developed for the accumulated rainwater to address the following pathways of potential exposure 1) ingestion by humans; 2) dermal contact by humans; 3) ground water and soil contamination due to overflow.

A summary of remedial action goals for the accumulated rainwater on-site and for the excavated pits is shown in Figure 16 and in Figure 17. The goals are based on site-specific LDEQ standards for the accumulated rainwater and health-based risk values for the soil clean-up levels.

In addition to these objectives the following remedial action goals also apply:

> Excavated Pit Clean-up Levels: For other previously unidentified carcinogenic compounds, maximum concentrations left untreated must be those which produce a risk of 10^{-6} or less, with RMEs. For non-carcinogenic compounds maximum concentration left untreated will be those with an HI less than or equal to 1.
>
> Accumulated Rainwater: For other previously unidentified carcinogenic compounds, those which produce a risk of 10^{-6} or less assuming it is consistent with the RMEs. For non-carcinogenic compounds, the maximum concentration left untreated must have an HI less than or equal to 1.

VIII. DESCRIPTION OF ALTERNATIVES

A feasibility study was conducted to develop and evaluate remedial alternatives for the GCV site. Interim remedial alternatives were assembled to address the potential problem of the accumulated rainwater. Each of the five alternatives are developed independently, although it is recognized that some interaction does occur.

FIGURE 16

Louisiana Department of Environmental Quality
Effluent Pollutant Concentration Limits

A. CONVENTIONAL POLLUTANTS

Parameter (mg/l)	Daily Maximum	Sample Frequency	Sample Type
Flow (GPM)	Report	Daily	Estimate
COD	100	1/week	24-hr Composite
TOC	50	1/week	24-hr Composite
BOD_5	30	1/week	24-hr Composite
TSS	30	1/week	24-hr Composite
Oil & Grease	15	1/week	Grab
pH (S.U.)	Range of 6-9	1/week	Grab

B. METALS

Parameter	Daily Maximum (ug/l)	Sample Frequency	Sample Type
Total Silver	110	1/week	24-hr Composite
Total Arsenic	137	1/week	24-hr Composite
Total Beryllium	275	1/week	24-hr Composite
Total Cadmium	275	1/week	24-hr Composite
Total Chromium	343	1/week	24-hr Composite
Total Copper	824	1/week	24-hr Composite
Total Mercury	93	1/week	24-hr Composite
Total Nickel	549	1/week	24-hr Composite
Total Lead	275	1/week	24-hr Composite
Total Antimony	549	1/week	24-hr Composite
Total Selenium	110	1/week	24-hr Composite
Total Thallium	549	1/week	24-hr Composite
Total Zinc	686	1/week	24-hr Composite
Total Cyanide	1200	1/week	24-hr Composite
Total Barium	2 mg/l	1/week	24-hr Composite

C. VOLATILE ORGANICS

Parameter	Daily Maximum (ug/l)	Sample Frequency	Sample Type
Acrylonitrile	100	3/week	Grab
Benzene	100	3/week	Grab
Carbon tetrachloride	100	3/week	Grab
Chlorobenzene	100	3/week	Grab
1,2-Dichloroethane	100	3/week	Grab
1,1,1-Trichloroethane	59	3/week	Grab
1,1-Dichloroethane	59	3/week	Grab
1,1,2-Trichloroethane	100	3/week	Grab
Chloroethane	100	3/week	Grab
Chloroform	100	3/week	Grab
1,1-Dichloroethylene	60	3/week	Grab
1,2-trans-Dichloroethylene	66	3/week	Grab
1,2-Dichloropropane	100	3/week	Grab
Methylene Chloride	100	3/week	Grab
Methyl Chloride	100	3/week	Grab
Tetrachloroethylene	100	3/week	Grab
Toluene	74	3/week	Grab
Trichloroethylene	69	3/week	Grab
Vinyl Chloride	100	3/week	Grab

D. OTHER ORGANICS

Parameter	Daily Maximum (ug/l)	Sample Frequency	Sample Type
Acenaphthene	47	1/week	24-hr Composite
1,2,4-Trichlorobenzene	100	1/week	24-hr Composite
Hexachlorobenzene	100	1/week	24-hr Composite
Hexachloroethane	100	1/week	24-hr Composite
1,2-Dichlorobenzene	100	1/week	24-hr Composite
1,3-Dichlorobenzene	100	1/week	24-hr Composite
1,4-Dichlorobenzene	100	1/week	24-hr Composite
1,3-Dicholoropropylene	100	1/Week	24-hr Composite
2,4-Dimethylphenol	47	1/Week	24-hr Composite
Ethylbenzene	100	1/week	24-hr Composite
Flouranthene	54	1/week	24-hr Composite
Bis(2-chloroisopropyl) ether	100	1/week	24-hr Composite
Hexachlorobutadiene	100	1/week	24-hr Composite
Naphthalene	47	1/week	24-hr Composite
Nitrobenzene	100	1/week	24-hr Composite
2-Nitrophenol	100	1/week	24-hr Composite
4-Nitrophenol	100	1/week	24-hr Composite
2,4-Dinitrophenol	100	1/week	24-hr Composite
4,6-Dinitro-o-cresol	100	1/week	24-hr Composite

D. OTHER ORGANICS (continued)

Parameter	Daily Maximum (ug/l)	Sample Frequency	Sample Type
Phenol	47	1/week	24-hr Composite
Bis (2-ethyhexyl) phthalate	100	1/week	24-hr Composite
Di-n-butyl phthalate	43	1/week	24-hr Composite
Diethyl phthalate	100	1/week	24-hr Composite
Dimethyl phthalate	47	1/week	24-hr Composite
Benzo(a)anthracene	47	1/week	24-hr Composite
Benzo(a)pyrene	48	1/week	24-hr Composite
3,4-Benzofluoranthene	48	1/week	24-hr Composite
Benzo(k)flouranthene	47	1/week	24-hr Composite
Chrysene	47	1/week	24-hr Composite
Acenaphthylene	47	1/week	24-hr Composite
Anthracene	47	1/week	24-hr Composite
Fluorene	47	1/week	24-hr Composite
Phenanthrene	47	1/week	24-hr Composite
Pyrene	48	1/week	24-hr Composite
Polychlorinated biphenyls	10	1/week	24-hr Composite
Xylene	100	1/week	24-hr Composite

E. PESTICIDES

Parameter	Daily Maximum (ug/l)	Sample Frequency	Sample Type
Pentachlorophenol	250	1/week	24-hr Composite
a-BHC-Alpha	90	1/week	24-hr Composite
b-BHC-Beta	90	1/week	24-hr Composite
g-BHC-Gamma	90	1/week	24-hr Composite
a-ENDOSULFAN-Alpha	90	1/week	24-hr Composite
b-ENDOSULFAN-Beta	90	1/week	24-hr Composite
Endrin	180	1/week	24-hr Composite
Heptachlor	90	1/week	24-hr Composite
Toxaphene	5	1/week	24-hr Composite
2,4-Dichlorophenol	47	1/week	24-hr Composite

REMEDIAL GOALS
SLUDGE AND ASSOCIATED SOILS
Units: mg/kg

Contaminant of Concern	Maximum Onsite Value			Background Range	Exposure Limit - EL[1]		Remedial Goal	Basis
	West Pit	Washout Pit	Former West Pit		Non-C.	Carc.		
Arsenic[4]	26.5	73.7J	29.4	2.3-16	23	0.36	16	Upper Bkgd. Limit
Barium[4]	47,800	42,000	12,500 J	110-430	5,400	NA[2]	5,400	EL-Non-C
Benzene	99	529	1.4	NA	NA	0.66	0.66	EL-Carc.
Total Carcinogenic PAHs[3]	44 J	1.1 J	4.4 J	NA	NA	NA	3	Region VI[5]
Total Non-Carcinogenic PAHs[3]	247 J	729 J	255 J	NA	NA	NA	$HI^4 = 1$	Region VI[5]

[1]EL based on carcinogenic risk 1E-06 and Hazard Index = 1
[2]NA = Not Applicable
[3]Maximum values taken from composite samples analyzed by Cleanup (EPA) Methods 3611 and 3640 (See Table 14 in RI report, Sverdrup 1992a)
[4]HI = Hazard Index
[5]Determined by EPA Region VI, Dallas, TX

FIGURE 17

The remedial action alternatives for Operable Unit Number 2 are presented below with a description of the common elements contained in each alternative. The costs of several of the alternatives differ from those in the proposed plan because the estimates have been refined based on several factors including public comments and minor changes in the description of the alternatives. These include a recalculation of excavation and engineering costs and the elimination of the capping of any excavated pits under this action since the pits will be excavated to clean-up levels.

This section addresses the rainwater that has accumulated on the sludge in the Washout Pit and the West Pit. The primary contaminants of concern driving the risk from exposure to the pit sludges and the contaminated rainwater are PAHs along with several inorganic constituents, including barium and arsenic. (Figure 17). In addition to the health risks, the sludge is a probable source for the contamination of the underlying vadose zone soils and ground water. The sludge from the two open waste pits has also been shown to exceed the TCLP limit for benzene. The contaminants of concern, therefore include both organic and inorganic (metal) constituents.

Several of the alternatives for treating the accumulated rainwater additionally include the excavation of the Washout Pit or West Pit or both to further protect human health and the environment and to facilitate implementation of the both the interim and final remedy. The volumes of material to be addressed under these alternatives are listed below. These volumes assume excavation of the upper one foot of soil below the sludge. The actual volume of soils excavated could change during the construction phase of the remedy based on the depth of contamination above remediation levels.

- West Pit - Size - 28,000 square feet
  - Sludge Volume - 5,000 cubic yards
  - Accumulated Rainwater - 1,300,000 gallons

- Washout Pit - Size - 12,000 square feet
  - Sludge Volume - 2,700 cubic yards
  - Accumulated Rainwater - 400,000 gallons

A brief description of the five alternatives evaluated to address the accumulated rainwater follows:

- Alternative 1 Pump and Treat Accumulated Rainwater
- Alternative 2 Cover Washout Pit and West Pit with Impermeable Membranes

- o Alternative 3 Consolidate Washout Pit Into West Pit and Cover West Pit with an Impermeable Membrane
- o Alternative 4 Consolidate Washout Pit and West Pit into a Lined Holding Area
- o Alternative 5 Consolidate Washout Pit and West Pit into a Temporary Holding Tank

A. Common Elements

Each of the alternatives listed above to address the accumulated rainwater have the following common elements; site preparation, restoration of the site surface upon completion of the remedial action, issuance of deed notices, (although non-enforceable, to advise future owners about the risks of disturbing the cover and/or the underlying material), construction of additional fences if necessary, evaluation of alternate access routes, abandonment of the 3 on-site water supply wells and air monitoring during excavation. The monitoring will be on-site and at the site boundary during excavation in this interim action.

All of the alternatives would involve pumping and treating a total of about 1,700,000 gallons of accumulated rainwater. The volume of water treated, assuming that each pit is full, is 1,300,000 gallons from the West Pit and 400,000 gallons from the Washout Pit. The rainwater has been found in the past to be contaminated with organic and inorganic constituents such as zinc, aluminum, chromium, barium, pentachlorophenol, lead, copper, ethylbenzene, naphthalene, and phenanthrene. It is expected that this water could have elevated levels of any of the above chemicals or any other chemicals found in the pit sludges. Treatment of this rainwater in the past has been successful in reducing the contaminant concentration to below remedial action goals.

In each of the alternatives, the rainwater would be allowed to accumulate to a pre-determined level in the waste pits. The inorganic and organic-contaminated water would flow through a treatment unit. The effluent water would be monitored during the treatment process with a Chemical Oxygen Demand (COD) analyzer. Composite samples of the effluent would be collected and analyzed for volatile organic and semivolatile organic compounds, water quality parameters, and metals as established by the Louisiana Department of Environmental Quality (LDEQ). The water would be discharged in accordance with the limits established by LDEQ. (See Figure 16.) Treatment would be monitored to assure that remediation goals are achieved.

For all of the alternatives except Alternative 1, accumulated rainwater would no longer come into contact with contaminated pit sludges.

All of the alternatives that involve excavation involve consolidating sludges and soils that have contaminant concentrations that exceed remedial action goals. For the excavation alternatives, all excavated areas will be excavated to 2 feet below contaminants that exceed remedial action goals. The areas will be backfilled with clean soil. The emptied Washout Pit would be closed by backfilling with soil. A two foot compacted clay cap would be installed on the filled Washout Pit, covered with topsoil and seeded. In addition all of the alternatives that involve covering the sludge will use an impermeable synthetic membrane that will be at least 60 mil thick.

All costs and implementation times are estimates. The costs have a degree of accuracy of +50% to -30% pursuant to the "Guidance for Conducting Remedial Investigations and Feasibility Studies Under CERCLA - Interim Final" OSWER Directive 9355.301, October 1988. Note that costs for the three alternatives involving excavation have been revised since the proposed plan. The revised costs reflect the public comments and more precise estimates of excavation and engineering costs. (See Appendix II.)

Alternative 1 Pump and Treat Accumulated Rainwater

Capital Cost: $115,650
Operation and Maintenance (annual): $86,050
Total Cost (present worth): $566,850
Time of Implementation:
Set-up: 7 weeks each operation

The major feature of this alternative is pumping and treating 1,700,000 gallons of accumulated rainwater. The water, which may be contaminated with several organic and inorganic (metal) contaminants, would be treated to the applicable discharge limits before being released to the environment.

Treatment Components: The accumulated rainwater would flow through a treatment unit and be discharged. The water would be discharged in accordance with the limits established by LDEQ. Treatment will be monitored to assure that remediation goals are achieved.

Containment Components: The alternative does not have a true containment component. However, rainwater will be allowed to accumulate in the pits approximately 6 months, until the pits are full, before the remedy would be implemented.

General Components: The estimated time to implement this remedy and meet the cleanup levels is 7 weeks for each pump and treat operation. It is expected that this alternative would have to be implemented 6 times prior to the final remedy being implemented. This alternative allows the rainwater to accumulate for 6 months at a time and therefore, is not completely protective of human health and the environment. Because this alternative does not completely eliminate the risk of contact with the rainwater, it is not favored by EPA.

The estimated costs for the rainwater treatment part of the remedy are Capital costs: $115,650; O&M Costs: $86,050; Present worth: $566,850.

Alternative 2 Cover Washout Pit and West Pit with Synthetic Membranes

Alternative 2 is essentially the same as Alternative 1 except that an impermeable synthetic membrane would be installed over the West Pit and Washout Pit. The major feature of this alternative is pumping and treating the 1,700,000 gallons of accumulated rainwater. The water, which may be contaminated with the several organic and inorganic (metal) contaminants would be treated to the applicable discharge limits before being released to the environment.

Capital Cost: $382,800
Operation and Maintenance (annual): $5,000
Total Cost (present worth): $395,700
Time of Implementation:
Set-up: 14 weeks each operation

Treatment Components: The accumulated rainwater would flow through a treatment unit and be discharged. The water would be discharged in accordance with the limits established by LDEQ. Treatment will be monitored to assure that remediation goals are achieved.

Containment Components: The containment portion of this remedy would be the installation of a impermeable synthetic membrane over the sludge in the West Pit.

General Components: This alternative would allow ponding to occur on top of the two liners. Ponding is a attractive nuisance which means that it could attract trespassers, especially children. In addition, the ponded water would have to be addressed in some manner. The covering of two sludge pits also leaves the possibility of squeezing of the waste speeding up ground water contamination. Because it not fully protective of human health and the environment for the above reasons, this alternative is not favored by EPA.

The estimated time to implement this remedy and meet the cleanup levels 14 weeks. The estimated costs for the remedy are Capital costs: $382,800; O&M Costs: $5,000; Present worth: $395,700.

D. Alternative 3 Consolidate Washout Pit Into West Pit and Cover West Pit with an Synthetic Membrane

Capital Cost: $512,300
Operation and Maintenance (annual): $5,000
Total Cost (present worth): $525,200
Time of Implementation:
Set-up: 14 weeks

Alternative 3 contains the same treatment and containment components as Alternative 2 and an additional element of consolidation of the Washout Pit into the West Pit. In addition to the water treatment, about 2700 cubic yards of sludge and 550 cubic yards of contaminated soil (including a 40% bulking factor) will be moved from the Washout Pit to the West Pit.

Treatment Components: The accumulated rainwater would flow through a treatment unit and be discharged. The water would be discharged in accordance with the limits established by LDEQ. Treatment will be monitored to assure that remediation goals are achieved.

Containment Components: The containment portion of this remedy would be the consolidation of soils and sludges into the West Pit and the installation of impermeable synthetic membrane covers over the West Pit and the newly closed Washout Pit.

The following steps will be taken: The sludge and soil from the Washout Pit will be excavated and placed in the West Pit. Soils from the buried waste pits may also be excavated in order to achieve positive drainage and to give the sludge more structural stability. If this does not achieve positive drainage, the free board positions of the dike could also be used. An impermeable membrane cover (described under Common Elements) will be installed over the West Pit. The West Pit effluent will be analyzed initially, but continued monitoring of run-off is not anticipated since the rainwater will not come into contact with the waste material.

In the event that the material excavated from the Washout Pit exceeds the holding capacity of the West Pit, excess waste material will be mounded on and around the West Pit and covered.

General Components: Implementation of this alternate would eliminate the ponding that would be experienced if Alternative 2 were implemented because the volume of the soils and sludges would stabilize and fill in the West Pit. During excavation, exact volumes of contaminated material could be determined. This would aid in implementation of the final action. It would be further protective of human health and the environment because the Washout Pit and possibly the buried pits would be excavated eliminating their threat to the groundwater. Because this alternative would be fully protective in regard to the treatment of the rainwater and would be further protective due to the excavation of one pit and possibly the buried pits in a cost effective manner, this alternative is favored by EPA.

The estimated time to implement this remedy and meet the cleanup levels is 14 weeks. The estimated costs for the remedy are Capital costs: $512,300; O&M Costs: $5,000; Present worth: $525,200. Accumulated rainwater would no longer come into contact with contaminated pit sludges under this alternative and the Washout Pit will no longer be a possible source of groundwater contamination.

E. Alternative 4 Consolidate Washout Pit and West Pit into a Lined Holding Area

Capital Cost: $821,250
Operation and Maintenance (annual): $5,000
Total Cost (present worth): $834,150
Time of Implementation:
Set-up: 17 weeks

Alternative 4 contains the same treatment and containment components as Alternative 3 except that and instead of consolidating the Washout Pit into the West Pit, the waste from both pits would be placed in a lined holding area. In addition to the water treatment, about 7700 cubic yards of sludge and 1820 cubic yards of contaminated soil (including a 40% bulking factor) will be moved from the Washout Pit and the West Pit into a lined impoundment constructed in the northeast Area of the site.

Treatment Components: The accumulated rainwater would flow through a treatment unit and be discharged. The water would be discharged in accordance with the limits established by LDEQ. Treatment will be monitored to assure that remediation goals are achieved.

Containment Components: The containment portion of this remedy would be the consolidation of soils and sludges from the Washout Pit and the West Pit into a holding area and the installation of an impermeable synthetic membrane cover over the holding area.

The following steps would be taken: The sludge and soil from the Washout Pit and the West Pit would be excavated and placed in a lined pit. An impermeable membrane cover (described under Common Elements) would be installed over this new pit.

General Components: Implementation of this alternate would eliminate the ponding that would be experienced if Alternative 2 were implemented because the volume of the soils and sludges placed in a new lined pit would create a mound that would allow positive drainage. This alternative would be further protective of human health and the environment because the West Pit and Washout Pit would be excavated to clean-up levels, eliminating their threat to the groundwater. Alternative 4 would be fully protective in regard to the treatment of the rainwater and would also be fully protective of the groundwater, providing that liner integrity was maintained. The costs involved with this interim alternative, however, are not proportional to the amount of risk that they will reduce, since the cost of this alternative is 1.6 times more than the cost of Alternative 3.

The estimated time to implement this remedy and meet the cleanup levels is 17 weeks. The estimated costs for the remedy are Capital costs: $821,250; O&M Costs: $5,000; Present worth: $834,150.

F. Alternative 5 Consolidate Washout Pit and West Pit into a Temporary Holding Tank

Capital Cost: $845,800
Operation and Maintenance (annual): $5,000
Total Cost (present worth): $858,700
Time of Implementation:
Set-up: 19 weeks

Alternative 5 contains the same treatment and containment components as Alternative 4 except that excavated materials from the West Pit and the Washout Pit would be placed into a temporary holding tank instead of into another pit. In addition to the water treatment, about 7700 cubic yards of sludge and 1820 cubic yards of contaminated soil (including a 40% bulking factor) will be moved from the Washout Pit and the West Pit into a temporary holding tank will be constructed on the Northeast Area of the site.

Treatment Components: The accumulated rainwater would flow through a treatment unit and be discharged. The water would be discharged in accordance with the limits established by LDEQ. Treatment will be monitored to assure that remediation goals are achieved.

Containment Components: The containment portion of this remedy would be the consolidation of soils and sludges from the Washout Pit and the West Pit into a temporary holding tank. The tank would be constructed to be compatible with the contaminated materials being stored in it and would have a projected life of the project of three (3) years. The dimensions of the tank would be approximately 260 feet on a side with a holding capacity of 2 million gallons. The tank would be covered with an impermeable synthetic membrane.

General Components: Implementation of this alternative would eliminate the ponding that would be experienced if Alternative 2 were implemented because the volume of the soils and sludges would be placed in a tank. This alternative would be further protective of human health and the environment because the West Pit and Washout Pit would be excavated to clean-up levels eliminating their threat to the groundwater. Alternative 5 would be fully protective in regard to the treatment of the rainwater and would also be the most protective of the groundwater, providing that the tank integrity were maintained. The costs involved with this interim alternative, however, are not proportional to the amount of risk that they will reduce, since the cost of this alternative is 1.6 times the cost of Alternative 3.

The estimated time to implement this remedy and meet the cleanup levels is 19 weeks. The estimated costs for the remedy are Capital costs: $845,800; O&M Costs: $5,000; Present worth: $858,700. Accumulated rainwater would no longer come into contact with contaminated pit sludges under this alternative and the Washout and West Pits would no longer be a possible source of groundwater contamination.

IX. SUMMARY OF COMPARATIVE ANALYSIS OF ALTERNATIVES

The EPA uses nine criteria to evaluate alternatives for addressing a Superfund site. These nine criteria are categorized into three groups: threshold, balancing, and modifying. The threshold criteria must be met in order for an alternative to be eligible for selection. The balancing criteria are used to weigh major tradeoffs among alternatives. The modifying criteria are taken into account after state and public comment is received on the Proposed Plan of Action.

Nine Criteria

The nine criteria used in evaluating all of the alternatives are as follows:

A. Threshold Criteria

Overall Protection of Human Health and the Environment addresses the way in which an alternative would reduce, eliminate, or control the risks posed by the site to human health and the environment. The methods used to achieve an adequate level of protection vary but may include treatment and engineering controls. Total elimination of risk is often impossible to achieve. However, a remedy must minimize risks to assure that human health and the environment are protected.

Compliance with ARARs, or "applicable or relevant and appropriate requirements," assures that an alternative will meet all related federal, state, and local requirements.

B. Balancing Criteria

Long-term Effectiveness and Permanence addresses the ability of an alternative to reliably provide long-term protection for human health and the environment after the remediation goals have been accomplished.

Reduction of Toxicity, Mobility, or Volume of Contaminants through Treatment assesses how effectively an alternative will address the contamination on a site. Factors considered include the nature of the treatment process; the amount of hazardous materials that will be destroyed by the treatment process; how effectively the process reduces the toxicity, mobility, or volume of waste; and the type and quantity of contamination that will remain after treatment.

Short-term Effectiveness addresses the time it takes for remedy implementation. Remedies often require several years for implementation. A potential remedy is evaluated for the length of time required for implementation and the potential impact on human health and the environment during implementation.

Implementability addresses the ease with which an alternative can be accomplished. Factors such as availability or materials and services are considered.

Cost (including capital costs and projected long-term operation and maintenance costs) is considered and compared to the benefit that will result from implementing the alternative.

C. Modifying Criteria

State Acceptance allows the state to review the proposed plan and offer comments to the EPA. A state may agree with, oppose, or have no comment on the proposed remedy.

Community Acceptance allows for a public comment period for interested persons or organizations to comment on the proposed remedy. EPA considers these comments in making its final remedy selection. The comments are addressed in the responsiveness summary which is a part of this ROD.

D. Comparative Analysis of Alternatives

1. Overall Protection of Human Health and the Environment

All of the alternatives will provide some degree of overall protection of human health and the environment. The degree to which each alternative provides this protection is discussed below.

All of the alternatives are protective of human health and the environment by eliminating, reducing, or controlling risk through treatment of accumulated rainwater contamination, engineering controls and/or institutional controls.

Alternatives 3 is more protective of human health and the environment than Alternatives 1 and 2 because the risk of the Washout Pit leaching contaminants that can infiltrate through the underlying soils into the ground water will be eliminated. By the Washout Pit soils and sludges being consolidated into the West Pit, the West Pit Sludge will be more stable. Positive drainage will also be achieved either through consolidation or by lowering the dikes so that a mound is formed.

Alternative 4 is slightly more protective of human health and the environment than Alternative 3 because both pits will be excavated and placed in a lined pit and covered, eliminating risks from the sludges, providing that the integrity of the liner is maintained.

Alternative 5 is the most protective alternative because tank integrity is more easily maintained than liner integrity so the risk from the pit sludges and buried pits to the environment will be eliminated and the risks to human health will also be entirely eliminated.

Compliance with ARARs

ARARs are federal and state requirements that the selected final remedy must meet. All the interim action alternatives at the GCV site will meet the standards set by LDEQ for the treatment and discharge of the accumulated rainwater. In addition, those involving excavation will meet the appropriate National Emission Standards for Hazardous Air Pollutants, relevant and appropriate portions of the Standards for Owners and Operators of Hazardous Waste Management, Storage and Disposal Facilities and the applicable Occupational Safety and Health Administration regulations.

3. Long Term Effectiveness and Permanence

This criterion is not applicable to interim actions.

4. Reduction of Toxicity, Mobility or Volume Through Treatment

The treatment of the contaminated rainwater in Alternatives 2-5 has been implemented in the past and has been effective in bringing the contaminant concentrations of the rainwater to below the water quality limits set by LDEQ. For Alternative 1, the toxicity of collected rainwater are periodically reduced through the pump and treat procedures. The mobility of the contaminated rainwater is also reduced by the pump and treat procedure. However, in the event of a heavy rainfall, there exists a potential for the pits to overflow without treatment which would not be monitored. Therefore, the effective reduction in mobility for this alternative is not as great as in Alternatives 2-5.

Like Alternative 1, Alternatives 2-5 will reduce the toxicity of collected rainwater through treatment. Alternatives 2-5 will equally eliminate the mobility of the contaminated rainwater by preventing contact of the rainwater with the contaminated sludge. Alternatives 4 and 5 further reduce the pit sludge mobility by containing them in a lined excavation and in a tank respectively.

5. Short-Term Effectiveness

Alternative 1 will be effective in the short-term by pumping and treating the contaminated rainwater thereby minimizing contaminated overflow, however, even with strict monitoring of the level in the pits, the possibility of contaminated rainwater overflowing still exists. Since this alternative allows rainfall to accumulate in between pump and treat episodes, its effectiveness is lessened because people are exposed for approximately 6 month periods at a time.

Alternatives 2-5 would also be effective in the short term because the rainwater would be treated and discharged, but these alternatives would involve some site worker risk. Alternative 2 would expose site workers to minimal physical and chemical hazards during installation of the pit covers. Alternative 3-5 would involve the same hazards as Alternative 2, and would further involve evacuation of sludge and soil from the pits, which would pose a more direct risk to the workers, both physical in using earthmoving equipment, and chemical in moving the sludges and soil.

Alternative 3 involves the evacuation of only one pit, so it involves less risk to workers than Alternatives 4 and 5 where two pits are excavated. Risks to the community would be controlled by air monitoring during excavation.

Alternative 1 would take the least time of all the alternative at 7 weeks, however it would periodically need to be re-implemented.

The other alternatives would all take between 14 and 19 weeks to implement which gives no alternative a clear benefit over the other.

Of the three alternatives most protective of human health and the environment and most capable of reducing toxicity mobility and volume, Alternative 3, the preferred alternative, is the shortest to implement at 14 weeks and would pose the least direct threat to workers since only one pit would be excavated.

6. Implementability

All of the alternatives evaluated present no technical or administrative difficulties in implementation. Implementability of an alternative refers to the ease with which an alternative can be accomplished, including such factors as availability of materials and service. All of the alternatives evaluated present no technical or administrative difficulties.

Alternative 1 is the most easily implemented because it is an activity that has been conducted at the site, so labor and equipment requirements are known and readily available. Likewise, Alternative 2 can be quickly and easily implemented with labor and materials available within the region surrounding the site. Alternatives 3 through 5 require a significant amount of waste handling however, the resources are readily available in the area to effectively implement them. Alternative 3 involves the evacuation of only one pit, so it involves less risk to workers than Alternatives 4 and 5 where two pits are excavated.

7. Cost

The most expensive alternative to implement would be Alternative 5, which has a present worth of $858,700. The least expensive alternative is Alternative 2, with a present worth of $395,700. The alternatives range in cost from $525,200 to $858,700. Alternative 3, the selected remedy costs $525,200 which is the middle of the price range of alternatives.

8. State Acceptance

Under the Superfund law, EPA is required to ensure that States have a meaningful and continuing role in remedy selection and execution. While States are not required to formally concur with EPA-selected remedies, they must contribute 10 percent of the remedy's construction costs and formally concur with the deletion of sites from the National Priorities List upon completion of the remediation process. For these reasons, EPA has attempted to keep State staff informed regarding the progress of studies and is requesting the views of the State of Louisiana regarding cleanup options before selection of a remedy in the ROD. The commitment of matching State funds is not required before actual on-site construction activities begin. The expenditure of Superfund monies for actual remedy construction cannot occur prior to such commitment of matching State funds.

The Louisiana Department of Environmental Quality has reviewed the Remedial Investigation/Feasibility Study and the Proposed Plan for this Interim Action. The State of Louisiana is in agreement with the selection of Alternative 3 to address the accumulated rainwater and to begin the consolidation of the waste pits.

9. Community Acceptance

EPA recognizes that the community in which a Superfund site is located is the principal beneficiary of all remedial actions undertaken. EPA also recognizes that it is its responsibility to inform interested citizens of the nature of Superfund environmental problems and solutions, and to learn from the community what its desires are regarding these sites.

EPA solicited input from the public on the remedial alternatives proposed to accumulated rainwater. The comments from the residential community indicated that the community is in support of the pumping and treating of this rainwater, but would like both the West Pit and the Washout Pit to be excavated in this interim action.

The Selected Remedy

Based on considerations of the requirements of CERCLA, the detailed analysis of the alternatives using the nine criteria, public comments, EPA has determined that **Alternative 3, Consolidate Washout Pit into West Pit and Cover West Pit with an Synthetic Membrane** is the most appropriate interim action for the Gulf Coast Vacuum Site in Vermilion Parish, Louisiana.

The major components of this alternative include:

- Pumping and treating of approximately 1,700,000 gallons of inorganic (metals) and organic-contaminated accumulated rainwater

- Discharge of the treated rainwater on-site

- Excavation of approximately 2,700 cubic yards of the contaminated sludge and 550 cubic yards of associated soils from the Washout pit (excavated to clean-up levels)

- Consolidation of the excavated material into the West Pit to achieve positive drainage in the West Pit

- Covering West Pit with an impermeable synthetic membrane

The principal threat associated with the accumulated rainwater at the GCV site is the potential for overflow of the rainwater The purpose of this response action is to control risks posed by direct contact with accumulated rainwater and to minimize migration of the contaminated rainwater to adjacent soils and into the groundwater. The goal of the remedial action is to treat the accumulated rainwater to the standards established by the Louisiana Department of Environmental Quality. Treatment will be monitored to ensure that these clean-up levels are achieved. An additional goal of the response action is to excavate the Washout Pit to clean-up levels which are 16 ppm for arsenic, 5400 ppm for barium, .66 ppm for benzene, 3 ppm as benzo(A)pyrene equivalents for the carcinogenic PAHs and an HI less than or equal to 1 for non-carcinogenic PAHs. Clean-up levels for contaminants discovered during remedy implementation and those contaminants above clean-up levels are detailed in the Remedial Actions Goals Section.

XI. THE STATUTORY DETERMINATIONS

EPA's primary responsibility at Superfund sites is to select remedial actions that are protective of human health and the environment. Section 121 of CERCLA also requires that the selected remedial action for the site comply with applicable or relevant and appropriate environmental standards established under Federal and State environmental laws, unless a waiver is granted. The selected remedy must also be cost-effective and for final source actions, utilize treatment or resource recovery technologies to the maximum extent practicable. The statute also contains a preference for remedies that include treatment as a principal element. The following sections discuss how the selected remedy for accumulated rainwater at the Gulf Coast sites meet the statutory requirements.

A. Protection of Human Health and the Environment

In order to protect human health and the environment, the accumulated rainwater that exceeds remedial action objectives will be pumped and treated to the site-specific standards determined by LDEQ. Material in the Washout Pit will be excavated to clean-up standards and consolidated into the West Pit. These performance standards will also assure that direct contact risks associated with the accumulated rainwater will be eliminated and that this material cease to act as an overflow threat.

The selected remedy protects human health and the environment by reducing the concentration of contaminants through treatment. Of all the alternatives evaluated for the accumulated rainwater that included a component of excavation of pits, the selected alternative provides the best overall protection to human health and the environment. No unacceptable short-term risks will be caused by implementing this remedy.

B. Compliance With ARARs

Although it is not necessary that an interim action comply with ARARs the selected remedy will meet the applicable LDEQ site-specific discharge standards. These are applicable during rainwater treatment and discharge. In addition, the excavation of the Washout Pit will meet the following ARARs:

<u>Chemical-Specific ARARs for Sludges, Tank Contents, Soils and Sediments</u>

1. National Emission Standards for Hazardous Air Pollutants (40 CFR Part 61) (NESHAPS). Relevant and appropriate during excavation and consolidation processes.

2. Louisiana Department of Environmental Quality Discharge Requirements. Site-specific discharge requirements.

<u>Action-Specific ARARs for Sludges and Associated Soils</u>

1. **Standards for Owners and Operators of Hazardous Waste Treatment, Storage, and Disposal Facilities (40 CFR Part 264).** May be relevant and appropriate during excavation consolidation.

2. **OSHA 1910.120 Occupational Safety and Health Regulations**

   Applicable because site workers may be exposed to hazardous waste.

C. Cost-Effectiveness

EPA believes that the selected remedies are cost-effective in mitigating the threat of direct contact and for reducing the potential for groundwater contamination from the site wastes and for controlling the threat from the contaminated ground water. Section 300.430 (f) (ii) (D) of the NCP requires EPA to determine cost-effectiveness by evaluating the following three of the five balancing criteria to determine overall effectiveness: long-term effectiveness and permanence, reduction of toxicity, mobility or volume through treatment, and short-term effectiveness. Overall effectiveness is then compared to cost to ensure that the remedy is cost effective. EPA believes the selected remedies meet these criteria.

The estimated present worth cost for the selected remedy for the sludge, associated soil and tank contents is $10,015,000. This alternative costs 5 times more than the stabilization alternative, yet the selected alternative is significantly more effective and protective of human health and the environment due to the significant reduction in volume, toxicity and mobility of the organics achieved through incineration and mobility for inorganics. The selected alternative eliminates the hazards posed by the organic constituents and greatly reduces those posed by the inorganic contaminants at 37% of the cost of the alternative involving off-site incineration.

D. Utilization of Permanent Solutions and Treatment or Resource Recovery Technologies to the Maximum Extent Practicable

Although it is not required by statue for an interim remedy, EPA believes the selected remedy represents the maximum extent to which permanent solutions and treatment/resource recovery technologies can be utilized in a cost-effective manner for the interim measures at the GCV site.

E. Preference for Treatment as a Principal Element:

The statutory preference for remedies that employ treatment as a principal element need not be met for an interim action, however, the preference will be satisfied through implementation of Alternative 3 for the treatment of the accumulated rainwater. Though not required by statute, the selected interim remedy utilizes permanent solutions and treatment technologies to the maximum extent practicable.

F. Compliance with Long-Term Remedial Actions

Alternative 3 would be consistent with the final source action proposed for the site. It treats the inorganic and organic-contaminated rainwater and additionally implements part of the final action by excavating the Washout Pit to clean-up levels consistent with the final action. This will eliminate the need to close the Washout Pit during the final action. In addition, an accurate determination of the volume of sludge and associated soil in the Washout Pit will be made which will assist in implementing the final remedy.

XI. DOCUMENTATION OF SIGNIFICANT CHANGES:

The proposed plan for the interim action at the GCV site was released for public comment in July 1992. The proposed plan identified Alternative 3, Consolidate Washout Pit into West Pit and Cover Wets Pit with a Synthetic Impermeable Membrane as the preferred alternative to address the accumulated rainwater. EPA reviewed all written and verbal comments submitted during the public comment period. Upon review of these comments, it was determined that no significant changes to the remedy, as originally identified in the Proposed Plan, were necessary.

Two minor differences between the ROD and the proposed plan are the revision of costs (detailed in the Description of Alternatives Section) and the deletion of the clay cover from the alternatives involving pit excavation. The ROD costs are within +50% to -30% of the costs in the proposed plan. A clay cover will not be placed on the excavated Washout Pit since this area will be cleaned up to clean-up levels. These differences did not affect selection of the interim action alternative.

State of Louisiana

Department of Environmental Quality

Edwin W. Edwards
Governor

Kai David Midboe
Secretary

September 30, 1992

92 OCT -5

Steve Gilrein (6H-SA)
US EPA Region VI
1445 Ross Avenue
Dallas, Texas 75202-2733

RE: **GULF COAST VACUUM SITE**

Dear Mr. ~~Gilrein~~: Steve

The Inactive & Abandoned Sites Division concurs with you on your conceptual remedy of on-site incineration and stabilization of incinerator ash as well as contaminated site soils.

We also concur with your proposed plan for your interim source action of operable unit #2, for controlling rain fall accumulation and contaminated overflow from the pits on site.

If you need more information concerning this, please call me at (504) 765-0487.

Sincerely,

Harold F. Ethridge, Jr.
Administrator

HFEJr/de

OFFICE OF LEGAL AFFAIRS AND ENFORCEMENT   INACTIVE AND ABANDONED SITES DIVISION   P O BOX 82282   BATON ROUGE, LOUISIANA 70884-2282

TELEPHONE (504) 765-0487   FAX (504) 765-0484